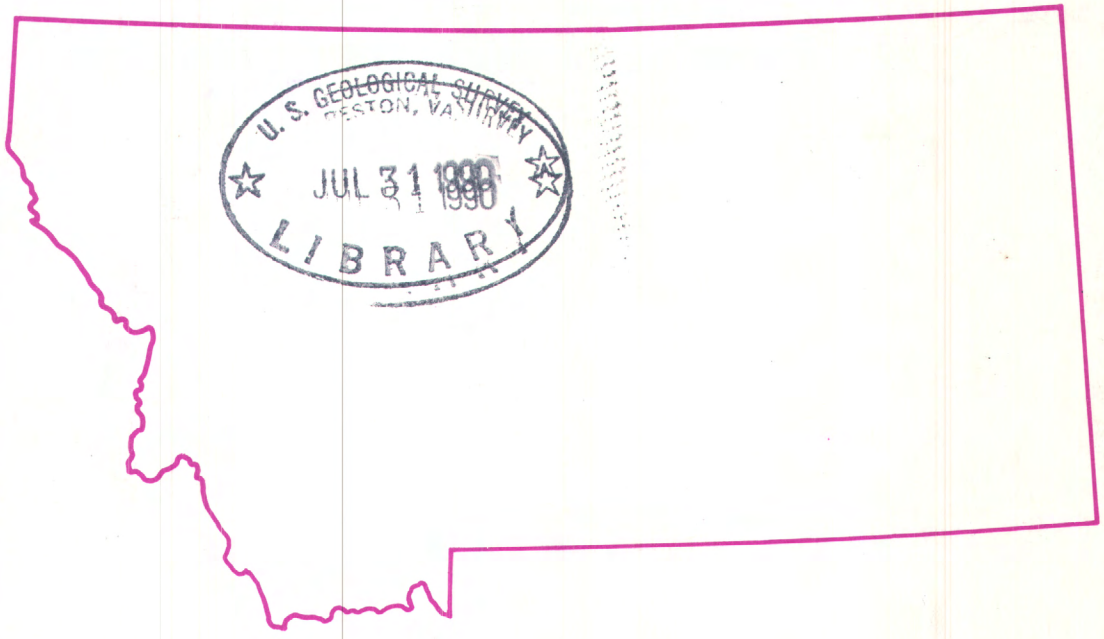
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Montana
Water Year 1989



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Prepared in cooperation with the State of Montana
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CALENDAR FOR WATER YEAR 1989

1988

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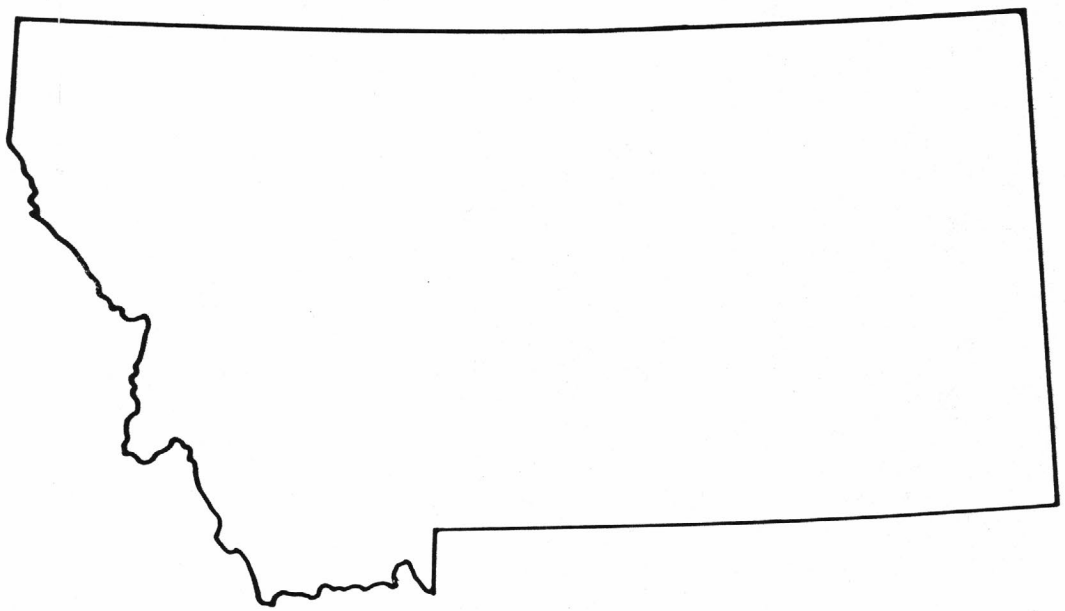
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Water Resources Data
Montana
Water Year 1989

by R.R. Shields, J.R. Knapton, M.K. White, T.M. Brosten, and J.H. Lambing



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MT-89-1
Prepared in cooperation with the State of Montana
and with other agencies

DEPARTMENT OF THE INTERIOR

MANUEL LUJAN, JR., Secretary

U.S. GEOLOGICAL SURVEY

Dallas L. Peck, Director

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1990

PREFACE

In the act that established the U.S. Geological Survey more than a century ago, the agency was charged by Congress with the responsibility for "...classification of the public lands, and examination of the geologic structure, mineral resources, and products of the national domain." This charge was simple recognition of the principle that factual information is essential to sound development and management decisions involving natural resources. In keeping with this principle, the Water Resources Division of the Survey publishes annually, by district, hydrologic records for water resources thought to be of particular usefulness to the public and to the scientific community.

This report is the culmination of a concerted effort by dedicated personnel of the Montana district, 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 Geological Survey policy and established guidelines, the following individuals contributed significantly to the collection, processing, and tabulation of the data:

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This report is one of a series issued State by State under the general direction of Philip Cohen, Chief Hydrologist, and J.F. Daniel, Assistant Chief Hydrologist for Scientific Publications and Data Management. This report was prepared by the U.S. Geological Survey in cooperation with the State of Montana and with other agencies, under the supervision of J.A. Moreland, District Chief, and J.F. Blakey, Jr., Regional Hydrologist, Central Region.

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16. Abstract (Limit: 200 words)

Water resources data for water year 1989 for Montana consist of records of stage, discharge, and water quality of streams; stage, contents and water quality of lakes and reservoirs; and water levels in wells. This report contains discharge records for 246 gaging stations; stage/contents for 9 lakes and reservoirs; water quality for 109 stations, 3 lakes; water levels for 276 observation wells and 8 long-term observation wells equipped with continous recorders. Also included are 53 smaller reservoirs. Additional water year 1989 data collected at crest-stage gage and miscellaneous measurement sites were collected but are not published in this report. These data are stored within the district office files in Helena and are available on request. These data represent part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Montana.

17. Document Analysis a. Descriptors
*Montana, *Hydrologic data, *Surface water, *Ground water, *Water quality, Flow rate, Gaging stations, Lakes, Reservoirs, Chemical analyses, Sediments, Water temperatures, Sampling sites, Water levels, Water analyses.

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(Letter after station name designates types of data: (d) discharge, (c) chemical, (b) biological, (m) microbiological, (t) water temperature, (s) sediment, (e) elevations or contents)

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WATER RESOURCES DATA FOR MONTANA, 1989

INTRODUCTION

The Water Resources Division of the U.S. Geological Survey, in cooperation with State and other Federal agencies, obtains a large amount of data pertaining to the water resources of Montana 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 Geological Survey, the data are published annually in this report series entitled, "Water Resources Data, Montana."

Water resources data for water year 1989 for Montana consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; amounts and water quality of atmospheric deposition; and water levels of wells. This volume contains records for water discharge at 246 streamflow-gaging stations; stage and contents at 9 lakes and reservoirs; water quality at 79 gaging stations, 30 water-quality stations; 3 lake stations; and 2 atmospheric deposition stations; and water levels at 276 observation wells and 8 long-term observation wells equipped with continuous recorders. Also included are data for 53 smaller reservoirs. Additional water year 1989 data collected at crest-stage gage and miscellaneous measurement sites were collected but are not published in this report. These data are stored within the district office files in Helena and are available on request. A few pertinent stations in bordering States are also included in this report. In this volume the locations of gaging stations are shown in figure 7, water-quality stations are shown in figure 8, and ground-water observation wells are shown in figure 9. 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 Montana.

Records of discharge or stage of streams, and contents or stage of lakes and reservoirs were first published in a series of U.S. Geological Survey water-supply papers entitled "Surface Water Supply of the United States." Through September 30, 1960, these water-supply papers were in an annual series and then in a 5-year series for 1961-65 and 1966-70. Records of chemical quality, water temperatures, and suspended sediment were published from 1941 to 1970 in an annual series of water-supply papers entitled "Quality of Surface Waters of the United States." Records of ground-water levels were published from 1935 to 1974 in a series of water-supply papers entitled "Ground-Water Levels in the United States." Water-supply papers may be consulted in the libraries of the principal cities of the United States or may be purchased from U.S. Geological Survey, Books and Open-File Reports Section, Federal Center, Building 810, Box 25425, Denver, Colorado 80225.

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

Beginning with the 1971 water year, water data for streamflow, water quality, and ground water are published in official Survey reports on a State-boundary basis. These official Survey reports carry 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 MT-89-1." These water-data reports are for sale, in paper copy or on 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 telephone (406) 449-5263.

COOPERATION

The U.S. Geological Survey and organizations of the State of Montana have had cooperative agreements for the systematic collection of streamflow records since 1906, for water-quality records since 1946, and for ground-water levels since 1964. Organizations that assisted in collecting data through cooperative agreement with the Survey are:

Montana Department of Natural Resources and Conservation
K. Barclay, director

Montana State Highway Commission
L. Larson, director of highways

Montana Department of Fish, Wildlife and Parks
K.L. Cool, director

Montana Department of Health and Environmental Sciences
D. Piccini, director

Montana Department of State Lands
D. Casey, commissioner of state lands

Montana Bureau of Mines and Geology
E.T. Ruppel, director

Assistance in the form of funds or services was given by the U.S. Department of State-International Joint Commission, Waterways Treaty Program, in collecting records for 39 gaging stations and 4 water-quality stations; by the Corps of Engineers, U.S. Army, for 33 gaging stations and 7 water-quality stations; by the Bureau of Land Management, U.S Department of the Interior, for 4 gaging stations and 5 water-quality stations; by the U.S. Bureau of Reclamation, U.S. Department of the Interior, for 8 gaging stations; the U.S. Bureau of Indian Affairs, U.S. Department of the Interior, for 21 gaging stations and 12 water-quality stations; and the Environmental Protection Agency, U.S. Department of the Interior, for 3 gaging stations and 7 water-quality stations.

The following organizations aided in collecting records:

The Montana Power Company and the Washington Power Company.

Organizations that supplied data are acknowledged in station descriptions.

GENERAL HYDROLOGIC SETTING

Montana, with an area of about 147,200 mi^2 (square miles) (fig. 1), is the fourth largest State in the Union. The major river basins in the State are the Hudson Bay basin (465 mi^2) and upper Missouri River basin (120,700 mi^2) east of the Continental Divide and the upper Columbia River basin (26,000 mi^2) west of the divide. The Hudson Bay and upper Missouri River basins drain about 82 percent of the State and provide slightly less than 50 percent of the total streamflow. The upper Columbia River basin drains 18 percent of the State and provides slightly more than 50 percent of the total streamflow.

The major river in the Hudson Bay basin is the St. Mary River. This river flows north from Montana's Glacier National Park to the Saskatchewan River in Canada and then into Hudson Bay.

The Missouri River basin in Montana includes drainage of the Missouri River and the Yellowstone River. The Missouri River, which is formed by the confluence of the Jefferson, Madison, and Gallatin Rivers in southwestern Montana, flows north through the central part of the State and then east across northern Montana into North Dakota. Major tributaries of the Missouri River are the Dearborn, Smith, Sun, Teton, Marias, Judith, Musselshell, Milk, Redwater, and Poplar Rivers. The Milk River originates in Glacier National Park in Montana, flows northeastward into Canada, and then flows southeastward back into Montana. The Poplar River flows southward from its source in Canada into Montana. The Yellowstone River, which originates in Wyoming, drains the south-central and southeastern parts of Montana. The Yellowstone River joins the Missouri River just east of the Montana-North Dakota border. The major tributaries to the Yellowstone are the Shields, Boulder, and Stillwater Rivers that originate in Montana and the Clarks Fork Yellowstone, Bighorn, Tongue, and Powder Rivers that originate in Wyoming and flow northward into Montana.

The upper Columbia River basin in western Montana is composed of two major river systems: the Kootenai and the Pend Oreille. The Kootenai River system originates in British Columbia, Canada. The Pend Oreille River system originates in Montana and British Columbia, Canada. The principal drainages in the Pend Oreille system are the Clark Fork (River), which originates in Montana, and the Flathead River, the North Fork of which originates in British Columbia. The Flathead River joins the Clark Fork near Paradise, Mont.

Two major multipurpose reservoirs have been constructed on the Missouri River. Canyon Ferry Lake, which was formed in 1953 by the U.S. Bureau of Reclamation's Canyon Ferry Dam, is 25 miles long and has a usable capacity of about 2.04 million acre-feet. Fort Peck Lake was formed in 1939 by the U.S. Army Corps of Engineers' Fort Peck Dam. It is more than 100 miles long and has a storage capacity of 18.9 million acre-feet. The Yellowstone River has no dams or storage reservoirs on its mainstem and is the longest free-flowing river in the conterminous United States.

Major multipurpose reservoirs in the upper Columbia River basin have been constructed on the Kootenai and Flathead Rivers. Lake Koocanusa, which was formed on the Kootenai River by Libby Dam in 1972, has a usable capacity of 5.7 million acre-feet. In the Flathead River basin, the largest storage projects are Hungry Horse Reservoir (completed in 1952)--a multipurpose project on the South Fork Flathead River with a usable capacity of about 3.5 million acre-feet and Flathead Lake--a natural lake (surface area 195 mi^2) with a usable capacity that was increased to about 1.8 million acre-feet with the construction of Kerr Dam in 1937.

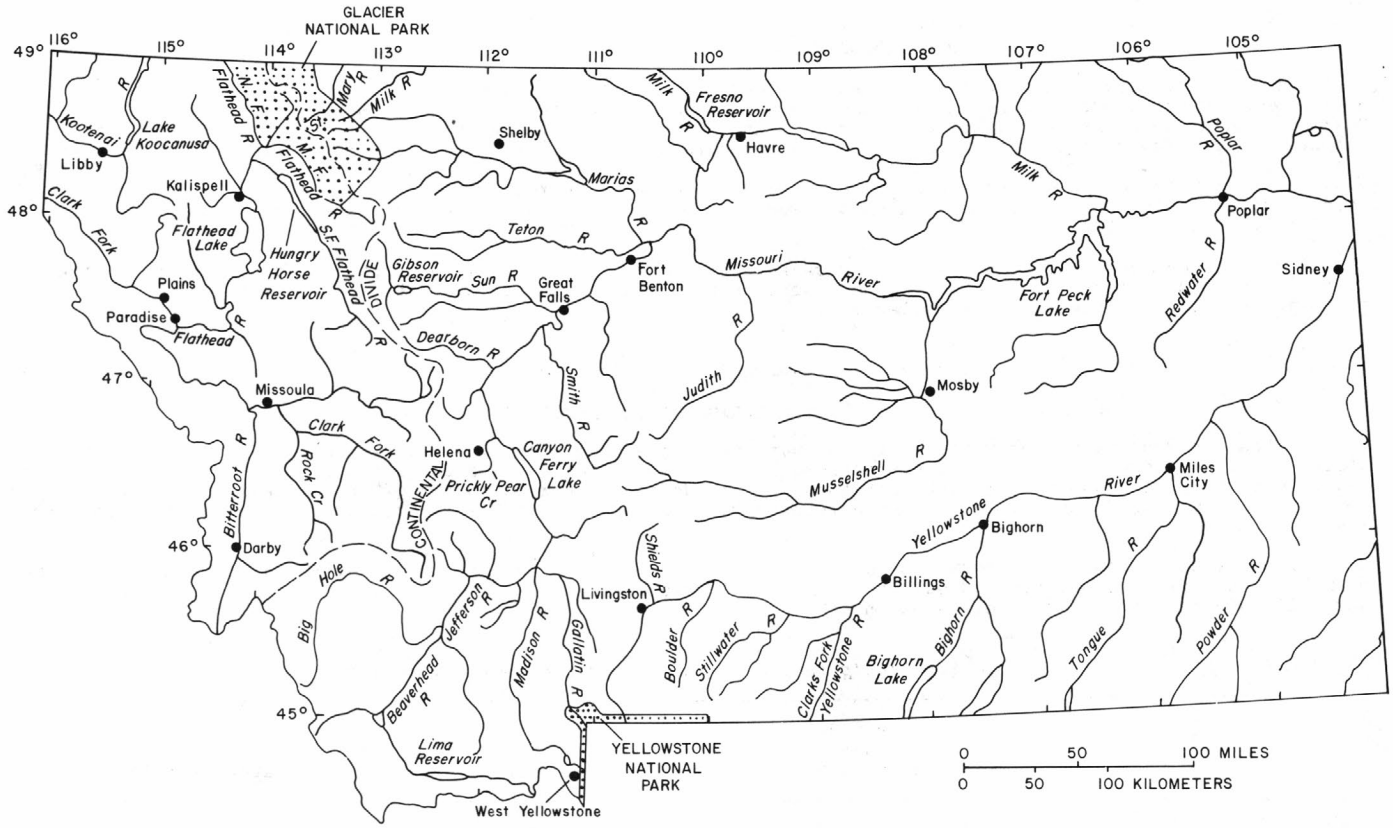
The western and southwestern parts of the State are in the Northern Rocky Mountains physiographic province. The central and eastern parts are in the Great Plains province. The Northern Rocky Mountains province is characterized by rugged mountains and intermontane valleys, whereas the Great Plains province consists of plains and small mountain ranges. Climate and hydrologic conditions differ substantially between the two provinces. The elevation ranges from about 10,000 feet at the Continental Divide in Glacier National Park and more than 12,000 feet in the headwaters of the Yellowstone River in Yellowstone National Park to about 1,800 feet where the Kootenai River flows from the State.

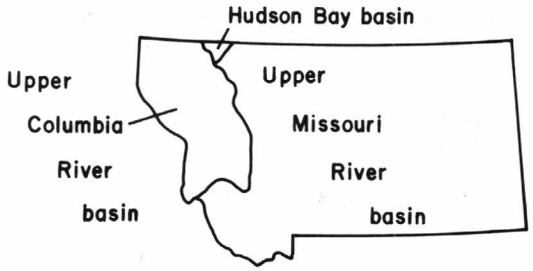
Annual precipitation varies considerably throughout the basins, from about 100-120 inches along the Continental Divide in Glacier National Park to about 6-12 inches in eastern Montana and in some of the intermontane valleys east of the Continental Divide. The predominant factor controlling the diverse precipitation patterns in Montana is the effect of geographic and topographic features on the two primary moisture systems that bring warm, moist air into the State from either the Gulf of Mexico or the Pacific Ocean. In mountain areas, much of this precipitation falls as snow during the winter. Although much of the annual precipitation on the Great Plains also falls as snow during the winter, intense rainstorms during the summer can add substantial quantities of precipitation to the annual totals in a short time. In areas east of the mountains, generally one-half of the annual precipitation falls from May through July.

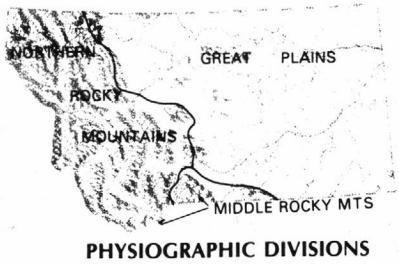
Peak runoff from the basins can result from spring snowmelt, snowmelt mixed with rain, or intense rainfall. In addition, backwater from ice jams commonly creates flooding in the lower Yellowstone River basin. The record flood of April 1952 in northeastern Montana is an example of spring snowmelt flooding. Floods in June 1964, June 1975, and May 1981 are examples of runoff caused by snowmelt mixed with rain. The May 1978 flood in the southeastern part of the State is an example of flooding caused by intense rainfall--about 5 inches in 2 days. Flash floods, although restricted in areal extent, are at times numerous in the north-central and eastern parts of the State. In many areas, peak runoff is stored in reservoirs to help decrease flooding. The stored water is used for irrigation (the predominant use of water statewide), power generation, and recreation.

Surface water generally is suitable for most uses throughout the State except in parts of eastern Montana where, because of large concentrations of dissolved solids and some constituents, recommended standards for domestic and agriculture uses may be exceeded. Water quality varies markedly between the western mountain region and the eastern plains. In the mountains, where the rocks generally are older (commonly of Precambrian age) and more resistant to weathering and the runoff is rapid, the streamflow characteristically is a calcium bicarbonate type. The dissolved-solids concentrations in mountain streams seldom exceed 500 mg/L (milligrams per liter), even during base-flow conditions. Water in the eastern two-thirds of the State, where Cretaceous and Tertiary rocks are dominant, generally is a sodium sulfate type; dissolved-solids concentrations range from about 500 to 5,000 mg/L. Snowmelt and intense rainstorms sometimes produce rapid runoff that results in smaller concentrations of dissolved solids, and calcium and bicarbonate become the dominant ions.

A notable exception to the general classification of streamflow in eastern Montana occurs in the northeastern part of the State, where the runoff and base-flow waters typically are a sodium bicarbonate type. Substantial concentrations of boron--as much as 2,000 µg/L (micrograms per liter) in the Poplar River north of Poplar--also are common. The water in the downstream reaches of the Yellowstone and Missouri Rivers, which originate in the mountains, is another exception. Characteristics of mountain-type water are present, but gradually diminish as the water moves downstream and mixes with water from tributaries in eastern Montana.







PHYSIOGRAPHIC DIVISIONS

Figure 1.--General geographic features of Montana.

In the Hudson Bay and upper Missouri River basins, water is present in alluvium along streams, in glacial deposits in the north and northeastern parts of the State, and in consolidated rocks underlying most of the area. In the upper Columbia River basin, the quantities of ground water in storage generally are largest in the alluvium of the intermontane valleys. Also, the alluvium generally contains the most productive aquifers; yields to wells along the major streams may be several hundred gallons per minute. These deposits are readily recharged by precipitation, by streams during periods of high flow, and by applied irrigation water. The composition of the glacial deposits largely determines their potential for yielding water to wells. Where outwash gravels are present, the potential for developing large-yield wells is good; where till is present, yields generally are limited to a few gallons per minute. Many consolidated-rock formations are water yielding, but, owing to the complexity of the geology, not all the formations will be present in any given area. Also, the well depth required to penetrate a given formation will vary with location. Yields from wells completed in consolidated rocks generally are only a few gallons per minute; however, several hundred gallons per minute can be obtained from deeply buried, fractured limestone in localized areas.

HYDROLOGIC-MONITORING ACTIVITY--WATER YEAR 1989

Eight streamflow-gaging stations and 17 water-quality stations were established or reactivated in Montana during water year 1989 to aid in an assessment of the water resources. New stations were installed in the Prickly Pear drainage south of Helena to monitor streamflow and water quality associated with the forest fires of 1988 in the basin. One new station was installed on the Bitterroot River at Missoula to monitor streamflow at the mouth of this drainage. Streamflow-gaging stations were reactivated in Yellowstone National Park on the Yellowstone River downstream from Yellowstone Lake and on the Madison River near West Yellowstone to assess the effects of the 1988 forest fires. Another streamflow-gaging station on the North Fork Sun River was reactivated to assess the runoff effects of 1988 forest fires.

Eight streamflow-gaging stations and seven water-quality stations were discontinued at the end of the water year. They were discontinued because either sufficient data had been collected to meet users' needs or funding was not available to continue the data collection.

SUMMARY OF HYDROLOGIC CONDITIONS--WATER YEAR 1989

Precipitation and Temperature

Weather in Montana during water year 1989 was near normal and significantly wetter than during 1988. The State received some relief from the meteorologic, hydrologic, and agricultural drought that was prevalent during water year 1988, although the drought continued to some degree in various parts of the State. Major effects that persisted from the drought were declining reservoir contents, deficient soil moisture, and declining ground-water levels.

Precipitation was near normal throughout the State, with averages ranging from 87 percent to 136 percent of normal. Data for precipitation, departure from normal precipitation, and percentage of normal precipitation for seven divisions of the State are listed in table 1.

Table 1.--*Precipitation and departure from normal, in inches*[1]

Division (number of stations)	October 1988 through March 1989			April through September 1989			Water year 1989		
	Precipitation	Departure from normal, 1951-80	Percentage of normal	Precipitation	Departure from normal, 1951-80	Percentage of normal	Precipitation	Departure from normal, 1951-80	Percentage of normal
Western (42)	10.06	-0.67	94	10.57	+1.28	114	20.63	+0.61	103
Southwestern (25)	5.75	+.40	107	8.85	-1.12	89	14.60	-.72	95
North Central (40)	3.92	+.80	126	13.83	+3.86	139	17.75	+4.66	136
Central (36)	4.93	+.55	113	12.16	+1.63	115	17.09	+2.18	115
South Central (26)	6.32	+.97	118	9.82	-.88	92	16.14	+.09	101
Northeastern (30)	2.30	-.33	87	9.06	-1.44	86	11.36	-1.77	87
Southeastern (22)	3.60	+.18	105	9.48	-.83	92	13.08	-.65	95

[1] Data from U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, 1989, Climatological data, Montana: v. 91, no. 10 through v. 92, no. 9.

Most National Weather Service stations in Montana measure precipitation only in valley locations. Data for precipitation falling as snow in the mountainous western part of the State during the winter are published by the U.S. Soil Conservation Service in the report "Montana Water Supply Outlook"; data for 1989 are listed in table 2. Normals for precipitation and snowpack are based on different periods of record. Normals for precipitation are determined from a base period of 1951-80 and normals for snowpack are determined from a base period of 1961-85. Once 30 years of long-term data for snowpack have been collected, the base periods will be the same.

As the winter of 1988-89 began, soil moisture was considerably less than normal as a result of drought. In the northwestern part of the State, a major rainstorm in October replenished much of the soil moisture. In the rest of the State, however, soil moisture remained deficient. The snowpack for the 1988-89 winter was near normal, except in the southeastern tributary basins of the Yellowstone River. By April 1, the snowpack ranged from 72 to 103 percent of normal. By May 1, melting had begun and snowpack ranged from 50 to 94 percent of normal. By June 1, most snow courses were bare. Much of the initial snowmelt seeped into the ground to augment deficient soil moisture. Precipitation was substantially less than normal during May and June, with many areas receiving less than 60 percent of normal rainfall. May and June generally are the months of greatest rainfall.

Table 2.--*Water content of mountain snowpack as percent of normal*[1]

Drainage basin	1989				
	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1
Hudson Bay :					
St. Mary	69	90	85	97	85
Missouri:					
Upper Missouri	94	97	91	99	83
Sun-Teton-Marias	83	99	89	96	94
Judith-Musselshell	63	82	82	87	82
Milk	65	89	86	96	91
Upper Yellowstone	78	86	85	97	85
Bighorn	74	79	76	87	70
Tongue	73	73	64	75	67
Powder	60	63	61	72	50
Upper Columbia:					
Kootenai	72	92	81	96	87
Clark Fork	80	92	86	96	78
Flathead	89	102	90	103	93

[1]Data from U.S. Department of Agriculture, Soil Conservation Service, 1989. Normal based on 1961-85 period of record.

Temperatures for water year 1989 were near normal. Statewide, monthly mean temperatures ranged from 15.6 °F (degrees Fahrenheit) less than normal in February to 4.4 °F greater than normal in July. January temperatures were significantly greater than normal. In many trees and shrubs, the sap began to flow in response to those warm temperatures. Then, an Arctic cold front moved into the State on February 1 and decreased temperatures as much as 70 °F in a few hours. As a result, many fruit and timber trees were killed or severely damaged.

Streamflow

Streamflow data for water year 1989 are compared to long-term data for water years 1961-85 at seven streamflow-gaging stations (fig. 2). The effects of the near-normal precipitation in water year 1989 and the soil-moisture deficiencies from water year 1988 are reflected in the streamflow records. The drought, which had begun in 1985, was temporarily relieved by greater than normal precipitation in September 1986, but resumed in 1987 and continued through 1988. Although precipitation was nearly normal in 1989, the drought persisted in parts of the State. Not until snowmelt started in March did monthly flows return to the near-normal range. One exception was in the northwestern part of the State where an October 1988 storm increased streamflow to normal by November.

Compared to the mean yearly discharge for water years 1961-85, the annualdischarge at the seven streamflow-gaging stations during water year 1989 was: Marias River near Shelby (station 06099500), 104 percent of normal; Redwater River at Circle (station 06177500), 55 percent of normal; Middle Fork Flathead River near West Glacier (station 12358500), 98 percent of normal; Clark Fork at St. Regis (station 12354500), 78 percent of normal; Missouri River at Toston (station 06054500), 62 percent of normal; Yellowstone River at Corwin Springs (station 06191500), 85 percent of normal; and Yellowstone River at Billings (station 06214500), 80 percent of normal. By comparison, annual streamflow for water year 1989 was larger than for water year 1988 at all stations.

The long-term trend of yearly discharge at two of the index gaging stations is shown in figure 3. At one site (Yellowstone River at Corwin Springs), streamflow in 1989 was less than normal for the third consecutive year. At the other site (Middle Fork Flathead River near West Glacier), yearly streamflow returned to normal in 1989 after 6 consecutive years of less than normal streamflow.

No extraordinary floodflows were recorded during water year 1989. Peak discharges for selected streamflow-gaging stations in the State are listed in table 3. The recurrence interval of peak discharge at all stations was less than 5 years, except at Nevada Creek above reservoir, near Finn (station 12335500), where the recurrence interval was slightly less than 25 years on April 7 as a result of flooding caused by rapid melting of greater than normal snowpack in the valley upstream from the station.

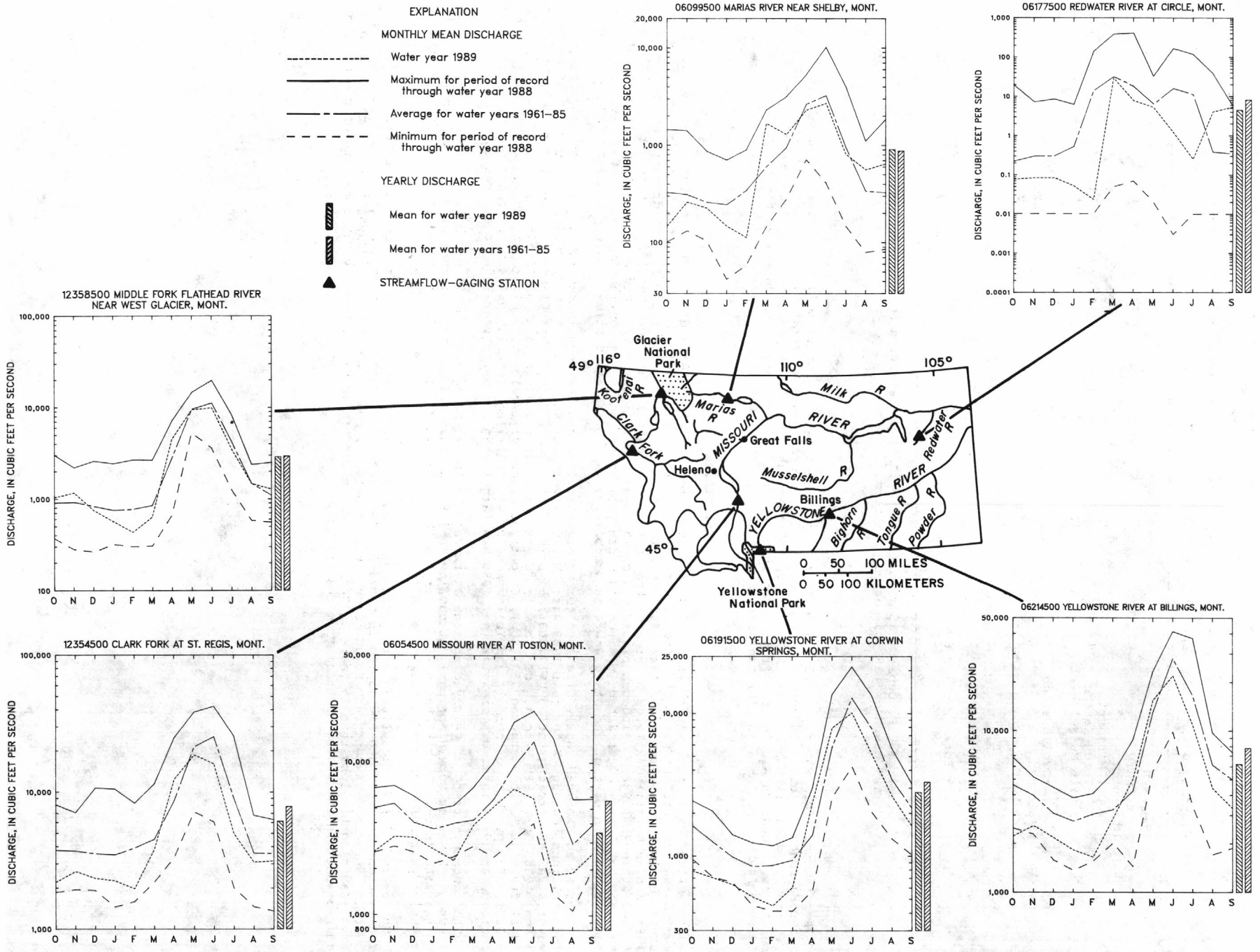


Figure 2.--Streamflow data for water year 1989 compared to long-term data for water years 1961-85 at selected streamflow-gaging stations.

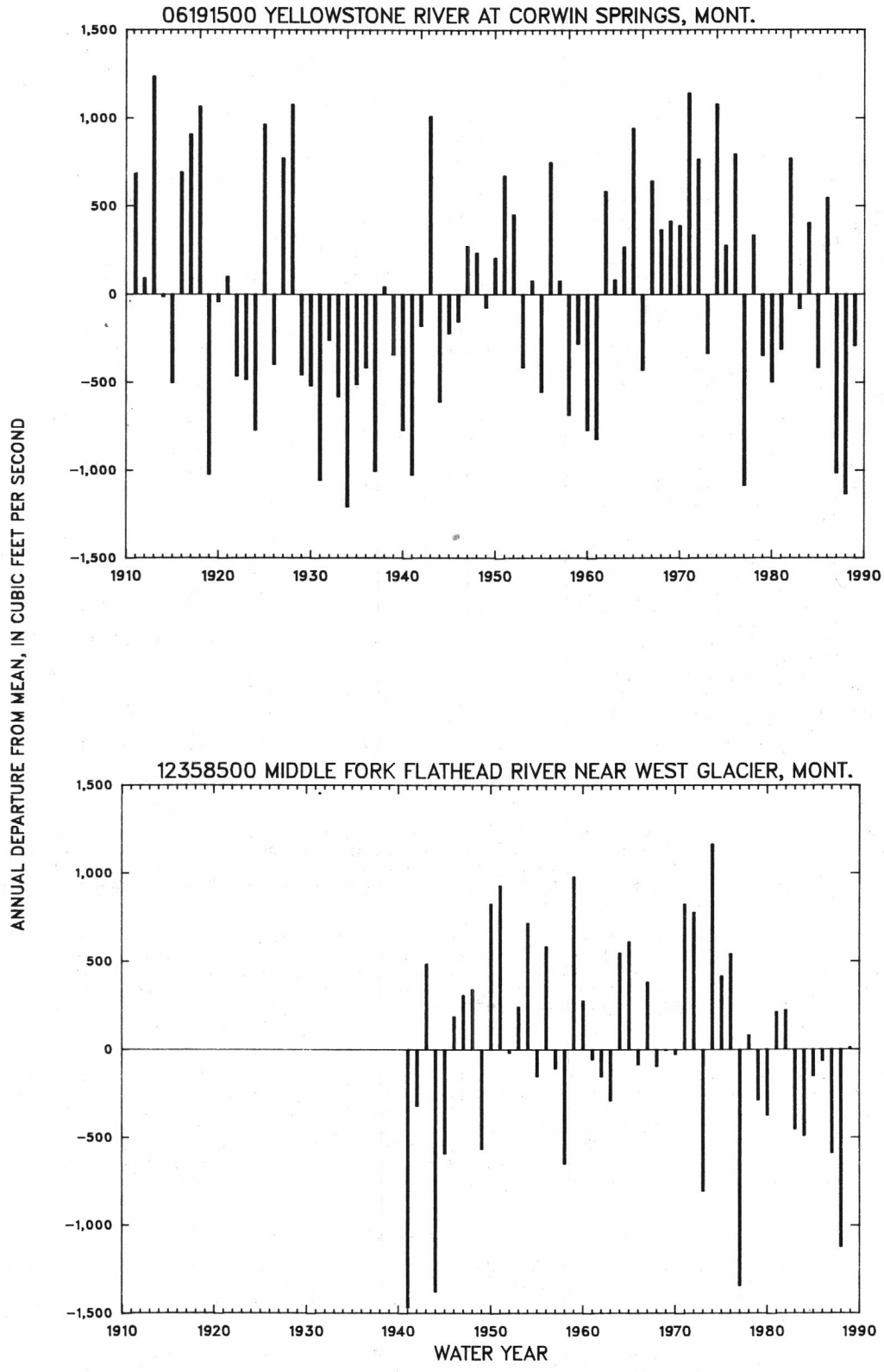


Figure 3.--Annual departure from mean annual streamflow at two unregulated streamflow-gaging stations.

Table 3.--*Comparisons of instantaneous peak discharge for water year 1989 with instantaneous peak discharge for period of record at selected stations*

[<, less than]

Station number	Station name	Drainage area (square miles)	Peak discharge, water year 1989			Peak discharge, period of record	
			Date	Cubic feet per second	Recurrence interval (years)	Date	Cubic feet per second
05014500	Swiftcurrent Creek at Many Glacier	30.9	06/11	1,080	2	06/08/64	6,700
05017500	St. Mary River near Babb	278	06/12	3,580	<5	06/09/64	16,500
06025500	Big Hole River near Melrose	2,476	06/16	4,100	<2	06/10/72	14,300
06054500	Missouri River at Toston	14,669	04/27	13,500	<2	06/06/48	32,000
06062500	Tenmile Creek near Rimini	32.7	05/10	184	<2	05/22/81	3,290
06089000	Sun River near Vaughn	1,854	03/11	6,220	<5	06/09/64	53,500
06099500	Marias River near Shelby	3,242	06/12	7,720	<5	06/09/64	241,000
06115200	Missouri River near Landusky	40,987	03/29	16,700	<2	06/06/53	137,000
06120500	Musselshell River at Harlowton	1,125	03/12	624	<2	06/20/75	7,270
06154400	Peoples Creek near Hays	220	06/02	32	<2	06/08/72	8,460
06174500	Milk River at Nashua	22,332	03/30	4,500	<2	04/18/52	45,300
06191500	Yellowstone River at Corwin Springs	2,623	05/11	15,700	<2	06/14,15/18	32,000
06200000	Boulder River at Big Timber	523	06/16	5,440	<2	05/28/56	9,840
06214500	Yellowstone River at Billings	11,795	06/17	37,700	<2	06/19/74	69,500
06289000	Little Bighorn River at State line, near Wyola	193	05/10	424	<2	06/03/44	2,730
06308500	Tongue River at Miles City	5,379	03/27	1,900	<2	06/15/62	13,300
06329500	Yellowstone River near Sidney	69,103	06/20	37,600	<2	06/02/21	159,000
12301300	Tobacco River near Eureka	440	04/22	1,350	<2	06/18/74	2,470
12304500	Yaak River near Troy	766	05/08	6,060	<2	05/21/56	12,100
12332000	Middle Fork Rock Creek near Philipsburg	123	06/16	718	<2	06/16/74	1,680
12335500	Nevada Creek above reservoir, near Finn	116	04/07	1,470	<25	06/02/53	1,800
12340000	Blackfoot River near Bonner	2,290	05/11	10,300	<5	06/10/64	19,200
12354500	Clark Fork at St. Regis	10,709	05/12	32,900	<2	05/24/48	68,900
12358500	Middle Fork Flathead River near West Glacier	1,128	05/11	19,000	<2	06/09/64	140,000
12370000	Swan River near Bigfork	671	05/12	4,940	<2	06/20/74	8,890

The residual effects of the extreme drought conditions during 1988 were reflected in minimum daily streamflows recorded in the winter of 1988-89. Minimum daily discharges for selected streamflow-gaging stations are listed in table 4. Nine of the 25 stations used to index low flow had a recorded minimum daily discharge with recurrence interval of 20 to 100 years. The extremely cold temperatures in February caused a sharp decrease in streamflows that were already low owing to the drought.

Instantaneous record low flows (table 4) were recorded at the following four long-term stations--Yellowstone River at Corwin Springs; Little Bighorn River at State line, near Wyola (station 06289000); Blackfoot River near Bonner (station 12340000); and Clark Fork at St. Regis. Because the snowpack that generally supplies water to the basins was insufficiently supplemented by spring rains in southwestern Montana, drought conditions continued. An instantaneous record minimum discharge also was recorded on the Missouri River at Toston which may have been related to construction activities at Toston Dam. These low flows caused problems for downstream water users and markedly affected fish populations.

Managers of major reservoirs had to contend with substantial water shortages owing to less than normal quantities of snowmelt runoff during water year 1989. The percentage of normal (based on water years 1961-85) storage by month for major reservoirs is presented in table 5. At the end of water year 1988, most reservoirs were severely overdrafted. Although much of the runoff that occurred in 1989 went into storage, runoff was not sufficient to meet all the needs of water users. An example of the effects of insufficient reservoir storage in the Missouri River basin was that the U.S. Army Corps of Engineers shortened the navigation season on the lower Missouri River by 5 weeks. Runoff resulting from summer rainstorms increased storage in Gibson and Fresno Reservoirs.

Quality of Streamflow

The National Stream Quality Accounting Network (NASQAN) is a data-collection network that was established to assess the quality of the Nation's water through systematic and continuing measurements at selected locations that represent major drainage basins or parts of them. Presently, Montana has 16 NASQAN stations throughout the State. The first station was established in 1973.

Statistical summaries for selected water-quality measurements at eight NASQAN stations on the mainstem of the St. Mary, Missouri, Yellowstone, Clark Fork, and Flathead Rivers are presented in table 6. The statistical summaries include the minimum and maximum values for water year 1989 as well as for the period of record through water year 1988. Statistical summaries in the form of box plots for dissolved solids at the same stations are given in figure 4 for water year 1989 and the period of record.

Table 4.--*Minimum daily discharge for water year 1989 and minimum instantaneous discharge for period of record at selected stations*

[<, less than; >, greater than]

Station number	Station name	Drainage area (square miles)	Minimum daily discharge, water year 1989			Minimum instantaneous discharge, period of record	
			Date	Cubic feet per second	Recurrence interval (years)	Date	Cubic feet per second
05014500	Swiftcurrent Creek at Many Glacier	30.9	01/19	13	<2	11/14,16/76	0
05017500	St. Mary River near Babb	278	02/04	60	2	01/05/63	26
06025500	Big Hole River near Melrose	2,476	02/05	150	5	08/17/31	49
06054500	Missouri River at Toston	14,669	02/05	1,000	20	07/16/89	450(1,2)
06061500	Prickly Pear Creek near Clancy	192	02/03	5.0	50	01/26/58	.5
06089000	Sun River near Vaughn	1,854	02/03	80	>5	05/24/44	20
06099500	Marias River near Shelby	3,242	01/02	70	5	08/20/19	10
06115200	Missouri River near Landusky	40,987	12/28	3,000	<5	07/08/36	1,120
06120500	Musselshell River at Harlowton	1,125	10/01	2.3	>20	(3)	0
06174500	Milk River at Nashua	22,332	10/1,2,5,6	16	5	(3)	0
06181000	Poplar River near Poplar	3,174	03/04-09	.1	20	(3)	0
06191500	Yellowstone River at Corwin Springs	2,623	02/02	380	<50	02/02/89	343(1)
06200000	Boulder River at Big Timber	523	10/01-04	28	<20	08/26/61	10
06214500	Yellowstone River at Billings	11,795	02/03	543	>50	12/12/32	430
06289000	Little Bighorn River at State line, near Wyola	193	02/02	18	>100	02/02/89	18(1)
06308500	Tongue River at Miles City	5,379	07/12,13	13	<5	08/13,14/40	0
06329500	Yellowstone River near Sidney	69,103	01/02	800	<50	05/17/61	470
12301300	Tobacco River near Eureka	440	02/02	35	<10	01/11/63	20
12304500	Yaak River near Troy	766	10/13,14	82	<5	12/09/72	50
12332000	Middle Fork Rock Creek near Philipsburg	123	02/02	10	<10	02/09/53	5.3
12335500	Nevada Creek above reservoir, near Finn	116	02/04	3.5	<5	(3)	<2.0
12340000	Blackfoot River near Bonner	2,290	02/04	250	<10	02/02/89	156(1)
12354500	Clark Fork at St. Regis	10,709	02/03	800	>100	02/03/89	732(1)
12358500	Middle Fork Flathead River near West Glacier	1,128	02/02	303	10	11/27/52	<173
12370000	Swan River near Bigfork	671	10/14	275	<10	01/26-29/30	193

[1] New minimum for period of record.
[2] Low flow may have been related to construction activities at Toston Dam.
[3] At times.

Table 5.--*Percentage of normal storage by month during water year 1989 for major reservoirs used to supply water principally for hydroelectric-power generation and irrigation*

Reservoir	Usable capacity (acre-feet)	Percentage of normal storage based on 1961-85 period of record											
		Oct. 88	Nov.	Dec.	Jan. 89	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
Hydroelectric-power generation:													
Canyon Ferry Lake	2,043,000	79	80	83	85	81	85	88	88	83	81	82	83
Fort Peck Lake	18,910,000	86	85	83	82	81	82	82	83	80	78	78	78
Hungry Horse Reservoir	3,451,000	55	59	62	63	57	54	75	86	90	88	79	68
Flathead Lake	1,791,000	91	79	66	69	86	90	101	103	102	100	100	103
Irrigation:													
Lima Reservoir	84,050	21	23	25	28	29	34	57	54	26	8	11	20
Gibson Reservoir	99,050	34	39	44	58	65	78	148	89	103	108	199	243
Fresno Reservoir	103,000	23	20	16	13	9	42	63	83	78	70	58	81

Table 6.--*Comparison of minimum and maximum values for selected water-quality constituents and properties for water year 1989 and for the period of NASQAN[1] record at eight stations*

[<, less than]

Station number	Station	Water year 1989			Period of NASQAN record through water year 1988		
		Number of samples	Minimum	Maximum	Number of samples	Minimum	Maximum
	Dissolved solids, in milligrams per liter						
05020500	St. Mary River at international boundary	6	88	140	81	70	195
06054500	Missouri River at Toston	4	155	272	139	125	308
06115200	Missouri River near Landusky	6	292	400	68	104	950
06192500	Yellowstone River near Livingston	6	75	237	67	66	258
06214500	Yellowstone River at Billings	4	135	318	114	83	439
06329500	Yellowstone River near Sidney	6	188	587	215	158	874
12353000	Clark Fork below Missoula	6	90	159	73	59	218
12363000	Flathead River at Columbia Falls	4	74	107	57	68	128
	Dissolved phosphorus, in milligrams per liter						
05020500	St. Mary River at international boundary	6	<0.01	0.01	82	<0.01	0.04
06054500	Missouri River at Toston	4	<.01	.04	80	<.01	.09
06115200	Missouri River near Landusky	6	<.01	.04	68	<.01	.39
06192500	Yellowstone River near Livingston	6	<.01	.02	136	<.01	.09
06214500	Yellowstone River at Billings	4	.01	.02	77	<.01	.14
06329500	Yellowstone River near Sidney	6	<.01	.03	87	<.01	.07
12353000	Clark Fork below Missoula	6	<.01	.03	73	.01	.29
12363000	Flathead River at Columbia Falls	4	<.001	<.001	56	<.001	.03
	Dissolved oxygen, in percent of saturation						
05020500	St. Mary River at international boundary	6	95	109	106	83	112
06054500	Missouri River at Toston	4	102	111	178	89	128
06115200	Missouri River near Landusky	6	76	97	142	60	106
06192500	Yellowstone River near Livingston	6	93	114	115	73	138
06214500	Yellowstone River at Billings	4	92	100	163	78	152
06329500	Yellowstone River near Sidney	6	61	98	249	43	109
12353000	Clark Fork below Missoula	6	96	104	98	82	146
12363000	Flathead River at Columbia Falls	4	96	101	107	92	107
	Dissolved arsenic, in micrograms per liter						
05020500	St. Mary River at international boundary	4	<1	<1	43	<1	<10
06054500	Missouri River at Toston	4	19	45	62	8	100
06115200	Missouri River near Landusky	4	10	13	47	2	25
06192500	Yellowstone River near Livingston	4	8	37	36	6	27
06214500	Yellowstone River at Billings	4	7	11	55	2	14
06329500	Yellowstone River near Sidney	4	2	8	54	1	6
12353000	Clark Fork below Missoula	4	1	2	40	1	12
12363000	Flathead River at Columbia Falls	4	<1	<1	38	<1	2
	Turbidity, in nephelometric turbidity units						
05020500	St. Mary River at international boundary	6	0.4	110	76	0.3	85
06054500	Missouri River at Toston	4	1.6	7.0	71	.1	60
06115200	Missouri River near Landusky	6	5.4	340	68	1.5	7,500
06192500	Yellowstone River near Livingston	6	.60	14	67	.6	38
06214500	Yellowstone River at Billings	4	2.5	32	70	.2	140
06329500	Yellowstone River near Sidney	6	6.3	1,100	87	1.0	2,500
12353000	Clark Fork below Missoula	6	.8	7.5	73	.4	100
12363000	Flathead River at Columbia Falls	4	.4	100	57	.2	90

[1]National Stream Quality Accounting Network.

Generally, the dissolved-solids concentrations (and major ions) in streams are related inversely to streamflow. Small dissolved-solids concentrations generally occur when streamflows are high as a result of runoff from snowmelt or rainfall. Conversely, dissolved-solids concentrations typically increase as streamflow declines and a greater proportion of flow is composed of ground water discharging to the stream. This inverse relation between dissolved solids and streamflow is less pronounced at sites downstream from lakes and reservoirs where the various components of flow can be retained and mixed.

As indicated in table 6 and figure 4, dissolved-solids concentrations for 1989 at the eight NASQAN stations were within the ranges for the periods of record and, except for stations on the upper Missouri and upper Yellowstone Rivers, median (50th percentile) values for 1989 were near the medians of the previous data. For the Missouri River at Toston (station 06054500), Yellowstone River near Livingston (station 06192500), and Yellowstone River at Billings (station 06214500), median values for 1989 were nearer to the 75th percentiles rather than the medians of the period of record. Although precipitation throughout the State was near normal for 1989, the recovery of streamflow from the prior 2 years of drought was not immediate in some locations such as the

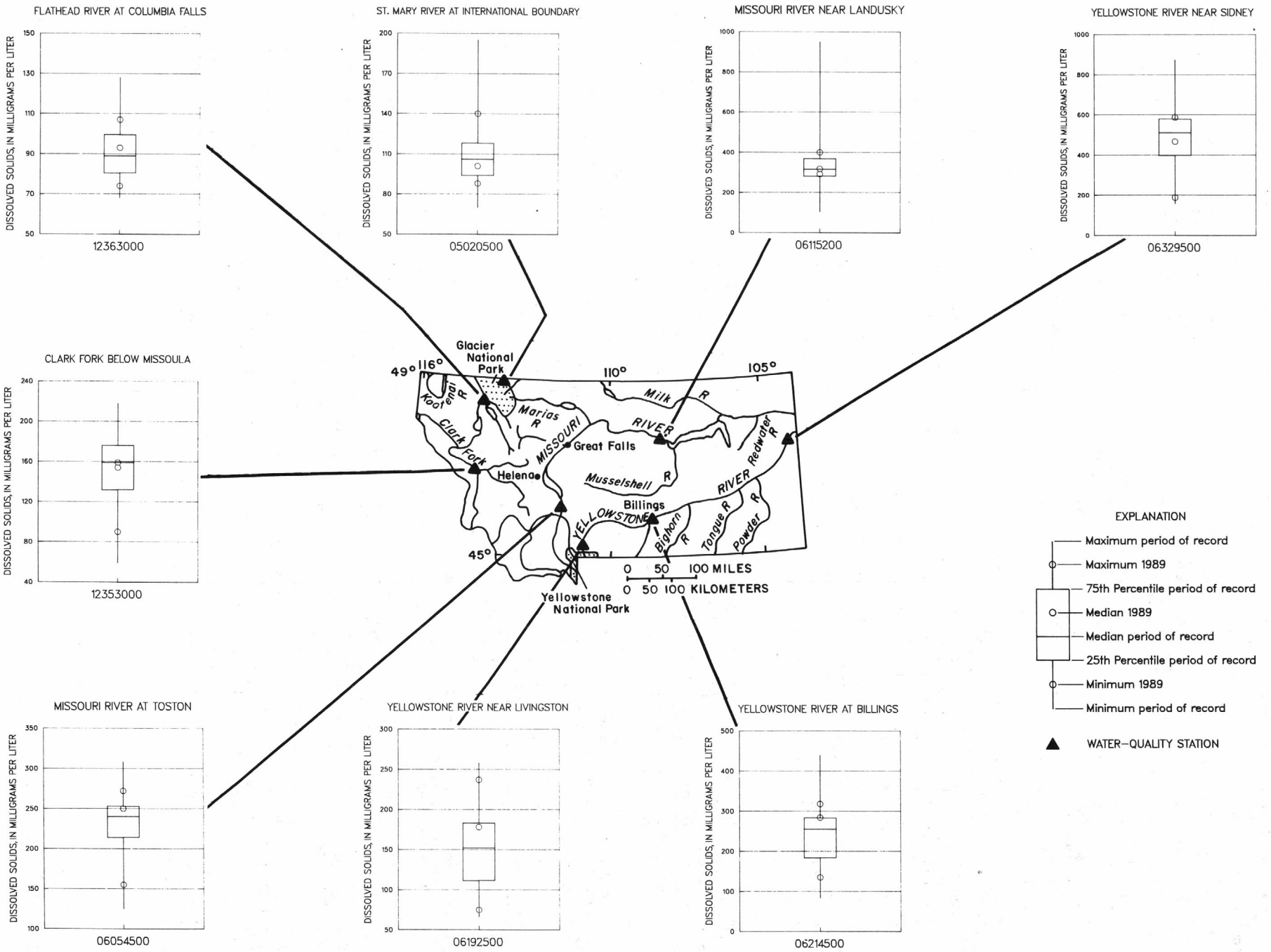


Figure 4.--Dissolved-solids concentrations for water year 1989 compared to data for the period of record through water year 1988.

Missouri River at Toston (62 percent of normal) and Yellowstone River at Billings (80 percent of normal). The diminished streamflow probably accounted for median dissolved-solids concentrations being larger than normal during 1989. Conversely, in other parts of the State, streamflow recovery from the drought was more immediate, resulting in more normal concentrations for dissolved solids.

Phosphorus, along with nitrogen, is recognized as a major constituent for growth of aquatic plants. Excessive phosphorus concentration, often from manmade sources, can result in biological enrichment. Dissolved-phosphorus concentrations measured at the eight NASQAN stations during 1989 had relatively small ranges (table 6) and were indicative of little enrichment. Like most other dissolved constituents, dilution from ample streamflow helped to maintain small phosphorus concentrations at these stations during 1989.

Dissolved oxygen in streams sustains most aquatic organisms and is an important constituent that allows for the purification of wastes. Dissolved oxygen is often reported in percent of saturation, where 100 percent is considered to be ideal for most aquatic needs. At six of the eight NASQAN stations, dissolved-oxygen saturation was about 100 percent during 1989. The two exceptions were Missouri River near Landusky (station 06115200) and Yellowstone River near Sidney (station 06329500), where maximum values were near 100 percent, but minimums were 76 and 61 percent, respectively. Although these percentages are considered to be small by water-quality standards, the values are typical of winter conditions when decomposition of organic material consumes oxygen, reaeration at the stream surface is prevented by thick ice cover, and oxygen production by photosynthesis is at a minimum.

Arsenic is toxic to humans and many other organisms if it occurs in excess of relatively small concentrations. The U.S. Enviromnmental Protection Agency has established a maximum arsenic concentration of 50 µg/L for the National Primary Drinking Water Regulation[1] to protect human health. Natural sources from geothermal activity in Yellowstone National Park contribute arsenic to headwater tributaries of the Missouri and Yellowstone Rivers. The arsenic concentrations decrease downstream as a result of dilution from tributary inflow and physical and chemical processes that tend to immobilize the element. New maximum concentrations were established in water year 1989 at two stations--Yellowstone River near Livingston and Yellowstone River near Sidney. The increased arsenic concentrations probably were a result of decreased dilution from some tributaries of the Yellowstone River that had less than normal streamflows during 1989.

Turbidity is a surrogate measure of the suspended sediment present in a stream and, in contrast to dissolved constituents, generally has a direct relation to stream discharge. The St. Mary River at international boundary and Flathead River at Columbia Falls both had new maximum turbidities in 1989 compared to the previous records. The St. Mary station had a maximum of 110 nephelometric turbidity units for 1989 compared to 85 for the period of record, and the Flathead station had a maximum of 100 for 1989 compared to 90 for the period of record.

Ground-Water Levels

Water levels were measured in a statewide network of 276 wells during water year 1989. Although measurements for October 1989 were obtained during water year 1990, they are representative of conditions during late water year 1989 and therefore are presented herein. Water levels in most wells in the network are measured annually; however, some wells are measured more frequently. At the beginning of water year 1989, six wells that had been equipped with continuous recorders had varying length of record. During water year 1989, continuous recorders were installed on an additional three wells and discontinued on one well. Hydrographs for seven network wells are shown in figure 5. The network water-level data are presented in table 7.

About one-third of the wells in the statewide network are completed in unconsolidated aquifers and are relatively shallow. Water levels in these wells commonly will fluctuate throughout the year and from year to year as a result of changes in climatic conditions or human activities, such as large-scale withdrawals, or both. In general, water levels in these wells were lower in water year 1989 than for comparable times in water year 1988, and were below average for the period of record.

A 40-foot-deep observation well in Lincoln County (well 31N31W33CCBB01) is completed in alluvium of the Kootenai River valley. The hydrograph shows erratic fluctuations in water level, with maximum seasonal change of about 8 feet (fig. 5). The alluvium is composed of coarse sand and gravel and is hydraulically connected to the river. Rapid fluctuations in water level in the well result from changes in river stage and recharge from precipitation. Water-level measurements in this well were discontinued in April 1989.

A 143-foot-deep observation well in Sheridan County (well 32N58E04DBBD02) is completed in alluvium of a buried channel of the ancestral Missouri River. The hydrograph shows decreasing water levels in response to the hot, dry climatic conditions and increased irrigation pumpage during the summers of water years 1988 and 1989 (fig. 5).

A 377-foot-deep observation well in Sanders County (well 23N24W34ADAA01) is completed in a confined sand and gravel alluvial aquifer. The hydrograph shows seasonal fluctuations in water levels and an overall decrease in water levels from 1971 to 1977 and from 1981 to 1985 (fig. 5). A similar decreasing trend may be occurring for 1988 through 1989. Water from the aquifer is used extensively for irrigation. The long-term declines are at least partly a result of increased withdrawals. Recovery of water levels from 1978 to 1980 and from 1986 to 1988 was a result of increased precipitation during these years and decreased demand for irrigation water.

A 40-foot-deep observation well in Ravalli County (06N20W19CCCC02) is completed in alluvium of the Bitterroot River valley. The hydrograph shows seasonal fluctuations of 8 to 12 feet (fig. 5). Water levels are largely affected by seasonal recharge from irrigation water from surface sources and fluctuations in the stage of the river. The water level in the well generally is highest in early summer and lowest in the winter. The seasonal water-level fluctuations are consistent from year to year and indicate no long-term trend.

A 68-foot-deep observation well in Powder River County (well 04S45E04BDDB01) is completed in shallow alluvium consisting of sand and gravel. Water levels in the aquifer are largely affected by precipitation and stream stage and are not directly affected by human activities. An overall decrease in water levels has occurred from 1986 through 1989 (fig. 5).

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[1] U.S. Environmental Protection Agency, 1988, Maximum contaminant levels (subpart B of part 141, National interim primary drinking-water regulations): U.S. Code of Federal Regulations, Title 40, Parts 100 to 149, revised as of July 1, 1988, p. 530-533.

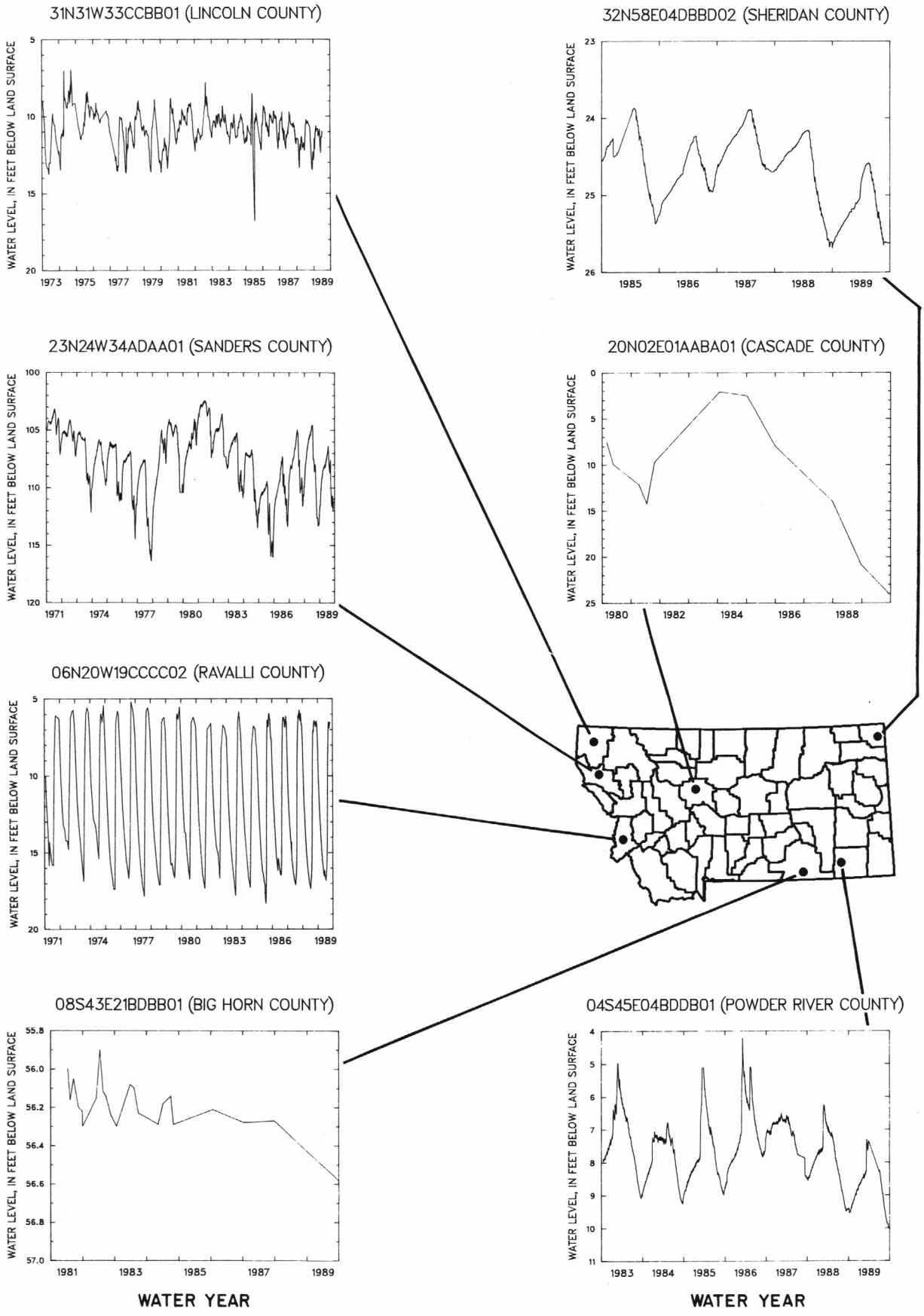


Figure 5.--Long-term fluctuations of water levels in selected observation wells.

About two-thirds of the wells in the statewide network are completed in deeper, consolidated aquifers. Water levels in these wells generally do not fluctuate substantially from year to year unless they are affected by human activities. Many of these deeper wells are completed in sandstone or coal aquifers in the Tongue River Member of the Fort Union Formation (Paleocene age) in eastern Montana. As shown by the hydrograph for a 223-foot-deep well in Big Horn County (well 08S43E21BDBB01) completed in a combined coal and sandstone aquifer, water levels in these aquifers remain relatively stable during normal climatic periods but generally have been declining since 1987 because of less than normal recharge.

An extensively used deep aquifer in west-central Montana is the Madison Group (Mississippian age), which consists primarily of limestone. The hydrograph for a 605-foot-deep well in Cascade County (well 20N02E01AABA01) completed in the Madison Group shows a general decline in water levels from 1984 to 1989 because of increased withdrawals and less than normal recharge from precipitation.

Table 7.--*Water levels in observation wells*

[Local number--composed of township, range, section, position within a section, and sequential number. Depth of well--in feet below land surface. Aquifer--the names were retrieved from the National Water Data Storage and Retrieval System (WATSTORE) and some may not follow current usage of the U.S. Geological Survey. Date of measurement--reported as month, day, year. Water level--in feet below or above (+) land surface. Symbol: --, no data]

Local number	Depth of well	Aquifer	Date of measurement	Water level
37N27W21CBAB01	45	Pleistocene glaciolacustrine deposits	10-07-88	24.29
			08-16-89	21.17
37N27W24BABB01	230	Pleistocene glacial outwash	10-07-88	113.34
			08-16-89	113.58
37N27W27ACCB01	320	Pleistocene glaciolacustrine deposits	10-07-88	150.54
			08-16-89	146.58
37N47E01ABBB01	53	Pleistocene glacial outwash	04-07-89	21.10
			06-09-89	20.92
			10-11-89	21.19
37N47E01ABBB02	83	Paleocene Tongue River Member of Fort Union Formation	04-07-89	21.71
			06-09-89	21.51
			10-11-89	21.83
37N47E12BBBB01	147	Paleocene Tongue River Member of Fort Union Formation	04-07-89	79.02
			06-09-89	78.99
			10-11-89	79.14
37N47E13AADD01	208	Paleocene Tongue River Member of Fort Union Formation	04-07-89	13.52
			06-09-89	13.99
			10-11-89	14.48
37N47E13ADAA01	45	Pleistocene glacial outwash	04-07-89	14.08
			06-09-89	14.53
			10-11-89	15.02
37N47E17DABB02	266	Paleocene Tongue River Member of Fort Union Formation	04-07-89	217.89
			06-09-89	217.71
			10-11-89	217.62
37N47E23AADD02	120	Paleocene Tongue River Member of Fort Union Formation	04-07-89	82.08
			06-09-89	82.05
			10-11-89	82.14
37N48E05AAAA01	218	Paleocene Fort Union Formation	06-09-89	+0.63
			10-11-89	+0.54
37N48E05BABB01	43	Pleistocene glacial outwash	04-07-89	6.29
			06-09-89	6.12
			10-11-89	6.77
37N48E23BBDC01	400	Upper Cretaceous Fox Hills-Hell Creek aquifer	04-07-89	60.76
			06-09-89	60.65
			10-11-89	60.88
36N28W01ADC 01	206	Pleistocene glacial till	10-07-88	108.97
			08-16-89	109.60
36N28W11AADB01	290	Pleistocene glaciolacustrine deposits	10-07-88	60.37
			08-16-89	34.59
36N27W05DCBC01	168	Pleistocene glaciolacustrine deposits	10-07-88	36.03
			08-16-89	39.38
36N09E05DBAD01	1,015	Upper Cretaceous Eagle Sandstone	10-03-88	4.51
			08-30-89	5.16

Table 7.--*Water levels in observation wells*--Continued

Local number	Depth of well	Aquifer	Date of measurement	Water level
36N25E06CBCB01	75	Pliocene Flaxville Formation	12-05-88	61.93
			09-06-89	62.27
36N26E33DBD 01	67	Pliocene Flaxville Formation	12-05-88	51.70
			09-06-89	51.37
35N02E27AABD01	250	Upper Cretaceous Eagle Sandstone	10-03-88	19.79
			08-31-89	19.62
35N24E09DBBC01	53	Pliocene Flaxville Formation	12-05-88	39.61
			09-06-89	40.41
34N24E06DCCC01	200	Upper Cretaceous Fox Hills Sandstone	12-05-88	65.92
			09-06-89	65.77
33N06W12AAA 02	400	Upper Cretaceous Virgelle Sandstone Member of Eagle Sandstone	08-15-89	30.18
33N06W12AAA 03	250	Upper Cretaceous Two Medicine Formation of Montana Group	08-15-89	30.49
32N15E17DDDC01	180	Quaternary alluvium	10-05-88	38.40
			08-30-89	36.92
32N58E04DBBD02	143	Pleistocene glacial outwash	10-16-88	25.57
			04-12-89	24.73
			10-11-89	25.56
31N31W33CCBB01	40	Quaternary alluvium	10-05-88	12.65
			01-12-89	11.28
31N14E03CDDC01	215	Upper Cretaceous Judith River Formation of Montana Group	11-16-88	45.20
			09-06-89	40.60
31N24E06BCC 01	70	Pleistocene alluvium	12-05-88	9.09
			09-06-89	9.90
30N33W05ABAB01	187	Pleistocene glaciolacustrine deposits	11-22-88	+18.13
			09-13-89	+19.75
30N33W30DAAD01	43	Pleistocene glaciolacustrine deposits	10-04-88	10.73
			09-13-89	10.34
30N33W30DAAD02	23	Pleistocene glaciolacustrine deposits	10-04-88	9.67
			09-13-89	9.23
30N05W33DDB 01	122	Upper Cretaceous Virgelle Sandstone Member of Eagle Sandstone	08-15-89	46.22
30N38E09CADB01	195	Upper Cretaceous Judith River Formation of Montana Group	09-05-89	51.91
29N22W14BBDD01	220	Pleistocene glaciolacustrine deposits	11-29-88	137.68
			08-10-89	149.12
29N22W28ACCC01	200	Pleistocene glaciolacustrine deposits	10-13-88	167.40
			08-10-89	175.28
29N22W36BCBD01	452	Pleistocene glaciolacustrine deposits	10-13-88	140.64
			08-10-89	163.44
29N21W20CCCC01	278	Pleistocene glaciolacustrine deposits	10-13-88	110.08
			08-10-89	111.51
27N56E34AABC01	118	Paleocene Tongue River Member of Fort Union Formation	10-16-88	40.34
			10-11-89	40.25
26N20E36ADCC01	1,470	Upper Cretaceous Eagle Sandstone	12-06-88	89.09
26N24E31BADC01	174	Lower Cretaceous First Cat Creek sandstone of Montana Group	11-03-88	23.71
			12-14-88	23.90
			02-23-89	24.01
			03-29-89	24.13
			06-09-89	24.15
			07-12-89	24.27
			08-10-89	24.31
			09-10-89	24.42
			10-11-89	24.45
26N24E31BDDC01	226	Lower Cretaceous Third Cat Creek sandstone of Kootenai Formation	11-03-88	1.83
			12-14-88	2.50
			02-23-89	3.36
			03-29-89	3.51
			06-09-89	1.58
			07-12-89	+0.11
			08-10-89	0.03
			09-10-89	1.60
			10-11-89	1.07

Table 7.--*Water levels in observation wells*--Continued

Local number	Depth of well	Aquifer	Date of measurement	Water level
26N49E13ACAB01	180	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-15-88	43.81
			10-13-89	43.83
26N54E17DCAA01	240	Paleocene Tongue River Member of Fort Union Formation	10-15-88	91.75
			10-13-89	91.82
26N59E22DBDD01	212	Paleocene Tongue River Member of Fort Union Formation	10-15-88	33.21
			10-13-89	34.42
25N47E04DAAB01	200	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-15-88	68.46
			10-13-89	68.37
25N50E24CBDA01	220	Paleocene Lebo Shale Member of Fort Union Formation	10-15-88	11.57
			10-13-89	11.70
24N23W21BCDA01	250	Pleistocene glacial till	10-11-88	36.00
			01-25-89	36.86
			04-11-89	35.56
			07-19-89	34.95
			10-16-89	37.09
24N44E20CABD01	300	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-14-88	178.41
			10-12-89	177.66
24N47E35BBBA01	101	Paleocene Lebo Shale Member of Fort Union Formation	10-15-88	18.52
			10-13-89	17.99
24N47E35BBBC01	640	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-15-88	194.49
			10-13-89	195.12
24N54E29CACB01	190	Paleocene Tongue River Member of Fort Union Formation	10-15-88	57.92
			10-13-89	55.68
24N56E25DDAC01	60	Paleocene Tongue River Member of Fort Union Formation	10-15-88	6.70
			10-13-89	7.44
23N24W27CDDD01	184	Pleistocene alluvium	10-11-88	30.63
			01-24-89	27.72
			04-11-89	26.56
			07-19-89	30.16
			10-13-89	28.28
23N24W34ADAA01	377	Quaternary alluvium	10-04-88	111.92
			10-11-88	111.65
			11-23-88	109.19
			01-09-89	108.23
			01-24-89	108.24
			02-22-89	108.05
			04-11-89	106.95
			04-24-89	106.59
			05-03-89	106.35
			06-09-89	108.75
			07-17-89	111.03
			07-20-89	114.92
			08-31-89	111.34
			10-06-89	109.16
			10-13-89	109.25
23N43E34BABC01	175	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-14-88	103.91
			10-12-89	105.60
23N51E20BBBD01	175	Paleocene Fort Union Formation	10-15-88	17.61
			10-13-89	18.49
22N58E10CCCC01	135	Paleocene Fort Union Formation	10-15-88	68.69
			10-13-89	68.30
21N20W24CAAA02	290	Pleistocene glacial till	10-10-88	10.85
			01-18-89	10.64
			04-11-89	14.05
			07-19-89	48.91
			10-05-89	8.91
21N23E13CBBB01	1,630	Upper Cretaceous Eagle Sandstone	09-24-89	+126.38
21N51E10ABCD01	131	Paleocene Tongue River Member of Fort Union Formation	10-13-88	15.34
			10-12-89	13.95
21N53E08ADCC01	70	Paleocene Tongue River Member of Fort Union Formation	10-14-88	26.35
			10-12-89	26.45
21N56E28ADDC01	220	Paleocene Tongue River Member of Fort Union Formation	10-15-88	87.63
			10-13-89	87.85

Table 7.--*Water levels in observation wells*--Continued

Local number	Depth of well	Aquifer	Date of measurement	Water level
20N22W30DADD01	155	Quaternary alluvium	10-11-88	3.27
			01-19-89	4.05
			04-14-89	4.46
			07-20-89	4.26
			10-11-89	4.03
20N20W26CCBD01	200	Pleistocene glaciolacustrine deposits	10-05-88	159.97
			01-18-89	160.28
			04-10-89	166.92
			07-19-89	167.80
			10-17-89	147.75
20N02E01AABA01	605	Upper Mississippian Madison Group	08-30-89	23.93
20N03E28CCCD01	85	Lower Cretaceous Flood Shale Member of Black Leaf Formation	08-30-89	39.60
20N03E32ADDC01	215	Lower Cretaceous Flood Shale Member of Black Leaf Formation	08-30-89	52.63
20N47E36ADDD01	220	Paleocene Tongue River Member of Fort Union Formation	10-14-88	46.56
			10-12-89	46.55
20N52E17BBBB01	180	Paleocene Tongue River Member of Fort Union Formation	10-14-88	75.68
			10-12-89	75.80
20N53E04DAAA01	280	Paleocene Tongue River Member of Fort Union Formation	10-14-88	141.75
			10-12-89	141.86
20N53E14BBCC01	206	Paleocene Tongue River Member of Fort Union Formation	10-14-88	87.43
			10-12-89	87.84
20N53E20CCCC01	259	Paleocene Tongue River Member of Fort Union Formation	10-14-88	139.88
			10-12-89	140.27
20N54E01DCDD01	220	Paleocene Tongue River Member of Fort Union Formation	10-15-88	40.33
			10-13-89	40.58
20N55E32AAAA01	200	Paleocene Tongue River Member of Fort Union Formation	10-15-88	156.34
			10-13-89	156.21
20N56E08DDCD01	223	Paleocene Tongue River Member of Fort Union Formation	10-15-88	138.46
			10-13-89	138.51
20N56E08DDCD02	180	Paleocene Tongue River Member of Fort Union Formation	10-15-88	109.10
			10-13-89	109.43
19N20W35AAA 01	54	Pleistocene glaciolacustrine deposits	10-05-88	44.95
			01-18-89	43.65
			04-06-89	43.75
			07-18-89	48.39
			10-05-89	44.50
19N03E01AABA01	65	Lower Cretaceous Kootenai Formation	08-30-89	42.97
19N06E23BADA01	75	Upper Jurassic Swift Formation of Ellis Group	08-30-89	42.82
19N06E26ACAD01	435	Upper Mississippian Madison Group	08-30-89	211.25
19N44E35DDDD01	140	Paleocene Tongue River Member of Fort Union Formation	10-14-88	39.88
			10-12-89	39.48
19N53E24CCDC01	220	Paleocene Tongue River Member of Fort Union Formation	10-14-88	143.64
			10-12-89	143.50
18N20W14DBDC01	30	Pleistocene glacial till	10-03-88	12.37
			01-17-89	14.59
			04-05-89	14.75
			07-18-89	12.49
			10-05-89	11.53
18N30E19BBBA01	1,003	Upper Cretaceous Judith River Formation of Montana Group	09-25-89	+43.63
18N38E20BBAB01	518	Upper Cretaceous Hell Creek Formation	10-13-88	39.78
			10-15-89	40.28
18N40E01DBBB01	159	Paleocene Fort Union Formation	10-13-88	33.64
			10-15-89	33.30
18N44E13AAAC01	278	Paleocene Tongue River Member of Fort Union Formation	10-14-88	95.76
			10-12-89	95.41
18N50E16CBBB01	161	Paleocene Lebo Shale Member of Fort Union Formation	10-14-88	46.79
			10-12-89	47.00

Table 7.--*Water levels in observation wells*--Continued

Local number	Depth of well	Aquifer	Date of measurement	Water level
17N47E16DDDD01	242	Paleocene Tongue River Member of Fort Union Formation	10-14-88	146.86
			10-12-89	152.86
16N44E25BBAA01	263	Paleocene Tongue River Member of Fort Union Formation	10-13-88	88.54
			10-15-89	88.55
16N44E25BBAB01	1,460	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-13-88	157.29
			10-15-89	157.44
16N44E25BBAC01	103	Paleocene Tongue River Member of Fort Union Formation	10-13-88	31.91
			10-15-89	30.71
16N50E06DDCD01	380	Paleocene Tongue River Member of Fort Union Formation	10-14-88	290.87
			10-12-89	290.82
16N51E36DCCC01	202	Paleocene Tullock Member of Fort Union Formation	10-14-88	152.09
			10-12-89	152.01
15N12W36BCDD01	206	Pleistocene glacial drift	10-25-89	104.84
15N19E09BABC01	90	Lower Cretaceous Third Cat Creek sandstone of Kootenai Formation	09-13-89	35.97
15N46E04BBBC01	160	Paleocene Tongue River Member of Fort Union Formation	10-13-88	109.23
			10-15-89	109.83
15N53E12ABAB01	317	Paleocene Lebo Shale Member of Fort Union Formation	10-13-88	132.69
			10-14-89	132.66
15N53E12ABAB02	193	Paleocene Tongue River Member of Fort Union Formation	10-13-88	81.69
			10-14-89	81.86
15N53E12ABAB03	172	Paleocene Tongue River Member of Fort Union Formation	10-13-88	78.70
			10-14-89	78.77
15N55E12ABDC01	675	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-13-88	57.70
			10-14-89	57.78
14N49E21AAAA01	440	Paleocene Tullock Member of Fort Union Formation	10-13-88	120.66
			10-15-89	121.26
13N19W29DADD01	84	Quaternary alluvium	10-25-89	53.25
13N51E31BCDD01	565	Upper Cretaceous Hell Creek Formation	10-13-88	+0.98
			10-15-89	0.41
13N51E31BCDD02	340	Paleocene Tullock Member of Fort Union Formation	10-13-88	107.36
			10-15-89	107.39
13N51E31BDCB01	860	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-13-88	29.81
			10-15-89	30.56
13N53E18ABAA01	62	Paleocene Tongue River Member of Fort Union Formation	10-13-88	41.53
			10-14-89	39.50
13N56E30CCBC01	100	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-17-88	39.54
			10-14-89	39.19
12N55E20DCCD01	1,185	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-17-88	80.43
			10-14-89	80.01
12N55E25CDCC01	1,275	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-17-88	43.93
			10-14-89	42.72
12N56E23CCDA01	1,449	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-17-88	243.25
			10-14-89	240.15
12N56E23DCCA01	1,195	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-17-88	271.42
			10-14-89	269.29
12N56E24CABD01	145	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-17-88	133.35
			10-14-89	133.37
12N56E25CBDB01	1,480	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-17-88	304.33
			10-14-89	300.98
12N56E34DAAC01	1,467	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-17-88	276.97
			10-14-89	273.41
11N03W30BBBC01	127	Quaternary alluvium	12-20-88	48.49
			09-01-89	39.17
11N03W30DADA01	44	Quaternary alluvium	09-01-89	1.05

Table 7.--*Water levels in observation wells*--Continued

Local number	Depth of well	Aquifer	Date of measurement	Water level
11N36E28BACD01	2,745	Lower Cretaceous Third Cat Creek sandstone of Kootenai Formation	10-12-88	+99.6
			10-16-89	+102.5
11N54E29CACD01	800	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-17-88	+47.75
11N57E21CDBB01	1,230	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-17-88	60.25
			10-14-89	59.81
10N07W30BBC 01	70	Tertiary System	10-26-89	32.47
10N04W02CBAA01	110	Cretaceous bedrock	10-11-88	37.37
			12-05-88	36.87
			01-04-89	37.02
			03-15-89	35.56
			05-01-89	34.52
			06-06-89	34.34
10N04W10DDDA01	23	Quaternary alluvium	12-20-88	8.55
			08-31-89	5.23
10N03W03BACB01	65	Quaternary alluvium	09-01-89	2.65
10N03W08BBAA01	23	Quaternary alluvium	09-01-89	8.49
10N03W09ACCC01	64	Quaternary alluvium	09-01-89	2.00
10N03W11DDCC01	40	Quaternary alluvium	12-20-88	23.81
			09-01-89	16.38
10N03W17ACAD01	28	Quaternary alluvium	09-01-89	17.46
10N03W22AAAA01	23	Quaternary alluvium	09-01-89	8.07
10N02W18DDCD01	70	Tertiary sediments	12-20-88	51.05
			09-01-89	45.36
10N36E06CACA01	195	Upper Cretaceous Judith River Formation of Montana Group	10-12-88	91.02
			10-16-89	86.84
10N45E28BBBA01	951	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-13-88	223.97
			10-15-89	224.68
10N45E28BBBA02	362	Paleocene Tullock Member of Fort Union Formation	10-13-88	111.28
			10-15-89	111.20
10N45E28BBBB01	762	Upper Cretaceous Hell Creek Formation	10-13-88	223.42
			10-15-89	224.14
10N55E25CDCD01	1,150	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-17-88	74.27
10N58E19ABBA01	166	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-17-88	126.35
			10-14-89	123.99
08N20W19BAAD03	52	Tertiary System	10-25-89	14.80
08N19W07CBBD01	117	Tertiary sediments	10-25-89	101.40
08N09W27BDDD01	94	Tertiary sediments	08-09-89	24.18
			08-16-89	24.31
			10-04-89	24.36
			10-18-89	24.57
08N31E36DDDD01	1,175	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-12-88	213.10
			10-17-89	215.30
08N31E36DDDD02	850	Upper Cretaceous Hell Creek Formation	10-12-88	209.11
			10-17-89	209.24
08N31E36DDDD03	486	Upper Cretaceous Hell Creek Formation	10-12-88	125.81
			10-17-89	128.32
08N50E18BDBC01	280	Paleocene Tullock Member of Fort Union Formation	10-18-88	42.77
			10-15-89	42.88
07N09W08ADD 01	13	Pleistocene alluvium	10-26-89	9.82
07N47E24AAD 01	50	Paleocene Fort Union Formation	10-13-88	33.91
			10-15-89	34.40
07N50E05CCBD01	700	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-18-88	397.93
			10-15-89	397.38

Table 7.--*Water levels in observation wells*--Continued

Local number	Depth of well	Aquifer	Date of measurement	Water level
07N57E24BBCB01	362	Paleocene Tongue River Member of Fort Union Formation	10-17-88	216.92
			10-14-89	216.84
06N20W19CCCC02	40	Quaternary alluvium	10-27-88	10.72
			12-21-88	14.13
			02-10-89	16.04
			03-15-89	16.26
			05-04-89	16.08
			07-26-89	6.54
			09-13-89	7.06
			10-24-89	10.31
06N44E36CACD01	902	Upper Cretaceous Fox Hills Sandstone	10-12-88	128.90
			10-16-89	128.77
06N44E36CACD02	609	Upper Cretaceous Hell Creek Formation	10-12-88	128.74
			10-16-89	128.81
06N44E36CACD03	316	Upper Cretaceous Hell Creek Formation	10-12-88	140.74
			10-16-89	140.93
05N01E27CCBB01	215	Tertiary sediments	10-07-89	97.17
05N25E16CCCC01	1,350	Upper Cretaceous Fox Hills Sandstone	10-12-88	535.0
			10-17-89	535.7
05N25E16CCCC02	427	Upper Cretaceous Hell Creek Formation	10-12-88	135.07
			10-17-89	159.65
05N55E23AADB01	1,080	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-17-88	37.47
			10-14-89	36.74
05N58E14BBBB01	360	Paleocene Tongue River Member of Fort Union Formation	10-17-88	96.94
			10-14-89	96.79
04N10W10DC 02	20	Pleistocene alluvium	10-04-88	5.13
			11-17-88	4.83
			01-05-89	4.56
			02-21-89	4.26
			05-11-89	4.59
			07-06-89	3.92
			08-16-89	4.41
			10-04-89	4.16
04N01E02BBCC01	191	Tertiary sediments	10-17-89	43.25
04N01E10BBCB01	447	Tertiary sediments	08-15-89	124.62
04N01E13BCAC01	209	Tertiary sediments	10-17-89	39.52
04N01E15BCBB01	348	Tertiary sediments	08-15-89	146.05
04N40E31DCAA01	199	Upper Cretaceous Hell Creek Formation	09-21-89	44.80
02N27E35DBAB01	5,070	Upper Mississippian Mission Canyon Limestone	10-17-88	+1,003.3
			01-19-89	+1,002.0
			03-22-89	+1,002.0
			05-08-89	+1,011.2
			06-16-89	+1,008.9
			08-03-89	+1,008.9
			09-11-89	+1,002.0
02N40E31DCCD01	165	Paleocene Tongue River Member of Fort Union Formation	09-21-89	108.96
02N43E24CCBC01	60	Quaternary alluvium	09-21-89	16.14
02N43E24CDDA01	21	Quaternary alluvium	09-21-89	10.65
01N04E25DCD 01	101	Quaternary alluvium	09-13-89	11.27
01N26E10ABBA01	193	Upper Cretaceous Eagle Sandstone	10-19-88	28.30
			10-17-89	28.09
01N41E21DBDB01	125	Paleocene Tongue River Member of Fort Union Formation	09-21-89	73.00
01N41E22CCAD01	72	Holocene spoil banks	09-21-89	23.58
01N41E26BCAB01	195	Paleocene Tongue River Member of Fort Union Formation	09-21-89	23.38
01N41E36DCBA01	150	Paleocene Tongue River Member of Fort Union Formation	09-21-89	135.75

Table 7.--*Water levels in observation wells*--Continued

Local number	Depth of well	Aquifer	Date of measurement	Water level
01N54E18DDAC01	8,422	Upper Mississippian Mission Canyon Limestone	10-04-88	+761.3
			10-17-88	+763.4
			10-18-88	+764.2
			10-19-88	+763.6
			12-07-88	+761.3
			01-25-89	+758.9
			03-01-89	+772.7
			04-12-89	+763.5
			05-18-89	+768.1
			06-29-89	+768.1
			08-09-89	+763.5
			09-27-89	+761.2
01N54E18DDBA01	400	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-18-88	44.32
			10-16-89	44.47
01S33E19DAA 01	25	Pleistocene terrace deposits	10-05-88	18.56
			09-21-89	18.00
01S33E24BCBC02	26	Quaternary alluvium	10-05-88	11.47
			09-20-89	11.15
02S41E19DABA01	43	Quaternary alluvium	09-21-89	7.59
02S44E35DAAB01	84	Quaternary alluvium	09-21-89	31.02
02S49E22DCCA04	118	Paleocene Tongue River Member of Fort Union Formation	10-05-88	77.70
			10-16-89	77.91
03S33E09DCC 01	74	Pleistocene terrace deposits	10-04-88	47.82
			11-22-88	47.40
			01-05-89	40.60
			02-21-89	41.92
			05-18-89	41.82
			06-28-89	42.76
			08-10-89	41.74
			09-06-89	40.02
03S33E16BBBB01	19	Quaternary alluvium	10-04-88	2.46
			11-22-88	2.76
			01-05-89	3.45
			02-21-89	4.14
			04-06-89	3.59
			05-18-89	3.81
			06-28-89	3.24
			08-10-89	2.71
			09-06-89	2.53
03S33E16BBBB02	46	Quaternary alluvium	10-04-88	31.13
			11-22-88	31.10
			01-05-89	31.10
			02-21-89	31.15
			04-06-89	31.20
			05-18-89	31.23
			06-28-89	31.26
			08-10-89	31.24
			09-06-89	31.22
03S35E18DABD01	400	Upper Cretaceous Parkman Sandstone of Montana Group	10-03-88	114.92
			09-19-89	109.69
03S44E09ADD 01	84	Quaternary alluvium	09-21-89	40.77
03S45E05DBAA01	148	Paleocene Tongue River Member of Fort Union Formation	09-21-89	50.48
04S06W16AAAA02	57	Tertiary sediments	10-26-89	28.67
04S06W35BBBB01	170	Tertiary sediments	10-26-89	+17.76
04S32E35AAAA01	39	Quaternary alluvium	10-04-88	10.24
			11-22-88	13.98
			01-05-89	15.42
			02-21-89	16.44
			04-06-89	16.56
			05-18-89	16.95
			06-28-89	8.67
			08-10-89	8.77
			09-06-89	9.74

Table 7.--*Water levels in observation wells*--Continued

Local number	Depth of well	Aquifer	Date of measurement	Water level
04S45E04BDDB01	68	Quaternary alluvium	10-07-88	9.52
			11-17-88	9.14
			12-28-88	8.72
			03-27-89	7.36
			06-30-89	8.30
			08-11-89	9.30
			09-21-89	10.00
			09-29-89	10.03
04S45E15BCDD01	60	Quaternary alluvium	09-21-89	12.68
04S45E28BDDD01	269	Paleocene Tongue River Member of Fort Union Formation	09-21-89	127.28
05S07W23ABA 01	20	Tertiary sediments	10-26-89	12.75
05S06W10BCCA01	200	Tertiary sediments	10-26-89	130.58
05S45E16ADDD01	320	Paleocene Tongue River Member of Fort Union Formation	09-21-89	145.29
05S45E23ABCA02	44	Quaternary alluvium	09-21-89	14.17
05S45E23BBAA01	169	Paleocene Tongue River Member of Fort Union Formation	09-21-89	36.61
05S45E23BBAA02	106	Paleocene Tongue River Member of Fort Union Formation	09-21-89	46.84
05S45E23BBAA03	65	Paleocene Tongue River Member of Fort Union Formation	09-21-89	47.77
05S51E10ABAB01	1,010	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-16-89	+4.1
06S08W26CCCA02	51	Tertiary sediments	10-26-89	28.97
06S41E08CCAC01	128	Paleocene Tongue River Member of Fort Union Formation	09-24-89	43.06
06S41E17ADDD01	19	Quaternary alluvium	09-24-89	16.12
06S41E25CDAC01	144	Paleocene Tongue River Member of Fort Union Formation	09-24-89	68.54
06S41E26BBDD01	23	Quaternary alluvium	09-24-89	19.75
06S41E29ADCA01	393	Paleocene Tongue River Member of Fort Union Formation	09-24-89	264.74
06S41E29ADCA02	322	Paleocene Tongue River Member of Fort Union Formation	09-24-89	237.77
06S41E34CDAA01	364	Paleocene Tongue River Member of Fort Union Formation	09-24-89	183.05
06S41E34CDAA02	155	Paleocene Tongue River Member of Fort Union Formation	09-24-89	93.52
06S42E31DBBA01	68	Quaternary alluvium	09-24-89	32.72
07S08W03BDC 02	40	Quaternary alluvium	10-07-88	16.05
			11-16-88	17.28
			12-29-88	17.66
			02-15-89	17.65
			04-05-89	18.04
			05-18-89	14.80
			06-29-89	14.98
			08-07-89	14.29
			09-21-89	15.69
07S08W17DDC 02	50	Tertiary sediments	10-05-88	27.47
			11-15-88	28.72
			12-29-88	30.53
			02-15-89	32.06
			04-04-89	33.10
			05-18-89	33.70
			06-29-89	27.85
			08-09-89	25.46
			09-21-89	27.78
07S44E34BAAD01	86	Paleocene Tongue River Member of Fort Union Formation	09-23-89	55.00
07S44E35DCCA01	213	Paleocene Tongue River Member of Fort Union Formation	09-22-89	149.67
07S44E35DCCA02	132	Paleocene Tongue River Member of Fort Union Formation	09-22-89	103.97
07S45E32CADD01	207	Paleocene Tongue River Member of Fort Union Formation	09-22-89	151.66
07S45E32CADD02	42	Paleocene Tongue River Member of Fort Union Formation	09-22-89	29.56
07S45E32DCBA02	18	Quaternary alluvium	09-22-89	8.84
07S49E13ABBB01	--	Upper Cretaceous Fox Hills-Hell Creek aquifer	10-18-88	+6.61

Table 7.--*Water levels in observation wells*--Continued

Local number	Depth of well	Aquifer	Date of measurement	Water level
07S49E28DAAC01	452	Paleocene Tullock Member of Fort Union Formation	10-16-89	90.15
07.5S40E32DBDA	120	Paleocene Tongue River Member of Fort Union Formation	09-24-89	70.98
08S09W01CCCC01	47	Tertiary sediments	10-03-88	27.17
			09-20-89	36.07
08S40E26ACBC01	172	Paleocene Tongue River Member of Fort Union Formation	09-24-89	67.54
08S42E06ADBA01	398	Paleocene Tongue River Member of Fort Union Formation	09-23-89	8.85
08S43E20DABA01	222	Paleocene Tongue River Member of Fort Union Formation	09-23-89	88.81
08S43E21BBDD03	13	Quaternary alluvium	09-23-89	6.81
08S43E21BDBB01	223	Paleocene Tongue River Member of Fort Union Formation	09-22-89	56.58
08S43E21BDBB02	146	Paleocene Tongue River Member of Fort Union Formation	09-23-89	48.09
08S43E23CACA03	29	Quaternary alluvium	09-23-89	15.23
08S43E23CDAA01	78	Paleocene Tongue River Member of Fort Union Formation	09-23-89	50.40
08S43E23CDAA02	329	Paleocene Tongue River Member of Fort Union Formation	09-23-89	166.62
08S43E31BBDA01	131	Paleocene Tongue River Member of Fort Union Formation	09-23-89	128.68
08S43E31BBDA02	257	Paleocene Tongue River Member of Fort Union Formation	09-23-89	243.67
08S44E02BACD01	15	Quaternary alluvium	09-22-89	9.68
08S44E03CBBD01	201	Paleocene Tongue River Member of Fort Union Formation	09-23-89	132.08
08S44E03CBBD02	129	Paleocene Tongue River Member of Fort Union Formation	09-23-89	74.44
08S44E09DABB01	28	Quaternary alluvium	09-22-89	23.65
08S44E12ACDC01	351	Paleocene Tongue River Member of Fort Union Formation	09-22-89	187.52
08S44E12ACDC02	252	Paleocene Tongue River Member of Fort Union Formation	09-22-89	127.70
08S44E12ADBC02	14	Quaternary alluvium	09-22-89	10.78
08S44E14ABAB01	337	Paleocene Tongue River Member of Fort Union Formation	09-23-89	219.27
08S44E14ABAB02	250	Paleocene Tongue River Member of Fort Union Formation	09-22-89	155.47
08S44E14ABAB03	161	Paleocene Tongue River Member of Fort Union Formation	09-22-89	110.15
08S44E19CBBB01	190	Paleocene Tongue River Member of Fort Union Formation	09-23-89	157.90
08S44E19CBBB02	130	Paleocene Tongue River Member of Fort Union Formation	09-23-89	77.30
08S44E19CBCB02	36	Quaternary alluvium	09-23-89	28.83
08S45E16DBCB01	188	Paleocene Tongue River Member of Fort Union Formation	09-22-89	85.27
08S45E16DBCB02	66	Paleocene Tongue River Member of Fort Union Formation	09-22-89	35.09
08S45E34BCBC01	253	Paleocene Tongue River Member of Fort Union Formation	09-22-89	126.46
08S46E17CBCD01	18	Quaternary alluvium	09-22-89	6.47
08S46E18DDAC01	18	Quaternary alluvium	09-22-89	8.44
08S46E27CDAB01	233	Paleocene Tongue River Member of Fort Union Formation	09-22-89	127.14
08S46E27CDAB02	138	Paleocene Tongue River Member of Fort Union Formation	09-22-89	91.63
08S46E32DDAC01	30	Quaternary alluvium	09-22-89	20.13
09S40E20BDAC01	380	Paleocene Tongue River Member of Fort Union Formation	09-24-89	256.09
09S42E01BCAD02	34	Quaternary alluvium	09-23-89	24.87
09S42E11BDAA01	222	Paleocene Tongue River Member of Fort Union Formation	09-23-89	144.25
09S43E04ABDD02	26	Quaternary alluvium	09-23-89	13.99
09S43E07CADB01	165	Paleocene Tongue River Member of Fort Union Formation	09-23-89	60.02
09S43E07CADB02	218	Paleocene Tongue River Member of Fort Union Formation	09-23-89	86.73

Table 7.--*Water levels in observation wells*--Continued

Local number	Depth of well	Aquifer	Date of measurement	Water level
09S43E21BADA01	229	Paleocene Tongue River Member of Fort Union Formation	09-23-89	95.16
09S43E21BADA02	135	Paleocene Tongue River Member of Fort Union Formation	09-23-89	49.64
09S43E22ACCA01	129	Paleocene Tongue River Member of Fort Union Formation	09-23-89	27.83
09S45E03DABB01	144	Paleocene Tongue River Member of Fort Union Formation	09-22-89	24.24
09S45E03DABB04	65	Paleocene Tongue River Member of Fort Union Formation	09-22-89	29.07
09S45E03DABB05	71	Paleocene Tongue River Member of Fort Union Formation	09-22-89	26.70
09S45E11ADDB01	307	Paleocene Tongue River Member of Fort Union Formation	09-22-89	240.89
09S45E11CCAA01	218	Paleocene Tongue River Member of Fort Union Formation	09-22-89	67.08
09S46E08BACB01	240	Paleocene Tongue River Member of Fort Union Formation	09-22-89	171.23
09S46E09ADCD01	176	Paleocene Tongue River Member of Fort Union Formation	09-22-89	110.07
09S46E09DABA01	110	Paleocene Tongue River Member of Fort Union Formation	09-22-89	95.17
09S46E09DABA02	209	Paleocene Tongue River Member of Fort Union Formation	09-22-89	156.23
09S46E09DBAB02	30	Quaternary alluvium	09-22-89	19.29
09S46E11BACC02	18	Quaternary alluvium	09-22-89	12.95
09S46E11BBAB01	262	Paleocene Tongue River Member of Fort Union Formation	09-22-89	150.90
09S46E11BBAB02	208	Paleocene Tongue River Member of Fort Union Formation	09-22-89	142.02

SPECIAL NETWORKS AND PROGRAMS

Hydrologic Bench-Mark Network is a network of approximately 60 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 natural or regional water-quality planning and management. The 500 or so sites in NASQAN are generally located at the downstream ends of hydrologic accounting units designated by the U.S. Geological Survey Office of Water Data Coordination in consultation with the Water Resources Council. The objectives of NASQAN are (1) to obtain information on the quality and quantity of water moving within and from the United States through a systematic and uniform process of data collection, summarization, analysis, and reporting such that the data may be used for, (2) description of the areal variability of water quality in the Nation's rivers through analysis of data from this and other programs, (3) detection of changes or trends with time in the pattern of occurrence of water-quality characteristics, and (4) providing a nationally consistent data base useful for water-quality assessment and hydrologic research. Stations in this network in this volume are listed below:

05020500	St. Mary River at international boundary
06054500	Missouri River at Toston, Mont.
06089000	Sun River near Vaughn, Mont.
06115200	Missouri River near Landusky, Mont.
06130500	Musselshell River at Mosby, Mont.
06174500	Milk River at Nashua, Mont.
06181000	Poplar River near Poplar, Mont.
06192500	Yellowstone River near Livingston, Mont.
06214500	Yellowstone River at Billings, Mont.
06294700	Bighorn River at Bighorn, Mont.
06308500	Tongue River at Miles City, Mont.
06326500	Powder River near Locate, Mont.
06329500	Yellowstone River near Sidney, Mont.
12353000	Clark Fork below Missoula, Mont.
12355000	Flathead River at Flathead, British Columbia
12363000	Flathead River at Columbia Falls, Mont.

The National Trends Network (NTN) is a network of stations 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 compostion 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-monitoirng 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 water year 1989 that began October 1, 1988, and ended September 30, 1989. 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 7 through 9. The following sections of the introductory text are presented to provide users with a more detailed explanation of how the hydrologic data published in this report were collected, analyzed, computed, and arranged for presentation.

Station Identification Numbers

Each data station, whether streamsite or well, in this report is assigned a unique identification number. This number 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. Generally, the "downstream-order" system is used for regular surface-water stations, the "latitude-longitude" system is used for surface-water stations where only miscellaneous measurements are made, and the rectangular-grid system is used for wells.

Downstream-Order System

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

The station-identification number is assigned according to downstream order. In assigning station numbers, no distinction is made between partial-record stations and other stations; therefore, the station number for apartial-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 06090300, which appears just to the left of the station name, includes the two-digit Part number "06" plus the six-digit downstream-order number "090300." The Part number designates the major river basin; for example, Part "06" is the Missouri River basin. All records for a drainage basin encompassing more than one State can be arranged in downstream order by assembling pages from the various State reports by station number to include all records in the basin.

Latitude-Longitude System

The identification numbers for 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 sites within a 1-second grid. This site-identification number, once assigned, is a pure number and has no locational significance. In the rare instance where the initial determination of latitude and longitude are found to be in error, the station will retain its initial identification number; however, its true latitude and longitude will be listed in the LOCATION paragraph of the station description. (See figure below.)

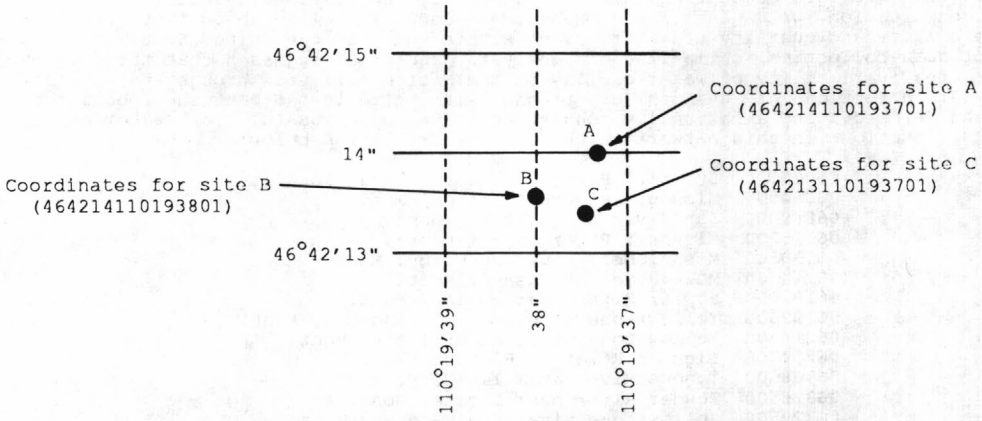


Figure 6.--System for numbering miscellaneous sites (latitude and longitude).

Rectangular-Grid System

In this report, wells are numbered according to geographic position within the rectangular-grid system of land subdivision. The location (local) number consists of as many as 14 characters. The first three characters specify the township and its position north (N) or south (S) of the Montana Base Line. The next three characters specify the range and its position west (W) or east (E) of the Montana Principal Meridian. The next two characters are the section number. The next one to four characters designate the quarter section (160-acre tract), quarter-quarter section (40-acre tract), quarter-quarter-quarter section (10-acre tract), and quarter-quarter-quarter-quarter section (2.5-acre tract), respectively, in which the well is located. The subdivisions of the section are designated A, B, C, and D in a counterclockwise direction, beginning in the northeast quadrant. The last two characters form a sequence number based on the order of inventory. For example, well 30N33W05ABAB01 is the first well inventoried in the NW1/4NE1/4NW1/4NE1/4 sec.5, T.30 N., R.33 W.

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."

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 Geological Survey as a result of experience accumulated since 1880. These methods are described in standard textbooks, in Water-Supply Paper 2175, and in U.S. Geological Survey Techniques of Water-Resources Investigations, Book 3, Chapter A6.

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

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

discharge relations that daily mean discharges must be estimated from other information such as temperature and precipitation records, notes of observations, and records for other stations in the same or nearby basins for comparable periods.

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

At some stream-gaging stations in Montana the stage-discharge relation is usually affected by ice from November to March, and it becomes impossible to compute the discharge in the usual manner. Discharge for periods of ice effect is computed on the basis of gage-height record and occasional winter discharge measurements. Consideration is given to the available information on temperature and precipitation, notes by gage observers and hydrologists, and comparable records of discharge for other stations in the same or nearby basins.

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 many stations, were determined by methods given in "River Mileage Measurement," Bulletin 14, Revision of October 1968, prepared by the Water Resources Council or were provided by the U.S. Army Corps of Engineers, or Montana Department of Natural Resources and Conservation, Water Resources Division.

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.--Previously, if a significant error in published records was discovered, a revision was published in the first report following discovery of the error. This paragraph then served to document for users all the reports in which revisions had been published for the station and the water years to which the revisions applied. However, beginning with the 1983 water year, revisions will no longer be published but appropriate changes will be made in WATSTORE files. All previous revisions are, of course, in WATSTORE, and users are encouraged to obtain all required data from the WATSTORE computer files (see the section, "Access to WATSTORE Data").

Under "Revised Records," a year listed without qualification indicates that daily, monthly, or annual discharges were revised. The qualifications (M), (m), and (P) mean only that the instantaneous maximum, the instantaneous or daily minimum, and flood peaks above the base, respectively, have been revised. A "W" for "WATSTORE" will be shown, replacing the name of the data report in which the revised values would previously have been published, for all revisions made after 1982. For example, the notation for indicating that the 1979 water-year daily values for a particular station in Montana have been revised during the 1983 water year would no longer be "WDR MT-83-1: 1979," but "W 1983: 1979." 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 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.

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

The daily table for stream-gaging stations gives mean discharge for each day and is followed by monthly and yearly summaries. In the monthly summary below the daily table, the line headed "TOTAL" gives the sum of the daily figures. The line headed "MEAN" gives the average flow in cubic feet per second during the month. The lines headed "MAX" and "MIN" give the maximum and minimum daily discharges, respectively, for the month. Discharge for the month also is usually expressed in cubic feet per second per square mile (line headed "CFSM"), or in inches (line headed "IN."), or in acre-feet (line headed "AC-FT"). Figures for cubic feet per second per square mile and runoff in inches are omitted if there is extensive regulation or diversion, if the drainage area includes large noncontributing areas, or if the average annual rainfall over the drainage basin is usually less than 20 inches. In the yearly summary below the monthly summary, the figures shown are the appropriate discharges for the calendar and water years. At some stations monthly and (or) yearly observed discharges are adjusted for reservoir storage or diversion, or diversions or reservoir contents are given. These figures are identified by a symbol and corresponding footnote.

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 ft^3/s; to the nearest tenth between 1.0 and 10 ft^3/s; to whole numbers between 10 and 1,000 ft^3/s; and to 3 significant figures for more than 1,000 ft^3/s. The number of significant figures used is based solely on the magnitude of the discharge value. No rounding rules apply to discharges listed for partial-record stations and miscellaneous sites. Listed discharges are those actually computed.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, figures of cubic feet per second per square mile and of runoff, in inches, are not published unless satisfactory adjustments can be made for diversions, for changes in contents of reservoirs, or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments

are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge.

Other Records Available

Information 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 Montana district office. Also, most of the daily mean discharges are in computer-readable form and have been analyzed statistically. Information on the availability of the unpublished information or on the results of statistical analyses of the published records may be obtained from the office whose address is given on the back of the title page of this report.

Publications

The annual series of water-supply papers that give information on quantity of surface waters in Montana are given in the following table. Data for the Hudson Bay basin is given in Part 5, for the Missouri River basin in Part 6, and for the Columbia River basin in Part 12.

Table 8.---*Water-supply paper numbers and parts for surface-water stations, 1899-1970*

Year	Part 5	Part 6	Part 12	Year	Part 5	Part 6	Part 12
1899	36	36,37	38				
1900	49	49	51,52				
1901	65,66,75	66,75	66,75	1936	805	806	812
1902	83,85	84	85	1937	825	826	832
1903	98,99,100	99	100	1938	855	856	862
1904	128,130	130	135	1939	875	876	882
1905	171	172	178	1940	895	896	902
1906	207	208	214	1941	925	926	932
1907	245	246	252	1942	955	956	962
1908	245	246	252	1943	975	976	982
1909	265	266	272	1944	1005	1006	1012
1910	285	286	292	1945	1035	1036	1042
1911	305	306	312	1946	1055	1056	1062
1912	325	326	332A	1947	1085	1086	1092
1913	355	356	362A	1948	1115	1116	1122
1914	385	386	392	1949	1145	1146	1152
1915	405	406	412	1950	1175	1176	1182
1916	435	436	442	1951	1208	1209	1216
1917	455	456	462	1952	1238	1239	1246
1918	475	476	482	1953	1278	1279	1286
1919	505	506	512	1954	1338	1339	1346
1920	505	506	512	1955	1388	1389	1396
1921	525	526	532	1956	1438	1439	1446
1922	545	546	552	1957	1508	1509	1516
1923	565	566	572	1958	1558	1559	1566
1924	585	586	592	1959	1628	1629	1636
1925	605	606	612	1960	1708	1709	1716
1926	625	626	632	1961-65	1913	1916	1933
1927	645	646	652	1966-70	2113	2116	2133
1928	665	666	672				
1929	685	686	692				
1930	700	701	707				
1931	715	716	722	1950	1308	1309	1316
1932	730	731	737	Compilation			
1933	745	746	752				
1934	760	761	767	1960	1728	1729	1736
1935	785	786	792	Compilation			

Records of Surface-Water Quality

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

Classification of Records

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

A 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 8.

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.

Onsite Measurements and Sample Collection

In obtaining water-quality data, a major concern needs to be assuring that the data obtained represent the in place quality of the water. To assure this, certain measurements, such as water temperature, pH, and dissolved oxygen, need to be made onsite when the samples are taken. To assure that measurements made in the laboratory also represent the in place 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 Geological Survey Montana 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. Most 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. Samples for analysis of the water-sediment mixture are collected using modified suspended-sediment samplers. All samples obtained for the National Stream Quality Accounting Network (see definitions) are obtained from at least several verticals.

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 Geological Survey Montana 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 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 and those taken manually once daily are on file in the Montana district office.

Sediment

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

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

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

In addition to the records of 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

Sediment samples, samples for indicator bacteria, and daily samples for specific conductance are analyzed locally. All other samples are analyzed in the Geological Survey laboratory in Arvada, Colorado, or the Montana Bureau of Mines and Geology laboratory in Butte, Montana. Methods used in analyzing sediment samples and computing

sediment records are given in TWRI, Book 5, Chap. C1. Methods used by the Geological Survey laboratory are given in TWRI, Book 1, Chap. D2; Book 3, Chap. C2; Book 5, Chap. A1, A3, and A4.

In March 1989 the National Water-Quality Laboratory discovered a bias in the turbidimetric method for sulfate analysis, indicating that values below 75 mg/L have a median positive bias of 2 mg/L above the true value for the period between 1982 and 1989. Sulfate values in this report have not been corrected for this bias.

Data Presentation

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

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

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

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

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

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

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

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

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

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

Table 9.--*Descriptor values for weather conditions*

0	Cloudless	70	Snow or sleet
1	Partly cloudy	71	Slight snow in flakes, intermittent
2	Cloudy	72	Slight snow in flakes, continuous
3	Overcast	73	Moderate snow in flakes, intermittent
10	Precipitation within sight	74	Moderate snow in flakes, continuous
13	Ugly, threatening sky	75	Heavy snow in flakes, intermittent
40	Fog	76	Heavy snow in flakes, continuous
50	Drizzle	77	Snow and fog
51	Slight drizzle, intermittent	78	Granular snow (frozen drizzle)
52	Slight drizzle, continuous	79	Ice crystals
53	Moderate drizzle, intermittent	80	Showers
54	Moderate drizzle, continuous	81	Slight or moderate rain shower (s)
55	Thick drizzle, intermittent	82	Heavy rain shower (s)
56	Thick drizzle, continuous	83	Slight or moderate snow shower (s)
57	Drizzle and fog	84	Heavy snow shower (s)
58	Slight or moderate drizzle and rain	85	Slight or moderate rain and snow shower (s)
59	Thick drizzle and rain	86	Heavy rain and snow shower (s)
60	Rain	87	Granular snow shower (s)
61	Slight rain, intermittent	88	Slight or moderate hail or rain and hail shower (s)
62	Slight rain, continuous	90	Thunderstorm
63	Moderate rain, intermittent	93	Slight thunderstorm with rain or snow
64	Moderate rain, continuous	94	Slight thunderstorm with hail
65	Heavy rain, intermittent	95	Moderate thunderstorm with rain or snow
66	Heavy rain, continuous	96	Moderate thunderstorm with hail
67	Rain and fog	97	Heavy thunderstorm with rain or snow
68	Slight or moderate mixed rain and snow	99	Heavy thunderstorm with hail
69	Heavy mixed rain and snow		

Remark Codes

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

PRINTED OUTPUT	REMARK
E	Estimated value
>	Actual value is known to be greater than the value shown
<	Actual value is known to be less than the value shown
K	Results based on colony count outside the acceptance range (non-ideal colony count)

Publications

The annual series of water-supply papers that give information on quality of surface waters in Montana are shown in the following table. Data for Hudson Bay and Missouri River basins are given in parts 5-6 and data for Upper Columbia River basin are given in part 12.

Table 10.--*Water-supply paper numbers and parts for water-quality stations, 1947-70*

Year	Parts 5-6	Part 12	Year	Parts 5-6	Part 12
1946	1050	----	1959	1643	1645
1947	1102	----	1960	1743	1745
1948	1132	----	1961	1883	1885
1949	1162	1163	1962	1943	1945
1950	1187	1189	1963	1949	1951
1951	1198	1200	1964	1956	1959
1952	1251	1253	1965	1963	1966
1953	1291	1293	1966	1993	1996
1954	1351	1353	1967	2013	2016
1955	1401	1403	1968	2095	2100
1956	1451	1453	1969	2145	2150
1957	1521	1523	1970	2155	2160
1958	1572	1574			

Records of Ground-Water Levels

Only water-level data from a national network of observation wells are given in this report. These data are intended to provide a sampling and historical record of water-level changes in the Nation's most important aquifers. Locations of the observation wells in this network in Montana are shown in figure 9.

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. Water-level records are obtained primarily from direct measurements with a steel tape.

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.

Publications

Publication of ground-water level data for the United States in water-supply papers was begun by the Geological Survey in 1935. From 1935 through 1939, a single water-supply paper for each year covering the entire nation was issued (Water-Supply Papers---777, 817, 840, 845, and 886). From 1940 through 1974, separate water-supply papers were issued for 6 sections of the United States. Water-level data for Montana are in the water-supply papers listed in the following table, each report containing one or more calendar years (January-December) of data. Data in this report are for the 12-month water year ending September 30.

Table 11.--*Water-supply paper numbers and parts for ground-water stations for northwestern United States, 1940-1974*

Year	WSP No.	Year	WSP No.	Year	WSP No.
1940	910	1947	1100	1954	1325
1941	940	1948	1130	1955	1408
1942	948	1949	1160	1956-60	1760
1943	990	1950	1169	1961-65	1845
1944	1020	1951	1195	1966-70	1980
1945	1927	1952	1225	1971-74	2161
1946	1075	1953	1269		

Information about reports and other data on ground water in Montana may be obtained from the district office, at the address given on the back of the title page.

ACCESS TO WATSTORE DATA

The U.S. Geological Survey is the principal Federal water-data agency and, as such, collects and disseminates about 70 percent of the water data currently being used by numerous State, local, private, and other Federal agencies to develop and manage our water resources. As part of the U.S. Geological Survey's program of releasing water data to the public, a large-scale computerized system has been developed for the storage and retrieval of water data collected through its activities. The National Water Data Storage and Retrieval System (WATSTORE) was established in 1972 to provide an effective and efficient means for the processing and maintenance of water data collected through the activities of the U.S. Geological Survey and to facilitate release of the data to the public. A variety of useful products, ranging from data tables to complex statistical analyses such as Log Pearson Type III, can be produced using WATSTORE. The system resides on the central computer facilities of the U.S. Geological Survey at its National Center in Reston, Virginia, and consists of related files and data bases.

* Station Header File - Contains descriptive information on over 440,000 sites throughout the United States and its territories where the U.S. Geological Survey collectes or has collected data.

* Daily Values File - Contains over 220 million daily values of streamflows, stages, reservoir contents, water temperatures, specific conductances, sediment concentrations, sediment discharges, and ground-water levels.

* Peak Flow File - Contains approximately 500,000 maximum (peak) streamflow and gage-height values at surface-water sites.

* Water-Quality Data - Contains approximately 2 million analyses of water samples that describe the chemical, physical, biological, and radio-chemical characteristics of both surface and ground water.

* Ground-Water Site Inventory Data Base - Contains inventory data for over 900,000 wells, springs, and other sources of ground water. The data includes site location, geohydrologic characterisitcs, well-construction history, and one-time field measurements such as water temperature.

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

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

In addition to providing direct access to WATSTORE, data can be provided in various machine-readable formats on magnetic tape or 5-1/4 inch floppy disk. Information about the availability of specific types of data or products, and user charges, can be obtained locally from each of the Water Resources Division's district offices. (See address on the back of the title page.)

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.

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

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

Fecal streptococcal bacteria are bacteria found 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.

Non-ideal colony count (K) is a remark code used in reporting bacteria densities when plate counts fall outside of an ideal range. The lower limit of 20 colonies is set as the number below which statistically valid results become increasingly questionable. The upper limit, which differs according to type of bacteria, represents numbers above which interference from colony crowding, deposition of extraneous material, and other factors appear to result in increasingly questionable results.

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

Bottom material: See Bed material.

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

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 or to prevent the intrusion of salt water.

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

Cubic foot per second (ft^3/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 (cfs-day) is the volume of water represented by a flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, approximately 1.9835 acre-feet, about 646,000 gallons, or 2,447 cubic meters.

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.

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

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

Dissolved refers to that material in a representative water sample which passes through a 0.45 µm membrane filter. This is a convenient operational definition used by Federal agencies that collect water data. Determination 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 ($CaCO_3$).

Hydrologic Bench-Mark Network is a network of approximately 60 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.

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.

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

Less than (<) is a remark code indicating that the analyzed value was found to be less than the numeric value listed. The value associated with the "<" remark indicates the detection limit of the applied laboratory.

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

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

Micrograms per liter (UG/L, µg/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.

Microsiemens per centimeter at 25 degrees Celsius (µS/cm) is a unit for reporting specific electrical conductance.

Milligrams per liter (MG/L, 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 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.

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

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

Organism is any living entity.

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

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

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

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:

Classification	Size (mm)	Method of analysis
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 logarithmic units. The pH value of a solution is the negative logarithm of the hydrogen-ion activity, in moles per liter.

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

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

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

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

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

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.

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

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

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

Suspended-sediment discharge (tons/day) is the rate at which dry 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^3/s) x 0.0027.

Suspended-sediment load is a general term that refers to material in suspension. It 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 degrees Celsius. 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-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.G.S. 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 planimetered. All areas shown are those for the stage when the planimetered map was made.

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

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

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

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

Total, recoverable 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.

Turbidity of a sample is the reduction of transparency due to the presence of particulate matter. In this report it is expressed in Nephelometric turbidity units (NTU), obtained from the Nephelometric method for turbidity determination which measures the intensity of light scattered by suspended particles at 90 degrees from the path of an incident light source.

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

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 abbreviaton for "Water-Supply Paper" in reference to previously published reports.

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS

The U.S. Geological Survey publishes a series of manuals describing procedures for planning and conducting specialized work in water-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-D2. *Application of seismic-refraction techniques to hydrologic studies*, by F. P. Haeni: USGS--TWRI Book 2, Chapter D2. 1988. 86 pages.

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

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

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

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

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

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

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

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

3-A7. *Stage measurements at gaging stations*, by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3. Chapter A7. 1968. 28 pages.

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

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

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

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

3-A12. *Fluorometric procedures for dye tracing*, by J. F. Wilson, Jr., E. D. Cobb, and F. A. Kilpatrick: USGS--TWRI Book 3, Chapter A12. 1986. 41 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-A16. *Measurement of discharge using tracers*, by F. A. Kilpatrick and E. D. Cobb: USGS--TWRI Book 3, Chapter A16. 1985. 52 pages.

3-A17. *Acoustic velocity meter systems*, by Antonius Laenen: USGS--TWRI Book 3, Chapter A17. 1985. 38 pages.

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

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS--Continued

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

3-B2. *Introduction to ground-water hydraulics, a programmed text for self-instruction*, by G. D. Bennett: USGS--TWRI Book 3, Chapter B2. 1976. 172 pages.

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

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

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

3-C1. *Fluvial sediment concepts*, by H. P. Guy: USGS--TWRI Book 3, Chapter C1. 1970. 55 pages.

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

3-C3. *Computation of fluvial-sediment discharge*, by George Porterfield: USGS--TWRI Book 3, Chapter C3. 1972. 66 pages.

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

4-A2. *Frequency curves*, by H. C. Riggs: USGS--TWRI Book 4, Chapter A2. 1968. 15 pages.

4-B1. *Low-flow investigations*, by H. C. Riggs: USGS--TWRI Book 4, Chapter B1. 1972. 18 pages.

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

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

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

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

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

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

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

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

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

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

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

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. Schaffrannek, 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.

DISCONTINUED STREAMFLOW-GAGING AND WATER-QUALITY STATIONS

The following continuous-record streamflow-gaging and water-quality stations have been discontinued or converted to partial-record stations. Daily surface-water records and water-quality data for each station were collected and published for the water years shown below. Parentheses indicate former station name. Some stations have not been assigned station numbers. [--, no data]

Station number	Station name	Drainage area (square miles)	Period of record	
			Surface water	Water quality
	Part 5--Hudson Bay Basin			
05010000	Belly River at international boundary	74.8	1947-64	
05010500	North Fork Belly River at international boundary	10.1	1947-55	
05010700	Mountain View Irrigation District Canal near Mountain View, Alberta	--	1935-78	
05011000	Belly River near Mountain View, Alberta	121	1912-78	
05011500	Waterton River near international boundary	61.0	1947-64	
05012000	Street Creek at international boundary	6.0	1948-55	
05012500	Boundary Creek at international boundary	21.0	1948-64	
05013000	Waterton River near Waterton Park, Alberta	238	1908-33,1948-78	
05013500	St. Mary Lake near St. Mary	130	1929-61	
05013600	St. Mary River near St. Mary	130	1961-62	
05013700	St. Mary River above Swiftcurrent Creek, near Babb	177	1902-15	
05013900	Grinnell Creek at Grinnell Glacier, near Many Glacier	1.1	1959-71	
05014000	Grinnell Creek near Many Glacier	3.32	1949-78	
05014500	Swiftcurrent Creek at Many Glacier	31.4		1964,1966-69, 1971
05015000	Canyon Creek near Many Glacier	7.2	1918-37	
05016500	Swiftcurrent Creek near Babb	100	1902-10	
05017000	Lower St. Mary Lake near Babb	276	1929-55	
05017500	St. Mary River near Babb	278		1965
05018000	St. Mary Canal at intake, near Babb	--	1918-50	
05019000	St. Mary Canal at Hudson Bay Divide, near Browning	--	1917-66	1965,1981-83
05019500	St. Mary River below St. Mary Canal, near Babb	279	1929-50	
05020000	Kennedy Creek near Babb	60.6	1905-06	
	Part 6--Missouri River Basin			
06010000	Red Rock River near Lakeview	237	1933-37	
06010500	Red Rock River at Metzel Fork, near Monida	264	1925-29	
06011000	Red Rock River at Kennedy Ranch, near Lakeview	323	1936-67	
06011500	Red Rock River above Lima Reservoir, near Monida	431	1911,1914-18, 1925,1930	
06013000	Red Rock River at Lima	602	1907-11	
06013500	Big Sheep Creek below Muddy Creek, near Dell	278	1936,1946-53, 1977-79	1977-79
06014000	Red Rock River near Dell	1,421	1942-67	
06014500	Red Rock River at Red Rock	1,548	1951-52,1974-83	
06015000	Horse Prairie Creek near Grant	325	1946-53	
06015400	Beaverhead River near Grant	2,322	1962-83	1966-68
06015500	Grasshopper Creek near Dillon	348	1921-33,1946-54, 1955-58,1960-61	1986
06016000	Beaverhead River at Barretts	2,737		1949-51,1965-78, 1986
06016500	Rattlesnake Creek near Dillon	23.9	1946-49	
06017000	Beaverhead River at Dillon	2,895	1951-52,1963-71	
06017500	Blacktail Deer Creek near Dillon	312	1946-54,1955-66	
06017600	Blacktail Deer Creek at Dillon	--		1986
06018000	Beaverhead River near Dillon	3,484	1951-52,1963-83	
06018500	Beaverhead River near Twin Bridges (at Blaine)	3,619		1950-51,1962-81, 1986
06019000	Ruby River above Warm Springs Creek, near Alder	145	1948-53	
06020000	Ruby River at damsite, near Alder	592	1911-14,1935-37	
06021000	Ruby River near Alder	614	1929-39,1946-61	
06021500	Ruby River at Laurin	650	1946-61	
06022000	Ruby River below Ramshorn Creek, near Sheridan	843	1946-53	
06022500	Ruby River near Sheridan	863	1946-51	
06023000	Ruby River near Twin Bridges	935	1940-43,1946-65, 1979-81	1965,1979-81, 1986
06023500	Big Hole River near Jackson	44.0	1948-54	
06024000	Miner Creek near Jackson	17.6	1948-54	
06024500	Trail Creek near Wisdom	72.6	1948-54,1966-72	
06024580	Big Hole River near Wise River	1,611	1979-81	1980-81
06024590	Wise River near Wise River	214	1973-85	
06025000	Big Hole River near Dewey	1,990	1910-13	
06025700	Willow Creek diversions to Birch Creek, near Glen	--	1946-53,1955-66	
06025800	Willow Creek near Glen	35.6	1962-66	1962-65
06026000	Birch Creek near Glen	36.0	1946-53,1955-76	1958-62
06026210	Big Hole River near Glen	2,655		1966-68
06026400	Big Hole River near Twin Bridges	2,762	1979-81	1967,1980-81, 1986
06026500	Jefferson River near Twin Bridges	7,632	1940-43,1958-72	1957-62,1965-72
06027000	Jefferson River near Silver Star	7,683	1910-16,1920-39	
06027200	Jefferson River at Silver Star	7,683	1972-74	1973-74
06027500	Beall Creek near Waterloo	5.63	1941-42	
06028000	Big Pipestone Creek near Whitehall	108	1910-11	

DISCONTINUED STREAMFLOW-GAGING AND WATER-QUALITY STATIONS--Continued

Station number	Station name	Drainage area (square miles)	Period of record	
			Surface water	Water quality
	Part 6--Missouri River Basin--Continued			
06028500	Little Pipestone Creek near Whitehall	30.7	1935-40	
06028700	Big Pipestone Creek at Whitehall	--		1986
06029000	Whitetail Creek near Whitehall	30.8	1949-54,1955-68	
06029500	Little Whitetail Creek near Whitetail	91.0	1911	
06030000	Whitetail Creek at Whitehall	179	1911	
06030500	Boulder River above Rock Creek, near Basin	19.4	1936,1946-53, 1955-57	
06031000	Rock Creek at CCC Camp, near Bernice	9.87	1936	
06031500	Boulder River at Basin	219	1921-23	
06032000	Boulder River near Basin	296	1919-20	
06032500	Muskrat Creek near Boulder	6.09	1912-14	
06033500	North Fork Little Boulder River near Boulder	18.8	1926-27	
06033900	Boulder River near Cardwell	--		1986
06034000	South Boulder River near Jefferson Island	27.5	1926-33	
06034300	South Boulder River near Cardwell	--		1986
06034500	Jefferson River at Sappington	9,277	1895-1905,1938-69	
06035500	Norwegian Creek near Harrison	22.4	1938-43,1946-51	
06036500	Willow Creek near Willow Creek	165	1919-33,1946-53, 1955-57	1986
06036650	Jefferson River near Three Forks	9,532		1980-81,1986-87
06037700	South Fork Madison River above Denny Creek, near West Yellowstone	--		1987-88
06038500	Madision River below Hebgen Lake, near Grayling	905		1986-88
06038800	Madison River at Kirby Ranch, near Cameron	1,065		1960
06039000	West Fork Madison River near Lakeview	11.9	1936	
06039200	West Fork Madison River near Cameron	220	1965-67	1986,1988
06039500	Madison River at Lyon	1,346	1928-32	
06040000	Madison River near Cameron	1,669	1952-63,1968-70	1988
06040010	Blaine Spring Creek near Cameron	3.42	1971-72	
06040300	Jack Creek near Ennis	51.5	1973-86	1980
06040400	Meadow Creek near McAllister	--		1986
06041300	Warm Springs Creek near Norris	72.5		1986
06041500	Madison River near Norris	2,288	1890-93,1910	
06041700	Cherry Creek near Norris	--		1986
06042000	Madison River below Cherry Creek, near Norris	2,387	1897-1905	
06042500	Madison River near Three Forks	2,511	1893-97,1928-32, 1941-50	
06042600	Madison River at Three Forks	--		1986-87
06043000	Taylor Creek near Grayling	98.0	1946-54,1955-57, 1966-67	
06043500	Gallatin River near Gallatin Gateway	825		1986
06044000	Gallatin River near Salesville	833	1895-1905,1910-13, 1921-23	
06044100	Wilson Creek near Gallatin Gateway	5.33	1951-53	
06044200	West Fork Wilson Creek near Gallatin Gateway	3.81	1951-53	
06044300	Big Bear Creek near Gallatin Gateway	13.2	1951-53	
06044400	Little Bear Creek near Gallatin Gateway	3.87	1951-53	
06044500	South Cottonwood Creek near Gallatin Gateway	21.9	1951-53	
06045000	Gallatin River at Axtell Bridge, near Gallatin Gateway	927	1950-54	
06045200	Fish Creek near Gallatin Gateway	--	1952-53	
06045300	Yellow Dog Creek near Belgrade	6.85	1952-53	
06045350	Godfrey Creek near Belgrade	6.32	1951-53	
06045400	Baker Creek near Manhattan	--	1951-53	
06045500	Gallatin River near Belgrade	965	1950-54	
06046000	Gallatin River near Manhattan	970	1950-54	
06046100	Ridgley Creek near Manhattan	--	1951-53	
06046300	Camp Creek near Belgrade	34.5	1951-53	
06046400	Randall Creek near Manhattan	--	1951-53	
06046500	Rocky Creek near Bozeman	49.0	1951-53	
06047000	Bear Canyon near Bozeman	17.0	1951-53	
06047500	Sourdough Creek near Bozeman	28.2	1951-53	
06048000	East Gallatin River at Bozeman	148	1939-61	
06048500	Bridger Creek near Bozeman	62.5	1946-69,1971-72, 1987	
06048600	Lyman Creek near Bozeman	1.75	1951-53	
--	Churn Creek near Bozeman	--	1953	
06048800	Deer Creek near Bozeman	--	1953	
06048900	East Gallatin River near Belgrade	--	1951-53	
06049000	Middle Cottonwood Creek near Bozeman	4.25	1951-53	
06050100	Hyalite Creek near Belgrade	--	1951-52	
06050200	Bostwick Creek near Belgrade	5.04	1951-53	
06050400	Thompson Creek near Belgrade	--	1951-53	
06050450	Ben Hart Creek near Belgrade	--	1951-53	
06050500	Ross Creek near Belgrade	1.25	1951-53	
06050700	Truman Creek near Belgrade	2.94	1951-53	
06051000	Reese Creek near Belgrade	21.5	1951-53	
06051200	Bear Creek near Belgrade	4.30	1951-53	
06051300	Foster Creek near Belgrade	--	1953	
06051500	Dry Creek at Andrus Ranch, near Manhattan	96.2	1952-53	
06051700	Reynolds (Quagle) Creek near Manhattan	--	1952-53	
06052000	Dry Creek at Brownell Ranch, near Manhattan	104	1951	

DISCONTINUED STREAMFLOW-GAGING AND WATER-QUALITY STATIONS--Continued

Station number	Station name	Drainage area (square miles)	Period of record	
			Surface water	Water quality
	Part 6--Missouri River Basin--Continued			
06052050	Story Creek near Manhattan	--	1951-53	
06052050	Story Creek near Manhattan	--	1951-53	
06052100	Cowan Creek near Manhattan	--	1951-53	
06052200	Gibson Creek near Manhattan	--	1951-53	
06052300	Bull Run Creek near Manhattan	--	1951-53	
06052500	Gallatin River at Logan	1,795		1951-52,1956-57, 1965,1979-86
06053000	Sixteenmile Creek at Ringling	79.0	1950-55	
06053400	Sixteenmile Creek near Toston	--		1986
06053500	Broadwater East Canal near Toston	--	1941-49	
06054000	Broadwater West Canal near Toston	--	1941-49	
06055000	Crow Creek near Townsend	48.6	1912-13	
06056500	Deep Creek near Townsend	65.4	1910-15	
06057000	Missouri River near Townsend	15,343	1891-1904	
06057500	Lake Sewell near Helena	15,894	1936-53	
06058000	Missouri River at Canyon Ferry	15,894	1889	
06058502	Missouri River below Canyon Ferry Dam, near Helena	15,904		1968-87
06059000	Dutchman Creek near Alhambra	9.78	1921-24	
06059500	Warm Springs Creek at Alhambra	20.6	1921-24	
06060000	Clancy Creek at Clancy	33.1	1921-23	
06060500	Lump Gulch at Foley's Ranch, near Clancy	33.0	1921-24	
06061000	Lump Gulch at Zastrow's Ranch, near Clancy	43.4	1908-13	
06061500	Prickly Pear Creek near Clancy	192		1950
06062000	Prickly Pear Creek at East Helena	251	1908-13	
06062500	Tenmile Creek near Rimini	32.7		1981
06063000	Tenmile Creek near Helena	102	1908-54	1948,1950-51
06063500	Sevenmile Creek at Birdseye	31.9	1908-13	
06064000	Sevenmile Creek near Helena	--	1908	
06065500	Missouri River below Hauser Lake Dam, near Helena	16,876	1922-42	
06067000	Little Prickly Pear Creek above Deadman Creek, near Marysville	20.1	1909-11	
06067500	Deadman Creek near Marysville	9.52	1909-11	
06068000	Lost Horse Creek near Marysville	13.1	1909-11	
06068500	Little Prickly Pear Creek near Marysville	44.4	1913-33	
06069000	Marsh Creek near Marysville	6.07	1909-12	
06070000	Canyon Creek near Canyon Creek	73.8	1921-23	
06070500	Cottonwood Creek near Canyon Creek	16.5	1921-22	
06071000	Little Prickly Pear Creek near Canyon Creek	183	1909-24	
06071080	Sieben Ranch ditch below Clark Creek, near Wolf Creek	--		1962-67
06071100	Little Prickly Pear Creek at Sieben Ranch, near Wolf Creek	270	1962-67	1962-67
06071130	Little Prickly Pear Creek above Medicine Rock Creek, near Wolf Creek	--		1962-67
06071180	Medicine Rock Creek near Wolf Creek	--		1962-65,1967
06071200	Lyons Creek near Wolf Creek	29.9		1962-67
--	Little Prickly Pear Creek above Sheep Creek, near Wolf Creek	--		1964
06071240	Sheep Creek near Wolf Creek	--		1962,1964-67
06071290	Wolf Creek at Wolf Creek	--		1962-67
06071300	Little Prickly Pear Creek at Wolf Creek	381	1962-67	1962-67
06071500	Missouri River at Craig	17,739	1890-92	
06072000	Dearborn River above Falls Creek, near Clemons	69.6	1908-12	
06072500	Falls Creek near Clemons	37.6	1908-12	
06073000	Dearborn River near Clemons	123	1921-23,1929-53	
06073500	Dearborn River near Craig	325	1946-69	
06074000	Missouri River at Cascade	18,493	1902-15,1953	
06074500	Smith River near White Sulphur Springs	30.7	1923-31,1934-36	
06075500	Smith River above Fivemile Creek, near White Sulphur Springs	73.2	1934-43	
06076000	Newland Creek near White Sulphur Springs	6.74	1946-54	
06076500	Newland Creek near damsite, near White Sulphur Springs	44.8	1950-57	
06077000	Sheep Creek near White Sulphur Springs	42.8	1941-72	1980
06077500	Smith River near Eden	1,594	1951-69	
06078000	Smith River at Truly	2,006	1905-07,1929-32	
06079000	South Fork Sun River near Augusta	252	1911-12	
06080000	Sun River near Augusta	609	1889-91,1904-40	1972
--	Willow Creek Feeder Canal	--	1967-68	
06080700	Spring Valley Canal below Spring Valley drop, near Fairfield	--	1967-68	
06080800	Spring Valley Canal above Upper Turnbull drop, near Fairfield	--	1967-68	
--	Greenfield Canal below drop, near Fairfield	--	1950-51	
06080900	Sun River below diversion dam, near Augusta	609	1967-80	1968-79
06081000	Floweree Big Canal near Augusta	--	1912	
06081500	Willow Creek near Augusta	96.1	1905-25	
06082200	Sun River below Willow Creek, near Augusta	827	1967-74	
06082500	Smith Creek near Augusta	25.0	1906-13	
06083500	Ford Creek near Augusta	19.4	1906-13	
06084000	Smith Creek below Ford Creek, near Augusta	74.0	1946-52	
06084500	Elk Creek at Augusta	157	1905-25	
06085000	Crown Butte Canal at Riebling	--	1912	
06085500	Crown Butte Canal near Simms	--	1912	
06085800	Sun River at Simms	1,320	1953,1964,1966-79	
06086000	Sun River at Fort Shaw	1,417	1912-28	
06086500	Sun River Canal at Sun River	--	1912	
06087000	Sun River Canal at Vaughn	--	1912	

DISCONTINUED STREAMFLOW-GAGING AND WATER-QUALITY STATIONS--Continued

Station number	Station name	Drainage area (square miles)	Period of record	
			Surface water	Water quality
	Part 6--Missouri River Basin--Continued			
06087500	Sun River at Sun River	1,454	1905-12	
06087850	Sun River above Muddy Creek, near Vaughn	1,526		1972
06088000	Muddy Creek near Power	137	1935-40,1982-83	
06085800	Sun River at Simms	1,320	1953,1964,1966-79	
06086000	Sun River at Fort Shaw	1,417	1912-28	
06086500	Sun River Canal at Sun River	--	1912	
06087000	Sun River Canal at Vaughn	--	1912	
06087500	Sun River at Sun River	1,454	1905-12	
06087850	Sun River above Muddy Creek, near Vaughn	1,526		1972
06088000	Muddy Creek near Power	137	1935-40,1982-83	
06088100	Spring Coulee near Power	30.4	1982-83	
06088200	Tank Coulee near Power	31.0	1982-83	
06088300	Muddy Creek near Vaughn	282	1968-87	1968-82
06088500	Muddy Creek at Vaughn	314		1967-68,1972-82
06090000	Missouri River at Great Falls	22,294	1890,1894-95, 1910-11	
06090100	Missouri River at Black Eagle Dam	--		1951
06090500	Belt Creek near Monarch	368	1951-82	1977-81
06090600	Belt Creek near Belt	700	1905-07	
06090610	Belt Creek near Portage	799	1980-83	1981-83
06090700	Highwood Creek near Highwood	57.8	1905-06	
06090720	Highwood Creek near Portage	122	1980-83	1981-83
06090800	Missouri River at Fort Benton	24,740		1965,1969-73, 1980-86
06091000	Two Medicine River near East Glacier	51.1	1912-13,1918-24, 1962-64	
06091500	Two Medicine River at Midvale	--	1902-03	
06091850	Two Medicine Canal wasteway to Mission Lake, near Blackfoot	--		1971
06091852	Mission Lake near Blackfoot	--		1971-75
06091853	Spring Creek at Mission Lake outlet, near Cut Bank	--		1971
06091900	Two Medicine Canal near Cut Bank	--		1955-56
06092000	Two Medicine River near Browning	317	1907-25,1951-77	1955-56
06092500	Badger Creek near Browning	133	1951-73	
06093300	Badger Canal near Dupuyer	--		1955-56
06093500	Badger Creek near Family	239	1907-25	
06093600	Two Medicine River near Cut Bank	--		1982-84
06094500	Birch Creek at Swift Dam, near Dupuyer	75.3	1913-29	
06095000	Birch Creek near Dupuyer	105	1907-37	
06096000	Birch Creek at Nelson's Ranch, near Dupuyer	111	1914-26	
06096500	Birch Creek at Hall's Ranch, near Dupuyer	122	1913-20	
06097000	Birch Creek at Robare	128	1914-26	
06097200	Blacktail Creek near Dupuyer	--		1982-84
06097500	Dupuyer Creek at Dupuyer	65.7	1908-13	
06098000	Dupuyer Creek near Valier	137	1912-37	
06098100	Birch Creek near Valier	471	1978-83	1978-83
06098500	Cut Bank Creek near Browning	123	1918-25	
06098900	Big Rock Coulee near Santa Rita	--		1982-84
06099100	Spring Creek near Cut Bank	--		1982-84
06099500	Marias River near Shelby	3,242		1947-53
06100000	Dry Fork Marias River near Valier	131	1911-15	
06100500	Dry Fork Marias River at Fowler	314	1921-31	
06101000	Willow Creek near Devon	310	1921-25	
06101200	Willow Creek near Galata	839	1977-82	
06101500	Marias River near Chester	4,927		1964-72,1978-86
06101560	Pondera Coulee near Chester	598	1976-85	
06102000	Marias River near Brinkman	6,425	1922-56	
06102050	Marias River near Loma	6,995	1960-72	
06102500	Teton River near Farmington	105	1947-55	
06103000	Teton River at Strabane	128	1904-06,1908-25	
06103500	McDonald Creek near Strabane	5.17	1913-14,1917-20	
06104000	McDonald Creek near Choteau	10.4	1917-20	
06104500	Teton River near Choteau	221	1906,1913-19	1955-57
06105000	Deep Creek at Frazer's Ranch, near Choteau	37.7	1912	
06105500	Willow Creek near Choteau	88.2	1912-17	
06106000	Deep Creek near Choteau	223	1911-25	
06106200	Priest Butte Lake drain near Choteau	--		1955-57
06106500	Muddy Creek near Bynum	71.1	1912-25	
06107000	North Fork Muddy Creek near Bynum	61.3	1912-25	
06107500	Muddy Creek near Agawam	274	1917	
06108000	Teton River near Dutton	1,308		1954-57
06108500	Teton River near Fort Benton	1,989	1929-32	
06109000	Missouri River at Loma	34,221	1935-53	
06109500	Missouri River at Virgelle	34,379		1975-85
06109750	Middle Fork Judith River below Lost Fork, near Utica	108	1972-75	
06109775	Middle Fork Judith River at Ranger Station, near Utica	--		1964
06109780	Middle Fork Judith River near Utica	160	1972-79	
06109800	South Fork Judith River near Utica	58.7	1958-79	
06110000	Judith River near Utica	328	1920-75	
06111000	Ross Fork Creek near Hobson	337	1946-54,1955-62	
06111500	Big Spring Creek near Lewistown	20.9	1932-57	
06111750	Big Spring Creek below Casing Creek, at Lewistown	140		1967-68

DISCONTINUED STREAMFLOW-GAGING AND WATER-QUALITY STATIONS--Continued

Station number	Station name	Drainage area (square miles)	Period of record	
			Surface water	Water quality
	Part 6--Missouri River Basin--Continued			
06111850	Big Spring Creek at Hanover	260		1967-68
06112000	Cottonwood Creek near Lewistown	45.6	1946-51	
06112100	Cottonwood Creek near Moore	47.7	1957-63	
06112500	Sage Creek at Windham	58.6	1920-22	
06113000	Judith River near Lewistown	1,939	1910-11	
06113500	Judith River near Winifred	2,160	1929-32	
06114000	Wolf Creek at Neubert Ranch, near Stanford	79.2	1920-26	
06114500	Wolf Creek near Stanford	112	1950-53,1955-62	
06115000	Missouri River at Power Plant Ferry, near Zortman	40,763	1934-68	
06115500	North Fork Musselshell River near Delpine	31.4	1940-79	
06116000	North Fork Musselshell River at Delpine	48.6	1909-12,1922-32	
06116900	Checkerboard Creek near Delpine	21.1	1909-15	
06117000	Checkerboard Creek at Delpine	23.6	1922-32	
06117500	Spring Creek near Martinsdale	32.5	1922-24	
06118000	North Fork Musselshell River at Martinsdale	233	1907-14	
06118500	South Fork Musselshell River above Martinsdale	287	1942-79	
06119500	South Fork Musselshell River near Martinsdale	300	1907-15,1930-32	
06120000	Big Elk Creek at Twodot	98.3	1953-56	
06121000	American Fork near Harlowton	94.6	1907-14,1924-32	
06121500	Lebo Creek near Harlowton	59.1	1907-14,1924-32	
06122000	American Fork below Lebo Creek, near Harlowton	166	1946-67	
06123000	Musselshell River at Shawmut	1,496	1902-07	
06123500	Musselshell River near Ryegate	1,979	1946-79	
06124000	Careless Creek near Living Springs	21.2	1920-23	
06124500	West Careless Creek near Living Springs	23.5	1920-21	
06125000	Roberts Creek at Hedgesville	322	1920-23	
06125500	Careless Creek at Wallum	471	1934-42	
06125700	Big Coulee Creek near Lavina	232	1957-72	
06126450	Rehder Creek near Klein	23.1		1978-81
06126470	Halfbreed Creek near Klein	53.2		1978-81,1984
06126500	Musselshell River near Roundup	4,023		1978-81
06127150	East Parrot Creek near Roundup	20.2		1978-81
06127160	West Parrot Creek near Roundup	20.5		1978-81
06127300	Fattig Creek near Delphia	22.9		1978-81
06127600	Musselshell River near Mosby	5,941	1963-66	1963-66
06127900	Flatwillow Creek near Flatwillow	188	1911-32,1934-56	
06128200	Flatwillow Creek near Winnett	642	1921-32,1948-52	
06129000	Box Elder Creek near Winnett	684	1930-33,1934-38, 1958-72	
06129500	McDonald Creek at Winnett	421	1930-32,1934-45, 1953-56	
06130000	Flatwillow Creek near Mosby	1,855	1964-66	1964-66
06130680	Big Dry Creek at Jordan	521		1976-77
06130700	Sand Creek near Jordan	317	1957-67	
06130935	Crow Rock Creek near Cohagen	213		1978-80
06130950	Little Dry Creek near Van Norman	1,224	1980	1976-77
06131000	Big Dry Creek near Van Norman	2,554		1978,1981
06131120	Timber Creek near Van Norman	287		1976-79
06131200	Nelson Creek near Van Norman	100	1976-85	1976-79
06132000	Missouri River below Fork Peck Dam	57,556		1964,1975-87
06132500	Milk River near international boundary, near Browning	287	1905-31	1964
06132700	Milk River near Del Bonita	325	1962-65	
06133000	Milk River at western crossing of international boundary	397		1973,1984-86
06133500	North Fork Milk River above St. Mary Canal, near Browning	61.8		1965,1973-74, 1982-83
06134000	North Milk River near international boundary	91.6		1965,1973-74, 1981,1984-86
06134500	Milk River at Milk River, Alberta	1,036		1965
06134850	Milk River near Writing-on-Stone Provincial Park	1,690	1978-83	
06134950	Milk River near Pendant D'Oreille	2,330	1978-83	
06135000	Milk River at eastern crossing of international boundary	2,588		1965-66,1973-74, 1984-86
06135500	Sage Creek at Q Ranch, near Wild Horse, Alberta	175	1935-83	1965
06136000	Sage Creek at international boundary	220	1946-84	
06136700	Milk River below Fresno Dam, near Havre	3,400	1952-53	1950
06137000	Milk River above Havre	3,826	1928-33	
06137500	Big Sandy Creek near Big Sandy	83.3	1946-51	
06137540	Duck Creek near Box Elder	--		1982-84
06137550	Camp Creek near Box Elder	7.2		1983-84
06137570	Boxelder Creek near Rocky Boy	48.2		1977-81,1983-84
06137575	Boxelder Creek at Box Elder	67.1		1983
06138000	Sage Creek near Kremlin	914	1946-51	
06138300	Sage Creek near Box Elder	985		1983-84
06138500	Big Sandy Creek near Box Elder	1,629	1927-39	
06138570	Big Sandy Creek above Gravel Coulee, near Laredo	1,639		1982-84
06139000	Big Sandy Creek near Laredo	1,752	1918-20	
06139900	Beaver Creek at reservation boundary, near Rocky Boy	16.1		1982-84
06140000	Beaver Creek near Havre	87.4	1918-21	
06140500	Milk River at Havre	5,844		1964-72
06141000	Boxelder Creek near Havre	23.7	1919-22	

DISCONTINUED STREAMFLOW-GAGING AND WATER-QUALITY STATIONS--Continued

Station number	Station name	Drainage area (square miles)	Period of record	
			Surface water	Water quality
	Part 6--Missouri River Basin--Continued			
06141500	Boxelder Creek at P.X. Ranch, near Havre	33.3	1918	
06142000	Clear Creek near Bearpaw	69.6	1918-22	
06142500	Fort Belknap Canal near Chinook	--	1903-21	
06143000	Milk River at Lohman	6,166	1918-26,1934-51	
06144000	Paradise Valley Canal near headgate, near Chinook	--	1906-08,1920-21	
06144100	Walburger Coulee near Govenlock, Saskatchewan	--	1963-79	
06144250	Lodge Creek at Alberta boundary	342	1951-62,1963-67	
06144300	Lodge Creek below Spangler Project, near Govenlock, Saskatchewan	--	1963-66	
06144400	Middle Creek near Battle Creek, Saskatchewan	177	1963-72	
06144500	Lodge Creek at international boundary	753	1910-52	
06145000	McRae Creek at international boundary	59.0	1927-52	
06146000	North Chinook Canal near Havre	--	1921-24,1928-68	
06146500	Reser Ditch near Chinook	--	1905-06	
06147000	West Fork Ditch near Chinook	--	1905-07	
06147500	Lodge Creek at Chinook	1,175	1906-08	
06148000	Battle Creek above Cypress Lake west inflow canal, near West Plains, Saskatchewan	270	1939-66	
06150000	Woodpile Coulee near international boundary	60.2	1927-77	
06150500	East Fork Battle Creek near international boundary	89.5	1927-76	
06152000	Cook Canal near Chinook	--	1905-19	
06152500	Matheson Canal near Chinook	--	1905-22,1928-49, 1951-60	
06153000	Paradise Valley Canal near Chinook	--	1903-19	
06153500	Harlem Canal near Zurich	--	1904-21	
06154100	Milk River near Harlem	9,822		1960-69
06154150	White Bear Creek below Fifteenmile Creek, near Dodson	--		1982-84
06154390	Peoples Creek near Cleveland	--		1982-84
06154400	Peoples Creek near Hays	220		1960-61,1963
06154500	Peoples Creek near Dodson	670	1918-22,1951-73, 1982-88	1982-88
--	Milk River above Dodson Dam	--	1952	
06155005	Dodson North Canal near Malta	--		1973
06155010	Dodson North Canal near Malta	--		1973
06155500	Milk River at Malta	11,762	1902-22,1952	
06155510	Milk River near Malta	--		1973
--	Milk River near Saco	--	1952	
06156000	Whitewater Creek near international boundary	458	1927-80	1977-80
06158000	Frenchman River above Eastend Reservoir, near Ravenscrag, Saskatchewan	601	1912-18,1937-67	
06160500	Frenchman River at Morrison's, near Eastend, Saskatchewan	800	1937-55	
06160600	Frenchman River below Eastern Irrigation Project, near Eastend, Saskatchewan	832	1937-55,1962-75	
06161000	Frenchman River at 50-mile, near Bracken, Saskatchewan	1,248	1914-31,1935-55	
06163400	Denniel Creek near Val Marie, Saskatchewan	251	1963-77	
06163500	Frenchman River below Val Marie, Saskatchewan	1,725	1937-53,1963-76	
06164500	Frenchman Canal near Saco	--	1921,1928-68	
06164590	Beaver Creek near Zortman	10.1		1984
06164620	Little Warm Creek near Lodge Pole	--		1982-83
06164630	Big Warm Creek near Zortman	8.58	1983-87	1983-84
06164640	Big Warm Creek near Lodge Pole	--		1982-83
06164800	Beaver Creek above Dix Creek, near Malta	929	1967-69,1976-82	
06165000	Beaver Creek near Malta	1,010	1917-21	
06165500	Beaver Creek overflow near Bowdoin	--	1903-13	
06166000	Beaver Creek below Guston Coulee, near Saco (Beaver Creek near Bowdoin)	1,208		1980-85
06166500	Beaver Creek near Saco	1,224	1903-06,1908-13	
06167000	Beaver Creek near Brady's Ranch, at Ashfield	1,327	1918	
06167100	Beaver Creek above dam, near Saco	1,238		1982-85
06167500	Beaver Creek near Hinsdale	1,785	1918-21,1952	
06168000	Bowray Ditch near Barnard	--	1914	
06168500	Rock Creek at international boundary	241	1914-16,1927-62	
06169000	Horse Creek at international boundary	73.5	1914-62	
06169600	South Creek tributary near Opheim	2.15	1983-87	
06169700	South Creek tributary No. 2 near Opheim	1.62	1983-87	
06169800	South Creek tributary No. 3 near international boundary	.32	1983-87	
06170000	McEachern Creek at international boundary	182	1924-77	1978-80
06170050	Rock Creek below McEachern Creek, near international boundary	650	1983-87	
06170080	Starbuck Coulee near international boundary	4.16	1983-87	
06170200	Willow Creek near Hinsdale	283	1965-73	
06170500	Rock Creek Canal near Hinsdale	--	1918-20	
06171000	Rock Creek near Hinsdale	1,313	1906-07,1912-20	
06171500	Milk River at Hinsdale	20,897	1908-14,1952	
06172000	Milk River near Vandalia	20,926	1915-25,1928-39, 1952	
06172000	Milk River at Vandalia	20,944	1970-73,1983-86	1970-73
06172200	Buggy Creek near Tampico (Lime Creek)	105	1958-67	
06172310	Milk River at Tampico	21,078		1974-77
--	Milk River at Glasgow	--	1952	
06172500	Sheepshed Reservoir	11.3	1955-67	
06173000	Halfway Reservoir	16.2	1955-62	

DISCONTINUED STREAMFLOW-GAGING AND WATER-QUALITY STATIONS--Continued

Station number	Station name	Drainage area (square miles)	Period of record	
			Surface water	Water quality
	Part 6--Missouri River Basin--Continued			
06173500	Burnett Northwest Reservoir	5.0	1954-59,1960-67	
06174000	Willow Creek near Glasgow	538	1954-87	1954-64
06174200	Milk River near Glasgow	23,200	1952	1969-73
06174550	Middle Fork Porcupine Creek near Baylor	--		1982-83
06174700	West Fork Porcupine Creek near Baylor	--		1982-83
06175400	Frazer Reservoir outlet near Frazer	--		1959-74
06175500	Little Porcupine Creek at Frazer	280	1909-16,1918-19	
06175505	Little Porcupine Creek below diversion, at Frazer	--		1982-84
06175540	Prairie Elk Creek near Oswego	352	1975-85	1976-79
06175580	Sand Creek near Wolf Point	--		1976-77
06176000	Wolf Point ditch at Wolf Point	--	1909-10	
06176500	Wolf Creek near Wolf Point	251		1982-84
06177000	Missouri River near Wolf Point	82,290		1948-51,1961-62, 1965-68,1970-73, 1979-85
06177025	Tule Creek near Poplar	--		1982,1984
06177150	Redwater River at Brockway	216		1980,1982-83
06177400	McCune Creek near Circle	29.9	1982-85	
06177500	Redwater River at Circle	547		1975-85
06177520	Horse Creek near Circle	101		1977-79
06177650	Redwater River near Richey	1,071	1982-86	1982-85
06177700	Cow Creek tributary near Vida	1.71	1982-85	
06177825	Redwater River near Vida	1,974	1975-85	1976-85
06178150	Poplar River near Scobey	572		1975-80
06179000	East Fork Poplar River near Scobey	722	1935-40,1975-79	
06179500	West Fork Poplar River at international boundary	139	1931-53	1976-83
06180000	West Fork Poplar River near Richland	428	1935-49	
06180200	West Fork Poplar River near Four Buttes	--		1975-76
06180500	Poplar River near Bredette	2,940	1934-47	1980
06181500	Big Muddy Creek at international boundary	29.0	1949-52	
06182000	Beaver Creek near international boundary	185	1949-53	
06182500	Big Muddy Creek at Daleview	279	1947-72	
06183000	Big Muddy Creek at Plentywood	850	1948-53	
06183500	Big Muddy Creek at Reserve	1,044	1920-25,1950-53	
06183900	Wolf Creek near Reserve	--		1982-84
06184000	Wolf Creek near Medicine Lake	165	1918-19	
06184400	Smoke Creek near Flaxville	--		1982-84
06184500	Smoke Creek near Poplar	283	1918	
06185000	Big Muddy Creek near Culbertson	2,447	1908-22	
06185150	Hardscrabble Creek near Culbertson	121		1981-83
06185500	Missouri River near Culbertson	91,557		1946,1965-86
	Part 6--Yellowstone River Basin			
06186000	Yellowstone Lake at Bridge Bay, Yellowstone National Park	1,006	1921-86	
06186500	Yellowstone River at Yellowstone Lake outlet, Yellowstone National Park	1,006		1984-85
06187000	Yellowstone River near Canyon Hotel, Yellowstone National Park	1,157	1913-51	
06187500	Tower Creek at Tower Falls, Yellowstone National Park	50.4	1922-43	
06187550	Yellowstone River at Tower Junction, Yellowstone National Park	1,342	1984-86	1984-85
06188500	East Fork Blacktail Deer Creek near Mammoth, Yellowstone National Park	10.3	1938-41	
06189500	Bear Creek at Jardine	40.8	1946-49	
06190000	Lupine Creek near Mammoth, Yellowstone National Park	4.67	1938-41	
06190500	Gardner River at Mammoth, Yellowstone National Park	200	1922-39	
06191800	Big Creek near Emigrant	60.9	1973-79,1983-85	
06192000	Mill Creek near Pray	148	1951-56	
06193000	Shields River near Wilsall	87.8	1935-57	
06193500	Shields River at Clyde Park	543	1921-23,1929-32, 1934-67	1965
06194000	Brackett Creek near Clyde Park	57.9	1921-23,1934-57	
06194500	Canyon Creek near Chadbourn	21.5	1923	
06195000	Bangtail Creek at Chadbourn	13.3	1923	
06195500	Willow Creek near Chadbourn	29.7	1923	
06196000	North Fork Big Timber Creek near Big Timber	36.6	1907-12	
06196500	South Fork Big Timber Creek near Big Timber	28.1	1907-11	
06197000	Big Timber Creek near Big Timber	74.9	1912-24	
06197020	Big Timber Creek near mouth, near Big Timber	--		1965
06197500	Boulder River near Contact	226	1910-16,1929, 1950-69,1970-74, 1981-83	1971-73
06198000	East Fork Boulder River near McLeod	85.6	1907-10,1982-83	
06198500	West Fork Boulder River near Bruffeys	91.6	1904-10	
06199000	West Boulder River at McLeod	135	1907-14	
06199500	Boulder River near McLeod	476	1912-14	
06200000	Boulder River at Big Timber	523		1965
06200400	Sweet Grass Creek near Melville	46.3	1907-12	
06200500	Sweet Grass Creek above Melville	54.4	1913-25,1937-69	

DISCONTINUED STREAMFLOW-GAGING AND WATER-QUALITY STATIONS--Continued

Station number	Station name	Drainage area (square miles)	Period of record	
			Surface water	Water quality
	Part 6--Yellowstone River Basin--Continued			
06201000	Sweet Grass Creek below Melville	143	1907-24,1937-43, 1946-52	
06201500	Sweet Grass Creek near Greycliff	367	1941-42	
06201800	Stillwater River above Woodbine Creek, near Nye	160	1924-27	
06202000	Woodbine Creek near Nye	19.4	1924-27	
06202500	Stillwater River near Nye	180	1929-32	
06202530	Stillwater River above West Fork, near Nye	--		1971-73
06202597	Castle Creek near Nye	--		1973
06202598	West Fork Stillwater River below Castle Creek, near Nye	122		1971-73
06202600	Stillwater River at Nye	337	1969-77	1970
06202610	Stillwater River at Beehive	371		1971-73
06203000	East Rosebud Creek near Roscoe	105	1920-21	
06203500	East Rosebud Creek at Roscoe	125	1921-24	
06204300	Butcher Creek near Absarokee	39.6	1960-62	1960
06204500	Rosebud Creek near Absarokee	394	1935-69	
06204700	Rosebud Creek at Absarokee	401	1910-14	
06205200	Yellowstone River at Laurel	8,189		1974-79
06205450	Clarks Fork Yellowstone River at Montana-Wyoming State line, near Cooke City	--		1975-77
06207510	Big Sand Coulee at Wyoming-Montana State line	134	1973-81	1973-81
06207520	Silver Tip Creek below Amoco dam, near Belfry	--		1972
06207523	Silver Tip Creek below Sinclair oil field, near Belfry	--		1972
06207530	Silver Tip Creek above Gobblers Draw, near Belfry	--		1971
06207540	Silver Tip Creek near Belfry	88.0	1968-75	1969-75
06207700	North Fork Bluewater Creek near Bridger	--		1961-70
06207800	Bluewater Creek near Bridger	28.1	1960-70	1960-70
06207850	Bluewater Creek at Sanford Ranch	43.9		1960-70
06207870	Bluewater Creek near Fromberg	46.6		1960-70
06207900	Bluewater Creek at Fromberg	53.2	1961-64	1960-70,1980
06208000	Clarks Fork Yellowstone River at Fromberg	1,940	1905-14	
06208400	Elbow Creek near Joliet	48.6	1984	1984
06208500	Clarks Fork Yellowstone River at Edgar	2,032		1972-73
06208800	Clarks Fork Yellowstone River near Silesia	2,093	1970-87	1977-84
06209000	Glacier Lake near Red Lodge	3.77	1939-47,1960-64	
06209010	Rock Creek below Glacier Lake, near Red Lodge	3.89	1960-64	
06209500	Rock Creek near Red Lodge	124	1932-82,1985-86	
06210000	West Fork Rock Creek below Basin Creek, near Red Lodge	63.1	1937-57	
06210500	West Fork Rock Creek, near Red Lodge	66.9	1932-44	
06213000	Red Lodge Creek near Boyd	234	1932-37	
06213500	Rock Creek at Joliet	539	1946-53	
06214050	Clarks Fork Yellowstone River near Laurel	2,783		1969-73
06214100	Yellowstone River near Laurel	11,060		1969-72
06215000	Pryor Creek above Pryor	39.6	1921-25,1967-74	
06215500	Lost Creek near Pryor	9.72	1921-24	
06216500	Pryor Creek near Billings	440	1911-24,1938-54	
06217000	Pryor Creek at Huntley	606	1904-17	
06217500	Yellowstone River at Huntley	12,840	1908-16	1951-52,1971-81
06217750	Fly Creek at Pompey's Pillar	285	1969-81	1969-81
06217950	Buffalo Creek near Custer	221	1980-83	
06218000	Yellowstone River at Junction (at Custer)	14,427	1906-08	1969-70
06286258	Big Coulee near Lovell, Wyoming	30.1	1970-78	
06286270	Porcupine Creek near Lovell, Wyoming	135	1964-67	
06286340	Dry Head Creek near Pryor	58.0	1965-66	
06286350	Dry Head Creek above Hoodoo Creek, near Pryor	80.0	1966-68	
06286370	Big Bull Elk Creek near St Xavier	35.0	1965-68	
06286390	Black Canyon Creek near St. Xavier	52.0	1965-66	
06286395	Black Canyon Creek below Three Springs Creek, near St. Xavier	75.0	1966-68	
06286500	Bighorn Canal below wasteway, near St. Xavier	--	1947-52	
06287000	Bighorn River near St. Xavier	19,667		1963-81
06287500	Soap Creek near St. Xavier	98.3	1911-14,1939-53, 1968-72	
06287700	Soap Creek near mouth, near St. Xavier	111	1914-24	
06288000	Rotten Grass Creek near St. Xavier	147	1911-22,1968-73	
06288200	Beauvais Creek near St. Xavier	100	1967-78	1967-78
06288500	Bighorn River near Hardin	20,722	1904-25,1928-33	
06288960	Little Bighorn River near Parkman, Wyoming	137	1970-72	
06288990	West Fork Little Bighorn River near Parkman, Wyoming	38.2	1970-72,1983-87	
06289500	Little Bighorn River near Wyola	251	1912-24	
06290500	Little Bighorn River below Pass Creek, near Wyola	428		1970-75,1977
06292000	Lodge Grass Creek near Wyola	88.9	1921-24	
06292500	Lodge Grass Creek near Lodge Grass	143	1912-16,1921-24	
06293000	Lodge Grass Creek at Lodge Grass	170	1916-20	
06293500	Little Bighorn River near Crow Agency	1,181	1912-24,1928-33, 1938-60	
06293900	Little Bighorn River at Crow Agency	1,190	1905-06	
06294600	East Cabin Creek tributary near Hardin	8.63	1982-85	
06294690	Tullock Creek near Bighorn	446	1975-82	
06294700	Bighorn River at Bighorn	22,885	1945-81	
06294840	Yellowstone River at Myers	37,680		1974-77
06294920	East Fork Sarpy Creek near Colstrip	--		1981-83
06294940	Sarpy Creek near Hysham	453	1973-84	1975-84

DISCONTINUED STREAMFLOW-GAGING AND WATER-QUALITY STATIONS--Continued

Station number	Station name	Drainage area (square miles)	Period of record	
			Surface water	Water quality
	Part 6--Yellowstone River Basin--Continued			
06294950	Starved to Death Creek near Sanders	36.9	1980-85	
06294980	East Fork Armells Creek near Colstrip	97.3		1975-85
06294991	West Fork Armells Creek near Forsyth	48.2		1975-77
06295000	Yellowstone River at Forsyth	40,339		1974-82
06295110	Rosebud Creek at Kirby	116		1978-79
06295113	Rosebud Creek at reservation boundary, near Kirby	123		1980-84
06295250	Rosebud Creek near Colstrip	799		1975-85
06295350	Greenleaf Creek near Colstrip	30.5		1975-76
06295380	Cow Creek near Colstrip	27.2		1980-85
06295400	Rosebud Creek above Pony Creek, near Colstrip	961		1975-78
06295420	Snider Creek near Brandenberg	11.9		1978-81
06295500	Rosebud Creek near Rosebud	1,193	1938-43	1975-77
06296000	Rosebud Creek near Forsyth	1,279	1947-54	
06296100	Snell Creek near Hathaway	10.5	1982-85	
06296120	Yellowstone River near Miles City	42,847		1969-84
06306000	Tongue River near Acme, Wyoming	894	1939-57	
06306100	Squirrel Creek near Decker	33.6	1975-86	1976-85
06306250	Prairie Dog Creek near Acme, Wyoming	358	1971-79	
06306500	Tongue River near Decker	1,585	1928-38	
06306800	Deer Creek near Decker	38.3		1975-77
06306900	Spring Creek near Decker	34.7		1978-82
06306950	South Fork Leaf Rock Creek near Kirby (Leaf Rock Creek near Kirby)	4.53	1982-85	
06307510	Fourmile Creek near Birney	22.3		1975-76
06307525	Prairie Dog Creek above Jack Creek, near Birney	6.57	1979-82	1978-83
06307528	Prairie Dog Creek near Birney	19.6	1979-84	1978-83
06307530	Bull Creek near Birney	45.8		1975-76
06307540	Hanging Woman Creek at State line, near Otter	90.2		1980-83
06307545	Waddle Creek near Otter	51.0		1980-83
06307550	Trail Creek near Otter	17.4		1980-83
06307560	East Trail Creek near Otter	31.3	1976-81	1977-81
06307563	Corral Creek near Otter	26.5		1980-83
06307567	Horse Creek near Birney	16.0		1980-83
06307570	Hanging Woman Creek below Horse Creek, near Birney	321		1978-83,1986-87
06307610	Tongue River below Hanging Woman Creek, near Birney	2,533		1974-79
06307615	Cook Creek near Birney	62.6		1975-77
06307665	Otter Creek near Otter	40.9		1978-84
06307670	Bear Creek at Otter	90.4		1975-77
06307717	Otter Creek below Fifteenmile Creek, near Otter	453	1982-86	1982-85
06307725	Otter Creek above Tenmile Creek, near Ashland	466		1978-81
06307730	Threemile Creek near Ashland	51.5		1975-76
06307735	Home Creek near Ashland	58.7		1977-83
06307737	East Fork Otter Creek near Ashland	--		1983-84
06307800	Tongue River near Ashland	3,830	1956-73	
06307810	Beaver Creek near Ashland	92.3		1974-76
06307830	Tongue River below Brandenberg Bridge, near Ashland	4,062	1973-84	1974-81
06307840	Liscom Creek near Ashland	47.6		1975-77
06307890	Foster Creek near Volborg	116		1975-77
06308000	Tongue River near Miles City	4,539	1929-33	
06308080	Pumpkin Creek near Sonnette	70.7		1976-77
06308160	Pumpkin Creek near Loesch	170		1976-79
06308170	Little Pumpkin Creek near Volborg	101		1976-77
06308190	Pumpkin Creek near Volborg	386		1976-85
06308400	Pumpkin Creek near Miles City	697	1972-85,1987	1976-85
06309000	Yellowstone River at Miles City	48,253		1948-52,1965, 1974-75,1977-83
06309075	Sunday Creek near Miles City	714	1975-84	
06309079	Muster Creek near Kinsey	28.5		1978-80
06309083	Yellowstone River near Shirley	49,100		1970
06309145	Custer Creek near Kinsey	151		1978-80
06324410	Powder River below Fence Creek, near Moorhead	--		1974
06325000	Little Powder River at Biddle	1,541	1938-43	
06325500	Little Powder River near Broadus	1,974	1947-53,1957-72	
06326000	Powder River near Mizpah	12,132	1928-33	
06326050	Mizpah Creek at Olive	124		1976-77
06326200	Mizpah Creek near Volberg	510		1976-78
06326300	Mizpah Creek near Mizpah	797	1975-86	
06326507	Locate Creek near Ismay	62.5		1980-83
06326530	Yellowstone River near Terry	63,447		1974-83
06326555	Cherry Creek near Terry	358	1980-81	1978-81
06326600	O'Fallon Creek near Ismay	669		1978-84
06326850	O'Fallon Creek at Mildred	1,396	1975-78	
06326953	Clear Creek near Hoyt	138		1978-80
06326995	Upper Sevenmile Creek near Lindsey	137		1978-80
06327000	Upper Sevenmile Creek near Glendive	--	1921-22	
06327500	Yellowstone River at Glendive	66,788	1898-1911,1932-34	
06327850	Glendive Creek near Glendive	300		1978-81
06328000	Deer Creek near Glendive	198	1921-22	1978-80
06328200	Lower Sevenmile Creek near Bloomfield	25.2	1982-86	
06328500	Lower Yellowstone Canal at Lower Yellowstone Dam, at Intake	--		1971

DISCONTINUED STREAMFLOW-GAGING AND WATER-QUALITY STATIONS--Continued

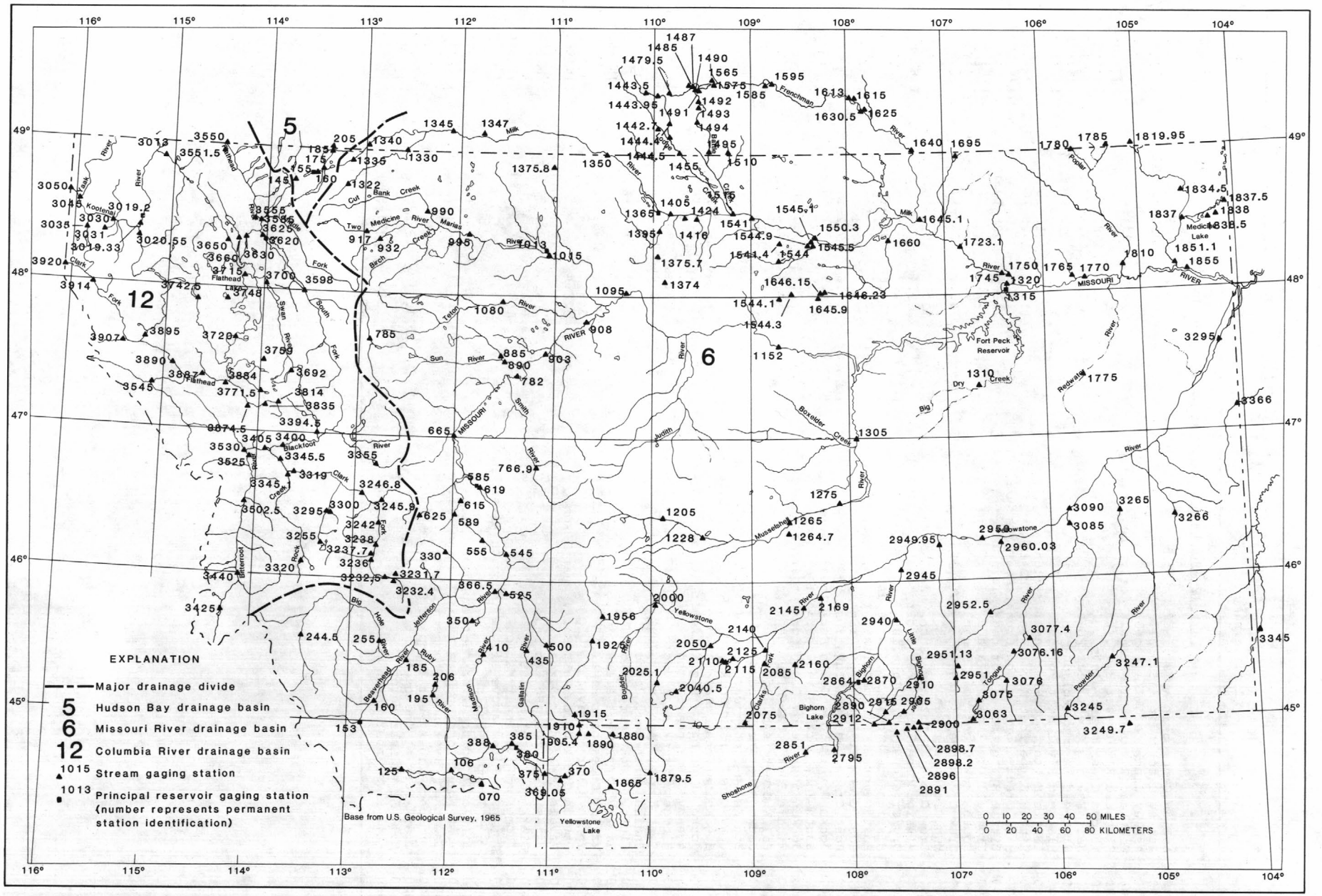
Station number	Station name	Drainage area (square miles)	Period of record	
			Surface water	Water quality
	Part 6--Yellowstone River Basin--Continued			
06328690	Lower Yellowstone Project main canal drain, near Cartwright, North Dakota	--		1971
06329000	Cottonwood Creek near Intake	85.3		1978-81
06329200	Burns Creek near Savage	233	1958-67,1975-84, 1986	1976-79,1984, 1986
06329400	Sears Creek near Crane	26.9		1971
06329520	Fox Creek near Lambert	183		1981-83
06329540	Lone Tree Creek near Sidney	39.4		1981-83
06333500	Little Missouri River at Alzada	671	1904-07	1949-50
06333850	North Creek near Alzada	.68	1951	
06333900	North Creek spreader diversion near Alzada	1.29	1952-56	
06334000	Little Missouri River near Alzada	904	1911-25,1928-32, 1935-69	
06334630	Boxelder Creek near Webster	1,092	1959-73	1972-73
06336447	Duck Creek near Wibaux	46.5	1978-85	1979
06336500	Beaver Creek at Wibaux	351	1938-69,1979-83	1979-84
06336510	Upper Hay Creek tributary No.2 near Wibaux	4.1		1979,1981
06336515	Hay Creek near Wibaux	11.4		1978-81
06336545	Little Beaver Creek near Wibaux	96.2	1978-81	1979-80
	Part 12--Kootenai River Basin			
12300000	Kootenay River at Newgate, British Columbia	7,660	1931-72	1949,1965
12300200	Young Creek near Rexford	36.0	1973-75	
12300500	Fortine Creek near Trego	112	1947-53	
12301000	Grave Creek near Fortine	64.9	1923-24	
12301300	Tobacco River near Eureka	440		1971-85
12301500	Kootenai River near Rexford	8,420	1929-41,1968-71	1967-72
12301550	Pinkham Creek near Rexford	75.7	1973-81	
12301600	Lake Koocanusa below Pinkham Creek, near Rexford	--		1972-76
12301810	Big Creek near Rexford	137	1972-81	
12301850	Kootenai River at Worland Bridge, near Libby	8,892	1961-71	1962-71
12301921	Libby Dam near Libby	--		1964
12301990	Fisher River above Wolf Creek, near Libby	768		1967-70
12301999	Wolf Creek near Libby	216	1967-77	1967-70
12302000	Fisher River near Jennings	780	1951-69	1963-69
12302055	Fisher River near Libby	838		1967-85
12302500	Granite Creek near Libby	23.6	1933-34,1936-44, 1960-69	
12303000	Kootenai River at Libby	10,240		1969-73,1978
12303400	Ross Creek near Troy	23.8		1971,1976-78
12303430	Stanley Creek near Troy	12.8		1976-78
12303490	Lake Creek near Troy	188		1976-78
12304000	Callahan Creek at Troy	85.8	1911-12,1914-16	
12304200	Yaak River near Yaak	493	1957-62	
12304500	Yaak River near Troy	766		1963-73,1975-85
	Part 12--Pend Oreille River Basin			
12323200	Blacktail Creek near Butte	14.7	1984-88	
12323500	German Gulch Creek near Ramsay	40.6	1955-69	
12323750	Silver Bow Creek at Warm Springs	483	1972-79	1971
12324000	Racetrack Creek near Anaconda	30	1911-13	
12324100	Racetrack Creek below Granite Creek, near Anaconda	39.5	1914-17,1957-73	
12324300	Clark Fork near Garrison	1,139	1961-62	
12324600	Clark Fork at Garrison	1,550		1969-71
12324660	Gold Creek at Goldcreek	64.1	1964-66	
12326000	Trout Creek above main canal, near Philipsburg	4.09	1946-49	
12326500	Trout Creek near Southern Cross	34.8	1946-51	
12327000	Trout Creek near Philipsburg	34.9	1939-43,1945-46	
12327500	Marshall Creek near Philipsburg	22.8	1942-43	
12328000	Marshall Creek at mouth, near Philipsburg	23.2	1939-42	
12328500	Flint Creek near Philipsburg	192	1939-41	1972-73
12329000	Flint Creek above Maxville Siding, at Maxville	207	1939-41	
12330100	Flint Creek below Boulder Creek, near Maxville	--		1971
12330500	Flint Creek near Maxville	325	1946-49	
12331000	Flint Creek near Hall	325	1939	
12331500	Flint Creek near Drummond	490	1948-49	
12331600	Clark Fork at Drummond	2,378	1967-68,1971-83	1971-74
12331900	Clark Fork near Clinton	2,629		1979-83
12333000	East Fork Rock Creek near Philipsburg	30.3	1935-43	
12333500	Rock Creek near Quigley	749	1922-27	
12334000	Ranch Creek near Quigley	42.7	1922-27	
12334500	Rock Creek below Ranch Creek, near Quigley	794	1910-12	
12334600	Blackfoot River near Lincoln	15.1	1969-70	1969-70
12334650	Blackfoot River below Alice Creek, near Lincoln	96.9	1971-75	1971-75
12334700	Blackfoot River below 7-Up Pete Creek, near Lincoln	255		1973
12334800	Blackfoot River at Dalton Mountain Road, near Lincoln	399		1973
12334900	Blackfoot River at Blackfoot Canyon Campground, near Lincoln	437		1973
12335000	Blackfoot River near Helmville	481	1940-54	
12335500	Nevada Creek above reservoir, near Finn	116		1980

DISCONTINUED STREAMFLOW-GAGING AND WATER-QUALITY STATIONS--Continued

Station number	Station name	Drainage area (square miles)	Period of record	
			Surface water	Water quality
	Part 12--Pend Oreille River Basin--Continued			
12336000	Nevada Creek near Finn	144	1934-39	
12337000	Nevada Creek near Helmville	165	1946-49	
12337500	Douglas Creek near Helmville	84.8	1946-47	
12338000	North Fork Blackfoot River near Ovando	228	1921-23	
12338500	Blackfoot River near Ovando	1,274	1940-63	
12338690	Monture Creek near Ovando	140	1973-83	
12339000	Blackfoot River at Clearwater	1,550	1921-23	
12339500	Clearwater River at Clearwater	391	1921-23	
12339800	Blackfoot River near Potomac	2,046	1957-65	
12341000	Rattlesnake Creek at Missoula	79.7	1899-1901,1958-67	
12341500	Clark Fork at Missoula	6,084	1898-1907	
12343000	West Fork Bitterroot River near Darby	552	1910-17	
12343400	East Fork Bitterroot River near Conner	381	1956-72	
12343500	East Fork Bitterroot River at Conner	405	1910-16,1937-57	
12345000	Rock Creek near Darby	55.4	1946-53,1957-59	
12345500	Rock Creek Canal near Darby	--	1946,1948-53	
12345850	Sleeping Child Creek near Hamilton	65.2	1973-77	
12346000	Bitterroot River near Grantsdale	1,414	1902-07	
12346500	Skalkaho Creek near Hamilton	87.8	1949-53,1957-79	1980
12347000	Skalkaho Creek at Brennan's ranch, near Hamilton	96.2	1920-24	
12347500	Blodgett Creek near Corvallis	25.9	1947-69	
12348000	Blodgett Creek near Hamilton	28.3	1938-43	
12348200	Bitterroot River near Corvallis	1,711	1959-63	1959-63
12348500	Willow Creek near Corvallis	22.4	1920-24,1957-66	
12349000	Willow Creek at Anfinson Ranch, near Corvallis	23.2	1938-43	
12349500	Fred Burr Creek near Victor	17.7	1947-51	
12350000	Bear Creek near Victor	26.8	1938-55,1957-59	
12350500	Kootenai Creek near Stevensville	28.9	1949-53,1957-63	
12351000	Burnt Fork Bitterroot River near Stevensville	74.0	1920,1922-24, 1938-62	
12351200	Bitterroot River near Florence	2,354	1957-66	
12351400	Eightmile Creek near Florence	20.6	1957-63	
12351500	Lolo Creek near Lolo	231	1911-15	
12352000	Lolo Creek above Sleeman Creek, near Lolo	250	1951-60	
12352980	Bitterroot River at Maclay Bridge, near Missoula	2,850		1970-73
12353280	Ninemile Creek near Huson	170	1973-83	
12353300	Clark Fork near Alberton	9,272	1959-63	1969-71
12353500	Clark Fork at Tarkio	9,882	1945-49	
12353820	Dry Creek near Superior	46.3	1982-86	
12354000	St. Regis River near St. Regis	303	1910-17,1958-75	
12355100	Starvation Creek near Flathead, British Columbia	16.4	1986-87	
12355150	Tuchuck Creek near Flathead, British Columbia	10.1	1986-88	
12355350	Big Creek at Big Creek Ranger Station, near Columbia Falls	82.1		1980
12355600	Middle Fork Flathead River at Schafer Ranger Station, near Essex	--		1970
12355700	Middle Fork Flathead River near Essex	408	1957-61	
12355900	Middle Fork Flathead River above Bear Creek, near Essex	--		1970
12356000	Skyland Creek near Essex	8.09	1946-52	
12356500	Bear Creek near Essex	20.4	1946-52	
12357000	Middle Fork Flathead River at Essex	510	1940-53,1956-64	
12357500	Middle Fork Flathead River at West Glacier	943	1911-23,1929-33, 1943-48	
12358000	McDonald Creek at Apgar	175	1912-14	
12358500	Middle Fork Flathead River near West Glacier	1,128		1949-50,1970
12358900	South Fork Flathead River above Harrison Creek, near Hungry Horse	--		1970
12359000	South Fork Flathead River at Spotted Bear Ranger Station, near Hungry Horse	958	1948-57,1959-67	1964
12359500	Spotted Bear River near Hungry Horse	184	1949-56	1963
12359800	South Fork Flathead River above Twin Creek, near Hungry Horse	1,160		1965-81
12360000	Twin Creek near Hungry Horse	47.0	1948-56,1965-67	1965-67
12360500	Lower Twin Creek near Hungry Horse	22.4	1948-56	
12360600	Soldier Creek near Hungry Horse	4.77	1965-67	1965-67
12361000	Sullivan Creek near Hungry Horse	71.3	1948-56,1959-76	1963-66
12361500	Graves Creek near Hungry Horse	27.0	1948-56,1965-67	1965-67
12361600	Canyon Creek near Hungry Horse	5.8	1965-67	1965-67
12361700	Goldie Creek near Hungry Horse	3.29	1965-67	
12361880	Wounded Buck Creek near Hungry Horse	13.6	1965-67	
12361950	Hungry Horse Creek near Hungry Horse	23.3	1969-72	
12361960	Emery Creek near Hungry Horse	26.4	1965-67	1965-67
12363500	Flathead River near Kalispell	--		1968-69
12363920	Stillwater River at Olney	146	1973-82	
12364000	Logan Creek at Tally Lake, near Whitefish	183	1931-34,1936-42, 1945-47	
12364500	Logan Creek near Whitefish	199	1931	
12365000	Stillwater River near Whitefish	524		1977-83
12365500	Stillwater River near Kalispell	338	1907,1922, 1928-31	
12365800	Swift Creek near Whitefish	78.0	1973-81	1977-81
12366000	Whitefish River near Kalispell	170		1977-83

DISCONTINUED STREAMFLOW-GAGING AND WATER-QUALITY STATIONS--Continued

Station number	Station name	Drainage area (square miles)	Period of record	
			Surface water	Water quality
	Part 12--Pend Oreille River Basin--Continued			
12367000	Ashley Creek near Kila	44.2	1916	
12367500	Ashley Creek near Kalispell	201	1931-50,1972-74	1969-70
12367800	Ashley Creek below Kalispell	--		1969-70
12368500	Flathead River at Therriault Ferry, near Kalispell	--	1934-45	
12369000	Flathead River near Bigfork	--		1969-71
12370900	Teepee Creek near Polson	2.17	1983-87	1983-85
12371100	Hell Roaring Creek near Polson	6.22	1917-32	
12371550	Flathead Lake at Polson	7,086		1969-71
12372000	Flathead River near Polson	7,096		1977-83
12373000	Little Bitterroot River near Marion	31.8	1910-16	
12374000	Little Bitterroot River near Hubbart	134	1909-16	
12374500	Mill Creek above Bassoo Creek, near Niarada	19.6		1983-85
12374500	Little Bitterroot River near Niarada	223	1908-10,1916-17	
12374800	Cromwell Creek near Niarada	14.3		1983-85
12375900	South Crow Creek near Ronan	7.57		1983-85
12376000	Crow Creek near Ronan	46.1	1907-17	
12376500	Mud Creek near Ronan	30.4	1908-11	
12377000	Crow Creek at Lozeaus ranch, near Ronan	139	1911-16	
12377150	Mission Creek above reservoir, near St. Ignatius	12.4		1983-86
12377500	Dry Creek near St. Ignatius	24.7	1908-16	
12378000	Mission Creek near St. Ignatius	74.8	1907-17	
12378500	Post Creek at Fitzpatrick's ranch, near Ronan	28.4	1907-11	
12379000	Post Creek at Deschamp's ranch, near Ronan	29.7	1911	
12379500	Post Creek near St. Ignatius	47.6	1912-17	
12381000	Jocko River above South Fork, near Jocko	14.9	1912-16	
12381400	South Fork Jocko River near Arlee	56.0	1983	1983-86
12381500	Jocko River below South Fork, near Jocko	72.3	1912-16	
12382000	Middle Fork Jocko River near Jocko	19.5	1912-16	
12382500	Falls Creek near Jocko	3.57	1912-16	
12383000	Jocko River near Jocko	140	1918-19	
12383500	Big Knife Creek near Arlee (Big Knife Creek above Big Knife Canal, near Jocko)	6.88		1983-85
12384000	Big Knife Creek near Jocko	7.44	1909-11	
12384500	Jocko River below Big Knife Creek, near Jocko	154	1909-16	
12387100	Agency Creek near Jocko	4.00	1909-16	
12387200	Blodgett Creek near Jocko	5.48	1909	
12386000	East Finley Creek near Jocko	5.48	1909-16	
12386500	Indian Ditch near Jocko	--	1909-16	
12387000	Finley Creek near Jocko	36.7	1909-16	
12387450	Valley Creek near Arlee	15.3		1983-85
12387500	Valley Creek near Ravalli	64.1	1909-10	
12388000	Jocko River at Ravalli	348	1907-11	
12388400	Revais Creek below West Fork, near Dixon	23.4		1983-85
12388500	Revais Creek near Dixon	35.0	1911-19	
12388650	Camas Creek near Hot Springs	4.46	1983-87	1983-85
12389000	Clark Fork near Plains	19,958		1969-77
12389200	Thompson River near Marion	104		1975-76
12389300	Thompson River above Little Thompson River, near Thompson Falls	321		1975-76
12389400	Little Thompson River near Thompson Falls	129		1975-76
12389450	West Fork Thompson River near Thompson Falls	35.7		1975-76
12389500	Thompson River near Thompson Falls	642		1975-79
12390500	Prospect Creek near Thompson Falls	145	1911	
12391000	Clark Fork at Thompson Falls	21,113	1952-59	1969-73
12391500	Bull River near Heron	--		1971
12391550	Bull River near Noxon	139	1973-82	1977-79


EXPLANATION
Major drainage divide
5 Hudson Bay drainage basin
6 Missouri River drainage basin
12 Columbia River drainage basin
1015 Stream gaging station
1013 Principal reservoir gaging station (number represents permanent station identification)
Base from U.S. Geological Survey, 1965
0 10 20 30 40 50 MILES
0 20 40 60 80 KILOMETERS
Fort Peck Reservoir
Bighorn Lake
Yellowstone Lake
MISSOURI RIVER
Milk River
Marias River
Sun River
Teton River
Dearborn River
Big Hole River
Jefferson River
Madison River
Gallatin River
Boulder River
Yellowstone River
Clarks Fork
Shoshone River
Tongue River
Powder River
Little Bighorn River
Musselshell River
Judith River
Boxelder Creek
Redwater River
Poplar River
Frenchman River
Milk River
Kootenai River
Flathead Lake
Flathead River
Middle Fork
North Fork
South Fork
Swan River
Blackfoot River
Bitterroot River
Rock Creek
Clark Fork
Big Hole River
Ruby River
Beaverhead River
Cut Bank Creek
Two Medicine River
Birch Creek
Dry Creek
Big Dry Creek
Smith River
Missouri River
Yellowstone River
Powder River
Bighorn River
Tongue River
Little Bighorn River
Musselshell River
Judith River
Boxelder Creek
Redwater River
Poplar River
Frenchman River
Milk River
Kootenai River

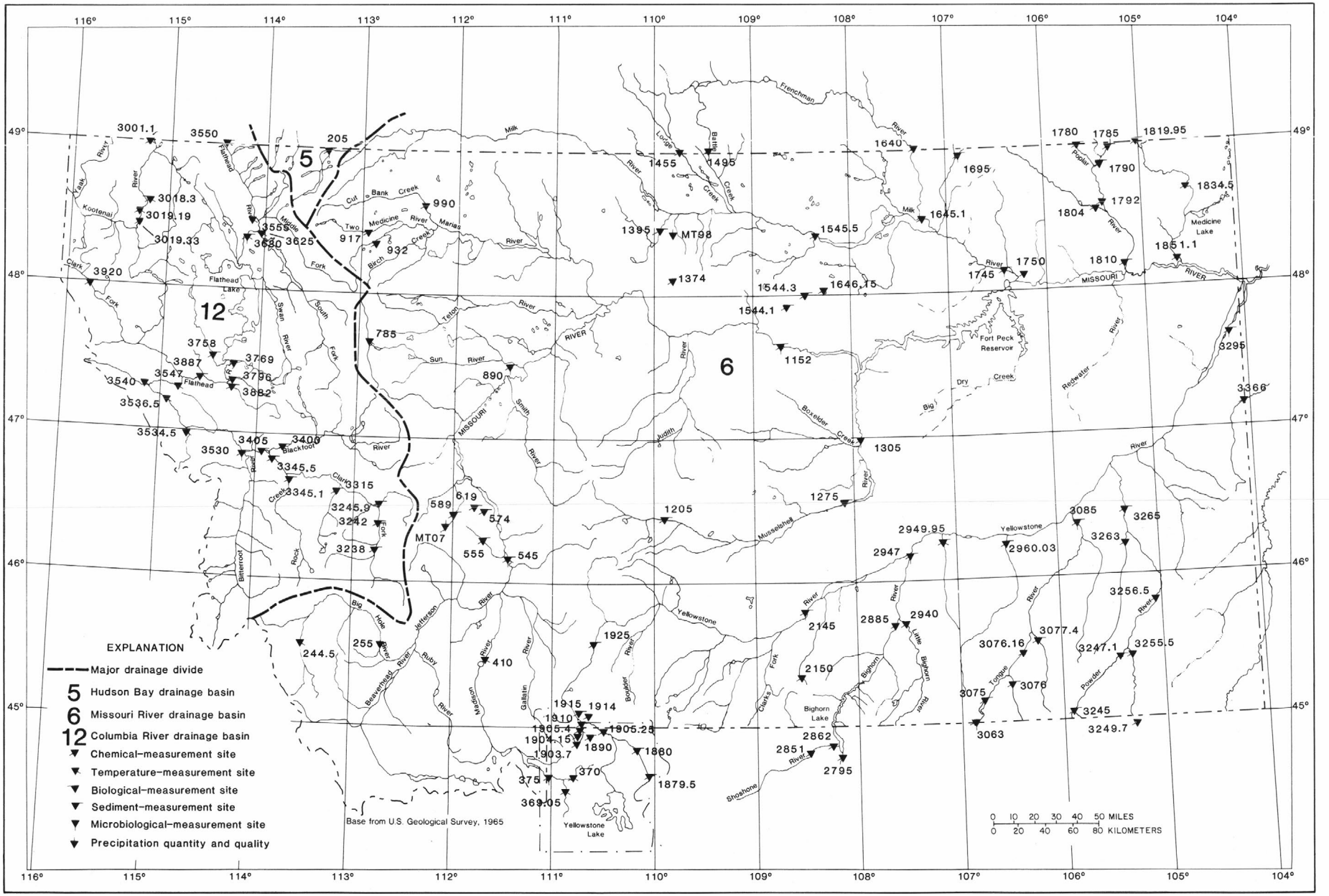


Figure 8.--Location of water-quality stations, water year 1989.

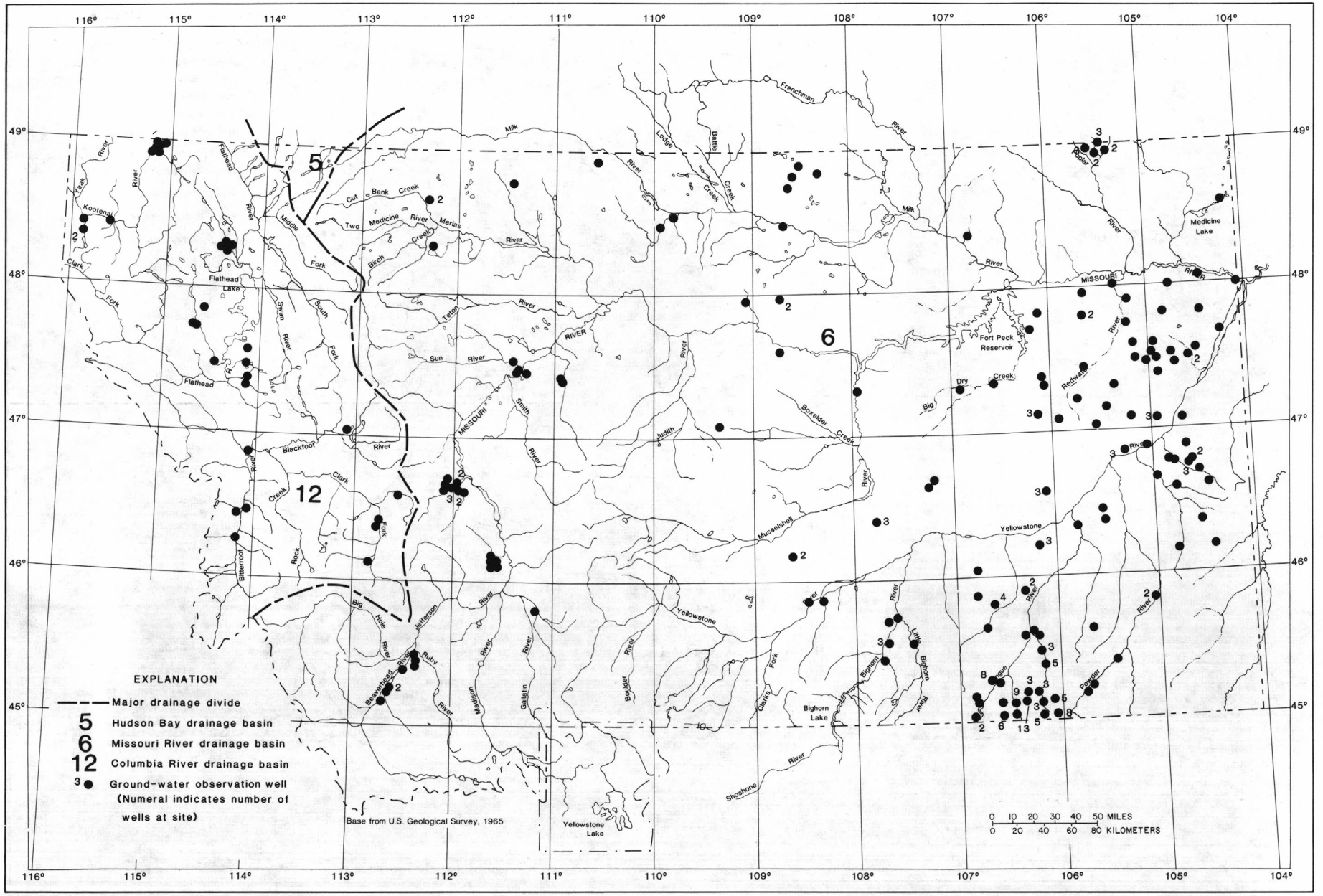


Figure 9.--Location of ground-water observation wells, water year 1989.

STATION RECORDS, SURFACE WATER AND WATER QUALITY

SASKATCHEWAN RIVER BASIN

05014500 SWIFTCURRENT CREEK AT MANY GLACIER, MT

(Hydrologic bench-mark station)

LOCATION.--Lat 48°47'57", long 113°39'21", in SE1/4 sec.11, T.35 N., R.16 W., Glacier County, Hydrologic Unit 10010002, Glacier National Park, on right bank 100 ft upstream from outlet of Swiftcurrent Lake at Many Glacier, and 11 mi southwest of Babb.

DRAINAGE AREA.--30.9 mi^2.

PERIOD OF RECORD.--June 1912 to current year (records incomplete most years prior to 1959). Published as "at McDermott Lake" 1912-14. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1508: 1918(M), 1943. WDR MT-75-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 4,876.78 ft above National Geodetic Vertical Datum of 1929. Prior to May 23, 1916, nonrecording gage on left bank of lake opposite present gage and at present datum, and May 23, 1916, to June 15, 1918, nonrecording gage at present site and datum.

REMARKS.--Estimated daily discharges: Feb. 1-10. Records good. Several observations of water temperature and specific conductance were made during the year. No regulation or diversion upstream from station.

AVERAGE DISCHARGE.--33 years, (1917-19, 1958-89), 142 ft^3/s, 62.41 in/yr, 102,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,700 ft^3/s, June 8, 1964, gage height, 10.00 ft, from floodmarks, from rating curve extended above 1,100 ft^3/s, on basis of computation of peak flow over dam; no flow Nov. 14-16, 1976, result of pumping operation.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 680 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct. 17	0045	884	4.33	June 11	1630	*1,080	*4.78
May 8	0600	850	4.25				

Minimum daily discharge, 13 ft^3/s, Jan. 19.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73	55	39	27	e18	17	29	126	250	391	140	167
2	72	58	37	24	e17	17	29	174	479	345	148	156
3	67	72	36	25	e16	17	27	208	589	275	135	177
4	61	89	33	34	e16	16	27	243	577	259	111	187
5	55	95	31	36	e17	16	29	293	567	268	101	176
6	49	129	30	34	e18	20	41	443	688	257	98	177
7	42	177	30	30	e18	21	78	703	782	247	96	160
8	39	159	27	27	e18	20	112	812	722	252	96	151
9	38	138	26	26	e18	23	102	673	704	242	104	140
10	37	110	26	27	e18	46	84	627	722	209	132	132
11	36	108	27	26	19	67	72	751	1020	187	131	121
12	35	99	28	23	18	69	68	542	897	181	120	108
13	34	86	43	20	17	66	69	386	710	260	112	98
14	39	80	47	25	18	64	79	306	631	423	111	90
15	68	74	41	23	17	61	126	265	690	356	107	82
16	481	67	37	15	17	56	195	287	700	312	97	76
17	698	64	35	14	17	48	177	354	553	276	85	83
18	372	58	32	14	17	43	151	391	429	241	77	102
19	241	50	31	13	16	41	160	351	412	214	68	115
20	176	48	29	14	16	37	231	277	395	212	63	111
21	145	47	29	26	16	34	354	225	324	249	68	105
22	122	47	28	42	16	34	454	203	296	244	75	99
23	109	61	29	43	17	33	406	219	287	207	87	92
24	90	60	28	35	16	31	297	235	269	178	112	84
25	85	58	27	29	16	31	228	215	304	176	302	81
26	77	57	25	25	17	33	181	195	341	171	443	76
27	75	48	23	23	16	32	149	181	379	166	340	72
28	67	46	23	22	17	32	124	185	361	173	310	68
29	61	45	23	22	---	32	111	164	342	166	283	64
30	60	41	24	28	---	30	109	148	381	152	237	63
31	55	---	27	27	---	28	---	156	---	141	200	---
TOTAL	3659	2326	951	799	477	1115	4299	10338	15801	7430	4589	3413
MEAN	118	77.5	30.7	25.8	17.0	36.0	143	333	527	240	148	114
MAX	698	177	47	43	19	69	454	812	1020	423	443	187
MIN	34	41	23	13	16	16	27	126	250	141	63	63
AC-FT	7260	4610	1890	1580	946	2210	8530	20510	31340	14740	9100	6770

CAL YR 1988 TOTAL 39911 MEAN 109 MAX 698 MIN 11 AC-FT 79160
WTR YR 1989 TOTAL 55197 MEAN 151 MAX 1020 MIN 13 AC-FT 109500

e Estimated

SASKATCHEWAN RIVER BASIN

05015500 LAKE SHERBURNE AT SHERBURNE, MT
(International gaging station)

LOCATION.--Lat 48°49'42", long 113°31'16", in SE1/4SE1/4SE1/4 sec.35, T.36 N., R.15 W., Glacier County, Hydrologic Unit 10010002, Blackfeet Indian Reservation, in gatehouse at dam on Swiftcurrent Creek, 4.5 mi southwest of Babb.

DRAINAGE AREA.--64.1 mi^2.

PERIOD OF RECORD.--May 1915 to September 1923 (fragmentary), May 1924 to September 1925, November 1925 to June 1926 September 1926 to March 1936 (no winter records some years), May 1936 to September 1952 (monthend contents and daily elevations). October 1952 to current year (monthend contents only). Monthend contents for some periods, published in WSP 1308. Published as Sherburne Lake Reservoir at Sherburne 1915, 1917-28, 1931-52, and as Sherburne Lake Reservoir near Babb 1929-30.

REVISED RECORDS.--W 1983: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 4,709.45 ft above National Geodetic Vertical Datum of 1929. Prior to May 7, 1931, nonrecording gage at present site, and May 8, 1931, to Sept. 30, 1974, water-stage recorder at present site, all at datum 9.45 ft lower.

REMARKS.--Reservoir is formed on a natural lake by earthfill dam completed in 1921. Prior to 1919, flashboards on a temporary dam provided limited storage. Storage behind main dam began in 1919. The following capacity figures are from capacity table effective Jan. 1, 1983; see previous reports for superseded figures. Usable capacity, 64,790 acre-ft between gage height 29.3 ft, 9.3 ft, above lowest outlet gage sill, and 88.00 ft, spillway crest. Streambed above gates prevents withdrawal of storage to sill elevation. Dead storage, 3,060 acre-ft below gage height, 29.30 ft. Figures given herein represent usable contents. Water is used for irrigation on Milk River project of U.S. Bureau of Reclamation.

COOPERATION.--This is one of a number of stations which are maintained jointly by the United States and Canada.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 65,480 acre-ft, June 30, 1986, gage height, 88.40 ft; no usable contents at times.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 64,160 acre-ft, July 21, gage height, 87.63 ft; minimum, 3,790 acre-ft, Apr. 17, gage height, 35.33 ft.

MONTHEND GAGE HEIGHT AND CONTENTS AT 2400, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

Date	Gage height (feet)	Contents (acre-feet)	Change in Contents (acre-feet)
Sept. 30	39.21	6,660	--
Oct. 31	50.70	16,660	+10,000
Nov. 30	57.23	23,300	+6,640
Dec. 31	59.67	25,940	+2,640
CAL YR 1988			- 9,910
Jan. 31	61.70	28,210	+ 2,270
Feb. 28	62.90	29,580	+ 1,370
Mar. 31	55.21	21,170	-8,410
Apr. 30	37.92	5,670	-15,500
May 31	50.47	16,440	+10,770
June 30	84.40	58,840	+42,400
July 31	86.30	61,920	+3,080
Aug. 31	74.10	43,530	-18,390
Sept. 30	56.74	22,780	-20,750
WTR YR 1989			+16,120

SASKATCHEWAN RIVER BASIN

05016000 SWIFTCURRENT CREEK AT SHERBURNE, MT

(International gaging station)

LOCATION.--Lat 48°49'49", long 113°30'59", in NW1/4SW1/4SW1/4 sec.36, T.36 N., R.15 W., Glacier County, Hydrologic Unit 10010002, Blackfeet Indian Reservation, on left bank 1,200 ft downstream from outlet of Lake Sherburne Dam at Sherburne and 4.2 mi southwest of Babb.

DRAINAGE AREA.--64.6 mi^2.

PERIOD OF RECORD.--July 1912 to November 1915 (no winter records), March 1916 to October 1923, May 1924 to September 1981 (no winter records), March 1984 to current year (seasonal records only). Monthly discharge only for some periods, published in WSP 1308, 1728. Published as "at Sherburne Lake" 1912-14.

REVISED RECORDS.--WSP 1388: Drainage area. WSP 1508: 1935.

GAGE.--Water-stage recorder. Datum of gage is 4,730.26 ft above National Geodetic Vertical Datum of 1929. Prior to Aug. 10, 1920, nonrecording gages at two sites within 1,000 ft of present site at different datums. Aug. 10, 1920, to May 17, 1921, nonrecording gage at present site and May 18, 1921, to Sept. 30, 1975, water-stage recorder at present site, all at datum 9.45 ft lower. Several observations of water temperature and specific conductance were made during the year.

REMARKS.-- No estimated daily discharges this year. Records good. Flow regulated by Lake Sherburne (see preceding page).

COOPERATION.--This is one of a number of stations which are maintained jointly by the United States and Canada.

AVERAGE DISCHARGE.--7 years (1916-23), 199 ft^3/s, 144,200 acre-ft/yr, unadjusted.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,420 ft^3/s, June 25, 1969, gage height, 7.63 ft; maximum gage height, 7.77 ft, July 15, 1981; no flow at times when gates in dam are closed.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 710 ft^3/s, Apr. 15, gage height, 5.68 ft; minimum daily, 0.22 ft^3/s, Mar. 19.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			146	561	333	433	1.5	531	451	552		
2			116	554	384	314	1.5	530	480	564		
3			68	615	439	238	1.5	527	479	571		
4			66	652	460	225	1.5	526	476	562		
5			65	660	480	51	1.5	525	476	573		
6			64	653	504	1.6	67	523	473	575		
7			63	638	522	1.5	184	522	472	565		
8			62	564	552	1.5	179	578	470	553		
9			60	529	479	1.4	119	661	468	543		
10			59	588	175	3.1	379	688	466	551		
11			248	640	21	7.3	500	686	464	550		
12			286	636	1.4	3.8	531	656	461	557		
13			284	646	1.2	2.9	591	581	460	576		
14			283	653	1.1	2.6	623	575	499	572		
15			281	684	.99	2.2	565	588	533	575		
16			279	663	76	2.1	421	558	530	585		
17			105	372	204	2.0	269	565	526	608		
18			.25	274	324	1.9	128	604	524	603		
19			.22	302	364	1.9	115	615	558	574		
20			61	331	364	1.7	221	611	582	545		
21			229	434	363	1.7	326	606	577	502		
22			279	577	362	1.9	359	602	595	448		
23			331	659	402	1.9	386	598	604	357		
24			401	559	425	1.9	432	568	598	266		
25			397	455	424	2.1	396	529	591	107		
26			475	357	422	1.9	269	464	586	.39		
27			199	149	439	1.7	219	358	580	.36		
28			.29	.94	448	1.7	186	313	572	.33		
29			.26	.94	444	1.7	292	169	566	.29		
30			308	148	495	1.6	459	78	558	30		
31			547		469		533	246		56		
TOTAL			5763.02	14554.88	10378.69	1316.6	8756.5	16181	15675	13121.37		
MEAN			186	485	335	43.9	282	522	522	423		
MAX			547	684	552	433	623	688	604	608		
MIN			.22	.94	.99	1.4	1.5	78	451	.29		
AC-FT			11430	28870	20590	2610	17370	32100	31090	26030		

SASKATCHEWAN RIVER BASIN

05017500 ST. MARY RIVER NEAR BABB, MT

LOCATION.--Lat 48°50'00", long 113°25'08", in NW1/4NW1/4SE1/4 sec.34, T.36 N., R.14 W., Glacier County, Hydrologic Unit 10010002, Blackfeet Indian Reservation, on right bank 0.7 mi upstream from outlet of Lower St. Mary Lake and 2.0 mi southeast of Babb.

DRAINAGE AREA.--276 mi^2.

PERIOD OF RECORD.--July 1901 to October 1902, May 1910 to September 1925, October 1950 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as "at Main" in 1901-02, and as "below Swiftcurrent Creek, at Babb" 1910-15. Records published as "near Babb" for April 1902 to September 1915, May 1929 to September 1950 at sites about 1.5 mi downstream not equivalent because flow of Swiftcurrent Creek not included 1902-15 and because diversion by St. Mary Canal not included 1929-50.

REVISED RECORDS.--WSP 1308: 1913-14, 1920, 1922-24. WSP 1508: 1902.

GAGE.--Water-stage recorder. Datum of gage is 4,468.13 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1915, water-stage recorder or nonrecording gages at several sites about 3.8 mi downstream at different datums Oct. 1, 1915, to Sept. 30, 1925, water-stage recorder or nonrecording gages at several sites within 1.5 mi downstream at different datums.

REMARKS.--Estimated daily discharges: Jan. 31 to Feb. 15, Apr. 23-25, May 5-13, 18, June 3-8. Records good except those for estimated daily discharges, which are fair. Entire flow of Swiftcurrent Creek below Lake Sherburne is diverted into Lower St. Mary Lake upstream from station. Flow of Swiftcurrent Creek regulated by Lake Sherburne (station number 05015500) since 1919. October 1950 to September 1976, monthly discharge and runoff figures adjusted for change in contents in Lake Sherburne. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--55 years (1901-2, 1910-25, 1950-89), 768 ft^3/s, 556,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,500 ft^3/s, June 9, 1964, gage height, 12.96 ft, from highwater mark in well, from rating curve extended above 6,100 ft^3/s on basis of slope-area measurement of peak flow; minimum daily, 27 ft^3/s, Jan. 3-5, 1953 and Nov. 30, 1987.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,580 ft^3/s, June 12, gage height, 5.53 ft; minimum daily, 60 ft^3/s, Feb. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	126	324	157	83	e68	99	481	841	1260	1450	1180	1100
2	135	298	146	83	e66	122	557	904	1350	1470	1190	1160
3	145	287	139	85	e63	128	607	980	e1540	1420	1170	1170
4	149	284	131	87	e60	125	667	1050	e1820	1350	1120	1160
5	157	276	126	88	e62	124	706	e1120	e1980	1300	1090	1140
6	162	279	121	90	e63	127	750	e1230	e2110	1260	1060	1130
7	165	290	114	90	e64	126	779	e1450	e2260	1280	1030	1110
8	165	298	109	89	e65	131	799	e1840	e2450	1300	1010	1090
9	165	309	107	87	e66	137	767	e2160	2550	1250	1040	1070
10	166	312	103	86	e68	163	748	e2380	2670	1270	1090	1050
11	165	318	102	84	e70	195	778	e2470	3280	1350	1100	1030
12	163	315	103	82	e72	254	812	e2400	3550	1390	1110	998
13	161	302	110	81	e72	299	829	e2240	3460	1530	1090	965
14	160	296	110	81	e71	334	857	2020	3260	1810	1040	945
15	169	289	106	79	e70	364	884	1810	3090	1910	1040	942
16	222	275	101	78	71	380	942	1620	3050	1930	1010	927
17	440	259	98	79	72	372	923	1580	2950	1870	984	924
18	736	247	99	80	72	302	804	e1640	2730	1720	966	967
19	907	243	99	79	72	246	773	1720	2470	1540	958	958
20	894	233	98	78	71	212	807	1710	2250	1450	945	966
21	838	223	96	76	69	221	898	1620	2040	1470	935	963
22	755	218	93	76	68	271	1090	1520	1830	1500	928	965
23	688	216	90	75	67	311	e1320	1450	1700	1490	929	958
24	612	206	85	74	66	371	e1470	1440	1570	1460	984	943
25	550	192	85	71	64	424	e1450	1420	1530	1450	1160	940
26	510	185	83	71	64	470	1370	1380	1500	1340	1330	929
27	484	176	81	71	65	497	1250	1330	1470	1230	1380	915
28	436	175	79	70	75	375	1050	1370	1450	1130	1330	902
29	398	167	79	69	---	294	890	1340	1430	1070	1290	884
30	369	167	78	71	---	263	807	1280	1430	1090	1140	866
31	342	---	82	e70	---	369	---	1270	---	1160	1050	---
TOTAL	11534	7659	3210	2463	1896	8106	26865	48585	66030	44240	33679	30067
MEAN	372	255	104	79.5	67.7	261	895	1567	2201	1427	1086	1002
MAX	907	324	157	90	75	497	1470	2470	3550	1930	1380	1170
MIN	126	167	78	69	60	99	481	841	1260	1070	928	866
AC-FT	22880	15190	6370	4890	3760	16080	53290	96370	131000	87750	66800	59640

CAL YR 1988 TOTAL 200159 MEAN 547 MAX 2070 MIN 41 AC-FT 397000
WTR YR 1989 TOTAL 284334 MEAN 779 MAX 3550 MIN 60 AC-FT 564000

e Estimated

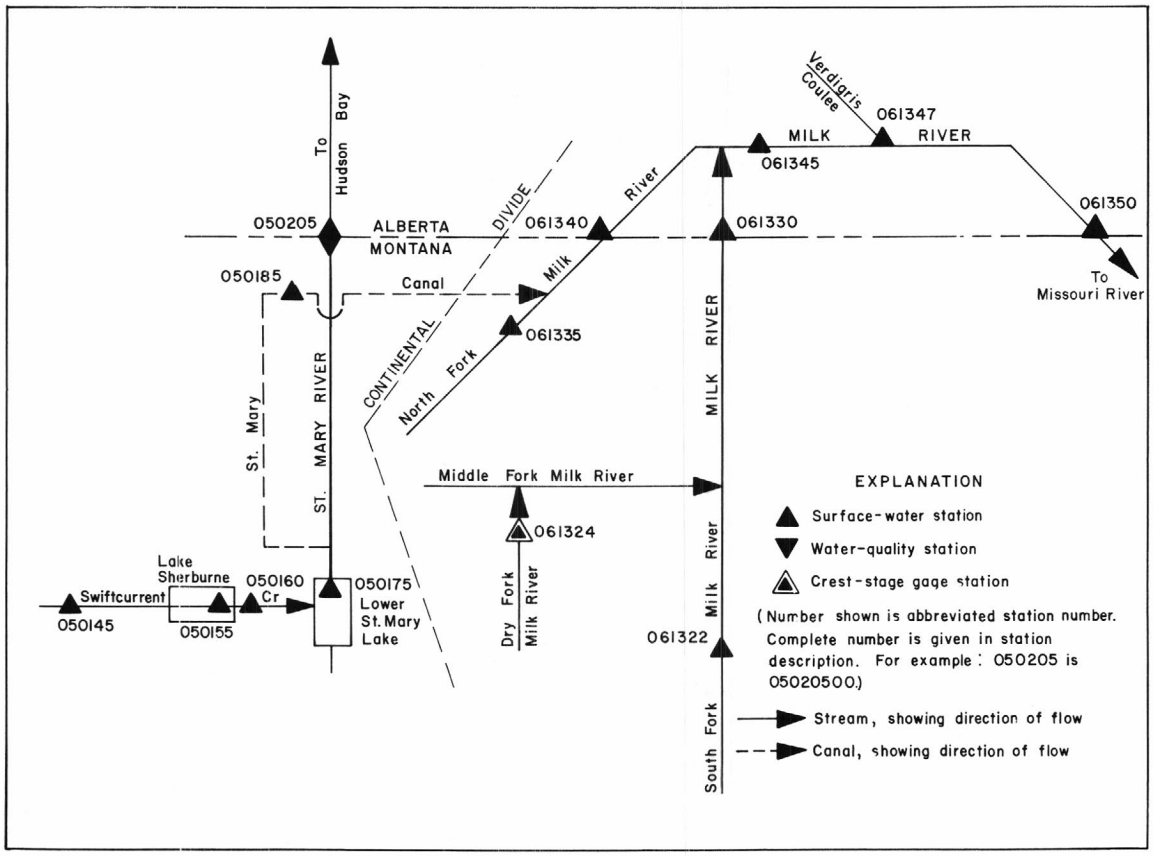


Figure 10.--Schematic diagram showing diversions from St. Mary River in Part 5 to Milk River in Part 6.

SASKATCHEWAN RIVER BASIN

05018500 ST. MARY CANAL AT ST. MARY CROSSING, NEAR BABB, MT

(International gaging station)

LOCATION.--Lat 48°56'50", long 113°22'28", in NE1/4SW1/4SW1/4 sec.19, T.37 N., R.13 W., Glacier County, Hydrologic Unit 10010002, Blackfeet Indian Reservation, on left bank 50 ft upstream from inlet of St. Mary siphon, 6.6 mi northeast of Babb, and 9 mi downstream from intake.

PERIOD OF RECORD.--July 1918 to current season (seasonal records only). Monthly discharge only for some periods, published in WSP 1308, 1728.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 4,450 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to June 14, 1951, water-stage recorder at several sites 0.8 mi downstream at different datums.

REMARKS.--Estimated daily discharges: Mar. 1-7, 14-20. Records excellent except those for estimated daily discharges, which are fair. Canal diverts water from left bank of St. Mary River near Babb and discharges into North Fork Milk River. This water flows in the natural channel of Milk River through Canada and then back into Montana where it is used for irrigation in Milk River Valley downstream from Havre, Mt. U.S. Bureau of Reclamation satellite telemeter of station. Several observations of water temperature and specific conductance were made during the year.

COOPERATION.--This is one of a number of stations which are maintained jointly by the United States and Canada.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 767 ft^3/s, June 19, 28, 1936; no flow at times each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	423	640	710	721	669	628	629		
2			e.00	500	586	711	721	665	629	628		
3			e.00	547	545	721	719	653	615	627		
4			e.00	590	460	727	717	651	614	627		
5			e.00	631	483	730	714	649	615	628		
6			e32	659	596	732	713	645	614	626		
7			e116	676	638	724	712	631	614	627		
8			92	683	678	728	713	637	614	624		
9			93	680	694	731	712	651	613	623		
10			132	677	702	726	713	654	612	625		
11			147	685	712	628	710	652	615	626		
12			215	694	717	691	704	644	625	628		
13			286	696	722	714	680	644	625	629		
14			e250	701	730	712	631	641	624	608		
15			e275	705	726	714	674	638	623	607		
16			e300	652	726	725	684	632	623	603		
17			e325	528	727	723	685	631	624	579		
18			e350	293	728	720	679	630	625	577		
19			e250	173	723	724	676	629	623	578		
20			e175	167	701	730	683	628	622	585		
21			202	224	716	726	692	628	623	579		
22			244	414	721	721	694	627	622	566		
23			287	424	720	718	694	628	623	524		
24			327	421	720	719	688	635	623	375		
25			377	463	716	730	679	629	626	241		
26			412	463	714	727	675	602	635	80		
27			468	492	712	724	671	606	633	.00		
28			396	578	715	723	665	603	632	.00		
29			304	664	713	722	662	615	630	.00		
30			254	662	712	721	663	632	629	.00		
31			318	---	711	---	665	626	---	.00		
TOTAL			6627.00	16165	21104	21552	21409	19705	18673	14649.00		
MEAN			214	539	681	718	691	636	622	473		
MAX			468	705	730	732	721	669	635	629		
MIN			.00	167	460	628	631	602	612	.00		
AC-FT			13140	32060	41860	42750	42460	39080	37040	29060		

e Estimated

SASKATCHEWAN RIVER BASIN

05020500 ST. MARY RIVER AT INTERNATIONAL BOUNDARY

(International gaging station)

LOCATION.--Lat 49°00'12", long 113°18'48", in SW1/4 sec.5, T.1, R.25 W., fourth meridian, in Alberta, Hydrologic Unit 10010002, on right bank 0.4 mi north of international boundary, 2.5 mi downstream from Boundary Creek, 7.5 mi southwest of Kimball, Alberta, and 11.5 mi northeast of Babb, MT.

DRAINAGE AREA.--465 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1902 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as "near Cardston, Alberta" and "at Cook's Ranch, Alberta" 1902-12 and as "near Kimball, Alberta" 1913-55.

REVISED RECORDS.--WSP 1308: 1902, 1908-12. WSP 1508: 1902, 1908-9. W 1983: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 4,116.04 ft, levels by Prairie Farm Rehabilation Administration. Prior to Jan. 1, 1913, nonrecording gages at two sites within 0.3 mi of present site at different datums. Jan. 1, 1913, to Oct. 25, 1955, water-stage recorder at several sites about 8 mi downstream from present site at various datums. Oct. 26, 1955, to Mar. 23, 1965, water-stage recorder at site 200 ft upstream at datum 2 ft higher. Mar. 24, 1965, to Sept. 8, 1975, water-stage recorder at site 100 ft upstream at same datum.

REMARKS.--Estimated daily discharges: Nov. 27 to Apr. 9. Water-discharge records good except those for estimated daily discharges, which are fair. Since 1917, St. Mary Canal has diverted water from the river near Babb, MT, to North Fork Milk River. Some regulation by Lake Sherburne on Swiftcurrent Creek. U.S. Bureau of Reclamation satellite telemeter at station.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

AVERAGE DISCHARGE.--14 years (1902-16), prior to operation of St. Mary Canal, 1,003 ft^3/s, 726,700 acre-ft/yr; 73 years (1916-89), 680 ft^3/s, 492,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 40,000 ft^3/s, June 5, 1908, gage height, 12.75 ft, from flood-marks, site and datum then in use, from rating curve extended above 6,000 ft^3/s; minimum daily, 16 ft^3/s, Nov. 29, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,470 ft^3/s, June 11, gage height, 7.92 ft; minimum daily, 65 ft^3/s, Mar. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	148	373	e230	e120	e90	e70	e85	380	914	1030	652	718
2	154	356	e220	e120	e90	e70	e80	550	1080	1030	676	765
3	164	346	e210	e130	e88	e65	e80	699	1350	974	677	786
4	172	335	e195	e140	e85	e90	e85	873	1620	908	614	770
5	184	330	e190	e145	e90	e100	e90	910	1780	848	569	744
6	194	342	e180	e150	e90	e90	e100	958	1910	800	537	733
7	198	346	e170	e150	e93	e85	e105	1240	2140	797	507	702
8	198	348	e160	e145	e95	e95	e105	1730	2270	813	461	700
9	198	361	e150	e140	e95	e100	e110	2000	2340	778	469	680
10	199	369	e140	e135	e95	e140	115	2150	2650	777	520	667
11	199	377	e135	e130	e95	e150	121	2200	4920	861	550	627
12	197	384	e135	e125	e93	e120	146	2120	4510	902	560	585
13	191	370	e140	e120	e95	e110	167	1910	3830	1180	541	543
14	188	357	e140	e115	e95	e95	198	1670	3400	1590	487	505
15	193	352	e135	e115	e95	e90	247	1420	3120	1590	493	499
16	235	346	e130	e110	e90	e80	414	1220	3000	1570	467	491
17	394	332	e130	e105	e90	e110	595	1150	2820	1480	432	494
18	675	320	e135	e110	e95	e125	723	1200	2550	1300	411	565
19	915	322	e135	e110	e95	e120	782	1310	2230	1100	407	547
20	944	306	e130	e105	e95	e110	824	1310	1980	979	393	541
21	885	305	e125	e105	e90	e85	845	1170	1730	977	379	530
22	809	293	e125	e105	e90	e100	905	1070	1500	994	374	519
23	742	298	e125	e100	e70	e90	1160	997	1360	974	373	518
24	659	278	e120	e95	e90	e90	1300	997	1210	953	457	503
25	590	273	e120	e95	e95	e100	1250	974	1220	951	831	486
26	556	249	e120	e90	e90	e125	1180	930	1160	858	1210	460
27	528	e240	e115	e90	e85	e120	1040	881	1110	753	1180	443
28	476	e240	e115	e90	e70	e110	735	945	1080	632	1110	423
29	441	e230	e115	e90	---	e95	446	910	1040	552	1020	406
30	417	e230	e110	e90	---	e90	343	866	1020	555	829	386
31	391	---	e115	e95	---	e90	---	896	---	620	715	---
TOTAL	12434	9608	4495	3565	2529	3110	14376	37636	62844	30126	18901	17336
MEAN	401	320	145	115	90.3	100	479	1214	2095	972	610	578
MAX	944	384	230	150	95	150	1300	2200	4920	1590	1210	786
MIN	148	230	110	90	70	65	80	380	914	552	373	386
AC-FT	24660	19060	8920	7070	5020	6170	28510	74650	124700	59750	37490	34390

CAL YR 1988 TOTAL 146596 MEAN 401 MAX 1800 MIN 56 AC-FT 290800
WTR YR 1989 TOTAL 216960 MEAN 594 MAX 4920 MIN 65 AC-FT 430300

05020500 ST. MARY RIVER AT INTERNATIONAL BOUNDARY--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: February 1978 to September 1981.
WATER TEMPERATURE: February 1978 to September 1979.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1978-81): Maximum daily, 317 microsiemens, Mar. 30, 31, 1981; minimum daily, 141 microsiemens, June 14, 1979.
WATER TEMPERATURE (water years 1978-79): Maximum, 21.0°C, Aug.23, 1979; minimum, 0.0°C, on many days during winter.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)
OCT								
04...	0840	169	--	--	194	2.0	6.0	--
NOV								
04...	0855	344	95	2	180	3.5	4.0	656
DEC								
14...	1000	138	100	3	185	-10.0	0.0	665
FEB								
15...	0930	E90	100	3	215	-15.0	0.0	660
28...	1500	63	--	--	212	-17.0	0.0	--
MAR								
21...	1545	73	--	--	208	9.0	0.0	--
29...	1115	84	--	--	255	3.0	0.0	--
APR								
13...	1030	159	15	1	270	10.0	4.5	660
26...	1750	1160	--	--	205	3.0	4.0	--
JUN								
13...	1630	3480	5	1	160	20.0	14.0	660
27...	1755	1110	--	--	186	21.0	16.0	--
AUG								
16...	1000	461	30	1	165	17.0	14.0	655
30...	1845	819	--	--	182	9.0	12.0	--

DATE	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
NOV							
04...	11.2	99	K15	K5	104	0	85
DEC							
14...	12.9	101	K1	K8	118	0	96
FEB							
15...	12.2	96	K1	K2	126	0	103
APR							
13...	12.2	109	<1	K4	--	--	--
JUN							
13...	9.0	101	57	K16	96	0	79
AUG							
16...	8.4	95	K8	K18	102	0	83

DATE	TIME	PH (STANDARD UNITS) (00400)	TURBIDITY (NTU) (00076)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)
NOV										
04...	0855	7.4	1.8	91	6	23	8.1	1.5	0.1	0.50
DEC										
14...	1000	8.0	0.40	99	4	25	9.0	2.0	0.1	0.40
FEB										
15...	0930	8.0	0.50	110	3	27	9.4	2.5	0.1	0.40
APR										
13...	1030	7.9	2.5	130	6	31	12	3.8	0.2	0.60
JUN										
13...	1630	8.2	110	86	7	22	7.6	2.0	0.1	--
AUG										
16...	1000	8.0	0.50	89	6	23	7.6	1.6	0.1	0.30

SASKATCHEWAN RIVER BASIN

05020500 ST. MARY RIVER AT INTERNATIONAL BOUNDARY--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLORIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUORIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	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)	NITROGEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)
NOV 04...	87	5.5	0.30	<0.10	2.8	98	93	0.13	91.0	<0.010
DEC 14...	97	5.9	0.40	0.10	2.8	104	103	0.14	38.8	<0.010
FEB 15...	104	6.8	0.30	0.10	3.1	127	112	0.17	E30.9	<0.010
APR 13...	121	12	0.40	0.10	3.3	140	136	0.19	60.1	<0.010
JUN 13...	85	7.0	0.20	0.10	3.2	95	90	0.13	893	<0.010
AUG 16...	85	4.0	0.30	0.10	2.8	88	90	0.12	110	<0.010

DATE	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DIS-SOLVED (MG/L AS P) (00666)	PHOSPHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SEDIMENT, SUS-PENDED (MG/L) (80154)	SEDIMENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV 04...	<0.100	<0.010	0.030	<0.20	<0.010	<0.010	<0.010	8	7.4	94
DEC 14...	<0.100	<0.010	0.020	<0.20	<0.010	<0.010	<0.010	3	1.1	86
FEB 15...	<0.100	<0.010	<0.010	<0.20	<0.010	<0.010	<0.010	1	E0.24	50
APR 13...	<0.100	0.200	0.130	0.30	<0.010	<0.010	<0.010	12	5.2	94
JUN 13...	<0.100	0.020	<0.010	<0.20	0.020	<0.010	<0.010	308	2890	67
AUG 16...	<0.100	0.040	0.030	0.20	0.020	0.010	<0.010	4	5.0	56

DATE	TIME	ALUMINUM, DIS-SOLVED (UG/L AS AL) (01106)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BERYLLIUM, 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)
NOV 04...	0855	<10	<1	120	<0.5	1	<1	<3	2	8	<5
FEB 15...	0930	10	<1	130	<0.5	<1	<1	<3	1	7	7
JUN 13...	1630	20	<1	96	<0.5	<1	<1	<3	1	20	<1
AUG 16...	1000	<10	<1	110	<0.5	<1	2	<3	3	7	<1

DATE	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, DIS-SOLVED (UG/L AS NI) (01065)	SELENIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	STRONTIUM, DIS-SOLVED (UG/L AS SR) (01080)	VANADIUM, DIS-SOLVED (UG/L AS V) (01085)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
NOV 04...	<4	2	<0.1	<10	2	<1	<1.0	54	<6	5
FEB 15...	<4	3	<0.1	<10	<1	<1	<1.0	74	<6	10
JUN 13...	<4	3	<0.1	<10	<1	<1	<1.0	75	<6	5
AUG 16...	4	1	<0.1	<10	1	<1	<1.0	56	<6	5

MISSOURI RIVER MAIN STEM

06007000 TOM CREEK NEAR LAKEVIEW, MT

LOCATION.--Lat 44°35'18", long 111°39'48", in NW1/4SE1/4NE1/4 sec.25, T.14 S., R.1 W., Beaverhead County, Hydrologic Unit 10020001, 200 ft upstream of culvert on Red Rock Pass road, 7.3 mi east of Lakeview, 37.5 mi east of Monida, and 45.5 mi west of West Yellowstone.

DRAINAGE AREA.--6.43 mi^2.

PERIOD OF RECORD.--May 1 to Sept. 30, 1989 (seasonal records only).

GAGE.--Nonrecording gage. Elevation of gage is 6,740 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: May 1-8, 10, 13-15, 17-23, May 26 to June 27, 29,30, July 1 to Aug. 7, Aug. 9 to Sept. 30. Seasonal records good except those prior to July 3, which are poor. At times all flow is diverted from Tom Creek to Battle Creek, upstream from station. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13 ft^3/s, May 18, 1989, gage height, 1.65 ft, from floodmarks; no flow many days.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 13 ft^3/s, May 18, gage height, 1.65 ft, from floodmarks; no flow many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1								e1.0	e7.0	e5.0	e.00	e.00
2								e1.0	e7.0	e2.0	e.00	e.00
3								e1.0	e7.5	e.00	e.00	e.00
4								e1.0	e7.5	e.00	e.00	e.00
5								e1.0	e7.5	e.00	e.00	e.00
6								e3.0	e8.0	e.00	e.00	e.00
7								e4.0	e8.5	e.00	e.00	e.00
8								e6.0	e8.5	e.00	e.00	e.00
9								7.6	e8.5	e.00	e.00	e.00
10								e8.5	e8.5	e.00	e.00	e.00
11								10	e8.0	e.00	e.00	e.00
12								9.9	e8.0	e.00	e.00	e.00
13								e9.0	e7.5	e.00	e.00	e.00
14								e8.0	e7.0	e.00	e.00	e.00
15								e7.0	e7.0	e.00	e.00	e.00
16								6.7	e7.5	e.00	e.00	e.00
17								e8.0	e7.5	e.00	e.00	e.00
18								e12	e7.0	e.00	e.00	e.00
19								e10	e7.0	e.00	e.00	e.00
20								e8.0	e6.5	e.00	e.00	e.00
21								e7.5	e6.5	e.00	e.00	e.00
22								e8.5	e6.5	e.00	e.00	e.00
23								e11	e6.0	e.00	e.00	e.00
24								10	e6.0	e.00	e.00	e.00
25								9.0	e6.0	e.00	e.00	e.00
26								e8.0	e5.5	e.00	e.00	e.00
27								e7.0	e5.5	e.00	e.00	e.00
28								e6.5	5.4	e.00	e.00	e.00
29								e7.0	e5.0	e.00	e.00	e.00
30								e7.0	e5.0	e.00	e.00	e.00
31								e6.5	---	e.00	e.00	---
TOTAL								210.7	208.9	7.00	0.00	0.00
MEAN								6.80	6.96	.23	.000	.000
MAX								12	8.5	5.0	.00	.00
MIN								1.0	5.0	.00	.00	.00
AC-FT								418	414	14	.00	.00

e Estimated

MISSOURI RIVER MAIN STEM

06010600 RED ROCK RIVER AT BRUNDAGE BRIDGE, NEAR MONIDA, MT

LOCATION.--Lat 44°38'58", long 111°59'09", in NW1/4NW1/4SW1/4 sec.33, T.13 S., R.3 W., Beaverhead County, Hydrologic Unit 10020001, on downstream side of Brundage Bridge, 2.1 mi upstream from Winslow Creek, 8 mi downstream of Lower Red Rock Lake, 20 mi east of Monida, and at mile 2,577.9.

DRAINAGE AREA.--277 mi^2.

PERIOD OF RECORD.--Oct. 1, 1988 to Sept. 30, 1989 (seasonal records only).

GAGE.--Nonrecording gage. Elevation of gage is 6,605 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Oct. 1-5, 7-31, May 1-8, 10-15, 17-31, June 1-19, 23,25,30, July 1-4, 8,9, 14-16,18, 21-23, 28-30, Aug. 3-7, 9-15, 18-20, 25-27, 30,31, Sept. 1-5, 8-11, 15-17, 21-30. Seasonal records fair except those for estimated daily discharges, which are poor. Natural storage in Red Rock Lakes. Diversions for irrigation of about 4,800 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 350 ft^3/s, May 11, 1989; maximum discharge observed, 251 ft^3/s, May 9, 1989, gage height, 3.56 ft; minimum daily discharge, 5.8 ft^3/s, Oct. 15-17, 1988.

EXTREMES FOR CURRENT SEASON.--Maximum daily discharge, 350 ft^3/s, May 11; maximum discharge observed, 251 ft^3/s, May 9, gage height, 3.56 ft; minimum daily discharge, 5.8 ft^3/s, Oct. 15-17.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e6.0							e95	e180	e140	38	e43
2	e6.0							e100	e180	e130	38	e43
3	e6.2							e105	e190	e120	e36	e43
4	e6.4							e110	e190	e115	e34	e44
5	e6.6							e120	e180	111	e32	e45
6	6.6							e140	e180	104	e30	45
7	e6.8							e170	e200	99	e30	54
8	e6.8							e210	e190	e98	30	e54
9	e6.6							248	e190	e96	e30	e53
10	e6.4							e310	e200	94	e32	e52
11	e6.2							e350	e210	77	e34	e52
12	e6.0							e310	e210	74	e37	51
13	e6.0							e220	e200	69	e41	45
14	e6.0							e190	e200	e68	e48	42
15	e5.8							e180	e190	e64	e48	e43
16	e5.8							213	e210	e60	45	e46
17	e5.8							e230	e240	58	40	e48
18	e6.2							e240	e230	e50	e40	51
19	e6.6							e230	e200	49	e41	45
20	e7.0							e210	208	45	e43	45
21	e7.2							e190	203	e40	45	e45
22	e7.4							e190	191	e45	43	e45
23	e7.4							e200	e190	e50	43	e45
24	e7.2							e210	191	48	43	e45
25	e7.0							e190	e187	43	e44	e45
26	e7.0							e180	179	42	e46	e45
27	e7.0							e180	173	43	e48	e45
28	e7.0							e180	169	e45	48	e45
29	e7.2							e180	160	e44	46	e45
30	e7.2							e190	e150	e42	e45	e45
31	e7.4							e190	---	41	e44	---
TOTAL	204.8							6061	5771	2204	1242	1394
MEAN	6.61							196	192	71.1	40.1	46.5
MAX	7.4							350	240	140	48	54
MIN	5.8							95	150	40	30	42
AC-FT	406							12020	11450	4370	2460	2760

e Estimated

MISSOURI RIVER MAIN STEM

06012500 RED ROCK RIVER BELOW LIMA RESERVOIR, NEAR MONIDA, MT

LOCATION.--Lat 44°39'22", long 112°22'14", in NE1/4SE1/4SE1/4 sec. 31, T.13 S., R.6 W., Beaverhead County, Hydrologic Unit 10020001, on right bank just downstream from Lima Reservoir, 7 mi northwest of Monida, and at mile 2,542.1.

DRAINAGE AREA.--570 mi^2.

PERIOD OF RECORD.--January 1911 to December 1918, April 1919, May 1925 to October 1933, April 1934 to September 1935, May 1936 to October 1938, May 1939 to September 1969, June 1974 to September 1982, April 1985 to current year (seasonal records only). No winter records 1974-1982. Monthly discharge only for some periods, published in WSP 1309. Prior to October 1950, published as "below Red Rock Reservoir".

REVISED RECORDS.--WSP 1309: 1935. WSP 1389: 1912, 1934. WSP 1559: Drainage area.

GAGE.--Water-stage recorder and sharp-crested weir. Elevation of gage is 6,530 ft, estimated from spillway elevation based on Montana Department of Natural Resources and Conservation datum. Prior to Oct. 1, 1978, at datum 1.00 ft higher. See WSP 1709 for history of nonrecording gage changes prior to May 8, 1939.

REMARKS.--No estimated daily discharges. Seasonal records good. Flow regulated by Lima Reservoir (station number 06012000). No storage during 1934. Diversions for irrigation of about 10,000 acres upstream from reservoir. Several observations of water temperature and specific conductance were made during the year. U.S. Bureau of Reclamation statellite telemeter at station.

AVERAGE DISCHARGE.--48 years (1912-18, 1926-33, 1935, 1937-38, 1940-69), 143 ft^3/s, 103,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 2,500 ft^3/s, May 15, 1933, gage height, 6.40 ft, estimated by damtender, released to prevent failure of dam; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of May 1984 reached a discharge of 1,500 ft^3/s, gage height, 5.15 ft, from floodmarks.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 627 ft^3/s, June 16, gage height, 3.54 ft; minimum daily, 0.14 ft^3/s, Oct. 2.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.43						.89	8.4	504	456	38	54
2	.14						.86	20	535	450	38	55
3	.51						.88	27	578	445	38	55
4	.65						1.1	39	605	441	38	55
5	.77						1.6	47	596	434	38	55
6	.51						1.8	78	556	429	33	55
7	.71						1.8	95	578	426	30	51
8	.81						1.3	96	575	426	26	48
9	.86						.91	96	571	428	23	48
10	.90						.86	109	569	432	23	49
11	.86						1.1	141	566	426	26	49
12	.92						1.4	123	572	424	31	49
13	1.1						1.4	123	620	288	40	55
14	1.0						1.4	123	615	89	44	59
15	.90						1.7	123	613	89	47	59
16	.95						1.8	157	617	72	49	59
17	1.1						1.6	178	616	61	49	54
18	1.3						1.5	178	615	58	48	50
19	1.2						1.3	179	614	57	43	51
20	1.4						1.4	196	613	57	40	25
21	1.1						1.3	221	613	57	40	9.8
22	1.2						.92	228	604	57	40	10
23	1.4						.90	289	556	57	40	9.7
24	1.3						.51	378	527	57	41	10
25	1.4						.66	318	500	57	48	10
26	1.3						1.1	363	494	51	53	10
27	1.4						.88	412	475	47	60	10
28	.74						.94	456	471	40	64	10
29	.80						1.1	454	463	38	63	10
30	.59						1.2	488	460	38	58	10
31	.42							505		38	54	
TOTAL	28.67						36.11	6248.4	16891	6525	1303	1134.5
MEAN	.92						1.20	202	563	210	42.0	37.8
MAX	1.4						1.8	505	620	456	64	59
MIN	.14						.51	8.4	460	38	23	9.7
AC-FT	57						72	12390	33500	12940	2580	2250

MISSOURI RIVER MAIN STEM

06015300 CLARK CANYON RESERVOIR NEAR GRANT, MT

LOCATION.--Lat 45°00'06", long 112°51'27", in SE1/4SW1/4 sec 32, T.9 S., R.10 W., Beaverhead County, Hydrologic Unit 10020001, in shaft house near left end of dam on Beaverhead River, 1.5 mi upstream from Clark Canyon Creek, 10 mi east of Grant, and at mile 2,483.9.

DRAINAGE AREA.--2,321 mi^2.

PERIOD OF RECORD.--May 1964 to current year (monthend contents only). Records of daily elevations are in files of Helena district.

GAGE.--Water-stage recorder in shaft house. Datum of gage is referenced to National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation).

REMARKS.--Reservoir is formed by zoned earthfill dam with concrete control works and spillway completed in October 1964. Storage began Aug. 28, 1964 (uncontrolled storage began June 10, 1964). Usable capacity, 255,600 acre-ft between elevation 5,455.00 ft, invert of outlet works, and 5,560.40 ft, top of flood control. Dead storage, 1,509 acre-ft, below elevation 5,455.00 ft. Normal operating level, 177,500 acre-ft at elevation 5,546.00 ft. Minimum operating level, 1,450 acre-ft at elevation 5,470.60 ft. Figures given herein represent usable contents total contents published in previous water-supply papers and annual reports for May 1964 to September 1975. Water is used for irrigation, flood control, and recreation.

COOPERATION.--Elevations and capacity table furnished by U.S. Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily contents, 283,000 acre-ft, June 25, 1984, elevation, 5,564.70 ft; minimum since normal operating level was reached, 38,200 acre-ft, Aug. 23, 1989, elevation, 5,508.67 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents at 2400, 121,200 acre-ft, May 1, elevation, 5,534.59 ft; minimum, 38,200 acre-ft, Aug. 23, elevation, 5,508.67 ft.

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

Date	Elevation (feet)	Contents (acre-feet)	Change in Contents (acre-feet)
Sept. 30	5,523.01	76,100	---
Oct. 31	5,524.58	81,500	+5,400
Nov. 30	5,526.51	88,400	+6,900
Dec. 31	5,528.62	96,400	+8,000
CAL YR 1988			-66,200
Jan. 31	5,530.30	103,000	+6,600
Feb. 28	5,531.28	107,000	+4,000
Mar. 31	5,533.30	115,600	+8,600
Apr. 30	5,534.54	121,000	+5,400
May 31	5,532.42	111,800	-9,200
June 30	5,522.78	75,400	-36,400
July 31	5,513.03	47,900	-27,500
Aug. 31	5,508.82	38,500	-9,400
Sept. 30	5,511.47	44,300	+5,800
WTR YR 1989			-31,800

MISSOURI RIVER MAIN STEM

06016000 BEAVERHEAD RIVER AT BARRETTS, MT

LOCATION.--Lat 45°06'59", long 112°44'59", in SE1/4SW1/4SE1/4 sec.19, T.8 S., R.9 W., Beaverhead County, Hydrologic Unit 10020002, on left bank 1.4 mi upstream from Barretts, 2.2 mi downstream from Grasshopper Creek, 8.9 mi southwest of Dillon, and at mile 2,469.2.

DRAINAGE AREA.--2,737 mi^2.

PERIOD OF RECORD.--August 1907 to September 1986, October 1986 to current year. (seasonal records only). Monthly discharge only for some periods, published in WSP 1309. Prior to October 1963, published as "at Barratts".

REVISED RECORDS.--WSP 1279: 1908(M), 1910-12(M), 1929(M), 1935-36. WSP 1559: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 5,268.17 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 19, 1934, nonrecording gages at same site and datum.

REMARKS.--No estimated daily discharges. Seasonal records good. Some regulation by Lima Reservoir (station number 06012000) and nearly complete regulation by Clark Canyon Reservoir (station number 06015300) since August 1964. Diversions for irrigation of about 90,000 acres above station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--79 years (1908-1986), 441 ft^3/s, 319,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,720 ft^3/s, June 20, 1908, gage height, 6.1 ft; minimum recorded, 69 ft^3/s, Jan. 30, 1939, result of freezeup.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 967 ft^3/s, June 11, gage height, 2.32 ft; minimum daily, 80 ft^3/s, Sept. 17.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	117					140	153	179	430	635	566	169
2	119					138	155	232	460	618	525	152
3	119					138	148	265	513	626	508	151
4	119					138	146	273	556	611	505	150
5	118					138	150	277	550	615	496	142
6	119					138	173	276	637	653	493	123
7	120					137	192	322	726	663	489	106
8	124					135	233	361	817	646	463	99
9	123					135	213	386	908	662	450	85
10	124					135	179	393	920	661	447	85
11	124					135	171	403	956	632	450	85
12	124					135	170	394	942	641	430	87
13	126					135	178	338	940	678	415	88
14	126					135	184	318	931	654	390	87
15	127					135	191	333	916	680	329	86
16	126					135	196	344	911	769	391	83
17	128					133	195	293	895	764	382	80
18	129					133	187	295	835	758	365	88
19	132					133	180	312	800	811	354	91
20	132					153	187	303	819	805	356	89
21	133					152	191	302	805	806	330	95
22	131					159	194	318	786	795	308	96
23	131					162	200	371	781	789	280	95
24	131					158	203	422	788	758	246	95
25	131					163	200	415	779	705	233	95
26	132					176	201	399	794	687	223	96
27	134					183	192	395	801	693	204	99
28	133					176	181	399	782	670	188	100
29	134					169	166	439	757	662	186	99
30	134					156	162	477	700	625	184	99
31	135					158	---	430	---	594	181	---
TOTAL	3935					4546	5471	10664	23235	21366	11367	3095
MEAN	127					147	182	344	774	689	367	103
MAX	135					183	233	477	956	811	566	169
MIN	117					133	146	179	430	594	181	80
AC-FT	7810					9020	10850	21150	46090	42380	22550	6140

MISSOURI RIVER MAIN STEM

06018500 BEAVERHEAD RIVER NEAR TWIN BRIDGES, MT

LOCATION.--Lat 45°23'01", long 112°27'07", in SW1/4NW1/4SE1/4 sec.22, T.5 S., R.7 W., Madison County, Hydrologic Unit 10020002, on left bank at downstream side of bridge on State Highway 41, 11.5 mi upstream from Ruby River, 12.7 mi southwest of Twin Bridges, 14.5 mi northeast of Dillon, and at mile 2,340.4.

DRAINAGE AREA.--3,619 mi^2.

PERIOD OF RECORD.--August 1935 to current year. Prior to October 1968, published as "at Blaine."

REVISED RECORDS.--WSP 1309: 1938(M), 1945(M). WSP 1559: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 4,809.15 ft above National Geodetic Vertical Datum of 1929. Prior to Feb. 17, 1949, nonrecording gage at bridge 0.5 mi upstream at different datum. Feb. 17, 1949, to June 28, 1951, nonrecording gage at present site and datum.

REMARKS.--Estimated daily discharges: Feb. 3-16. Records good except those for estimated daily discharges, which are poor. Flow partly regulated by Lima Reservoir (station number 06012000 and Clark Canyon Reservoir (station number 06015300) since August 1964. Diversions upstream from station for irrigation of about 135,400 acres of which about 5,000 acres are irrigated by imported water from Birch and Willow Creeks and of which about 9,200 acres lies downstream from station including 600 acres in Ruby River drainage. U.S. Bureau of Reclamation satellite telemeter at station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--54 years, 423 ft^3/s, 306,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 3,130 ft^3/s, June 12, 1944, gage height, 6.76 ft, site and datum then in use; maximum gage height, 7.88 ft, June 25, 1984; minimum discharge observed, 7.0 ft^3/s, May 25, 1940.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 517 ft^3/s, Mar. 10, gage height, 5.22 ft; minimum, 30 ft^3/s, June 8,9, gage height, 2.98 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	191	305	270	225	222	229	307	147	81	75	60	213
2	213	306	285	221	146	195	298	149	65	71	62	209
3	204	309	291	236	e105	192	293	148	63	65	56	194
4	167	310	283	257	e100	220	284	144	67	58	52	193
5	145	303	282	268	e115	269	284	138	75	57	51	189
6	131	300	285	268	e130	270	295	120	40	44	47	189
7	150	300	286	229	e150	311	304	110	33	39	41	205
8	135	304	286	208	e170	320	324	109	31	44	35	199
9	149	304	288	223	e185	388	346	110	30	44	39	207
10	164	309	287	289	e205	465	324	120	44	47	45	216
11	177	311	290	245	e220	359	302	121	39	55	52	209
12	190	302	292	236	e230	333	271	151	53	47	53	183
13	185	298	300	236	e235	331	289	178	58	41	51	169
14	225	298	282	256	e232	315	275	173	67	40	49	133
15	245	300	246	236	e230	297	280	130	62	41	57	105
16	228	301	257	255	e228	293	273	139	76	47	46	100
17	229	321	256	262	222	292	275	141	77	63	41	97
18	232	325	255	264	236	292	248	127	94	61	51	96
19	238	310	267	268	245	297	204	127	95	48	59	78
20	239	299	266	267	253	299	175	124	78	57	74	77
21	237	294	266	269	253	300	178	102	62	56	108	91
22	244	299	257	273	256	307	164	79	66	64	100	92
23	247	317	268	274	263	306	163	59	59	72	103	92
24	259	327	237	250	269	306	162	46	52	75	129	103
25	268	301	211	226	274	310	151	51	58	72	158	109
26	284	280	142	232	272	339	138	66	69	52	159	120
27	283	269	172	254	268	359	148	74	66	48	168	144
28	284	291	205	253	253	346	152	62	67	47	190	163
29	286	293	217	273	---	332	157	74	85	52	188	138
30	293	289	199	277	---	320	154	105	78	54	177	120
31	294	---	236	274	---	310	---	106	---	59	198	---
TOTAL	6816	9075	7964	7804	5967	9502	7218	3530	1890	1695	2699	4433
MEAN	220	302	257	252	213	307	241	114	63.0	54.7	87.1	148
MAX	294	327	300	289	274	465	346	178	95	75	198	216
MIN	131	269	142	208	100	192	138	46	30	39	35	77
AC-FT	13520	18000	15800	15480	11840	18850	14320	7000	3750	3360	5350	8790

CAL YR 1988 TOTAL 82939 MEAN 227 MAX 436 MIN 40 AC-FT 164500
WTR YR 1989 TOTAL 68593 MEAN 188 MAX 465 MIN 30 AC-FT 136100

e Estimated

06019500 RUBY RIVER ABOVE RESERVOIR, NEAR ALDER, MT

LOCATION.--Lat 45°10'31", long 112°08'52", in SW1/4SW1/4SW1/4 sec.31, T.7 S., R.4 W., Madison County, Hydrologic Unit 10020003, on left bank at Puller Hot Springs, 0.4 mi upstream from Cottonwood Creek, 6 mi upstream from Ruby Dam, 10.5 mi south of Alder, and at mile 54.4.

DRAINAGE AREA.--538 mi^2.

PERIOD OF RECORD.--May 1938 to current year. Monthly discharge only for May 1938, published in WSP 1309.

REVISED RECORDS.--WSP 1309: 1938(M). WSP 1559: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 5,440.2 ft above National Geodetic Vertical Datum of 1929 (river-profile survey). Prior to Oct. 1, 1938, nonrecording gage at bridge 1,500 ft downstream at datum 5.2 ft lower. Oct. 1, 1938, to Aug. 5, 1955, water-stage recorder at site 500 ft downstream at datum 0.5 ft lower.

REMARKS.--Estimated daily discharges: Nov. 26,27, Dec. 1,2, 15-18, Dec. 21 to Jan. 3, 5-16, 23-29, Feb. 1-19, Mar. 2-4. Records good except those for estimated daily discharges, which are fair. Diversion for irrigation of about 3,000 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--51 years, 180 ft^3/s, 130,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,810 ft^3/s, May 16, 1984, gage height, 6.24 ft; minimum daily, 35 ft^3/s, Jan. 23, 1962.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 640 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 11	0730	*694	*4.06	Only peak greater than base discharge this year.			

Minimum discharge, 61 ft^3/s, Aug. 22, Sept. 25-27, gage height, 2.15 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	86	112	e96	e86	e84	84	95	142	229	113	102	84
2	88	112	e96	e88	e81	e82	97	154	243	109	100	83
3	89	113	101	e92	e77	e80	91	167	258	105	97	84
4	86	115	101	100	e70	e80	89	169	256	103	94	83
5	93	116	103	e94	e70	84	97	176	253	96	91	82
6	97	117	102	e88	e72	85	96	209	270	80	86	80
7	94	116	105	e85	e74	87	104	275	308	82	87	84
8	97	118	103	e80	e77	95	118	354	300	82	90	83
9	99	119	104	e85	e79	159	115	414	288	82	94	83
10	96	115	103	e88	e82	134	103	486	305	85	93	84
11	93	119	102	e87	e83	117	107	554	319	83	95	86
12	87	116	104	e85	e84	109	106	408	268	83	91	88
13	86	112	106	e84	e83	106	108	318	245	90	98	94
14	84	120	105	e86	e81	98	115	279	222	85	102	97
15	84	111	e90	e87	e80	90	121	268	209	86	95	89
16	83	113	e90	e88	e80	94	128	340	220	82	92	88
17	83	116	e90	92	e82	93	150	349	297	81	87	88
18	82	115	e90	92	e85	90	139	363	223	81	83	86
19	88	105	95	93	e86	94	151	344	189	86	84	86
20	99	107	96	92	87	87	174	301	179	82	86	91
21	103	110	e90	92	86	90	189	282	180	82	87	91
22	104	111	e88	93	84	92	238	290	174	96	70	93
23	105	116	e88	e88	85	92	214	335	165	116	68	87
24	106	111	e85	e86	84	91	183	313	152	115	79	87
25	104	102	e82	e85	85	95	171	259	131	104	85	75
26	103	e95	e80	e84	84	102	162	235	129	106	90	62
27	108	e95	e80	e84	84	105	165	219	125	113	85	64
28	106	103	e80	e84	84	103	159	222	124	117	87	74
29	107	104	e85	e84	---	101	146	253	120	107	85	70
30	106	104	e90	91	---	98	143	253	116	108	82	65
31	105	---	e90	91	---	96	---	232	---	104	80	---
TOTAL	2951	3338	2920	2734	2273	3013	4074	8963	6497	2944	2745	2491
MEAN	95.2	111	94.2	88.2	81.2	97.2	136	289	217	95.0	88.5	83.0
MAX	108	120	106	100	87	159	238	554	319	117	102	97
MIN	82	95	80	80	70	80	89	142	116	80	68	62
AC-FT	5850	6620	5790	5420	4510	5980	8080	17780	12890	5840	5440	4940

CAL YR 1988 TOTAL 49013 MEAN 134 MAX 832 MIN 44 AC-FT 97220
WTR YR 1989 TOTAL 44943 MEAN 123 MAX 554 MIN 62 AC-FT 89140

e Estimated

RUBY RIVER BASIN

06020600 RUBY RIVER BELOW RESERVOIR, NEAR ALDER, MT

LOCATION.--Lat 45°14'32", long 112°06'36", in SE1/4SE1/4NE1/4 sec.8, T.7 S., R.4 W., Madison County, Hydrologic Unit 10020003, on right bank 0.2 mi downstream from Ruby Dam, 5.7 mi south of Alder, and at mile 47.8.

DRAINAGE AREA.--596 mi^2.

PERIOD OF RECORD.--November 1962 to current year.

REVISED RECORDS.--1985 (M).

GAGE.--Water-stage recorder. Datum of gage is 5,286.63 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers).

REMARKS.--Estimated daily discharges: Feb. 5-10. Records good. Flow regulated by Ruby River Reservoir (station number 06020500). Diversions for irrigation of about 3,500 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--26 years, 218 ft^3/s, 157,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,010 ft^3/s, May 16, 1984, gage height, 8.52 ft, from flood-mark; minimum, 1.4 ft^3/s, Dec. 5, 1974, dam closure, result of discharge measurement; minimum daily, 16 ft^3/s, Jan. 5-9, 1989.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 500 ft^3/s, June 8, gage height, 4.03 ft; minimum daily, 16 ft^3/s, Jan. 5-9.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	57	42	22	22	27	27	29	66	418	296	291	182
2	57	42	22	19	27	27	29	83	417	295	264	193
3	59	42	21	17	27	27	29	90	417	294	225	198
4	62	42	21	17	27	27	29	92	416	293	274	197
5	63	42	22	16	e27	27	29	92	414	292	282	197
6	64	42	23	16	e27	27	29	99	413	291	280	195
7	65	42	23	16	e27	27	29	111	413	294	279	197
8	66	42	23	16	e27	27	29	177	468	299	277	227
9	66	42	23	16	e27	27	29	207	494	301	275	224
10	60	36	23	17	e27	27	29	253	492	329	301	221
11	56	31	24	17	26	27	29	277	490	315	311	217
12	58	31	24	17	26	27	29	286	463	325	306	214
13	59	31	24	17	26	27	30	283	443	333	304	211
14	60	31	24	17	26	27	30	277	441	331	294	209
15	61	30	24	17	26	28	30	295	435	330	287	204
16	61	30	24	17	26	28	30	335	393	314	280	206
17	61	30	25	17	26	28	30	360	391	249	259	229
18	61	30	25	17	26	28	30	380	391	311	256	225
19	61	31	25	20	26	28	30	393	359	342	255	218
20	62	31	25	26	27	28	30	361	342	340	252	212
21	62	31	25	26	27	28	30	334	342	339	249	206
22	62	31	26	26	27	28	30	323	340	337	247	201
23	63	31	26	26	27	28	30	385	340	336	246	195
24	63	31	26	27	27	28	30	391	338	326	230	188
25	62	31	26	27	27	28	30	409	337	306	205	182
26	62	29	26	27	27	28	38	429	341	304	195	175
27	62	28	25	27	27	28	46	426	357	302	187	165
28	57	28	26	27	27	28	53	422	356	300	186	153
29	42	25	25	27	---	29	54	421	350	299	184	140
30	42	22	25	27	---	29	55	420	322	299	184	125
31	42	---	25	27	---	29	---	419	---	298	182	---
TOTAL	1838	1007	748	648	747	857	984	8896	11933	9620	7847	5906
MEAN	59.3	33.6	24.1	20.9	26.7	27.6	32.8	287	398	310	253	197
MAX	66	42	26	27	27	29	55	429	494	342	311	229
MIN	42	22	21	16	26	27	29	66	322	249	182	125
AC-FT	3650	2000	1480	1290	1480	1700	1950	17650	23670	19080	15560	11710

CAL YR 1988 TOTAL 55950 MEAN 153 MAX 758 MIN 21 AC-FT 111000
WTR YR 1989 TOTAL 51031 MEAN 140 MAX 494 MIN 16 AC-FT 101200

e Estimated

BIG HOLE RIVER BASIN

06024450 BIG HOLE RIVER BELOW BIG LAKE CREEK, AT WISDOM, MT

LOCATION.--Lat 45°37'07", long 113°27'25", in SW1/4SW1/4NE1/4 sec. 33, T.2 S., R.15 W., Beaverhead County, Hydrologic Unit 10020004, on downstream side of State Highway 43 bridge, 0.3 mi west of Wisdom, 0.6 mi downstream from Big Lake Creek, and at mile 116.0.

DRAINAGE AREA.--575 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1988 to current year (seasonal records only).

GAGE.--Water-stage recorder. Elevation of gage is 6,040 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--No estimated daily discharges this year. Seasonal water-discharge records fair. Diversions for irrigation of about 66,900 acres upstream from station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,080 ft^3/s, June 1, 1988, gage height, 4.58 ft; no flow many days in August and September 1988.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 978 ft^3/s, June 17, gage height, 4.50 ft; minimum 12 ft^3/s, Aug. 20.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16							156	201	39	61	36
2	16							140	138	37	60	33
3	16							168	136	37	53	29
4	17							160	173	42	45	28
5	17							127	141	37	36	28
6	17							119	124	44	39	26
7	19							127	130	46	35	23
8	20							233	190	38	30	22
9	22							391	261	38	30	23
10	23							368	341	43	31	24
11	24							448	345	52	27	24
12	25							642	330	52	22	23
13	26							454	278	122	24	22
14	26							414	260	163	24	21
15	27							289	461	115	22	20
16	27							253	819	125	20	20
17	29							215	899	180	18	20
18	30							164	600	176	17	29
19	31							242	366	134	15	36
20	34							255	251	112	17	33
21	35							160	313	114	22	29
22	34							122	248	145	24	29
23	33							83	200	129	32	27
24	32							59	157	108	53	25
25	33							53	112	95	65	25
26	33							59	81	85	66	24
27	31							52	56	87	56	24
28	31							54	52	97	52	26
29	31							448	46	84	46	29
30	32							609	42	70	41	28
31	34							318	---	60	39	---
TOTAL	821							7382	7751	2706	1122	786
MEAN	26.5							238	258	87.3	36.2	26.2
MAX	35							642	899	180	66	36
MIN	16							52	42	37	15	20
AC-FT	1630							14640	15370	5370	2230	1560

BIG HOLE RIVER BASIN

06024450 BIG HOLE RIVER BELOW BIG LAKE CREEK AT WISDOM, MT--Continued

WATER QUALITY RECORDS

PERIOD OF RECORD.--Water years 1988 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: May 1988 to current year (seasonal).

INSTRUMENTATION.--Temperature recorder since April 27, 1988.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: Maximum, 24.5°C, July 22, 1988, July 6, 1989.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURE: Maximum, 24.5°C July 6.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
OCT					
05...	1110	16	116	10.0	7.0
NOV					
01...	1240	36	127	14.0	4.0
APR					
27...	1240	284	76	3.0	6.0
MAY					
17...	1150	224	84	17.5	10.5
JUN					
29...	1100	47	128	13.0	12.0
SEP					
20...	1040	33	110	3.5	7.0

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	15.5	8.0	11.5	---	---	---	---	---	---	---	---	---
2	15.0	7.5	11.0	---	---	---	---	---	---	---	---	---
3	13.5	7.5	10.5	---	---	---	---	---	---	---	---	---
4	13.5	6.5	9.5	---	---	---	---	---	---	---	---	---
5	13.5	6.0	9.5	---	---	---	---	---	---	---	---	---
6	12.5	5.5	9.0	---	---	---	---	---	---	---	---	---
7	12.5	5.0	8.5	---	---	---	---	---	---	---	---	---
8	12.0	6.0	8.5	---	---	---	---	---	---	---	---	---
9	12.5	6.0	9.0	---	---	---	---	---	---	---	---	---
10	13.0	6.0	9.0	---	---	---	---	---	---	---	---	---
11	12.5	6.0	9.0	---	---	---	---	---	---	---	---	---
12	11.0	5.0	8.0	---	---	---	---	---	---	---	---	---
13	11.5	5.5	8.5	---	---	---	---	---	---	---	---	---
14	9.5	7.0	8.5	---	---	---	---	---	---	---	---	---
15	11.0	7.5	9.0	---	---	---	---	---	---	---	---	---
16	10.5	9.0	9.5	---	---	---	---	---	---	---	---	---
17	11.5	8.0	9.5	---	---	---	---	---	---	---	---	---
18	7.5	4.5	6.5	---	---	---	---	---	---	---	---	---
19	8.5	6.0	7.0	---	---	---	---	---	---	---	---	---
20	10.0	6.0	8.0	---	---	---	---	---	---	---	---	---
21	10.0	5.0	7.5	---	---	---	---	---	---	---	---	---
22	9.0	5.5	7.0	---	---	---	---	---	---	---	---	---
23	9.0	4.0	6.5	---	---	---	---	---	---	---	---	---
24	8.5	4.5	6.5	---	---	---	---	---	---	---	---	---
25	9.0	4.0	6.5	---	---	---	---	---	---	---	---	---
26	8.0	4.5	6.0	---	---	---	---	---	---	---	---	---
27	6.0	2.0	4.0	---	---	---	---	---	---	---	---	---
28	5.0	1.5	3.5	---	---	---	---	---	---	---	---	---
29	5.5	1.0	3.5	---	---	---	---	---	---	---	---	---
30	6.0	3.0	4.5	---	---	---	---	---	---	---	---	---
31	7.0	2.5	4.5	---	---	---	---	---	---	---	---	---
MONTH	15.5	1.0	7.5	---	---	---	---	---	---	---	---	---

06024450 BIG HOLE RIVER BELOW BIG LAKE CREEK AT WISDOM, MT--Continued

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	---	---	---	---	---	---	11.5	5.5	9.0
2	---	---	---	---	---	---	---	---	---	9.5	7.0	8.0
3	---	---	---	---	---	---	---	---	---	10.0	5.5	7.5
4	---	---	---	---	---	---	---	---	---	13.5	5.5	9.0
5	---	---	---	---	---	---	---	---	---	14.5	6.0	10.0
6	---	---	---	---	---	---	---	---	---	15.5	7.5	11.5
7	---	---	---	---	---	---	---	---	---	14.5	10.5	12.5
8	---	---	---	---	---	---	---	---	---	15.0	9.5	12.0
9	---	---	---	---	---	---	---	---	---	16.0	9.0	12.5
10	---	---	---	---	---	---	---	---	---	14.0	10.5	12.0
11	---	---	---	---	---	---	---	---	---	10.5	8.0	9.0
12	---	---	---	---	---	---	---	---	---	8.5	5.5	7.0
13	---	---	---	---	---	---	---	---	---	7.5	5.5	6.5
14	---	---	---	---	---	---	---	---	---	11.5	5.5	8.0
15	---	---	---	---	---	---	---	---	---	11.0	7.0	9.0
16	---	---	---	---	---	---	---	---	---	12.5	6.5	9.0
17	---	---	---	---	---	---	---	---	---	16.0	7.0	11.5
18	---	---	---	---	---	---	---	---	---	11.5	6.0	8.5
19	---	---	---	---	---	---	---	---	---	10.5	3.0	6.5
20	---	---	---	---	---	---	---	---	---	13.0	5.5	9.0
21	---	---	---	---	---	---	---	---	---	14.0	6.5	10.5
22	---	---	---	---	---	---	---	---	---	17.0	8.0	12.5
23	---	---	---	---	---	---	---	---	---	14.5	8.5	11.5
24	---	---	---	---	---	---	---	---	---	11.0	5.5	8.5
25	---	---	---	---	---	---	---	---	---	11.0	5.5	8.0
26	---	---	---	---	---	---	---	---	---	13.0	5.0	9.0
27	---	---	---	---	---	---	---	---	---	14.0	8.0	11.0
28	---	---	---	---	---	---				10.5	7.5	9.0
29	---	---	---	---	---	---				10.5	5.5	7.5
30	---	---	---	---	---	---				14.0	7.0	10.5
31	---	---	---	---	---	---	---	---	---	14.5	8.0	11.5
MONTH	---	---	---	---	---	---	---	---	---	17.0	3.0	9.5
		JUNE			JULY			AUGUST			SEPTEMBER	
1	16.0	9.0	12.5	20.0	12.0	16.0	21.0	15.5	18.0	18.5	10.5	14.5
2	14.5	10.0	12.5	22.5	12.0	17.0	19.0	13.5	16.0	16.5	11.5	14.0
3	12.0	9.5	10.5	23.5	13.0	18.0	20.5	12.0	16.0	17.5	9.0	12.5
4	17.5	8.5	12.0	23.5	14.0	18.5	22.0	12.5	17.0	17.5	9.0	13.0
5	21.0	11.0	15.5	24.0	14.0	19.0	22.0	13.0	17.5	15.5	9.5	12.0
6	22.0	13.5	17.5	24.5	14.5	19.0	23.0	13.5	18.0	14.5	8.0	11.0
7	20.5	12.5	16.5	23.5	15.0	19.0	22.0	14.0	18.0	16.0	7.5	11.5
8	21.5	12.5	17.0	23.5	15.0	19.0	21.5	15.5	18.5	11.5	8.5	10.0
9	18.0	14.5	16.5	21.5	14.5	17.5	22.5	16.5	19.0	14.5	7.0	10.0
10	18.0	13.0	15.5	22.0	13.0	17.0	21.0	13.5	17.5	14.5	6.5	10.0
11	19.5	11.5	15.0	23.5	13.5	18.0	21.5	14.0	17.5	15.0	6.5	10.5
12	21.0	13.5	17.0	21.0	15.0	18.0	18.5	14.0	16.0	14.5	5.5	9.5
13	20.5	14.0	17.0	22.0	15.5	18.5	22.0	12.5	16.5	15.5	6.0	10.5
14	19.0	14.5	16.5	24.0	15.0	19.0	21.0	13.0	16.5	16.0	7.5	11.5
15	20.5	14.5	17.0	21.5	16.0	18.5	19.0	13.0	15.5	15.5	7.5	11.5
16	17.0	14.0	15.5	17.5	14.0	15.5	20.5	11.0	15.5	13.5	7.5	10.5
17	16.5	12.0	14.5	19.5	13.0	15.5	20.5	11.5	16.0	10.5	8.5	9.5
18	19.5	12.5	15.5	22.0	13.0	17.5	21.0	12.0	16.5	11.5	8.5	10.0
19	19.0	13.5	16.0	23.5	15.0	19.0	20.5	13.0	17.0	13.5	5.5	9.0
20	14.5	10.0	12.0	22.0	16.0	19.0	18.0	12.5	15.0	14.0	6.0	10.0
21	13.5	8.5	10.5	21.0	16.0	18.5	15.5	11.5	13.5	15.0	6.0	10.0
22	14.0	10.0	11.5	23.5	15.5	19.0	18.0	11.5	14.0	15.5	7.0	11.0
23	14.5	9.0	12.0	22.0	15.5	19.0	14.5	12.0	13.0	15.5	7.5	11.5
24	19.0	9.0	13.5	24.0	15.5	19.5	14.0	10.5	11.5	15.5	8.0	11.5
25	16.5	11.5	14.0	24.0	16.0	20.0	14.5	10.0	12.0	15.5	7.5	11.5
26	18.0	10.5	14.0	22.5	16.0	19.0	16.0	9.5	12.5	15.0	9.5	12.0
27	17.5	11.5	14.5	18.5	16.0	17.0	14.0	10.5	12.0	13.5	9.0	11.0
28	20.0	11.0	15.5	22.5	13.0	17.5	16.5	8.5	12.5	15.5	7.5	11.5
29	22.5	11.5	16.5	22.5	14.5	18.5	18.0	9.5	13.5	16.0	8.5	12.0
30	21.0	12.5	16.5	20.0	15.0	17.5	18.5	12.0	15.0	12.5	9.0	10.5
31	---	---	---	21.0	14.5	17.5	18.0	11.5	14.5	---	---	---
MONTH	22.5	8.5	14.5	24.5	12.0	18.0	23.0	8.5	15.5	18.5	5.5	11.0

BIG HOLE RIVER BASIN

06025500 BIG HOLE RIVER NEAR MELROSE, MT

LOCATION.--Lat 45°31'36", long 112°42'03", in SE1/4SE1/4SW1/4 sec.34, T.3 S., R.9 W., Madison County, Hydrologic Unit 10020004, on left bank 50 ft downstream from bridge, on U.S. Highway 91, 0.1 mi downstream from Rock Creek, 7 mi south of Melrose, and at mile 31.1.

DRAINAGE AREA.--2,476 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1923 to current year. Monthly discharge only for some periods, published in WSP 1309.

GAGE.--Water-stage recorder. Datum of gage is 5,032.87 ft above National Geodetic Vertical Datum of 1929. Prior to June 14, 1927, water-stage recorder, and July 17, 1927, to Sept. 30, 1931, nonrecording gage, at site 1.7 mi upstream at different datum.

REMARKS.--Estimated daily discharges: Nov. 25 to Mar. 14. Water-discharge records good except those for estimated daily discharges, which are poor. Diversions for irrigation of about 136,000 acres upstream from station.

AVERAGE DISCHARGE.--66 years, 1,146 ft^3/s, 830,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 23,000 ft^3/s, June 14, 1927, when Wise River Reservoir dam failed (gage height, 14.0 ft, from floodmark, site and datum then in use), from rating curve extended above 8,000 ft^3/s; maximum discharge unaffected by dam failure, 14,300 ft^3/s, June 10, 1972, gage height, 8.04 ft; minimum observed, 49 ft^3/s, Aug. 17, 1931, gage height, 0.70 ft, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,890 ft^3/s, June 16, gage height, 4.25 ft; minimum daily, 150 ft^3/s, Feb. 5.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	188	289	e260	e200	e230	e230	446	986	1670	906	432	381
2	190	285	e270	e205	e200	e220	472	995	1490	846	413	347
3	188	300	e280	e220	e170	e220	431	1010	1590	780	392	323
4	197	333	e270	e215	e160	e220	412	1030	1790	736	369	307
5	213	342	e280	e200	e150	e250	420	1060	1810	697	346	293
6	206	351	e300	e190	e160	e400	494	1130	1950	644	334	283
7	206	364	e290	e170	e180	e520	727	1340	2210	608	305	279
8	203	352	e280	e160	e180	e500	1150	1850	2310	584	285	273
9	203	353	e290	e170	e190	e550	1460	2340	2470	568	283	275
10	207	336	e300	e190	e210	e600	1600	2650	2710	537	268	284
11	216	334	e320	e200	e230	e580	1460	3040	2780	500	245	274
12	218	343	e340	e210	e230	e560	1280	3160	2580	481	235	280
13	218	252	e350	e220	e220	e530	1430	2910	2400	516	234	276
14	223	244	e250	e230	e210	e500	1770	2440	2250	552	236	266
15	220	251	e200	e240	e200	410	1870	2170	2440	602	226	254
16	232	306	e200	e240	e210	464	1940	1950	3530	622	216	245
17	255	374	e200	e250	e220	440	1970	1870	3660	636	208	249
18	290	388	e205	e250	e230	427	1730	1800	3150	684	194	314
19	292	367	e210	e240	e230	460	1750	1850	2600	672	185	346
20	287	373	e210	e240	e235	441	1860	1800	2220	620	204	334
21	282	382	e210	e245	e235	443	1940	1700	2020	560	216	331
22	277	383	e205	e240	e235	455	2120	1520	1900	597	233	324
23	272	388	e200	e235	e240	458	2220	1400	1770	604	263	315
24	272	384	e190	e220	e245	431	2050	1360	1590	599	432	314
25	272	e350	e180	e220	e240	455	1780	1270	1410	549	537	308
26	274	e300	e170	e230	e240	449	1550	1190	1270	493	536	301
27	271	e250	e180	e230	e230	472	1370	1090	1180	515	502	297
28	275	e320	e190	e240	e230	488	1240	1060	1130	503	457	291
29	272	e310	e200	e250	---	481	1140	1490	1080	478	446	288
30	271	e290	e200	e260	---	479	1040	1960	992	462	425	287
31	282	---	e200	e260	---	466	---	2070	---	441	408	---
TOTAL	7472	9894	7430	6870	5940	13599	41122	53491	61952	18592	10065	8939
MEAN	241	330	240	222	212	439	1371	1726	2065	600	325	298
MAX	292	388	350	260	245	600	2220	3160	3660	906	537	381
MIN	188	244	170	160	150	220	412	986	992	441	185	245
AC-FT	14820	19620	14740	13630	11780	26970	81570	106100	122900	36880	19960	17730

CAL YR 1988 TOTAL 215932 MEAN 590 MAX 3370 MIN 53 AC-FT 428300
WTR YR 1989 TOTAL 245366 MEAN 672 MAX 3660 MIN 150 AC-FT 486700

e Estimated

06025500 BIG HOLE RIVER NEAR MELROSE, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1956-57, 1960-64, 1977 to current year.
PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: August 1956 to September 1957, August 1960 to September 1964, June 1977 to current year.
SUSPENDED-SEDIMENT DISCHARGE: August 1956 to September 1957, August 1960 to September 1964.
INSTRUMENTATION.--Temperature recorder since June 22, 1977.
EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: Maximum, 24.0°C, June 25, 1988; minimum, 0.0°C on many days during winter periods most years.
SEDIMENT CONCENTRATION (water years 1956-57, 1960-64): Maximum daily mean, 200 mg/L, June 29, 1961; minimum daily mean, 1 mg/L, on many days in 1960-64.
SEDIMENT LOAD (water years 1956-57, 1960-64): Maximum daily, 4,300 tons, June 9, 1964; minimum daily, less than 0.5 ton on several days in 1961.
EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURE: Maximum, 23.5°C, July 25; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
OCT					
05...	1610	196	262	25.0	12.5
NOV					
16...	1415	349	235	1.0	0.5
FEB					
22...	1100	233	218	1.0	0.0
APR					
05...	1000	458	194	2.5	3.5
MAY					
15...	1400	2210	93	10.5	9.0
JUN					
27...	1745	1160	157	18.0	15.0
AUG					
01...	1735	439	198	25.0	20.0
SEP					
18...	1700	287	245	14.0	13.5

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	14.5	10.5	12.5	7.0	4.0	5.5	.0	.0	.0	.0	.0	.0
2	14.5	10.5	12.5	7.0	6.0	6.5	.0	.0	.0	.0	.0	.0
3	14.0	10.5	12.5	7.5	5.5	6.0	.5	.0	.0	.0	.0	.0
4	13.5	9.5	11.5	6.5	4.0	5.5	.0	.0	.0	.5	.0	.0
5	13.5	9.0	11.0	6.0	4.0	5.0	.0	.0	.0	.0	.0	.0
6	12.5	8.5	10.5	7.0	5.0	5.5	.5	.0	.0	.0	.0	.0
7	12.0	7.5	10.0	5.0	3.0	4.0	.5	.0	.0	.0	.0	.0
8	12.5	8.0	10.5	4.5	3.0	3.5	.0	.0	.0	.0	.0	.0
9	13.0	9.0	11.0	3.5	1.5	2.5	.5	.0	.5	.5	.0	.0
10	13.0	8.5	11.0	2.5	1.5	2.0	.5	.0	.0	.5	.0	.0
11	12.5	8.5	10.5	3.0	1.5	2.0	.5	.0	.0	.0	.0	.0
12	11.5	7.5	9.5	1.5	.0	1.0	1.5	.5	1.0	.0	.0	.0
13	11.5	8.5	10.0	1.0	.0	.5	2.0	.5	1.0	.0	.0	.0
14	11.5	9.0	10.5	2.0	.5	1.0	.0	.0	.0	.0	.0	.0
15	10.5	9.0	10.0	1.0	.0	.0	.5	.0	.0	.0	.0	.0
16	12.0	10.0	11.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
17	12.5	10.0	11.0	1.5	.0	1.0	.5	.0	.0	.5	.0	.0
18	10.0	7.0	8.5	2.0	.0	1.0	.5	.0	.0	.5	.0	.0
19	10.5	8.0	9.0	1.0	.0	.5	.0	.0	.0	.5	.0	.5
20	10.0	7.0	8.5	1.0	.0	.5	.5	.0	.0	.5	.0	.5
21	10.5	7.0	9.0	1.0	.0	.5	.0	.0	.0	.5	.0	.0
22	10.5	7.5	9.0	2.0	.5	1.5	.0	.0	.0	.0	.0	.0
23	9.5	6.0	7.5	2.5	2.0	2.5	.0	.0	.0	.0	.0	.0
24	9.5	6.0	7.5	2.0	.0	1.0	.0	.0	.0	.0	.0	.0
25	9.5	6.5	8.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
26	9.5	6.5	8.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	7.5	5.0	6.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	6.0	3.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	5.5	2.5	4.5	.5	.0	.0	.0	.0	.0	.5	.0	.0
30	6.5	3.5	5.0	.0	.0	.0	.0	.0	.0	.5	.0	.0
31	7.0	3.5	5.0	---	---	---	.0	.0	.0	.5	.0	.5
MONTH	14.5	2.5	9.0	7.5	.0	2.0	2.0	.0	.0	.5	.0	.0

BIG HOLE RIVER BASIN

06025500 BIG HOLE RIVER NEAR MELROSE, MT--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	5.5	2.5	4.0	12.5	7.0	9.5
2	.0	.0	.0	.0	.0	.0	6.0	2.0	4.0	11.0	9.0	10.0
3	.0	.0	.0	.0	.0	.0	5.0	1.5	3.5	11.5	8.5	9.5
4	.0	.0	.0	.0	.0	.0	6.5	1.5	4.0	12.5	8.0	10.0
5	.0	.0	.0	.5	.0	.0	9.5	3.5	6.0	14.0	8.0	11.0
6	.0	.0	.0	.5	.0	.5	9.5	6.5	7.5	15.5	10.5	12.5
7	.0	.0	.0	.5	.0	.5	9.5	6.0	7.5	14.5	12.5	13.0
8	.0	.0	.0	.5	.0	.5	6.5	3.5	5.0	14.5	12.0	13.0
9	.0	.0	.0	.5	.0	.5	4.5	.5	2.5	14.0	10.5	12.0
10	.0	.0	.0	.5	.0	.5	3.5	.5	2.5	13.5	11.5	12.5
11	.0	.0	.0	.5	.5	.5	5.0	1.0	3.0	12.0	9.5	10.5
12	.0	.0	.0	.5	.0	.5	7.5	2.5	5.0	9.0	7.5	8.0
13	.0	.0	.0	.5	.0	.5	8.0	4.5	6.0	7.5	7.0	7.5
14	.0	.0	.0	.5	.0	.5	7.0	4.5	5.5	10.0	6.0	8.0
15	.0	.0	.0	2.0	.0	1.0	7.5	6.0	6.5	10.0	8.5	9.0
16	.0	.0	.0	2.5	.5	1.0	8.5	6.5	7.5	12.0	9.5	10.5
17	.0	.0	.0	1.5	.0	.5	8.5	5.5	6.5	14.0	9.5	11.5
18	.0	.0	.0	3.0	.0	1.5	10.0	4.5	7.0	12.0	8.5	10.5
19	.0	.0	.0	3.5	1.0	2.0	12.0	8.0	9.5	10.0	6.5	8.0
20	.0	.0	.0	5.5	.5	3.0	11.5	9.0	10.0	10.0	6.5	8.0
21	.0	.0	.0	5.5	2.0	3.5	12.0	9.5	10.5	11.0	8.5	9.5
22	.0	.0	.0	6.0	2.0	3.5	10.5	9.0	10.0	13.5	9.5	11.5
23	.5	.0	.5	4.0	2.5	3.5	9.0	7.5	8.5	14.0	10.5	12.0
24	.5	.0	.0	5.0	.5	3.0	8.5	6.5	7.5	11.0	8.0	10.0
25	.5	.0	.5	6.0	3.0	4.0	7.5	5.5	6.5	9.5	7.0	8.0
26	.5	.0	.0	5.5	3.5	4.5	9.0	5.5	7.0	11.5	7.0	9.0
27	.5	.0	.5	6.5	3.0	4.5	8.0	6.0	7.0	13.5	9.5	11.0
28	.5	.0	.0	5.0	3.0	4.0	7.0	4.5	6.0	11.0	8.0	10.0
29	---	---	---	5.5	2.5	3.5	9.0	3.0	6.0	9.0	6.5	8.0
30	---	---	---	6.0	1.0	3.5	11.5	5.0	8.0	12.5	7.0	9.5
31	---	---	---	7.0	3.0	4.5	---	---	---	13.0	9.5	11.0
MONTH	.5	.0	.0	7.0	.0	2.0	12.0	.5	6.5	15.5	6.0	10.0
		JUNE			JULY			AUGUST			SEPTEMBER	
1	14.0	11.0	12.5	18.5	14.0	16.0	20.0	16.5	18.5	17.5	12.0	15.0
2	14.0	12.0	13.0	20.0	13.0	16.5	21.0	15.5	18.0	16.0	13.0	14.5
3	12.5	10.5	11.0	21.0	14.5	17.5	20.0	14.5	17.0	16.5	11.0	13.5
4	14.5	9.5	11.5	22.0	15.0	18.0	20.5	14.5	17.5	17.5	11.0	14.0
5	16.5	11.5	13.5	21.5	15.0	18.0	21.5	14.5	18.0	15.5	11.5	13.5
6	16.5	13.5	15.0	22.5	15.0	18.5	21.5	15.0	18.5	13.0	10.5	12.0
7	17.0	13.5	15.0	22.5	15.5	19.0	21.5	16.0	19.0	15.5	9.5	12.5
8	17.0	13.0	15.0	21.5	15.5	18.5	20.5	17.0	19.0	13.0	10.5	11.5
9	16.0	14.5	15.0	19.5	15.0	17.0	20.5	17.0	18.5	13.0	9.0	11.0
10	16.0	13.5	14.5	19.5	13.5	16.5	20.5	16.0	18.0	13.0	9.0	11.0
11	15.0	12.5	14.0	21.5	14.0	17.5	20.5	15.5	18.0	13.5	8.5	11.0
12	16.5	13.5	15.0	20.0	15.5	18.0	20.0	16.0	18.0	13.5	7.5	10.5
13	16.5	14.0	15.5	22.0	16.5	19.0	20.0	15.0	17.5	14.5	8.5	11.5
14	16.5	14.5	15.5	22.0	16.0	19.0	20.0	15.0	17.5	15.5	9.5	12.5
15	17.5	14.0	15.5	21.0	16.5	18.5	19.0	15.0	17.0	15.5	10.0	13.0
16	16.0	14.0	15.0	18.0	15.0	16.5	20.0	13.5	16.5	15.0	10.5	13.0
17	14.5	12.5	14.0	19.5	14.0	16.0	19.5	13.5	16.5	13.5	11.5	12.5
18	15.0	12.5	14.0	21.0	14.0	17.5	20.0	14.5	17.5	13.5	10.5	12.0
19	17.5	14.0	15.5	22.5	16.0	19.0	19.5	15.5	17.5	14.5	9.0	11.5
20	16.0	11.0	13.5	21.5	17.0	19.0	17.0	14.5	16.0	14.0	9.5	12.0
21	12.5	10.0	11.0	20.5	17.0	19.0	15.0	13.0	14.0	14.5	9.5	12.0
22	13.0	10.0	11.5	22.0	16.5	19.0	17.5	12.5	14.5	15.0	10.0	12.5
23	13.5	11.0	12.0	20.5	17.0	19.0	15.5	13.0	14.0	15.0	10.0	12.5
24	16.5	10.5	13.0	22.5	16.5	19.5	13.0	12.0	12.5	15.5	10.5	13.0
25	15.0	13.0	14.0	23.5	17.0	20.0	15.0	11.0	13.0	15.0	10.5	13.0
26	15.0	11.5	13.5	23.0	17.5	20.0	15.5	10.5	13.0	15.5	11.5	13.5
27	15.5	12.5	14.0	20.5	17.0	19.0	15.5	11.5	13.5	15.0	12.0	13.5
28	16.5	12.0	14.5	22.0	15.5	19.0	16.0	11.0	13.5	15.5	10.5	13.5
29	18.5	12.5	15.0	20.5	16.5	18.5	17.0	11.5	14.0	15.5	11.0	13.5
30	18.5	14.0	16.0	20.5	15.5	18.0	18.0	13.0	15.0	14.0	11.5	13.0
31	---	---	---	21.0	15.5	18.0	16.0	12.5	14.5	---	---	---
MONTH	18.5	9.5	14.0	23.5	13.0	18.0	21.5	10.5	16.5	17.5	7.5	12.5

BOULDER RIVER BASIN

06033000 BOULDER RIVER NEAR BOULDER, MT

LOCATION.--Lat 46°12'40", long 112°05'27", in SE1/4NE1/4SW1/4 sec. 3, T.5 N., R.4 W., Jefferson County, Hydrologic Unit 10020006, on left bank 40 ft downstream from county bridge, 1.1 mile downstream of Muskrat Creek, 2.0 mi southeast of Boulder, and at mile 44.1.

DRAINAGE AREA.--381 mi^2.

PERIOD OF RECORD.--April 1929 to December 1932, March 1934 to September 1972, October 1984 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1279: 1931.

GAGE.--Water-stage recorder. Elevation of gage is 4,810 ft above National Geodetic Vertical Datum of 1929, by barometer. Prior to Aug. 29, 1946, nonrecording gage at present site and datum.

REMARKS.--Estimated daily discharges: Dec. 15 to Mar. 9. Records good except these for estimated daily discharges, which are poor. Diversions for irrigation of about 3,500 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--46 years (1930-32, 1935-72, 1985-89), 116 ft^3/s, 84,040 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,490 ft^3/s, June 9, 1964, gage height, 10.90 ft; no flow July 15-17, 21, 1931.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of May 22, 1981, reached a discharge of 7,000 ft^3/s, gage height, 12.3 ft, from floodmarks.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 420 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 23	0100	537	6.75	June 16	0600	432	6.54
May 11	0300	*974	*7.42				

Minimum daily discharge, 13 ft^3/s, Feb. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	26	25	e18	e20	e20	36	189	239	79	33	50
2	15	26	22	e17	e15	e20	39	203	288	72	36	42
3	15	26	24	e18	e14	e19	36	244	333	69	35	38
4	16	26	24	e20	e13	e19	36	259	323	61	33	35
5	15	26	23	e19	e14	e25	46	281	304	57	32	33
6	15	26	24	e18	e15	e30	74	369	304	51	31	31
7	15	29	26	e16	e16	e35	128	528	292	47	30	31
8	15	29	26	e15	e17	e38	191	640	268	41	33	33
9	15	27	27	e16	e18	e40	246	677	269	40	31	35
10	15	20	28	e18	e19	50	187	790	351	40	30	36
11	16	27	28	e17	e20	55	143	835	281	40	30	38
12	16	23	30	e17	e20	44	126	607	234	36	31	36
13	16	26	31	e17	e19	43	153	492	197	43	32	35
14	15	31	28	e18	e18	37	187	414	175	43	37	34
15	16	22	e20	e19	e17	36	224	377	224	37	38	34
16	16	25	e20	e20	e18	34	262	414	366	39	38	33
17	21	32	e20	e20	e19	37	249	416	253	45	34	34
18	32	30	e21	e21	e19	32	175	432	205	44	31	103
19	30	27	e22	e21	e20	33	222	384	180	38	30	81
20	31	26	e22	e21	e20	35	331	334	164	36	31	56
21	29	29	e22	e21	e21	35	414	317	177	39	31	48
22	28	30	e21	e20	e22	37	476	308	156	44	32	43
23	26	32	e20	e19	e22	39	473	326	136	40	38	40
24	27	29	e19	e18	e23	34	349	326	130	37	94	38
25	27	23	e18	e18	e23	40	281	290	119	36	83	39
26	26	24	e16	e18	e22	45	249	261	114	35	65	39
27	25	22	e15	e19	e22	44	229	249	112	54	58	38
28	24	25	e15	e20	e21	43	207	254	119	52	57	33
29	23	28	e16	e21	---	40	179	263	107	41	51	32
30	26	27	e17	e22	---	40	183	260	86	38	41	32
31	26	---	e18	e22	---	42	---	232	---	36	49	---
TOTAL	647	799	688	584	527	1121	6131	11971	6506	1410	1255	1230
MEAN	20.9	26.6	22.2	18.8	18.8	36.2	204	386	217	45.5	40.5	41.0
MAX	32	32	31	22	23	55	476	835	366	79	94	103
MIN	15	20	15	15	13	19	36	189	86	35	30	31
AC-FT	1280	1580	1360	1160	1050	2220	12160	23740	12900	2800	2490	2440

CAL YR 1988 TOTAL 26148.2 MEAN 71.4 MAX 639 MIN 8.7 AC-FT 51860
WTR YR 1989 TOTAL 32869 MEAN 90.1 MAX 835 MIN 13 AC-FT 65200

e Estimated

WILLOW CREEK BASIN

06035000 WILLOW CREEK NEAR HARRISON, MT

LOCATION.--Lat 46°43'23", long 111°44'25", in SE1/4SW1/4NW1/4 sec.28, T.1 S., R.1 W., Madison County, Hydrologic Unit 10020005, on right bank 2.2 mi upstream from Willow Creek Dam, 2.5 mi northeast of Harrison, and at mile 13.6.

DRAINAGE AREA.--83.8 mi^2.

PERIOD OF RECORD.--April 1938 to September 1982, October 1982 to current year (seasonal records only). Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1559: Drainage area.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 4,750 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to Oct. 8, 1946, water-stage recorder at datum 0.22 ft higher, with different concrete control.

REMARKS.--Estimated daily discharges: Apr. 3,4,10,11. Records good except those for Apr. 1-22, which are fair. Diversions for irrigation of about 12,500 acres of which 3,500 acres is in Norwegian Creek drainage. Several observations of water temperature and specific conductance were obtained during the year.

AVERAGE DISCHARGE.--44 years (1938-82), 40.7 ft^3/s, 29,490 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 813 ft^3/s, Feb. 3, 1963, gage height, 4.24 ft, from floodmarks, from rating curve extended above 300 ft^3/s; minimum, 0.32 ft^3/s, July 21-24, 1988, gage height, 0.26 ft.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 130 ft^3/s, May 11, gage height, 1.68 ft; minimum, 0.80 ft^3/s, Aug. 3, gage height, 0.31 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.9						35	54	54	12	1.4	2.9
2	1.9						35	57	53	10	1.3	3.0
3	1.9						e30	69	60	8.5	1.4	3.0
4	1.9						e27	54	63	6.5	1.8	2.8
5	1.9						30	52	57	6.7	1.8	2.7
6	1.9						36	55	60	5.9	1.4	3.0
7	1.9						41	62	58	4.1	1.3	3.2
8	1.9						41	87	54	4.4	1.3	4.2
9	1.9						36	89	62	4.5	1.4	7.1
10	1.9						e30	96	85	5.4	1.8	10
11	1.9						e28	123	85	4.4	2.0	9.8
12	1.9						29	119	68	3.2	1.5	8.8
13	1.9						30	113	62	4.8	2.0	8.4
14	1.9						30	106	57	3.3	2.6	7.5
15	1.9						32	106	52	2.3	2.2	7.4
16	1.9						34	111	86	3.5	2.1	8.1
17	2.4						34	104	87	4.3	2.0	9.7
18	2.7						32	105	66	2.1	2.0	13
19	2.8						35	110	59	1.9	1.7	11
20	2.3						38	96	53	1.9	2.3	11
21	2.3						40	91	35	1.9	2.6	8.8
22	1.9						44	88	26	2.6	2.5	9.1
23	1.9						42	88	15	2.1	2.9	9.8
24	1.9						45	83	9.1	2.1	3.7	8.7
25	1.9						49	76	8.9	2.0	4.2	9.4
26	1.9						51	70	8.1	2.0	4.7	8.9
27	1.9						80	66	7.3	2.4	3.5	8.3
28	1.9						67	66	18	2.4	3.1	8.4
29	2.0						59	76	16	1.9	2.9	7.8
30	1.9						62	70	13	1.7	2.9	7.3
31	2.1							61		1.9	3.0	
TOTAL	62.2						1202	2603	1437.4	122.7	71.3	223.1
MEAN	2.01						40.1	84.0	47.9	3.96	2.30	7.44
MAX	2.8						80	123	87	12	4.7	13
MIN	1.9						27	52	7.3	1.7	1.3	2.7
AC FT	123						2380	5160	2850	243	141	443

e Estimated

JEFFERSON RIVER BASIN

06036650 JEFFERSON RIVER NEAR THREE FORKS, MT

LOCATION.--Lat 45°53'52", long 111°35'45", in SW1/4SW1/4NW1/4 sec.27, T.2 N., R.1 E., Broadwater County, Hydrologic Unit 10020005, on left bank 50 ft downstream from bridge on U.S. Highway 10, 2.5 mi northwest of Three Forks, and at mile 2,329.3.

DRAINAGE AREA.--9,532 mi^2.

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

GAGE.--Water-stage recorder. Datum of gage is 4,076.76 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 25 to Dec. 6, Dec. 8,9, Dec. 15 to Mar. 20. Records good except those for estimated daily discharges, which are poor. Several observations of water temperature and specific conductance were made during the year. Some regulation by Ruby River Reservoir (station number 06020500) and Clark Canyon Reservoir (station number 06015300). Diversions for irrigation of about 390,000 acres upstream from station. U.S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--11 years, 2,191 ft^3/s, 1,587,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 15,900 ft^3/s, May 24, 1981, gage height recorded, 8.06 ft, 8.21 ft, from floodmark; maximum gage height, 9.39 ft, Dec. 10, 1980, ice jam; minimum discharge, 43 ft^3/s, Aug. 19, 21, Sept. 7, 8, 1988, gage height, 1.31 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,910 ft^3/s, May 12, gage height, 4.60 ft; maximum gage height, 7.22 ft, Dec. 19, ice jam; minimum discharge, 259 ft^3/s, Aug. 19, gage height, 1.72 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	663	991	e950	e650	e600	e1000	1320	1800	2190	1020	445	853
2	674	992	e900	e700	e500	e900	1300	1710	1970	1020	427	856
3	674	998	e950	e750	e450	e850	1280	1710	1750	1040	402	851
4	693	1000	e950	e850	e400	e800	1250	1750	1770	957	381	823
5	699	1020	e900	e900	e450	e900	1240	1730	1950	871	368	793
6	685	1050	e1000	e800	e550	e1100	1220	1690	1970	785	358	759
7	666	1050	1100	e750	e600	e1300	1270	1700	2020	641	346	749
8	672	1050	e1050	e700	e650	e1500	1430	2000	2180	503	317	732
9	677	1060	e1050	e800	e700	e1900	1780	2450	2320	415	302	709
10	686	1050	1110	e850	e750	e2200	2210	2960	2540	367	295	706
11	709	1050	1090	e850	e800	e2100	2350	3370	2820	353	279	719
12	726	1030	1080	e850	e850	e2000	2260	3770	2860	323	270	723
13	752	1050	1130	e800	e850	e1800	2090	3840	2680	309	267	735
14	751	1040	1110	e800	e800	e1600	2100	3600	2470	327	275	719
15	755	980	e900	e800	e800	e1500	2420	3210	2330	327	281	677
16	796	978	e750	e850	e750	e1400	2560	2920	2460	311	284	629
17	818	988	e800	e950	e750	e1300	2640	2720	3320	374	285	616
18	812	1080	e850	e1000	e800	e1300	2710	2610	3610	431	266	630
19	825	1110	e950	e1000	e900	e1400	2530	2560	3190	471	263	694
20	883	1100	e900	e1050	e950	e1400	2470	2490	2700	506	267	735
21	886	1100	e950	e1050	e1000	1390	2610	2360	2360	519	277	731
22	893	1120	e950	e1000	e1000	1380	2730	2230	2130	474	325	713
23	894	1160	e950	e1000	e1050	1380	2960	2050	1960	465	390	712
24	893	1170	e900	e950	e1100	1360	3060	1840	1810	478	418	710
25	911	e1100	e750	e900	e1200	1370	2860	1760	1650	505	620	701
26	933	e1000	e600	e900	e1200	1390	2570	1680	1510	473	808	703
27	974	e900	e500	e950	e1150	1400	2440	1590	1340	449	914	677
28	956	e950	e550	e950	e1100	1430	2230	1470	1260	441	975	687
29	968	e1000	e600	e1000	---	1420	2090	1440	1210	444	995	716
30	974	e1000	e650	e1050	---	1390	1910	1650	1120	435	966	689
31	986	---	e700	e900	---	1350	---	2020	---	450	922	---
TOTAL	24884	31167	27620	27350	22700	43510	63890	70680	65450	16484	13988	21747
MEAN	803	1039	891	882	811	1404	2130	2280	2182	532	451	725
MAX	986	1170	1130	1050	1200	2200	3060	3840	3610	1040	995	856
MIN	663	900	500	650	400	800	1220	1440	1120	309	263	616
AC-FT	49360	61820	54780	54250	45030	86300	126700	140200	129800	32700	27750	43140

CAL YR 1988 TOTAL 391854 MEAN 1071 MAX 3880 MIN 44 AC-FT 777200
WTR YR 1989 TOTAL 429470 MEAN 1177 MAX 3840 MIN 263 AC-FT 851900

e Estimated

MADISON RIVER BASIN

06036905 FIREHOLE RIVER NEAR WEST YELLOWSTONE, MT

LOCATION.--Lat 44°37'13", long 110°51'44", Yellowstone National Park, Hydrologic Unit 10020007, on right bank 1.6 mi south of Madison Junction, 12 mi east of West Yellowstone, and at mile 1.8.

DRAINAGE AREA.--282 mi^2.

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Elevation of gage is 7,050 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--No estimated daily discharges. Water-discharge records good. No regulation or diversions upstream from station.

AVERAGE DISCHARGE.--6 years, 326 ft^3/s, 236, 200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,520 ft^3/s, May 31, 1986, gage height, 5.48 ft; minimum, 195 ft^3/s, Jan. 9. 1989, gage height, 2.76 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 862 ft^3/s, May 18, gage height, 4.43 ft; minimum, 195 ft^3/s, Jan. 9, gage height, 2.76 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	224	223	229	229	236	231	255	309	445	295	264	261
2	224	226	230	229	236	253	261	334	484	290	269	258
3	224	245	232	232	238	240	245	385	656	285	264	257
4	226	233	228	235	236	227	239	349	617	282	264	257
5	228	225	228	236	232	234	249	370	512	278	264	255
6	225	244	232	239	232	238	271	421	519	274	265	255
7	225	227	231	224	234	250	306	480	518	272	271	259
8	223	233	224	223	230	247	304	527	527	268	272	261
9	224	228	230	209	231	301	273	550	511	273	274	261
10	225	225	231	231	240	315	258	641	509	290	274	258
11	225	233	229	234	239	307	266	632	505	274	283	257
12	224	234	230	235	237	290	273	566	481	279	289	258
13	225	235	231	242	236	279	290	499	459	315	318	256
14	226	240	224	245	232	262	312	470	451	283	290	254
15	225	228	206	236	227	252	334	514	439	273	306	254
16	225	229	214	240	228	256	364	545	494	267	277	253
17	236	238	220	236	232	255	387	560	453	265	272	260
18	226	232	221	239	239	249	375	651	407	265	274	303
19	235	229	225	241	243	253	400	627	399	263	300	261
20	227	230	223	238	239	240	416	482	389	262	280	257
21	226	232	232	235	234	240	464	513	357	262	280	255
22	225	240	225	248	234	243	467	578	338	264	272	254
23	224	259	226	250	242	244	442	677	331	265	267	254
24	224	245	226	235	239	245	407	613	328	272	270	254
25	226	237	231	231	241	273	400	486	322	261	286	252
26	225	231	221	240	238	284	380	445	322	267	280	253
27	223	222	216	240	235	276	377	459	315	275	272	257
28	222	238	225	235	233	264	342	482	312	285	275	272
29	223	232	226	239	---	273	312	536	306	268	268	258
30	222	231	229	238	---	262	304	514	298	264	264	256
31	221	---	238	240	---	254	---	449	---	262	261	---
TOTAL	6983	7004	7013	7304	6593	8037	9973	15664	13004	8498	8565	7760
MEAN	225	233	226	236	235	259	332	505	433	274	276	259
MAX	236	259	238	250	243	315	467	677	656	315	318	303
MIN	221	222	206	209	227	227	239	309	298	261	261	252
AC-FT	13850	13890	13910	14490	13080	15940	19780	31070	25790	16860	16990	15390

CAL YR 1988 TOTAL 95415 MEAN 261 MAX 637 MIN 206 AC-FT 189300
WTR YR 1989 TOTAL 106398 MEAN 292 MAX 677 MIN 206 AC-FT 211000

MADISON RIVER BASIN

06036905 FIREHOLE RIVER NEAR WEST YELLOWSTONE, MT--Continued

WATER QUALITY RECORDS

PERIOD OF RECORD.--Water years 1983 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: August 1983 to September 1986, October 1987 to September 1988.
WATER TEMPERATURE: August 1983 to current year.

INSTRUMENTATION.--Water-quality monitor Aug. 30, 1983 to Sept. 25, 1988. Water temperature recorder since Sept. 26, 1988.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1983-86, 1988): Maximum, 633 microsiemens, Apr. 1 1988; minimum, 140 microsiemens, Jun. 5, 1986.
WATER TEMPERATURE: Maximum, 30.0°C, June 24, 1988; minimum, 1.0°C, Dec. 24, 1983, Feb. 1, 1985, Feb. 5, 1989.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURE: Maximum, 28.0°C, July 19, 22, 24, 28; minimum, 1.0°C, Feb. 5.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)
OCT											
06...	1230	229	0	0	610	15.0	15.5	592	8.3	108	80
NOV											
03...	1145	250	80	2	575	13.0	12.5	582	8.8	109	81
DEC											
13...	1445	232	--	--	603	1.0	8.0	--	--	--	--
FEB											
09...	1000	--	--	--	605	-16.0	4.0	--	--	--	--
MAR											
07...	0945	253	--	--	636	5.0	12.0	--	--	--	--
MAY											
03...	1015	390	90	2	454	3.5	13.0	--	--	--	59
JUN											
14...	1115	477	40	1	313	22.0	17.5	--	--	--	39
JUL											
26...	1000	263	10	1	524	23.0	21.5	--	--	--	66
SEP											
12...	1100	255	0	0	522	6.5	13.5	--	--	--	70

DATE	TIME	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STANDARD UNITS) (00400)	TURBIDITY (NTU) (00076)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)
OCT										
06...	1230	154	0	125	8.2	2.1	20	0	6.8	0.76
NOV										
03...	1145	142	4	124	8.3	1.1	16	0	5.5	0.55

DATE	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)
OCT										
06...	110	11	8.8	128	15	8.7	110	416	0.56	257
NOV										
03...	110	13	8.2	125	22	4.5	110	417	0.57	282

MADISON RIVER BASIN

06036905 FIREHOLE RIVER NEAR WEST YELLOWSTONE, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	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)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHOROUS DIS-SOLVED (MG/L AS P) (00666)
OCT										
06...	7	1	<0.100	<0.100	0.020	0.020	<0.20	<0.20	0.020	0.020
NOV										
03...	7	<1	<0.100	<0.100	0.010	0.010	<0.20	<0.20	0.020	0.020

DATE	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	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									
06...	0.010	0.010	1.4	0.9	930	18	2	1.2	87
NOV									
03...	0.020	0.010	2.5	1.2	920	41	3	2.0	75

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	20.5	14.0	17.5	15.0	11.5	13.5	9.5	7.0	8.5	8.5	7.0	8.0
2	20.5	14.5	17.5	14.0	13.0	13.5	9.5	6.0	8.0	7.5	6.5	7.0
3	20.0	15.5	17.5	13.5	11.5	13.0	11.0	8.5	9.5	10.0	6.5	8.5
4	19.0	14.5	17.0	13.0	11.0	11.5	10.5	7.5	9.0	12.0	10.0	11.0
5	19.5	13.5	16.5	13.0	11.0	12.0	9.5	7.5	8.5	10.5	10.0	10.0
6	19.5	13.0	16.0	13.5	11.0	12.5	11.0	9.0	10.0	10.5	7.5	9.0
7	18.5	13.5	16.0	12.5	9.5	11.0	11.0	8.5	10.5	7.5	5.0	6.0
8	19.0	13.5	16.0	11.5	10.5	11.0	9.0	7.0	8.5	5.0	3.0	4.5
9	19.0	14.5	16.5	12.5	10.0	11.0	11.0	9.0	10.0	5.5	3.0	4.0
10	19.5	13.5	16.5	12.0	9.0	10.5	12.0	10.0	11.0	6.0	3.0	4.5
11	19.0	13.5	16.5	12.0	10.5	11.0	11.0	9.5	10.0	7.5	5.5	6.0
12	18.5	13.0	16.0	10.5	9.0	10.0	11.5	10.5	11.0	7.5	3.5	5.5
13	18.5	15.0	16.5	12.0	9.5	10.5	11.0	7.5	9.0	9.0	5.5	7.0
14	17.0	14.5	16.0	11.5	10.5	11.0	8.5	5.5	7.5	7.5	5.5	6.5
15	16.0	14.5	15.0	10.0	7.5	9.0	7.0	4.0	5.5	6.0	5.0	5.5
16	15.0	14.0	14.5	10.0	8.5	9.0	8.0	5.0	6.5	7.0	5.0	6.0
17	17.5	14.5	16.0	12.0	10.0	10.5	9.0	6.5	8.0	8.5	4.5	6.5
18	17.0	12.5	15.0	11.5	8.5	10.0	9.5	6.5	8.0	10.0	8.5	9.0
19	17.5	15.0	16.0	10.5	8.5	9.5	9.0	7.0	8.0	11.5	8.5	10.0
20	17.0	13.0	15.0	10.5	9.0	10.0	9.0	7.0	8.0	11.5	8.5	10.0
21	18.0	13.5	15.5	10.5	9.5	10.0	10.0	8.0	9.0	10.5	7.5	9.0
22	16.0	13.0	14.5	11.5	10.0	10.5	8.5	6.5	7.5	10.5	8.0	9.0
23	16.5	12.5	14.5	11.0	9.0	10.0	9.5	7.5	9.0	9.5	6.5	8.5
24	17.0	12.5	15.0	10.5	8.0	9.5	9.0	6.0	7.5	8.5	5.5	7.0
25	17.5	13.5	15.5	9.5	6.5	8.0	8.5	6.0	8.0	8.0	4.0	6.0
26	15.0	13.5	14.0	9.0	6.5	7.5	6.5	4.5	5.5	9.5	5.5	7.5
27	15.0	11.5	13.0	7.5	5.0	6.5	6.5	3.0	4.5	9.5	6.0	8.0
28	14.0	11.5	12.5	9.5	7.5	8.5	7.0	5.0	6.0	9.5	6.0	8.0
29	16.0	12.5	14.5	8.5	8.0	8.5	7.0	6.0	6.5	10.5	7.5	9.0
30	15.0	13.0	14.0	11.0	8.0	9.5	9.5	6.5	7.5	11.5	9.0	10.0
31	15.5	11.5	13.5	---	---	---	10.0	9.0	9.5	10.5	7.0	9.0
MONTH	20.5	11.5	15.5	15.0	5.0	10.5	12.0	3.0	8.0	12.0	3.0	7.5

MADISON RIVER BASIN

06036905 FIREHOLE RIVER NEAR WEST YELLOWSTONE, MT--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	7.0	2.5	5.0	10.0	7.0	8.5	15.5	11.0	13.0	21.0	13.0	17.0
2	6.5	1.5	3.5	10.0	8.0	9.5	14.0	10.0	12.0	20.0	15.0	17.0
3	4.5	1.5	3.0	11.0	6.5	9.0	14.0	8.0	11.0	17.5	12.5	15.5
4	5.0	1.5	3.0	11.0	4.0	7.5	15.0	8.0	11.5	18.0	13.0	15.5
5	5.0	1.0	3.0	13.5	8.0	10.5	14.5	11.5	13.0	21.5	13.0	17.5
6	7.5	2.5	5.0	14.0	11.0	12.5	18.5	12.5	15.0	21.5	13.0	17.5
7	8.0	4.0	6.0	15.0	12.5	13.5	16.5	12.5	14.5	19.0	13.5	16.5
8	8.5	4.0	6.0	14.5	12.0	13.5	16.5	11.0	13.5	17.5	12.5	15.5
9	9.5	4.0	7.0	17.0	13.0	14.0	15.5	9.0	12.0	19.5	11.5	15.5
10	12.5	9.5	11.0	16.5	11.0	13.5	17.5	8.5	13.0	17.5	11.5	14.0
11	14.0	11.0	12.0	17.0	11.5	14.0	19.0	11.0	15.0	13.5	10.0	12.0
12	11.5	9.0	10.0	17.0	10.5	13.5	20.0	11.5	15.5	12.5	10.5	11.5
13	10.0	7.5	9.0	13.5	8.5	11.5	20.0	11.5	16.0	13.0	10.0	11.5
14	9.5	6.5	8.0	11.5	8.5	9.5	20.5	13.0	16.5	17.5	10.5	14.0
15	8.5	4.5	6.5	12.0	7.5	9.5	17.0	13.0	15.0	16.5	12.5	14.5
16	10.0	6.0	8.0	13.0	9.0	11.0	16.5	13.0	15.0	16.0	12.0	14.0
17	12.5	10.0	11.0	12.0	8.5	10.5	14.5	11.5	13.5	17.5	10.5	14.0
18	13.5	11.5	12.5	12.0	8.5	10.5	19.5	11.0	15.0	15.5	8.5	12.0
19	14.5	12.0	13.0	13.5	10.0	12.0	17.0	11.5	14.5	14.0	6.0	10.0
20	13.5	11.0	12.5	15.5	8.0	11.0	19.0	12.0	15.0	18.0	9.5	13.5
21	12.5	9.5	11.0	12.5	10.5	11.5	18.0	11.5	15.0	18.5	11.0	15.5
22	12.5	10.5	11.5	12.5	10.0	11.5	17.5	11.5	14.5	18.5	12.0	15.0
23	13.0	11.0	11.5	14.5	9.5	11.5	16.5	12.0	14.0	16.0	9.5	13.0
24	14.5	9.0	11.5	15.5	10.5	13.0	16.5	11.5	14.0	12.0	8.0	10.5
25	13.0	10.5	11.5	14.5	13.0	13.5	15.5	12.5	14.0	13.5	9.0	11.0
26	13.5	10.0	11.5	16.5	12.5	14.0	14.0	11.0	12.0	17.5	11.0	14.5
27	11.5	9.0	10.0	14.0	11.5	13.0	15.5	10.5	13.0	17.5	12.5	15.5
28	11.5	9.0	10.0	13.0	10.0	10.5	14.5	10.5	12.5	18.5	13.0	16.0
29	---	---	---	15.0	10.5	12.5	16.5	10.5	13.5	18.5	13.0	16.0
30	---	---	---	17.0	10.5	13.0	20.5	11.0	15.5	16.5	12.5	14.0
31	---	---	---	13.5	11.5	12.5	---	---	---	18.5	11.5	15.0
MONTH	14.5	1.0	8.5	17.0	4.0	11.5	20.5	8.0	14.0	21.5	6.0	14.5
		JUNE			JULY			AUGUST			SEPTEMBER	
1	18.5	13.0	16.5	24.0	18.0	21.0	25.0	21.5	23.5	23.0	16.0	19.5
2	18.5	15.5	17.0	24.5	17.5	21.0	24.5	19.5	22.0	21.0	17.0	19.0
3	16.5	10.5	13.0	26.5	18.0	22.0	23.0	18.0	20.5	21.5	15.0	18.0
4	17.5	10.0	13.5	26.5	19.0	23.0	25.0	18.0	21.5	22.0	15.5	18.5
5	19.5	14.5	17.0	26.5	19.0	22.5	26.0	19.0	22.5	21.0	15.5	18.0
6	19.5	15.0	17.0	27.0	18.0	22.5	25.5	20.0	22.5	20.5	17.5	18.5
7	21.0	15.0	18.0	27.0	19.0	23.0	25.5	19.0	22.5	23.0	16.5	19.5
8	19.0	15.0	17.0	25.5	20.0	22.5	23.5	20.5	22.0	19.5	17.0	18.0
9	20.5	14.0	17.5	21.5	20.5	21.0	24.0	21.0	22.0	20.5	16.0	17.5
10	19.0	15.5	17.0	24.5	19.5	21.5	25.5	19.5	22.0	18.5	14.5	16.5
11	19.0	14.0	16.5	27.5	18.0	22.5	26.0	20.5	23.0	18.5	12.5	15.5
12	18.5	14.0	17.0	23.0	20.5	22.0	24.0	20.0	22.0	20.0	12.5	16.0
13	21.5	14.0	18.0	24.5	20.0	22.0	26.5	19.5	22.5	20.5	13.0	17.0
14	19.5	16.5	18.5	27.5	19.0	23.0	24.5	20.0	22.0	21.0	14.5	17.5
15	23.0	16.5	20.0	27.5	19.5	23.0	23.5	18.5	21.0	21.0	14.5	18.0
16	20.5	17.0	18.5	25.0	20.0	22.5	23.5	18.5	21.0	21.0	15.0	18.0
17	20.5	15.0	17.5	23.5	19.0	21.0	25.5	18.0	21.5	19.5	16.0	18.0
18	21.5	16.0	19.0	27.5	18.0	22.5	22.5	20.5	21.5	18.0	16.0	17.0
19	22.5	17.0	20.0	28.0	20.5	24.0	22.5	19.0	20.5	20.0	14.5	17.0
20	19.5	15.5	17.0	26.5	21.0	23.5	21.0	18.0	19.5	19.5	14.5	17.0
21	18.5	14.0	16.5	25.5	21.5	23.5	20.5	17.5	19.5	20.5	14.5	17.5
22	18.5	14.0	16.5	28.0	21.5	24.5	23.5	18.5	21.0	21.5	14.5	18.0
23	20.0	15.0	17.5	24.0	21.5	23.0	24.0	18.5	21.5	21.5	15.5	18.5
24	21.0	15.0	17.5	28.0	19.5	23.5	20.5	17.5	18.5	21.0	15.0	18.5
25	21.0	15.5	18.5	26.5	21.0	24.0	18.5	16.5	17.0	21.5	15.0	18.5
26	22.0	16.5	19.5	24.0	21.0	22.5	21.0	16.0	18.0	19.0	16.5	18.0
27	22.5	18.0	20.5	26.5	21.0	23.5	21.5	16.5	19.0	20.5	17.0	19.0
28	22.5	17.5	20.0	28.0	20.5	24.0	22.5	16.5	19.5	22.0	17.5	19.5
29	25.0	17.0	21.0	27.0	21.0	24.0	22.5	16.5	19.5	22.0	16.5	19.0
30	25.0	18.5	21.5	27.5	21.0	24.0	22.5	17.0	20.0	20.0	15.5	18.0
31	---	---	---	27.0	21.0	24.0	21.5	16.5	19.0	---	---	---
MONTH	25.0	10.0	18.0	28.0	17.5	23.0	26.5	16.0	21.0	23.0	12.5	18.0

MADISON RIVER BASIN

06037000 GIBBON RIVER NEAR WEST YELLOWSTONE, MT

LOCATION.--Lat 44°38'58", long 110°47'02", Yellowstone National Park, Hydrologic Unit 10020007, on right bank, 0.6 mi downstream from Canyon Creek, 4.0 mi east of Madison Junction, 16.7 mi east of West Yellowstone, and at mile 5.6.

DRAINAGE AREA.--118 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1913 to September 1916 (incomplete record most years), October 1983 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 6,940 ft above National Geodetic Vertical Datum of 1929, from topographic map. Nonrecording gage at site 0.1 mi downstream at different datum, 1913-1916.

REMARKS.--Estimated daily discharges: Nov. 27, Dec. 2, 15-18, 25-28, Jan. 7-13, 24-27, Feb. 1-10,15, Mar. 4. Water-discharge records good except those for estimated daily discharges and discharges over 500 ft^3/s, which are fair. No regulation or diversions upstream of station.

AVERAGE DISCHARGE.--6 years, 112 ft^3/s, 81,140 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,210 ft^3/s, May 11, 1989, gage height, 4.53 ft; minimum, 47 ft^3/s, Jan. 9, 1989, gage height, 2.20 ft, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,210 ft3/s, May 11, gage height, 4.53 ft; minimum, 47 ft^3/s, Jan. 9, gage height, 2.20 ft, result of freezeup.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	66	71	73	71	e68	70	83	152	205	116	100	83
2	66	73	e70	70	e64	75	85	181	208	113	102	82
3	66	75	71	71	e62	71	78	225	229	113	96	80
4	67	75	71	73	e60	e68	76	218	225	111	95	80
5	66	72	70	74	e60	70	78	251	208	109	94	81
6	67	76	71	76	e62	73	79	377	196	107	93	80
7	67	74	73	e74	e64	77	91	598	196	106	93	81
8	67	75	69	e72	e66	76	100	692	186	106	98	81
9	67	74	70	e68	e67	93	92	828	184	105	98	81
10	67	72	72	e76	e68	99	84	1020	187	112	117	84
11	67	78	72	e74	69	97	86	831	189	109	122	82
12	69	76	72	e72	69	93	89	670	172	109	100	81
13	70	76	72	e74	69	94	97	465	161	123	111	79
14	69	79	69	76	68	90	111	417	153	113	99	79
15	70	73	e62	75	e67	81	129	382	151	108	102	79
16	70	77	e62	75	66	86	136	412	154	106	95	80
17	75	78	e63	75	69	84	145	424	159	105	91	81
18	71	77	e64	75	72	79	160	427	146	104	96	97
19	71	74	64	74	73	81	222	507	140	101	128	82
20	69	77	65	74	72	74	244	341	134	101	102	80
21	69	78	68	73	70	78	308	320	136	100	95	78
22	70	78	68	78	68	79	324	339	134	105	88	79
23	69	83	68	79	73	78	318	362	133	106	87	80
24	69	83	66	e72	71	78	277	380	131	113	87	80
25	71	76	e66	e70	72	84	274	298	133	103	95	80
26	70	79	e65	e71	71	93	245	262	131	110	97	80
27	69	e73	e64	e72	70	89	215	240	126	114	92	81
28	69	79	e66	72	70	85	177	235	125	129	94	83
29	70	77	69	72	---	88	153	254	123	107	89	82
30	70	76	68	72	---	84	147	235	119	102	86	81
31	71	---	72	75	---	80	---	217	---	100	83	---
TOTAL	2134	2284	2115	2275	1900	2547	4703	12560	4874	3366	3025	2437
MEAN	68.8	76.1	68.2	73.4	67.9	82.2	157	405	162	109	97.6	81.2
MAX	75	83	73	79	73	99	324	1020	229	129	128	97
MIN	66	71	62	68	60	68	76	152	119	100	83	78
AC-FT	4230	4530	4200	4510	3770	5050	9330	24910	9670	6680	6000	4830

CAL YR 1988 TOTAL 30355 MEAN 82.9 MAX 299 MIN 57 AC-FT 60210
WTR YR 1989 TOTAL 44220 MEAN 121 MAX 1020 MIN 60 AC-FT 87710

e Estimated

MADISON RIVER BASIN

06037000 GIBBON RIVER NEAR WEST YELLOWSTONE, MT--Continued

WATER QUALITY RECORDS

PERIOD OF RECORD.--Water years 1983 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: September 1983 to September 1986, October 1987 to September 1988.
WATER TEMPERATURE: August 1983 to current year.

INSTRUMENTATION.--Water-quality monitor Aug. 31, 1983 to Sep. 26, 1988. Water temperature recorder since Sep. 26, 1988.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1983-86, 1988): Maximum, 612 microsiemens, Dec. 30, 1987; minimum, 77 microsiemens, May 30, 1986.
WATER TEMPERATURE: Maximum, 25.5°C, June 24, 1988; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURE: Maximum, 24.0°C, July 22; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)
OCT											
06...	0930	65	--	0	435	2.0	8.0	595	9.6	104	65
NOV											
03...	0850	78	70	1	482	8.5	4.0	584	9.0	90	74
DEC											
13...	0930	70	--	--	473	-0.5	5.0	--	--	--	--
FEB											
09...	1100	77	--	--	532	-12.0	0.0	--	--	--	--
MAR											
07...	1330	79	--	--	546	5.0	7.0	--	--	--	--
MAY											
03...	1430	217	90	1	278	6.0	9.0	--	--	--	33
17...	1445	395	--	--	168	21.0	11.5	--	--	--	--
JUN											
13...	1615	169	50	1	249	21.0	19.0	--	--	--	29
JUL											
26...	1400	112	95	90	334	18.0	19.5	--	--	--	42
AUG											
11...	1230	115	40	1	316	25.0	20.0	--	--	--	36
SEP											
12...	1245	82	0	0	349	10.5	11.5	--	--	--	42

DATE	TIME	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STANDARD UNITS) (00400)	TURBIDITY (NTU) (00076)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)
OCT											
06...	0930	84	0	71	7.4	2.8	26	0	8.2	1.4	64
NOV											
03...	0850	86	0	71	7.6	1.9	27	0	8.5	1.5	75
AUG											
11...	1230	--	--	--	7.5	--	24	0	7.4	1.3	45

DATE	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	RESIDUE TOTAL AT 105 DEG. C, SUSPENDED (MG/L) (00530)
OCT										
06...	6	21	71	26	3.6	91	324	0.44	56.9	6
NOV										
03...	6	15	71	32	4.0	93	347	0.47	73.1	5
AUG										
11...	4	10	49	22	3.0	--	155	0.21	48.1	--

MADISON RIVER BASIN

06037000 GIBBON RIVER NEAR WEST YELLOWSTONE, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	RESIDUE VOLATILE, SUSPENDED (MG/L) (00535)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N) (00607)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)
OCT										
06...	1	<0.100	<0.100	0.040	0.030	--	<0.20	<0.20	0.010	0.010
NOV										
03...	<1	<0.100	<0.100	0.070	0.060	--	<0.20	<0.20	0.010	0.010
AUG										
11...	--	--	<0.100	--	0.080	0.92	--	1.0	0.240	0.070

DATE	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	ARSENIC TOTAL (UG/L AS AS) (01002)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT										
06...	<0.010	0.010	1.3	1.0	--	1000	160	4	0.70	89
NOV										
03...	0.010	<0.010	1.5	0.6	--	1100	190	5	1.1	94
AUG										
11...	--	--	--	--	140	630	--	464	144	62

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	16.5	10.0	13.0	10.0	6.0	8.0	4.0	1.5	2.5	3.5	2.0	2.5
2	16.5	10.0	13.0	9.5	8.5	9.0	3.5	.0	1.5	2.5	1.0	2.0
3	16.0	11.0	13.5	9.5	6.5	8.5	5.0	2.0	3.5	5.0	2.0	3.5
4	15.5	9.5	12.5	7.5	5.5	6.5	4.5	1.5	2.5	6.0	4.0	5.0
5	15.0	8.5	11.5	8.0	4.5	6.5	4.0	1.0	2.5	5.0	3.5	4.5
6	14.5	7.5	11.0	8.0	6.5	7.5	5.0	3.5	4.5	4.5	1.5	3.5
7	14.5	8.0	11.0	6.5	4.0	5.5	5.0	2.5	4.0	1.0	.0	.0
8	14.0	8.0	11.0	6.0	5.0	5.5	3.0	1.0	2.0	.0	.0	.0
9	14.5	9.0	11.5	6.5	4.0	5.0	5.0	3.0	4.0	.5	.0	.0
10	15.0	8.5	11.5	6.0	3.5	4.5	5.5	4.5	5.0	1.0	.0	1.0
11	14.5	8.5	11.5	6.5	5.0	6.0	5.0	4.0	4.5	1.5	.0	.0
12	13.5	8.0	11.0	5.0	4.5	5.0	6.0	4.5	5.5	1.5	.0	.5
13	14.0	10.0	11.5	6.5	4.5	5.5	6.0	4.0	5.0	2.5	.0	1.0
14	13.0	9.5	11.0	6.0	4.5	6.0	3.5	.0	2.0	2.5	.5	1.5
15	12.0	10.0	11.0	4.5	1.5	3.0	.0	.0	.0	1.5	.5	1.0
16	11.5	10.5	11.0	5.0	3.0	4.0	.0	.0	.0	3.0	1.0	2.0
17	13.0	10.5	11.5	6.0	4.0	5.0	2.0	.0	1.0	3.5	1.5	2.5
18	12.0	7.5	10.0	5.5	3.0	4.0	3.0	.0	1.0	5.0	3.5	4.0
19	13.0	10.0	11.0	5.0	3.0	4.0	3.0	.5	2.0	5.5	4.0	4.5
20	12.0	8.0	10.0	4.5	3.0	4.0	3.5	2.0	3.0	5.5	2.5	4.0
21	13.0	8.0	10.5	5.0	3.5	4.5	4.5	3.0	4.0	4.5	1.5	3.0
22	11.5	9.0	10.0	6.0	4.5	5.5	3.5	1.5	2.5	4.5	1.5	3.5
23	12.0	7.5	9.5	6.0	4.0	5.5	4.0	2.0	3.0	4.5	1.0	3.0
24	12.0	7.5	9.5	5.0	3.0	4.0	3.5	2.0	2.5	2.5	.0	.5
25	12.0	8.0	10.0	3.5	1.0	2.5	3.0	.0	2.0	.5	.0	.0
26	11.0	8.0	9.5	3.5	1.0	2.5	.0	.0	.0	3.0	.0	1.0
27	9.5	6.5	8.0	1.5	.0	.5	.0	.0	.0	3.5	.0	1.5
28	9.5	6.0	7.5	4.0	1.0	2.5	.5	.0	.0	4.0	.0	2.0
29	10.5	6.5	8.5	3.5	2.5	3.0	.5	.0	.5	4.5	1.5	3.0
30	10.0	7.0	8.5	4.5	3.0	4.0	3.5	.5	2.0	6.0	3.5	4.5
31	10.5	6.0	8.0	---	---	---	4.0	3.0	3.5	5.0	3.0	4.5
MONTH	16.5	6.0	10.5	10.0	.0	5.0	6.0	.0	2.5	6.0	.0	2.5

MADISON RIVER BASIN

06037000 GIBBON RIVER NEAR WEST YELLOWSTONE, MT--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	3.5	.0	1.5	---	---	---	10.0	5.0	7.0	14.5	7.0	10.5
2	.0	.0	.0	5.0	---	---	11.0	5.5	7.5	12.0	8.5	10.0
3	.0	.0	.0	5.0	1.0	---	9.5	2.5	6.0	10.0	7.0	8.5
4	.0	.0	.0	4.5	.0	1.5	10.0	2.0	6.0	11.0	7.0	9.0
5	.0	.0	.0	7.5	1.5	4.5	10.0	6.0	8.0	14.0	6.5	10.5
6	1.0	.0	.0	7.5	5.0	6.5	12.0	8.0	10.0	13.5	6.0	10.0
7	.5	.0	.0	8.5	6.5	7.5	12.5	8.0	10.0	11.0	5.5	9.0
8	.0	.0	.0	8.5	6.5	7.5	12.5	7.0	9.0	12.0	7.0	9.5
9	.0	.0	.0	12.0	8.0	9.5	11.5	5.0	7.5	14.0	5.0	10.0
10	5.5	.0	3.0	12.0	7.0	9.0	12.0	3.0	7.5	13.0	8.0	10.5
11	7.5	---	---	12.0	7.5	9.0	13.5	5.5	9.0	10.5	6.5	9.0
12	---	---	---	12.0	5.5	8.5	15.0	5.5	10.0	9.0	5.5	7.5
13	4.5	2.5	3.5	8.5	1.0	6.5	15.0	6.5	10.5	8.0	5.5	6.5
14	4.0	1.0	2.0	7.0	3.5	5.0	15.0	8.0	11.0	11.5	5.0	8.5
15	4.5	.0	2.0	7.0	2.0	4.0	12.0	9.0	10.0	11.5	8.0	10.0
16	6.5	4.0	5.0	6.5	5.0	5.5	11.0	8.5	9.5	11.0	8.5	10.0
17	7.0	5.0	6.0	7.0	3.5	5.0	10.5	7.5	9.0	12.5	8.0	10.5
18	8.5	6.0	7.0	6.5	4.0	5.5	14.0	6.0	9.5	11.5	6.5	9.0
19	8.0	6.0	7.0	7.5	4.5	6.0	11.5	6.5	9.0	8.5	2.0	5.5
20	6.0	4.0	5.0	10.0	1.5	5.5	12.5	6.0	9.5	12.0	5.0	9.0
21	7.0	5.0	5.5	7.5	5.0	6.0	12.0	6.0	9.0	13.5	8.5	11.5
22	8.0	5.5	6.5	7.0	6.0	6.5	11.0	5.5	8.0	14.5	10.0	12.5
23	8.5	---	---	9.5	5.0	7.0	9.5	5.5	7.5	13.0	9.5	11.5
24	8.5	5.0	7.0	10.5	4.5	7.5	10.5	5.0	7.5	10.5	6.5	7.5
25	7.5	4.0	6.0	10.0	7.5	8.5	9.0	5.5	7.5	9.5	5.0	7.0
26	6.0	3.0	4.5	11.0	7.5	9.0	7.5	5.0	5.5	13.0	7.5	10.0
27	6.0	4.0	5.0	9.0	6.5	8.0	7.5	4.0	6.0	12.5	9.0	11.0
28	5.5	4.0	4.5	8.0	5.0	6.5	9.0	5.0	7.0	13.5	9.5	12.0
29	---	---	---	9.0	5.0	6.5	10.5	4.5	7.5	14.0	10.5	12.5
30	---	---	---	11.0	4.5	7.5	14.0	5.0	9.5	12.0	10.0	11.0
31	---	---	---	8.0	5.5	6.5	---	---	---	14.5	8.5	11.5
MONTH	---	---	---	---	---	---	15.0	2.0	8.5	14.5	2.0	9.5
		JUNE			JULY			AUGUST			SEPTEMBER	
1	14.5	9.5	12.5	20.0	13.5	16.5	20.5	16.5	18.5	19.0	11.0	14.5
2	15.0	12.0	13.5	21.0	13.0	16.5	21.0	15.0	17.5	17.5	12.0	14.5
3	13.0	10.0	11.5	22.0	13.5	17.5	20.5	13.5	16.5	18.0	10.5	13.5
4	15.0	9.5	12.0	22.5	14.0	18.0	21.0	13.5	17.0	18.5	10.5	14.0
5	16.5	10.5	13.5	22.0	14.0	18.0	22.0	14.0	18.0	17.5	11.0	14.0
6	17.5	12.0	14.5	22.5	13.5	17.5	21.0	14.5	18.0	16.5	12.5	14.0
7	19.0	12.0	15.5	22.5	14.0	18.0	21.0	15.0	18.0	19.0	11.5	14.5
8	17.0	13.0	15.0	21.5	15.0	18.0	19.0	16.0	17.5	15.5	12.5	13.5
9	17.0	11.5	14.0	17.5	15.5	16.5	19.5	16.5	17.5	17.5	11.0	13.0
10	16.5	13.0	14.5	20.5	14.5	17.0	21.0	14.0	17.0	14.0	10.0	11.5
11	17.0	12.0	14.0	22.5	13.5	17.5	21.5	15.5	18.0	15.0	8.0	10.5
12	17.5	11.5	14.5	19.5	15.5	17.5	20.5	15.5	17.5	15.5	7.5	11.0
13	19.0	12.0	15.5	21.0	16.0	18.0	22.5	14.5	18.0	16.5	8.0	12.0
14	17.5	13.0	15.5	22.5	14.0	18.0	20.5	15.5	17.5	17.0	9.5	13.0
15	21.0	13.5	17.0	21.5	14.5	18.0	19.5	14.0	16.5	17.0	9.5	13.0
16	17.5	14.0	16.0	20.0	15.0	17.0	20.0	14.0	16.5	17.5	10.0	13.5
17	18.5	12.0	15.0	18.5	14.0	16.0	21.0	13.0	17.0	16.0	11.0	13.0
18	19.0	12.5	16.0	22.5	13.0	17.5	18.5	12.5	16.5	14.0	11.0	12.5
19	20.5	13.5	16.5	23.0	15.0	19.0	18.5	12.5	15.0	15.5	9.0	12.0
20	16.0	11.5	14.0	22.0	15.5	19.0	18.0	13.5	15.0	16.0	9.5	12.5
21	14.5	10.0	12.0	20.5	16.5	18.5	16.5	12.5	14.5	16.5	9.5	13.0
22	16.0	9.5	12.5	24.0	16.5	19.5	19.5	13.5	16.5	17.5	10.0	13.0
23	16.0	10.5	13.0	20.0	16.5	18.0	20.5	14.0	17.0	17.5	10.5	13.5
24	16.5	11.0	13.0	23.5	14.5	18.5	15.5	12.5	14.0	16.5	10.5	13.5
25	17.0	11.0	14.0	22.0	16.0	19.0	13.5	11.5	12.5	17.5	10.0	13.5
26	18.0	12.0	15.0	19.5	15.5	17.5	16.5	10.5	13.5	15.5	11.5	13.5
27	18.5	13.5	15.5	20.5	15.5	18.0	17.0	12.0	14.0	16.5	12.0	14.0
28	18.0	13.0	15.5	22.5	15.0	18.5	18.0	12.0	14.5	18.5	12.5	15.0
29	21.0	12.0	16.5	23.0	16.0	19.0	17.5	11.0	14.5	17.0	11.5	14.0
30	21.0	13.5	17.0	22.5	16.0	19.0	19.0	12.5	15.0	15.5	10.5	13.0
31	---	---	---	23.5	16.0	19.5	17.5	12.0	14.5	---	---	---
MONTH	21.0	9.5	14.5	24.0	13.0	18.0	22.5	10.5	16.0	19.0	7.5	13.0

MADISION RIVER BASIN

06037500 MADISON RIVER NEAR WEST YELLOWSTONE, MT

LOCATION.--Lat 44°39'25", long 111°04'03", in NE1/4NW1/4SW1/4 sec.36, T.13 S., R.5 E., Gallatin County, Hydrologic Unit 10020007, Yellowstone National Park, on left bank 0.7 mi downstream of Montana-Wyoming stateline, 1.5 mi east of West Yellowstone, 16.4 mi downstream from Gibbon River, and at mile 132.7.

DRAINAGE AREA.--420 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1913 to December 1917, July 1918 to October 1921, June 1922 to September 1973, August 1983 to September 1986, October 1988 to September 1989. Monthly discharge only for some periods, published in WSP 1309.

GAGE.--Water-stage recorder. Elevation of gage is 6,650 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to Oct. 20, 1918, nonrecording gage, and Oct. 20, 1918 to June 29, 1930, nonrecording gage or water-stage recorder at sites 2.5 mi upstream at different datums. Supplementary nonrecording gage at site 0.3 mi downstream at different datum used at time during 1927-30.

REMARKS.--Estimated daily discharges: Oct. 1 to Mar. 13, Apr. 18 to May 15. Water-discharge records good except those for Oct. 1 to June 14, which are fair. No regulation or diversions upstream from station.

AVERAGE DISCHARGE.--62 years (1913-17, 1918-21, 1922-73, 1984-86, 1989), 490 ft^3/s, 15.84 in/yr, 355,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,340 ft^3/s, May 31, 1986, gage height, 3.56 ft, maximum gage height, about 10.0 ft, Jan. 8, 1937, ice jam; minimum discharge, 100 ft^3/s, Feb. 7, 1933, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,070 ft^3/s and maximums (*)

Date	Time	Discharge (ft^3/s)	Gage Height (ft)	Date	Time	Discharge (ft^3/s)	Gage Height (ft)
May 10	unknown	*unknown	*unknown	May 19	0900	1,240	2.79

Minimum daily discharge, 300 ft^3/s, Dec. 15.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e320	e330	e340	e320	e340	e340	384	e550	706	426	380	369
2	e320	e330	e340	e320	e340	e360	390	e600	728	418	388	368
3	e320	e350	e330	e330	e330	e350	379	e700	822	411	375	363
4	e320	e340	e330	e340	e320	e330	363	e650	959	406	372	363
5	e320	e330	e330	e340	e320	e340	360	e700	801	399	369	363
6	e320	e350	e340	e350	e320	e350	375	e900	778	395	367	361
7	e320	e340	e340	e330	e330	e360	410	e1200	779	389	374	366
8	e320	e340	e330	e330	e330	e360	440	e1300	759	386	379	371
9	e320	e330	e330	e320	e340	e420	427	e1500	736	390	382	370
10	e320	e330	e340	e330	e350	e470	405	e1700	731	414	384	369
11	e320	e340	e340	e340	e340	e460	394	e1500	740	405	432	366
12	e320	e350	e340	e340	e330	e440	395	e1300	696	395	395	366
13	e330	e350	e340	e350	e320	e420	411	e1100	675	456	446	360
14	e330	e350	e330	e360	e320	408	434	e1000	647	415	395	358
15	e330	e340	e300	e350	e320	396	473	e950	629	392	424	356
16	e330	e330	e310	e340	e320	388	519	958	661	390	390	354
17	e340	e350	e320	e340	e330	394	572	960	663	387	378	363
18	e330	e340	e320	e350	e340	383	e600	1000	593	388	376	429
19	e340	e340	e320	e350	e350	381	e700	1130	566	381	443	381
20	e330	e340	e320	e350	e350	374	e750	892	550	378	406	368
21	e330	e340	e320	e350	e340	367	e850	847	537	379	401	362
22	e330	e350	e320	e360	e340	369	e900	897	506	386	388	358
23	e330	e370	e330	e360	e350	369	e900	1010	495	381	379	359
24	e330	e360	e330	e350	e350	368	e800	1020	486	407	380	356
25	e330	e350	e330	e340	e350	388	e750	864	485	385	405	355
26	e330	e340	e320	e340	e350	429	e700	773	481	398	409	355
27	e320	e340	e310	e340	e340	417	e650	742	470	416	392	363
28	e320	e350	e320	e340	e340	401	e600	753	461	437	395	380
29	e320	e340	e330	e350	---	402	e550	806	452	400	383	364
30	e320	e340	e330	e340	---	396	e520	803	435	385	376	361
31	e320	---	e330	e340	---	386	---	741	---	380	370	---
TOTAL	10080	10280	10160	10590	9400	12016	16401	29846	19027	12375	12133	10977
MEAN	325	343	328	342	336	388	547	963	634	399	391	366
MAX	340	370	340	360	350	470	900	1700	959	456	446	429
MIN	320	330	300	320	320	330	360	550	435	378	367	354
AC-FT	19990	20390	20150	21010	18640	23830	32530	59200	37740	24550	24070	21770

WTR YR 1989 TOTAL 163285 MEAN 447 MAX 1700 MIN 300 AC-FT 323900

e Estimated

06037500 MADISON RIVER NEAR WEST YELLOWSTONE, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1983-86, March to September 1989.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: July 1883 to July 1986.
WATER TEMPERATURE: July 1983 to July 1986.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1983-86): Maximum, 558 microsiemens, Mar. 24, 25, 1986; minimum, 78 microsiemens, May 30, 1986.
WATER TEMPERATURE (water years 1983-86): Maximum, 25.5°C, Aug. 6, 9, 1983; minimum, 0.0°C, on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)
MAR										
08...	0945	377	--	--	595	1.5	8.0	--	--	--
APR										
14...	1500	437	0	0	505	18.0	16.0	603	8.2	106
20...	1930	726	70	1	358	15.0	16.0	601	7.8	101
MAY										
04...	0815	637	--	--	414	4.5	10.5	--	--	--
17...	1645	975	30	1	262	16.0	14.5	596	8.4	106
JUN										
08...	0930	755	5	1	295	23.0	16.0	601	8.0	103
14...	1230	--	--	--	347	21.0	19.0	--	--	--
JUL										
06...	0945	391	0	0	439	23.0	18.0	605	7.8	104
25...	1600	388	--	--	471	27.5	25.0	--	--	--
AUG										
04...	0915	369	0	0	472	16.0	16.0	600	8.2	106
SEP										
12...	1600	--	--	--	485	12.5	15.0	--	--	--

DATE	TIME	PH (STANDARD UNITS) (00400)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)
APR									
14...	1500	8.0	20	6.7	0.82	95	9	9.4	113
20...	1930	7.6	20	6.3	0.98	64	6	7.7	79
MAY									
17...	1645	7.6	16	5.2	0.83	43	5	5.6	59
JUN									
08...	0930	7.7	16	5.3	0.73	55	6	5.8	72
JUL									
06...	0945	7.9	20	6.5	0.80	80	8	8.3	108
AUG									
04...	0915	7.9	20	6.7	0.72	87	9	9.8	115

DATE	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N) (00607)
APR									
14...	21	64	8.2	274	0.37	323	<0.100	0.020	0.78
20...	19	40	5.0	192	0.26	375	0.130	0.050	0.45
MAY									
17...	13	28	3.5	135	0.18	355	<0.100	0.050	0.35
JUN									
08...	11	33	4.5	159	0.22	324	<0.100	0.030	0.37
JUL									
06...	14	53	6.7	235	0.32	248	<0.100	0.020	0.38
AUG									
04...	13	59	6.7	253	0.34	252	<0.100	0.020	0.68

MADISON RIVER BASIN

06037500 MADISON RIVER NEAR WEST YELLOWSTONE, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)	ARSENIC TOTAL (UG/L AS AS) (01002)	BORON, DISSOLVED (UG/L AS B) (01020)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
APR								
14...	0.80	0.320	0.030	280	850	25	29	79
20...	0.50	0.030	0.020	180	520	45	88	63
MAY								
17...	0.40	0.020	0.020	150	400	33	87	48
JUN								
08...	0.40	0.020	0.020	160	440	11	22	58
JUL								
06...	0.40	<0.010	<0.010	300	670	5	5.3	57
AUG								
04...	0.70	0.030	0.010	300	740	6	6.0	83

06038500 MADISON RIVER BELOW HEBGEN LAKE, NEAR GRAYLING, MT

LOCATION.--Lat 44°52'00", long 111°20'15", NE1/4NE1/4NE1/4 sec.22, T.11 S., R.3 E., Gallatin County, Hydrologic Unit 10020007, Gallatin National Forest, on right bank 1,500 ft downstream from Hebgen Dam, 8 mi northwest of Grayling, 17 mi upstream from West Fork, and at mile 108.8.

DRAINAGE AREA.--905 mi^2.

PERIOD OF RECORD.--June 1909 to current year. Prior to October 1938 adjusted runoff only, published in WSP 1309. Prior to October 1949, published as "below Hebgen Reservoir".

REVISED RECORDS.--WSP 1509: 1948. WSP 1559: Drainage area. WSP 1629: 1943. WSP 1709: 1959. WSP 1729: 1943.

GAGE.--Water-stage recorder. Datum of gage is 6,448.47 ft above National Geodetic Vertical Datum of 1929 (after 1959 earthquake). Prior to July 13, 1943, nonrecording gage in stilling well.

REMARKS.--No estimated daily discharges this year. Records excellent. Flow completely regulated by Hebgen Lake (station number 06038000). Diversions for irrigation of about 1,100 acres upstream from station. Several observations of water temperature and specific conductance were obtained during the year. U.S. Bureau of Reclamation satellite telemeter at station.

AVERAGE DISCHARGE.--80 years, 1,005 ft^3/s, 15.08 in/yr, 728,100 acre-ft/yr, adjusted for storage.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,200 ft^3/s, Aug. 17, 1959, caused by wave over Hebgen Dam during earthquake, gage height, 5.3 ft, from floodmark, from rating curve extended above 3,500 ft^3/s on basis of slope-area measurement of peak flow; maximum observed unaffected by wave over dam, 5,980 ft^3/s, June 3, 1943, gage height, 3.69 ft; minimum daily, 5.0 ft^3/s, May 9-12, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,090 ft^3/s, Dec. 13, gage height, 2.51 ft; minimum daily, 399 ft^3/s, June 10.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	819	690	972	624	736	736	743	1320	667	751	1180	1190
2	819	691	971	624	733	738	744	1320	672	753	1180	1190
3	819	768	971	624	731	737	744	1330	673	752	1180	1190
4	819	939	971	623	733	735	743	1320	674	752	1230	1180
5	819	939	971	623	733	736	742	1320	679	753	1280	1180
6	819	937	970	625	733	735	743	1320	681	753	1280	1180
7	819	938	969	641	732	735	944	1330	681	754	1280	1180
8	819	937	968	657	733	738	1330	1330	684	754	1280	1180
9	819	937	965	656	734	738	1330	1340	613	756	1280	1180
10	819	935	962	657	734	738	1320	1340	399	758	1280	1180
11	793	934	960	657	734	735	1320	1350	402	759	1280	1180
12	671	935	1320	690	734	737	1320	1360	404	760	1270	1180
13	670	932	2070	734	734	739	1320	1360	405	760	1270	1180
14	670	931	2060	734	734	738	1320	1360	404	769	1270	1180
15	671	931	2060	734	734	740	1320	1370	406	771	1260	1180
16	670	930	2050	734	734	740	1320	1370	410	771	1200	1180
17	670	930	2040	734	734	741	1320	1370	411	771	1200	1180
18	671	930	2030	738	735	741	1320	1380	410	771	1200	1180
19	671	930	2020	741	734	742	1320	1380	545	773	1200	1180
20	671	929	2010	740	734	742	1320	1380	823	772	1200	1180
21	671	929	2010	738	735	742	1320	1390	981	774	1200	1180
22	671	929	1330	741	735	741	1320	1390	982	775	1200	1180
23	672	929	622	742	735	739	1320	1390	982	778	1190	1180
24	672	929	622	741	734	740	1320	1400	982	798	1190	1180
25	673	929	623	740	734	741	1320	1430	981	843	1190	1150
26	673	928	625	738	737	742	1330	1310	981	992	1190	1170
27	673	928	623	737	735	742	1330	993	978	1100	1190	1180
28	673	928	623	738	735	742	1330	996	963	1100	1190	1170
29	676	926	623	736	---	742	1330	1000	844	1090	1190	1180
30	689	939	623	735	---	742	1320	1000	751	1090	1190	1170
31	689	---	624	736	---	741	---	901	---	1110	1190	---
TOTAL	22450	27317	37258	21712	20553	22915	35823	40150	20468	25663	37910	35370
MEAN	724	911	1202	700	734	739	1194	1295	682	828	1223	1179
MAX	819	939	2070	742	737	742	1330	1430	982	1110	1280	1190
MIN	670	690	622	623	731	735	742	901	399	751	1180	1150
AC-FT	44530	54180	73900	43070	40770	45450	71050	79640	40600	50900	75190	70160
MEAN †	628	726	675	720	678	760	1113	2250	1628	864	833	786
CFSM †	.69	.80	.75	.80	.75	.84	1.23	2.49	1.80	.95	.92	.87
IN †	.80	.89	.86	.92	.78	.97	1.37	2.87	2.01	1.10	1.06	.97
AC-FT†	38630	43180	41500	44270	37670	46750	66250	138340	96900	53100	51190	46760

OBSERVED

CAL YR 1988	TOTAL	299904	MEAN	819	MAX	2070	MIN	299	AC-FT	594900
WTR YR 1989	TOTAL	347589	MEAN	952	MAX	2070	MIN	399	AC-FT	689400

ADJUSTED

CAL YR 1988	TOTAL	295337	MEAN	807	CFSM	.89	IN	12.14	AC-FT	585800
WTR YR 1989	TOTAL	355180	MEAN	973	CFSM	1.08	IN	14.60	AC-FT	704500

(†) Adjusted for change in contents in Hebgen Lake.

MADISON RIVER BASIN

06038800 MADISON RIVER AT KIRBY RANCH, NEAR CAMERON, MT

LOCATION.--Lat 44°53'22", long 111°34'46", in NE1/4NE1/4SE1/4 sec.10, T.11 S., R.1 E., Madison County, Hydrologic Unit 10020007, on upstream side of county bridge 0.2 mi upstream from West Fork Madison River, and 22 mi south of Cameron, and at mile 89.8.

DRAINAGE AREA.--1,065 mi^2.

PERIOD OF RECORD.--September 1959 to September 1963, May 1978 to current season (seasonal records only).

GAGE.--Nonrecording gage. Elevation of gage is 5,860 ft above National Geodetic Vertical Datum of 1929, from topographic map. Aug. 31, 1959, to Oct. 2, 1959, nonrecording gage at present site but at a different datum. Oct. 3, 1959, to September 1963, water-stage recorder at site 75 ft upstream at different datum.

REMARKS.--No estimated daily discharges this year. Seasonal records fair. Flow regulated by Hebgen Lake (station 06038000). Diversions for irrigation of about 1,500 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 5,000 ft^3/s, June 6, 1986, gage height, 3.14 ft; minimum daily, 280 ft^3/s, May 26, 27, 1960.

EXTREMES FOR CURRENT SEASON.--Maximum discharge observed, 1,870 ft^3/s, May 11,23, gage height, 1.74 ft; minimum observed, 983 ft^3/s, July 12, gage height, 1.19 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1								1520	1100	1120		
2								1500	1100	1130		
3								1470	1120	1080		
4								1450	1140	1090		
5								1430	1100	1090		
6								1450	1190	1050		
7								1520	1420	1030		
8								1620	1450	1050		
9								1700	1470	1040		
10								1790	1370	1030		
11								1850	1240	1040		
12								1790	1120	991		
13								1710	1110	1000		
14								1630	1100	1010		
15								1570	1150	1010		
16								1600	1310	1010		
17								1640	1350	1010		
18								1600	1110	1000		
19								1610	1130	999		
20								1650	1270	999		
21								1650	1400	999		
22								1690	1340	999		
23								1830	1270	1000		
24								1740	1250	1010		
25								1700	1250	1020		
26								1640	1250	1050		
27								1470	1250	1120		
28								1270	1250	1180		
29								1250	1220	1210		
30								1270	1120	1200		
31								1250		1210		
TOTAL								48860	36950	32777		
MEAN								1576	1232	1057		
MAX								1850	1470	1210		
MIN								1250	1100	991		
AC-FT								96910	73290	65010		

MADISON RIVER BASIN

06041000 MADISON RIVER BELOW ENNIS LAKE, NEAR MCALLISTER, MT

LOCATION.--Lat 45°29'25", long 111°38'00", in SW1/4SE1/4NW1/4 sec.17, T.4 S., R.1 E., Madison County, Hydrologic Unit 10020007, on right bank 500 ft downstream from Madison powerplant, 1.5 mi downstream from Ennis Lake, 5.7 mi northeast of McAllister, and at mile 38.8.

DRAINAGE AREA.--2,186 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1901 to December 1905, October 1906 to current year. Prior to October 1938 adjusted monthly runoff only, published in WSP 1309. Published as "below Madison Reservoir" 1938-49. Records published as "near Red Bluff" 1890-94 and as "near Norris" 1910 are not equivalent and are published as "near Norris" in WSP 1309.

REVISED RECORDS.--WSP 1559: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 4,689.03 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to May 7, 1941, nonrecording gage in wooden stilling well at present site at different datum. May 7, 1941, to Jan. 13, 1945, nonrecording gages in concrete stilling well at present site and datum.

REMARKS.--Estimated daily discharges. Feb. 1-5. Water-discharge records good. Flow regulated by Hebgen Lake (station number 06038000) and Ennis Lake (station number 06040500). Diversions for irrigation of about 23,000 acres upstream from station. U. S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--51 years, 1,762 ft^3/s, 1,277,000 acre-ft/yr, unadjusted.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,550 ft^3/s, June 12, 1970, gage height, 8.01 ft; minimum daily 210 ft^3/s, Aug. 25, 26, 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,840 ft^3/s, May 12, gage height, 4.38 ft; minimum daily, 770 ft^3/s, Dec. 30.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1090	1210	1360	772	e1000	1320	1290	1760	1600	1540	1470	1520
2	1100	1210	1350	778	e900	1220	1290	1760	1560	1540	1470	1520
3	1100	1370	1400	777	e900	1210	1290	1800	1570	1480	1470	1510
4	1120	1430	1420	834	e900	1120	1290	1800	1570	1410	1480	1520
5	1130	1420	1420	898	e900	1070	1280	1800	1580	1390	1480	1490
6	1130	1410	1420	1020	904	1060	1290	1790	1760	1390	1480	1500
7	1130	1410	1420	1070	910	1160	1480	1810	1980	1350	1480	1520
8	1130	1410	1420	1050	911	1380	1650	1990	2170	1330	1470	1520
9	1130	1410	1420	1040	908	1550	1650	2200	2220	1280	1490	1510
10	1190	1430	1420	1040	913	1750	1680	2280	2100	1320	1500	1510
11	1240	1440	1420	1040	922	1850	1630	2440	2160	1420	1500	1510
12	1120	1440	1600	1040	922	1820	1730	2720	2140	1420	1500	1510
13	1060	1440	2050	1040	926	1740	1760	2600	1960	1300	1520	1510
14	1060	1450	2240	1030	928	1680	1850	2410	1820	1160	1530	1510
15	1060	1440	2140	1020	1010	1580	1850	2250	1770	1110	1530	1510
16	1060	1440	2140	1050	1060	1500	1840	2130	1790	1080	1530	1510
17	1070	1450	2200	1080	1060	1430	1670	2110	2080	1100	1530	1510
18	1080	1440	2320	1090	1060	1370	1690	2040	2170	1100	1530	1510
19	1070	1440	2370	1140	1060	1370	1810	2070	2030	1100	1530	1490
20	1070	1440	2380	1180	1150	1290	1820	2000	1890	1060	1530	1490
21	1080	1430	2390	1180	1210	1280	1880	1950	1920	1110	1530	1490
22	1070	1430	2410	1190	1210	1280	1890	1870	1890	1130	1530	1510
23	1070	1430	1960	1250	1220	1290	1910	1820	1760	1130	1530	1510
24	1070	1430	1370	1290	1360	1300	1890	1850	1720	1140	1520	1490
25	1060	1430	1190	1280	1500	1310	1800	1960	1650	1170	1520	1440
26	1140	1430	992	1260	1500	1360	1800	2060	1580	1210	1520	1470
27	1250	1420	907	1250	1490	1420	1800	2060	1600	1200	1520	1510
28	1240	1400	824	1240	1490	1450	1790	1770	1660	1410	1520	1490
29	1230	1360	772	1240	---	1430	1790	1650	1620	1510	1500	1490
30	1230	1360	770	1230	---	1300	1780	1640	1570	1490	1510	1470
31	1220	---	772	1220	---	1240	---	1640	---	1460	1520	---
TOTAL	34800	42250	49267	33619	30224	43130	50170	62030	54890	39840	46740	45050
MEAN	1123	1408	1589	1084	1079	1391	1672	2001	1830	1285	1508	1502
MAX	1250	1450	2410	1290	1500	1850	1910	2720	2220	1540	1530	1520
MIN	1060	1210	770	772	900	1060	1280	1640	1560	1060	1470	1440
AC-FT	69030	83800	97720	66680	59950	85550	99510	123000	108900	79020	92710	89360

CAL YR 1988 TOTAL 478555 MEAN 1308 MAX 2600 MIN 770 AC-FT 949200
WTR YR 1989 TOTAL 532010 MEAN 1458 MAX 2720 MIN 770 AC-FT 1055000

e Estimated

MADISON RIVER BASIN

06041000 MADISON RIVER BELOW ENNIS LAKE, NEAR MCALLISTER, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1972-73, 1977 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: June 1977 to current year.

INSTRUMENTATION.--Temperature recorder since June 21, 1977.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: Maximum, 23.0°C, July 29, 1980, July 31, Aug. 1, 1988; minimum, 0.0°C several to many days during winter months most years.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURE: Maximum, 22.0°C, July 8, 24, 25, 26, 27; minimum, 0.0°C on many days during winter.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
NOV					
01...	0900	1210	334	11.5	7.0
DEC					
14...	1445	2310	336	-4.0	1.5
JAN					
04...	1045	875	375	6.0	1.5
FEB					
10...	1100	--	406	-1.0	1.0
MAR					
14...	0815	1660	316	-1.0	2.5
MAY					
05...	0900	--	363	6.5	9.5
JUN					
12...	1345	2130	256	20.0	16.5
JUL					
27...	1415	1190	276	30.0	21.5
SEP					
11...	1400	--	300	14.5	11.0

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	12.0	10.5	11.5	7.0	6.5	6.5	1.0	.5	.5	1.0	.5	1.0
2	12.0	11.0	11.5	7.0	6.5	6.5	1.0	.5	1.0	1.0	.5	1.0
3	13.0	11.0	12.0	7.0	6.5	6.5	1.0	1.0	1.0	1.5	1.0	1.0
4	13.0	12.5	13.0	6.5	6.0	6.5	1.5	1.0	1.0	1.5	.5	1.5
5	13.0	11.0	12.0	6.0	5.5	6.0	1.5	1.0	1.5	1.5	1.5	1.5
6	12.5	11.0	12.0	5.5	4.5	5.0	1.5	1.5	1.5	1.5	1.0	1.5
7	12.0	11.5	12.0	4.5	4.5	4.5	1.5	1.5	1.5	1.0	1.0	1.0
8	12.0	10.5	11.5	4.5	4.0	4.0	1.5	1.5	1.5	1.0	1.0	1.0
9	12.0	10.0	11.5	4.0	3.5	4.0	1.5	1.0	1.5	1.0	1.0	1.0
10	11.5	11.0	11.5	4.0	3.0	3.5	1.5	1.0	1.5	1.5	1.0	1.0
11	11.5	11.0	11.5	3.0	2.5	3.0	1.5	1.0	1.0	1.0	1.0	1.0
12	12.0	11.0	11.5	2.5	2.0	2.0	1.5	1.0	1.5	1.0	.5	1.0
13	12.0	12.0	12.0	2.0	1.5	1.5	1.5	1.5	1.5	1.0	.0	.5
14	12.0	11.5	11.5	1.5	1.5	1.5	1.5	1.0	1.5	1.0	.0	.5
15	11.5	11.0	11.5	1.5	1.0	1.0	1.5	1.0	1.0	1.0	.0	.5
16	11.0	11.0	11.0	1.0	1.0	1.0	1.5	1.0	1.0	1.0	.5	1.0
17	11.0	10.5	11.0	1.0	1.0	1.0	1.0	.5	1.0	1.0	1.0	1.0
18	11.0	10.5	10.5	1.5	1.0	1.0	1.0	.5	1.0	1.5	.5	1.0
19	10.5	10.5	10.5	1.5	1.0	1.5	1.0	.0	.5	1.5	.5	1.0
20	10.5	10.5	10.5	1.0	.5	1.0	1.0	.0	.5	1.5	1.0	1.0
21	10.5	10.0	10.5	.5	.5	.5	1.0	.0	.5	1.5	.5	1.5
22	10.5	10.0	10.0	1.0	.5	.5	1.0	.5	.5	1.5	.5	1.0
23	10.5	9.5	10.0	1.0	.0	.5	.5	.5	.5	1.5	.5	1.0
24	10.0	9.5	10.0	1.0	.0	.5	.5	.5	.5	1.0	1.0	1.0
25	10.0	9.5	9.5	.5	.0	.0	.5	.0	.5	1.0	1.0	1.0
26	10.0	9.5	10.0	.0	.0	.0	.5	.0	.5	1.0	.5	1.0
27	9.5	8.0	9.0	.0	.0	.0	.5	.5	.5	1.0	.0	.5
28	8.0	6.0	7.0	.5	.0	.0	1.0	.5	.5	1.0	.0	.5
29	7.0	6.5	7.0	.5	.5	.5	.5	.5	.5	1.0	.0	.5
30	7.0	6.5	6.5	.5	.5	.5	1.0	.0	.5	1.0	.0	.5
31	7.0	6.5	7.0	---	---	---	1.5	1.0	1.0	1.0	.0	.5
MONTH	13.0	6.0	10.5	7.0	.0	2.5	1.5	.0	1.0	1.5	.0	1.0

MADISON RIVER BASIN

06041000 MADISON RIVER BELOW ENNIS LAKE, NEAR MCALLISTER, MT--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	1.0	1.0	1.0	4.0	3.5	4.0	10.5	6.5	8.0
2	.5	.0	.5	1.0	1.0	1.0	4.5	3.0	4.0	10.0	9.0	9.5
3	.5	.5	.5	1.0	.5	1.0	4.5	4.0	4.0	9.5	9.0	9.0
4	.5	.5	.5	1.0	.5	1.0	4.5	3.5	4.0	11.0	9.0	10.0
5	.5	.5	.5	1.0	.5	1.0	4.5	4.0	4.5	11.5	9.5	10.0
6	1.0	.5	.5	1.5	.5	1.0	4.5	3.0	4.0	12.5	11.0	11.5
7	1.0	.0	.5	1.5	1.0	1.0	4.5	2.0	3.5	13.0	11.0	12.0
8	1.0	.0	.5	1.5	1.0	1.5	4.5	3.0	3.5	12.5	11.5	12.0
9	1.0	.0	1.0	2.0	1.5	2.0	3.5	1.0	2.0	14.5	12.0	13.0
10	1.0	.5	1.0	2.0	1.5	2.0	2.0	1.0	1.5	15.0	13.0	14.0
11	1.0	.0	.5	2.0	1.5	2.0	2.5	1.5	2.0	14.5	13.0	13.5
12	1.0	.5	.5	2.5	1.5	2.0	4.0	1.5	2.5	13.5	11.0	12.0
13	1.0	.5	.5	2.5	1.5	2.5	5.5	3.5	4.0	11.5	9.0	10.5
14	1.0	.0	.5	2.5	1.5	2.5	7.5	5.5	6.5	9.0	7.0	8.5
15	.5	.0	.5	2.5	2.0	2.0	8.5	7.0	7.5	11.0	6.5	9.0
16	.5	.5	.5	2.0	2.0	2.0	9.5	8.0	9.0	11.0	9.5	10.0
17	.5	.5	.5	2.5	1.5	2.0	9.0	8.0	8.5	11.5	9.5	11.0
18	.5	.5	.5	2.0	2.0	2.0	9.5	6.0	8.0	11.5	10.5	11.0
19	.5	.5	.5	2.0	1.5	1.5	10.0	9.0	9.5	10.5	9.5	10.0
20	1.0	.5	.5	2.0	1.0	1.5	10.5	8.5	9.5	10.0	9.0	9.5
21	1.0	.5	.5	1.5	1.0	1.5	11.5	9.0	10.5	11.0	9.0	10.0
22	1.0	.5	.5	2.5	1.0	1.5	11.0	10.5	11.0	11.5	10.0	11.0
23	1.0	.0	.5	2.0	1.5	2.0	10.0	9.5	10.0	12.5	11.0	11.5
24	1.0	.5	.5	2.5	1.0	2.0	10.0	8.5	9.5	12.5	11.0	11.5
25	1.0	.5	.5	3.0	1.5	2.5	8.5	6.0	7.5	11.0	9.5	10.0
26	1.0	.5	1.0	3.0	2.5	3.0	8.5	8.0	8.0	11.0	9.5	10.0
27	1.0	1.0	1.0	3.5	2.0	3.0	7.5	6.0	7.0	11.0	10.0	10.5
28	1.0	1.0	1.0	3.5	2.0	3.0	7.0	5.5	6.0	10.0	9.0	10.0
29	---	---	---	4.0	2.0	3.5	6.5	5.5	6.0	10.0	9.5	10.0
30	---	---	---	4.5	3.0	4.0	7.0	6.0	6.5	10.0	9.5	10.0
31	---	---	---	4.0	3.5	4.0	---	---	---	12.5	10.0	10.5
MONTH	1.0	.0	.5	4.5	.5	2.0	11.5	1.0	6.0	15.0	6.5	10.5
		JUNE			JULY			AUGUST			SEPTEMBER	
1	13.5	12.0	12.5	18.0	17.0	17.5	21.5	21.0	21.0	17.0	15.5	16.0
2	13.5	11.0	11.5	18.5	18.0	18.0	21.0	20.5	21.0	17.0	16.0	16.5
3	14.5	12.5	13.5	20.0	17.0	18.5	20.5	20.0	20.5	16.0	15.5	15.5
4	14.0	13.0	13.5	20.0	19.5	20.0	20.5	20.0	20.0	16.5	15.5	16.0
5	15.5	12.5	13.5	20.0	19.0	19.5	20.5	20.0	20.0	16.5	15.5	16.0
6	16.5	15.5	16.0	20.5	19.0	19.5	20.0	19.0	19.5	15.5	14.0	15.0
7	17.0	15.5	16.5	21.5	20.0	21.0	20.5	19.0	20.0	14.0	13.0	13.5
8	19.0	14.5	16.5	22.0	21.0	21.5	21.5	20.0	20.5	13.0	12.5	13.0
9	18.5	17.0	18.0	20.5	19.5	20.0	21.5	20.5	21.0	12.5	10.0	11.5
10	17.5	17.0	17.5	19.5	18.5	19.0	20.5	20.0	20.5	11.0	10.5	11.0
11	17.5	17.0	17.0	18.5	17.0	18.0	20.5	20.0	20.5	11.0	10.5	11.0
12	17.0	16.5	16.5	19.0	17.5	18.5	20.5	20.0	20.5	11.0	10.5	10.5
13	18.0	16.5	17.0	19.5	19.0	19.5	21.0	20.0	20.5	11.0	10.5	10.5
14	18.5	17.0	18.0	20.5	19.5	20.0	21.0	20.0	20.5	12.0	10.5	11.0
15	19.0	17.5	18.0	20.5	19.5	20.0	21.0	20.0	20.5	13.0	11.0	12.0
16	19.0	18.0	18.5	20.5	19.5	20.0	20.0	19.5	19.5	13.5	13.0	13.0
17	18.0	17.5	18.0	21.0	20.0	20.5	20.5	19.0	20.0	13.5	13.0	13.0
18	18.0	17.5	17.5	20.5	19.5	20.0	19.0	18.5	18.5	13.0	10.5	12.0
19	18.5	16.5	17.5	20.5	19.5	20.0	19.0	18.5	19.0	12.5	10.5	11.5
20	18.0	16.0	17.0	20.5	20.0	20.0	19.5	19.0	19.0	12.5	12.0	12.5
21	16.5	15.5	16.0	21.0	20.5	20.5	19.0	18.0	18.5	12.5	11.5	12.0
22	16.5	16.0	16.0	21.5	20.5	21.0	18.0	18.0	18.0	12.5	11.0	12.0
23	16.5	15.0	15.5	21.5	21.0	21.0	18.0	17.0	18.0	14.0	12.0	12.5
24	15.0	14.0	14.5	22.0	21.0	21.5	17.0	16.5	16.5	14.0	13.0	13.5
25	14.5	13.0	14.0	22.0	21.5	21.5	16.5	16.0	16.0	14.5	13.0	13.5
26	15.5	13.5	14.5	22.0	21.0	21.5	16.5	15.5	16.0	15.0	13.5	14.0
27	16.0	15.5	16.0	22.0	21.0	21.5	16.5	15.5	16.0	14.5	13.5	14.0
28	16.5	15.5	16.0	21.0	21.0	21.0	16.0	15.5	15.5	14.0	13.5	14.0
29	17.0	16.0	16.5	21.0	20.5	21.0	16.0	15.5	15.5	15.0	13.5	14.0
30	17.5	17.0	17.0	21.5	20.5	21.0	16.0	15.0	15.5	15.5	14.5	15.0
31	---	---	---	21.5	21.5	21.5	16.5	15.5	15.5	---	---	---
MONTH	19.0	11.0	16.0	22.0	17.0	20.0	21.5	15.0	19.0	17.0	10.0	13.0

GALLATIN RIVER BASIN

06043500 GALLATIN RIVER NEAR GALLATIN GATEWAY, MT

LOCATION.--Lat 45°29'51", long 111°25'12", in SE1/4SE1/4SE1/4 sec.7, T.4 S., R.4 E., Gallatin County, Hydrologic Unit 10020008, on left bank 0.3 mi downstream from Spanish Creek, 7.3 mi south of Gallatin Gateway and at mile 47.7.

DRAINAGE AREA.--825 mi^2.

PERIOD OF RECORD.--August 1889 to September 1894, June 1930 to September 1969, annual maximum, water years 1970-71, October 1971 to September 1981, October 1984 to current year. Monthly discharge only for some periods, published in WSP 1309. Published as West Gallatin River near Bozeman 1889-94.

REVISED RECORDS.--WSP 1389: 1892(M), 1893-94. WSP 1559: Drainage area. WDR MT-85-1 (M).

GAGE.--Water-stage recorder. Datum of gage is 5,167.67 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 20, 1932, nonrecording gages at several different sites and datums within 0.8 mi of present site.

REMARKS.--Estimated daily discharges: Jan. 16-18, Feb. 1-21. Records good except those for estimated daily discharges, which are fair. Diversions for irrigation of about 1,400 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--59 years (1890-94, 1931-69, 1972-81, 1985-89) 806 ft^3/s, 583,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,100 ft^3/s, June 17, 1974, gage height, 7.38 ft; minimum, 117 ft^3/s, Jan. 19, 1935, gage height, 0.68 ft, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 2,900 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 11	0215	2,950	3.80	June 11	0015	3,790	4.29
June 16	1845	*4,280	*4.55				

Minimum daily discharge, 180 ft^3/s, Feb. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	351	318	221	263	e220	245	273	533	1640	1560	616	432
2	348	324	230	255	e200	245	276	593	1950	1460	614	423
3	344	325	259	261	e190	242	270	691	2220	1390	577	425
4	343	322	253	266	e180	210	263	687	2030	1340	563	415
5	342	312	245	249	e190	234	270	704	2230	1310	548	407
6	338	324	263	246	e210	248	277	909	2790	1250	537	410
7	337	309	277	229	e220	256	310	1320	3080	1170	529	427
8	333	312	267	221	e220	265	328	2040	3180	1120	525	411
9	332	319	262	240	e220	294	310	2090	3310	1110	532	419
10	331	281	267	252	e230	327	281	2490	3540	1060	563	420
11	330	319	257	244	e240	328	299	2630	3300	1010	563	420
12	328	301	266	244	e240	315	305	2290	2880	959	533	408
13	331	302	273	250	e240	313	326	1850	2810	1040	547	401
14	334	323	270	252	e230	297	362	1600	2770	934	520	395
15	339	277	225	241	e220	274	419	1570	2960	875	502	388
16	330	294	195	e240	e220	280	463	1680	3970	855	488	382
17	380	303	198	e245	e230	276	481	1730	3640	849	473	384
18	360	300	212	e245	e230	272	446	1880	2880	798	467	437
19	362	274	243	246	e230	274	533	1860	2750	752	508	408
20	353	261	258	250	e240	271	644	1660	2730	738	520	393
21	341	276	268	253	e240	257	794	1620	2310	757	515	385
22	335	285	258	261	244	271	1070	1680	2040	794	485	380
23	332	307	255	267	250	274	1000	1950	1880	731	465	377
24	330	288	245	244	252	272	827	1980	1730	753	472	372
25	329	256	241	228	254	278	810	1730	1640	688	492	368
26	328	237	225	235	259	288	744	1550	1590	686	500	361
27	326	222	212	243	260	290	689	1500	1590	711	473	383
28	317	218	217	247	256	287	614	1480	1650	748	497	435
29	328	242	232	261	---	280	549	1670	1610	715	467	393
30	324	241	252	262	---	278	536	1670	1600	677	463	379
31	319	---	269	260	---	274	---	1560	---	630	438	---
TOTAL	10455	8672	7615	7700	6415	8515	14769	49197	74300	29470	15992	12038
MEAN	337	289	246	248	229	275	492	1587	2477	951	516	401
MAX	380	325	277	267	260	328	1070	2630	3970	1560	616	437
MIN	317	218	195	221	180	210	263	533	1590	630	438	361
AC-FT	20740	17200	15100	15270	12720	16890	29290	97580	147400	58450	31720	23880

CAL YR 1988 TOTAL 237478 MEAN 649 MAX 3820 MIN 195 AC-FT 471000
WTR YR 1989 TOTAL 245138 MEAN 672 MAX 3970 MIN 180 AC-FT 486200

e Estimated

GALLATIN RIVER BASIN

06050000 HYALITE CREEK AT HYALITE RANGER STATION, NEAR BOZEMAN, MT

LOCATION.--Lat 45°33'42", long 111°04'12", in NW1/4NW1/4SE1/4 sec.23, T.3 S., R.5 E., Gallatin County, Hydrologic Unit 10020008, Gallatin National Forest, on right bank 0.8 mi south of former Hyalite Ranger Station, 7.3 mi south of Bozeman, and at mile 20.8.
DRAINAGE AREA.--48.2 mi^2.
PERIOD OF RECORD.--August 1895 to October 1896, calendar year 1897 (discharge measurements only), April 1898 to October 1899, June to October 1900, May to September 1902, calendar year 1903 (discharge measurements only), September to December 1904, September 1934 to current year. Monthly discharge only for some periods, published in WSP 1309. Prior to 1934, published as Middle Creek near Bozeman.
REVISED RECORDS.--WSP 84: 1898-99. WSP 1509: 1902, 1939(M). WSP 1559: Drainage area. WSP 1709: 1953, 1956-57.
GAGE.--Water-stage recorder. Datum of gage is 5,539.6 ft above National Geodetic Vertical Datum of 1929. Prior to September 1934, nonrecording gages at two sites 0.5 mi upstream at different datums. Sept. 13, 1934, to May 13, 1948, water-stage recorder at site 0.3 mi downstream at different datum.
REMARKS.--Estimated daily discharges: Nov. 10, 15-17, 19-21, Nov. 23 to Dec. 9, Dec. 15-31, Jan. 7-12, 24-30, Feb. 1-7,26, Mar. 2-6, 17,18. Records good except those for estimated daily discharges, which are poor. Flow regulated by Middle Creek Reservoir (station 06049500) since March 1951. Several observations of water temperature and specific conductance were made during the year.
AVERAGE DISCHARGE.--57 years (1895-96, 1898-99, 1935-89), 66.4 ft^3/s, 18.71 in/yr, 48,110 acre-ft/yr, adjusted for storage in Middle Creek Reservoir.
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 956 ft^3/s, June 14, 1898, gage height, 2.10 ft, site and datum then in use; maximum gage height, 4.56 ft, Dec. 22, 1983, backwater from ice; minimum daily discharge, 5.0 ft^3/s, Jan. 27, 1961.
EXTREMES FOR CURRENT YEAR.--Maximum discharge, 528 ft^3/s, June 16, gage height, 3.08 ft; maximum gage height, 3.97 ft, Feb. 3, backwater from ice; minimum discharge, 9.3 ft^3/s, Nov. 2, gage height, 1.56 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	15	e15	16	e14	15	16	36	93	169	112	50
2	20	11	e15	16	e13	e15	16	44	97	150	105	50
3	20	12	e15	16	e13	e14	16	55	95	119	103	50
4	19	11	e15	16	e12	e13	16	52	93	98	102	50
5	26	11	e15	16	e13	e15	16	55	103	97	104	49
6	26	13	e16	16	e15	e16	18	66	116	103	103	46
7	26	17	e16	e15	e16	16	23	81	167	99	103	41
8	20	17	e15	e14	17	16	22	140	162	87	102	41
9	20	17	e16	e15	17	18	19	98	145	81	103	41
10	20	e17	16	e15	17	19	20	89	153	78	99	41
11	20	17	16	e15	17	19	18	82	186	88	87	40
12	20	17	17	e16	16	18	19	79	199	93	87	40
13	20	17	17	16	16	18	21	70	156	94	86	40
14	20	17	17	16	16	17	25	68	146	89	75	41
15	19	e17	e16	16	16	16	31	74	173	89	72	30
16	19	e17	e16	16	16	16	38	102	373	88	67	29
17	25	e17	e16	16	16	e16	33	116	338	91	72	30
18	19	17	e17	16	16	e16	31	139	190	110	72	26
19	20	e17	e17	16	16	16	43	175	146	123	72	21
20	19	e16	e17	16	16	16	54	168	153	125	72	21
21	18	e16	e16	16	16	16	68	146	199	124	69	21
22	18	17	e16	16	16	16	68	115	174	127	66	21
23	19	e17	e16	16	16	16	54	112	135	124	66	21
24	19	e17	e16	e15	16	16	45	111	91	120	65	20
25	20	e16	e15	e14	16	16	43	107	97	118	62	20
26	19	e16	e15	e15	e16	17	42	103	108	111	61	20
27	20	e15	e14	e14	16	17	38	100	102	116	60	22
28	19	e16	e15	e14	16	17	35	98	130	116	60	21
29	19	e16	e15	e15	---	16	33	106	155	123	60	21
30	19	e16	e16	e16	---	17	34	101	148	111	59	21
31	19	---	e16	16	---	16	---	96	---	109	58	---
TOTAL	628	472	490	481	436	505	955	2984	4623	3370	2484	985
MEAN	20.3	15.7	15.8	15.5	15.6	16.3	31.8	96.3	154	109	80.1	32.8
MAX	26	17	17	16	17	19	68	175	373	169	112	50
MIN	18	11	14	14	12	13	16	36	91	78	58	20
AC-FT	1250	936	972	954	865	1000	1890	5920	9170	6680	4930	1950
MEAN †	22.8	39.1	22.0	0	18.1	20.6	44.0	136	167	73.2	35.6	28.4
CFSM †	.47	.81	.46	.00	.38	.43	.91	2.82	3.46	1.52	.74	.59
IN †	.54	.91	.53	.00	.39	.49	1.02	3.26	3.87	1.75	.85	.66
AC-FT †	1,400	2,320	1,350	0	1,000	1,270	2,620	8,370	9,940	4,500	2,190	1,690

OBSERVED

CAL YR 1988	TOTAL	22,372	MEAN	61.1	MAX	440	MIN	11	AC-FT	44,370
WTR YR 1989	TOTAL	18,413	MEAN	50.4	MAX	373	MIN	11	AC-FT	36,520

ADJUSTED

CAL YR 1988	TOTAL	22,289	MEAN	60.9	CFSM	1.26	IN	17.20	AC-FT	44,210
WTR YR 1989	TOTAL	18,382	MEAN	50.4	CFSM	1.05	IN	14.18	AC-FT	36,460

(†) Adjusted for change in contents in Middle Creek Reservoir.

e Estimated.

GALLATIN RIVER BASIN

06052500 GALLATIN RIVER AT LOGAN, MT

LOCATION.--Lat 45°53'07", long 111°26'15", in SE1/4NW1/4NE1/4 sec.35, T.2 N., R.2 E., Gallatin County, Hydrologic Unit 10020008, on right bank at former county road bridge site, 0.2 mi upstream from present county bridge, 0.5 mi west of Logan, and at mile 6.3.

DRAINAGE AREA.--1,795 mi^2.

PERIOD OF RECORD.--September 1893 to December 1905, August 1928 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1389: 1898-99, 1903, 1905, 1929(M), 1935-36(M), 1938-39(M), 1941(M). WSP 1559: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 4,086.42 ft above National Geodetic Vertical Datum of 1929. Prior to Aug. 10, 1928, nonrecording gages at several sites within 0.5 mi of present site at various datums. Aug. 10, 1928, to Oct. 7, 1941, nonrecording gage at present site and datum.

REMARKS.--Estimated daily discharges: Nov. 27, Dec. 2, 4-5, 15-20, Dec. 25 to Jan. 2, Jan. 7-16, Jan. 24 to Feb. 23, Mar. 1-5. Records good except those for May 7-12, which are fair, and those for estimated daily discharges, which are poor. Some regulation by Middle Creek Reservoir (station number 06049500). Diversions for irrigation of about 110,000 acres upstream from station. U.S. Army Corps of Engineers satellite telemeter at station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--73 years (1894-1905, 1929-89), 1,067 ft^3/s, 773,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 9,840 ft^3/s, June 21, 1899, gage height, 6.25 ft, site and datum then in use; maximum gage height, 11.88 ft, Feb. 5, 1963, from floodmark, backwater from ice; minimum discharge observed, 130 ft^3/s, July 19, 1939, gage height, 2.04 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,740 ft^3/s, June 17, gage height, 6.69 ft; minimum, 234 ft^3/s, Feb. 1, gage height, 3.41 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	473	560	619	e570	e350	e520	768	1010	1440	1020	360	467
2	475	557	e610	e580	e400	e500	760	1080	1540	960	351	450
3	472	562	621	591	e360	e470	729	1300	1810	884	329	463
4	483	563	e610	595	e320	e420	690	1380	1810	768	315	472
5	498	551	e600	589	e300	e500	675	1340	1780	662	295	469
6	508	553	623	591	e350	543	735	1350	1950	588	291	489
7	510	552	648	e550	e380	589	799	1540	2400	515	297	501
8	509	556	634	e500	e370	643	874	2350	2490	436	290	491
9	525	566	630	e520	e360	800	821	3120	2600	396	299	504
10	528	560	630	e550	e380	1220	753	3190	2750	379	309	524
11	522	555	623	e550	e420	1280	718	3440	3050	372	316	532
12	526	576	623	e560	e450	969	721	3270	2540	356	316	517
13	527	599	652	e570	e440	952	728	2820	2290	354	319	505
14	536	609	654	e580	e430	830	757	2360	2120	359	348	504
15	537	634	e640	e590	e420	721	820	2090	2090	337	364	494
16	540	625	e560	e600	e410	686	896	2270	2710	338	369	486
17	581	653	e500	605	e400	652	1020	2360	3520	362	369	491
18	605	658	e520	598	e410	636	967	2350	2690	350	366	530
19	602	637	e550	600	e420	650	928	2580	2360	340	377	557
20	602	617	e580	592	e450	630	1050	2370	2200	323	407	557
21	604	624	603	596	e500	617	1220	2130	2110	324	441	555
22	590	639	606	613	e540	646	1520	2040	1880	350	434	548
23	581	683	606	608	e560	718	1670	2120	1630	362	425	538
24	582	712	585	e570	572	692	1550	2240	1490	377	450	532
25	571	650	e550	e530	569	731	1410	2090	1370	354	478	518
26	559	624	e500	e550	571	845	1370	1810	1290	335	482	505
27	550	e600	e480	e540	568	879	1410	1620	1200	346	488	503
28	569	603	e520	e560	555	926	1330	1540	1150	358	494	532
29	579	626	e560	e580	---	856	1150	1750	1150	367	476	550
30	580	635	e590	e600	---	831	1050	1820	1090	388	461	535
31	577	---	e580	e550	---	789	---	1600	---	386	471	---
TOTAL	16901	18139	18307	17778	12255	22741	29889	64330	60500	14046	11787	15319
MEAN	545	605	591	573	438	734	996	2075	2017	453	380	511
MAX	605	712	654	613	572	1280	1670	3440	3520	1020	494	557
MIN	472	551	480	500	300	420	675	1010	1090	323	290	450
AC-FT	33520	35980	36310	35260	24310	45110	59280	127600	120000	27860	23380	30390

CAL YR 1988 TOTAL 290003 MEAN 792 MAX 3800 MIN 221 AC-FT 575200
WTR YR 1989 TOTAL 301992 MEAN 827 MAX 3520 MIN 290 AC-FT 599000

e Estimated

MISSOURI RIVER MAIN STEM

06054500 MISSOURI RIVER AT TOSTON, MT

LOCATION.--Lat 46°08'46", long 111°25'11", in NW1/4SE1/4NW1/4 sec.36, T.5 N., R.2 E., Broadwater County, Hydrologic Unit 10030101, on left bank 2.2 mi southeast of Toston, 4.8 mi upstream from Crow Creek, 7.8 mi downstream from Sixteenmile Creek, and at mile 2,296.1.

DRAINAGE AREA.--14,669 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1890 to February 1891, April 1910 to December 1916, April 1941 to current year. Monthly discharge only for some periods, published in WSP 1309.

GAGE.--Water-stage recorder. Datum of gage is 3,905.68 ft above National Geodetic Vertical Datum of 1929. Prior to Dec. 20, 1916, nonrecording gages at site 2.5 mi downstream at different datums.

REMARKS.--Estimated daily discharges: Feb. 1-20, Mar. 3-5. Water-discharge records good except those for estimated daily discharges, which are fair. Some regulation by six reservoirs on tributaries and Clark Canyon Reservoir (station 06015300). Diversions for irrigation of about 555,400 acres of which 12,000 acres lies downstream from station. U.S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--54 years (1911-16, 1942-89), 5,323 ft^3/s, 3,857,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 32,000 ft^3/s, June 6, 1948, gage height, 11.77 ft; minimum, 450 ft^3/s, July 31, 1989, gage height, 1.68 ft, result of regulation.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 13,500 ft^3/s, Apr. 27, gage height, 7.94 ft, result of regulation; minimum, 450 ft^3/s, July 31, gage height, 1.68 ft, result of regulation.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2270	2970	3120	2340	e2500	3150	3650	4590	5250	3410	1730	2620
2	2280	2930	2930	2220	e1400	2880	3650	5830	5010	3280	1720	2620
3	2310	2960	3290	2280	e1200	e2300	3550	4750	5000	3270	1660	2620
4	2320	3130	3260	2610	e1100	e2200	3460	5590	4970	3000	1650	2590
5	2430	3170	3130	2620	e1000	e2400	3400	5130	5100	2750	1590	2540
6	2470	3190	3540	2690	e1300	2760	3450	4960	5190	2560	1570	2510
7	2490	3230	3590	2460	e1500	3110	3700	5290	5810	2350	1570	2530
8	2440	3080	3430	2290	e1700	3430	4240	6260	6060	1980	1540	2520
9	2460	3230	3470	2110	e1800	4000	4530	7740	6550	1810	1540	2550
10	2470	3290	3480	2560	e2000	5190	4860	8530	6850	1660	1560	2560
11	2560	3260	3380	2710	e2200	6250	4990	9390	7310	1680	1570	2580
12	2610	3300	3400	2600	e2300	5780	4900	10300	7400	1670	1560	2580
13	2510	3290	3840	2630	e2400	5700	4310	10500	6730	1630	1590	2560
14	2480	3360	4010	2540	e2400	5170	5040	9530	6190	1480	1620	2540
15	2480	3310	3910	2560	e2300	4690	5350	8550	5800	1330	1650	2500
16	2500	3320	3490	2400	e2200	4290	5640	8060	6170	1280	1770	2430
17	2610	3300	3510	2710	e2200	3800	5900	7800	8050	1320	1730	2390
18	2660	3390	3700	2880	e2300	3660	5710	7540	8670	1360	1710	2490
19	2690	3420	4030	2990	e2500	3980	5630	7600	7830	1370	1720	2560
20	2700	3370	4130	3030	e2700	3920	5660	7380	6920	1350	1780	2590
21	2730	3370	4250	3070	2750	3750	5980	6800	6460	1350	1850	2610
22	2720	3400	4200	3100	2830	3610	6480	6480	5910	1410	1860	2600
23	2690	3460	4280	3030	2910	3690	6940	6170	5370	1410	1970	2580
24	2710	3580	3240	2950	2980	3650	7090	6030	5050	1420	2070	2600
25	2700	3420	2750	2830	3020	3730	6710	5950	4680	1430	2280	2560
26	2690	3290	1880	2730	3320	3900	6310	5620	4340	1410	2520	2490
27	2770	3050	1430	2770	3360	3940	6200	5440	4000	1450	2650	2470
28	2950	3090	1330	2750	3320	4260	6080	5130	3880	1550	2760	2480
29	2990	3270	1750	2850	---	4050	5660	4910	3940	1630	2890	2590
30	2980	3350	1700	3020	---	3970	5340	5140	3660	1790	2730	2540
31	2970	---	2080	3190	---	3730	---	5200	---	1780	2750	---
TOTAL	80640	97780	99530	83520	63490	120940	154410	208190	174150	57170	59160	76400
MEAN	2601	3259	3211	2694	2267	3901	5147	6716	5805	1844	1908	2547
MAX	2990	3580	4280	3190	3360	6250	7090	10500	8670	3410	2890	2620
MIN	2270	2930	1330	2110	1000	2200	3400	4590	3660	1280	1540	2390
AC-FT	159900	193900	197400	165700	125900	239900	306300	412900	345400	113400	117300	151500

CAL YR 1988 TOTAL 1139071 MEAN 3112 MAX 9340 MIN 788 AC-FT 2259000
WTR YR 1989 TOTAL 1275380 MEAN 3494 MAX 10500 MIN 1000 AC-FT 2530000

e Estimated

MISSOURI RIVER MAIN STEM

06054500 MISSOURI RIVER AT TOSTON, MT--Continued
(National stream quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1949-53, 1965, 1972 to current year. Sampling location moved in October 1978, from old bridge on U. S. Highway 287 at Toston, to cableway 2.4 miles upstream.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1973 to September 1981.
WATER TEMPERATURE: May 1949 to June 1953, April 1973 to current year.
SUSPENDED-SEDIMENT DISCHARGE: March 1949 to June 1953.

INSTRUMENTATION.--Temperature recorder since July 6, 1977.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1973-81): Maximum daily, 524 microsiemens, Mar. 4, 1978; minimum daily, 159 microsiemens, May 28, 1979.
WATER TEMPERATURE: Maximum, 29.0°C, July 31, 1988, July 20, 1989; minimum, 0.0°C, on many days during winter.
SEDIMENT CONCENTRATION (water years 1949-53): Maximum daily mean, 670 mg/L, Mar. 22, 25, 1951; minimum daily mean, 5 mg/L, Jul. 12, 1951.
SEDIMENT LOAD (water years 1949-53): Maximum daily, 16,100 tons, May 5, 1952; minimum daily, 51 tons Feb. 1, 1951.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURE: Maximum recorded, 29.0°C July 20; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT												
31...	0945	--	--	--	429	7.5	5.5	--	--	--	--	--
DEC												
05...	1330	3030	--	--	422	6.5	0.5	--	--	--	--	--
14...	0930	4100	80	2	413	-3.0	1.0	669	13.8	111	K7	48
FEB												
13...	1030	2360	--	--	462	-6.0	0.0	--	--	--	--	--
MAR												
07...	1100	3070	100	3	435	4.0	0.5	660	12.9	104	K4	45
14...	1400	5220	--	--	382	1.0	1.0	--	--	--	--	--
MAY												
16...	0930	8140	--	--	273	13.0	11.0	--	--	--	--	--
JUN												
14...	1430	5680	80	2	246	21.0	18.0	662	8.4	103	24	37
JUL												
28...	1515	1530	--	--	340	28.5	26.0	--	--	--	--	--
SEP												
13...	1315	2550	0	0	382	20.0	12.0	666	9.8	104	--	--
14...	1600	--	--	--	390	23.0	13.5	--	--	--	--	--

DATE	TIME	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STANDARD UNITS) (00400)	TURBIDITY (NTU) (00076)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)
DEC											
14...	0930	176	0	144	8.2	7.0	150	39	12	27	1
MAR											
07...	1100	181	0	149	8.1	4.2	170	45	13	26	0.9
JUN											
14...	1430	115	0	93	8.1	5.3	100	28	7.3	13	0.6
SEP											
13...	1315	156	6	141	8.5	1.6	140	38	12	25	0.9

MISSOURI RIVER MAIN STEM

06054500 MISSOURI RIVER AT TOSTON, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)
DEC											
14...	4.0	145	41	16	1.5	29	272	258	0.37	3010	<0.010
MAR											
07...	4.0	153	44	14	1.4	29	252	268	0.34	2090	<0.010
JUN											
14...	2.6	97	18	6.2	0.70	19	155	152	0.21	2380	<0.010
SEP											
13...	4.2	144	36	13	1.4	25	248	244	0.34	1710	<0.010

DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)
DEC										
14...	0.250	0.010	0.030	<0.20	0.040	0.010	0.010	<10	40	42
MAR										
07...	0.380	0.030	0.030	0.50	0.050	0.040	0.020	<10	31	48
JUN										
14...	<0.100	0.020	0.030	0.60	0.040	0.020	0.010	10	19	37
SEP										
13...	<0.100	<0.010	0.020	0.30	0.010	<0.010	<0.010	10	45	45

DATE	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)
DEC										
14...	<0.5	<1	<1	<3	2	21	<5	110	7	<0.1
MAR										
07...	<0.5	2	<1	<3	3	27	<5	99	9	<0.1
JUN										
14...	<0.5	<1	<1	<3	8	37	1	45	9	0.4
SEP										
13...	<0.5	<1	<1	<3	2	15	1	96	12	0.1

DATE	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
DEC										
14...	<10	<1	<1	<1.0	220	<6	<3	34	376	79
MAR										
07...	<10	2	<1	<1.0	250	<6	<3	43	356	63
JUN										
14...	<10	1	<1	<1.0	150	<6	7	15	230	84
SEP										
13...	<10	<1	<1	<1.0	230	<6	5	6	41	93

MISSOURI RIVER MAIN STEM

06054500 MISSOURI RIVER AT TOSTON, MT--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	14.5	13.0	14.0	7.5	6.5	7.0	.5	.0	.0	1.0	.5	.5
2	15.0	13.5	14.5	8.5	7.5	8.0	.5	.0	.0	1.0	.0	.5
3	14.5	13.5	14.0	8.5	7.5	8.0	.5	.0	.0	1.0	.5	.5
4	14.0	12.5	13.5	7.5	6.0	7.0	.5	.0	.0	1.0	.5	.5
5	13.0	12.0	12.5	6.0	5.5	5.5	.5	.0	.0	1.0	.5	.5
6	12.5	11.5	12.0	6.5	5.5	6.0	.5	.0	.0	.5	.0	.5
7	12.0	11.0	11.5	6.5	5.0	5.5	.5	.0	.0	.5	.0	.5
8	12.0	11.0	11.5	4.5	4.0	4.5	.5	.0	.0	.5	.5	.5
9	12.5	11.5	12.0	5.0	4.0	4.5	1.0	.5	.5	1.0	.5	.5
10	13.0	11.5	12.5	4.0	3.0	3.5	.5	.0	.5	1.0	.5	.5
11	12.5	11.5	12.0	3.5	2.5	3.0	1.0	.0	.5	1.0	.5	.5
12	12.0	11.0	12.0	3.0	2.0	2.5	1.0	.5	.5	1.0	.5	.5
13	12.0	11.0	11.5	2.5	2.0	2.0	2.0	1.0	1.5	1.0	.5	.5
14	12.0	11.5	12.0	2.0	1.5	2.0	2.0	.5	1.5	1.0	.0	.5
15	12.5	11.5	11.5	1.5	.5	1.0	.5	.0	.5	1.0	.5	.5
16	12.5	11.5	12.0	1.0	.5	1.0	.5	.0	.5	1.0	.5	.5
17	12.0	11.0	11.5	1.5	1.0	1.5	.5	.0	.5	1.0	.5	.5
18	11.5	10.5	11.0	2.0	1.5	1.5	1.0	.0	.5	1.0	.5	.5
19	10.5	10.0	10.0	2.0	1.5	1.5	1.0	.0	.5	1.0	.5	.5
20	11.0	9.5	10.0	1.5	1.0	1.5	1.0	.5	.5	1.0	.5	.5
21	10.5	10.0	10.0	1.5	1.0	1.0	.5	.0	.5	1.0	.5	.5
22	10.5	9.5	10.0	2.5	1.5	2.0	1.0	.5	.5	.5	.0	.5
23	9.5	8.5	9.0	3.0	2.5	3.0	1.0	.5	.5	1.0	.0	.5
24	10.0	9.0	9.5	3.0	1.0	2.0	1.0	.0	.5	1.0	.0	.5
25	11.0	9.5	10.0	1.0	.0	.5	.5	.5	.5	.5	.0	.5
26	10.5	9.5	10.0	.5	.0	.0	.5	.5	.5	.5	.0	.5
27	9.5	6.0	7.5	.0	.0	.0	.5	.5	.5	.5	.0	.5
28	6.0	5.0	5.5	.5	.0	.0	1.0	.5	.5	1.0	.0	.5
29	5.0	4.5	4.5	.5	.0	.0	1.0	.0	.5	1.0	.0	.5
30	6.0	5.0	5.5	.5	.0	.0	1.0	.0	.5	1.0	.5	.5
31	7.0	5.5	6.0	---	---	---	1.0	.5	.5	.5	.0	.5
MONTH	15.0	4.5	10.5	8.5	.0	3.0	2.0	.0	.5	1.0	.0	.5

MISSOURI RIVER MAIN STEM

06054500 MISSOURI RIVER AT TOSTON, MT--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.5	.5	.5	1.0	.0	.5	7.0	5.5	6.0	12.5	10.5	11.0
2	.5	.5	.5	---	---	---	7.0	6.0	6.5	12.0	11.0	11.5
3	.5	.5	.5	---	---	---	6.0	5.0	5.5	12.0	11.5	11.5
4	.5	.5	.5	---	---	---	5.5	5.0	5.5	11.5	11.5	11.5
5	.5	.0	.5	---	---	---	7.5	5.0	6.5	13.5	11.5	12.5
6	.5	.0	.5	---	---	---	9.5	7.5	8.5	15.0	13.5	14.5
7	.5	.0	.0	---	---	---	9.0	7.0	8.5	16.0	15.0	15.5
8	.5	.0	.0	---	---	---	8.0	6.5	7.5	15.5	15.0	15.0
9	1.0	.0	.5	---	---	---	7.5	6.0	6.5	15.0	14.0	14.5
10	1.0	.5	.5	---	---	---	7.0	6.0	6.5	16.0	15.0	16.0
11	1.0	.5	.5	---	---	---	7.5	6.0	7.0	16.0	13.0	14.5
12	1.0	.5	.5	---	---	---	9.0	7.0	8.0	13.5	10.0	11.5
13	1.0	.0	.5	---	---	---	10.5	8.5	9.5	10.0	9.0	9.5
14	1.0	.5	1.0	---	---	---	12.0	9.5	11.0	11.5	8.5	9.5
15	1.0	.5	.5	1.5	.5	1.0	---	10.5	---	11.5	10.5	11.0
16	1.0	.0	.5	1.0	.0	.5	---	---	---	12.5	10.5	11.0
17	1.0	.0	.5	1.5	.5	1.0	---	---	---	14.0	12.5	13.0
18	1.0	.5	.5	1.5	.0	.5	---	---	---	14.5	11.5	13.5
19	1.0	.5	.5	1.5	.0	.5	12.5	10.5	11.5	11.0	8.5	9.5
20	1.0	.5	1.0	1.5	.0	1.0	13.5	12.0	13.0	11.5	9.0	10.0
21	1.0	.5	1.0	2.0	.0	1.0	14.0	13.5	13.5	12.5	11.5	12.0
22	1.0	.5	1.0	4.5	2.0	3.0	14.0	11.0	12.5	14.5	12.5	13.5
23	1.0	.5	1.0	5.0	3.5	4.5	11.0	10.0	10.5	15.5	13.5	15.0
24	1.0	.5	1.0	5.5	4.0	5.0	10.0	8.5	9.0	13.5	10.5	12.0
25	1.5	.5	1.0	7.0	5.0	6.0	8.5	8.0	8.5	10.5	10.0	10.5
26	1.5	.5	1.0	7.5	6.5	7.0	8.5	8.5	8.5	12.5	10.5	11.5
27	1.0	.0	.5	7.0	5.5	6.5	8.5	6.5	7.5	13.5	12.5	13.0
28	1.0	.5	.5	7.5	6.0	7.0	6.5	6.0	6.5	12.5	11.0	12.0
29	---	---	---	7.0	5.5	6.0	8.5	6.5	7.5	11.0	10.0	10.5
30	---	---	---	7.5	6.0	6.5	10.5	8.5	9.0	11.5	10.0	10.5
31	---	---	---	7.5	5.5	7.0	---	---	---	14.0	12.0	13.0
MONTH	1.5	.0	.5	---	---	---	---	---	---	16.0	8.5	12.5
		JUNE			JULY			AUGUST			SEPTEMBER	
1	15.0	14.0	14.5	22.0	20.0	20.5	23.0	20.5	21.5	---	---	---
2	16.0	15.0	15.5	22.0	20.5	21.0	23.5	20.0	21.5	---	---	---
3	15.5	14.0	15.0	23.5	20.5	22.0	22.5	19.0	20.5	---	---	---
4	15.5	13.5	14.0	25.0	22.5	23.0	22.5	18.5	20.0	---	---	---
5	17.5	15.5	17.0	24.5	22.0	23.0	23.0	19.0	20.0	---	---	---
6	19.0	17.5	18.5	25.5	22.0	23.5	23.5	19.0	21.0	---	---	---
7	19.0	18.0	18.5	26.5	23.5	25.0	23.5	20.0	21.5	---	---	---
8	---	---	---	26.0	22.5	24.0	24.5	20.5	22.0	---	---	---
9	---	---	---	23.5	20.5	22.5	23.0	21.0	21.5	---	---	---
10	---	---	---	24.0	20.0	21.5	24.0	20.5	21.5	---	---	---
11	---	---	---	25.5	20.0	22.5	24.0	20.0	21.5	---	---	---
12	---	---	---	26.5	22.0	23.5	24.0	20.5	21.5	---	---	---
13	---	---	---	26.5	22.0	24.0	23.5	20.0	21.0	---	---	---
14	---	---	---	25.5	21.5	23.5	22.5	19.5	20.5	---	---	---
15	19.5	17.5	18.5	27.5	21.5	23.5	21.0	19.0	20.0	15.0	12.5	13.5
16	19.5	17.5	19.0	27.0	21.5	23.5	21.0	18.5	19.5	15.5	12.5	14.5
17	17.5	15.5	16.5	25.5	21.5	23.0	21.0	18.0	19.0	14.5	13.0	14.0
18	18.0	16.5	17.0	26.5	20.5	22.5	21.0	18.5	19.5	14.5	12.5	13.5
19	18.5	18.0	18.0	27.5	20.5	23.5	20.5	18.5	19.0	14.5	13.0	13.5
20	18.0	15.5	17.0	29.0	22.5	24.5	19.5	18.0	18.5	15.5	12.5	13.5
21	15.0	14.0	14.0	27.5	23.0	24.5	19.0	17.0	18.0	15.0	13.0	13.5
22	16.5	14.5	15.5	27.5	22.5	24.5	20.5	16.5	17.5	15.5	13.0	14.0
23	17.5	15.5	16.5	26.5	22.5	24.0	18.5	16.5	17.5	15.5	13.0	14.5
24	17.5	15.5	16.0	---	22.5	---	18.0	16.5	17.0	15.5	13.5	14.5
25	18.5	17.0	18.0	---	---	---	16.5	15.0	16.0	16.0	14.0	15.0
26	17.5	17.0	17.0	---	---	---	17.0	15.0	15.5	16.5	14.0	15.0
27	19.0	17.0	18.0	---	---	---	18.0	15.5	16.5	16.5	15.0	15.5
28	19.5	18.0	18.5	---	---	---	---	---	---	16.5	15.0	15.5
29	20.0	19.0	19.5	24.5	20.0	22.5	---	---	---	16.5	14.5	15.5
30	21.5	20.0	20.5	24.5	20.5	22.0	---	---	---	16.5	14.5	15.5
31	---	---	---	23.5	20.0	21.5	---	---	---	---	---	---
MONTH	21.5	13.5	17.0	29.0	20.0	23.0	24.5	15.0	19.5	16.5	12.5	14.5

MISSOURI RIVER BASIN

06055500 CROW CREEK NEAR RADERSBURG, MT

LOCATION.--Lat 46°16'10", long 111°41'38", Broadwater County, Hydrologic Unit 10030101, on left bank, 0.8 mi west of Helena National Forest boundary, 1.5 mi upstream from Slim Sam Creek, and 6.0 mi northwest of Radersburg.

DRAINAGE AREA.--76.6 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April to June 1901, May 1919 to September 1929, June 1966 to June 1972, April to October 1989 (seasonal records only). Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1509: 1920, 1921, 1922(M), 1924(M). WRD MT-1966: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 4,870 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to June 29, 1901, nonrecording gage at site 1.5 mi downstream at different datum. May 25, 1919, to Apr. 16, 1924, nonrecording gage at about the same site as earlier record but different datum. Apr. 17, 1924, to Sept. 30, 1929, at site 0.6 mi downstream at different datum.

REMARKS.--Estimated daily discharges: Apr. 1-4. Water-discharge records good. No known diversions upstream of gage.

AVERAGE DISCHARGE.--15 years (water years, 1919-29, 1966-71), 47.7 ft^3/s, 34,560 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,640 ft^3/s, May 22, 1981, gage height, 8.14 ft; minimum, 1.4 ft^3/s, Jan. 10, 1922, gage height, 0.19 ft^3/s, site and datum then in use.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 336 ft^3/s, May 11, gage height, 4.32 ft; minimum daily, 7.2 ft^3/s, Apr. 4.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1				e8.0	33	78	34	18	15			
2				e7.7	37	98	33	17	15			
3				e7.4	45	110	31	16	15			
4				e7.2	47	109	30	16	14			
5				8.8	52	110	29	16	13			
6				13	70	120	28	15	13			
7				19	111	125	26	15	13			
8				19	161	116	25	15	13			
9				16	172	117	24	15	14			
10				14	222	122	24	15	15			
11				13	277	111	24	15	15			
12				13	194	97	24	15	14			
13				15	146	85	27	22	14			
14				18	118	78	24	19	13			
15				22	110	78	22	17	13			
16				27	128	92	24	18	12			
17				26	126	76	23	16	13			
18				23	135	66	21	14	28			
19				28	124	60	20	14	24			
20				41	112	59	19	15	18			
21				59	107	59	21	15	16			
22				73	104	53	23	14	15			
23				62	112	51	22	14	15			
24				51	114	52	19	20	14			
25				46	104	47	18	20	14			
26				42	94	44	18	18	13			
27				39	88	43	30	17	13			
28				35	89	41	23	19	13			
29				32	88	39	20	16	13			
30				32	83	36	19	15	13			
31				---	77	---	19	15	---			
TOTAL				817.1	3480	2372	744	506	443			
MEAN				27.2	112	79.1	24.0	16.3	14.8			
MAX				73	277	125	34	22	28			
MIN				7.2	33	36	18	14	12			
AC-FT				1620	6900	4700	1480	1000	879			

e Estimated

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1987 to September 1989

REMARKS.--Study is being done because of a fire in the summer of 1988.

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
OCT 1987										
26...	1330	11	--	0	117	--	6.0	--	--	--
AUG 1988										
31...	1115	5.6	0	0	120	23.5	12.0	640	9.4	104
SEP										
14...	1030	13	80	1	110	13.0	8.5	645	10.2	103
NOV										
01...	1120	11	--	--	108	13.0	4.5	--	--	--
29...	0925	9.9	--	--	117	-1.0	0.0	--	--	--
JAN 1989										
30...	1250	9.1	--	--	119	14.0	0.0	--	--	--
APR										
04...	1040	6.3	--	--	126	--	1.0	--	--	--
08...	1015	18	50	1	129	3.5	2.0	646	11.4	97
MAY										
09...	1040	164	--	--	68	13.0	5.0	--	--	--
18...	0830	137	80	2	63	9.0	5.0	633	10.4	98
JUN										
16...	1800	89	90	2	66	13.0	12.0	640	8.8	97
AUG										
08...	0925	16	--	--	105	--	--	--	--	--
16...	0915	20	10	1	106	15.0	12.0	641	9.1	101
SEP										
26...	1030	13	5	1	115	22.0	9.5	642	9.7	101

DATE	TIME	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
AUG 1988												
31...	1115	50	0	40	7.5	49	15	2.7	3.7	0.2	1.0	40
SEP												
14...	1030	35	0	28	7.9	45	14	2.5	3.6	0.2	0.50	--
APR 1989												
08...	1015	--	--	--	7.6	56	17	3.3	4.3	0.2	0.70	47
MAY												
18...	0830	27	0	21	7.3	26	8.4	1.3	2.2	0.2	0.80	22
JUN												
16...	1800	29	0	23	7.5	26	8.2	1.4	2.4	0.2	0.60	25
AUG												
16...	0915	--	--	--	7.7	45	14	2.5	3.5	0.2	0.70	44
SEP												
26...	1030	54	0	45	7.9	50	15	2.9	3.8	0.2	0.70	46

MISSOURI RIVER BASIN

06055500 CROW CREEK NEAR RADERSBURG, MT--Continued

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1989

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)	BROMIDE DIS-SOLVED (MG/L AS BR) (71870)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	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, NITRATE DIS-SOLVED (MG/L AS N) (00618)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
AUG 1988												
31...	10	2.1	0.10	<0.10	13	73	0.10	1.10	0.080	--	--	<0.200
SEP												
14...	11	0.70	0.10	<0.10	14	64	0.09	2.25	0.100	--	--	<0.200
APR 1989												
08...	16	1.2	0.10	--	14	86	0.12	4.16	--	0.100	0.140	<0.010
MAY												
18...	7.0	0.50	0.10	--	11	45	0.06	16.6	--	<0.100	<0.100	0.030
JUN												
16...	6.0	0.30	<0.10	--	12	45	0.06	10.9	--	<0.100	<0.100	0.020
AUG												
16...	9.0	0.50	0.10	--	13	70	0.09	3.77	--	<0.100	<0.100	0.010
SEP												
26...	11	1.3	0.10	--	14	76	0.10	2.65	--	<0.100	<0.100	0.010

DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N) (00607)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHOROUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)
AUG 1988												
31...	--	--	--	<0.50	--	0.020	0.020	0.020	0.020	--	--	<30
SEP												
14...	--	--	--	<0.50	--	0.030	0.010	0.020	0.010	--	--	<30
APR 1989												
08...	<0.010	--	--	0.30	0.30	0.020	0.020	0.010	<0.010	2.6	1.8	--
MAY												
18...	0.030	0.67	--	0.70	<0.20	0.020	0.020	0.020	0.020	4.7	3.8	--
JUN												
16...	0.020	0.18	--	0.20	<0.20	0.010	0.010	0.030	0.010	2.3	2.5	--
AUG												
16...	0.010	--	--	<0.20	<0.20	0.020	<0.010	<0.010	<0.010	1.6	1.4	--
SEP												
26...	0.020	0.19	0.58	0.20	0.60	0.030	0.030	0.010	<0.010	1.2	1.3	--

DATE	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)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)
AUG 1988											
31...	--	--	<20	<2	2	--	<2	16	--	<2	1
SEP											
14...	--	--	40	<2	<2	--	<2	<2	--	<2	1
APR 1989											
08...	10	<0.5	--	<1	<5	<3	<10	11	<10	4	<1
MAY											
18...	6	<0.5	<10	<1	<5	<3	<10	15	<10	<4	<1
JUN											
16...	5	<0.5	10	<1	<5	<3	<10	22	<10	<4	<1
AUG											
16...	8	<0.5	20	2	<5	<3	<10	6	<10	<4	1
SEP											
26...	9	<0.5	20	<1	<5	<3	<10	12	<10	<4	<1

06055500 CROW CREEK NEAR RADERSBURG, MT--Continued

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1989

DATE	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	NICKEL, DIS-SOLVED (UG/L AS NI) (01065)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)	TI-TANIUM, DIS-SOLVED (UG/L AS TI) (01150)	VANA-DIUM, DIS-SOLVED (UG/L AS V) (01085)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)	ZIR-CONIUM, DIS-SOLVED (UG/L AS ZR) (01160)	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)
AUG 1988											
31...	<20	<10	<2.0	100	<1	1	<3	<4	--	--	--
SEP											
14...	<20	<10	<2.0	100	<1	1	<3	<4	--	--	--
APR 1989											
08...	<10	<10	<1.0	130	--	<6	<3	--	108	5.2	94
MAY											
18...	<10	<10	<1.0	66	--	<6	5	--	4	1.5	42
JUN											
16...	<10	<10	<1.0	61	--	<6	4	--	1	0.24	61
AUG											
16...	<10	<10	<1.0	100	--	<6	3	--	1	0.05	100
SEP											
26...	<10	<10	1.0	110	--	<6	4	--	1	0.03	69

MISSOURI RIVER BASIN

06057400 BEAVER CREEK ABOVE WEASEL CREEK NEAR WINSTON, MT

LOCATION.--Lat 46°26'48", long 111°42'35", in SE1/4NW1/4SW1/4 sec. 15, T.8 N., R.1 W., Broadwater County, Hydrologic Unit 10030101, 1,000 ft upstream from Weasel Creek, 1/4 mi downstream from South Pole Creek, and 3 1/2 mi southwest of Winston.

PERIOD OF RECORD.--August 1988 to September 1989.

REMARKS.--Study is being done because of a forest fire in the summer of 1988.

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	PH (STANDARD UNITS) (00400)
AUG 1988											
31...	1545	1.8	0	0	110	25.0	14.0	641	9.1	105	7.7
SEP											
14...	1400	4.6	100	2	150	19.0	9.5	644	9.6	100	7.8
APR 1989											
08...	1245	14	--	--	143	0.5	0.5	644	11.9	98	7.3
MAY											
17...	1400	74	10	2	66	11.0	6.5	635	10.0	98	7.4
JUN											
16...	1500	49	80	2	56	12.0	10.0	638	9.2	98	7.4
AUG											
16...	1200	12	10	1	88	15.0	11.0	637	9.0	98	7.8
SEP											
25...	1300	16	0	0	93	22.0	8.5	641	9.4	96	7.8
28...	0845	16	--	--	--	--	--	--	--	--	--

DATE	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)
AUG 1988											
31...	44	14	2.1	3.8	0.3	1.2	50	0	40	10	0.60
SEP											
14...	59	19	2.8	3.8	0.2	1.3	44	0	36	28	1.7
APR 1989											
08...	57	18	2.8	3.7	0.2	1.2	--	--	--	32	1.4
MAY											
17...	26	7.8	1.5	2.5	0.2	0.60	20	0	17	11	0.90
JUN											
16...	22	7.1	1.1	1.9	0.2	0.60	21	0	17	8.0	0.50
AUG											
16...	34	11	1.6	3.0	0.2	0.90	--	--	--	10	0.60
SEP											
25...	31	9.8	1.6	2.8	0.2	0.80	29	0	24	10	1.2
28...	--	--	--	--	--	--	--	--	--	--	--

DATE	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	BROMIDE DISSOLVED (MG/L AS BR) (71870)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NITRATE DISSOLVED (MG/L AS N) (00618)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)
AUG 1988											
31...	0.10	<0.10	15	72	0.10	0.35	0.100	--	--	<0.200	--
SEP											
14...	<0.10	<0.10	14	93	0.13	1.16	0.130	--	--	<0.200	--
APR 1989											
08...	0.10	--	12	93	0.13	3.51	--	0.300	0.330	<0.010	0.020
MAY											
17...	0.10	--	12	46	0.06	9.29	--	<0.100	<0.100	0.030	0.040
JUN											
16...	0.10	--	10	40	0.05	5.27	--	<0.100	<0.100	0.010	0.010
AUG											
16...	<0.10	--	13	58	0.08	1.89	--	0.300	0.260	0.020	0.040
SEP											
25...	<0.10	--	13	56	0.08	2.41	--	0.500	0.470	0.010	0.010
28...	--	--	--	--	--	--	--	--	--	--	--

06057400 BEAVER CREEK ABOVE WEASEL CREEK NEAR WINSTON, MT--Continued

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1989

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N) (00607)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)
AUG 1988											
31...	--	--	<0.50	--	0.030	0.030	0.030	0.020	--	--	<30
SEP											
14...	--	--	<0.50	--	0.030	0.030	0.020	0.020	--	--	<30
APR 1989											
08...	--	--	0.30	<0.20	0.030	0.020	0.030	0.020	4.3	2.9	--
MAY											
17...	--	--	<0.20	<0.20	0.030	0.030	0.020	0.030	2.6	2.6	--
JUN											
16...	--	--	<0.20	<0.20	0.030	0.040	0.030	0.030	2.5	2.3	--
AUG											
16...	0.18	0.16	0.20	0.20	0.060	0.040	0.040	0.030	2.2	1.7	--
SEP											
25...	--	--	<0.20	<0.20	0.030	0.020	0.030	0.020	1.5	1.6	--
28...	--	--	--	--	--	--	--	--	--	--	--

DATE	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)
AUG 1988											
31...	--	--	<20	<2	<2	--	<2	12	--	<2	1
SEP											
14...	--	--	30	<2	<2	--	2	<2	--	<2	<1
APR 1989											
08...	10	<0.5	--	<1	<5	<3	<10	7	<10	<4	2
MAY											
17...	5	<0.5	<10	<1	<5	<3	<10	48	<10	<4	1
JUN											
16...	6	<0.5	<10	<1	<5	<3	<10	10	<10	<4	3
AUG											
16...	9	<0.5	20	<1	<5	<3	<10	9	<10	<4	1
SEP											
25...	7	<0.5	<10	<1	6	<3	<10	25	<10	<4	2
28...	--	--	--	--	--	--	--	--	--	--	--

DATE	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	TITANIUM, DISSOLVED (UG/L AS TI) (01150)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	ZIRCONIUM, DISSOLVED (UG/L AS ZR) (01160)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
AUG 1988											
31...	<20	<10	<2.0	99	<1	2	6	<4	--	--	--
SEP											
14...	<20	<10	<2.0	140	<1	<1	5	<4	--	--	--
APR 1989											
08...	<10	<10	<1.0	130	--	<6	81	--	2	0.08	50
MAY											
17...	<10	<10	<1.0	59	--	<6	<3	--	1	0.20	17
JUN											
16...	<10	<10	<1.0	56	--	<6	5	--	6	0.79	70
AUG											
16...	<10	<10	<1.0	85	--	<6	5	--	3	0.10	100
SEP											
25...	<10	10	1.0	76	--	<6	10	--	--	--	--
28...	--	--	--	--	--	--	--	--	2	0.09	78

MISSOURI RIVER MAIN STEM

06058500 CANYON FERRY LAKE NEAR HELENA, MT

LOCATION.--Lat 46°38'57", long 111°43'39", in SE1/4SE1/4 sec.4, T.10 N., R.1 W., Lewis and Clark County, Hydrologic Unit 10030101, in block 17 of Canyon Ferry Dam, 15 mi east of Helena, and at mile 2,252.8.

DRAINAGE AREA.--15,904 mi^2.

PERIOD OF RECORD.--April 1953 to current year (monthend contents only). Prior to October 1981, published as Canyon Ferry Reservoir near Helena. Records of monthend contents in Lake Sewell, submerged by present reservoir Apr. 8, 1953, available January 1936 to March 1953. Scattered daily elevations and contents for April to July 1953, published in WSP 1320-B. Daily elevations and contents for May to June 1964, published in WSP 1840-B. Daily elevations and contents on file in Helena district office.

REVISED RECORDS.--WSP 1559: Drainage area.

GAGE.--Water-stage recorder in powerhouse control room. Datum of gage is referenced to National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation).

REMARKS.--Reservoir is formed by concrete dam; construction began in 1949, completed in 1953. Storage began in March 1953. Usable capacity, 2,043,000 acre-ft between elevation 3,650.00 ft, invert of outlet works, and 3,800.00 ft, controlled spillway elevation. Dead storage, 7,470 acre-ft, below elevation 3,650.00 ft. Minimum operating level, 426,500 acre-ft at elevation 3,728.00 ft for on-site power generation. Figures given herein represent usable contents. Water is used for power production, flood control, irrigation, recreation, and supplemental water supply for city of Helena.

COOPERATION.--Elevations and capacity table furnished by U.S. Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily contents, 2,043,000 acre-ft, July 15-29, 31, 1955, July 2, 5, 6, 8, 1956, July 16, 17, 1962, June 23, 1964, elevation, 3,800.0 ft; minimum since first filling, 1,017,000 acre-ft, Apr. 11, 1967, elevation, 3,764.70 ft.

EXTREMES FOR CURRENT YEAR.--Maximum daily contents at 2400, 1,590,000 acre-ft, June 30, July 1, elevation, 3,785.88 ft; minimum, 1,243,000 acre-ft, Mar. 9, elevation, 3,773.76 ft.

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	3,779.78	1,414,000	---
Oct. 31	3,779.70	1,404,000	-10,000
Nov. 30	3,780.45	1,426,000	+22,000
Dec. 31	3,780.63	1,431,000	+5,000
CAL YR 1988			-95,000
Jan. 31	3,778.74	1,377,000	-54,000
Feb. 28	3,774.67	1,267,000	-110,000
Mar. 31	3,774.91	1,273,000	+6,000
Apr. 30	3,776.92	1,327,000	+54,000
May 31	3,781.92	1,470,000	+143,000
June 30	3,785.88	1,590,000	+120,000
July 31	3,783.17	1,507,000	-83,000
Aug. 31	3,781.07	1,444,000	-63,000
Sept. 30	3,781.06	1,445,000	+1,000
WTR YR 1989			+31,000

PRICKLY PEAR CREEK BASIN

06058900 PRICKLY PEAR CREEK BELOW ANDERSON GULCH, NEAR JEFFERSON CITY, MT

LOCATION.--Lat 46°21'45", long 111°59'47" in NE1/4SE1/4NE1/4 sec. 17, T.7N., R.3W., Jefferson County, Hydrologic Unit 10030101, on right bank at downstream side of county road bridge, 0.5 mi downstream from Anderson Gulch, 12 mi downstream from Helena National Forest boundary, and 2.3 mi southeast of Jefferson City.

DRAINAGE AREA.--14.0 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1 to October 10, 1989.

GAGE.--Water-stage recorder. Elevation of gage is 4,900 above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Apr. 1-4,10. Water-discharge records good. No known diversions upstream of station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 54 ft^3/s, May 10, 1989, gage height, 2.57 ft, minimum daily, 4.0 ft^3/s, Apr. 5, 1989.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 54 ft^3/s, May 10, gage height, 2.57 ft, minimum daily, 4.0 ft^3/s, Apr. 5.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1				e4.5	10	23	14	7.7	6.4			
2				e4.4	11	27	14	7.3	6.1			
3				e4.2	13	27	13	7.1	6.2			
4				e4.1	12	27	13	7.0	5.9			
5				4.0	13	30	12	6.8	5.8			
6				5.1	18	33	12	6.7	5.9			
7				6.3	25	32	12	6.4	6.0			
8				5.6	28	30	11	6.6	6.4			
9				4.9	27	31	11	6.3	7.4			
10				e4.7	39	38	11	6.2	7.3			
11				4.4	37	31	11	6.1	6.9			
12				4.5	27	28	11	6.3	6.7			
13				5.1	24	27	11	7.0	6.6			
14				5.9	22	26	10	6.3	6.6			
15				7.2	24	30	10	7.0	6.2			
16				8.3	30	32	11	7.0	6.0			
17				6.7	30	26	10	6.2	7.3			
18				6.2	31	24	9.4	5.9	16			
19				8.4	26	22	8.9	5.9	9.9			
20				11	24	22	8.8	6.0	8.3			
21				14	25	21	9.7	6.0	7.8			
22				15	27	21	9.7	5.8	7.5			
23				12	29	21	8.6	7.4	7.3			
24				10	27	20	8.3	8.8	7.1			
25				9.7	24	19	8.1	7.6	6.9			
26				9.3	23	18	8.3	7.0	6.8			
27				9.1	23	18	13	7.1	6.8			
28				8.4	24	17	8.7	7.4	6.7			
29				8.9	22	16	8.2	6.5	6.7			
30				9.2	21	15	7.9	6.3	6.6			
31				---	21	---	7.9	7.0	---			
TOTAL				221.1	737	752	322.5	208.7	214.1			
MEAN				7.37	23.8	25.1	10.4	6.73	7.14			
MAX				15	39	38	14	8.8	16			
MIN				4.0	10	15	7.9	5.8	5.8			
AC-FT				439	1460	1490	640	414	425			

e Estimated

PRICKLY PEAR CREEK BASIN

06058900 PRICKLY PEAR CREEK BELOW ANDERSON GULCH, NEAR JEFFERSON CITY, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--September 1988 to September 1989.

REMARKS.--Study is being done because of a fire in the summer of 1988.

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)
SEP 1988										
01...	0900	4.5	0	0	110	15.0	8.0	645	10.4	104
13...	0830	5.5	20	1	95	7.0	4.0	648	11.5	103
NOV										
29...	1200	5.1	--	--	105	1.5	0.5	--	--	--
FEB 1989										
23...	1005	3.5	--	--	118	--	0.0	--	--	--
APR										
05...	1055	3.7	--	--	107	--	3.0	--	--	--
07...	1600	6.3	80	1	100	12.0	5.5	640	10.4	98
21...	1255	12	--	--	80	--	6.0	--	--	--
MAY										
08...	1045	26	--	--	67	--	4.0	--	--	--
17...	0800	27	50	1	63	11.5	3.5	635	10.8	98
JUN										
16...	1230	32	100	2	58	13.0	8.0	636	9.8	99
AUG										
09...	0715	6.5	--	--	103	--	11.0	--	--	--
15...	1615	7.0	50	1	95	20.0	12.0	635	9.0	100
SEP										
25...	0915	7.2	0	0	75	8.0	6.0	640	10.0	96
28...	1015	6.7	--	--	--	--	--	--	--	--

DATE	TIME	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STANDARD UNITS) (00400)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)
SEP 1988												
01...	0900	52	0	43	7.70	45	14	2.4	3.7	0.2	1.2	--
13...	0830	43	0	35	7.40	39	12	2.1	3.3	0.2	1.1	--
APR 1989												
07...	1600	--	--	--	7.40	42	13	2.2	3.5	0.2	1.3	36
MAY												
17...	0800	26	0	21	7.30	25	8.0	1.3	2.2	0.2	1.2	23
JUN												
16...	1230	24	0	20	7.40	23	7.3	1.2	2.0	0.2	0.90	22
AUG												
15...	1615	--	--	--	7.50	38	12	1.9	3.2	0.2	1.2	36
SEP												
25...	0915	42	0	36	7.80	38	12	2.0	3.3	0.2	1.2	36
28...	1015	--	--	--	--	--	--	--	--	--	--	--

DATE	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	BROMIDE DISSOLVED (MG/L AS BR) (71870)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NITRATE DISSOLVED (MG/L AS N) (00618)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)
SEP 1988												
01...	11	0.30	0.10	<0.10	18	77	0.10	0.94	0.120	--	--	<0.200
13...	9.3	0.60	<0.10	<0.10	18	68	0.09	1.01	0.130	--	--	<0.200
APR 1989												
07...	13	1.0	0.10	--	16	72	0.10	1.22	--	<0.100	<0.100	0.040
MAY												
17...	8.0	1.2	0.10	--	12	47	0.06	3.42	--	<0.100	<0.100	0.050
JUN												
16...	6.0	0.30	0.10	--	12	42	0.06	3.61	--	<0.100	<0.100	0.010
AUG												
15...	9.0	0.30	0.10	--	17	66	0.09	1.26	--	<0.100	<0.100	0.030
SEP												
25...	10	1.4	0.70	--	16	67	0.09	1.31	--	<0.100	<0.100	0.010
28...	--	--	--	--	--	--	--	--	--	--	--	--

06058900 PRICKLY PEAR CREEK BELOW ANDERSON GULCH, NEAR JEFFERSON CITY, MT--Continued

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1989

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N) (00607)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)
SEP 1988												
01...	--	--	--	<0.50	--	0.020	0.010	0.010	0.010	--	--	<30
13...	--	--	--	<0.50	--	0.030	0.020	0.020	0.010	--	--	<30
APR 1989												
07...	0.030	0.26	--	0.30	<0.20	0.020	<0.010	<0.010	<0.010	2.6	1.9	--
MAY												
17...	0.050	0.25	0.25	0.30	0.30	0.010	<0.010	<0.010	<0.010	6.0	5.1	--
JUN												
16...	0.020	0.29	0.38	0.30	0.40	0.010	<0.010	<0.010	<0.010	4.9	4.3	--
AUG												
15...	0.030	--	--	<0.20	<0.20	0.020	<0.010	<0.010	<0.010	2.0	1.6	--
SEP												
25...	--	0.19	--	0.20	0.20	0.020	0.030	<0.010	<0.010	1.6	1.9	--
28...	--	--	--	--	--	--	--	--	--	--	--	--

DATE	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)
SEP 1988											
01...	--	--	20	<2	2	--	<2	23	--	3	1
13...	--	--	40	2	<2	--	3	27	--	<2	2
APR 1989											
07...	7	<0.5	<10	2	<5	<3	<10	36	<10	<4	2
MAY											
17...	4	<0.5	<10	<1	<5	<3	<10	46	<10	<4	<1
JUN											
16...	4	<0.5	<10	<1	<5	<3	<10	45	<10	<4	2
AUG											
15...	6	<0.5	<10	1	<5	<3	<10	26	<10	<4	2
SEP											
25...	5	<0.5	<10	<1	6	<3	<10	29	<10	<4	2
28...	--	--	--	--	--	--	--	--	--	--	--

DATE	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	TITANIUM, DISSOLVED (UG/L AS TI) (01150)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	ZIRCONIUM, DISSOLVED (UG/L AS ZR) (01160)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
SEP 1988											
01...	<20	<10	<2.0	85	<1	<1	<3	<4	--	--	--
13...	<20	<10	<2.0	78	<1	<1	12	<4	--	--	--
APR 1989											
07...	<10	<10	<1.0	90	--	<6	16	--	7	0.12	83
MAY											
17...	<10	<10	<1.0	56	--	<6	9	--	13	0.95	52
JUN											
16...	<10	<10	<1.0	51	--	<6	15	--	4	0.35	34
AUG											
15...	<10	<10	<1.0	81	--	<6	13	--	1	0.02	100
SEP											
25...	<10	<10	<1.0	78	--	<6	<3	--	--	--	--
28...	--	--	--	--	--	--	--	--	1	0.02	50

PRICKLY PEAR CREEK BASIN

06061500 PRICKLY PEAR CREEK NEAR CLANCY, MT

LOCATION.--Lat 46°31'09", long 111°56'45", in NE1/4SE1/4SW1/4 sec.23, T.9 N., R.3 W., Jefferson County, Hydrologic Unit 10030101, on right bank 3.5 mi downstream from Lump Gulch Creek, 4 mi northeast of Clancy, 7 mi southeast of Helena, and at mile 24.4.

DRAINAGE AREA.--192 mi^2.

PERIOD OF RECORD.--July 1908 to September 1916, July 1921 to September 1933, October 1945 to October 1953, October 1954 to September 1969, October 1978 to current year. October 1969 to September 1980 record collected by Montana Department of Natural Resources and Conservation. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1086: 1946(m). WSP 1309: 1925, 1927, 1931(M), 1933, 1948(M). WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 4,067.1 ft above National Geodetic Vertical Datum of 1929. Prior to July 12, 1910, nonrecording gage at site 1.2 mi upstream at different datum. July 12, 1910, to Sept. 30, 1916, and July 28, 1921, to Aug. 12, 1933, nonrecording gage at site 2.2 mi upstream at different datum.

REMARKS.--Estimated daily discharges: Nov. 15, 26-29, Dec. 1-5, 8,9. Dec. 15 to Jan. 19, Jan 23 to Mar. 10, Mar. 16-20,24. Records good except those for estimated daily discharges, which are poor. Diversions for irrigation of about 700 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--54 years (water years, 1909-16, 1922-33, 1946-53, 1955-69, 1979-89), 49.0 ft^3/s, 35,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,300 ft^3/s, May 22, 1981, gage height, 8.82 ft, from rating curve extended above 900 ft^3/s, on basis of culvert computation at gage height 8.82 ft; minimum, 0.5 ft^3/s, Jan. 26, 1958, gage height, 0.40 ft, ice jam upstream; minimum gage height, 0.16 ft, Sept. 3-5, 7,8, 1988.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 19, 1975, reached a discharge of 1,200 ft^3/s, gage height, 6.56 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 9	2115	ice jam	*3.92	No other peak greater than base discharge.			
Mar. 10	1800	*267	2.78				

Minimum daily discharge, 5.0 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	16	e14	e11	e7.0	e11	29	71	68	43	23	28
2	20	16	e14	e12	e6.0	e11	28	81	77	42	23	25
3	19	16	e14	e13	e5.0	e10	26	96	81	39	22	24
4	19	16	e14	e13	e5.5	e10	25	91	83	36	21	23
5	19	16	e14	e12	e6.0	e12	35	91	80	35	20	21
6	18	16	14	e11	e6.5	e20	63	101	82	33	19	21
7	18	16	15	e9.0	e6.5	e40	72	124	80	31	19	21
8	17	16	e14	e8.0	e6.5	e50	71	136	77	29	20	21
9	17	16	e15	e9.0	e7.0	e100	48	129	80	29	19	25
10	16	15	15	e10	e7.0	e150	42	147	103	29	19	27
11	16	16	14	e10	e7.5	123	40	162	90	31	19	26
12	16	15	15	e11	e8.5	95	40	128	79	31	18	25
13	16	15	15	e10	e8.0	72	46	118	72	46	20	24
14	16	16	15	e10	e8.0	38	53	108	68	39	22	23
15	15	e14	e14	e11	e7.5	31	62	106	79	34	20	22
16	15	15	e14	e11	e7.5	e20	72	130	115	35	23	21
17	20	16	e14	e11	e7.0	e17	62	114	85	34	22	23
18	22	16	e14	e12	e7.5	e15	54	118	73	32	20	56
19	20	15	e15	e12	e8.0	e18	63	108	67	29	20	48
20	19	14	e14	12	e9.0	e20	81	96	64	24	21	36
21	18	14	e14	12	e10	21	94	92	63	27	21	32
22	17	15	e14	13	e11	24	101	92	59	36	21	29
23	17	16	e14	e12	e12	25	90	96	59	32	23	28
24	16	15	e13	e11	e13	e23	75	93	60	30	33	26
25	16	14	e12	e10	e14	38	66	84	53	27	33	25
26	16	e13	e11	e10	e13	42	62	78	50	26	30	24
27	16	e12	e11	e11	e13	37	69	74	51	40	29	23
28	16	e13	e12	e11	e12	38	63	76	52	34	31	23
29	15	e14	e12	e12	---	34	58	77	50	28	28	23
30	16	15	e13	e15	---	31	63	72	45	26	25	23
31	16	---	e12	e10	---	31	---	67	---	23	28	---
TOTAL	537	452	425	345.0	239.5	1207	1753	3156	2145	1010	712	796
MEAN	17.3	15.1	13.7	11.1	8.55	38.9	58.4	102	71.5	32.6	23.0	26.5
MAX	22	16	15	15	14	150	101	162	115	46	33	56
MIN	15	12	11	8.0	5.0	10	25	67	45	23	18	21
AC-FT	1070	897	843	684	475	2390	3480	6260	4250	2000	1410	1580

CAL YR 1988 TOTAL 8322.7 MEAN 22.7 MAX 96 MIN 5.8 AC-FT 16510
WTR YR 1989 TOTAL 12777.5 MEAN 35.0 MAX 162 MIN 5.0 AC-FT 25340

e Estimated

PRICKLY PEAR CREEK BASIN

06061900 MCCLELLAN CREEK NEAR EAST HELENA, MT

LOCATION.--Lat 46°32'26", long 111°52'57", im SE1/4NE1/4NW1/4 sec.17, T.9 N., R.2 W., Jefferson County, Hydrologic Unit 10030101, on right bank 0.5 mi downstream from abandoned diversion dam, 3.8 mi southeast of East Helena, and at mile 1.8.

DRAINAGE AREA.--33.2 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April to October 1989. June 1960 to September 1975 (annual maximums) published as "McClellan Creek at city diversion dam, near East Helena."

GAGE.--Water-stage recorder. Elevation of gage is 4,130 ft above National Geodetic Vertical Datum of 1929, from topographic map. June 1960 to September 1975, crest-stage gage at site 0.5 mi upstream at different datum.

REMARKS.--Estimated daily discharges: Apr. 1-20. Water-discharge records good except those for April and May, which are poor.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 390 ft^3/s, June 8, 1964, gage height, 2.59 ft, site and datum then in use; minimum observed, 2.8 ft^3/s, Aug. 25, 1961.

EXTREMES FOR CURRENT SEASON.--Maximum discharge unknown but occurred on May 10; minimum daily, 12 ft^3/s, Sept. 16.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1				e22	78	46	27	15	15			
2				e21	97	55	26	15	14			
3				e20	113	56	25	15	14			
4				e19	119	54	24	14	13			
5				e21	122	52	23	14	13			
6				e28	120	53	23	13	13			
7				e32	130	52	22	13	13			
8				e30	140	49	21	15	13			
9				e27	134	49	21	14	16			
10				e26	152	56	21	13	16			
11				e25	144	49	21	13	15			
12				e25	119	45	21	13	14			
13				e30	109	42	23	24	14			
14				e37	98	40	20	18	13			
15				e39	91	52	20	15	13			
16				e41	84	56	21	19	12			
17				e36	82	44	20	14	15			
18				e43	87	41	18	13	32			
19				e53	82	39	17	13	22			
20				e70	68	39	17	13	19			
21				87	52	37	18	13	17			
22				88	46	35	19	13	16			
23				81	49	38	17	14	15			
24				72	50	36	17	18	15			
25				67	48	34	16	18	15			
26				64	46	33	16	16	14			
27				67	45	33	31	17	14			
28				62	48	32	18	17	14			
29				61	51	30	16	15	14			
30				66	50	27	16	14	13			
31				---	47	---	16	17	---			
TOTAL				1360	2701	1304	631	468	456			
MEAN				45.3	87.1	43.5	20.4	15.1	15.2			
MAX				88	152	56	31	24	32			
MIN				19	45	27	16	13	12			
AC-FT				2700	5360	2590	1250	928	904			

e Estimated

PRICKLY PEAR CREEK BASIN

06061900 McCLELLAN CREEK NEAR EAST HELENA, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--September 1988 to September 1989.

REMARKS.--Study is being done because of a fire in the summer of 1988.

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)
SEP 1988										
01...	1200	3.0	0	0	115	24.0	14.5	648	9.0	104
13...	1500	5.8	80	1	165	18.0	10.5	651	9.6	101
APR 1989										
07...	1300	32	90	1	175	12.5	1.5	644	11.8	100
21...	0925	85	--	--	126	--	4.0	--	--	--
MAY										
08...	1215	141	--	--	103	--	7.0	--	--	--
17...	1100	86	25	2	105	15.5	7.0	638	9.8	97
31...	1110	48	--	--	123	--	5.0	--	--	--
JUN										
16...	1000	55	85	1	130	13.0	11.0	640	8.9	96
AUG										
09...	1155	14	--	--	145	--	15.0	--	--	--
15...	1330	15	50	1	154	17.5	13.0	653	8.8	98
SEP										
26...	1400	15	10	1	117	26.0	14.0	641	8.7	101

DATE	TIME	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STANDARD UNITS) (00400)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)
SEP 1988												
01...	1200	45	0	35	7.7	45	14	2.3	3.6	0.2	1.2	--
13...	1500	42	0	35	7.4	67	21	3.4	4.1	0.2	1.5	--
APR 1989												
07...	1300	--	--	--	7.7	70	20	4.8	4.0	0.2	2.1	34
MAY												
17...	1100	28	0	22	7.4	42	13	2.3	3.3	0.2	1.3	24
JUN												
16...	1000	42	0	35	7.6	52	16	3.0	3.4	0.2	1.5	37
AUG												
15...	1330	--	--	--	7.9	62	19	3.6	4.2	0.2	1.8	47
SEP												
26...	1400	40	0	32	7.8	45	14	2.5	3.8	0.2	1.3	34

DATE	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	BROMIDE DISSOLVED (MG/L AS BR) (71870)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NITRATE DISSOLVED (MG/L AS N) (00618)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)
SEP 1988												
01...	18	0.30	<0.10	<0.10	17	79	0.11	0.64	0.020	--	--	<0.200
13...	34	1.6	<0.10	<0.10	18	105	0.14	1.64	0.100	--	--	<0.200
APR 1989												
07...	39	1.2	0.10	--	16	113	0.15	9.74	--	1.10	1.10	0.040
MAY												
17...	22	0.70	0.10	--	15	73	0.10	17.0	--	0.300	0.350	0.030
JUN												
16...	22	0.60	<0.10	--	16	85	0.11	12.6	--	0.200	0.240	0.020
AUG												
15...	23	0.60	0.10	--	19	101	0.14	4.08	--	0.200	0.210	0.030
SEP												
26...	20	0.50	0.10	--	17	80	0.11	3.24	--	0.200	0.230	0.010

PRICKLY PEAR CREEK BASIN

06061900 McCLELLAN CREEK NEAR EAST HELENA, MT--Continued

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1989

DATE	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N) (00607)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)
SEP 1988												
01...	--	--	--	<0.50	--	0.020	0.020	0.020	0.020	--	--	30
13...	--	--	--	<0.50	--	0.030	0.020	0.010	0.020	--	--	<30
APR 1989												
07...	0.040	0.56	0.26	0.60	0.30	0.110	0.030	0.030	<0.010	5.8	3.3	--
MAY												
17...	0.040	0.37	0.36	0.40	0.40	0.020	0.020	0.010	0.010	2.7	2.6	--
JUN												
16...	0.020	0.28	0.18	0.30	0.20	0.060	0.040	0.050	0.030	7.5	3.0	--
AUG												
15...	0.030	0.47	0.27	0.50	0.30	0.140	0.050	0.050	0.030	4.4	2.5	--
SEP												
26...	0.010	0.19	0.19	0.20	0.20	0.040	0.020	0.030	0.030	2.1	1.8	--

DATE	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)
SEP 1988											
01...	--	--	30	<2	<2	--	<2	2	--	<2	<1
13...	--	--	50	<2	<2	--	4	3	--	<2	2
APR 1989											
07...	22	<0.5	<10	<1	<5	<3	<10	66	<10	<4	10
MAY											
17...	11	<0.5	<10	<1	<5	<3	<10	14	<10	<4	1
JUN											
16...	21	<0.5	20	<1	<5	<3	<10	21	<10	<4	33
AUG											
15...	25	<0.5	<10	<1	<5	<3	<10	13	<10	<4	26
SEP											
26...	14	<0.5	<10	<1	<5	<3	<10	9	<10	<4	4

DATE	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	TITANIUM, DISSOLVED (UG/L AS TI) (01150)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	ZIRCONIUM, DISSOLVED (UG/L AS ZR) (01160)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
SEP 1988											
01...	<20	<10	<2.0	95	<1	2	<3	<4	--	--	--
13...	<20	<10	<2.0	140	<1	<1	<3	<4	--	--	--
APR 1989											
07...	<10	<10	<1.0	130	--	<6	5	--	61	5.3	92
MAY											
17...	<10	<10	<1.0	89	--	<6	17	--	9	2.1	51
JUN											
16...	<10	<10	<1.0	110	--	<6	6	--	128	19	64
AUG											
15...	<10	<10	<1.0	120	--	<6	3	--	40	1.6	93
SEP											
26...	<10	<10	<1.0	100	--	<6	<3	--	12	0.49	81

PRICKLY PEAR CREEK BASIN

463205111524201 McCLELLAN CREEK WELL NEAR CITY DIVERSION NEAR EAST HELENA, MT

LOCATION.--Lat 46°32'05", long 111°52'42", in SE1/4SW1/4NE1/4 sec.17, T.9 N., R.2 W., Jefferson County, at Ron Smith residence, 1 1/2 mi southeast of Northern Pacific Reservoir, 4 mi southeast of East Helena.

PERIOD OF RECORD.--September 1988 to April 1989 (discontinued).

REMARKS.--Study is being done because of a forest fire in the summer of 1988.

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1989

DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	PH (STANDARD UNITS) (00400)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)
SEP 1988											
08...	1300	120	25.0	15.5	--	47	14	2.9	3.8	0.2	1.7
15...	0900	143	7.0	12.5	6.90	60	18	3.7	3.9	0.2	1.6
APR 1989											
08...	1600	182	4.0	4.0	7.30	77	23	4.8	4.3	0.2	1.7

DATE	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	BROMIDE DISSOLVED (MG/L AS BR) (71870)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	NITROGEN, NITRATE DISSOLVED (MG/L AS N) (00618)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)
SEP 1988											
08...	--	15	0.80	<0.10	<0.10	18	--	--	0.140	--	--
15...	--	28	1.3	<0.10	<0.10	18	--	--	0.100	--	--
APR 1989											
08...	44	37	1.4	0.10	--	15	117	0.16	--	0.800	0.790

DATE	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)
SEP 1988										
08...	<0.200	--	--	<0.50	--	0.040	0.030	0.020	0.020	--
15...	<0.200	--	--	<0.50	--	0.080	0.020	0.020	0.020	--
APR 1989										
08...	0.010	0.010	0.29	0.30	<0.20	0.020	0.010	0.010	<0.010	2.5

DATE	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)
SEP 1988										
08...	30	--	--	50	<2	<2	--	19	42	--
15...	<30	--	--	40	5	2	--	2	69	--
APR 1989										
08...	--	21	<0.5	--	<1	<5	<3	20	46	<10

DATE	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	TITANIUM, DISSOLVED (UG/L AS TI) (01150)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	ZIRCONIUM, DISSOLVED (UG/L AS ZR) (01160)
SEP 1988										
08...	<2	3	<20	<10	<2.0	87	6	3	4	<4
15...	<2	4	<20	<10	<2.0	110	<1	2	3	<4
APR 1989										
08...	<4	2	<10	<10	2.0	140	--	<6	13	--

PRICKLY PEAR CREEK BASIN

463307111535601 EAST HELENA CITY WELLS NEAR McCLELLAN CREEK NEAR EAST HELENA, MT

LOCATION.--Lat 46°33'07", long 111°53'56", in SE1/4SW1/4NE1/4 sec.7, T.9 N., R.2 W., Jefferson County, 800 ft upstream from Northern Pacific Reservoir, 3 mi southeast of East Helena.

PERIOD OF RECORD.--May to September 1989.

REMARKS.--Study is being done because of a forest fire in the summer of 1988.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	PH (STANDARD UNITS) (00400)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)
MAY												
24...	0700	--	--	170	--	6.0	7.0	70	20	4.8	4.0	0.2
JUN												
21...	0715	100	2	--	--	--	7.2	80	23	5.5	4.2	0.2
AUG												
22...	0710	--	--	197	--	12.0	7.4	99	28	6.9	5.1	0.2
SEP												
27...	0700	30	1	177	12.0	11.0	7.0	73	21	5.0	5.2	0.3

DATE	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N) (00607)
MAY											
24...	1.6	51	25	1.0	0.10	17	102	0.14	0.180	0.010	0.29
JUN											
21...	1.5	63	24	0.90	0.20	18	114	0.15	<0.100	0.020	0.48
AUG											
22...	1.9	83	25	3.8	0.10	19	140	0.19	0.150	0.010	--
SEP											
27...	1.8	62	24	2.0	0.10	19	116	0.16	0.200	<0.010	--

DATE	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)
MAY											
24...	0.30	0.030	0.010	<0.010	1.6	14	<0.5	<10	<1	<5	<3
JUN											
21...	0.50	--	0.020	0.010	0.9	14	<0.5	<10	<1	<5	<3
AUG											
22...	<0.20	0.010	<0.010	0.020	0.9	18	<0.5	20	<1	<5	<3
SEP											
27...	0.50	0.010	<0.010	0.010	1.0	18	<0.5	10	<1	<5	<3

DATE	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
MAY											
24...	<10	7	<10	4	<1	<10	<10	1.0	100	<6	6
JUN											
21...	<10	4	<10	<4	<1	<10	<10	<1.0	100	<6	13
AUG											
22...	<10	11	<10	5	<1	<10	10	<1.0	130	<6	9
SEP											
27...	<10	<3	<10	4	<1	<10	<10	<1.0	120	<6	3

PRICKLY PEAR CREEK BASIN

06062500 TENMILE CREEK NEAR RIMINI, MT

LOCATION.--Lat 46°31'27", long 112°5'22", in NW1/4SW1/4NE1/4 sec.20, T.9 N., R.5 W., Lewis and Clark County, Hydrologic Unit 10030101, Helena National Forest, on left bank at U.S. Forest Service Moose Creek picnic grounds, 500 ft upstream from Moose Creek, 2.5 mi north of Rimini, and at mile 20.4.

DRAINAGE AREA.--32.7 mi^2.

PERIOD OF RECORD.--October 1914 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1309: 1917, 1921, 1924-25. WSP 1509: 1915, 1916-17(M), 1920(M), 1927(M), 1928-30, 1947(M), 1948, 1950(M). WSP 1559: Drainage area. WSP 1709: 1959.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 4,850 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to Dec. 17, 1934, water-stage recorder at site 40 ft downstream at different datum and different control.

REMARKS.--Estimated daily discharges: Nov. 11, Dec. 2, 16,17, Dec. 31, Jan. 1,5-10, 22-28, Jan. 31 to Feb. 20, Feb. 25 to Mar. 7. Records good except those for estimated daily discharges, which are fair. Flow regulated by Chessman and Scott Reservoirs on tributaries upstream from station, combined capacity, 2,340 acre-ft. Small diversions upstream from station for water supply for city of Helena. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--75 years, 17.6 ft^3/s, 12,750 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,290 ft^3/s, May 22, 1981, gage height, 6.20 ft; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 105 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 10	2215	*184	*3.15	No other peak greater than base discharge.			

Minimum discharge, 0.47 ft^3/s, Nov. 10, gage height, 1.15 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.0	1.1	1.5	e1.0	e.90	e.95	1.6	39	39	6.7	5.0	8.2
2	2.2	1.2	e1.5	1.1	e.80	e.95	1.6	45	42	6.3	5.7	6.8
3	1.8	1.3	1.6	1.1	e.75	e.90	1.5	52	44	6.0	4.7	6.3
4	1.3	1.2	1.5	1.0	e.70	e.90	1.5	58	46	4.5	4.2	6.0
5	1.2	1.1	1.5	e1.0	e.70	e1.0	2.5	69	41	5.2	3.9	5.6
6	.97	1.5	1.6	e.95	e.70	e1.2	6.8	94	39	5.1	3.0	5.4
7	.78	2.2	1.6	e.90	e.75	e1.4	16	119	36	5.7	1.6	5.3
8	.92	1.1	1.5	e.85	e.80	1.6	17	132	33	2.0	1.5	5.5
9	.76	.93	1.5	e.90	e.85	1.8	11	132	32	1.5	1.4	7.4
10	.68	1.1	1.4	e.95	e.90	2.3	11	153	44	1.6	1.3	7.1
11	.66	e1.3	1.3	1.0	e.95	2.7	9.1	146	32	2.0	1.3	6.8
12	.68	1.3	1.4	1.0	e1.0	3.0	9.1	120	28	2.4	1.4	6.1
13	.81	1.5	1.6	1.1	e.95	3.3	12	104	25	5.7	1.7	5.7
14	.78	1.7	1.1	1.1	e.90	2.6	16	92	22	3.3	2.3	5.3
15	.74	1.3	1.1	1.1	e.90	2.2	24	82	27	2.5	1.8	4.9
16	.81	2.2	e1.2	1.1	e.85	1.8	34	73	30	3.7	1.4	4.6
17	9.9	1.9	e1.3	1.1	e.85	1.7	30	71	22	3.5	1.1	5.5
18	5.6	1.7	1.3	1.0	e.90	1.6	27	74	18	2.2	.95	17
19	4.1	1.6	1.5	1.0	e.90	1.5	36	63	16	2.1	1.7	11
20	3.5	1.7	1.5	1.1	e.95	1.4	54	57	17	1.3	6.2	8.3
21	2.8	1.7	1.4	1.1	1.0	1.4	70	54	16	1.2	9.0	7.5
22	2.2	1.7	1.3	e1.0	1.0	1.4	89	54	14	1.1	15	6.9
23	1.9	1.9	1.2	e1.0	1.0	1.3	78	54	13	3.8	8.9	6.6
24	1.8	1.5	1.1	e.95	1.0	1.3	61	52	12	11	14	6.2
25	1.7	1.5	1.0	e.90	e1.0	1.6	52	47	10	7.4	9.2	5.9
26	1.6	1.4	.81	e.95	e1.1	2.1	47	43	9.6	6.5	8.1	5.7
27	1.5	1.5	.88	e1.0	e1.0	1.9	43	42	11	11	11	5.6
28	1.1	1.7	.93	e1.1	e1.0	1.8	38	40	17	7.3	10	5.4
29	.99	1.6	.96	1.2	---	1.7	34	38	13	5.8	7.9	5.2
30	1.1	1.6	1.1	1.3	---	1.6	35	39	7.6	5.5	7.4	5.1
31	1.1	---	e1.0	1.3	---	1.6	---	39	---	5.1	11	---
TOTAL	58.98	45.03	40.18	32.15	25.10	52.50	868.7	2277	756.2	139.0	163.65	198.9
MEAN	1.90	1.50	1.30	1.04	.90	1.69	29.0	73.5	25.2	4.48	5.28	6.63
MAX	9.9	2.2	1.6	1.3	1.1	3.3	89	153	46	11	15	17
MIN	.66	.93	.81	.85	.70	.90	1.5	38	7.6	1.1	.95	4.6
AC-FT	117	89	80	64	50	104	1720	4520	1500	276	325	395

CAL YR 1988 TOTAL 2916.72 MEAN 7.97 MAX 94 MIN .66 AC-FT 5790
WTR YR 1989 TOTAL 4657.39 MEAN 12.8 MAX 153 MIN .66 AC-FT 9240

e Estimated

MISSOURI RIVER MAIN STEM

06066500 MISSOURI RIVER BELOW HOLTER DAM, NEAR WOLF CREEK, MT

LOCATION.--Lat 46°59'41", long 112°00'37", in NE1/4SW1/4SE1/4 sec.5, T.14 N., R.3 W., Lewis and Clark County, Hydrologic Unit 10030102, on left bank 0.4 mi downstream from Holter Dam, 2.8 mi southeast of Wolf Creek, and at mile 2,210.7.

DRAINAGE AREA.--17,149 mi^2.

PERIOD OF RECORD.--October 1945 to current year.

GAGE.--Water-stage recorder. Datum of gage is 3,464.11 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--No estimated daily discharges this year. Records good. Flow regulated by nine smaller irrigation reservoirs and powerplants, Clark Canyon Reservoir (station number 06015300), and Canyon Ferry Lake (station number 06058500). Diversions for irrigation of about 594,400 acres. Several observations of water temperature and specific conductance were obtained during the year.

AVERAGE DISCHARGE.--44 years, 5,586 ft^3/s, 4,050,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 34,800 ft^3/s, June 8, 1948, gage height, 11.70 ft; minimum, probably less than 250 ft^3/s during powerplant shutdown July 26, 1968; minimum daily, 747 ft^3/s, May 27, 1962.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,050 ft^3/s, Feb. 3, gage height, 3.50 ft; minimum daily, 2,650 ft^3/s, Nov. 5.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2960	2740	3060	3220	5400	4200	4320	4840	4600	2990	2820	3000
2	2910	2730	3070	3240	5440	4210	4270	4840	4490	2830	2830	3010
3	2860	2730	3000	3310	5460	4320	4250	4800	4300	2830	2900	3010
4	2900	2730	3080	3260	5380	4040	4880	4830	4130	2820	3110	3020
5	2910	2650	3040	3070	5350	4330	5480	4970	4170	2850	3030	2930
6	2900	2790	2980	3580	5310	4510	5160	5010	4310	2850	2990	2830
7	2910	2990	3020	4160	5300	4780	4940	4910	4220	2860	2980	2860
8	2900	2850	3140	4140	5290	4780	4830	4920	4070	2870	2990	2860
9	2900	2810	3160	4070	5100	4750	4540	4920	3800	2840	2980	2860
10	2820	3010	3140	4030	4360	4740	4170	4940	3590	2750	3000	2870
11	2880	2990	3120	4040	4120	4770	4040	4890	3620	2800	3010	2860
12	3050	3040	3070	3980	4140	4940	4060	4960	3600	2810	3020	2890
13	3060	3010	3030	3550	4160	5090	4080	4970	3540	2800	3020	2900
14	2880	3000	3060	3230	4160	4980	4110	4950	3500	2890	3020	2920
15	2670	3000	3090	3230	4170	4900	4430	4940	3640	2920	3000	2920
16	2720	2990	3150	3390	4200	4720	4870	4910	3440	3030	2980	2910
17	2760	2970	3120	3590	4210	5140	5020	4940	3400	3160	2980	2920
18	2750	2940	3100	3710	4210	5400	5180	5020	3400	3200	2980	2940
19	2790	3090	2950	3860	4210	5410	5130	5020	3620	3190	2980	2910
20	2910	3180	2930	3850	4200	5380	5120	4770	3650	3200	3040	2910
21	2970	3180	2960	3840	4190	4410	5110	4510	3740	3170	3060	2930
22	2830	3150	3000	3890	4160	3710	4950	4490	3480	2960	3070	2920
23	2770	3080	3030	3870	4170	3730	4870	4690	3090	2840	3090	2930
24	2770	3090	3070	3810	4120	3820	4870	4730	2930	2820	3100	2960
25	2790	3090	3090	3770	4090	4020	5110	4690	2980	2760	3210	2960
26	2850	3030	3110	3720	4210	4040	5140	4670	2940	2740	3230	3020
27	2950	3040	3740	3610	4220	4170	5050	4670	2940	2770	3170	3030
28	2870	3020	4170	3540	4210	4200	5050	4670	2930	2760	3150	2970
29	2780	3020	4160	3580	---	4380	4930	4630	2880	2780	3120	2980
30	2760	3100	3920	3630	---	4630	4870	4640	2960	2790	3050	2990
31	2760	---	3390	4240	---	4560	---	4630	---	2810	2950	---
TOTAL	88540	89040	98950	114010	127540	141060	142830	149370	107960	89690	93860	88020
MEAN	2856	2968	3192	3678	4555	4550	4761	4818	3599	2893	3028	2934
MAX	3060	3180	4170	4240	5460	5410	5480	5020	4600	3200	3230	3030
MIN	2670	2650	2930	3070	4090	3710	4040	4490	2880	2740	2820	2830
AC-FT	175600	176600	196300	226100	253000	279800	283300	296300	214100	177900	186200	174600

CAL YR 1988 TOTAL 1257810 MEAN 3437 MAX 5090 MIN 2650 AC-FT 2495000
WTR YR 1989 TOTAL 1330870 MEAN 3646 MAX 5480 MIN 2650 AC-FT 2640000

SMITH RIVER BASIN

06076690 SMITH RIVER NEAR FORT LOGAN, MT

LOCATION.--Lat 46°47'45", long 111°10'41", in NE1/4SW1/4SW1/4 sec.13, T.12 N., R.4 E., Meagher County, Hydrologic Unit 10030103, on left bank, 15 ft downstream from ranch bridge, 1.0 mi upstream from Sheep Creek, 9.0 mi north of Fort Logan, and at mile 83.7.

DRAINAGE AREA.--846 mi^2.

PERIOD OF RECORD.--October 1977 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 4,400 ft above National Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 8 to Mar. 11. Records good except those for estimated daily discharges, which are poor. Flow slightly regulated by Smith River Reservoir (station number 06075000). Diversion for irrigation of about 19,300 acres upstream of station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--12 years, 157 ft^3/s, 113,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,600 ft^3/s, May 22, 1981, gage height, 7.80 ft; minimum, 16 ft^3/s, Aug. 22, Sept. 2, 1988; minimum gage height, 2.12 ft, Nov. 11, 1978.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 600 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 10	2330	*1,300	a*5.51	No other peak greater than base discharge.			

a--ice jam.

Minimum daily discharge, 35 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	85	58	e64	e54	e42	e54	137	153	106	72	53	71
2	84	58	e70	e54	e38	e50	128	133	97	71	54	67
3	80	57	e70	e56	e35	e50	108	136	98	69	51	67
4	68	57	e64	e58	e37	e50	108	130	94	71	49	67
5	64	57	e63	e54	e40	e52	101	125	100	67	48	64
6	63	57	e62	e50	e42	e60	132	122	107	60	46	63
7	62	55	e56	e46	e47	e70	210	125	132	56	47	63
8	59	e53	e52	e43	e48	e80	204	144	147	54	47	64
9	60	e48	e54	e45	e50	e110	156	150	156	53	53	68
10	60	e44	e56	e47	e52	e950	129	149	182	57	52	70
11	61	e50	e56	e46	e52	e750	114	169	224	60	49	72
12	62	e47	e58	e45	e52	432	100	192	237	57	45	73
13	60	e46	e64	e45	e52	315	100	220	199	58	48	72
14	60	e45	e56	e45	e52	206	101	210	170	62	50	71
15	60	e45	e50	e45	e50	157	105	183	160	59	51	69
16	58	e45	e52	e50	e48	139	112	181	186	54	55	67
17	66	e45	e58	e56	e46	89	113	158	196	58	57	66
18	72	e45	e64	e60	e45	88	107	148	169	62	52	81
19	68	e46	e64	e64	e45	132	107	150	145	64	50	89
20	66	e50	e58	e66	e47	131	111	142	126	56	50	86
21	63	e52	e62	e64	e49	125	110	136	126	55	53	80
22	60	e54	e62	e60	e52	124	116	129	114	59	57	77
23	60	e52	e62	e52	e54	117	119	120	101	57	56	77
24	61	e52	e58	e46	e56	118	121	114	112	53	63	86
25	60	e50	e50	e48	e58	131	125	113	101	52	79	75
26	61	e48	e46	e50	e60	216	134	120	97	49	79	75
27	60	e46	e46	e54	e60	226	140	116	92	53	77	67
28	59	e42	e48	e56	e58	234	145	111	80	52	77	67
29	56	e50	e50	e60	---	216	150	128	77	51	72	65
30	59	e60	e52	e58	---	170	161	166	74	52	73	67
31	59	---	e54	e50	---	149	---	142	---	55	73	---
TOTAL	1976	1514	1781	1627	1367	5791	3804	4515	4005	1808	1766	2146
MEAN	63.7	50.5	57.5	52.5	48.8	187	127	146	133	58.3	57.0	71.5
MAX	85	60	70	66	60	950	210	220	237	72	79	89
MIN	56	42	46	43	35	50	100	111	74	49	45	63
AC-FT	3920	3000	3530	3230	2710	11490	7550	8960	7940	3590	3500	4260

CAL YR 1988 TOTAL 22762 MEAN 62.2 MAX 138 MIN 18 AC-FT 45150
WTR YR 1989 TOTAL 32100 MEAN 87.9 MAX 950 MIN 35 AC-FT 63670

e Estimated

MISSOURI RIVER MAIN STEM

06078200 MISSOURI RIVER NEAR ULM, MT

LOCATION.--Lat 47°26'06", long 111°23'07", in NE1/4NW1/4NW1/4 sec.5, T.19 N., R.3 E., Cascade County, Hydrologic Unit 10030102, on left bank 5.6 mi east of Ulm, 9.1 mi downstream from Smith River, and at mile 2,140.4.

DRAINAGE AREA.--20,941 mi^2.

PERIOD OF RECORD.--August 1957 to current year.

GAGE.--Water-stage recorder. Datum of gage is 3,313.27 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Dec. 22 to Mar. 19. Records good except those for estimated daily discharges, which are poor. Flow regulated by 10 smaller irrigation reservoirs and power plants, Clark Canyon Reservoir (station number 06015300), and Canyon Ferry Lake (station number 06058500). Diversions for irrigation of about 630,400 acres upstream from station. U.S. Army Corps of Engineers satellite telemeter at station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--32 years, 6,654 ft^3/s, 4,821,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 28,500 ft^3/s, May 24, 1981, gage height, 14.99 ft; minimum daily, 1,700 ft^3/s, June 17, 1961.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1953 reached a stage of about 17 ft; discharge, 35,000 ft^3/s. Flood in June 1948 reached a stage of abut 16 ft; discharge, 32,000 ft^3/s, from information by local residents.

EXTREMES FOR CURRENT YEAR.--Maximum discharge unknown, backwater from ice; maximum gage height, 9.50 ft, Mar. 12, backwater from ice; minimum daily discharge, 2,930 ft^3/s, Oct. 16.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3300	3080	3390	e3700	e3300	e4600	5270	7010	6290	3850	3150	3720
2	3240	3080	3400	e3600	e3400	e4600	5070	7360	6190	3870	3170	3670
3	3190	3060	3430	e3700	e5600	e4600	4880	7900	6120	3690	3170	3590
4	3140	3010	3360	e3600	e6400	e4700	4820	8150	6040	3630	3130	3540
5	3130	3050	3430	e3600	e6700	e4400	5090	8020	5890	3560	3320	3490
6	3180	3050	3400	e3500	e6000	e4700	5790	7890	5860	3530	3300	3430
7	3160	3000	3380	e4000	e5800	e5000	5830	7960	5950	3520	3180	3280
8	3150	3270	3360	e4500	e5700	e5600	6030	8150	5920	3470	3160	3250
9	3150	3250	3410	e4400	e5600	e6000	6280	8330	5750	3380	3170	3280
10	3140	3140	3540	e4400	e5400	e8000	5870	8240	5600	3370	3140	3350
11	3110	3320	3530	e4400	e4700	e9500	5370	8180	5400	3290	3110	3360
12	3020	3390	3520	e4400	e4500	e10000	5040	8270	5510	3290	3110	3340
13	3260	3350	3490	e4300	e4500	e8000	4940	8120	5540	3380	3110	3320
14	3320	3390	3310	e3800	e4500	e7000	4940	7820	5320	3440	3150	3310
15	3210	3390	3380	e3600	e4500	e6800	5040	7480	5140	3530	3290	3280
16	2930	3370	3390	e3700	e4500	e6500	5330	7230	5230	3610	3360	3260
17	2940	3350	3600	e3800	e4500	e6200	6140	7040	5310	3600	3310	3240
18	3000	3350	3490	e4000	e4500	e6800	6370	6920	5080	3670	3250	3350
19	3030	3350	3340	e4100	e4500	e7000	6350	7070	4880	3740	3200	3460
20	3020	3410	3250	e4200	e4500	6730	6270	6940	4840	3690	3190	3430
21	3150	3570	3220	e4200	e4500	6140	6470	6680	4850	3690	3220	3380
22	3220	3620	e3250	e4200	e4500	5450	6860	6340	4970	3660	3230	3350
23	3150	3610	e3300	e4200	e4500	4770	7070	6190	4710	3500	3320	3350
24	3020	3510	e3400	e4100	e4400	4670	6980	6340	4390	3340	3410	3280
25	3030	3510	e3400	e4100	e4400	4540	6810	6370	4170	3200	3740	3310
26	3050	3470	e3500	e4000	e4500	4760	6770	6360	4190	3140	4050	3320
27	3120	3450	e3600	e3900	e4600	5090	6890	6250	4150	3160	4320	3320
28	3240	3350	e4100	e3800	e4600	5080	7080	6210	4090	3230	4170	3350
29	3230	3340	e4500	e3800	---	5110	7000	6390	4020	3140	4120	3300
30	3150	3390	e4500	e3900	---	5210	6840	6380	3890	3090	3990	3280
31	3110	---	e4400	e4000	---	5360	---	6370	---	3100	3900	---
TOTAL	97090	99480	109570	123500	135100	182910	179490	223960	155290	107360	105440	101190
MEAN	3132	3316	3535	3984	4825	5900	5983	7225	5176	3463	3401	3373
MAX	3320	3620	4500	4500	6700	10000	7080	8330	6290	3870	4320	3720
MIN	2930	3000	3220	3500	3300	4400	4820	6190	3890	3090	3110	3240
AC-FT	192600	197300	217300	245000	268000	362800	356000	444200	308000	212900	209100	200700

CAL YR 1988 TOTAL 1350670 MEAN 3690 MAX 5930 MIN 2930 AC-FT 2679000
WTR YR 1989 TOTAL 1620380 MEAN 4439 MAX 10000 MIN 2930 AC-FT 3214000

e Estimated

SUN RIVER BASIN

06078500 NORTH FORK SUN RIVER NEAR AUGUSTA, MT

LOCATION.--Lat 47°38'27", long 112°51'34", in SW1/4SW1/4SW1/4 sec.23, T.22 N., R.10 W., Teton County, Hydrologic Unit 10030104, on left bank 400 ft upstream from Arsenic Creek, 1 mi upstream from South Fork and Gibson Reservoir, and 25 mi northwest of Augusta.

DRAINAGE AREA.--258 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1911 to September 1912, October 1945 to September 1967, May to September 1989 (seasonal records only). Monthly discharge only for some periods, published in WSP 1309. Prior to October 1959, published as North Fork of North Fork Sun River near Augusta.

GAGE.--Water-stage recorder. Datum of gage is 4,785.72 ft above National Geodetic Vertical Datum of 1929, levels by U.S. Bureau of Reclamation. May 27, 1911, to Sept. 30, 1912, staff gage near present site at different datum. Oct. 1, 1945, to July 22, 1946, wire-weight gage at site three-quarters of a mile downstream at different datum. July 23, 1946, to June 8, 1964, water-stage recorder at present site and datum. Sept. 12, 1964 to Sept. 30, 1968, water-stage recorder at present site and datum.

REMARKS.--Estimated daily discharges: May 1. Water-discharge records good except those above 600 ft^3/s, which are fair. No known regulation or diversion upstream of station. U.S. Bureau of Reclamation satellite telemeter at station.

AVERAGE DISCHARGE.--24 years (1912, 1946-68), 361 ft^3/s, 19.00 in/yr, 261,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 51,100 ft^3/s, June 8, 1964, gage height, 15.82 ft, from floodmark, from slope-area measurement of peak flow; minimum, 27 ft^3/s, Nov. 21, 1949.

EXTREMES FOR CURRENT SEASON.--Peak discharges greater than base discharge of 1,250 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 11	0015	*2,950	*5.48	June 10	1800	2,160	4.53

Minimum discharge, 126 ft^3/s, Sept. 29,30, gage height, 0.56 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1								e750	757	619	271	222
2								949	1100	554	281	213
3								1010	1370	493	253	211
4								1060	1380	464	238	206
5								1120	1560	435	229	194
6								1450	1790	377	220	190
7								1960	1940	343	215	185
8								2170	1870	326	214	179
9								2040	1860	320	210	180
10								2310	2010	323	203	186
11								2670	2060	314	192	188
12								2000	1790	298	187	183
13								1490	1670	629	189	174
14								1170	1660	578	187	166
15								1060	1570	466	202	160
16								1060	1530	710	185	156
17								1080	1270	583	173	154
18								1090	1090	500	166	168
19								978	1060	436	160	172
20								825	961	396	156	162
21								766	774	409	152	156
22								766	698	360	150	151
23								911	669	352	156	147
24								954	642	336	174	142
25								809	683	328	242	139
26								725	640	312	255	137
27								684	639	355	221	140
28								723	638	317	215	134
29								658	627	289	203	130
30								632	633	275	194	131
31								642	---	275	245	---
TOTAL								36512	36941	12772	6338	5056
MEAN								1178	1231	412	204	169
MAX								2670	2060	710	281	222
MIN								632	627	275	150	130
AC-FT								72420	73270	25330	12570	10030

e Estimated

06078500 NORTH FORK SUN RIVER NEAR AUGUSTA, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--May to September 1989.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	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)
MAY										
01...	1600	770	0	0	275	21.0	7.5	97	202	85
09...	1210	2050	0	0	212	14.0	4.0	78	432	77
JUN										
06...	1220	1760	30	1	194	21.0	6.5	106	504	86
20...	1205	1180	--	--	207	8.5	6.0	8	25	84
27...	1220	616	--	--	217	22.0	8.5	29	48	80
JUL										
20...	1200	407	0	0	255	25.5	12.0	21	23	90
AUG										
17...	1230	169	60	1	290	14.0	11.5	28	13	71
SEP										
21...	1345	154	--	--	293	--	--	34	14	90

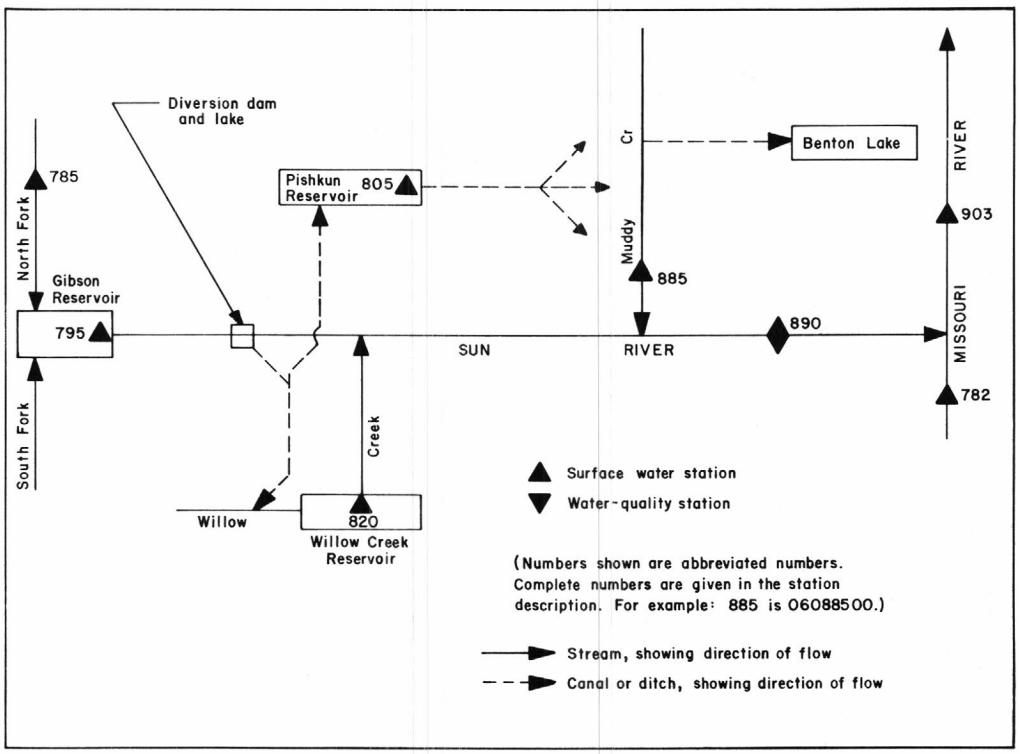


Figure 11.--Schematic diagram showing diversions and storage in Sun River basin.

SUN RIVER BASIN

06088500 MUDDY CREEK AT VAUGHN, MT

LOCATION.--Lat 47°33'42", long 111°32'33", in SE1/4SW1/4NE1/4 sec.24, T.21 N., R.1 E., Cascade County, Hydrologic Unit 10030104, on right bank at Vaughn, and at mile 1.3.

DRAINAGE AREA.--314 mi ^{2}.

PERIOD OF RECORD.--May 1925 to February 1926, April 1934 to September 1968, July 1971 to current year.

REVISED RECORDS.--WSP 856: 1937. WSP 1509: 1934-35, 1941(M). WSP 1559: 1956. WSP 1629: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,337.64 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). May 21, 1925 to Feb. 8, 1926, nonrecording gage at site 500 ft downstream at different datum. Apr. 19, 1925 to Sept. 30, 1955, at present site at datum 1.00 ft higher. May 18, 1955 to Apr. 25, 1960, and Sept. 24, 1962 to Sept. 30, 1968, auxiliary crest-stage gage. Oct. 1, 1955 to Sept. 30, 1968, nonrecording gage at bridge 30 ft downstream at present datum.

REMARKS.--Estimated daily discharges: Oct. 27-31, Nov. 13 to May 23. Records good except those for estimated daily discharges, which are poor. Several observations of water temperature and specific conductance were made during the year. Natural flow increased by wastage from Sun River Canal and by return flow from irrigation. Diversions for irrigation of about 700 acres upstream from station.

AVERAGE DISCHARGE.--52 years (1934-68, 1971-89), 127 ft^3/s, 92,010 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,600 ft^3/s, June 4, 1953, gage height, 17.7 ft, present datum, from floodmarks, from rating curve extended above 3,000 ft ^{3}/s on basis of slope-area measurement of peak flow; minimum, 2.0 ft^3/s, Mar. 16, 17, 1972, gage height, 1.20 ft, result of ice jams upstream.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1908 reached a stage of about 24 ft, present datum (discharge not determined); flood in June 1932 reached a stage of about 19 ft, present datum (discharge not determined); from information by local residents.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,480 ft^3/s, Aug. 26, gage height, 8.21 ft; minimum daily, 26 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	101	62	e52	e40	e32	e31	e47	e80	112	286	378	248
2	91	60	e52	e39	e27	e29	e45	e70	106	277	451	229
3	89	57	e50	e40	e26	e28	e43	e90	102	330	420	214
4	87	56	e54	e42	e27	e29	e43	e75	129	346	406	203
5	86	56	e56	e44	e29	e30	e43	e65	212	380	385	197
6	87	56	e54	e40	e32	e32	e44	e60	236	275	315	193
7	83	54	e45	e37	e35	e33	e47	e55	270	280	295	185
8	81	54	e40	e34	e33	e31	e50	e50	313	272	266	179
9	79	55	e39	e36	e31	e35	e49	e50	371	257	242	173
10	77	56	e39	e37	e34	e100	e47	e50	401	316	249	180
11	76	56	e41	e36	e36	e500	e45	e60	416	251	259	171
12	74	54	e44	e37	e34	e200	e44	e70	341	230	253	165
13	73	e50	e47	e38	e37	e300	e45	e100	271	365	275	163
14	72	e45	e45	e41	e34	e150	e47	e120	300	501	329	159
15	69	e40	e43	e37	e32	e100	e49	e120	350	396	343	155
16	69	e41	e45	e40	e33	e80	e52	e110	441	493	348	152
17	73	e42	e47	e41	e30	e70	e54	e90	401	599	346	151
18	68	e44	e49	e41	e29	e60	e52	e70	301	617	353	181
19	67	e45	e46	e39	e28	e50	e50	e60	325	521	342	158
20	66	e47	e44	e40	e31	e45	e50	e150	262	445	338	149
21	65	e48	e45	e41	e34	e40	e50	e250	285	448	330	144
22	64	e49	e46	e41	e38	e100	e50	e140	326	427	336	118
23	63	e47	e43	e38	e40	e250	e52	e130	381	371	320	108
24	65	e42	e40	e34	e41	e200	e55	118	427	390	323	105
25	65	e40	e38	e33	e39	e150	e60	157	352	311	886	106
26	66	e38	e36	e34	e37	e180	e65	229	419	305	1040	110
27	e70	e44	e34	e36	e35	e100	e70	196	460	435	532	105
28	e66	e50	e36	e39	e32	e80	e75	184	394	645	424	100
29	e50	e54	e37	e41	---	e65	e80	306	356	481	334	97
30	e54	e53	e40	e42	---	e55	e90	240	329	369	309	97
31	e60	---	e42	e37	---	e50	---	156	---	373	288	---
TOTAL	2256	1495	1369	1195	926	3203	1593	3701	9389	11992	11715	4695
MEAN	72.8	49.8	44.2	38.5	33.1	103	53.1	119	313	387	378	156
MAX	101	62	56	44	41	500	90	306	460	645	1040	248
MIN	50	38	34	33	26	28	43	50	102	230	242	97
AC-FT	4470	2970	2720	2370	1840	6350	3160	7340	18620	23790	23240	9310

CAL YR 1988 TOTAL 37828 MEAN 103 MAX 571 MIN 14 AC-FT 75030
WTR YR 1989 TOTAL 53529 MEAN 147 MAX 1040 MIN 26 AC-FT 106200

e Estimated

SUN RIVER BASIN

06089000 SUN RIVER NEAR VAUGHN, MT

LOCATION.--Lat 47°31'37", long 111°29'05", in NW1/4SE1/4SW1/4 sec.33, T.21 N., R.2 E., Cascade County, Hydrologic Unit 10030104, on right bank 3.7 mi downstream from Muddy Creek, 3.6 mi southeast of Vaughn, and at mile 13.6.

DRAINAGE AREA.--1,854 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July to October 1897 (gage heights and discharge measurements only, published as "near Great Falls"), April 1934 to current year. Monthly discharge only for April 1934, published in WSP 1309.

REVISED RECORDS.--WSP 786: 1934. WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,317.12 ft above National Geodetic Vertical Datum of 1929. July 11 to Oct. 30, 1897, nonrecording gage at site 0.8 mi upstream at different datum. Apr. 19 to Aug. 3, 1934, nonrecording gage at present site and datum.

REMARKS.--Estimated daily discharges: Nov. 13 to Mar. 25, June 29 to Aug. 10. Water-discharge records good except those for estimated daily discharges, which are poor. Flow regulated by Gibson, Pishkun, Willow Creek, and Nilan Reservoir Diversion for irrigation of about 110,000 acres upstream from station. U.S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--55 years, 699 ft^3/s, 506,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 53,500 ft^3/s, June 9, 1964, 42,200 ft^3/s in main channel, plus 11,300 ft^3/s in bypass channel, gage height, 23.4 ft, from floodmark; minimum, 20 ft^3/s, Apr. 24, 1944.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 1964 exceeded the stage of the June 1908 flood by about 3 ft and is the highest since 1908, from information by local residents.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,430 ft^3/s, May 12, gage height, 8.22 ft; maximum gage height, 12.77 ft, Mar. 11, backwater from ice; minimum daily discharge, 80 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	250	234	e200	e120	e110	e120	311	2520	1570	e500	e700	648
2	244	226	e190	e150	e90	e110	296	2140	1460	e470	e700	560
3	243	220	e180	e180	e80	e110	277	1990	1410	e450	e850	541
4	239	219	e190	e200	e85	e120	265	2540	1630	e500	e650	487
5	239	218	e200	e170	e95	e130	258	1980	2550	e600	e500	465
6	239	217	e180	e140	e110	e150	262	2170	2880	e650	e470	461
7	238	224	e160	e110	e110	e170	270	2520	2390	e500	e440	445
8	231	225	e140	e90	e100	e210	292	2610	2500	e470	e420	425
9	226	229	e160	e95	e120	e300	308	3360	2740	e460	e410	420
10	222	225	e170	e100	e130	e500	300	4060	2560	e450	e400	527
11	221	230	e180	e100	e140	e2000	285	4330	2790	e550	397	560
12	216	220	e180	e110	e140	e1500	277	5240	3080	e450	389	533
13	210	e220	e180	e120	e140	e1000	268	4770	2580	e400	401	515
14	195	e210	e150	e130	e130	e800	263	3790	1880	e600	482	611
15	195	e200	e120	e140	e120	e650	267	3070	1150	e900	518	669
16	195	e210	e140	e150	e110	e550	335	2600	1120	e700	575	689
17	205	e210	e170	e160	e110	e500	363	2360	1370	e750	581	691
18	209	e210	e210	e170	e110	e550	373	2440	1920	e850	570	711
19	205	e210	e170	e180	e120	e600	355	2490	1860	e1000	572	740
20	205	e220	e130	e180	e130	e600	342	2470	1380	e850	586	737
21	199	e220	e150	e170	e140	e650	353	2440	894	e750	602	681
22	199	e230	e140	e160	e150	e700	387	2400	793	e650	598	686
23	196	e220	e130	e150	e160	e800	420	2380	776	e600	583	664
24	196	e210	e120	e140	e180	e900	641	2190	721	e550	600	660
25	196	e190	e110	e130	e170	e1000	699	1930	622	e600	1630	652
26	199	e170	e100	e140	e150	1210	886	1960	553	e550	2790	665
27	214	e150	e120	e150	e140	660	1340	1910	567	e500	1420	662
28	204	e170	e130	e160	e130	510	1910	1610	577	e850	1110	665
29	205	e180	e140	e170	---	428	2160	1650	e550	e1000	958	668
30	215	e200	e150	e190	---	367	2500	1740	e530	e800	852	659
31	237	---	e130	e130	---	330	---	1660	---	e650	750	---
TOTAL	6687	6317	4820	4485	3500	18225	17263	81320	47403	19600	22504	18097
MEAN	216	211	155	145	125	588	575	2623	1580	632	726	603
MAX	250	234	210	200	180	2000	2500	5240	3080	1000	2790	740
MIN	195	150	100	90	80	110	258	1610	530	400	389	420
AC-FT	13260	12530	9560	8900	6940	36150	34240	161300	94020	38880	44640	35900

CAL YR 1988 TOTAL 85851 MEAN 235 MAX 895 MIN 100 AC-FT 170300
WTR YR 1989 TOTAL 250221 MEAN 686 MAX 5240 MIN 80 AC-FT 496300

e Estimated

06089000 SUN RIVER NEAR VAUGH, MT--Continued
(National stream quality accounting network station)

WATER-QUALITY RECORDS

LOCATION.--Samples collected at county bridge 1.8 mi downstream from gaging station.

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

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1968 to current year.
WATER TEMPERATURE: October 1968 to September 1979.

REMARKS.--Unpublished records of once-daily water temperature are available in files of District office.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 2,610 microsiemens, Apr. 8, 1977; minimum daily, 214 microsiemens, June 8, 1970.
WATER TEMPERATURE (water years 1969-79): Maximum daily, 28.0°C, Aug. 11, 27, 1969, Aug. 16, 1977; minimum daily, 0.0°C on many days during winter.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,600 microsiemens, Mar. 17, 22; minimum daily, 312 microsiemens, May 23.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)
OCT								
12...	1030	214	0	0	950	16.0	11.0	677
NOV								
03...	1400	224	--	--	1180	5.5	6.5	--
DEC								
15...	1045	116	--	--	1070	-6.0	0.5	--
JAN								
04...	1130	202	40	1	830	3.5	0.0	671
MAR								
08...	1100	213	100	2	850	-1.0	0.0	676
APR								
13...	0951	271	0	0	818	11.0	10.0	--
19...	1015	356	0	0	710	20.0	11.5	674
MAY								
11...	1500	4360	--	--	330	19.0	11.0	--
23...	1330	2380	50	1	304	16.5	13.0	--
JUN								
07...	1100	2370	20	1	335	18.0	15.5	678
29...	1315	554	--	--	645	29.0	23.5	--
AUG								
10...	1150	381	0	0	677	25.0	17.5	--
21...	1130	605	95	1	620	21.5	18.0	670
SEP								
20...	1155	699	--	--	622	21.5	20.0	--

DATE	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)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
OCT							
12...	10.7	110	K16	27	318	8	270
JAN							
04...	12.3	96	K1	49	327	0	268
MAR							
08...	13.0	101	<1	--	302	0	242
19...	11.4	119	K3	39	247	5	208
JUN							
07...	8.8	99	110	95	163	3	136
AUG							
21...	9.8	118	66	170	258	9	226

SUN RIVER BASIN

06089000 SUN RIVER NEAR VAUGHN, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	PH (STAND-ARD UNITS) (00400)	TUR-BID-ITY (NTU) (00076)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
OCT										
12...	1030	8.6	14	430	160	71	60	58	1	2.4
JAN										
04...	1130	8.2	1.9	360	90	69	45	45	1	1.5
MAR										
08...	1100	8.0	6.9	380	130	74	46	52	1	2.2
APR										
13...	0951	--	--	340	110	63	44	52	1	2.0
19...	1015	8.6	26	300	97	61	37	40	1	1.9
MAY										
23...	1330	--	--	150	19	37	13	7.7	0.3	0.90
JUN										
07...	1100	8.4	37	160	24	41	14	9.3	0.3	1.0
AUG										
10...	1150	--	--	310	97	54	42	37	0.9	2.2
21...	1130	8.5	0.40	290	63	56	36	31	0.8	1.8

DATE	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)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)
OCT										
12...	261	250	5.8	0.50	4.0	617	619	0.84	357	0.010
JAN										
04...	267	190	4.6	0.40	7.8	535	529	0.73	292	0.010
MAR										
08...	243	220	4.5	0.40	7.6	559	557	0.76	321	0.010
APR										
13...	224	220	5.5	0.40	2.5	--	526	0.72	385	--
19...	207	180	3.9	0.30	3.5	460	454	0.63	442	<0.010
MAY										
23...	127	32	1.0	0.10	4.4	--	172	0.23	1110	--
JUN										
07...	138	35	1.2	0.20	4.5	188	188	0.26	1200	<0.010
AUG										
10...	211	150	4.6	0.50	5.0	--	424	0.58	436	--
21...	220	120	3.3	0.40	5.6	377	393	0.51	616	<0.010

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, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHOROUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	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										
12...	1.10	0.030	0.030	0.50	0.030	0.020	<0.010	80	46	96
JAN										
04...	1.20	0.040	0.040	0.20	0.020	<0.010	<0.010	61	33	74
MAR										
08...	1.00	0.060	0.040	0.40	0.020	<0.010	0.010	21	12	95
APR										
13...	0.630	--	--	--	--	<0.010	--	--	--	--
19...	0.390	0.030	0.030	0.40	0.050	0.010	<0.010	69	66	95
MAY										
23...	<0.100	--	--	--	--	<0.010	--	--	--	--
JUN										
07...	<0.100	0.020	0.040	0.40	0.010	<0.010	<0.010	148	947	82
AUG										
10...	0.460	--	--	--	--	0.010	--	--	--	--
21...	0.680	0.010	0.020	0.80	0.090	<0.010	<0.010	148	242	98

SUN RIVER BASIN

06089000 SUN RIVER NEAR VAUGHN, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	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)
OCT											
12...	1030	<10	1	87	<0.5	<1	<1	<3	1	6	<5
MAR											
08...	1100	<10	<1	78	<0.5	<1	1	<3	1	14	<5
JUN											
07...	1100	<10	<1	81	<0.5	<1	<1	<3	5	7	<1
AUG											
21...	1130	<10	<1	78	<0.5	<1	<1	<3	5	4	1

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)	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										
12...	51	11	<0.1	<10	<1	1	1.0	800	<6	11
MAR										
08...	37	8	<0.1	10	2	1	<1.0	710	<6	10
JUN										
07...	11	3	<0.1	<10	<1	<1	<1.0	210	<6	8
AUG										
21...	33	4	<0.1	20	1	<1	<1.0	540	<6	<3

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	927	1110	840	881	---	898	1000	649	380	---	714	815
2	909	1060	814	836	---	947	974	608	382	---	667	773
3	911	1020	808	878	---	958	967	592	379	691	657	749
4	917	985	816	844	924	952	956	455	360	633	627	746
5	919	969	822	823	975	931	946	408	339	611	613	738
6	916	942	831	860	964	922	933	425	333	676	613	736
7	925	936	852	985	957	872	921	396	315	682	668	736
8	928	933	891	935	952	853	897	388	314	691	637	744
9	904	921	902	973	959	809	889	345	314	701	648	617
10	935	906	915	1010	956	784	843	351	314	691	643	717
11	934	919	901	928	946	1010	829	335	331	720	616	716
12	934	937	922	892	941	649	831	317	333	710	642	691
13	942	958	928	890	931	785	817	335	381	752	638	672
14	938	926	---	898	913	911	806	335	492	650	653	626
15	922	950	---	887	919	883	801	342	556	652	618	591
16	912	1000	911	863	914	1010	695	348	506	640	630	570
17	944	939	1020	887	917	1600	702	350	472	619	617	591
18	934	909	1000	873	960	1060	705	332	354	587	607	586
19	922	961	960	862	937	975	698	336	387	604	595	674
20	1080	932	932	857	913	956	692	326	421	628	617	610
21	1020	903	911	932	896	920	672	327	509	633	627	594
22	974	901	929	947	894	1600	664	318	509	630	602	579
23	951	899	925	982	892	987	676	312	544	635	685	578
24	961	919	934	1030	886	903	622	342	542	632	676	578
25	953	992	939	990	899	910	592	346	619	657	835	577
26	942	981	1020	1010	896	884	531	341	626	675	837	571
27	945	1010	1050	978	905	875	525	336	605	689	820	565
28	946	986	1060	914	913	998	603	416	646	815	831	565
29	970	1030	1040	900	---	999	713	376	669	790	818	562
30	984	917	942	861	---	977	708	414	641	752	814	567
31	1010	---	879	986	---	999	---	381	---	757	782	---
MEAN	945	958	920	916	926	962	774	383	452	676	679	648

WTR YR 1989 MEAN 768 MAX 1600 MIN 312

MISSOURI RIVER MAIN STEM

06090300 MISSOURI RIVER NEAR GREAT FALLS, MT

LOCATION.--Lat 47°35'04", long 111°03'35", in SW1/4SE1/4SW1/4 sec.11, T.21 N., R.5 E., Cascade County, Hydrologic Unit 10030102, on left bank 700 ft downstream from Morony Dam, 12.6 mi northeast of Great Falls, and at mile 2,105.4.

DRAINAGE AREA.--23,292 mi^2.

PERIOD OF RECORD.--May to July 1953 (in WSP 1320-B), October 1956 to current year.

GAGE.--Water-stage recorder. Datum of gage is 2,807.21 ft National Geodetic Vertical Datum of 1929. Prior to July 27, 1977, nonrecording gage at same site at 2.00 ft lower datum. July 27, 1977 to May 26, 1987, at site 600 ft upstream at datum 2.00 ft lower. October 1971 to July 27, 1977, discharges were obtained from the Montana Power Company at Rainbow Dam 7.05 mi upstream. Prior to October 1971, Foxboro meters were used for determining discharge through powerplant. Water-stage recorder on Morony Reservoir was used for determining head on taintor gates with datum of gage at National Geodetic Vertical Datum of 1929 (level by Montana Power Company).

REMARKS.--No estimated daily discharges. Records good. Flow regulated by 18 smaller irrigation reservoirs and powerplants upstream, Clark Canyon Reservoir (station number 06015300), and Canyon Ferry Lake (station number 06058500). Diversion for irrigation of about 750,400 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--33 years, 7,790 ft^3/s, 5,644,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 72,000 ft^3/s, June 10, 1964, from hydrographic comparison with nearby stations; minimum, about 1.0 ft^3/s, Apr. 16, 1962, powerplant shutdown; minimum daily, 1,760 ft^3/s, Apr. 16, 1961. Flood of June 10, 1964, is the highest since 1908.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 19,700 ft^3/s, May 11, gage height, 5.98 ft; minimum daily, 2,110 ft^3/s, Dec. 27.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3920	3930	4410	5510	4410	4910	6420	10400	9120	5710	4390	5080
2	3970	3990	4360	4860	2400	3950	6330	10600	8910	5570	4570	4970
3	3800	3880	4400	4470	3550	5220	6040	10400	9020	5500	4520	4750
4	3820	3880	4360	4850	5080	3680	5820	12100	9170	5420	4450	4810
5	3800	4000	4300	5340	5870	4830	5730	11100	10300	5190	4440	4450
6	3800	3910	4390	5090	6020	5220	6360	10500	10800	5120	4600	4600
7	3910	4160	4430	4120	6140	5670	6950	11100	10100	4930	4440	4340
8	3880	3740	4220	4200	6300	6310	7180	11300	10500	4950	4210	4290
9	3740	4240	4010	4000	6390	6830	7260	12200	10800	4630	4340	4310
10	3900	4230	4360	4470	6370	7710	7220	13300	10400	4770	3990	4350
11	3660	4160	4380	5270	6250	12000	6720	13200	10500	4630	4250	4570
12	3570	4310	4420	5380	5830	12800	6180	14100	10300	4600	4150	4400
13	3800	4240	4540	5270	5240	11000	6100	13800	10400	4620	4090	5340
14	3730	4380	4300	5350	5340	7630	6050	12500	9380	5540	4310	4060
15	3880	4950	4180	4960	5170	8380	6020	11300	8430	5810	4320	4250
16	3970	5600	3940	4330	5180	7290	6270	10700	8330	5790	4670	4700
17	3690	4940	3790	4480	5230	6120	7120	10100	8800	5540	4590	4670
18	3550	4700	4390	4720	4820	5620	7540	9920	9370	5640	4420	5040
19	3670	4430	4460	5020	4950	8070	7860	10300	8830	5460	4340	4860
20	3700	4350	4110	5170	5080	8030	7600	10100	8330	5440	4330	5170
21	3660	4960	3800	5160	5230	8120	7900	9990	7660	5200	4350	4910
22	3910	3530	3570	5170	5510	7130	8140	9610	7730	5470	4580	4750
23	3940	3870	3820	5190	5390	6880	8790	9270	7680	4890	4710	4060
24	3710	3540	3480	5020	5300	7020	8580	9400	6450	4590	4710	4730
25	3990	3900	2940	4110	5460	6660	8820	9080	6620	4670	5830	4750
26	3700	4430	2120	4060	5400	6840	8750	9120	6250	4450	7310	4940
27	3810	4320	2110	4430	5230	6730	9340	9100	6510	4400	6890	4690
28	4170	4290	3280	4920	6310	6540	9960	8700	6160	4460	6530	4820
29	4110	4090	3940	4960	---	6340	10000	9080	6090	4880	6010	5060
30	3960	4410	4950	5160	---	6280	10300	9340	5790	4580	5490	4830
31	3980	---	5350	5440	---	6320	---	9020	---	4330	5450	---
TOTAL	118700	127360	125110	150480	149450	216130	223350	330730	258730	156780	149280	140550
MEAN	3829	4245	4036	4854	5337	6972	7445	10670	8624	5057	4815	4685
MAX	4170	5600	5350	5510	6390	12800	10300	14100	10800	5810	7310	5340
MIN	3550	3530	2110	4000	2400	3680	5730	8700	5790	4330	3990	4060
AC-FT	235400	252600	248200	298500	296400	428700	443000	656000	513200	311000	296100	278800

CAL YR 1988 TOTAL 1650190 MEAN 4509 MAX 7140 MIN 2110 AC-FT 3273000
WTR YR 1989 TOTAL 2146650 MEAN 5881 MAX 14100 MIN 2110 AC-FT 4258000

MISSOURI RIVER MAIN STEM

06090800 MISSOURI RIVER AT FORT BENTON, MT

LOCATION.--Lat 47°49'03", long 110°39'59", in NW1/4SE1/4SE1/4 sec.23, T.24 N., R.8 E., Chouteau County, Hydrologic Unit 10030102, on left bank at downstream side of Old Fort Benton Bridge at Fort Benton, 3.8 mi upstream from Shonkin Creek, and at mile 2,073.2.

DRAINAGE AREA.--24,749 mi^2.

PERIOD OF RECORD.--October 1890 to current year. Records for June 1881 to September 1890, published in WSP 546 and 761, have been found to be unreliable and should not be used.

REVISED RECORDS.--WSP 746: 1932. WSP 1146: 1891-1907, 1908(M), 1909-18, 1937-38. WSP 1209: 1948(P). WSP 1309: 1929(M). WSP 1629: Drainage area. See also PERIOD OF RECORD.

GAGE.--Water-stage recorder. Datum of gage is 2,614.05 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 11, 1920, nonrecording gages, and Oct. 11, 1920, to Apr. 25, 1924, water-stage recorder, all at present site at datum 1.00 ft higher.

REMARKS.--Estimated daily discharges: Dec. 23 to Jan. 21, Feb. 1 to Mar. 9. Records good except those for estimated daily discharges, which are fair. Flow regulated by 18 smaller irrigation reservoirs and powerplants, Clark Canyon Reservoir (station number 06015300), and Canyon Ferry Lake (station number 06058500). Diversions for irrigation of about 751,000 acres upstream from station. Extreme diurnal fluctuation caused by powerplant at Morony Dam. National Weather Service gage-height telemeter at station . Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--99 years, 7,751 ft^3/s, 5,616,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, about 140,000 ft^3/s, June 6, 1908, gage height, 18.5 ft present datum, from rating curve extended above 63,000 ft^3/s; minimum, 320 ft^3/s, July 5, 1936, gage height, -0.50 ft; minimum daily, 627 ft^3/s, July 5, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 15,900 ft^3/s, May 11, gage height, 5.14 ft; maximum gage height, 8.18 ft, Jan. 9, ice jam; minimum daily discharge, 2,200, Dec. 27.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3720	3530	3880	e4800	e3500	e4800	6300	9970	8250	4970	4040	4820
2	3790	3480	3910	e4500	e2400	e4000	6180	10300	7940	4940	4180	4740
3	3770	3510	3890	e4300	e3000	e5000	6050	9940	7920	4910	4180	4480
4	3650	3510	3890	e4800	e4000	e4000	5740	11800	7880	4780	4180	4490
5	3610	3360	3880	e5000	e5000	e5000	5570	11300	8690	4710	4150	4350
6	3590	3480	3990	e4500	e5600	e5500	5900	9900	9300	4750	4250	4180
7	3690	3480	3920	e4000	e5800	e6000	6690	11100	8810	4430	4240	4130
8	3700	3230	3880	e4100	e6000	e6800	6980	11400	8750	4450	4090	4130
9	3590	3740	3720	e3900	e6000	e8000	6810	12100	9260	4300	4120	4150
10	3840	3480	3880	e4500	e6000	9190	7120	13600	8900	4290	3910	4080
11	3310	3620	3910	e5000	e5800	12500	6530	13700	8910	4320	4090	4300
12	3470	3600	4070	e5000	e5400	13600	6090	14600	9140	4320	4070	4330
13	3510	3560	4140	e5000	e5200	11700	5950	14800	8970	4390	3940	4580
14	3490	3620	3930	e5000	e5300	8790	5700	13200	8300	5050	4120	4410
15	3690	3770	3850	e4300	e5200	8170	5820	11800	7570	5500	4100	3880
16	3710	4710	3720	e4000	e5200	7330	5960	11000	7060	5170	4460	4430
17	3650	4610	3470	e4100	e5200	6490	6380	10400	7600	5190	4520	4490
18	3360	4070	3980	e4300	e4800	5300	7180	10000	8070	4900	4350	4730
19	3460	3960	4060	e4400	e5000	7220	7330	10300	7760	4920	4220	4820
20	3450	3770	3950	e4500	e5200	7710	7270	10200	7270	4710	4220	4880
21	3470	4050	3640	e4500	e5400	8090	7350	9900	6650	4750	4200	4710
22	3590	3810	3330	4420	e5500	7140	7780	9510	6480	4700	4300	4990
23	3600	3190	e3500	4470	e5400	6890	8500	9050	7060	4410	4830	3890
24	3520	3150	e3300	4410	e5400	7300	8300	9260	5410	4240	4310	4390
25	3590	3160	e3000	4200	e5600	7120	8570	8590	5650	4040	5310	4560
26	3490	3880	e2500	3820	e5600	7030	8440	8680	5440	3960	6720	4700
27	3450	3750	e2200	3770	e5500	6910	8670	8550	5550	4000	6740	4600
28	3450	3800	e3000	4060	e6500	6690	9740	8180	5460	4000	6150	4500
29	4020	3620	e3700	4270	---	6290	9760	8300	5370	4240	5610	4750
30	3380	3710	e4500	4290	---	6280	9920	8650	5160	4210	5380	4740
31	3560	---	e5000	4550	---	6170	---	8220	---	4080	5060	---
TOTAL	111170	110210	115590	136760	144500	223010	214580	328300	224580	141630	142040	134230
MEAN	3586	3674	3729	4412	5161	7194	7153	10590	7486	4569	4582	4474
MAX	4020	4710	5000	5000	6500	13600	9920	14800	9300	5500	6740	4990
MIN	3310	3150	2200	3770	2400	4000	5570	8180	5160	3960	3910	3880
AC-FT	220500	218600	229300	271300	286600	442300	425600	651200	445500	280900	281700	266200

CAL YR 1988 TOTAL 1586990 MEAN 4336 MAX 7710 MIN 2200 AC-FT 3148000
WTR YR 1989 TOTAL 2026600 MEAN 5552 MAX 14800 MIN 2200 AC-FT 4020000

e Estimated

MARIAS RIVER BASIN

06091700 TWO MEDICINE RIVER BELOW SOUTH FORK, NEAR BROWNING, MT

LOCATION.--Lat 48°25'36", long 112°59'20", in SE1/4SE1/4SE1/4 sec. 23, T.31 N., R.11 W., Glacier County, Hydrologic Unit 10030201, Blackfeet Indian Reservation, on right bank 93 ft downstream from bridge on Blackfeet Secondary Highway No. 1, 9.7 mi south of Browning, and 12.3 mi northwest of Heart Butte.

DRAINAGE AREA.--250 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1977 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 4,180 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 25, Nov. 27, to Mar. 21, May 12. Water-discharge records good except those for estimated daily discharges, which are poor. Flow regulated by Lower Two Medicine Lake (station number 06090900). Diversions for irrigation of about 64.0 acres upstream from station.

AVERAGE DISCHARGE.--12 years, 314 ft^3/s, 227,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,900 ft^3/s, May 26, 1980, gage height, 6.69 ft; minimum daily, 10 ft^3/s, Jan. 29, 1980, and Jan. 6, 1982.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge, 100,000 ft^3/s, June 8, 1964, as determined at Two Medicine River near Browning (station number 06092000) located about 10 mi downstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,950 ft^3/s, May 10, gage height, 5.32 ft; minimum daily, 24 ft^3/s, Oct 13,14.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	95	e65	e50	e47	e52	93	768	1430	562	173	295
2	29	94	e69	e56	e35	e47	83	1090	1840	544	182	262
3	28	103	e65	e62	e38	e45	85	1280	2040	504	180	247
4	28	108	e61	e72	e42	e40	71	1500	2070	470	152	220
5	28	93	e58	e64	e45	e47	121	1650	1910	438	132	207
6	27	99	e55	e55	e46	e55	311	2160	1970	413	128	218
7	27	115	e53	e48	e45	e150	788	2710	2080	395	125	201
8	26	100	e52	e41	e46	e200	614	3210	1960	370	122	196
9	26	92	e51	e48	e47	e240	422	2870	1850	343	121	189
10	25	78	e54	e56	e49	e250	347	3010	2140	345	120	201
11	25	89	e57	e52	e49	e220	334	3160	3010	341	112	189
12	25	74	e60	e60	e49	e170	342	e2480	2500	288	108	177
13	24	81	e58	e66	e49	e140	404	1820	2060	526	109	168
14	24	73	e54	e60	e48	e120	512	1510	1840	711	105	156
15	32	65	e50	e54	e47	e110	798	1280	1710	657	142	144
16	167	77	e54	e62	e47	e90	1140	1250	1640	671	123	138
17	197	77	e58	e62	e46	e82	827	1450	1450	586	110	134
18	125	70	e62	e64	e47	e77	748	1410	1260	494	101	178
19	96	62	e56	e56	e48	e72	1040	1310	1120	440	89	181
20	81	71	e48	e59	e49	e74	1450	1120	1000	395	86	161
21	71	70	e52	e62	e50	e100	1760	977	863	368	88	152
22	70	70	e54	e52	e50	127	2090	938	752	322	85	146
23	65	92	e48	e50	e52	155	1770	1010	713	300	84	143
24	61	66	e47	e47	e56	117	1390	1040	632	271	145	134
25	57	e70	e48	e53	e62	122	1170	924	697	259	517	128
26	67	66	e44	e53	e60	238	1000	826	656	242	541	126
27	80	e40	e48	e54	e60	236	894	773	610	225	492	123
28	66	e42	e54	e54	e58	174	750	916	582	214	450	118
29	68	e47	e60	e55	---	133	701	786	582	194	399	117
30	74	e56	e68	e56	---	110	736	823	572	184	343	114
31	81	---	e58	e53	---	102	---	1120	---	175	331	---
TOTAL	1830	2335	1721	1736	1367	3895	22791	47171	43539	12247	5995	5163
MEAN	59.0	77.8	55.5	56.0	48.8	126	760	1522	1451	395	193	172
MAX	197	115	69	72	62	250	2090	3210	3010	711	541	295
MIN	24	40	44	41	35	40	71	768	572	175	84	114
AC-FT	3630	4630	3410	3440	2710	7730	45210	93560	86360	24290	11890	10240
(†)	0	0	0	0	0	0	0	1000	2980	8600	6570	4370

CAL YR 1988 TOTAL 76433 MEAN 209 MAX 1580 MIN 16 AC-FT 151600
WTR YR 1989 TOTAL 149790 MEAN 410 MAX 3210 MIN 24 AC-FT 297100

e Estimated

† Flows, in acre-ft, in Two Medicine Canal.

06091700 TWO MEDICINE RIVER BELOW SOUTH FORK NEAR BROWNING, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1987 to current year (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)
NOV 01...	1500	99	--	--	230	14.0	17.0
DEC 12...	1345	60	--	--	209	6.5	0.5
JAN 25...	1545	52	--	--	190	1.5	0.0
MAR 06...	1534	54	--	--	224	7.0	0.0
APR 10...	1600	406	0	0	--	13.0	7.0
MAY 17...	1645	1470	80	2	114	17.0	10.5
JUN 27...	1540	595	--	--	138	27.0	17.0
JUL 18...	1543	490	0	0	133	24.0	21.0
AUG 08...	1515	124	0	0	168	26.5	22.0
SEP 26...	1352	124	--	--	177	29.5	14.0

DATE	TIME	PH LAB (STANDARD UNITS) (00403)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)
APR 10...	1600	8.0	99	27	7.7	4.5	0.2	1.0	67
MAY 17...	1645	8.2	56	15	4.4	1.6	0.1	0.50	51
AUG 08...	1515	8.7	81	22	6.4	2.5	0.1	0.50	69
JUL 18...	1543	8.1	58	15	5.0	1.7	0.1	0.50	52

DATE	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	ARSENIC DISSOLVED (UG/L AS AS) (01000)
APR 10...	43	0.50	0.10	4.5	129	0.17	141	<0.100	<1
MAY 17...	8.0	0.40	0.10	4.4	65	0.09	258	<0.100	--
AUG 08...	14	0.30	0.10	3.1	90	0.12	30.2	<0.100	--
JUL 18...	10	0.30	<0.10	3.3	67	0.09	88.6	<0.100	--

DATE	BORON, DISSOLVED (UG/L AS B) (01020)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)
APR 10...	<10	<1	2	96	<5	7	<0.1	<1
MAY 17...	<10	--	--	45	--	--	--	--
AUG 08...	<10	--	--	10	--	--	--	--
JUL 18...	<10	--	--	19	--	--	--	--

MARIAS RIVER BASIN

06093200 BADGER CREEK BELOW FOUR HORNS CANAL, NEAR BROWNING, MT

LOCATION.--Lat 48°22'12", long 112°48'07", in NW1/4SW1/4SE1/4 sec.8, T.30 N., R.9 W., Glacier County, Hydrologic Unit 10030201, on left bank, 3.4 mi downstream from point of diversion to Four Horns Canal, 15.5 mi southeast of Browning, and at mile 11.6.

DRAINAGE AREA.--152 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1951 to current year. Records since October 1973 equivalent to those published as Badger Creek near Browning (station number 06092500) if diversion to Four Horns Canal is added to flow past station.

GAGE.--Water-stage recorder. Elevation of gage is 4,140 ft above National Geodetic Vertical Datum of 1929, from topographic map. May 1951 to September 1973, water-stage recorder at site 3.4 mi upstream at datum 4,179.26 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 13-16, 25,26, Dec. 8,9, Dec. 19 to Jan. 14, Jan. 18 to Mar. 7, Mar. 15-22. Water-discharge records good except those for estimated daily discharges, which are fair. Four Horns Canal diverts water from right bank in NE1/4 sec.24, T.30 N., R.10 W., at diversion dam 3.4 mi upstream for irrigation of about 6,000 acres downstream from station. Recorded diversions from Badger Creek upstream from station for the current year are listed in daily table below.

AVERAGE DISCHARGE.--38 years, 220 ft^3/s, 19.65 in/yr, 159,400 acre-ft/yr, adjusted for diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 49,700 ft^3/s, June 8, 1964, gage height, 10.37 ft, from rating curve extended above 2,000 ft^3/s on basis of slope-area measurement of peak flow (site and datum then in use); minimum daily, 6.5 ft^3/s, Sept. 17, 1984.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,000 ft^3/s, June 11, gage height, 7.11 ft; minimum daily, 9.7 ft^3/s, Oct. 28.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	92	93	e64	e54	e60	74	280	475	283	96	126
2	19	94	89	e70	e48	e60	73	346	683	271	137	121
3	25	98	85	e76	e52	e56	72	411	798	254	111	120
4	25	103	84	e82	e56	e70	72	459	899	244	103	117
5	25	99	83	e70	e60	e87	74	447	920	213	97	116
6	25	106	85	e66	e64	e89	91	580	1000	157	95	117
7	25	126	83	e61	e62	e86	133	856	1050	154	94	112
8	25	115	e82	e56	e60	80	178	1030	953	149	92	110
9	24	109	e81	e60	e62	80	148	980	935	145	91	110
10	20	100	81	e62	e62	159	137	1230	1110	146	89	114
11	20	93	80	e62	e60	111	131	1630	1810	137	87	109
12	20	93	81	e66	e62	89	126	1040	1500	124	85	106
13	20	e90	93	e62	e60	85	132	767	1170	244	85	102
14	20	e86	90	e60	e60	78	146	625	988	237	86	98
15	20	e84	84	62	e58	e60	181	572	888	207	87	96
16	24	e86	83	67	e56	e54	258	600	793	244	81	94
17	54	87	84	74	e54	e50	241	658	652	190	80	97
18	23	85	85	e70	e56	e50	223	636	557	138	79	114
19	16	84	e80	e65	e58	e55	239	556	515	129	79	104
20	15	83	e72	e67	e60	e51	332	482	464	125	79	124
21	14	82	e74	e71	e60	e60	488	452	409	121	96	147
22	14	84	e76	e66	e60	e74	579	454	382	112	99	145
23	14	96	e70	e62	e62	75	577	514	374	106	110	144
24	13	90	e66	e61	e64	72	453	486	353	101	129	143
25	12	e86	e61	e58	e66	83	386	404	382	101	220	142
26	14	e84	e58	e60	e64	90	340	366	357	99	228	141
27	13	79	e62	e62	e64	83	327	358	331	102	180	142
28	9.7	88	e64	e64	e62	79	292	390	314	97	161	140
29	11	88	e70	e66	---	77	268	346	299	91	142	138
30	12	89	e79	e66	---	75	269	340	291	89	133	138
31	48	---	e70	e60	---	75	---	384	---	87	135	---
TOTAL	634.7	2779	2428	2018	1666	2353	7040	18679	21652	4897	3466	3627
MEAN	20.5	92.6	78.3	65.1	59.5	75.9	235	603	722	158	112	121
MAX	54	126	93	82	66	159	579	1630	1810	283	228	147
MIN	9.7	79	58	56	48	50	72	280	291	87	79	94
AC-FT	1260	5510	4820	4000	3300	4670	13960	37050	42950	9710	6870	7190
(†)	4520	0	0	0	0	0	0	2070	2300	4730	4360	2390

CAL YR 1988 TOTAL 34044.7 MEAN 93.0 MAX 689 MIN 9.7 AC-FT 67530
WTR YR 1989 TOTAL 71239.7 MEAN 195 MAX 1810 MIN 9.7 AC-FT 141300

e Estimated
(†) Diversions, in acre-feet, by Four Horns Canal.

06093200 BADGER CREEK BELOW FOUR HORNS CANAL, NEAR BROWNING, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1987 to current year (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
NOV 01...	1210	92	--	--	571	12.0	6.0
DEC 12...	1155	83	--	--	561	12.0	4.0
JAN 25...	1330	58	--	--	636	1.5	0.0
MAR 06...	1258	86	--	--	574	6.0	0.0
APR 10...	1230	130	0	0	496	6.0	3.0
MAY 17...	1145	662	90	2	314	6.0	10.0
JUN 27...	1125	348	--	--	386	29.5	10.5
28...	1231	317	--	--	390	26.0	11.5
JUL 18...	1115	140	0	0	459	24.0	13.0
AUG 08...	1100	90	0	0	522	27.0	14.0
SEP 26...	1111	142	--	--	545	24.5	10.0

DATE	TIME	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
APR 10...	1230	8.2	270	72	23	2.2	0.1	0.60	154
MAY 17...	1145	8.2	170	43	14	1.5	0.0	0.50	127
JUL 18...	1115	8.4	240	63	21	2.1	0.1	0.50	156
AUG 08...	1100	8.5	290	75	24	1.9	0.0	0.60	158

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, 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)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)
APR 10...	110	0.40	0.40	4.5	305	0.42	107	<0.100	<1
MAY 17...	38	0.20	0.10	4.1	178	0.24	317	<0.100	--
JUL 18...	87	0.30	0.40	4.5	272	0.37	103	<0.100	--
AUG 08...	120	0.20	0.40	4.7	322	0.44	78.1	<0.100	--

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)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
APR 10...	<10	<1	1	6	<5	1	<0.1	<1
MAY 17...	10	--	--	10	--	--	--	--
JUL 18...	<10	--	--	6	--	--	--	--
AUG 08...	20	--	--	<3	--	--	--	--

MARIAS RIVER BASIN

06099000 CUT BANK CREEK AT CUT BANK, MT

LOCATION.--Lat 48°38'00", long 112°20'46", in SW1/4SE1/4NE1/4 sec.11, T.33 N., R.6 W., Glacier County, Hydrologic Unit 10030202, Blackfeet Indian Reservation, on right bank, 0.1 mi downstream from bridge on U.S. Highway 2, 0.7 mi west of Cut Bank, 0.8 mi downstream from Old Maids Coulee, and at mile 17.7.

DRAINAGE AREA.--1,065 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1905 to October 1919, May to July 1920, May 1922 to October 1924, May 1951 to September 1973, October 1981 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1309; 1907-8, 1910-11, 1924-25. WSP 1509: 1911, 1916(M). WSP 1559: 1905(M), 1908(M). WSP 1709: 1959. WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 3,550 ft above National Vertical Datum of 1929, from topographic map. Prior to May 12, 1922, nonrecording gage at several sites 0.5 mi upstream at various datums. May 12, 1922 to Nov. 1, 1924, nonrecording gage at present site and different datum.

REMARKS.--Estimated daily discharges: Oct. 28-31, Nov. 8 to Mar. 28, June 11-15. Water-discharge records good except those for estimated daily discharges, which are poor. Few minor diversions for irrigation and municipal water supply for city of Cut Bank upstream from station. Natural flow of stream may be affected by return flow from Two Medicine Canal which irrigates lands upstream from station.

AVERAGE DISCHARGE.--46 years (1906-19, 1923-24, 1952-73, 1982-89), 185 ft^3/s, 134,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,600 ft^3/s, June 9, 1964, gage height, 13.93 ft, 14.2 ft, from floodmarks, from rating curve extended above 12,000 ft^3/s, on basis of slope-area measurement of peak flow; minimum, 0.92 ft^3/s, Sept. 10, 1988.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 750 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 26	----	unknown	unknown	June 11	unknown	*5,160	a*8.00
May 9	1600	988	4.01				

a--from crest-stage gage.

Minimum daily discharge, 6.6 ft^3/s, Oct. 2.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.2	66	e58	e27	e20	e21	266	241	524	271	116	260
2	6.6	62	e62	e26	e16	e20	214	224	594	269	119	231
3	7.0	60	e56	e30	e15	e18	160	245	727	249	115	208
4	8.1	59	e58	e35	e15	e17	156	269	782	217	107	192
5	8.5	63	e60	e30	e17	e17	129	297	741	179	107	178
6	9.1	69	e58	e25	e20	e18	115	331	696	159	107	179
7	9.4	64	e54	e23	e25	e19	128	460	745	142	97	188
8	9.3	e64	e52	e21	e23	e27	244	736	796	127	89	179
9	9.5	e64	e54	e22	e21	e60	340	943	714	113	85	165
10	9.6	e61	e56	e23	e23	e100	257	864	710	122	82	167
11	9.7	e64	e54	e24	e27	e94	181	787	e2260	135	85	170
12	11	e62	e62	e25	e23	e78	143	879	e1300	117	85	166
13	11	e60	e54	e26	e28	e66	130	723	e1050	115	81	157
14	11	e60	e50	e26	e24	e58	133	543	e948	299	78	149
15	11	e54	e45	e26	e25	e53	149	429	e862	598	84	139
16	12	e56	e48	e28	e22	e50	173	351	758	469	87	133
17	14	e58	e50	e29	e21	e48	250	322	723	401	93	128
18	113	e58	e54	e30	e19	e47	233	337	621	335	89	153
19	161	e56	e41	e31	e20	e46	217	344	509	272	82	180
20	127	e62	e31	e31	e22	e46	204	321	449	217	80	171
21	107	e58	e34	e30	e23	e50	271	288	429	198	77	153
22	92	e64	e37	e28	e22	e60	406	255	373	168	72	146
23	82	e64	e32	e26	e22	e80	491	230	364	144	70	141
24	75	e58	e30	e24	e25	e200	462	242	373	132	72	133
25	69	e54	e31	e22	e27	e500	374	264	385	122	128	128
26	66	e50	e26	e25	e25	e1100	344	249	417	122	373	125
27	62	e47	e28	e27	e25	e1000	320	239	384	131	523	110
28	e58	e52	e29	e26	e22	e900	315	302	355	123	431	99
29	e58	e58	e31	e28	---	852	292	329	326	116	389	94
30	e60	e56	e33	e30	---	519	262	321	289	112	339	92
31	e63	---	e28	e24	---	344	---	427	---	111	299	---
TOTAL	1358.0	1783	1396	828	617	6508	7359	12792	20204	6285	4641	4714
MEAN	43.8	59.4	45.0	26.7	22.0	210	245	413	673	203	150	157
MAX	161	69	62	35	28	1100	491	943	2260	598	523	260
MIN	6.6	47	26	21	15	17	115	224	289	111	70	92
AC-FT	2690	3540	2770	1640	1220	12910	14600	25370	40070	12470	9210	9350

CAL YR 1988 TOTAL 29130.9 MEAN 79.6 MAX 573 MIN 1.6 AC-FT 57780
WTR YR 1989 TOTAL 68485.0 MEAN 188 MAX 2260 MIN 6.6 AC-FT 135800

e Estimated

MARIAS RIVER BASIN

06099000 CUT BANK CREEK AT CUT BANK, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1982 to current year (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (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											
02...	0945	60	--	--	535	6.5	2.5	--	--	--	--
DEC											
13...	1010	54	--	--	599	2.0	0.5	--	--	--	--
JAN											
26...	1310	25	--	--	783	7.0	0.0	--	--	--	--
MAR											
07...	1537	19	--	--	836	14.0	0.0	--	--	--	--
APR											
11...	1100	183	0	0	670	9.0	4.0	7.9	200	44	43
MAY											
18...	1045	350	95	2	284	9.5	10.0	8.2	120	7	28
JUN											
15...	1345	864	--	--	346	22.0	18.5	--	--	--	--
28...	0817	349	--	--	346	10.5	15.0	--	--	--	--
JUL											
18...	2015	320	0	0	292	19.5	20.5	8.3	120	4	27
AUG											
09...	0930	87	100	0	442	13.5	16.0	8.4	160	9	35
SEP											
26...	1650	123	--	--	473	25.0	16.0	--	--	--	--

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	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, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)
APR											
11...	23	70	2	3.4	158	180	8.3	0.10	6.6	430	0.58
MAY											
18...	12	13	0.5	0.90	112	32	1.7	0.10	3.8	159	0.22
JUL											
18...	12	16	0.7	0.90	113	31	1.7	0.10	3.9	160	0.22
AUG											
09...	17	34	1	1.3	149	71	3.9	0.10	1.1	253	0.34

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	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)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
APR											
11...	212	0.130	1	40	<1	1	42	<5	21	<0.1	<1
MAY											
18...	150	<0.100	--	<10	--	--	21	--	--	--	--
JUL											
18...	139	<0.100	--	20	--	--	17	--	--	--	--
AUG											
09...	59.4	<0.100	--	40	--	--	11	--	--	--	--

MARIAS RIVER BASIN

06099500 MARIAS RIVER NEAR SHELBY, MT

LOCATION.--Lat 48°25'38", long 111°53'20", in SE1/4NW1/4SE1/4 sec.20, T.31 N., R.2 W., Toole County, Hydrologic Unit 10030203, on left bank 20 ft downstream from bridge on old U.S. Highway 91, 5.1 mi south of Shelby, 24 mi downstream from Cut Bank Creek, and at mile 140.6.

DRAINAGE AREA.--3,242 mi^2, of which 518 mi^2 is probably noncontributing.

PERIOD OF RECORD.--April 1902 to December 1904, May 1905 to December 1906, May 1907 to January 1908, April 1911 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1309: 1903-4, 1918, 1921, 1933, 1935, 1947. WSP 1509: 1902, 1912(M), 1916, 1943(M). WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,087.72 ft above National Geodetic Vertical Datum of 1929. Prior to Dec. 23, 1947, nonrecording gage or water-stage recorder at several sites within 1,000 ft of present site at approximately the same datum. Dec. 23, 1947, to Apr. 6, 1976, water-stage recorder at site 150 ft downstream at same datum.

REMARKS.--Estimated daily discharges: Oct. 26-31, Nov. 8 to Apr. 3, June 12-15. Records good except those for estimated daily discharges, which are poor. Some regulation by Lower Two Medicine Lake (station number 06090900), Four Horns Reservoir (station number 06093000) Swift Reservoir (station number 06094000), and Lake Frances (station number 06095500), having a combined capacity of 172,630 acre-ft. Diversions for irrigation of about 50,000 acres upstream from station and about 15,000 acres downstream from station. U.S. Bureau of Reclamation satellite telemeter at station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--81 years, (1902-4, 1905-6, 1911-89), 918 ft^3/s, 665,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 241,000 ft^3/s, June 9, 1964, largely due to failure of Swift Dam, gage height, 23.64 ft, from floodmark, from rating curve extended above 34,000 ft^3/s on basis of slope-area measurement of peak flow; maximum unaffected by dam failure, 75,700 ft^3/s, June 20, 1975, gage height, 18.21 ft; minimum observed, 10 ft^3/s, Aug. 20, 1919.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,720 ft^3/s, June 12, gage height, 7.88 ft; minimum, 73 ft^3/s, Oct. 4,5, gage height, 2.69 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	77	241	e230	e210	e160	e160	e770	1430	2020	1180	469	1020
2	78	257	e250	e210	e120	e150	e620	1420	2340	1130	467	922
3	80	277	e260	e220	e100	e140	e550	1670	2930	1110	457	832
4	75	281	e250	e230	e120	e130	480	1910	3300	1040	429	771
5	75	297	e240	e230	e130	e120	477	2050	3320	943	416	715
6	80	305	e230	e230	e140	e130	473	2220	3150	860	389	683
7	86	299	e220	e220	e150	e150	593	2750	3250	742	380	697
8	87	e300	e210	e200	e150	e170	1160	3630	3390	669	367	685
9	85	e290	e220	e180	e140	e320	1220	4190	3210	617	349	659
10	86	e280	e230	e160	e140	e600	1020	4020	3130	608	321	649
11	87	e290	e240	e170	e150	e700	895	4230	4880	636	307	663
12	88	e280	e250	e180	e160	e660	795	4350	e6200	622	290	654
13	90	e270	e260	e190	e160	e500	760	3700	e5200	567	281	623
14	91	e260	e260	e190	e150	e410	785	2940	e4200	926	276	592
15	98	e250	e250	e190	e140	e330	873	2410	e3500	1470	285	560
16	100	e260	e240	e190	e140	e300	1190	2170	3100	1460	355	549
17	100	e270	e250	e190	e150	e280	1530	2100	2870	1390	354	549
18	175	e270	e260	e200	e150	e250	1360	2230	2540	1230	328	586
19	313	e260	e270	e190	e160	e240	1280	2170	2180	1030	327	699
20	317	e270	e260	e180	e160	e220	1420	2030	1970	888	324	709
21	269	e270	e250	e180	e160	e220	1870	1840	1840	800	314	652
22	245	e280	e230	e170	e160	e260	2320	1690	1700	759	307	646
23	223	e280	e210	e160	e170	e370	2710	1610	1670	658	322	619
24	210	e270	e190	e150	e200	e560	2500	1660	1590	595	357	580
25	201	e250	e180	e150	e200	e680	2080	1650	1530	555	653	543
26	e190	e240	e170	e150	e190	e1100	1880	1530	1640	541	1300	508
27	e180	e220	e180	e150	e180	e2000	1750	1410	1560	545	1670	512
28	e170	e200	e190	e160	e180	e1800	1720	1570	1430	587	1510	518
29	e180	e200	e200	e170	---	e1400	1590	1760	1390	573	1450	519
30	e200	e220	e210	e180	---	e1200	1470	1660	1300	509	1250	509
31	e220	---	e210	e180	---	e980	---	1730	---	473	1100	---
TOTAL	4556	7937	7100	5760	4310	16530	38141	71730	82330	25713	17404	19423
MEAN	147	265	229	186	154	533	1271	2314	2744	829	561	647
MAX	317	305	270	230	200	2000	2710	4350	6200	1470	1670	1020
MIN	75	200	170	150	100	120	473	1410	1300	473	276	508
AC-FT	9040	15740	14080	11420	8550	32790	75650	142300	163300	51000	34520	38530

CAL YR 1988 TOTAL 145270 MEAN 397 MAX 2460 MIN 26 AC-FT 288100
WTR YR 1989 TOTAL 300934 MEAN 824 MAX 6200 MIN 75 AC-FT 596900

e Estimated

MARIAS RIVER BASIN

06101300 LAKE ELWELL NEAR CHESTER, MT

LOCATION.--Lat 48°19'06", long 111°05'27", in NW1/4 sec.33, T.30 N., R.5 E., Liberty County, Hydrologic Unit 10030203, in control house of river outlet tunnel at Tiber Dam on Marias River, 15 mi southwest of Chester, and at mile 80.4.

DRAINAGE AREA.--4,923 mi^2, of which 518 mi^2 is probably noncontributing.

PERIOD OF RECORD.--October 1955 to current year (monthend contents only). Daily elevations and contents May to June 1964, published in WSP 1840-B. Prior to October 1975, published as Tiber Reservoir near Chester.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is referenced to National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation). Records of daily elevations on file in Helena district office.

REMARKS.--Reservoir is formed by rolled earthfill dam with concrete spillway chute; construction began in September 1952; completed in March 1956. Storage began Oct. 28, 1955. Usable capacity, 1,347,000 acre-ft between elevation 2,870.00 ft, trashrack sill, and 3,012.50 ft, top of flood control. Dead storage, 21,580 acre-ft below elevation, 2,870.00 ft. Prior to Oct. 1, 1963, usable capacity was 1,313,000 acre-ft and dead storage was 24,000 acre-ft at same elevations. Figures given herein represent usable contents. Water is presently used for recreation and flood control.

COOPERATION.--Elevations and capacity table furnished by U.S. Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents observed, 1,193,000 acre-ft, July 12, 13, 1965, elevation, 3,005.59 ft; minimum observed since normal operation began, 442,100 acre-ft, Apr. 1, 1968, elevation, 2,953.81 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 882,600 acre-ft, June 18, elevation, 2,989.36 ft; minimum, 640,900 acre-ft, Mar. 7, elevation, 2,973.26 ft.

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	2,975.89	676,200	---
Oct. 31	2,974.98	663.800	-12,400
Nov. 30	2,974.52	657,600	-6,200
Dec. 31	2,974.10	652,000	-5,600
CAL YR 1988			-70,000
Jan. 31	2,973.71	646,800	-5,200
Feb. 28	2,973.32	641,700	-5,100
Mar. 31	2,977.62	701,800	+60,100
Apr. 30	2,980.35	739,900	+38,100
May 31	2,985.97	826,700	+86,800
June 30	2,989.16	879,200	+52,500
July 31	2,987.38	849,600	-29,600
Aug. 31	2,985.87	825,100	-24,500
Sept. 30	2,985.37	817,100	-8,000
WTR YR 1989			+140,900

MARIAS RIVER BASIN

06101500 MARIAS RIVER NEAR CHESTER, MT

LOCATION.--Lat 48°18'23", long 111°04'47", in SW1/4SW1/4SW1/4 sec.34, T.30 N., R.5 E., Liberty County, Hydrologic Unit 10030203, on left bank 2.0 mi downstream from Tiber Dam, 4.4 mi upstream from Pondera Coulee, 15 mi southwest of Chester, and at mile 78.3.

DRAINAGE AREA.--4,927 mi^2, of which 518 mi^2 is probably noncontributing.

PERIOD OF RECORD.--April to September 1921, October 1945 to September 1947, October 1955 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1629: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,814.03 ft above National Geodetic Vertical Datum of 1929 (U.S. Bureau of Reclamation bench mark). Prior to Oct. 1, 1921, nonrecording gage at bridge 2.5 mi downstream at different datum. Oct. 4, 1945, to Sept. 30, 1946, nonrecording gage at site 3 mi downstream at different datum.

REMARKS.--No estimated daily discharges. Records good. Flow completely regulated by Lake Elwell since Oct. 28, 1955 (see preceding page). U.S. Bureau of Reclamation satellite telemeter at station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--36 years (1945-47, 1955-89), 839 ft^3/s, 607,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge not determined, occurred about Mar. 20, 1947; maximum discharge since dam completion, 10,400 ft^3/s, June 16, 1964, gage height, 10.63 ft; minimum probably less than 0.2 ft^3/s during period of no gage-height record Oct. 29 to Nov. 10, 1955, when gates at dam were closed.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 1948 reached a stage of 16 ft, present datum.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,250 ft^3/s, June 10, gage height, 5.49 ft; minimum daily, 292 ft^3/s, Mar. 15.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	303	310	310	306	301	296	427	505	1720	1380	1700	778
2	302	310	310	305	302	294	426	504	1720	1380	1520	778
3	307	309	310	305	301	293	427	506	1710	1380	1110	778
4	303	312	310	306	301	293	427	503	1720	1380	861	778
5	301	314	310	305	300	293	428	507	1790	1380	802	588
6	302	312	310	305	297	295	429	501	1990	1380	808	436
7	301	310	310	306	297	295	426	500	1990	1370	812	468
8	301	310	310	306	297	294	425	501	1990	1380	809	517
9	301	310	310	306	297	295	427	502	2130	1380	810	517
10	303	311	310	305	297	298	427	501	2230	828	816	517
11	306	310	310	301	297	293	427	500	2240	664	818	517
12	306	313	309	301	297	293	459	496	2230	669	816	517
13	306	314	308	301	297	294	495	494	2240	674	826	517
14	306	314	306	301	297	293	497	496	2250	675	827	518
15	306	314	309	301	296	292	495	495	2240	676	827	531
16	306	314	306	301	297	294	493	495	2230	672	833	540
17	306	314	306	301	297	294	496	494	2240	665	834	536
18	306	314	306	301	297	293	495	686	2240	819	834	540
19	309	314	305	301	297	293	497	1060	2240	1140	838	707
20	309	310	306	301	296	293	499	1320	2240	1540	840	841
21	310	310	306	301	297	293	500	1420	2170	1720	841	841
22	306	311	306	301	297	338	499	1420	1980	1710	844	844
23	308	310	306	301	295	402	501	1430	1810	1700	848	841
24	306	310	305	301	297	426	501	1430	1700	1700	848	841
25	308	311	305	301	295	424	501	1410	1700	1700	848	855
26	305	310	306	301	296	424	501	1420	1710	1700	855	918
27	310	310	306	301	293	424	505	1410	1710	1700	853	958
28	310	310	306	301	293	424	502	1410	1710	1700	855	958
29	310	310	306	299	---	427	500	1420	1580	1700	818	958
30	310	310	306	299	---	427	504	1590	1380	1700	751	958
31	310	---	305	301	---	427	---	1720	---	1710	778	---
TOTAL	9483	9341	9534	9372	8321	10314	14136	27646	58830	40172	27480	20891
MEAN	306	311	308	302	297	333	471	892	1961	1296	886	696
MAX	310	314	310	306	302	427	505	1720	2250	1720	1700	958
MIN	301	309	305	299	293	292	425	494	1380	664	751	436
AC-FT	18810	18530	18910	18590	16500	20460	28040	54840	116700	79680	54510	41440

CAL YR 1988 TOTAL 165839 MEAN 453 MAX 692 MIN 241 AC-FT 328900
WTR YR 1989 TOTAL 245520 MEAN 673 MAX 2250 MIN 292 AC-FT 487000

MARIAS RIVER BASIN

06108000 TETON RIVER NEAR DUTTON, MT

LOCATION.--Lat 47°55'49", long 111°33'07", in SE1/4SW1/4SW1/4 sec.12, T.25 N., R.1 E., Teton County, Hydrologic Unit 10030205, on right bank 150 ft upstream from Kerr Bridge, 0.9 mi downstream from Hunt Coulee, 9.5 mi northeast of Dutton, and at mile 100.9.

DRAINAGE AREA.--1,307 mi^2. Area at site used prior to July 17, 1965, 1,308 mi^2.

PERIOD OF RECORD.--August 1954 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 3,235 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to July 17, 1965, water-stage recorder at site 1,800 ft downstream at datum 1.97 ft lower.

REMARKS.--Estimated daily discharges: Nov. 13 to Mar. 11, Mar. 16-18, July 16-19. Records good except those for estimated daily discharges, which are poor. Water is diverted on left bank in sec.34, T.25 N., R.7 W., for storage in Bynum Reservoir (usable capacity, 75,000 acre-ft). Diversions for irrigation of about 44,000 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--35 years, 145 ft^3/s, 105,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 71,300 ft^3/s, June 9, 1964, gage height, 20.48 ft, present site and datum, from floodmark, from slope-area measurement of peak flow; no flow at times during 1984, 1985, and 1988.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,570 ft^3/s, Mar. 24, gage height, 5.04 ft; maximum gage height, 6.38 ft, Mar. 10, backwater from ice; minimum discharge, 6.8 ft^3/s, Nov. 12, gage height, 0.74 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	21	e26	e25	e22	e21	357	436	328	79	102	228
2	12	20	e27	e25	e17	e20	295	341	262	68	119	212
3	12	21	e28	e26	e14	e19	251	268	201	64	123	195
4	12	20	e28	e27	e14	e19	209	247	187	59	114	177
5	13	20	e26	e24	e15	e21	180	237	210	52	95	163
6	13	20	e23	e20	e16	e26	159	210	214	47	86	159
7	13	20	e20	e18	e18	e35	151	190	184	43	76	156
8	13	20	e18	e16	e19	e45	147	174	161	38	69	154
9	14	20	e22	e15	e21	e60	141	176	155	31	62	149
10	13	20	e26	e16	e23	e450	141	185	152	32	56	149
11	13	21	e29	e17	e24	e900	130	168	176	40	55	155
12	13	17	e30	e19	e25	860	118	176	445	39	57	168
13	13	e17	e30	e20	e24	527	107	198	609	50	57	167
14	12	e17	e29	e21	e21	278	99	198	417	86	54	157
15	12	e16	e21	e22	e19	250	94	183	320	348	53	147
16	13	e17	e19	e24	e18	e150	87	164	293	e450	63	135
17	14	e18	e22	e25	e17	e120	83	149	270	e270	66	129
18	14	e18	e29	e25	e17	e100	81	135	249	e210	67	137
19	15	e18	e29	e25	e19	117	86	115	214	e160	65	137
20	15	e19	e25	e25	e21	148	82	104	184	151	60	148
21	15	e20	e25	e24	e23	143	75	104	156	139	58	156
22	16	e21	e25	e23	e26	289	70	101	136	134	60	142
23	19	e21	e23	e22	e29	451	73	96	143	125	72	125
24	26	e19	e20	e20	e30	702	79	86	157	114	90	118
25	25	e18	e18	e23	e29	781	88	76	160	104	246	112
26	22	e17	e15	e26	e28	1000	107	73	163	100	510	108
27	22	e15	e17	e28	e26	1170	138	85	173	98	820	103
28	20	e17	e18	e31	e24	1170	190	87	162	111	538	99
29	18	e19	e20	e34	---	943	266	120	136	109	433	102
30	22	e24	e22	e35	---	633	407	270	94	106	337	99
31	22	---	e25	e30	---	457	---	360	---	102	271	---
TOTAL	488	571	735	731	599	11905	4491	5512	6711	3559	4934	4386
MEAN	15.7	19.0	23.7	23.6	21.4	384	150	178	224	115	159	146
MAX	26	24	30	35	30	1170	407	436	609	450	820	228
MIN	12	15	15	15	14	19	70	73	94	31	53	99
AC-FT	968	1130	1460	1450	1190	23610	8910	10930	13310	7060	9790	8700

CAL YR 1988 TOTAL 10434.86 MEAN 28.5 MAX 90 MIN .00 AC-FT 20700
WTR YR 1989 TOTAL 44622 MEAN 122 MAX 1170 MIN 12 AC-FT 88510

e Estimated

MISSOURI RIVER MAIN STEM

06109500 MISSOURI RIVER AT VIRGELLE, MT

LOCATION.--Lat 48°00'18", long 110°15'25", in SW1/4W1/4SE1/4 sec.13, T.26 N., R.11 E., Chouteau County, Hydrologic Unit 10040101, on left bank 0.2 mi upstream from Virgelle ferry, 0.6 mi southwest of Virgelle, 1.8 mi downstream from Spring Coulee, and at mile 2,034.2.

DRAINAGE AREA.--34,379 mi^2.

PERIOD OF RECORD.--February 1935 to current year. Prior to October 1953, published as "at Loma."

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,507.50 ft above National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1953, water-stage recorder at Loma, 18 mi upstream, at datum 2,543.40 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Dec. 26 to Apr. 3, June 15,16. Records good except those for estimated daily discharges, which are fair. Flow regulated by 23 smaller irrigation reservoirs and powerplants, Clark Canyon Reservoir (station number 06015300), Canyon Ferry Lake (station number 06058500), and Lake Elwell (station number 06101300). Diversions for irrigation of about 850,400 acres upstream from station. U.S. Army Corps of Engineers satellite telemeter at station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--54 years, 8,559 ft^3/s, 6,201,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 122,000 ft^3/s, June 5, 1953, gage height, 23.4 ft, from flood-mark, from rating curve for former site at Loma extended above 66,000 ft3/s, adjusted to present site; minimum daily, 638 ft^3/s, July 5, 1936.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1908 reached a stage about 2 ft higher than that of June 5, 1953, from information by local residents.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 16,400 ft^3/s, May 13, gage height, 6.74 ft; maximum gage height, 12.23 ft, Mar. 13, backwater from ice; minimum daily discharge, 2,600 ft^3/s, Dec. 28.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3970	3930	4250	e5400	e4900	e6800	e7000	10900	10700	6510	5640	6030
2	3990	3880	4210	e5200	e4500	e5400	e7200	11400	10700	6450	5690	5670
3	4000	3920	4250	e5000	e3500	e4500	e7000	11200	10400	6310	5720	5450
4	3890	3840	4250	e4900	e4100	e5400	6930	11800	10400	6240	5360	5290
5	3860	3790	4290	e5200	e5000	e4500	6560	13100	10600	6110	5000	5300
6	3840	3940	4260	e5400	e5600	e5600	6450	11300	11600	5980	4780	4900
7	3860	3800	4280	e4900	e6000	e6200	7130	11800	11700	5750	4800	4880
8	3960	3960	4220	e4400	e6400	e6800	7460	12200	11100	5540	4730	4640
9	3940	3730	4120	e4500	e6600	e8000	7650	12700	11600	5470	4470	4500
10	3860	4020	4020	e4400	e6600	e9000	7850	13900	11700	5290	4580	4660
11	3890	4060	4270	e5000	e6600	e11000	7450	14800	11500	5160	4440	4690
12	3770	4000	4410	e5500	e6200	e14000	6990	14800	11700	4680	4630	4940
13	3690	4090	4460	e5500	e5800	e16000	6500	15900	11600	4820	4480	4670
14	3860	4080	4450	e5500	e5700	e13000	6420	14800	11800	5200	4520	5660
15	3820	4160	4160	e5500	e5800	e10000	6550	13500	e11200	6040	4580	4170
16	3970	4760	4010	e4800	e5600	e9000	6540	12500	e10500	5970	4800	4590
17	4060	4870	3880	e4500	e5600	e8000	6780	11800	10200	6190	5130	4910
18	3720	4490	3930	e4700	e5600	e7000	7710	11100	10600	5870	4980	5150
19	3670	4410	4360	e4800	e5400	e5800	8010	11100	10900	5960	4770	5380
20	3750	4210	4310	e4900	e5500	e8000	8130	11800	10200	6070	4730	5170
21	3840	4200	4210	e5000	e5800	e8500	7880	11700	9680	6320	4750	5580
22	3730	4680	4100	e5000	e6400	e9000	8510	11700	9030	6460	4770	5540
23	3920	3550	3820	e5000	e6600	e8400	8950	11200	9050	6470	5160	5050
24	3950	3770	4100	e4800	e7000	e8000	9360	11000	8550	6100	5110	4740
25	3780	3480	3890	e4700	e6500	e8300	9220	10800	7590	5870	5880	5190
26	3920	3890	e3400	e4400	e6000	e8000	9310	10700	7600	5810	6960	5170
27	3760	4120	e2900	e4200	e6000	e7800	9590	10600	7410	5720	8130	5330
28	3790	4010	e2600	e4000	e5900	e7800	10600	10500	7540	5660	7470	5180
29	4100	4080	e3500	e4500	---	e7600	10900	10300	7330	5700	7140	5300
30	4000	3950	e4300	e4500	---	e7400	10900	10700	7100	6030	6770	5440
31	3920	---	e4700	e4600	---	e7200	---	10600	---	5790	6120	---
TOTAL	120080	121670	125910	150700	161200	252000	237530	372200	301580	181540	166090	153170
MEAN	3874	4056	4062	4861	5757	8129	7918	12010	10050	5856	5358	5106
MAX	4100	4870	4700	5500	7000	16000	10900	15900	11800	6510	8130	6030
MIN	3670	3480	2600	4000	3500	4500	6420	10300	7100	4680	4440	4170
AC-FT	238200	241300	249700	298900	319700	499800	471100	738300	598200	360100	329400	303800

CAL YR 1988 TOTAL 1761070 MEAN 4812 MAX 8380 MIN 2600 AC-FT 3493000
WTR YR 1989 TOTAL 2343670 MEAN 6421 MAX 16000 MIN 2600 AC-FT 4649000

e Estimated

MISSOURI RIVER MAIN STEM

06115200 MISSOURI RIVER NEAR LANDUSKY, MT

(National stream quality accounting network station)

LOCATION.--Lat 47°37'51", long 108°41'13", in NW1/4NE1/4 sec.31, T.22 N., R.24 E., Fergus County, Hydrologic Unit 10040104, Fort Peck Game Range, on right bank 380 ft upstream from bridge on U.S. Highway 191, 0.9 mi upstream from Armells Creek, 20 mi south of Landusky, and at mile 1,921.61.

DRAINAGE AREA.--40,987 mi^2. Area at site used prior to Dec. 13, 1968, 40,763 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--February 1934 to current year. Prior to October 1968, published as "at powerplant ferry, near Zortman."

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,239.96 ft above National Geodetic Vertical Datum of 1929 (State Highway bench mark). Prior to Feb. 7, 1935, nonrecording gage, and Feb. 7, 1935, to Dec. 12, 1968, water-stage recorder, at site 16.5 mi upstream at datum 33.06 ft higher.

REMARKS.--Estimated daily discharges: Nov. 18 to Mar. 28, July 6-21, July 27 to Aug. 8. Water-discharge records good except those for July 6-21 and July 27 to Aug. 8, which are fair, and those for Nov. 18 to Mar. 28, which are poor. Flow regulated by 24 smaller irrigation reservoirs and powerplants, Clark Canyon Reservoir (station number 06015300), Canyon Ferry Lake (station number 06058500), and Lake Elwell (station number 06101300). Diversions for irrigation of about 870,400 acres upstream from station. U. S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--55 years, 9,303 ft^3/s, 6,740,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 137,000 ft^3/s, June 6, 1953, gage height 22.20 ft, from graph based on gage readings, site and datum then in use; maximum gage height, 30.16 ft, Mar. 19, 1947 (ice jam), from floodmark, site and datum then in use; maximum gage height, present site and datum, 34.17 ft, Mar. 26, 1978, (ice jam), from floodmark; minimum discharge, 1,120 ft^3/s, July 8, 1936, gage height, 1.92 ft, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 19,400 ft^3/s, May 14, gage height, 19.58 ft; maximum gage height, 25.25 ft, from highwater mark, result of Mar. 27 ice jam; minimum daily discharge, 3,000 ft^3/s, Dec. 28, Jan. 1.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4520	4120	e4600	e3000	e6500	e6000	11000	12200	11400	7800	e6100	7460
2	4240	4240	e4500	e4000	e6000	e6000	9700	12200	11700	7200	e5900	7050
3	4240	4200	e4500	e5400	e5500	e6000	9080	12400	12000	6900	e5800	6630
4	4250	4150	e4600	e5800	e5500	e5500	8280	12300	11400	6710	e5800	6430
5	4250	4120	e4600	e6000	e5700	e5000	7670	12800	11300	6680	e5800	6150
6	4190	4130	e4600	e5600	e6000	e6000	7170	14400	11000	e6500	e5400	6100
7	4150	4010	e4500	e5200	e6000	e7000	6930	12700	11900	e6300	e5300	5900
8	4150	4150	e4500	e4500	e6000	e7000	7370	12700	12400	e6100	e5200	5620
9	4200	4110	e4400	e4500	e6000	e8000	7900	13300	11700	e6000	4960	5360
10	4250	4090	e4300	e4700	e6400	e10000	8010	13900	12100	e5800	4940	5310
11	4170	4340	e4600	e5200	e7000	e10000	8030	15300	12400	e5700	5000	5330
12	4320	4280	e4700	e5800	e7500	e9500	7970	16300	12200	e5200	4890	5310
13	3990	4410	e4700	e5800	e7000	e9000	7440	16800	12300	e5300	4910	5490
14	4030	4420	e4700	e5800	e6500	e8500	7000	18400	12300	e5800	4800	5550
15	4020	4480	e4500	e5500	e6000	e8000	6840	17100	12800	e6200	4700	5770
16	4110	4520	e4300	e6000	e6000	e7500	6790	16000	13200	e6400	4880	5710
17	4540	4690	e4200	e6500	e5800	e7000	6910	14500	11800	e6500	5030	4860
18	4330	e4700	e4300	e7000	e5800	e7500	7080	13500	11000	e6400	5320	5390
19	4330	e4500	e4200	e6800	e5600	e8000	7700	12600	11400	e6400	5470	5620
20	3970	e4500	e4200	e6500	e5600	e8500	8170	12100	11700	e6400	5350	5840
21	4020	e4500	e4200	e7000	e6000	e9000	8330	12800	10900	e6500	5260	5820
22	4010	e4800	e4000	e6800	e6600	e9500	8210	12700	10500	6830	5290	5980
23	4100	e5000	e3700	e6700	e7000	e10000	8760	12600	9840	7170	5310	5890
24	4110	e4800	e3700	e6600	e8000	e10500	9340	11900	9620	7250	5690	6120
25	4170	e4500	e3500	e6500	e8000	e11000	9920	11500	9710	6720	7310	5150
26	4180	e4000	e3400	e6800	e7500	e12000	9820	11500	8180	6440	6360	5510
27	4130	e3500	e3100	e7000	e7000	e13000	11200	11200	8650	e6200	7400	5660
28	4100	e4500	e3000	e7000	e6500	e14000	11900	11100	8210	e6100	8690	5760
29	4080	e4500	e3600	e6600	---	15300	12600	11200	8300	e6100	8700	5710
30	4080	e4500	e3600	e7400	---	15100	12500	11600	8030	e6100	8430	5640
31	4740	---	e3600	e7000	---	13300	---	11500	---	e6100	7910	---
TOTAL	129970	130760	128900	185000	179000	282700	259620	411100	329940	197800	181900	174120
MEAN	4193	4359	4158	5968	6393	9119	8654	13260	11000	6381	5868	5804
MAX	4740	5000	4700	7400	8000	15300	12600	18400	13200	7800	8700	7460
MIN	3970	3500	3000	3000	5500	5000	6790	11100	8030	5200	4700	4860
AC-FT	257800	259400	255700	366900	355000	560700	515000	815400	654400	392300	360800	345400

CAL YR 1988 TOTAL 1929550 MEAN 5272 MAX 9830 MIN 3000 AC-FT 3827000
WTR YR 1989 TOTAL 2590810 MEAN 7098 MAX 18400 MIN 3000 AC-FT 5139000

e Estimated

MISSOURI RIVER MAIN STEM

06115200 MISSOURI RIVER NEAR NEAR LANDUSKY, MT--Continued
(National stream quality accounting network station)

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: March 1979 to September 1981.
WATER TEMPERATURE: March to September 1979.
SUSPENDED-SEDIMENT DISCHARGE: October 1971 to current year

REMARKS.--Unpublished records of once-daily water temperature are available in files of the District office. Prior to July 1972, sampling and record computations were under supervision of Corps of Engineers, U.S. Army. Sediment loads estimated for several days during winter period. Flow affected by ice during most of winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1979-81): Maximum daily, 1,240 microsiemens, June 20, 1979; minimum daily, 410 microsiemens, July 3, 1980.
WATER TEMPERATURE (water year 1979): Maximum, 24.0°C, on several days during June to August 1979; minimum, 0.5°C, on several days during March 1979.
SEDIMENT CONCENTRATION : Maximum daily mean, 27,400 mg/L, June 22, 1976; minimum daily mean, 2 mg/L, Dec. 21, 1983.
SEDIMENT LOAD : Maximum daily, 1,680,000 tons, June 22, 1976; minimum daily, 33 tons, Dec. 21, 1983.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATION: Maximum daily mean, 8,200 mg/L, Aug. 25; minimum daily mean, 29 mg/L, Jan. 25, 28.
SEDIMENT LOAD: Maximum daily, 235,000 tons, Mar. 28; minimum daily, 316 tons, Jan. 1.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)
OCT								
26...	1500	4240	90	2	500	16.0	9.0	698
JAN								
25...	1300	6460	0	0	485	-6.0	0.0	714
MAR								
29...	1200	15200	--	--	--	--	1.0	--
APR								
04...	1300	8240	0	0	610	8.0	6.0	714
MAY								
23...	1200	12300	0	0	495	25.0	16.5	699
JUL								
21...	1145	6250	80	1	530	29.0	23.5	704
AUG								
22...	1145	5280	10	1	--	31.0	21.5	--
SEP								
21...	0900	5870	0	0	495	11.0	16.0	714

DATE	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)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
OCT							
26...	10.2	97	<1	<1	157	7	139
JAN							
25...	12.0	88	<1	<1	180	0	146
MAR							
29...	--	--	--	--	--	--	--
APR							
04...	8.8	76	--	--	187	0	154
MAY							
23...	8.2	92	<1	K9	173	0	142
JUL							
21...	7.3	93	<1	K12	148	13	144
AUG							
22...	--	--	--	--	--	--	--
SEP							
21...	8.6	93	K6	K21	--	--	--

MISSOURI RIVER MAIN STEM

06115200 MISSOURI RIVER NEAR NEAR LANDUSKY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	PH (STAND-ARD UNITS) (00400)	TUR-BID-ITY (NTU) (00076)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)
OCT 26...	1500	8.8	16	220	82	52	22	28	0.8
JAN 25...	1300	8.2	5.4	190	48	48	18	26	0.8
APR 04...	1300	8.3	340	250	92	57	25	41	1
MAY 23...	1200	8.2	36	190	50	47	18	25	0.8
JUL 21...	1145	8.6	140	220	75	51	22	30	0.9
SEP 21...	0900	8.4	36	220	62	50	22	30	0.9

DATE	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)
OCT 26...	3.3	157	96	9.7	0.80	7.0	310	303	0.42
JAN 25...	3.5	156	77	10	0.80	11	292	283	0.40
APR 04...	4.8	155	150	9.6	0.70	15	400	399	0.54
MAY 23...	2.7	151	85	7.2	0.70	10	293	281	0.40
JUL 21...	3.5	160	110	8.7	0.90	11	362	325	0.49
SEP 21...	2.7	154	110	8.4	0.70	6.5	326	323	0.44

DATE	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 + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHOROUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
OCT 26...	3550	<0.010	<0.100	0.050	0.050	0.30	0.020	0.010	<0.010
JAN 25...	5090	0.010	0.320	0.110	0.090	0.40	0.030	0.020	0.040
APR 04...	8900	0.020	0.690	0.110	0.120	0.40	0.050	0.040	0.020
MAY 23...	9730	<0.010	0.130	0.020	0.020	0.40	0.030	0.010	<0.010
JUL 21...	6110	<0.010	0.150	0.040	0.020	0.70	0.100	<0.010	<0.010
SEP 21...	5170	<0.010	<0.100	0.010	<0.010	0.40	0.050	<0.010	<0.010

DATE	TIME	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)
OCT 26...	1500	<10	13	52	<0.5	1	<1	<3	<1	20	<5
APR 04...	1300	100	11	46	<0.5	<1	<1	<3	2	89	<5
JUL 21...	1145	20	11	53	<0.5	<1	1	<3	3	10	<1
SEP 21...	0900	10	10	52	<0.5	<1	<1	<3	1	<3	<1

MISSOURI RIVER MAIN STEM

06115200 MISSOURI RIVER NEAR NEAR LANDUSKY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

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)	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										
26...	59	<1	0.1	<10	2	<1	<1.0	500	<6	17
APR										
04...	55	9	0.1	<10	<1	2	<1.0	500	<6	7
JUL										
21...	55	5	0.2	<10	2	<1	<1.0	470	<6	5
SEP										
21...	56	1	<0.1	<10	2	<1	<1.0	490	<6	<3

DATE	TIME	TEMPER-ATURE WATER (DEG C) (00010)	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .002 MM (70337)	SED. SUSP. FALL DIAM. % FINER THAN .004 MM (70338)
OCT							
26...	1500	9.0	4240	89	1020	--	--
JAN							
25...	1300	0.0	6460	28	488	--	--
MAR							
29...	1200	1.0	15200	3160	130000	28	49
MAY							
23...	1200	16.5	12300	318	10600	--	--
JUL							
21...	1145	23.5	6250	372	6280	--	--
AUG							
22...	1145	21.5	5280	88	1250	--	--
SEP							
21...	0900	16.0	5870	153	2420	--	--

DATE	SED. SUSP. FALL DIAM. % FINER THAN .008 MM (70339)	SED. SUSP. FALL DIAM. % FINER THAN .016 MM (70340)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343)	SED. SUSP. FALL DIAM. % FINER THAN .250 MM (70344)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT						
26...	--	--	--	--	--	67
JAN						
25...	--	--	--	--	--	48
MAR						
29...	58	67	89	97	100	--
MAY						
23...	--	--	--	--	--	50
JUL						
21...	--	--	--	--	--	84
AUG						
22...	--	--	--	--	--	64
SEP						
21...	--	--	--	--	--	58

DATE	TIME	BED MAT. FALL DIAM. % FINER THAN .004 MM (80157)	BED MAT. FALL DIAM. % FINER THAN .062 MM (80158)	BED MAT. FALL DIAM. % FINER THAN .125 MM (80159)	BED MAT. FALL DIAM. % FINER THAN .250 MM (80160)	BED MAT. SIEVE DIAM. % FINER THAN .062 MM (80164)	BED MAT. SIEVE DIAM. % FINER THAN .125 MM (80165)	BED MAT. SIEVE DIAM. % FINER THAN .250 MM (80166)	BED MAT. SIEVE DIAM. % FINER THAN .500 MM (80167)	BED MAT. SIEVE DIAM. % FINER THAN 1.00 MM (80168)	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM (80169)	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM (80170)
OCT												
26...	1500	20	--	--	--	66	92	99	100	--	--	--
MAY												
23...	1200	22	82	99	100	--	--	--	--	--	--	--
JUL												
21...	1145	7	--	--	--	31	60	76	99	100	--	--
SEP												
21...	0900	--	--	--	--	0.3	2	45	83	96	98	100

MISSOURI RIVER MAIN STEM

06115200 MISSOURI RIVER NEAR NEAR LANDUSKY, MT--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	120	1460	71	790	33	410	39	316	270	4740	58	940
2	60	687	68	778	31	377	47	508	121	1960	56	907
3	66	756	53	601	30	364	68	991	49	728	57	923
4	55	631	57	639	31	385	101	1580	46	683	58	861
5	68	780	60	667	32	397	98	1590	69	1060	47	634
6	71	803	59	658	35	435	79	1190	97	1570	77	1250
7	76	852	53	574	39	474	64	899	125	2030	250	4720
8	83	930	43	482	43	522	54	656	131	2120	500	9450
9	85	964	37	411	47	558	50	607	130	2110	950	20500
10	78	895	53	585	51	592	50	634	129	2230	3700	99900
11	69	777	100	1170	55	683	53	744	127	2400	7280	197000
12	62	723	74	855	61	774	57	893	122	2470	5810	149000
13	64	689	63	750	66	838	60	940	113	2140	4150	101000
14	69	751	62	740	73	926	56	877	97	1700	2700	62000
15	70	760	60	726	79	960	44	653	70	1130	1700	36700
16	80	888	66	805	87	1010	34	551	51	826	920	18600
17	999	12200	78	988	99	1120	32	562	49	767	600	11300
18	942	11000	95	1210	117	1360	42	794	52	814	650	13200
19	628	7340	101	1230	127	1440	52	955	55	832	680	14700
20	147	1580	78	948	89	1010	56	983	60	907	700	16100
21	82	890	55	668	51	578	54	1020	66	1070	800	19400
22	58	628	52	674	35	378	47	863	76	1350	920	23600
23	63	697	60	810	41	410	38	687	89	1680	1300	35100
24	69	766	75	972	53	529	30	535	99	2140	1750	49600
25	80	901	90	1090	63	595	29	509	101	2180	1990	59100
26	83	937	105	1130	66	606	30	551	89	1800	2580	83600
27	66	736	112	1060	65	544	30	567	73	1380	5360	188000
28	66	731	85	1030	68	551	29	548	62	1090	6230	235000
29	66	727	55	668	96	933	44	784	---	---	3500	145000
30	68	749	37	450	70	680	218	4360	---	---	3200	130000
31	91	1160	---	---	37	360	342	6460	---	---	2890	104000
TOTAL	---	54388	---	24159	---	20799	---	33807	---	45907	---	1832085
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2270	67400	1020	33600	325	10000	265	5580	179	2950	343	6910
2	1900	49800	720	23700	375	11800	260	5050	184	2930	210	4000
3	1470	36000	690	23100	5190	168000	290	5400	176	2760	185	3310
4	1080	24100	620	20600	2490	76600	240	4350	130	2040	240	4170
5	777	16100	360	12400	656	20000	210	3790	83	1300	185	3070
6	440	8520	705	27400	465	13800	190	3330	68	991	176	2900
7	256	4790	625	21400	290	9320	250	4250	64	916	151	2410
8	261	5190	582	20000	350	11700	360	5930	72	1010	93	1410
9	296	6310	355	12700	415	13100	370	5990	108	1450	100	1450
10	363	7850	450	16900	390	12700	160	2510	96	1280	128	1840
11	203	4400	308	12700	550	18400	125	1920	59	796	127	1830
12	240	5160	798	35100	480	15800	125	1760	82	1080	128	1840
13	280	5620	628	28500	145	4820	135	1930	101	1340	155	2300
14	250	4720	990	49200	100	3320	230	3600	85	1100	99	1480
15	316	5840	862	39800	285	9850	615	10300	69	876	73	1140
16	252	4620	705	30500	1410	50300	1520	26300	78	1030	85	1310
17	219	4090	645	25300	3000	95600	1310	23000	76	1030	46	604
18	249	4760	662	24100	1700	50500	550	9500	100	1440	79	1150
19	188	3910	510	17400	880	27100	245	4230	151	2230	133	2020
20	327	7210	492	16100	490	15500	240	4150	135	1950	168	2650
21	336	7560	240	8290	360	10600	400	7020	124	1760	157	2470
22	337	7470	297	10200	340	9640	290	5350	94	1340	168	2710
23	451	10700	328	11200	660	17500	167	3230	67	961	153	2430
24	637	16100	435	14000	460	11900	148	2900	1000	15400	125	2070
25	505	13500	432	13400	525	13800	111	2010	8200	162000	48	667
26	430	11400	445	13800	180	3980	80	1390	2500	42900	36	536
27	4330	131000	400	12100	400	9340	106	1770	800	16000	58	886
28	5520	177000	378	11300	1550	34400	157	2590	1780	41800	78	1210
29	3920	133000	1050	31800	810	18200	188	3100	842	19800	99	1530
30	1750	59100	2800	87700	340	7370	189	3110	535	12200	222	3380
31	---	---	1470	45600	---	---	181	2980	458	9780	---	---
TOTAL	---	843220	---	749890	---	774940	---	168320	---	354440	---	65683

TOTAL LOAD FOR YEAR: 4967638 TONS

MUSSELSHELL RIVER BASIN

06120500 MUSSELSHELL RIVER AT HARLOWTON, MT

LOCATION.--Lat 46°25'48", long 109°50'24", in NE1/4 sec.28, T.8 N., R.15 E., Wheatland County, Hydrologic Unit 10040201, on left bank 350 ft downstream from bridge on U.S. Highway 191, 1.0 mi southwest of Harlowton, 6 mi upstream from American Fork, and at mile 327.8.

DRAINAGE AREA.--1,125 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1907 to November 1929, March 1930 to December 1932, April to August 1933, February 1934 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1309: 1912, 1915(M), 1918, 1925. WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 4,171.46 ft above National Geodetic Vertical Datum of 1929 (levels by Morrison and Maierle, Inc.). Prior to Dec. 8, 1937, nonrecording gages at site 1.2 mi downstream at different datums. Dec. 8, 1937, to Aug. 26, 1955, nonrecording gage at bridge 300 ft upstream at different datums.

REMARKS.--Estimated daily discharges: Nov. 13 to Mar. 28. Records fair except those for estimated daily discharges, which are poor. Some regulation by Bair and Martinsdale Reservoirs. Diversions for irrigation of about 30,100 acres upstream from station of which about 2,300 acres is flood irrigated.

AVERAGE DISCHARGE.--79 years (water years 1908-29, 1931-32, 1935-89), 160 ft^3/s, 115,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 7,270 ft^3/s, June 20, 1975, gage height, 10.01 ft; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 428 ft^3/s, May 13, gage height, 3.53 ft; maximum gage height, 3.73 ft, Mar. 12, backwater from ice; minimum discharge, 2.0 ft^3/s, Oct. 1.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.3	16	e27	e15	e10	e15	57	73	27	84	105	46
2	2.5	18	e22	e20	e8.0	e15	50	70	23	75	105	44
3	2.5	21	e23	e25	e10	e14	41	68	28	67	99	38
4	2.9	19	e23	e30	e15	e12	32	51	74	60	79	34
5	3.2	21	e25	e29	e18	e20	31	45	77	51	69	30
6	3.3	26	e25	e25	e20	e35	32	39	68	48	68	29
7	3.4	27	e22	e20	e20	e50	36	35	73	50	74	27
8	3.4	26	e20	e13	e22	e60	64	51	99	59	78	27
9	3.4	27	e23	e20	e25	e70	60	144	102	62	75	37
10	3.6	27	e23	e25	e27	e90	41	207	107	69	68	51
11	3.5	27	e29	e25	e27	e100	34	233	139	82	62	56
12	3.6	24	e27	e24	e24	e110	34	347	147	73	53	55
13	4.5	e23	e23	e22	e21	e100	32	406	140	80	37	54
14	4.3	e23	e20	e22	e20	e94	33	290	112	131	37	59
15	4.4	e21	e18	e21	e20	e80	34	207	101	118	59	45
16	4.9	e21	e21	e24	e18	e70	38	213	100	92	55	50
17	7.4	e22	e25	e27	e15	e60	56	257	127	78	49	45
18	7.5	e22	e28	e28	e17	e70	57	216	128	61	44	55
19	7.4	e23	e25	e28	e20	e76	51	194	125	47	42	60
20	9.0	e24	e25	e30	e23	e66	45	160	136	38	36	57
21	8.6	e25	e23	e23	e25	e74	33	96	183	58	33	55
22	9.2	e28	e22	e19	e25	e80	32	62	174	92	31	50
23	10	e25	e20	e16	e25	e80	53	42	150	91	30	45
24	10	e24	e17	e15	e30	e70	75	26	153	93	40	43
25	11	e22	e14	e18	e30	e80	89	23	154	89	70	43
26	11	e19	e13	e22	e30	e90	91	20	167	81	60	38
27	11	e18	e14	e25	e25	e90	94	14	149	79	50	32
28	11	e22	e15	e25	e20	e82	107	12	109	84	61	35
29	11	e22	e17	e28	---	75	97	30	96	98	65	30
30	12	e25	e19	e32	---	68	82	48	93	105	49	31
31	13	---	e17	e15	---	62	---	40	---	108	51	---
TOTAL	204.8	688	665	711	590.0	2058	1611	3719	3361	2403	1834	1301
MEAN	6.61	22.9	21.5	22.9	21.1	66.4	53.7	120	112	77.5	59.2	43.4
MAX	13	28	29	32	30	110	107	406	183	131	105	60
MIN	2.3	16	13	13	8.0	12	31	12	23	38	30	27
AC-FT	406	1360	1320	1410	1170	4080	3200	7380	6670	4770	3640	2580

CAL YR 1988 TOTAL 11332.75 MEAN 31.0 MAX 170 MIN .00 AC-FT 22480
WTR YR 1989 TOTAL 19145.8 MEAN 52.5 MAX 406 MIN 2.3 AC-FT 37980

e Estimated

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1988 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
NOV							
09...	1100	27	80	1	1240	7.0	3.5
DEC							
30...	1155	18	--	--	745	-3.5	0.5
FEB							
13...	1040	20	--	--	1010	-4.0	0.0
MAR							
24...	1200	76	40	1	930	10.0	1.0
MAY							
11...	0842	204	--	--	497	18.5	12.5
15...	0940	205	100	51	710	11.5	10.0
JUN							
29...	0825	96	5	0	919	17.0	16.0
JUL							
27...	0930	78	90	2	920	24.5	20.5
AUG							
16...	1010	61	--	--	1060	17.0	17.0
SEP							
21...	0940	56	0	0	1070	10.0	10.0

DATE	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
NOV						
09...	655	11.5	101	312	2	259
MAR						
24...	649	11.8	98	252	0	207
MAY						
15...	656	8.8	91	--	--	--
JUN						
29...	658	8.0	94	--	--	--
JUL						
27...	659	7.8	101	253	0	202
SEP						
21...	661	9.2	94	293	0	237

DATE	TIME	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
NOV										
09...	1100	8.5	490	230	110	53	95	2	3.0	259
MAR										
24...	1200	8.1	370	160	88	36	64	1	3.1	213
MAY										
15...	0940	8.0	710	530	120	100	280	5	6.1	178
JUN										
29...	0825	8.0	370	150	89	37	61	1	2.5	229
JUL										
27...	0930	8.0	340	140	80	34	61	1	3.0	207
SEP										
21...	0940	8.0	430	200	99	45	76	2	3.2	219

MUSSELSHELL RIVER BASIN

06120500 MUSSELSHELL RIVER AT HARLOWTON, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

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, 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 TOTAL (MG/L AS N) (00615)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
NOV										
09...	430	8.3	0.40	9.5	865	1.18	63.0	<0.010	<0.100	0.030
MAR										
24...	290	7.0	0.30	8.7	621	0.84	127	<0.010	<0.100	0.080
MAY										
15...	1000	23	0.40	4.7	1640	2.23	908	<0.010	<0.100	0.050
JUN										
29...	260	5.8	0.30	4.6	598	0.81	155	<0.010	<0.100	0.010
JUL										
27...	270	5.9	0.40	9.3	585	0.80	123	<0.010	<0.100	<0.010
SEP										
21...	350	6.9	0.40	7.3	730	0.99	110	<0.010	<0.100	0.020

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	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									
09...	0.17	0.20	0.010	0.010	130	7	36	2.6	61
MAR									
24...	0.32	0.40	0.020	<0.010	70	17	66	14	73
MAY									
15...	0.65	0.70	0.020	<0.010	240	8	93	51	81
JUN									
29...	0.29	0.30	0.010	<0.010	110	20	54	14	58
JUL									
27...	--	1.0	0.020	0.010	110	17	48	10	76
SEP									
21...	0.28	0.30	<0.010	<0.010	120	10	35	5.3	74

DATE	TIME	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)	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, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)
JUN												
29...	0825	1	--	<10	--	<1	--	1	--	4	--	80
JUL												
27...	0930	<1	1	--	<0.5	--	<1	--	2	--	3	--

DATE	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	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)
JUN											
29...	<1	--	40	--	<0.10	3	--	<1	--	<10	--
JUL											
27...	--	1	--	21	<0.10	--	2	<1	<1	--	13

06120500 MUSSELSHELL RIVER AT HARLOWTON, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	ALDRIN, TOTAL (UG/L) (39330)	CHLORDANE, TOTAL (UG/L) (39350)	DDD, TOTAL (UG/L) (39360)	DDE, TOTAL (UG/L) (39365)	DDT, TOTAL (UG/L) (39370)	DIAZINON, TOTAL (UG/L) (39570)	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L) (82052)	DIELDRIN TOTAL (UG/L) (39380)	ENDOSULFAN, TOTAL (UG/L) (39388)	ENDRIN, TOTAL (UG/L) (39390)
JUN											
29...	0825	<0.010	<0.1	<0.010	<0.010	<0.010	<0.01	<0.01	<0.010	<0.010	<0.010
JUL											
27...	0930	<0.010	<0.1	<0.010	<0.010	<0.010	<0.01	<0.01	<0.010	<0.010	<0.010

DATE	ETHION, TOTAL (UG/L) (39398)	HEPTACHLOR, TOTAL (UG/L) (39410)	HEPTACHLOR EPOXIDE TOTAL (UG/L) (39420)	LINDANE TOTAL (UG/L) (39340)	MALATHION, TOTAL (UG/L) (39530)	METHOXYCHLOR, TOTAL (UG/L) (39480)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL TRITHION, TOTAL (UG/L) (39790)	MIREX, TOTAL (UG/L) (39755)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L) (39250)
JUN										
29...	<0.01	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10
JUL										
27...	<0.01	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10

DATE	PARATHION, TOTAL (UG/L) (39540)	PCB, TOTAL (UG/L) (39516)	PERTHANE TOTAL (UG/L) (39034)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L) (39720)	SILVEX, TOTAL (UG/L) (39760)	TOXAPHENE, TOTAL (UG/L) (39400)	TOTAL TRITHION (UG/L) (39786)	2,4-D, TOTAL (UG/L) (39730)	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)
JUN										
29...	<0.01	<0.1	<0.1	0.03	<0.01	<1	<0.01	<0.01	<0.01	<0.01
JUL										
27...	<0.01	<0.1	<0.1	<0.01	<0.01	<1	<0.01	<0.01	<0.01	<0.01

MUSSELSHELL RIVER BASIN

06122800 MUSSELSHELL RIVER NEAR SHAWMUT, MT

LOCATION.--Lat 46°21'02", long 109°33'18", in NE1/4NW1/4SE1/4 sec. 23, T.7 S., R.17 E., Wheatland County, Hydrologic Unit 10040201, on left bank 1.6 mi west of Shawmut, 3.2 mi upstream from county bridge located 0.5 mi south of Shawmut, 4.8 mi downstream from diversion to Deadman's Basin Reservoir, and at mile 304.1.

DRAINAGE AREA.--1,479 mi^2.

PERIOD OF RECORD.--March 1986 to current season (seasonal records only).

GAGE.--Water-stage recorder. Elevation of gage is 3,880 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--No estimated daily discharges. Seasonal records fair. Diversions for irrigation of about 40,000 acres upstream from station of which about 29,000 acres is downstream from station. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 691 ft^3/s, June 9, 1986, gage height, 4.09 ft, from rating curve extended above 53 ft^3/s; minimum daily, 0.04 ft^3/s, Sept. 28-30, 1988.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 112 ft^3/s, July 1, gage height, 1.94 ft; minimum daily, 0.06 ft^3/s, Oct. 1.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.06						36	3.4	30	105	19	33
2	.10						10	3.0	28	94	16	25
3	.08						11	3.0	26	75	12	23
4	.08						11	2.6	28	58	11	21
5	.08						10	2.6	34	48	10	19
6	.10						9.7	2.2	35	39	10	17
7	.10						4.9	2.2	34	27	9.6	16
8	.10						3.3	2.4	37	13	10	16
9	.11						3.1	2.5	40	16	13	16
10	.10						2.8	2.3	40	21	13	17
11	.10						2.5	3.5	44	18	13	18
12	.10						2.1	14	47	13	13	19
13	.11						2.1	73	43	12	14	18
14	.10						2.0	74	41	17	15	18
15	.12						1.8	21	38	62	14	10
16	.17						2.0	6.8	34	46	16	5.9
17	.17						2.4	8.3	36	32	17	5.1
18	.16						2.5	15	37	20	19	4.9
19	.16						2.2	6.8	37	13	18	4.3
20	.14						2.1	3.7	38	11	18	4.2
21	.13						2.1	2.7	50	10	17	8.6
22	.13						1.8	3.8	60	12	17	50
23	.16						1.8	18	51	17	17	53
24	.16						1.9	15	47	20	23	55
25	.19						2.2	13	49	22	25	53
26	.19						2.7	12	51	13	34	51
27	.19						4.3	14	43	15	30	46
28	.18						4.9	14	18	22	29	44
29	.16						4.3	18	14	17	30	45
30	.21						3.7	25	62	18	29	38
31	.23							31		22	42	
TOTAL	4.17						153.2	418.8	1172	928	573.6	754.0
MEAN	.13						5.11	13.5	39.1	29.9	18.5	25.1
MAX	.23						36	74	62	105	42	55
MIN	.06						1.8	2.2	14	10	9.6	4.2
AC-FT	8.3						304	831	2320	1840	1140	1500

MUSSELSHELL RIVER BASIN

06126470 HALFBREED CREEK NEAR KLEIN, MT

LOCATION.--Lat 46°23'14", long 108°32'29", in SW1/4NE1/4SW1/4 sec.1, T.7 N., R.25 E., Musselshell County, Hydrologic Unit 10040201, on left bank, 800 ft upstream from private road bridge, 1.2 mi south of Klein, 3.2 mi upstream from mouth, and 4.1 mi south of Roundup.

DRAINAGE AREA.--53.2 mi^2.

PERIOD OF RECORD.--October 1977 to September 1986, July 1987 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 3,330 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Dec. 24 to Jan. 3, Jan. 6-15, 23-28, Feb. 1-20, Mar. 1-6. Records fair except those for estimated daily discharges, which are poor. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--11 years (water years, 1978-86, 1987-89), 0.98 ft^3/s, 710 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 630 ft^3/s, July 16, 1986, gage height, 8.69 ft, from floodmark, from rating curve extended above 345 ft^3/s based on extension of 1978 slope-area data; no flow Feb. 2-14, 1985.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 5.0 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage Height (ft)	Date	Time	Discharge (ft^3/s)	Gage Height (ft)
Mar. 10	2030	9.5	4.59	Mar. 12	2330	*9.9	*4.60

Minimum discharge, 0.03 ft^3/s, Aug. 14-19.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.23	.33	.17	e.21	e.50	e.45	.84	1.1	.88	.23	.04	.15
2	.19	.33	.17	e.22	e.20	e.43	.74	.83	1.0	.20	.05	.15
3	.20	.33	.17	e.23	e.10	e.45	.65	.91	1.0	.20	.04	.15
4	.21	.30	.17	.26	e.12	e.40	.61	.94	.84	.19	.05	.15
5	.33	.26	.19	.26	e.14	e.50	.73	.87	.69	.16	.06	.15
6	.48	.26	.20	e.24	e.16	e.70	.88	.79	.60	.14	.07	.15
7	.54	.25	.20	e.21	e.18	.98	.90	.85	.54	.13	.08	.15
8	.57	.23	.19	e.18	e.15	1.4	.82	1.1	.50	.10	.09	.12
9	.61	.23	.20	e.21	e.18	4.3	.81	1.1	.46	.11	.11	.12
10	.63	.23	.20	e.22	e.21	5.9	.74	1.0	.46	.19	.13	.18
11	.65	.23	.20	e.22	e.23	6.0	.73	.94	.46	.26	.10	.20
12	.70	.22	.25	e.21	e.24	4.6	.68	1.1	.51	.26	.09	.21
13	.76	.23	.26	e.23	e.27	7.9	.67	1.4	.64	.24	.09	.22
14	.76	.25	.25	e.25	e.30	.96	.67	1.3	.54	.26	.05	.20
15	.79	.23	.21	e.28	e.30	.76	.71	1.1	.50	.26	.03	.17
16	.84	.18	.21	.30	e.27	.73	.73	1.1	.51	.25	.03	.17
17	.99	.17	.23	.31	e.25	.72	.77	1.1	.58	.23	.04	.17
18	.86	.15	.24	.31	e.27	.69	.85	1.0	.63	.18	.03	.17
19	.80	.16	.26	.33	e.28	.67	.77	.99	.49	.14	.04	.17
20	.71	.17	.26	.29	e.31	.68	.73	.86	.43	.11	.05	.17
21	.59	.16	.25	.29	.33	.69	.67	.79	.70	.09	.07	.17
22	.61	.15	.25	.28	.36	1.0	.67	.79	.78	.09	.08	.17
23	.61	.17	.23	e.25	.42	1.8	.67	.73	.82	.07	.08	.17
24	.61	.22	e.23	e.22	.53	2.3	.67	.72	.63	.09	.06	.17
25	.61	.20	e.21	e.21	.65	2.4	.67	.67	.50	.12	.09	.17
26	.62	.19	e.19	e.23	.62	2.8	.92	.67	.46	.08	.08	.17
27	.66	.15	e.21	e.24	.66	1.8	1.3	.67	.42	.07	.09	.17
28	.56	.19	e.23	e.23	.56	1.4	1.7	.68	.38	.07	.12	.19
29	.55	.17	e.25	.25	---	1.0	2.0	1.3	.32	.06	.10	.20
30	.44	.17	e.26	1.3	---	1.0	1.8	1.3	.25	.05	.12	.22
31	.33	---	e.25	1.6	---	1.0	---	.96	---	.04	.32	---
TOTAL	18.04	6.51	6.79	10.07	8.79	56.41	26.10	29.66	17.52	4.67	2.48	5.12
MEAN	.58	.22	.22	.32	.31	1.82	.87	.96	.58	.15	.080	.17
MAX	.99	.33	.26	1.6	.66	7.9	2.0	1.4	1.0	.26	.32	.22
MIN	.19	.15	.17	.18	.10	.40	.61	.67	.25	.04	.03	.12
AC-FT	36	13	13	20	17	112	52	59	35	9.3	4.9	10

CAL YR 1988 TOTAL 185.07 MEAN .51 MAX 7.1 MIN .04 AC-FT 367
WTR YR 1989 TOTAL 192.16 MEAN .53 MAX 7.9 MIN .03 AC-FT 381

e Estimated

MUSSELSHELL RIVER BASIN

06126500 MUSSELSHELL RIVER NEAR ROUNDUP, MT

LOCATION.--Lat 46°25'41", long 108°34'19", in NW1/4SE1/4SE1/4 sec. 22, T.8 N., R.25 E., Musselshell County, Hydrologic Unit 10040202, on left bank 20 ft downstream from Halfbreed Creek, 0.1 mi upstream from bridge on U.S. Highway 87, 2.0 mi southwest of Roundup, and at mile 211.6.

DRAINAGE AREA.--4,023 mi^2.

PERIOD OF RECORD.--May 1946 to current year. Monthly discharge only from October 1947 to September 1949, published in WSP 1309.

REVISED RECORDS.--WSP 1086: 1946. WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,188.15 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Sept. 26, 1949, nonrecording gage at present site and datum.

REMARKS.--Estimated daily discharges: Nov. 9,10, Nov. 15 to Mar. 26. Records good except those for estimated daily discharge, which are poor. Some regulation by Bair (station number 06116500), Martinsdale (station number 06119000) and Deadman's Basin (station number 06122500) Reservoirs. Diversions for irrigation of about 59,600 acres upstream from station, of which about 11,000 acres is flood irrigated. Several observations of water temperature and specific conductance were made during the year. U.S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--43 years, 216 ft^3/s, 156,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,610 ft^3/s, June 18, 1967, gage height, 12.45 ft; maximum gage height, 13.73 ft, Mar. 9, 1979, ice jam; minimum daily discharge, 0.13 ft^3/s, Sept. 10, 1988; minimum gage height, 0.23 ft, July 31, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 278 ft^3/s, Mar. 28, gage height 2.20 ft; maximum gage height, 4.78 ft, Mar. 13, ice jam; minimum daily discharge, 0.50 ft^3/s, Nov. 15.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.1	8.4	e2.5	e4.0	e2.5	e4.0	145	182	29	33	74	60
2	2.6	8.7	e2.5	e4.5	e2.0	e3.5	131	151	32	50	64	66
3	2.2	8.5	e2.6	e5.4	e2.2	e4.0	116	150	30	217	57	66
4	2.5	8.4	e3.4	e7.0	e2.4	e3.7	97	135	27	240	44	55
5	2.6	8.4	e3.5	e5.0	e2.5	e5.0	85	125	44	238	35	49
6	2.6	8.2	e3.6	e4.0	e2.8	e6.0	81	120	57	194	32	46
7	2.7	8.1	e4.3	e3.5	e3.5	e8.0	81	106	50	172	26	45
8	2.5	8.1	e3.5	e3.0	e4.0	e10	79	102	75	146	21	43
9	2.9	e9.0	e5.0	e3.5	e5.0	e20	78	114	76	118	22	42
10	3.1	e9.4	e6.0	e4.5	e7.0	e40	74	111	80	131	17	48
11	3.2	10	e7.0	e4.5	e9.0	e80	70	91	81	139	19	51
12	2.9	7.4	e8.2	e4.0	e8.0	e120	65	89	96	172	17	51
13	3.2	3.3	e9.3	e4.2	e7.5	e200	64	100	91	171	22	48
14	3.7	.66	e8.0	e4.5	e6.8	e150	60	161	85	174	21	47
15	3.6	e.50	e7.5	e4.5	e6.4	e100	56	202	91	158	14	45
16	4.6	e.70	e7.7	e5.0	e5.8	e80	52	189	102	163	11	42
17	5.7	e.90	e9.0	e6.0	e5.0	e60	50	150	103	177	17	40
18	6.1	e1.1	e9.2	e7.0	e5.4	e50	51	125	121	152	17	40
19	6.9	e1.5	e8.8	e7.5	e6.0	e47	53	118	127	142	12	35
20	7.0	e2.1	e8.6	e7.7	e7.0	e50	55	106	131	133	8.5	33
21	6.8	e2.3	e10	e7.5	e8.0	e60	52	95	140	122	9.3	31
22	6.9	e2.0	e11	e7.0	e10	e70	49	84	161	119	13	34
23	7.5	e2.6	e9.0	e6.4	e12	e80	46	72	119	126	31	30
24	7.7	e3.4	e7.0	e6.0	e12	e94	43	58	86	129	27	29
25	8.0	e3.4	e5.0	e6.8	e11	e110	44	42	77	137	34	49
26	7.6	e2.2	e3.5	e7.4	e10	e150	52	39	74	131	43	56
27	7.5	e1.8	e3.7	e8.0	e10	197	71	30	64	123	61	59
28	7.7	e2.8	e4.0	e9.0	e7.0	243	93	22	51	109	62	58
29	8.0	e2.7	e4.5	e9.6	---	216	203	25	51	95	59	55
30	7.6	e2.3	e5.0	e10	---	184	212	28	47	83	55	54
31	7.9	---	e4.8	e5.0	---	149	---	31	---	77	53	---
TOTAL	156.9	138.86	187.7	182.0	180.8	2594.2	2408	3153	2398	4371	997.8	1407
MEAN	5.06	4.63	6.05	5.87	6.46	83.7	80.3	102	79.9	141	32.2	46.9
MAX	8.0	10	11	10	12	243	212	202	161	240	74	66
MIN	2.2	.50	2.5	3.0	2.0	3.5	43	22	27	33	8.5	29
AC-FT	311	275	372	361	359	5150	4780	6250	4760	8670	1980	2790

CAL YR 1988 TOTAL 14514.10 MEAN 39.7 MAX 204 MIN .13 AC-FT 28790
WTR YR 1989 TOTAL 18175.26 MEAN 49.8 MAX 243 MIN .50 AC-FT 36050

e Estimated

MUSSELSHELL RIVER BASIN

06127500 MUSSELSHELL RIVER AT MUSSELSHELL, MT

LOCATION.--Lat 46°31'23", long 108°06'30", in SE1/4SW1/4SW1/4 sec.20, T.9 N., R.29 E., Musselshell County, Hydrologic Unit 10040202, on left bank 0.9 mi upstream from Hawk Creek, 1 mi west of Musselshell, and at mile 164.5.

DRAINAGE AREA.--4,568 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1928 to September 1932 (no records December to February for the water years 1930-31), August 1945 to September 1979, October 1982 to September 1983, October 1983 to current season (seasonal record only). Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,984.72 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Oct. 8, 1949, nonrecording gage at site 1 mi downstream at different datums.

REMARKS.--No estimated daily discharges this year. Water-discharge records good. Some regulation by Bair (station number 06116500), Martinsdale (station number 06119000), and Deadman's Basin (station number 06122500) Reservoirs. Diversions for irrigation of about 63,300 acres upstream from station, of which about 12,500 acres is flood irrigated.

AVERAGE DISCHARGE.--37 years (1928-29, 1931-32, 1945-79, 1982-83), 215 ft^3/s, 155,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,850 ft^3/s, June 19, 1967, gage height, 11.57 ft; maximum gage height, 12.96 ft, Mar. 10, 1979, ice jam; no flow at times.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 222 ft^3/s, Apr. 30, gage height, 2.87 ft; minumum daily, 1.5 ft^3/s, Oct. 2.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.9						154	211	32	20	34	54
2	1.5						148	181	29	8.2	29	57
3	1.6						134	163	27	5.5	19	68
4	1.8						122	157	27	139	14	68
5	3.2						108	142	24	159	6.9	59
6	3.5						99	131	18	155	5.4	52
7	3.7						93	126	27	123	4.1	49
8	2.9						91	119	26	86	3.5	48
9	2.6						88	115	30	52	3.0	46
10	2.7						85	121	41	37	3.0	46
11	2.7						80	117	46	51	2.5	48
12	2.8						75	110	45	48	3.3	51
13	3.6						70	106	59	77	2.6	51
14	3.3						63	113	56	86	2.2	46
15	2.8						57	174	52	102	16	44
16	3.0						58	209	58	85	17	45
17	3.7						58	191	71	106	12	44
18	2.9						57	158	63	103	9.6	45
19	4.6						55	136	80	83	8.1	44
20	5.6						54	126	91	72	8.4	41
21	5.0						46	118	111	66	10	37
22	4.9						52	106	121	54	6.9	35
23	4.7						43	94	140	61	5.7	36
24	5.4						47	78	108	67	5.6	34
25	9.2						44	62	79	86	18	32
26	5.7						51	48	69	84	21	39
27	5.7						59	41	62	82	26	53
28	6.4						82	38	46	74	49	58
29	6.2						109	37	40	60	59	58
30	6.0						208	34	21	50	64	57
31	6.0							32		44	57	
TOTAL	125.6						2490	3594	1699	2325.7	525.8	1445
MEAN	4.05						83.0	116	56.6	75.0	17.0	48.2
MAX	9.2						208	211	140	159	64	68
MIN	1.5						43	32	18	5.5	2.2	32
AC-FT	249						4940	7130	3370	4610	1040	2870

MUSSELSHELL RIVER BASIN

06127500 MUSSELSHELL RIVER AT MUSSELSHELL, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1988 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
NOV							
07...	1300	7.8	30	1	2700	16.5	5.5
MAR							
28...	1430	221	100	2	2060	14.5	7.5
MAY							
18...	0840	161	100	2	--	19.0	16.0
JUN							
26...	1255	69	20	1	1690	25.0	19.0
JUL							
18...	0950	112	5	1	1490	21.0	20.0
AUG							
07...	1240	4.2	--	--	2060	28.5	23.5
SEP							
18...	1355	44	30	1	1940	15.0	17.5

DATE	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
NOV						
07...	660	11.5	106	371	11	317
MAR						
28...	675	10.5	100	276	0	223
MAY						
18...	678	8.2	94	--	--	--
JUN						
26...	685	8.7	105	--	--	--
JUL						
18...	692	7.6	93	278	0	222
SEP						
18...	684	8.4	99	101	0	81

DATE	TIME	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
NOV										
07...	1300	8.6	730	410	110	110	370	6	5.2	320
MAR										
28...	1430	8.3	650	430	120	85	220	4	6.2	224
MAY										
18...	0840	8.3	310	99	76	29	38	1	2.6	211
JUN										
26...	1255	8.2	550	320	96	76	190	4	4.4	236
JUL										
18...	0950	8.0	480	260	90	63	150	3	4.4	228
SEP										
18...	1355	8.1	590	510	96	85	220	4	4.7	224

MUSSELSHELL RIVER BASIN

06127500 MUSSELSHELL RIVER AT MUSSELSHELL, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

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, 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, NITRATE TOTAL (MG/L AS N) (00620)	NITRO-GEN, NITRITE TOTAL (MG/L AS N) (00615)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)
NOV										
07...	1200	44	0.30	4.3	2030	2.77	42.8	--	<0.010	0.200
MAR										
28...	920	28	0.30	6.4	1520	2.07	907	0.290	0.010	0.300
MAY										
18...	200	4.2	0.20	12	489	0.66	212	--	<0.010	<0.100
JUN										
26...	720	18	0.30	2.7	1250	1.70	233	--	<0.010	<0.100
JUL										
18...	570	12	0.30	6.5	1030	1.40	311	--	0.010	<0.100
SEP										
18...	860	19	0.30	2.5	1340	1.82	159	--	<0.010	<0.100

DATE	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	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										
07...	0.050	0.85	0.90	0.140	0.040	230	10	37	0.78	62
MAR										
28...	0.160	0.34	0.50	0.020	0.010	170	20	324	193	96
MAY										
18...	0.040	0.36	0.40	0.030	<0.010	70	40	186	81	96
JUN										
26...	0.020	0.38	0.40	0.030	<0.010	190	21	82	15	95
JUL										
18...	0.030	0.57	0.60	0.060	0.010	160	11	181	55	96
SEP										
18...	0.020	0.28	0.30	<0.010	<0.010	420	6	89	11	95

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE) (01012)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR) (01034)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)
JUN							
26...	1255	1	<10	<1	3	4	1400
JUL							
18...	0950	2	<10	<1	3	5	2300

DATE	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)
JUN						
26...	<1	220	0.20	6	2	10
JUL						
18...	3	150	<0.10	4	2	10

MUSSELSHELL RIVER BASIN

06127500 MUSSELSHELL RIVER AT MUSSELSHELL, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	ALDRIN, TOTAL (UG/L) (39330)	CHLORDANE, TOTAL (UG/L) (39350)	DDD, TOTAL (UG/L) (39360)	DDE, TOTAL (UG/L) (39365)	DDT, TOTAL (UG/L) (39370)	DIAZINON, TOTAL (UG/L) (39570)	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L) (82052)	DIELDRIN TOTAL (UG/L) (39380)	ENDOSULFAN, TOTAL (UG/L) (39388)	ENDRIN, TOTAL (UG/L) (39390)
JUN 26...	1255	<0.010	<0.1	<0.010	<0.010	<0.010	<0.01	0.04	<0.010	<0.010	<0.010
JUL 18...	0950	<0.010	<0.1	<0.010	<0.010	<0.010	<0.01	<0.01	<0.010	<0.010	<0.010

DATE	ETHION, TOTAL (UG/L) (39398)	HEPTACHLOR, TOTAL (UG/L) (39410)	HEPTACHLOR EPOXIDE TOTAL (UG/L) (39420)	LINDANE TOTAL (UG/L) (39340)	MALATHION, TOTAL (UG/L) (39530)	METHOXYCHLOR, TOTAL (UG/L) (39480)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL TRITHION, TOTAL (UG/L) (39790)	MIREX, TOTAL (UG/L) (39755)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L) (39250)
JUN 26...	<0.01	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10
JUL 18...	<0.01	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10

DATE	PARATHION, TOTAL (UG/L) (39540)	PCB, TOTAL (UG/L) (39516)	PERTHANE TOTAL (UG/L) (39034)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L) (39720)	SILVEX, TOTAL (UG/L) (39760)	TOXAPHENE, TOTAL (UG/L) (39400)	TOTAL TRITHION (UG/L) (39786)	2,4-D, TOTAL (UG/L) (39730)	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)
JUN 26...	<0.01	<0.1	<0.1	<0.01	<0.01	<1	<0.01	<0.01	<0.01	<0.01
JUL 18...	<0.01	<0.1	<0.1	<0.01	<0.01	<1	<0.01	<0.01	<0.01	<0.01

MUSSELSHELL RIVER BASIN

06130500 MUSSELSHELL RIVER AT MOSBY, MT
(National stream quality accounting network station)

LOCATION.--Lat 46°59'34" long 107°53'34", in NW1/4SW1/4NW/14 sec.11, T.14 N., R.30 E., Petroleum County, Hydrologic Unit 10040205, on left bank 300 ft upstream from bridge on State Highway 20, 0.3 mi west of Mosby, 10.9 mi downstream from Flatwillow Creek, and at mile 60.0.

DRAINAGE AREA.--7,846 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May to November 1929, March 1930 to September 1932, February 1934 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1559: 1935-36. WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,495.9 ft above National Geodetic Vertical Datum of 1929. Dec. 6, 1962, to Mar. 14, 1966, water-stage recorder at site 900 ft downstream at different datum. Mar. 15, 1966, to Dec. 11, 1973, water-stage recorder and nonrecording gages at site 400 ft downstream at same datum. Dec. 12, 1973, to Oct. 1, 1981, nonrecording gage at site 300 ft downstream at same datum. See WSP 2116 for history of changes prior to 1962.

REMARKS.--Estimated daily discharges: Oct. 27-30, Nov. 11 to Mar. 10. Water-discharge records good except those for estimated daily discharges, which are poor. Some regulation by Bair (station number 06116500), Martinsdale (station number 06119000) and Deadman's Basin (station number 06122500) Reservoirs. Diversions for irrigation of about 103,000 acres upstream from station.

AVERAGE DISCHARGE.--57 years (water years 1931-32, 1935-89), 282 ft^3/s, 204,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 18,000 ft^3/s, June 18, 1944, gage height, 14.43 ft; maximum gage height, 15.1 ft, Mar. 12, 1979, from floodmark, backwater from ice jam; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, unknown; maximum gage height, 10.97 ft, Mar. 9, backwater from ice; minimum daily discharge, 0.02 ft^3/s, July 31, Aug. 3-7.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.34	1.1	e15	e4.0	e8.0	e11	307	447	78	34	.05	3.0
2	.25	1.1	e18	e4.5	e4.0	e11	262	423	95	24	.03	19
3	.21	2.9	e17	e5.0	e3.0	e10	235	374	152	19	.02	32
4	.17	4.2	e15	e7.0	e2.0	e8.0	217	357	163	16	.02	29
5	.17	4.1	e17	e6.0	e3.5	e11	200	335	162	8.6	.02	32
6	.16	4.4	e16	e4.5	e7.0	e25	191	318	135	2.7	.02	41
7	.15	4.7	e14	e3.5	e8.0	e300	175	293	121	1.3	.02	42
8	.14	5.1	e11	e3.0	e7.0	e1200	162	273	111	.79	.03	42
9	.16	7.8	e12	e3.5	e8.0	e3000	154	267	98	.43	.03	41
10	.17	7.7	e14	e4.5	e9.0	e2200	149	251	99	.48	.04	37
11	.20	e7.0	e13	e5.0	e11	2000	145	247	97	1.3	.05	38
12	.19	e7.2	e14	e5.5	e12	1130	146	253	85	1.1	.04	36
13	.19	e7.2	e15	e6.0	e14	1110	142	519	104	2.3	.04	35
14	.18	e8.0	e15	e5.5	e12	522	134	703	92	2.5	.05	34
15	.18	e7.0	e10	e6.0	e10	399	121	482	98	2.1	.04	39
16	.36	e6.0	e9.0	e8.0	e9.0	446	104	413	96	8.2	.05	44
17	.40	e8.0	e9.5	e10	e7.0	283	95	426	112	7.5	.05	38
18	.28	e8.5	e10	e12	e8.0	245	78	409	107	2.1	.03	36
19	.23	e9.0	e11	e11	e9.0	204	75	363	94	.81	.03	37
20	.23	e9.0	e12	e13	e11	175	80	320	75	.48	.03	37
21	.44	e11	e10	e17	e17	204	81	306	72	.31	.03	37
22	.76	e9.0	e8.0	e15	e15	256	74	280	77	.23	.03	35
23	.75	e13	e6.0	e13	e16	631	70	256	91	.17	5.2	26
24	.77	e13	e5.0	e10	e19	1100	70	221	104	.17	3.1	26
25	.72	e11	e4.5	e8.0	e19	849	80	176	118	.34	6.0	25
26	.76	e9.0	e4.0	e10	e18	597	93	163	114	.17	11	23
27	e.50	e7.0	e3.5	e13	e15	465	222	153	94	.12	11	22
28	e.30	e8.0	e3.0	e14	e13	374	553	123	76	.11	5.8	20
29	e.40	e9.0	e3.5	e16	---	348	1060	107	65	.07	3.0	20
30	e.90	e10	e4.0	e19	---	387	624	105	49	.06	1.7	32
31	1.0	---	e4.5	e15	---	348	---	105	---	.02	1.8	---
TOTAL	11.66	220.0	323.5	277.5	294.5	18849.0	6099	9468	3034	137.46	49.35	958.0
MEAN	.38	7.33	10.4	8.95	10.5	608	203	305	101	4.43	1.59	31.9
MAX	1.0	13	18	19	19	3000	1060	703	163	34	11	44
MIN	.14	1.1	3.0	3.0	2.0	8.0	70	105	49	.02	.02	3.0
AC-FT	23	436	642	550	584	37390	12100	18780	6020	273	98	1900

CAL YR 1988 TOTAL 14456.29 MEAN 39.5 MAX 956 MIN .00 AC-FT 28670
WTR YR 1989 TOTAL 39721.97 MEAN 109 MAX 3000 MIN .02 AC-FT 78790

e Estimated

MUSSELSHELL RIVER BASIN

06130500 MUSSELSHELL RIVER AT MOSBY, MT--Continued
(National stream quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981.
WATER TEMPERATURE: October 1974 to September 1979.
SUSPENDED-SEDIMENT DISCHARGE: October 1982 to current year.

REMARKS.--Unpublished records of once-daily water temperatures are available in files of District office. Flow affected by ice during most of winter months.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1975-81): Maximum daily, 4,900 microsiemens, Aug. 14, 1977; minimum daily, 678 microsiemens, Mar. 23, 1978.
WATER TEMPERATURE (water years 1975-79): Maximum daily, 26.0°C, Aug. 7, 9, 1978; minimum daily, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATION: Maximum daily mean, 25,800 mg/L, Aug. 3, 1985; minimum daily mean, 7 mg/L Oct. 30, 1988.
SEDIMENT LOAD: Maximum daily, 242,000 tons, Sep. 26, 1986; minimum daily, 0 ton, 1985, 1988 during periods of no flow.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATION: Maximum daily mean, 5,840 mg/L, Apr. 29; minimum daily mean, 7 mg/L, Oct. 30.
SEDIMENT LOAD: Maximum daily, 22,300 tons, Mar. 9; minimum daily, less than .01 ton, on July 31 and several days in August.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TCCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
NOV												
08...	1230	4.9	--	--	5100	11.5	5.0	--	--	--	--	--
DEC												
30...	1130	4.0	100	2	4320	4.5	0.5	688	9.5	74	K4	52
FEB												
13...	1400	14	100	2	7000	0.5	0.0	--	--	--	--	--
MAR												
21...	1345	181	70	2	1520	5.5	3.0	693	12.0	99	<1	120
MAY												
17...	1030	431	0	0	2020	17.0	16.0	694	8.1	91	300	420
JUN												
27...	1055	97	30	1	2160	27.5	21.5	694	8.0	100	--	--
JUL												
26...	1030	0.26	2	1	4670	24.0	25.0	705	7.6	101	--	--
SEP												
19...	1105	37	5	1	2790	19.0	16.0	699	8.9	99	53	44

DATE	TIME	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STAND-ARD UNITS) (00400)	TUR-BID-ITY (NTU) (00076)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)
DEC										
30...	1130	490	0	397	8.0	2.4	1400	220	200	640
MAR										
21...	1345	171	0	140	8.2	38	470	91	58	170
MAY										
17...	1030	260	0	212	8.2	230	580	110	74	220
SEP										
19...	1105	295	0	240	8.2	3.6	840	120	130	370

06130500 MUSSELSHELL RIVER AT MOSBY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)
DEC 30...	8	8.0	404	2400	58	0.30	5.0	4020	3780	5.47
MAR 21...	3	7.8	146	680	13	0.30	5.6	1160	1110	1.58
MAY 17...	4	6.3	216	880	15	0.40	4.2	1580	1440	2.15
SEP 19...	6	7.1	231	1400	27	0.40	1.7	2240	2200	3.05

DATE	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)
DEC 30...	43.4	<0.010	0.270	0.120	0.110	0.70	0.010	<0.010	<0.010
MAR 21...	567	0.020	0.530	0.270	0.240	0.70	0.100	0.030	<0.010
MAY 17...	1840	0.020	<0.100	0.070	0.013	0.40	0.030	0.010	<0.010
SEP 19...	224	<0.010	<0.100	0.020	0.030	0.40	0.030	<0.010	<0.010

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE) (01012)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)
DEC 30...	1130	<10	--	<1	100	--	<10	--	<1	--	1
MAR 21...	1345	20	--	1	26	--	<0.5	--	<1	--	<1
MAY 17...	1030	20	--	1	35	--	<0.5	--	<1	--	1
JUN 27...	1055	--	1	--	--	<10	--	<1	--	4	--
JUL 26...	1030	--	1	--	--	10	--	<1	--	2	--
SEP 19...	1105	20	--	<1	<100	--	<10	--	<1	--	1

DATE	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)
DEC 30...	<1	--	3	--	30	--	<5	150	--	40	--
MAR 21...	<3	--	3	--	33	--	<5	58	--	32	--
MAY 17...	<3	--	5	--	30	--	<1	77	--	3	--
JUN 27...	--	4	--	1500	--	1	--	--	80	--	0.10
JUL 26...	--	4	--	240	--	<1	--	--	170	--	<0.10
SEP 19...	<1	--	1	--	<10	--	<1	110	--	<10	--

MUSSELSHELL RIVER BASIN

06130500 MUSSELSHELL RIVER AT MOSBY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	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)	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, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
DEC											
30...	<0.1	2	--	6	--	2	<1.0	4500	<1	--	20
MAR											
21...	0.1	<10	--	9	--	2	<1.0	1500	<6	--	8
MAY											
17...	<0.1	<10	--	4	--	2	<1.0	1800	<6	--	7
JUN											
27...	--	--	5	--	1	--	--	--	--	10	--
JUL											
26...	--	--	4	--	2	--	--	--	--	10	--
SEP											
19...	<0.1	3	--	2	--	2	<1.0	2500	<1	--	<10

DATE	TIME	ALDRIN, TOTAL (UG/L) (39330)	CHLOR-DANE, TOTAL (UG/L) (39350)	DDD, TOTAL (UG/L) (39360)	DDE, TOTAL (UG/L) (39365)	DDT, TOTAL (UG/L) (39370)	DI-AZINON, TOTAL (UG/L) (39570)	DICAMBA (MED-IBEN) (BAN-VEL D) TOTAL (UG/L) (82052)	DI-ELDRIN TOTAL (UG/L) (39380)	ENDO-SULFAN, TOTAL (UG/L) (39388)	ENDRIN, TOTAL (UG/L) (39390)
JUN											
27...	1055	<0.010	<0.1	<0.010	<0.010	<0.010	<0.01	<0.01	<0.010	<0.010	<0.010
JUL											
26...	1030	<0.010	<0.1	<0.010	<0.010	<0.010	<0.01	<0.01	<0.010	<0.010	<0.010

DATE	ETHION, TOTAL (UG/L) (39398)	HEPTA-CHLOR, TOTAL (UG/L) (39410)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L) (39420)	LINDANE TOTAL (UG/L) (39340)	MALA-THION, TOTAL (UG/L) (39530)	METH-OXY-CHLOR, TOTAL (UG/L) (39480)	METHYL PARA-THION, TOTAL (UG/L) (39600)	METHYL TRI-THION, TOTAL (UG/L) (39790)	MIREX, TOTAL (UG/L) (39755)	NAPH-THA-LENES, POLY-CHLOR. TOTAL (UG/L) (39250)
JUN										
27...	<0.01	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10
JUL										
26...	<0.01	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10

DATE	PARA-THION, TOTAL (UG/L) (39540)	PCB, TOTAL (UG/L) (39516)	PER-THANE TOTAL (UG/L) (39034)	PICLO-RAM (TOR-DON) (AMDON) TOTAL (UG/L) (39720)	SILVEX, TOTAL (UG/L) (39760)	TOX-APHENE, TOTAL (UG/L) (39400)	TOTAL TRI-THION (UG/L) (39786)	2,4-D, TOTAL (UG/L) (39730)	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)
JUN										
27...	<0.01	<0.1	<0.1	0.01	<0.01	<1	<0.01	0.15	<0.01	<0.01
JUL										
26...	<0.01	<0.1	<0.1	<0.01	<0.01	<1	<0.01	<0.01	<0.01	<0.01

06130500 MUSSELSHELL RIVER AT MOSBY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	TEMPER-ATURE WATER (DEG C) (00010)	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .002 MM (70337)	SED. SUSP. FALL DIAM. % FINER THAN .004 MM (70338)	SED. SUSP. FALL DIAM. % FINER THAN .008 MM (70339)	SED. SUSP. FALL DIAM. % FINER THAN .016 MM (70340)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV												
08...	1230	5.0	4.9	39	0.52	--	--	--	--	--	--	79
DEC												
30...	1130	0.5	4.0	87	0.94	--	--	--	--	--	--	61
FEB												
13...	1400	0.0	14	173	6.5	--	--	--	--	--	--	44
MAR												
08...	1430	0.5	1110	1470	4410	62	70	78	84	98	100	--
21...	1345	3.0	181	77	38	--	--	--	--	--	--	94
30...	1230	9.0	396	411	439	65	80	--	95	99	100	--
MAY												
17...	1030	16.0	431	706	822	--	--	--	--	--	--	99
JUN												
27...	1055	21.5	97	102	27	--	--	--	--	--	--	83
JUL												
26...	1030	25.0	0.26	62	0.04	--	--	--	--	--	--	94
AUG												
01...	1025	28.5	0.07	49	0.01	--	--	--	--	--	--	70
08...	0910	21.5	0.03	71	0.01	--	--	--	--	--	--	63
SEP												
19...	1105	16.0	37	33	3.3	--	--	--	--	--	--	94

DATE	TIME	BED MAT. SIEVE DIAM. % FINER THAN .062 MM (80164)	BED MAT. SIEVE DIAM. % FINER THAN .125 MM (80165)	BED MAT. SIEVE DIAM. % FINER THAN .250 MM (80166)	BED MAT. SIEVE DIAM. % FINER THAN .500 MM (80167)	BED MAT. SIEVE DIAM. % FINER THAN 1.00 MM (80168)	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM (80169)	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM (80170)	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM (80171)	BED MAT. SIEVE DIAM. % FINER THAN 16.0 MM (80172)	BED MAT. SIEVE DIAM. % FINER THAN 32.0 MM (80173)	BED MAT. SIEVE DIAM. % FINER THAN 64.0 MM (80174)
NOV												
08...	1230	18	20	23	25	29	36	47	61	77	100	--
MAR												
21...	1345	49	55	61	63	67	71	77	86	98	100	--
SEP												
19...	1105	13	16	23	26	29	35	45	60	80	94	100

MUSSELSHELL RIVER BASIN

06130500 MUSSELSHELL RIVER AT MOSBY, MT--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	63	.06	30	.09	49	2.0	33	.36	143	3.1	40	1.2
2	64	.04	31	.09	26	1.3	35	.43	140	1.5	34	1.0
3	66	.04	29	.23	32	1.5	32	.43	117	.95	42	1.1
4	81	.04	43	.49	30	1.2	34	.64	89	.48	37	.8
5	68	.03	50	.55	15	.69	47	.76	96	.91	34	1.0
6	47	.02	46	.55	28	1.2	54	.66	96	1.8	36	2.4
7	34	.01	54	.69	26	.98	35	.33	88	1.9	560	454
8	39	.01	42	.58	34	1.0	30	.24	79	1.5	1300	4210
9	35	.02	39	.82	39	1.3	28	.26	57	1.2	2750	22300
10	29	.01	43	.89	43	1.6	25	.30	65	1.6	3110	18500
11	35	.02	44	.83	47	1.6	28	.38	69	2.0	3770	20400
12	37	.02	45	.87	48	1.8	49	.73	89	2.9	2430	7410
13	38	.02	49	.95	92	3.7	35	.57	117	4.4	2770	8300
14	40	.02	53	1.1	87	3.5	58	.86	39	1.3	850	1200
15	50	.02	44	.83	65	1.8	40	.65	30	.81	532	573
16	54	.05	35	.57	55	1.3	49	1.1	38	.92	493	594
17	30	.03	32	.69	48	1.2	47	1.3	40	.76	152	116
18	16	.01	22	.50	47	1.3	54	1.7	43	.93	268	177
19	28	.02	20	.49	43	1.3	60	1.8	50	1.2	101	56
20	50	.03	38	.92	39	1.3	88	3.1	37	1.1	132	62
21	65	.08	41	1.2	34	.92	87	4.0	36	1.7	129	71
22	57	.12	40	.97	38	.82	77	3.1	47	1.9	420	290
23	32	.06	41	1.4	61	.99	80	2.8	31	1.3	3000	5110
24	40	.08	22	.77	36	.49	70	1.9	52	2.7	3500	10400
25	40	.08	42	1.2	30	.36	75	1.6	59	3.0	2870	6580
26	27	.06	30	.73	26	.28	80	2.2	64	3.1	1600	2580
27	24	.03	35	.66	38	.36	79	2.8	59	2.4	1080	1360
28	22	.02	29	.63	20	.16	76	2.9	41	1.4	730	737
29	11	.01	31	.75	23	.22	78	3.4	---	---	514	483
30	7	.02	45	1.2	64	.69	80	4.1	---	---	449	469
31	17	.05	---	---	45	.55	133	5.4	---	---	520	489
TOTAL	---	1.13	---	22.24	---	37.41	---	50.80	---	48.76	---	112928.5
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	510	423	830	1000	82	17	56	5.1	51	.01	40	.32
2	463	328	601	686	156	40	56	3.6	97	.01	37	1.9
3	382	242	441	445	237	97	58	3.0	96	.01	49	4.2
4	340	199	323	311	271	119	55	2.4	63	.00	48	3.8
5	269	145	319	289	218	95	74	1.7	73	.00	62	5.4
6	245	126	278	239	164	60	79	.58	97	.01	41	4.5
7	169	80	193	153	169	55	55	.19	87	.00	37	4.2
8	198	87	153	113	220	66	52	.11	67	.01	49	5.6
9	224	93	146	105	129	34	62	.07	47	.00	53	5.9
10	197	79	134	91	173	46	43	.06	66	.01	28	2.8
11	192	75	150	100	170	45	49	.17	48	.01	28	2.9
12	153	60	189	129	215	49	67	.20	25	.00	29	2.8
13	151	58	1240	1740	201	56	51	.32	20	.00	41	3.9
14	172	62	2180	4140	147	37	48	.32	26	.00	33	3.0
15	153	50	700	911	152	40	52	.29	35	.00	19	2.0
16	151	42	556	620	136	35	50	1.1	44	.01	30	3.6
17	124	32	559	643	147	44	56	1.1	35	.00	31	3.2
18	73	15	362	400	140	40	57	.32	44	.00	31	3.0
19	102	21	300	294	127	32	54	.12	37	.00	35	3.5
20	141	30	212	183	104	21	46	.06	39	.00	45	4.5
21	112	24	219	181	93	18	42	.04	34	.00	44	4.4
22	128	26	179	135	102	21	44	.03	34	.00	36	3.4
23	133	25	169	117	109	27	52	.02	61	.86	50	3.5
24	122	23	175	104	154	43	60	.03	51	.43	30	2.1
25	85	18	163	77	184	59	68	.06	61	.99	38	2.6
26	110	28	112	49	159	49	69	.03	43	1.3	47	2.9
27	410	246	110	45	77	20	63	.02	42	1.2	40	2.4
28	2980	4450	138	46	52	11	66	.02	42	.66	44	2.4
29	5840	16700	114	33	55	9.7	82	.02	40	.32	35	1.9
30	2430	4090	119	34	56	7.4	75	.01	42	.19	47	4.1
31	---	---	140	40	---	---	82	.00	50	.24	---	---
TOTAL	---	27877	---	13453	---	1293.1	---	21.09	---	6.27	---	100.72

TOTAL LOAD FOR YEAR 155840.02

BIG DRY CREEK BASIN

06131000 BIG DRY CREEK NEAR VAN NORMAN, MT

LOCATION.--Lat 47°20'58", long 106°21'26", in NE1/4SW1/4NW1/4 sec.3, T.18 N., R.42 E., Garfield County, Hydrologic Unit 10040105, on left bank 900 ft downstream from Little Dry Creek, 3.2 mi northeast of Van Norman Post Office, 26 mi east of Jordan, and at mile 55.1.

DRAINAGE AREA.--2,554 mi^2.

PERIOD OF RECORD.--October 1939 to July 1969, July 1970 to current year (discharge measurements only, October 1947 to March 1949). Prior to July 1970, published as "Dry Creek near Van Norman".

REVISED RECORDS.--WSP 1309: 1947(M). WSP 1559: 1944(M), 1947. WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 2,330 ft above National Geodetic Vertical Datum of 1929, by barometer. Prior to July 24, 1978, at site 400 ft upstream at same datum.

REMARKS.--Estimated daily discharges: Nov. 11 to Mar. 24, June 24-26, July 14,15, and July 28 to Aug. 8. Records fair except those for estimated daily discharges, which are poor. Few small diversions for irrigation of hay meadows upstream from station. U.S. Army Corps of Engineers satellite telemeter at station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--46 years (1939-47, 1949-68, 1970-89), 52.5 ft^3/s, 38,040 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 24,600 ft^3/s, Mar. 21, 1947, gage height, 13.39 ft; maximum gage height, 15.26 ft, Mar. 21, 1947, ice jam; no flow at times most years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 400 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 13	----	unknown	unknown	June 24	0300	628	2.88
Mar. 24	----	unknown	a3.30	July 14	1000	*1,640	*3.98
Apr. 30	1200	479	2.67				

a--but may have been higher during period of no gage-height record.

No flow in February and March.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.69	.35	e.35	e.20	e.20	e.00	50	308	22	1.9	e5.2	53
2	.48	.34	e.35	e.20	e.00	e.00	39	255	21	1.7	e4.6	30
3	.35	.35	e.35	e.20	e.00	e.00	32	196	23	1.4	e4.0	22
4	.35	.40	e.35	e.20	e.00	e.00	26	145	17	1.9	e3.5	15
5	.22	.49	e.35	e.20	e.00	e.00	21	106	14	2.3	e3.0	10
6	.20	.54	e.30	e.20	e.00	e.00	18	84	10	2.0	e2.6	7.8
7	.19	.55	e.30	e.20	e.00	e.00	15	64	9.2	1.5	e2.2	6.5
8	.17	.65	e.25	e.20	e.00	e.00	19	49	8.0	1.2	e1.9	5.1
9	.17	.62	e.25	e.10	e.00	e5.0	19	40	6.8	1.0	1.8	4.3
10	.19	.75	e.25	e.10	e.00	e850	18	33	7.2	.93	1.6	3.7
11	.19	e.30	e.25	e.10	e.00	e900	14	27	6.2	.86	1.5	3.3
12	.16	e.25	e.30	e.10	e.00	e900	12	27	5.8	.73	1.2	3.0
13	.18	e.25	e.30	e.20	e.00	e950	11	42	5.0	.58	1.1	2.7
14	.19	e.25	e.30	e.25	e.00	e700	9.9	31	4.7	e831	.96	2.5
15	.16	e.25	e.25	e.30	e.00	e500	8.8	48	4.1	e426	.77	2.3
16	.28	e.25	e.30	e.40	e.00	e350	9.0	54	5.1	344	.63	2.0
17	.25	e.20	e.30	e.50	e.00	e250	8.6	60	5.5	281	.63	1.8
18	.29	e.20	e.30	e.50	e.00	e200	7.9	54	4.4	265	.75	1.8
19	.33	e.25	e.30	e.50	e.00	e150	7.5	43	3.6	191	.59	1.9
20	.31	e.30	e.30	e.50	e.00	e100	7.4	32	2.6	140	.61	1.7
21	.38	e.35	e.25	e.50	e.00	e80	7.0	27	2.5	103	.57	1.7
22	.24	e.40	e.25	e.50	e.00	e60	6.4	24	2.7	71	.96	1.5
23	.30	e.35	e.25	e.50	e.00	e150	5.8	17	2.1	62	.99	1.4
24	.19	e.30	e.25	e.45	e.00	e600	9.4	12	e231	72	1.7	1.4
25	.28	e.25	e.25	e.40	e.00	662	10	11	e5.1	31	165	1.4
26	.27	e.20	e.20	e.35	e.00	506	20	10	e4.0	16	25	1.3
27	.40	e.25	e.20	e.40	e.00	383	74	9.7	3.6	11	15	1.2
28	.33	e.30	e.20	e.40	e.00	236	139	8.5	3.3	e8.6	5.8	1.3
29	.25	e.30	e.20	e.40	---	154	225	58	3.1	e7.5	7.0	1.3
30	.33	e.35	e.20	e.40	---	99	373	42	2.6	e6.6	53	1.2
31	.33	---	e.20	e.40	---	64	---	19	---	e5.9	116	---
TOTAL	8.65	10.59	8.45	9.85	0.20	8849.00	1222.7	1936.2	445.2	2890.60	430.16	194.1
MEAN	.28	.35	.27	.32	.007	285	40.8	62.5	14.8	93.2	13.9	6.47
MAX	.69	.75	.35	.50	.20	950	373	308	231	831	165	53
MIN	.16	.20	.20	.10	.00	.00	5.8	8.5	2.1	.58	.57	1.2
AC-FT	17	21	17	20	.4	17550	2430	3840	883	5730	853	385

CAL YR 1988 TOTAL 629.74 MEAN 1.72 MAX 33 MIN .00 AC-FT 1250
WTR YR 1989 TOTAL 16005.70 MEAN 43.9 MAX 950 MIN .00 AC-FT 31750

e Estimated

MISSOURI RIVER MAIN STEM

06131500 FORT PECK LAKE AT FORT PECK, MT

LOCATION.--Lat 48°00'26", long 106°23'49", in sec. 14, T.26 N., R.41 E., McCone County, Hydrologic Unit 10040104, in No. 4 emergency gate shaft of Fort Peck Dam on Missouri River at Fort Peck, 2 mi downstream from Bear Creek, 9.5 mi southwest of Nashua, 9.5 mi upstream from Milk River, and at mile 1,771.6.

DRAINAGE AREA.--57,500 mi^2.

PERIOD OF RECORD.--October 1937 to current year. (Monthend contents only, except October 1938 to September 1940, when elevations were included.) Monthend contents for October 1937 to August 1938, published only in WSP 1309. Daily elevations and contents for May to June 1964, published in WSP 1840-B. Prior to October 1970, published as "Fort Peck Reservoir." Daily elevations on file in Helena district office.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is referenced to National Geodetic Vertical Datum of 1929. Prior to May 1, 1941, nonrecording gage at same site and datum.

REMARKS.--Reservoir is formed by earthfill dam completed in 1939; storage began in 1937. The following capacity figures are from capacity table effective July 1, 1973; see previous reports for superseded figures. Total capacity, 18,910,000 acre-ft between elevation 2,095.00 ft, invert of lower ring gates, and 2,250.00 ft, top of 25 ft gates. Elevation of spillway crest, 2,225.00 ft. Normal operating level, 17,930,000 acre-ft, elevation, 2,246.00 ft. Dead storage, 542,800 acre-ft below elevation 2,095.00 ft. Minimum operating level, 4,283,000 acre-ft, elevation, 2,160.00 ft, for on-site power generation. Figures given herein represent total contents; usable contents published in previous water-supply papers for October 1950 to September 1955. Water is used for navigation, recreation, flood control, and power generation. Elevations materially affected by wind.

COOPERATION.--Elevations and capacity table furnished by U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 19,310,000 acre-ft, July 15-17, 1975, elevation, 2,251.6 ft; minimum since first filling, 5,061,000 acre-ft, Jan. 25, 26, 1956, elevation, 2,167.67 ft, by capacity table used Mar. 1, 1940, to Dec. 31, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum contents at 2400, 13,690,000 acre-ft, Oct. 1, elevation, 2,226.46 ft; minimum, 12,000,000 acre-ft, Mar. 8, elevation, 2,217.47 ft.

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

Date	Elevation (feet)	Contents (acre-feet)	Change in Contents (acre-feet)
Sept. 30	2,226.50	13,700,000	---
Oct. 31	2,226.01	13,600,000	-100,000
Nov. 30	2,224.43	13 300,000	-300,000
Dec. 31	2,222.01	12,840,000	-460,000
CAL YR 1988			-2,450,000
Jan. 31	2,219.90	12,440,000	-400,000
Feb. 28	2,217.94	12,080,000	-360,000
Mar. 31	2,219.33	12,340,000	+260,000
Apr. 30	2,220.66	12,580,000	+240,000
May 31	2,222.95	13,010,000	+430,000
June 30	2,223.49	13,100,000	+90,000
July 31	2,222.37	12,900,000	-200,000
Aug. 31	2,221.09	12,660,000	-240,000
Sept. 30	2,219.93	12,450,000	-210,000
WTR YR 1989			-1,250,000

MISSOURI RIVER MAIN STEM

06132000 MISSOURI RIVER BELOW FORT PECK DAM, MT

LOCATION.--Lat 48°02'39", long 106°21'21", in NW1/4 sec.6, T.26 N., R.42 E., McCone County, Hydrologic Unit 10060001, on right bank 2 mi upstream from Milk River, 6 mi south of Nashua, 8 mi downstream from Fort Peck Dam, and at mile 1,763.5.

DRAINAGE AREA.--57,556 mi^2.

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

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,018.00 ft above National Geodetic Vertical Datum of 1929 (U.S. Army Corps of Engineers bench mark). Prior to Apr. 14, 1938, at site 0.7 mi upstream at different datum; Apr. 14, 1938, to Sept. 30, 1963, at present site at datum 2.00 ft higher, all water-stage recorders. Since Oct. 1, 1969, published discharge is determined by flowmeters at Fort Peck Dam.

REMARKS.--Flow completely regulated by Fort Peck Lake. Diversions for irrigation of about 880,400 acres upstream from station.

COOPERATION.--Records since Oct. 1, 1969, furnished by U.S. Army Corps of Engineers; 2 to 4 discharge measurements are made each year and the records are reviewed by Geological Survey. Records for March 1934 to September 1969 collected and computed by Geological Survey.

AVERAGE DISCHARGE.--5 years (1934-39, prior to Fort Peck Lake reaching operational level), 6,347 ft^3/s, 4,598,000 acre-ft/yr; 46 years (1943-89, after operational level in Fort Peck Lake was reached), 9,839 ft^3/s, 7,128,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 51,000 ft^3/s including 32,000 ft^3/s inflow from spillway 1 mi downstream from station, Aug. 8, 1946; maximum gage height observed, 12.30 ft Mar. 10, 1936 (ice jam), site and datum then in use; maximum daily reverse flow, 400 ft^3/s, Mar. 29, 1943, backwater from Milk River.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 13,400 ft^3/s, Feb. 11 ; minimum daily, 4,400 ft^3/s, Oct. 8,9,16.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4500	7100	11000	11100	11600	11500	8000	5800	9000	9100	9500	9000
2	4500	6600	11000	11000	11500	11200	8600	5400	9000	9200	9200	7900
3	4500	6300	11100	11700	13000	11200	8000	5300	8500	9300	9000	8500
4	4500	6200	9800	11900	12800	11000	7800	5300	9000	9200	9300	8400
5	4500	6300	11100	11900	12100	11300	6700	5300	9400	9900	9100	8800
6	4600	6500	10400	11400	12500	11000	6700	5000	9100	9300	9400	8900
7	4500	6400	11400	12200	12700	10700	6800	5600	9000	9600	8600	9000
8	4400	6500	10500	11600	12000	10500	6800	7900	9100	9300	9200	8600
9	4400	6500	11200	10800	13300	10900	6400	7400	9000	9100	8500	8500
10	4500	9300	10500	10600	12800	10700	5900	6900	8600	9100	8800	8600
11	4500	9200	11300	10900	13400	11200	6000	7000	8500	9400	8900	8800
12	4500	9200	10900	11300	12500	10800	5700	6900	9000	9000	8600	8500
13	4600	9100	10900	11900	12500	11100	5800	6900	9200	9000	8800	8700
14	4500	9000	11200	12200	12700	12400	5900	6700	9200	8100	8600	8800
15	4500	9000	11400	12100	13000	11700	5900	7200	9000	8700	9800	8600
16	4400	8500	11200	11000	13300	11900	5400	7200	9200	9100	8600	7400
17	4500	8900	11000	11000	12900	11500	6600	7100	9000	9200	9500	7900
18	4500	8300	11100	11500	12400	11600	5900	7000	9400	8800	9000	8100
19	4500	8900	11100	11100	11700	11500	6200	7000	9000	9400	8900	7900
20	4600	9200	10800	11800	12500	11800	6400	8100	9300	9100	8800	8000
21	4600	10000	10900	12400	11100	11600	6200	7900	8800	9100	9200	7400
22	4600	9300	10900	11600	10600	12500	6200	7900	9100	8700	9200	7500
23	4700	10200	11500	11700	11300	11300	6200	8100	9300	8900	8700	7500
24	4600	9600	11300	11700	10700	11500	6700	8000	9100	8700	8800	7700
25	4500	10300	10700	11800	11400	9400	6000	7900	9000	9400	8900	7800
26	4700	9800	11200	11900	11100	7600	5900	8100	9000	8700	8800	7500
27	4500	9900	11300	12000	11300	7300	6200	8100	9200	8700	8900	7400
28	4500	10500	11100	11300	11200	7600	6000	8400	9100	9000	8000	7400
29	4500	10300	11300	11700	---	8200	5800	8400	9100	9000	8600	7400
30	4500	9800	11000	11300	---	8100	5500	9000	9000	9000	8800	10000
31	6900	---	11200	12700	---	8300	---	8600	---	9400	9100	---
TOTAL	142600	256700	341300	359100	339900	328900	192200	221400	271200	281500	277100	246500
MEAN	4600	8557	11010	11580	12140	10610	6407	7142	9040	9081	8939	8217
MAX	6900	10500	11500	12700	13400	12500	8600	9000	9400	9900	9800	10000
MIN	4400	6200	9800	10600	10600	7300	5400	5000	8500	8100	8000	7400
AC-FT	282800	509200	677000	712300	674200	652400	381200	439100	537900	558400	549600	488900

CAL YR 1988 TOTAL 2877400 MEAN 7862 MAX 12200 MIN 4300 AC-FT 5707000
WTR YR 1989 TOTAL 3258400 MEAN 8927 MAX 13400 MIN 4400 AC-FT 6463000

MILK RIVER BASIN

06132200 SOUTH FORK MILK RIVER NEAR BABB, MT

(International gaging station)

LOCATION.--Lat 48°45'14", long 113°10'00", in NE1/4NW1/4NW1/4 sec.34, T.35 N., R.12 W., Glacier County, Hydrologic Unit 10050001, Blackfeet Indian Reservation, on right bank 900 ft, upstream from bridge on FAS 464 ("Duck Lake Road"), 14.4 mi southeast of Babb, 15.2 mi northwest of Browning, and at mile 17.3.

DRAINAGE AREA.--70.4 mi^2.

PERIOD OF RECORD.--May 1961 to current season (seasonal records only).

REVISED RECORDS.--W 1983: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 4,731.6 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 6. Records good. Many small diversions for irrigation upstream from station. Several observations of water temperature and specific conductance were made during the year.

COOPERATION.--This is one of a number of stations which are maintained jointly by the United States and Canada.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,000 ft^3/s, June 8, 1964, gage height, 6.61 ft, from rating curve extended above 400 ft^3/s, on basis of slope-area measurement of peak flow at site 3 mi downstream; maximum gage height, 7.17 ft, Feb. 24, 1986; no flow Aug. 23, 1973, June 28 to Aug. 14, 1977, Aug. 26 to Sept. 2, 1984.

EXTREMES FOR CURRENT SEASON.--Peak discharges greater than base discharge of 260 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 7	1040	390	5.02	June 11	1600	*446	*5.24

Minimum daily discharge, 4.5 ft^3/s, Mar. 4.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e5.5	e25	68	162	49	23	33	21		
2			e5.5	e20	64	109	45	31	29	27		
3			e5.0	e20	66	121	44	28	26	26		
4			e4.5	e18	61	118	42	24	24	24		
5			e5.0	e40	60	88	39	24	22	23		
6			e7.0	e150	60	69	38	25	31	23		
7			e7.5	357	65	63	35	22	32	23		
8			e8.0	196	83	62	31	20	32	22		
9			e8.0	104	83	59	29	20	35	20		
10			e15	67	69	75	34	21	37	20		
11			e80	56	64	358	43	19	41	22		
12			e120	69	61	283	37	17	35	27		
13			e100	86	57	169	81	16	29	25		
14			e60	99	53	131	211	16	26	22		
15			e50	111	50	114	104	21	23	25		
16			e40	120	46	98	77	25	20	25		
17			e35	69	44	84	62	21	19	23		
18			e30	70	44	76	49	19	46	22		
19			e25	67	42	71	41	17	50	22		
20			e20	79	40	68	38	16	36	22		
21			e15	88	37	65	36	15	30	22		
22			e15	94	35	65	30	15	26	21		
23			e15	81	33	88	27	15	23	20		
24			e10	72	34	82	27	31	21	20		
25			e15	63	36	113	31	144	19	19		
26			e30	68	39	112	37	139	19	19		
27			e55	71	37	77	30	67	19	19		
28			e50	66	62	63	27	61	18	19		
29			e40	67	71	59	24	57	18	19		
30			e30	71	70	54	23	46	17	19		
31			e25		127		23	40		18		
TOTAL			931.0	2564	1761	3156	1444	1055	836	679		
MEAN			30.0	85.5	56.8	105	46.6	34.0	27.9	21.9		
MAX			120	357	127	358	211	144	50	27		
MIN			4.5	18	33	54	23	15	17	18		
AC FT			1850	5090	3490	6260	2860	2090	1660	1350		

e Estimated

MILK RIVER BASIN

06133000 MILK RIVER AT WESTERN CROSSING OF INTERNATIONAL BOUNDARY

(International gaging station)

LOCATION.--Lat 49°00'27", long 112°32'42", in NE1/4 sec.1, T.1, R.20 W., fourth meridian, in Alberta, Hydrologic Unit 10050001, on left bank 0.8 mi north of international boundary, 22 mi upstream from North Milk River, 23 mi southwest of Milk River, Alberta, and at mile 656.4.

DRAINAGE AREA.--401 mi^2.

PERIOD OF RECORD.--March 1931 to current season (seasonal records only). Prior to October 1961, published as South Fork Milk River near international boundary.

REVISED RECORDS.--WSP 1389: 1934(M), 1935, 1936(M), 1937, 1942(M), 1947-48(M). W 1983: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 3,820 ft, from topographic map. Prior to Aug. 9, 1948, and Aug. 9, 1948, to Oct. 31, 1958, water-stage recorders at sites 0.4 mi and 0.5 mi downstream, respectively, at different datums.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 5 and Oct. 29-31. Records good except those for estimated daily discharges, which are poor. Several diversions for irrigation upstream from station. U.S. Bureau of Reclamation satellite telemeter at station.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,930 ft^3/s, June 9, 1964, gage height, 9.77 ft; maximum gage height, 12.55 ft, Mar. 18, 1976, backwater from ice; no flow at times.

EXTREMES FOR CURRENT SEASON.--Peak discharges greater than base discharge of 430 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 16	1230	ice jam	*5.50	Apr. 8	1630	554	4.64
Mar. 27	--	550	ice jam	June 11	1830	*1,130	5.49

No flow Mar. 1-10.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	e125	135	240	69	20	57	27		
2			e.00	e88	128	262	61	20	48	28		
3			e.00	e88	123	199	55	20	42	29		
4			e.00	e73	128	181	49	20	37	35		
5			e.00	e77	115	198	43	25	33	37		
6			e.00	80	112	163	41	25	31	36		
7			e.00	189	111	126	37	21	30	34		
8			e.00	448	120	104	30	20	33	33		
9			e.00	300	146	94	28	19	38	33		
10			e.00	178	149	143	26	18	40	33		
11			e3.5	136	120	802	27	17	43	32		
12			e7.1	109	107	1050	27	17	44	30		
13			e17	114	99	664	38	16	46	30		
14			e73	140	91	324	52	15	41	35		
15			e42	160	83	238	200	14	34	37		
16			e33	185	75	192	175	15	30	35		
17			e25	208	67	160	116	18	28	35		
18			e36	153	62	137	88	23	33	37		
19			e40	143	60	118	66	23	33	36		
20			e49	125	57	102	52	23	60	35		
21			e67	148	55	93	45	18	62	34		
22			e94	176	53	88	40	16	50	34		
23			e172	175	50	87	34	15	42	34		
24			e202	163	49	106	29	14	38	33		
25			e230	147	50	131	27	33	34	31		
26			e270	134	52	164	25	84	32	31		
27			e364	147	55	184	25	190	30	31		
28			e385	155	95	132	38	126	28	30		
29			e335	151	103	100	33	90	28	e27		
30			e233	148	140	82	24	81	27	e22		
31			e155		162		21	70		e17		
TOTAL			2832.60	4663	2952	6664	1621	1126	1152	991		
MEAN			91.4	155	95.2	222	52.3	36.3	38.4	32.0		
MAX			385	448	162	1050	200	190	62	37		
MIN			.00	73	49	82	21	14	27	17		
AC-FT			5620	9250	5860	13220	3220	2230	2280	1970		

e Estimated

MILK RIVER BASIN

06133500 NORTH FORK MILK RIVER ABOVE ST. MARY CANAL, NEAR BROWNING, MT

(International gaging station)

LOCATION.--Lat 48°58'15", long 113°03'19", in NE1/4NW1/4NE1/4 sec.16, T.37 N., R.11 W., Glacier County, Hydrologic Unit 10050001, Blackfeet Indian Reservation, on left bank 1.7 mi upstream from outlet of canal, 1.9 mi south of international boundary, 29 mi north of Browning, and at mile 57.8.

DRAINAGE AREA.--60.2 mi^2.

PERIOD OF RECORD.--May 1911 to July 1912 and June to July 1918 (published as "near Browning"), May 1919 to current season (seasonal records only). Monthly discharge only for some periods published in WSP 1309.

REVISED RECORDS.--W 1983: Drainage area.

GAGE.--Water-discharge recorder. Concrete control since 1936. Elevation of gage is 4,220 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to June 20, 1921, nonrecording gages at several sites within 1 mi of present site at different datums.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 5, Oct. 31. Records good. Many small diversions for irrigation upstream from station. Several observations of water temperature and specific conductance were made during the year. U.S. Bureau of Reclamation satellite telemeter at station.

COOPERATION.--This is one of a number of stations which are maintained jointly by the United States and Canada.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,090 ft^3/s, May 8, 1967, gage height, 7.95 ft, from rating curve extended above 130 ft^3/s, on basis of slope-area measurements at gage heights 7.55 ft and 7.95 ft; maximum gage height, 8.24 ft, Feb. 24, 1986, backwater from ice and snow; no flow Oct. 29, 1942.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 218 ft^3/s, June 11, gage height, 3.26 ft; maximum gage height, 4.70 ft, Mar. 11, backwater from ice; minimum discharge, 2.3 ft^3/s, Apr. 3, gage height, 0.85 ft, result of freezeup.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e4.0	e18	16	34	9.5	7.5	10	12		
2			e4.0	e16	20	20	9.1	9.2	9.6	12		
3			e4.0	e16	21	17	9.2	8.2	9.6	11		
4			e4.5	e10	16	18	8.9	7.4	9.6	11		
5			e4.5	e10	15	14	8.7	7.7	9.6	11		
6			e5.0	31	15	12	8.6	7.8	9.6	11		
7			e6.0	40	15	11	8.4	7.6	10	11		
8			e7.0	26	17	11	8.0	7.2	11	11		
9			e20	16	15	10	7.9	7.2	11	11		
10			e50	14	13	21	8.9	7.4	12	11		
11			e85	14	13	140	9.4	7.3	11	17		
12			e60	17	12	50	8.2	7.2	10	11		
13			e40	21	12	28	12	7.5	9.8	11		
14			e27	19	12	21	20	7.6	9.8	12		
15			e25	20	11	18	12	8.8	9.1	12		
16			e20	21	11	15	9.9	8.8	9.1	11		
17			e15	18	11	13	8.8	8.4	10	11		
18			e10	18	11	12	8.2	8.3	17	11		
19			e9.0	17	10	11	8.0	8.3	14	11		
20			e8.0	18	9.9	11	7.8	8.1	11	11		
21			e10	18	9.7	11	7.7	8.0	11	11		
22			e12	18	9.6	11	7.3	7.8	11	11		
23			e10	17	9.6	11	7.0	8.1	10	11		
24			e9.0	16	9.8	12	7.2	10	10	11		
25			e15	15	11	17	8.4	25	10	11		
26			e20	19	11	16	8.6	20	10	11		
27			e50	19	11	11	8.0	13	10	11		
28			e40	20	22	10	7.8	12	10	11		
29			e28	22	17	10	7.3	11	10	11		
30			e25	20	18	9.6	7.2	10	10	11		
31			e20		34		7.4	10		e10		
TOTAL			647.0	564	438.6	605.6	275.4	292.4	314.8	350		
MEAN			20.9	18.8	14.1	20.2	8.88	9.43	10.5	11.3		
MAX			85	40	34	140	20	25	17	17		
MIN			4.0	10	9.6	9.6	7.0	7.2	9.1	10		
AC-FT			1280	1120	870	1200	546	580	624	694		

e Estimated

MILK RIVER BASIN

06134000 NORTH MILK RIVER NEAR INTERNATIONAL BOUNDARY

(International gaging station)

LOCATION.--Lat 49°01'19", long 112°58'16", in SW1/4NE1/4 sec.11, T.1, R.23 W., fourth meridian, in Alberta, Hydrologic Unit 10050001, on right bank 0.4 mi upstream from highway bridge, 1.6 mi north of international boundary, 2.8 mi east of Whiskey Gap, Alberta, 11 mi southeast of Kimball, Alberta, and at mile 49.9.

DRAINAGE AREA.--91.8 mi^2. Area at site used Apr. 12, 1930, to Aug. 15, 1962, 97.4 mi^2.

PERIOD OF RECORD.--July 1909 to October 1912 (seasonal records only), January 1913 to October 1922, March 1923 to current season (seasonal records only). Records for November and December 1912, published in WSP 1309, have been found to be unreliable and should not be used. Published as "near Kimball, Alberta" 1913-16. Prior to February 1962, published as North Fork Milk River near international boundary.

REVISED RECORDS.--WSP 1309: 1909-13, 1915(M), 1920(M), 1937(M). WSP 1559: 1948(M). WSP 1729: 1944(M). W 1983: Drainage area. See also PERIOD OF RECORD.

GAGE.--Water-stage recorder. Datum of gage is 4,112.16 ft above mean sea level (Geodetic Surveys of Canada datum). Prior to May 1913, nonrecording gage at site 2 mi downstream at different datum. May 1, 1913, to Apr. 11, 1930, water-stage recorder 700 ft downstream at different datum. Apr. 12, 1930, to Aug. 15, 1962, water-stage recorder 1,500 ft downstream at different datum.

REMARKS.--Estimated daily discharges: Mar. 1-27 and Oct. 29-31. Records good except those for estimated daily discharges, which are poor. Since 1917, flow increased during irrigation season by water from St. Mary Canal (station number 05018500). Several small diversions for irrigation upstream from station. U.S. Bureau of Reclamation satellite telemeter at station.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,950 ft^3/s, June 17, 1948, gage height, 6.47 ft, site and datum then in use, from rating curve extended above 1,500 ft^3/s; no flow Mar. 1, 2, 1940.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 1,100 ft3/s, June 11, gage height, 4.78 ft; minimum daily, 4.8 ft^3/s, Mar. 2.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e5.6	323	667	763	710	625	593	593		
2			e4.8	420	629	727	713	632	597	593		
3			e4.9	494	590	735	710	614	586	593		
4			e5.3	544	505	742	706	600	576	593		
5			e6.0	597	448	745	703	607	579	590		
6			e5.7	657	505	738	699	604	583	593		
7			e8.8	696	586	727	692	593	579	600		
8			e8.3	699	643	724	692	583	579	590		
9			e7.4	685	682	727	689	600	579	593		
10			e151	682	699	780	692	604	576	597		
11			e280	678	706	975	696	607	572	600		
12			e262	689	713	696	689	600	579	597		
13			e292	699	720	717	703	597	583	600		
14			e253	703	735	727	653	597	583	597		
15			e197	703	738	720	614	600	579	586		
16			e180	692	735	720	650	590	579	583		
17			e180	622	731	727	650	586	583	572		
18			e180	456	735	724	650	586	600	561		
19			e179	268	742	731	646	586	590	554		
20			e197	182	699	720	639	586	583	561		
21			e207	175	699	731	653	586	583	561		
22			e325	265	713	727	657	583	583	558		
23			e360	388	717	724	657	586	586	540		
24			e353	403	724	727	657	604	579	487		
25			e374	413	720	749	657	643	579	338		
26			e456	452	724	745	643	597	586	222		
27			e494	463	727	727	636	576	586	109		
28			494	516	759	724	629	572	590	42		
29			385	611	735	720	618	569	590	e21		
30			305	671	735	717	618	586	590	e13		
31			261		763		618	600		e9.2		
TOTAL			6421.8	15846	21224	22156	20639	18499	17510	14646.2		
MEAN			207	528	685	739	666	597	584	472		
MAX			494	703	763	975	713	643	600	600		
MIN			4.8	175	448	696	614	569	572	9.2		
AC-FT			12740	31430	42100	43950	40940	36690	34730	29050		

e Estimated

MILK RIVER BASIN

06134500 MILK RIVER AT MILK RIVER, ALBERTA

(International gaging station)

LOCATION.--Lat 49°08'37", long 112°04'44", in NE1/4 sec.21, T.2, R.16 W., fourth meridian, in Alberta, Hydrologic Unit 10050002, on right bank 5 ft downstream from highway bridge at Milk River, Alberta, 22 mi downstream from North Milk River, and at mile 613.4.

DRAINAGE AREA.--1,050 mi^2.

PERIOD OF RECORD.--June 1909 to October 1910 (no winter records), April 1911 to current year. Monthly discharge only for June 1909, published in WSP 1309.

REVISED RECORDS.--WSP 1309: 1912. WSP 1599: 1916, 1927(M), 1947(M). W 1983: Drainage area. W 1984: 1983 (M).

GAGE.--Water-stage recorder. Datum of gage is 3,402.78 ft above mean sea level (Geodetic Survey of Canada datum). Prior to June 17, 1919, nonrecording gages, and June 17, 1919, to Nov. 2, 1921, water-stage recorder at several sites 300 ft upstream at datum 0.61 ft higher. Nov. 3, 1921, to Aug. 28, 1947, water-stage recorder at site 60 ft upstream at present datum. Aug. 29, 1947, to Nov. 10, 1976, water-stage recorder located 700 ft downstream on left bank at present datum.

REMARKS.--Estimated daily discharges: Oct. 26-29 and Nov. 7 to Mar. 27. Records good except those for estimated daily discharges, which are poor. Since 1917, flow increased during irrigation season by water from St. Mary Canal (station number 05018500). Several diversions for irrigation upstream from station.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

AVERAGE DISCHARGE.--73 years (1916-89), 324 ft^3/s, 234,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,850 ft^3/s, Feb. 25, 1986, gage height, 12.46 ft, from flood-marks, from rating curve extended above 8,600 ft^3/s; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,160 ft^3/s, June 12, gage height, 5.65 ft; maximum gage height, 6.66 ft, Mar. 27, backwater from ice; minimum daily discharge, 0.35 ft^3/s, Jan. 8-10 and Feb. 1-3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.5	14	e8.3	e8.1	e.35	e1.5	597	766	886	756	639	657
2	6.4	13	e8.4	e7.9	e.35	e1.4	561	759	975	735	636	643
3	6.2	13	e8.6	e6.6	e.35	e1.5	604	717	908	731	629	643
4	5.9	12	e9.4	e5.6	e1.4	e1.6	667	685	851	727	622	625
5	6.0	11	e9.9	e6.3	e2.3	e2.0	724	618	858	720	614	611
6	6.2	9.9	e10	e4.7	e2.8	e21	837	558	851	713	632	611
7	6.2	e9.9	e9.9	e1.1	e3.2	e21	865	600	805	710	622	611
8	6.0	e9.7	e8.9	e.35	e3.2	e9.4	1010	675	773	699	614	604
9	6.1	e9.7	e9.5	e.35	e2.5	e21	1110	731	756	696	600	607
10	6.8	e9.5	e8.6	e.35	e1.9	e54	901	784	830	699	607	611
11	7.0	e9.5	e7.1	e.53	e2.2	e85	816	784	1580	696	604	611
12	6.9	e9.5	e6.5	e.71	e2.9	e82	784	766	1940	689	604	611
13	6.8	e9.0	e6.7	e1.1	e2.7	e237	780	770	1550	685	611	618
14	6.9	e8.8	e6.0	e1.4	e3.2	e262	795	773	1090	738	611	629
15	7.1	e8.9	e9.8	e1.8	e2.4	e281	819	780	929	706	611	618
16	7.2	e9.9	e6.0	e2.1	e1.8	e176	833	773	855	816	611	607
17	7.8	e9.7	e6.7	e2.5	e1.9	e325	848	759	830	780	597	614
18	7.8	e7.9	e8.0	e2.8	e1.1	e342	837	752	812	738	593	639
19	8.2	e11	e8.1	e3.0	e1.1	e364	738	745	788	720	604	636
20	8.2	e15	e8.3	e3.2	e2.9	e417	597	749	766	696	611	622
21	8.0	e15	e8.5	e3.1	e3.2	e243	456	717	763	682	600	639
22	8.8	e15	e8.4	e3.0	e3.0	e290	420	713	766	675	593	639
23	8.5	e16	e8.3	e3.1	e2.8	e420	441	720	759	682	590	632
24	8.5	e19	e7.4	e3.4	e3.9	e572	554	724	770	696	600	629
25	8.2	e18	e6.0	e4.8	e3.5	e625	597	735	830	696	660	622
26	e9.3	e14	e4.1	e6.4	e1.8	e717	600	724	844	678	689	622
27	e9.3	e14	e2.8	e6.0	e1.1	e1060	632	731	883	664	735	629
28	e11	e13	e2.1	e5.3	e1.2	1270	636	837	855	671	742	629
29	e12	e10	e2.8	e6.0	---	1170	664	840	805	660	682	629
30	11	e9.2	e4.8	e6.7	---	911	735	819	780	650	653	632
31	12	---	e8.1	e4.9	---	720	---	e860	---	639	660	---
TOTAL	242.8	354.1	228.0	113.19	61.05	10703.4	21458	22964	27688	21843	19476	18730
MEAN	7.83	11.8	7.35	3.65	2.18	345	715	741	923	705	628	624
MAX	12	19	10	8.1	3.9	1270	1110	860	1940	816	742	657
MIN	5.9	7.9	2.1	.35	.35	1.4	420	558	756	639	590	604
AC-FT	482	702	452	225	121	21230	42560	45550	54920	43330	38630	37150

CAL YR 1988 TOTAL 91619.5 MEAN 250 MAX 932 MIN 2.1 AC-FT 181700
WTR YR 1989 TOTAL 143861.54 MEAN 394 MAX 1940 MIN .35 AC-FT 285300

e Estimated

MILK RIVER BASIN

06134700 VERDIGRIS COULEE NEAR THE MOUTH, NEAR MILK RIVER, ALBERTA

(International gaging station)

LOCATION.--Lat 49°06'39", long 111°45'31", in NW1/4 sec.12, T.2, R.14 W., fourth meridian, in Alberta, Hydrologic Unit 10050002, on left bank, 0.6 mi upstream from mouth, 5 mi downstream from culvert on provincial highway 501, and 15 mi east of Milk River, Alberta.

DRAINAGE AREA.--137 mi^2, of which 130 mi^2 is probably noncontributing.

PERIOD OF RECORD.--May 1985 to current season (seasonal records only).

GAGE.--Water-stage recorder. Elevation of gage is 3,040 ft, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 5, Aug. 22-29, Oct. 29-31, and Nov. 21-30. Records fair except those for estimated daily discharges, which are poor. Nearly all flow is the result of interbasin diversion from St. Mary River into Weston Lake 25 miles upstream.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 62 ft^3/s, June 11, 1989, gage height, 6.27 ft; no flow at times most years.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 62 ft^3/s, June 11, gage height, 6.27 ft; no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	e.32	1.0	9.6	19	8.0	8.5	8.1	1.5	
2			e.00	e.28	7.2	11	18	7.4	8.4	5.2	.57	
3			e.00	e.14	6.8	11	18	8.2	9.0	2.5	1.8	
4			e.00	e.11	6.0	11	18	10	9.0	2.6	5.1	
5			e.00	e.11	2.0	11	18	6.4	6.8	5.6	5.7	
6			e.00	.25	1.6	11	17	3.2	8.7	4.8	4.7	
7			e.00	.25	2.2	12	17	1.8	7.8	3.4	4.5	
8			e.00	.14	1.1	12	16	2.2	7.4	7.4	5.7	
9			e1.8	.07	.25	11	17	2.5	6.3	5.4	1.6	
10			e3.5	.04	.07	18	16	2.5	5.9	6.0	2.9	
11			e.35	.04	1.4	55	16	1.6	2.4	7.0	.81	
12			e.00	.04	.64	30	16	1.7	.71	5.8	.39	
13			e.00	4.5	.49	21	17	1.1	.99	4.0	.11	
14			e.00	6.3	.28	19	21	1.1	2.2	4.6	.04	
15			e.00	5.6	.07	18	17	.92	2.8	3.5	.04	
16			e.00	7.9	.04	18	15	3.2	1.4	2.7	.00	
17			e.00	6.3	.32	18	15	1.8	5.0	1.8	.00	
18			e.00	6.7	.32	18	15	2.0	7.6	.25	2.0	
19			e.00	7.1	2.1	17	15	1.7	4.6	2.9	5.3	
20			e.00	6.4	5.8	18	14	.88	6.1	2.3	.42	
21			e.00	5.3	.81	18	13	1.3	3.5	3.5	e.21	
22			e.04	6.4	.07	18	13	e1.4	4.8	2.3	e.00	
23			e.64	6.8	.25	19	13	e2.4	1.1	1.4	e.00	
24			e1.1	5.7	1.0	19	12	e3.4	5.5	2.7	e.00	
25			e1.7	4.1	8.5	23	14	e4.4	4.2	1.5	e.00	
26			e20	4.7	.92	21	14	e5.4	4.0	1.4	e.00	
27			e26	11	.74	19	12	e6.4	5.7	1.8	e.00	
28			e14	11	9.3	19	11	e7.3	6.0	7.1	e.00	
29			e4.9	8.3	20	19	12	e8.3	4.0	e2.1	e.00	
30			e2.8	4.7	16	19	10	9.3	4.5	e1.8	e.00	
31			e.39		9.8		8.9	9.7		e2.5		
TOTAL			77.22	120.59	107.07	543.6	467.9	127.50	154.90	113.95	43.39	
MEAN			2.49	4.02	3.45	18.1	15.1	4.11	5.16	3.68	1.45	
MAX			26	11	20	55	21	10	9.0	8.1	5.7	
MIN			.00	.04	.04	9.6	8.9	.88	.71	.25	.00	
AC-FT			153	239	212	1080	928	253	307	226	86	

e Estimated

MILK RIVER BASIN

06135000 MILK RIVER AT EASTERN CROSSING OF INTERNATIONAL BOUNDARY

(International gaging station)

LOCATION.--Lat 48°59'03", long 110°28'10", in SE1/4NE1/4NW1/4 sec.7, T.37 N., R.10 E., Hill County, Hydrologic Unit 10050002, on right bank 1.1 mi south of international boundary, 6.5 mi upstream from Lost River, 12.5 mi northwest of Simpson, 29.5 mi north of Rudyard, and at mile 484.1.

DRAINAGE AREA.--2,506 mi^2.

PERIOD OF RECORD.--August 1909 to current season (seasonal records only). A few winter records were collected and are on file in the Helena district office. Monthly discharge only for April 1912, published in WSP 1309.

REVISED RECORDS.--WSP 1086: 1927, 1935. WSP 1559: 1920(M), 1922(M), 1926, 1928(M), 1929, 1930(M), 1932(M). WSP 1729: 1921-13, 1921-22, 1929(M). W 1983: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,659.64 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Oct. 1, 1970, water-stage recorder or nonrecording gages of several sites within 10.5 mi upstream at different datum.

REMARKS.--Estimated daily discharges: Mar. 1-26 and Oct. 31. Records fair except those for estimated daily discharges, which are poor. Since 1917, flow increased during irrigation season by water from St. Mary Canal (station number 05018500). Many diversions for irrigation upstream from station. Several observations of water temperature and specific conductance were made during the year. U.S. Bureau of Reclamation satellite telemeter at station.

COOPERATION.--This is one of a number of stations which are maintained jointly by the United States and Canada.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft^3/s, Apr. 9, 1965, gage height, 9.53 ft, site and datum then in use, but may have been higher Mar. 28, 1952; maximum gage height, 13.65 ft, Mar. 28, 1952 (backwater from ice), site and datum then in use; no flow at times.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 4,000 ft^3/s, Mar. 26, gage height, 8.20 ft; maximum gage height, 8.41 ft, Mar. 24, backwater from ice; minimum daily discharge, 0.01 ft^3/s, Mar. 1-5.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.01	1030	681	780	904	597	660	663		
2			e.01	797	804	822	838	582	637	668		
3			e.01	591	810	882	810	575	655	649		
4			e.01	483	778	1030	788	551	649	641		
5			e.01	473	742	991	778	571	622	647		
6			e2.0	572	660	983	779	575	631	613		
7			e5.0	722	656	942	752	561	612	621		
8			e20	842	653	962	725	544	632	636		
9			e110	876	724	989	714	563	628	609		
10			e150	1050	833	1010	706	546	617	592		
11			e120	1130	1000	1160	714	520	604	591		
12			e80	905	1090	1290	743	488	609	558		
13			e40	813	1020	2260	766	501	605	583		
14			e15	761	867	2040	819	500	597	613		
15			e12	759	764	1570	858	551	597	615		
16			e10	819	745	1270	891	618	611	607		
17			e15	884	775	1080	1080	570	609	608		
18			e20	892	803	977	870	582	641	597		
19			e50	863	779	928	836	518	663	599		
20			e80	830	796	903	809	488	663	561		
21			e120	644	717	854	766	501	651	576		
22			e200	479	740	793	726	513	652	552		
23			e350	369	765	729	681	505	633	558		
24			e550	361	772	756	711	500	648	550		
25			e900	378	858	873	622	641	655	564		
26			e2500	613	831	831	684	574	648	530		
27			2390	867	817	802	663	591	630	512		
28			2190	644	968	861	705	618	621	471		
29			2180	598	1140	915	604	644	625	378		
30			2030	637	1070	927	586	745	636	313		
31			1300	---	874	---	594	718	---	e270		
TOTAL			15439.05	21682	25532	31210	23522	17551	18941	17545		
MEAN			498	723	824	1040	759	566	631	566		
MAX			2500	1130	1140	2260	1080	745	663	668		
MIN			.01	361	653	729	586	488	597	270		
AC-FT			30620	43010	50640	61910	46660	34810	37570	34800		

e Estimated

MILK RIVER BASIN

06137400 BIG SANDY CREEK AT RESERVATION BOUNDARY, NEAR ROCKY BOY, MT

LOCATION.--Lat 48°10'21", long 109°49'31", in SE1/4NE1/4NW1/4 sec. 20, T.28 N., R.15 E., Chouteau County, Hydrologic Unit 10050005, on left bank 1.0 mi downstream from Muddy Creek, 6.0 mi south of Rocky Boy Agency, and at mile 90.5.

DRAINAGE AREA.--24.7 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1982 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 3,830 ft above National Geodetic Vertical Datum of 1929,, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 15-21, 25-28, Nov. 30 to Dec. 2, Dec. 4,5, 7-11, 14-17, Dec. 20 to Mar. 12, Mar. 14-21,23,24. Water-discharge records fair except those for estimated daily discharges, which are poor. No known regulation or diversions upstream of station.

AVERAGE DISCHARGE.--7 years, 7.27 ft^3/s, 5,270 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 371 ft^3/s, May 23, 1986, gage height, 4.84 ft; minimum, 0.29 ft^3/s, Mar. 31, Aug. 11, 20, 1988, gage height, 2.10 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 30 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 12	0800	*unknown	*a3.71	No other peak greater than base discharge.			

a--backwater from ice.

Minimum daily discharge, 0.60 ft^3/s, Jan. 9.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.91	2.1	e1.6	e1.4	e2.0	e.70	5.1	6.8	18	8.6	3.8	5.5
2	1.0	2.2	e1.6	e1.6	e.80	e.70	4.4	6.9	24	8.2	3.5	4.6
3	1.0	2.2	1.6	e1.7	e.65	e.70	3.8	6.9	21	7.7	3.4	4.4
4	1.1	2.1	e1.3	e1.9	e.80	e.70	3.5	6.9	20	7.0	3.4	4.6
5	1.1	1.9	e1.3	e1.7	e.90	e.75	3.5	6.9	18	6.5	3.8	4.1
6	1.3	1.8	1.3	e1.6	e1.0	e1.0	3.7	6.5	16	6.3	3.6	3.9
7	1.3	1.7	e1.0	e1.2	e.90	e1.4	5.4	6.7	15	6.1	3.3	3.8
8	1.3	1.8	e1.0	e.70	e.80	e1.8	5.7	9.7	14	5.7	3.2	3.8
9	1.3	1.6	e1.0	e.60	e.70	e2.5	3.8	9.9	12	5.4	3.0	3.7
10	1.4	1.5	e1.0	e.70	e.80	e10	3.7	8.8	12	6.0	3.0	3.8
11	1.4	1.6	e1.2	e.80	e.80	e30	4.9	8.0	17	5.6	2.9	4.0
12	1.5	1.6	1.3	e.90	e.80	e25	6.5	7.4	18	5.2	2.2	3.8
13	1.5	1.6	1.3	e1.0	e.80	20	8.5	12	13	5.3	1.8	3.5
14	1.3	1.6	e1.3	e.90	e.80	e8.0	9.8	12	11	6.4	2.1	3.5
15	1.4	e1.5	e1.2	e.80	e.75	e5.0	14	9.0	11	5.7	2.2	3.4
16	2.3	e1.3	e1.6	e.90	e.70	e3.0	13	8.3	16	5.4	5.1	3.3
17	2.4	e1.2	e3.5	e1.0	e.65	e2.5	6.5	8.1	12	5.3	4.2	3.2
18	2.2	e1.2	4.9	e1.1	e.65	e2.2	6.0	7.9	10	5.5	3.6	5.0
19	1.8	e1.3	4.2	e1.1	e.70	e2.2	7.6	7.6	9.7	5.0	3.3	5.0
20	1.8	e1.3	e3.0	e1.2	e.80	e2.4	10	6.8	9.0	4.8	3.2	4.0
21	1.8	e1.4	e2.8	e1.2	e.80	e2.4	13	6.2	11	4.5	3.1	3.7
22	1.8	1.6	e2.0	e1.1	e.75	2.4	12	6.1	10	5.1	3.3	3.6
23	1.7	1.6	e1.8	e1.0	e.90	e2.5	10	6.1	9.8	4.6	4.7	3.3
24	2.0	1.5	e1.7	e1.0	e1.0	e2.5	8.2	6.4	9.6	4.4	6.6	3.1
25	2.0	e1.3	e1.6	e.90	e.90	3.3	6.6	19	12	4.6	14	3.1
26	1.9	e1.1	e1.5	e1.0	e.90	4.9	8.3	14	13	4.4	9.5	3.2
27	1.8	e.90	e1.4	e1.3	e.90	5.2	12	11	12	4.3	5.8	3.2
28	1.8	e1.1	e1.3	e1.8	e.80	6.1	8.7	9.6	17	4.0	5.6	3.2
29	1.6	1.6	e1.4	e2.5	---	5.9	7.4	15	13	3.8	5.8	3.2
30	1.7	e1.6	e1.6	e3.5	---	5.8	6.5	17	10	3.6	4.9	3.2
31	1.8	---	e1.5	e4.0	---	5.7	---	17	---	3.6	6.8	---
TOTAL	49.21	46.80	54.8	42.10	23.75	167.25	222.1	290.5	414.1	168.6	134.7	113.7
MEAN	1.59	1.56	1.77	1.36	.85	5.40	7.40	9.37	13.8	5.44	4.35	3.79
MAX	2.4	2.2	4.9	4.0	2.0	30	14	19	24	8.6	14	5.5
MIN	.91	.90	1.0	.60	.65	.70	3.5	6.1	9.0	3.6	1.8	3.1
AC-FT	98	93	109	84	47	332	441	576	821	334	267	226

CAL YR 1988 TOTAL 708.82 MEAN 1.94 MAX 22 MIN .42 AC-FT 1410
WTR YR 1989 TOTAL 1727.61 MEAN 4.73 MAX 30 MIN .60 AC-FT 3430

e Estimated

MILK RIVER BASIN

06137400 BIG SANDY CREEK AT RESERVATION BOUNDARY, NEAR ROCKY BOY, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1982-84, 1987 to current year (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (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											
05...	1025	0.89	--	--	398	7.5	7.5	--	--	--	--
NOV											
15...	1200	1.6	--	--	402	-3.0	0.5	--	--	--	--
DEC											
28...	0900	1.3	--	--	410	-20.0	0.0	--	--	--	--
FEB											
09...	1400	0.78	--	--	478	-3.0	0.0	--	--	--	--
MAR											
22...	1212	2.7	--	--	357	0.0	0.0	--	--	--	--
MAY											
03...	0910	7.2	95	2	345	3.0	6.0	8.1	140	3	39
JUN											
14...	1110	12	95	2	329	18.0	13.0	7.9	120	0	34
JUL											
25...	1730	5.0	--	0	350	25.0	21.5	8.4	130	0	37
AUG											
29...	1000	5.8	0	0	350	13.0	11.5	8.1	140	0	39

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	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, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)
MAY											
03...	11	13	0.5	10	140	37	1.6	0.20	15	211	0.29
JUN											
14...	9.6	13	0.5	12	135	31	1.3	0.20	17	200	0.27
JUL											
25...	10	14	0.5	13	154	27	1.3	0.20	18	213	0.29
AUG											
29...	11	14	0.5	13	159	27	0.30	0.20	18	218	0.30

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	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)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
MAY											
03...	4.10	--	1	30	2	<1	20	2	22	<0.1	<1
JUN											
14...	6.47	0.130	--	30	--	--	26	--	--	--	--
JUL											
25...	2.87	<0.100	--	20	--	--	21	--	--	--	--
AUG											
29...	3.41	<0.100	--	30	--	--	20	--	--	--	--

MILK RIVER BASIN

06137570 BOXELDER CREEK NEAR ROCKY BOY, MT

LOCATION.--Lat 48°18'07", long 109°50'37", in SW1/4SW1/4NW1/4 sec.6, T.29 N., R.15 E., Hill County, Hydrologic Unit 10050005, on Rocky Boy Indian Reservation, on right bank 1,000 ft upstream from Bonneau Reservoir, 4,000 ft downstream from Wolf Creek, 4.1 mi northwest of Rocky Boy Agency, and a mile 14.0.

DRAINAGE AREA.--48.2 mi^2.

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

GAGE.--Water-stage recorder. Elevation of gage is 3,225 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 17-19, 25-29, Dec. 21 to Mar. 11, and Mar. 15-23. Records excellent for period of no flow and good for period of flow except those for estimated daily discharges, which are poor. Other than beaver dams no known regulation or diversions upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--14 years, 9.07 ft^3/s, 6,570 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 898 ft^3/s, May 23, 1986, gage height, 10.95 ft, from outside highwater mark; no flow July 26 to Oct. 20, 1988.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 30 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 6	1730	ice jam	*10.06	May 30	0130	30	6.89
Mar. 26	0130	*36	7.00				

No flow Oct. 1-20.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.27	.91	e.66	e2.5	e1.7	5.7	8.6	15	6.9	1.7	3.9
2	.00	.29	.90	e.76	e1.5	e1.6	5.1	8.0	16	6.3	1.7	2.9
3	.00	.29	.89	e.90	e1.0	e1.5	4.5	8.2	15	6.0	1.6	2.5
4	.00	.29	.92	e1.2	e1.2	e1.5	4.2	8.1	14	5.7	1.5	2.5
5	.00	.30	.92	e1.0	e1.4	e1.4	4.0	7.9	13	5.5	1.8	2.4
6	.00	.33	.90	e.80	e1.7	e2.5	4.2	7.5	12	5.2	1.9	2.5
7	.00	.30	.78	e.60	e2.0	e6.0	4.5	7.7	12	4.9	1.7	2.4
8	.00	.32	.83	e.50	e1.8	e12	4.8	9.6	11	4.7	1.6	2.3
9	.00	.34	.96	e.45	e1.7	e25	4.8	9.5	11	4.6	1.7	2.3
10	.00	.34	.95	e.50	e1.8	e20	4.4	8.4	10	4.7	1.5	2.2
11	.00	.41	1.0	e.55	e1.9	e15	4.1	7.5	12	4.7	1.3	2.2
12	.00	.41	1.1	e.70	e2.1	10	3.8	7.5	14	4.3	1.3	2.1
13	.00	.42	1.2	e1.0	e2.0	7.8	3.8	10	12	4.3	1.3	1.9
14	.00	.44	1.0	e.90	e1.8	7.1	4.2	12	11	4.9	1.3	1.8
15	.00	.59	1.0	e.80	e1.6	e6.6	4.8	12	9.8	4.7	1.3	1.8
16	.00	.56	1.2	e1.0	e1.5	e6.0	6.0	11	11	4.3	2.1	1.7
17	.00	e.50	1.2	e2.0	e1.4	e5.6	7.7	10	10	4.1	2.1	1.8
18	.00	e.55	1.4	e3.0	e1.3	e5.2	6.5	9.1	9.2	3.9	1.8	3.5
19	.00	e.60	1.3	e2.0	e1.5	e5.0	5.5	9.7	8.3	3.6	2.0	3.8
20	.00	.64	1.3	e2.0	e1.7	e4.8	5.2	7.9	7.8	3.2	1.8	3.8
21	.01	.72	e1.0	e3.0	e2.2	e4.8	5.7	7.0	8.0	3.0	1.7	2.6
22	.04	.81	e.90	e2.6	e2.0	e5.5	7.7	6.6	8.4	2.9	1.6	2.2
23	.06	.84	e.80	e2.2	e2.3	e6.0	8.5	6.3	8.9	2.9	2.3	2.2
24	.11	.76	e.75	e2.0	e3.0	6.7	9.0	6.5	8.8	2.6	2.9	2.1
25	.13	e.60	e.70	e1.9	e2.5	9.8	7.8	10	9.5	2.8	6.1	2.1
26	.16	e.60	e.65	e2.1	e2.0	25	9.6	13	10	2.6	4.6	2.0
27	.20	e.55	e.65	e2.5	e2.0	13	15	11	9.6	2.5	3.6	1.9
28	.21	e.60	e.60	e2.8	e1.8	12	16	9.7	11	2.4	3.9	1.9
29	.22	e.70	e.65	e2.5	---	11	11	16	9.6	2.1	3.7	1.9
30	.29	.85	e.80	e3.3	---	8.5	9.9	25	7.9	2.0	3.0	2.2
31	.27	---	e.72	e4.0	---	6.2	---	17	---	1.8	4.6	---
TOTAL	1.70	15.22	28.88	50.22	51.2	254.8	198.0	308.3	325.8	124.1	71.0	71.4
MEAN	.055	.51	.93	1.62	1.83	8.22	6.60	9.95	10.9	4.00	2.29	2.38
MAX	.29	.85	1.4	4.0	3.0	25	16	25	16	6.9	6.1	3.9
MIN	.00	.27	.60	.45	1.0	1.4	3.8	6.3	7.8	1.8	1.3	1.7
AC-FT	3.4	30	57	100	102	505	393	612	646	246	141	142

CAL YR 1988 TOTAL 720.22 MEAN 1.97 MAX 15 MIN .00 AC-FT 1430
WTR YR 1989 TOTAL 1500.62 MEAN 4.11 MAX 25 MIN .00 AC-FT 2980

e Estimated

MILK RIVER BASIN

06137580 SAGE CREEK NEAR WHITLASH, MT

LOCATION.--Lat 48°53'30", long 111°01'47", in NW1/4NW1/4SW1/4 sec.12, T.36 N., R.5 E., Liberty County, Hydrologic Unit 10050006, on left bank, 0.2 mi downstream from bridge on Black Jack Road, 10 mi southeast of Whitlash.

DRAINAGE AREA.--7.26 mi^2.

PERIOD OF RECORD.--October 1976 to September 1982, October 1984 to current year.

GAGE.--Water-stage recorder, Parshall flume, and V-notch sharp-crested weir. Elevation of gage is 3,900 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Dec. 21,25,26, Dec. 31 to Jan. 2, Jan. 4-13, 15, 17-19, Jan. 29 to Mar. 10, Mar. 14-23. Records good except those below 0.2 ft^3/s, which are fair, those below 0.1 ft^3/s, which are poor, and those for estimated daily discharges, which are poor. No known regulation upstream of station. Diversions for irrigation of about 40 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--11 years, (1977-82, 1985-89), 2.54 ft^3/s 1,840 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 100 ft^3/s, Aug. 10, 1982, gage height, 3.04 ft; no flow part of several days during some years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 20 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
June 2	0045	*54	*2.50	June 11	1515	51	2.44

Mininum daily discharge, 0.15 ft^3/s, Feb. 1.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.78	.72	.59	e.35	e.15	e.35	1.7	8.2	43	5.2	2.3	2.6
2	.89	.70	.56	e.40	e.16	e.34	1.6	11	45	4.9	2.2	2.5
3	.93	.70	.51	.42	e.18	e.30	1.5	12	32	4.5	2.1	2.4
4	.94	.68	.52	e.60	e.20	e.25	1.7	11	26	4.1	2.0	2.3
5	.90	.63	.52	e.55	e.22	e.30	1.7	11	21	4.0	2.0	2.3
6	.84	.66	.47	e.45	e.24	e.40	2.2	11	18	3.7	1.8	2.3
7	.81	.62	.30	e.35	e.24	e.60	4.6	10	15	3.5	1.7	2.3
8	.79	.58	.29	e.25	e.23	e1.0	2.1	9.8	14	3.3	1.5	2.2
9	.82	.53	.46	e.25	e.24	e4.0	2.2	8.8	12	3.3	1.5	2.0
10	.81	.56	.43	e.30	e.30	e10	2.0	8.6	13	3.5	1.4	2.0
11	.77	.66	.51	e.40	e.33	6.4	2.2	7.9	30	3.3	1.4	1.9
12	.74	.54	.63	e.50	e.35	1.8	2.8	7.1	28	2.8	1.2	1.8
13	.76	.44	.63	e.60	e.35	1.2	3.0	6.5	22	3.8	1.4	1.7
14	.76	.27	.32	.50	e.33	e.70	3.2	6.0	19	7.1	1.6	1.6
15	.76	.42	.41	e.45	e.30	e.50	4.7	5.3	17	5.1	1.3	1.5
16	.82	.63	.43	.50	e.29	e.60	2.6	4.8	15	4.1	1.7	1.4
17	.87	.63	.51	e.60	e.28	e.65	3.7	4.5	13	4.1	1.3	1.5
18	.81	.63	.73	e.65	e.28	e.70	2.8	4.5	12	3.6	1.3	2.5
19	.76	.59	.36	e.55	e.30	e.70	3.2	4.3	10	3.3	1.3	1.9
20	.76	.57	.38	.56	e.35	e.70	4.6	3.9	9.5	3.2	1.3	1.7
21	.75	.70	e.45	.61	e.40	e.70	5.9	3.6	8.8	3.1	1.2	1.5
22	.84	.76	.47	.50	e.35	e.75	7.0	3.4	7.9	2.9	1.1	1.5
23	.76	.78	.46	.47	e.34	e.80	5.5	3.3	7.6	2.8	1.3	1.5
24	.70	.43	.45	.44	e.40	.80	4.4	3.8	7.1	2.9	1.5	1.4
25	.70	.45	e.45	.43	e.50	2.9	4.1	5.2	9.0	3.3	4.2	1.4
26	.69	.31	e.45	.47	e.45	4.7	5.1	4.1	7.7	2.8	4.0	1.3
27	.45	.38	.43	.50	e.40	3.6	5.1	4.3	6.9	2.7	3.2	1.2
28	.70	.52	.38	.50	e.38	2.4	5.7	12	6.3	2.8	2.8	1.3
29	.66	.43	.42	e.60	---	1.8	7.1	11	6.1	2.5	2.7	1.3
30	.83	.49	.43	e.80	---	1.9	7.3	14	5.4	2.4	2.6	1.2
31	.76	---	e.40	e.30	---	1.7	---	28	---	2.3	2.6	---
TOTAL	24.16	17.01	14.35	14.85	8.54	53.54	111.3	248.9	487.3	110.9	59.5	54.0
MEAN	.78	.57	.46	.48	.30	1.73	3.71	8.03	16.2	3.58	1.92	1.80
MAX	.94	.78	.73	.80	.50	10	7.3	28	45	7.1	4.2	2.6
MIN	.45	.27	.29	.25	.15	.25	1.5	3.3	5.4	2.3	1.1	1.2
AC-FT	48	34	28	29	17	106	221	494	967	220	118	107

CAL YR 1988 TOTAL 217.64 MEAN .59 MAX 3.9 MIN .02 AC-FT 432
WTR YR 1989 TOTAL 1204.35 MEAN 3.30 MAX 45 MIN .15 AC-FT 2390

e Estimated

06139500 BIG SANDY CREEK NEAR HAVRE, MT

LOCATION.--Lat 48°31'36", long 109°50'27", in SW1/4SW1/4SW1/4 sec.18, T.32 N., R.15 E., Hill County, Hydrologic Unit 10050005, on right bank, 6 mi upstream from mouth, 7.7 mi west southwest of Havre post office, and 22 mi downstream from Sage Creek.

DRAINAGE AREA.--1,805 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--February 1946 to November 1953 (monthly discharge only for February 1946, published in WSP 1309 as "Big Sandy Creek near Assinniboine"), annual maximum, water years 1955-67 (published as "Big Sandy Creek near Assinniboine"), and May 1984 to current year (seasonal records only).

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 2,510 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--No estimated daily discharges this year. Water-discharge records fair. Diversions for irrigation of about 1,000 acres upstream from station.

AVERAGE DISCHARGE.--7 years (water years, 1947-53), 25.2 ft^3/s, 18,240 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,570 ft^3/s, Apr. 3, 1952, gage height, 14.70 ft, from floodmarks; no flow at times most years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 30, 1978, reached a stage of 15.15 ft, from floodmarks, discharge, about 6,000 $ft^3 3/s$.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 42 ft^3/s, June 28, gage height, 2.89 ft; no flow many days.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1				35	13	2.9	6.9	.00	.14			
2				30	11	3.2	7.8	.00	.11			
3				25	9.2	2.9	7.1	.00	.08			
4				19	7.1	2.3	5.1	.00	.05			
5				17	4.4	1.8	3.8	.00	.02			
6				15	2.7	1.2	3.0	.00	.00			
7				12	1.7	.77	2.6	.00	.00			
8				10	.90	.51	2.2	.00	.00			
9				8.6	.63	1.2	1.8	.00	.00			
10				7.6	.33	8.4	1.3	.00	.00			
11				6.7	.50	8.9	1.1	.00	.00			
12				5.8	.43	9.2	.75	.00	.00			
13				5.1	.69	11	.48	.00	.00			
14				4.3	.76	12	.69	.00	.00			
15				3.5	4.8	13	.65	.00	.00			
16				3.4	11	12	.42	.00	.00			
17				3.2	2.7	9.4	.78	.00	.00			
18				3.1	1.8	5.7	.57	.00	.01			
19				2.9	1.3	3.0	.28	.00	.11			
20				2.6	.88	1.8	.36	.00	.07			
21				2.6	.54	1.1	.22	.00	.04			
22				2.1	.43	.90	.16	.00	.01			
23				2.2	.29	.66	.13	.00	.00			
24				5.8	.22	.39	.11	.05	.00			
25				3.8	.23	.51	.13	1.8	.00			
26				4.4	.71	1.1	.09	.72	.00			
27				13	.82	7.8	.06	.27	.00			
28				12	.87	17	.03	.19	.00			
29				12	1.9	15	.00	.15	.00			
30				13	2.5	7.4	.00	.17	.00			
31					3.1		.00	.18				
TOTAL				290.7	87.43	163.04	48.61	3.53	0.64			
MEAN				9.69	2.82	5.43	1.57	.11	.021			
MAX				35	13	17	7.8	1.8	.14			
MIN				2.1	.22	.39	.00	.00	.00			
AC-FT				577	173	323	96	7.0	1.3			

MILK RIVER BASIN

06139500 BIG SANDY CREEK NEAR HAVRE, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1986 to current year.

REMARKS.--Some scheduled sampling was not possible as there were periods of no streamflow.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
MAR							
21...	0900	16	98	2	435	-6.0	0.0
30...	1310	62	--	--	452	11.0	6.0
APR							
17...	1820	--	--	--	1770	6.0	11.5
MAY							
03...	1245	9.6	80	1	1250	16.5	16.0
23...	1340	0.24	--	--	2230	27.0	19.0
JUN							
15...	1215	13	20	1	1060	24.0	23.0
21...	1740	0.86	--	--	819	24.0	20.0
JUL							
18...	0730	0.70	10	1	1040	19.0	18.0

DATE	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
MAR						
21...	662	10.2	80	160	0	133
MAY						
03...	695	10.3	115	372	24	344
JUN						
15...	692	10.5	136	313	33	308
JUL						
18...	702	5.4	62	194	66	267

DATE	TIME	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
MAR										
21...	0900	8.00	120	0	28	12	40	2	11	134
MAY										
03...	1245	8.70	270	0	50	35	180	5	8.8	349
JUN										
15...	1215	9.00	200	0	22	35	160	5	8.1	306
JUL										
18...	0730	9.50	120	0	9.6	23	180	7	6.3	277

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, 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, NITRATE TOTAL (MG/L AS N) (00620)	NITRO-GEN, NITRITE TOTAL (MG/L AS N) (00615)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)
MAR										
21...	73	8.8	0.20	12	265	0.36	11.5	0.340	0.060	0.400
MAY										
03...	280	27	0.30	7.5	795	1.08	20.6	--	0.010	<0.100
JUN										
15...	220	17	0.30	0.33	648	0.88	22.7	--	<0.010	<0.100
JUL										
18...	200	36	0.30	0.48	616	0.84	1.16	--	<0.010	0.200

MILK RIVER BASIN

06139500 BIG SANDY CREEK NEAR HAVRE, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
MAR 21...	0.360	1.1	1.5	0.340	0.250	100	370	67	2.9	49
MAY 03...	0.020	0.48	0.50	0.040	0.010	310	8	19	0.49	--
JUN 15...	0.020	0.88	0.90	0.030	0.010	340	10	84	2.9	93
JUL 18...	<0.010	--	0.90	0.040	<0.010	350	31	20	0.04	87

DATE	ARSENIC TOTAL (UG/L AS AS) (01002)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE) (01012)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	SELENIUM, TOTAL (UG/L AS SE) (01147)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)
JUN 15...	4	<10	<1	<1	4	650	3	20	<0.10	4	<1	<10
JUL 18...	5	<10	<1	12	12	760	3	20	<0.10	7	<1	10

DATE	TIME	ALDRIN, TOTAL (UG/L) (39330)	CHLORDANE, TOTAL (UG/L) (39350)	DDD, TOTAL (UG/L) (39360)	DDE, TOTAL (UG/L) (39365)	DDT, TOTAL (UG/L) (39370)	DIAZINON, TOTAL (UG/L) (39570)	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L) (82052)	DIELDRIN TOTAL (UG/L) (39380)	ENDOSULFAN, TOTAL (UG/L) (39388)	ENDRIN, TOTAL (UG/L) (39390)
JUN 15...	1215	<0.010	<0.1	<0.010	<0.010	<0.010	<0.01	<0.01	<0.010	<0.010	<0.010
JUL 18...	0730	<0.010	<0.1	<0.010	<0.010	<0.010	<0.01	0.01	<0.010	<0.010	<0.010

DATE	ETHION, TOTAL (UG/L) (39398)	HEPTACHLOR, TOTAL (UG/L) (39410)	HEPTACHLOR EPOXIDE TOTAL (UG/L) (39420)	LINDANE TOTAL (UG/L) (39340)	MALATHION, TOTAL (UG/L) (39530)	METHOXYCHLOR, TOTAL (UG/L) (39480)	METHYL PARATHION, TOTAL (UG/L) (39600)	METHYL TRITHION, TOTAL (UG/L) (39790)	MIREX, TOTAL (UG/L) (39755)	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L) (39250)
JUN 15...	<0.01	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10
JUL 18...	<0.01	<0.010	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10

DATE	PARATHION, TOTAL (UG/L) (39540)	PCB, TOTAL (UG/L) (39516)	PERTHANE TOTAL (UG/L) (39034)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L) (39720)	SILVEX, TOTAL (UG/L) (39760)	TOXAPHENE, TOTAL (UG/L) (39400)	TOTAL TRITHION (UG/L) (39786)	2,4-D, TOTAL (UG/L) (39730)	2, 4-DP TOTAL (UG/L) (82183)	2,4,5-T TOTAL (UG/L) (39740)
JUN 15...	<0.01	<0.1	<0.1	<0.01	<0.01	<1	<0.01	<0.01	<0.01	<0.01
JUL 18...	<0.01	<0.1	<0.1	<0.01	<0.01	<1	<0.01	0.73	<0.01	<0.01

MILK RIVER BASIN

06140500 MILK RIVER AT HAVRE, MT

LOCATION.--Lat 48°33'50", long 109°41'42", in SE1/4NE1/4NE1/4 sec.6, T.32 N., R.16 E., Hill County, Hydrologic Unit 10050004, on left bank, 1.25 mi upstream from Bullhook Creek and 7th Avenue East highway bridge in Havre, 8.2 mi downstream from Big Sandy Creek, 15.8 mi downstream from Fresno Dam, and at mile 419.2.

DRAINAGE AREA.--5,785 mi^2, of which 670 mi^2 is probably noncontributing.

PERIOD OF RECORD.--May to November 1898, April 1899 to November 1922, March, April 1923, March, April 1952 (gage heights only, in WSP 1260-B), June 1953 (in WSP 1320-B), August 1954 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1309: 1899-1900, 1902-4, 1907-8, 1909(M), 1912, 1917(M), 1920(M). WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,465.24 ft above National Geodetic Vertical Datum of 1929. Prior to Nov. 4, 1902, nonrecording gage at site 0.75 mi downstream at different datum. Nov. 4, 1902, to Aug. 6, 1980, nonrecording gages 1.25 mi downstream on 7th Avenue East highway bridges, all at datums then in use.

REMARKS.--Estimated daily discharges: Nov. 15-23, Nov. 25 to Dec. 1, Dec. 7-12, Dec. 14 to Mar. 27. Records fair except those for estimated daily discharges, which are poor. Diversions for irrigation of about 6,000 acres upstream from station. Since 1917, flow increased during irrigation season by water from St. Mary Canal (station number 05018500). Since 1939, flow regulated by Fresno Reservoir (station number 06136500). Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--17 years (water years, 1900-1916), prior to operation of St. Mary Canal, 273 ft^3/s, 197,800 acre-ft/yr; 41 years (water years, 1917-22, 1955-89), 415 ft^3/s, 300,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 20,000 ft^3/s, Apr. 12, 1899, gage height, 19.3 ft, site and datum then in use, from floodmarks, from rating curve extended above 5,200 ft^3/s; no flow at times in several years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,590 ft^3/s, July 14, gage height, 6.18 ft; minimum daily, 15 ft^3/s, Feb. 2.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	31	e40	e27	e18	e22	99	291	937	803	1210	465
2	28	30	42	e25	e15	e22	88	282	912	801	1190	440
3	26	30	40	e28	e16	e21	79	317	1040	809	1190	443
4	29	26	38	e35	e18	e20	71	324	1100	884	1170	443
5	29	27	35	e35	e20	e21	65	323	1170	904	1150	433
6	29	30	34	e33	e22	e30	63	323	1180	1030	1140	395
7	29	26	e32	e30	e22	e50	59	322	1230	1110	1110	391
8	28	28	e30	e27	e22	e60	110	322	1310	1130	1030	390
9	28	29	e32	e22	e23	e70	123	295	1400	1180	1020	392
10	28	27	e30	e25	e23	e100	123	118	1530	1210	1010	393
11	28	32	e32	e28	e23	e110	160	390	1530	1290	997	395
12	28	29	e35	e30	e23	e90	177	387	1440	1400	982	395
13	28	28	35	e33	e23	e86	180	470	1440	1420	977	395
14	29	18	e34	e32	e22	e80	244	475	1480	1560	970	396
15	28	e20	e31	e30	e21	e76	249	476	1480	1530	899	374
16	31	e40	e34	e32	e20	e74	249	477	1410	1510	800	273
17	28	e35	e39	e35	e20	e70	253	499	1320	1530	764	273
18	27	e35	e40	e39	e19	e68	251	601	1300	1490	728	285
19	29	e35	e38	e35	e20	e66	253	567	1280	1350	715	272
20	27	e37	e35	e40	e22	e66	254	617	1240	1250	716	244
21	29	e38	e33	e44	e24	e68	253	633	1240	1160	709	201
22	28	e40	e32	e35	e23	e70	256	637	1270	1150	712	278
23	28	e40	e30	e31	e26	e80	251	705	1160	1140	707	310
24	28	40	e30	e28	e30	e100	258	724	1140	1150	689	313
25	29	e32	e29	e25	e28	e150	255	1030	1160	1270	715	313
26	31	e31	e28	e27	e26	e200	273	1080	1130	1270	524	313
27	31	e30	e27	e30	e25	e450	293	1100	1020	1270	471	315
28	22	e31	e27	e35	e23	430	293	1110	992	1240	481	314
29	29	e32	e28	e40	---	254	289	1130	876	1220	473	313
30	35	e35	e30	e45	---	143	291	1110	818	1230	468	314
31	32	---	e28	e33	---	114	---	965	---	1220	473	---
TOTAL	886	942	1028	994	617	3261	5862	18100	36535	37511	26190	10471
MEAN	28.6	31.4	33.2	32.1	22.0	105	195	584	1218	1210	845	349
MAX	35	40	42	45	30	450	293	1130	1530	1560	1210	465
MIN	22	18	27	22	15	20	59	118	818	801	468	201
AC-FT	1760	1870	2040	1970	1220	6470	11630	35900	72470	74400	51950	20770

CAL YR 1988 TOTAL 109756.0 MEAN 300 MAX 1410 MIN 7.0 AC-FT 217700
WTR YR 1989 TOTAL 142397 MEAN 390 MAX 1560 MIN 15 AC-FT 282400

e Estimated

MILK RIVER BASIN

06141600 LITTLE BOXELDER CREEK AT MOUTH, NEAR HAVRE, MT

LOCATION.--Lat 48°33'43", long 109°31'53", in SE1/4SE1/4NW1/4 sec.4, T.32 N., R.17 E., Hill County, Hydrologic Unit 10050004, on right bank, attached to downstream pier of railroad bridge (number 423.2) 0.6 mi upstream from Milk River, and 7 mi east of Havre, MT.

DRAINAGE AREA.--95.9 mi^2.

PERIOD OF RECORD.--March 1986 to current year (seasonal records only).

GAGE.--Water-stage recorder and concrete weir. Elevation of gage is 2,455 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1-10, 14-24, Apr. 1-3, 5-7, July 8 to Aug. 6. Records excellent Oct. 1-31, fair Aug. 14 to Sept. 30, and poor Mar. 1 to Aug. 13. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 425 ft^3/s, Sept. 25, 1986, gage height, 9.09 ft; no flow many days 1988-89.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 61 ft^3/s, May 30, gage height, 3.55 ft; maximum gage height, 3.78 ft, Mar. 11; no flow many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00					e.00	e.10	13	47	6.9	e.01	6.5
2	.00					e.00	e.08	11	45	4.7	e.01	3.2
3	.00					e.00	e.10	10	45	2.0	e.01	2.2
4	.00					e.00	.20	11	43	1.5	e.01	1.5
5	.00					e.00	e.10	12	39	1.0	e.01	1.1
6	.00					e.10	e.07	11	34	.70	e.01	.85
7	.00					e1.0	e.09	11	26	.60	.00	.74
8	.00					e10	.19	11	12	e.30	.00	.62
9	.00					e20	.38	9.5	11	e.25	.00	.55
10	.00					e30	.89	7.6	8.0	e.20	.00	.54
11	.00					43	.96	9.4	5.7	e.15	.00	.45
12	.00					25	3.1	7.4	9.7	e.12	.00	.70
13	.00					20	3.4	11	14	e.10	.00	.74
14	.00					e20	.97	18	9.0	e.10	.00	.69
15	.00					e19	1.5	17	6.2	e.13	.00	.57
16	.00					e17	3.1	14	6.3	e.13	.00	.40
17	.00					e12	4.0	12	6.6	e.14	.00	.35
18	.00					e9.0	6.0	11	7.4	e.14	.00	.62
19	.00					e7.0	4.2	9.1	6.7	e.11	.00	.95
20	.00					e5.0	3.5	8.0	6.1	e.09	.00	1.7
21	.00					e5.2	3.1	7.8	6.1	e.07	.00	2.4
22	.00					e5.5	3.7	6.7	6.8	e.06	.00	2.7
23	.00					e6.0	3.6	6.1	9.2	e.05	.00	2.0
24	.00					e6.5	8.1	6.0	10	e.04	.00	1.8
25	.00					6.7	11	6.6	11	e.03	1.0	1.5
26	.00					5.0	10	15	14	e.03	.33	1.2
27	.00					6.1	16	13	17	e.03	.23	.98
28	.00					3.5	30	10	14	e.02	5.2	.87
29	.00					2.9	21	20	10	e.02	3.7	.80
30	.00					2.0	16	48	8.5	e.02	2.9	.76
31	.00					.98	---	49	---	e.01	3.3	---
TOTAL	0.00					288.48	155.43	412.2	494.3	19.74	16.72	39.98
MEAN	.000					9.31	5.18	13.3	16.5	.64	.54	1.33
MAX	.00					43	30	49	47	6.9	5.2	6.5
MIN	.00					.00	.07	6.0	5.7	.01	.00	.35
AC-FT	.00					572	308	818	980	39	33	79

e Estimated

MILK RIVER BASIN

06142400 CLEAR CREEK NEAR CHINOOK, MT

LOCATION.--Lat 48°34'44", long 109°23'26", in SE1/4NW1/4NW1/4 sec.33, T.33 N., R.18 E., Blaine County, Hydrologic Unit 10050004, on right bank, 7 mi west of Chinook, and at mile 2.5.

DRAINAGE AREA.--135 mi^2.

PERIOD OF RECORD.--June 1984 to current year (seasonal records only).

GAGE.--Water-stage recorder. Elevation of gage is 2,470 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--No estimated daily discharges this year. Records fair. Diversions for irrigation of about 2,000 acres upstream from station. U.S. Bureau of Reclamation satellite telemeter at station. Several observations of water termperatures and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 571 ft^3/s, Sept. 25, 1986, gage height, 8.23 ft, from rating curve extended above 312 ft^3/s; no flow at times most years.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 62 ft^3/s, June 19, gage height, 2.40 ft, the result of unknown regulation; minimum daily, 0.01 ft^3/s, Aug. 13.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1				.74	7.9	40	18	.06	.50			
2				.52	6.4	37	16	.05	.94			
3				.41	6.7	36	14	.04	.58			
4				.32	5.4	35	14	.05	.45			
5				.30	4.4	32	12	.05	.36			
6				.28	3.5	26	11	.05	.31			
7				.34	3.6	22	9.6	.02	.23			
8				.28	1.9	20	7.2	.02	.23			
9				.21	1.6	18	5.9	.03	.23			
10				.25	2.1	16	6.0	.02	.30			
11				.26	5.3	18	5.7	.02	.38			
12				.25	6.0	24	4.7	.02	.51			
13				.19	9.3	28	4.1	.01	.54			
14				.22	21	24	4.6	.03	.49			
15				.18	23	20	6.0	.02	.37			
16				.21	19	20	5.3	.06	.34			
17				.20	14	28	6.7	.03	.29			
18				.19	12	31	7.4	.03	.42			
19				.18	10	25	2.6	.03	.82			
20				.13	9.5	20	2.2	.03	2.7			
21				.11	8.7	19	1.5	.02	2.4			
22				.10	8.1	19	.66	.02	1.8			
23				.13	7.7	22	.43	.02	1.5			
24				.21	8.0	23	.30	.07	1.1			
25				.13	9.0	24	.27	.09	.76			
26				.26	19	32	.21	.05	.58			
27				1.1	22	37	.17	.04	3.2			
28				15	16	28	.17	.04	.56			
29				17	20	25	.13	.05	.47			
30				11	41	23	.08	.05	.49			
31					43		.06	.06				
TOTAL				50.70	375.1	772	166.98	1.18	23.85			
MEAN				1.69	12.1	25.7	5.39	.038	.79			
MAX				17	43	40	18	.09	3.2			
MIN				.10	1.6	16	.06	.01	.23			
AC-FT				101	744	1530	331	2.3	47			

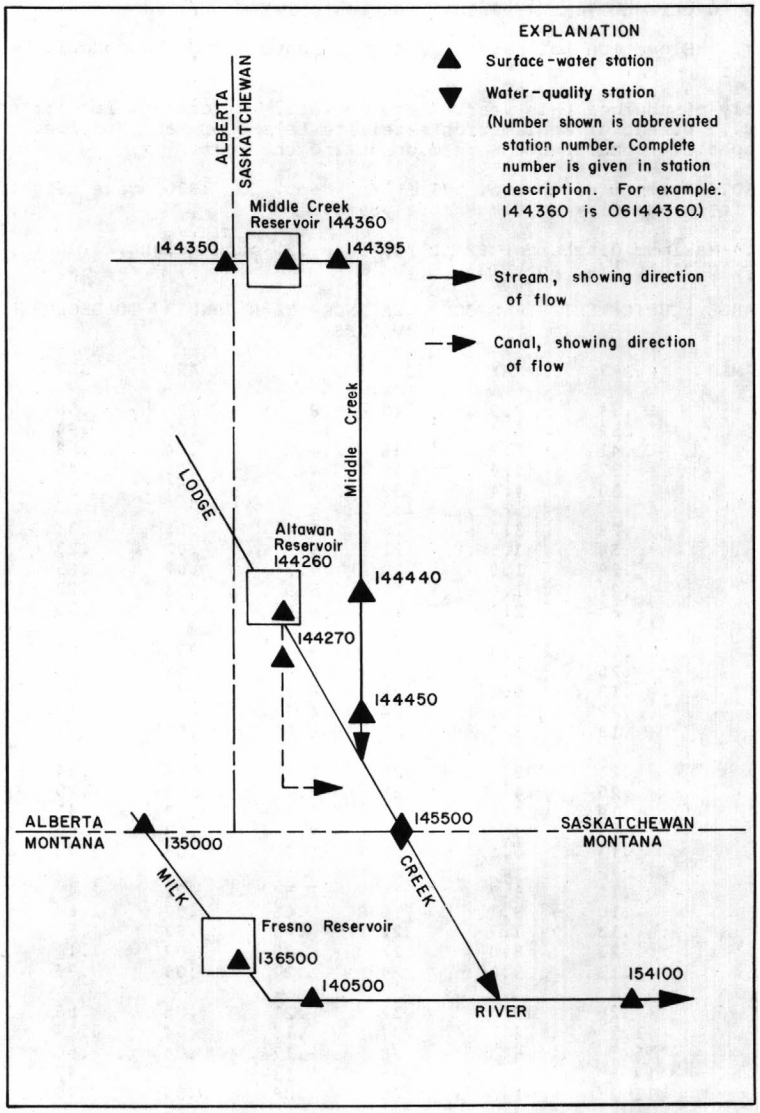


Figure 12.--Schematic diagram showing diversions and storage in Lodge Creek basin.

MILK RIVER BASIN

06144270 SPANGLER DITCH NEAR GOVENLOCK, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°09'16", long 109°54'58", in NW1/4 sec.26, T.2, R.30 W., third meridian, Hydrologic Unit 10050007, on right bank 0.9 mi south of Altawan Dam, and 6.8 mi southwest of Govenlock.

PERIOD OF RECORD.--March 1966 to current season (seasonal records only). 1915 to 1936, March 1950 to current season, in reports of Department of the Environment, Canada. Estimates of seasonal diversion only in most years prior to March 1950.

GAGE.--Water-stage recorder. Elevation of gage is 2,920 ft, from topographic map. Prior to March 1950, non-recording gages at several sites within 2 mi of present site at different datums. March 1950 to July 8, 1960, water-stage recorder at site 350 ft downstream at different datum.

REMARKS.--No estimated daily discharges this year. Records good. Canal diverts water from right bank of Lodge Creek in SW1/4 sec.35, T.2, R.30 W., third meridian, for irrigation of 1,320 acres in Spangler irrigation project.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 65 ft^3/s, Apr. 22, 1950, July 9, 1985; no flow most of each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			.00	.00	.00	.00	.00	.00	.00	.00		
2			.00	.00	.00	.00	.00	.00	.00	.00		
3			.00	.00	.00	.00	.00	.00	.00	.00		
4			.00	.00	.00	.00	.00	.00	.00	.00		
5			.00	.00	.00	.00	.00	.00	.00	.00		
6			.00	.00	.00	.00	.00	.00	.00	.00		
7			.00	.00	.00	.00	.00	.00	.00	.00		
8			.00	.00	20	.00	.00	.00	.00	.00		
9			.00	.00	31	.00	.00	.00	.00	.00		
10			.00	.00	31	.00	.00	.00	.00	.00		
11			.00	.00	31	.00	.00	.00	.00	.00		
12			.00	.00	31	.00	.00	.00	.00	.00		
13			.00	.00	32	.00	.00	.00	.00	.00		
14			.00	.00	24	.00	.00	.00	.00	.00		
15			.00	.00	12	.00	.00	.00	.00	.00		
16			.00	.00	.00	.00	.00	.00	.00	.00		
17			.00	.00	.00	.00	.00	.00	.00	.00		
18			.00	.00	.00	.00	.00	.00	.00	.00		
19			.00	.00	.00	.00	.00	.00	.00	.00		
20			.00	.00	.00	.00	.00	.00	.00	.00		
21			.00	.00	.00	.00	.00	.00	.00	.00		
22			.00	.00	.00	.00	.00	.00	.00	.00		
23			.00	.00	.00	.00	.00	.00	.00	.00		
24			.00	.00	.00	.00	.00	.00	.00	.00		
25			.00	.00	.00	.00	.00	.00	.00	.00		
26			.00	.00	.00	.00	.00	.00	.00	.00		
27			.00	.00	.00	.00	.00	.00	.00	.00		
28			.00	.00	.00	.00	.00	.00	.00	.00		
29			.00	.00	.00	.00	.00	.00	.00	.00		
30			.00	.00	.00	.00	.00	.00	.00	.00		
31			.00		.00		.00	.00		.00		
TOTAL			0.00	0.00	212.00	0.00	0.00	0.00	0.00	0.00		
MEAN			.000	.000	6.84	.000	.000	.000	.000	.000		
MAX			.00	.00	32	.00	.00	.00	.00	.00		
MIN			.00	.00	.00	.00	.00	.00	.00	.00		
AC-FT			.00	.00	421	.00	.00	.00	.00	.00		

MILK RIVER BASIN

06144350 MIDDLE CREEK NEAR SASKATCHEWAN BOUNDARY

(International gaging station)

LOCATION.--Lat 49°25'30", long 110°03'08", in SW1/4 sec.34, T.5, R.1 W., fourth meridian, in Alberta, Hydrologic Unit 10050007, on left bank 2 mi upstream from Middle Creek Reservoir, 2 mi west of Saskatchewan boundary, 18 mi northwest of Govenlock, Saskatchewan, and at mile 65.7.

DRAINAGE AREA.--118 mi^2.

PERIOD OF RECORD.--March 1963 to current season (seasonal records only). Prior to March 1982, published as "Middle Creek near Alberta boundary". June 1910 to April 1915, published as "at McKinnon's Ranch" and September 1949 to current season in reports of Department of the Environment, Canada.

REVISED RECORDS.--W 1983: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,381.13 ft above mean sea level (Geodetic Survey of Canada datum). Prior to Mar. 1, 1951, nonrecording gages, and Mar. 1, 1951, to July 5, 1961, water-stage recorder, at site 0.3 mi downstream at different datums.

REMARKS.--Estimated daily discharges: Mar. 1-18, July 29, Oct. 31. Records fair. Minor diversions for irrigation upstream from station.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,980 ft^3/s, Apr. 15, 1952, gage height, 10.27 ft, site and datum then in use, from rating curve extended above 600 ft^3/s on basis of slope-area measurement of peak flow; no flow at times.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 14 ft^3/s, Mar. 28, gage height, 4.11 ft; maximum gage height, 4.17 ft, Mar. 6, backwater from ice; minimum daily discharge, 0.04 ft^3/s, on several days.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.07	2.7	.81	9.9	.46	.11	.07	.07		
2			e.07	1.8	.67	7.7	.42	.11	.04	.07		
3			e.07	1.3	.71	4.3	.32	.11	.07	.07		
4			e.07	1.1	.60	2.3	.28	.07	.07	.07		
5			e.07	.95	.60	1.2	.25	.11	.07	.07		
6			e.99	.74	.53	.60	.25	.11	.07	.07		
7			e.21	.85	.49	.35	.21	.11	.07	.07		
8			e.18	.46	.46	.28	.21	.18	.07	.07		
9			e.07	.32	.46	.25	.18	.21	.07	.07		
10			e.07	.46	.57	.42	.25	.21	.07	.07		
11			e.07	.88	.53	.99	.32	.18	.07	.07		
12			e.07	1.4	.46	.57	.25	.18	.07	.07		
13			e.04	2.0	.42	.32	.21	.14	.07	.07		
14			e.14	1.8	.46	.25	.39	.18	.21	.07		
15			e.07	2.0	.49	.25	.42	.18	.60	.07		
16			e.07	4.3	.49	.32	.28	.18	.18	.07		
17			e.07	6.4	.39	.21	.25	.18	.28	.07		
18			e.07	4.6	.35	.25	.28	.18	.28	.07		
19			.04	2.8	.32	.21	.21	.11	.25	.07		
20			.04	1.9	.35	.18	.18	.07	.14	.07		
21			.04	1.4	.28	.25	.14	.07	.14	.07		
22			.04	1.4	.25	.35	.14	.04	.11	.07		
23			.04	.99	.25	.46	.11	.04	.11	.07		
24			.04	7.5	.35	.46	.14	.04	.07	.07		
25			1.5	7.3	.60	.95	.14	.07	.07	.07		
26			.88	4.5	.60	.67	.18	.07	.07	.07		
27			.99	2.9	.49	.64	.11	.07	.07	.07		
28			3.6	1.8	.95	.78	.11	.07	.07	.07		
29			2.4	1.1	1.2	.74	e.11	.07	.07	.07		
30			3.8	.95	.92	.64	.11	.07	.07	.07		
31			3.4		.28		.11	.07		e.07		
TOTAL			19.28	68.60	16.33	36.79	7.02	3.59	3.67	2.17		
MEAN			.62	2.29	.53	1.23	.23	.12	.12	.070		
MAX			3.8	7.5	1.2	9.9	.46	.21	.60	.07		
MIN			.04	.32	.25	.18	.11	.04	.04	.07		
AC-FT			38	136	32	73	14	7.1	7.3	4.3		

e Estimated

MILK RIVER BASIN

06144395 MIDDLE CREEK BELOW MIDDLE CREEK RESERVOIR, NEAR GOVENLOCK, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°24'44", long 109°55'06", in SW1/4 sec.25, T.5, R.30 W., third meridian, Hydrologic Unit 10050007, on right bank 9.1 mi downstream from Middle Creek Reservoir, 14 mi northwest of Govenlock, and at mile 57.6.

DRAINAGE AREA.--149 mi^2.

PERIOD OF RECORD.--April 1972 to current season (seasonal records only). July 1909 to May 1931, September 1935 to October 1936, and April 1972 to current season in reports of Department of the Environment, Canada. Published as "at Ross Ranch" 1909-20, "at Downes and Robert's Ranch" 1920-23, and "at Wright's Ranch" 1920-31, 1935-36. Discharge measurements only during 1928 season.

REVISED RECORDS.--W 1983: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 3,300 ft, from topographic map. Prior to April 1972, non-recording gages at two sites within 2 mi of present site, at different datums.

REMARKS.--No estimated daily discharges this year. Records good. Flow completely regulated by Middle Creek Reservoir (station number 06144360). Many diversions for irrigation upstream from station. At high reservoir levels flow may be diverted to Lodge Creek through Middle Creek Reservoir. Diversions for irrigation of 920 acres between Middle Creek Reservoir and station.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 77 ft^3/s, May 3, 1985; no flow at times most seasons.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			.00	.00	.00	2.3	.00	.00	.00	.00		
2			.00	.00	.00	2.4	.00	.00	.00	.00		
3			.00	.00	.00	.35	.00	.00	.00	.00		
4			.00	.00	.00	.04	.00	.00	.00	.00		
5			.00	.00	.00	.00	.00	.00	.00	.00		
6			.00	.00	.00	.00	.00	.00	.00	.00		
7			.00	.00	.00	.00	.00	.00	.00	.00		
8			.00	.00	.00	.00	.00	.00	.00	.00		
9			.00	.00	.00	.00	.00	.00	.00	.00		
10			.00	.00	.00	.00	.00	.00	.00	.00		
11			.00	.00	.00	.00	.00	.00	.00	.00		
12			.00	.00	.00	.00	.00	.00	.00	.00		
13			.00	.00	.00	.00	.00	.00	.00	.00		
14			.00	.00	.00	.00	.00	.00	.00	.00		
15			.00	.00	.00	.00	.00	.00	.00	.00		
16			.00	.00	.00	.00	.00	.00	.00	.00		
17			.00	.00	.00	.00	.00	.00	.00	.00		
18			.00	.00	.00	.00	.00	.00	.00	.00		
19			.00	.00	.00	.00	.00	.00	.00	.00		
20			.00	.00	.00	.00	.00	.00	.00	.00		
21			.00	.00	.00	.00	.00	.00	.00	.00		
22			.00	.00	.00	.00	.00	.00	.00	.00		
23			.00	.00	.00	.00	.00	.00	.00	.00		
24			.00	.00	23	.00	.00	.00	.00	.00		
25			.00	.00	20	.00	.00	.00	.00	.00		
26			.00	.00	2.4	.00	.00	.00	.00	.00		
27			.00	.00	1.1	.00	.00	.00	.00	.00		
28			.00	.00	2.9	.00	.00	.00	.00	.00		
29			.00	.00	5.7	.00	.00	.00	.00	.00		
30			.00	.00	4.9	.00	.00	.00	.00	.00		
31			.00		5.1		.00	.00		.00		
TOTAL			0.00	0.00	65.10	5.09	0.00	0.00	0.00	0.00		
MEAN			.000	.000	2.10	.17	.000	.000	.000	.000		
MAX			.00	.00	23	2.4	.00	.00	.00	.00		
MIN			.00	.00	.00	.00	.00	.00	.00	.00		
AC-FT			.00	.00	129	10	.00	.00	.00	.00		

MILK RIVER BASIN

06144440 MIDDLE CREEK NEAR GOVENLOCK, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°13'42", long 109°48'57", in NW1/4 sec.23, T.3, R.29 W., third meridian, Hydrologic Unit 10050007, on left bank 43.9 mi downstream from Middle Creek Reservoir, 0.3 mi northwest of Govenlock, and at mile 22.8.

DRAINAGE AREA.--253 mi^2.

PERIOD OF RECORD.--February 1986 to current season (seasonal records only). March 1968 to current season in reports of Department of the Environment, Canada.

GAGE.--Water-stage recorder. Elevation of gage is 3,010 ft, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 9. Records good. Natural flow of stream is affected by Middle Creek Reservoir (station 06144360), several smaller reservoirs, diversions for irrigation, and return flow from irrigated areas. At high reservoir levels flow may be diverted to Lodge Creek through Middle Creek Reservoir.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,190 ft^3/s, Sept. 25, 1986, gage height, 9.81 ft; no flow at times each season.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 18 ft^3/s, Mar. 30, gage height, 4.26 ft; no flow many days.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	e6.5	1.5	5.1	.57	.00	.00	.00		
2			e.00	e5.2	1.6	5.3	.53	.00	.00	.00		
3			e.00	e6.6	2.2	3.9	.49	.00	.00	.00		
4			e.00	e4.0	2.0	6.2	.46	.00	.00	.00		
5			e.00	e4.0	1.7	6.3	.42	.00	.00	.00		
6			e.00	e5.1	1.6	3.3	.32	.00	.00	.00		
7			e.00	e3.4	1.5	2.2	.25	.00	.00	.00		
8			e.00	e1.4	1.5	1.7	.21	.00	.00	.00		
9			e.00	e2.9	1.4	1.4	.14	.00	.00	.07		
10			e.00	1.4	1.3	1.6	.11	.00	.00	.25		
11			e.00	6.8	1.2	2.2	.07	.00	.00	.28		
12			e.00	3.7	1.1	2.1	.04	.00	.00	.35		
13			e.00	1.9	1.1	1.8	.00	.00	.00	.42		
14			e.00	2.1	1.2	1.4	.04	.00	.00	.49		
15			e.00	3.9	1.3	1.2	.04	.00	.00	.57		
16			e.00	3.9	1.4	1.3	.00	.00	.00	.60		
17			e.00	2.6	1.2	2.0	.04	.00	.00	.53		
18			e.00	1.9	1.1	1.4	.04	.00	.00	.57		
19			e.00	1.9	1.0	1.0	.00	.00	.00	.67		
20			e.00	1.2	.81	.78	.00	.00	.00	.74		
21			e.00	.78	.57	.67	.00	.00	.00	.71		
22			e.00	.78	.46	.57	.00	.00	.00	.71		
23			e.00	1.0	.35	.53	.00	.00	.00	.74		
24			e.49	.42	.35	.49	.00	.00	.00	.74		
25			e.64	7.9	.32	.49	.00	.00	.00	.74		
26			e5.9	5.1	.25	.60	.00	.00	.00	.78		
27			e3.8	2.3	.21	.85	.00	.00	.00	.81		
28			e4.8	1.9	7.4	.81	.00	.00	.00	.81		
29			e9.2	1.8	6.9	.74	.00	.00	.00	.78		
30			e8.7	1.6	5.4	.60	.00	.00	.00	.81		
31			e6.1		4.1		.00	.00		.88		
TOTAL			39.63	93.98	54.02	58.53	3.77	0.00	0.00	14.05		
MEAN			1.28	3.13	1.74	1.95	.12	.000	.000	.45		
MAX			9.2	7.9	7.4	6.3	.57	.00	.00	.88		
MIN			.00	.42	.21	.49	.00	.00	.00	.00		
AC-FT			79	186	107	116	7.5	.00	.00	28		

e Estimated

MILK RIVER BASIN

06144450 MIDDLE CREEK ABOVE LODGE CREEK, NEAR GOVENLOCK, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°06'01", long 109°49'02", in NE1/4 sec.4, T.2, R.29 W., third meridian, Hydrologic Unit 10050007, on left bank, 0.7 mi upstream from Lodge Creek, and 9 mi south of Govenlock.

DRAINAGE AREA.--276 mi^2.

PERIOD OF RECORD.--March 1962 to October 1966 and February 1986 to current season. Seasonal records only. March 1911 to May 1931 and March 1962 to current season in reports of Department of the Environment, Canada. Published as "at Hammond's Ranch" 1911-31.

GAGE.--Water-stage recorder. Elevation of gage is 2,830 ft, from topographic map. Prior to Mar. 1, 1962, nonrecording gage at site 1,000 ft downstream at different datum.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 8. Records poor. Natural flow of stream affected by Middle Creek Reservoir (station 06144360), several smaller reservoirs, diversions for irrigation, and return flow from irrigated areas. At high reservoir levels flow may be diverted to Lodge Creek through Middle Creek Reservoir.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 738 ft^3/s, Sept. 26, 1986, gage height, 13.84 ft; no flow at times each season.

EXTREMES FOR CURRENT SEASON.--Maximum discharge not determined; no flow many days.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	e4.2	.00	.00	.00	.00	.00	.00		
2			e.00	e5.4	.00	.00	.00	.00	.00	.00		
3			e.00	e1.4	.00	.00	.00	.00	.00	.00		
4			e.00	e.39	.00	.00	.00	.00	.00	.00		
5			e.00	e.21	.00	.00	.00	.00	.00	.00		
6			e.00	e.14	.00	.00	.00	.00	.00	.00		
7			e.00	e.11	.00	.00	.00	.00	.00	.00		
8			e.00	e.07	.00	.00	.00	.00	.00	.00		
9			e.00	.04	.00	.00	.00	.00	.00	.00		
10			e.00	.00	.00	.00	.00	.00	.00	.00		
11			e.00	.00	.00	.00	.00	.00	.00	.00		
12			e.00	.00	.00	.00	.00	.00	.00	.00		
13			e.00	.00	.00	.00	.00	.00	.00	.00		
14			e.00	.00	.00	.00	.00	.00	.00	.00		
15			e.00	.00	.00	.00	.00	.00	.00	.00		
16			e.00	.00	.00	.00	.00	.00	.00	.00		
17			e.00	.00	.00	.00	.00	.00	.00	.00		
18			e.00	.00	.00	.00	.00	.00	.00	.00		
19			e.00	.00	.00	.00	.00	.00	.00	.00		
20			e.00	.00	.00	.00	.00	.00	.00	.00		
21			e.00	.00	.00	.00	.00	.00	.00	.00		
22			e.00	.00	.00	.00	.00	.00	.00	.00		
23			e.00	.00	.00	.00	.00	.00	.00	.00		
24			e.00	.00	.00	.00	.00	.00	.00	.00		
25			e.00	.00	.00	.00	.00	.00	.00	.00		
26			e.00	.00	.00	.00	.00	.00	.00	.00		
27			e.00	.00	.00	.00	.00	.00	.00	.00		
28			e.00	.00	.00	.00	.00	.00	.00	.00		
29			e.04	.00	.00	.00	.00	.00	.00	.00		
30			e4.0	.00	.00	.00	.00	.00	.00	.00		
31			e7.8		.00		.00	.00		.00		
TOTAL			11.84	11.96	0.00	0.00	0.00	0.00	0.00	0.00		
MEAN			.38	.40	.000	.000	.000	.000	.000	.000		
MAX			7.8	5.4	.00	.00	.00	.00	.00	.00		
MIN			.00	.00	.00	.00	.00	.00	.00	.00		
AC-FT			23	24	.00	.00	.00	.00	.00	.00		

e Estimated

MILK RIVER BASIN

06145500 LODGE CREEK BELOW MCRAE CREEK, AT INTERNATIONAL BOUNDARY

(International gaging station)

LOCATION.--Lat 49°00'19", long 109°43'02", in SW1/4 sec.5, T.1, R.28 W., third meridian, in Saskatchewan, Hydrologic Unit 10050007, on right bank 0.3 mi downstream from McRae Creek, 0.4 mi north of international boundary, 0.8 mi northeast of Willow Creek Port of Entry, 31 mi north of Havre, MT, and at mile 84.3.

DRAINAGE AREA.--825 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1951 to current season (seasonal records only). Prior to October 1951, records were collected on both McRae Coulee (1927-51) and Lodge Creek above McRae Coulee (1910-51). Summations are equivalent to records at this site. Prior to March 1965, published as "below McRae Coulee."

REVISED RECORDS.--W 1983: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,731.0 ft above mean sea level (International Boundary Survey datum).

REMARKS.--No estimated daily discharges this year. Water-discharge records good. Natural flow affected by numerous storage reservoirs, diversions for irrigation of about 3,000 acres, and return flow from irrigation area.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,890 ft^3/s, Sept. 25, 1986, gage height, 16.36 ft, from rating curve extended above 4,100 ft^3/s on basis of slope-area measurement of peak flow; no flow at times each season.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 69 ft^3/s, May 16, gage height, 3.33 ft; maximum gage height, 3.44 ft, Apr. 1, backwater from ice; no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			.00	28	.00	.74	.04	.00	.00	.00		
2			.00	22	.00	.60	.04	.00	.00	.00		
3			.00	14	.00	.46	.00	.00	.00	.00		
4			.00	7.6	.00	.32	.00	.00	.00	.00		
5			.00	3.8	.00	.25	.00	.00	.00	.00		
6			.00	2.3	.00	.14	.00	.00	.00	.00		
7			.00	1.5	.00	.07	.00	.00	.00	.00		
8			.00	1.1	.00	.07	.00	.00	.00	.00		
9			.00	.71	.00	.04	.00	.00	.00	.00		
10			.00	.57	.00	.07	.00	.00	.00	.00		
11			.00	.32	24	.35	.00	.00	.00	.00		
12			.00	.21	43	42	.00	.00	.00	.00		
13			.00	.14	44	37	.00	.00	.00	.00		
14			.00	.11	43	16	.00	.00	.00	.00		
15			.00	.07	43	7.2	.00	.00	.00	.00		
16			.00	.07	58	4.1	.00	.00	.00	.00		
17			.00	.04	63	2.5	.00	.00	.00	.00		
18			.00	.04	57	1.6	.00	.00	.00	.00		
19			.00	.04	48	1.1	.00	.00	.00	.00		
20			.00	.04	34	.71	.00	.00	.00	.00		
21			.00	.04	14	.46	.00	.00	.00	.00		
22			.00	.04	6.8	.35	.00	.00	.00	.00		
23			.00	.04	4.1	.25	.00	.00	.00	.00		
24			.00	.04	2.9	.18	.00	.00	.00	.00		
25			.00	.04	1.9	.21	.00	.00	.00	.00		
26			.57	.04	1.6	.25	.00	.00	.00	.00		
27			5.8	.04	1.1	.18	.00	.00	.00	.00		
28			23	.04	.88	.14	.00	.00	.00	.00		
29			26	.04	1.2	.07	.00	.00	.00	.00		
30			18	.04	1.2	.07	.00	.00	.00	.00		
31			17		.95		.00	.00		.00		
TOTAL			90.37	83.06	493.63	117.48	0.08	0.00	0.00	0.00		
MEAN			2.92	2.77	15.9	3.92	.003	.000	.000	.000		
MAX			26	28	63	42	.04	.00	.00	.00		
MIN			.00	.04	.00	.04	.00	.00	.00	.00		
AC-FT			179	165	979	233	.2	.00	.00	.00		

MILK RIVER BASIN

06145500 LODGE CREEK BELOW MCRAE CREEK, AT INTERNATIONAL BOUNDARY--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1964, 1973, 1977-80, 1987 to current year (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
MAR										
28...	1400	16	90	10	174	11.0	1.0	6.9	42	9.2
APR										
06...	1440	2.1	--	--	191	9.0	4.0	--	--	--
18...	1025	0.02	0	0	360	10.0	7.0	7.8	99	23
MAY										
23...	1630	3.7	100	10	830	15.0	17.0	8.1	280	61
JUN										
22...	0950	0.34	--	--	908	19.0	16.5	--	--	--

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	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)
MAR									
28...	4.6	14	0.9	4.4	24	52	2.2	<0.10	4.0
APR									
06...	--	--	--	--	--	--	--	--	--
18...	10	32	1	5.9	83	82	3.7	0.10	3.6
MAY									
23...	30	71	2	8.5	137	280	5.3	0.20	2.8
JUN									
22...	--	--	--	--	--	--	--	--	--

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)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	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)
MAR									
28...	105	0.14	4.54	<0.100	0.100	1	<0.5	10	<1
APR									
06...	--	--	--	--	--	--	--	--	--
18...	210	0.29	0.01	<0.100	0.020	2	<0.5	30	<1
MAY									
23...	541	0.74	5.40	<0.100	0.020	2	<0.5	50	<1
JUN									
22...	--	--	--	--	--	--	--	--	--

DATE	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, 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, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
MAR									
28...	<1	1	150	<5	73	<0.1	6	<1	7
APR									
06...	--	--	--	--	--	--	--	--	--
18...	2	1	83	<5	7	<0.1	<1	<1	6
MAY									
23...	<1	3	11	1	3	<0.1	3	<1	10
JUN									
22...	--	--	--	--	--	--	--	--	--

MILK RIVER BASIN

RESERVOIRS IN LODGE CREEK BASIN IN SASKATCHEWAN

(International gaging stations)

06144260 ALTAWAN RESERVOIR.--Lat 49°10'00", long 109°55'00", in SW1/4 sec.35, T.2, R.30 W., third meridian, Hydrologic Unit 10050007, at dam on Lodge Creek, 6.3 mi southwest of Govenlock, and at mile 113.5. DRAINAGE AREA, 373 mi^2. PERIOD OF RECORD, February 1966 to current season (seasonal records only). February 1960 to current season in reports of Department of the Environment, Canada. Water-stage recorder. Datum of gage is at mean sea level (Geodetic Survey of Canada datum). Prior to July 7, 1967, nonrecording gage in gate read every ten days during irrigation season.
REMARKS.--Reservoir is formed by earthfill dam with concrete spillway and control works as well as an emergency earthen spillway, completed in 1959. The following capacity figures are from revised capacity table effective Jan. 1, 1983. Usable capacity is 5,440 acre-ft between elevation 2,918.0 ft, bottom of outlet works, and 2,952.0 ft, maximum design level. No dead storage. Water is used for irrigation. This is one of a number of stations which are maintained jointly by Canada and the United States. REVISED RECORDS, W 1983: Drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents, 8,300 acre-ft, Sept. 26, 1986, elevation, 2,958.10 ft; no contents Mar. 1, 1960, Oct. 6-31, 1984, Mar. 1-18, and Oct. 3-31, 1985.
EXTREMES FOR CURRENT SEASON: Maximum contents, 1,570 acre-ft, May 4, elevation, 2,940.32 ft; minimum 0.5 acre-ft, May 20, elevation, 2,919.06 ft.

06144360 MIDDLE CREEK RESERVOIR (REVISED).--Lat 49°24'22", long 109°59'02", in NE1/4 sec.21, T.5, R.30 W., third meridian, Hydrologic Unit 10050007, at dam on Middle Creek, 0.7 mi east of Alberta-Saskatchewan boundary, 6.3 mi west of Battle Creek, 15 mi northwest of Govenlock, and at mile 66.7. DRAINAGE AREA, 143 mi^2. PERIOD OF RECORD, February 1966 to current season. Occasional nonrecording gage readings in 1937 and 1939-51, March 1952 to current season in reports of Department of the Environment, Canada. Seasonal records only. Water-stage recorder. Datum of gage is at mean sea level (Geodetic Survey of Canada datum). Prior to July 7, 1967, nonrecording gage in gate well read every ten days during irrigation season.
REMARKS.--Reservoir is formed by earthfill dam with concrete control works and sod spillway at elevation 3,383.0 ft on Middle Creek and at Ducks Unlimited outlet, constructed in 1937. The following capacity figures are from revised capacity table effective Jan. 1, 1987. Usable capacity, 12,660 acre-ft between elevation 3,368.60 ft, bottom of outlet works on Middle Creek, and 3,383.0 ft, natural spillway. Invert of outlet pipe at Ducks Unlimited outlet is at elevation 3,372.04 ft. No dead storage. Water is used for irrigation and to maintain levels of Orleans Lakes. Water may be released to Lodge Creek via Ducks Unlimited outlet, Simms Lake and Walburger Coulee. Spillway does not return water to Middle Creek, may return to Lodge Creek via Walburger Coulee. This is one of a number of stations which are maintained jointly by Canada and the United States. REVISED RECORDS, W 1984: Drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 23,080 acre-ft, Apr. 13, 1952, elevation, 3,387.92 ft; no contents at various times.
EXTREMES FOR CURRENT SEASON: Maximum contents, 1,490 acre-ft, Apr. 21, elevation, 3,371.79 ft; no contents, Aug. 20 to Oct. 31.

Monthend contents, in acre-ft, October 1988 to October 1989

Date	Altawan Reservoir	Middle Creek Reservoir
Oct. 31	326	1,270
Nov. 30	-	-
Dec. 31	-	-
Jan. 31	-	-
Feb. 28	302	-
Mar. 31	559	1,250
Apr. 30	1,570	1,210
May 31	138	313
June 30	139	275
July 31	122	106
Aug. 31	109	0
Sept. 30	99	0
Oct. 31	88	0

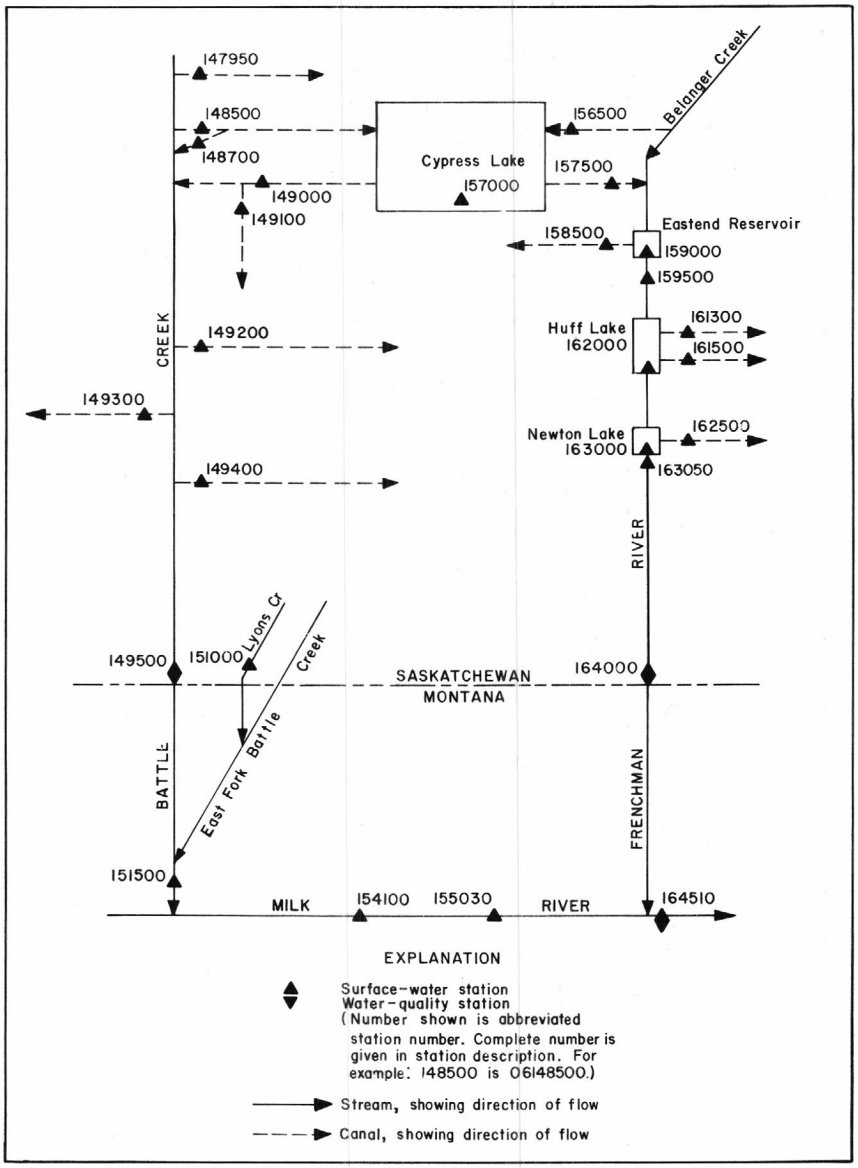


Figure 13.--Schematic diagram showing diversions and storage in Battle Creek and Frenchman River basins.

MILK RIVER BASIN

06147950 GAFF DITCH NEAR MERRYFLAT, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°26'05", long 109°50'07", in NW1/4 sec.34, T.5, R.29 W., third meridian, Hydrologic Unit 10050008, on left bank about 200 ft downstream from headgates, and 4 mi southwest of Merryflat.

PERIOD OF RECORD.--March 1972 to current season (seasonal record only). March 1964 to current season in reports of Department of the Environment, Canada.

GAGE.--Water-stage recorder. Elevation of gage is 3,350 ft, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 19. Records fair. Water is diverted from left bank of Battle Creek in NW1/4 sec.34, T.5. R.29 W., third meridian, for irrigation of about 890 acres along Battle Creek.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 42 ft^3/s, Apr. 22, 1971; no flows at times each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	e.00	17	.00	.00	.00	.00	.00		
2			e.00	e.00	14	.00	.00	.00	.00	.00		
3			e.00	e.00	15	.00	.00	.00	.00	.00		
4			e.00	e.00	17	.00	.00	.00	.00	.00		
5			e.00	e.00	19	.00	.00	.00	.00	.00		
6			e.00	e.00	21	.00	.00	.00	.00	.00		
7			e.00	e.00	21	.00	.00	.00	.00	.00		
8			e.00	e.00	21	.00	.00	.00	.00	.00		
9			e.00	e.00	20	.00	.00	.00	.00	.00		
10			e.00	e.00	19	.00	.00	.00	.00	.00		
11			e.00	e.00	18	.00	.00	.00	.00	.00		
12			e.00	e.00	18	.00	.00	.00	.00	.00		
13			e.00	e.00	18	.00	.00	.00	.00	.00		
14			e.00	e.00	18	.00	.00	.00	.00	.00		
15			e.00	e.00	18	.00	.00	.00	.00	.00		
16			e.00	e1.7	18	.00	.00	.00	.00	.00		
17			e.00	e7.3	16	.00	.00	.00	.00	.00		
18			e.00	e5.8	15	.00	.00	.00	.00	.00		
19			e.00	e15	14	.00	.00	.00	.00	.00		
20			e.00	17	6.0	.00	.00	.00	.00	.00		
21			e.00	19	.78	.00	.00	.00	.00	.00		
22			e.00	21	.57	.00	.00	.00	.00	.00		
23			e.00	22	.07	.00	.00	.00	.00	.00		
24			e.00	23	.00	.00	.00	.00	.00	.00		
25			e.00	21	.00	.00	.00	.00	.00	.00		
26			e.00	20	.00	.00	.00	.00	.00	.00		
27			e.00	19	.00	.00	.00	.00	.00	.00		
28			e.00	19	.00	.00	.00	.00	.00	.00		
29			e.00	16	.00	.00	.00	.00	.00	.00		
30			e.00	11	.00	.00	.00	.00	.00	.00		
31			e.00		.04		.00	.00		.00		
TOTAL			0.00	237.80	344.46	0.00	0.00	0.00	0.00	0.00		
MEAN			.000	7.93	11.1	.000	.000	.000	.000	.000		
MAX			.00	23	21	.00	.00	.00	.00	.00		
MIN			.00	.00	.00	.00	.00	.00	.00	.00		
AC-FT			.00	472	683	.00	.00	.00	.00	.00		

e Estimated

MILK RIVER BASIN

06148500 CYPRESS LAKE WEST INFLOW CANAL NEAR WEST PLAINS, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°28'18", long 109°37'08", in SE1/4 sec.18, T.6, R.27 W., third meridian, Hydrologic Unit 10050008, on left bank 2.5 mi downstream from canal headgates, 5.5 mi northeast of West Plains, and 13 mi northwest of Consul.

PERIOD OF RECORD.--March 1939 to current season (seasonal records only). Monthly discharge only for some periods, published in WSP 1309.

GAGE.--Water-stage recorder. Elevation of gage is 3,210 ft, from topographic map. Prior to Oct. 16, 1956, at site 2.3 mi upstream at different datum.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 19. Records fair except those for estimated daily discharges, which are poor. Canal diverts water from Battle Creek in NW1/4 sec.1, T.6, R.28 W., third meridian, for storage in Cypress Lake. Part or all of flow may be returned to Battle Creek via wasteway and drain canal 0.4 mi downstream.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 884 ft^3/s, Apr. 27, 1965; no flow at times each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	e.00	.00	30	6.7	.00	.00	.00		
2			e.00	e.00	.00	32	7.0	.00	.00	.00		
3			e.00	e.00	.00	28	5.9	.00	.00	.00		
4			e.00	e.00	.00	28	4.0	.00	.00	.00		
5			e.00	e.00	.00	26	.07	.00	.00	.00		
6			e.00	e.00	.00	19	.00	.00	.00	.00		
7			e.00	e.00	.00	19	.00	.00	.00	.00		
8			e.00	e.00	.00	20	.00	.00	.00	.00		
9			e.00	e.00	.00	15	.00	.00	.00	.00		
10			e.00	e.00	.00	6.4	.00	.00	.00	.00		
11			e.00	e.00	.00	8.5	.00	.00	.00	.00		
12			e.00	e.00	.00	9.4	.00	.00	.00	.00		
13			e.00	e.00	.00	32	.00	.00	.00	.00		
14			e.00	e.18	.00	43	.00	.00	.00	.00		
15			e.00	e.35	.00	29	.00	.00	.00	.00		
16			e.00	e.53	.00	20	.00	.00	.00	.00		
17			e.00	e.71	.00	11	.00	.00	.00	.00		
18			e.00	e16	.00	10	.00	.00	.00	.00		
19			e.00	e18	.00	10	.00	.00	.00	.00		
20			e.00	1.7	.00	10	.00	.00	.00	.00		
21			e.00	1.3	.00	11	.00	.00	.00	.00		
22			e.00	.78	.00	11	.00	.00	.00	.00		
23			e.00	.21	.00	9.4	.00	.00	.00	.00		
24			e.00	.11	.00	2.5	.00	.00	.00	.00		
25			e.00	.07	.00	3.1	.00	.00	.00	.00		
26			e.00	.07	.00	5.5	.00	.00	.00	.00		
27			e.00	.04	.00	17	.00	.00	.00	.00		
28			e.00	.04	.57	18	.00	.00	.00	.00		
29			e.00	.00	16	13	.00	.00	.00	.00		
30			e.00	.00	24	12	.00	.00	.00	.00		
31			e.00		27		.00	.00		.00		
TOTAL			0.00	40.09	67.57	508.8	23.67	0.00	0.00	0.00		
MEAN			.000	1.34	2.18	17.0	.76	.000	.000	.000		
MAX			.00	18	27	43	7.0	.00	.00	.00		
MIN			.00	.00	.00	2.5	.00	.00	.00	.00		
AC-FT			.00	80	134	1010	47	.00	.00	.00		

e Estimated

MILK RIVER BASIN

06148700 CYPRESS LAKE WEST INFLOW CANAL DRAIN NEAR OXARAT, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°28'25", long 109°36'38", in NW1/4 sec.17, T.6, R.27 W., third meridian, Hydrologic Unit 10050008, on left bank about 500 ft downstream from drain gate on Cypress Lake west inflow canal, 0.5 mi upstream from Battle Creek, and 4 mi northwest of Oxarat.

PERIOD OF RECORD.--March 1963 to current season (seasonal records only). March 1955 to current season in reports of Department of the Environment, Canada.

GAGE.--Water-stage recorder. Elevation of gage is 3,200 ft, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 1. Records poor. Drain used as an emergency bypass to return diverted water to Battle Creek. It may also be used to return stored water from Cypress Lake when lake stage is high.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 450 ft^3/s, Apr. 20, 1955; no flow at times each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	e.00	.00	.32	.18	.00	.00	.00		
2			e.00	.00	.00	.32	.18	.00	.00	.00		
3			e.00	.00	.00	.28	.18	.00	.00	.00		
4			e.00	.00	.00	.25	.18	.00	.00	.00		
5			e.00	.00	.00	.21	.14	.00	.00	.00		
6			e.00	.00	.00	.21	.07	.00	.00	.00		
7			e.00	.00	.00	.18	.07	.00	.00	.00		
8			e.00	.00	.00	.14	.04	.00	.00	.00		
9			e.00	.00	.00	.14	.04	.00	.00	.00		
10			e.00	.00	.00	.14	.04	.00	.00	.00		
11			e.00	.04	.00	.14	.04	.00	.00	.00		
12			e.00	.04	.00	.11	.04	.00	.00	.00		
13			e.00	.04	.00	.14	.00	.00	.00	.00		
14			e.00	.04	.00	.21	.00	.00	.00	.00		
15			e.00	.07	.00	.18	.00	.00	.00	.00		
16			e.00	.07	.00	.14	.00	.00	.00	.00		
17			e.00	.04	.00	.14	.00	.00	.00	.00		
18			e.00	.60	.00	.14	.00	.00	.00	.00		
19			e.00	.28	.00	.18	.00	.00	.00	.00		
20			e.00	.18	.00	.18	.00	.00	.00	.00		
21			e.00	.18	.00	.18	.00	.00	.00	.00		
22			e.00	.14	.00	.21	.00	.00	.00	.00		
23			e.00	.11	.00	.18	.00	.00	.00	.00		
24			e.00	.07	.00	.18	.00	.00	.00	.00		
25			e.00	.07	.00	.18	.00	.00	.00	.00		
26			e.00	.04	.00	.14	.00	.00	.00	.00		
27			e.00	.04	.00	.21	.00	.00	.00	.00		
28			e.00	.00	.07	.21	.00	.00	.00	.00		
29			e.00	.00	.32	.18	.00	.00	.00	.00		
30			e.00	.00	.35	.18	.00	.00	.00	.00		
31			e.00		.35		.00	.00		.00		
TOTAL			0.00	2.05	1.09	5.60	1.20	0.00	0.00	0.00		
MEAN			.000	.068	.035	.19	.039	.000	.000	.000		
MAX			.00	.60	.35	.32	.18	.00	.00	.00		
MIN			.00	.00	.00	.11	.00	.00	.00	.00		
AC-FT			.00	4.1	2.2	11	2.4	.00	.00	.00		

e Estimated

MILK RIVER BASIN

06149000 CYPRESS LAKE WEST OUTFLOW CANAL NEAR WEST PLAINS, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°28'14", long 109°35'18", in SW1/4 sec.16, T.6, R.27 W., third meridian, Hydrologic Unit 10050008, on left bank 1.1 mi downstream from Cypress Lake West Dam, 6 mi northeast of West Plains, and 13 mi north of Consul.

PERIOD OF RECORD.--March 1940 to current season (seasonal records only). Monthly discharge only for some periods, published in WSP 1309.

GAGE.--Water-stage recorder. Elevation of gage is 3,180 ft, from topographic map. Prior to Sept. 18, 1952, at site 1 mi upstream and 300 ft downstream from Cypress Lake West Dam at different datum.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 17. Records fair except those below 1.0 ft ^{3}/s, which are poor. Canal diverts water from Cypress Lake in NW1/4 sec.15, T.6, R.27 W., third meridian, for irrigation of 5,500 acres in Battle Creek basin in Saskatchewan. Water may be delivered to Battle Creek or diverted into Vidora Ditch at gate structure near lower end of canal.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 304 ft^3/s, May 4, 1951; no flow at times each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	e.00	.28	8.4	.04	.00	.04	.04		
2			e.00	e.00	.25	7.5	.04	.00	.00	.00		
3			e.00	e.00	.99	5.4	.04	.00	.04	.00		
4			e.00	e.00	72	3.5	.04	.00	.04	.00		
5			e.00	e.07	122	3.4	.07	.00	.04	.00		
6			e.00	e.11	121	3.2	.07	.00	.04	.00		
7			e.00	e.18	123	3.1	.04	.00	.04	.00		
8			e.00	e.21	121	3.1	.04	.00	.04	.00		
9			e.00	e.28	129	3.1	.00	.00	.00	.00		
10			e.00	e.32	126	3.2	.04	.00	.04	.00		
11			e.00	e.39	126	3.4	.07	.00	.04	.00		
12			e.00	e.14	119	3.2	.04	.00	.04	.00		
13			e.00	e.14	118	3.1	.00	.00	.04	.00		
14			e.00	e.18	111	3.0	.07	.00	.04	.00		
15			e.00	e.28	126	2.9	.07	.00	.00	.00		
16			e.00	e.14	122	3.0	.00	.00	.00	.00		
17			e.00	e.28	121	2.8	.00	.00	.00	.00		
18			e.00	.67	122	2.8	.00	.00	.07	.00		
19			e.00	.64	110	2.6	.00	.00	.07	.00		
20			e.00	.88	89	2.5	.00	.00	.04	.04		
21			e.00	.85	83	2.3	.00	.00	.04	.04		
22			e.00	.57	94	.53	.00	.00	.04	.00		
23			e.00	.21	106	.14	.00	.00	.04	.00		
24			e.00	.25	88	.07	.00	.00	.04	.04		
25			e.00	.21	58	.78	.00	.07	.00	.04		
26			e.00	.28	83	.92	.00	.07	.00	.04		
27			e.00	.25	61	.11	.00	.04	.00	.04		
28			e.00	.25	47	.07	.14	.04	.00	.04		
29			e.00	.28	48	.04	.07	.00	.00	.00		
30			e.00	.25	24	.04	.04	.00	.00	.00		
31			e.00		4.6		.00	.04		e.00		
TOTAL			0.00	8.31	2676.12	78.20	0.92	0.26	0.82	0.32		
MEAN			.000	.28	86.3	2.61	.030	.008	.027	.010		
MAX			.00	.88	129	8.4	.14	.07	.07	.04		
MIN			.00	.00	.25	.04	.00	.00	.00	.00		
AC-FT			.00	16	5310	155	1.8	.5	1.6	.6		

e Estimated

MILK RIVER BASIN

06149100 VIDORA DITCH NEAR CONSUL, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°27'27", long 109°35'30", in SW1/4 sec.9, T.6, R.27 W., third meridian, Hydrologic Unit 10050008, on left bank 0.5 mi downstream from headgate near lower end of Cypress Lake west outflow canal, 12 mi north of Consul.

PERIOD OF RECORD.--March 1963 to current season (seasonal records only). March 1952 to current season in reports of Department of the Environment, Canada.

GAGE.--Water-stage recorder. Elevation of gage is 3,200 ft, from topographic map. Prior to Aug. 1, 1963, at datum 1.0 ft higher.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 26. Records fair. Canal diverts water from Cypress Lake west outflow canal in NE1/4 sec.8, T.6, R.27 W., third meridian, for irrigation of about 2,140 acres in the Battle Creek basin. Water may be delivered either to this canal or returned to Battle Creek from Cypress Lake.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 101 ft^3/s, May 26, 1988; no flow at times each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	e.00	.00	4.4	.00	.00	.00	.00		
2			e.00	e.00	.00	.49	.00	.00	.00	.00		
3			e.00	e.00	.00	.46	.00	.00	.00	.00		
4			e.00	e.00	17	.39	.00	.00	.00	.00		
5			e.00	e.00	40	.42	.00	.00	.00	.00		
6			e.00	e.00	40	.42	.00	.00	.00	.00		
7			e.00	e.00	41	.42	.00	.00	.00	.00		
8			e.00	e.00	40	.32	.00	.00	.00	.00		
9			e.00	e.00	41	.25	.00	.00	.00	.00		
10			e.00	e.00	40	.14	.00	.00	.00	.00		
11			e.00	e.00	40	.11	.00	.00	.00	.00		
12			e.00	e.00	40	.04	.00	.00	.00	.00		
13			e.00	e.00	40	.00	.00	.00	.00	.00		
14			e.00	e.00	38	.00	.00	.00	.00	.00		
15			e.00	e.00	41	.00	.00	.00	.00	.00		
16			e.00	e.00	40	.00	.00	.00	.00	.00		
17			e.00	e.00	40	.00	.00	.00	.00	.00		
18			e.00	e.00	39	.00	.00	.00	.00	.00		
19			e.00	e.00	36	.00	.00	.00	.00	.00		
20			e.00	e.00	33	.00	.00	.00	.00	.00		
21			e.00	e.00	32	.00	.00	.00	.00	.00		
22			e.00	e.00	33	.00	.00	.00	.00	.00		
23			e.00	e.00	37	.00	.00	.00	.00	.00		
24			e.00	e.00	43	.00	.00	.00	.00	.00		
25			e.00	e.00	51	.00	.00	.00	.00	.00		
26			e.00	e.00	83	.00	.00	.00	.00	.00		
27			e.00	.00	64	.00	.00	.00	.00	.00		
28			e.00	.00	46	.00	.00	.00	.00	.00		
29			e.00	.00	46	.00	.00	.00	.00	.00		
30			e.00	.00	25	.00	.00	.00	.00	.00		
31			e.00		4.1		.00	.00		.00		
TOTAL			0.00	0.00	1110.10	7.86	0.00	0.00	0.00	0.00		
MEAN			.000	.000	35.8	.26	.000	.000	.000	.000		
MAX			.00	.00	83	4.4	.00	.00	.00	.00		
MIN			.00	.00	.00	.00	.00	.00	.00	.00		
AC-FT			.00	.00	2200	16	.00	.00	.00	.00		

e Estimated

MILK RIVER BASIN

06149200 RICHARDSON DITCH NEAR CONSUL, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°21'50", long 109°32'12", near center of south line of sec.11, T.5, R.27 W., third meridian, Hydrologic Unit 10050008, on left bank 420 ft downstream from headgate, 4.8 mi north of Consul.

PERIOD OF RECORD.--March 1963 to current season (seasonal records only). 1910-12, 1914, 1916-20, 1922-33, 1935, July 1946 to current season in reports of Department of the Environment, Canada. Estimates of seasonal diversion only in most seasons prior to 1946.

GAGE.--Water-stage recorder. Prior to June 26, 1949, nonrecording gages at different sites and datums. June 26, 1949, to Aug. 28, 1963, water-stage recorder at present site at datum 1.00 ft higher.

REMARKS.--No estimated daily discharges this year. Records good. Ditch diverts from left bank of Battle Creek in SW1/4 sec.11, T.5, R.27 W., third meridian, for irrigation of about 1,330 acres along Battle Creek.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 72 ft^3/s, June 15, 1974; no flow at times each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			.00	.00	.00	.00	.00	.00	.00	.00		
2			.00	.00	.00	.00	.00	.00	.00	.00		
3			.00	.00	.00	.00	.00	.00	.00	.00		
4			.00	.00	.11	.00	.00	.00	.00	.00		
5			.00	.00	28	.00	.00	.00	.00	.00		
6			.00	.00	34	.00	.00	.00	.00	.00		
7			.00	.00	32	.00	.00	.00	.00	.00		
8			.00	.00	30	.00	.00	.00	.00	.00		
9			.00	.00	32	.00	.00	.00	.00	.00		
10			.00	.00	34	.00	.00	.00	.00	.00		
11			.00	.00	34	.00	.00	.00	.00	.00		
12			.00	.00	34	.00	.00	.00	.00	.00		
13			.00	.00	33	.00	.00	.00	.00	.00		
14			.00	.00	33	.00	.00	.00	.00	.00		
15			.00	.00	34	.00	.00	.00	.00	.00		
16			.00	.00	35	.00	.00	.00	.00	.00		
17			.00	.00	29	.00	.00	.00	.00	.00		
18			.00	.00	28	.00	.00	.00	.00	.00		
19			.00	.00	27	.00	.00	.00	.00	.00		
20			.00	.00	25	.00	.00	.00	.00	.00		
21			.00	.00	32	.00	.00	.00	.00	.00		
22			.00	.00	31	.00	.00	.00	.00	.00		
23			.00	.00	29	.00	.00	.00	.00	.00		
24			.00	.00	22	.00	.00	.00	.00	.00		
25			.00	.00	14	.00	.00	.00	.00	.00		
26			.00	.00	2.8	.00	.00	.00	.00	.00		
27			.00	.00	.00	.00	.00	.00	.00	.00		
28			.00	.00	.00	.00	.00	.00	.00	.00		
29			.00	.00	.00	.00	.00	.00	.00	.00		
30			.00	.00	.00	.00	.00	.00	.00	.00		
31			.00		.00		.00	.00		.00		
TOTAL			0.00	0.00	632.91	0.00	0.00	0.00	0.00	0.00		
MEAN			.000	.000	20.4	.000	.000	.000	.000	.000		
MAX			.00	.00	35	.00	.00	.00	.00	.00		
MIN			.00	.00	.00	.00	.00	.00	.00	.00		
AC-FT			.00	.00	1260	.00	.00	.00	.00	.00		

MILK RIVER BASIN

06149300 MCKINNON DITCH NEAR CONSUL, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°20'00", long 109°29'40", in NW1/4 sec.30, T.4, R.26 W., third meridian, Hydrologic Unit 10050008, on right bank 1.0 mi downstream from headgate on Battle Creek, and 2.7 mi northeast of Consul.

PERIOD OF RECORD.--March 1963 to current season (seasonal records only). 1911-26, 1929-31, and March 1938 to current season in reports of Department of the Environment, Canada. Estimates of seasonal diversions only in many years prior to 1947.

GAGE.--Water-stage recorder. Prior to September 1949, nonrecording gages at various sites and datums. Sept. 4, 1949, to Aug. 29, 1963, water-stage recorder at present site at datum 1.00 ft higher.

REMARKS.--No estimated daily discharges this year. Records good. Ditch diverts from right bank of Battle Creek in NE1/4 sec.30, T.4, R.26 W., third meridian, for irrigation of about 1,320 acres along Battle Creek.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 68 ft^3/s, June 18, 1975; no flow at times each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			.00	.00	.00	.00	.00	.00	.00	.00		
2			.00	.00	.00	.00	.00	.00	.00	.00		
3			.00	.00	.00	.00	.00	.00	.00	.00		
4			.00	.00	.00	.00	.00	.00	.00	.00		
5			.00	.00	25	.00	.00	.00	.00	.00		
6			.00	.00	33	.00	.00	.00	.00	.00		
7			.00	.00	34	.00	.00	.00	.00	.00		
8			.00	.00	34	.00	.00	.00	.00	.00		
9			.00	.00	35	.00	.00	.00	.00	.00		
10			.00	.00	34	.00	.00	.00	.00	.00		
11			.00	.00	35	.00	.00	.00	.00	.00		
12			.00	.00	34	.00	.00	.00	.00	.00		
13			.00	.00	32	.00	.00	.00	.00	.00		
14			.00	.00	32	.00	.00	.00	.00	.00		
15			.00	.00	32	.00	.00	.00	.00	.00		
16			.00	.00	34	.00	.00	.00	.00	.00		
17			.00	.00	35	.00	.00	.00	.00	.00		
18			.00	.00	36	.00	.00	.00	.00	.00		
19			.00	.00	36	.00	.00	.00	.00	.00		
20			.00	.00	34	.00	.00	.00	.00	.00		
21			.00	.00	29	.00	.00	.00	.00	.00		
22			.00	.00	22	.00	.00	.00	.00	.00		
23			.00	.00	32	.00	.00	.00	.00	.00		
24			.00	.00	14	.00	.00	.00	.00	.00		
25			.00	.00	.00	.00	.00	.00	.00	.00		
26			.00	.00	.00	.00	.00	.00	.00	.00		
27			.00	.00	.00	.00	.00	.00	.00	.00		
28			.00	.00	.00	.00	.00	.00	.00	.00		
29			.00	.00	.00	.00	.00	.00	.00	.00		
30			.00	.00	.00	.00	.00	.00	.00	.00		
31			.00		.00		.00	.00		.00		
TOTAL			0.00	0.00	632.00	0.00	0.00	0.00	0.00	0.00		
MEAN			.000	.000	20.4	.000	.000	.000	.000	.000		
MAX			.00	.00	36	.00	.00	.00	.00	.00		
MIN			.00	.00	.00	.00	.00	.00	.00	.00		
AC-FT			.00	.00	1250	.00	.00	.00	.00	.00		

MILK RIVER BASIN

06149400 NASHLYN CANAL NEAR CONSUL, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°13'57", long 109°33'27", in NE1/4 sec.22, T.3, T.27 W., third meridian, Hydrologic Unit 10050008, on left bank 0.8 mi downstream from headgate on Battle Creek, and 5.9 mi south of Consul.

PERIOD OF RECORD.--March 1963 to current season (seasonal records only). 1912, 1914-35, 1938 to current season in reports of Department of the Environment, Canada. Prior to March 1950, estimates of seasonal diversions only in many seasons. Prior to Mar. 1, 1971, published as "Stirling and Nash Ditch".

GAGE.--Water-stage recorder. Prior to Sept. 21, 1949, water-stage recorder at present site or nonrecording gages at site 0.5 mi downstream at different datums.

REMARKS.--Estimated daily discharges: Mar. 1-31. Records good. Ditch diverts water from left bank of Battle Creek in SW1/4 sec.27, T.3, R.27 W., third meridian, for irrigation of about 1,880 acres along Battle Creek.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 85 ft^3/s, Apr. 14, 1952; no flow at times each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	18	.00	.00	.00	.00	.00	.00		
2			e.00	12	.00	.00	.00	.00	.00	.00		
3			e.00	13	.00	.00	.00	.00	.00	.00		
4			e.00	16	.00	.00	.00	.00	.00	.00		
5			e.00	23	.00	.00	.00	.00	.00	.00		
6			e.00	25	14	.00	.00	.00	.00	.00		
7			e.00	28	9.1	.00	.00	.00	.00	.00		
8			e.00	28	9.1	.00	.00	.00	.00	.00		
9			e.00	22	8.4	.00	.00	.00	.00	.00		
10			e.00	16	8.3	.00	.00	.00	.00	.00		
11			e.00	16	9.2	.00	.00	.00	.00	.00		
12			e.00	17	9.5	.00	.00	.00	.00	.00		
13			e.00	20	12	.00	.00	.00	.00	.00		
14			e.00	22	13	.00	.00	.00	.00	.00		
15			e.00	26	17	.00	.00	.00	.00	.00		
16			e.00	27	30	.00	.00	.00	.00	.00		
17			e.00	24	22	.00	.00	.00	.00	.00		
18			e.00	22	17	.00	.00	.00	.00	.00		
19			e.00	38	18	.00	.00	.00	.00	.00		
20			e.00	40	26	.00	.00	.00	.00	.00		
21			e.00	16	21	.00	.00	.00	.00	.00		
22			e.00	.57	17	.00	.00	.00	.00	.00		
23			e.00	.00	20	.00	.00	.00	.00	.00		
24			e.00	.00	19	.00	.00	.00	.00	.00		
25			e.00	.00	36	.00	.00	.00	2.3	.00		
26			e.00	.00	20	.00	.00	.00	7.6	.00		
27			e.00	.00	1.5	.00	.00	.00	1.8	.00		
28			e.00	.00	.25	.00	.00	.00	.64	.00		
29			e.00	.00	.00	.00	.00	.00	.21	.00		
30			e.00	.00	.00	.00	.00	.00	.04	.00		
31			e.00		.00		.00	.00		.00		
TOTAL			0.00	469.57	357.35	0.00	0.00	0.00	12.59	0.00		
MEAN			.000	15.7	11.5	.000	.000	.000	.42	.000		
MAX			.00	40	36	.00	.00	.00	7.6	.00		
MIN			.00	.00	.00	.00	.00	.00	.00	.00		
AC-FT			.00	931	709	.00	.00	.00	25	.00		

e Estimated

MILK RIVER BASIN

06149500 BATTLE CREEK AT INTERNATIONAL BOUNDARY

(International gaging station)

LOCATION.--Lat 49°00'07", long 109°25'18", in SE1/4 sec.4, T.1, R.26 W., third meridian, Hydrologic Unit 10050008, on left bank 600 ft north of international boundary, in Saskatchewan, 8 mi upstream from Woodpile Coulee, 30 mi north of Chinook, MT, and at mile 69.8.

DRAINAGE AREA.--997 mi^2, of which 378 mi^2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1917 to current season (seasonal records only most seasons). Monthly discharge only for March 1918 and March 1928, published in WSP 1309.

REVISED RECORDS.--WSP 1389: 1935(M), 1936, 1937-38(M). WSP 1729: 1924, 1926, 1932 (montlhy discharge only). W 1983: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,729.8 ft above mean sea level (International Boundary Survey datum, adjustment of 1928).

REMARKS.--Estimated daily discharges: Mar. 1-3 and July 10-12. Water-discharge records good. Natural flow of stream affected by storage reservoirs, diversions for irrigation of about 9,500 acres, and return flow from irrigated areas. Water may be diverted into or from Frenchman River basin through Cypress Lake.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,780 ft^3/s, Sept. 25, 1986, gage height, 11.57 ft, from rating curve extended above 4,400 ft^3/s on basis of slope-area measurement of peak flow; no flow at times most seasons.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 90 ft^3/s, Mar. 30, gage height, 4.35 ft; no flow many days.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	49	17	52	9.8	.67	.00	2.5		
2			e.00	48	16	41	8.4	.57	.00	1.9		
3			e.00	34	14	34	6.5	.42	.00	1.3		
4			.00	20	12	27	7.5	.35	.00	1.2		
5			.00	16	11	31	7.0	.32	.00	2.9		
6			.00	23	10	32	5.8	.28	.00	2.9		
7			.00	24	8.7	26	5.0	.25	.00	2.8		
8			.07	17	7.6	21	3.6	.18	.00	3.1		
9			.18	15	5.7	16	2.9	.07	.00	2.3		
10			.42	13	3.6	14	e3.4	.04	1.4	3.7		
11			1.2	12	2.3	18	e3.8	.04	4.6	4.2		
12			.11	13	1.6	16	e4.2	.04	4.2	3.1		
13			.07	16	1.5	13	4.7	.00	3.7	4.0		
14			.04	35	1.2	12	5.9	.00	2.5	4.4		
15			.00	43	.99	15	5.9	.00	1.9	4.7		
16			.00	37	.85	18	4.7	.00	2.2	5.1		
17			.00	23	.67	32	4.7	.00	3.4	4.9		
18			.00	20	.53	20	4.4	.00	4.5	4.9		
19			.00	18	.35	13	3.1	.00	4.4	5.0		
20			.00	13	3.3	9.9	2.8	.00	3.4	4.8		
21			.00	39	2.8	9.3	2.3	.00	3.4	5.0		
22			.00	19	1.6	11	1.7	.00	5.2	6.8		
23			.00	14	.99	14	1.2	.00	5.5	6.8		
24			.00	30	.67	13	1.1	.00	4.5	6.9		
25			.14	41	1.1	13	1.7	.00	3.0	6.8		
26			2.0	46	4.0	11	2.7	.00	2.9	7.3		
27			6.3	35	3.6	9.6	3.1	.00	3.2	7.3		
28			6.6	28	21	9.1	2.2	.00	2.6	7.3		
29			20	26	26	7.2	1.4	.00	2.0	7.9		
30			29	20	30	6.2	.95	.00	2.5	7.7		
31			61		49		.74	.00		7.2		
TOTAL			127.13	787	259.65	564.3	123.19	3.23	71.00	146.7		
MEAN			4.10	26.2	8.38	18.8	3.97	.10	2.37	4.73		
MAX			61	49	49	52	9.8	.67	5.5	7.9		
MIN			.00	12	.35	6.2	.74	.00	.00	1.2		
AC-FT			252	1560	515	1120	244	6.4	141	291		

e Estimated

MILK RIVER BASIN

06149500 BATTLE CREEK AT INTERNATIONAL BOUNDARY--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1964, 1972-74, 1987 to current year (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
MAR										
28...	1730	7.5	100	68	1090	5.0	0.0	8.0	400	72
APR										
06...	1215	22	--	--	416	6.0	0.5	--	--	--
19...	1620	17	100	10	493	21.0	11.0	8.0	180	39
MAY										
25...	1630	3.7	--	--	762	16.0	12.0	--	--	--
JUN										
23...	1100	14	70	2	617	19.5	17.5	9.3	170	16
JUL										
19...	1905	3.4	--	--	518	30.5	28.0	--	--	--
SEP										
11...	1630	4.4	--	--	584	16.0	13.0	--	--	--

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	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)
MAR									
28...	54	97	2	10	338	280	7.9	0.20	9.6
APR									
19...	20	37	1	3.9	152	100	3.0	0.20	4.4
JUN									
23...	31	69	2	4.4	157	160	3.7	0.30	0.60

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)	PHOS-PHOROUS DIS-SOLVED (MG/L AS P) (00666)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	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)
MAR									
28...	734	1.0	14.9	<0.100	0.030	2	<0.5	70	<1
APR									
19...	299	0.41	13.7	<0.100	0.010	1	<0.5	30	<1
JUN									
23...	379	0.52	14.3	<0.100	0.030	5	<0.5	80	1

DATE	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, 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, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
MAR									
28...	<1	2	38	<5	140	<0.1	5	<1	36
APR									
19...	1	1	16	<5	11	<0.1	<1	<1	<3
JUN									
23...	<1	2	37	2	6	<0.1	2	<1	5

MILK RIVER BASIN

06151000 LYONS CREEK AT INTERNATIONAL BOUNDARY

(International gaging station)

LOCATION.--Lat 49° 00'17", long 109°13'48", in SW1/4 sec.1, T.1, R.25 W., third meridian, Hydrologic Unit 10050008, on right bank 0.3 mi north of international boundary, 8 mi south of Arena, Saskatchewan, 28 mi north of Chinook, MT, and at mile 20.5.

DRAINAGE AREA.--66.7 mi^2.

PERIOD OF RECORD.--March 1927 to current season (seasonal records only in most seasons). Monthly discharge only for February, March 1934, published in WSP 1309. Prior to March 1962, published as Lyons Coulee at international boundary.

REVISED RECORDS.--WSP 1389: 1929(M), 1936, 1937(M), 1939, 1940-41(M), 1946(M). WSP 1629: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 2,800 ft, from international boundary map. Prior to Oct. 19, 1935, nonrecording gages at site 0.5 mi south of international boundary at different datum. Oct. 19, 1935, to Oct. 31, 1940, nonrecording gage at site 1.2 mi north of international boundary at different datum. Nov. 1, 1940, to Aug. 4, 1958, nonrecording gages at sites within 300 ft of present site at present datum.

REMARKS.--No estimated daily discharges. Records good. Natural flow of stream affected by small stockwater and irrigation dams upstream from station.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,400 ft^3/s, Sept. 25, 1986, gage height, 6.78 ft, from rating curve extended above 300 ft^3/s on basis of slope-area measurement of peak flow; no flow most of each season.

EXTREMES FOR CURRENT SEASON.--No flow for season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			.00	.00	.00	.00	.00	.00	.00	.00		
2			.00	.00	.00	.00	.00	.00	.00	.00		
3			.00	.00	.00	.00	.00	.00	.00	.00		
4			.00	.00	.00	.00	.00	.00	.00	.00		
5			.00	.00	.00	.00	.00	.00	.00	.00		
6			.00	.00	.00	.00	.00	.00	.00	.00		
7			.00	.00	.00	.00	.00	.00	.00	.00		
8			.00	.00	.00	.00	.00	.00	.00	.00		
9			.00	.00	.00	.00	.00	.00	.00	.00		
10			.00	.00	.00	.00	.00	.00	.00	.00		
11			.00	.00	.00	.00	.00	.00	.00	.00		
12			.00	.00	.00	.00	.00	.00	.00	.00		
13			.00	.00	.00	.00	.00	.00	.00	.00		
14			.00	.00	.00	.00	.00	.00	.00	.00		
15			.00	.00	.00	.00	.00	.00	.00	.00		
16			.00	.00	.00	.00	.00	.00	.00	.00		
17			.00	.00	.00	.00	.00	.00	.00	.00		
18			.00	.00	.00	.00	.00	.00	.00	.00		
19			.00	.00	.00	.00	.00	.00	.00	.00		
20			.00	.00	.00	.00	.00	.00	.00	.00		
21			.00	.00	.00	.00	.00	.00	.00	.00		
22			.00	.00	.00	.00	.00	.00	.00	.00		
23			.00	.00	.00	.00	.00	.00	.00	.00		
24			.00	.00	.00	.00	.00	.00	.00	.00		
25			.00	.00	.00	.00	.00	.00	.00	.00		
26			.00	.00	.00	.00	.00	.00	.00	.00		
27			.00	.00	.00	.00	.00	.00	.00	.00		
28			.00	.00	.00	.00	.00	.00	.00	.00		
29			.00	.00	.00	.00	.00	.00	.00	.00		
30			.00	.00	.00	.00	.00	.00	.00	.00		
31			.00		.00		.00	.00		.00		
TOTAL			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
MEAN			.000	.000	.000	.000	.000	.000	.000	.000		
MAX			.00	.00	.00	.00	.00	.00	.00	.00		
MIN			.00	.00	.00	.00	.00	.00	.00	.00		
AC-FT			.00	.00	.00	.00	.00	.00	.00	.00		

MILK RIVER BASIN

06151500 BATTLE CREEK NEAR CHINOOK, MT

LOCATION.--Lat 48°39'05", long 109°13'47", in NW1/4SW1/4NE1/4 sec.3, T.33 N., R.19 E., Blaine County, Hydrologic Unit 10050008, on left bank, 4 mi north of Chinook, and at mile 14.

DRAINAGE AREA.--1,539 mi^2.

PERIOD OF RECORD.--April 1905 to September 1921 (monthly discharge only, published in WSP 1309), June 1984 to current year (seasonal records only). Published as North Fork Milk River near Chinook prior to 1913.

GAGE.--Water-stage recorder. Elevation of gage is 2,410 ft above National Geodetic Vertical Datum of 1929, from topographic map. Apr. 22, 1905 to Apr. 8, 1918, chain gage 100 ft downstream, and Apr. 9, 1918 to Sept. 30, 1921, chain gage on bridge 600 ft downstream at same datum but different from present datum.

REMARKS.--Estimated daily discharges: Apr. 1-6. Records fair except those below 1.0 ft^3/s, which are poor. Diversions for irrigation of about 11,000 acres upstream from station. U.S. Bureau of Reclamation satellite telemeter at station. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,400 ft^3/s, Sept. 26, 1986, gage height, 22.91 ft, from rating curve extended above 900 ft^3/s, on basis of slope-area measurement of peak flow; no flow at times.

EXTREMES FOR CURRENT SEASON.--Maximum discharge recorded, 86 ft^3/s, Apr. 3, gage height, 2.45 ft; no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1				e50	19	.40	7.7	1.6	.03			
2				e55	17	2.6	12	.59	.03			
3				e75	15	16	11	.21	.01			
4				e60	12	14	11	.14	.01			
5				e45	9.5	11	10	.14	.01			
6				e32	7.6	7.1	9.4	.10	.01			
7				27	6.1	3.4	10	.04	.01			
8				23	5.2	2.8	9.6	.02	.01			
9				23	4.2	5.5	9.5	.00	.01			
10				22	2.6	3.6	10	.00	.01			
11				17	1.9	2.6	11	.00	.01			
12				15	1.1	1.7	12	.00	.01			
13				15	1.6	2.4	12	.00	.01			
14				12	1.4	2.7	8.9	.00	.01			
15				10	1.1	5.1	5.9	.00	.01			
16				7.6	1.4	5.2	5.6	.03	.00			
17				18	1.4	2.3	5.8	.02	.00			
18				21	1.2	.49	5.6	.01	.03			
19				17	1.1	.27	5.6	.00	.05			
20				11	.99	.18	5.2	.00	.03			
21				6.9	.54	4.2	5.2	.00	.03			
22				4.7	.53	7.8	5.2	.00	.03			
23				6.1	.51	5.5	5.2	.00	.03			
24				9.8	.41	3.0	5.2	.02	.03			
25				12	.52	1.0	5.7	.40	.03			
26				8.2	.40	2.0	5.6	.22	.01			
27				20	.32	3.5	6.0	.10	.01			
28				34	.25	7.3	6.5	.06	.01			
29				26	.63	7.3	6.9	.04	.01			
30				21	.81	7.3	6.9	.04	.01			
31				---	.47	---	5.4	.03	---			
TOTAL				704.3	116.78	138.24	241.6	3.81	0.50			
MEAN				23.5	3.77	4.61	7.79	.12	.017			
MAX				75	19	16	12	1.6	.05			
MIN				4.7	.25	.18	5.2	.00	.00			
AC-FT				1400	232	274	479	7.6	1.0			

e Estimated

MILK RIVER BASIN

06154100 MILK RIVER NEAR HARLEM, MT

LOCATION.--Lat 48°29'22", long 108°45'28", in NE1/4SE1/4NE1/4 sec.32, T.32 N., R.23 E., Blaine County, Hydrologic Unit 10050004, Fort Belknap Indian Reservation, on right bank 30 ft downstream from U.S. Highway 2 bridge, 0.6 mi northeast of unincorporated community of Fort Belknap Agency, 3.5 mi southeast of Harlem, and at mile 332.2.

DRAINAGE AREA.--9,822 mi^2.

PERIOD OF RECORD.--October 1959 to September 1969, October 1982 to current year. Gage heights only for period Apr. 3-25, 1952, published as "at Fort Belknap" in 1260-B.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,319.48 ft above National Geodetic Vertical Datum of 1929. Apr. 3-25, 1952, nonrecording gage on old bridge 200 ft downstream at different datum. Nov. 1, 1959, to Mar. 12, 1968, nonrecording gage or water-stage recorder at several sites within 0.5 mi of present site at different datum.

REMARKS.--Estimated daily discharges: Nov. 16-18, 25-28, Dec. 7-9, 14-16, Dec. 20 to Apr. 4. Records fair except those for estimated daily discharges, which are poor. Flow increased during irrigation season by water from St. Mary Canal (station number 05018500). Flow mainly regulated by Fresno Reservoir (station number 06136500) since 1939. Diversions for irrigation of about 60,000 acres of which about 13,000 acres lie downstream from station. Several observations of water temperature and specific conductance were made during the year. U. S. Bureau of Reclamation satellite telemeter at station.

AVERAGE DISCHARGE.--17 years (1960-69, 1983-89), 356 ft^3/s, 257,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,900 ft^3/s, Sept. 29, 1986, gage height, 25.73 ft; no flow on many days August, September 1988.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1952 reached a stage of about 23.5 ft, present site and datum.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 866 ft^3/s, July 18,19, gage height, 9.74 ft; minimum not determined but probably was no flow on Apr. 24 for part of the day.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	42	31	e20	e35	e21	e300	346	755	594	638	460
2	40	44	34	e22	e30	e20	e200	326	632	520	629	459
3	36	50	38	e24	e25	e19	e180	323	565	476	600	440
4	35	42	41	e25	e20	e18	e170	313	533	450	581	415
5	35	38	41	e25	e24	e17	172	320	566	415	602	417
6	36	41	36	e25	e28	e20	152	342	635	404	619	444
7	35	37	e35	e23	e30	e25	132	348	618	423	625	433
8	37	36	e35	e22	e30	e35	117	345	542	500	639	389
9	39	37	e35	e20	e30	e50	107	339	539	537	603	364
10	37	34	35	e22	e33	e100	97	336	590	561	554	358
11	36	38	34	e22	e33	e150	119	269	641	559	562	357
12	36	37	35	e24	e33	e140	144	177	749	544	553	360
13	38	35	38	e26	e35	e130	141	312	758	559	554	368
14	40	30	e37	e26	e30	e120	172	410	684	622	564	371
15	37	21	e35	e25	e27	e110	187	459	682	667	570	364
16	38	e20	e36	e25	e25	e100	202	428	720	719	578	364
17	36	e20	38	e28	e25	e95	235	427	754	742	583	349
18	38	e25	35	e30	e25	e90	243	417	774	836	534	290
19	40	26	27	e35	e25	e90	263	442	740	856	501	277
20	41	27	e25	e40	e28	e85	271	474	687	835	472	286
21	39	29	e24	e50	e30	e90	263	446	661	779	458	270
22	39	149	e24	e55	e27	e100	259	460	629	716	439	253
23	37	62	e22	e53	e30	e130	253	403	667	642	432	200
24	36	35	e22	e51	e35	e150	146	402	707	628	485	268
25	34	e35	e22	e50	e30	e180	242	408	692	647	613	312
26	37	e32	e20	e47	e28	e210	272	445	726	612	742	313
27	36	e30	e20	e50	e25	e250	299	618	748	633	677	316
28	31	e31	e20	e47	e23	e220	314	613	764	643	507	329
29	32	33	e20	e45	---	e300	355	640	737	649	466	308
30	40	32	e22	e60	---	e250	367	723	682	646	479	305
31	48	---	e20	e70	---	e350	---	804	---	631	477	---
TOTAL	1158	1148	937	1087	799	3665	6374	13115	20177	19045	17336	10439
MEAN	37.4	38.3	30.2	35.1	28.5	118	212	423	673	614	559	348
MAX	48	149	41	70	35	350	367	804	774	856	742	460
MIN	31	20	20	20	20	17	97	177	533	404	432	200
AC-FT	2300	2280	1860	2160	1580	7270	12640	26010	40020	37780	34390	20710

CAL YR 1988 TOTAL 58367.40 MEAN 159 MAX 938 MIN .00 AC-FT 115800
WTR YR 1989 TOTAL 95280 MEAN 261 MAX 856 MIN 17 AC-FT 189000

e Estimated

MILK RIVER BASIN

06154140 FIFTEENMILE CREEK TRIBUTARY NEAR HARLEM, MT

LOCATION.--Lat 48°19'29", long 108°42'49", in SW1/4NW1/4SW1/4 sec.26, T.30 N., R.23 E., Blaine County, Hydrologic Unit 10050004, just downstream of culvert on State Highway 66, 1.7 mi upstream of mouth, and 15.5 mi south of Harlem.

DRAINAGE AREA.--2.31 mi^2.

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

GAGE.--Water-stage recorder. Elevation of gage is 2,650 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Feb. 16 to June 19. Records poor. No known regulation or diversion upstream of station.

AVERAGE DISCHARGE.--6 years (1983-89), 0.12 ft^3/s, 86.9 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 180 ft^3/s, Feb. 25, 1986, gage height, 3.61 ft; no flow most days each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge unknown but occurred on Mar. 8, backwater from ice; maximum gage height, 2.80 ft, Mar. 9, ice jam; no flow most days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.00
2	.00	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.00
3	.00	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.00
4	.00	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.00
5	.00	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.00
6	.00	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.00
7	.00	.00	.00	.00	.00	e2.0	e.00	e.00	e.00	.00	.00	.00
8	.00	.00	.00	.00	.00	e25	e.00	e.00	e.00	.00	.00	.00
9	.00	.00	.00	.00	.00	e10	e.00	e.00	e.00	.00	.00	.00
10	.00	.00	.00	.00	.00	e5.0	e.00	e.00	e.00	.00	.00	.00
11	.00	.00	.00	.00	.00	e1.0	e.00	e.00	e.00	.00	.00	.00
12	.00	.00	.00	.00	.00	e.10	e.00	e.00	e.00	.00	.00	.00
13	.00	.00	.00	.00	.00	e.00	e.00	e3.0	e.00	.00	.00	.00
14	.00	.00	.00	.00	.00	e.00	e.00	e1.0	e.00	.00	.00	.00
15	.00	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.00
16	.00	.00	.00	.00	e.00	e.00	e.00	e.00	e.00	.00	.00	.00
17	.00	.00	.00	.00	e.00	e.00	e.00	e.00	e.00	.00	.00	.00
18	.00	.00	.00	.00	e.00	e.00	e.00	e.00	e.00	.00	.00	.00
19	.00	.00	.00	.00	e.00	e.00	e.00	e.00	e.00	.00	.00	.00
20	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.00	.00
21	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.00	.00
22	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.00	.00
23	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.00	.00
24	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.00	.00
25	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.20	.00
26	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.00	.00
27	.00	.00	.00	.00	e.00	e.00	e.10	e.00	.00	.00	.00	.00
28	.00	.00	.00	.00	e.00	e.00	e.00	e.00	.00	.00	.00	.00
29	.00	.00	.00	.00	---	e.00	e.00	e5.0	.00	.00	.00	.00
30	.00	.00	.00	.00	---	e.00	e.00	e1.0	.00	.00	.00	.00
31	.00	---	.00	.00	---	e.00	---	e.00	---	.00	.00	---
TOTAL	0.00	0.00	0.00	0.00	0.00	43.10	0.10	10.00	0.00	0.00	0.20	0.00
MEAN	.000	.000	.000	.000	.000	1.39	.003	.32	.000	.000	.006	.000
MAX	.00	.00	.00	.00	.00	25	.10	5.0	.00	.00	.20	.00
MIN	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
AC-FT	.00	.00	.00	.00	.00	85	.2	20	.00	.00	.4	.00

CAL YR 1988 TOTAL 0.00 MEAN .000 MAX .00 MIN .00 AC-FT .00
WTR YR 1989 TOTAL 53.40 MEAN .15 MAX 25 MIN .00 AC-FT 106

e Estimated

MILK RIVER BASIN

06154400 PEOPLES CREEK NEAR HAYS, MT

LOCATION.--Lat 48°13'25", long 108°42'48", in SW1/4 sec.35, T.29 N., R.23 E., Blaine County, Hydrologic Unit 1005009, on right bank 45 ft downstream from bridge on State Highway 66, 2.5 mi downstream from Myrtle Creek, 16.4 mi north of Hays, and at mile 47.2.

DRAINAGE AREA.--220 mi^2.

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

GAGE.--Water-stage recorder. Datum of gage is 2,714.10 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 15-22, 24-30, Dec. 7-11, Dec. 14 to Mar. 28. Records fair except those for estimated daily discharges, which are poor. Some storage in numerous stock and beaver ponds and diversions for irrigation of about 1,300 acres upstream of station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--22 years (water years 1968-89), 14.9 ft^3/s, 10,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,460 ft^3/s, June 8, 1972, gage height, 15.03 ft, from floodmark, from rating curve extended above 490 ft^3/s on basis of slope-area measurement of peak flow; no flow at times most years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 100 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 7	2200	ice jam	*7.48	No peaks greater than base discharge this year.			
June 2	1700	*32	4.07				

No flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.02	.03	.04	e.00	e.00	e.00	4.9	11	29	5.4	.00	.02
2	.02	.02	.04	e.00	e.00	e.00	2.6	8.2	31	3.3	.00	.02
3	.03	.02	.04	e.00	e.00	e.00	.76	3.8	28	1.8	.00	.02
4	.03	.01	.03	e.00	e.00	e.00	.38	2.3	22	.64	.00	.02
5	.02	.02	.03	e.00	e.00	e.00	.13	1.4	19	.19	.00	.02
6	.02	.01	.03	e.00	e.00	e.50	.13	.89	17	.10	.00	.02
7	.03	.01	e.02	e.00	e.00	e5.0	.13	.33	15	.06	.00	.01
8	.02	.02	e.02	e.00	e.00	e25	.07	.19	14	.03	.00	.01
9	.02	.02	e.02	e.00	e.00	e24	.06	.23	10	.00	.00	.01
10	.02	.02	e.02	e.00	e.00	e24	.07	.19	8.3	.01	.00	.01
11	.02	.02	e.02	e.00	e.00	e23	.03	.09	5.9	.01	.00	.01
12	.02	.02	.04	e.00	e.00	e23	.02	.22	5.7	.01	.00	.01
13	.02	.02	.02	e.00	e.00	e22	.01	1.2	4.5	.00	.00	.01
14	.01	.02	e.02	e.00	e.00	e22	.01	3.3	5.0	.00	.00	.01
15	.01	e.02	e.02	e.00	e.00	e21	.00	5.9	6.1	.00	.00	.01
16	.02	e.02	e.02	e.00	e.00	e21	.01	14	13	.00	.01	.01
17	.02	e.02	e.02	e.02	e.00	e20	.01	14	5.7	.00	.01	.01
18	.02	e.02	e.03	e.01	e.00	e22	.00	12	7.8	.00	.01	.01
19	.02	e.02	e.02	e.01	e.00	e21	.00	9.9	11	.00	.00	.01
20	.02	e.02	e.01	e.01	e.00	e20	.00	9.4	10	.00	.00	.01
21	.03	e.02	e.00	e.00	e.00	e19	.00	8.6	6.4	.00	.00	.01
22	.02	e.02	e.00	e.00	e.00	e18	.00	6.4	5.6	.00	.00	.01
23	.02	.03	e.00	e.00	e.00	e17	.00	6.3	6.4	.00	.00	.01
24	.03	e.02	e.00	e.00	e.01	e16	.00	5.4	6.5	.00	.00	.01
25	.03	e.02	e.00	e.00	e.01	e15	.01	7.1	6.4	.00	.01	.01
26	.03	e.02	e.00	e.00	e.00	e14	.13	8.9	9.0	.00	.00	.01
27	.03	e.02	e.00	e.01	e.00	e13	2.9	8.9	10	.00	.00	.01
28	.03	e.02	e.00	e.01	e.00	e14	21	14	8.9	.00	.00	.00
29	.03	e.02	e.00	e.01	---	11	24	17	8.9	.00	.01	.00
30	.03	e.02	e.00	e.02	---	5.9	15	23	8.5	.00	.02	.00
31	.02	---	e.00	e.01	---	6.7	---	23	---	.00	.02	---
TOTAL	0.71	0.59	0.51	0.11	0.02	443.10	72.36	227.14	344.6	11.55	0.09	0.33
MEAN	.023	.020	.016	.004	.001	14.3	2.41	7.33	11.5	.37	.003	.011
MAX	.03	.03	.04	.02	.01	25	24	23	31	5.4	.02	.02
MIN	.01	.01	.00	.00	.00	.00	.00	.09	4.5	.00	.00	.00
AC-FT	1.4	1.2	1.0	.2	.04	879	144	451	684	23	.2	.7

CAL YR 1988 TOTAL 201.95 MEAN .55 MAX 6.5 MIN .00 AC-FT 401
WTR YR 1989 TOTAL 1101.11 MEAN 3.02 MAX 31 MIN .00 AC-FT 2180

e Estimated

MILK RIVER BASIN

06154410 LITTLE PEOPLES CREEK NEAR HAYS, MT

LOCATION.--Lat 47°57'58", long 108°39'36", in SE1/4SE1/4NW1/4 sec.32, T.26 N., R.24 E., Blaine County, Hydrologic Unit 10050009, on right bank 0.5 mi upstream from west entrance to Mission Canyon, 2 mi southeast of Hays, and at mile 23.1.

DRAINAGE AREA.--13.0 mi^2.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS.--WDR MT-81-1: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 3,769.72 ft above National Geodetic Vertical Datum of 1929. August 1972 to June 24, 1976, gage at former site at datum 10.00 ft higher. Prior to Apr. 22, 1987, gage located 330 ft downstream.

REMARKS.--No estimated daily discharges this year. Water-discharge records fair. No known regulation or diversion upstream from station.

AVERAGE DISCHARGE.--17 years, 4.68 ft^3/s, 3,390 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 576 ft^3/s, May 25, 1974, gage height, 4.57 ft, from floodmark, at site and datum then in use, from rating curve extended above 44 ft^3/s on basis of slope-area measurement of peak flow; minimum, 0.92 ft^3/s, Mar. 21, 1985.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 50 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 13	1800	*126	*2.18	Only peak greater than base discharge this year.			

Minimum discharge, 0.99 ft^3/s, Feb. 4,21, Mar. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.5	1.5	1.5	1.4	1.5	1.2	1.8	5.7	23	7.2	3.4	2.5
2	1.5	1.5	1.5	1.4	1.3	1.2	1.8	6.5	22	7.5	3.5	2.5
3	1.5	1.5	1.5	1.4	1.2	1.1	1.8	7.6	20	7.1	3.6	2.5
4	1.5	1.5	1.5	1.4	1.2	1.2	1.8	8.6	15	7.0	3.5	2.5
5	1.6	1.5	1.5	1.4	1.2	1.2	2.0	7.1	14	6.6	3.1	2.5
6	1.6	1.5	1.5	1.4	1.2	1.2	2.1	6.5	12	6.3	2.9	2.4
7	1.6	1.5	1.5	1.4	1.2	1.2	2.1	5.9	11	6.2	2.9	2.4
8	1.6	1.5	1.4	1.5	1.2	1.2	2.1	5.4	9.4	6.0	3.0	2.4
9	1.7	1.5	1.4	1.3	1.2	1.2	2.0	5.2	8.3	5.9	3.1	2.4
10	1.6	1.5	1.4	1.3	1.2	1.4	2.0	5.7	7.9	5.6	3.2	2.4
11	1.6	1.5	1.4	1.3	1.1	1.4	2.0	6.5	9.3	5.8	3.2	2.4
12	1.6	1.5	1.4	1.3	1.1	1.3	2.1	7.2	12	5.6	3.2	2.4
13	1.6	1.5	1.5	1.3	1.1	1.3	2.1	71	13	5.6	3.2	2.4
14	1.6	1.5	1.5	1.3	1.1	1.3	2.2	61	11	5.2	3.2	2.4
15	1.6	1.5	1.5	1.3	1.1	1.3	2.2	28	11	5.0	3.2	2.4
16	1.6	1.5	1.5	1.3	1.1	1.3	2.1	18	15	4.8	3.2	2.4
17	1.6	1.5	1.5	1.3	1.1	1.3	2.1	22	12	4.7	3.2	2.4
18	1.5	1.5	1.5	1.5	1.1	1.4	2.1	19	12	4.7	3.1	2.4
19	1.5	1.6	1.5	1.4	1.1	1.5	2.2	18	11	4.1	3.0	2.4
20	1.5	1.6	1.5	1.4	1.1	1.5	2.2	15	11	4.3	2.8	2.4
21	1.5	1.6	1.5	1.4	1.1	1.6	2.3	14	13	4.4	2.7	2.3
22	1.6	1.6	1.5	1.4	1.1	1.6	2.4	10	12	4.2	2.7	2.4
23	1.6	1.6	1.5	1.4	1.1	1.6	2.4	9.7	11	4.0	2.7	2.4
24	1.5	1.6	1.5	1.5	1.1	1.6	2.4	9.3	9.9	3.9	2.9	2.4
25	1.5	1.6	1.5	1.5	1.2	1.8	2.4	9.5	9.5	3.8	3.0	2.4
26	1.5	1.5	1.4	1.5	1.2	1.8	2.4	8.6	9.1	3.6	2.7	2.4
27	1.6	1.4	1.4	1.5	1.2	1.8	3.0	8.7	9.0	3.6	2.8	2.4
28	1.5	1.4	1.4	1.5	1.2	1.8	4.1	10	9.3	3.4	2.8	2.4
29	1.5	1.4	1.4	1.5	---	1.8	5.0	13	8.1	3.5	2.6	2.4
30	1.5	1.4	1.4	1.5	---	1.8	5.2	16	7.4	3.4	2.5	2.6
31	1.5	---	1.4	1.5	---	1.8	---	21	---	3.4	2.6	---
TOTAL	48.2	45.3	45.4	43.5	32.6	44.7	72.4	459.7	358.2	156.4	93.5	72.6
MEAN	1.55	1.51	1.46	1.40	1.16	1.44	2.41	14.8	11.9	5.05	3.02	2.42
MAX	1.7	1.6	1.5	1.5	1.5	1.8	5.2	71	23	7.5	3.6	2.6
MIN	1.5	1.4	1.4	1.3	1.1	1.1	1.8	5.2	7.4	3.4	2.5	2.3
AC-FT	96	90	90	86	65	89	144	912	710	310	185	144

CAL YR 1988 TOTAL 816.9 MEAN 2.23 MAX 42 MIN 1.3 AC-FT 1620
WTR YR 1989 TOTAL 1472.5 MEAN 4.03 MAX 71 MIN 1.1 AC-FT 2920

06154410 LITTLE PEOPLES CREEK NEAR HAYS, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1977 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)
OCT												
25...	1200	1.5	60	1	460	6.0	7.0	675	10.0	93	8.4	260
DEC												
13...	1340	1.5	--	--	448	3.5	5.0	--	--	--	--	--
JAN												
24...	1300	1.5	100	72	454	-5.0	4.0	670	11.4	99	8.5	250
MAR												
21...	1000	1.6	--	--	452	4.0	5.0	--	--	--	--	--
APR												
05...	1500	2.1	100	2	462	3.0	6.0	670	9.6	88	8.4	250
MAY												
18...	1030	17	--	--	370	14.0	9.0	--	--	--	--	--
JUN												
20...	1610	11	--	--	380	16.0	9.0	--	--	--	--	--
AUG												
09...	1700	3.1	0	0	452	27.0	15.0	668	9.0	102	7.9	240
SEP												
21...	1530	2.4	--	--	420	20.0	11.5	--	--	--	--	--

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)	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, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)
OCT												
25...	34	61	26	2.8	0.1	1.4	226	28	0.80	0.20	10	266
JAN												
24...	17	59	24	2.7	0.1	1.6	229	29	0.70	0.30	9.5	264
APR												
05...	25	64	23	3.1	0.1	1.6	230	33	0.60	0.30	10	274
AUG												
09...	34	63	21	3.7	0.1	1.8	210	28	0.50	0.30	11	255

DATE	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	ARSENIC TOTAL (UG/L AS AS) (01002)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE) (01012)	BORON, DIS-SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR) (01034)
OCT												
25...	0.36	1.08	<0.100	0.030	0.17	0.20	0.010	1	<10	20	1	1
JAN												
24...	0.36	1.07	<0.100	0.020	0.28	0.30	0.010	2	<10	10	<1	1
APR												
05...	0.37	1.55	<0.100	<0.010	--	<0.20	<0.010	2	<10	20	<1	<1
AUG												
09...	0.35	2.14	<0.100	0.010	--	<0.20	<0.010	1	<10	20	<1	1

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	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												
25...	1	150	23	<5	20	<0.10	5	<1	<10	11	0.04	65
JAN												
24...	1	60	3	<5	<10	<0.10	1	<1	<10	45	0.18	23
APR												
05...	2	30	5	<5	<10	0.10	6	2	<10	55	0.31	82
AUG												
09...	9	40	<3	2	<10	<0.10	3	<1	10	26	0.22	84

MILK RIVER BASIN

06154430 LODGE POLE CREEK AT LODGE POLE, MT

LOCATION.--Lat 48°01'52", long 108°31'55", in SE1/4SE1/4SW1/4 sec. 5, T.26 N., R.25 E., Blaine County, Hydrologic Unit 10050009, Fort Belknap Indian Reservation, 10 ft upstream of culvert in county road just south of Lodge Pole and 8 mi northeast of Hays.

DRAINAGE AREA.--19.5 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1987 to current year. Miscellaneous measurements made at this site 1972, 1978, and 1982-85 water years.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 3,420 ft above National Geodetic Vertical datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Dec. 12, 13. Water-discharge records fair. No known diversion for irrigation upstream of station. Several observations of water temperature and specific conductance were made during the year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge, 390 ft^3/s, Sept. 25, 1986, gage height, 6.84 ft, from floodmark, by computation of peak flow through culvert.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 54 ft^3/s, May 14, 1989, gage height, 2.41 ft; minimum, 0.01 ft^3/s, Jan. 13, 1989, gage height, 1.03 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 54 ft^3/s, May 14, gage height, 2.41 ft; minimum, 0.01 ft^3/s, Jan. 13, gage height, 1.03 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.20	.24	.16	.13	.08	.05	.05	.05	25	6.3	3.4	3.6
2	.20	.24	.16	.11	.08	.06	.05	.06	20	6.3	3.4	3.6
3	.20	.24	.16	.12	.08	.06	.05	.06	17	5.3	3.3	3.5
4	.20	.24	.16	.13	.08	.06	.05	.05	15	5.2	3.4	3.5
5	.20	.24	.16	.12	.08	.06	.05	.05	13	4.7	3.3	3.6
6	.20	.24	.16	.10	.08	.14	.05	.05	11	4.5	3.3	3.6
7	.22	.24	.16	.10	.07	.06	.04	.05	9.4	4.4	3.3	3.6
8	.24	.24	.16	.10	.07	.06	.04	.05	8.3	4.1	3.2	3.5
9	.21	.23	.16	.10	.07	.07	.03	.05	7.1	4.0	3.4	3.5
10	.20	.24	.15	.10	.07	.10	.03	.05	9.1	4.1	3.3	3.5
11	.20	.22	.15	.10	.07	.08	.03	.05	11	3.8	3.3	3.5
12	.20	.21	e.14	.10	.07	.08	.03	.05	17	3.6	3.4	3.5
13	.20	.20	e.14	.04	.07	.08	.03	7.4	15	3.8	3.5	3.4
14	.20	.20	.13	.10	.07	.08	.03	45	14	4.0	3.4	3.4
15	.23	.20	.13	.10	.07	.08	.03	25	12	3.9	3.3	3.2
16	.24	.20	.13	.10	.07	.08	.04	14	16	3.8	3.4	3.3
17	.24	.20	.14	.10	.07	.07	.03	7.7	14	3.9	3.4	3.5
18	.28	.20	.13	.10	.07	.08	.03	5.9	13	3.6	3.4	3.6
19	.28	.20	.13	.10	.08	.08	.03	6.9	12	3.5	3.3	3.5
20	.28	.20	.13	.10	.08	.08	.03	4.1	12	3.3	3.3	3.5
21	.28	.19	.13	.10	.07	.07	.03	3.3	12	3.4	3.3	3.5
22	.25	.20	.13	.10	.07	.07	.02	2.5	12	3.3	3.1	3.5
23	.24	.20	.13	.10	.06	.07	.03	2.1	12	3.4	3.2	3.6
24	.24	.20	.13	.10	.05	.07	.03	1.9	12	3.3	3.8	3.6
25	.23	.20	.13	.10	.05	.08	.03	3.8	12	3.4	3.8	3.6
26	.24	.20	.13	.09	.05	.07	.04	5.6	11	3.3	3.4	3.7
27	.23	.18	.13	.08	.05	.07	.06	10	10	3.3	3.5	3.7
28	.23	.16	.13	.08	.05	.06	.06	11	9.8	3.3	3.5	4.0
29	.24	.16	.13	.08	---	.06	.06	14	8.4	3.2	3.6	4.0
30	.24	.16	.13	.08	---	.06	.05	13	7.3	3.3	3.8	4.0
31	.23	---	.13	.08	---	.06	---	23	---	3.4	3.7	---
TOTAL	7.07	6.27	4.37	3.04	1.93	2.25	1.16	206.82	377.4	122.7	105.7	107.1
MEAN	.23	.21	.14	.098	.069	.073	.039	6.67	12.6	3.96	3.41	3.57
MAX	.28	.24	.16	.13	.08	.14	.06	45	25	6.3	3.8	4.0
MIN	.20	.16	.13	.04	.05	.05	.02	.05	7.1	3.2	3.1	3.2
AC-FT	14	12	8.7	6.0	3.8	4.5	2.3	410	749	243	210	212

CAL YR 1988 TOTAL 170.40 MEAN .47 MAX 14 MIN .08 AC-FT 338
WTR YR 1989 TOTAL 945.81 MEAN 2.59 MAX 45 MIN .02 AC-FT 1880

e Estimated

MILK RIVER BASIN

06154430 LODGE POLE CREEK AT LODGE POLE, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1982-84, 1988 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)
OCT												
25...	1400	0.23	0	0	552	13.0	9.0	681	7.0	68	7.6	300
DEC												
14...	0900	0.12	--	--	560	-5.0	2.0	--	--	--	--	--
JAN												
24...	1600	0.11	98	1	550	-5.0	3.0	679	9.2	77	7.9	280
APR												
05...	1200	0.04	100	2	568	5.0	5.0	680	7.4	65	7.9	300
MAY												
18...	1240	4.4	--	--	442	15.0	10.0	--	--	--	--	--
JUN												
27...	1430	9.5	--	--	450	25.0	15.0	--	--	--	--	--
AUG												
08...	1230	3.3	0	0	560	25.0	12.5	680	8.0	84	7.2	300

DATE	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)
OCT												
25...	82	22	8.8	0.2	2.1	41	0.70	0.20	13	334	0.45	0.21
JAN												
24...	78	21	8.4	0.2	2.3	45	1.0	0.30	12	328	0.45	0.10
APR												
05...	83	22	8.3	0.2	2.2	53	0.90	0.30	12	341	0.46	0.04
AUG												
08...	84	21	7.1	0.2	2.2	40	0.60	0.30	13	305	0.41	2.72

DATE	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	ARSENIC TOTAL (UG/L AS AS) (01002)	BERYL-LIUM, TOTAL RECOV-ERABLE (UG/L AS BE) (01012)	BORON, DIS-SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR) (01034)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)
OCT											
25...	<0.100	0.030	0.17	0.20	0.010	1	<10	30	1	1	1
JAN											
24...	<0.100	0.040	0.36	0.40	0.020	1	<10	30	<1	<1	<1
APR											
05...	<0.100	0.020	--	<0.20	<0.010	1	<10	30	<1	1	1
AUG											
08...	<0.100	0.020	--	<0.20	<0.010	<1	<10	30	<1	1	3

DATE	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG) (71900)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI) (01067)	SELE-NIUM, TOTAL (UG/L AS SE) (01147)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	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											
25...	270	59	<5	50	0.10	4	<1	<10	54	0.03	23
JAN											
24...	800	39	<5	140	<0.10	1	<1	<10	49	0.02	51
APR											
05...	430	74	<5	100	0.30	3	<1	10	74	0.01	44
AUG											
08...	160	20	1	60	<0.10	<1	<1	<10	82	0.73	54

MILK RIVER BASIN

06154490 WILLOW COULEE NEAR DODSON, MT

LOCATION.--Lat 48°19'31", long 108°24'52", in SW1/4NE1/4SE1/4 sec.25, T.30 N., R.25 E., Blaine County, Hydrologic Unit 10050009, just below culvert on county road 1.1 mi upstream of mouth and 9.5 mi southwest of Dodson.

DRAINAGE AREA.--5.16 mi^2.

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

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 2,450 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 8,9, 12-21. Records fair except those for estimated daily discharges, which are poor. No known diversion for irrigation upstream of station. Several observtions of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--6 years, 0.83 ft^3/s, 601 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,310 ft^3/s, Sept. 25, 1986, gage height, 7.84 ft, from floodmark by computation of peak flow through culvert and over road; no flow periods most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4.9 ft^3/s, Mar. 24,27, gage height, 1.88 ft; no flow most days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	.87	.09	.19	.00	.00	.00
2	.00	.00	.00	.00	.00	.00	.77	.03	.10	.00	.00	.00
3	.00	.00	.00	.00	.00	.00	.33	.00	.05	.00	.00	.00
4	.00	.00	.00	.00	.00	.00	.45	.00	.02	.00	.00	.00
5	.00	.00	.00	.00	.00	.00	.35	.00	.00	.00	.00	.00
6	.00	.00	.00	.00	.00	.00	.18	.00	.00	.00	.00	.00
7	.00	.00	.00	.00	.00	.00	.17	.00	.00	.00	.00	.00
8	.00	.00	.00	.00	.00	e.20	.16	.00	.00	.00	.00	.00
9	.00	.00	.00	.00	.00	e.60	.11	.00	.00	.00	.00	.00
10	.00	.00	.00	.00	.00	1.2	.04	.00	.00	.00	.00	.00
11	.00	.00	.00	.00	.00	.53	.01	.00	.00	.00	.00	.00
12	.00	.00	.00	.00	.00	e.30	.00	.00	.00	.00	.00	.00
13	.00	.00	.00	.00	.00	e.10	.00	.18	.00	.00	.00	.00
14	.00	.00	.00	.00	.00	e.00	.00	.85	.00	.00	.00	.00
15	.00	.00	.00	.00	.00	e.00	.00	.43	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	e.00	.00	.15	.00	.00	.00	.00
17	.00	.00	.00	.00	.00	e.00	.00	.06	.00	.00	.00	.00
18	.00	.00	.00	.00	.00	e.00	.00	.01	.00	.00	.00	.00
19	.00	.00	.00	.00	.00	e.00	.00	.01	.00	.00	.00	.00
20	.00	.00	.00	.00	.00	e.00	.00	.00	.00	.00	.00	.00
21	.00	.00	.00	.00	.00	e.05	.00	.00	.00	.00	.00	.00
22	.00	.00	.00	.00	.00	.14	.00	.00	.00	.00	.00	.00
23	.00	.00	.00	.00	.00	.98	.00	.00	.00	.00	.00	.00
24	.00	.00	.00	.00	.00	2.8	.00	.00	.00	.00	.00	.00
25	.00	.00	.00	.00	.00	3.2	.00	.00	.00	.00	.00	.00
26	.00	.00	.00	.00	.00	3.5	.00	.00	.00	.00	.00	.00
27	.00	.00	.00	.00	.00	3.1	.77	.00	.00	.00	.00	.00
28	.00	.00	.00	.00	.00	1.9	.87	.00	.00	.00	.00	.00
29	.00	.00	.00	.00	---	.73	.69	.24	.00	.00	.00	.00
30	.00	.00	.00	.00	---	.67	.21	.87	.00	.00	.00	.00
31	.00	---	.00	.00	---	.93	---	.48	---	.00	.00	---
TOTAL	0.00	0.00	0.00	0.00	0.00	20.93	5.98	3.40	0.36	0.00	0.00	0.00
MEAN	.000	.000	.000	.000	.000	.68	.20	.11	.012	.000	.000	.000
MAX	.00	.00	.00	.00	.00	3.5	.87	.87	.19	.00	.00	.00
MIN	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
AC-FT	.00	.00	.00	.00	.00	42	12	6.7	.7	.00	.00	.00

CAL YR 1988 TOTAL 0.70 MEAN .002 MAX .30 MIN .00 AC-FT 1.4
WTR YR 1989 TOTAL 30.67 MEAN .084 MAX 3.5 MIN .00 AC-FT 61

e Estimated

06154510 KUHR COULEE TRIBUTARY NEAR DODSON, MT

LOCATION.--Lat 48°23"17", long 108°23'17", in SW1/4NW1/4SW1/4 sec. 20, T.30 N., R.26 E., Phillips County, at culvert in county road 0.5 mi upstream of Kuhr Coulee and 8.5 mi southwest of Dodson.

DRAINAGE AREA.--1.25 mi^2.

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

GAGE.--Water-stage recorder. Elevation of gage is 2,430 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Jan. 29 to Mar. 25. Records fair except those for estimated discharges, which are poor. No known diversions for irrigation upstream from station.

AVERAGE DISCHARGE.--6 years, 0.19 ft^3/s, 138 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 436 ft^3/s, Sept. 25, 1986, gage height, 15.82 ft, from floodmark, based on rating curve developed on basis of culvert computation of peak flow; no flow most days each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, unknown, but occurred on Mar. 9; maximum gage height, 2.70 ft, date unknown, from crest-stage gage; no flow most days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	e.00	e.00	.01	.00	.00	.00	.00	.00
2	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
3	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
4	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
5	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
6	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
7	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
8	.00	.00	.00	.00	e.00	e1.0	.00	.00	.00	.00	.00	.00
9	.00	.00	.00	.00	e.00	e1.5	.00	.00	.00	.00	.00	.00
10	.00	.00	.00	.00	e.00	e.80	.00	.00	.00	.00	.00	.00
11	.00	.00	.00	.00	e.00	e.40	.00	.00	.00	.00	.00	.00
12	.00	.00	.00	.00	e.00	e.20	.00	.00	.00	.00	.00	.00
13	.00	.00	.00	.00	e.00	e.00	.00	.08	.00	.00	.00	.00
14	.00	.00	.00	.00	e.00	e.00	.00	.25	.00	.00	.00	.00
15	.00	.00	.00	.00	e.00	e.00	.00	.04	.00	.00	.00	.00
16	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
17	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
18	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
19	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
20	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
21	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
22	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
23	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
24	.00	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00
25	.00	.00	.00	.00	e.00	e.03	.00	.00	.00	.00	.00	.00
26	.00	.00	.00	.00	e.00	.92	.01	.00	.00	.00	.00	.00
27	.00	.00	.00	.00	e.00	.47	.70	.00	.00	.00	.00	.00
28	.00	.00	.00	.00	e.00	.26	.24	.00	.00	.00	.00	.00
29	.00	.00	.00	.00	---	.14	.01	.07	.00	.00	.00	.00
30	.00	.00	.00	e.00	---	.07	.00	.53	.00	.00	.00	.00
31	.00	---	.00	e.00	---	.01	---	.07	---	.00	.00	---
TOTAL	0.00	0.00	0.00	0.00	0.00	5.80	0.97	1.04	0.00	0.00	0.00	0.00
MEAN	.000	.000	.000	.000	.000	.19	.032	.034	.000	.000	.000	.000
MAX	.00	.00	.00	.00	.00	1.5	.70	.53	.00	.00	.00	.00
MIN	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
AC-FT	.00	.00	.00	.00	.00	12	1.9	2.1	.00	.00	.00	.00

CAL YR 1988 TOTAL 0.00 MEAN .000 MAX .00 MIN .00 AC-FT .00
WTR YR 1989 TOTAL 7.81 MEAN .021 MAX 1.5 MIN .00 AC-FT 15

e Estimated

MILK RIVER BASIN

06154550 PEOPLES CREEK BELOW KUHR COULEE, NEAR DODSON, MT

LOCATION.--Lat 48°21'49", long 108°21'16", in NW1/4NW1/4NE1/4 sec.16, T.30 N., R.26 E., Phillips County, Hydrologic Unit 1005009, on right bank 10 ft downstream from bridge on county highway, 2.4 mi downstream of Kuhr Coulee, 5.5 mi southwest of Dodson, and at mile 7.8.

DRAINAGE AREA.--675 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1918 to November 1921 (fragmentary), June 1951 to September 1973, October 1981 to September 1988 (published as "near Dodson), October 1988 to September 1989. Monthly discharge only for some periods, published in WSP 1309.

GAGE.--Water-stage recorder. Datum of gage is 2,309.18 ft above National Geodetic Vertical Datum of 1929 (levels by Bureau of Indian Affairs). Prior to June 1951, nonrecording gage at site 0.5 mi upstream at different datum. June 1, 1951 to Sept. 30, 1988, water-stage recorder at sites 2.5 mi upstream at different datum.

REMARKS.--Estimated daily discharges: Dec. 13 to Mar. 8, Mar. 14-29, Sept. 25-30. Water-discharge records fair except those for estimated daily discharges, which are poor. Diversions for irrigation of about 3,300 acres upstream from station.

AVERAGE DISCHARGE.--30 years (1952-73, 1982-89), 32.5 ft^3/s, 23,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,590 ft^3/s, Sept. 25, 1986, gage height, 15.91 ft., from floodmark; maximum gage height, 17.05 ft, Mar. 29, 1952, backwater from ice, from floodmark in gage house, at different site and datum; no flow at times most years.

EXTREMES FOR CURRENT YEAR.--No peak discharges greater than base discharges of 500 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage Height (ft)	Date	Time	Discharge (ft^3/s)	Gage Height (ft)
Mar. 9	2000	*279	*6.32	No peak greater than base discharge this year.			

No flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	e.00	e.00	e.00	30	37	52	29	.62	.17
2	.00	.00	.00	e.00	e.00	e.00	26	30	52	27	.41	.18
3	.00	.00	.00	e.00	e.00	e.00	23	24	54	24	.17	.19
4	.00	.00	.00	e.00	e.00	e.00	20	20	51	22	.08	.20
5	.00	.00	.00	e.00	e.00	e.00	17	17	46	19	.16	.23
6	.00	.00	.00	e.00	e.00	e.00	16	15	41	18	.12	.23
7	.00	.00	.00	e.00	e.00	e10	15	13	37	17	.05	.23
8	.00	.00	.00	e.00	e.00	e100	14	13	35	15	.04	.48
9	.00	.00	.00	e.00	e.00	228	14	11	32	13	.04	.65
10	.00	.00	.00	e.00	e.00	215	13	9.9	30	12	.03	.67
11	.00	.00	.00	e.00	e.00	163	12	10	29	12	.03	.72
12	.00	.00	.00	e.00	e.00	116	12	10	30	11	.03	.78
13	.00	.00	e.05	e.00	e.00	84	11	17	34	10	.02	.86
14	.00	.00	e.02	e.00	e.00	e70	10	22	35	11	.02	.90
15	.00	.00	e.00	e.00	e.00	e50	10	19	36	12	.02	.90
16	.00	.00	e.00	e.00	e.00	e40	9.5	42	42	12	.03	.95
17	.00	.00	e.00	e.10	e.00	e30	9.8	65	45	12	.05	1.0
18	.00	.00	e.05	e.20	e.00	e25	10	52	40	12	.03	1.1
19	.00	.00	e.02	e.30	e.00	e30	10	44	39	11	.04	1.2
20	.00	.00	e.00	e.40	e.00	e35	9.9	36	36	11	.11	1.3
21	.00	.00	e.00	e.50	e.00	e40	9.5	31	35	8.8	.13	1.4
22	.00	.00	e.00	e.30	e.00	e45	9.0	29	32	7.6	.15	1.5
23	.00	.00	e.00	e.20	e.00	e50	8.4	26	30	6.5	.18	1.7
24	.00	.00	e.00	e.10	e.05	e55	9.2	23	31	5.8	.05	1.7
25	.00	.00	e.00	e.05	e.25	e60	9.5	22	31	5.2	.08	e1.7
26	.00	.00	e.00	e.05	e.10	e70	11	22	33	4.0	.08	e1.7
27	.00	.00	e.00	e.10	e.00	e65	26	22	34	3.1	.08	e1.7
28	.00	.00	e.00	e.05	e.00	e55	65	21	35	2.5	.10	e1.5
29	.00	.00	e.00	e.10	---	e53	56	28	34	1.9	.11	e1.5
30	.00	.00	e.00	e.25	---	44	49	57	30	1.2	.13	e1.5
31	.00	---	e.00	e.05	---	35	---	52	---	.85	.17	---
TOTAL	0.00	0.00	0.14	2.75	0.40	1768.00	544.8	839.9	1121	357.45	3.36	28.84
MEAN	.000	.000	.005	.089	.014	57.0	18.2	27.1	37.4	11.5	.11	.96
MAX	.00	.00	.05	.50	.25	228	65	65	54	29	.62	1.7
MIN	.00	.00	.00	.00	.00	.00	8.4	9.9	29	.85	.02	.17
AC-FT	.00	.00	.3	5.5	.8	3510	1080	1670	2220	709	6.7	57

WTR YR 1989 TOTAL 4666.64 MEAN 12.8 MAX 228 MIN .00 AC-FT 9260

e Estimated

06154550 PEOPLES CREEK BELOW KUHR COULEE NEAR DODSON ,MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--April to August 1989.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)
APR											
06...	1300	15	100	2	--	5.0	5.5	8.2	370	79	42
MAY											
17...	1730	64	0	0	1220	20.0	19.0	8.3	460	96	54
JUN											
26...	1315	33	--	0	742	20.0	18.0	8.5	260	44	36
AUG											
09...	1300	0.03	100	2	1850	25.0	20.0	8.1	320	54	45

DATE	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	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, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)
APR											
06...	140	3	7.8	237	440	10	0.30	8.9	871	1.19	35.3
MAY											
17...	100	2	7.3	250	440	6.0	0.50	7.9	862	1.17	149
JUN											
26...	63	2	4.4	159	220	3.7	0.40	1.2	468	0.64	41.7
AUG											
09...	310	8	8.0	369	660	20	0.70	9.6	1330	1.81	0.11

DATE	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	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)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
APR										
06...	0.120	1	250	<1	1	410	<5	82	0.1	2
MAY										
17...	<0.100	--	230	--	--	10	--	--	--	--
JUN										
26...	<0.100	--	170	--	--	10	--	--	--	--
AUG										
09...	<0.100	--	590	--	--	33	--	--	--	--

MILK RIVER BASIN

06155030 MILK RIVER NEAR DODSON, MT

LOCATION.--Lat 48°24'11", long 108°17'35", in NE1/4SE1/4NW1/4 sec.36, T.31 N., R.26 E., Phillips County, Hydrologic Unit 10050004, on left bank 30 ft downstream from U.S. Highway 2 bridge, 0.95 mi downstream from Dodson Dam, 1.9 mi west of Dodson, and at mile 273.2.

DRAINAGE AREA.--11,192 mi^2.

PERIOD OF RECORD.--October 1982 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 2,250 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 19-21,26,27, Dec. 7 to Mar. 31. Records good except those for estimated daily discharges, which are poor. Numerous diversions for irrigation upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--7 years, 175 ft^3/s, 126,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,200 ft^3/s, Sept. 26, 1986, gage height, 29.79 ft; no flow at times most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 476 ft^3/s, May 31, gage height, 7.97 ft; maximum gage height, 12.27 ft, Mar. 12, ice jam; minimum discharge, 0.21 ft^3/s, Apr. 16, gage height, 2.93 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	57	61	e30	e60	e45	11	16	326	269	86	68
2	16	57	56	e35	e50	e40	14	18	282	204	81	60
3	17	58	54	e40	e40	e40	11	17	244	129	74	59
4	18	70	54	e45	e35	e40	9.5	16	172	89	67	51
5	18	86	57	e45	e40	e35	6.6	16	111	64	53	48
6	19	86	62	e45	e45	e40	5.4	17	107	50	48	45
7	19	85	e60	e40	e50	e50	4.3	16	137	47	49	43
8	19	83	e55	e35	e50	e60	3.3	17	161	43	52	44
9	18	93	e50	e25	e50	e70	2.9	18	123	39	55	43
10	18	115	e40	e30	e55	e100	2.8	19	83	42	61	43
11	19	112	e40	e30	e55	e150	2.5	18	90	58	56	42
12	19	105	e45	e35	e55	e200	2.3	17	101	84	52	42
13	19	96	e50	e40	e60	e180	2.3	17	149	90	53	42
14	18	62	e45	e40	e55	e160	2.6	15	217	91	53	41
15	15	54	e40	e35	e50	e150	2.5	16	236	93	54	40
16	14	44	e45	e35	e45	e130	1.3	18	273	133	59	40
17	13	36	e50	e40	e45	e110	2.2	20	286	207	68	38
18	12	32	e55	e40	e45	e100	3.1	23	296	241	79	37
19	11	e30	e50	e45	e45	e90	3.9	28	328	265	71	37
20	11	e35	e45	e45	e50	e80	4.6	29	310	297	57	36
21	10	e35	e40	e50	e55	e70	7.1	34	273	320	52	35
22	9.1	38	e40	e45	e50	e60	6.8	40	247	264	49	33
23	8.0	44	e35	e40	e60	e55	5.6	43	223	203	47	33
24	6.8	51	e35	e40	e65	e50	5.6	55	220	150	45	31
25	19	98	e35	e45	e60	e60	5.6	53	262	104	46	29
26	60	e80	e30	e50	e55	e65	5.4	49	273	84	58	29
27	57	e70	e30	e55	e50	e70	5.0	62	283	79	162	29
28	57	63	e30	e50	e45	e60	5.3	180	297	73	229	29
29	57	58	e30	e55	---	e45	8.1	356	309	71	174	30
30	57	62	e35	e60	---	e30	12	420	305	81	103	31
31	57	---	e30	e70	---	e15	---	445	---	88	90	---
TOTAL	726.9	1995	1384	1315	1420	2450	164.6	2108	6724	4052	2283	1208
MEAN	23.4	66.5	44.6	42.4	50.7	79.0	5.49	68.0	224	131	73.6	40.3
MAX	60	115	62	70	65	200	14	445	328	320	229	68
MIN	6.8	30	30	25	35	15	1.3	15	83	39	45	29
AC-FT	1440	3960	2750	2610	2820	4860	326	4180	13340	8040	4530	2400

CAL YR 1988 TOTAL 21177.69 MEAN 57.9 MAX 577 MIN .00 AC-FT 42010
WTR YR 1989 TOTAL 25830.5 MEAN 70.8 MAX 445 MIN 1.3 AC-FT 51230

e Estimated

MILK RIVER BASIN

06156500 BELANGER CREEK DIVERSION CANAL NEAR VIDORA, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°29'39", long 109°21'54", in NW1/4 sec.19, T.6, R.25 W., third meridian, Hydrologic Unit 10050013, on left bank 0.3 mi downstream from diversion weir and 12 mi north of Vidora.

PERIOD OF RECORD.--March 1946 to current season (seasonal records only). Monthly discharge only for some periods, published in WSP 1309.

GAGE.--Water-stage recorder. Elevation of gage is 3,200 ft, from Cypress Lake elevation.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 21. Records poor. Canal diverts water from right bank of Belanger Creek in SW1/4 sec.30, T.6, R.25 W., third meridian, for storage in Cypress Lake.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 598 ft^3/s, May 7, 1975; no flow at times each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	e.00	.25	.00	.00	.00	.00	.00		
2			e.00	e.00	.25	.00	.00	.00	.00	.00		
3			e.00	e.00	.88	.00	.00	.00	.00	.00		
4			e.00	e.14	2.4	.00	.00	.00	.00	.00		
5			e.00	e.00	2.3	.00	.00	.00	.00	.00		
6			e.00	e.00	2.4	.00	.00	.00	.00	.00		
7			e.00	e.00	2.5	.00	.00	.00	.00	.00		
8			e.00	e.00	2.4	.00	.00	.00	.00	.00		
9			e.00	e.00	.14	.00	.00	.00	.00	.00		
10			e.00	e.00	.00	.00	.00	.00	.00	.00		
11			e.00	e.11	.00	.00	.00	.00	.00	.00		
12			e.00	e.21	.00	.00	.00	.00	.00	.00		
13			e.00	e.35	.00	.00	.00	.00	.00	.00		
14			e.00	e.28	.00	.00	.00	.00	.00	.00		
15			e.00	e.28	.07	.00	.00	.00	.00	.00		
16			e.00	e.21	.28	.00	.00	.00	.00	.00		
17			e.00	e.14	.35	.00	.00	.00	.00	.00		
18			e.00	e.04	.18	.00	.00	.00	.00	.00		
19			e.00	e.04	.18	.00	.00	.00	.00	.00		
20			e.00	e.21	.25	.00	.00	.00	.00	.00		
21			e.00	e.35	.18	.00	.00	.00	.00	.00		
22			e.00	.35	1.4	.00	.00	.00	.00	.00		
23			e.00	.28	2.5	.00	.00	.00	.00	.00		
24			e.00	.11	.85	.00	.00	.00	.00	.00		
25			e.00	.14	.07	.00	.00	.00	.00	.00		
26			e.00	.18	.00	.00	.00	.00	.00	.00		
27			e.00	.21	.00	.00	.00	.00	.00	.00		
28			e.00	.21	.00	.00	.00	.00	.00	.00		
29			e.00	.25	.00	.00	.00	.00	.00	.00		
30			e.00	.21	.00	.00	.00	.00	.00	.00		
31			e.00		.00		.00	.00		.00		
TOTAL			0.00	4.30	19.83	0.00	0.00	0.00	0.00	0.00		
MEAN			.000	.14	.64	.000	.000	.000	.000	.000		
MAX			.00	.35	2.5	.00	.00	.00	.00	.00		
MIN			.00	.00	.00	.00	.00	.00	.00	.00		
AC-FT			.00	8.5	39	.00	.00	.00	.00	.00		

e Estimated

MILK RIVER BASIN

06157500 CYPRESS LAKE EAST OUTFLOW CANAL NEAR VIDORA, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°29'12", long 109°21'08", in SE1/4 sec.19, T.6, R.25 W., third meridian, Hydrologic Unit 10050013, on right bank 500 ft upstream from Belanger Creek, and 12.3 mi north of Vidora.

PERIOD OF RECORD.--April to October 1940, April 1943 to current season (seasonal records only). Monthly discharge only for some periods, published in WSP 1309.

GAGE.--Water-stage recorder. Elevation of gage is 3,180 ft, from topographic map. Prior to Sept. 26, 1946, at datum 2.24 ft higher and Sept. 26, 1946, to May 18, 1950, at datum 1.54 ft higher.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 16, July 11-19, and Sept. 18 to Oct. 1. Records poor. Canal diverts water from Cypress Lake for irrigation in Frenchman River basin in Saskatchewan.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 202 ft^3/s, Apr. 19, 1952; no flow at times most seasons.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	e.18	.25	3.7	4.4	.07	.71	e.74		
2			e.00	e.35	.25	2.2	7.9	.07	.67	.71		
3			e.00	e.53	.28	2.5	8.1	.07	.64	.64		
4			e.00	e.71	2.2	2.4	7.1	.07	.60	.57		
5			e.00	e.64	6.2	1.9	6.1	.04	.71	.78		
6			e.00	e.88	4.6	.35	5.8	.04	.81	1.0		
7			e.00	e1.1	2.2	1.3	4.6	.04	.74	.99		
8			e.00	e.88	.92	1.1	4.2	.07	.78	.92		
9			e.00	e.18	.46	.88	2.7	.04	.78	.99		
10			e.00	e.11	.32	.81	3.8	.04	.71	.95		
11			e.00	e.21	.32	1.3	e4.2	.04	.78	.95		
12			e.00	e.46	.28	2.3	e4.1	.00	.88	.92		
13			e.00	e.78	.28	2.0	e4.0	.00	1.0	.92		
14			e.00	e.60	.28	.11	e3.9	.00	1.2	.92		
15			e.00	e.67	.25	.07	e3.8	.00	1.2	.95		
16			e.00	e1.2	.21	.07	e3.7	.00	1.2	.95		
17			e.00	1.2	.25	.11	e3.5	.00	1.1	1.0		
18			e.00	1.0	.25	.14	e3.4	.00	e1.1	1.1		
19			e.00	.99	.25	.21	e3.2	.00	e1.0	1.1		
20			e.00	1.1	.21	.14	2.7	.00	e1.0	1.0		
21			e.00	1.3	.18	.11	1.4	.00	e.99	1.0		
22			e.00	1.3	.18	.21	.67	.00	e.95	.99		
23			e.00	.88	.18	.35	.14	.04	e.95	.88		
24			e.00	.64	.25	1.6	.18	.07	e.92	.78		
25			e.00	.49	.32	4.9	.35	.35	e.88	.78		
26			e.00	.42	.35	8.1	3.2	.99	e.85	.78		
27			e.00	.35	.39	5.6	1.2	1.3	e.85	.74		
28			e.00	.28	.88	4.7	2.0	1.2	e.81	.71		
29			e.00	.25	2.0	4.1	.85	.99	e.78	.71		
30			e.00	.25	6.4	3.8	.14	.88	e.74	.67		
31			e.00		12		.11	.74		.60		
TOTAL			0.00	19.93	43.39	57.06	101.44	7.15	26.33	26.74		
MEAN			.000	.66	1.40	1.90	3.27	.23	.88	.86		
MAX			.00	1.3	12	8.1	8.1	1.3	1.2	1.1		
MIN			.00	.11	.18	.07	.11	.00	.60	.57		
AC-FT			.00	40	86	113	201	14	52	53		

e Estimated

MILK RIVER BASIN

06158500 EASTEND CANAL AT EASTEND, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°30'21", long 108°50'54", in NW1/4 sec.25, T.6, R.22 W., third meridian, Hydrologic Unit 10050013, on left bank 600 ft downstream from headgate, 1.5 mi west of Eastend.

PERIOD OF RECORD.--March 1937 to current season (seasonal records only). Monthly discharge only for some periods, published in WSP 1309.

GAGE.--Water-stage recorder. Datum of gage is 2,998.58 ft above mean sea level (Geodetic Survey of Canada datum). Prior to June 1973, at sites within 1 mi, at different datums.

REMARKS.--No estimated daily discharges this year. Records good. Canal diverts water from Eastend Reservoir in NW1/4 sec.25, T.6, R.22 W., third meridian, on right bank for irrigation of about 3,100 acres in the Frenchman River basin in Saskatchewan.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 86 ft^3/s, June 4, 1986; no flow at times each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			.00	.00	.00	.00	.00	4.6	.00	.00		
2			.00	.00	.00	.00	.00	.00	.00	.00		
3			.00	.00	.00	.00	.00	.00	.00	.00		
4			.00	.00	28	.00	.00	.00	.00	.00		
5			.00	.00	48	.00	.00	.00	.00	.00		
6			.00	.00	55	.00	.00	.00	.00	.00		
7			.00	.00	57	.00	.00	.00	.00	.00		
8			.00	.00	69	.00	.00	.00	.00	.00		
9			.00	.00	72	.00	.00	.00	.00	.00		
10			.00	.00	74	.00	.00	.00	.00	.00		
11			.00	.00	75	.00	.00	.00	.00	.00		
12			.00	.00	75	.00	.00	.00	.00	.00		
13			.00	.00	74	.00	7.3	.00	.00	.00		
14			.00	.00	76	.00	42	.00	.00	.00		
15			.00	.00	75	.00	66	.00	.00	.00		
16			.00	.00	71	.00	67	.00	.00	.00		
17			.00	.00	67	.00	69	.00	.00	.00		
18			.00	.00	67	.00	69	.00	.00	.00		
19			.00	.00	66	.00	71	.00	.00	.00		
20			.00	.00	64	.00	73	.00	.00	.00		
21			.00	.00	61	.00	72	.00	.00	.00		
22			.00	.00	61	.00	75	.00	.00	.00		
23			.00	.00	62	.00	66	.00	.00	.00		
24			.00	.00	59	.00	60	.00	.00	.00		
25			.00	.00	55	.00	61	.00	.00	.00		
26			.00	.00	50	.00	55	.00	.00	.00		
27			.00	.00	35	.00	52	.00	.00	.00		
28			.00	.00	16	.00	50	.00	.00	.00		
29			.00	.00	.00	.00	38	.00	.00	.00		
30			.00	.00	.00	.00	18	.00	.00	.00		
31			.00		.00		14	.00		.00		
TOTAL			0.00	0.00	1512.00	0.00	1025.30	4.60	0.00	0.00		
MEAN			.000	.000	48.8	.000	33.1	.15	.000	.000		
MAX			.00	.00	76	.00	75	4.6	.00	.00		
MIN			.00	.00	.00	.00	.00	.00	.00	.00		
AC-FT			.00	.00	3000	.00	2030	9.1	.00	.00		

MILK RIVER BASIN

06159500 FRENCHMAN RIVER BELOW EASTEND RESERVOIR, NEAR EASTEND, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°30'54", long 108°50'16", in SE1/4 sec.36, T.6, R.22 W., third meridian, Hydrologic Unit 10050013, on left bank 0.8 mi west of Eastend, 1.7 mi downstream from Eastend Reservoir, and at mile 298.8.

DRAINAGE AREA.--619 mi^2.

PERIOD OF RECORD.--April 1909 to October 1916, March 1918 to May 1931, September 1935, March to July 1936, and April 1939 to current season (seasonal records only). Monthly discharge only for some periods, published in WSP 1309. Published as "at East End" 1909-16. Records prior to April 1939, not equivalent owing to diversion in Eastend Canal since 1937.

REVISED RECORDS.--WSP 1729: 1919, 1941 (monthly figures only). W 1983: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 2,960 ft, from topographic map. Prior to July 1941, non-recording gages at several sites within 1.5 mi of present site at various datums.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 15. Records fair except those for estimated daily discharges, which are poor. Natural flow of stream affected by storage reservoirs, diversions for irrigation, and return flow from irrigated areas. Water may be diverted into or from Battle Creek basin through Cypress Lake.

COOPERATION.-This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,500 ft^3/s, Apr. 16, 1952, gage height, 19.10 ft, from flood-mark in gage house; no flow at times.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 202 ft^3/s, June 13, gage height, 2.72 ft, minimum daily, 0.07 ft^3/s, May 17-24,26,27.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e3.7	e21	6.5	131	38	2.4	1.7	18		
2			e4.0	e14	6.5	148	27	2.3	1.6	17		
3			e9.9	e13	6.1	110	8.9	2.3	1.9	17		
4			e12	e13	5.5	73	8.9	2.2	1.2	16		
5			e9.9	e12	3.0	51	8.4	2.3	9.8	16		
6			e13	e9.3	1.3	37	6.6	2.2	17	15		
7			e8.9	e6.5	1.1	33	5.2	2.0	16	16		
8			e7.6	e6.1	.99	30	4.9	1.9	16	15		
9			e13	e6.0	.85	21	4.9	1.8	16	14		
10			e28	e6.7	.67	16	5.0	1.9	16	15		
11			e23	e7.0	.42	16	4.7	1.8	16	13		
12			e15	e7.0	.21	41	4.5	1.8	15	12		
13			e22	e6.9	.57	124	4.4	1.9	16	11		
14			e22	e7.2	.49	162	4.5	1.9	15	11		
15			e18	e12	.39	80	4.2	1.8	15	11		
16			e19	44	.35	51	4.1	2.0	16	10		
17			e18	67	.07	51	4.0	1.8	15	10		
18			e16	78	.07	50	3.6	1.7	15	10		
19			e13	61	.07	12	3.5	1.4	16	10		
20			e12	50	.07	10	3.5	1.6	17	15		
21			e12	50	.07	18	3.2	1.6	18	11		
22			e12	49	.07	25	3.1	1.6	19	10		
23			e12	58	.07	11	3.2	1.7	19	10		
24			e14	74	.07	11	3.2	1.6	18	11		
25			e22	53	.67	11	3.2	2.3	18	11		
26			e19	42	.07	37	2.7	1.6	18	11		
27			e27	31	.07	45	2.6	1.8	19	12		
28			e32	17	.64	40	2.9	1.6	19	12		
29			e23	11	26	40	2.2	1.6	19	11		
30			e22	8.6	66	40	2.1	1.5	19	12		
31			e23		90		2.1	1.8		10		
TOTAL			506.0	841.3	218.95	1525	189.3	57.7	439.2	393		
MEAN			16.3	28.0	7.06	50.8	6.11	1.86	14.6	12.7		
MAX			32	78	90	162	38	2.4	19	18		
MIN			3.7	6.0	.07	10	2.1	1.4	1.2	10		
AC-FT			1000	1670	434	3020	375	114	871	780		

e Estimated

MILK RIVER BASIN

06161300 HUFF LAKE PUMPING CANAL NEAR VAL MARIE, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°22'20", long 107°53'05", in NW1/4 sec.7, T.5, R.14 W., third meridian, Hydrologic Unit 10050013, on right bank 50 ft downstream from pump discharge outlet, and 11 mi northwest of Val Marie.

PERIOD OF RECORD.--March 1963 to current season (seasonal records only). Published as Val Marie West Pumping Canal near Val Marie, Saskatchewan, March 1963 to October 1980. July 1950 to current season in reports of Department of the Environment, Canada.

GAGE.--Water-stage recorder. Prior to 1956 and subsequent to 1960, records obtained from occasional discharge measurements and records of pump operation.

REMARKS.--No estimated daily discharges this year. Records fair. Canal diverts water from Huff Lake in NW1/4 sec.7, T.5, R.14 W., third meridan, on left bank for irrigation of about 2,100 acres in the Frenchman River basin in Saskatchewan.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 31 ft^3/s, May 30 to June 2, 7-10, 1975, May 5, 6, 7, 9, 1977; no flow at times each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			.00	.00	.00	.00	.00	.00	.00	.00		
2			.00	.00	.00	.00	.00	.00	.00	.00		
3			.00	.00	.00	.00	.00	.00	.00	.00		
4			.00	.00	.00	.00	.00	.00	.00	.00		
5			.00	.00	.00	.00	.00	.00	.00	.00		
6			.00	.00	.00	.00	.00	.00	.00	.00		
7			.00	.00	.00	.00	.00	.00	.00	.00		
8			.00	.00	18	.00	.00	.00	1.2	.00		
9			.00	.00	26	.00	.00	.00	.46	.00		
10			.00	.00	25	.00	.00	.00	.00	.00		
11			.00	.00	25	.00	.00	.00	.46	.00		
12			.00	.00	24	.00	.00	.00	.00	.00		
13			.00	.00	25	.00	.00	.00	.00	.00		
14			.00	.00	25	.00	.00	.00	.00	.00		
15			.00	.00	25	.00	.00	.00	.00	.00		
16			.00	.00	24	.00	.00	.00	.00	.00		
17			.00	.00	24	.00	.00	.00	.00	.00		
18			.00	.00	24	.00	.00	.00	.00	.00		
19			.00	.00	17	.00	.00	.00	.00	.00		
20			.00	.00	2.2	.00	.00	.00	.00	.00		
21			.00	.00	.00	.00	.00	.00	.00	.00		
22			.00	.00	.00	.00	.00	.00	.00	.00		
23			.00	.00	.00	.00	.00	.00	.00	.00		
24			.00	.00	.00	.00	.00	.00	.00	.00		
25			.00	.00	.00	.00	.00	.00	.00	.00		
26			.00	.00	.00	.00	.00	.00	.00	.00		
27			.00	.00	.00	.00	.00	.00	.00	.00		
28			.00	.00	.00	.00	.00	.00	.00	.00		
29			.00	.00	.00	.00	.00	.00	.00	.00		
30			.00	.00	.00	.00	.00	.00	.00	.00		
31			.00		.00		.00	.00		.00		
TOTAL			0.00	0.00	284.20	0.00	0.00	0.00	2.12	0.00		
MEAN			.000	.000	9.17	.000	.000	.000	.071	.000		
MAX			.00	.00	26	.00	.00	.00	1.2	.00		
MIN			.00	.00	.00	.00	.00	.00	.00	.00		
AC-FT			.00	.00	564	.00	.00	.00	4.2	.00		

MILK RIVER BASIN

06161500 HUFF LAKE GRAVITY CANAL NEAR VAL MARIE, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°22'10", long 107°53'06", in SW1/4 sec.7, T.5, R.14 W., third meridian, Hydrologic Unit 10050013, on right bank at outlet of Huff Lake, and 11 mi northwest of Val Marie.

PERIOD OF RECORD.--March 1946 to current season (seasonal records only). Published as Val Marie West Gravity Canal near Val Marie, Saskatchewan, March 1946 to October 1980. Monthly figures only prior to March 1947, published in WSP 1309.

GAGE.--Water-stage recorder. Datum of gage is 2,662.88 ft above mean sea level (Geodetic Survey of Canada datum). Prior to Sept. 27, 1949, at site 0.5 mi downstream at different datum.

REMARKS.--No estimated daily discharges this year. Records fair. Canal diverts water from Huff Lake in SW1/4 sec.7, T.5, R.14 W., third meridian, on left bank for irrigation of about 1,900 acres in the Frenchman River basin in Saskatchewan. Since 1962, records have been based on gate openings in Huff Lake Dam.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 55 ft^3/s, July 14, 1972; no flow at times each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			.00	.00	.00	.00	.00	.00	.00	.00		
2			.00	.00	.00	.00	.00	.00	.00	.00		
3			.00	.00	.00	.00	.00	.00	.00	.00		
4			.00	.00	.00	.00	.00	.00	.00	.00		
5			.00	.00	.00	.00	.00	.00	.00	.00		
6			.00	.00	.00	.00	.00	.00	.00	.00		
7			.00	.00	.00	.00	.00	.00	.00	.00		
8			.00	.00	31	.00	.00	.00	.00	.00		
9			.00	.00	33	.00	.00	.00	.00	.00		
10			.00	.00	28	.00	.00	.00	.00	.00		
11			.00	.00	30	.00	.00	.00	.00	.00		
12			.00	.00	31	.00	.00	.00	.00	.00		
13			.00	.00	17	.00	.00	.00	.00	.00		
14			.00	.00	24	.00	.00	.00	.00	.00		
15			.00	.00	31	.00	.00	.00	.00	.00		
16			.00	.00	33	.00	.00	.00	.00	.00		
17			.00	.00	39	.00	.00	.00	.00	.00		
18			.00	.00	45	.00	.00	.00	.00	.00		
19			.00	.00	43	.00	.00	.00	.00	.00		
20			.00	.00	40	.00	.00	.00	.00	.00		
21			.00	.00	38	.00	.00	.00	.00	.00		
22			.00	.00	26	.00	.00	.00	.00	.00		
23			.00	.00	13	.00	.00	.00	.00	.00		
24			.00	.00	3.5	.00	.00	.00	.00	.00		
25			.00	.00	.00	.00	.00	.00	.00	.00		
26			.00	.00	.00	.00	.00	.00	.00	.00		
27			.00	.00	.00	.00	.00	.00	.00	.00		
28			.00	.00	.00	.00	.00	.00	.00	.00		
29			.00	.00	.00	.00	.00	.00	.00	.00		
30			.00	.00	.00	.00	.00	.00	.00	.00		
31			.00		.00		.00	.00		.00		
TOTAL			0.00	0.00	505.50	0.00	0.00	0.00	0.00	0.00		
MEAN			.000	.000	16.3	.000	.000	.000	.000	.000		
MAX			.00	.00	45	.00	.00	.00	.00	.00		
MIN			.00	.00	.00	.00	.00	.00	.00	.00		
AC-FT			.00	.00	1000	.00	.00	.00	.00	.00		

MILK RIVER BASIN

06162500 NEWTON LAKE MAIN CANAL NEAR VAL MARIE, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°18'18", long 107°48'05", in NE1/4 sec.15, T.4, R.14 W., third meridian, Hydrologic Unit 10050013, on right bank about 500 ft downstream from Newton Lake, and 5.4 mi northwest of Val Marie.

PERIOD OF RECORD.--April 1937 to current season (seasonal records only). Published as Val Marie Main Canal near Val Marie, Saskatchewan, March 1962 to October 1980. Prior to April 1947 monthly discharge only, published in WSP 1309. Prior to March 1962, published as Val Marie Canal near Val Marie.

GAGE.--Water-stage recorder. Datum of gage is 2,622.03 ft above mean sea level (Geodetic Surveys of Canada datum). Prior to May 21, 1963, at several sites within 2 mi of present site at different datums.

REMARKS.--No estimated daily discharges this year. Records good. Canal diverts water from Newton Lake in SE1/4 sec.22, T.4, R.14 W., third meridian, on left bank for irrigation of about 4,700 acres in the Frenchman River basin in Saskatchewan.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 122 ft^3/s, May 26, 27, 1976; no flow at times each season.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			.00	.00	.00	.00	.00	.00	.00	.00		
2			.00	.00	.00	.00	.00	.00	.00	.00		
3			.00	.00	.00	.00	.00	.00	.00	.00		
4			.00	.00	.00	.00	.00	.00	.00	.00		
5			.00	.00	.00	.00	.00	.00	.00	.00		
6			.00	.00	.00	.00	.00	.00	.00	.00		
7			.00	.00	.00	.00	.00	.00	.00	.00		
8			.00	.00	.00	.00	.00	.00	.00	.00		
9			.00	.00	.00	.00	.00	.00	.00	.00		
10			.00	.00	.00	.00	.00	.00	.00	.00		
11			.00	.00	.00	.00	.00	.00	.00	.00		
12			.00	.00	.00	.00	.00	.00	.00	.00		
13			.00	.00	.00	.00	.00	.00	.00	.00		
14			.00	.00	.00	.00	.00	.00	.00	.00		
15			.00	.00	.00	.00	.00	.00	.00	.00		
16			.00	.00	.00	.00	.00	.00	.00	.00		
17			.00	.00	.00	.00	.00	.00	.00	.00		
18			.00	.00	.00	.00	.00	.00	.00	.00		
19			.00	.00	.00	.00	.00	.00	.00	.00		
20			.00	.00	.00	.00	.00	.00	.00	.00		
21			.00	.00	.00	.00	.00	.00	.00	.00		
22			.00	.00	.00	.00	.00	.00	.00	.00		
23			.00	.00	.00	.00	.00	.00	.00	.00		
24			.00	.00	.00	.00	.00	.00	.00	.00		
25			.00	.00	.00	.00	.00	.00	.00	.00		
26			.00	.00	.00	.00	.00	.00	.00	.00		
27			.00	.00	.00	.00	.00	.00	.00	.00		
28			.00	.00	.00	.00	.00	.00	.00	.00		
29			.00	.00	.00	.00	.00	.00	.00	.00		
30			.00	.00	.00	.00	.00	.00	.00	.00		
31			.00		.00		.00	.00		.00		
TOTAL			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
MEAN			.000	.000	.000	.000	.000	.000	.000	.000		
MAX			.00	.00	.00	.00	.00	.00	.00	.00		
MIN			.00	.00	.00	.00	.00	.00	.00	.00		
AC-FT			.00	.00	.00	.00	.00	.00	.00	.00		

MILK RIVER BASIN

06163050 FRENCHMAN RIVER BELOW NEWTON LAKE, NEAR VAL MARIE, SASKATCHEWAN

(International gaging station)

LOCATION.--Lat 49°18'07", long 107°48'20", in NE1/4 sec.15, T.4, R.14 W., third meridian, Hydrologic Unit 10050013, on left bank about 200 ft downstream from spillway for Newton Lake, about 5.4 mi northwest of Val Marie, and at mile 156.1.

DRAINAGE AREA.--1,349 mi^2, of which 210 mi^2 probably is noncontributing.

PERIOD OF RECORD.--May 1976 to current season. Seasonal records only. Published as Frenchman River below Val Marie Reservoir, near Val Marie, Saskatchewan, May 1976 to October 1979. June to October 1939, July to October 1965, and May 1966 to current season in reports of Department of the Environment, Canada.

REVISED RECORDS.--W 1983: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,606.11 ft above mean sea level (Geodetic Survey of Canada datum).

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 3. Records fair except those below 10 ft^3/s, which are poor. Natural flow of stream affected by storage reservoirs, diversions for irrigation, and return flow from irrigated areas. Water may be diverted into or from Battle Creek basin through Cypress Lake.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,350 ft^3/s, Apr. 19, 1979, gage height, 12.87 ft; no flow at times.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 69 ft^3/s, July 1, gage height, 2.50 ft; no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.00	e.07	.00	46	59	3.7	.28	16		
2			e.00	e.07	.00	47	67	3.7	.07	15		
3			e.00	e.07	.00	51	66	3.6	.28	14		
4			e.00	.07	.00	50	64	3.6	.14	15		
5			e.00	.07	5.0	50	64	3.7	.00	16		
6			e.07	.07	9.7	49	64	4.0	.00	18		
7			e.11	.07	9.4	49	60	4.2	.00	16		
8			e.14	.07	9.4	49	47	4.4	.00	16		
9			e.18	.04	9.1	50	46	4.4	.00	15		
10			e.18	.04	8.8	51	46	4.2	.00	15		
11			e.18	.04	8.9	52	45	3.7	.00	14		
12			e.18	.04	8.9	52	37	3.6	.00	17		
13			e.14	.04	8.7	52	37	3.5	.00	16		
14			e.14	.04	9.0	53	36	2.6	.00	13		
15			e.14	.04	9.0	52	35	2.1	.00	12		
16			e.14	.04	9.0	53	34	2.0	.07	12		
17			e.14	.04	8.6	54	25	2.0	.99	10		
18			e.14	.04	8.6	53	10	1.3	15	8.2		
19			e.14	.04	8.7	54	8.1	.85	26	11		
20			e.14	.04	8.8	54	4.0	.85	17	10		
21			e.14	6.0	9.0	55	2.8	.85	16	11		
22			e.14	22	9.2	55	2.7	.85	14	10		
23			e.11	25	9.6	55	2.5	.67	14	9.4		
24			e.11	24	9.6	55	2.3	.60	13	7.7		
25			e.11	24	9.2	55	2.1	.67	12	4.7		
26			e.11	8.4	9.2	55	1.9	.32	13	3.8		
27			e.07	.00	9.4	55	1.6	.00	13	2.1		
28			e.07	.00	9.6	55	1.6	.04	11	2.7		
29			e.07	.00	35	54	2.6	.04	12	2.2		
30			e.07	.00	47	54	3.6	.00	16	2.6		
31			e.07		47		3.7	.64		1.4		
TOTAL			3.23	110.44	343.40	1569	881.5	66.68	193.83	336.8		
MEAN			.10	3.68	11.1	52.3	28.4	2.15	6.46	10.9		
MAX			.18	25	47	55	67	4.4	26	18		
MIN			.00	.00	.00	46	1.6	.00	.00	1.4		
AC-FT			6.4	219	681	3110	1750	132	384	668		

e Estimated

MILK RIVER BASIN

06164000 FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY

(International gaging station)

LOCATION.--Lat 49°00'00", long 107°18'06", in SE1/4 sec.5, T.1, R.10 W., third meridian, in Saskatchewan, Hydrologic Unit 10050013, on left bank 50 ft north of international boundary, 22 mi northeast of Whitewater, MT, and at mile 76.4.

DRAINAGE AREA.--2,120 mi², of which 343 mi² probably is noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1917 to current season (seasonal records only for most seasons).

REVISED RECORDS.--WSP 1389: 1938(M), 1939-41, 1942(M), 1943, 1950(M). W 1983: Drainage area.

GAGE.--Water-stage recorder and concrete control since August 1949. Elevation of gage is 2,420 ft, from topographic map. Prior to June 23, 1937, water-stage recorder at site 0.5 mi upstream at different datum. June 23, 1937, to October 1952, water-stage recorder at site 100 ft downstream at present datum.

REMARKS.--Estimated daily discharges: Oct. 31. Water-discharge records good except those for July, which are fair. Natural flow of stream affected by several storage reservoirs, diversions for irrigation of about 14,500 acres, and return flow from irrigated areas. Water may be diverted into or from Battle Creek basin through Cypress Lake.

COOPERATION.--This is one of a number of stations which are maintained jointly by the United States and Canada.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 22,700 ft³/s, Apr. 15, 1952, gage height, 19.90 ft, from floodmark, from rating curve extended above 2,300 ft³/s on basis of slope-area measurement of peak flow; no flow at times most seasons.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 1,070 ft³/s, June 10, gage height, 8.42 ft; no flow many days.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			.00	207	.92	46	40	.04	.00	.00		
2			.00	168	3.3	50	38	.04	.00	.00		
3			.00	126	1.5	46	37	.00	.00	.00		
4			.00	96	.85	42	36	.00	.00	.00		
5			.00	63	.60	43	36	.00	.00	.00		
6			.00	49	.64	44	36	.00	.00	.00		
7			.00	32	.39	42	35	.00	.00	.00		
8			.00	19	.32	41	34	.00	.00	.00		
9			.00	14	.39	41	33	.00	.00	.00		
10			5.3	12	1.1	179	32	.00	.00	.00		
11			2.6	8.3	1.2	137	32	.00	.00	.00		
12			1.1	9.0	1.4	144	38	.00	.00	.00		
13			.71	7.6	2.1	80	34	.00	.00	.00		
14			.46	1.9	2.0	57	33	.00	.00	.00		
15			.25	.74	1.9	54	46	.00	.00	4.6		
16			6.1	.60	4.5	58	120	.00	.00	13		
17			9.2	.32	4.0	59	56	.00	.00	10		
18			18	.18	3.5	55	32	.00	.00	7.9		
19			17	.57	3.4	53	29	.00	.00	6.7		
20			15	.67	2.6	51	21	.00	.00	6.1		
21			11	.46	1.8	48	12	.00	.00	5.8		
22			6.7	.35	5.6	46	7.9	.00	.00	5.2		
23			7.0	.28	6.9	46	6.6	.00	.00	4.8		
24			9.9	.32	7.9	47	4.8	.00	.00	4.2		
25			38	.28	10	51	2.6	.00	.00	3.5		
26			46	.32	9.9	60	1.4	.00	.00	3.6		
27			108	.42	9.6	74	.92	.00	.00	3.5		
28			133	.57	9.2	50	.42	.00	.00	3.5		
29			209	1.1	11	45	.14	.00	.00	3.5		
30			338	.78	11	42	.07	.00	.00	3.4		
31			208		21		.04	.00		e3.4		
TOTAL			1190.32	820.76	140.51	1831	834.89	0.08	0.00	92.70		
MEAN			38.4	27.4	4.53	61.0	26.9	.003	.000	2.99		
MAX			338	207	21	179	120	.04	.00	13		
MIN			.00	.18	.32	41	.04	.00	.00	.00		
AC-FT			2360	1630	279	3630	1660	.2	.00	184		

e Estimated

MILK RIVER BASIN

06164000 FRENCHMAN RIVER AT INTERNATIONAL BOUNDARY--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1964, 1972-73, 1987 to current year (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)
MAR										
23...	1710	8.2	--	--	915	1.5	0.0	--	--	--
29...	1710	286	50	1	326	6.0	0.0	7.1	70	15
APR										
20...	1200	0.73	0	0	650	18.0	14.0	7.9	170	36
JUN										
23...	1615	46	90	13	1090	19.0	20.0	8.0	290	52

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	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)
MAR									
29...	8.0	34	2	6.4	38	100	3.4	0.10	7.1
APR									
20...	20	70	2	8.3	109	210	7.5	0.20	5.4
JUN									
23...	40	120	3	11	260	320	5.8	0.40	5.9

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)	PHOS-PHOROUS DIS-SOLVED (MG/L AS P) (00666)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	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)
MAR									
29...	197	0.27	152	<0.100	0.090	2	<0.5	40	2
APR									
20...	423	0.58	0.83	<0.100	0.020	2	<0.5	70	<1
JUN									
23...	711	0.97	88.3	<0.100	0.030	2	<0.5	110	<1

DATE	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, 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, DIS-SOLVED (UG/L AS NI) (01065)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
MAR									
29...	2	6	150	<5	10	0.1	8	<1	5
APR									
20...	2	3	27	<5	4	<0.1	3	<1	<3
JUN									
23...	<1	4	10	1	5	<0.1	6	<1	14

MILK RIVER BASIN

RESERVOIRS IN FRENCHMAN RIVER BASIN IN SASKATCHEWAN

(International gaging stations)

06157000 CYPRESS LAKE(REVISED).--Lat 49°27'30", long 109°30'25", in SE1/4 sec.12, T.6, R.27 W., third meridian, Hydrologic Unit 10050013, on south shore, and 12 mi north of Consul. DRAINAGE AREA, 107 mi^2. PERIOD OF RECORD, February 1939 to current season (seasonal records only). Records prior to October 1946, published only in WSP 1309. March to May 1952 daily elevations and contents, published in WSP 1260-B. Water-stage recorder. Datum of gage is at mean sea level (Geodetic Survey of Canada datum; subtract 33.67 ft to obtain Reclamation Service datum). Prior to 1969 season, at Reclamation Service datum. Prior to 1940, nonrecording gage on natural lake at "South" station. February 1940 to Apr. 28, 1955, elevation obtained from average of nonrecording gage readings at west and east dams. Apr. 29, 1955, to Aug. 21, 1984, gage located at east dam. REMARKS, This is an offstream reservoir formed by two earthfill dams on a natural lake of the same name which is the natural head of the Frenchman River. There are concrete control works at both dams. The following capacity figures are from capacity table effective February 1970; see previous reports for superseded figures. Usable capacity, 79,500 acre-ft between elevation 3,187.0 ft, bottom of west outlet works, and 3,201.9 ft, maximum design level. Dead storage, 24,300 acre-ft. Water is diverted from Battle Creek on west, 12 mi northwest of Consul, and from Belanger Creek, in the Frenchman River basin, on the east, 12 mi north of Vidora. Water is released to the same streams for irrigation. Figures given herein represent total contents. This is one of a number of stations which are maintained jointly by Canada and the United States. REVISED RECORDS, W 1983: Drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents, 117,300 acre-ft, Apr. 21, 1955, elevation, 3,203.36 ft; minimum observed since first filling, 20,100 acre-ft, Oct. 28, 1989, elevation, 3,186.07 ft.

EXTREMES FOR CURRENT SEASON: Maximum contents, 29,500 acre-ft, Apr. 26, elevation, 3,188.11 ft; minimum, 20,100 acre-ft, Oct. 28, elevation, 3,186.07 ft.

06159000 EASTEND RESERVOIR.--Lat 49°30'26", long 108°51'08", in NW1/4 sec.25, T.6, R.22 W., third meridian Hydrologic Unit 10050013, at dam on Frenchman River, 1.6 mi west of Eastend, and at mile 300.5. DRAINAGE AREA, 619 mi^2. PERIOD OF RECORD, February 1937 to current season (seasonal records only). Prior to 1958, published as East End Reservoir at East End. Nonrecording gages read about once a day during irrigation season and twice a day during high stages February 1937 to July 1979. Water-stage recorder. Datum of gage is at mean sea level (Geodetic Survey of Canada datum). REMARKS, Reservoir is formed by earthfill dam completed in 1939, breached during flood in 1952 and rebuilt the same year with a concrete spillway and control works. The following capacity figures are from revised capacity table effective Jan. 1, 1983. Usable capacity, 1,690 acre-ft between elevation 2,993.5 ft, bottom of outlet works, and 3,012.0 ft, maximum design level. No dead storage. Water is used for irrigation. This is one of a number of stations which are maintained jointly by Canada and the United States. REVISED RECORDS (SEASONS), WSP 1309: 1948(M). WSP 1729: Drainage area. WSP 2116: 1937-65. W 1983: Drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents, about 3,700 acre-ft, Apr. 15, 1952, elevation, about 3,015 ft, dam overtopped; no contents at various times.

EXTREMES FOR CURRENT SEASON: Maximum contents, 2,350 acre-ft, May 4, elevation, 3,013.61 ft; minimum observed, 19 acre-ft, Feb. 21, elevation, 3,001.26 ft.

06162000 HUFF LAKE(REVISED).--Lat 49°22'16", long 107°53'07", in SW1/4 sec.7, T.5, R.14 W., third meridian, Hydrologic Unit 10050013, near dam on Frenchman River, 11 mi northwest of Val Marie, and at mile 169.7. DRAINAGE AREA, 1,274 mi^2. PERIOD OF RECORD, February 1940 to current season (seasonal records only). February 1940 to October 1979, published as Val Marie West Reservoir. Records prior to October 1946, published only in WSP 1309. April to May 1952 daily elevations and contents, published in WSP 1260-B. Water-stage recorder. Datum of gage is at mean sea level (Geodetic Survey of Canada datum). May 1952 to May 1954, reference point on control structure. May 1954 to May 10, 1966, nonrecording gages. May 11, 1966, to Oct. 31, 1979, recording gage on riparian gatewell. REMARKS, Reservoir is formed by earthfill dam with concrete control works completed in 1939. The following capacity figures are from revised capacity table effective Jan. 1, 1983. Usable capacity, 3,610 acre-ft between elevation 2,663.2 ft, bottom of outlet works, and 2,676.5 ft, maximum design level. Dead storage, 10 acre-ft. Water is used for irrigation. This is one of a number of stations which are maintained jointly by Canada and the United States. REVISED RECORDS (SEASONS), WSP 1309: 1947-50.

EXTREMES FOR PERIOD OF RECORD: Maximum contents, 4,360 acre-ft, May 20, 1967, elevation, 2,677.83 ft; no contents Feb. 28, Mar. 31, 1950, Oct. 22-31, 1984, Mar. 1-7 and Aug. 6 to Sept. 14, 1985.

EXTREMES FOR CURRENT SEASON: Maximum contents, 3,550 acre-ft, May 6, elevation, 2,676.35 ft; minimum, 20 acre-ft, Feb. 23, elevation, 2,663.57 ft.

06163000 NEWTON LAKE.--Lat 49°18'12", long 107°48'20", in NE1/4 sec.15, T.4, R.14 W., third meridian, Hydrologic Unit 10050013, at dam on Frenchman River, 5.4 mi northwest of Val Marie, and at mile 156.2. DRAINAGE AREA, 1,349 mi^2. PERIOD OF RECORD, February 1937 to current season (seasonal records only). February 1937 to October 1979, published as Val Marie Reservoir. Water-stage recorder. Datum of gage is at mean sea level (Geodetic Survey of Canada datum). Prior to May 11, 1966, nonrecording gages. REMARKS, Reservoir is formed by earthfill dam with concrete control works; construction began in 1936; storage began in 1937; construction completed in 1938. The following capacity figures are from revised capacity table effective Jan. 1, 1983. Usable capacity, 9,950 acre-ft between elevation 2,616.1 ft, bottom of outlet works, and 2,635.4 ft maximum design level. No dead storage. Water is used for irrigation. This is one of a number of stations which are maintained jointly by Canada and the United States. REVISED RECORDS (SEASONS), WSP 2116: 1937-65. WSP 1729: 1949.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 18,920 acre-ft, Apr. 19, 1952, elevation, 2,638.80 ft; no contents at times.

EXTREMES FOR CURRENT SEASON: Maximum contents, 1,390 acre-ft, May 29, elevation, 2,626.37 ft; no contents observed on Nov. 2.

MILK RIVER BASIN

RESERVOIRS IN FRENCHMAN RIVER BASIN IN SASKATCHEWAN--Continued

Monthend contents, in acre-feet, October 1988 to October 1989

Date	Cypress Lake	Eastend Reservoir	Huff Lake	Newton Lake
Oct. 31	28,200	86	349	55
Nov. 30	-	-	-	-
Dec. 31	-	-	-	-
Jan. 31	-	-	-	-
Feb. 28	28,400	34	30	114
Mar. 31	28,700	237	957	266
Apr. 30	29,400	2,200	3,350	445
May 31	24,400	1,330	316	1,320
June 30	24,500	1,910	393	1,050
July 31	22,500	274	42	131
Aug. 31	21,600	602	25	23
Sept. 30	20,700	219	98	34
Oct. 31	20,200	74	181	2

MILK RIVER BASIN

06164510 MILK RIVER AT JUNEBERG BRIDGE, NEAR SACO, MT

LOCATION.--Lat 48°30'32", long 107°13'02", in NE1/4NE1/4 sec.30, T.32 N., R.35 E., Phillips County, Hydrologic Unit 10050014, on left bank 25 ft upstream from Juneberg bridge on Phillips County road, 1.5 mi downstream from Frenchman River, 6.9 mi northeast of Saco, and at mile 152.3.

DRAINAGE AREA. --17,670 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1977 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 2,130 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Dec. 20 to Mar. 27. Water-discharge records good except those for estimated daily discharges, which are poor. Flow increased during irrigation season by water from St. Mary Canal which diverts from the St. Mary River near Babb (station number 05017500). Flow regulated by Fresno Reservoir (station number 06136500), two reservoirs in Lodge Creek basin in Saskatchewan (station numbers 06144260 and 06144360 and four reservoirs in Frenchman River basin in Saskatchewan. There are many small dams for the diversion of irrigation canals upstream. U. S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--12 years, 432 ft^3/s, 313,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,400 ft^3/s, Apr. 3, 1978, gage height, 24.20 ft; maximum gage height, 26.70 ft, Mar. 4, 1986, backwater from ice jam; minimum daily discharge, 2.1 ft^3/s, Aug. 20, 1984.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,370 ft^3/s, Mar. 28, gage height, 5.86 ft; maximum gage height, 6.13 ft, Mar. 16, ice jam; minimum discharge, 25 ft^3/s,May 10, gage height, 2.74 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	51	78	107	e45	e55	e50	523	32	473	399	189	309
2	52	78	91	e50	e50	e45	412	32	545	422	177	231
3	53	78	81	e55	e45	e45	478	44	512	427	137	188
4	52	79	76	e60	e40	e45	404	45	410	355	131	164
5	51	76	75	e55	e45	e40	291	39	359	253	131	144
6	50	64	72	e50	e50	e50	210	37	304	178	139	141
7	49	71	71	e45	e55	e60	139	38	221	270	152	148
8	56	80	62	e45	e55	e60	123	35	165	259	164	141
9	64	98	70	e40	e55	e60	96	29	151	238	148	129
10	66	99	74	e40	e55	e75	76	29	214	228	186	125
11	67	102	76	e45	e55	e90	63	34	257	253	206	118
12	68	110	76	e45	e60	e100	56	38	197	276	188	111
13	67	117	79	e50	e65	e95	49	41	157	291	181	104
14	63	126	80	e50	e60	e90	39	44	145	295	189	102
15	57	107	77	e45	e60	e80	36	43	148	324	179	103
16	50	115	75	e45	e55	e75	37	53	164	332	170	104
17	50	103	76	e50	e50	e70	34	68	208	333	158	106
18	46	84	75	e60	e50	e65	35	54	244	273	152	109
19	41	79	74	e60	e50	e60	36	51	291	236	153	105
20	39	75	e70	e60	e55	e60	33	43	338	264	151	106
21	36	64	e70	e60	e55	e55	30	43	346	299	160	104
22	35	61	e70	e55	e55	e55	31	42	380	336	161	101
23	33	61	e65	e55	e60	e50	30	38	359	362	142	96
24	34	63	e60	e55	e70	e50	28	36	319	386	149	95
25	34	64	e55	e50	e65	e100	26	38	290	335	134	94
26	37	63	e50	e55	e60	e300	29	45	278	278	136	89
27	40	59	e50	e60	e55	e700	32	82	288	237	148	92
28	38	62	e50	e55	e50	1330	36	104	330	195	163	89
29	36	75	e50	e55	---	1210	37	117	358	213	188	87
30	37	103	e55	e60	---	974	36	128	381	189	273	83
31	72	---	e50	e60	---	771	---	246	---	172	356	---
TOTAL	1524	2494	2162	1615	1535	6910	3485	1748	8832	8908	5291	3718
MEAN	49.2	83.1	69.7	52.1	54.8	223	116	56.4	294	287	171	124
MAX	72	126	107	60	70	1330	523	246	545	427	356	309
MIN	33	59	50	40	40	40	26	29	145	172	131	83
AC-FT	3020	4950	4290	3200	3040	13710	6910	3470	17520	17670	10490	7370

CAL YR 1988 TOTAL 43241 MEAN 118 MAX 608 MIN 25 AC-FT 85770
WTR YR 1989 TOTAL 48222 MEAN 132 MAX 1330 MIN 26 AC-FT 95650

e Estimated

MILK RIVER BASIN

06164510 MILK RIVER AT JUNEBERG BRIDGE, NEAR SACO, MT--Continued

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 September 1979.

REMARKS.--Unpublished records of once-daily water temperature are available in files of District office.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 2,220 microsiemens, Jan. 7, 8, 1978; minimum daily, 263 microsiemens, Mar. 17, 1982.
WATER TEMPERATURE (water years 1978-79): Maximum daily, 26.5°C, July 20, 22, Aug. 2, 1979; 0.0°C on many days during winter.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 2,000 microsiemens, Feb. 15, 16, 17; minimum daily, 452 microsiemens, Mar. 31.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)
OCT												
24...	1130	34	20	1	1600	11.0	7.5	8.2	420	84	52	230
DEC												
12...	1100	76	90	2	1680	4.5	0.0	8.1	430	88	50	230
JAN												
30...	0945	61	100	2	1810	3.0	0.0	7.7	430	90	49	230
MAR												
27...	1200	664	100	1	572	2.0	0.0	7.6	140	31	15	69
APR												
07...	1000	144	100	2	610	3.0	3.0	8.1	140	31	15	75
MAY												
17...	1030	71	0	0	1420	18.0	17.0	8.1	340	73	38	190
JUN												
12...	1130	196	80	1	680	22.0	19.0	8.1	190	41	22	80
AUG												
07...	1000	145	0	0	725	22.0	20.0	8.3	200	47	21	74
SEP												
11...	1300	120	0	0	680	9.0	12.5	8.3	190	45	20	74

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, 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-PHOROUS DIS-SOLVED (MG/L AS P) (00666)
OCT												
24...	5	6.4	321	540	30	0.30	9.1	1140	1.56	105	<0.100	0.020
DEC												
12...	5	5.0	367	530	45	0.30	5.7	1170	1.60	241	<0.100	<0.010
JAN												
30...	5	4.7	372	550	43	0.30	7.4	1200	1.63	198	0.570	--
MAR												
27...	3	7.2	114	170	11	0.10	6.3	381	0.52	683	0.740	0.070
APR												
07...	3	6.4	103	190	8.5	0.20	6.9	396	0.54	154	0.320	0.030
MAY												
17...	4	7.0	256	480	25	0.40	5.4	972	1.32	186	<0.100	--
JUN												
12...	3	4.5	174	160	8.6	0.20	3.6	424	0.58	225	<0.100	<0.010
AUG												
07...	2	5.0	207	150	8.7	0.20	7.3	437	0.59	171	<0.100	<0.010
SEP												
11...	2	3.7	186	160	13	0.20	4.8	432	0.59	140	<0.100	<0.010

06164510 MILK RIVER AT JUNEBERG BRIDGE, NEAR SACO, MT--Continued

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1440	1750	1750	1720	1700	1530	490	1230	1650	591	651	700
2	1460	1750	1100	1740	1730	1610	521	1230	955	587	665	696
3	1420	1580	1800	1760	1730	1600	572	1230	958	583	662	700
4	1450	1940	1800	1840	1760	1720	574	1280	697	581	694	716
5	1430	1950	1790	1850	1790	1720	576	1280	596	585	695	714
6	1440	1890	1790	1860	1850	1720	627	1300	571	606	708	713
7	1430	1920	1790	1890	1990	1680	618	1350	585	607	702	637
8	1490	1970	1760	1870	1940	1630	671	1390	1030	675	739	634
9	1490	1930	1750	1860	1810	1270	700	1380	722	678	708	635
10	1490	1950	1740	1840	1810	1250	704	1450	721	675	705	676
11	1520	1910	1720	1820	1980	1600	721	1350	722	671	698	678
12	1520	1730	1720	1850	1990	1600	780	1450	586	672	696	706
13	1530	1740	1710	1760	1990	1260	778	1450	694	691	702	709
14	1540	1680	1710	1780	1950	1260	831	1450	695	691	722	931
15	1560	1620	1790	1760	2000	810	852	1520	692	692	695	812
16	1560	1570	1790	1750	2000	810	866	1490	771	689	694	811
17	1560	1950	1870	1770	2000	620	877	1490	770	689	727	801
18	1610	1790	1860	1720	1890	590	901	1490	779	700	724	805
19	1600	1960	1880	1720	1900	580	938	1490	713	721	725	805
20	1580	1960	1890	1710	1880	570	941	1520	706	724	715	732
21	1600	1930	1860	1710	1880	584	986	1560	701	742	713	886
22	1620	1750	1860	1700	1880	593	1040	1560	670	757	694	827
23	1680	1530	1850	1670	1880	583	1030	1550	579	644	702	737
24	1680	1550	1850	1680	1740	594	1050	1620	614	644	694	863
25	1670	1060	1870	1680	1730	618	1060	1620	614	593	728	854
26	1680	1730	1920	1700	1740	665	1150	1620	605	594	730	907
27	1600	1650	1910	1710	1740	605	1150	1760	603	594	748	905
28	1640	1730	1880	1700	1670	485	1110	1840	606	608	749	928
29	1620	1720	1850	1710	---	499	1140	1850	582	606	657	936
30	1610	1730	1770	1720	---	511	1140	1740	584	628	658	932
31	1610	---	1780	1710	---	452	---	1680	---	630	656	---
MEAN	1550	1760	1790	1760	1860	1020	846	1490	726	650	702	780

WTR YR 1989 MEAN 1240 MAX 2000 MIN 452

MILK RIVER BASIN

06164590 BEAVER CREEK NEAR ZORTMAN, MT

LOCATION.--Lat 47°56'19", long 108°23'26", in NE1/4SE1/4NE1/4 sec.8, T.25 N., R.26 E., Phillips County, Hydrologic Unit 10050014, on right bank, at Baker Creek School, 3.3 mi southeast of Blaine-Phillips County line, 4.7 mi east of Fort Belknap Indian Reservation boundary, and 6 mi northeast of Zortman.

DRAINAGE AREA.--10.1 mi^2.

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

GAGE.--Water-stage recorder. Elevation of gage is 3,320 ft above National Geodetic Vertical Datum of 1929, from topographic map.

AVERAGE DISCHARGE.--6 years (water years 1984-89), 1.11 ft^3/s, 804 acre ft/yr.

REMARKS.--Estimated daily discharges: Nov. 16-21, Nov. 26 to Mar. 25. Records fair except those for estimated daily discharges, which are poor. No known diversions for irrigation upstream from station. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 57 ft^3/s, May 23, 1986, gage height, 2.29 ft; maximum gage height, 3.38 ft, Dec. 31, 1983, backwater from ice; no flow many days, 1985, 1988-89.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5.5 ft^3/s, May 29, gage height, 0.97 ft; maximum gage height, 1.72 ft, Dec. 30, backwater from ice; no flow many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.23	.25	e.25	e.05	e.00	e.00	.33	.47	.70	3.3	1.7	2.5
2	.23	.25	e.25	e.10	e.00	e.00	.33	.46	.68	3.1	1.5	2.3
3	.22	.24	e.25	e.15	e.00	e.00	.33	.47	.70	3.0	1.5	1.8
4	.22	.24	e.25	e.20	e.00	e.00	.36	.49	.64	3.2	1.7	1.7
5	.24	.25	e.25	e.15	e.00	e.00	.36	.44	.76	3.2	1.7	1.6
6	.24	.25	e.25	e.10	e.00	e.05	.36	.46	.75	3.1	1.7	1.7
7	.25	.24	e.20	e.05	e.00	e.20	.36	.46	.65	3.0	1.7	1.7
8	.24	.23	e.20	e.00	e.00	e.30	.34	.48	.64	2.9	1.7	1.7
9	.23	.23	e.20	e.00	e.00	e.50	.31	.48	.70	2.7	1.7	1.7
10	.24	.23	e.20	e.00	e.00	e.70	.32	.49	.82	3.0	1.7	1.7
11	.24	.25	e.20	e.00	e.00	e1.0	.35	.59	1.0	2.9	1.7	1.7
12	.25	.24	e.25	e.00	e.00	e1.0	.38	.62	1.1	2.8	1.7	1.7
13	.26	.24	e.25	e.00	e.00	e.90	.39	3.7	.90	2.8	1.7	1.7
14	.24	.23	e.20	e.00	e.00	e.80	.37	1.3	.83	2.8	1.7	1.7
15	.22	.24	e.20	e.00	e.00	e.70	.43	.68	1.1	2.9	1.7	1.7
16	.22	e.24	e.20	e.05	e.00	e.60	.43	.74	1.5	2.6	2.2	1.7
17	.22	e.23	e.25	e.05	e.00	e.50	.41	.68	1.4	2.3	2.3	1.7
18	.21	e.22	e.25	e.05	e.00	e.40	.42	.62	1.8	2.2	1.7	1.7
19	.21	e.23	e.25	e.05	e.00	e.40	.44	.62	2.2	2.1	1.7	1.7
20	.22	e.23	e.20	e.05	e.00	e.40	.48	.59	2.3	2.3	1.7	1.7
21	.22	e.24	e.15	e.05	e.00	e.40	.46	.59	2.6	2.0	1.7	1.7
22	.22	.23	e.15	e.05	e.00	e.70	.43	.59	2.8	2.1	1.7	1.5
23	.21	.26	e.15	e.05	e.00	e1.5	.42	.60	3.0	1.7	1.7	1.3
24	.22	.24	e.10	e.00	e.00	e2.5	.42	.64	3.3	1.9	1.8	1.1
25	.21	.23	e.10	e.00	e.00	e4.0	.41	1.7	3.2	2.1	2.8	1.3
26	.22	e.20	e.10	e.00	e.00	3.2	.87	.75	3.2	1.9	2.8	1.1
27	.21	e.15	e.05	e.00	e.00	1.3	3.2	.60	3.1	1.7	2.1	1.4
28	.19	e.20	e.05	e.00	e.00	.79	1.6	.57	3.3	2.1	2.3	1.3
29	.20	e.20	e.05	e.00	---	.56	1.1	3.0	3.1	1.7	2.3	1.4
30	.24	e.20	e.10	e.00	---	.44	.52	1.4	3.1	1.7	2.4	1.1
31	.25	---	e.10	e.00	---	.38	---	.81	---	1.8	3.2	---
TOTAL	7.02	6.91	5.65	1.20	0.00	24.22	16.93	26.09	51.87	76.9	59.5	48.6
MEAN	.23	.23	.18	.039	.000	.78	.56	.84	1.73	2.48	1.92	1.62
MAX	.26	.26	.25	.20	.00	4.0	3.2	3.7	3.3	3.3	3.2	2.5
MIN	.19	.15	.05	.00	.00	.00	.31	.44	.64	1.7	1.5	1.1
AC-FT	14	14	11	2.4	.00	48	34	52	103	153	118	96

CAL YR 1988 TOTAL 105.12 MEAN .29 MAX 4.4 MIN .00 AC-FT 209
WTR YR 1989 TOTAL 324.89 MEAN .89 MAX 4.0 MIN .00 AC-FT 644

e Estimated

06164615 LITTLE WARM CREEK AT RESERVATION BOUNDARY, NEAR ZORTMAN, MT

LOCATION.--Lat 47°59'04", long 108°21'15", in SE1/4SW1/4SW1/4 sec. 27, T.26 N., R.26 E., Phillips County, Hydrologic Unit 10050014, 0.2 mi upstream from Fort Belknap Indian Reservation boundary, 2.5 mi northwest of U.S. Highway 191, at 15 mi northeast of Zortman.

DRAINAGE AREA.--6.31 mi^2.

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 3,070 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Oct. 27 to Mar. 7. Water-discharge records poor. Diversions for irrigation upstream from station can, at times, dry up stream.

AVERAGE DISCHARGE.--6 years, 2.81 ft^3/s, 2,040 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 300 ft^3/s, Sept. 25, 1986, gage height, 6.93 ft; no flow at times most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 30 ft^3/s, May 13, 29, gage height, 3.42 ft; minimum daily, 1.6 ft^3/s, Oct. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.6	e2.6	e2.6	e2.0	e2.0	e2.7	3.3	3.0	3.4	3.5	3.0	2.6
2	2.3	e2.7	e2.7	e2.1	e1.7	e2.6	3.2	3.0	3.4	3.4	2.9	2.8
3	1.6	e2.7	e2.7	e2.2	e1.8	e2.5	3.1	3.0	3.4	3.0	2.6	2.5
4	1.8	e2.7	e2.7	e2.3	e2.0	e2.4	2.9	2.8	3.3	3.1	2.6	2.1
5	2.3	e2.6	e2.6	e2.3	e2.1	e2.3	2.7	2.8	3.4	3.2	2.6	2.2
6	2.4	e2.7	e2.5	e2.2	e2.2	e4.0	2.9	2.8	3.4	3.5	2.6	2.3
7	2.5	e2.7	e2.4	e2.1	e2.2	e6.0	3.0	2.8	3.6	3.4	2.6	2.3
8	2.5	e2.6	e2.4	e1.8	e2.1	4.8	2.9	3.0	3.5	3.2	2.4	2.3
9	2.6	e2.6	e2.5	e1.9	e2.0	5.9	2.9	2.9	3.5	3.2	2.3	2.5
10	2.4	e2.4	e2.4	e1.9	e2.1	6.5	2.8	3.2	3.9	3.2	2.5	3.2
11	2.3	e2.5	e2.5	e2.0	e2.4	3.8	2.8	3.3	3.7	3.2	2.8	3.2
12	1.7	e2.5	e2.5	e2.1	e2.6	2.8	2.9	3.2	3.6	3.2	2.8	3.3
13	2.1	e2.5	e2.4	e2.2	e2.5	2.8	2.9	12	3.4	3.1	2.8	3.2
14	2.1	e2.4	e2.3	e2.2	e2.4	2.7	2.9	5.4	3.3	3.2	2.7	3.3
15	2.0	e2.4	e2.3	e2.1	e2.3	2.8	2.9	3.6	3.4	3.0	2.8	3.2
16	2.2	e2.3	e2.3	e2.2	e2.2	3.3	3.0	3.5	3.6	2.8	2.8	3.3
17	1.8	e2.3	e2.4	e2.4	e2.1	3.1	3.0	3.2	3.4	3.1	2.6	3.3
18	2.2	e2.3	e2.6	e2.5	e2.0	3.2	3.0	3.4	3.2	2.8	2.6	3.4
19	2.8	e2.3	e2.5	e2.6	e2.0	2.8	3.0	3.6	3.3	3.0	2.8	3.3
20	3.2	e2.4	e2.4	e2.7	e2.1	3.2	3.0	3.4	3.4	2.9	2.7	3.3
21	2.8	e2.5	e2.4	e2.7	e2.1	3.2	3.1	3.5	3.5	3.0	2.5	3.2
22	2.7	e2.5	e2.3	e2.8	e2.1	3.4	3.1	3.4	3.4	3.0	2.0	3.2
23	2.8	e2.6	e2.3	e2.7	e2.3	3.2	2.9	3.6	3.4	3.1	2.3	3.2
24	2.7	e2.6	e2.2	e2.6	e3.0	3.1	3.0	3.5	3.5	2.9	2.9	3.3
25	2.8	e2.5	e2.2	e2.5	e3.2	4.6	2.8	4.7	3.4	2.8	3.4	3.3
26	2.8	e2.4	e2.1	e2.6	e3.0	4.3	4.5	3.7	3.5	2.7	2.6	3.3
27	e2.6	e2.4	e2.0	e2.8	e2.9	4.2	15	3.3	3.7	2.9	2.9	3.2
28	e2.5	e2.4	e2.0	e2.8	e2.8	3.8	7.9	3.1	3.9	2.9	3.0	3.2
29	e2.4	e2.5	e2.1	e2.7	---	3.5	5.7	11	3.6	2.8	2.6	3.2
30	e2.5	e2.5	e2.2	e3.0	---	3.3	3.1	5.6	3.4	2.9	2.5	3.3
31	e2.6	---	e2.2	e2.9	---	3.3	---	3.9	---	2.9	2.6	---
TOTAL	74.6	75.1	73.7	73.9	64.2	110.1	110.2	123.2	104.4	94.9	82.8	90.0
MEAN	2.41	2.50	2.38	2.38	2.29	3.55	3.67	3.97	3.48	3.06	2.67	3.00
MAX	3.2	2.7	2.7	3.0	3.2	6.5	15	12	3.9	3.5	3.4	3.4
MIN	1.6	2.3	2.0	1.8	1.7	2.3	2.7	2.8	3.2	2.7	2.0	2.1
AC-FT	148	149	146	147	127	218	219	244	207	188	164	179

CAL YR 1988 TOTAL 750.22 MEAN 2.05 MAX 13 MIN .00 AC-FT 1490
WTR YR 1989 TOTAL 1077.1 MEAN 2.95 MAX 15 MIN 1.6 AC-FT 2140

e Estimated

MILK RIVER BASIN

06164615 LITTLE WARM CREEK AT RESERVATION BOUNDRY, NEAR ZORTMAN, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1983 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (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											
27...	1400	2.6	--	--	1970	-4.0	8.0	--	--	--	--
DEC											
14...	1400	2.3	100	2	2140	-5.0	1.0	7.9	1200	980	300
MAR											
07...	1430	6.0	--	--	1730	6.0	2.0	--	--	--	--
APR											
05...	1000	2.8	100	2	2120	2.0	5.0	8.0	1100	970	300
MAY											
18...	1550	3.5	--	--	2100	13.0	17.5	--	--	--	--
JUN											
27...	1230	4.2	--	0	1930	24.5	18.0	7.9	1000	870	270
AUG											
08...	1530	2.7	0	0	1920	30.0	22.0	8.0	1000	880	270

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	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, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)
DEC											
14...	99	79	1	11	175	1100	49	1.4	15	1760	2.39
APR											
05...	96	86	1	12	172	1100	46	1.4	12	1760	2.39
JUN											
27...	91	65	0.9	10	176	970	43	1.4	12	1570	2.13
AUG											
08...	91	64	0.9	11	175	970	43	1.4	16	1570	2.14

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	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)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
DEC											
14...	10.9	<0.100	1	360	<1	2	50	<5	70	0.2	<1
APR											
05...	13.3	<0.100	--	400	--	--	30	--	--	--	--
JUN											
27...	17.8	<0.100	--	390	--	--	12	--	--	--	--
AUG											
08...	11.5	<0.100	--	380	--	--	23	--	--	--	--

MILK RIVER BASIN

06164623 LITTLE WARM CREEK TRIBUTARY NEAR LODGE POLE, MT

LOCATION.--Lat 47°59'43", long 108°19'09", in SW1/4SE1/4NW1/4 sec. 24, T.26 N., R.26 E., Phillips County, Hydrologic Unit 10050014, at culvert on county road 0.3 mi northeast of Little Warm Creek, 1.3 mi east of Fort Belknap Indian Reservation boundary, 2.3 mi northeast of State Highway 191, and 10 mi southeast of Lodge Pole.

DRAINAGE AREA.--2.42 mi^2.

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

REVISED RECORDS.--WDR MT-86-1: 1983-85(M).

GAGE.--Water-stage recorder. Elevation of gage is 2,910 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Dec. 26 to Feb. 23, Feb. 26 to Mar. 6. Records fair except those for estimated daily discharges, which are poor. No known diversions for irrigation upstream from station.

AVERAGE DISCHARGE.--6 years, 0.20 ft^3/s, 145 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 460 ft^3/s, Sept. 25, 1986, gage height, 4.83 ft, from floodmarks, on basis of culvert computations and flow-over-road measurement of peak flow; no flow most days.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 33 ft^3/s, May 29, gage height, 2.09 ft; no flow most days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	e.00	e.00	e.00	.00	.00	.00	.00	.00	.00
2	.00	.00	.00	e.00	e.00	e.00	.00	.00	.00	.00	.00	.00
3	.00	.00	.00	e.00	e.00	e.00	.00	.00	.00	.00	.00	.00
4	.00	.00	.00	e.00	e.00	e.00	.00	.00	.00	.00	.00	.00
5	.00	.00	.00	e.00	e.00	e.00	.00	.00	.00	.00	.00	.00
6	.00	.00	.00	e.00	e.00	e.50	.00	.00	.00	.00	.00	.00
7	.00	.00	.00	e.00	e.00	1.1	.00	.00	.00	.00	.00	.00
8	.00	.00	.00	e.00	e.00	.75	.00	.00	.00	.00	.00	.00
9	.00	.00	.00	e.00	e.00	.86	.00	.00	.00	.00	.00	.00
10	.00	.00	.00	e.00	e.00	.68	.00	.00	.00	.00	.00	.00
11	.00	.00	.00	e.00	e.00	.15	.00	.00	.00	.00	.00	.00
12	.00	.00	.00	e.00	e.00	.01	.00	.46	.00	.00	.00	.00
13	.00	.00	.00	e.00	e.00	.00	.00	3.6	.00	.00	.00	.00
14	.00	.00	.00	e.00	e.00	.00	.00	.12	.00	.00	.00	.00
15	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00	.00
17	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00	.00
18	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00	.00
19	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00	.00
20	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00	.00
21	.00	.00	.00	e.00	e.00	.00	.00	.00	.00	.00	.00	.00
22	.00	.00	.00	e.00	e.00	.09	.00	.00	.00	.00	.00	.00
23	.00	.00	.00	e.00	e.00	.36	.00	.02	.00	.00	.00	.00
24	.00	.00	.00	e.00	.02	.69	.00	.01	.00	.00	.00	.00
25	.00	.00	.00	e.00	.01	.80	.00	.25	.00	.00	.00	.00
26	.00	.00	e.00	e.00	e.00	.48	1.7	.02	.00	.00	.00	.00
27	.00	.00	e.00	.02	e.00	.16	6.7	.00	.00	.00	.00	.00
28	.00	.00	e.00	.00	e.00	.06	3.4	.00	.00	.00	.00	.00
29	.00	.00	e.00	.01	---	.00	.12	9.6	.00	.00	.00	.00
30	.00	.00	e.00	.03	---	.00	.00	.31	.00	.00	.00	.00
31	.00	---	e.00	e.00	---	.00	---	.08	---	.00	.00	---
TOTAL	0.00	0.00	0.00	0.06	0.03	6.69	11.92	14.47	0.00	0.00	0.00	0.00
MEAN	.000	.000	.000	.002	.001	.22	.40	.47	.000	.000	.000	.000
MAX	.00	.00	.00	.03	.02	1.1	6.7	9.6	.00	.00	.00	.00
MIN	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
AC-FT	.00	.00	.00	.1	.06	13	24	29	.00	.00	.00	.00

CAL YR 1988 TOTAL 6.40 MEAN .017 MAX 4.8 MIN .00 AC-FT 13
WTR YR 1989 TOTAL 33.17 MEAN .091 MAX 9.6 MIN .00 AC-FT 66

e Estimated

MILK RIVER BASIN

06166000 BEAVER CREEK BELOW GUSTON COULEE, NEAR SACO, MT

LOCATION.--Lat 48°21'25", long 107°34'48", in SE1/4SW1/4NW1/4 sec.16, T.30 N., R.32 E., Phillips County, Hydrologic Unit 10050014, on right bank, 25 ft upstream from bridge on county road, 13 mi southwest of Saco, 22.5 river miles downstream from Guston Coulee, and at mile 61.1.

DRAINAGE AREA.--1,208 mi^2.

PERIOD OF RECORD.--April 1981 to current year (seasonal records only).

GAGE.--Water-stage recorder. Elevation of gage is 2,215 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Oct. 25-31, Mar. 1-30, Apr. 1-13. Records fair except those for estimated daily discharges, which are poor. Some regulation by numerous small reservoirs on tributary streams. Diversions for irrigation upstream from gage. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 23,500 ft^3/s, Sept. 26, 1986, gage height, 14.68 ft, from slope-area determination of peak flow; no flow at times each year.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, about 1,460 ft^3/s, Mar. 29, gage height, 11.09 ft, from highwater mark; no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00					e.00	e400	480	17	.96	2.0	.31
2	.00					e.00	e300	272	131	.63	1.4	.28
3	.00					e.00	e250	196	110	.46	1.5	.25
4	.00					e.00	e200	119	60	.40	3.0	.25
5	.00					e.00	e150	63	54	.30	2.2	.26
6	.00					e.00	e110	37	52	.22	.98	.24
7	.00					e5.0	e93	29	39	.11	.59	.26
8	.00					e10	e70	14	23	.00	.48	.27
9	.00					e15	e55	14	12	.00	.51	.27
10	.00					e50	e40	15	10	.00	.69	.28
11	.00					e40	e30	13	9.8	.00	.76	.29
12	.00					e40	e25	9.2	9.6	.00	.57	.27
13	.00					e30	e22	8.6	6.1	.00	.41	.28
14	.00					e20	18	9.7	3.6	.00	.31	.26
15	.00					e15	9.0	7.7	3.8	.00	.21	.26
16	.00					e10	.30	6.8	3.7	.00	.16	.36
17	.00					e9.0	.27	16	4.0	.00	.16	.45
18	.00					e8.0	.33	61	3.7	.00	.31	.47
19	.00					e7.0	.82	74	3.8	.00	.52	.45
20	.00					e6.0	.35	49	4.8	.00	.88	.42
21	.00					e6.0	.14	34	2.9	.00	1.4	.37
22	.00					e10	.04	28	1.5	.00	1.7	.31
23	.00					e10	.08	24	1.2	.07	1.6	.26
24	e.00					e10	.14	13	3.2	.50	1.1	.24
25	e.00					e15	.11	11	3.4	.25	.82	.21
26	e.00					e50	.25	7.9	3.3	.10	.67	.18
27	e.00					e200	.33	6.8	6.6	.89	.53	.17
28	e.00					e500	2.8	6.8	7.1	5.6	.44	.15
29	e.00					e1460	171	5.7	5.1	6.1	.34	.12
30	e.00					e1140	512	6.4	2.2	5.4	.30	.10
31	e.00					550	---	10	---	3.4	.32	---
TOTAL	0.00					4216.00	2460.96	1647.6	597.4	25.39	26.86	8.29
MEAN	.000					136	82.0	53.1	19.9	.82	.87	.28
MAX	.00					1460	512	480	131	6.1	3.0	.47
MIN	.00					.00	.04	5.7	1.2	.00	.16	.10
AC-FT	.00					8360	4880	3270	1180	50	53	16

e Estimated

MILK RIVER BASIN

06169500 ROCK CREEK BELOW HORSE CREEK, NEAR INTERNATIONAL BOUNDARY

(Hydrologic bench-mark station)

LOCATION.--Lat 48°58'10", long 106°50'20", in NE1/4NW1/4 sec.15, T.37 N., R.37 E., Valley County, Hydrologic Unit 10050015, on right bank 2 mi south of international boundary, 3 mi downstream from Horse Creek, 21 mi northwest of Opheim, MT, and at mile 82.0.

DRAINAGE AREA.--328 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1916 to October 1926, September 1956 to current year (seasonal records only prior to October 1978). Monthly discharge only for some periods, published in WSP 1309. Published as Rock Creek near Barnard, Mt. 1916-17. Prior to September 1956, records were collected at both Horse Creek (1914-56) and Rock Creek above Horse Creek (1914-56). Summations are equivalent to records at this site.

REVISED RECORDS.--WSP 1509: 1925(M), WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 2,530 ft, above National Geodetic Vertical Datum of 1929, from topographic map. March 1916 to October 1926, nonrecording gages at several sites within 500 ft upstream at different datum.

REMARKS.--Estimated daily discharges: Nov. 25 to Apr. 8. Water-discharge records fair except those for estimated daily discharges, which are poor. Several small diversions for irrigation upstream from station.

AVERAGE DISCHARGE.--11 years (1979-89), 14.7 ft^3/s, 10,650 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,420 ft^3/s, Apr. 7, 1969, gage height, 12.03 ft; maximum gage height, 13.40 ft, Mar. 29, 1978, backwater from ice; no flow at times most years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 15, 1952, reached a stage of 12.6 ft, from floodmarks, discharge, 5,110 ft^3/s, by slope-area measurement of peak flow.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 250 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 29	--	*unknown	*5.80	May 24	0915	267	4.78

No flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.01	e.24	e.00	e.00	e.00	e110	2.3	4.5	.97	.00	.00
2	.00	.03	e.26	e.00	e.00	e.00	e110	1.7	3.9	1.2	.00	.00
3	.00	.02	e.24	e.00	e.00	e.00	e100	1.6	4.4	.78	.00	.00
4	.00	.02	e.24	e.00	e.00	e.00	e70	1.4	5.4	.57	.00	.00
5	.00	.03	e.26	e.00	e.00	e.00	e40	1.4	4.1	.48	.00	.00
6	.00	.01	e.22	e.00	e.00	e.00	e35	1.3	3.3	.38	.00	.00
7	.00	.00	e.18	e.00	e.00	e.00	e30	1.2	2.9	.27	.00	.00
8	.00	.00	e.12	e.00	e.00	e.00	e25	1.1	2.4	.18	.00	.00
9	.00	.00	e.10	e.00	e.00	e.00	22	1.0	2.0	.11	.00	.00
10	.00	.00	e.08	e.00	e.00	e.10	17	.99	1.7	.07	.00	.00
11	.00	.00	e.07	e.00	e.00	e.50	12	.85	1.5	.04	.00	.00
12	.00	.00	e.10	e.00	e.00	e.70	9.7	1.5	25	.02	.00	.00
13	.00	.01	e.15	e.00	e.00	e.50	10	2.8	13	.02	.00	.00
14	.00	.01	e.12	e.00	e.00	e.40	12	3.5	4.9	.06	.00	.00
15	.00	.03	e.10	e.00	e.00	e.30	12	4.0	5.7	.06	.00	.00
16	.00	.03	e.08	e.00	e.00	e.25	9.9	4.8	6.5	2.5	.00	.00
17	.00	.02	e.10	e.00	e.00	e.20	7.9	4.2	4.4	9.6	.00	.00
18	.00	.02	e.12	e.00	e.00	e.15	6.8	3.6	2.7	7.8	.00	.00
19	.01	.01	e.10	e.00	e.00	e.12	4.8	4.0	1.9	4.1	.00	.00
20	.01	.02	e.08	e.00	e.00	e.10	3.4	3.1	1.3	2.7	.00	.00
21	.00	.04	e.06	e.00	e.00	e.08	2.9	3.9	1.0	1.4	.00	.00
22	.00	.27	e.04	e.00	e.00	e.06	2.1	3.9	.87	.73	.00	.00
23	.00	.54	e.03	e.00	e.00	e.05	2.2	6.3	4.0	.49	.00	.00
24	.00	.44	e.02	e.00	e.00	e5.0	2.5	142	1.6	.40	.00	.00
25	.00	e.35	e.01	e.00	e.00	e20	2.6	75	1.0	.34	.00	.00
26	.00	e.25	e.00	e.00	e.00	e30	3.1	37	1.1	.61	.00	.00
27	.00	e.20	e.00	e.00	e.00	e80	3.3	16	.76	.70	.00	.00
28	.00	e.20	e.00	e.00	e.00	e100	3.3	8.5	.90	.36	.00	.00
29	.00	e.22	e.00	e.00	---	e180	2.9	6.4	1.0	.18	.00	.00
30	.00	e.22	e.00	e.00	---	e150	2.7	5.3	.70	.06	.00	.00
31	.01	---	e.00	e.00	---	e120	---	5.5	---	.00	.00	---
TOTAL	0.03	3.00	3.12	0.00	0.00	688.51	675.1	356.14	114.43	37.18	0.00	0.00
MEAN	.001	.10	.10	.000	.000	22.2	22.5	11.5	3.81	1.20	.000	.000
MAX	.01	.54	.26	.00	.00	180	110	142	25	9.6	.00	.00
MIN	.00	.00	.00	.00	.00	.00	2.1	.85	.70	.00	.00	.00
AC-FT	.06	6.0	6.2	.00	.00	1370	1340	706	227	74	.00	.00

CAL YR 1988 TOTAL 577.46 MEAN 1.58 MAX 38 MIN .00 AC-FT 1150
WTR YR 1989 TOTAL 1877.51 MEAN 5.14 MAX 180 MIN .00 AC-FT 3720

e Estimated

MILK RIVER BASIN

06169500 ROCK CREEK BELOW HORSE CREEK, NEAR INTERNATIONAL BOUNDARY--Continued
(Hydrologic bench-mark station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1964-65, 1977 to current year.

REMARKS.--Some scheduled sampling was not possible as there were periods of no streamflow.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)
OCT								
18...	1000	0.01	0	0	2010	2.5	4.0	702
DEC								
13...	1035	0.16	--	--	1960	2.0	0.0	--
MAR								
27...	1000	79	100	2	375	0.0	0.0	694
APR								
03...	1040	102	--	--	450	1.0	0.0	--
10...	1045	16	--	--	520	2.0	2.0	--
JUN								
13...	1115	13	20	1	1120	20.0	17.0	709

DATE	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)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
OCT							
18...	10.1	84	K3	K34	631	102	680
MAR							
27...	11.8	89	K120	K180	--	--	--
JUN							
13...	7.9	88	570	230	511	18	440

DATE	TIME	PH (STAND-ARD UNITS) (00400)	TUR-BID-ITY (NTU) (00076)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
OCT										
18...	1000	9.1	17	190	0	17	35	440	14	9.4
MAR										
27...	1000	8.2	280	56	0	11	7.0	62	4	5.3
JUN										
13...	1115	8.6	38	220	0	33	34	190	6	8.7

DATE	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)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)
OCT										
18...	711	430	11	0.60	5.2	1400	1360	1.90	0.04	<0.010
MAR										
27...	114	87	4.0	0.10	8.4	307	256	0.42	65.5	0.090
JUN										
13...	488	150	3.1	0.30	3.0	739	687	1.01	25.9	<0.010

MILK RIVER BASIN

06169500 ROCK CREEK BELOW HORSE CREEK, NEAR INTERNATIONAL BOUNDARY--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)
OCT										
18...	<0.100	0.030	0.050	1.5	0.200	0.050	<0.010	10	10	<100
MAR										
27...	0.310	0.050	--	1.9	0.420	0.180	0.130	530	13	28
JUN										
13...	<0.100	0.030	0.020	0.60	0.040	<0.010	<0.010	30	3	77

DATE	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)
OCT										
18...	<10	<1	<1	<1	3	20	<5	240	10	0.3
MAR										
27...	<0.5	2	4	<3	19	470	<5	42	24	--
JUN										
13...	<0.5	<1	1	<3	3	24	<1	120	3	<0.1

DATE	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT										
18...	6	2	<1	<1.0	270	10	<10	91	<0.01	75
MAR										
27...	<10	4	<1	<1.0	100	<6	17	571	122	99
JUN										
13...	10	4	<1	<1.0	400	<6	10	149	5.2	76

DATE	TIME	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90) (80060)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)
MAR									
27...	1000	<0.4	45	7.1	30	5.4	26	0.05	0.31

MILK RIVER BASIN

06172310 MILK RIVER AT TAMPICO, MT

LOCATION.--Lat 48°18'29", long 106°49'19", in SW1/4SW1/4SW1/4 sec.32, T.30 N., R.38 E., Valley County, Hydrologic Unit 10050012, on right bank, at county bridge 0.8 miles downstream from Buggy Creek and 0.3 miles northeast of Tampico, and at mile 98.7.

DRAINAGE AREA.--21,078 mi^2.

PERIOD OF RECORD.--October 1973 to September 1977, May 1987 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 2,110 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Dec. 15 to Apr. 3. Records good except those for estimated daily discharges, which are poor. Flow increased during irrigation season by water from St. Mary Canal which diverts from the St. Mary River near Babb. Flow regulated by Fresno and Nelson Reservoirs, five reservoirs in Lodge Creek basin in Saskatchewan, and four reservoirs in Frenchman River basin in Saskatchewan. Many small dams for the diversion of irrigation canals upstream, the closest being Vandalia Dam 19 mi upstream. Diversions upstream from station for irrigation of about 126,000 acres of which about 17,000 acres lies downstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--6 years (1974-77, 1988-89), 465 ft^3/s, 336,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,210 ft^3/s, May 26, 1974, gage height, 23.65 ft; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 17, 1952 reached an observed stage of 38.67 ft at gage 200 ft downstream from Vandalia Dam, furnished by the U.S. Army Corps of Engineers; discharge about 45,000 ft^3/s.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, unknown; maximum gage height, 16.96 ft, Mar. 30, backwater from ice; minimum discharge, 6.8 ft^3/s, May 23, July 12,13.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	49	90	e50	e45	e45	e3000	9.8	12	285	16	225
2	15	77	110	e50	e45	e45	e2500	12	23	222	21	203
3	14	80	112	e55	e45	e45	e2000	168	327	197	38	151
4	26	84	95	e60	e50	e50	1730	349	425	182	33	98
5	40	76	87	e55	e50	e55	1190	212	380	166	22	65
6	42	79	92	e50	e50	e55	820	99	368	65	15	52
7	43	92	76	e50	e50	e60	183	42	302	22	13	43
8	46	68	78	e50	e50	e65	65	22	192	12	14	38
9	50	75	78	e50	e50	e70	72	17	123	9.0	20	39
10	50	88	71	e50	e50	e80	126	15	111	8.0	22	29
11	50	102	78	e55	e50	e90	102	13	150	8.0	28	23
12	52	110	80	e55	e50	e85	111	13	190	7.3	43	19
13	56	111	81	e55	e50	e80	81	13	133	6.9	46	17
14	163	110	82	e55	e50	e75	66	10	79	7.6	44	16
15	172	122	e60	e55	e50	e70	31	8.8	68	8.2	60	15
16	157	133	e50	e55	e45	e70	18	9.5	82	10	66	15
17	144	110	e55	e55	e45	e70	13	8.8	100	50	50	14
18	168	127	e55	e55	e45	e75	14	8.5	130	85	35	12
19	165	120	e55	e55	e45	e75	12	8.8	165	82	23	12
20	149	98	e50	e55	e50	e70	11	8.3	208	56	18	11
21	132	93	e50	e55	e55	e70	10	8.5	267	30	16	11
22	117	89	e50	e55	e55	e80	11	8.2	314	50	15	12
23	103	85	e45	e55	e55	e90	9.7	7.7	342	59	15	14
24	92	83	e45	e50	e55	e90	9.5	8.9	312	93	14	37
25	111	76	e45	e50	e50	e100	8.0	9.2	252	135	16	59
26	145	74	e45	e60	e50	e150	10	9.2	221	105	14	86
27	68	65	e45	e65	e50	e500	10	10	207	57	14	96
28	43	75	e50	e70	e45	e1000	9.2	9.5	252	40	16	176
29	44	74	e55	e65	---	e2000	8.1	11	297	36	23	219
30	47	74	e55	e60	---	e4000	8.5	12	320	18	55	192
31	53	---	e55	e55	---	e3000	---	12	---	13	132	---
TOTAL	2571	2699	2075	1710	1380	12410	12239.0	1153.7	6352	2125.0	957	1999
MEAN	82.9	90.0	66.9	55.2	49.3	400	408	37.2	212	68.5	30.9	66.6
MAX	172	133	112	70	55	4000	3000	349	425	285	132	225
MIN	14	49	45	50	45	45	8.0	7.7	12	6.9	13	11
AC-FT	5100	5350	4120	3390	2740	24620	24280	2290	12600	4210	1900	3970

CAL YR 1988 TOTAL 24276.84 MEAN 66.3 MAX 742 MIN .00 AC-FT 48150
WTR YR 1989 TOTAL 47670.7 MEAN 131 MAX 4000 MIN 6.9 AC-FT 94550

e Estimated

MILK RIVER BASIN

06174500 MILK RIVER AT NASHUA, MT

(National stream quality accounting network station)

LOCATION.--Lat 48°07'47", long 106°21'50", in NE1/4NE1/4 sec.1, T.27 N., R.41 E., Valley County, Hydrologic Unit 10050012, on right bank at downstream side of former highway bridge site, 0.6 mi southwest of Nashua, 2.0 mi upstream from Porcupine Creek, and at mile 22.7.

DRAINAGE AREA.--22,332 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1939 to current year.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,027.75 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 13 to Apr. 2. Aug. 12-21, and Aug. 28 to Sept. 5. Water-discharge records good except those for estimated daily discharges, which are poor. Flow increased during irrigation season by water from St. Mary Canal which diverts from the St. Mary River near Babb. Flow regulated by Fresno Reservoir (station number 06136500), two reservoirs in Lodge Creek basin in Saskatchewan, and four reservoirs in Frenchman River basin in Saskatchewan. Diversions for irrigation of about 140,000 acres upstream from station. U. S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--50 years, 682 ft³/s, 494,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 45,300 ft³/s, Apr. 18, 1952, gage height, 31.38 ft; no flow July 14, 15, July 17 to Aug. 1, Aug. 15 to Sept. 6, 1984, and May 16-19, 1985.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 4,500 ft³/s, Mar. 30; maximum gage height, 15.11 ft, Mar. 30, backwater from ice; minimum discharge, 16 ft³/s, Oct. 1,2,5,6, gage height, 2.00 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	74	e95	e60	e65	e60	e4000	543	102	247	176	e265
2	16	75	e95	e60	e60	e55	e3800	431	118	263	129	e279
3	18	81	e95	e65	e55	e55	3750	345	117	260	111	e288
4	18	82	e95	e70	e55	e55	3280	270	124	246	165	e297
5	16	99	e95	e65	e60	e55	2690	252	242	225	240	e311
6	17	115	e100	e65	e60	e60	2040	386	425	208	273	282
7	17	119	e100	e65	e60	e65	1500	370	455	197	288	245
8	22	118	e95	e60	e60	e65	1030	301	422	144	314	205
9	32	120	e95	e60	e60	e70	595	254	398	93	320	178
10	34	124	e95	e60	e60	e75	314	222	321	65	320	165
11	34	116	e95	e60	e60	e80	210	177	257	53	300	163
12	34	118	e100	e65	e60	e90	189	155	204	40	e270	156
13	34	e100	e100	e65	e60	e100	196	146	248	38	e270	141
14	36	e95	e100	e65	e60	e95	180	144	273	34	e261	139
15	37	e90	e95	e65	e60	e90	195	172	258	30	e261	140
16	48	e85	e95	e65	e60	e85	230	193	196	37	e252	127
17	113	e80	e95	e65	e60	e80	231	167	148	40	e244	118
18	135	e80	e100	e65	e55	e80	139	223	149	53	e236	115
19	135	e80	e95	e65	e55	e80	77	379	168	71	e227	122
20	138	e85	e90	e65	e55	e80	93	298	186	130	e217	130
21	149	e90	e85	e65	e55	e85	138	208	211	143	e222	142
22	155	e95	e80	e65	e60	e90	145	194	244	135	225	145
23	143	e100	e75	e65	e65	e100	109	183	273	114	229	144
24	134	e100	e70	e60	e65	e150	94	154	296	111	225	133
25	132	e95	e65	e60	e65	e300	92	138	322	115	219	136
26	127	e90	e60	e70	e65	e700	89	127	329	134	203	139
27	121	e85	e60	e75	e60	e1500	97	116	307	181	213	157
28	144	e85	e60	e75	e60	e2000	113	110	280	201	e214	170
29	144	e85	e65	e75	---	e3000	447	109	246	187	e222	183
30	109	e90	e65	e80	---	e4500	622	108	234	186	e240	206
31	84	---	e65	e75	---	e4000	---	111	---	164	e257	---
TOTAL	2392	2851	2675	2040	1675	17900	26685	6986	7553	4145	7343	5421
MEAN	77.2	95.0	86.3	65.8	59.8	577	889	225	252	134	237	181
MAX	155	124	100	80	65	4500	4000	543	455	263	320	311
MIN	16	74	60	60	55	55	77	108	102	30	111	115
AC-FT	4740	5650	5310	4050	3320	35500	52930	13860	14980	8220	14560	10750

CAL YR 1988 TOTAL 38151.8 MEAN 104 MAX 656 MIN 5.5 AC-FT 75670
WTR YR 1989 TOTAL 87666 MEAN 240 MAX 4500 MIN 16 AC-FT 173900

e Estimated

06174500 MILK RIVER AT NASHUA, MT--Continued
(National stream quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1950-53, 1960 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: January 1974 to September 1981.
WATER TEMPERATURE: January 1974 to September 1979.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1974-81): Maximum daily, 2,540 microsiemens, Dec.12, 1977; minimum daily, 246 microsiemens, Apr. 14, 1974.
WATER TEMPERATURE (water years 1974-79): Maximum, 27.0°C, July 20, 21, 1974; minimum, 0.0°C on many days during winter.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, IN CUBIC FEET PER SECOND (00060)	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)
OCT								
24...	1100	--	136	0	0	1420	9.0	7.0
DEC								
08...	1030	--	93	0	0	2100	-10.0	0.0
MAR								
28...	1400	E2000	--	0	0	487	11.0	0.0
APR								
12...	1140	--	190	--	--	640	12.0	7.0
MAY								
23...	1030	--	185	0	0	1000	23.0	21.5
JUL								
17...	1100	--	37	99	1	962	21.0	23.0
SEP								
21...	1100	--	142	0	0	922	17.0	15.0

DATE	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	COLIFORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
OCT								
24...	711	9.0	80	K16	K28	349	0	279
DEC								
08...	725	9.3	67	K7	<1	512	0	413
MAR								
28...	703	10.2	76	K210	1000	45	0	36
MAY								
23...	703	9.9	122	K39	K83	121	0	101
JUL								
17...	708	8.0	101	260	K84	282	0	224
SEP								
21...	716	9.6	102	230	K73	282	0	230

DATE	TIME	PH (STANDARD UNITS) (00400)	TURBIDITY (NTU) (00076)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)
OCT										
24...	1100	8.2	25	380	98	73	47	190	4	6.8
DEC										
08...	1030	8.0	8.8	520	110	97	67	300	6	6.7
MAR										
28...	1400	7.5	2800	88	52	22	7.9	67	3	4.9
MAY										
23...	1030	7.6	83	200	100	49	20	140	4	6.8
JUL										
17...	1100	8.2	25	250	26	57	26	120	3	7.0
SEP										
21...	1100	8.1	15	240	9	54	25	110	3	5.9

06174500 MILK RIVER AT NASHUA, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLORIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUORIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	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)	NITROGEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)
OCT 24...	279	450	32	0.30	6.6	988	974	1.34	363	<0.010
DEC 08...	446	700	48	0.40	11	1520	1480	2.07	382	0.010
MAR 28...	53	170	5.4	0.30	7.0	326	310	0.44	E1760	0.020
MAY 23...	107	380	14	0.40	7.4	713	680	0.97	356	0.020
JUL 17...	233	260	20	0.30	7.2	655	632	0.89	65.4	<0.010
SEP 21...	230	220	17	0.30	4.5	578	575	0.79	222	<0.010

DATE	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DIS-SOLVED (MG/L AS P) (00666)	PHOSPHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	SEDIMENT, SUS-PENDED (MG/L) (80154)	SEDIMENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT 24...	<0.100	0.050	0.030	0.90	0.030	0.010	<0.010	277	102	99
DEC 08...	0.110	0.060	0.090	1.0	0.040	0.010	<0.010	363	91	80
MAR 28...	0.680	0.090	0.100	9.1	2.70	0.050	0.020	5630	E30400	99
MAY 23...	0.320	0.090	0.100	0.80	0.190	0.050	0.030	250	125	99
JUL 17...	<0.100	0.020	0.030	0.90	0.060	0.020	<0.010	55	5.5	98
SEP 21...	<0.100	0.010	0.020	0.70	0.060	<0.010	0.010	35	13	98

DATE	TIME	ALUMINUM, DIS-SOLVED (UG/L AS AL) (01106)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	BERYLLIUM, 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)
OCT 24...	1100	10	6	49	<0.5	3	<1	<3	3	29	<5
MAR 28...	1400	100	2	22	<0.5	<1	2	2	5	170	<5
JUL 17...	1100	20	5	49	<0.5	<1	<1	<3	2	4	<1
SEP 21...	1100	10	3	47	<0.5	<1	<1	<3	2	<3	<1

DATE	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, DIS-SOLVED (UG/L AS NI) (01065)	SELENIUM, DIS-SOLVED (UG/L AS SE) (01145)	SILVER, DIS-SOLVED (UG/L AS AG) (01075)	STRONTIUM, DIS-SOLVED (UG/L AS SR) (01080)	VANADIUM, DIS-SOLVED (UG/L AS V) (01085)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
OCT 24...	94	41	--	<10	<1	<1	1.0	740	<6	7
MAR 28...	44	8	1.5	<1	3	1	<1.0	190	2	11
JUL 17...	60	22	0.1	<10	1	<1	<1.0	530	<6	6
SEP 21...	51	4	0.2	<10	2	<1	<1.0	500	<6	<3

MILK RIVER BASIN

06175000 PORCUPINE CREEK AT NASHUA, MT

LOCATION.--Lat 48°08'09", long 106°20'52", in SW1/4NE1/4SE1/4 sec.31, T.28 N., R.42 E., Valley County, Hydrologic Unit 10050016, on right bank, 30 ft downstream from U.S. Highway 2 bridge, 0.1 mi downstream from Fort Peck Indian Reservation boundary, 0.3 mi east of Nashua, and at mile 3.9.

DRAINAGE AREA.--725 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1908 to September 1924 (no winter records 1912-13, 15-16, 22-24), October 1981 to current year. Flows are equivalent if overflow channel just upstream from the present location is gaged.

GAGE.--Water-stage recorder. Elevation of gage is 2,060 ft above National Geodetic Vertical Datum of 1929, from topographic map. July 12, 1908, to Sept. 30, 1924, nonrecording gage 0.5 mi upstream at different datum.

REMARKS.--Estimated daily discharges: Oct. 1 to Mar. 29, Apr. 15 to Sept. 30. Water-discharge records poor. Diversions for irrigation of about 430 acres upstream from station.

AVERAGE DISCHARGE.--16 years (1909-11, 1913-14, 1916-21, 1982-89), 22.1 ft^3/s, 16,010 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,600 ft^3/s, Apr. 13, 1982, gage height, 15.95 ft; maximum gage height, 18.0 ft, Apr. 11, 1916, from floodmark, at previous site and datum; no flow each year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 24, 1939, computed as 35,000 ft^3/s by U.S. Indian Service (now U.S. Bureau of Indian Affairs), caused by failure of Middle Fork dam.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, unknown; maximum gage height, 5.83 ft, Mar. 29, backwater from ice; no flow most days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	e.00	e.00	e.00	e.00	e.00	123	e.70	e.00	e.00	e.00	e.00
2	.00	e.00	e.00	e.00	e.00	e.00	121	e.30	e.00	e.00	e.00	e.00
3	.00	e.00	e.00	e.00	e.00	e.00	108	e.00	e.00	e.00	e.00	e.00
4	.00	e.00	e.00	e.00	e.00	e.00	86	e.00	e.00	e.00	e.00	e.00
5	.00	e.00	e.00	e.00	e.00	e.00	57	e.00	e.00	e.00	e.00	e.00
6	.00	e.00	e.00	e.00	e.00	e.00	43	e.00	e.00	e.00	e.00	e.00
7	.00	e.00	e.00	e.00	e.00	e.00	32	e.00	e.00	e.00	e.00	e.00
8	.00	e.00	e.00	e.00	e.00	e.00	28	e.00	e.00	e.00	e.00	e.00
9	.00	e.00	e.00	e.00	e.00	e.00	24	e.00	e.00	e.00	e.00	e.00
10	.00	e.00	e.00	e.00	e.00	e.00	18	e.00	e.00	e.00	e.00	e.00
11	.00	e.00	e.00	e.00	e.00	e.00	13	e.00	e.00	e.00	e.00	e.00
12	.00	e.00	e.00	e.00	e.00	e.00	9.3	e.00	e.00	e.00	e.00	e.00
13	.00	e.00	e.00	e.00	e.00	e.00	7.6	e.00	e.00	e.00	e.00	e.00
14	.00	e.00	e.00	e.00	e.00	e.00	6.2	e.00	e.00	e.00	e.00	e.00
15	.00	e.00	e.00	e.00	e.00	e.00	e5.0	e.00	e.00	e.00	e.00	e.00
16	.00	e.00	e.00	e.00	e.00	e.00	e5.0	e.00	e.00	e.00	e.00	e.00
17	.00	e.00	e.00	e.00	e.00	e.00	e4.0	e.00	e.00	e.00	e.00	e.00
18	.00	e.00	e.00	e.00	e.00	e.00	e3.0	e.00	e.00	e.00	e.00	e.00
19	.00	e.00	e.00	e.00	e.00	e.00	e2.0	e.00	e.00	e.00	e.00	e.00
20	.00	e.00	e.00	e.00	e.00	e.00	e2.0	e.00	e.00	e.00	e.00	e.00
21	.00	e.00	e.00	e.00	e.00	e.00	e2.5	e.00	e.00	e.00	e.00	e.00
22	.00	e.00	e.00	e.00	e.00	e.00	e3.0	e.00	e.00	e.00	e.00	e.00
23	.00	e.00	e.00	e.00	e.00	e.00	e3.0	e.00	e.00	e.00	e.00	e.00
24	.00	e.00	e.00	e.00	e.00	e.00	e3.0	e.00	e.00	e.00	e.00	e.00
25	.00	e.00	e.00	e.00	e.00	e.00	e2.5	e.00	e.00	e.00	e.00	e.00
26	.00	e.00	e.00	e.00	e.00	e5.0	e2.5	e.00	e.00	e.00	e.00	e.00
27	.00	e.00	e.00	e.00	e.00	e15	e3.0	e.00	e.00	e.00	e.00	e.00
28	e.00	e.00	e.00	e.00	e.00	e50	e2.5	e.00	e.00	e.00	e.00	e.00
29	e.00	e.00	e.00	e.00	---	e300	e1.5	e.00	e.00	e.00	e.00	e.00
30	e.00	e.00	e.00	e.00	---	245	e.70	e.00	e.00	e.00	e.00	e.00
31	e.00	---	e.00	e.00	---	148	---	e.00	---	e.00	e.00	---
TOTAL	0.00	0.00	0.00	0.00	0.00	763.00	721.30	1.00	0.00	0.00	0.00	0.00
MEAN	.000	.000	.000	.000	.000	24.6	24.0	.032	.000	.000	.000	.000
MAX	.00	.00	.00	.00	.00	300	123	.70	.00	.00	.00	.00
MIN	.00	.00	.00	.00	.00	.00	.70	.00	.00	.00	.00	.00
AC-FT	.00	.00	.00	.00	.00	1510	1430	2.0	.00	.00	.00	.00

CAL YR 1988 TOTAL 4.31 MEAN .012 MAX .10 MIN .00 AC-FT 8.5
WTR YR 1989 TOTAL 1485.30 MEAN 4.07 MAX 300 MIN .00 AC-FT 2950

e Estimated

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1982 to current year (discontinued).

REMARKS.--Some scheduled sampling was not possible as there were periods of no streamflow.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (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											
30...	1130	276	0	0	430	3.0	2.0	7.5	94	11	21
APR											
12...	1000	9.6	--	0	1000	10.0	6.0	8.1	230	58	50

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	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, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)
MAR											
30...	10	52	2	7.1	83	130	7.6	0.20	8.7	288	0.39
APR											
12...	25	120	4	5.3	170	320	15	0.30	9.0	647	0.88

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	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)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
MAR											
30...	214	0.200	3	80	<1	1	340	<5	61	0.2	1
APR											
12...	16.8	<0.100	--	160	--	--	39	--	--	--	--

WOLF CREEK BASIN

06176500 WOLF CREEK NEAR WOLF POINT, MT

LOCATION.--Lat 48°05'47", long 105°40'41", in NE1/4SE1/4NW1/4 sec.17, T.27 N., R.47 E., Roosevelt County, Hydrologic Unit 10060001, on right bank 0.5 mi north of U.S. Highway 2, 1.5 mi west of Wolf Point, and at mile 2.3.

DRAINAGE AREA.--251 mi^2.

PERIOD OF RECORD.--August 1908 to July 1914 (no winter records 1909, 1913-14), March 1950 to September 1953, water years 1954, 1956-1973 (annual maximums), October 1981 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 2,000 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to July 31, 1914, nonrecording gage at site 0.8 mi upstream at different datum. Aug. 1, 1914, to Sept. 30, 1953, water-stage recorder at same site and datum. May 1955 to September 1973, crest-stage gage at same site and datum.

REMARKS.--Estimated daily discharges: Dec. 9 to Apr. 2. Records poor. Minor diversion for irrigation upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--14 years (1910-12, 1951-53, 1982-89), 8.04 ft^3/s, 5,820 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,780 ft^3/s, Apr. 4 or 5, 1954, gage height, 12.9 ft, on basis of contracted-opening measurement of peak flow; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of 1938 reached a stage of about 12 ft, at previous site and datum, from information by local resident.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 12 ft^3/s, Apr. 27, gage height, 4.04 ft; maximum gage height, 5.75 ft, Mar. 28, backwater from ice; no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	e.00	e.00	e.00	e6.0	6.6	2.2	.00	.00	.00
2	.00	.00	.00	e.00	e.00	e.00	e4.0	5.8	1.9	.00	.00	.00
3	.00	.00	.00	e.00	e.00	e.00	5.5	5.3	1.9	.00	.00	.00
4	.00	.00	.00	e.00	e.00	e.00	4.5	5.0	1.4	.00	.00	.00
5	.00	.00	.00	e.00	e.00	e.00	3.8	4.4	1.1	.00	.00	.00
6	.00	.00	.00	e.00	e.00	e.00	4.0	4.2	.83	.00	.00	.00
7	.00	.00	.00	e.00	e.00	e.00	6.1	4.1	.48	.00	.00	.00
8	.00	.00	.00	e.00	e.00	e.00	6.3	3.9	.39	.00	.00	.00
9	.00	.00	e.00	e.00	e.00	e.00	6.1	3.5	.32	.00	.00	.00
10	.00	.00	e.00	e.00	e.00	e.00	5.9	3.2	.23	.00	.00	.00
11	.00	.00	e.00	e.00	e.00	e.00	6.0	2.9	3.5	.00	.00	.00
12	.00	.00	e.00	e.00	e.00	e.00	6.7	3.2	3.2	.00	.00	.00
13	.00	.00	e.00	e.00	e.00	e.00	6.7	4.7	1.6	.00	.00	.00
14	.00	.00	e.00	e.00	e.00	e.00	6.2	4.8	1.2	.00	.00	.00
15	.00	.00	e.00	e.00	e.00	e.00	6.5	4.9	.94	.00	.00	.00
16	.00	.00	e.00	e.00	e.00	e.00	7.3	5.8	.62	.00	.00	.00
17	.00	.00	e.00	e.00	e.00	e.00	7.0	5.8	.43	.00	.00	.00
18	.00	.00	e.00	e.00	e.00	e.00	6.8	5.2	.15	.00	.00	.00
19	.00	.00	e.00	e.00	e.00	e.00	6.6	4.6	.07	.00	.00	.00
20	.00	.00	e.00	e.00	e.00	e.00	6.3	4.1	.00	.00	.00	.00
21	.00	.00	e.00	e.00	e.00	e.00	6.1	3.7	.00	.00	.00	.00
22	.00	.00	e.00	e.00	e.00	e.00	5.7	3.3	.00	.00	.00	.00
23	.00	.00	e.00	e.00	e.00	e.00	5.6	2.9	.00	.00	.00	.00
24	.00	.00	e.00	e.00	e.00	e.00	7.0	2.8	.00	.00	.00	.00
25	.00	.00	e.00	e.00	e.00	e.00	7.6	2.7	.00	.00	.00	.00
26	.00	.00	e.00	e.00	e.00	e2.0	9.2	2.8	.00	.00	.00	.00
27	.00	.00	e.00	e.00	e.00	e11	12	2.5	.00	.00	.00	.00
28	.00	.00	e.00	e.00	e.00	e10	10	2.2	.00	.00	.00	.00
29	.00	.00	e.00	e.00	---	e9.0	8.8	2.2	.00	.00	.00	.00
30	.00	.00	e.00	e.00	---	e8.0	7.6	2.4	.00	.00	.00	.00
31	.00	---	e.00	e.00	---	e7.0	---	2.5	---	.00	.00	---
TOTAL	0.00	0.00	0.00	0.00	0.00	47.00	197.9	122.0	22.46	0.00	0.00	0.00
MEAN	.000	.000	.000	.000	.000	1.52	6.60	3.94	.75	.000	.000	.000
MAX	.00	.00	.00	.00	.00	11	12	6.6	3.5	.00	.00	.00
MIN	.00	.00	.00	.00	.00	.00	3.8	2.2	.00	.00	.00	.00
AC-FT	.00	.00	.00	.00	.00	93	393	242	45	.00	.00	.00

CAL YR 1988 TOTAL 266.48 MEAN .73 MAX 5.1 MIN .00 AC-FT 529
WTR YR 1989 TOTAL 389.36 MEAN 1.07 MAX 12 MIN .00 AC-FT 772

e Estimated

MISSOURI RIVER MAIN STEM

06177000 MISSOURI RIVER NEAR WOLF POINT, MT

LOCATION.--Lat 48°04'00", long 105°31'55", in SW1/4NW1/4 sec.28, T.27 N., R.48 E., McCone County, Hydrologic Unit 10060001, on right bank 500 ft downstream from bridge on State Highway 13, 5 mi southeast of Wolf Point, 7.8 mi downstream from Wolf Creek, and at mile 1,701.4.

DRAINAGE AREA.--82,290 mi^2.

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

REVISED RECORDS.--WSP 1146: 1931. WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,958.57 ft above National Geodetic Vertical Datum of 1929. Prior to Apr. 13, 1930, nonrecording gages at Wolf Point ferry landing 5.5 mi upstream at different datum.

REMARKS.--Estimated daily discharges: Dec. 24 to Mar. 27. Records good except those for estimated daily discharges, which are fair. Flow partly regulated by Fort Peck Lake and many other reservoirs upstream from station. Diversion for irrigation of about 1,010,400 acres upstream from station. U. S. Army Corps of Engineers satellite telemeter at station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--11 years (1928-39, prior to Fort Peck Lake reaching operational level), 7,219 ft^3/s, 5,230,000 acre-ft/yr; 46 years (1943-89, after operational level was reached), 10,480 ft^3/s, 7,593,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 66,800 ft^3/s, Mar. 25, 1939, gage height, 14.4 ft, ice present, from rating curve extended above 39,000 ft^3/s; maximum gage height, 15.64 ft, Mar. 27, 1960, backwater from ice; minimum daily discharge, 320 ft^3/s, Dec. 10, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 14, 1908, reached a stage of about 20 ft, present site and datum.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 13,900 ft^3/s, Apr. 2, gage height, 4.91 ft; maximum gage height, 9.10 ft, Jan. 5, backwater from ice; minimum discharge, 4,000 ft^3/s, Oct. 3, gage height, 0.84 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4310	5090	10200	e11100	e11400	e11400	13100	6410	8880	9140	8880	9340
2	4390	6330	11000	e11300	e12800	e11300	13400	6340	8790	9220	9150	8910
3	4260	6350	11300	e11300	e11700	e11600	13400	6150	8970	9240	9260	8830
4	4280	6160	11200	e11100	e11600	e11300	12700	5760	8990	9260	8900	8170
5	4350	5650	10600	e11800	e13100	e11300	11800	5530	8790	9360	8850	8660
6	4360	6220	10500	e12000	e12900	e11100	10600	5370	9170	9430	8740	8480
7	4390	6240	10900	e12000	e12200	e11400	9740	5330	9390	8950	8960	9020
8	4340	6260	11000	e11500	e12600	e11100	9090	5610	9270	9870	9080	8880
9	4240	6320	11200	e12300	e12800	e10800	8860	6760	9370	9270	8850	8740
10	4200	6370	10900	e11700	e12100	e10600	8350	8060	9380	9160	8640	8530
11	4170	7390	11000	e10900	e13400	e11000	7380	7870	9310	9110	8740	8490
12	4240	9240	10900	e10700	e12900	e10800	7320	6980	8890	8420	8830	8330
13	4290	9890	11400	e11000	e13500	e11300	6580	7300	8630	8990	8680	8640
14	4420	9580	11000	e11400	e12600	e10900	6620	7190	8960	8690	8370	8410
15	4420	9860	11100	e12000	e12600	e11200	6540	7070	9120	8380	8630	8960
16	4300	9070	11400	e12300	e12800	e12500	6710	7150	9060	8070	9080	8460
17	4210	9140	11200	e12200	e13100	e11800	6380	7200	9070	8590	8870	8280
18	4190	8760	11100	e11100	e13400	e12000	6560	7610	9000	8700	8770	7480
19	4270	8990	11000	e11100	e13000	e11600	6680	7430	8890	8730	9300	8190
20	4340	8940	11400	e11600	e12500	e11700	6570	7080	9140	8640	8830	8110
21	4280	8800	11000	e11200	e11800	e11600	6520	7810	8950	8750	8710	7540
22	4450	9630	10900	e11900	e12600	e11900	6750	8460	9290	8680	8560	7860
23	4430	10100	11000	e12500	e11200	e11700	6620	8200	8810	8860	9220	7310
24	4420	9830	e11000	e11700	e10700	e12600	6720	8040	9150	8610	9040	7530
25	4560	10100	e11600	e11800	e11400	e11400	6790	8710	9270	8690	8790	7510
26	4370	10200	e11400	e11800	e10800	e11600	6760	7890	9110	8660	8690	7760
27	4380	10500	e10800	e11900	e11500	e9700	6480	8350	8910	8850	8840	7740
28	4360	9910	e11300	e12000	e11200	10000	6580	8090	9790	8700	9160	7760
29	4340	10100	e11400	e12100	---	10400	6410	8080	9510	8870	8590	7480
30	4380	10500	e11200	e11400	---	11300	6200	8750	9450	8820	8120	---
31	4370	---	e11400	e11800	---	12500	---	8830	---	9070	8680	---
TOTAL	134310	251520	343300	360500	344200	351400	244210	225410	273310	275780	273810	---
MEAN	4333	8384	11070	11630	12290	11340	8140	7271	9110	8896	8833	---
MAX	4560	10500	11600	12500	13500	12600	13400	8830	9790	9870	9300	---
MIN	4170	5090	10200	10700	10700	9700	6200	5330	8630	8070	8120	---
AC-FT	266400	498900	680900	715100	682700	697000	484400	447100	542100	547000	543100	---

CAL YR 1988 TOTAL 2888910 MEAN 7893 MAX 12300 MIN 4170 AC-FT 5730000
WTR YR 1989 TOTAL 3324900 MEAN 9109 MAX 13500 MIN 4170 AC-FT 6595000

e Estimated

REDWATER RIVER BASIN

06177500 REDWATER RIVER AT CIRCLE, MT

LOCATION.--Lat 47°24'51", long 105°34'30", in SW1/4SW1/4 sec.11, T.19 N., R.48 E., McCone County, Hydrologic Unit 10060002, on left bank at Circle, 1 mi upstream from Horse Creek, and at mile 110.2.

DRAINAGE AREA.--547 mi^2.

PERIOD OF RECORD.--April to November 1929, March to November 1930, July 1931 to December 1932, March to June 1933, February to November 1934, April 1935 to December 1936, April 1937 to June 1972, October 1974 to current year. Monthly discharge only for some periods, published in WSP 1309. Prior to October 1967, published as Redwater Creek at Circle.

REVISED RECORDS.--WSP 1006: 1929-30, 1932-33, 1935-39. WSP 1509: 1929, 1934. WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Sharp-crested weir since Sept. 24, 1938. Datum of gage is 2,394.32 ft National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to June 1, 1941, and Mar. 23, 1943, to Feb. 16, 1948, nonrecording gage at site 0.3 mi upstream at same datum. June 1, 1941, to Mar. 22, 1943, nonrecording gage at site 200 ft upstream at datum 2.8 ft lower. Feb. 26, 1948, to May 7, 1950, nonrecording gage at site 200 ft upstream at present datum.

REMARKS.--Estimated daily discharges: Dec. 16 to Mar. 11 and Mar. 24-26. Records good except those for estimated daily discharges, which are poor. Diversions for irrigation of about 1,200 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--51 years (1931-32, 1935-36, 1937-71, 1975-89), 12.9 ft^3/s, 9,350 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,960 ft^3/s, June 29, 1986, gage height, 12.85 ft, from floodmarks, rating curve extended above 3,500 ft^3/s; no flow at time most years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 80 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 11	0330	ice jam	a*9.23	Aug. 31	1430	*326	8.15

a--backwater from ice.

Minimum daily discharge, 0.02 ft^3/s, on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.06	.10	.10	e.05	e.05	e.02	7.5	15	2.2	.86	1.4	72
2	.06	.10	.09	e.05	e.02	e.02	6.8	13	2.3	.61	.96	27
3	.06	.10	.08	e.05	e.02	e.02	7.2	11	2.1	.45	.77	15
4	.06	.10	.07	e.05	e.02	e.02	7.7	9.8	2.1	.35	.47	11
5	.06	.10	.09	e.05	e.02	e1.0	7.9	9.3	1.9	.28	.30	8.0
6	.08	.10	.10	e.05	e.02	e1.5	8.1	8.3	1.8	.23	.21	5.8
7	.07	.09	.10	e.05	e.02	e1.5	7.8	8.2	1.6	.19	.13	4.4
8	.08	.07	.06	e.05	e.02	e2.5	7.5	7.2	1.5	.18	.06	3.0
9	.08	.07	.06	e.05	e.02	e15	7.0	6.3	1.4	.15	.04	2.7
10	.10	.07	.09	e.02	e.02	e150	6.5	5.3	1.3	.17	.04	1.8
11	.10	.09	.10	e.02	e.02	e200	5.9	4.6	1.3	.17	.04	1.8
12	.11	.06	.10	e.02	e.02	187	5.3	5.2	1.2	.15	.03	1.5
13	.10	.06	.11	e.02	e.02	75	4.8	5.3	1.1	.12	.03	1.2
14	.11	.08	.12	e.02	e.02	28	4.4	4.9	1.0	.29	.03	1.1
15	.10	.10	.11	e.02	e.02	22	4.1	4.6	.98	.25	.03	.91
16	.09	.08	e.07	e.02	e.02	18	3.7	4.5	.98	.20	.03	.73
17	.10	.06	e.05	e.08	e.02	16	3.6	4.3	1.1	.28	.03	.65
18	.09	.06	e.07	e.08	e.02	13	3.4	3.6	1.0	.27	.03	.49
19	.08	.08	e.10	e.08	e.02	11	3.2	3.4	.93	.21	.04	.43
20	.08	.09	e.10	e.08	e.02	9.5	3.0	3.0	.77	.18	.03	.35
21	.06	.09	e.10	e.08	e.02	8.8	2.7	2.8	.71	.13	.03	.30
22	.06	.10	e.10	e.08	e.02	9.3	2.5	2.9	.73	.12	.03	.25
23	.06	.10	e.10	e.06	e.05	16	2.3	2.6	.71	.13	.04	.22
24	.06	.11	e.10	e.06	e.05	e22	7.0	2.2	.69	.13	.04	.22
25	.06	.10	e.10	e.06	e.02	e20	11	2.1	.78	.11	.20	.18
26	.06	.10	e.07	e.06	e.02	e18	14	2.0	.75	.10	.14	.16
27	.06	.08	e.07	e.06	e.02	16	15	1.9	.78	.09	.13	.13
28	.06	.06	e.05	e.06	e.02	14	22	1.7	.67	.16	.13	.11
29	.06	.09	e.05	e.06	---	12	21	2.1	.68	.12	.12	.10
30	.09	.06	e.05	e.06	---	9.6	20	2.3	.85	.09	.12	.06
31	.10	---	e.05	e.06	---	8.3	---	2.2	---	.86	121	---
TOTAL	2.40	2.55	2.61	1.61	0.65	905.08	232.9	161.6	35.91	7.63	126.68	161.59
MEAN	.077	.085	.084	.052	.023	29.2	7.76	5.21	1.20	.25	4.09	5.39
MAX	.11	.11	.12	.08	.05	200	22	15	2.3	.86	121	72
MIN	.06	.06	.05	.02	.02	.02	2.3	1.7	.67	.09	.03	.06
AC-FT	4.8	5.1	5.2	3.2	1.3	1800	462	321	71	15	251	321

CAL YR 1988 TOTAL 215.91 MEAN .59 MAX 4.6 MIN .00 AC-FT 428
WTR YR 1989 TOTAL 1641.21 MEAN 4.50 MAX 200 MIN .02 AC-FT 3260

e Estimated

POPLAR RIVER BASIN

06178000 POPLAR RIVER AT INTERNATIONAL BOUNDARY

(International gaging station)

LOCATION.--Lat 48°59'25", long 10°41'46", in NE1/4NE1/4SE1/4 sec.6, T.37 N., R.46 E., Daniels County, Hydrologic Unit 10060003, on left bank 0.7 mi south of international boundary, 1.5 mi upstream from Coal Creek, 18.5 mi northwest of Scobey, Mt, and at mile 135.7.

DRAINAGE AREA.--358 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1931 to current season (seasonal records only for most years). Published as Middle Fork Poplar River at international boundary, March 1931 to November 1975.

REVISED RECORDS.--WSP 1389: 1931, 1935-37(M), 1939-40, 1942(M), 1943, 1948(M), 1950(M). WSP 1729: Drainage area. W 1984: Drainage area.

GAGE.--Water-stage recorder and concrete control since September 1977. Elevation of gage is 2,460 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 1, June 24-30, Sept. 9-14, and Oct. 25-31. Water-discharge records good except those for March and those below 1.0 ft^3/s, which are poor. A few small diversions for irrigation upstream from station.

COOPERATION.--This is one of a number of stations which are maintained jointly by the United States and Canada.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,700 ft^3/s, Apr. 6, 1954, gage height, 10.25 ft, from flood-mark, from rating curve extended above 2,500 ft^3/s on basis of slope-area measurement of peak flow; no flow at times.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, about 250 ft^3/s, Mar. 26, gage height, 4.99 ft, backwater from ice; maximum gage height, 6.20 ft, Mar. 11, backwater from ice; no flow Aug. 13,14,19,20.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			.00	e40	8.6	8.8	3.8	.02	.06	.08		
2			.00	53	7.9	7.5	2.7	.02	.06	.08		
3			.00	48	7.2	6.9	2.0	.02	.06	.08		
4			.00	39	7.0	6.4	1.6	.02	.06	.10		
5			.00	31	6.4	5.5	1.4	.03	.06	.15		
6			.00	32	6.0	4.8	1.4	.03	.06	.23		
7			.00	29	5.5	4.2	1.3	.03	.06	.18		
8			.00	24	5.2	3.7	1.2	.02	.04	.13		
9			.00	19	4.7	3.1	.83	.02	e.04	.12		
10			e5.0	18	4.2	2.9	.59	.02	e.04	.12		
11			e60	16	3.9	3.4	.40	.02	e.04	.10		
12			e40	16	5.2	4.2	.20	.01	e.04	.09		
13			e30	15	9.9	4.4	.17	.00	e.04	.10		
14			e25	15	11	4.3	.16	.00	e.04	.11		
15			e20	15	9.3	3.7	.13	.01	.04	.10		
16			e15	13	9.7	3.5	.12	.01	.04	.11		
17			e12	11	9.8	3.0	.36	.01	.04	.10		
18			e10	10	9.1	2.3	.35	.01	.05	.11		
19			e8.5	9.4	9.5	1.7	.22	.00	.06	.10		
20			e7.5	9.1	9.4	1.2	.14	.00	.05	.11		
21			e7.0	8.8	8.1	1.2	.09	.08	.06	.11		
22			e7.5	8.9	6.9	1.1	.08	.04	.05	.11		
23			e8.5	9.1	6.4	1.0	.08	.04	.04	.24		
24			e9.0	10	6.4	e1.0	.07	.03	.04	.30		
25			e20	10	6.0	e3.0	.07	.06	.03	e.40		
26			e170	9.4	5.9	e6.0	.06	.08	.04	e.35		
27			e140	9.1	6.2	e5.0	.07	.06	.04	e.30		
28			e110	8.1	5.8	e9.0	.07	.06	.04	e.30		
29			e65	7.4	5.1	e8.0	.05	.06	.05	e.25		
30			e50	7.3	6.3	e5.5	.03	.06	.05	e.25		
31			e40	---	9.4	---	.03	.06	---	e.25		
TOTAL			860.00	550.6	222.0	126.3	19.77	0.93	1.42	5.16		
MEAN			27.7	18.4	7.16	4.21	.64	.030	.047	.17		
MAX			170	53	11	9.0	3.8	.08	.06	.40		
MIN			.00	7.3	3.9	1.0	.03	.00	.03	.08		
AC-FT			1710	1090	440	251	39	1.8	2.8	10		

e Estimated

POPLAR RIVER BASIN

06178000 POPLAR RIVER AT INTERNATIONAL BOUNDARY--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1964, 1976 to current year.

REMARKS.--Some scheduled sampling was not possible as there were periods of no streamflow.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	PH (STAND-ARD UNITS) (00400)
OCT											
13...	0845	0.04	0	0	1990	8.0	7.0	699	9.2	83	8.5
NOV											
16...	0930	0.05	20	1	2000	-12.0	0.0	699	11.8	89	8.1
MAR											
23...	1130	8.4	100	2	779	2.0	0.0	700	7.6	57	7.7
APR											
05...	0945	31	100	2	685	1.0	1.0	703	12.0	92	8.1
MAY											
09...	1230	4.4	--	0	1400	22.0	17.0	705	9.5	107	8.7
JUN											
15...	1430	3.6	100	2	1190	22.5	21.0	699	7.6	94	8.9
JUL											
18...	0915	0.32	0	0	1700	17.0	21.0	705	8.6	105	8.7
AUG											
09...	1130	0.02	40	1	1850	25.0	20.0	699	8.9	108	8.9
SEP											
15...	0915	0.05	0	0	1890	12.0	12.0	696	10.4	106	8.9

DATE	COLOR (PLAT-INUM-COBALT UNITS) (00080)	TUR-BID-ITY (NTU) (00076)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	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)
OCT										
13...	23	3.0	300	30	55	400	10	9.2	640	480
NOV										
16...	27	2.4	430	64	66	360	8	9.9	763	430
MAR										
23...	140	8.8	190	35	25	110	3	12	284	150
APR										
05...	60	4.4	180	31	26	88	3	8.1	248	130
MAY										
09...	--	--	340	49	54	220	5	8.1	531	280
JUN										
15...	45	3.2	270	26	49	170	5	7.1	457	190
JUL										
18...	110	2.9	240	25	42	300	9	11	579	340
AUG										
09...	110	4.3	240	22	44	330	9	12	658	350
SEP										
15...	40	3.5	300	32	53	340	9	10	595	410

POPLAR RIVER BASIN

06178000 POPLAR RIVER AT INTERNATIONAL BOUNDARY--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NITRATE TOTAL (MG/L AS N) (00620)	NITROGEN, NITRITE TOTAL (MG/L AS N) (00615)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)
OCT										
13...	13	0.60	2.7	1380	1.87	0.15	--	<0.010	<0.100	0.010
NOV										
16...	12	0.50	13	1410	1.92	0.19	--	<0.010	<0.100	0.020
MAR										
23...	6.8	0.30	12	522	0.71	11.8	0.160	0.040	0.200	0.090
APR										
05...	3.9	0.20	12	449	0.61	37.6	--	<0.010	<0.100	0.020
MAY										
09...	6.4	0.40	7.1	945	1.28	11.2	--	<0.010	<0.100	0.020
JUN										
15...	5.8	0.40	0.68	724	0.98	7.04	--	<0.010	<0.100	0.010
JUL										
18...	9.6	0.40	5.9	1080	1.47	0.94	--	<0.010	<0.100	0.020
AUG										
09...	12	0.60	3.6	1170	1.59	0.06	--	<0.010	<0.100	0.030
SEP										
15...	12	0.50	0.73	1220	1.66	0.16	--	<0.010	<0.100	0.020

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT										
13...	0.69	0.70	0.020	<0.010	--	2100	20	32	<0.01	83
NOV										
16...	0.48	0.50	0.020	0.020	--	2000	30	63	0.01	78
MAR										
23...	1.3	1.4	0.140	0.070	--	550	300	10	0.23	14
APR										
05...	0.88	0.90	0.100	0.040	12	490	170	17	1.4	90
MAY										
09...	0.48	0.50	0.210	<0.010	--	1100	31	58	0.69	91
JUN										
15...	0.79	0.80	0.020	<0.010	--	1100	27	15	0.15	73
JUL										
18...	1.6	1.6	0.070	0.030	--	1900	79	11	0.01	70
AUG										
09...	1.1	1.1	0.080	0.040	--	2200	40	15	<0.01	79
SEP										
15...	0.88	0.90	0.030	<0.010	12	2000	15	27	<0.01	66

POPLAR RIVER BASIN

06178000 POPLAR RIVER AT INTERNATIONAL BOUNDARY--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE) (01012)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)
APR									
05...	0945	40	10	10	<10	<0.5	1	<1	2
SEP									
15...	0915	<10	--	3	--	<0.5	--	<1	--

DATE	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)
APR								
05...	1	5	2	370	<5	<5	30	25
SEP								
15...	<1	--	3	--	--	<1	--	4

DATE	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	MERCURY DISSOLVED (UG/L AS HG) (71890)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, TOTAL (UG/L AS SE) (01147)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
APR								
05...	<0.10	<0.1	8	2	<1	<1	<10	9
SEP								
15...	--	<0.1	--	1	--	<1	--	19

POPLAR RIVER BASIN

06178500 EAST POPLAR RIVER AT INTERNATIONAL BOUNDARY

(International gaging station)

LOCATION.--Lat 48°59'58", long 105°24'32", in SW1/4SW1/4 sec.3, T.1, R.26 W., second meridian, in Saskatchewan, Hydrologic Unit 10060003, on left bank 10 ft north of international boundary, 400 ft southwest of Canadian East Poplar Port of Entry, 14 mi north of Scobey, MT, and at mile 21.9.

DRAINAGE AREA.--541 mi^2

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1931 to current year (seasonal records only in most seasons prior to October 1974). Prior to March 1962, published as East Fork Poplar River at international boundary.

REVISED RECORDS.--WSP 1389: 1932, 1939, 1942-43, 1947. W 1983: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 2,410.92 ft National Geodetic Vertical Datum of 1929 (International Boundary Survey datum). Prior to Oct. 5, 1953, water-stage recorder at site 80 ft upstream at same datum.

REMARKS.--Estimated daily discharges: Oct. 4-6, Jan. 9-12, Feb. 1 to Mar. 29, June 1,3,6,15,16, 24-30, July 11-15, Aug. 22,23, and Sept. 12-15,19,21, 24-28. Water-discharge records good. Since September 1975 flow regulated by Morrison Dam at Cookson Reservoir 3.1 mile upstream. Several diversions for irrigation upstream from station.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,020 ft^3/s, Apr. 23, 1975, gage height, 12.01 ft; maximum gage height, 12.8 ft, Mar. 25, 1943, from floodmark, backwater from ice; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, about 40 ft^3/s, Mar. 10, gage height, 6.27 ft; minimum daily, 1.5 ft^3/s, Mar. 2-5.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.3	2.6	2.4	2.2	e2.2	e1.6	3.2	5.9	e3.0	2.4	1.9	2.2
2	2.2	2.6	2.5	2.1	e2.0	e1.5	3.0	6.9	2.9	2.4	2.0	2.1
3	2.2	2.5	2.5	2.2	e1.7	e1.5	3.1	6.2	e2.8	2.3	2.0	2.3
4	e2.0	2.5	2.5	2.2	e1.6	e1.5	3.0	5.8	2.8	2.2	2.0	2.2
5	e2.1	2.5	2.5	2.4	e1.6	e1.5	2.9	4.5	2.6	2.2	1.9	2.2
6	e2.3	2.4	2.5	2.4	e1.7	e1.7	3.0	5.2	e2.4	2.1	1.9	2.1
7	2.4	2.4	2.5	2.3	e1.7	e2.0	3.1	6.0	2.3	2.1	1.9	2.1
8	2.4	2.3	2.4	2.1	e1.7	e2.3	3.0	5.8	2.4	2.1	1.9	2.1
9	2.4	2.5	2.4	e2.0	e1.9	e3.0	2.9	5.8	2.4	2.1	1.9	2.1
10	2.2	2.5	2.4	e1.9	e2.1	e20	2.8	5.4	2.3	2.0	1.9	2.1
11	2.2	2.5	2.4	e2.0	e2.3	e10	2.7	6.8	2.5	e2.0	1.8	2.2
12	2.2	2.5	2.5	e2.2	e2.5	e5.0	2.7	7.3	2.5	e2.0	1.8	e2.2
13	2.3	2.5	2.5	2.4	e2.6	e3.5	2.8	9.4	2.5	e2.1	1.7	e2.2
14	2.7	2.5	2.5	2.5	e2.7	e2.5	2.7	6.1	2.4	e2.2	1.8	e2.2
15	2.6	2.5	2.4	2.5	e2.6	e2.0	2.7	5.5	e2.3	e2.2	1.9	e2.1
16	2.5	2.5	2.4	2.5	e2.5	e1.8	2.6	6.3	e2.5	2.2	1.9	2.1
17	2.6	2.5	2.4	2.5	e2.3	e1.6	2.5	6.0	2.6	2.3	1.9	2.1
18	2.5	2.4	2.4	2.5	e2.1	e1.6	2.5	5.8	2.6	2.2	1.9	2.1
19	2.4	2.4	2.4	2.5	e1.9	e1.6	2.5	6.5	2.4	2.2	1.9	e2.1
20	2.4	2.5	2.4	2.5	e1.8	e1.6	2.5	6.2	2.4	2.1	1.9	2.2
21	2.2	2.5	2.4	2.5	e1.8	e1.8	2.5	6.0	2.4	1.9	2.1	e2.2
22	2.4	2.5	2.4	2.5	e1.9	e2.0	2.4	6.0	2.3	1.9	e2.1	2.2
23	2.0	2.5	2.4	2.5	e2.1	e2.2	2.3	6.0	2.5	1.9	e2.1	2.3
24	2.3	2.5	2.3	2.5	e2.3	e2.5	2.7	6.7	e2.5	1.9	2.1	e2.2
25	2.4	2.5	2.2	2.1	e2.3	e3.5	3.4	6.4	e2.5	2.0	2.0	e2.2
26	2.5	2.5	2.2	2.4	e2.2	e4.5	3.0	6.2	e2.4	1.9	2.1	e2.2
27	2.4	2.4	2.2	2.5	e2.0	e4.0	3.0	6.7	e2.4	1.9	2.0	e2.2
28	2.2	2.3	2.1	2.6	e1.8	e3.8	2.9	6.2	e2.4	2.0	2.1	e2.3
29	2.3	2.4	2.1	2.6	---	e3.5	2.9	6.2	e2.4	2.0	2.1	2.3
30	2.4	2.4	2.1	2.6	---	3.3	2.8	6.6	e2.4	1.9	2.1	2.2
31	2.5	---	2.2	2.7	---	3.2	---	4.6	---	1.9	2.2	---
TOTAL	72.5	74.1	73.5	73.4	57.9	102.1	84.1	191.0	74.8	64.6	60.8	65.3
MEAN	2.34	2.47	2.37	2.37	2.07	3.29	2.80	6.16	2.49	2.08	1.96	2.18
MAX	2.7	2.6	2.5	2.7	2.7	20	3.4	9.4	3.0	2.4	2.2	2.3
MIN	2.0	2.3	2.1	1.9	1.6	1.5	2.3	4.5	2.3	1.9	1.7	2.1
AC-FT	144	147	146	146	115	203	167	379	148	128	121	130

CAL YR 1988 TOTAL 1047.9 MEAN 2.86 MAX 7.6 MIN 1.7 AC-FT 2080
WTR YR 1989 TOTAL 994.1 MEAN 2.72 MAX 20 MIN 1.5 AC-FT 1970

e Estimated

POPLAR RIVER BASIN

06178500 EAST POPLAR RIVER AT INTERNATIONAL BOUNDARY--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1964-65, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1982 to current year.
WATER TEMPERATURE: June 1975 to September 1983.

REMARKS.--Unpublished records of once-daily water temperature are available in files of District office.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily observed, 1,810 microsiemens, Nov. 12, 1986; minimum daily observed, 654 microsiemens, Apr. 16, 1982.
WATER TEMPERATURE (water years 1975-83): Maxumum, 29.5°C, July 6, 1975, July 25, 26, 1978; minimum, 0.0°C on many days during winters most years.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily observed, 1,670 microsiemens, Dec. 27; minimum daily observed, 920 microsiemens, Mar. 28.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (STAND-ARD UNITS) (00400)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	COLOR (PLAT-INUM-COBALT UNITS) (00080)	TUR-BID-ITY (NTU) (00076)
OCT											
13...	1100	2.6	0	0	1420	8.10	15.0	8.5	700	15	4.6
NOV											
15...	1230	2.3	80	1	1580	7.80	-6.0	0.5	705	4	5.7
DEC											
13...	1330	2.6	100	72	1450	7.50	0.0	0.0	686	5	2.6
JAN											
17...	1215	2.6	60	1	1410	--	2.0	0.0	691	5	1.6
FEB											
16...	0945	2.8	100	2	1470	7.60	-23.0	0.0	723	5	1.6
MAR											
22...	0945	2.9	100	2	1390	7.70	1.0	0.0	696	10	2.6
APR											
13...	1100	2.9	0	0	1320	8.30	7.0	7.0	704	25	2.6
MAY											
10...	0900	5.0	70	1	1580	8.40	15.0	14.0	702	25	13
JUN											
15...	1600	2.3	100	2	1460	8.50	26.0	20.0	698	20	7.7
JUL											
17...	1500	2.4	100	2	1440	8.40	21.0	22.0	699	25	7.1
AUG											
09...	1430	1.8	80	1	1490	8.30	29.0	23.0	700	35	7.7
SEP											
19...	1115	2.2	20	1	1400	8.30	16.0	12.5	700	15	3.0
19...	1145	2.2	20	1	1400	8.30	16.0	12.5	700	7	2.6
19...	1215	2.2	20	1	1400	8.30	16.0	12.5	700	15	3.3

POPLAR RIVER BASIN

06178500 EAST POPLAR RIVER AT INTERNATIONAL BOUNDARY--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
OCT										
13...	11.3	106	390	69	52	210	5	7.6	511	280
NOV										
15...	14.6	110	400	78	49	200	4	7.8	591	280
DEC										
13...	8.2	63	390	78	48	200	4	6.7	571	290
JAN										
17...	9.0	68	380	76	46	190	4	7.6	559	270
FEB										
16...	--	--	380	75	46	200	4	7.3	564	270
MAR										
22...	9.2	69	370	74	44	190	4	7.6	556	270
APR										
13...	11.7	105	330	62	43	180	4	6.6	476	270
MAY										
10...	6.9	73	360	51	57	230	5	18	565	310
JUN										
15...	9.2	111	330	48	51	210	5	4.0	501	290
JUL										
17...	8.3	104	340	55	48	200	5	--	529	280
AUG										
09...	9.7	124	320	50	47	200	5	8.3	507	290
SEP										
19...	7.4	76	340	58	48	210	5	7.1	484	270
19...	7.4	76	340	58	47	200	5	6.9	435	270
19...	7.4	76	350	59	48	210	5	7.2	499	270

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NITRATE TOTAL (MG/L AS N) (00620)	NITROGEN, NITRITE TOTAL (MG/L AS N) (00615)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)
OCT										
13...	5.6	0.30	11	944	1.28	6.63	--	<0.010	<0.100	0.100
NOV										
15...	5.4	0.30	12	989	1.34	6.14	0.090	0.010	0.100	0.530
DEC										
13...	5.4	0.30	14	987	1.34	6.93	--	<0.010	0.100	0.790
JAN										
17...	5.0	0.20	16	948	1.29	6.65	--	0.010	<0.100	0.960
FEB										
16...	5.4	0.30	16	960	1.31	7.26	--	<0.010	0.100	1.10
MAR										
22...	5.0	0.30	14	940	1.28	7.36	--	<0.010	0.100	0.840
APR										
13...	5.1	0.30	8.4	863	1.17	6.75	--	<0.010	<0.100	0.110
MAY										
10...	6.7	0.40	5.5	1020	1.39	13.8	--	0.010	<0.100	0.080
JUN										
15...	5.9	0.30	5.9	914	1.24	5.68	--	<0.010	<0.100	0.020
JUL										
17...	4.4	0.30	13	959	1.30	6.21	--	<0.010	<0.100	0.020
AUG										
09...	5.6	0.30	11	918	1.25	4.46	--	<0.010	<0.100	<0.010
SEP										
19...	5.6	0.30	8.8	900	1.22	5.35	--	<0.010	<0.100	<0.010
19...	5.6	0.30	9.0	860	1.17	5.11	--	<0.010	<0.100	<0.010
19...	5.7	0.30	8.9	910	1.24	5.41	--	<0.010	<0.100	0.010

POPLAR RIVER BASIN

06178500 EAST POPLAR RIVER AT INTERNATIONAL BOUNDARY--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT										
13...	0.50	0.60	0.050	<0.010	--	2000	11	69	0.48	90
NOV										
15...	0.27	0.80	0.020	<0.010	--	1900	17	165	1.0	--
DEC										
13...	0.51	1.3	0.010	<0.010	--	1900	13	122	0.86	57
JAN										
17...	0.0	0.80	0.010	<0.010	--	1700	30	165	1.2	51
FEB										
16...	0.20	1.3	0.010	<0.010	--	1700	32	100	0.76	53
MAR										
22...	0.26	1.1	0.020	0.030	--	1800	53	52	0.41	67
APR										
13...	0.59	0.70	0.020	<0.010	--	1700	20	38	0.30	89
MAY										
10...	0.92	1.0	0.080	<0.010	13	1900	12	77	1.0	76
JUN										
15...	0.38	0.40	0.020	0.010	--	2000	16	79	0.49	95
JUL										
17...	0.88	0.90	0.050	<0.010	--	2000	11	71	0.46	79
AUG										
09...	--	0.70	0.060	0.010	--	2000	12	63	0.31	48
SEP										
19...	--	0.50	0.020	<0.010	5.5	2000	7	42	0.25	76
19...	--	0.30	0.020	<0.010	6.5	2000	<3	--	--	--
19...	0.39	0.40	<0.010	0.010	4.8	2000	20	--	--	--

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE) (01012)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)
MAY									
10...	0900	<10	5	4	<10	<0.5	<1	<1	<1
SEP									
19...	1115	30	--	2	--	--	--	--	<1
19...	1145	10	--	2	--	--	--	--	<1
19...	1215	40	--	2	--	--	--	--	<1

DATE	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)
MAY								
10...	<1	3	1	1100	1	1	140	59
SEP								
19...	--	2	--	--	1	--	--	13
19...	--	2	--	--	1	--	--	14
19...	--	1	--	--	<1	--	--	14

DATE	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	MERCURY DISSOLVED (UG/L AS HG) (71890)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, TOTAL (UG/L AS SE) (01147)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
MAY								
10...	<0.10	<0.1	3	2	<1	<1	<10	4
SEP								
19...	--	--	1	--	--	--	--	--
19...	--	--	<1	--	--	--	--	--
19...	--	--	1	--	--	--	<10	--

06178500 EAST POPLAR RIVER AT INTERNATIONAL BOUNDARY--Continued

COMPOSITE OF MONTHLY SAMPLES, WATER YEAR OCTOBER 1987 TO SEPTEMBER 1988

COMPOSITE PERIOD	URANIUM NATURAL DIS-SOLVED (UG/L AS U) (22703)
OCT. 1, 1987 TO SEP. 30, 1988	1.9

SPECIFIC CONDUCTANCE, MICROSIEMENS PER CENTIMETER AT 25, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1350	1470	1550	1460	1380	1260	1180	1450	1500	1350	1350	1330
2	1330	1420	1480	1480	1430	1400	1150	1460	1520	1380	1340	1360
3	1370	1370	1450	1490	1450	1430	1120	1520	1540	1380	1340	1340
4	1370	1320	1460	1480	1470	1430	1120	1530	1550	1390	1350	1340
5	1370	1300	1450	1470	1490	1400	1140	1540	1550	1420	1330	1330
6	1370	1390	1450	1320	1460	1400	1200	1560	1470	1430	1330	1340
7	1370	1390	1460	1410	1420	1400	1220	1560	1480	1420	1330	1340
8	1360	1390	1450	1410	1410	---	1220	1560	1400	1450	1330	1340
9	1360	1390	1520	1420	1420	---	1220	1540	1430	1460	1340	1340
10	1370	1430	1550	1430	1440	---	1220	1530	1410	1450	1310	1350
11	1380	1440	1610	1430	1420	---	1350	1520	1440	1450	1310	1340
12	1380	1450	1550	1410	1430	---	1360	1540	1460	1440	1340	1340
13	1370	1460	1420	1410	1400	---	1270	1550	1440	1440	1340	1340
14	1400	1440	1420	1400	1420	---	1240	1630	1420	1440	1360	1350
15	1380	1430	1460	1420	1410	---	1320	1650	1400	1450	1350	1350
16	1370	1450	1440	1400	1420	1420	1410	1600	1400	1420	1350	1340
17	1380	1450	1550	1410	1440	1450	1380	1600	1410	1430	1340	1340
18	1380	1490	1560	1400	1470	1480	1340	1570	1410	1400	1350	1370
19	1410	1520	1570	1370	1400	1450	1380	1570	1410	1390	1320	1370
20	1450	1500	1480	1410	1480	1420	1390	1540	1430	1400	1360	1370
21	1420	1520	1490	1410	1470	1430	1420	1530	1410	1400	1330	1370
22	1410	1540	1490	1410	1420	1410	1400	1540	1420	1400	1330	1370
23	1410	1530	1520	1390	1450	1370	1390	1510	1420	1400	1340	1370
24	1420	1530	1540	1410	1450	1330	1430	1520	1400	1390	1350	1370
25	1410	1520	1590	1400	1400	1280	1440	1500	1390	1400	1360	1360
26	1390	1520	1630	1440	1400	1280	1510	1490	1390	1420	1350	1370
27	1390	1590	1670	1440	1380	1280	1500	1490	1390	1420	1350	1380
28	1430	1610	1660	1430	1380	920	1530	1490	1340	1410	1360	1390
29	1450	1640	1630	1440	---	1000	1570	1510	1360	1410	1360	1380
30	1480	1640	1620	1410	---	1040	1560	1510	1350	1410	1350	1420
31	1490	---	1570	1390	---	1150	---	1510	---	1380	1350	---
MEAN	1390	1470	1530	1420	1430	1320	1330	1540	1430	1410	1340	1360

POPLAR RIVER BASIN

06179000 EAST FORK POPLAR RIVER NEAR SCOBEY, MT

LOCATION.--Lat 48°51'08", long 105°25'15", in NE1/4NW1/4 sec.27, T.36 N., R.48 E., Daniels County, Hydrologic Unit 10060003, at bridge on State Highway 13, 2.5 mi upstream from mouth, and 4 mi north of Scobey.

DRAINAGE AREA.--722 mi^2.

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: October 1975 to September 1979.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE (water years 1976-79): Maximum, 27.5°C July 15, 1978, July 19, 1979; minimum, 0.0°C on many days during winter.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)
OCT										
13...	1245	3.0	0	0	1960	20.0	8.5	701	11.6	109
NOV										
15...	1530	2.5	100	2	1650	-6.0	0.0	702	11.4	85
DEC										
14...	0800	3.0	100	2	1970	-5.0	0.0	701	9.6	72
JAN										
17...	1400	3.0	75	1	2360	2.0	0.0	694	9.8	74
FEB										
16...	1100	0.20	100	2	2000	-23.0	0.0	724	--	--
MAR										
22...	1130	3.0	100	2	684	1.0	0.0	697	8.0	60
APR										
13...	1415	3.0	0	0	748	8.5	7.0	705	11.4	102
MAY										
09...	1530	5.5	0	0	1390	24.0	17.5	706	9.5	108
JUN										
16...	0800	2.5	100	2	1620	18.0	20.0	697	8.6	104
JUL										
17...	1230	2.5	100	2	1650	21.0	20.0	700	8.8	106
AUG										
10...	0800	2.0	40	1	1780	19.0	22.0	703	8.8	110
SEP										
14...	1445	1.0	0	0	1800	22.0	14.0	701	10.2	108

DATE	PH (STANDARD UNITS) (00400)	COLOR (PLATINUM-COBALT UNITS) (00080)	TURBIDITY (NTU) (00076)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)
OCT										
13...	9.0	53	3.5	360	25	72	380	9	12	722
NOV										
15...	8.7	22	2.5	350	35	63	270	6	10	608
DEC										
14...	8.3	21	7.0	450	60	72	300	6	10	744
JAN										
17...	7.7	15	2.5	560	97	76	350	6	11	899
FEB										
16...	7.7	30	17	500	90	68	280	5	10	752
MAR										
22...	7.7	110	8.3	190	40	22	86	3	12	247
APR										
13...	8.3	55	1.7	180	32	24	98	3	6.8	249
MAY										
09...	8.7	40	1.9	280	41	43	230	6	8.3	477
JUN										
16...	9.2	40	18	310	23	61	260	6	11	537
JUL										
17...	9.4	55	6.7	280	18	57	280	7	12	580
AUG										
10...	9.2	55	17	280	17	58	310	8	12	610
SEP										
14...	9.3	60	18	310	22	61	340	8	12	617

06179000 EAST FORK POPLAR RIVER NEAR SCOBEY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

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, 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 TOTAL (MG/L AS N) (00615)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
OCT										
13...	440	11	0.40	1.5	1380	1.87	11.2	<0.010	<0.100	0.020
NOV										
15...	360	9.1	0.30	3.1	1120	1.52	7.54	<0.010	<0.100	<0.010
DEC										
14...	420	9.5	0.40	6.8	1330	1.81	10.8	<0.010	<0.100	0.010
JAN										
17...	460	10	0.30	18	1560	2.13	12.7	0.010	<0.100	0.120
FEB										
16...	380	8.6	0.40	19	1310	1.78	0.71	<0.010	<0.100	0.600
MAR										
22...	140	4.7	0.20	9.5	463	0.63	3.75	0.070	<0.100	0.140
APR										
13...	150	4.3	0.20	6.5	472	0.64	3.82	0.010	<0.100	0.010
MAY										
09...	310	7.0	0.30	1.9	929	1.26	13.8	<0.010	<0.100	0.020
JUN										
16...	350	6.8	0.30	0.97	1040	1.41	7.00	<0.010	<0.100	0.010
JUL										
17...	360	6.6	0.30	5.0	1090	1.48	7.35	<0.010	<0.100	0.110
AUG										
10...	390	8.7	0.40	4.8	1170	1.59	6.31	<0.010	<0.100	0.020
SEP										
14...	400	9.5	0.40	1.4	1220	1.66	3.29	<0.010	<0.100	0.020

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	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										
13...	1.1	1.1	0.040	<0.010	--	3100	30	82	0.66	81
NOV										
15...	--	0.60	0.020	<0.010	--	2200	45	75	0.51	72
DEC										
14...	0.69	0.70	0.020	<0.010	--	2400	22	94	0.76	59
JAN										
17...	0.58	0.70	0.010	0.010	--	2600	40	171	1.4	59
FEB										
16...	0.30	0.90	0.030	0.010	--	2200	26	190	0.10	78
MAR										
22...	1.4	1.5	0.080	0.040	--	580	260	8	0.06	96
APR										
13...	0.59	0.60	0.030	0.010	--	630	120	6	0.05	100
MAY										
09...	0.68	0.70	0.050	<0.010	11	1400	50	54	0.80	46
JUN										
16...	0.89	0.90	0.030	<0.010	--	2000	27	30	0.20	85
JUL										
17...	2.2	2.3	0.080	0.040	--	2200	44	30	0.20	54
AUG										
10...	1.1	1.1	0.090	0.020	--	2500	39	22	0.12	71
SEP										
14...	1.3	1.3	0.050	0.020	18	2700	44	29	0.08	88

DATE	TIME	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	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)	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)
MAY									
09...	1530	20	5	4	<10	<0.5	<1	1	<1
SEP									
14...	1445	10	--	8	--	<0.5	--	<1	--

POPLAR RIVER BASIN

06179000 EAST FORK POPLAR RIVER NEAR SCOBEY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)
MAY 09...	<1	4	1	270	1	1	70	5
SEP 14...	<1	--	8	--	--	<1	--	4

DATE	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	MERCURY DISSOLVED (UG/L AS HG) (71890)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, TOTAL (UG/L AS SE) (01147)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
MAY 09...	<0.10	<0.1	2	2	<1	<1	<10	5
SEP 14...	--	0.5	--	2	--	<1	--	16

06179200 POPLAR RIVER ABOVE WEST FORK, NEAR BREDETTE, MT

LOCATION.--Lat 48°33'05", long 105°21'55", in NW1/4SW1/4SW1/4 sec.4, T.32 N., R.49 E., Roosevelt County, Hydrologic Unit 10060004, on county road bridge, 3.8 mi upstream from mouth, and 4.4 mi northwest of Bredette.

DRAINAGE AREA.--1,745 mi².

PERIOD OF RECORD.--Water years 1976-81, 1985 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
OCT 14...	0750	1.1	--	0	1530	4.5	8.0
NOV 15...	0915	3.7	0	0	1960	-8.0	0.0
DEC 06...	1255	4.4	--	2	2010	-2.0	0.0
JAN 18...	0755	5.0	--	1	2100	-2.0	0.0
APR 14...	0900	57	--	0	960	3.0	5.0
MAY 09...	0950	22	--	0	1520	15.0	13.0
JUL 17...	1130	2.8	100	60	1730	16.0	19.0
SEP 14...	1045	3.5	0	0	1780	20.0	13.0

DATE	TIME	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
NOV 15...	0915	8.5	300	31	55	330	8	8.7	637
APR 14...	0900	8.2	210	33	31	150	5	7.4	325
JUL 17...	1130	9.0	220	17	44	320	9	9.9	591
SEP 14...	1045	8.6	250	20	48	320	9	9.5	560

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, 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)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)
NOV 15...	430	18	0.50	4.1	1260	1.71	12.6	<0.100	--
APR 14...	190	8.9	0.30	7.5	624	0.85	96.0	<0.100	3
JUL 17...	350	17	0.50	3.3	1120	1.52	8.45	<0.100	--
SEP 14...	390	18	0.50	0.92	1140	1.56	10.8	<0.100	--

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)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
NOV 15...	1600	--	--	16	--	--	--	--
APR 14...	750	<1	2	76	<5	13	<0.1	<1
JUL 17...	1800	--	--	32	--	--	--	--
SEP 14...	1800	--	--	22	--	--	--	--

06180400 WEST FORK POPLAR RIVER NEAR BREDETTE, MT

LOCATION.--Lat 48°33'01", long 105°25'42", in SW1/4SW1/4 sec.1, T.32 N., R.48 E., Roosevelt County, Hydrologic Unit 10060004, at bridge on State Highway 13, 5.9 mi upstream from mouth, and 6.6 mi northwest of Bredette.

DRAINAGE AREA.--1,010 mi².

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
OCT							
14...	0830	3.4	--	0	1220	5.0	8.0
NOV							
15...	1000	2.5	0	0	1510	-7.0	0.0
DEC							
06...	1200	3.6	--	2	1490	-2.0	0.0
APR							
14...	0800	34	0	0	950	2.5	5.0
MAY							
09...	1020	15	--	0	1390	13.5	13.0
JUL							
17...	1045	2.2	100	62	1310	15.0	19.0
SEP							
14...	1130	3.1	0	0	--	20.0	13.5

DATE	TIME	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
NOV									
15...	1000	8.4	110	20	15	300	12	3.6	609
APR									
14...	0800	8.4	120	22	15	190	8	4.3	398
JUL									
17...	1045	9.0	79	10	13	280	14	4.5	548
SEP									
14...	1130	8.9	88	12	14	300	14	3.7	563

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, 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)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)
NOV									
15...	190	8.6	0.50	9.5	913	1.24	6.16	<0.100	--
APR									
14...	120	5.8	0.30	7.4	604	0.82	55.4	<0.100	4
JUL									
17...	170	6.7	0.40	7.5	822	1.12	4.88	<0.100	--
SEP									
14...	190	8.1	0.50	4.0	871	1.18	7.29	<0.100	--

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)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
NOV								
15...	650	--	--	25	--	--	--	--
APR								
14...	390	<1	1	150	<5	6	<0.1	<1
JUL								
17...	740	--	--	110	--	--	--	--
SEP								
14...	730	--	--	34	--	--	--	--

POPLAR RIVER BASIN

06181000 POPLAR RIVER NEAR POPLAR, MT

(National stream-quality accounting network station)

LOCATION.--Lat 48°10'15", long 105°10'42", in NE1/4NE1/4 sec.19, T.28 N., R.51 E., Roosevelt County, Hydrologic Unit 10060003, on right bank 4 mi north of Poplar, and at mile 11.

DRAINAGE AREA.---3,174 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1908 to October 1924, August 1947 to September 1969, June 1975 to September 1979, October 1981 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1176. 1948. WSP 1389: 1911. WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,953.16 ft above National Geodetic Vertical Datum of 1929. Prior to May 1, 1911, nonrecording gage at site 4.2 mi upstream at different datum. May 1, 1911, to Oct. 4, 1913, nonrecording gage at site 14 mi upstream at different datum. Oct. 5, 1913, to Oct. 31, 1924, nonrecording gage at site 2.2 mi upstream at different datum. Aug. 10, 1947, to Sept. 30, 1969, water-stage recorder at present site and datum.

REMARKS.--Estimated daily discharges: Nov. 12 to Mar. 31. Water-discharge records good except those for estimated daily discharges, which are poor. Diversions for irrigation of about 5,500 acres upstream from station. Flow partially regulated by Coronach Dam, on the East Fork Poplar River, 2 mi north of international boundary.

AVERAGE DISCHARGE.--50 years (1908-24, 1947-69, 1975-79, 1982-89), 128 ft^3/s, 92,740 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 37,400 ft^3/s, Apr. 6, 1954, gage height, 17.86 ft, from floodmark, from slope-area measurement of peak flow; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of July 10, 1946, reached a stage of 18.1 ft, from floodmark, discharge, 40,000 ft^3/s, from slope-area measurement of peak flow made at site 20 mi upstream.

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

Date	Time	Discharge	Gage height	Date	Time	Discharge	Gage height
Mar. 13	0615	ice jam	*7.32	Mar. 28	---	*unknown	ice jam

Minimum daily discharge, 0.10 ft^3/s, Mar. 4-9.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.3	7.1	e5.0	e3.5	e2.0	e.15	545	70	39	60	2.0	1.1
2	2.6	7.8	e5.0	e3.5	e2.0	e.15	421	67	39	41	1.6	.88
3	2.6	6.4	e5.0	e4.0	e1.5	e.15	369	64	38	31	1.3	.70
4	2.9	7.8	e5.0	e4.0	e1.5	e.10	319	62	37	26	1.1	.59
5	3.1	7.8	e5.0	e3.5	e1.0	e.10	265	59	35	21	1.1	.61
6	3.1	7.8	e5.5	e3.5	e1.0	e.10	238	55	33	18	1.3	1.5
7	3.2	7.6	e5.5	e3.0	e.95	e.10	224	54	30	15	1.3	3.9
8	3.7	7.3	e5.5	e2.5	e.90	e.10	213	52	28	14	1.1	4.8
9	3.8	7.4	e5.5	e2.0	e.85	e.10	191	49	26	12	.93	4.3
10	3.8	7.1	e6.0	e2.0	e.80	e.15	167	45	25	11	.88	3.8
11	3.8	7.4	e6.5	e2.0	e.75	e1.0	144	43	27	11	.88	3.9
12	3.8	e7.5	e7.0	e2.0	e.70	e15	137	48	37	10	.85	5.4
13	3.9	e7.0	e7.0	e2.0	e.70	e100	129	64	31	9.0	.78	6.1
14	4.1	e6.0	e6.5	e2.0	e.65	e80	120	65	26	8.4	.78	6.1
15	4.2	e5.0	e6.0	e2.5	e.60	e50	110	58	24	7.5	.74	5.8
16	4.6	e4.5	e5.5	e3.0	e.55	e35	101	57	23	6.9	.65	5.2
17	5.1	e5.0	e5.0	e3.0	e.50	e25	93	60	21	6.6	.62	5.1
18	5.1	e5.5	e5.0	e3.0	e.50	e15	92	69	21	7.6	.68	5.1
19	5.1	e5.5	e5.5	e3.0	e.50	e15	90	65	21	7.9	.68	4.9
20	5.2	e5.0	e5.0	e3.0	e.55	e20	86	62	19	6.7	.68	4.7
21	5.4	e4.5	e5.0	e2.5	e.60	e30	81	58	18	5.3	.68	4.8
22	5.4	e5.0	e5.0	e2.5	e.60	e45	77	56	18	4.5	.68	4.5
23	5.3	e5.5	e5.0	e2.0	e.60	e70	72	52	19	4.2	.73	4.2
24	5.6	e5.5	e5.0	e2.0	e.60	e150	79	49	18	4.0	.84	4.0
25	5.8	e5.5	e4.5	e2.0	e.60	e250	81	53	17	3.5	1.1	3.7
26	5.6	e5.0	e4.0	e1.8	e.60	e350	85	57	16	3.0	.97	3.8
27	5.5	e4.5	e3.5	e1.8	e.50	e450	81	53	16	2.8	.88	3.5
28	4.9	e4.0	e3.5	e2.0	e.25	e750	78	45	20	3.2	1.4	3.3
29	4.8	e4.5	e3.5	e2.0	---	e650	75	39	29	3.1	1.1	3.4
30	5.3	e5.0	e4.0	e2.0	---	e600	72	38	40	2.5	.90	3.6
31	6.4	---	e4.0	e2.5	---	e500	---	38	---	2.3	1.3	---
TOTAL	136.0	181.5	159.0	80.1	22.85	4202.20	4835	1706	791	369.0	30.53	113.28
MEAN	4.39	6.05	5.13	2.58	.82	136	161	55.0	26.4	11.9	.98	3.78
MAX	6.4	7.8	7.0	4.0	2.0	750	545	70	40	60	2.0	6.1
MIN	2.3	4.0	3.5	1.8	.25	.10	72	38	16	2.3	.62	.59
AC-FT	270	360	315	159	45	8340	9590	3380	1570	732	61	225

CAL YR 1988 TOTAL 3783.94 MEAN 10.3 MAX 106 MIN .00 AC-FT 7510
WTR YR 1989 TOTAL 12626.46 MEAN 34.6 MAX 750 MIN .10 AC-FT 25040

e Estimated

POPLAR RIVER BASIN

06181000 POPLAR RIVER NEAR POPLAR, MT--Continued
(National stream quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975-81, 1986 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT												
26...	1230	5.4	75	2	2210	5.0	4.0	703	11.8	98	K2	78
DEC												
12...	1130	7.0	0	0	2280	4.0	0.0	711	10.9	81	K10	K34
MAR												
28...	1030	729	75	1	400	6.0	0.0	706	9.2	68	K110	K3300
MAY												
04...	0930	62	100	2	1370	9.0	11.5	711	10.4	103	K7	54
JUL												
18...	1030	7.4	70	1	1820	21.0	19.0	717	7.3	84	190	360
SEP												
20...	1130	4.8	0	0	2550	16.0	12.5	716	9.2	93	200	380

DATE	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STAND-ARD UNITS) (00400)	TUR-BID-ITY (NTU) (00076)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
OCT												
26...	501	27	465	8.5	8.7	290	0	37	48	450	12	7.5
DEC												
12...	830	0	669	8.2	3.0	310	0	46	48	470	12	6.8
MAR												
28...	144	0	122	8.0	190	81	0	17	9.4	57	3	5.9
MAY												
04...	474	24	422	8.8	29	200	0	32	30	240	7	6.1
JUL												
18...	474	23	415	8.5	13	200	0	22	34	360	11	8.5
SEP												
20...	586	10	474	8.6	10	250	0	26	44	510	14	11

DATE	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)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N) (00618)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)
OCT											
26...	492	270	320	0.40	5.0	1410	1420	1.92	20.6	--	<0.010
DEC											
12...	617	340	210	0.50	10	1460	1530	1.99	27.6	--	0.010
MAR											
28...	146	70	5.4	0.10	6.9	288	247	0.39	567	0.190	0.020
MAY											
04...	457	220	49	0.40	4.8	872	835	1.19	146	--	<0.010
JUL											
18...	429	220	250	0.40	5.9	1160	1150	1.58	23.2	--	<0.010
SEP											
20...	484	280	410	0.50	1.4	1590	1570	2.16	20.6	--	<0.010

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT											
26...	<0.100	<0.010	<0.010	--	0.40	0.020	0.020	<0.010	175	2.6	89
DEC											
12...	<0.100	<0.010	0.030	--	0.50	0.020	<0.010	<0.010	265	5.0	81
MAR											
28...	0.210	0.080	0.040	2.0	2.1	0.330	0.040	<0.010	488	961	96
MAY											
04...	<0.100	0.020	0.060	0.88	0.90	0.030	0.010	0.020	73	12	100
JUL											
18...	<0.100	0.020	0.030	0.68	0.70	0.030	0.010	<0.010	41	0.82	95
SEP											
20...	<0.100	0.010	0.010	0.59	0.60	<0.010	<0.010	<0.010	25	0.32	91

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)
OCT											
26...	1230	<10	1	60	<0.5	<1	<1	<3	2	19	<5
MAR											
28...	1030	320	2	45	<0.5	<1	2	<3	6	300	<5
JUL											
18...	1030	20	4	55	<0.5	<1	<1	<3	2	7	<1
SEP											
20...	1130	<10	2	58	<0.5	<1	<1	<3	2	7	<1

DATE	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
OCT										
26...	120	9	0.1	<10	1	<1	1.0	660	<6	14
MAR										
28...	18	7	0.4	<10	2	<1	<1.0	170	<6	6
JUL										
18...	100	5	0.2	<10	1	<1	<1.0	500	<6	7
SEP										
20...	140	6	0.2	<10	1	<1	<1.0	650	<6	4

BIG MUDDY CREEK BASIN

06181995 BEAVER CREEK AT INTERNATIONAL BOUNDARY

(International gaging station)

LOCATION.--Lat 48°59'59", long 105°02'06", in SE1/4 sec.5, T.1, R.23 W., second meridian, in Saskatchewan, Hydrologic Unit 10060006, on left bank 300 ft north of international boundary, 6 mi east of Canadian Big Beaver Port of Entry, 8 mi upstream from mouth, and 9 mi southeast of Big Beaver, Saskatchewan.

DRAINAGE AREA.--149 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1977 to current year (seasonal records after November 1982). April 1949 to October 1952, seasonal records collected 0.8 mi downstream (station number 06182000 Beaver Creek near international boundary). Records probably are equivalent.

REVISED RECORDS.--W 1983: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 2,250 ft, from topographic map. April 1949 to October 1952, nonrecording gage 0.8 mi downstream at different datum.

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 8 and Nov. 15-19. Water-discharge records fair except those for estimated daily discharges, which are poor.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,020 ft^3/s, Apr. 7, 1952, gage height, 13.3 ft, from floodmark from rating curve extended above 320 ft^3/s, on basis of slope-area measurements of peak flow; no flow at times.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, about 360 ft^3/s, Mar. 26, gage height, 8.23 ft, backwater from ice; minimum daily, 0.57 ft^3/s, July 19-21.

DISCHARGE, CUBIC FEET PER SECOND, CALENDAR YEAR JANUARY TO DECEMBER 1989
MEAN VALUES

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1			e.81	e12	2.3	1.7	.78	.74	.81	.74	.85	
2			e.81	e10	2.2	1.8	.71	.74	6.6	.78	.85	
3			e.81	e11	2.3	1.7	.71	.71	1.7	.78	.85	
4			e.81	e11	2.5	1.6	.71	.74	.92	.85	.88	
5			e.81	e8.7	2.3	1.5	.67	.74	.85	.85	.92	
6			e1.1	e7.2	2.1	1.4	.64	.78	.88	.81	.88	
7			e1.8	e6.4	2.0	1.4	.67	.74	.88	.78	.85	
8			e3.5	e5.5	1.9	1.4	.67	.74	.92	.81	.88	
9			e14	4.9	1.9	1.3	.64	.71	.99	.81	.88	
10			e25	4.4	1.8	1.3	.64	.71	.99	.78	.88	
11			e106	4.1	1.7	1.5	.64	.71	1.1	.78	.88	
12			e88	3.7	1.9	1.4	.64	.71	1.1	.78	.92	
13			e71	3.6	2.3	1.3	.64	.71	1.2	.78	.88	
14			e49	3.2	2.0	1.1	.64	.71	1.1	.78	.92	
15			e32	3.1	2.0	1.1	.60	.71	.99	.81	e.88	
16			e23	2.9	2.4	1.1	.60	.71	1.0	.81	e.88	
17			e19	2.8	2.1	1.1	.60	.74	1.1	.81	e.88	
18			e14	2.6	2.4	1.0	.60	.74	1.1	.81	e.88	
19			e11	2.5	2.3	.95	.57	.74	1.2	.81	e.88	
20			e7.1	2.5	2.1	.85	.57	.78	1.3	.81	.88	
21			e4.2	2.6	2.0	.95	.57	.85	1.2	.81	.92	
22			e2.0	2.5	1.8	1.0	.60	.81	1.4	.81	.92	
23			e2.3	2.4	1.7	1.0	.60	.78	1.7	.81	.99	
24			e4.3	2.9	2.0	.85	.64	.74	1.3	.81	.99	
25			e22	2.7	2.1	.88	.67	.78	1.2	.81	.95	
26			e248	2.6	2.1	1.0	.71	.78	1.0	.81	.99	
27			e171	2.5	1.8	.95	.74	.81	.67	.85	.99	
28			e78	2.4	1.7	.99	.74	.92	.67	.81	1.1	
29			e59	2.5	1.7	.95	.78	.92	.71	.81	1.1	
30			e71	2.4	1.8	.81	.74	.78	.71	.81	1.1	
31			e23		1.7		.74	.88		.85		
TOTAL			1154.35	137.6	62.9	35.88	20.47	23.66	37.29	24.96	27.65	
MEAN			37.2	4.59	2.03	1.20	.66	.76	1.24	.81	.92	
MAX			248	12	2.5	1.8	.78	.92	6.6	.85	1.1	
MIN			.81	2.4	1.7	.81	.57	.71	.67	.74	.85	
AC-FT			2290	273	125	71	41	47	74	50	55	

e Estimated

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1977 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (STAND-ARD UNITS) (00400)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	COLOR (PLAT-INUM-COBALT UNITS) (00080)
DEC										
05...	1145	0.99	0	0	1780	7.9	3.0	0.0	700	19
MAY										
10...	1100	1.9	80	1	1620	8.4	16.0	14.0	701	25
JUL										
20...	0830	0.61	0	0	1690	8.1	25.0	20.0	709	35
SEP										
21...	1130	1.3	30	1	1590	8.2	17.0	12.5	709	15

DATE	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
DEC										
05...	5.0	13.4	100	280	57	33	330	9	6.7	604
MAY										
10...	3.3	6.2	66	240	50	29	300	8	7.1	523
JUL										
20...	1.0	7.1	85	190	32	27	320	10	6.6	542
SEP										
21...	1.7	7.8	79	220	45	27	300	9	7.0	537

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, 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 TOTAL (MG/L AS N) (00615)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)
DEC										
05...	410	6.1	0.20	12	1220	1.66	3.26	<0.010	<0.100	0.100
MAY										
10...	350	5.0	0.20	8.0	1060	1.45	5.46	<0.010	<0.100	0.030
JUL										
20...	370	5.5	0.20	9.0	1100	1.49	1.81	<0.010	<0.100	0.010
SEP										
21...	350	5.5	0.20	7.1	1070	1.45	3.74	<0.010	<0.100	0.020

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	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)
DEC										
05...	0.20	0.30	0.010	0.010	--	1500	13	119	0.32	60
MAY										
10...	0.67	0.70	0.040	<0.010	7.8	1300	15	45	0.23	60
JUL										
20...	0.39	0.40	0.030	0.020	--	1600	17	30	0.05	60
SEP										
21...	0.28	0.30	<0.010	<0.010	6.3	1500	26	37	0.13	90

POPLAR RIVER BASIN

06181995 BEAVER CREEK AT INTERNATIONAL BOUNDARY--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	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)	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, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)
MAY 10...	1100	2	2	<10	<0.5	<1	<1	<1	<1	3	1	740
SEP 21...	1130	--	<1	--	<0.5	--	<1	--	<1	--	2	--

DATE	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	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)	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)
MAY 10...	1	<1	110	47	<0.10	--	3	2	<1	<1	<10	4
SEP 21...	--	<1	--	13	--	<0.1	--	1	--	<1	--	7

BIG MUDDY CREEK BASIN

06183450 BIG MUDDY CREEK NEAR ANTELOPE, MT

LOCATION.--Lat 48°40'22", long 104°30'42", in SW1/4SW1/4NW1/4 sec.27, T.34 N., R.55 E., Sheridan County, Hydrologic Unit 10060006, on right bank, 3 mi southwest of Antelope, and 7 mi south of Plentywood, MT.

DRAINAGE AREA.--967 mi^2. Prior to 1981, drainage area published as 1,171 mi^2.

WATER DISCHARGE RECORDS

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

REVISED RECORDS.--WDR MT-81-1: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 2,000 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 11 to Apr. 4. Water-discharge records good except those for estimated daily discharges, which are poor. Several known diversions for irrigation upstream from station.

AVERAGE DISCHARGE.--11 years, 33.2 ft^3/s, 24,050 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,890 ft^3/s, Apr. 14, 1982, gage height, 17.37 ft; no flow on many days during 1984, 1985, 1988, and 1989.

EXTREMES FOR CURRENT YEAR.--Maximum discharge unknown but occurred on Mar. 13; maximum gage height, 10.82 ft, Mar. 13, backwater from ice; no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.04	.15	e3.5	e.00	e.00	e.00	e250	14	9.5	7.9	.32	.00
2	.04	.15	e3.5	e.00	e.00	e.00	e200	14	9.6	7.3	.19	.00
3	.04	.12	e4.0	e.00	e.00	e.00	e150	14	11	6.7	.10	.00
4	.04	.11	e3.5	e.00	e.00	e.00	e105	19	11	6.4	.06	.00
5	.33	.09	e3.5	e.00	e.00	e.00	90	18	11	5.9	.03	.00
6	.55	.09	e3.0	e.00	e.00	e.00	61	16	11	5.5	.01	.00
7	.35	.10	e2.0	e.00	e.00	e.00	71	16	11	4.9	.00	.00
8	.23	.10	e1.5	e.00	e.00	e.10	56	23	11	4.5	.00	.00
9	.15	.18	e1.0	e.00	e.00	e1.0	51	18	10	4.2	.00	25
10	.12	.16	e1.0	e.00	e.00	e10	58	14	10	4.0	.00	23
11	.11	e.10	e.80	e.00	e.00	e50	50	12	10	3.5	.00	15
12	.11	e.15	e.80	e.00	e.00	e100	32	11	10	2.7	.00	9.7
13	.12	e.15	e.90	e.00	e.00	e900	37	11	9.8	2.1	.00	6.7
14	.12	e.20	e.80	e.00	e.00	e800	22	10	9.8	2.8	.00	4.1
15	.11	e.30	e.50	e.00	e.00	e700	16	9.9	9.0	2.5	.00	3.5
16	.09	e.45	e.50	e.00	e.00	e600	13	11	7.8	1.6	.00	2.9
17	.12	e.45	e.50	e.00	e.00	e500	29	11	43	7.9	.00	2.6
18	.11	e.50	e.60	e.00	e.00	e400	38	11	95	4.0	.00	1.8
19	.10	e.80	e.60	e.00	e.00	e450	67	13	67	1.8	.00	.94
20	.11	e1.0	e.50	e.00	e.00	e450	35	16	43	.96	.00	.57
21	.09	e1.0	e.30	e.00	e.00	e400	27	15	30	.50	.00	.48
22	.12	e1.5	e.20	e.00	e.00	e450	26	13	21	.28	.00	.68
23	.10	e2.0	e.10	e.00	e.00	e500	28	13	18	.18	.00	.68
24	.10	e2.5	e.10	e.00	e.00	e500	30	14	15	.12	.00	.58
25	.10	e2.5	e.05	e.00	e.00	e500	28	14	12	.07	.00	.47
26	.11	e2.0	e.00	e.00	e.00	e600	27	14	11	.04	.00	.38
27	.13	e2.0	e.00	e.00	e.00	e600	25	13	10	.03	.00	.36
28	.10	e2.0	e.00	e.00	e.00	e670	31	13	12	.04	.00	.28
29	.10	e2.5	e.00	e.00	---	e550	31	12	11	.13	.00	.26
30	.13	e3.0	e.00	e.00	---	e450	17	11	8.3	.59	.00	.27
31	.15	---	e.00	e.00	---	e350	---	9.8	---	.55	.00	---
TOTAL	4.22	26.35	33.75	0.00	0.00	10531.10	1701	423.7	557.8	89.69	0.71	100.25
MEAN	.14	.88	1.09	.000	.000	340	56.7	13.7	18.6	2.89	.023	3.34
MAX	.55	3.0	4.0	.00	.00	900	250	23	95	7.9	.32	25
MIN	.04	.09	.00	.00	.00	.00	13	9.8	7.8	.03	.00	.00
AC-FT	8.4	52	67	.00	.00	20890	3370	840	1110	178	1.4	199

CAL YR 1988 TOTAL 1707.91 MEAN 4.67 MAX 106 MIN .00 AC-FT 3390
WTR YR 1989 TOTAL 13468.57 MEAN 36.9 MAX 900 MIN .00 AC-FT 26710

e Estimated

BIG MUDDY CREEK BASIN

06183450 BIG MUDDY CREEK NEAR ANTELOPE, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1979 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)
OCT							
12...	1325	0.10	--	--	3180	11.0	9.0
DEC							
05...	1415	3.4	0	0	3850	5.5	0.0
MAR							
28...	1645	666	50	1	459	12.0	0.5
APR							
04...	1730	103	100	2	680	7.0	3.0
11...	1530	52	--	--	1220	8.0	5.0
MAY							
10...	1610	13	--	--	2490	17.0	17.0
JUL							
19...	1330	1.2	--	--	2950	33.0	22.0
SEP							
21...	1430	0.34	10	1	3420	18.0	13.0

DATE	TIME	PH LAB (STANDARD UNITS) (00403)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
DEC										
05...	1415	8.20	550	59	98	750	14	11	1110	1100
MAR										
28...	1645	7.60	110	21	13	50	2	6.8	136	100
APR										
04...	1730	7.80	150	26	21	92	3	7.8	182	170
SEP										
21...	1430	8.60	400	37	75	680	15	13	868	1100

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)
DEC									
05...	89	0.80	8.2	2780	3.78	25.5	<0.100	1400	50
MAR									
28...	3.0	0.10	5.9	283	0.39	509	0.350	190	240
APR									
04...	5.2	0.10	7.0	440	0.60	122	0.220	290	200
SEP									
21...	26	0.50	1.8	2460	3.34	2.25	<0.100	1700	60

DATE	TIME	ARSENIC DISSOLVED (UG/L AS AS) (01000)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)
DEC								
05...	1415	5	<1	<1	<5	10	0.1	<1

06183700 BIG MUDDY CREEK DIVERSION CANAL NEAR MEDICINE LAKE, MT

LOCATION.--Lat 48°30'34", long 104°32'55", in SE1/4NW1/4SE1/4 sec.22, T.32 N., R.55 E., Sheridan County, Hydrologic Unit 10060006, on right bank, on dike road about 75 ft downstream from canal headgate and 2.2 miles northwest of Medicine Lake.

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

GAGE.--Water-stage recorder. Elevation of gage is 1,940 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Oct. 1 to Apr. 3, July 25 to Sept. 30. Records poor. Canal diverts water into Medicine Lake at the Medicine Lake National Wildlife Refuge. At times stage-discharge relationship is severely affected by backwater from Medicine Lake. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,300 ft^3/s, Mar. 2, 1986; maximum gage height, 9.97 ft, Mar. 31, 1989, backwater from ice; no flow at times most years.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 850 ft^3/s, Mar. 28; gage height, 9.97 ft, Mar. 31, backwater from ice; no flow many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e.00	e.00	e.50	e.00	e.00	e.00	e400	27	5.8	4.9	e2.5	e.50
2	e.00	e.00	e1.0	e.00	e.00	e.00	e300	28	7.3	3.5	e2.0	e.50
3	e.00	e.00	e.50	e.00	e.00	e.00	e200	21	6.7	4.1	e1.5	e.50
4	e.00	e.00	e.50	e.00	e.00	e.00	173	14	5.2	4.0	e1.0	e.50
5	e.00	e.00	e1.0	e.00	e.00	e.00	119	17	6.3	3.0	e1.0	e.50
6	e.00	e.00	e.50	e.00	e.00	e.00	99	18	4.1	2.1	e.90	e.50
7	e.00	e.00	e.10	e.00	e.00	e.00	73	17	6.3	2.7	e.90	e.50
8	e.00	e.00	e.05	e.00	e.00	e.00	77	17	6.9	3.0	e.80	e.50
9	e.00	e.00	e.05	e.00	e.00	e.50	62	19	7.9	3.0	e.80	e.50
10	e.00	e.00	e.05	e.00	e.00	e5.0	51	36	6.0	3.0	e.70	e10
11	e.00	e.00	e.10	e.00	e.00	e20	59	17	4.2	2.9	e.70	e8.0
12	e.00	e.00	e.25	e.00	e.00	e50	54	9.8	3.0	2.6	e.60	e6.0
13	e.00	e.00	e.10	e.00	e.00	e450	40	13	4.8	2.5	e.60	e5.0
14	e.00	e.00	e.05	e.00	e.00	e600	39	11	5.5	2.4	e.50	e3.5
15	e.00	e.00	e.00	e.00	e.00	e500	30	12	5.1	2.4	e.50	e2.5
16	e.00	e.00	e.00	e.00	e.00	e400	25	12	3.7	2.2	e.50	e2.0
17	e.00	e.00	e.00	e.00	e.00	e350	24	9.2	2.9	2.3	e.50	e1.5
18	e.00	e.00	e.00	e.00	e.00	e300	25	13	3.2	2.3	e.50	e1.0
19	e.00	e.00	e.00	e.00	e.00	e250	38	3.3	5.0	2.2	e.50	e.80
20	e.00	e.00	e.00	e.00	e.00	e300	52	5.3	22	2.1	e.50	e.70
21	e.00	e.00	e.00	e.00	e.00	e300	43	7.3	23	2.1	e.50	e.60
22	e.00	e.05	e.00	e.00	e.00	e250	26	9.6	18	2.5	e.50	e.50
23	e.00	e.10	e.00	e.00	e.00	e300	29	12	14	3.6	e.50	e.50
24	e.00	e.50	e.00	e.00	e.00	e350	31	6.8	12	4.0	e.50	e.50
25	e.00	e.10	e.00	e.00	e.00	e350	35	5.8	8.5	e3.0	e.50	e.45
26	e.00	e.05	e.00	e.00	e.00	e400	37	9.4	7.3	e2.5	e.50	e.45
27	e.00	e.00	e.00	e.00	e.00	e600	37	9.6	9.3	e2.5	e.50	e.40
28	e.00	e.00	e.00	e.00	e.00	e850	27	12	6.3	e2.0	e.50	e.35
29	e.00	e.00	e.00	e.00	---	e750	29	10	5.3	e2.0	e.50	e.35
30	e.00	e.05	e.00	e.00	---	e600	26	7.0	8.4	e2.5	e.50	e.35
31	e.00	---	e.00	e.00	---	e500	---	6.5	---	e3.0	e.50	---
TOTAL	0.00	0.85	4.75	0.00	0.00	8475.50	2260	415.6	234.0	86.9	23.00	49.95
MEAN	.000	.028	.15	.000	.000	273	75.3	13.4	7.80	2.80	.74	1.66
MAX	.00	.50	1.0	.00	.00	850	400	36	23	4.9	2.5	10
MIN	.00	.00	.00	.00	.00	.00	24	3.3	2.9	2.0	.50	.35
AC-FT	.00	1.7	9.4	.00	.00	16810	4480	824	464	172	46	99

CAL YR 1988 TOTAL 66.91 MEAN .18 MAX 25 MIN .00 AC-FT 133
WTR YR 1989 TOTAL 11550.55 MEAN 31.6 MAX 850 MIN .00 AC-FT 22910

e Estimated

BIG MUDDY CREEK BASIN

06183750 LAKE CREEK NEAR DAGMAR, MT

LOCATION.--Lat 48°33'51", long 104°10'38", in SE1/4SE1/4SW1/4 sec. 31, T.33 N., R.58 E., Sheridan, County, Hydrologic Unit 10060006, on left bank, at downstream end of dike, just north of Medicine Lake National Wildlife Refuge, and 1.7 miles southeast of Dagmar.

DRAINAGE AREA.--101 mi^2.

PERIOD OF RECORD.--September 1985 to current year (seasonal records only.)

GAGE.--Water-stage recorder. Elevation of gage is 1,979.00 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1-12. Records good. Numerous diversions upstream for irrigation. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 65 ft^3/s, Apr. 5, 1989, gage height, 2.11 ft; no flow most days.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 65 ft^3/s, Apr. 5, gage height, 2.11 ft; no flow most days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						e.00	23	1.6	.12	.00	.00	.00
2						e.00	25	1.6	.15	.00	.00	.00
3						e.00	25	1.8	.15	.00	.00	.00
4						e.00	33	1.5	.12	.00	.00	.00
5						e.00	64	1.0	.10	.00	.00	.00
6						e.00	61	.67	.08	.00	.00	.00
7						e.00	58	.47	.07	.00	.00	.00
8						e.00	47	.41	.07	.00	.00	.00
9						e.00	24	.41	.05	.00	.00	.00
10						e.00	15	.35	.04	.00	.00	.00
11						e.00	14	.31	.09	.00	.00	.00
12						e.00	14	.26	.13	.00	.00	.00
13						.00	13	.26	.11	.00	.00	.00
14						.00	9.2	.24	.09	.00	.00	.00
15						.00	4.8	.26	.08	.00	.00	.00
16						.00	2.8	.61	.06	.00	.00	.00
17						.00	2.6	.67	.04	.00	.00	.00
18						.00	2.4	.39	.01	.00	.00	.00
19						.00	14	.21	.00	.00	.00	.00
20						.00	20	.13	.00	.00	.00	.00
21						.00	11	.09	.00	.00	.00	.00
22						.00	6.6	.09	.00	.00	.00	.00
23						.00	4.5	.11	.00	.00	.00	.00
24						.00	6.4	.27	.00	.00	.00	.00
25						.00	8.0	.47	.00	.00	.00	.00
26						4.9	6.2	.52	.00	.00	.00	.00
27						17	4.5	.42	.00	.00	.00	.00
28						12	3.9	.25	.00	.00	.00	.00
29						5.5	2.7	.17	.00	.00	.00	.00
30						10	1.8	.16	.00	.00	.00	.00
31						18	---	.15	---	.00	.00	---
TOTAL						67.40	527.4	15.85	1.56	0.00	0.00	0.00
MEAN						2.17	17.6	.51	.052	.000	.000	.000
MAX						18	64	1.8	.15	.00	.00	.00
MIN						.00	1.8	.09	.00	.00	.00	.00
AC-FT						134	1050	31	3.1	.00	.00	.00

e Estimated

06183800 COTTONWOOD CREEK NEAR DAGMAR, MT

LOCATION.--Lat 48°30'35", long 104°10'23", in SE1/4NE1/4SE1/4 sec.21, T.32 N., R.58 E., Sheridan County, Hydrologic Unit 10060006, on right bank, at bridge on county road 1.2 mi southeast of Medicine Lake National Wildlife Refuge, and 5.3 mi south of Dagmar.

DRAINAGE AREA.--126 mi^2.

PERIOD OF RECORD.--October 1985 to current year. Seasonal records only.

GAGE.--Water-stage recorder. Elevation of gage is 1,975.00 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1-29. Records fair except those estimated daily discharges, which are poor. Several observations of of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 277 ft^3/s, Apr. 2, 1987, gage height, 4.78 ft; maximum gage height, 6.30 ft, Mar. 27, 1989, backwater from ice; no flow most days each year.

EXTREMES FOR CURRENT SEASON.--Maximum discharge unknown but occurred on Mar. 27; maximum gage height, 6.30 ft, Mar. 27, backwater from ice; no flow most days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						e.00	8.5	1.2	.03	.00	.00	.00
2						e.00	6.0	.86	.03	.00	.00	.00
3						e.00	5.4	.64	.02	.00	.00	.00
4						e.00	4.9	1.0	.02	.00	.00	.00
5						e.00	4.2	.76	.01	.00	.00	.00
6						e.00	3.6	.45	.01	.00	.00	.00
7						e.00	3.4	.32	.01	.00	.00	.00
8						e.00	2.3	.19	.01	.00	.00	.00
9						e.00	2.1	.11	.00	.00	.00	.00
10						e.00	2.2	.23	.01	.00	.00	.00
11						e.00	1.6	.04	.02	.00	.00	.00
12						e5.0	.50	.04	.01	.00	.00	.00
13						e20	.25	.03	.01	.00	.00	.00
14						e10	2.1	.02	.01	.00	.00	.00
15						e5.0	2.2	.13	.01	.00	.00	.00
16						e1.0	2.1	.96	.02	.00	.00	.00
17						e.00	1.6	2.8	.02	.00	.00	.00
18						e.00	1.2	1.6	.01	.00	.00	.00
19						e.00	2.0	.92	.01	.00	.00	.00
20						e.00	1.6	.36	.01	.00	.00	.00
21						e.00	2.1	.17	.01	.00	.00	.00
22						e.00	1.8	.10	.01	.00	.00	.00
23						e.00	1.4	.12	.01	.00	.00	.00
24						e1.0	2.4	.20	.01	.00	.00	.00
25						e30	2.2	.13	.01	.00	.00	.00
26						e100	2.1	.16	.01	.00	.00	.00
27						e275	2.0	.11	.01	.00	.00	.00
28						e242	2.1	.07	.01	.00	.00	.00
29						e65	2.0	.10	.01	.00	.00	.00
30						38	1.8	.10	.01	.00	.00	.00
31						17	---	.06	---	.00	.00	---
TOTAL						809.00	77.65	13.98	0.38	0.00	0.00	0.00
MEAN						26.1	2.59	.45	.013	.000	.000	.000
MAX						275	8.5	2.8	.03	.00	.00	.00
MIN						.00	.25	.02	.00	.00	.00	.00
AC-FT						1600	154	28	.8	.00	.00	.00

e Estimated

BIG MUDDY CREEK BASIN

06183850 SAND CREEK NEAR DAGMAR, MT

LOCATION.--Lat 48°29'38", long 104°16'23", in SE1/4NW1/4NW1/4 sec.26, T.32 N., R.57 E., Sheridan County, Hydrologic Unit 10060006, at Medicine Lake National Wildlife Refuge boundary, on right bank at downstream end of culvert on county road, 1.0 mi upstream from mouth, and 7 mi southwest of Dagmar.

DRAINAGE AREA.--122 mi^2.

PERIOD OF RECORD.--August 1985 to current year (seasonal records only).

GAGE.--Water-stage recorder. Elevation of gage is 1,945 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1 to Mar. 30. Records good except those for estimated daily discharge, which are poor. No known diversions for irrigation upstream of station. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 112 ft^3/s, Apr. 3, 1987, gage height, 4.06 ft; maximum gage height, 5.19 ft, Mar. 26, 1989, backwater from ice jam; no flow many days each year.

EXTREMES FOR CURRENT SEASON.--Maximum discharge unknown, maximum gage height, 5.19 ft, Mar. 26, backwater from ice jam; no flow most days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						e.00	15	3.1	.00	.00	.00	.00
2						e.00	12	3.0	.00	.00	.00	.00
3						e.00	9.5	2.8	.00	.00	.00	.00
4						e.00	8.9	3.0	.00	.00	.00	.00
5						e.00	8.1	2.5	.00	.00	.00	.00
6						e.00	7.7	2.4	.00	.00	.00	.00
7						e.00	8.3	2.1	.00	.00	.00	.00
8						e.00	8.0	1.6	.00	.00	.00	.00
9						e.00	7.2	1.2	.00	.00	.00	.00
10						e.00	6.4	.71	.00	.00	.00	.00
11						e.00	5.9	.22	.00	.00	.00	.00
12						e.10	5.5	.08	.00	.00	.00	.00
13						e.30	5.1	.06	.00	.00	.00	.00
14						e.10	4.9	.03	.00	.00	.00	.00
15						e.00	4.9	.01	.00	.00	.00	.00
16						e.00	4.6	.01	.00	.00	.00	.00
17						e.00	4.5	.04	.00	.00	.00	.00
18						e.00	4.5	.03	.00	.00	.00	.00
19						e.00	4.4	.03	.00	.00	.00	.00
20						e.00	4.3	.03	.00	.00	.00	.00
21						e.00	4.0	.00	.00	.00	.00	.00
22						e.00	3.7	.00	.00	.00	.00	.00
23						e.00	3.4	.00	.00	.00	.00	.00
24						e.00	4.3	.00	.00	.00	.00	.00
25						e10	4.0	.00	.00	.00	.00	.00
26						e25	4.1	.00	.00	.00	.00	.00
27						e40	3.7	.00	.00	.00	.00	.00
28						e50	3.7	.00	.00	.00	.00	.00
29						e30	3.5	.00	.00	.00	.00	.00
30						e15	3.3	.00	.00	.00	.00	.00
31						16	---	.00	---	.00	.00	---
TOTAL						186.50	177.4	22.95	0.00	0.00	0.00	0.00
MEAN						6.02	5.91	.74	.000	.000	.000	.000
MAX						50	15	3.1	.00	.00	.00	.00
MIN						.00	3.3	.00	.00	.00	.00	.00
AC-FT						370	352	46	.00	.00	.00	.00

e Estimated

BIG MUDDY CREEK BASIN

06185110 BIG MUDDY CREEK NEAR MOUTH, NEAR CULBERTSON, MT

LOCATION.--Lat 48°09'52", long 104°37'45", in NE1/4NW1/4SW1/4 sec.21, T.28 N., R.55 E., Roosevelt County, Hydrologic Unit 10060006, Fort Peck Indian Reservation, on right bank 30 ft downstream from U.S. Highway 2 bridge and 5.3 mi northwest of Culbertson.

DRAINAGE AREA.--2,684 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--November 1981 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,896.52 ft above National Geodetic Vertical Datum of 1929 (unadjusted).

REMARKS.--Estimated daily discharges: Nov. 14 to Apr. 1. Water-discharge records poor. Flows are subject to extreme regulation by diversions and dams at Medicine Lake National Wildlife Refuge about 40 mi upstream.

AVERAGE DISCHARGE.--8 years (1982-89), 29.9 ft^3/s, 21,660 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,860 ft^3/s, Apr. 16, 1982, gage height, 10.40 ft; no flow on many days.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 212 ft^3/s, Apr. 5, gage height, 4.11 ft; maximum gage height, 5.39 ft, Mar. 26, backwater from ice; no flow many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.24	.01	e.30	e.05	e.03	e.00	e60	37	10	25	1.4	.58
2	.27	.00	e.40	e.05	e.01	e.00	55	32	10	34	1.2	1.1
3	.26	.00	e.40	e.05	e.00	e.00	42	34	8.8	38	1.1	2.2
4	.44	.00	e.40	e.05	e.00	e.00	23	35	6.7	42	1.2	2.6
5	.24	.00	e.30	e.05	e.00	e.00	11	31	5.1	46	1.4	2.7
6	.22	.05	e.30	e.05	e.00	e.00	182	29	3.3	48	1.5	1.4
7	.15	.00	e.30	e.05	e.00	e.10	124	28	2.4	46	1.2	.94
8	.07	.00	e.20	e.05	e.00	e.10	79	27	3.0	44	1.0	.68
9	.04	.00	e.10	e.02	e.00	e.10	58	26	2.8	40	1.3	.75
10	.05	.03	e.10	e.02	e.00	e.10	50	26	2.4	36	1.1	.50
11	.11	.04	e.15	e.02	e.00	e.10	48	22	2.6	31	.99	.53
12	.22	.02	e.20	e.02	e.00	e1.0	46	23	3.8	28	1.0	.45
13	.09	.02	e.15	e.02	e.00	e1.0	45	17	5.9	24	.81	.39
14	.05	e.02	e.10	e.02	e.00	e1.0	45	20	5.8	18	1.0	.32
15	.01	e.02	e.10	e.02	e.00	e.90	43	24	4.7	16	.91	.33
16	.01	e.02	e.10	e.05	e.00	e.80	41	24	4.3	13	.74	.33
17	.01	e.02	e.10	e.10	e.00	e.50	38	24	4.7	11	.45	.34
18	.02	e.02	e.10	e.10	e.00	e.50	36	23	5.3	17	.53	.20
19	.09	e.02	e.10	e.10	e.00	e.50	36	22	5.4	14	.57	.21
20	.04	e.02	e.10	e.10	e.00	e.50	36	21	3.5	10	.86	.18
21	.10	e.05	e.10	e.10	e.00	e.50	34	18	4.2	7.9	.87	.16
22	.02	e.10	e.10	e.10	e.00	e1.0	35	16	5.2	5.4	.45	.10
23	.00	e.20	e.10	e.06	e.00	e1.5	34	16	4.8	5.2	.42	.15
24	.05	e.20	e.10	e.06	e.00	e1.0	102	15	4.8	5.6	.34	.04
25	.17	e.20	e.10	e.06	e.00	e10	140	16	4.2	4.2	.82	.04
26	.14	e.20	e.05	e.06	e.00	e50	135	15	3.7	3.8	.56	.05
27	.08	e.10	e.05	e.06	e.00	e100	123	11	4.2	3.6	.51	.00
28	.11	e.10	e.05	e.06	e.00	e90	106	11	3.7	2.9	.44	.00
29	.08	e.10	e.05	e.06	---	e80	73	12	5.8	2.4	.55	.00
30	.05	e.20	e.05	e.06	---	e75	43	11	16	2.4	.47	.02
31	.00	---	e.05	e.06	---	e70	---	11	---	1.8	.72	---
TOTAL	3.43	1.76	4.80	1.73	0.04	486.20	1923	677	157.1	626.2	26.41	17.29
MEAN	.11	.059	.15	.056	.001	15.7	64.1	21.8	5.24	20.2	.85	.58
MAX	.44	.20	.40	.10	.03	100	182	37	16	48	1.5	2.7
MIN	.00	.00	.05	.02	.00	.00	11	11	2.4	1.8	.34	.00
AC-FT	6.8	3.5	9.5	3.4	.08	964	3810	1340	312	1240	52	34

CAL YR 1988 TOTAL 1011.03 MEAN 2.76 MAX 13 MIN .00 AC-FT 2010
WTR YR 1989 TOTAL 3924.96 MEAN 10.8 MAX 182 MIN .00 AC-FT 7790

e Estimated

BIG MUDDY CREEK BASIN

06185110 BIG MUDDY CREEK NEAR MOUTH, NEAR CULBERTSON, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1982 to current year.(discontinued)

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)
OCT											
26...	1000	0.25	75	2	5590	1.5	3.0	9.1	590	22	130
MAR											
30...	0900	74	0	0	469	1.0	0.0	7.7	130	21	19
APR											
11...	1255	48	--	--	1140	12.0	5.0	--	--	--	--
JUL											
20...	1300	9.9	0	0	1600	33.0	27.0	8.6	270	26	51
SEP											
19...	1245	0.30	0	0	2340	21.0	15.0	8.6	380	30	73

DATE	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	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, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)
OCT											
26...	1400	25	16	1440	2100	99	0.40	2.4	4640	6.30	3.13
MAR											
30...	48	2	7.6	130	110	4.4	0.10	9.0	298	0.41	59.6
APR											
11...	--	--	--	--	--	--	--	--	--	--	--
JUL											
20...	280	7	23	472	420	19	0.30	3.0	1110	1.50	29.6
SEP											
19...	450	10	23	731	600	25	0.40	0.90	1640	2.23	1.33

DATE	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	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)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
OCT										
26...	<0.100	--	1900	--	--	80	--	--	--	--
MAR										
30...	0.210	5	110	<1	2	340	<5	41	0.6	<1
APR										
11...	--	--	--	--	--	--	--	--	--	--
JUL										
20...	<0.100	--	750	--	--	25	--	--	--	--
SEP										
19...	<0.100	--	920	--	--	40	--	--	--	--

MISSOURI RIVER MAIN STEM

06185500 MISSOURI RIVER NEAR CULBERTSON, MT

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^2.

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: Oct. 1-6 and Dec. 24 to Apr. 5. 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. U.S. Army Corps of Engineers satellite telemeter at stations. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--40 years (1943-51, 1959-89, after operational level at Fort Peck Lake was reached), 10,660 ft^3/s, 7,723,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 78,200 ft^3/s, Mar. 26, 1943, gage height, 14.80 ft, from rating curve extended above 30,000 ft^3/s; maximum gage height observed, 19.66 ft, Apr. 14, 1979, backwater from ice jam; minimum daily discharge, 575 ft^3/s, Nov. 22, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 14,100 ft^3/s, Apr. 6, gage height, 7.12 ft; maximum gage height, 12.11 ft, backwater from ice; minimum daily discharge, 4,730 ft^3/s, Oct. 12.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e4800	5140	10200	e11500	e11500	e11500	e11500	6840	9160	9520	9170	9000
2	e4800	5220	10300	e11500	e12000	e11500	e12500	6770	9320	9420	9310	9560
3	e4800	5990	10400	e11500	e11500	e11500	e13500	6850	9200	9230	9270	9710
4	e4800	6720	10900	e11500	e13000	e11500	e13500	6790	9230	9310	9500	9520
5	e4800	6750	11000	e11500	e12000	e11500	e13500	6500	9340	9290	9460	9170
6	e4800	6590	10900	e11500	e12000	e11500	13700	6220	9180	9350	9250	9110
7	4840	6370	10400	e12000	e13500	e11500	12700	6030	9150	9360	9350	9190
8	4840	6640	10800	e12000	e13000	e11500	11200	5940	9470	9350	9140	9380
9	4820	6640	11600	e12000	e12500	e11500	10200	5950	9540	9260	9440	9680
10	4790	6710	12600	e11500	e13000	e11500	9570	6310	9650	9720	9290	9600
11	4760	6790	13000	e12500	e13000	e11000	9020	7580	9720	9340	9340	9410
12	4730	6920	12900	e12000	e12500	e11000	8110	8340	9700	9200	8970	9270
13	4750	8030	11200	e11000	e13500	e11000	7460	8060	9300	8860	9100	9180
14	4810	9110	11100	e11000	e13000	e11000	7080	7640	8840	8770	9170	9180
15	4850	9550	11000	e11000	e13500	e11500	6670	7670	8910	8930	8880	9200
16	4920	9400	11100	e11500	e13000	e11000	6520	7650	9200	8730	8930	9250
17	4950	9250	11900	e12000	e13000	e11500	6560	7630	9270	8340	9130	9420
18	4900	9560	12500	e12500	e13000	e12500	6520	7650	9120	8580	9590	9030
19	4860	9930	13000	e12500	e13000	e12000	6340	7670	9140	8800	9220	8470
20	4860	10100	11400	e11500	e13500	e12000	6740	7910	8950	8920	9500	8390
21	4930	10100	11500	e11500	e13000	e12000	6630	7710	9010	8760	9650	8660
22	4920	9720	11500	e12000	e12500	e12000	6540	7700	9150	8840	9240	8350
23	4930	9420	11700	e11500	e12000	e12000	6680	8430	9240	8870	9100	8170
24	5050	9420	e10000	e12000	e12500	e12000	6870	8680	9170	8980	9360	8070
25	5120	9840	e11500	e12500	e11500	e12000	6980	8490	9040	8930	9900	7900
26	5140	9920	e10500	e12000	e11000	e12500	7040	8660	9270	8820	9520	7940
27	5150	9920	e12000	e12000	e11500	e12000	7410	8860	9310	8850	9410	8060
28	5120	9910	e11500	e12000	e11000	e11500	7250	8380	9060	9060	9400	8140
29	5100	9890	e11000	e12000	---	e10500	6990	8600	9410	8960	9590	8180
30	5090	9960	e11500	e12000	---	e10500	7020	8450	9790	8980	9580	8040
31	5100	---	e11500	e12500	---	e10500	---	8720	---	9180	9070	---
TOTAL	152130	249510	352400	366000	350000	357000	262300	234680	277840	280510	288830	266230
MEAN	4907	8317	11370	11810	12500	11520	8743	7570	9261	9049	9317	8874
MAX	5150	10100	13000	12500	13500	12500	13700	8860	9790	9720	9900	9710
MIN	4730	5140	10000	11000	11000	10500	6340	5940	8840	8340	8880	7900
AC-FT	301700	494900	699000	726000	694200	708100	520300	465500	551100	556400	572900	528100

CAL YR 1988 TOTAL 2971150 MEAN 8118 MAX 13000 MIN 4100 AC-FT 5893000
WTR YR 1989 TOTAL 3437430 MEAN 9418 MAX 13700 MIN 4730 AC-FT 6818000

e Estimated

YELLOWSTONE RIVER BASIN

06186500 YELLOWSTONE RIVER AT YELLOWSTONE LAKE OUTLET, YELLOWSTONE NATIONAL PARK

LOCATION.--Lat 44°34'03", long 110°22'48", Yellowstone National Park, Hydrologic Unit 10070001, on left bank 450 ft downstream from Fishing Bridge, 0.3 mi downstream from outlet of Yellowstone Lake, and at mile 616.4.

DRAINAGE AREA.--1,006 mi^2.

PERIOD OF RECORD.--December 1922 to September 1982, October 1983 to September 1986, October 1, 1988 to September 30, 1989. Prior to October 1926, gage heights only. Monthly discharge only for winter periods in water years 1927-30, 1932-33, 1935-38, 1940, 1942-46 published in WSP 1309; figures of daily discharge for these months published in WSP 646, 666, 686, 701, 731, 746, 786, 806, 826, 856, 896, 956, 976, 1006, 1036, and 1056, have been found to be unreliable and should not be used.

REVISED RECORDS.--WSP 1309: See PERIOD OF RECORD. WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 7,729.58 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 2, 1928, nonrecording gage at site 450 ft upstream at datum 1.07 ft higher.

REMARKS.--Estimated daily discharges: Oct. 1 to Apr. 12, Apr. 20 to May 17. Records good except those for estimated daily discharges, which are poor. No artificial regulation. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--60 YEARS (1927-82, 1984-86, 1989), 1,331 ft^3/s, 17.97 in/yr, 964,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9.170 ft^3/s, June 28, 1974, gage height, 8.20 ft; minimum daily, 110 ft^3/s, Feb. 13-15, 1989, ice affect, discharge estimated; minimum gage height, 1.45 ft, Dec. 17, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,490 ft^3/s, June 20,22, gage height, 6.18 ft; minimum daily, 110 ft^3/s, Feb. 13-15.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e380	e290	e270	e215	e140	e122	e350	e860	2510	4180	2680	1340
2	e375	e285	e270	e210	e140	e123	e400	e850	2540	4180	2670	1320
3	e375	e285	e270	e200	e138	e124	e440	e850	2650	4160	2600	1280
4	e370	e280	e270	e195	e136	e125	e480	e860	2740	4130	2350	1240
5	e360	e280	e265	e190	e134	e125	e500	e900	2800	4120	2280	1230
6	e355	e280	e265	e190	e132	e126	e500	e950	2880	4080	2220	1190
7	e350	e280	e265	e190	e130	e125	e520	e980	3000	4020	2160	1160
8	e345	e280	e260	e190	e125	e124	e560	e1000	3110	3970	2100	1140
9	e340	e280	e260	e190	e120	e123	e570	e1100	3240	3930	2060	1130
10	e335	e280	e260	e185	e120	e122	e580	e1150	3360	3900	2010	1110
11	e330	e275	e260	e185	e115	e121	e575	e1250	3500	3860	1980	1090
12	e325	e275	e260	e180	e115	e122	e585	e1400	3610	3800	1940	1070
13	e320	e275	e260	e180	e110	e123	593	e1500	3700	3820	1930	1050
14	e315	e275	e260	e175	e110	e127	592	e1550	3790	3760	1890	1040
15	e315	e275	e260	e170	e110	e131	597	e1600	3890	3680	1860	1020
16	e310	e275	e260	e165	e115	e150	600	e1700	4020	3630	1820	1020
17	e310	e270	e260	e160	e115	e170	604	e1800	4170	3540	1770	1020
18	e310	e270	e255	e155	e120	e180	605	1900	4240	3450	1720	1010
19	e305	e270	e250	e155	e125	e200	608	1970	4310	3400	1730	989
20	e305	e270	e250	e150	e125	e210	e620	1990	4420	3300	1720	968
21	e305	e270	e240	e148	e125	e220	e650	2020	4470	3220	1690	953
22	e305	e270	e230	e146	e120	e220	e670	2060	4470	3150	1660	941
23	e305	e275	e220	e144	e120	e220	e690	2140	4440	3080	1630	933
24	e305	e275	e220	e144	e120	e220	e720	2250	4390	3030	1600	918
25	e305	e275	e225	e142	e115	e220	e740	2300	4340	2950	1570	904
26	e310	e275	e225	e142	e115	e230	e780	2330	4300	2910	1530	895
27	e315	e275	e225	e140	e120	e250	e800	2340	4250	2860	1500	890
28	e320	e275	e225	e140	e120	e260	e835	2350	4220	2800	1470	891
29	e320	e275	e225	e140	---	e270	e865	2390	4200	2730	1430	883
30	e310	e270	e225	e140	---	e280	e870	2430	4190	2690	1410	874
31	e300	---	e220	e140	---	e290	---	2480	---	2680	1380	---
TOTAL	10130	8285	7710	5196	3430	5453	18499	51250	111750	109010	58360	31499
MEAN	327	276	249	168	122	176	617	1653	3725	3516	1883	1050
MAX	380	290	270	215	140	290	870	2480	4470	4180	2680	1340
MIN	300	270	220	140	110	121	350	850	2510	2680	1380	874
AC-FT	20090	16430	15290	10310	6800	10820	36690	101700	221700	216200	115800	62480
CFSM	.32	.27	.25	.17	.12	.17	.61	1.64	3.70	3.50	1.87	1.04
IN.	.37	.31	.29	.19	.13	.20	.68	1.90	4.13	4.03	2.16	1.16

WTR YR 1989 TOTAL 420572 MEAN 1152 MAX 4470 MIN 110 AC-FT 834200 CFSM 1.15 IN. 15.55

e Estimated

YELLOWSTONE RIVER BASIN

06187950 SODA BUTTE CREEK NEAR LAMAR RANGER STATION, YNP

LOCATION.--Lat 44°52'06", long 110°09'53", Yellowstone National Park, Hydrologic Unit 10070001, on left bank, 4 mi southeast of Lamar Ranger Station, and at mile 1.5.

DRAINAGE AREA.--99.0 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1, 1988 to September 30, 1989.

GAGE.--Water-stage recorder. Elevation of gage is 6,630 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Oct. 1-27, Nov. 26 to Dec. 5, 12-22, 25-29, Jan. 7 to Feb. 18, Feb. 27 to Mar. 7. Water-discharge records good except those for June 6-17, which are fair, and those for estimated daily discharges, which are poor. No regulation or diversion upstream of station. Several observations of water temperature and specific conductance were made during the year.

COOPERATION.--Gage-height record was collected in cooperation with U.S. National Park Service.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,430 ft^3/s, June 16, 1989, gage height, 5.03 ft; minimum, 11 ft^3/s, Jan. 31, 1989, but may have been less during period of ice effect.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,430 ft^3/s, June 16, gage height, 5.03 ft; minimum, 11 ft^3/s, Jan. 31, but may have been less during the period of ice affect.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e28	25	e16	15	e17	e15	20	106	452	528	108	64
2	e27	26	e16	17	e15	e14	21	125	551	490	108	60
3	e27	27	e16	17	e13	e14	24	129	632	477	99	59
4	e28	26	e16	18	e12	e13	21	115	553	475	95	58
5	e28	25	e16	18	e12	e13	21	121	662	463	91	58
6	e28	26	16	20	e12	e15	22	218	835	423	87	56
7	e28	23	17	e19	e13	e18	25	364	952	396	94	55
8	e28	25	17	e17	e14	22	27	531	1070	362	99	56
9	e28	24	18	e16	e15	23	25	566	1030	335	94	56
10	e28	19	18	e17	e17	24	24	812	1080	366	96	54
11	e28	26	19	e18	e18	23	24	787	1020	317	111	50
12	e28	23	e19	e15	e18	22	25	672	878	308	93	49
13	e28	24	e20	e15	e18	22	27	530	887	342	96	49
14	e28	26	e19	e16	e18	20	31	464	899	277	85	48
15	e28	25	e15	e15	e18	22	37	472	985	249	83	46
16	e30	22	e13	e15	e18	22	43	493	1050	264	78	45
17	e32	23	e14	e16	e18	21	47	524	975	218	75	46
18	e30	22	e14	e17	e19	20	49	579	792	197	110	56
19	e29	21	e14	e17	19	21	62	579	877	187	116	51
20	e29	22	e14	e17	20	26	105	478	901	179	89	49
21	e28	22	e15	e18	20	21	198	521	643	172	83	48
22	e28	24	e16	e18	21	23	243	590	509	186	78	47
23	e28	27	17	e16	21	21	224	657	438	176	73	45
24	e28	26	18	e15	21	20	184	618	393	158	72	44
25	e27	22	e16	e15	22	20	205	489	394	145	76	43
26	e26	e19	e15	e16	20	22	197	412	390	140	78	43
27	e25	e16	e13	e16	e17	23	158	387	431	136	75	43
28	25	e16	e14	e16	e16	22	129	403	477	134	79	45
29	26	e16	e14	e17	---	21	110	465	502	129	72	43
30	26	e17	15	e18	---	20	106	447	537	116	67	43
31	26	---	15	e18	---	21	---	412	---	110	65	---
TOTAL	861	685	495	518	482	624	2434	14066	21795	8455	2725	1509
MEAN	27.8	22.8	16.0	16.7	17.2	20.1	81.1	454	726	273	87.9	50.3
MAX	32	27	20	20	22	26	243	812	1080	528	116	64
MIN	25	16	13	15	12	13	20	106	390	110	65	43
AC-FT	1710	1360	982	1030	956	1240	4830	27900	43230	16770	5410	2990

WTR YR 1989 TOTAL 54649 MEAN 150 MAX 1080 MIN 12 AC-FT 108400

e Estimated

YELLOWSTONE RIVER BASIN

06187950 SODA BUTTE CREEK NEAR LAMAR RANGER STATION, YELLOWSTONE NATIONAL PARK--Continued
WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1988 to September 1989.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)
OCT										
27...	1330	27	--	--	292	9.0	6.0	--	--	--
NOV										
02...	0915	26	100	51	303	5.0	4.0	595	9.4	92
DEC										
07...	1000	17	--	--	330	-9.0	1.0	--	--	--
JAN										
11...	1345	18	--	--	348	-9.0	2.5	--	--	--
FEB										
16...	1130	18	--	--	335	-5.0	2.5	--	--	--
MAR										
15...	1635	--	--	--	303	-3.0	1.0	--	--	--
APR										
12...	1200	--	--	--	310	4.0	4.0	--	--	--
28...	1025	126	--	--	222	2.0	2.0	--	--	--
JUN										
07...	1542	--	--	--	123	24.0	11.5	--	--	--
JUL										
04...	1015	441	--	--	125	24.0	7.0	--	--	--
AUG										
09...	1000	97	--	--	222	15.0	11.0	--	--	--
SEP										
06...	1500	55	--	--	255	16.0	12.5	--	--	--

DATE	TIME	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STANDARD UNITS) (00400)	TURBIDITY (NTU) (00076)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)
NOV											
02...	0915	178	0	145	7.5	0.70	150	36	14	5.4	0.2

DATE	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	RESIDUE TOTAL AT 105 DEG. C, SUSPENDED (MG/L) (00530)
NOV										
02...	2.4	149	9.6	0.90	0.10	20	176	0.24	12.4	6

DATE	RESIDUE VOLATILE, SUSPENDED (MG/L) (00535)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N) (00607)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOSPHORUS TOTAL (MG/L AS P) (00665)
NOV										
02...	<1	<0.100	<0.100	0.110	0.120	0.09	0.08	0.20	0.20	0.030

DATE	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV										
02...	0.030	0.010	0.020	1.2	1.4	120	16	2	0.14	100

YELLOWSTONE RIVER BASIN

06188000 LAMAR RIVER NEAR TOWER FALLS RANGER STATION, YELLOWSTONE NATIONAL PARK

LOCATION.--Lat 44°55'40", long 110°23'35", Yellowstone National Park, Hydrologic Unit 10070001, on left bank 0.5 mi north of the Cooke City highway, 1.6 mi northeast of Tower Falls Ranger Station, 2.7 mi downstream from Slough Creek, and at mile 0.5.

DRAINAGE AREA.--660 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1922, April 1923 to September 1969, May 1985 to September 1986 (seasonal records only), September 1988 to September 1989.

GAGE.--Water-stage recorder. Elevation of gage is 6,000 ft above National Vertical Datum of 1929, from topographic map. Prior to Sept. 16, 1925, nonrecording gage and Sept. 16, 1925 to July 29, 1927, water-stage recorder at same site at datum 1.00 ft higher. July 29, 1925 to Sept. 30, 1969, water-stage recorder at same site and datum. May 1985 to September 1986, nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Oct. 22-27, Nov. 11 to Mar. 31, Apr. 13-27, May 11-16, June 29 to July 7. Water-discharge records good except those for estimated daily discharges, which are poor. No regulation or diversions.

AVERAGE DISCHARGE.--47 years (1924-69,1989), 832 ft^3/s, 602,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,600 ft^3/s, May 25, 1928, gage height, 9.75 ft; minimum observed, 40 ft^3/s, Mar. 16, 1945, result of discharge measurement.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 5,500 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage Height (ft)	Date	Time	Discharge (ft^3/s)	Gage Height (ft)
May 10	2115	*9,130	*8.08	No other peak greater than peak discharge.			

Minimum daily dischaarge, 60 ft^3/s, Feb. 2-4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	110	101	e104	e84	e62	e80	133	1260	3740	e2280	442	246
2	108	102	e116	e83	e60	e76	135	1600	4280	e2100	464	236
3	108	108	e120	e82	e60	e73	120	1730	4660	e2000	420	227
4	107	112	e120	e82	e60	e73	134	1490	3750	e1800	387	221
5	107	104	e120	e82	e62	e80	128	1510	4390	e1700	367	214
6	106	107	e130	e80	e65	e85	129	2760	5240	e1600	356	207
7	105	104	e130	e77	e68	e90	148	4100	5840	e1500	359	210
8	104	105	e122	e76	e72	e92	181	5900	5980	1350	360	219
9	104	107	e120	e76	e76	e98	177	5950	5620	1290	350	218
10	104	88	e118	e76	e82	e110	164	7310	5640	1370	355	216
11	104	e100	e116	e73	e86	e130	198	e6800	5390	1320	431	205
12	103	e100	e112	e71	e90	e140	237	e5900	4650	1160	355	193
13	104	e100	e110	e70	e92	e140	e313	e5300	4600	1410	403	191
14	103	e96	e92	e70	e91	e136	e400	e4600	4610	1170	356	188
15	107	e98	e80	e70	e90	e132	e600	e4000	4600	1010	318	184
16	107	e98	e85	e70	e88	e126	e900	e3600	5770	976	296	181
17	119	e95	e88	e68	e88	e121	e940	4010	5010	877	280	176
18	131	e90	e90	e70	e88	e116	e940	4490	4160	810	307	224
19	126	e90	e92	e70	e87	e110	e1200	4520	4280	744	611	227
20	130	e92	e94	e70	e85	e110	e1500	3350	4410	704	382	198
21	121	e95	e94	e70	e83	e110	e2000	3830	3310	671	342	190
22	e115	e96	e92	e69	e83	e110	e2500	4780	2670	706	315	183
23	e114	e100	e92	e67	e84	e110	e2700	5550	2360	737	287	177
24	e110	e98	e91	e64	e82	e110	e2400	5220	2230	677	270	170
25	e110	e95	e90	e64	e82	e110	e2400	3550	2160	599	310	167
26	e107	e94	e85	e65	e81	e112	e2300	2910	2150	628	325	162
27	e104	e94	e80	e66	e80	e120	e2400	2840	2200	613	302	165
28	102	e94	e80	e66	e80	e128	1560	3150	2320	632	313	177
29	101	e97	e80	e66	---	e128	1280	3950	e2300	580	295	179
30	102	e100	e82	e66	---	e128	1170	3900	e2310	508	265	164
31	103	---	e84	e64	---	e130	---	3400	---	470	248	---
TOTAL	3386	2960	3109	2227	2207	3414	29387	123260	120630	33992	10871	5915
MEAN	109	98.7	100	71.8	78.8	110	980	3976	4021	1097	351	197
MAX	131	112	130	84	92	140	2700	7310	5980	2280	611	246
MIN	101	88	80	64	60	73	120	1260	2150	470	248	162
AC-FT	6720	5870	6170	4420	4380	6770	58290	244500	239300	67420	21560	11730

WTR YR 1989 TOTAL 341358 MEAN 935 MAX 7310 MIN 60 AC-FT 677100

e Estimated

YELLOWSTONE RIVER BASIN

06188000 LAMAR RIVER NEAR TOWER FALLS RANGER STATION, YELLOWSTONE NATIONAL PARK--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1985-86, August 1988 to current year.

PERIOD OF DAILY RECORD.--
SUSPENDED-SEDIMENT DISCHARGE: May 1985 to September 1986, August 1988 to current year.

REMARKS.--Water-quality and sediment records for August and September 1988 are published in this report. Unpublished records of once-daily water temperature are available in files of District office.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SEDIMENT CONCENTRATION: Maximum daily mean, 967 mg/L, June 4, 1986; minimum daily mean, 1 mg/L, on several days in August 1986, October 1988, and September 1989.
SEDIMENT LOAD: Maximum daily, 23,700 tons, June 4, 1986; minimum daily, 0.29 tons, Oct. 2, 15, 16, 1989.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATION: Maximum daily mean, 690 mg/L, Aug. 19; minimum daily mean, 1 mg/L, on several days in October and September.
SEDIMENT LOAD: Maximum daily, 11,200 tons, May 10; minimum daily, 0.29 tons, Oct. 2, 15, 16.

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
AUG 1988										
20...	1100	127	10	1	218	16.5	12.5	8	2.7	89
26...	1530	130	--	--	218	22.0	13.5	--	--	--
OCT										
05...	1100	106	0	0	215	8.0	7.5	4	1.1	50
NOV										
02...	1240	103	100	10	230	9.0	5.0	3	0.83	95
DEC										
07...	1400	133	--	--	249	-8.0	0.0	2	0.72	100
JAN 1989										
13...	1215	72	--	--	255	-14.0	0.0	--	--	--
FEB										
16...	1500	86	30	1	252	-3.0	0.0	2	0.46	25
MAR										
15...	1450	134	--	--	229	2.0	1.0	4	1.4	91
APR										
12...	1500	229	--	0	210	9.0	4.0	6	3.7	86
20...	1445	1660	--	--	--	3.0	2.5	129	578	78
27...	1615	1910	--	--	153	2.0	2.0	--	--	--
MAY										
16...	1230	3670	--	--	123	14.0	4.0	66	654	42
JUN										
08...	1800	5600	--	--	75	17.0	8.5	158	2390	52
JUL										
04...	1430	1690	--	--	92	32.0	12.0	16	73	75
AUG										
09...	1400	351	--	--	181	24.0	17.0	12	11	94
31...	1515	243	--	--	198	20.0	13.0	6	3.9	82

DATE	TIME	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STANDARD UNITS) (00400)	TURBIDITY (NTU) (00076)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)
OCT 1988											
05...	1100	614	9.6	100	131	0	109	7.8	1.6	94	0
NOV											
02...	1240	605	10.3	102	137	0	112	8.0	0.80	100	0

DATE	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)
OCT 1988											
05...	23	8.9	11	0.5	1.8	112	12	1.0	0.10	18	141
NOV											
02...	25	9.6	11	0.5	1.7	114	11	1.0	0.20	20	147

06188000 LAMAR RIVER NEAR TOWER FALLS RANGER STATION, YELLOWSTONE NATIONAL PARK--Continued

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1989

DATE	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	RESIDUE VOLA-TILE, SUS-PENDED (MG/L) (00535)	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)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N) (00607)
OCT 1988										
05...	0.19	40.4	6	<1	<0.100	<0.100	0.030	0.030	0.27	0.17
NOV										
02...	0.20	40.8	5	<1	<0.100	<0.100	<0.010	<0.010	--	--

DATE	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHOROUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)
OCT 1988										
05...	0.30	0.20	0.030	0.010	0.020	<0.010	2.1	1.6	100	9
NOV										
02...	0.20	<0.20	0.030	0.030	0.020	0.020	1.7	1.2	110	20

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1987 TO SEPTEMBER 1988

DAY	APRIL MEAN CONCEN-TRATION (MG/L)	APRIL LOADS (T/DAY)	MAY MEAN CONCEN-TRATION (MG/L)	MAY LOADS (T/DAY)	JUNE MEAN CONCEN-TRATION (MG/L)	JUNE LOADS (T/DAY)	JULY MEAN CONCEN-TRATION (MG/L)	JULY LOADS (T/DAY)	AUGUST MEAN CONCEN-TRATION (MG/L)	AUGUST LOADS (T/DAY)	SEPTEMBER MEAN CONCEN-TRATION (MG/L)	SEPTEMBER LOADS (T/DAY)
1									---		3	.94
2									---		2	.63
3									---		3	.95
4									---		2	.63
5									---		2	.63
6									---		3	.94
7									---		4	1.2
8									---		4	1.2
9									---		4	1.2
10									---		4	1.2
11									---		4	1.3
12									---		1	.33
13									---		1	.33
14									---		1	.35
15									---		1	.33
16									---		1	.32
17									---		1	.31
18									---		1	.31
19									---		1	.31
20									5		1	.31
21									4		3	.92
22									3		4	1.2
23									5		2	.61
24									8		3	.92
25									3		4	1.2
26									5		2	.60
27									1		3	.91
28									4		2	.60
29									1		1	.30
30									4		2	.60
31									4		---	---
TOTAL									---		---	21.58

TOTAL LOAD FOR YEAR: 21.58 TONS.

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

YELLOWSTONE RIVER BASIN

06188000 LAMAR RIVER NEAR TOWER FALLS RANGER STATION, YELLOWSTONE NATIONAL PARK--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	1	.30	2	.55	2	.56	2	.45	2	.33	3	.65
2	1	.29	3	.83	2	.63	2	.45	2	.32	3	.62
3	2	.58	3	.87	2	.65	2	.44	2	.32	3	.59
4	2	.58	3	.91	2	.65	2	.44	2	.32	3	.59
5	3	.87	2	.56	2	.65	2	.44	2	.33	3	.65
6	3	.86	2	.58	2	.70	2	.43	2	.35	3	.69
7	3	.85	2	.56	2	.70	2	.42	2	.37	3	.73
8	3	.84	2	.57	2	.66	2	.41	2	.39	3	.75
9	3	.84	2	.58	2	.65	2	.41	2	.41	4	1.1
10	2	.56	2	.48	2	.64	2	.41	2	.44	4	1.2
11	2	.56	2	.54	2	.63	2	.39	2	.46	4	1.4
12	2	.56	2	.54	2	.60	2	.38	2	.49	4	1.5
13	2	.56	2	.54	2	.59	2	.38	2	.50	4	1.5
14	2	.56	2	.52	2	.50	2	.38	2	.49	4	1.5
15	1	.29	2	.53	2	.43	2	.38	2	.49	4	1.4
16	1	.29	2	.53	2	.46	2	.38	2	.48	4	1.4
17	1	.32	2	.51	2	.48	2	.37	2	.48	5	1.6
18	2	.71	2	.49	2	.49	2	.38	2	.48	5	1.6
19	2	.68	2	.49	2	.50	2	.38	2	.47	6	1.8
20	4	1.4	2	.50	2	.51	2	.38	2	.46	6	1.8
21	4	1.3	2	.51	2	.51	2	.38	2	.45	6	1.8
22	4	1.2	2	.52	2	.50	2	.37	2	.45	6	1.8
23	4	1.2	2	.54	2	.50	2	.36	2	.45	7	2.1
24	3	.89	2	.53	2	.49	2	.35	2	.44	7	2.1
25	3	.89	2	.51	2	.49	2	.35	2	.44	7	2.1
26	3	.87	2	.51	2	.46	2	.35	2	.44	7	2.1
27	2	.56	2	.51	2	.43	2	.36	3	.65	7	2.3
28	2	.55	2	.51	2	.43	2	.36	3	.65	7	2.4
29	2	.55	2	.52	2	.43	2	.36	---	---	7	2.4
30	2	.55	2	.54	2	.44	2	.36	---	---	7	2.4
31	2	.56	---	---	2	.45	2	.35	---	---	7	2.5
TOTAL	---	21.62	---	16.88	---	16.81	---	12.05	---	12.35	---	47.07
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	6	2.2	15	51	90	909	39	240	10	12	5	3.3
2	6	2.2	24	104	123	1420	25	142	9	11	5	3.2
3	5	1.6	28	131	176	2210	20	108	95	108	6	3.7
4	5	1.8	19	76	63	638	19	92	24	25	3	1.8
5	5	1.7	22	90	123	1460	20	92	5	5.0	4	2.3
6	6	2.1	140	1040	225	3180	15	65	3	2.9	6	3.4
7	17	6.8	306	3390	328	5170	13	53	2	1.9	4	2.3
8	30	15	495	7890	325	5250	11	40	2	1.9	2	1.2
9	27	13	410	6590	205	3110	10	35	7	6.6	1	.59
10	22	9.7	540	10700	196	2980	59	218	5	4.8	1	.58
11	25	13	535	9820	162	2360	46	164	35	41	1	.55
12	33	21	275	4380	122	1530	14	44	385	369	1	.52
13	35	30	165	2360	122	1520	87	331	78	85	1	.52
14	37	40	122	1520	138	1720	64	202	105	101	2	1.0
15	45	73	95	1030	127	1580	29	79	29	25	2	.99
16	50	121	120	1170	327	5090	26	69	8	6.4	2	.98
17	40	102	130	1410	183	2480	10	24	6	4.5	2	.95
18	36	91	218	2640	130	1460	8	17	25	21	4	2.4
19	195	632	213	2600	126	1460	7	14	690	1140	5	3.1
20	140	567	62	561	158	1880	6	11	250	258	3	1.6
21	180	972	145	1500	60	536	5	9.1	40	37	2	1.0
22	130	877	239	3080	47	339	7	13	20	17	2	.99
23	100	729	350	5240	35	223	11	22	9	7.0	2	.96
24	85	551	295	4160	24	145	65	119	6	4.4	1	.46
25	88	570	80	767	23	134	16	26	6	5.0	1	.45
26	58	360	56	440	24	139	30	51	6	5.3	1	.44
27	38	246	60	460	25	148	370	612	6	4.9	2	.89
28	24	101	87	740	30	188	155	264	7	5.9	2	.96
29	20	69	115	1230	35	217	130	204	6	4.8	2	.97
30	14	44	127	1340	40	249	35	48	6	4.3	2	.89
31	---	---	64	588	---	---	19	24	5	3.3	---	---
TOTAL	---	6265.1	---	77098	---	49725	---	3432.1	---	2328.9	---	42.99

TOTAL LOAD FOR YEAR 139018.87 TONS

06189000 BLACKTAIL DEER CREEK NEAR MAMMOTH, YELLOWSTONE NATIONAL PARK

LOCATION.--Lat 44°56'50", long 110°35'07", Yellowstone National Park, Hydrologic Unit 10070001, on left bank 0.6 mile upstream from East Fork, 0.7 mile upstream from culvert on Mammoth-Tower Falls highway, and 6.0 mi southeast of Mammoth.

DRAINAGE AREA.--14.3 mi^2.

PERIOD OF RECORD.--December 1937 to October 1945, Oct. 1, 1988 to Sept. 30, 1989.

GAGE.--Water-stage recorder. Elevation of gage is 6,680 ft above National Geodetic Vertical Datum of 1929, from topographic map. December 1937 to October 1945, water-stage recorder and Cippoletti weir at site 300 ft downstream at different datum.

REMARKS.--Estimated daily discharges: Oct. 1-26, Nov. 13 to Apr. 13, July 1-4. Records good except those for estimated daily discharges, which are poor. No diversion or regulation upstream of station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--8 years (1939-45, 1989), 7.53 ft^3/s, 5,460 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 168 ft^3/s, June 1, 1943, gage height, 3.17 ft, site and datum then in use; no flow for short periods Dec. 23, 24, 1937, ice jams upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 60 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage Height (ft)	Date	Time	Discharge (ft^3/s)	Gage Height (ft)
Apr. 22	1615	*138	*3.62	May 23	2300	73	2.84
May 10	1915	135	3.59	June 10	2315	36	2.09
May 18	2045	106	3.28	June 17	0015	35	2.08

Minimum discharge, 0.62 ft^3/s, Nov. 5,7, gage height, 0.60 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e1.8	1.7	e1.7	e1.8	e1.6	e1.8	e2.5	17	29	e10	4.8	3.7
2	e1.8	1.7	e1.7	e1.8	e1.4	e1.8	e2.5	23	29	e9.5	5.0	3.6
3	e1.8	1.9	e1.7	e1.8	e1.3	e1.8	e2.4	29	30	e9.0	4.5	3.5
4	e1.8	1.6	e1.7	e1.8	e1.3	e1.8	e2.4	27	28	e8.5	4.3	3.5
5	e1.8	1.5	e1.7	e1.8	e1.4	e1.9	e2.4	40	27	8.1	4.2	3.3
6	e1.8	2.1	e1.7	e1.7	e1.4	e2.0	e2.6	61	28	7.8	4.1	3.4
7	e1.8	1.4	e1.7	e1.5	e1.5	e2.1	e3.5	74	26	7.7	4.1	3.5
8	e1.8	1.9	e1.7	e1.5	e1.5	e2.3	e4.0	94	25	7.4	4.1	3.6
9	e1.8	1.7	e1.7	e1.6	e1.6	e2.5	e3.2	84	25	7.5	4.2	3.7
10	e1.8	2.0	e1.7	e1.7	e1.6	e2.5	e2.8	104	27	13	4.6	3.5
11	e1.8	2.0	e1.7	e1.7	e1.7	e2.5	e2.9	90	29	8.3	5.4	3.4
12	e1.8	1.9	e1.8	e1.7	e1.6	e2.4	e3.0	72	23	8.6	5.0	3.4
13	e1.8	e1.9	e1.8	e1.8	e1.6	e2.4	e6.5	47	21	12	5.5	3.4
14	e1.8	e1.8	e1.8	e1.8	e1.6	e2.3	12	40	20	8.1	4.6	3.4
15	e1.8	e1.8	e1.7	e1.8	e1.6	e2.3	21	40	18	7.3	4.5	3.2
16	e1.8	e1.7	e1.7	e1.8	e1.6	e2.2	28	41	25	7.4	4.2	3.2
17	e1.8	e1.7	e1.7	e1.8	e1.6	e2.2	15	39	29	7.2	4.0	3.3
18	e1.8	e1.7	e1.7	e1.8	e1.6	e2.3	15	54	22	6.7	4.1	5.0
19	e1.8	e1.7	e1.7	e1.8	e1.7	e2.4	20	54	18	6.2	5.9	3.7
20	e1.7	e1.7	e1.7	e1.9	e1.7	e2.4	28	37	18	6.0	5.3	3.5
21	e1.7	e1.8	e1.7	e1.9	e1.8	e2.5	50	39	20	5.8	4.9	3.4
22	e1.7	e1.8	e1.7	e1.8	e1.9	e2.5	83	46	16	6.7	4.3	3.4
23	e1.7	e1.9	e1.6	e1.7	e2.0	e2.5	54	51	14	6.5	4.1	3.3
24	e1.7	e1.8	e1.6	e1.6	e2.0	e2.5	42	45	15	6.4	3.9	3.2
25	e1.7	e1.7	e1.5	e1.5	e2.0	e2.6	41	35	13	5.5	4.6	3.2
26	e1.6	e1.6	e1.5	e1.6	e2.0	e2.7	32	32	13	5.8	4.9	3.2
27	1.4	e1.6	e1.5	e1.7	e1.9	e2.7	23	30	12	5.5	4.2	3.3
28	1.5	e1.6	e1.6	e1.7	e1.9	e2.7	18	31	11	8.3	5.1	3.7
29	1.7	e1.7	e1.6	e1.8	---	e2.7	16	35	11	5.6	4.1	3.4
30	1.7	e1.7	e1.6	e1.9	---	e2.6	15	33	11	5.1	3.8	3.2
31	1.6	---	e1.7	e1.7	---	e2.6	---	30	---	4.9	3.7	---
TOTAL	53.9	52.6	51.9	53.8	46.4	72.5	553.7	1474	633	232.4	140.0	104.1
MEAN	1.74	1.75	1.67	1.74	1.66	2.34	18.5	47.5	21.1	7.50	4.52	3.47
MAX	1.8	2.1	1.8	1.9	2.0	2.7	83	104	30	13	5.9	5.0
MIN	1.4	1.4	1.5	1.5	1.3	1.8	2.4	17	11	4.9	3.7	3.2
AC-FT	107	104	103	107	92	144	1100	2920	1260	461	278	206

WTR YR 1989 TOTAL 3468.3 MEAN 9.50 MAX 104 MIN 1.3 AC-FT 6880

e Estimated

YELLOWSTONE RIVER BASIN

06189000 BLACKTAIL DEER CREEK NEAR MAMMOTH, YELLOWSTONE NATIONAL PARK--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1988 to September 1989 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	PH (STAND-ARD UNITS) (00400)	TUR-BID-ITY (NTU) (00076)
OCT												
26...	1230	1.7	--	--	138	15.0	6.0	--	--	--	--	--
NOV												
01...	1330	1.6	95	2	140	12.0	5.0	596	10.0	100	7.4	1.9
DEC												
06...	1230	1.7	--	--	139	0.0	0.0	--	--	--	--	--
JAN												
14...	0830	1.8	--	--	167	-5.0	0.0	--	--	--	--	--
FEB												
14...	1545	1.6	--	--	152	-4.0	0.0	--	--	--	--	--
MAR												
16...	1000	2.2	--	--	208	3.0	0.5	--	--	--	--	--
APR												
12...	1005	3.0	--	--	211	9.0	0.0	--	--	--	--	--
27...	1940	27	--	--	188	3.0	2.0	--	--	--	--	--
MAY												
08...	2030	123	--	--	142	11.0	7.0	--	--	--	--	--
15...	1830	44	--	--	133	6.0	14.0	--	--	--	--	--
JUN												
07...	1420	27	--	--	98	22.5	12.0	--	--	--	--	--
JUL												
04...	1945	8.3	--	--	101	27.0	16.0	--	--	--	--	--
AUG												
10...	1900	4.5	--	--	125	13.0	16.0	--	--	--	--	--
SEP												
06...	1300	3.4	--	--	124	12.5	10.0	--	--	--	--	--

DATE	HARD-NESS TOTAL (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)	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)
NOV											
01...	56	0	13	5.6	6.6	0.4	1.9	64	7.2	0.90	0.30

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	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)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	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)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)
NOV											
01...	30	102	0.14	0.44	29	0.200	<0.100	0.030	<0.010	<0.20	<0.20

DATE	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHOROUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	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											
01...	0.090	0.090	0.070	0.060	2.6	2.5	10	37	4	0.02	80

06190370 GARDNER RIVER ABOVE MAMMOTH SPRINGS OUTFLOW, NEAR MAMMOTH, YELLOWSTONE NATIONAL PARK

LOCATION.--Lat 44°58'05", long 110°40'46", Yellowstone National Park, Hydrologic Unit 10070001, on right bank, 1200 ft upstream from Mammoth Springs outflow, 0.5 mi upstream from foot bridge.

PERIOD OF RECORD.--Water years 1988 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)
OCT									
05...	0730	71	--	0	245	-5.0	4.5	17	5.5
NOV									
01...	1615	74	30	1	250	15.5	6.0	24	5.7
DEC									
06...	1530	76	90	71	273	0.0	0.0	25	6.4
JAN									
10...	1030	64	--	84	255	-3.0	0.0	19	6.6
MAR									
15...	1300	55	30	1	283	0.0	1.5	28	7.9
APR									
11...	0900	67	--	0	272	-1.5	0.0	26	7.2
MAY									
10...	1645	E850	60	53	147	14.0	11.0	14	2.0
JUN									
07...	1100	E550	--	1	133	21.0	7.0	8.0	1.4
JUL									
05...	0900	295	0	0	160	26.0	10.0	9.0	2.1
AUG									
08...	1045	128	90	3	205	21.0	13.0	13	3.5
SEP									
11...	1130	102	10	1	220	9.5	5.0	16	3.9

DATE	TIME	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
OCT									
05...	0730	8.2	100	4	28	7.2	11	0.5	2.6
JUN									
07...	1100	7.8	64	5	19	3.9	3.3	0.2	1.2

DATE	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)
OCT								
05...	96	1.1	28	158	0.21	30.3	110	28
JUN								
07...	59	0.50	13	86	0.12	E127	30	18

YELLOWSTONE RIVER BASIN

06190415 MAMMOTH SPRINGS OUTFLOW AT MAMMOTH, YELLOWSTONE NATIONAL PARK

LOCATION.--Lat 44°58'08", long 110°41'02", Yellowstone National Park, Hydrologic Unit 10070001, 2,000 ft upstream from mouth.

PERIOD OF RECORD.--Water years 1988 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)
OCT									
06...	0730	0.89	0	0	1980	-1.5	8.0	600	160
NOV									
02...	1545	1.0	100	2	2000	9.0	12.5	650	170
DEC									
06...	1700	1.1	100	74	2150	-2.0	9.0	640	170
JAN									
10...	0845	0.95	100	76	2090	3.0	6.0	640	170
MAR									
15...	1100	0.89	30	1	2100	0.0	9.5	640	170
APR									
11...	1030	0.89	--	--	2110	6.0	11.0	610	170
MAY									
10...	1545	1.3	100	65	2070	17.0	18.0	640	170
JUN									
07...	1150	1.4	30	1	2050	23.0	23.5	640	180
JUL									
05...	1130	1.3	0	0	2050	29.0	24.0	650	180
AUG									
08...	0800	1.3	90	2	2080	15.0	18.0	650	180
SEP									
11...	1245	1.6	30	1	1970	10.0	16.0	650	180

DATE	TIME	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
OCT									
06...	0730	7.8	750	540	170	80	130	2	43
JUN									
07...	1150	8.0	770	560	170	84	140	2	55

DATE	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)
OCT								
06...	210	2.2	48	1360	1.85	3.28	3800	<3
JUN								
07...	214	2.4	52	1460	1.97	5.50	4100	20

YELLOWSTONE RIVER BASIN

06190525 GARDNER RIVER SINKHOLE DIVERSION AT MAMMOTH, YELLOWSTONE NATIONAL PARK

WATER-QUALITY RECORDS

LOCATION.--Lat 44°58'53", long 110°41'09", Yellowstone National Park, Hydrologic Unit 10070001, 0.3 mi upstream from Hot River, 1.0 mi northeast of Mammoth and at mile 3.7.

PERIOD OF RECORD.--October 1988 to September 1989.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)
OCT 05...	1600	11	0	0	265	21.0	10.0	27	8.1
DEC 05...	1530	9.7	10	1	310	2.0	0.0	47	10
MAR 13...	1715	3.6	100	2	260	1.0	1.0	44	11
APR 11...	1430	7.0	40	1	280	12.0	6.0	35	9.7
MAY 09...	1200	E12	30	1	158	21.0	7.0	18	3.2
JUN 06...	1600	E10	40	10	150	28.0	11.5	10	2.1
JUL 05...	1515	E10	0	0	192	33.0	12.0	12	2.7
AUG 08...	1500	8.4	90	3	252	27.0	16.5	21	5.5
SEP 11...	1415	5.6	30	1	265	11.0	8.0	28	7.1

DATE	TIME	PH LAB (STANDARD UNITS) (00403)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)
JUN 06...	1600	8.0	68	5	20	4.4	4.0	0.2	1.4

DATE	ALKALINITY LAB (MG/L AS CACO3) (90410)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)
JUN 06...	63	0.50	14	94	0.13	E2.54	40	12

YELLOWSTONE RIVER BASIN

06190540 HOT RIVER AT MAMMOTH, YELLOWSTONE NATIONAL PARK

LOCATION.--LAT 44°59'07", long 110°41'18", Yellowstone National Park, Hydrologic Unit 10070001, on left bank, 50 ft downstream from outfall, 150 ft upstream of mouth, 0.8 mile northeast of U.S. Post Office at Mammoth, Yellowstone National Park.

DRAINAGE AREA.--Indeterminate.

PERIOD OF RECORD.--September 1988 to September 1989. Miscellaneous measurements made at this site 1938-44, 1966-67, and 1986-87 water years.

GAGE.--Water-stage recorder. Datum of gage is 5,666.11 ft above National Geodetic Vertical Datum of 1929. Levels by U.S. National Park Service.

REMARKS.--Estimated daily discharges: Oct. 23-29, Nov. 17 to Dec. 4, Dec. 27 to Jan. 10, and Feb. 1-8. Records good except those for estimated daily discharges, which are poor. No regulation or diversion upstream of station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 30 ft^3/s, on many days in 1989, gage height, 1.38 ft; minimum, 22 ft^3/s, Mar. 20, 1989, gage height, 1.22 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 30 ft^3/s, on many days, gage height, 1.38 ft; minimum, 22 ft^3/s, Mar. 20, gage height, 1.22 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	29	e25	e28	e28	27	27	25	30	27	27	24
2	30	29	e28	e28	e26	25	27	25	30	27	27	24
3	30	29	e28	e28	e25	25	27	25	30	27	26	24
4	30	30	e27	e28	e27	26	26	26	29	27	26	24
5	30	30	26	e28	e28	27	27	26	29	27	26	24
6	30	30	28	e28	e28	27	27	27	29	27	27	24
7	30	30	28	e26	e28	26	27	29	29	27	27	24
8	30	30	28	e27	28	27	27	30	29	26	27	24
9	30	30	28	e28	28	27	27	30	29	26	27	24
10	30	30	28	e28	28	27	27	30	29	27	27	24
11	30	30	e28	28	28	27	27	30	29	27	27	24
12	30	30	e28	28	28	26	27	30	29	26	27	23
13	30	30	e28	28	28	26	27	29	29	27	27	23
14	30	30	e27	29	28	26	28	29	28	26	27	24
15	30	27	e26	28	27	25	28	29	28	26	27	24
16	30	29	28	28	28	26	28	28	29	26	27	24
17	30	e29	29	28	28	25	28	29	29	26	27	24
18	30	e29	29	28	27	25	28	29	29	26	26	24
19	30	e29	29	28	27	26	27	29	28	27	26	24
20	30	e29	29	27	27	24	27	29	28	27	25	24
21	30	e29	29	28	27	25	27	29	28	27	25	24
22	30	e29	28	28	27	25	28	29	28	27	25	24
23	e30	e29	28	28	27	26	28	30	28	27	25	24
24	e30	e28	27	28	27	26	27	30	27	27	25	24
25	e30	e27	28	28	27	27	28	29	27	27	25	24
26	e30	e26	27	29	27	27	27	30	27	27	25	24
27	e30	e25	e25	29	27	27	26	30	27	27	25	24
28	e29	e26	e26	29	27	27	26	30	27	27	25	24
29	e29	e28	e28	28	---	27	26	30	27	27	25	24
30	29	e27	e28	28	---	27	25	30	27	27	25	24
31	29	---	e28	28	---	27	---	30	---	27	25	---
TOTAL	926	863	857	868	766	811	812	891	852	829	808	718
MEAN	29.9	28.8	27.6	28.0	27.4	26.2	27.1	28.7	28.4	26.7	26.1	23.9
MAX	30	30	29	29	28	27	28	30	30	27	27	24
MIN	29	25	25	26	25	24	25	25	27	26	25	23
AC-FT	1840	1710	1700	1720	1520	1610	1610	1770	1690	1640	1600	1420

WTR YR 1989 TOTAL 10001 MEAN 27.4 MAX 30 MIN 23 AC-FT 19840

e Estimated

06190540 HOT RIVER AT MAMMOTH, YELLOWSTONE NATIONAL PARK--Continued

WATER QUALITY RECORDS

PERIOD OF RECORD.--Water years 1988 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1988 to September 1989.
WATER TEMPERATURE: October 1988 to September 1989.

INSTRUMENTATION.--Water-quality monitor since Sept. 13, 1988.

REMARKS.--No specific conductance or water temperature records Oct. 4-5 (monitor not in operation) and Nov. 14 to Dec. 5 (condensation problem caused monitor to fail).

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 2190 microsiemens, Apr. 4, 1989; minimum, 1520 microsiemens, June 17, 1989.
WATER TEMPERATURE: Maximum, 51.5°C, Feb. 2, 1989; minimum, 38°C, June 16, 17, 1989.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 2190 microsiemens, Apr. 4; minimum, 1520 microsiemens, June 17.
WATER TEMPERATURES: Maximum, 51.5°C, Feb. 2; minimum, 38°C, June 16, 17.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)
OCT									
05...	1530	30	--	0	--	22.0	42.0	400	110
NOV									
01...	1000	29	20	1	1670	5.0	40.5	420	110
DEC									
05...	1345	27	10	1	1660	2.0	39.5	420	110
15...	1045	24	20	1	1800	--	47.5	--	--
JAN									
13...	1600	28	--	1	1640	-9.0	40.0	430	110
FEB									
17...	1145	28	--	--	1580	-4.0	41.5	--	--
MAR									
13...	1530	27	--	71	1810	5.0	43.0	450	120
APR									
11...	1245	27	0	0	1840	14.0	44.0	430	120
MAY									
09...	1030	30	30	1	1610	18.0	41.0	410	110
16...	1815	27	--	--	1710	12.0	45.0	--	--
JUN									
06...	1415	29	30	1	1550	28.0	42.0	390	110
JUL									
05...	1515	27	0	0	1640	33.0	44.5	420	110
AUG									
08...	1500	27	90	3	1700	26.0	45.5	420	120
SEP									
01...	0930	--	--	--	1780	--	--	--	--
05...	1600	24	--	--	1820	30.0	48.0	--	--
11...	1500	24	30	1	1570	15.5	47.5	470	120

DATE	TIME	PH LAB (STANDARD UNITS) (00403)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)
OCT									
05...	1530	7.2	640	360	170	52	86	2	29
JUN									
06...	1415	6.9	620	290	170	47	81	1	33

DATE	ALKALINITY LAB (MG/L AS CACO3) (90410)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)
OCT								
05...	275	2.3	44	1060	1.44	85.9	2500	<3
JUN								
06...	328	2.3	39	1070	1.45	83.9	2400	21

YELLOWSTONE RIVER BASIN

06190540 HOT RIVER AT MAMMOTH, YELLOWSTONE NATIONAL PARK--Continued

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	1740	1690	1710	1700	1650	1670	---	---	---	1690	1660	1680
2	1730	1680	1710	1690	1670	1680	---	---	---	1700	1680	1690
3	1720	1700	1710	1690	1670	1680	---	---	---	1720	1690	1700
4	1720	---	---	1690	1670	1680	---	---	---	1720	1700	1710
5	---	---	---	1700	1680	1690	---	---	---	1730	1700	1720
6	1650	1620	1630	1700	1680	1690	1690	1670	---	1940	1700	1760
7	1660	1630	1640	1700	1680	1690	1700	1680	1660	1840	1700	1770
8	1670	1650	1660	1690	1670	1680	1790	1700	1720	1700	1660	1680
9	1680	1660	1670	1680	1660	1680	1710	1690	1680	1690	1660	1680
10	1690	1660	1680	1700	1650	1670	1730	1710	1700	1710	1670	1690
11	1700	1680	1690	1670	1640	1660	1730	1720	1710	1730	1710	1720
12	1700	1680	1690	1680	1640	1660	1750	1730	1730	1730	1710	1720
13	1700	1690	1690	1680	1650	1670	1760	1740	1740	1740	1690	1720
14	1720	1680	1700	---	---	---	1820	1740	1770	1740	1700	1710
15	1710	1680	1700	---	---	---	2040	1720	1850	1750	1710	1730
16	1700	1690	1700	---	---	---	1810	1690	1740	1730	1530	1710
17	1710	1680	1700	---	---	---	1700	1660	1680	1740	1710	1730
18	1690	1660	1680	---	---	---	1660	1640	1660	1750	1730	1740
19	1700	1650	1670	---	---	---	1660	1640	1650	1750	1730	1740
20	1710	1590	1640	---	---	---	1680	1650	1660	2120	1710	1790
21	1640	1600	1620	---	---	---	1670	1650	1660	1730	1710	1720
22	1650	1620	1630	---	---	---	1760	1640	1680	1730	1700	1720
23	1640	1620	1640	---	---	---	1670	1640	1660	1790	1700	1730
24	1650	1630	1640	---	---	---	2070	1640	1720	1780	1720	1750
25	1650	1630	1640	---	---	---	1710	1640	1670	1720	1680	1700
26	1650	1630	1640	---	---	---	1740	1710	1730	1710	1680	1690
27	1640	1600	1630	---	---	---	1720	1640	1670	1720	1680	1690
28	1660	1620	1640	---	---	---	1650	1630	1640	1710	1690	1700
29	1680	1640	1660	---	---	---	1640	1630	1640	1700	1680	1690
30	1690	1660	1670	---	---	---	1650	1630	1640	1700	1690	1700
31	1700	1670	1680	---	---	---	1660	1640	1650	1720	1700	1710
MONTH	1740	1590	1670	1700	1640	1680	2070	1630	1690	2120	1530	1720
		FEBRUARY			MARCH			APRIL			MAY	
1	2050	1720	1840	1800	1770	1780	1870	1850	1860	2130	2050	2100
2	2180	1740	1910	2060	1780	1900	1860	1840	1850	2110	2060	2090
3	1740	1680	1710	2000	1790	1880	2050	1840	1870	2100	2040	2060
4	1700	1670	1690	1800	1770	1790	2190	1820	1910	2100	2040	2070
5	1700	1670	1680	1780	1760	1760	1850	1830	1840	2080	1910	2040
6	1720	1670	1690	1800	1770	1790	1850	1840	1840	2000	1690	1920
7	1720	1690	1700	1810	1800	1810	1840	1820	1830	1720	1650	1700
8	1740	1710	1720	1820	1790	1800	1840	1810	1830	1660	1610	1640
9	1740	1710	1730	1800	1770	1780	1840	1830	1830	1630	1580	1620
10	1750	1720	1730	1800	1780	1790	2130	1820	1880	1640	1600	1620
11	1760	1720	1740	1800	1790	1800	1850	1830	1840	1640	1600	1630
12	1770	1740	1750	1820	1800	1800	1850	1820	1840	1660	1620	1640
13	1770	1740	1760	1820	1800	1810	1850	1830	1840	1760	1660	1720
14	1780	1740	1760	1830	1810	1820	1840	1820	1830	1800	1750	1780
15	1780	1730	1760	2050	1780	1870	1840	1820	1830	1800	1770	1790
16	1750	1720	1740	1810	1780	1800	1840	1820	1830	1800	1760	1780
17	1750	1740	1740	1890	1790	1840	1840	1810	1830	1800	1750	1770
18	1760	1740	1750	1820	1780	1810	1830	1780	1810	1790	1680	1750
19	1770	1760	1770	1800	1780	1790	1820	1760	1790	1710	1680	1690
20	1770	1760	1770	2090	1780	1870	1790	1730	1770	1770	1720	1750
21	1770	1740	1760	1840	1810	1820	1780	1690	1740	1790	1760	1770
22	1760	1740	1750	1840	1810	1820	1740	1680	1710	1790	1730	1760
23	1760	1750	1760	1830	1800	1820	1750	1700	1730	1720	1660	1700
24	1780	1750	1770	1870	1810	1830	1810	1750	1790	1710	1650	1670
25	1770	1760	1770	1830	1810	1820	1830	1790	1810	1720	1660	1690
26	1790	1770	1780	1820	1810	1820	1920	1810	1850	1680	1620	1650
27	1790	1770	1780	1830	1810	1820	1980	1930	1960	1650	1630	1640
28	1880	1760	1790	1830	1810	1820	2060	2000	2020	1650	1630	1640
29	---	---	---	1830	1810	1820	2110	2060	2090	1650	1600	1630
30	---	---	---	1860	1820	1840	2120	2080	2110	1650	1590	1620
31	---	---	---	1860	1850	1860	---	---	---	1650	1620	1640
MONTH	2180	1670	1750	2090	1760	1820	2190	1680	1850	2130	1580	1760

YELLOWSTONE RIVER BASIN

06190540 HOT RIVER AT MAMMOTH, YELLOWSTONE NATIONAL PARK--Continued

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	1650	1620	1640	1690	1660	1670	1680	1660	1670	1870	1850	1870
2	1650	1620	1640	1690	1660	1670	1660	1610	1650	1880	1870	1880
3	1640	1620	1630	1690	1600	1670	1670	1610	1660	1880	1870	1880
4	1660	1620	1640	1690	1660	1670	1700	1600	1670	1900	1870	1890
5	1660	1640	1650	1680	1660	1670	1730	1680	1700	1900	1880	1890
6	1640	1590	1620	1680	1660	1670	1740	1690	1720	1910	1890	1900
7	1620	1590	1600	1680	1660	1670	1740	1690	1730	1910	1890	1900
8	1610	1580	1590	1680	1660	1670	1730	1690	1720	1920	1880	1900
9	1620	1580	1600	1670	1650	1660	1720	1710	1720	1920	1880	1900
10	1610	1580	1600	1690	1640	1670	1730	1710	1720	1900	1880	1890
11	1610	1570	1590	1700	1670	1680	1730	1710	1720	1910	1880	1900
12	1640	1600	1620	1700	1680	1690	1740	1710	1720	1920	1880	1900
13	1650	1620	1630	1700	1670	1690	1740	1720	1730	1900	1880	1890
14	1650	1630	1640	1710	1690	1700	1740	1720	1730	1920	1880	1900
15	1640	1610	1630	1700	1690	1700	1750	1720	1730	1930	1900	1920
16	1610	1530	1570	1700	1680	1690	1770	1730	1750	1940	1910	1930
17	1590	1520	1550	1700	1680	1690	1770	1750	1760	1950	1930	1940
18	1620	1580	1600	1700	1680	1690	1800	1750	1770	1930	1900	1920
19	1650	1600	1620	1710	1680	1700	1760	1710	1730	1950	1910	1930
20	1650	1620	1630	1710	1680	1700	1790	1760	1780	1960	1930	1950
21	1670	1630	1650	1730	1700	1710	1810	1780	1800	1970	1940	1950
22	1680	1660	1670	1720	1690	1710	1820	1810	1810	1950	1940	1950
23	1690	1660	1670	1710	1690	1700	1830	1800	1820	1950	1940	1950
24	1700	1660	1680	1710	1680	1700	1820	1800	1810	1950	1930	1940
25	1720	1680	1700	1710	1690	1700	1810	1790	1800	1940	1920	1930
26	1710	1660	1700	1710	1690	1700	1820	1800	1810	1950	1920	1930
27	1700	1680	1690	1720	1690	1700	1830	1820	1820	1950	1930	1940
28	1690	1670	1680	1720	1690	1700	1860	1810	1840	1940	1910	1930
29	1690	1660	1680	1700	1670	1690	1880	1840	1860	1920	1900	1910
30	1690	1660	1670	1700	1670	1690	1880	1830	1870	1920	1900	1910
31	---	---	---	1700	1670	1680	1890	1870	1880	---	---	---
MONTH	1720	1520	1640	1730	1600	1690	1890	1600	1760	1970	1850	1910

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	42.5	41.0	42.0	41.5	40.5	41.0	---	---	---	40.0	39.5	39.5
2	42.5	41.0	42.0	42.0	41.0	41.5	---	---	---	40.0	39.5	40.0
3	42.5	41.5	42.0	41.5	41.0	41.0	---	---	---	40.5	40.0	40.0
4	42.0	41.0	---	41.0	40.5	40.5	---	---	---	41.0	40.5	40.5
5	42.0	---	---	40.5	40.0	40.5	---	---	---	41.0	40.5	40.5
6	41.5	40.5	41.0	41.0	40.5	40.5	39.0	---	---	45.5	40.5	41.5
7	42.0	40.5	41.0	40.5	40.0	40.0	39.5	39.0	39.0	43.5	40.0	41.5
8	42.0	40.5	41.5	40.5	40.0	40.0	41.5	39.0	40.5	39.5	39.5	39.5
9	42.0	41.0	41.5	40.0	39.5	40.0	39.0	39.0	39.0	39.5	39.5	39.5
10	42.0	41.0	41.5	40.0	39.5	40.0	39.5	39.0	39.5	40.5	39.5	40.0
11	42.0	41.0	41.5	40.5	40.0	40.0	39.5	39.0	39.0	40.5	40.0	40.5
12	41.5	40.5	41.5	40.0	39.5	40.0	39.5	39.5	39.5	40.5	40.0	40.5
13	42.0	41.5	41.5	---	39.5	---	40.0	39.5	39.5	41.0	40.0	40.5
14	42.5	41.5	41.5	---	---	---	41.0	39.0	40.0	41.0	40.0	40.0
15	42.5	41.5	42.0	---	---	---	47.5	40.0	42.5	41.0	40.0	40.5
16	42.5	41.5	42.0	---	---	---	42.0	39.5	40.5	40.5	40.0	40.5
17	42.5	41.5	42.0	---	---	---	40.0	39.0	39.5	41.0	40.5	40.5
18	41.5	40.5	41.0	---	---	---	39.0	39.0	39.0	41.5	41.0	41.0
19	42.0	41.5	41.5	---	---	---	39.0	39.0	39.0	41.0	41.0	41.0
20	42.0	41.0	41.5	---	---	---	39.5	39.0	39.0	49.5	40.5	42.0
21	42.0	41.0	41.5	---	---	---	39.5	39.5	39.5	40.5	40.5	40.5
22	42.0	41.0	41.5	---	---	---	42.0	39.5	39.5	40.5	40.5	40.5
23	41.5	40.5	41.0	---	---	---	39.5	39.5	39.5	42.5	40.0	40.5
24	41.5	41.0	41.0	---	---	---	49.0	39.5	41.0	42.0	40.0	41.0
25	41.5	40.5	41.0	---	---	---	41.0	39.5	40.0	40.5	40.0	40.0
26	42.0	41.0	41.5	---	---	---	41.5	41.0	41.5	40.0	39.5	39.5
27	41.0	40.5	40.5	---	---	---	41.0	39.5	40.0	39.5	39.5	39.5
28	41.5	40.0	40.5	---	---	---	39.5	39.0	39.0	40.0	39.5	40.0
29	41.5	40.5	41.0	---	---	---	39.0	39.0	39.0	40.0	40.0	40.0
30	41.5	40.5	41.0	---	---	---	39.0	39.0	39.0	40.5	40.0	40.0
31	41.5	40.5	41.0	---	---	---	39.5	39.0	39.5	41.0	40.5	41.0
MONTH	42.5	---	---	---	---	---	---	---	---	49.5	39.5	40.5

YELLOWSTONE RIVER BASIN

06190540 HOT RIVER AT MAMMOTH, YELLOWSTONE NATIONAL PARK--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	48.5	41.5	43.5	42.0	41.5	41.5	44.5	43.5	44.0	50.5	49.0	50.0
2	51.5	41.5	45.5	48.0	42.0	44.5	44.5	43.5	44.0	50.0	49.0	49.5
3	41.5	40.5	41.0	47.0	42.5	44.0	48.0	43.5	44.0	49.5	48.0	49.0
4	40.5	40.0	40.5	42.5	42.0	42.0	51.0	43.5	45.0	49.5	48.5	49.0
5	40.0	40.0	40.0	42.0	41.5	42.0	44.5	43.5	44.0	49.0	46.5	48.5
6	40.5	40.0	40.5	42.0	42.0	42.0	45.0	44.0	44.5	48.0	42.0	46.5
7	40.5	40.5	40.5	42.5	42.0	42.5	44.5	44.0	44.5	42.5	41.5	42.0
8	41.0	40.5	41.0	43.0	42.5	42.5	44.5	43.5	44.0	42.0	41.0	41.5
9	41.0	40.5	41.0	42.5	42.0	42.5	44.0	43.0	43.5	42.5	40.5	41.5
10	41.0	41.0	41.0	43.0	42.5	42.5	50.0	43.5	44.5	42.5	41.5	42.0
11	41.5	41.0	41.0	43.5	42.5	43.0	44.5	42.0	43.5	42.5	41.5	42.0
12	41.5	41.0	41.5	43.5	42.5	43.0	45.0	43.5	44.0	42.5	41.5	42.0
13	41.5	41.5	41.5	43.5	40.5	43.0	45.0	43.5	44.0	44.0	42.0	43.5
14	42.0	41.0	41.5	43.5	43.0	43.0	44.5	43.5	44.0	45.5	44.0	44.5
15	42.0	41.0	41.5	48.0	40.5	44.5	44.5	44.0	44.0	45.0	44.5	45.0
16	41.5	41.0	41.0	43.5	43.0	43.5	44.0	43.5	44.0	45.0	44.0	45.0
17	41.5	41.0	41.0	45.0	43.5	44.5	44.5	43.0	44.0	45.5	44.0	44.5
18	42.5	41.5	42.0	44.5	44.0	44.0	44.5	43.0	43.5	45.0	42.5	44.0
19	42.5	42.0	42.5	44.0	43.5	44.0	44.5	43.0	43.5	43.0	42.0	42.5
20	42.5	42.0	42.5	50.0	43.5	45.5	44.0	42.5	43.0	45.0	43.0	44.0
21	42.5	42.0	42.0	45.0	44.0	44.5	43.5	41.5	42.5	46.0	44.0	45.0
22	42.0	42.0	42.0	45.0	44.5	44.5	42.5	41.0	41.5	45.5	44.0	45.0
23	42.5	42.0	42.0	44.5	44.0	44.0	42.5	41.0	42.0	44.0	42.0	43.0
24	42.5	42.0	42.0	45.0	43.5	44.0	44.0	42.0	43.0	43.0	41.5	42.0
25	42.0	42.0	42.0	44.0	44.0	44.0	44.5	43.0	43.5	43.0	42.0	42.5
26	42.0	41.5	42.0	44.5	44.0	44.0	45.5	43.5	44.5	42.5	41.0	42.0
27	42.0	41.5	42.0	44.5	43.5	44.0	48.0	46.0	47.0	42.5	41.0	42.0
28	44.0	41.0	42.0	44.5	43.5	44.0	49.0	48.0	48.0	42.5	41.5	42.0
29	---	---	---	44.0	43.5	43.5	49.5	49.0	49.5	42.5	41.0	41.5
30	---	---	---	44.5	43.5	44.0	50.0	49.5	50.0	42.0	41.0	41.5
31	---	---	---	44.0	43.5	43.5	---	---	---	42.5	41.0	42.0
MONTH	51.5	40.0	41.5	50.0	40.5	43.5	51.0	41.0	44.5	50.5	40.5	44.0
		JUNE			JULY			AUGUST			SEPTEMBER	
1	42.5	41.0	42.0	44.5	40.5	43.0	46.5	45.0	46.0	48.0	47.0	47.5
2	42.5	41.5	42.0	44.5	40.5	43.5	46.0	45.0	45.5	48.0	47.0	47.5
3	42.0	41.0	41.5	45.0	40.5	43.5	46.0	44.5	45.5	48.0	47.0	47.5
4	42.5	41.0	41.5	45.0	43.5	44.0	46.5	44.5	45.5	48.0	47.0	47.5
5	43.0	41.0	42.0	45.0	43.5	44.5	46.0	44.5	45.5	48.5	47.0	48.0
6	42.5	41.0	42.0	45.5	43.5	44.5	46.0	44.5	45.5	48.0	47.5	48.0
7	42.5	41.0	42.0	45.5	43.5	44.5	46.0	45.0	45.5	48.5	47.5	48.0
8	42.0	40.5	41.5	45.0	44.0	44.5	46.0	45.0	45.5	48.5	47.5	48.0
9	42.0	40.5	41.5	44.5	44.0	44.0	46.0	45.0	45.5	48.0	48.0	48.0
10	42.0	41.0	41.0	45.0	44.0	44.5	46.0	45.0	45.5	48.0	47.5	47.5
11	41.5	40.0	41.0	45.5	44.0	45.0	46.0	44.5	45.5	48.0	46.5	47.5
12	42.0	40.5	41.5	45.5	44.5	45.0	45.5	44.5	45.5	48.0	47.0	47.5
13	42.5	40.5	41.5	45.5	44.5	45.0	46.5	45.0	45.5	48.0	46.5	47.0
14	42.5	41.0	42.0	46.0	44.5	45.5	46.0	45.0	45.5	48.0	47.0	47.5
15	43.0	41.0	42.0	46.0	44.5	45.5	46.0	44.5	45.5	48.0	47.0	47.5
16	42.5	38.0	41.0	46.0	44.5	45.5	46.0	44.5	45.5	48.0	47.0	48.0
17	41.5	38.0	39.5	45.5	44.5	45.0	46.5	44.5	45.5	48.5	47.5	48.0
18	42.5	40.5	41.5	46.0	44.0	45.0	45.5	45.0	45.5	48.0	47.0	47.5
19	42.5	40.5	42.0	46.5	44.5	45.5	45.5	44.5	45.0	48.0	47.0	47.5
20	42.0	41.0	41.5	46.5	45.0	45.5	46.5	45.5	46.0	48.0	47.5	47.5
21	42.0	40.5	41.5	46.5	45.5	46.0	47.0	46.0	46.5	48.0	47.5	47.5
22	42.5	41.0	41.5	46.5	45.0	46.0	47.5	46.5	47.0	48.0	47.0	47.5
23	43.0	41.5	42.0	46.0	45.5	45.5	48.0	46.5	47.5	48.0	47.5	48.0
24	43.0	40.5	42.5	46.5	44.5	45.5	47.0	46.5	47.0	48.0	47.5	48.0
25	43.0	40.5	42.5	46.5	45.0	45.5	46.5	46.0	46.5	48.0	47.0	47.5
26	43.5	40.5	42.5	46.0	45.0	45.5	47.5	46.0	46.5	48.5	47.5	48.0
27	43.5	42.5	43.0	46.5	44.5	45.5	47.0	46.5	47.0	48.5	48.0	48.5
28	44.0	42.5	43.0	47.0	45.5	46.0	47.5	46.5	47.0	48.5	47.5	48.5
29	44.0	40.5	43.0	46.5	45.0	46.0	48.0	46.5	47.5	48.0	47.5	48.0
30	44.5	40.5	43.0	46.5	45.0	46.0	48.0	47.0	47.5	48.0	47.5	48.0
31	---	---	---	46.5	45.0	46.0	48.0	47.0	47.5	---	---	---
MONTH	44.5	38.0	42.0	47.0	40.5	45.0	48.0	44.5	46.0	48.5	46.5	48.0

YELLOWSTONE RIVER BASIN

06191000 GARDNER RIVER NEAR MAMMOTH, YELLOWSTONE NATIONAL PARK

LOCATION.--Lat 44°59'33", long 110°41'26", Yellowstone National Park, Hydrologic Unit 10070001, on left bank at Wyoming-Montana state line, 400 ft upstream from highway bridge, 0.5 mi downstream from Hot River (formerly Boiling River), 1.5 mi north of Mammoth, and at mile 2.9.

DRAINAGE AREA.--202 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1938 to September 1972, April 1984 to current year. Prior to October 1959, published as Gardiner River near Mammoth.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 5,623.97 ft above National Geodetic Vertical Datum of 1929 (levels by U. S. National Park Service).

REMARKS.--Estimated daily discharges: Feb. 3-14. Records good. No regulation or diversion upstream of station.

AVERAGE DISCHARGE.--39 years (1938-72, 1985-89), 215 ft^3/s, 14.45 in/yr, 155,800 acre ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,080 ft^3/s, June 4, 1956, gage height, 4.46 ft; maximum gage height, 4.78 ft, June 16, 1962, backwater from logs and debris; minimum discharge, 35 ft^3/s, Mar. 28, 1942, gage height, 1.08 ft.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 10	2400	*1,110	*4.00	June 11	0100	914	3.72
May 19	0030	815	3.57	June 17	0400	1,080	3.95

Minimum discharge, 41 ft^3/s, Dec. 15, Feb. 2, gage height, 1.69 ft, but may have been lower during Feb. 3-14, the period of no gage-height record.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	100	91	74	85	64	82	94	226	529	347	150	120
2	100	93	80	84	56	76	95	270	570	332	149	118
3	99	96	92	82	e54	71	92	319	635	319	144	116
4	99	94	81	83	e54	77	90	313	562	310	141	116
5	98	90	83	84	e58	100	92	375	569	300	140	115
6	98	97	92	84	e64	92	95	520	662	288	139	116
7	97	89	87	63	e74	91	104	670	699	274	139	117
8	97	92	74	75	e70	95	108	813	738	266	139	116
9	97	91	91	83	e70	117	103	891	730	262	140	115
10	97	85	86	86	e74	110	97	959	762	277	142	113
11	97	95	84	79	e78	105	100	988	787	253	145	112
12	97	88	86	80	e72	103	105	826	695	246	155	111
13	97	87	84	84	e76	98	114	645	664	269	145	110
14	97	94	80	84	e76	93	125	557	660	236	138	109
15	97	78	53	82	77	88	139	562	667	225	139	107
16	97	92	67	82	85	90	150	601	877	216	133	106
17	100	93	81	82	83	92	158	634	896	213	129	106
18	97	90	85	82	84	90	169	692	677	201	134	128
19	97	87	88	83	85	91	200	695	657	193	171	114
20	97	87	86	84	85	87	223	540	663	187	150	110
21	95	88	89	84	84	87	280	508	550	182	145	108
22	95	87	85	86	84	89	379	575	459	187	136	108
23	95	89	85	83	84	89	359	700	411	184	130	107
24	95	85	83	73	84	90	325	721	386	182	129	108
25	94	79	82	73	86	94	324	564	369	173	136	107
26	92	77	69	86	83	99	326	477	360	169	138	109
27	91	70	75	88	83	99	276	457	365	171	132	111
28	91	86	81	81	84	97	241	462	372	182	137	114
29	92	90	80	88	---	96	216	554	361	165	129	115
30	92	88	81	87	---	94	212	563	355	158	124	115
31	91	---	87	80	---	93	---	508	---	153	121	---
TOTAL	2978	2648	2531	2540	2111	2875	5391	18185	17687	7120	4319	3377
MEAN	96.1	88.3	81.6	81.9	75.4	92.7	180	587	590	230	139	113
MAX	100	97	92	88	86	117	379	988	896	347	171	128
MIN	91	70	53	63	54	71	90	226	355	153	121	106
AC-FT	5910	5250	5020	5040	4190	5700	10690	36070	35080	14120	8570	6700

CAL YR 1988 TOTAL 50387 MEAN 138 MAX 647 MIN 53 AC-FT 99940
WTR YR 1989 TOTAL 71762 MEAN 197 MAX 988 MIN 53 AC-FT 142300

e Estimated

YELLOWSTONE RIVER BASIN

06191000 GARDNER RIVER NEAR MAMMOTH, YELLOWSTONE NATIONAL PARK--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1985, 1988 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1984 to September 1985.
WATER TEMPERATURE: October 1984 to September 1985.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water year 1985): Maximum , 941 microsiemens, Mar. 4, 1985; minimum, 186 microsiemens, May 26, 1985.
WATER TEMPERATURE (water year 1985): Maximum, 22.5°C, July 22, 26, 1985; minimum, 4.0°C, Apr. 20, May 12, 1985.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)
OCT								
04...	1700	100	30	1	708	16.0	18.5	658
NOV								
01...	1130	92	25	1	760	14.0	17.0	622
DEC								
05...	1700	87	10	1	791	2.0	11.0	--
JAN								
11...	1650	87	80	81	799	-9.0	12.5	--
FEB								
14...	1315	73	--	--	873	-4.0	13.5	--
MAR								
08...	0930	87	75	3	840	10.0	15.0	--
15...	0930	64	30	1	950	0.0	16.5	--
APR								
11...	1530	102	70	2	730	17.0	16.0	--
MAY								
09...	1730	777	20	1	222	21.0	12.0	--
JUN								
06...	1715	618	30	1	231	28.0	13.0	--
JUL								
03...	1945	303	--	--	331	31.0	18.0	--
05...	1715	293	0	0	342	34.0	19.0	--
AUG								
08...	1745	138	90	2	509	22.0	19.5	--
SEP								
05...	1816	116	--	--	604	22.0	19.0	--
11...	1530	122	30	1	567	15.0	15.5	--

DATE	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)
OCT							
04...	8.0	99	199	0	168	140	38
NOV							
01...	8.6	110	212	0	171	150	40
DEC							
05...	--	--	--	--	--	160	43
JAN							
11...	--	--	--	--	--	160	41
MAR							
08...	--	--	--	--	--	170	43
15...	--	--	--	--	--	210	55
APR							
11...	--	--	--	--	--	150	39
MAY							
09...	--	--	--	--	--	30	6.6
JUN							
06...	--	--	--	--	--	28	7.0
JUL							
05...	--	--	--	--	--	51	12
AUG							
08...	--	--	--	--	--	88	21
SEP							
11...	--	--	--	--	--	110	26

06191000 GARDNER RIVER NEAR MAMMOTH, YELLOWSTONE NATIONAL PARK--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	PH (STAND-ARD UNITS) (00400)	TUR-BID-ITY (NTU) (00076)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)
OCT												
04...	1700	7.8	1.1	270	100	73	21	36	1	42	172	1.4
NOV												
01...	1130	7.5	0.50	290	120	77	23	38	1	13	177	1.5
JUN												
06...	1715	--	--	97	21	28	6.5	8.0	0.4	3.3	76	0.50

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	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)	RESIDUE TOTAL AT 105 DEG. C, SUS-PENDED (MG/L) (00530)	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)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, ORGANIC DIS-SOLVED (MG/L AS N) (00607)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)
OCT												
04...	32	485	0.66	131	5	<0.100	<0.100	0.020	0.020	0.38	0.28	0.40
NOV												
01...	33	479	0.65	119	9	<0.100	<0.100	<0.010	0.010	--	--	<0.20
JUN												
06...	15	142	0.19	237	--	--	--	--	--	--	--	--

DATE	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHOROUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	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												
04...	0.30	0.010	<0.010	0.010	<0.010	1.2	1.1	880	13	24	6.5	34
NOV												
01...	<0.20	0.020	0.020	<0.010	<0.010	0.9	0.7	950	11	8	2.0	60
JUN												
06...	--	--	--	--	--	--	--	160	12	--	--	--

YELLOWSTONE RIVER BASIN

06191400 LaDUKE (CORWIN) HOT SPRINGS NEAR CORWIN SPRINGS, MT

LOCATION.--Lat 45°05'26", long 110°46'28", in NW1/4SE1/4SW1/4 sec.32, T.8 S., R.8 E., Park County, Hydrologic Unit 10070001, downstream end of concrete culvert under U.S. Highway 89, about 4.5 mi north of Gardiner, and 3 mi south of Corwin Springs.

PERIOD OF RECORD.--Water years 1988 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)
OCT									
04...	1430	0.24	--	1	2570	18.0	63.5	1300	43
31...	1310	0.26	0	0	2700	20.0	--	1300	44
DEC									
08...	0915	0.25	30	1	--	-9.0	61.5	1300	44
JAN									
14...	1106	0.25	20	1	2650	0.0	61.5	1300	43
FEB									
13...	1615	0.24	--	70	2610	-7.0	61.0	--	--
MAR									
08...	1115	0.24	--	--	2700	10.0	63.5	1300	43
APR									
10...	1700	0.24	--	--	2640	13.0	61.5	1300	43
MAY									
10...	1400	0.26	60	93	2580	23.0	62.0	1300	43
JUN									
07...	0830	0.27	20	1	2540	15.0	62.0	1300	41
JUL									
05...	1815	0.21	0	0	2610	33.0	62.5	1300	44
AUG									
11...	0850	0.20	60	3	2490	16.0	63.0	1300	41
SEP									
08...	1345	0.17	--	60	2580	12.5	64.5	--	--
11...	1715	0.19	30	1	2650	17.0	62.5	1300	41

DATE	TIME	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
OCT									
04...	1430	7.3	1100	890	350	61	240	3	19
JUN									
07...	0830	7.5	1100	810	320	61	240	3	22

DATE	ALKA-LINITY LAB (MG/L AS CACO3) (90410)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)
OCT								
04...	240	3.4	48	2210	3.00	1.43	530	10
JUN								
07...	239	3.7	49	2180	2.96	1.59	490	10

YELLOWSTONE RIVER BASIN

06191500 YELLOWSTONE RIVER AT CORWIN SPRINGS, MT

LOCATION.--Lat 45°06'43", long 110°47'37", in NW1/4SE1/4NW1/4 sec.30, T.8 S., R.8 E., Park County, Hydrologic Unit 10070002, on left bank 20 ft downstream from county road bridge at Corwin Springs, 1.3 mi upstream from Mol Heron Creek, 7 mi northwest of Gardiner, and at mile 549.7.

DRAINAGE AREA.--2,623 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1889 to November 1893 (published as "at Horr"), September 1910 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1309: 1912. WSP 1509: 1889-94, 1911, 1913, 1916-18, 1920-21, 1925, 1927. WSP 1559: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 5,079.09 ft above National Geodetic Vertical Datum of 1929. Aug. 12, 1889, to Nov. 4, 1893, nonrecording gages at site 2 mi upstream at different datums. Sept. 2, 1910, to Apr. 19, 1935, nonrecording gages on bridge at present datum.

REMARKS.--Estimated daily discharges: Dec. 16,17, 26-31, Jan. 8,11,13, Feb. 3-21, Mar. 1-5, 16-19. Water-discharge records good except those for estimated daily discharges, which are poor. Natural storage in Yellowstone Lake. Diversions for irrigation of about 960 acres of which 40 acres lies downstream from station. U.S. Geological Survey satellite telemeter at station.

AVERAGE DISCHARGE.--83 years, (1890-93, 1911-89) 3,093 ft^3/s, 16.01 in/yr, 2,241,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 32,000 ft^3/s, June 14, 15, 1918, gage height, 11.5 ft, from rating curve extended above 18,000 ft^3/s; minimum, 343 ft^3/s, Feb. 2, 1989, gage height, 0.12 ft, result of freezeup; minimum gage height observed, 0.05 ft, Feb. 23, Mar. 5,9, 1937.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 12,000 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 11	0230	*15,700	*7.52	June 17	0200	14,300	7.16
May 24	0300	12,800	6.75				

Minimum discharge, 343 ft^3/s, Feb. 2, gage height, 0.12 ft, result of freezeup, but may have been lower during periods of estimated daily discharge.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	834	701	639	581	497	e440	890	2680	8360	7390	3420	1960
2	834	706	635	572	415	e420	918	3180	9240	7080	3380	1920
3	826	732	666	561	e400	e410	858	3570	10300	6890	3300	1900
4	821	733	681	561	e390	e400	874	3350	8850	6700	3200	1850
5	812	701	673	565	e380	e450	946	3290	9590	6560	3080	1820
6	807	716	700	576	e400	469	957	5000	11100	6320	3000	1810
7	801	718	711	532	e410	473	1040	7650	12300	6060	2940	1760
8	797	706	670	e510	e430	490	1060	10300	12700	5870	2890	1750
9	789	722	671	523	e450	554	1030	10500	12300	5760	2850	1730
10	782	661	662	528	e470	588	961	12400	12500	5810	2830	1710
11	782	719	674	e510	e500	595	1050	13400	12300	5760	2860	1670
12	780	724	685	491	e520	603	1080	11200	11000	5440	2750	1640
13	776	719	698	e500	e520	618	1170	8750	11100	5800	2810	1620
14	779	748	691	514	e500	617	1350	7360	11200	5490	2720	1600
15	787	671	563	526	e480	586	1630	7510	11200	5170	2610	1580
16	786	697	e520	509	e450	e580	1880	7920	13800	5070	2530	1550
17	807	752	e580	509	e430	e560	1990	8260	12800	4930	2460	1540
18	834	726	609	496	e430	e550	1970	8810	11000	4750	2410	1640
19	815	672	615	512	e440	e570	2490	9510	11100	4590	2780	1620
20	810	722	634	504	e440	584	3080	7410	11400	4460	2570	1550
21	794	717	643	499	e450	598	4260	7730	9680	4370	2480	1500
22	780	723	633	506	453	636	5520	9240	8650	4340	2390	1490
23	761	756	624	518	458	638	6020	10700	8110	4270	2310	1470
24	754	779	617	478	459	639	4940	11000	7760	4200	2260	1450
25	748	695	613	458	458	677	5180	8260	7560	4030	2270	1420
26	742	633	e580	478	456	737	5000	7130	7540	3960	2280	1400
27	740	614	e540	510	442	817	3870	6890	7470	3950	2210	1400
28	714	626	e550	491	446	852	3240	7200	7600	4030	2190	1430
29	717	629	e560	490	---	871	2770	8580	7540	3800	2130	1420
30	712	643	e560	500	---	861	2610	8790	7520	3630	2050	1380
31	704	---	e570	498	---	871	---	7910	---	3530	2010	---
TOTAL	24225	21061	19467	16006	12574	18754	70634	245480	303570	160010	81970	48580
MEAN	781	702	628	516	449	605	2354	7919	10120	5162	2644	1619
MAX	834	779	711	581	520	871	6020	13400	13800	7390	3420	1960
MIN	704	614	520	458	380	400	858	2680	7470	3530	2010	1380
AC-FT	48050	41770	38610	31750	24940	37200	140100	486900	602100	317400	162600	96360

CAL YR 1988 TOTAL 719094 MEAN 1965 MAX 12500 MIN 448 AC-FT 1426000
WTR YR 1989 TOTAL 1022331 MEAN 2801 MAX 13800 MIN 380 AC-FT 2028000

e Estimated

YELLOWSTONE RIVER BASIN

06191500 YELLOWSTONE RIVER AT CORWIN SPRINGS, MT--Continued

WATER QUALITY RECORDS

PERIOD OF RECORD.--Water years 1965, 1969-74, 1977-81, 1984-87,September 1988 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: March 1984 to September 1985.
WATER TEMPERATURE: June 1977 to September 1981, March 1984 to September 1985.
SUSPENDED-SEDIMENT DISCHARGE: May 1985 to September 1987, September 1988 to current year.

REMARKS.--Water quality and sediment records for 1988 are published in this report. Unpublished records of once-daily water temperature are available in files of District office.

EXTREMES FOR PERIOD OF DAILY RECORDS.--
SPECIFIC CONDUCTANCE (water years 1984-85): Maximum, 311 microsiemens, Feb. 5, 1985; minimum, 71 microsiemens, June 21, 22, 1984.
WATER TEMPERATURE (water years 1977-81, 1984-85): Maximum, 21.5°C, July 22, 23, 1977; minimum, 0.0°C, on many days during winter periods most years.
SEDIMENT CONCENTRATION: Maximum daily mean, 650 mg/L, May 11, 1989: minimum daily mean, 1 mg/L, on several days in September 1987.
SEDIMENT LOAD: Maximum daily, 29,200 tons, June 3, 1986; minimum daily, 2.7 tons, Sep. 29, 1987.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATION: Maximum daily mean, 650 mg/L, May 11; minimum daily mean, 2 mg/L, on many days in October
November, August and September.
SEDIMENT LOAD: Maximum daily, 23,500 tons, May 11; minimum daily, 3.6 tons, Nov. 10.

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	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 1987										
04...	1420	804	--	--	303	11.0	10.0	--	--	--
DEC										
15...	1000	504	--	--	400	-10.0	0.0	--	--	--
JAN 1988										
27...	1010	474	--	--	427	-1.0	1.0	--	--	--
MAR										
08...	0830	--	--	--	342	-3.0	2.0	--	--	--
APR										
18...	1740	2540	--	--	170	12.5	9.0	--	--	--
JUN										
07...	0900	11200	--	--	82	18.0	9.5	--	--	--
JUL										
20...	1100	2350	--	--	168	25.0	17.5	--	--	--
AUG										
31...	0930	1080	--	--	246	20.0	15.0	--	--	--
OCT										
04...	1230	814	20	1	307	14.0	11.5	3	6.6	--
31...	1500	697	0	0	312	19.0	8.5	4	7.5	82
DEC										
08...	1130	678	--	--	321	-9.0	2.0	6	11	92
JAN 1989										
09...	1700	533	--	73	408	-5.0	0.0	6	8.6	69
FEB										
13...	1515	526	100	72	418	-7.0	0.0	12	17	87
MAR										
08...	1330	484	30	1	432	10.0	1.0	16	21	95
APR										
10...	1400	924	50	1	280	4.0	5.5	8	20	82
20...	0930	3430	20	1	192	16.0	7.0	119	1100	77
MAY										
10...	1145	12200	20	1	117	20.0	6.5	576	19000	46
JUN										
09...	1000	12400	30	1	88	19.0	8.0	200	6700	43
JUL										
03...	1530	6800	--	1	115	30.0	14.5	32	588	66
AUG										
03...	1345	3280	30	1	149	23.0	18.5	9	80	82
SEP										
12...	1500	1640	--	--	202	14.0	12.0	3	13	77

YELLOWSTONE RIVER BASIN

06191500 YELLOWSTONE RIVER AT CORWIN SPRINGS, MT--Continued

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1989

DATE	TIME	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STANDARD UNITS) (00400)	TURBIDITY (NTU) (00076)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)
OCT 1988											
04...	1230	636	10.2	112	91	0	75	8.2	1.7	77	2
31...	1500	638	11.3	116	97	0	80	8.2	2.8	82	2
APR 1989											
10...	1400	637	12.4	118	--	--	--	7.8	--	70	2
20...	0930	636	10.4	103	--	--	--	7.7	--	60	5
MAY											
10...	1145	631	10.2	100	--	--	--	7.6	--	45	7
JUN											
09...	1000	632	10.2	104	--	--	--	7.7	--	31	0
JUL											
03...	1530	637	8.6	101	--	--	--	7.8	--	32	0
AUG											
03...	1345	631	8.4	109	--	--	--	8.2	--	40	0

DATE	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)
OCT 1988											
04...	20	6.6	27	1	5.7	76	42	15	1.1	28	192
31...	21	7.1	28	1	5.9	80	46	15	1.0	29	203
APR 1989											
10...	18	6.2	25	1	5.4	69	42	13	0.90	--	154
20...	15	5.4	13	0.8	3.2	55	27	6.9	0.40	--	106
MAY											
10...	12	3.6	5.6	0.4	1.8	38	15	2.8	0.30	--	65
JUN											
09...	8.0	2.7	5.8	0.5	1.5	31	9.0	3.8	0.40	--	50
JUL											
03...	8.1	2.9	9.4	0.7	2.0	37	11	4.7	0.40	--	61
AUG											
03...	10	3.6	14	1	2.8	44	16	7.2	0.70	--	82

DATE	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	RESIDUE TOTAL AT 105 DEG. C, SUSPENDED (MG/L) (00530)	RESIDUE VOLATILE, SUSPENDED (MG/L) (00535)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, ORGANIC DISSOLVED (MG/L AS N) (00607)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)
OCT 1988											
04...	0.26	422	6	<1	0.200	0.190	0.020	0.020	0.38	0.38	0.40
31...	0.27	381	20	7	0.300	0.200	<0.010	<0.010	--	--	0.30
APR 1989											
10...	0.21	383	--	--	--	0.250	--	0.110	--	0.19	--
20...	0.14	985	--	--	--	0.490	--	0.110	--	0.29	--
MAY											
10...	0.09	2130	--	--	--	0.160	--	0.100	--	0.60	--
JUN											
09...	0.07	1670	--	--	--	<0.100	--	0.080	--	0.52	--
JUL											
03...	0.08	1120	--	--	--	<0.100	--	0.020	--	0.18	--
AUG											
03...	0.11	725	--	--	--	0.110	--	0.370	--	0.53	--

YELLOWSTONE RIVER BASIN

06191500 YELLOWSTONE RIVER AT CORWIN SPRINGS, MT--Continued

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTEMBER 1988

DATE	NITROGEN, AMMONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	ARSENIC TOTAL (UG/L AS AS) (01002)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)
OCT 1988										
04...	0.40	0.020	0.010	<0.010	<0.010	--	2.3	--	610	24
31...	0.20	0.020	0.020	<0.010	<0.010	1.9	2.0	--	650	39
APR 1989										
10...	0.30	0.020	<0.010	--	--	--	--	28	520	--
20...	0.40	0.110	0.050	--	--	--	--	30	210	--
MAY										
10...	0.70	0.080	0.060	--	--	--	--	12	60	--
JUN										
09...	0.60	0.040	0.040	--	--	--	--	8	80	--
JUL										
03...	0.20	0.010	<0.010	--	--	--	--	16	130	--
AUG										
03...	0.90	0.040	<0.010	--	--	--	--	21	200	--

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1987 TO SEPTEMBER 1988

DAY	APRIL MEAN CONCENTRATION (MG/L)	APRIL LOADS (T/DAY)	MAY MEAN CONCENTRATION (MG/L)	MAY LOADS (T/DAY)	JUNE MEAN CONCENTRATION (MG/L)	JUNE LOADS (T/DAY)	JULY MEAN CONCENTRATION (MG/L)	JULY LOADS (T/DAY)	AUGUST MEAN CONCENTRATION (MG/L)	AUGUST LOADS (T/DAY)	SEPTEMBER MEAN CONCENTRATION (MG/L)	SEPTEMBER LOADS (T/DAY)
1											---	---
2											---	---
3											---	---
4											---	---
5											---	---
6											---	---
7											---	---
8											---	---
9											---	---
10											---	---
11											5	13
12											5	13
13											5	13
14											4	11
15											4	10
16											3	7.6
17											3	7.5
18											3	7.4
19											4	9.7
20											3	7.3
21											2	5.0
22											2	4.9
23											2	4.8
24											3	7.1
25											2	4.7
26											2	4.6
27											2	4.6
28											2	4.6
29											2	4.6
30											2	4.5
31											---	---
TOTAL											---	148.9

TOTAL LOAD FOR YEAR: 148.9 TONS.

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

YELLOWSTONE RIVER BASIN

06191500 YELLOWSTONE RIVER AT CORWIN SPRINGS, MT--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	3	6.8	3	5.7	9	16	8	13	5	6.7	10	12
2	3	6.8	3	5.7	9	15	8	12	5	5.6	8	9.1
3	3	6.7	3	5.9	8	14	8	12	6	6.5	7	7.7
4	3	6.7	3	5.9	8	15	8	12	6	6.3	7	7.6
5	3	6.6	3	5.7	8	15	8	12	7	7.2	7	8.5
6	4	8.7	3	5.8	8	15	8	12	7	7.6	8	10
7	5	11	3	5.8	7	13	8	11	7	7.7	12	15
8	4	8.6	2	3.8	7	13	7	9.6	7	8.1	18	24
9	3	6.4	2	3.9	7	13	6	8.5	8	9.7	73	109
10	3	6.3	2	3.6	7	13	5	7.1	9	11	72	114
11	3	6.3	4	7.8	8	15	4	5.5	9	12	50	80
12	3	6.3	4	7.8	8	15	4	5.3	10	14	35	57
13	3	6.3	4	7.8	8	15	4	5.4	11	15	36	60
14	4	8.4	4	8.1	8	15	5	6.9	10	13	35	58
15	5	11	4	7.2	8	12	7	9.9	10	13	28	44
16	5	11	4	7.5	9	13	8	11	10	12	17	27
17	3	6.5	4	8.1	9	14	8	11	10	12	12	18
18	2	4.5	4	7.8	9	15	7	9.4	10	12	13	19
19	2	4.4	5	9.1	10	17	7	9.7	10	12	14	22
20	2	4.4	6	12	10	17	7	9.5	12	14	12	19
21	2	4.3	6	12	10	17	6	8.1	14	17	13	21
22	2	4.2	6	12	10	17	5	6.8	16	20	14	24
23	2	4.1	6	12	10	17	4	5.6	18	22	13	22
24	2	4.1	6	13	8	13	4	5.2	19	24	14	24
25	2	4.0	6	11	6	9.9	4	4.9	20	25	14	26
26	2	4.0	6	10	5	7.8	4	5.2	19	23	14	28
27	2	4.0	7	12	4	5.8	4	5.5	16	19	15	33
28	2	3.9	8	14	4	5.9	4	5.3	12	14	16	37
29	3	5.8	9	15	6	9.1	4	5.3	---	---	16	38
30	3	5.8	9	16	8	12	4	5.4	---	---	14	33
31	3	5.7	---	---	8	12	4	5.4	---	---	13	31
TOTAL	---	193.6	---	262.0	---	416.5	---	255.5	---	369.4	---	1037.9
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	14	34	14	101	70	1580	42	838	11	102	4	21
2	14	35	27	232	114	2840	40	765	9	82	4	21
3	11	25	29	280	160	4450	34	633	8	71	4	21
4	11	26	20	181	73	1740	30	543	16	138	3	15
5	12	31	20	178	100	2590	30	531	4	33	3	15
6	12	31	94	1270	199	5960	28	478	2	16	4	20
7	16	45	420	8680	265	8800	25	409	5	40	4	19
8	14	40	540	15000	307	10500	23	365	4	31	4	19
9	12	33	500	14200	192	6380	23	358	7	54	4	19
10	9	23	580	19400	180	6070	77	1210	7	53	2	9.2
11	13	37	650	23500	168	5580	78	1210	22	170	2	9.0
12	13	38	440	13300	115	3420	39	573	76	564	2	8.9
13	15	47	212	5010	110	3300	85	1330	56	425	3	13
14	23	84	95	1890	127	3840	43	637	30	220	5	22
15	34	150	91	1850	129	3900	27	377	10	70	5	21
16	48	244	95	2030	354	13200	25	342	5	34	6	25
17	35	188	105	2340	234	8090	20	266	5	33	6	25
18	28	149	127	3020	123	3650	18	231	5	33	8	35
19	55	370	208	5340	130	3900	17	211	250	1880	6	26
20	98	815	69	1380	145	4460	16	193	115	798	6	25
21	275	3160	100	2090	86	2250	13	153	32	214	6	24
22	295	4400	147	3670	71	1660	13	152	16	103	4	16
23	310	5040	253	7310	65	1420	18	208	12	75	4	16
24	105	1400	275	8170	58	1220	40	454	8	49	4	16
25	117	1640	84	1870	51	1040	15	163	8	49	7	27
26	80	1080	46	886	43	875	15	160	8	49	9	34
27	36	376	43	800	43	867	120	1280	9	54	5	19
28	23	201	86	1670	49	1010	102	1110	9	53	4	15
29	18	135	120	2780	43	875	70	718	7	40	4	15
30	15	106	133	3160	37	751	20	196	5	28	4	15
31	---	---	56	1200	---	---	14	133	5	27	---	---
TOTAL	---	19983	---	152788	---	116218	---	16227	---	5588	---	586.1

TOTAL LOAD FOR YEAR 313925.0 TONS

YELLOWSTONE RIVER BASIN

06192500 YELLOWSTONE RIVER NEAR LIVINGSTON, MT
(National stream quality accounting network station)

LOCATION.--Lat 45°35'50", long 110°33'55", in NE1/4NW1/4NW1/4 sec. 12, T.3 S., R.9 E., Park County, Hydrologic Unit 10070002, on right bank 50 ft downstream from bridge on Montana Secondary Highway 540, 2 mi downstream from Suce Creek, 4 mi south of Livingston, and at mile 501.4.

DRAINAGE AREA.--3,551 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1897 to December 1905, August 1928 to September 1932, October 1937 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1309: 1899. WSP 1509: 1902. WSP 1629: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 4,542.49 ft above National Geodetic Vertical Datum of 1929. May 2, 1897, to Dec. 31, 1905, nonrecording gage on highway bridge at different datum. Aug. 23, 1928, to Sept. 30, 1932, and Mar. 14, 1938, to Feb. 3, 1951, nonrecording gage on highway bridge at present datum.

REMARKS.--Estimated daily discharges: Dec. 25 to Feb. 11, 15-21 and Mar. 1-5. Water-discharge records good except those for estimated daily discharges and those for Apr. 15 to May 8, which are fair. Diversions for irrigation of about 24,200 acres of which about 2,000 acres is downstream from station.

AVERAGE DISCHARGE.--64 years, 3,721 ft^3/s, 2,696,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 36,300 ft^3/s, June 17, 1974, gage height, 9.21 ft; maximum gage height, 9.34 ft, June 20, 1943; minimum daily discharge, 540 ft^3/s, Feb. 4,5, 1989.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 13,500 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 11	1000	14,600	6.26	June 17	0815	*16,200	*6.60
June 11	1200	14,900	6.32				

Minimum daily discharge, 540 ft^3/s, Feb. 4, 5.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1110	1130	1030	e890	e620	e800	1240	3390	8460	8170	3770	2330
2	1100	1130	1050	e880	e600	e800	1260	3730	9200	7850	3730	2290
3	1100	1140	1150	e880	e560	e740	1270	4280	10400	7580	3770	2260
4	1090	1150	1110	e860	e540	e680	1220	4350	9720	7350	3620	2240
5	1090	1160	1130	e800	e540	e740	1250	4140	9830	7170	3430	2200
6	1080	1140	1140	e760	e560	883	1310	5180	11200	6920	3330	2180
7	1080	1160	1180	e720	e580	964	1360	7780	12800	6620	3330	2130
8	1070	1200	1150	e680	e640	962	1450	9780	13600	6350	3260	2100
9	1070	1200	1120	e680	e700	1130	1440	10700	13800	6220	3190	2090
10	1060	1190	1130	e700	e800	1170	1370	11200	14000	6210	3120	2080
11	1060	1150	1110	e700	e860	1160	1380	13200	14100	6320	3090	2060
12	1060	1210	1130	e700	877	1080	1450	11700	12700	5940	3080	2030
13	1060	1200	1150	e700	873	1040	1520	9920	12400	6070	3030	2010
14	1060	1230	1150	e720	858	1040	1660	8400	12400	6000	3070	1990
15	1120	1220	1130	e720	e820	993	1880	8040	12200	5600	2940	1970
16	1140	1130	994	e720	e800	985	2230	8300	14900	5450	2860	1940
17	1190	1230	976	e700	e760	1020	2450	8710	15300	5310	2790	1920
18	1200	1250	1060	e700	e770	1010	2480	8890	12900	5130	2720	1950
19	1210	1190	1070	e720	e800	1010	2700	9870	12400	4930	2880	2030
20	1190	1150	1090	e700	e800	997	3390	8460	12900	4780	2960	1960
21	1210	1200	1110	e700	e820	949	4340	8080	11300	4680	2810	1970
22	1190	1190	1070	e700	844	991	5850	9040	10000	4640	2730	1980
23	1190	1240	1080	e710	864	1030	6750	10400	9240	4560	2660	1960
24	1180	1280	1040	e700	894	1010	5890	11200	8720	4540	2600	1940
25	1180	1220	e1000	e660	943	1020	5790	9480	8390	4360	2580	1910
26	1180	1140	e880	e670	900	1080	5810	8060	8300	4260	2610	1860
27	1170	1130	e860	e700	877	1140	5040	7430	8170	4270	2580	1850
28	1170	1050	e860	e690	864	1200	4230	7430	8320	4260	2550	1850
29	1150	1140	e880	e700	---	1230	3720	8450	8270	4170	2500	1880
30	1160	1100	e900	e700	---	1240	3470	9000	8240	3990	2440	1870
31	1140	---	e900	e680	---	1220	---	8380	---	3850	2380	---
TOTAL	35060	35250	32630	22540	21364	31314	85200	256970	334160	173550	92410	60830
MEAN	1131	1175	1053	727	763	1010	2840	8289	11140	5598	2981	2028
MAX	1210	1280	1180	890	943	1240	6750	13200	15300	8170	3770	2330
MIN	1060	1050	860	660	540	680	1220	3390	8170	3850	2380	1850
AC-FT	69540	69920	64720	44710	42380	62110	169000	509700	662800	344200	183300	120700

CAL YR 1988 TOTAL 911114 MEAN 2489 MAX 15200 MIN 690 AC-FT 1807000
WTR YR 1989 TOTAL 1181278 MEAN 3236 MAX 15300 MIN 540 AC-FT 2343000

e Estimated

06192500 YELLOWSTONE RIVER NEAR LIVINGSTON, MT--Continued
(National stream quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1965, 1970 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1969 to september 1981.
WATER TEMPERATURE: October 1969 to September 1983.
SUSPENDED-SEDIMENT DISCHARGE: May 1985 to September 1986.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1969-81): Maximum daily, 398 microsiemens, Apr. 3, 1970; minimum daily, 73 microsiemens Jun. 14, 1979.
WATER TEMPERATURE (water years 1969-83): Maximum, 23.0°C, Jul. 9, 1976; minimum, 0.0°C on many days during winter.
SEDIMENT CONCENTRATION (water years 1985-86): Maximum daily mean, 790 mg/L, May 28, 1986; minimum daily mean, 4 mg/L on several days in August 1985 and September 1986.
SEDIMENT LOAD (water ydears 1985-86): Maximum daily, 33,700 tons, Jun. 2, 1986; minimum daily, 28 tons on several days in August and September of 1985 and 1986.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT												
19...	1615	1180	--	--	296	14.0	10.5	--	--	--	--	--
31...	1045	1140	20	1	307	14.0	6.5	650	11.9	114	K14	K17
DEC												
08...	1615	1090	--	--	328	-5.0	0.0	--	--	--	--	--
14...	1415	1160	--	76	382	-4.0	1.0	657	12.4	101	<1	K7
JAN												
09...	1315	679	--	--	368	2.0	0.0	--	--	--	--	--
FEB												
13...	1245	882	--	--	358	-1.0	1.0	--	--	--	--	--
MAR												
07...	1515	903	--	--	368	6.0	3.5	645	12.2	109	K1	58
08...	1715	930	--	--	348	11.0	4.0	--	--	--	--	--
APR												
19...	1115	2300	--	1	228	17.0	10.0	647	10.0	105	21	K9
MAY												
08...	1330	11200	--	--	135	17.0	10.0	--	--	--	--	--
JUN												
14...	0830	12600	50	2	101	11.0	11.0	652	8.8	93	27	20
JUL												
03...	1315	8050	--	--	125	22.0	15.0	--	--	--	--	--
SEP												
13...	0815	1990	0	0	228	3.0	8.5	652	9.4	94	K17	K8
19...	1130	1900	--	--	228	15.0	11.0	--	--	--	--	--

DATE	TIME	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STAND-ARD UNITS) (00400)	TUR-BID-ITY (NTU) (00076)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)
OCT											
31...	1045	123	0	100	8.1	1.8	110	29	9.1	24	1
DEC											
14...	1415	119	0	94	8.1	1.5	100	26	8.5	25	1
MAR											
07...	1515	127	0	101	8.2	1.4	110	30	9.3	30	1
APR											
19...	1115	80	0	65	7.9	6.0	74	19	6.4	17	0.9
JUN											
14...	0830	46	0	36	7.7	14	36	9.4	3.1	6.8	0.5
SEP											
13...	0815	87	0	75	7.9	0.60	78	20	6.7	17	0.8

YELLOWSTONE RIVER BASIN

06192500 YELLOWSTONE RIVER NEAR LIVINGSTON, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)
OCT											
31...	5.1	101	40	11	0.10	29	197	209	0.27	606	0.010
DEC											
14...	5.5	98	40	12	0.80	29	204	207	0.28	639	<0.010
MAR											
07...	6.6	103	53	16	1.0	34	237	245	0.32	578	0.010
APR											
19...	3.9	67	30	8.0	0.50	23	148	149	0.20	919	0.010
JUN											
14...	1.7	37	9.0	2.9	0.30	16	75	72	0.10	2550	<0.010
SEP											
13...	3.8	77	24	8.7	0.70	20	152	144	0.21	817	<0.010

DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT										
31...	0.180	<0.010	<0.010	<0.20	0.010	<0.010	<0.010	6	18	77
DEC										
14...	0.290	0.010	0.040	0.20	0.020	0.010	0.010	8	25	78
MAR										
07...	0.410	0.110	0.100	0.40	0.030	0.020	0.020	9	22	52
APR										
19...	0.290	0.030	0.030	0.70	0.090	0.020	0.030	99	615	81
JUN										
14...	<0.100	0.010	0.010	0.40	0.040	0.020	0.010	125	4250	40
SEP										
13...	<0.100	0.010	<0.010	<0.20	0.010	0.010	<0.010	8	43	82

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)
OCT											
31...	1045	30	25	44	<0.5	<1	<1	<3	2	15	<5
MAR											
07...	1515	90	37	44	<0.5	2	1	<3	2	51	<5
JUN											
14...	0830	60	8	16	<0.5	<1	<1	<3	6	41	1
SEP											
13...	0815	30	23	31	<0.5	<1	<1	<3	2	11	<1

DATE	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
OCT										
31...	110	3	<0.1	<10	3	<1	1.0	170	<6	5
MAR										
07...	150	2	0.1	10	2	<1	<1.0	200	<6	7
JUN										
14...	25	3	<0.1	<10	<1	<1	<1.0	57	<6	4
SEP										
13...	77	2	<0.1	<10	1	<1	<1.0	130	<6	<3

YELLOWSTONE RIVER BASIN

06195600 SHIELDS RIVER NEAR LIVINGSTON, MT

LOCATION.--Lat 45°44'18", long 110°28'45", in NE1/4SE1/4NW1/4 sec.22, T.1 S., R.10 E., Park County, Hydrologic Unit 10070003, on right bank 0.2 mi downstream from private road bridge, 6.5 mi northeast of Livingston, and at mile 2.0.

DRAINAGE AREA.--852 mi^2.

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

GAGE.--Water-stage recorder. Elevation of gage is 4,420 ft above National Geodetic Vertical Datum of 1929, from topographic map. Oct. 1, 1978, to Aug. 12, 1980, water-stage recorder at site 0.2 mi upstream at datum 7.89 ft higher.

REMARKS.--Estimated daily discharges: Nov. 15-18, 27-30, Dec. 15 to Mar. 7. Records good except those for estimated daily discharges, which are poor. Diversions for irrigation of about 32,000 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--11 years, 286 ft^3/s, 207,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,600 ft^3/s, June 20, 1979, gage height, 6.80 ft, previous datum; minimum, 17 ft^3/s, Aug. 20, 1988, gage height, 1.44 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,900 ft^3/s, May 11, gage height, 4.85 ft; minimum daily, 36 ft^3/s, Oct. 1, 2.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	36	61	84	e70	e50	e52	190	548	580	492	117	135
2	36	61	87	e76	e42	e50	197	582	556	472	113	127
3	38	61	94	e80	e40	e54	171	683	589	449	108	132
4	37	61	87	e82	e45	e60	172	758	597	417	110	134
5	38	64	91	e74	e50	e68	171	759	582	391	103	134
6	42	66	95	e64	e60	e78	255	820	607	364	101	130
7	42	66	92	e54	e64	e90	482	996	655	307	96	133
8	41	66	80	e64	e58	99	547	1370	656	294	92	136
9	43	65	96	e72	e64	174	391	1680	653	287	89	149
10	42	63	91	e76	e70	249	315	1630	772	282	90	154
11	43	67	89	e68	e66	224	313	1780	862	268	89	149
12	45	61	90	e74	e64	211	313	1680	745	235	90	146
13	47	70	95	e78	e70	205	337	1550	609	262	108	145
14	49	77	88	e78	e72	187	375	1330	523	267	110	144
15	52	e62	e57	e80	e72	151	410	1180	491	247	101	138
16	53	e80	e61	e80	e65	129	485	1280	606	255	99	133
17	64	e82	e72	e80	e62	99	509	1320	817	238	99	134
18	64	e82	e78	e80	e65	117	434	1240	645	224	100	144
19	63	81	e80	e84	e54	131	432	1210	538	213	111	154
20	66	80	e74	e80	e60	120	506	1080	533	200	119	143
21	64	95	e74	e78	e68	120	619	970	602	179	126	134
22	63	92	e74	e72	e70	127	761	897	529	173	121	140
23	59	97	e70	e66	e70	123	809	864	484	158	113	141
24	57	97	e63	e63	e66	114	811	862	516	159	121	140
25	55	81	e60	e66	e70	139	708	821	500	152	132	141
26	59	82	e58	e66	e70	182	663	748	488	142	145	138
27	60	e63	e56	e70	e66	210	674	684	471	139	140	135
28	59	e70	e60	e72	e58	226	613	638	478	153	141	136
29	59	e80	e68	e76	---	203	553	727	522	140	138	133
30	59	e82	e74	e80	---	200	537	772	518	130	142	129
31	60	---	e72	e70	---	195	---	658	---	127	143	---
TOTAL	1595	2215	2410	2273	1731	4387	13753	32117	17724	7816	3507	4161
MEAN	51.5	73.8	77.7	73.3	61.8	142	458	1036	591	252	113	139
MAX	66	97	96	84	72	249	811	1780	862	492	145	154
MIN	36	61	56	54	40	50	171	548	471	127	89	127
AC-FT	3160	4390	4780	4510	3430	8700	27280	63700	35160	15500	6960	8250

CAL YR 1988 TOTAL 46234 MEAN 126 MAX 990 MIN 20 AC-FT 91710
WTR YR 1989 TOTAL 93689 MEAN 257 MAX 1780 MIN 36 AC-FT 185800

e Estimated

YELLOWSTONE RIVER BASIN

06200000 BOULDER RIVER AT BIG TIMBER, MT

LOCATION.--Lat 45°'50'03", long 109°56'17", in SE1/4NE1/4SE1/4 sec.14, T.1 N., R.14 E., Sweet Grass County, Hydrologic Unit 10070002, on left bank 150 ft upstream from Old Boulder Bridge, 1 mi east of Big Timber, and at mile 1.6.

DRAINAGE AREA.--523 mi^2.

PERIOD OF RECORD.--April 1947 to December 1953, March 1955 to current year. Monthly discharge only for April 1947, published in WSP 1309.

GAGE.--Water-stage recorder. Datum of gage is 4,056.39 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers).

REMARKS.--Estimated daily discharges: Nov. 15-21, Nov. 25 to Mar. 8. Records good except those for periods of estimated daily discharges, which are poor. Diversions for irrigation of about 13,300 acres, of which about 250 acres is downstream of station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--40 years, 587 ft^3/s, 425,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,840 ft^3/s, May 28, 1956, gage height, 7.84 ft; maximum gage height, 8.25 ft, July 8, 1975; minimum discharge, 10 ft^3/s, about Aug. 26 or 27, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 3,000 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
June 11	0615	3,780	5.52	June 20	0715	3,630	5.42
June 16	2115	*5,440	*6.47				

Minimum discharge, 27 ft^3/s, Oct. 3,4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	114	e120	e80	e40	e60	120	316	1120	1990	266	147
2	28	110	e140	e100	e35	e50	119	316	1500	1750	260	138
3	28	111	e130	e120	e37	e70	118	350	1880	1660	239	128
4	28	116	e140	e150	e40	e70	114	363	1610	1600	218	124
5	30	115	e130	e130	e45	e90	113	344	1700	1590	207	120
6	30	112	e125	e110	e50	e160	116	353	2350	1480	197	115
7	31	118	e120	e80	e60	e150	120	547	2980	1330	189	125
8	30	117	e110	e60	e56	e140	132	1290	3150	1250	159	125
9	31	117	e130	e80	e70	158	142	1500	3260	1220	141	131
10	32	128	e130	e110	e100	205	127	1510	3400	1060	156	137
11	32	157	e140	e100	e110	169	119	2010	3390	1050	149	143
12	30	163	e140	e90	e110	149	123	1890	2540	919	128	137
13	30	161	e140	e100	e105	140	123	1470	2480	1040	138	138
14	33	162	e110	e110	e95	136	128	1170	2690	947	143	129
15	35	e140	e85	e100	e80	118	139	1060	2870	838	120	119
16	41	e150	e80	e110	e70	121	167	1060	4680	779	110	112
17	100	e160	e100	e115	e60	96	190	1070	4300	684	100	110
18	178	e160	e140	e115	e70	117	181	1150	2780	620	94	111
19	128	e145	e130	e115	e90	129	171	1370	2680	549	98	117
20	135	e140	e120	e110	e110	109	202	1170	3160	508	107	105
21	128	e160	e130	e120	e110	112	266	1080	2250	486	114	100
22	139	167	e120	e100	e110	112	428	1100	1730	571	110	90
23	133	168	e110	e90	e130	117	579	1300	1480	511	106	86
24	127	174	e100	e80	e130	115	511	1560	1370	456	126	81
25	122	e140	e80	e85	e110	118	435	1300	1280	416	148	79
26	115	e120	e60	e100	e100	131	425	1070	1300	394	137	75
27	116	e100	e70	e120	e90	133	448	960	1410	347	138	70
28	126	e120	e90	e110	e70	129	386	954	1770	361	164	76
29	122	e150	e110	e120	---	132	338	1240	1900	336	172	89
30	120	e130	e130	e130	---	126	325	1300	1960	309	160	82
31	116	---	e110	e90	---	121	---	1140	---	291	152	---
TOTAL	2402	4125	3570	3230	2283	3783	6905	33313	70970	27342	4746	3339
MEAN	77.5	137	115	104	81.5	122	230	1075	2366	882	153	111
MAX	178	174	140	150	130	205	579	2010	4680	1990	266	147
MIN	28	100	60	60	35	50	113	316	1120	291	94	70
AC-FT	4760	8180	7080	6410	4530	7500	13700	66080	140800	54230	9410	6620

CAL YR 1988 TOTAL 145050 MEAN 396 MAX 4560 MIN 24 AC-FT 287700
WTR YR 1989 TOTAL 166008 MEAN 455 MAX 4680 MIN 28 AC-FT 329300

e Estimated

YELLOWSTONE RIVER BASIN

06202510 STILLWATER RIVER ABOVE NYE CREEK, NEAR NYE, MT

LOCATION.--45°23'46", long 109°52'14", in SW1/4NE1/4SW1/4 sec.15, T.5 S., R.15 E., Stillwater County, Hydrologic Unit 10007005, at private bridge 200 ft above Nye Creek, 1.0 mi below Mountain View Creek, 4.3 mi southwest of Nye, and at mile 41.3.

DRAINAGE AREA.--193 mi^2.

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

GAGE.--Nonrecording gage and crest-stage gage. Elevation of gage is 4,880 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 15-20, 25-29, Dec. 7-17, Dec. 20 to Jan. 16, Jan. 23-27, Jan. 31 to Feb. 21, Feb. 28 to Mar. 7, Mar. 16-20. Records fair except those for estimated daily discharges, which are poor. There are no known diversions or regulation upstream from gage. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--9 years, 362 ft^3/s, 262,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,400 ft^3/s, July 10, 1983, gage height, 7.60 ft; minimum observed, 23 ft^3/s, Mar. 6, 1981, Nov. 23, 1984, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,450 ft^3/s, June 17, gage height, 6.60 ft; minimum daily, 27 ft^3/s Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	59	65	e34	e35	e31	66	279	943	1730	469	178
2	68	58	65	e40	e29	e30	61	279	970	1630	458	166
3	61	58	58	e43	e27	e30	61	308	1010	1630	435	165
4	61	61	54	e45	e29	e33	56	321	1200	1640	387	162
5	61	58	57	e43	e35	e38	53	263	1460	1500	362	157
6	63	56	56	e40	e38	e40	61	466	2070	1460	362	156
7	61	56	e52	e33	e40	e45	66	823	2440	1390	347	151
8	63	54	e50	e30	e39	53	88	1540	2730	1340	321	148
9	61	54	e49	e35	e42	81	61	1690	2640	1520	308	148
10	61	54	e47	e40	e45	76	34	1640	2600	1440	321	142
11	61	56	e47	e36	e47	80	52	1470	2660	1330	315	142
12	370	59	e47	e34	e46	76	86	1450	2650	1300	308	139
13	376	64	e43	e40	e45	74	118	1070	2830	1300	338	137
14	386	56	e40	e38	e44	65	139	792	2800	1280	317	131
15	396	e54	e38	e36	e42	61	139	789	3030	1200	299	126
16	71	e70	e46	e42	e41	e58	168	826	3290	983	271	118
17	81	e66	e50	46	e38	e54	207	865	3290	930	271	116
18	80	e62	51	53	e36	e52	207	865	2800	829	271	116
19	80	e58	47	51	e38	e50	225	775	2940	768	290	116
20	78	e70	e45	48	e41	e50	384	753	2860	718	287	116
21	72	65	e43	48	e44	51	446	887	2610	670	267	114
22	66	65	e40	48	45	51	490	1010	2330	669	259	108
23	70	59	e40	e45	41	53	490	1120	1990	794	247	108
24	65	53	e38	e40	39	56	518	1190	1370	782	236	106
25	61	e50	e35	e35	42	66	464	948	1150	671	229	100
26	61	e50	e33	e40	39	76	411	828	1150	663	225	99
27	61	e45	e33	e45	34	74	365	812	1170	649	225	101
28	61	e50	e35	50	e33	70	268	827	1400	598	211	113
29	59	e58	e35	50	---	66	251	842	1500	604	204	104
30	59	64	e37	47	---	66	278	865	1470	546	197	99
31	59	---	e37	e45	---	53	---	747	---	494	194	---
TOTAL	3301	1742	1413	1300	1094	1759	6313	27340	63353	33058	9231	3882
MEAN	106	58.1	45.6	41.9	39.1	56.7	210	882	2112	1066	298	129
MAX	396	70	65	53	47	81	518	1690	3290	1730	469	178
MIN	59	45	33	30	27	30	34	263	943	494	194	99
AC-FT	6550	3460	2800	2580	2170	3490	12520	54230	125700	65570	18310	7700

CAL YR 1988 TOTAL 113720 MEAN 311 MAX 3670 MIN 25 AC-FT 225600
WTR YR 1989 TOTAL 153786 MEAN 421 MAX 3290 MIN 27 AC-FT 305000
e Estimated

YELLOWSTONE RIVER BASIN

06204050 WEST ROSEBUD CREEK NEAR ROSCOE, MT

LOCATION.--Lat 45°14'35", long 109°43'50", in NE1/4 sec.10, T.7 S., R.16 E., Stillwater County, Hydrologic Unit 10070005, on left bank at Mystic Lake powerplant, 2.0 mi downstream from Mystic Lake, 13.5 mi southwest of Roscoe, and at mile 26.8.

DRAINAGE AREA.--52.1 mi^2.

PERIOD OF RECORD.--September 1965 to current year.

GAGE.--Water-stage recorder and rectangular weir. Datum of gage is 6,535.60 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--No estimated daily discharges this year. Records good. Flow regulated by Mystic Lake (station number 06204000). Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--24 years, 125 ft^3/s, 32.58 in/yr, 90,560 acre-ft/yr, adjusted for change in contents in Mystic Lake.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,630 ft^3/s, July 6, 1975, gage height, 4.71 ft; minimum daily, 2.5 ft^3/s, Apr. 3, 4, 6, 7, 1967.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 652 ft^3/s, July 1, gage height, 2.74 ft; minimum daily, 7.8 ft^3/s, Nov. 9.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	70	140	109	108	34	37	43	135	618	265	159
2	20	70	110	109	162	35	39	44	126	599	264	159
3	21	68	109	94	165	35	35	43	95	578	254	160
4	22	68	107	63	165	33	32	43	101	578	221	158
5	23	68	105	63	164	33	33	44	99	594	203	158
6	23	68	105	65	91	32	34	45	100	603	200	158
7	24	68	108	65	38	33	35	50	103	571	195	103
8	25	53	108	63	37	34	35	58	148	541	191	67
9	25	7.8	110	62	38	35	33	54	185	541	190	68
10	24	14	109	62	39	36	33	67	195	545	191	69
11	24	113	108	62	39	36	33	88	190	554	190	69
12	24	183	106	62	39	35	36	92	184	522	188	67
13	25	181	107	62	40	35	37	86	183	525	188	66
14	25	179	110	63	39	33	37	82	183	551	188	67
15	25	179	111	62	39	34	38	83	186	502	188	68
16	26	174	109	61	39	34	39	82	195	462	187	69
17	28	172	108	62	38	34	37	81	192	335	185	69
18	27	177	109	60	40	32	38	80	186	260	170	68
19	29	181	109	61	40	33	41	81	189	302	159	68
20	28	180	109	61	38	33	45	78	207	298	159	68
21	28	178	109	61	39	33	47	79	216	291	156	69
22	29	175	109	63	40	35	48	80	213	332	154	69
23	28	178	110	62	36	38	44	80	211	399	153	66
24	27	178	110	62	33	38	40	81	210	449	161	67
25	27	178	110	62	33	38	43	77	206	395	161	69
26	27	178	110	62	33	40	46	75	214	360	160	70
27	26	177	112	64	33	39	43	78	242	335	160	69
28	83	177	111	64	33	38	43	78	297	316	159	66
29	111	177	111	63	---	38	41	78	416	304	157	66
30	88	178	111	62	---	39	41	77	545	305	158	68
31	74	---	111	60	---	38	---	77	---	290	159	---
TOTAL	1035	4047.8	3411	2056	1678	1093	1163	2184	5952	13855	5714	2617
MEAN	33.4	135	110	66.3	59.9	35.3	38.8	70.5	198	447	184	87.2
MAX	111	183	140	109	165	40	48	92	545	618	265	160
MIN	19	7.8	105	60	33	32	32	43	95	260	153	66
AC-FT	2050	8030	6770	4080	3330	2170	2310	4330	11810	27480	11330	5190
MEAN †	28.1	25.0	22.9	32.8	0	17.1	34.2	138	459	454	155	60.2
CFSM †	.54	.48	.44	.63	0	.33	.66	.65	8.81	8.71	2.98	1.16
IN †	.62	.54	.51	.73	0	.38	.73	3.05	9.83	10.0	3.43	1.29
AC-FT †	1730	1490	1410	2020	0	1050	2030	8490	27310	27890	9530	3580

OBSERVED

CAL YR 1988	TOTAL	36937.8	MEAN	101	MAX	640	MIN	7.8	AC-FT	73270
WTR YR 1989	TOTAL	44805.8	MEAN	123	MAX	618	MIN	7.8	AC-FT	88870

ADJUSTED

CAL YR 1988	TOTAL	36974	MEAN	101	CFSM	1.94	IN	26.4	AC-FT	73350
WTR YR 1989	TOTAL	43625	MEAN	120	CFSM	2.30	IN	31.1	AC-FT	86520

† Adjusted for change in contents of Mystic Lake.

YELLOWSTONE RIVER BASIN

06205000 STILLWATER RIVER NEAR ABSAROKEE, MT

LOCATION.--Lat 45°33'04", long 109°23'12", in NE1/4NE1/4NW1/4 sec.28, T.3 S., R.19 E., Stillwater County, Hydrologic Unit 10070005, on right bank 3 mi downstream from Rosebud Creek, 3.5 mi northeast of Absarokee, 9 mi southwest of Columbus, and at mile 9.4.

DRAINAGE AREA.--975 mi^2.

PERIOD OF RECORD.--July 1910 to September 1914 (no winter records), March 1935 to current year.

REVISED RECORDS.--WSP 1309: 1911(M). WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,873.8 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Oct. 1, 1914, nonrecording gage, and Mar. 26, 1935, to Sept. 30, 1942, nonrecording gage, at bridge 2 mi upstream at different datums.

REMARKS.--Estimated daily discharges: Dec. 25-30, Jan. 5-9, 24-26, Jan. 31 to Mar. 8. Records good except those for estimated daily discharges, which are poor. Flow partly regulated by Mystic Lake (station number 06204000). Diversions for irrigation of about 24,300 acres, of which 400 acres lies downstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--54 years (1935-89), 951 ft^3/s, 689,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,000 ft^3/s, June 15, 1967, gage height, 7.17 ft; minimum observed, 58 ft^3/s, Apr. 2, 1936.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 4,400 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 9	1930	4,890	5.05	June 17	0600	*6,020	*5.60
June 11	0800	5,190	5.21	June 20	1000	5,070	5.19

Minimum daily discharge, 60 ft^3/s, Feb. 2.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	313	337	433	293	e90	e100	267	581	1570	3290	1070	577
2	304	329	378	281	e60	e80	258	598	1930	3090	1090	562
3	290	326	360	303	e66	e90	246	660	2480	2940	1050	544
4	278	324	347	307	e75	e100	231	644	2240	2890	965	521
5	276	319	344	e250	e90	e130	228	603	2350	2940	879	486
6	278	321	344	e230	e110	e190	243	673	3020	2880	815	488
7	274	317	352	e150	e130	e300	259	918	3960	2660	771	498
8	273	313	299	e110	e130	e400	297	1620	4300	2510	719	450
9	271	302	356	e170	e160	1760	313	1910	4580	2540	721	513
10	273	263	341	257	e210	1410	274	1960	4770	2490	737	484
11	270	269	330	241	e250	595	273	2610	4680	2590	771	487
12	264	343	338	211	e250	435	279	2740	3600	2290	737	470
13	264	410	350	220	e230	361	289	2160	3350	2410	730	460
14	261	423	323	253	e200	305	312	1730	3560	2370	728	444
15	270	412	260	202	e180	255	350	1830	3590	2140	698	436
16	282	405	261	211	e150	244	411	1840	5300	2000	674	415
17	428	414	328	277	e120	197	466	1740	5400	1870	640	402
18	368	424	366	270	e130	237	438	1750	3910	1540	622	401
19	332	405	337	257	e150	262	452	2040	3780	1420	641	406
20	334	405	313	248	e190	222	559	1700	4450	1380	641	387
21	332	427	308	247	e220	237	697	1600	3300	1360	633	382
22	321	432	288	244	e210	257	860	1660	2410	1400	611	366
23	314	436	273	221	e220	269	944	1940	1940	1460	573	362
24	311	463	256	e170	e230	266	823	2250	1770	1500	658	347
25	302	383	e230	e140	e220	278	763	1880	1700	1390	684	344
26	304	419	e210	e180	e190	308	762	1550	1680	1300	646	342
27	313	385	e190	253	e160	325	795	1400	1810	1320	642	346
28	314	396	e210	240	e130	311	714	1380	2250	1280	657	364
29	363	422	e230	309	---	298	627	1650	2690	1260	621	357
30	380	429	e260	413	---	280	600	1760	3040	1200	605	345
31	357	---	310	e220	---	272	---	1630	---	1140	588	---
TOTAL	9514	11253	9525	7378	4551	10774	14030	49007	95410	62850	22617	12986
MEAN	307	375	307	238	163	348	468	1581	3180	2027	730	433
MAX	428	463	433	413	250	1760	944	2740	5400	3290	1090	577
MIN	261	263	190	110	60	80	228	581	1570	1140	573	342
AC-FT	18870	22320	18890	14630	9030	21370	27830	97210	189200	124700	44860	25760

CAL YR 1988 TOTAL 246460 MEAN 673 MAX 5140 MIN 100 AC-FT 488900
WTR YR 1989 TOTAL 309895 MEAN 849 MAX 5400 MIN 60 AC-FT 614700

e Estimated

YELLOWSTONE RIVER BASIN

06207500 CLARKS FORK YELLOWSTONE RIVER NEAR BELFRY, MT

LOCATION.--Lat 45°00'37", long 109°03'53", in NW1/4SW1/4NW1/4 sec.32, T.9 S., R.22 E., Carbon County, Hydrologic Unit 10070006, on left bank 0.2 mi upstream from county road bridge and Big Sand Coulee, 0.8 mi north of Wyoming Montana State line, 9.5 mi southwest of Belfry, and at mile 71.2.

DRAINAGE AREA.--1,154 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1921 to current year. Monthly discharge only for some periods, published in WSP 1309. Published as Clarks Fork at Chance prior to October 1956 and as Clarks Fork Yellowstone River at Chance October 1956 to September 1968.

REVISED RECORDS.--WSP 1309: 1922 (M). WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,986.24 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Nov. 15, 1934, nonrecording gage, and Nov. 15, 1934, to July 26, 1951, water-stage recorder at bridge 0.4 mi downstream of different datum. July 27, 1951 to Sept. 30, 1953, water-stage recorder at present site at datum 0.98 ft higher.

REMARKS.--Estimated daily discharges: Dec. 24 to Mar. 7, Mar. 16-20. Water-discharge records good except those for estimated daily discharges, which are poor. Diversions for irrigation of about 11,100 acres upstream from station.

AVERAGE DISCHARGE.--68 years, 936 ft^3/s, 678,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,800 ft^3/s, June 9, 1981, gage height, 9.97 ft; minimum observed, 32 ft^3/s, Apr. 26, 1961, result of discharge measurement.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 5,400 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
June 17	0330	*7,470	*6.87	No other peak greater than base discharge.			

Minimum discharge, 35 ft^3/s, Oct. 20.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	44	58	243	e110	e100	e130	226	678	2160	3470	755	250
2	43	58	240	e130	e60	e110	220	744	2610	3370	867	228
3	42	57	257	e150	e50	e100	219	814	3120	3250	878	203
4	40	57	244	e170	e58	e110	205	805	2810	3190	733	176
5	39	59	233	e170	e56	e150	206	768	2690	3250	624	154
6	39	68	238	e140	e80	e200	218	1100	3650	3150	538	162
7	38	68	241	e100	e150	e220	234	1820	4920	2870	517	140
8	38	69	223	e90	e120	253	297	2790	5740	2690	515	135
9	37	69	208	e110	e140	328	320	3230	5760	2680	476	139
10	37	70	241	e140	e180	332	274	3650	6020	2530	448	148
11	37	75	238	e120	e200	287	260	4200	5820	2330	540	142
12	37	87	239	e110	e200	270	286	4100	5150	2150	545	130
13	37	86	243	e130	e190	264	344	3310	5030	2280	576	123
14	37	93	213	e120	e150	259	433	2540	5260	2330	553	115
15	38	91	178	e110	e120	231	592	2330	5060	2070	600	112
16	37	84	159	e150	e120	e210	654	2200	6910	1870	429	102
17	42	103	176	e190	e110	e200	674	2190	6760	1700	378	98
18	43	116	210	e200	e110	e190	601	2250	5300	1490	344	101
19	40	115	237	e200	e130	e190	770	2760	5120	1310	579	103
20	35	123	225	e200	e170	e200	1020	2250	6080	1240	413	102
21	37	147	216	e210	e170	205	1400	2100	4650	1210	353	102
22	44	188	216	e210	e170	210	1710	2420	3250	1200	327	94
23	50	191	205	e160	e175	213	1960	2880	2530	1220	297	90
24	56	191	e180	e110	e185	213	1490	3330	2220	1280	282	88
25	64	172	e150	e120	e200	213	1250	2630	2050	1140	323	86
26	63	163	e120	e150	e180	230	1290	2040	2100	1110	306	86
27	65	160	e100	e200	e170	249	1130	1710	2260	1140	320	86
28	68	182	e110	e190	e140	249	958	1690	2670	1100	318	87
29	65	215	e120	e210	---	241	802	2020	3000	968	297	90
30	61	240	e140	e220	---	230	721	2470	3260	898	283	90
31	59	---	e120	e200	---	221	---	2180	---	840	268	---
TOTAL	1412	3455	6163	4820	3884	6708	20764	69999	123960	61326	14682	3762
MEAN	45.5	115	199	155	139	216	692	2258	4132	1978	474	125
MAX	68	240	257	220	200	332	1960	4200	6910	3470	878	250
MIN	35	57	100	90	50	100	205	678	2050	840	268	86
AC-FT	2800	6850	12220	9560	7700	13310	41190	138800	245900	121600	29120	7460

CAL YR 1988 TOTAL 201321 MEAN 550 MAX 5600 MIN 35 AC-FT 399300
WTR YR 1989 TOTAL 320935 MEAN 879 MAX 6910 MIN 35 AC-FT 636600

e Estimated

YELLOWSTONE RIVER BASIN

06208500 CLARKS FORK YELLOWSTONE RIVER AT EDGAR, MT

LOCATION.--Lat 45°27'58", long 108°50'35", in SE1/4SE1/4SE1/4 sec.23, T.4 S., R.23 E., Carbon County, Hydrologic Unit 10070006, on right bank 400 ft downstream from county bridge, 0.5 mi east of Edgar, 6 mi upstream from Rock Creek, and at mile 27.0.

DRAINAGE AREA.--2,032 mi^2.

PERIOD OF RECORD.--July 1921 to September 1969, October 1986 to current year.

REVISED RECORDS.--WSP 1509: 1924, 1932(M). WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 3,460 ft, from topographic map. Prior to Aug. 31, 1953, nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Dec. 15 to Mar. 11. Records good except those for the estimated daily discharges, which are poor. Diversions for irrigation of about 41,500 acres, of which about 840 acres lies downstream from the station. In addition, about 6,300 acres of land upstream from the station are irrigated by diversions from the adjoining Rock Creek basin. Figures of discharge given herein have the flow of White Horse Canal subtracted.

AVERAGE DISCHARGE.--51 years (water years 1922-69, 1987-89), 1,031 ft^3/s, 747,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 10,900 ft^3/s, June 2, 1936, gage height, 8.62 ft; minimum, 36 ft^3/s, Apr. 22, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 5,300 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
June 17	1515	*6,990	*7.48	No other peak greater than base discharge this year.			

Minimum daily discharge, 90 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	280	350	453	e200	e200	e220	356	830	2010	3240	772	394
2	266	358	439	e230	e140	e200	356	837	2170	3290	759	361
3	269	353	437	e260	e90	e180	344	968	2630	3180	851	332
4	254	355	444	e270	e110	e210	334	995	2830	3150	845	300
5	264	348	429	e260	e100	e250	319	946	2410	3100	697	259
6	256	370	423	e220	e150	e350	322	1020	2820	2990	632	209
7	269	369	429	e170	e200	e400	331	1680	3970	2720	573	205
8	268	395	424	e150	e160	e560	349	2510	4940	2390	523	201
9	268	373	427	e180	e200	e720	427	3320	5240	2310	517	214
10	273	390	395	e220	e250	e700	417	3530	5490	2450	469	303
11	275	380	423	e200	e290	e660	374	4190	5710	2530	431	359
12	273	360	416	e170	e300	582	370	4330	5210	2180	566	351
13	269	392	421	e200	e280	478	398	3940	4810	2250	643	330
14	255	400	419	e190	e230	457	465	3030	5010	2390	692	311
15	249	404	e330	e180	e200	408	569	2620	4990	2270	677	299
16	246	392	e250	e230	e180	369	741	2600	5790	2020	651	302
17	292	369	e350	e290	e170	320	768	2500	6740	1890	448	307
18	297	411	e450	e350	e170	336	758	2440	5780	1610	373	294
19	327	419	e420	e350	e190	469	696	2750	5100	1320	368	299
20	333	394	e350	e350	e250	381	1000	2640	5520	1130	737	280
21	317	386	e400	e370	e300	359	1340	2340	5360	1050	597	290
22	343	406	e380	e350	e290	349	1720	2480	3870	1030	443	289
23	354	435	e350	e270	e330	349	1980	2870	2860	1070	363	270
24	380	446	e300	e170	e350	356	1740	3330	2490	1190	329	257
25	376	427	e250	e180	e350	354	1470	3090	2300	1120	459	256
26	377	399	e220	e210	e320	358	1400	2450	2210	1010	517	261
27	371	358	e180	e300	e300	380	1420	1990	2160	1060	544	260
28	390	392	e200	e300	e250	395	1200	1830	2390	1110	565	267
29	381	443	e220	e380	---	389	1050	1970	2740	1020	518	283
30	366	461	e250	e400	---	400	901	2440	2970	949	484	317
31	360	---	e230	e300	---	381	---	2330	---	886	425	---
TOTAL	9498	11735	11109	7900	6350	12320	23915	74796	118520	59905	17468	8660
MEAN	306	391	358	255	227	397	797	2413	3951	1932	563	289
MAX	390	461	453	400	350	720	1980	4330	6740	3290	851	394
MIN	246	348	180	150	90	180	319	830	2010	886	329	201
AC-FT	18840	23280	22030	15670	12600	24440	47440	148400	235100	118800	34650	17180

CAL YR 1988 TOTAL 242577 MEAN 663 MAX 5020 MIN 41 AC-FT 481200
WTR YR 1989 TOTAL 362176 MEAN 992 MAX 6740 MIN 90 AC-FT 718400

e Estimated

YELLOWSTONE RIVER BASIN

06211000 RED LODGE CREEK ABOVE COONEY RESERVOIR, NEAR BOYD, MT

LOCATION.--Lat 45°26'16", long 109°15'11", in NE1/4SE1/4SE1/4 sec.33, T.4 S., R.20 E., Carbon County, Hydrologic Unit 10070006, on right bank 0.6 mi upstream from Cooney Reservoir, 9.5 mi west of Boyd, and at mile 15.0.

DRAINAGE AREA.--143 mi^2.

PERIOD OF RECORD.--May 1937 to current year (no winter records most years).

REVISED RECORDS.--WSP 1729: Drainage area. WSP 2116: 1937(M), 1942(M), 1943(P), 1944(M), 1948(M), 1952(M), 1957(P), 1962(M), 1963(M).

GAGE.--Water-stage recorder. Datum of gage is 4,248.0 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--No estimated daily discharges this year. Seasonal records good. Some return flow from lands irrigated by water diverted from Rock Creek and East Rosebud Creek basins. Diversions for irrigation of about 5,100 acres upstream from station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,260 ft^3/s, June 15, 1967, gage height, 7.00 ft, from rating curve extended above 1,700 ft^3/s on basis of contracted-opening measurement of peak flow; no flow on many days in 1949.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 408 ft^3/s, May 12, gage height, 3.32 ft; minimum, 12 ft^3/s, Aug. 5.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32						48	93	94	74	22	54
2	33						49	86	102	76	21	55
3	35						42	109	105	73	22	60
4	35						37	95	119	74	18	60
5	37						39	85	105	68	14	54
6	37						44	82	108	60	15	48
7	36						52	82	113	53	17	49
8	37						68	170	113	54	19	56
9	35						55	210	114	52	23	84
10	35						48	176	122	58	29	82
11	30						53	164	132	69	28	83
12	30						54	285	129	53	27	75
13	28						53	274	121	64	24	69
14	29						50	239	125	71	25	68
15	31						50	280	107	67	28	65
16	36						58	244	124	68	31	59
17	75						78	219	143	71	35	50
18	70						71	202	121	68	32	50
19	53						64	197	104	63	36	52
20	54						69	189	87	60	39	49
21	50						73	177	81	59	45	51
22	47						74	164	80	59	45	52
23	47						68	156	67	55	45	51
24	45						64	133	74	53	52	49
25	45						70	130	91	44	68	47
26	43						88	122	95	45	58	47
27	43						142	117	87	45	60	43
28	45						128	109	78	45	66	45
29	45						100	122	79	44	60	41
30	48						100	114	75	44	57	35
31	46						---	106	---	36	53	---
TOTAL	1292						1989	4931	3095	1825	1114	1683
MEAN	41.7						66.3	159	103	58.9	35.9	56.1
MAX	75						142	285	143	76	68	84
MIN	28						37	82	67	36	14	35
AC-FT	2560						3950	9780	6140	3620	2210	3340

YELLOWSTONE RIVER BASIN

06211500 WILLOW CREEK NEAR BOYD, MT

LOCATION.--Lat 45°25'20", long 109°13'47", in SW1/4SW1/4SW1/4 sec.2, T.5 S., R.20 E., Carbon County, Hydrologic Unit 10070006, on left bank 0.5 mi upstream from Cooney Reservoir, 8 mi west of Boyd, and at mile 2.1.

DRAINAGE AREA.--53.3 mi^2.

PERIOD OF RECORD.--June 1937 to current year (no winter records most years).

REVISED RECORDS.--WSP 1729: Drainage area. WSP 2116: 1957, 1962. WDR MT-87-1: 1986.

GAGE.--Water-stage recorder. Elevation of gage is 4,260 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to Apr. 23, 1948, at site 0.5 mi downstream at different datum.

REMARKS.--No estimated daily discharges this year. Records good. Diversions for irrigation of about 1,800 acres upstream from station. Some return flow from lands irrigated by water diverted from Rock Creek basin. Several observations of water temperature and specific conductance were obtained during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,720 ft^3/s, June 15, 1967, gage height, 7.08 ft, from rating curve extended above 400 ft^3/s on basis of slope-area measurement of peak flow; maximum gage height, 7.24 ft, May 29, 1942, backwater from Cooney Reservoir, site and datum then in use; no flow May 29, 30, 1969.

EXTREMES FOR CURRENT SEASON.--Peak discharges greater than base discharge of 150 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 12	1830	*192	*3.92	No other peak greater than base discharge.			

Minimum discharge, 4.8 ft^3/s, Apr. 10.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21						23	48	34	60	53	43
2	25						25	41	30	69	51	38
3	24						22	46	36	69	47	36
4	23						20	41	34	72	49	37
5	23						20	37	33	63	39	37
6	23						27	33	32	60	37	36
7	23						40	31	30	61	39	38
8	23						61	66	27	56	38	34
9	22						35	92	27	57	40	43
10	22						27	58	27	68	46	49
11	21						28	49	35	119	67	58
12	18						29	108	34	92	68	53
13	14						31	114	35	110	71	48
14	12						37	84	39	115	76	44
15	13						40	75	40	105	78	42
16	16						56	76	43	92	66	41
17	32						58	79	48	96	63	38
18	32						45	62	43	92	60	36
19	25						46	56	37	85	60	35
20	21						47	52	35	82	63	35
21	20						44	50	38	79	67	33
22	20						41	50	38	85	63	33
23	20						36	41	42	88	60	31
24	21						32	31	51	94	57	30
25	21						34	33	59	90	62	28
26	21						41	32	59	81	64	27
27	21						67	30	54	70	63	24
28	21						58	28	49	70	62	24
29	21						46	30	49	62	62	24
30	23						46	37	54	68	56	23
31	24						---	35	---	63	50	---
TOTAL	666						1162	1645	1192	2473	1777	1098
MEAN	21.5						38.7	53.1	39.7	79.8	57.3	36.6
MAX	32						67	114	59	119	78	58
MIN	12						20	28	27	56	37	23
AC-FT	1320						2300	3260	2360	4910	3520	2180

YELLOWSTONE RIVER BASIN

06212500 RED LODGE CREEK BELOW COONEY RESERVOIR, NEAR BOYD, MT

LOCATION.--Lat 45°26'59", long 109°11'06", in NE1/4NW1/4NW1/4 sec.31, T.4 S., R.21 E., Carbon County, Hydrologic Unit 10070006, on right bank 250 ft upstream from Cottonwood Creek, 1.5 mi downstream from Cooney Dam, 6 mi west of Boyd, and at mile 10.5.

DRAINAGE AREA.--210 mi^2.

PERIOD OF RECORD.--September 1937 to current year.

REVISED RECORDS.--WSP 1309: 1942(M), 1944(M). WSP 2116: 1957(M).

GAGE.--Water-stage recorder. Datum of gage is 4,139.12 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 27, Dec. 8, 15-17, 24-29, Jan. 1,2, 6-12,15, 23-28, Feb. 1-12, 15-18, Mar. 1-5. Records good except those for estimated daily discharges, which are poor. Some return flow from lands irrigated by water diverted from Rock Creek and East Rosebud Creek basins. Flow completely regulated by Cooney Reservoir (station number 06212000). Diversions for irrigation of about 6,900 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--52 years, 101 ft^3/s, 73,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,470 ft^3/s, June 15, 1967, gage height, 10.17 ft; no flow Oct. 6, 7, 1948, Oct. 7, 8, 12, 16, 17, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 616 ft^3/s, Mar. 12, gage height, 4.51 ft; minimum daily, 3.7 ft^3/s, Oct. 16.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	9.7	7.9	e6.7	e7.4	e7.7	48	160	111	149	100	203
2	14	8.5	7.0	e6.9	e6.9	e7.7	48	159	110	121	100	193
3	14	8.3	7.0	7.8	e6.7	e7.6	48	157	111	120	94	181
4	15	8.1	7.4	7.7	e6.7	e7.5	48	156	112	121	84	182
5	14	8.1	7.0	7.7	e6.9	e7.5	48	155	112	120	84	179
6	14	6.9	7.2	e6.5	e6.9	9.2	48	132	111	121	86	171
7	13	6.3	7.4	e6.5	e6.9	9.6	48	114	124	123	94	173
8	11	6.7	e6.9	e6.5	e6.9	11	48	114	121	119	88	173
9	11	6.7	7.4	e6.8	e6.9	56	48	113	107	108	100	174
10	12	6.7	7.3	e7.2	e7.0	82	48	113	107	119	120	174
11	12	7.0	7.2	e6.7	e7.1	237	48	113	106	110	175	174
12	12	6.9	7.2	e6.7	e7.5	495	48	227	106	109	173	184
13	12	7.0	7.3	9.0	8.2	608	48	319	107	111	156	227
14	12	6.9	7.4	7.8	8.1	500	48	313	107	110	157	225
15	8.7	6.6	e6.9	e7.0	e6.9	339	48	331	118	122	158	223
16	3.7	6.6	e6.8	7.7	e6.9	296	63	346	130	147	158	206
17	6.3	6.7	e6.9	7.5	e6.7	236	76	346	150	148	159	175
18	4.5	6.6	7.4	7.6	e6.7	190	76	314	168	147	160	174
19	4.4	6.6	7.4	7.6	8.1	191	76	291	183	146	162	167
20	4.3	6.6	8.2	7.5	8.2	159	76	227	182	146	162	156
21	4.2	6.6	7.4	7.8	8.4	132	77	170	178	145	163	156
22	4.0	6.8	7.7	7.8	8.9	105	77	161	159	124	162	155
23	4.2	7.0	7.4	e6.7	8.9	64	77	159	146	124	162	154
24	4.9	7.1	e6.7	e6.7	9.0	48	77	159	135	124	164	154
25	5.0	7.3	e6.7	e6.7	9.2	49	77	160	116	117	165	153
26	4.7	7.0	e6.7	e6.9	9.3	49	77	126	118	114	165	142
27	6.2	e7.0	e6.7	e6.9	9.4	48	125	79	125	112	165	135
28	11	7.4	e6.9	e7.2	9.3	48	163	79	178	107	165	135
29	11	7.4	e7.3	7.9	---	48	162	98	177	108	164	133
30	11	7.7	8.6	7.9	---	48	161	110	175	103	176	126
31	11	---	7.9	8.2	---	48	---	110	---	100	203	---
TOTAL	288.1	214.8	225.2	226.1	216.0	4143.8	2160	5611	3990	3795	4424	5157
MEAN	9.29	7.16	7.26	7.29	7.71	134	72.0	181	133	122	143	172
MAX	15	9.7	8.6	9.0	9.4	608	163	346	183	149	203	227
MIN	3.7	6.3	6.7	6.5	6.7	7.5	48	79	106	100	84	126
AC-FT	571	426	447	448	428	8220	4280	11130	7910	7530	8780	10230

CAL YR 1988 TOTAL 25656.6 MEAN 70.1 MAX 1220 MIN 3.7 AC-FT 50890
WTR YR 1989 TOTAL 30451.0 MEAN 83.4 MAX 608 MIN 3.7 AC-FT 60400

e Estimated

YELLOWSTONE RIVER BASIN

06214000 ROCK CREEK AT ROCKVALE, MT

LOCATION.--Lat 45°31'05", long 108°51'42", in NW1/4SW1/4NW1/4 sec.2, T.4 S., R.23 E., Carbon County, Hydrologic Unit 10070006, on left bank just downstream from bridge on U.S. Highway 310, 0.3 mi southwest of Rockvale, and at mile 2.7.

DRAINAGE AREA.--569 mi^2.

PERIOD OF RECORD.--October 1920 to September 1922 (no winter record 1922), April 1932 to March 1933, February 1934 to September 1940, October 1984 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WDR MT-85-1: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 3,470 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to Sept. 30, 1940, nonrecording gage in same vicinity at different datum. Flow is equivalent.

REMARKS.--Estimated daily discharges: Nov. 27, Dec. 15 to Mar. 12, Mar. 15-18. Records good except those for estimated daily discharges, which are poor. Flow partly regulated by Cooney Reservoir. Diversions for irrigation of about 57,500 acres of which about 1,500 acres is downstream from station and about 2,500 acres is in the Clarks Fork Yellowstone River basin. Some return flow through Red Lodge Creek from lands irrigated by water diverted from East Rosebud Creek basin. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--12 years (water years 1921, 1935-40, 1985-89), 142 ft^3/s, 102,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,350 ft^3/s, May 8, 1988, gage height, 5.19 ft; maximum gage height, 8.10 ft, June 8, 1932, site and datum then in use; no flow July 14-16, 1935.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,180 ft^3/s, May 12, gage height, 3.68 ft; maximum gage height, 4.62 ft, Mar. 10, backwater from ice; minimum daily discharge, 9.3 ft^3/s, July 8.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	86	149	e100	e50	e80	201	318	205	68	68	118
2	24	85	146	e120	e35	e60	190	307	145	68	144	110
3	26	81	143	e130	e37	e50	172	314	128	41	186	91
4	27	81	137	e150	e45	e50	160	303	121	19	133	90
5	30	82	134	e140	e60	e60	162	277	47	25	97	87
6	31	94	131	e120	e70	e80	170	264	15	18	82	71
7	34	97	138	e100	e70	e100	186	249	14	13	56	74
8	31	103	111	e70	e80	e120	209	392	37	9.3	28	97
9	29	111	142	e80	e90	e170	183	469	74	10	10	126
10	28	108	147	e100	e100	e250	166	432	116	29	12	145
11	26	112	133	e120	e110	e400	165	526	192	138	49	169
12	24	114	131	e110	e110	e600	165	855	160	85	65	154
13	22	113	136	e110	e100	890	160	880	130	208	59	178
14	23	116	126	e110	e90	719	157	668	146	389	40	179
15	25	120	e85	e120	e80	e420	162	652	156	329	27	174
16	26	126	e70	e130	e70	e350	180	663	420	323	21	176
17	63	127	e170	e140	e60	e270	212	657	720	288	22	140
18	69	134	e160	e140	e60	e280	205	619	448	238	26	140
19	51	122	e140	e150	e70	299	195	609	373	199	45	143
20	44	128	e100	e150	e80	270	195	556	453	161	52	125
21	41	134	e110	e150	e100	234	199	440	363	151	55	117
22	39	139	e120	e130	e120	238	204	414	189	163	41	125
23	40	151	e110	e90	e140	195	207	417	114	181	36	128
24	45	162	e90	e70	e170	194	203	422	69	206	46	120
25	50	129	e80	e80	e160	209	219	385	39	142	90	111
26	53	132	e70	e100	e140	246	258	325	32	113	91	112
27	61	e100	e70	e110	e120	245	354	194	21	147	95	107
28	67	120	e80	e120	e110	242	385	159	21	152	107	113
29	73	155	e90	e140	---	225	361	195	29	158	96	115
30	86	144	e100	e140	---	213	353	254	33	140	102	111
31	88	---	e120	e90	---	210	---	232	---	106	114	---
TOTAL	1300	3506	3669	3610	2527	7969	6338	13447	5010	4317.3	2095	3746
MEAN	41.9	117	118	116	90.2	257	211	434	167	139	67.6	125
MAX	88	162	170	150	170	890	385	880	720	389	186	179
MIN	22	81	70	70	35	50	157	159	14	9.3	10	71
AC-FT	2580	6950	7280	7160	5010	15810	12570	26670	9940	8560	4160	7430

CAL YR 1988 TOTAL 51170.3 MEAN 140 MAX 2630 MIN 2.9 AC-FT 101500
WTR YR 1989 TOTAL 57534.3 MEAN 158 MAX 890 MIN 9.3 AC-FT 114100

e Estimated

YELLOWSTONE RIVER BASIN

06214500 YELLOWSTONE RIVER AT BILLINGS, MT

(National stream quality accounting network)

LOCATION.--Lat 45°47'48", long 108°28'12", in NE1/4NE1/4 sec.34, T.1 N., R.26 E., Yellowstone County, Hydrologic Unit 10070007, on left bank 30 ft downstream from bridge on U.S. Highway 87, 1 mi northeast of Billings, 10 mi upstream from Pryor Creek, and at mile 360.6.

DRAINAGE AREA.--11,795 mi^2. Area at site used Jan. 10, 1963, to Dec. 2, 1967, 11,783 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1904 to December 1905 (gage heights only January to March, December 1905), August 1928 to current year. Monthly discharge only for some periods, published in WSP 1309. Published as "near Billings" 1904-5.

REVISED RECORDS.--WDR MT 1968: 1967 (M). WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,081.36 ft above National Geodetic Vertical Datum of 1929. May 1904 to December 1905, nonrecording gage at bridge 30 ft upstream at different datum. Aug. 24, 1928, to June 30, 1932, nonrecording gage at bridge 30 ft upstream at datum 2.0 ft higher. July 1, 1932, to Oct. 12, 1937, water-stage recorder at old diversion dam 3 mi upstream at different datum. Oct. 13, 1937, to Jan. 9, 1963, water-stage recorder at present site at datum 2.0 ft higher. Jan. 10, 1963, to Dec. 2, 1967, water-stage recorder at city of Billings Water Department intake, 1.8 mi upstream at datum 3,096.09 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Dec. 26,27, Feb. 1,4,5, Sept. 20,21. Water-discharge records good. Diversions for irrigation of about 350,000 acres upstream from station. U.S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--61 years (1928-89), 6,971 ft^3/s, 5,050,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 69,500 ft^3/s, June 19, 1974, gage height, 14.60 ft; maximum gage height, 14.76 ft, June 16, 1967, present datum, from floodmark; minimum discharge, 430 ft^3/s, Dec. 12, 1932.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 37,700 ft^3/s, June 17, gage height, 10.67 ft; minimum, 516 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1880	2520	2690	1600	e1360	1810	2720	6480	14400	17300	5930	3820
2	1880	2500	2590	1680	843	1520	2640	6040	14400	17400	5850	3830
3	1850	2450	2550	2120	546	1330	2590	6270	16400	16400	5800	3690
4	1830	2420	2510	2180	e700	1200	2540	7090	18900	15800	5570	3590
5	1840	2420	2520	2270	e900	1230	2480	7300	17000	15300	5200	3480
6	1860	2420	2520	2450	1120	1450	2450	7010	17500	14800	4870	3350
7	1860	2430	2600	2130	1530	1840	2540	8020	21500	14000	4600	3280
8	1860	2430	2470	1180	1770	2270	2890	12500	25700	12900	4300	3350
9	1850	2490	2390	1240	1590	3020	3330	18600	27700	12200	4090	3360
10	1850	2530	2620	1560	1670	4790	3260	20900	28400	12200	4070	3590
11	1860	2490	2550	1740	2030	6510	3030	23200	30000	12400	4130	3750
12	1870	2520	2440	1670	1820	5900	2850	27500	28700	11800	4110	3770
13	1900	2540	2490	1640	1880	5080	2920	25400	24600	11500	4180	3660
14	1920	2680	2520	1660	1860	3950	2990	20700	24200	13100	4340	3550
15	2020	2670	2390	1760	1840	3350	3180	18000	24700	12500	4230	3430
16	2070	2630	2170	1690	1800	2940	3570	17300	26700	11300	4150	3300
17	2400	2670	1990	1910	1690	2360	4190	17300	35400	10700	3850	3200
18	2690	2680	2000	1960	1640	2100	4610	17400	33300	9730	3640	3200
19	2840	2760	2200	2160	1550	2390	4530	17900	26900	8710	3610	3180
20	2750	2710	2380	2160	1670	2740	4650	19100	26600	8010	4010	e3160
21	2650	2660	2250	2210	1820	2710	5720	16300	27600	7660	4490	e3160
22	2640	2690	2310	2130	1880	2650	7200	15400	22100	7520	4130	3180
23	2640	2760	2250	2040	1950	2610	9490	16800	18200	7640	3820	3130
24	2610	2900	2090	1970	2140	2870	10700	19000	16600	7780	3740	3070
25	2590	2890	2060	1340	2150	2780	9710	20100	15500	7500	4280	2960
26	2510	2750	e1680	1320	2170	2760	9290	16800	14700	6950	4360	2880
27	2480	2530	e1340	1460	2140	2880	9790	14100	14400	6790	4350	2850
28	2510	2360	968	1670	1960	2920	9380	12800	14800	6780	4450	2830
29	2490	2400	931	1830	---	2940	8100	13100	16100	6850	4360	2870
30	2550	2560	1340	1990	---	2950	7160	15300	16800	6770	4100	2860
31	2540	---	1570	1750	---	2840	---	16100	---	6430	3950	---
TOTAL	69090	77460	67379	56470	46019	88690	150500	479810	659800	336720	136560	99330
MEAN	2229	2582	2174	1822	1644	2861	5017	15480	21990	10860	4405	3311
MAX	2840	2900	2690	2450	2170	6510	10700	27500	35400	17400	5930	3830
MIN	1830	2360	931	1180	546	1200	2450	6040	14400	6430	3610	2830
AC-FT	137000	153600	133600	112000	91280	175900	298500	951700	1309000	667900	270900	197000

CAL YR 1988 TOTAL 1607599 MEAN 4392 MAX 29000 MIN 931 AC-FT 3189000
WTR YR 1989 TOTAL 2267828 MEAN 6213 MAX 35400 MIN 546 AC-FT 4498000

e Estimated

06214500 YELLOWSTONE RIVER AT BILLINGS, MT--Continued
(National stream quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1946, 1950-58, 1963 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1965 to September 1981.
WATER TEMPERATURE: December 1950 to September 1958, July 1963 to September 1979.
SUSPENDED-SEDIMENT DISCHARGE: October 1976 to September 1981.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1965-81): Maximum daily, 720 microsiemens, Jan. 12, 1980; minimum daily, 111 microsiemens, June 9, 1973.
WATER TEMPERATURE (water years 1951-58, 1963-79): Maximum, 26.5°C, July 24, 1955; minimum, 0.0°C, on many days during winter.
SEDIMENT CONCENTRATION (water years 1977-81): Maximum daily mean, 4,260 mg/L, May 18, 1978; minimum daily mean, 1 mg/L, Oct. 27, 30, 1976, Jan. 11, 12, 1978.
SEDIMENT LOAD (water years 1977-81): Maximum daily, 493,000 tons, May 19, 1978; minimum daily, 11 tons, Jan. 12, 1978.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT												
06...	0950	1820	--	--	739	13.0	16.5	--	--	--	--	--
DEC												
19...	0955	2220	30	1	553	-3.0	0.0	670	12.8	100	29	K13
FEB												
23...	1005	1950	--	--	550	5.0	0.5	--	--	--	--	--
MAR												
22...	0945	2660	100	2	470	7.0	1.5	680	12.0	96	K18	93
APR												
26...	1102	9330	--	--	301	10.5	8.0	--	--	--	--	--
MAY												
12...	1055	28600	--	--	113	7.0	10.0	--	--	--	--	--
JUL												
17...	0945	11100	50	1	219	18.5	20.0	684	7.5	92	K140	190
20...	0905	8030	--	--	286	23.0	20.5	--	--	--	--	--
AUG												
31...	0920	3940	--	--	511	17.0	18.0	--	--	--	--	--
SEP												
25...	1100	2950	0	0	412	11.5	14.5	684	9.0	99	K30	K22

DATE	TIME	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STANDARD UNITS) (00400)	TURBIDITY (NTU) (00076)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)
DEC											
19...	0955	--	--	--	8.2	2.5	210	53	18	33	1
MAR											
22...	0945	173	0	142	8.2	32	180	47	16	33	1
JUL											
17...	0945	91	0	69	8.0	21	80	21	6.7	12	0.6
SEP											
25...	1100	154	6	137	8.5	3.0	160	41	14	27	0.9

DATE	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)
DEC											
19...	3.5	151	110	8.2	0.50	17	317	311	0.43	1900	0.010
MAR											
22...	3.6	139	100	8.3	0.50	16	318	312	0.43	2280	<0.010
JUL											
17...	1.9	75	27	2.8	0.30	11	135	128	0.18	4050	<0.010
SEP											
25...	3.5	134	71	6.4	0.50	11	251	264	0.34	2000	<0.010

YELLOWSTONE RIVER BASIN

06214500 YELLOWSTONE RIVER AT BILLINGS, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)
DEC										
19...	0.470	<0.010	0.010	<0.20	0.020	0.010	<0.010	30	11	54
MAR										
22...	0.410	0.050	0.040	0.40	0.040	0.020	0.040	20	11	52
JUL										
17...	0.140	0.050	--	0.50	0.040	0.020	0.010	20	7	28
SEP										
25...	0.150	0.020	0.040	0.40	0.040	0.010	<0.010	10	10	48

DATE	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)
DEC										
19...	<0.5	<1	<1	<3	5	19	<5	62	11	<0.1
MAR										
22...	<0.5	<1	<1	<3	4	17	<5	57	13	0.1
JUL										
17...	<0.5	<1	<1	<3	2	13	<1	26	5	<0.1
SEP										
25...	<0.5	<1	<1	<3	3	11	1	51	5	0.2

DATE	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
DEC										
19...	<10	5	<1	3.0	440	<6	6	48	288	76
MAR										
22...	<10	5	<1	<1.0	430	<6	11	75	539	94
JUL										
17...	<10	1	<1	<1.0	190	<6	20	62	1860	84
SEP										
25...	<10	2	<1	<1.0	380	<6	<3	11	88	84

WATER QUALITY DATA, WATER YEARS OCTOBER 1987 TO SEPTERMBER 1989

DATE	TIME	GROSS ALPHA, DISSOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DISSOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	GROSS BETA, DISSOLVED (PCI/L AS SR/YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90) (80060)	RADIUM 226, DISSOLVED, RADON METHOD (PCI/L) (09511)	URANIUM NATURAL DISSOLVED (UG/L AS U) (22703)
JUN 1988									
29...	0745	1.2	7.1	2.7	3.8	2.1	3.4	0.05	0.67
SEP									
28...	0940	6.0	0.4	6.1	0.7	4.6	0.7	0.32	3.0
JUL 1989									
17...	0945	1.6	3.2	4.8	1.9	3.8	1.5	0.17	1.3

06215000 PRYOR CREEEK ABOVE PRYOR, MT

LOCATION.--Lat 45°20'26", long 108°34'07", in SW1/4NE1/4 sec.6, T.6 S., R.26 E., Bighorn County, Hydrologic Unit 10070008, 1.2 mi upstream from headworks of Pryor Ditch No. 1, 6.7 mi south of Pryor, and at site of former gaging station.

DRAINAGE AREA.--39.6 mi^2.

PERIOD OF RECORD.--Water years 1987 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)
MAY											
25...	1235	0.34	100	13	378	10.5	8.0	8.1	210	48	21
AUG											
30...	1445	0.02	--	0	340	27.0	19.5	8.3	190	42	21
SEP											
07...	0840	0.21	0	0	278	8.0	7.0	8.1	220	51	22
26...	1415	0.08	100	2	367	22.5	13.5	8.4	200	45	21

DATE	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	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, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)
MAY											
25...	0.80	0.0	0.70	189	8.0	0.40	0.50	6.2	200	0.27	0.18
AUG											
30...	0.80	0.0	0.60	160	9.0	1.3	0.60	7.2	178	0.24	0.01
SEP											
07...	0.90	0.0	0.50	148	9.0	0.30	0.50	7.2	180	0.25	0.10
26...	0.80	0.0	0.60	159	10	0.40	0.60	7.2	181	0.25	0.04

DATE	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	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)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
MAY										
25...	0.250	--	10	--	--	<3	--	--	--	--
AUG										
30...	<0.100	--	20	--	--	7	--	--	--	--
SEP										
07...	<0.100	<1	<10	<1	1	6	<1	<1	<0.1	<1
26...	--	--	30	--	--	6	--	--	--	--

YELLOWSTONE RIVER BASIN

06216000 PRYOR CREEK AT PRYOR, MT

LOCATION.--Lat 45°26'06", long 108°32'01", in NE1/4NW1/4NE1/4 sec.5, T.5 S., R.26 E., Big Horn County, Hydrologic Unit 10070008, on left bank 60 ft upstream from county bridge, 0.5 mi north of Pryor, 1.4 mi downstream from Lost Creek, and at mile 82.7.

DRAINAGE AREA.--117 mi^2.

PERIOD OF RECORD.--June 1921 to September 1924 (no winter records), October 1966 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1729: Drainage area. WDR MT-87-1: 1982-83 (M), 1986 (M).

GAGE.--Water-stage recorder. Datum of gage is 4,007.35 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Oct. 14, 1966, nonrecording gage at approximately same site at different datum.

REMARKS.--Estimated daily discharges: Nov. 26 to Dec. 3, Dec. 25 to Jan. 4, Jan. 7-17, Jan. 23-28, Jan. 31 to Feb. 10, Feb. 15-21, Feb. 28 to Mar. 5, Mar. 16-19. Records fair except those for estimated daily discharges, which are poor. Diversions for irrigation of about 1,100 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--23 years (water years 1967-89), 36.8 ft^3/s, 26,660 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,280 ft^3/s, May 19, 1978, gage height, 8.88 ft, from floodmark, from rating curve extended above 410 ft^3/s on basis of contracted-opening measurement of peak flow; minimum, 1.8 ft^3/s, July 31, Aug. 1, 1988.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 81 ft^3/s, Mar. 6, gage height, 4.82 ft; minimum, 4.1 ft^3/s, July 20, Aug. 16.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	26	27	e28	e28	e28	e29	30	28	26	13	13	12
2	26	26	e28	e28	e24	e27	29	27	26	13	14	11
3	26	27	e28	e28	e25	e27	29	28	26	12	13	11
4	27	27	29	e29	e26	e26	28	27	26	12	16	11
5	26	28	29	30	e27	e30	28	26	25	10	16	12
6	26	28	29	29	e27	42	28	26	24	8.7	16	11
7	27	27	29	e26	e27	52	27	26	15	6.6	17	12
8	27	27	28	e26	e27	43	27	27	13	6.9	16	14
9	27	27	29	e27	e27	40	27	26	24	7.2	7.8	15
10	28	27	30	e29	e27	40	27	26	28	12	7.1	16
11	28	27	29	e28	28	33	26	27	28	15	8.0	17
12	27	27	30	e27	29	30	26	31	27	9.4	7.6	16
13	27	28	29	e28	29	29	26	32	26	8.2	6.9	16
14	27	29	28	e28	29	28	26	30	26	8.9	7.1	15
15	27	29	27	e27	e28	28	25	29	25	9.6	7.9	15
16	28	29	27	e28	e27	e28	27	29	18	9.3	7.4	15
17	32	28	28	e29	e26	e27	28	28	15	8.1	7.7	16
18	28	29	28	30	e27	e28	28	27	13	7.7	8.8	21
19	27	28	29	30	e27	e29	28	27	13	6.6	11	22
20	27	28	29	30	e28	29	28	26	12	6.7	12	22
21	28	28	29	30	e28	29	26	24	13	6.9	12	22
22	28	28	29	30	29	30	26	25	13	7.5	11	19
23	28	28	29	e29	35	30	26	25	12	8.7	12	18
24	28	30	29	e28	36	31	27	24	10	10	13	18
25	28	29	e26	e28	33	31	27	25	10	12	15	18
26	28	e27	e26	e28	31	34	28	26	10	12	16	18
27	29	e28	e27	e29	31	33	30	26	9.4	e13	13	19
28	28	e28	e28	e29	e30	32	31	26	9.5	14	12	18
29	28	e28	e28	30	---	31	31	27	12	13	12	18
30	28	e27	e28	31	---	31	30	27	14	11	12	18
31	28	---	e28	e31	---	31	---	27	---	12	12	---
TOTAL	853	834	878	888	796	988	830	835	548.9	311.0	360.3	486
MEAN	27.5	27.8	28.3	28.6	28.4	31.9	27.7	26.9	18.3	10.0	11.6	16.2
MAX	32	30	30	31	36	52	31	32	28	15	17	22
MIN	26	26	26	26	24	26	25	24	9.4	6.6	6.9	11
AC-FT	1690	1650	1740	1760	1580	1960	1650	1660	1090	617	715	964

CAL YR 1988 TOTAL 10935.1 MEAN 29.9 MAX 638 MIN 3.2 AC-FT 21690
WTR YR 1989 TOTAL 8608.2 MEAN 23.6 MAX 52 MIN 6.6 AC-FT 17070

e Estimated

YELLOWSTONE RIVER BASIN

06216900 PRYOR CREEK NEAR HUNTLEY, MT

LOCATION.--Lat 45°49'19", long 108°17'23", in NE1/4SE1/4NW1/4 sec.19, T.1 N., R.28 E., Yellowstone County, Hydrologic Unit 10070008, on left bank 250 ft upstream from county bridge on Indian Creek road, 1.9 mi downstream from Indian Creek, 4.9 mi south of Huntley, and at mile 11.2.

DRAINAGE AREA.--582 mi^2.

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

GAGE.--Water-stage recorder. Elevation of gage is 3,140 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 24 to Mar. 13, Mar. 17-21. Records good except those for estimated daily discharges, which are poor. Several observations of water temperature and specific conductance were made during the year. Diversions for irrigation of about 3,200 acres upstream from station.

AVERAGE DISCHARGE.--11 years, 70.8 ft^3/s, 51,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,670 ft^3/s, May 8, 1988, result of discharge measurement, gage height, 6.81 ft; maximum gage height, 7.54 ft, Mar. 12, 1979, ice jam; no flow part of each day July 29 to Aug. 1, Aug. 4-6, 1988, July 15, 25, 27, 29, 1989.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of May 19, 1978, reached a discharge of 18,200 ft^3/s, from slope-area measurement of peak flow at site 10.5 mi downstream. Floodmarks at this site not recovered.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 11	----	*unknown	a*5.72	Mar. 27	0415	531	2.58

a--ice jam.

No flow part of each day July 15, 25, 27, 29.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	36	45	e40	e35	e19	e15	120	119	56	15	2.7	12
2	35	44	e45	e45	e12	e16	95	84	54	12	2.4	15
3	35	41	e50	e54	e13	e18	83	77	50	13	2.1	14
4	36	41	e50	e60	e15	e17	77	83	51	11	2.6	15
5	36	42	e50	e50	e17	e30	74	74	51	5.6	3.2	15
6	36	42	e45	e44	e20	e80	69	68	51	7.5	3.2	14
7	38	43	e40	e40	e23	e150	69	65	50	2.1	3.1	14
8	38	41	e35	e30	e22	e200	71	65	49	1.1	3.7	15
9	39	41	e40	e35	e24	e330	98	64	45	1.1	2.4	15
10	38	42	e45	e40	e28	e450	112	66	40	.81	1.7	17
11	37	44	e46	e40	e30	e640	91	64	41	.63	4.4	21
12	39	42	e48	e35	e29	e480	75	63	43	.38	1.8	22
13	38	43	e50	e35	e27	e330	69	131	44	.32	1.9	24
14	36	44	e45	e35	e25	158	65	148	40	.68	2.0	23
15	36	43	e40	e32	e24	128	62	96	38	.46	1.3	23
16	36	41	e45	e36	e20	102	61	85	36	1.1	1.5	21
17	41	44	e50	e40	e16	e90	62	89	35	1.3	.95	20
18	57	43	e50	e45	e18	e86	67	78	34	.82	.65	19
19	64	47	e45	e40	e20	e82	67	67	31	.52	.53	17
20	47	56	e40	e35	e21	e84	63	62	29	.54	.74	16
21	43	52	e42	e33	e22	e90	61	60	28	.43	.92	19
22	42	49	e41	e30	e23	97	59	58	25	.49	8.0	20
23	40	49	e38	e26	e27	131	56	56	24	.83	6.8	21
24	41	e45	e35	e25	e29	158	54	53	26	1.5	3.9	22
25	42	e45	e33	e27	e29	174	56	52	24	1.2	4.9	21
26	42	e40	e30	e30	e28	235	61	51	26	4.4	2.3	20
27	42	e35	e35	e35	e25	368	73	52	24	1.6	3.2	21
28	41	e40	e40	e35	e20	205	124	51	21	1.4	7.3	20
29	42	e45	e40	e40	---	139	194	51	19	.71	12	21
30	43	e50	e50	e45	---	116	150	52	18	2.1	13	21
31	44	---	e45	e30	---	124	---	56	---	2.1	12	---
TOTAL	1260	1319	1328	1162	626	5323	2438	2240	1103	92.72	117.19	558
MEAN	40.6	44.0	42.8	37.5	22.4	172	81.3	72.3	36.8	2.99	3.78	18.6
MAX	64	56	50	60	30	640	194	148	56	15	13	24
MIN	35	35	30	25	12	15	54	51	18	.32	.53	12
AC-FT	2500	2620	2630	2300	1240	10560	4840	4440	2190	184	232	1110

CAL YR 1988 TOTAL 20248.30 MEAN 55.3 MAX 1720 MIN .78 AC-FT 40160
WTR YR 1989 TOTAL 17566.91 MEAN 48.1 MAX 640 MIN .32 AC-FT 34840

e Estimated

YELLOWSTONE RIVER BASIN

06279500 BIGHORN RIVER AT KANE, WY

LOCATION.--Lat 44°45'31", long 108°10'51", in NW1/4NE1/4SW1/4 sec.9, T.55 N., R.94 W., Big Horn County, Hydrologic Unit 10080010, on right bank 180 ft upstream from Bighorn Canyon National Recreation Area boundary, 0.5 mi upstream from normal high-water line of Bighorn Lake at elevation 3,660 ft, 1.3 mi upstream from Five Springs Creek, and 5.9 mi south of Kane.

DRAINAGE AREA.--15,765 mi^2. Area at sites used prior to May 17, 1956, 15,846 mi^2.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS.--WSP 1309: 1929(M). WSP 1509: 1929. WSP 1709: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 3,660 ft above National Geodetic Vertical Datum of 1929, from topographic map. Aug. 29, 1928, to Apr. 25, 1932, nonrecording gage, and Apr. 25, 1932, to May 16, 1956, water-stage recorder at site 12.5 mi downstream at different datum.

REMARKS.--Estimated daily discharges: Nov. 26 to Dec. 8 and Dec. 13 to Mar. 25. Water-discharge records good except those for estimated daily discharges, which are poor. Some regulation by Boysen Reservoir (station 06258900) since October 1951. Diversions for irrigation of about 376,000 acres upstream from station. U.S. Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--61 years, 2,248 ft^3/s, 1,629,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 25,200 ft^3/s, June 16, 1935, gage height, 11.10 ft, site and datum then in use; minimum daily, 179 ft^3/s, July 22, 1934.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage since at least 1923, 14.8 ft, Sept. 30, 1923, site and datum in use April 1932 to May 1956.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,090 ft^3/s, July 23, gage height, 3.03 ft; minimum daily, 410 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	881	774	800	620	540	500	782	740	1630	950	800	809
2	976	774	840	660	450	480	768	714	1280	935	772	807
3	1000	774	740	730	410	490	767	676	1260	1010	760	826
4	955	772	790	750	450	540	765	675	1530	953	757	849
5	979	767	790	700	470	580	754	670	1560	910	758	888
6	944	765	740	600	480	660	753	684	1420	885	761	833
7	900	760	680	490	520	740	744	632	1630	841	788	802
8	863	760	780	570	550	770	723	603	1830	832	792	837
9	816	764	852	580	590	800	715	685	2500	807	779	1030
10	784	767	774	650	600	800	723	796	2680	792	783	1680
11	767	774	764	580	600	780	694	1070	2510	886	733	1610
12	753	774	767	550	580	760	692	1440	2630	849	733	1390
13	751	778	760	590	580	730	764	1870	2300	809	798	1310
14	750	789	700	580	560	710	785	1670	1730	914	930	1310
15	756	812	640	600	560	730	889	1390	1570	1030	921	1290
16	760	812	720	650	540	690	999	1470	1700	955	889	1250
17	753	792	870	700	540	680	1000	1510	2410	1020	846	1200
18	758	796	930	750	580	740	987	1440	2510	915	809	1150
19	768	796	900	720	600	800	975	1640	1960	816	810	1120
20	783	782	910	760	620	810	911	2040	1850	781	914	1110
21	789	735	910	760	640	840	860	1540	1890	729	1190	1130
22	786	767	840	740	670	840	807	1390	1750	692	1050	1130
23	783	836	740	740	680	880	764	1560	1550	1050	888	1130
24	782	844	650	640	680	940	741	1890	1360	892	835	1160
25	783	816	560	640	660	960	754	1960	1340	1000	812	1130
26	781	770	520	680	600	899	724	1390	1360	1210	841	1130
27	774	780	560	700	580	855	749	1110	1230	1170	851	1120
28	774	760	600	700	530	744	735	999	1140	998	896	1150
29	774	740	630	700	---	705	753	1140	1110	965	877	1140
30	774	750	660	690	---	718	769	1770	1020	897	822	1140
31	774	---	640	650	---	772	---	2050	---	837	813	---
TOTAL	25271	23380	23057	20470	15860	22943	23846	39214	52240	28330	26008	33461
MEAN	815	779	744	660	566	740	795	1265	1741	914	839	1115
MAX	1000	844	930	760	680	960	1000	2050	2680	1210	1190	1680
MIN	750	735	520	490	410	480	692	603	1020	692	733	802
AC-FT	50130	46370	45730	40600	31460	45510	47300	77780	103600	56190	51590	66370

CAL YR 1988 TOTAL 468522 MEAN 1280 MAX 9700 MIN 520 AC-FT 929300
WTR YR 1989 TOTAL 334080 MEAN 915 MAX 2680 MIN 410 AC-FT 662600

PERIOD OF RECORD.--Water years 1947 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (US/CM)	PH (STAND-ARD UNITS)	TEMPER-ATURE WATER (DEG C)	BARO-METRIC PRES-SURE (MM OF HG)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)
OCT 18...	1100	759	1160	8.5	9.0	--	--	--
NOV 07...	1330	735	1260	8.6	7.0	673	11.8	111
DEC 21...	1640	955	1200	8.2	0.0	--	--	--
MAR 07...	1215	738	1240	7.6	0.0	664	11.5	91
MAY 04...	1020	684	1100	8.5	13.0	672	10.2	110
JUN 14...	1145	1750	620	8.0	17.0	760	8.1	84
JUL 28...	1140	1020	1050	8.0	25.0	660	7.6	107
AUG 30...	1300	823	1140	8.6	20.5	--	--	--
SEP 20...	1430	1230	1100	8.6	16.0	668	9.0	105

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHORUS TOTAL (MG/L AS P)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY)
OCT 18...	--	--	--	--	--	--	67	137
NOV 07...	<1	0.4	0.02	0.38	0.4	0.02	26	52
DEC 21...	--	--	--	--	--	--	164	423
MAR 07...	K26	0.6	0.15	0.45	0.6	0.10	199	397
MAY 04...	K28	1.2	0.04	0.36	0.4	0.05	200	369
JUN 14...	--	--	--	--	--	--	423	2000
JUL 28...	370	1.1	0.01	1.6	1.6	0.13	757	2080
AUG 30...	--	--	--	--	--	--	166	369
SEP 20...	--	--	--	--	--	--	226	751

DATE	TIME	HARD-NESS TOTAL (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SILICA, DIS-SOLVED (MG/L AS SIO2)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)
OCT 18...	1100	420	100	41	120	3	5.1	1	55
DEC 21...	1640	440	110	41	120	3	8.7	<1	59
MAR 07...	1215	430	110	38	110	2	11	1	51
MAY 04...	1020	--	--	--	--	--	--	--	--
JUN 14...	1145	190	51	15	47	2	7.4	2	45
JUL 28...	1140	--	--	--	--	--	--	--	--
AUG 30...	1300	370	95	31	110	3	10	--	59
SEP 20...	1430	--	--	--	--	--	--	--	--

YELLOWSTONE RIVER BASIN

06279500 BIGHORN RIVER AT KANE, WY--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT 18...	<0.5	2	<5	<3	<10	45	<10	55	18
DEC 21...	<0.5	3	<5	<3	<10	7	<10	67	18
MAR 07...	<0.5	<1	<5	<3	<10	39	<10	72	26
MAY 04...	--	--	--	--	--	--	--	--	--
JUN 14...	<0.5	<1	<5	<3	<10	38	10	19	5
JUL 28...	--	--	--	--	--	--	--	--	--
AUG 30...	<0.5	<1	<5	<3	<10	210	<10	46	6
SEP 20...	--	--	--	--	--	--	--	--	--

DATE	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 18...	0.2	<10	10	2	<1.0	1200	<6	19
DEC 21...	<0.1	<10	<10	3	<1.0	1200	<6	7
MAR 07...	0.1	<10	<10	2	1.0	1200	<6	23
MAY 04...	--	--	--	3	--	--	--	--
JUN 14...	0.2	<10	10	2	1.0	490	<6	7
JUL 28...	--	--	--	3	--	--	--	--
AUG 30...	--	<10	<10	3	<1.0	1000	<6	7
SEP 20...	--	--	--	2	--	--	--	--

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND	TEMPERATURE WATER (DEG C)	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
MAY 04...	1020	684	13.0	0.04	0.01	<0.01	<0.01	<0.01	<0.01
JUN 14...	1145	1750	17.0	0.12	<0.01	<0.01	<0.01	<0.01	<0.01
JUL 28...	1140	1020	25.0	0.06	0.02	0.06	<0.01	<0.01	<0.01
AUG 30...	1300	823	20.5	0.03	0.01	0.03	<0.01	<0.01	<0.01
SEP 20...	1430	1230	16.0	<0.01	0.01	<0.01	<0.01	<0.01	<0.01

YELLOWSTONE RIVER BASIN

06285100 SHOSHONE RIVER NEAR LOVELL, WY

LOCATION.--Lat 44°50'19", long 108°26'04", in NW1/4NE1/4NE1/4 sec.17, T.56 N., R.96 W., Big Horn County, Hydrologic Unit 10080014, on left bank 20 ft upstream from bridge on County Road 9 and 1.5 mi west of Lovell.

DRAINAGE AREA.--2,350 mi^2, approximately.

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Elevation of gage is 3,850 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to Oct. 1, 1976, at site 500 ft downstream, at datum 2.00 ft higher. Oct. 1, 1976 to Sept. 30, 1980, at site 500 ft downstream, at datum 1.00 ft higher. Oct. 1, 1981 to Nov. 13, 1986, at site 500 ft downstream at same datum.

REMARKS.--Estimated daily discharges: Dec. 16 to May 5. Water-discharge records fair except those for estimated daily discharges, which are poor. Flow regulated by Buffalo Bill Reservoir. (See station 06282000.) Natural flow of stream affected by storage reservoirs, power development, diversions upstream from station for irrigation of about 143,000 acres, of which about 8,000 acres are downstream from station, and return flow from irrigated areas.

AVERAGE DISCHARGE.--23 years, 933 ft^3/s, 676,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,400 ft^3/s, June 10, 1981, gage height, 9.16 ft, site then in use, at present datum; maximum gage height, 10.09 ft, Feb. 3, 1972 (backwater from ice), site then in use, at present datum; minimum daily discharge, 27 ft^3/s, May 31, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,070 ft^3/s, June 21, gage height, 6.77 ft; minimum daily, 200 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	347	297	373	300	240	220	270	560	409	1160	917	709
2	321	292	378	290	210	210	270	550	331	1120	773	760
3	317	289	405	290	200	210	282	550	365	1110	718	773
4	288	277	348	300	210	210	300	550	386	731	711	859
5	304	276	352	300	210	210	315	550	438	607	721	824
6	481	285	380	290	210	220	330	463	398	505	753	707
7	395	332	355	280	220	220	300	441	420	448	870	704
8	421	315	328	270	223	230	270	500	448	457	925	693
9	615	284	337	270	230	240	260	547	450	775	1010	792
10	484	326	334	280	230	260	255	411	458	1220	1070	925
11	491	408	346	290	230	270	258	411	511	1510	1030	995
12	457	437	338	300	240	280	262	1030	561	1450	918	1020
13	426	467	357	300	240	270	270	930	544	1630	955	823
14	400	520	355	290	230	260	285	805	528	1850	862	822
15	380	518	319	290	230	260	310	1040	518	1700	763	691
16	373	478	310	280	220	260	340	1100	728	1580	660	551
17	413	471	310	280	220	260	360	922	1780	1480	576	539
18	425	477	314	280	220	250	380	860	1960	1160	624	565
19	388	438	320	270	230	240	390	671	1990	845	831	531
20	360	425	320	270	230	240	410	525	2320	772	990	546
21	335	426	320	260	230	250	440	506	2760	778	1080	555
22	325	422	325	250	240	260	470	468	2690	811	917	561
23	303	413	320	250	250	260	500	350	2770	1420	898	585
24	302	425	300	260	250	260	520	317	2490	1650	847	600
25	298	393	280	260	250	260	540	403	2540	1550	918	584
26	298	387	290	270	240	260	560	428	2530	1500	900	563
27	293	379	300	270	230	260	560	422	2420	1560	955	579
28	297	378	310	260	230	270	560	410	2360	1590	972	590
29	303	389	310	260	---	270	560	444	2280	1350	892	601
30	303	373	310	250	---	270	560	454	1710	1400	760	680
31	293	---	300	250	---	270	---	452	---	1440	682	---
TOTAL	11436	11597	10244	8560	6393	7710	11387	18070	40093	37159	26498	20727
MEAN	369	387	330	276	228	249	380	583	1336	1199	855	691
MAX	615	520	405	300	250	280	560	1100	2770	1850	1080	1020
MIN	288	276	280	250	200	210	255	317	331	448	576	531
AC-FT	22680	23000	20320	16980	12680	15290	22590	35840	79520	73700	52560	41110

CAL YR 1988 TOTAL 125924 MEAN 344 MAX 3160 MIN 115 AC-FT 249800
WTR YR 1989 TOTAL 209874 MEAN 575 MAX 2770 MIN 200 AC-FT 416300

YELLOWSTONE RIVER BASIN

06285100 SHOSHONE RIVER NEAR LOVELL, WY--Continued

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1966 to September 1983.
WATER TEMPERATURES: October 1966 to September 1983.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND	TEMPER-ATURE WATER (DEG C)	SPE-CIFIC CON-DUCT-ANCE (US/CM)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)
OCT						
06...	1200	469	12.0	1000	--	--
NOV						
07...	1730	306	6.0	1080	46	--
DEC						
21...	1300	330	0.0	1310	--	--
FEB						
08...	1445	223	0.0	1390	40	3
MAR						
16...	1020	260	0.0	1320	--	--
MAY						
05...	1000	547	10.5	650	150	1
JUN						
14...	0845	524	13.0	725	--	--
JUL						
28...	0920	1620	17.0	470	420	--
AUG						
23...	1030	1010	16.5	647	--	--
SEP						
20...	1235	710	13.5	725	--	--

YELLOWSTONE RIVER BASIN

06286200 SHOSHONE RIVER AT KANE, WY

LOCATION.--Lat 44°51'31", long 108°19'52", in NE1/4SE1/4SE1/4 sec.6, T.56 N., R.95 W., Big Horn County, Hydrologic Unit 10080014, at bridge on county road, 3.4 mi northeast of Lovell, 6.5 mi west of Kane, 6.6 mi upstream from high-water line of Bighorn Lake at elevation 3,640 ft, and 7.8 mi upstream from former discharge station.

DRAINAGE AREA.--2,989 mi^2, at former discharge station.

PERIOD OF RECORD.--Water years 1976 to September 1989 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (US/CM)	PH (STAND-ARD UNITS)	TEMPER-ATURE WATER (DEG C)	BARO-METRIC PRES-SURE (MM OF HG)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)
NOV								
07...	1530	321	1450	8.5	6.0	667	13.1	121
FEB								
08...	1645	E238	1550	8.0	0.0	710	8.6	64
MAY								
04...	1345	E545	830	8.3	13.0	668	9.4	102
AUG								
23...	1130	E1000	880	8.4	17.0	660	8.6	103

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHOROUS TOTAL (MG/L AS P)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)
NOV							
07...	130	1.6	0.06	0.44	0.5	0.03	--
FEB							
08...	390	1.7	0.23	0.37	0.6	0.05	2
MAY							
04...	350	1.0	0.06	0.34	0.4	0.05	2
AUG							
23...	930	1.2	0.02	0.38	0.4	0.07	2

YELLOWSTONE RIVER BASIN

06286400 BIGHORN LAKE NEAR ST. XAVIER, MT

LOCATION.--Lat 45°18'27", long 107°57'26", in SW1/4SE1/4 sec.18, T.6 S., R.31 E., Big Horn County, Hydrologic Unit 10080010, in block 13 of Yellowtail Dam on Bighorn River, 1.3 mi upstream from Grapevine Creek, 15.5 mi southeast of St. Xavier, and at mile 86.6.

DRAINAGE AREA.--19,626 mi^2.

PERIOD OF RECORD.--November 1965 to current year (monthend contents only). Prior to October 1969, published as "Yellowtail Reservoir." Records of daily elevations and contents on file in Helena district office.

GAGE.--Water-stage recorder in powerhouse control room. Datum of gage is referenced to National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation).

REMARKS.--Reservoir is formed by thin concrete-arch dam; construction began in 1961; completed in 1967. Storage began Nov. 3, 1965. Usable capacity, 1,356,000 acre-ft between elevation 3,296.50 ft, river outlet invert, and 3,657.00 ft, top of flood control. Elevation of spillway crest, 3,593.00 ft. Normal maximum operating level, 1,097,000 acre-ft, elevation, 3,640.00 ft. Minimum operating level, 483,400 acre-ft, elevation, 3,547.00 ft. Dead storage, 16,010 acre-ft, below elevation 3,296.50 ft. Figures given herein represent usable contents. Water is used for power production, flood control, irrigation, and recreation.

COOPERATION.--Elevations and capacity table furnished by U.S. Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 1,346,000 acre-ft, July 6, 1967, elevation, 3,656.43 ft; minimum since first filling, 641,900 acre-ft, Apr. 14, 1989, elevation 3,583.30 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 867,300 acre-ft, Sept. 30, elevation, 3,621.25 ft; minimum, 641,900 acre-ft, Apr. 14, elevation, 3,583.30 ft.

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30	3,610.96	793,300	---
Oct. 31	3,613.08	807,400	+14,100
Nov. 30	3,611.08	794,100	-13,300
Dec. 31	3,604.37	753,200	-40,900
CAL YR 1988			-150,900
Jan. 31	3,596.06	707,200	-46,000
Feb. 28	3,587.11	660,900	-46,300
Mar. 31	3,585.05	650,600	-10,300
Apr. 30	3,585.64	653,500	+2,900
May 31	3,595.24	702,800	+49,300
June 30	3,610.94	793,200	+90,400
July 31	3,615.71	825,700	+32,500
Aug. 31	3,616.48	831,300	+5,600
Sept. 30	3,621.25	867,300	
WTR YR 1989			+74,000

YELLOWSTONE RIVER BASIN

06287000 BIGHORN RIVER NEAR ST. XAVIER, MT

LOCATION.--Lat 45°19'00", long 107°55'05", in NW1/4NW1/4NE1/4 sec.16, T.6 S., R.31 E., Big Horn County, Hydrologic Unit 10080015, on right bank 800 ft downstream from Yellowtail afterbay dam, 1,500 ft downstream from Lime Kiln Creek, 14 mi southwest of St. Xavier, and at mile 83.9.

DRAINAGE AREA.--19,667 mi^2. Area at site used prior to Apr. 16, 1963, 19,626 mi^2.

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

GAGE.--Water-stage recorder. Datum of gage is 3,158.38 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Apr. 16, 1963, and June 13, 1964, to Mar. 31, 1965, water-stage recorder at site 1.2 mi upstream at different datum. Apr. 1, 1965, to July 31, 1966, water-stage recorder at site 1,300 ft downstream at present datum.

REMARKS.--No estimated daily discharges during year. Records good. Figures of discharge given herein are sum of river flow and flow of Bighorn Canal. Some regulation by 14 reservoirs in Wyoming with combined capacity of 1,400,000 acre-ft and complete regulation by Bighorn Lake (see preceding page) since Nov. 3, 1965. Diversions for irrigation of about 375,000 acres upstream from station. U.S. Bureau of Reclamation satellite telemeter at station.

AVERAGE DISCHARGE.--55 years, 3,531 ft^3/s, 2,558,000 acre-ft/yr, unadjusted.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 37,400 ft^3/s, June 16, 1935; minimum observed, 49 ft^3/s, Mar. 29, 1966, result of discharge measurement (dam closure); minimum daily, 112 ft^3/s, Apr. 2, 1967.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,360 ft^3/s, Aug. 9; minimum daily, 1,340 ft^3/s, Nov. 1.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1700	1340	1730	1840	1980	1970	1730	1680	1940	2060	2210	1970
2	1690	1700	1740	1850	1990	1970	1740	1700	1940	2060	2210	1970
3	1680	1720	1740	1840	2000	1970	1730	1690	1930	2070	2210	1970
4	1670	1720	1730	1850	1990	1860	1730	1700	1930	2070	2230	1960
5	1780	1730	1740	1840	2000	1850	1730	1700	1920	2080	2230	1970
6	1850	1740	1740	1840	2010	1850	1730	1710	2000	2080	2240	1980
7	1580	1730	1750	1850	2020	1850	1720	1700	2040	2100	2250	1970
8	1570	1720	1760	1850	2020	1850	1730	1700	2090	2090	2250	1980
9	1570	1710	1760	1860	2020	1860	1720	1700	2100	2100	2270	1970
10	1570	1720	1760	1870	2030	1850	1720	1680	2090	2100	2250	1980
11	1570	1720	1770	1870	2040	1850	1720	1680	2090	2110	2250	1980
12	1570	1720	1770	1870	2040	1840	1720	1670	2070	2110	2250	1990
13	1550	1710	1770	1880	2050	1840	1720	1670	2100	2120	2260	1980
14	1520	1710	1780	1890	2050	1840	1710	1670	2070	2120	2250	1960
15	1520	1710	1770	1900	2070	1840	1710	1670	2080	2130	2030	1960
16	1520	1710	1790	1900	2070	1840	1720	1660	2070	2140	1980	1960
17	1520	1710	1790	1900	2090	1840	1710	1880	2060	2140	1980	1960
18	1450	1710	1790	1900	2090	1840	1710	1650	2060	2140	1980	1960
19	1380	1700	1800	1920	2110	1850	1700	1650	2060	2130	1980	1960
20	1380	1700	1790	1920	2110	1840	1710	1660	2060	2140	1990	1960
21	1380	1700	1810	1930	2120	1860	1710	1650	2050	2130	1990	1960
22	1380	1700	1810	1930	2120	1850	1710	1650	2050	2150	1990	1960
23	1370	1700	1810	1940	2040	1850	1700	1700	2040	2160	1980	1960
24	1370	1710	1810	1940	1960	1850	1690	1780	2050	2160	1980	1960
25	1360	1710	1810	1940	1970	1850	1700	1780	2050	2170	1980	1960
26	1350	1710	1820	1950	1970	1840	1700	1770	2050	2170	1970	1960
27	1350	1720	1840	1950	1960	1850	1690	1780	2040	2180	1970	1960
28	1350	1720	1830	1960	1970	1740	1690	1770	2030	2180	1970	1970
29	1350	1720	1830	1970	---	1730	1690	1770	2050	2180	1980	1970
30	1350	1730	1840	1970	---	1730	1680	1820	2050	2200	1980	1970
31	1350	---	1840	1970	---	1730	---	1890	---	2190	1970	---
TOTAL	46600	51050	55320	58890	56890	57180	51370	53180	61160	65960	65060	59020
MEAN	1503	1702	1785	1900	2032	1845	1712	1715	2039	2128	2099	1967
MAX	1850	1740	1840	1970	2120	1970	1740	1890	2100	2200	2270	1990
MIN	1350	1340	1730	1840	1960	1730	1680	1650	1920	2060	1970	1960
AC-FT	92430	101300	109700	116800	112800	113400	101900	105500	121300	130800	129000	117100

CAL YR 1988 TOTAL 821420 MEAN 2244 MAX 3320 MIN 1340 AC-FT 1629000
WTR YR 1989 TOTAL 681680 MEAN 1868 MAX 2270 MIN 1340 AC-FT 1352000

YELLOWSTONE RIVER BASIN

06288500 BIGHORN RIVER NEAR HARDIN, MT

LOCATION.--Lat 45°43'46", long 107°34'52", in NE1/4SE1/4 sec.24, T.1 S., R.33 E., Big Horn County, Hydrologic Unit 10080015, at site of former gaging station, 1/2 mi upstream from Little Bighorn River, and 2 mi east of Hardin.

DRAINAGE AREA.--20,722 mi².

PERIOD OF RECORD.--Water years 1951, 1963-74, 1987 to current year (discontinued).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: December 1962 to September 1974.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE (water years 1963-74): Maximum (1962-64, 1967-74), 26.0°C, Aug. 10, 1963, July 21, 22, 1964; minimum, 0.0°C, on many days during winter periods most years.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)
MAY											
04...	0740	1870	60	1	1240	10.0	8.5	8.2	440	110	40
JUL											
06...	0815	1470	0	0	960	22.0	15.5	8.1	350	86	34
AUG											
22...	0800	1780	0	0	1080	17.5	14.5	8.0	340	84	31
SEP											
19...	0745	1670	0	0	972	13.5	10.5	8.2	310	79	28

DATE	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	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, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)
MAY											
04...	110	2	4.9	216	430	17	0.60	8.4	853	1.16	4310
JUL											
06...	94	2	4.6	184	390	13	0.50	4.9	740	1.01	2940
AUG											
22...	90	2	4.4	183	350	12	0.50	6.6	690	0.94	3320
SEP											
19...	83	2	3.4	171	320	11	0.40	7.4	638	0.87	2870

DATE	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	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)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
MAY										
04...	0.640	2	170	<1	<1	11	3	24	<0.1	3
JUL										
06...	0.500	--	150	--	--	14	--	--	--	--
AUG										
22...	0.460	--	140	--	--	11	--	--	--	--
SEP										
19...	0.600	--	120	--	--	6	--	--	--	--

06289000 LITTLE BIGHORN RIVER AT STATE LINE, NEAR WYOLA, MT

LOCATION.--Lat 45°00'25", long 107°36'52", in SW1/4NW1/4 sec.36, T.9 S., R.33 E., Bighorn County, Hydrologic Unit 10080016, on right bank 20 ft downstream from county bridge, 0.5 mi north of Wyoming-Montana State line, 1 mi downstream from West Fork, 13 mi southwest of Wyola, and at mile 115.2.

DRAINAGE AREA.--193 mi^2.

PERIOD OF RECORD.--March 1939 to current year. Prior to October 1940, published as Little Horn River at State Line, near Wyola.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 4,350 ft above National Geodetic Vertial Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Feb. 2,3, Mar. 1-5. Records good except those for estimated daily discharges, which are poor. Diversions for irrigation of 163 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--50 years, 151 ft^3/s, 109,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,730 ft^3/s, June 3, 1944, gage height, 4.87 ft, from rating curve extended above 1,400 ft^3/s; maximum gage height recorded, 5.93 ft, June 9, 1944 (log jam); minimum daily discharge, 18 ft^3/s, Feb. 2, 1989.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 510 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 10	2100	*424	*2.53	No peak above base discharge this year.			

Minimum daily discharge, 18 ft^3/s, Feb. 2.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	65	61	59	25	e42	54	84	210	150	102	73
2	68	66	61	60	e18	e40	54	86	229	146	101	72
3	68	65	60	63	e19	e35	53	88	228	142	100	72
4	68	64	59	60	31	e40	53	87	212	139	97	72
5	68	63	59	58	41	e45	54	87	208	137	95	71
6	66	64	60	57	51	52	55	95	221	134	94	72
7	68	61	61	37	57	52	57	126	225	131	93	72
8	67	61	47	32	54	52	56	236	225	128	91	75
9	67	62	65	52	54	58	52	243	223	127	90	79
10	68	58	61	68	58	61	50	312	229	137	89	77
11	68	63	61	59	58	59	54	362	232	138	89	72
12	68	61	60	48	57	58	54	351	218	133	86	74
13	67	62	60	59	56	58	54	277	208	143	86	72
14	68	63	59	60	55	56	55	244	200	141	85	72
15	69	58	41	51	54	55	58	230	195	126	85	71
16	69	60	45	61	53	55	64	235	205	121	84	70
17	78	60	56	58	48	51	62	255	210	120	82	69
18	71	61	65	56	55	55	62	297	193	117	87	71
19	74	57	65	55	57	55	64	317	188	113	90	70
20	72	57	63	54	56	52	73	267	189	110	90	69
21	70	59	62	54	55	53	82	262	196	109	84	68
22	70	60	60	54	53	53	99	279	190	109	81	67
23	68	63	59	54	53	53	115	314	188	145	79	67
24	69	64	49	49	53	55	121	298	193	146	78	66
25	67	57	49	38	52	55	106	248	181	117	78	66
26	67	58	39	45	52	57	119	225	170	111	77	65
27	65	51	39	62	52	59	103	220	165	108	76	65
28	60	66	42	58	51	57	91	235	160	106	76	65
29	68	63	50	57	---	56	84	271	156	108	75	65
30	65	63	64	56	---	55	85	250	152	107	74	65
31	65	---	67	52	---	54	---	222	---	105	74	---
TOTAL	2114	1835	1749	1686	1378	1638	2143	7103	5999	3904	2668	2104
MEAN	68.2	61.2	56.4	54.4	49.2	52.8	71.4	229	200	126	86.1	70.1
MAX	78	66	67	68	58	61	121	362	232	150	102	79
MIN	60	51	39	32	18	35	50	84	152	105	74	65
AC-FT	4190	3640	3470	3340	2730	3250	4250	14090	11900	7740	5290	4170

CAL YR 1988 TOTAL 47408 MEAN 130 MAX 971 MIN 28 AC-FT 94030
WTR YR 1989 TOTAL 34321 MEAN 94.0 MAX 362 MIN 18 AC-FT 68080

e Estimated

YELLOWSTONE RIVER BASIN

06289100 RED CANYON CREEK NEAR PARKMAN, WY

LOCATION.--Lat 44°58'42", long 107°35'09", in NW1/4NE1/4NE1/4 sec.27, T.58 N., R.89 W., Sheridan County, Hydrologic Unit 10080016, on right bank 0.2 mi upstream from bridge on county road, 1.7 mi upstream from Fuller Ranch, 2.1 mi upstream from the Wyoming-Montana State line, 2.5 mi upstream from mouth (Powers Upper Ditch), and 13 mi west of Parkman.

DRAINAGE AREA.--3.20 mi^2.

PERIOD OF RECORD.--October 1982 to current year (no winter records during 1985, 1987).

GAGE.--Water-stage recorder. Elevation of gage is 4,810 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 18-21, Nov. 24 to Dec. 1, Dec. 7-10, 15, 16, 20, Dec. 22 to Jan. 10, Feb. 2, 4-19, Mar. 7, 19-21, and Aug. 13-29. Records good except those for estimated daily discharges, which are poor. No diversions upstream from station.

AVERAGE DISCHARGE.--5 years (water years 1983, 1984, 1986, 1988-1989), 1.65 ft^3/s, 1,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 90 ft^3/s, May 15, 1984, gage height, 2.45 ft, from floodmarks; no flow Feb. 3, 4, 1989, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 5.0 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 8	1930	*10	*1.45	No other peak greater than base discharge.			

No flow Feb. 3, 4, result of freezeup.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.29	.39	.27	.30	.24	.22	.34	2.2	1.4	.62	.27	.23
2	.29	.42	.28	.32	.04	.22	.33	2.7	1.3	.61	.27	.20
3	.29	.43	.27	.34	.00	.21	.31	3.2	1.3	.57	.26	.20
4	.29	.43	.25	.37	.00	.08	.29	3.5	1.2	.55	.25	.18
5	.28	.42	.25	.40	.03	.14	.29	3.9	1.2	.53	.24	.18
6	.28	.44	.24	.36	.07	.15	.41	4.2	1.1	.52	.27	.18
7	.27	.45	.22	.33	.12	.19	.49	4.6	1.1	.51	.26	.18
8	.27	.45	.19	.31	.16	.21	.54	8.0	1.0	.45	.24	.32
9	.27	.46	.22	.34	.15	.26	.36	9.4	.97	.45	.23	.44
10	.26	.46	.25	.35	.20	.47	.34	8.9	.93	.46	.23	.40
11	.26	.43	.25	.32	.23	.43	.36	8.2	.92	.51	.23	.32
12	.25	.43	.28	.27	.22	.38	.37	7.1	.86	.49	.23	.32
13	.24	.42	.31	.25	.20	.35	.37	6.2	.83	.66	.24	.32
14	.22	.47	.23	.24	.19	.25	.44	5.6	.76	.77	.24	.29
15	.23	.39	.27	.22	.18	.26	.57	5.4	.68	.57	.24	.29
16	.63	.37	.29	.22	.18	.22	.84	5.4	.81	.52	.24	.29
17	.43	.35	.31	.22	.18	.20	.91	4.6	.94	.49	.23	.29
18	.33	.32	.31	.21	.17	.19	.98	4.3	.82	.43	.30	.29
19	.33	.27	.31	.22	.17	.17	1.1	4.1	.72	.39	.46	.31
20	.32	.28	.29	.21	.17	.15	1.3	3.5	.69	.36	.40	.29
21	.30	.32	.29	.22	.18	.18	1.7	3.2	.93	.35	.32	.25
22	.38	.38	.29	.23	.18	.19	2.1	2.8	.89	.35	.29	.29
23	.42	.47	.28	.25	.19	.19	2.5	2.6	.85	.35	.26	.29
24	.40	.37	.25	.28	.20	.19	2.5	2.4	.86	.36	.24	.29
25	.40	.27	.23	.23	.20	.22	2.2	2.3	.76	.35	.24	.27
26	.38	.24	.21	.30	.21	.39	2.1	2.1	.69	.33	.24	.25
27	.46	.22	.23	.36	.22	.47	2.1	1.9	.67	.31	.24	.25
28	.44	.24	.26	.29	.22	.48	2.1	1.8	.65	.31	.23	.25
29	.41	.25	.28	.22	---	.46	1.9	1.6	.64	.33	.23	.25
30	.38	.26	.30	.22	---	.41	2.0	1.6	.62	.29	.23	.25
31	.38	---	.32	.27	---	.36	---	1.5	---	.26	.23	---
TOTAL	10.38	11.10	8.23	8.67	4.50	8.29	32.14	128.8	27.09	14.05	8.08	8.16
MEAN	.33	.37	.27	.28	.16	.27	1.07	4.15	.90	.45	.26	.27
MAX	.63	.47	.32	.40	.24	.48	2.5	9.4	1.4	.77	.46	.44
MIN	.22	.22	.19	.21	.00	.08	.29	1.5	.62	.26	.23	.18
AC-FT	21	22	16	17	8.9	16	64	255	54	28	16	16

CAL YR 1988 TOTAL 515.28 MEAN 1.41 MAX 18 MIN .17 AC-FT 1020
WTR YR 1989 TOTAL 269.49 MEAN .74 MAX 9.4 MIN .00 AC-FT 535

YELLOWSTONE RIVER BASIN

06289600 WEST PASS CREEK NEAR PARKMAN, WY

LOCATION.--Lat 44°59'16", long 107°28'56", in NE1/4NE1/4SE1/4 sec.21, T.58 N., R.88 W., Sheridan County, Hydrologic Unit 10080016, on right bank, anchored to concrete headwall of culvert on county road and 7.6 mi northwest of Parkman.

DRAINAGE AREA.--15.4 mi^2.

PERIOD OF RECORD.--October 1982 to current year (no winter records water years 1985-87).

GAGE.--Water-stage recorder. Elevation of gage is 4,550 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to Apr. 2, 1985, at site 100 ft north (on abandoned channel) at datum 3.28 ft lower. Apr. 2, 1985 to Mar. 27, 1986, at site 300 ft upstream at datum 1.95 ft higher.

REMARKS.--Estimated daily discharges: Nov. 19, 20, 25-28, Dec. 7-9, 15, 22-31, Jan. 1-6, 8-18, 25-28, Feb. 1-6, 8, 28, and Mar. 1-9, 15, 18-21. Records good except those for estimated daily discharges, which are poor. Natural flow of stream affected by diversions for irrigation upstream from station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 195 ft^3/s, May 16, 1984, gage height, 4.62 ft, site and datum then in use; maximum gage height, 4.76 ft, Apr. 28, 1984 (backwater from ice and snow), site and datum then in use; minimum daily discharge, 0.02 ft^3/s, Jan. 7, 1988, result of channel blockage or diversion upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 20 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 8	1900	*39	*1.37	No other peak greater than base discharge.			

Minimum daily discharge, 0.64 ft^3/s, Feb. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.4	6.7	6.3	5.3	3.5	4.8	7.1	14	13	7.7	5.9	5.1
2	6.4	6.5	6.4	5.1	2.7	3.8	6.8	14	13	7.7	5.6	4.9
3	6.0	6.7	6.4	4.7	.80	3.2	6.6	15	13	7.7	5.8	5.0
4	6.1	6.4	6.4	5.1	.64	4.0	6.5	15	12	7.5	5.8	5.0
5	6.2	6.3	6.4	5.6	.75	4.5	6.5	16	12	7.6	5.8	4.9
6	6.2	6.3	6.4	5.4	.90	5.2	8.0	15	12	7.5	5.7	5.0
7	6.0	6.4	6.1	5.5	.94	6.3	7.5	16	13	7.4	5.7	5.0
8	6.0	6.2	5.5	5.1	.87	7.3	7.9	28	12	7.5	5.6	5.5
9	6.0	6.6	6.0	4.6	.78	8.0	7.4	29	12	7.6	5.7	6.1
10	6.0	6.4	6.4	5.5	.85	7.8	6.8	27	12	7.8	5.6	5.8
11	6.0	6.4	6.3	5.9	1.6	6.9	7.2	29	11	7.6	5.3	5.5
12	6.0	6.5	6.9	5.8	5.6	6.7	6.9	31	11	7.5	5.3	5.4
13	5.9	6.7	6.8	5.8	5.7	6.4	7.1	29	10	9.3	5.5	5.2
14	6.0	7.3	6.3	5.8	5.8	5.5	7.3	26	10	8.4	5.5	5.0
15	5.8	6.5	5.1	5.6	5.8	5.8	7.5	26	9.8	7.7	5.5	4.7
16	5.8	6.3	5.4	5.8	5.8	6.0	8.5	27	9.9	7.5	5.5	5.0
17	8.3	6.4	6.5	6.0	5.1	5.0	9.3	24	9.3	7.5	5.5	5.0
18	6.4	6.4	6.7	5.3	4.8	5.7	8.6	21	8.6	7.3	6.0	5.0
19	6.2	6.0	6.7	6.0	5.5	6.0	8.5	22	8.5	7.2	6.0	5.1
20	6.2	6.2	6.7	6.0	6.0	6.3	9.1	20	9.0	7.0	5.6	5.1
21	6.0	6.4	6.3	6.1	6.0	6.3	9.9	20	11	6.8	5.3	5.1
22	6.0	6.3	6.3	6.0	5.9	6.5	10	19	9.4	6.9	5.2	5.0
23	6.0	6.6	6.1	6.0	6.2	6.4	11	22	9.5	6.9	5.2	5.0
24	6.0	6.8	6.0	5.4	6.5	6.6	11	22	9.5	6.9	5.3	4.9
25	6.0	6.2	5.7	4.7	6.3	8.4	12	20	9.0	6.7	5.3	5.0
26	6.0	5.4	5.2	5.0	6.0	9.9	14	18	8.6	6.6	5.3	4.9
27	6.2	5.7	4.3	5.6	5.7	9.8	15	16	8.4	6.5	5.3	4.8
28	5.9	6.0	4.6	6.0	5.5	8.4	14	15	8.0	6.5	5.3	4.9
29	6.7	6.5	4.5	6.3	---	7.8	14	15	7.8	6.6	5.2	4.9
30	6.7	6.3	5.0	6.9	---	7.3	15	15	7.8	6.6	5.2	4.8
31	6.7	---	5.7	5.8	---	7.0	---	14	---	6.3	5.2	---
TOTAL	192.1	191.4	185.4	173.7	112.53	199.6	277.0	640	310.1	226.3	170.7	152.6
MEAN	6.20	6.38	5.98	5.60	4.02	6.44	9.23	20.6	10.3	7.30	5.51	5.09
MAX	8.3	7.3	6.9	6.9	6.5	9.9	15	31	13	9.3	6.0	6.1
MIN	5.8	5.4	4.3	4.6	.64	3.2	6.5	14	7.8	6.3	5.2	4.7
AC-FT	381	380	368	345	223	396	549	1270	615	449	339	303

CAL YR 1988 TOTAL 4003.78 MEAN 10.9 MAX 70 MIN .02 AC-FT 7940
WTR YR 1989 TOTAL 2831.43 MEAN 7.76 MAX 31 MIN .64 AC-FT 5620

YELLOWSTONE RIVER BASIN

06289820 EAST PASS CREEK NEAR DAYTON, WY

LOCATION.--Lat 44°59'23", long 107°25'20", in SE1/4SE1/4NE1/4 sec.24, T.58 N., R.88 W., Sheridan County, Hydrologic Unit 10080016, on left bank 0.3 mi downstream from bridge on county road, 5.0 mi northwest of Parkman, and 11.2 mi northwest of Dayton.

DRAINAGE AREA.--21.7 mi^2.

PERIOD OF RECORD.--October 1982 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 4,410 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 19, 20, 25-29, Dec. 7-9, 15, 16, 22-31, Jan. 1-3, 6-17, 24-27, 31, Feb. 1-10, 12, 15, 28, Mar. 1-8, 14-20, and Apr. 9, 10. Records good except those for estimated daily discharges, which are poor. Several small reservoirs upstream from station, combined capacity, 415 acre-ft, for irrigation. Diversions for irrigation of about 2,900 acres upstream from station.

AVERAGE DISCHARGE.--7 years, 13.4 ft^3/s, 9,710 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 197 ft^3/s, May 16, 1984, gage height, 3.14 ft; maximum gage height, 3.47 ft, Dec. 18, 1984 (backwater from ice); minimum daily discharge, 1.7 ft^3/s, Aug. 6, 7, 1988.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Dec. 28	2400	ice jam	*3.46	May 11	0500	*41	1.78

Minimum daily discharge, 2.1 ft^3/s, Sept. 2, 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.4	7.4	7.5	7.0	4.5	5.6	9.7	13	16	4.2	4.1	2.2
2	6.3	7.4	7.5	7.4	3.5	5.2	9.3	14	16	4.2	4.2	2.1
3	6.3	7.6	7.5	7.8	4.2	4.8	9.0	15	16	4.1	3.7	2.1
4	6.4	7.5	7.5	8.0	5.3	5.5	8.7	16	15	4.0	3.1	2.2
5	6.4	7.5	7.5	7.9	6.2	6.3	8.8	17	14	3.9	3.0	2.2
6	6.4	7.6	7.6	6.9	7.0	7.6	10	17	13	3.9	3.0	2.2
7	6.2	7.6	7.3	5.5	7.0	9.0	9.8	18	12	3.8	3.1	2.3
8	6.0	7.6	6.0	6.1	6.7	11	11	29	12	4.5	3.4	3.0
9	6.1	7.7	7.6	6.7	7.0	13	9.5	38	12	5.5	4.1	3.2
10	6.1	7.5	7.9	7.4	7.3	12	9.2	37	12	6.2	3.9	3.9
11	6.2	7.5	7.7	7.4	7.5	11	9.3	39	12	6.5	3.9	4.8
12	6.0	7.4	8.5	7.2	7.4	11	8.9	38	11	7.4	4.5	4.9
13	5.9	7.3	8.5	7.5	7.5	9.5	8.7	34	11	9.2	4.7	4.8
14	6.1	7.8	7.9	7.6	7.3	7.3	7.7	30	9.2	9.5	4.9	5.0
15	6.2	7.4	6.8	5.6	6.8	8.0	7.8	29	7.3	8.2	4.9	4.8
16	6.3	7.3	7.4	7.4	6.5	6.7	9.1	31	8.9	7.1	4.9	4.7
17	9.0	7.3	7.8	8.2	6.2	5.7	9.6	30	9.3	6.9	4.9	4.5
18	8.0	7.5	7.5	8.1	7.3	6.4	9.3	29	8.6	6.7	5.0	4.7
19	7.8	7.2	7.3	7.7	7.5	7.0	9.0	29	8.1	6.2	4.7	5.0
20	7.7	7.0	7.3	7.6	7.4	7.5	9.5	26	9.1	5.9	4.6	5.0
21	7.4	7.3	7.3	7.7	7.3	7.6	11	24	10	6.1	4.2	4.8
22	7.3	7.3	7.0	7.8	7.2	6.7	12	23	8.2	6.2	4.0	4.9
23	7.3	7.6	6.8	7.6	7.7	5.6	12	22	7.6	6.3	3.9	4.7
24	7.3	8.4	6.2	6.1	7.9	5.2	13	22	7.5	6.6	4.2	4.6
25	7.3	7.9	5.4	5.7	7.7	6.1	12	21	6.9	6.4	5.1	4.7
26	7.2	7.0	4.8	6.3	7.5	11	13	19	6.6	5.3	5.2	5.0
27	7.4	6.7	5.5	7.0	7.5	13	13	18	6.4	5.4	5.2	4.6
28	7.5	7.1	6.2	7.8	6.9	12	13	18	6.3	5.5	5.1	4.7
29	7.5	7.5	6.8	8.2	---	11	13	18	6.9	5.6	5.0	4.8
30	7.4	7.6	8.2	9.1	---	11	12	17	5.2	5.6	4.3	4.3
31	7.4	---	7.5	8.0	---	9.9	---	17	---	5.1	3.0	---
TOTAL	212.8	223.5	222.3	226.3	189.8	259.2	307.9	748	304.1	182.0	131.8	120.7
MEAN	6.86	7.45	7.17	7.30	6.78	8.36	10.3	24.1	10.1	5.87	4.25	4.02
MAX	9.0	8.4	8.5	9.1	7.9	13	13	39	16	9.5	5.2	5.0
MIN	5.9	6.7	4.8	5.5	3.5	4.8	7.7	13	5.2	3.8	3.0	2.1
AC-FT	422	443	441	449	376	514	611	1480	603	361	261	239

CAL YR 1988 TOTAL 4861.2 MEAN 13.3 MAX 90 MIN 1.7 AC-FT 9640
WTR YR 1989 TOTAL 3128.4 MEAN 8.57 MAX 39 MIN 2.1 AC-FT 6210

06289870 TWIN CREEK NEAR PARKMAN, WY

LOCATION.--Lat 44°59'37", long 107°21'18", in SE1/4NW1/4NW1/4 sec.22, T.58 N., R.87 W., Sheridan County, Hydrologic Unit 10080016, on right bank 0.5 mi downstream from culvert on county road, 0.7 mi northwest of intersection of county road and U.S. Highway 87, and 2.8 mi north of Parkman.

DRAINAGE AREA.--27.0 mi^2.

PERIOD OF RECORD.--October 1982 to current year (no winter records water years 1985-87).

REVISED RECORDS.--WDR WY-86: 1984(M).

GAGE.--Water-stage recorder. Elevation of gage is 4,120 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 17-21, 25-28, Dec. 7-17, Dec. 20 to Feb. 24, Feb. 28 to Mar. 9, and Mar. 15, 17-22. Records good except those for estimated daily discharges, which are poor. Natural flow of stream affected by diversions for irrigation upstream from station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 377 ft^3/s, Feb. 24, 1986, gage height, 7.44 ft (affected by backwater from trash and snow), from floodmark, from rating curve extended above 160 ft^3/s on basis of culvert measurement of peak flow; minimum daily discharge during period of operation, 0.15 ft^3/s, Aug. 9, 10, 1989.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 55 ft^3/s, May 9, gage height, 1.80 ft; maximum gage height, 1.95 ft, Mar. 9, from floodmark (backwater from ice jam); minimum daily discharge, 0.15 ft^3/s, Aug. 9, 10.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.2	.55	.71	.60	1.3	1.2	5.6	14	3.4	1.8	.45	.19
2	1.2	.55	.71	.70	.96	5.0	9.6	1.4	1.5	.88	.19	
3	1.2	.61	.75	.77	.45	.78	4.0	7.5	1.4	1.2	2.4	.19
4	1.2	.55	.70	.88	.42	.64	3.1	6.0	1.6	1.0	2.3	.20
5	1.2	.54	.69	.90	.46	.57	2.5	5.6	1.3	.87	1.2	.20
6	1.2	.54	.72	.78	.50	.69	4.2	5.6	.96	.73	.39	.23
7	1.2	.50	.67	.67	.55	2.0	6.1	5.2	.80	.64	.34	.40
8	1.2	.50	.54	.58	.59	16	6.1	9.3	.75	.59	.16	.62
9	1.4	.50	.60	.65	.65	40	5.7	43	1.7	.55	.15	.98
10	1.2	.51	.65	.71	.72	30	4.4	20	1.9	.69	.15	1.1
11	.93	.50	.71	.67	.74	14	3.7	12	.58	.81	.61	1.1
12	.87	.50	.78	.64	.76	12	3.4	15	.56	.90	3.6	1.0
13	.91	.50	.86	.62	.70	8.6	3.3	13	1.9	1.2	2.7	.98
14	.89	.57	.81	.67	.64	5.1	3.2	10	1.7	1.1	2.8	.91
15	.93	.91	.66	.78	.56	4.2	2.9	9.5	1.6	1.1	2.7	.91
16	.94	.78	.72	.91	.51	3.1	2.9	11	1.8	1.1	2.7	.89
17	1.1	.72	.80	1.1	.48	2.5	4.0	17	2.6	.99	3.4	.85
18	.74	.68	.87	1.3	.48	1.7	5.8	14	2.3	.92	2.6	.92
19	.58	.63	.81	1.2	.52	1.2	6.0	9.2	1.9	.73	2.6	1.0
20	.62	.58	.74	1.1	.60	1.1	4.5	7.0	1.7	.69	2.3	1.0
21	.56	.64	.68	1.1	.68	1.3	3.4	6.3	3.1	.60	2.2	1.1
22	.55	.72	.66	1.2	.73	1.5	2.7	5.6	3.5	.56	.46	1.1
23	.55	.81	.64	1.0	.95	1.7	2.0	4.7	3.6	.57	.30	2.1
24	.52	1.1	.61	.87	1.7	2.1	2.0	3.8	3.2	.65	.33	1.8
25	.48	.84	.57	.74	2.2	2.9	2.1	3.7	3.0	.71	1.1	.53
26	.45	.81	.54	.73	2.1	8.1	3.5	3.5	2.7	.76	.88	.60
27	.49	.78	.50	.80	1.8	23	6.5	3.6	2.5	.76	.31	.59
28	.48	.76	.47	.87	1.4	14	13	3.7	2.4	.40	.25	.56
29	.47	.80	.44	1.1	---	11	14	3.9	2.2	.64	.22	.94
30	.45	.77	.52	1.6	---	7.7	18	3.9	2.0	.65	.19	1.1
31	.50	---	.67	2.2	---	6.3	---	4.0	---	.65	.19	---
TOTAL	26.21	19.75	20.80	28.44	23.89	225.94	153.6	290.2	60.05	26.06	40.86	24.28
MEAN	.85	.66	.67	.92	.85	7.29	5.12	9.36	2.00	.84	1.32	.81
MAX	1.4	1.1	.87	2.2	2.2	40	18	43	3.6	1.8	3.6	2.1
MIN	.45	.50	.44	.58	.42	.57	2.0	3.5	.56	.40	.15	.19
AC-FT	52	39	41	56	47	448	305	576	119	52	81	48

CAL YR 1988 TOTAL 1639.33 MEAN 4.48 MAX 146 MIN .42 AC-FT 3250
WTR YR 1989 TOTAL 940.08 MEAN 2.58 MAX 43 MIN .15 AC-FT 1860

YELLOWSTONE RIVER BASIN

06290000 PASS CREEK NEAR WYOLA, MT

LOCATION.--Lat 45°03'23", long 107°21'19", in NE1/4NE1/4SE1/4 sec.13, T.9 S., R.35 E., Big Horn County, Hydrologic Unit 10080016, on right bank 125 ft downstream from bridge on U.S. Highway 87, 2.0 mi downstream of Twin Creek, 5.5 mi south of Wyola, and at mile 10.2.

DRAINAGE AREA.--111 mi^2. Drainage area at site used prior to Sept. 30, 1956, 119 mi^2.

PERIOD OF RECORD.--June 1935 to September 1956 (no winter records prior to 1939), October 1982 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 3,920 ft above National Geodetic Vertical Datum of 1929, from topographic map. Dec. 21, 1950, to Sept. 30, 1956, water-stage recorder, and June 4, 1935, to Dec. 20, 1950, nonrecording gage at site 0.3 mi upstream at different datum. Flow is equivalent.

REMARKS.--Estimated daily discharges: Nov. 9-20, Nov. 25 to Apr. 4. Records fair except those for estimated daily discharges, which are poor. Diversions for irrigation of about 2,500 acres upstream of station.

AVERAGE DISCHARGE.--25 years (water years 1939-56, 1983-89), 35.3 ft^3/s, 25,570 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 1,150 ft^3/s, June 4, 1944, gage height, 4.82 ft, from rating curve extended above 400 ft^3/s; maximum gage height observed, 6.22 ft, Mar. 25, 1943, ice jam; no flow Aug. 3, 9, 10, 1935.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 100 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 10	--	ice jam	*4.57	May 12	2000	133	3.36
May 9	1045	*145	3.45	May 16	2400	134	3.37

Minimum discharge, 3.4 ft^3/s, Sept. 6.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	15	e17	e12	e10	e11	e21	58	34	12	7.1	4.6
2	11	15	e16	e16	e6.5	e10	e22	45	31	12	5.6	3.8
3	11	15	e14	e16	e6.0	e9.0	e21	42	30	11	6.4	4.0
4	11	15	e15	e21	e7.0	e9.0	e21	40	31	10	7.1	4.3
5	11	15	e17	e19	e9.0	e15	21	40	29	7.7	7.2	4.6
6	11	15	e15	e13	e15	e25	26	39	26	7.7	5.6	3.8
7	11	15	e12	e9.0	e18	e45	30	39	25	7.5	4.8	4.1
8	11	15	e11	e11	e15	e55	30	56	24	7.0	4.7	4.8
9	11	e15	e13	e14	e20	e70	29	133	22	9.0	4.9	8.0
10	11	e14	e13	e17	e18	e80	26	105	22	11	5.0	8.7
11	12	e14	e16	e15	e23	e65	25	91	21	11	5.2	9.0
12	12	e14	e19	e14	e18	e50	23	108	20	11	6.4	9.2
13	11	e15	e14	e14	e19	e35	23	101	19	13	7.2	8.9
14	11	e14	e12	e16	e14	e20	21	81	18	17	7.4	8.9
15	11	e14	e11	e16	e15	e25	21	76	17	15	7.4	8.8
16	11	e14	e13	e18	e13	e19	22	82	16	15	7.5	8.4
17	19	e14	e16	e24	e11	e17	26	92	20	15	7.6	8.5
18	17	e13	e18	e23	e11	e15	31	76	17	13	8.3	8.0
19	14	e12	e15	e21	e12	e17	28	67	16	12	8.9	8.7
20	14	e15	e14	e20	e15	e18	25	59	14	10	8.4	8.9
21	14	17	e13	e22	e15	e19	24	54	23	9.7	7.7	8.8
22	14	18	e13	e24	e14	e22	24	51	22	10	7.0	8.8
23	14	19	e12	e20	e17	e20	24	50	20	11	5.7	9.3
24	14	25	e12	e17	e23	e23	24	48	22	13	4.9	9.2
25	14	e12	e11	e14	e21	e28	26	46	21	12	5.1	8.5
26	14	e13	e10	e18	e18	e31	28	43	20	9.4	5.9	9.4
27	14	e11	e12	e22	e16	e32	35	38	21	8.8	6.3	11
28	14	e13	e13	e25	e13	e31	52	35	20	8.1	5.8	11
29	14	e14	e13	e24	---	e29	52	35	17	7.5	6.0	11
30	15	e15	e20	e28	---	e23	64	36	16	7.9	6.7	12
31	15	---	e14	e18	---	e21	---	35	---	7.7	5.6	---
TOTAL	398	445	434	561.0	412.5	889.0	845	1901	654	332.0	199.4	237.0
MEAN	12.8	14.8	14.0	18.1	14.7	28.7	28.2	61.3	21.8	10.7	6.43	7.90
MAX	19	25	20	28	23	80	64	133	34	17	8.9	12
MIN	11	11	10	9.0	6.0	9.0	21	35	14	7.0	4.7	3.8
AC-FT	789	883	861	1110	818	1760	1680	3770	1300	659	396	470

CAL YR 1988 TOTAL 11572.2 MEAN 31.6 MAX 470 MIN 1.9 AC-FT 22950
WTR YR 1989 TOTAL 7307.9 MEAN 20.0 MAX 133 MIN 3.8 AC-FT 14500

e Estimated

06290500 LITTLE BIGHORN RIVER BELOW PASS CREEK, NEAR WYOLA, MT

LOCATION.--Lat 45°10'38", long 107°23'36", in W1/2SW1/4 sec.35, T.7 S., R.35 E., Big Horn County, Hydrologic Unit 10080016, on right bank 3.5 mi north of Wyola, 6 mi downstream from Pass Creek, and at mile 92.3.

DRAINAGE AREA.--428 mi^2.

PERIOD OF RECORD.--March 1939 to December 1958, August 1959 to September 1975, October 1976 to current year. Prior to October 1940, published as Little Horn River below Pass Creek, near Wyola.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 3,600 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 25-28, Dec. 8,9, Dec. 15 to Mar. 10. Records good except those for estimated daily discharges, which are poor. Diversions for irrigation of about 8,300 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--48 years, 208 ft^3/s, 150,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,010 ft^3/s, May 19, 1978, gage height, 10.02 ft, from rating curve extended above 2,800 ft^3/s on basis of slope-area measurement of peak flow; minimum, 12 ft^3/s, Aug. 5, 7, 8, 1961, gage height, 0.89 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 9	0130	a	*4.93	No peak greater than base discharge this year.			
May 12	1500	*564	3.35				

a--backwater from ice.

Minimum daily discharge, 25 ft^3/s, Feb. 2.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	85	100	96	e120	e40	e70	139	188	234	133	72	62
2	84	100	95	e120	e25	e70	129	164	220	131	63	56
3	83	101	97	e120	e26	e60	117	162	226	125	57	55
4	83	99	93	e100	e30	e60	109	156	216	116	55	55
5	85	98	93	e90	e45	e70	107	156	201	113	56	52
6	90	99	95	e74	e60	e80	131	152	202	105	57	55
7	90	99	97	e58	e60	e110	136	161	204	93	56	56
8	91	96	e90	e50	e54	e150	131	238	207	91	63	51
9	91	100	e83	e70	e68	e200	131	401	201	94	70	65
10	90	98	100	e90	e74	e250	115	405	199	107	74	71
11	90	98	98	e100	e75	224	110	482	216	114	73	73
12	90	97	100	e100	e73	186	107	541	207	97	64	81
13	89	98	107	e90	e72	158	101	488	199	125	62	75
14	88	102	100	e95	e70	126	101	397	189	147	66	73
15	89	101	e90	e100	e68	111	101	355	181	135	62	68
16	95	95	e100	e110	e66	114	109	347	181	128	62	66
17	129	96	e120	e110	e45	105	129	382	201	128	65	71
18	120	102	e100	e120	e47	110	134	381	187	115	69	69
19	109	93	e85	e120	e70	108	122	434	174	108	82	72
20	107	99	e85	e110	e100	103	117	380	169	100	81	71
21	104	97	e84	e115	e92	100	120	348	215	93	76	70
22	103	97	e84	e120	e96	113	127	349	209	88	71	69
23	102	100	e90	e100	e100	112	143	377	194	92	68	69
24	103	111	e90	e66	e140	122	156	399	208	144	76	69
25	101	e94	e80	e60	e120	139	155	341	202	107	79	72
26	101	e100	e60	e70	e100	187	167	304	184	97	76	68
27	104	e90	e70	e70	e90	240	174	279	170	91	72	64
28	99	e100	e77	e90	e80	190	198	268	153	88	70	63
29	101	99	e90	e100	---	163	193	305	142	81	68	63
30	102	98	e110	e110	---	146	214	310	136	83	64	63
31	101	---	e100	e70	---	144	---	270	---	87	63	---
TOTAL	2999	2957	2859	2918	1986	4121	4023	9920	5827	3356	2092	1967
MEAN	96.7	98.6	92.2	94.1	70.9	133	134	320	194	108	67.5	65.6
MAX	129	111	120	120	140	250	214	541	234	147	82	81
MIN	83	90	60	50	25	60	101	152	136	81	55	51
AC-FT	5950	5870	5670	5790	3940	8170	7980	19680	11560	6660	4150	3900

CAL YR 1988 TOTAL 62500 MEAN 171 MAX 1110 MIN 49 AC-FT 124000
WTR YR 1989 TOTAL 45025 MEAN 123 MAX 541 MIN 25 AC-FT 89310

e Estimated

YELLOWSTONE RIVER BASIN

06291000 OWL CREEK NEAR LODGE GRASS, MT

LOCATION.--Lat 45°16'05", long 107°18'03", in NW1/4NE1/4SE1/4, sec.33, T.6 S., R.36 E., Big Horn County, Hydrologic Unit 10080016, on right bank 1.4 mi downstream from Sioux Pass Creek, 5.0 mi southeast of Lodge Grass, and at mile 7.0.

DRAINAGE AREA.--163 mi^2.

PERIOD OF RECORD.--April 1939 to September 1945, October 1979 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 3,460 ft above National Geodetic Vertical Datum of 1929, from topographic map. April 1939 to September 1945, recording gage at same site and datum.

REMARKS.--Estimated daily discharges: Nov. 10 to Mar. 24. Records fair except those for estimated daily discharges, which are poor. Numerous diversions for irrigation upstream from station. Several observations of water temperature and specific water conductance were made during the year.

AVERAGE DISCHARGE.--16 years (water years 1940-45, 1980-89), 10.3 ft^3/s, 7,460 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,020 ft^3/s, June 18, 1944, gage height, 14.18 ft; maximum gage height, 14.50 ft, Mar. 18, 1944, ice jam; no flow at times.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 60 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 11	2000	*unknown	a*9.05	Apr. 29	1900	68	4.08
Mar. 27	1800	237	7.38				

a--backwater from ice jam.

Minimum discharge, 0.39 ft^3/s, Aug. 6,7.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.7	2.9	e4.8	e3.2	e3.5	e4.0	23	31	5.2	2.8	.80	.52
2	1.7	3.0	e5.2	e3.5	e2.2	e3.2	22	21	5.2	2.2	.57	.52
3	1.8	2.9	e5.2	e3.8	e1.5	e2.8	18	15	5.3	2.1	.56	.49
4	1.6	3.0	e5.0	e4.2	e1.5	e2.5	14	17	5.7	2.1	.55	.50
5	1.6	2.9	e5.6	e4.0	e1.7	e3.0	11	16	4.9	1.9	.48	.49
6	1.7	2.9	e6.4	e3.5	e1.9	e4.0	13	13	4.5	1.7	.45	.49
7	1.8	2.8	e6.2	e2.8	e2.3	e6.0	25	11	4.1	1.5	.46	.51
8	1.8	2.8	e5.4	e2.1	e2.5	e9.0	24	11	3.9	1.4	.47	.52
9	1.8	2.9	e5.0	e2.1	e2.7	e15	21	12	4.2	1.3	.48	.53
10	1.8	e2.8	e5.6	e2.5	e3.0	e70	21	19	4.0	1.4	.49	.65
11	2.0	e3.0	e6.0	e3.5	e3.2	e260	15	13	4.1	2.5	.53	.85
12	2.1	e3.1	e6.6	e3.0	e3.6	e190	13	12	3.8	2.0	.56	.93
13	2.0	e3.1	e7.0	e3.0	e4.0	e70	11	15	4.0	2.3	.57	.96
14	2.1	e3.1	e5.8	e3.5	e4.2	e35	9.9	20	3.9	2.6	.49	.82
15	2.0	e3.1	e4.5	e3.5	e4.0	e22	11	15	3.8	2.7	.51	.84
16	2.2	e3.2	e5.2	e4.5	e3.5	e25	10	12	4.2	2.7	.48	.75
17	3.6	e3.1	e6.4	e4.1	e3.2	e18	13	10	3.7	2.5	.47	.66
18	6.2	e2.9	e7.0	e4.0	e2.8	e12	18	9.7	4.9	2.2	.47	.57
19	6.1	e2.9	e6.4	e3.5	e2.9	e14	18	7.4	5.1	3.2	.62	.57
20	3.4	e3.2	e6.0	e3.5	e3.5	e13	17	6.3	3.3	2.4	.73	.58
21	2.9	e3.5	e5.8	e4.0	e3.5	e13	13	5.8	5.8	1.6	.70	.71
22	2.6	e3.7	e5.6	e4.5	e3.5	e13	10	5.5	9.6	1.3	.70	.71
23	2.5	e3.9	e5.0	e4.0	e4.5	e14	6.9	5.4	11	1.8	.59	.69
24	2.4	e4.5	e4.0	e3.5	e5.4	e16	5.7	5.2	8.3	2.6	.53	.67
25	2.5	e5.0	e3.1	e3.0	e6.0	28	5.7	4.8	8.2	1.9	.52	.64
26	2.5	e4.0	e2.8	e3.3	e5.6	97	6.7	4.7	6.9	1.5	.51	.67
27	2.6	e4.0	e3.0	e3.5	e5.2	189	12	4.7	5.2	3.0	.51	.76
28	2.7	e3.7	e3.2	e4.0	e4.5	143	32	4.5	4.3	1.5	.50	.79
29	2.8	e4.5	e3.5	e4.0	---	63	43	4.4	3.9	1.5	.52	.80
30	2.9	e4.5	e4.0	e5.0	---	39	40	4.7	3.5	1.3	.51	.74
31	2.9	---	e4.5	e5.0	---	26	---	5.4	---	.93	.52	---
TOTAL	78.3	100.9	159.8	111.6	95.9	1419.5	502.9	341.5	154.5	62.43	16.85	19.93
MEAN	2.53	3.36	5.15	3.60	3.42	45.8	16.8	11.0	5.15	2.01	.54	.66
MAX	6.2	5.0	7.0	5.0	6.0	260	43	31	11	3.2	.80	.96
MIN	1.6	2.8	2.8	2.1	1.5	2.5	5.7	4.4	3.3	.93	.45	.49
AC-FT	155	200	317	221	190	2820	998	677	306	124	33	40

CAL YR 1988 TOTAL 2722.83 MEAN 7.44 MAX 195 MIN .41 AC-FT 5400
WTR YR 1989 TOTAL 3064.11 MEAN 8.39 MAX 260 MIN .45 AC-FT 6080

e Estimated

YELLOWSTONE RIVER BASIN

06291200 LODGE GRASS CREEK AT STATE LINE, NEAR WYOLA, MT

LOCATION.--Lat 45°00'21", long 107°46'27", in NW1/4NW1/4SE1/4 sec.34, T.9 S., R.32 E., Big Horn County, Hydrologic Unit 10080016, on left bank 4.2 mi upstream from North Fork Lodge Grass Creek, 25 mi southwest of Wyola, 32 mi southwest of Lodge Grass, and at mile 58.4.

DRAINAGE AREA.--16.7 mi^2.

PERIOD OF RECORD.--October 1982 to September 1989, discontinued (no winter record in water year 1986).

GAGE.--Water-stage recorder. Elevation of gage is 6,060 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Oct. 28, Nov. 10, 12, 15-21, 24-29, Dec. 7-9, 14-17, Dec. 20 to Jan. 26, Feb. 3 to Mar. 28, Mar. 30, and Apr. 3, 4, 8-11, 29. Records good except those for estimated daily discharges, which are poor. No diversion upstream from station.

AVERAGE DISCHARGE.--6 years (water years 1983-85, 1987-89), 16.4 ft^3/s, 11,880 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 349 ft^3/s, June 4, 1986, gage height, 2.84 ft; minimum daily, 0.28 ft^3/s, Feb. 2, 1989, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 70 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 10	1730	*90	*1.57	May 23	1800	78	1.49

Minimum daily discharge, 0.28 ft^3/s, Feb. 2, result of freezeup.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.1	4.9	4.8	4.7	1.4	3.3	4.6	10	40	21	9.9	6.9
2	6.1	5.0	4.9	4.6	.28	3.3	4.4	11	50	21	9.9	6.7
3	6.1	5.0	4.8	4.4	.41	3.5	4.0	12	46	20	9.9	6.7
4	6.0	4.8	4.8	4.5	.80	3.6	4.3	12	40	20	9.9	6.6
5	5.8	4.8	4.7	4.4	1.6	3.8	4.4	12	44	20	9.9	6.3
6	5.9	5.3	4.8	4.2	3.3	3.9	4.6	14	45	19	9.8	6.3
7	5.9	4.9	4.7	3.7	3.6	3.9	4.9	18	47	19	9.4	6.4
8	5.9	5.1	4.1	4.0	3.4	4.1	4.7	40	47	18	9.1	6.5
9	5.8	5.1	4.9	4.5	3.8	4.4	4.2	42	46	17	9.1	6.8
10	5.9	4.8	4.8	4.8	4.1	4.7	3.7	61	46	17	12	6.8
11	6.1	5.3	5.0	4.6	4.0	4.9	4.4	70	45	17	10	6.1
12	6.1	4.9	4.9	4.3	4.0	4.9	4.6	65	42	17	9.2	6.5
13	5.9	5.1	4.8	4.4	3.9	4.8	4.7	52	39	17	8.7	6.4
14	5.8	5.4	4.3	4.2	3.8	4.0	4.8	43	36	17	8.6	6.4
15	5.6	4.3	3.9	4.2	3.7	3.6	5.1	42	36	15	8.3	6.3
16	5.6	4.5	4.5	4.3	3.5	3.5	5.8	42	36	14	8.0	6.0
17	7.1	4.6	5.6	4.4	3.5	3.7	5.5	48	36	14	8.0	5.8
18	5.7	4.7	5.3	4.4	3.5	4.1	5.6	58	34	14	8.7	6.4
19	6.1	4.2	4.8	4.2	3.6	4.0	6.1	63	33	14	8.3	6.3
20	5.8	4.4	4.6	4.1	3.7	3.7	7.7	53	31	13	8.0	6.1
21	5.5	4.7	4.9	4.3	3.8	3.8	9.3	52	31	13	7.8	6.1
22	5.3	5.2	4.6	4.4	3.8	4.0	11	57	30	13	7.2	6.1
23	5.2	5.3	4.3	4.3	3.9	4.0	13	65	28	13	7.0	6.1
24	5.3	5.0	4.1	4.2	4.0	4.1	13	60	28	13	7.0	6.1
25	5.1	4.7	3.9	3.8	4.0	4.3	12	47	26	12	7.0	6.1
26	5.1	4.3	3.8	4.0	3.9	4.5	13	42	24	12	7.0	6.1
27	4.7	4.3	4.2	4.2	3.8	4.8	12	42	23	12	7.0	6.1
28	4.5	4.8	4.6	4.1	3.5	4.6	11	50	23	11	6.9	6.1
29	5.1	5.1	5.0	4.2	---	4.4	10	56	23	11	7.0	6.1
30	4.9	5.2	5.2	4.2	---	4.4	10	46	22	11	7.0	6.1
31	5.0	---	5.0	4.3	---	4.6	---	39	---	10	7.0	---
TOTAL	175.0	145.7	144.6	132.9	90.59	127.2	212.4	1324	1077	475	262.6	189.3
MEAN	5.65	4.86	4.66	4.29	3.24	4.10	7.08	42.7	35.9	15.3	8.47	6.31
MAX	7.1	5.4	5.6	4.8	4.1	4.9	13	70	50	21	12	6.9
MIN	4.5	4.2	3.8	3.7	.28	3.3	3.7	10	22	10	6.9	5.8
AC-FT	347	289	287	264	180	252	421	2630	2140	942	521	375

CAL YR 1988 TOTAL 6252.2 MEAN 17.1 MAX 177 MIN 3.5 AC-FT 12400
WTR YR 1989 TOTAL 4356.29 MEAN 11.9 MAX 70 MIN .28 AC-FT 8640

YELLOWSTONE RIVER BASIN

06291500 LODGE GRASS CREEK ABOVE WILLOW CREEK DIVERSION, NEAR WYOLA, MT

LOCATION.--Lat 45°07'39", long 107°36'01", in SE1/4NE1/4NE1/4 sec.24, T.8 S., R.33 E., Big Horn County, Hydrologic Unit 10080016, on left bank 0.2 mi upstream from Willow Creek diversion canal, 1.1 mi downstream from Spring Creek, 10 mi west of Wyola, 17 mi southwest of Lodge Grass, and at mile 43.0.

DRAINAGE AREA.--80.7 mi^2.

PERIOD OF RECORD.--March 1939 to September 1974, October 1982 to current year.

REVISED RECORDS.--WSP 1559: 1944-47. WSP 1629: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 4,170 ft, from topographic map. March 1939 to September 1974 recording gage 0.1 mi upstream at different datum. Flows are equivalent.

REMARKS.--Estimated daily discharges: Nov. 28 to Mar. 7, Mar. 15-20. Records good except those for estimated daily discharges, which are poor. Diversions for irrigation of about 400 acres upstream of station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--42 years (1939-74, 1983-89), 48.6 ft^3/s, 35,210 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,130 ft^3/s, June 9, 1964, gage height, 6.14 ft, from rating curve extended above 600 ft^3/s; minimum daily, 3.0 ft^3/s, Jan. 17, 18, 25, 30, 31, 1950, Jan. 15, 16, 1954.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 270 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 12	0830	*173	*2.99	No peak greater than base discharge this year.			

Minimum daily discharge, 5.0 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	18	e18	e17	e7.0	e9.0	22	32	77	41	17	13
2	17	17	e17	e18	e5.5	e9.0	20	29	83	40	16	13
3	17	17	e16	e20	e5.0	e8.0	17	29	91	38	18	13
4	17	17	e17	e19	e6.0	e10	17	28	83	37	18	13
5	18	17	e18	e17	e8.0	e15	16	29	75	35	17	12
6	18	17	e18	e13	e10	e25	26	28	80	35	17	12
7	18	17	e16	e11	e11	e40	23	29	85	33	17	13
8	18	17	e15	e8.0	e11	47	22	51	86	31	16	14
9	18	18	e14	e11	e12	46	21	80	85	31	16	18
10	18	18	e16	e11	e11	37	19	87	86	34	17	18
11	18	18	e17	e10	e12	26	17	153	87	33	21	18
12	18	18	e16	e9.3	e12	24	17	159	81	31	18	16
13	18	18	e18	e10	e11	21	17	123	76	36	17	16
14	18	18	e16	e11	e10	18	17	100	72	38	16	14
15	18	17	e14	e12	e10	e16	17	87	69	32	15	14
16	18	17	e15	e12	e9.0	e14	21	82	70	31	15	13
17	26	17	e17	e13	e9.0	e14	28	85	71	31	14	12
18	22	17	e19	e13	e10	e13	26	100	66	28	16	13
19	20	16	e17	e12	e11	e14	22	133	63	26	22	14
20	20	16	e16	e12	e12	e15	21	111	62	26	23	14
21	19	17	e17	e14	e11	14	21	99	67	25	18	14
22	20	17	e17	e14	e12	16	23	103	60	24	16	14
23	19	18	e16	e12	e13	16	26	118	57	24	15	14
24	19	19	e15	e10	e14	18	29	127	56	27	14	13
25	18	16	e13	e10	e13	25	31	104	53	24	15	12
26	18	14	e12	e11	e11	35	31	89	50	22	14	12
27	18	13	e14	e12	e10	38	32	81	48	21	15	12
28	17	e14	e15	e13	e9.5	27	34	82	46	21	15	12
29	18	e16	e17	e13	---	27	42	101	43	20	14	12
30	18	e17	e18	e15	---	24	38	98	42	19	14	11
31	18	---	e19	e9.0	---	22	---	85	---	18	13	---
TOTAL	574	506	503	392.3	286.0	683.0	713	2642	2070	912	509	409
MEAN	18.5	16.9	16.2	12.7	10.2	22.0	23.8	85.2	69.0	29.4	16.4	13.6
MAX	26	19	19	20	14	47	42	159	91	41	23	18
MIN	17	13	12	8.0	5.0	8.0	16	28	42	18	13	11
AC-FT	1140	1000	998	778	567	1350	1410	5240	4110	1810	1010	811

CAL YR 1988 TOTAL 14596.0 MEAN 39.9 MAX 324 MIN 9.0 AC-FT 28950
WTR YR 1989 TOTAL 10199.3 MEAN 27.9 MAX 159 MIN 5.0 AC-FT 20230

e Estimated

YELLOWSTONE RIVER BASIN

06294000 LITTLE BIGHORN RIVER NEAR HARDIN, MT

LOCATION.--Lat 45°44'09", long 107°33'24", in SE1/4NE1/4NE1/4 sec.19, T.1 S., R.34 E., Big Horn County, Hydrologic Unit 10080016, on left bank 50 ft downstream from bridge on Sarpy Road, 0.2 mi upstream of terminal wasteway of Agency Canal, 0.6 mi upstream from mouth, and 2.3 mi east of Hardin.

DRAINAGE AREA.--1,294 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1953 to current year.

REVISED RECORDS.--WDR MT-86-1: 1978.

GAGE.--Water-stage recorder. Datum of gage is 2,882.29 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Oct. 7, 1953, nonrecording gage at site 0.4 mi downstream. Oct. 7, 1953, to May 6, 1963, water-stage recorder at site 0.3 mi downstream. May 6, 1963, to Nov. 6, 1963, non-recording gage at site 0.4 mi downstream. All at different datums. Nov. 7, 1963, to Aug. 15, 1976, water-stage recorder at site 35 ft downstream at present datum. Aug. 15, 1976, to Sept. 30, 1979, water-stage recorders were located on each bank downstream of Sarpy Road bridge and were used depending on control conditions.

REMARKS.--Estimated daily discharges: Nov. 27 to Dec. 1, Dec. 14-18, Dec. 24 to Mar. 24. Water-discharge records good except those for estimated daily discharges, which are poor. Flow partly regulated by Willow Creek Reservoir (capacity 23,000 acre-ft). Diversions for irrigation of 20,980 acres upstream from station. Figures of discharge given herein include flow of terminal wasteway of Agency Canal.

AVERAGE DISCHARGE.--36 years, 299 ft^3/s, 216,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 22,600 ft^3/s, May 19, 1978, gage height, 11.20 ft, used gage height obtained at bridge on Sarpy Creek Road; maximum gage height, 11.78 ft, Mar. 20, 1960, site and datum then in use, backwater from ice; minimum discharge observed, 0.20 ft^3/s, Aug. 7, 1961, result of discharge measurement.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 12	----	*unknown	a*7.06	Mar. 28	0615	1,280	4.30

a--backwater from ice.

Minimum daily discharge, 18 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	91	125	e130	e100	e30	e64	322	280	338	118	78	36
2	92	111	141	e120	e20	e64	294	299	317	95	71	42
3	86	113	157	e150	e18	e55	276	289	275	84	62	42
4	85	112	158	e170	e25	e55	252	271	250	78	57	39
5	84	109	156	e130	e40	e60	227	260	250	73	50	35
6	84	109	155	e100	e65	e80	215	250	243	52	37	31
7	86	107	141	e60	e65	e100	210	239	207	45	32	32
8	92	107	115	e45	e60	e160	228	232	164	40	32	29
9	92	120	125	e60	e70	e250	243	230	181	37	36	29
10	94	118	139	e100	e80	e450	244	368	185	52	39	35
11	92	122	142	e90	e80	e1700	238	448	275	41	42	39
12	93	122	134	e85	e78	e1500	216	532	252	43	53	53
13	95	120	132	e95	e76	e1200	198	623	249	47	58	60
14	93	121	e130	e100	e70	e800	187	672	220	47	55	63
15	93	119	e120	e90	e65	e450	177	608	200	76	49	61
16	98	128	e95	e110	e60	e270	171	513	180	119	58	58
17	117	124	e84	e120	e40	e200	168	459	180	114	64	54
18	128	115	e115	e130	e42	e180	168	445	182	95	58	50
19	137	111	141	e130	e60	e190	177	444	187	89	55	47
20	131	105	151	e120	e94	e190	186	450	175	87	58	45
21	120	123	151	e110	e85	e210	188	469	166	88	61	43
22	114	120	152	e120	e90	e220	183	459	175	84	63	43
23	109	151	146	e90	e100	e240	180	435	241	84	56	45
24	108	147	e110	e70	e150	e280	178	422	228	81	56	51
25	110	137	e70	e56	e130	307	183	423	233	74	56	49
26	117	127	e50	e65	e110	446	192	426	236	105	49	53
27	114	e95	e60	e68	e90	847	201	398	212	93	52	54
28	112	e130	e70	e85	e75	1230	216	358	186	84	53	50
29	103	e150	e80	e105	---	844	239	328	171	77	45	43
30	107	e150	e110	e120	---	539	263	319	151	78	38	40
31	110	---	e130	e60	---	384	---	324	---	78	32	---
TOTAL	3187	3648	3790	3054	1968	13565	6420	12273	6509	2358	1605	1351
MEAN	103	122	122	98.5	70.3	438	214	396	217	76.1	51.8	45.0
MAX	137	151	158	170	150	1700	322	672	338	119	78	63
MIN	84	95	50	45	18	55	168	230	151	37	32	29
AC-FT	6320	7240	7520	6060	3900	26910	12730	24340	12910	4680	3180	2680

CAL YR 1988 TOTAL 69032 MEAN 189 MAX 1400 MIN 22 AC-FT 136900
WTR YR 1989 TOTAL 59728 MEAN 164 MAX 1700 MIN 18 AC-FT 118500

e Estimated

YELLOWSTONE RIVER BASIN

06294000 LITTLE BIGHORN RIVER NEAR HARDIN, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1970-79, 1987 to current year (discontinued).

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1969 to September 1979.
WATER TEMPERATURE: October 1969 to September 1979.
SUSPENDED-SEDIMENT DISCHARGE: October 1969 to September 1977.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1970-79): Maximum daily, 1,870 microsiemens, Apr. 7, 1979; minimum daily, 377 microsiemens, June 18, 1974.
WATER TEMPERATURE (water years 1970-79): Maximum, 30.0°C, Aug. 9, 12, 1971; minimum, 0.0°C, on many days during winter periods.
SEDIMENT CONCENTRATION (water years 1970-77): Maximum daily mean, 6,660 mg/L, Mar. 20, 1975; minimum daily mean, 7 mg/L, Oct. 29, 30, 1973, Sep. 4, 1976.
SEDIMENT LOAD (water years 1970-77): Maximum daily, 58,000 tons, May 9, 1975; minimum daily, 1.9 tons, Sep. 4, 1976.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
OCT 05...	0835	53	--	--	758	6.5	10.0
NOV 23...	0955	146	--	--	660	6.0	2.5
JAN 06...	0945	102	--	--	500	-7.0	0.0
FEB 21...	1340	85	--	--	755	5.0	0.5
APR 05...	1522	218	--	--	1030	5.5	6.0
MAY 04...	0815	269	60	1	961	10.0	11.5
JUN 29...	0850	142	--	--	595	--	21.0
JUL 06...	0852	48	0	0	702	26.0	20.0
AUG 22...	0835	36	0	0	971	17.5	18.5
SEP 19...	0820	20	0	0	983	13.0	12.0
21...	0840	17	--	--	935	--	11.5

DATE	TIME	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
MAY 04...	0815	8.1	360	130	78	41	77	2	3.3
JUL 06...	0852	8.1	300	94	59	36	58	2	3.4
AUG 22...	0835	8.0	350	120	69	42	73	2	4.0
SEP 19...	0820	8.1	340	130	66	43	72	2	2.8

DATE	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, 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)
MAY 04...	239	280	4.8	0.20	7.3	635	0.86	461	<0.100
JUL 06...	202	230	5.0	0.20	0.77	514	0.70	66.6	<0.100
AUG 22...	221	290	7.1	0.30	9.6	628	0.85	61.1	<0.100
SEP 19...	211	290	6.7	0.20	5.0	612	0.83	33.1	<0.100

YELLOWSTONE RIVER BASIN

06294000 LITTLE BIGHORN RIVER NEAR HARDIN, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	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)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
MAY									
04...	1	130	<1	<1	26	1	5	<0.1	1
JUL									
06...	--	150	--	--	12	--	--	--	--
AUG									
22...	--	200	--	--	460	--	--	--	--
SEP									
19...	--	190	--	--	14	--	--	--	--

YELLOWSTONE RIVER BASIN

06294500 BIGHORN RIVER ABOVE TULLOCK CREEK, NEAR BIGHORN, MT

LOCATION.--Lat 46°07'29", long 107°28'06", in SE1/4SE1/4NE1/4 sec.3, T.4 N., R.34 E., Treasure County, Hydrologic Unit 10080015, on right bank, 1.9 mi upstream from Tullock Creek, 3.0 mi upstream from mouth, 3.6 mi southwest of Bighorn, and 4.5 mi southeast of Custer.

DRAINAGE AREA.--22,414 mi^2. Area at site used Oct. 7, 1955, to Sept. 30, 1981, 22,885 mi^2.

PERIOD OF RECORD.--October 1981 to current year. Previously published as "06294700 Bighorn River at Bighorn, MT" 1956-81, and as "near Custer" 1945-55. Flows are equivalent at all sites.

GAGE.--Water-stage recorder. Elevation of gage is 2,700 ft above National Geodetic Vertical Datum of 1929, from topographic map. May 11, 1945 to Dec. 6, 1945, nonrecording gage, and Dec. 7, 1945, to Oct. 6, 1955, water-stage recorder 1.7 mi upstream at different datum. Oct. 7, 1955, to Sept. 30, 1981, at site 2.3 mi downstream at different datum.

REMARKS.--Estimated daily discharges: Dec. 25 to Mar. 14. Records good except those for estimated daily discharges, which are poor. Flow regulated by Bighorn Lake beginning November 1965 (usable capacity, 1,356,000 acre-ft). Major regulation prior to November 1965 by 14 reservoirs in Wyoming and 1 in Montana with combined usable capacity of about 1,400,000 acre-ft. Diversion for irrigation of about 445,200 acres upstream from station. U.S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--44 years (water years 1945-81, 1982-89), 3,843 ft^3/s, 2,784,000 acre-ft/yr, unadjusted.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge, 59,200 ft^3/s, May 20, 1978, gage height, 14.15 ft; maximum gage height recorded, 14.21 ft, Apr. 2, 1965 (ice jam); minimum discharge, about 275 ft^3/s, Nov. 15, 1959, result of freezeup; minimum daily, 400 ft^3/s, Apr. 4, 1967.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft^3/s, July 4, 1983, gage height, 5.66 ft, maximum gage height, 8.65 ft, Jan. 13, 1985 (ice jam); minimum daily discharge, 1,220 ft^3/s, Oct. 18, 1985.

EXTREMES FOR CURRENT YEAR.--Maximum discharge not determined but occurred on Mar. 11; maximum gage height, 7.61 ft, Jan. 27, backwater from ice; minimum daily discharge, 1,280 ft^3/s, Oct. 30,31, Nov. 2.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1910	1300	1940	e2200	e1800	e1900	2330	2340	2150	1890	1970	1870
2	1930	1280	1920	e2100	e1500	e1800	2250	2260	2160	1790	1940	1860
3	1900	1550	1960	e2100	e1600	e1800	2190	2200	2090	1760	1960	1850
4	1870	1630	1960	e2000	e1900	e1800	2120	2140	2070	1700	1940	1860
5	1850	1630	1960	e2000	e2500	e1900	2080	2120	2080	1630	1930	1850
6	1940	1640	1990	e2000	e2300	e2100	2060	2090	2010	1520	1940	1810
7	2100	1640	2030	e2000	e2200	e2100	2040	2070	1890	1440	1940	1770
8	1740	1640	1970	e2050	e2000	e2200	2090	2090	1850	1450	1900	1750
9	1710	1660	1960	e2100	e2000	e2500	2120	2060	1860	1560	1900	1790
10	1690	1660	2050	e2100	e2000	e3200	2150	2090	1890	1550	2030	1800
11	1680	1670	2050	e2100	e2000	e4000	2120	2290	2030	1660	2030	1810
12	1640	1680	2080	e2150	e2000	e3800	2050	2390	2030	1680	2080	1810
13	1630	1700	2100	e2150	e2000	e3500	2010	2720	2010	1730	2110	1820
14	1610	1720	2120	e2150	e2000	e3200	1990	2750	2040	1790	2120	1800
15	1560	1720	2080	e2150	e2000	2750	1970	2550	2000	1840	2060	1790
16	1590	1730	2040	e2150	e1900	2460	1970	2410	1980	1930	1870	1760
17	1610	1770	2040	e2100	e1800	2280	1980	2370	2040	2070	1810	1740
18	1590	1780	2070	e2100	e1900	2430	2000	2480	2040	1930	1830	1730
19	1570	1770	2100	e2150	e2100	2170	2020	2280	2030	1900	1930	1720
20	1480	1750	2130	e2150	e2200	2170	2010	2260	1950	1860	1930	1690
21	1410	1810	2120	e2100	e2100	2150	2010	2310	2020	1910	1920	1670
22	1380	1840	2130	e2000	e2200	2210	2000	2230	2040	1920	1840	1650
23	1360	1870	2120	e2000	e2300	2280	1990	2200	2070	1950	1830	1630
24	1340	1980	2100	e2000	e2300	2560	1980	2200	2130	2120	1820	1640
25	1330	1880	e1900	e2100	e2100	2860	1990	2230	2190	2010	1930	1580
26	1310	1840	e1600	e2200	e2000	3170	2020	2290	2200	1990	1880	1600
27	1310	1850	e1900	e2200	e2000	3580	2040	2250	2150	2000	1870	1620
28	1300	1870	e2000	e2200	e2000	3720	2210	2190	2110	2040	1880	1620
29	1290	1930	e2100	e2200	---	3180	2340	2190	2050	2070	1880	1580
30	1280	1940	e2200	e2200	---	2710	2440	2130	1970	2040	1880	1630
31	1280	---	e2300	e2100	---	2430	---	2080	---	2060	1870	---
TOTAL	49190	51730	63020	65300	56700	80910	62570	70260	61130	56790	59820	52100
MEAN	1587	1724	2033	2106	2025	2610	2086	2266	2038	1832	1930	1737
MAX	2100	1980	2300	2200	2500	4000	2440	2750	2200	2120	2120	1870
MIN	1280	1280	1600	2000	1500	1800	1970	2060	1850	1440	1810	1580
AC-FT	97570	102600	125000	129500	112500	160500	124100	139400	121300	112600	118700	103300

CAL YR 1988 TOTAL 906010 MEAN 2475 MAX 6390 MIN 1280 AC-FT 1797000
WTR YR 1989 TOTAL 729520 MEAN 1999 MAX 4000 MIN 1280 AC-FT 1447000

e Estimated

06294700 BIGHORN RIVER AT BIGHORN, MT
(National stream quality accounting network station)

LOCATION.--Lat 46°08'50", long 107°28'00", in NE1/4NE1/4NE1/4 sec.33, T.5 N., R.34 E., Treasure County, Hydrologic Unit 10080015, on right bank 150 ft downstream from bridge on old U.S. Highway 10, 0.3 mi downstream from bridge Interstate Highway 94, 0.7 mi upstream from mouth, 1.3 mi southwest of Bighorn, and 4.4 mi east of Custer.

DRAINAGE AREA.--22,885 mi^2. Area at site used prior to Oct. 7, 1955, 22,410 mi^2.

PERIOD OF RECORD.--Water years 1946 to current year. Prior to October 1948, published as near Custer.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1964 to September 1981.
WATER TEMPERATURE: April 1949 to September 1951, October 1953 to September 1981.
SUSPENDED-SEDIMENT DISCHARGE: July 1947 to September 1954, October 1955 to September 1958, October 1959 to June 1972.

REMARKS.--Water-discharge records for Bighorn River above Tullock Creek near Bighorn (station 06294500) are used, flows are equivalent at these two sites.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1965-81): Maximum daily, 1,460 microsiemens, May 24, 1978; minimum daily, 460 microsiemens, Mar. 13, 1966.
WATER TEMPERATURE (water years 1949-51, 1954-81): Maximum observed, 30.0°C, July 17, 18, 1953; minimum observed, 0.0°C, on many days during winters.
SEDIMENT CONCENTRATION (water years 1947-54, 1955-58, 1959-72): Maximum daily mean, 23,200 mg/L, May 24, 1952; minimum daily mean, 8 mg/L, Oct. 31, 1967.
SEDIMENT LOAD (water years 1947-54, 1955-58, 1959-72): Maximum daily, 727,000 tons, May 24, 1952; minimum daily, 46 tons, Oct. 31, 1967.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)
NOV 01...	1140	1320	0	0	1120	10.5	8.5	687	10.4	99	K12
JAN 30...	0910	E2200	100	2	1020	9.5	0.0	688	12.2	93	K12
MAR 21...	1100	2190	100	2	1140	5.0	1.5	692	12.6	99	K1
MAY 24...	1100	2250	10	1	--	19.5	15.0	686	9.0	99	K68
JUL 18...	1100	1840	20	1	965	24.0	19.5	698	7.3	87	290
SEP 11...	1100	1840	10	1	1060	7.5	10.5	690	10.0	99	K56

DATE	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	PH (STANDARD UNITS) (00400)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	TURBIDITY (NTU) (00076)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)
NOV 01...	K3	8.6	161	8	144	5.0	360	210	84	35	99
JAN 30...	57	8.7	192	13	179	11	330	150	82	31	94
MAR 21...	K17	8.4	224	8	196	11	400	200	97	38	100
MAY 24...	130	8.8	203	19	197	17	360	160	84	36	90
JUL 18...	70	8.4	115	7	108	32	370	260	87	36	100
SEP 11...	K19	8.7	182	9	163	6.1	330	170	80	31	89

YELLOWSTONE RIVER BASIN

06294700 BIGHORN RIVER AT BIGHORN, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

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)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)
NOV											
01...	2	4.2	178	390	13	0.50	5.6	782	721	1.06	2790
JAN											
30...	2	3.9	182	360	12	0.40	7.0	699	700	0.95	E4150
MAR											
21...	2	4.5	203	390	14	0.50	7.0	797	772	1.08	4710
MAY											
24...	2	4.4	187	350	15	0.40	5.6	722	705	0.98	4390
JUL											
18...	2	4.7	188	380	13	0.50	6.3	765	696	1.04	3800
SEP											
11...	2	4.3	175	340	12	0.50	7.1	674	665	0.92	3350

DATE	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHOROUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	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											
01...	<0.010	0.350	0.040	0.040	0.40	0.020	0.020	<0.010	29	103	93
JAN											
30...	0.010	0.560	0.040	0.080	0.80	0.040	0.020	0.010	58	E345	66
MAR											
21...	<0.010	0.530	0.040	0.030	0.50	0.020	0.020	0.020	81	479	86
MAY											
24...	<0.010	0.280	0.030	0.040	0.80	0.060	0.010	<0.010	118	717	89
JUL											
18...	<0.010	0.470	0.070	0.100	0.70	0.080	0.010	<0.010	128	636	80
SEP											
11...	0.010	0.480	0.050	0.050	0.60	0.020	0.020	0.010	26	129	69

DATE	TIME	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)
NOV											
01...	1140	150	3	63	<0.5	4	4	<3	310	150	32
MAR											
21...	1100	40	1	63	<0.5	<1	<1	<3	6	6	<5
JUL											
18...	1100	<10	4	66	<0.5	<1	<1	<3	15	5	1
SEP											
11...	1100	<10	1	62	<0.5	<1	<1	<3	56	7	4

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)	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										
01...	48	100	0.9	<10	16	3	1.0	950	<6	190
MAR										
21...	49	20	<0.1	<10	7	3	<1.0	1100	<6	14
JUL										
18...	50	13	<0.1	<10	3	3	<1.0	1000	<6	19
SEP										
11...	37	4	0.2	<10	9	2	<1.0	880	<6	52

YELLOWSTONE RIVER BASIN

06294995 ARMELLS CREEK NEAR FORSYTH, MT

LOCATION.--Lat 46°14'59", long 106°48'22", in SE1/4NW1/4NE1/4 sec.26 T.6 N., R.39 E., Rosebud County, Hydrologic Unit 10100001, on right bank 300 ft upstream from bridge on Interstate Highway I-94, 2.2 mi upstream from mouth, and 6 mi southwest of Forsyth.

DRAINAGE AREA.--370 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1979 to September 1985, October 1987 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 2,560 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 25-27, Dec. 8, and Dec. 15 to Mar. 21. Water-discharge records poor. Diversions for irrigation of about 200 acres upstream of station.

AVERAGE DISCHARGE.--12 years, 5.50 ft^3/s, 3,980 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 960 ft^3/s, Mar. 13, 1979; maximum gage height observed, 6.62 ft, Mar. 12, 1978, backwater from ice; no flow at times most years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 130 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage Height (ft)	Date	Time	Discharge (ft^3/s)	Gage Height (ft)
Mar. 10	0930	*unknown	a*5.92	Apr. 30	1330	136	3.88

a--ice jam.

No flow part or all of each day, Feb. 2-4, July 5-12.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.06	.11	.06	e.02	e.02	e.06	5.2	50	1.8	.10	2.1	5.3
2	.07	.17	.07	e.03	e.00	e.04	5.2	24	2.3	.08	2.8	8.7
3	.06	.11	.06	e.04	e.00	e.02	5.2	18	2.5	.07	3.0	11
4	.06	.09	.08	e.05	e.00	e.04	5.2	10	2.1	.05	1.9	14
5	.07	.09	.05	e.05	e.02	e.10	5.2	6.5	1.6	.02	.72	4.5
6	.08	.09	.05	e.04	e.02	e.50	5.2	5.1	1.8	.00	.55	9.1
7	.08	.09	.05	e.03	e.04	e3.0	5.2	3.9	1.7	.00	.62	7.2
8	.08	.08	e.04	e.01	e.06	e11	5.2	3.3	1.3	.00	.68	1.3
9	.09	.08	.05	e.02	e.08	e25	5.2	4.5	1.1	.00	.77	.68
10	.10	.08	.06	e.03	e.10	e200	4.8	5.6	1.1	.00	.69	.50
11	.11	.08	.06	e.04	e.10	e50	4.5	3.6	.97	.01	.60	.49
12	.08	.08	.06	e.05	e.09	e30	4.5	2.8	.89	.37	.55	.48
13	.06	.08	.06	e.06	e.09	e25	4.5	3.0	1.0	.18	.65	.46
14	.06	.08	.06	e.06	e.09	e15	4.5	24	.91	.31	.71	.47
15	.07	.08	e.04	e.07	e.08	e6.0	4.5	12	.84	.42	.74	.50
16	.09	.08	e.02	e.08	e.06	e3.5	4.5	5.8	.65	.91	.73	.43
17	.09	.08	e.04	e.08	e.02	e2.5	4.5	4.2	.69	1.9	.56	.57
18	.08	.07	e.04	e.07	e.03	e2.5	4.5	3.3	.74	2.3	.72	.56
19	.08	.09	e.06	e.07	e.04	e3.0	4.5	2.8	.52	1.9	.67	.54
20	.11	.08	e.06	e.05	e.04	e3.5	4.5	2.2	.31	1.8	.59	.51
21	.12	.07	e.04	e.05	e.06	e4.5	4.0	2.1	.29	.83	.50	.40
22	.11	.07	e.03	e.06	e.06	7.1	3.5	2.1	.30	.48	.43	.42
23	.12	.06	e.03	e.06	e.08	8.8	3.1	2.0	.30	.26	.34	.45
24	.16	.09	e.03	e.05	e.09	46	3.0	1.7	7.7	.18	.32	.49
25	.10	e.08	e.03	e.03	e.10	40	2.8	1.6	.99	.10	.35	.33
26	.10	e.06	e.03	e.04	e.10	19	3.4	1.5	.50	.08	.36	.45
27	.13	e.04	e.02	e.04	e.10	13	4.9	1.5	.22	.07	.44	.40
28	.11	.09	e.02	e.05	e.08	15	41	1.5	.29	.12	.51	.45
29	.08	.07	e.01	e.05	---	14	45	1.7	.22	.33	.35	.37
30	.08	.06	e.02	e.07	---	7.4	86	1.8	.12	4.3	.45	.44
31	.08	---	e.03	e.06	---	5.6	---	1.8	---	2.9	3.4	---
TOTAL	2.77	2.48	1.36	1.51	1.65	561.16	293.3	213.9	35.75	20.07	27.80	71.49
MEAN	.089	.083	.044	.049	.059	18.1	9.78	6.90	1.19	.65	.90	2.38
MAX	.16	.17	.08	.08	.10	200	86	50	7.7	4.3	3.4	14
MIN	.06	.04	.01	.01	.00	.02	2.8	1.5	.12	.00	.32	.33
AC-FT	5.5	4.9	2.7	3.0	3.3	1110	582	424	71	40	55	142

CAL YR 1988 TOTAL 217.41 MEAN .59 MAX 6.4 MIN .00 AC-FT 431
WTR YR 1989 TOTAL 1233.24 MEAN 3.38 MAX 200 MIN .00 AC-FT 2450

YELLOWSTONE RIVER BASIN

06294995 ARMELLS CREEK NEAR FORSYTH, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975-86, 1988 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1982 to September 1983.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water year 1983): Maximum daily observed, 5,680 microsiemens, Dec. 16, 1982; minimum daily observed, 1,270 microsiemens, Jan. 11, 1983.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
OCT										
12...	0928	0.09	--	--	3650	12.0	10.0	--	--	--
NOV										
15...	0905	0.08	--	--	3860	-3.0	0.5	--	--	--
DEC										
21...	1205	0.04	--	--	3810	-3.0	0.0	--	--	--
FEB										
13...	0952	0.09	--	--	3950	-2.0	0.0	--	--	--
MAR										
08...	1000	11	100	2	1170	8.0	0.5	696	13.0	99
27...	0937	13	--	--	2830	6.5	9.0	--	--	--
MAY										
02...	1005	27	0	0	1910	13.0	11.0	696	8.4	84
JUN										
13...	0907	0.94	--	--	4650	22.0	15.5	--	--	--
JUL										
25...	1220	0.08	10	1	2410	32.0	27.0	697	7.0	97
SEP										
12...	1205	0.36	0	0	2690	14.0	12.5	703	9.2	95

DATE	TIME	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
MAR									
08...	1000	8.3	210	64	36	28	170	5	7.4
MAY									
02...	1005	8.8	440	230	69	65	260	6	8.3
JUL									
25...	1220	8.4	380	0	51	62	510	12	7.8
SEP									
12...	1205	8.5	350	0	57	51	520	12	7.1

DATE	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, 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 TOTAL (MG/L AS N) (00630)
MAR									
08...	141	440	6.8	0.20	6.6	780	1.06	23.2	0.300
MAY									
02...	209	790	9.2	0.30	8.7	1340	1.82	97.4	0.100
JUL									
25...	586	960	16	0.40	17	1980	2.69	0.43	<0.100
SEP									
12...	633	740	19	0.40	14	1790	2.43	1.74	<0.100

YELLOWSTONE RIVER BASIN

06294995 ARMELLS CREEK NEAR FORSYTH, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
MAR 08...	0.350	1.8	2.2	0.170	100	87	73	2.2	97
MAY 02...	0.030	0.67	0.70	0.040	230	110	327	24	99
JUL 25...	0.020	0.78	0.80	0.100	510	40	120	0.03	32
SEP 12...	0.020	0.68	0.70	0.040	460	60	94	0.09	33

DATE	TIME	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE) (01012)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)
MAR 08...	1000	1	<10	<0.5	3	1	4	<1	20	12	2700
JUL 25...	1220	3	--	<10	--	<1	--	2	--	3	--

DATE	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	MERCURY DISSOLVED (UG/L AS HG) (71890)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
MAR 08...	8	<5	90	51	1.8	--	7	1	<1	40	22
JUL 25...	--	<1	--	30	--	0.1	--	3	<1	--	<10

YELLOWSTONE RIVER BASIN

06295000 YELLOWSTONE RIVER AT FORSYTH, MT

LOCATION.--Lat 46°15'58", long 106°41'24", in NE1/4NW1/4NW1/4 sec.23, T.6 N., R.40 E., Rosebud County, Hydrologic Unit 10100001, on right bank 0.3 mi downstream from U.S. Highway 12 bridge, at intake for Forsyth water supply, at Forsyth, and at mile 238.2.

DRAINAGE AREA.--40,339 mi^2.

PERIOD OF RECORD.--July 16, 1921, to September 30, 1923 (no winter records), October 1977 to current year. Miscellaneous discharge measurements were made in 1974 to 1976 and are available in files of Helena district office.

GAGE.--Water-stage recorder. Datum of gage is 2,504.62 ft above National Geodetic Vertical Datum of 1929, from nearby elevation determined by City of Forsyth. July 1921 to March 1922, nonrecording gage on discontinued highway bridge 10 ft downstream from gage at different datum. March 1922 to September 1923, nonrecording gage on discontinued highway bridge 10 ft downstream from gage at datum 2 ft higher.

REMARKS.--Estimated daily discharges: Dec. 20 to Mar. 26. Records good except those for estimated daily discharges, which are poor. Diversions for irrigation of about 838,000 acres upstream from station. Flow regulated to some extent by Bighorn Lake, usable capacity, 1,356,000 acre-ft, on Bighorn River. Small diversion dam about 4,200 ft downstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--12 years (1978-89), 10,590 ft^3/s, 7,672,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 106,000 ft^3/s, May 21, 1978, gage height, 14.53 ft; minimum daily, 1,400 ft^3/s, Nov. 23, 1977.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of 1918 reached a stage of about 20 ft, datum used in 1921, information from local residents.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 37,800 ft^3/s, June 18, gage height, 7.23 ft; minimum daily, 1,700 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3860	4000	4540	e4000	e2800	e3500	6240	11000	18800	17600	8220	6000
2	3810	4040	4580	e4200	e1900	e3000	5910	10000	17600	17900	7580	5830
3	3830	4040	4670	e4400	e1700	e2600	5580	9330	17400	18000	7250	5680
4	3810	4200	4580	e4100	e2000	e2500	5400	9310	19000	17000	7190	5640
5	3900	4200	4540	e3700	e2500	e2500	5250	9960	21400	16300	7120	5540
6	3830	4210	4530	e3300	e3000	e3000	5260	10300	19700	15700	7010	5360
7	3940	4200	4490	e3000	e3700	e3500	5150	10100	19900	15200	6690	5220
8	3980	4190	4560	e2600	e4100	e4500	5120	10600	23700	14400	6290	5130
9	3700	4210	4490	e2900	e4100	e5000	5400	14800	27400	13400	5960	5200
10	3670	4270	4540	e3200	e3900	e7000	5910	20500	29200	12800	5800	5300
11	3660	4320	4570	e3500	e3900	e9000	6090	23400	30100	13000	5870	5460
12	3670	4340	4610	e3900	e4000	e11000	5780	25500	31700	13200	5740	5810
13	3640	4340	4630	e4200	e4100	e13000	5440	30000	30700	12900	5810	5890
14	3620	4360	4560	e4600	e4200	e11000	5330	29600	26800	12600	5970	5850
15	3620	4480	4560	e4500	e3900	e9000	5360	25100	26200	14200	6030	5690
16	3700	4530	4380	e5000	e3600	e7000	5450	21500	26400	14000	5910	5590
17	3850	4520	4380	e4800	e3300	e5000	5790	21000	28100	13100	5560	5420
18	3990	4540	4270	e4500	e3000	e4000	6520	21000	35700	12400	5350	5310
19	4210	4530	4130	e4400	e3300	e4000	7110	21000	35000	11300	5210	5340
20	4290	4530	e3900	e4500	e3700	e5000	7180	20900	28500	10300	5290	5300
21	4160	4550	e3800	e4500	e4000	e5600	7020	22200	28000	9600	5510	5270
22	4050	4560	e3800	e4500	e4200	e6000	7830	19800	29100	9260	6080	5260
23	3950	4550	e3700	e4200	e4300	e6400	9300	18500	24000	9080	5860	5200
24	3980	4750	e3500	e3700	e4300	e7000	11700	19500	20400	9560	5490	5150
25	3950	4910	e3000	e3000	e4500	e8000	13300	21600	18600	9610	5740	5070
26	3960	4920	e2700	e3300	e4200	e9000	12800	23400	17400	9200	6290	4920
27	3920	4630	e2400	e3600	e4200	9080	12300	20200	16500	8760	6370	4810
28	3920	4600	e2800	e3700	e3800	8980	13000	17400	15900	8540	6340	4720
29	3960	4480	e3200	e4000	---	8410	13300	16900	16100	8530	6450	4680
30	3960	4400	e3500	e4500	---	7390	12000	16600	17200	8630	6360	4640
31	3930	---	e4000	e4000	---	6650	---	18100	---	8630	6170	---
TOTAL	120320	132400	125910	122300	100200	197610	227820	569100	716500	384700	192510	160280
MEAN	3881	4413	4062	3945	3579	6375	7594	18360	23880	12410	6210	5343
MAX	4290	4920	4670	5000	4500	13000	13300	30000	35700	18000	8220	6000
MIN	3620	4000	2400	2600	1700	2500	5120	9310	15900	8530	5210	4640
AC-FT	238700	262600	249700	242600	198700	392000	451900	1129000	1421000	763100	381800	317900

CAL YR 1988 TOTAL 2536630 MEAN 6931 MAX 31800 MIN 2400 AC-FT 5031000
WTR YR 1989 TOTAL 3049650 MEAN 8355 MAX 35700 MIN 1700 AC-FT 6049000

e Estimated

06295113 ROSEBUD CREEK AT RESERVATION BOUNDARY, NEAR KIRBY, MT

LOCATION.--Lat 45°21'40", long 106°59'23", in NE1/4NE1/4SW1/4 sec.36, T.5 S., R.38 E., Big Horn County, Hydrologic Unit 10100003, on right bank, 0.2 mi upstream from Dry Creek, 0.5 mi north of reservation boundary, 1.9 mi downstream from Cache Creek, 2.0 mi north of Kirby, and at mile 179.6.

DRAINAGE AREA.-- 123 mi^2.

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

GAGE.--Water-stage recorder. Elevation of gage is 3,780 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 15 to Mar. 24, Apr. 8-11. Records poor. Numerous small diversions for irrigation upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--10 years (1980-89), 6.65 ft^3/s, 4,820 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 127 ft^3/s, Apr. 16, 1985, gage height, 5.71 ft; maximum gage height observed, 6.30 ft, Feb. 21, 1980, backwater from ice; no flow part of each day Sept. 6-10, 1989.

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 231 ft^3/s was measured May 9, 1978, at site 1.9 mi upstream from present site. Flow was known to be higher during flood of May 19-21, 1978, from information by local resident.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 79 ft^3/s, May 29, gage height, 4.74 ft; no flow for part of each day Sept. 6-10.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.3	1.9	e2.2	e1.7	e2.0	e1.8	20	13	6.2	1.3	.29	.34
2	1.4	1.9	e2.1	e2.0	e1.2	e1.9	17	12	6.2	.99	.15	.16
3	1.2	1.8	e2.0	e1.9	e1.0	e1.6	15	12	6.1	.76	.19	.13
4	1.5	1.9	e2.2	e2.0	e1.1	e1.7	14	12	6.1	.69	.28	.24
5	1.6	1.8	e2.3	e1.9	e1.2	e2.0	13	12	5.7	.60	.38	.32
6	1.7	1.9	e2.2	e1.7	e1.3	e2.5	13	13	5.3	.53	.52	.18
7	1.7	1.9	e1.9	e1.5	e1.3	e4.0	13	12	4.7	.48	.50	.15
8	1.6	2.0	e1.7	e1.4	e1.2	e9.0	e13	12	4.0	.22	.37	.10
9	1.5	1.9	e1.9	e1.6	e1.4	e13	e12	12	3.6	.19	.65	.03
10	1.6	1.9	e1.9	e1.8	e1.4	e15	e11	12	3.3	.40	.79	.04
11	1.5	2.0	e2.0	e1.7	e1.6	e14	e12	12	3.3	.49	1.1	.07
12	1.3	1.9	e2.2	e1.7	e1.8	e15	13	12	3.2	.40	1.3	.31
13	1.3	2.0	e2.4	e1.6	e1.7	e14	13	13	3.1	.54	1.4	.41
14	1.5	2.1	e2.2	e1.8	e1.6	e12	12	12	2.9	.37	1.5	.68
15	1.7	e2.1	e1.9	e1.8	e1.6	e13	12	12	2.7	.57	1.6	.75
16	1.9	e1.9	e2.0	e2.2	e1.5	e11	11	11	2.7	.71	1.6	.80
17	2.5	e1.9	e2.2	e2.1	e1.5	e10	11	11	2.8	.75	1.5	.82
18	2.3	e1.8	e2.6	e2.2	e1.5	e9.0	12	10	2.4	.73	1.7	.75
19	2.1	e1.7	e2.5	e2.1	e1.6	e10	13	9.2	2.4	.85	1.9	.81
20	2.0	e1.6	e2.4	e2.0	e1.8	e10	12	8.3	2.1	.91	1.9	1.0
21	2.0	e1.7	e2.3	e2.3	e1.8	e10	11	7.7	3.1	.88	1.9	1.2
22	1.9	e1.8	e2.2	e2.2	e1.9	e11	10	7.5	3.5	1.0	1.9	1.2
23	1.8	e1.9	e2.1	e2.1	e2.3	e10	9.6	7.2	3.7	1.1	1.9	1.4
24	1.7	e1.8	e2.0	e1.8	e2.9	e11	10	7.0	4.7	1.2	1.6	1.6
25	1.7	e1.7	e1.7	e1.7	e2.7	12	9.7	6.8	4.6	1.1	1.4	1.7
26	1.7	e1.8	e1.5	e2.1	e2.5	15	11	6.9	3.7	.98	1.2	1.8
27	1.8	e1.6	e1.8	e2.2	e2.4	27	13	7.2	2.9	.86	1.1	2.0
28	1.7	e1.8	e1.7	e2.3	e2.2	39	14	7.1	2.4	.68	.94	2.1
29	1.8	e1.9	e1.7	e2.5	---	69	14	6.7	2.0	.51	.80	2.1
30	1.9	e2.0	e2.1	e2.8	---	41	14	6.6	1.5	.43	.73	2.2
31	1.9	---	e2.0	e3.2	---	27	---	6.3	---	.38	.57	---
TOTAL	53.1	55.9	63.9	61.9	48.0	442.5	378.3	309.5	110.9	21.60	33.66	25.39
MEAN	1.71	1.86	2.06	2.00	1.71	14.3	12.6	9.98	3.70	.70	1.09	.85
MAX	2.5	2.1	2.6	3.2	2.9	69	20	13	6.2	1.3	1.9	2.2
MIN	1.2	1.6	1.5	1.4	1.0	1.6	9.6	6.3	1.5	.19	.15	.03
AC-FT	105	111	127	123	95	878	750	614	220	43	67	50

CAL YR 1988 TOTAL 1904.83 MEAN 5.20 MAX 27 MIN .46 AC-FT 3780
WTR YR 1989 TOTAL 1604.65 MEAN 4.40 MAX 69 MIN .03 AC-FT 3180

e Estimated

YELLOWSTONE RIVER BASIN

06295250 ROSEBUD CREEK NEAR COLSTRIP, MT

LOCATION.--Lat 45°46'03", long 106°34'10", in SE1/4SW1/4NE1/4 sec.8, T.1 S., R.42 E., Rosebud County, Hydrologic Unit 10100003, on left bank 10 ft downstream from bridge on FAS Route 315, 1.5 mi downstream from Lee Coulee, 8.4 mi southeast of Colstrip, and at mile 85.6.

DRAINAGE AREA.--799 mi^2.

PERIOD OF RECORD.--October 1974 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 3,000 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 17-20, 25-29, Dec. 24 to Mar. 23. Records poor. Diversions for irrigation of about 800 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--15 years, 32.3 ft^3/s, 23,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 605 ft^3/s, May 21, 1978, gage height, 9.03 ft; no flow many days most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge unknown; maximum gage height, 4.07 ft, Mar. 13, backwater from ice; no flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	2.4	5.1	e4.5	e3.0	e5.0	63	29	5.6	3.0	2.1	.00
2	.00	2.8	4.8	e4.8	e2.5	e5.0	72	30	6.1	2.4	1.6	.00
3	.00	2.7	5.4	e5.0	e2.7	e4.5	55	29	6.5	2.1	.78	.00
4	.00	3.2	4.6	e5.4	e2.8	e4.5	44	28	6.9	1.9	1.1	.00
5	.00	3.1	4.8	e5.0	e3.0	e4.0	36	26	7.1	1.3	.53	.00
6	.00	3.3	5.2	e4.0	e3.0	e5.0	32	24	7.2	.94	.29	.00
7	.00	2.9	4.7	e3.5	e2.8	e6.0	29	23	7.3	.60	.18	.00
8	.00	2.9	4.3	e3.0	e3.0	e20	28	23	7.2	.39	.14	.00
9	.00	2.9	5.2	e3.5	e4.0	e60	27	22	7.4	.31	.11	.00
10	.00	3.1	4.9	e4.5	e4.5	e45	26	22	7.5	.25	.08	.00
11	.00	3.3	5.1	e5.0	e5.0	e70	25	20	7.4	.22	.06	.00
12	.00	3.4	5.5	e5.4	e6.0	e120	24	19	6.9	.23	.04	.00
13	.00	3.9	5.9	e5.6	e6.0	e140	24	20	6.1	.21	.04	.00
14	.00	4.1	5.9	e6.0	e5.5	e120	24	19	5.4	.19	.01	.00
15	.00	4.0	4.9	e6.0	e5.0	e90	24	19	5.5	.15	.00	.00
16	.00	3.4	6.0	e6.0	e5.0	e65	22	19	5.0	.85	.00	.00
17	.29	e3.3	5.6	e6.0	e4.5	e45	22	18	4.7	12	.00	.00
18	1.0	e3.2	5.5	e5.5	e5.0	e35	22	17	5.4	3.5	.00	.00
19	1.8	e3.2	5.3	e5.5	e6.0	e42	21	15	5.3	2.6	.00	.00
20	1.2	e3.8	5.3	e6.0	e7.0	e40	21	13	3.8	2.0	.00	.00
21	3.0	4.6	5.4	e6.0	e7.0	e55	20	12	2.8	1.6	.00	.00
22	2.6	4.3	5.6	e5.5	e7.6	e31	20	11	2.6	1.7	.00	.00
23	2.3	4.9	5.4	e5.0	e7.6	e33	20	10	2.6	2.4	.00	.00
24	2.4	5.0	e5.4	e4.5	e7.4	37	19	9.0	3.2	2.7	.00	.00
25	2.5	e4.1	e5.0	e4.0	e7.0	41	19	8.0	2.9	3.1	.00	.00
26	2.5	e3.8	e4.8	e4.5	e6.5	44	19	7.8	2.6	3.1	.00	.00
27	2.2	e3.6	e4.5	e5.0	e6.2	53	20	7.1	2.7	3.1	.00	.00
28	2.2	e4.0	e3.5	e5.0	e5.5	70	23	6.9	3.0	3.3	.00	.00
29	2.3	e4.5	e4.0	e5.2	---	80	26	6.3	3.4	3.0	.00	.00
30	2.3	4.8	e5.0	e6.0	---	75	27	6.1	3.5	2.7	.00	.00
31	2.5	---	e5.0	e4.5	---	64	---	6.0	---	2.2	.00	---
TOTAL	31.09	108.5	157.6	155.4	141.1	1509.0	854	525.2	153.6	64.04	7.06	0.00
MEAN	1.00	3.62	5.08	5.01	5.04	48.7	28.5	16.9	5.12	2.07	.23	.000
MAX	3.0	5.0	6.0	6.0	7.6	140	72	30	7.5	12	2.1	.00
MIN	.00	2.4	3.5	3.0	2.5	4.0	19	6.0	2.6	.15	.00	.00
AC-FT	62	215	313	308	280	2990	1690	1040	305	127	14	.00

CAL YR 1988 TOTAL 3773.80 MEAN 10.3 MAX 50 MIN .00 AC-FT 7490
WTR YR 1989 TOTAL 3706.59 MEAN 10.2 MAX 140 MIN .00 AC-FT 7350

e Estimated

YELLOWSTONE RIVER BASIN

06296003 ROSEBUD CREEK AT MOUTH, NEAR ROSEBUD, MT

LOCATION.--Lat 46°15'53", long 106°28'30", in SW1/4NW1/4NE1/4 sec.21, T.6 N., R.42 E., Rosebud County, Hydrologic Unit 10100003, on left bank 0.4 mi upstream from bridge on Interstate Highway 94, 0.8 mi upstream from mouth, and 1.6 mi southwest of Rosebud.

DRAINAGE AREA.--1,302 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1974 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 2,480 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 16-27, and Dec. 16 to Mar. 12. Water-discharge records poor. Diversions for irrigation of about 2,000 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--15 years, 35.9 ft^3/s, 26,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,620 ft^3/s, May 19, 1978, gage height, 6.78 ft, from rating curve extended above 1,500 ft^3/s; no flow many days in August and September 1984, August and September 1988.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 9	----	*a unknown	*b 4.48	Apr. 30	1045	2.71	2.68
Mar. 24	1345	201	2.35				

a-- backwater from ice.
b--from crest-stage gage.

Minimum discharge, 0.02 ft^3/s, Oct. 13,14.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.18	.51	1.8	e1.5	e3.0	e2.3	65	134	3.5	1.0	1.4	.17
2	.17	.53	1.7	e1.7	e2.0	e2.0	62	50	5.1	1.6	1.2	.15
3	.04	.51	1.9	e1.9	e1.0	e2.0	56	36	5.2	.94	1.6	.10
4	.03	.50	2.0	e2.0	e.90	e1.8	54	37	9.8	.77	.90	.10
5	.03	.43	2.1	e2.0	e1.0	e1.6	58	35	8.0	.62	.71	.10
6	.03	.42	2.3	e1.8	e1.0	e10	50	32	5.7	.51	1.1	.09
7	.03	.42	2.1	e1.6	e.95	e25	43	31	2.9	.53	1.1	.11
8	.04	.42	2.1	e1.2	e1.1	e100	36	30	4.7	.57	.88	.08
9	.03	.42	2.2	e1.4	e1.6	e280	32	21	4.4	1.1	.77	.07
10	.03	.53	2.2	e1.6	e2.0	e300	30	28	4.6	1.2	.72	.11
11	.03	.63	2.7	e1.7	e2.5	e250	22	28	6.3	.76	.64	.11
12	.04	.52	2.5	e2.0	e3.0	e200	18	22	13	.67	.62	.08
13	.02	.51	2.9	e2.3	e3.0	143	18	91	4.6	.70	.60	.08
14	.03	.44	2.8	e2.5	e2.7	101	15	79	2.5	.76	.67	.07
15	.05	.42	1.7	e2.8	e2.4	86	16	33	1.4	.82	.66	.07
16	.21	e.40	e1.5	e2.9	e2.0	96	21	26	2.1	3.0	.51	.07
17	.24	e.37	e2.0	e3.0	e2.0	87	23	25	2.3	1.8	.66	.06
18	.21	e.36	e2.5	e3.3	e1.8	71	23	25	2.5	2.5	.62	.05
19	.80	e.35	e2.7	e3.5	e2.0	60	23	22	2.5	1.8	.74	.08
20	.56	e.36	e2.6	e3.5	e2.5	45	21	24	1.8	1.7	.72	.10
21	.33	e.37	e2.6	e3.5	e3.0	35	18	24	2.1	1.2	.74	.11
22	.29	e.39	e2.5	e3.5	e3.0	44	9.9	22	2.8	2.4	.56	.10
23	.26	e.40	e2.5	e3.0	e3.3	79	3.5	18	3.5	1.8	.47	.10
24	.25	e.50	e2.3	e2.5	e3.3	159	3.0	12	2.9	2.9	.37	.17
25	.24	e.45	e2.0	e2.3	e3.0	113	7.9	9.4	2.7	1.1	.47	.13
26	2.1	e.40	e1.8	e2.5	e2.8	74	18	9.0	2.5	.81	.43	.10
27	.78	e.35	e1.6	e2.7	e2.5	74	43	11	2.5	2.4	.41	.10
28	.42	.47	e1.4	e3.0	e2.3	132	95	12	2.9	2.1	.36	.10
29	.42	.74	e1.5	e3.2	---	66	156	12	2.2	1.3	.33	.10
30	.42	2.1	e1.6	e3.5	---	53	246	9.0	2.2	1.3	.20	.10
31	.44	---	e1.8	e4.0	---	62	---	4.3	---	1.6	.15	---
TOTAL	8.75	15.22	65.9	77.9	61.65	2754.7	1286.3	951.7	119.2	42.26	21.31	2.96
MEAN	.28	.51	2.13	2.51	2.20	88.9	42.9	30.7	3.97	1.36	.69	.099
MAX	2.1	2.1	2.9	4.0	3.3	300	246	134	13	3.0	1.6	.17
MIN	.02	.35	1.4	1.2	.90	1.6	3.0	4.3	1.4	.51	.15	.05
AC-FT	17	30	131	155	122	5460	2550	1890	236	84	42	5.9

CAL YR 1988 TOTAL 2489.64 MEAN 6.80 MAX 45 MIN .00 AC-FT 4940
WTR YR 1989 TOTAL 5407.85 MEAN 14.8 MAX 300 MIN .02 AC-FT 10730

e Estimated

YELLOWSTONE RIVER BASIN

06296003 ROSEBUD CREEK AT MOUTH NEAR ROSEBUD, MT --Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975-86, November 1987 to July 1988.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1978 to September 1981, October 1982 to September 1983.
WATER TEMPERATURE: October 1978 to September 1979.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1979-81, 1983): Maximum daily, 2,890 microsiemens, Oct. 18, 1980; minimum daily, 332 microsiemens, Mar. 9, 1979.
WATER TEMPERATURE (water year 1979): Maximum daily, 27.5°C, Aug. 5, 1979; minimum daily, 0.0°C, on many days during winter.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
OCT										
12...	0820	0.05	--	--	3630	4.5	9.0	--	--	--
NOV										
14...	1225	0.43	--	--	862	0.0	1.5	--	--	--
DEC										
21...	0855	2.6	--	--	2880	-4.0	0.0	--	--	--
FEB										
14...	1220	2.7	--	--	2150	-7.0	0.0	--	--	--
MAR										
09...	0905	257	0	0	202	8.0	0.5	699	12.2	92
28...	0824	164	--	--	800	10.0	6.0	--	--	--
30...	0807	52	--	--	752	5.0	4.5	--	--	--
MAY										
03...	0815	35	100	51	1340	11.5	11.5	696	9.0	91
JUN										
13...	1057	3.8	--	--	1800	22.0	17.0	--	--	--
JUL										
26...	1005	0.81	0	0	2300	28.0	23.0	704	6.2	79
SEP										
12...	0755	0.09	0	0	3210	8.0	7.5	705	10.2	93

DATE	TIME	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
MAR									
09...	0905	8.2	51	0	11	5.7	23	1	6.5
MAY									
03...	0815	8.5	400	120	58	61	160	4	7.9
JUL									
26...	1005	8.4	590	180	55	110	380	7	14
SEP									
12...	0755	8.6	660	170	49	130	460	8	12

DATE	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, 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 TOTAL (MG/L AS N) (00630)
MAR									
09...	62	35	5.3	0.20	6.4	131	0.18	90.9	0.500
MAY									
03...	279	450	5.8	0.40	8.2	919	1.25	86.8	0.200
JUL									
26...	407	1100	14	0.70	1.2	1920	2.61	4.20	<0.100
SEP									
12...	491	1200	21	0.90	1.0	2170	2.95	0.53	<0.100

YELLOWSTONE RIVER BASIN

06296003 ROSEBUD CREEK AT MOUTH NEAR ROSEBUD, MT --Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
MAR 09...	0.360	1.4	1.8	0.310	40	440	985	683	98
MAY 03...	0.030	1.4	1.4	0.040	150	80	1240	117	99
JUL 26...	0.020	0.88	0.90	0.030	370	20	103	0.23	98
SEP 12...	0.020	0.68	0.70	0.030	560	20	79	0.02	78

DATE	TIME	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE) (01012)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)
MAR 09...	0905	1	<10	<0.5	<1	<1	29	1	33	11	28000
JUL 26...	1005	1	--	<10	--	<1	--	2	--	3	--

DATE	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	MERCURY DISSOLVED (UG/L AS HG) (71890)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
MAR 09...	15	<5	210	110	0.20	0.1	26	3	<1	100	46
JUL 26...	--	<1	--	20	--	<0.1	--	4	<1	--	<10

YELLOWSTONE RIVER BASIN

06306300 TONGUE RIVER AT STATE LINE, NEAR DECKER, MT

LOCATION.--Lat 45°00'32", long 106°50'08", in NW1/4NW1/4NE1/4 sec.33, T.9 S., R.40 E., Big Horn County, Hydrologic Unit 10090101, on left bank 1 mi north of Wyoming-Montana State line, 1.4 mi southeast of Decker, 1.6 mi upstream from Badger Creek, and at mile 200.9.

DRAINAGE AREA.--1,477 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1960 to current year. Records published as "near Decker" May 1928 to September 1938, not equivalent owing to intervening drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,429.14 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers).

REMARKS.--Estimated daily discharges: Nov. 16 to Mar. 28. Water-discharge records good except those for estimated daily discharges, which are poor. Flow regulated by many small reservoirs in Wyoming, combined capacity, about 15,000 acre-ft. Diversions for irrigation of about 64,300 acres upstream from station.

AVERAGE DISCHARGE.--29 years, 465 ft^3/s, 336,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,500 ft^3/s, May 12, 1978, gage height, 14.25 ft; minimum, 3.0 ft^3/s, Aug. 23, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 2,000 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 10	1800	ice jam	*4.47	No peak greater than base discharge this year.			
May 11	1830	*714	3.96				

Minimum daily discharge, 40 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	146	154	e140	e70	e60	e70	212	275	415	348	82	112
2	144	154	e150	e80	e50	e70	205	252	350	326	69	109
3	144	155	e130	e90	e40	e65	191	255	319	302	63	105
4	143	151	e150	e100	e45	e60	173	246	350	299	67	98
5	139	149	e160	e90	e60	e70	160	240	350	280	64	96
6	144	145	e150	e80	e70	e100	166	236	289	255	64	96
7	146	145	e100	e70	e80	e150	191	231	309	228	64	86
8	149	153	e80	e60	e70	e200	205	306	381	214	66	84
9	143	141	e90	e80	e80	e250	212	559	502	193	76	98
10	136	147	e100	e90	e75	e300	191	573	495	181	81	158
11	132	140	e100	e80	e90	e290	163	621	502	206	97	207
12	137	136	e130	e80	e100	e280	169	630	572	196	97	222
13	134	148	e140	e75	e100	e270	165	635	536	184	102	202
14	134	144	e90	e90	e92	e190	160	536	438	281	109	197
15	134	150	e80	e110	e90	e200	158	485	348	274	109	197
16	134	e150	e90	e150	e80	e150	168	524	338	268	101	196
17	183	e140	e120	e140	e75	e120	209	511	443	239	97	193
18	216	e140	e160	e140	e80	e90	227	514	503	212	103	184
19	180	e130	e120	e120	e90	e110	230	540	427	182	113	176
20	164	e110	e85	e110	e100	e130	226	582	388	146	151	178
21	164	e120	e85	e130	e95	e150	246	537	442	127	174	183
22	155	e140	e85	e110	e95	e180	284	499	521	115	165	182
23	148	e170	e80	e100	e110	e210	351	491	513	103	142	171
24	150	e130	e80	e80	e140	e230	385	511	477	99	130	173
25	148	e100	e70	e80	e120	e250	353	513	534	163	135	170
26	150	e75	e65	e90	e110	e350	336	429	517	145	124	160
27	152	e80	e70	e90	e90	e450	364	362	476	118	114	158
28	149	e90	e70	e100	e80	e350	355	321	440	104	119	154
29	146	e100	e80	e110	---	289	333	314	406	96	122	145
30	154	e110	e90	e160	---	255	293	398	352	84	121	147
31	158	---	e80	e100	---	230	---	480	---	84	116	---
TOTAL	4656	3997	3220	3055	2367	6109	7081	13606	12933	6052	3237	4637
MEAN	150	133	104	98.5	84.5	197	236	439	431	195	104	155
MAX	216	170	160	160	140	450	385	635	572	348	174	222
MIN	132	75	65	60	40	60	158	231	289	84	63	84
AC-FT	9240	7930	6390	6060	4690	12120	14050	26990	25650	12000	6420	9200

CAL YR 1988 TOTAL 114098 MEAN 312 MAX 2810 MIN 39 AC-FT 226300
WTR YR 1989 TOTAL 70950 MEAN 194 MAX 635 MIN 40 AC-FT 140700

e Estimated

06306300 TONGUE RIVER AT STATE LINE, NEAR DECKER, MT--Continued

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1965 to September 1976, November 1980 to December 1986.
WATER TEMPERATURE: October 1965 to September 1976.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1966-76, 1981-87): Maximum daily, 1,490 microsiemens, Aug. 12, 1966, Jan. 11, 1972; minimum daily, 192 microsiemens, June 7, 1976.
WATER TEMPERATURE (water years 1966-76): Maximum, 30.5°C, July 16, 1966; minimum, 0.0°C on many days during winter.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND	SPE-CIFIC CON-DUCT-ANCE (US/CM)	PH (STAND-ARD UNITS)	TEMPER-ATURE AIR (DEG C)	TEMPER-ATURE WATER (DEG C)	BARO-METRIC PRES-SURE (MM OF HG)	OXYGEN, DIS-SOLVED (MG/L)
OCT								
11...	1330	134	760	--	20.0	12.0	--	--
19...	1130	180	730	8.2	--	10.0	680	9.5
NOV								
15...	1310	152	760	--	.5	1.5	--	--
DEC								
27...	1415	69	915	--	-5.0	0.0	--	--
JAN								
10...	1440	89	885	8.1	.5	0.0	661	9.8
FEB								
14...	1340	94	775	--	2.0	0.0	--	--
APR								
03...	1700	188	950	8.6	11.5	8.5	669	12.2
04...	1345	175	910	--	11.5	7.0	--	--
MAY								
10...	1035	529	460	--	17.5	15.5	--	--
JUN								
06...	1800	305	425	8.7	--	22.0	666	9.3
21...	1040	429	395	--	13.0	15.0	--	--
JUL								
26...	1030	141	640	--	24.0	24.5	--	--
SEP								
06...	1540	96	790	--	19.0	20.5	--	--

DATE	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS-PHOROUS TOTAL (MG/L AS P)
OCT							
19...	95	92	<0.1	<0.01	--	0.5	0.05
JAN							
10...	78	K3	0.4	0.14	0.26	0.4	0.07
APR							
03...	119	K1	<0.1	0.02	0.68	0.7	0.05
JUN							
06...	122	<1	<0.1	0.03	0.37	0.4	0.04

DATE	TIME	HARD-NESS TOTAL (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SILICA, DIS-SOLVED (MG/L AS SIO2)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)
OCT									
19...	1130	--	--	--	--	--	--	<1	<100
JAN									
10...	1440	--	--	--	--	--	--	<1	52
APR									
03...	1700	410	78	53	45	1	5.3	<1	47
JUN									
06...	1800	200	42	23	18	0.6	4.6	<1	38

YELLOWSTONE RIVER BASIN

06306300 TONGUE RIVER AT STATE LINE, NEAR DECKER, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	BERYLLIUM, DISSOLVED (UG/L AS BE)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, DISSOLVED (UG/L AS CU)	IRON, DISSOLVED (UG/L AS FE)	LEAD, DISSOLVED (UG/L AS PB)	LITHIUM DISSOLVED (UG/L AS LI)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT 19...	--	<1	<1	--	--	<10	<5	--	--
JAN 10...	--	<1	<1	--	--	16	<5	--	--
APR 03...	<0.5	<1	<5	<3	<10	19	<10	27	49
JUN 06...	<0.5	<1	<5	<3	<10	25	<10	13	8

DATE	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, DISSOLVED (UG/L AS ZN)
OCT 19...	0.2	--	--	<1	<1.0	--	--	--
JAN 10...	0.3	--	--	<1	<1.0	--	--	--
APR 03...	0.3	<10	<10	<1	<1.0	680	<6	9
JUN 06...	<0.1	<10	<10	<1	<1.0	260	<6	12

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND	TEMPERATURE WATER (DEG C)	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
JUN 06...	1800	305	22.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
JUL 11...	0635	217	19.0	0.01	0.01	<0.01	<0.01	<0.01	<0.01

YELLOWSTONE RIVER BASIN

06307500 TONGUE RIVER AT TONGUE RIVER DAM, NEAR DECKER, MT

LOCATION.--Lat 45°08'29", long 106°46'15", in SW1/4SE1/4SE1/4 sec.12, T.8 S., R.40 E., Big Horn County, Hydrologic Unit 10090101, on left bank 0.5 mi downstream from Tongue River Dam, 4 mi upstream from Post Creek, 8 mi northeast of Decker, 16 mi southeast of Kirby, and at mile 188.4.

DRAINAGE AREA.--1,770 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1939 to current year.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,344.40 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation). Prior to Aug. 5, 1975, at datum 10.00 ft lower.

REMARKS.--Estimated daily discharges: Oct. 1-11, July 12 to Sept. 30. Water-discharge records good except those for estimated daily discharges, which are fair. Flow regulated by Tongue River Reservoir (station number 06307000) and many small reservoirs, combined capacity, about 15,000 acre-ft. Diversion for irrigation of about 64,800 acres upstream from station.

AVERAGE DISCHARGE.--50 years, 446 ft^3/s, 323,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,800 ft^3/s, May 20, 1978, gage height, 20.00 ft, from floodmark in gage well; no flow part of each day Nov. 12, 13, 1969, when gates at dam were closed.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 504 ft^3/s, May 16, gage height, 11.80 ft; maximum gage height, 12.31 ft, Aug. 13,14, backwater from algae; minimum daily discharge, 55 ft^3/s, Oct. 19,22.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e93	57	61	61	172	164	161	291	265	293	e330	e240
2	e93	58	61	61	172	164	162	220	265	294	e330	e240
3	e93	58	61	61	172	164	162	222	265	328	e330	e240
4	e93	58	61	59	172	164	162	223	265	379	e330	e240
5	e93	58	61	59	172	164	162	223	262	379	e330	e240
6	e93	58	61	59	172	164	313	223	262	379	e330	e240
7	e93	59	63	59	172	164	354	223	262	379	e330	e240
8	e93	59	62	59	172	167	355	224	262	378	e330	e240
9	e93	59	62	58	172	164	355	227	264	331	e330	e240
10	e93	60	62	58	172	165	353	228	265	375	e330	e240
11	e93	61	62	58	172	162	352	229	265	376	e330	e240
12	82	61	62	58	172	163	352	232	265	e375	e330	e240
13	79	61	63	58	172	163	366	388	266	e375	e330	e240
14	58	62	63	58	172	164	433	490	268	e400	e330	e240
15	57	61	62	58	172	163	433	490	268	e430	e330	e240
16	56	61	62	58	172	162	432	491	268	e430	e330	e240
17	57	61	62	58	172	161	429	490	307	e430	e330	e240
18	57	61	62	59	172	161	428	490	281	e430	e330	e240
19	55	61	62	59	169	161	279	490	281	e430	e330	e240
20	56	61	62	59	169	161	308	493	284	e430	e330	e240
21	56	61	62	91	167	160	347	427	289	e430	e330	e240
22	55	61	62	118	167	159	348	267	285	e430	e330	e240
23	56	61	62	121	167	160	344	268	286	e430	e330	e240
24	57	61	62	122	167	160	345	268	286	e430	e330	e240
25	57	61	62	123	167	160	345	268	286	e430	e330	e240
26	58	61	62	145	164	159	345	268	288	e387	e330	e240
27	57	61	61	172	164	159	345	269	288	e330	e330	e240
28	58	61	61	172	164	159	345	269	289	e330	e330	e240
29	57	61	61	172	---	160	344	268	291	e330	e330	e240
30	57	61	61	172	---	161	341	268	293	e330	e280	e240
31	57	---	61	172	---	161	---	266	---	e330	e240	---
TOTAL	2205	1805	1914	2757	4761	5023	9800	9693	8271	11808	10090	7200
MEAN	71.1	60.2	61.7	88.9	170	162	327	313	276	381	325	240
MAX	93	62	63	172	172	167	433	493	307	430	330	240
MIN	55	57	61	58	164	159	161	220	262	293	240	240
AC-FT	4370	3580	3800	5470	9440	9960	19440	19230	16410	23420	20010	14280

CAL YR 1988 TOTAL 106659 MEAN 291 MAX 2090 MIN 55 AC-FT 211600
WTR YR 1989 TOTAL 75327 MEAN 206 MAX 493 MIN 55 AC-FT 149400

e Estimated

YELLOWSTONE RIVER BASIN

06307500 TONGUE RIVER AT TONGUE RIVER DAM, NEAR DECKER, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1951, 1976 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1980 to December 1986.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily (water years 1981-82, 1984-87), 932 microsiemens, Mar. 12, 14, 1981; minimum daily, 230 microsiemens, July 1, 1983.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, IN CUBIC FEET PER SECOND (00060)	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)
OCT										
12...	0900	--	93	0	0	590	8.5	13.0	680	9.5
NOV										
15...	0915	--	62	0	0	650	-1.0	6.0	678	10.9
DEC										
28...	0910	--	61	0	0	735	-14.0	2.0	681	11.0
FEB										
14...	0910	--	172	0	0	761	-5.0	2.5	680	11.9
APR										
05...	0900	--	161	100	3	785	5.0	3.0	683	11.2
MAY										
10...	1400	--	226	30	1	692	23.0	13.0	665	10.0
JUN										
21...	1545	--	289	100	10	540	16.0	17.0	678	9.4
JUL										
26...	1500	--	375	50	1	470	30.5	22.0	664	8.1
SEP										
07...	1015	E240	--	--	0	570	15.0	19.5	675	9.2

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	PH (STANDARD UNITS) (00400)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
OCT										
12...	101	8.0	270	47	36	31	0.8	3.5	175	150
NOV										
15...	99	8.0	310	57	41	34	0.8	3.7	207	160
DEC										
28...	89	8.2	340	64	44	37	0.9	3.9	237	170
FEB										
14...	98	7.8	360	68	45	36	0.8	3.6	212	170
APR										
05...	93	7.8	360	69	45	36	0.8	3.8	254	180
MAY										
10...	109	8.2	310	60	40	35	0.9	3.6	207	180
JUN										
21...	110	8.3	230	47	28	25	0.7	2.9	171	120
JUL										
26...	107	8.4	220	45	25	21	0.6	2.6	160	96
SEP										
07...	114	8.6	260	49	33	30	0.8	3.7	182	150

06307500 TONGUE RIVER AT TONGUE RIVER DAM, NEAR DECKER, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)
OCT									
12...	2.8	0.20	9.0	385	0.52	96.6	<0.100	0.130	0.47
NOV									
15...	3.2	0.30	6.8	430	0.59	72.0	<0.100	0.120	0.68
DEC									
28...	3.6	0.30	7.1	472	0.64	77.8	0.100	0.170	0.83
FEB									
14...	2.9	0.20	7.5	460	0.63	214	<0.100	0.150	1.0
APR									
05...	3.6	0.20	7.9	498	0.68	216	0.300	0.110	0.39
MAY									
10...	3.5	0.20	4.8	451	0.61	275	<0.100	0.080	0.72
JUN									
21...	2.7	0.20	4.2	333	0.45	260	<0.100	0.030	0.27
JUL									
26...	2.1	0.20	3.2	291	0.40	295	<0.100	0.070	0.43
SEP									
07...	2.8	0.30	5.1	383	0.52	E248	<0.100	0.040	0.46

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	CARBON, ORGANIC DISSOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUSPENDED TOTAL (MG/L AS C) (00689)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT									
12...	0.60	0.020	--	--	90	<3	5	1.3	73
NOV									
15...	0.80	0.040	3.5	0.6	90	8	23	3.9	74
DEC									
28...	1.0	0.040	--	--	80	4	62	10	53
FEB									
14...	1.2	0.020	--	--	70	4	94	44	89
APR									
05...	0.50	0.040	--	--	90	9	20	8.7	74
MAY									
10...	0.80	0.040	5.4	9.0	80	13	48	29	90
JUN									
21...	0.30	0.050	3.9	0.2	70	10	12	9.4	97
JUL									
26...	0.50	0.080	3.9	0.5	60	9	9	9.1	51
SEP									
07...	0.50	0.030	--	--	80	5	16	E10	68

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE) (01012)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)
NOV												
15...	0915	--	1	--	<0.5	--	1	--	<1	--	3	--
JUL												
26...	1500	1	1	10	<0.5	<1	<1	1	<1	21	2	140

DATE	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	MERCURY DISSOLVED (UG/L AS HG) (71890)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, TOTAL (UG/L AS SE) (01147)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
NOV												
15...	--	<5	--	17	--	<0.1	--	1	--	<1	--	13
JUL												
26...	72	1	90	66	0.40	0.2	3	1	<1	<1	30	10

YELLOWSTONE RIVER BASIN

06307600 HANGING WOMAN CREEK NEAR BIRNEY, MT

LOCATION.--Lat 45°17'57", long 106°30'28", in N1/2NW1/4SE1/4 sec.19, T.6 S., R.43 E., Rosebud County, Hydrologic Unit 10090101, on right bank 0.5 mi downstream from bridge on Birney-Otter road, 1.2 mi south of Birney, 1.2 mi downstream from East Fork, and at mile 3.3.

DRAINAGE AREA.--470 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1973 to September 1984, October 1985 to current year.

REVISED RECORDS.--WDR MT-82-1: 1980 (M).

GAGE.--Water-stage recorder. Elevation of gage is 3,150 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 26-28, Dec. 7,8,14,15, and Dec. 20 to Mar. 24. Water-discharge records poor. Diversions for irrigation of about 1,240 acres upstream from station.

AVERAGE DISCHARGE.--15 years, 3.54 ft^3/s, 2,560 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,060 ft^3/s, May 19, 1978, gage height, 11.56 ft, from rating curve extended above 360 ft^3/s on basis of slope-area measurement of peak flow; no flow many days 1981, 1983, 1988, 1989.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 100 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 9	----	*ice jam	*3.28	No peak greater than base discharge.			

No flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.25	e.25	e.15	e.28	.60	.44	.53	.08	.00	.00
2	.00	.00	.21	e.30	e.12	e.28	.63	.40	.30	.04	.00	.00
3	.00	.00	.21	e.30	e.10	e.27	.60	.49	.30	.01	.00	.00
4	.00	.00	.21	e.35	e.15	e.25	.59	.51	.38	.01	.00	.00
5	.00	.00	.21	e.30	e.20	e.25	.73	.48	.33	.00	.00	.00
6	.00	.00	.20	e.30	e.30	e1.0	.73	.40	.27	.00	.00	.00
7	.00	.08	e.19	e.25	e.40	e3.0	.59	.39	.25	.00	.00	.00
8	.00	.20	e.17	e.17	e.35	e5.5	.59	.71	.34	.00	.00	.00
9	.00	.02	.23	e.35	e.30	e7.0	.58	.64	.27	.00	.00	.00
10	.00	.01	.25	e.40	e.40	e10	.56	.43	.15	.00	.00	.00
11	.00	.02	.25	e.35	e.40	e5.0	.49	.41	.12	.00	.00	.00
12	.00	.08	.33	e.30	e.40	e2.5	.47	.55	.14	.00	.00	.00
13	.00	.08	.30	e.30	e.45	e1.8	.48	.80	.16	.49	.00	.00
14	.00	.12	e.20	e.35	e.40	e1.4	.42	.55	.17	.14	.00	.00
15	.00	.15	e.19	e.25	e.37	e1.2	.42	.46	.19	.13	.00	.00
16	.00	.11	.24	e.40	e.30	e1.1	.41	.78	.13	.08	.00	.00
17	.00	.12	.26	e.45	e.25	e.90	.45	1.1	.11	.04	.00	.00
18	.00	.16	.28	e.40	e.30	e.80	.39	.59	.16	.08	.00	.00
19	.00	.15	.29	e.40	e.35	e.90	.40	.46	.11	.03	.00	.00
20	.00	.13	e.28	e.35	e.45	e.90	.33	.39	.10	.01	.00	.00
21	.00	.13	e.28	e.35	e.60	e.85	.37	.42	.42	.00	.00	.00
22	.00	.14	e.28	e.40	e.55	e.95	.33	.38	.53	.00	.00	.00
23	.00	.15	e.28	e.40	e.70	e.90	.24	.38	.90	.00	.00	.00
24	.00	.20	e.27	e.35	e1.0	e1.0	.27	.41	.56	.00	.00	.00
25	.00	.22	e.25	e.25	e.70	1.1	.37	.31	.47	.00	.00	.00
26	.00	e.17	e.22	e.35	e.50	1.1	.40	.33	.39	.00	.00	.00
27	.00	e.15	e.24	e.40	e.40	1.3	.57	.31	.33	.00	.00	.00
28	.00	e.16	e.22	e.40	e.30	.89	.79	.31	.30	.00	.00	.00
29	.00	.19	e.25	e.45	---	.72	.60	.35	.21	.00	.00	.00
30	.00	.26	e.30	e.50	---	.60	.48	.39	.13	.00	.00	.00
31	.00	---	e.27	e.40	---	.61	---	.33	---	.00	.00	---
TOTAL	0.00	3.20	7.61	10.77	10.89	54.35	14.88	14.90	8.75	1.14	0.00	0.00
MEAN	.000	.11	.25	.35	.39	1.75	.50	.48	.29	.037	.000	.000
MAX	.00	.26	.33	.50	1.0	10	.79	1.1	.90	.49	.00	.00
MIN	.00	.00	.17	.17	.10	.25	.24	.31	.10	.00	.00	.00
AC-FT	.00	6.3	15	21	22	108	30	30	17	2.3	.00	.00

CAL YR 1988 TOTAL 753.17 MEAN 2.06 MAX 156 MIN .00 AC-FT 1490
WTR YR 1989 TOTAL 126.49 MEAN .35 MAX 10 MIN .00 AC-FT 251

e Estimated

06307600 HANGING WOMAN CREEK NEAR BIRNEY, MT--Continued

WATER-QUALITY RECORDS

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

REMARKS.--Some scheduled sampling was not possible as there were periods of no streamflow.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1980 to July 1983, October 1985 to September 1987.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1981-83, 1986-87): Maximum daily, 3,780 microsiemens, July 3, 1986; minimum daily, 263 microsiemens, Feb. 27, 1986.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)
NOV										
16...	0920	0.10	0	0	1820	-3.5	1.5	681	10.6	85
DEC										
28...	1205	0.22	--	--	2700	-7.5	0.0	--	--	--
FEB										
15...	0915	0.36	--	--	2430	--	0.0	--	--	--
MAR										
08...	1535	5.4	--	--	1100	10.0	0.0	--	--	--
10...	1105	9.7	--	--	1350	11.0	0.0	--	--	--
27...	1400	1.2	--	--	2130	--	6.0	--	--	--
APR										
05...	1220	0.67	100	62	2450	5.0	6.0	686	10.6	95
MAY										
09...	1535	0.57	--	--	2630	18.5	20.5	--	--	--
JUN										
22...	1230	0.49	70	1	2730	23.0	19.5	680	10.3	127

DATE	TIME	PH (STANDARD UNITS) (00400)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)
NOV									
16...	0920	8.2	640	90	100	260	4	13	602
APR									
05...	1220	8.3	670	88	110	340	6	13	476
JUN									
22...	1230	8.3	680	75	120	400	7	17	537

DATE	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)
NOV									
16...	600	9.8	1.4	22	1460	1.98	0.39	<0.100	0.020
APR									
05...	980	12	0.80	12	1840	2.50	3.33	<0.100	0.030
JUN									
22...	1100	10	1.3	11	2060	2.80	2.72	0.200	0.030

YELLOWSTONE RIVER BASIN

06307600 HANGING WOMAN CREEK NEAR BIRNEY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV 16...	0.68	0.70	0.050	310	30	62	0.02	81
APR 05...	0.77	0.80	0.030	270	20	72	0.13	85
JUN 22...	0.37	0.40	0.040	320	20	66	0.09	89

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE) (01012)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)
JUN 22...	1230	2	2	<10	<10	<1	<1	<1	1	8	2	250

DATE	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, TOTAL (UG/L AS SE) (01147)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
JUN 22...	4	<1	60	30	0.10	12	2	<1	<1	<10	20

YELLOWSTONE RIVER BASIN

06307616 TONGUE RIVER AT BIRNEY DAY SCHOOL BRIDGE, NEAR BIRNEY, MT

LOCATION.--Lat 45°24'42", long 106°27'26", in SE1/4SW1/4SW1/4 sec.8, T.5 S., R.43 E., Rosebud County, Hydrologic Unit 10090102, on left bank, 60 ft upstream from Bureau of Indian Affairs bridge, 0.2 mi east of Birney Day School, 5.5 mi downstream from Cook Creek, 6.5 mi northeast of Birney, and at mile 144.3.

DRAINAGE AREA.--2,621 mi^2.

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Elevation of gage is 3,060 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 14 to Mar. 25. Water-discharge records good except those for estimated daily discharges, which are poor. Flow regulated by Tongue River Reservoir (station number 06307000), and many small reservoirs in Wyoming (combined capacity, about 15,000 acre-ft. Numerous diversions for irrigation upstream from station.

AVERAGE DISCARGE.--10 years, 362 ft^3/s, 262,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,520 ft^3/s, June 14, 1984, gage height, 6.43 ft, from rating curve extended above 2,700 ft^3/s; minimum daily, 28 ft^3/s, Apr. 6-11, 1987.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 502 ft^3/s, May 17, gage height, 2.24 ft; maximum gage height, 3.03 ft. Mar. 9, backwater from ice; minimum daily discharge, 30 ft^3/s, Jan. 8.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	102	69	e80	e50	e150	e120	177	343	242	270	316	220
2	103	69	e70	e60	e90	e120	176	290	250	262	309	217
3	103	70	e70	e65	e80	e130	176	240	236	266	311	226
4	102	70	e80	e80	e90	e100	174	238	240	307	312	223
5	102	69	e70	e70	e120	e120	175	236	241	336	320	222
6	103	69	e75	e70	e150	e150	179	231	240	333	321	220
7	103	69	e65	e45	e160	e200	324	229	240	333	325	218
8	103	68	e60	e30	e130	e250	354	239	249	328	318	219
9	102	69	e65	e35	e140	e300	355	234	245	331	319	224
10	102	70	e65	e40	e160	e350	355	230	246	304	329	221
11	103	71	e70	e55	e150	e300	355	231	251	332	324	220
12	103	71	e75	e50	e170	e250	354	238	248	328	315	220
13	101	71	e80	e55	e150	e200	355	243	251	353	322	221
14	98	e70	e70	e60	e140	e170	379	396	252	354	323	223
15	74	e68	e55	e55	e130	e170	423	458	252	398	311	226
16	74	e60	e60	e70	e120	e150	423	464	255	420	303	226
17	76	e55	e70	e110	e110	e160	426	474	268	418	301	225
18	77	e60	e85	e80	e130	e180	420	459	289	412	306	226
19	71	e55	e70	e90	e160	e190	420	459	282	408	315	226
20	71	e60	e60	e80	e180	e180	287	455	279	407	319	229
21	69	e65	e60	e90	e160	e250	309	455	301	410	320	230
22	69	e70	e70	e130	e150	e300	345	371	286	415	311	228
23	69	e80	e60	e150	e180	e350	345	253	280	410	300	229
24	68	e70	e60	e100	e210	e400	343	252	280	418	296	227
25	68	e60	e50	e90	e190	e350	346	244	275	410	302	227
26	68	e55	e45	e110	e170	297	348	244	279	410	301	227
27	69	e50	e45	e110	e170	216	353	241	284	362	300	228
28	68	e55	e35	e150	e150	186	358	244	288	333	309	230
29	68	e60	e40	e200	---	183	347	241	288	319	313	229
30	69	e70	e50	e250	---	180	343	236	275	312	312	227
31	69	---	e60	e200	---	178	---	241	---	315	259	---
TOTAL	2627	1968	1970	2830	4090	6680	9724	9409	7892	11014	9642	6734
MEAN	84.7	65.6	63.5	91.3	146	215	324	304	263	355	311	224
MAX	103	80	85	250	210	400	426	474	301	420	329	230
MIN	68	50	35	30	80	100	174	229	236	262	259	217
AC-FT	5210	3900	3910	5610	8110	13250	19290	18660	15650	21850	19120	13360

CAL YR 1988 TOTAL 104512 MEAN 286 MAX 2090 MIN 35 AC-FT 207300
WTR YR 1989 TOTAL 74580 MEAN 204 MAX 474 MIN 30 AC-FT 147900

e Estimated

YELLOWSTONE RIVER BASIN

06307616 TONGUE RIVER AT BIRNEY DAY SCHOOL BRIDGE, NEAR BIRNEY, MT--Continued

WATER-QUALITY RECORD

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH LAB (STAND-ARD UNITS) (00403)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)
OCT									
12...	1345	103	--	--	670	28.0	14.5	--	--
NOV									
16...	1145	63	50	1	738	2.5	0.5	8.2	310
APR									
05...	1450	169	100	62	809	6.0	5.5	8.3	360
MAY									
09...	1400	232	--	--	720	19.0	18.0	--	--
JUN									
22...	1515	285	70	1	540	20.5	18.5	7.9	230
JUL									
25...	1430	412	--	--	470	32.0	26.5	--	--
SEP									
07...	1430	219	50	1	580	21.0	19.0	8.4	250

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)	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)
NOV									
16...	83	55	42	42	1	4.1	228	170	3.4
APR									
05...	120	66	47	43	1	4.0	237	200	3.5
JUN									
22...	61	46	29	27	0.8	3.0	174	130	2.6
SEP									
07...	74	45	34	33	0.9	3.7	179	150	2.7

DATE	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, 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)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)
NOV								
16...	0.30	5.7	459	0.62	78.1	<0.100	90	12
APR								
05...	0.20	2.6	509	0.69	232	<0.100	90	6
JUN								
22...	0.20	1.2	343	0.47	264	<0.100	60	14
SEP								
07...	0.30	4.3	380	0.52	225	<0.100	90	15

DATE	TIME	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)
APR								
05...	1450	1	<1	<1	<5	18	<0.1	<1

YELLOWSTONE RIVER BASIN

06307740 OTTER CREEK AT ASHLAND, MT

LOCATION.--Lat 45°35'18", long 106°15'17", in NE1/4NE1/4SE1/4 sec. 11, T.3 S., R.44 E., Rosebud County, Hydrologic Unit 10090102, on left bank 200 ft downstream from bridge on U.S. Highway 212, 0.3 mi southeast of Ashland, and at mile 2.7.

DRAINAGE AREA.--707 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1972 to November 1985, October 1987 to current year.

GAGE.--Water-stage recorder. Datum of gage is 2,916.57 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Dec. 20,21, Jan. 8-15, Feb. 1-10, Mar. 1-5. Water-discharge records poor. Diversion for irrigation of about 4,200 acres upstream from station.

AVERAGE DISCHARGE.--15 years, 5.62 ft^3/s, 4,070 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 425 ft^3/s, Mar. 21, 1978, gage height, 8.65 ft, backwater from beaver dam; no flow on many days in 1977, 1982, 1984, 1985, 1989.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)
Nov. 24	0600	3.2	a*4.11
Mar. 12	0730	*6.3	a4.09

No peaks greater than base discharge this year.

a--backwater from beaver dam.

No flow many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.40	.79	.82	.82	e.70	e.72	2.8	1.7	1.2	.61	.22	.00
2	.40	.78	.82	.82	e.50	e.65	2.6	1.7	1.2	.61	.18	.00
3	.40	.86	.82	.82	e.40	e.55	2.3	1.7	1.3	.53	.18	.00
4	.40	.78	.82	.82	e.45	e.50	2.0	1.7	1.2	.50	.16	.00
5	.50	.67	.82	.82	e.50	e.60	2.0	1.7	1.1	.45	.08	.00
6	.50	.61	.82	.82	e.60	.71	2.1	1.7	1.1	.40	.08	.00
7	.50	.58	.76	.82	e.70	.75	2.1	1.7	1.1	.40	.08	.00
8	.50	.61	.71	e.70	e.65	.93	1.8	1.7	1.0	.40	.08	.00
9	.50	.67	.71	e.75	e.70	.90	1.7	1.7	1.0	.36	.02	.00
10	.50	.71	.71	e.80	e.75	.76	1.7	1.7	1.0	.34	.00	.00
11	.50	.71	.71	e.80	.82	1.1	1.7	1.7	1.0	.29	.00	.00
12	.50	.63	.71	e.80	.82	5.3	1.7	1.8	1.0	.29	.00	.00
13	.50	.61	.71	e.80	.82	3.8	1.7	1.9	.94	.36	.00	.00
14	.50	.69	.71	e.80	.82	2.5	1.6	1.9	.93	.40	.00	.00
15	.54	.71	.71	e.85	.82	2.2	1.6	1.8	.89	.40	.00	.00
16	.65	.71	.71	.93	.82	2.1	1.7	1.7	.82	.48	.00	.00
17	.95	.71	.71	.93	.82	2.1	1.6	1.6	.82	.50	.00	.00
18	1.1	.71	.82	.93	.82	2.1	1.6	1.6	.77	.60	.00	.00
19	1.1	.71	.82	.93	.82	2.1	1.6	1.5	.68	1.1	.00	.03
20	.96	.71	e.80	.93	.82	2.2	1.6	1.8	.61	1.1	.00	.01
21	.75	.71	e.80	.93	.82	2.3	1.6	1.7	.69	1.1	.00	.01
22	.65	.71	.82	.98	.82	2.5	1.6	1.5	.78	.98	.00	.01
23	.61	.71	.82	.93	.92	2.6	1.6	1.5	.83	.87	.00	.01
24	.61	2.3	.82	.90	1.0	2.6	1.6	1.4	.93	.78	.00	.01
25	.61	1.1	.82	.82	.99	2.4	1.6	1.3	.93	.67	.00	.02
26	.53	.71	.82	.82	.82	2.5	1.6	1.3	.93	.61	.00	.03
27	.54	.76	.82	.82	.82	2.8	1.7	1.3	.93	.54	.00	.01
28	.61	.75	.82	.82	.82	4.0	1.8	1.3	.84	.48	.00	.01
29	.61	.82	.82	.82	---	3.9	1.7	1.3	.75	.40	.00	.01
30	.65	.82	.82	.86	---	3.5	1.7	1.2	.61	.35	.00	.01
31	.78	---	.82	.87	---	3.1	---	1.3	---	.29	.00	---
TOTAL	18.85	23.35	24.22	26.26	21.16	64.77	54.0	49.4	27.88	17.19	1.08	0.17
MEAN	.61	.78	.78	.85	.76	2.09	1.80	1.59	.93	.55	.035	.006
MAX	1.1	2.3	.82	.98	1.0	5.3	2.8	1.9	1.3	1.1	.22	.03
MIN	.40	.58	.71	.70	.40	.50	1.6	1.2	.61	.29	.00	.00
AC-FT	37	46	48	52	42	128	107	98	55	34	2.1	.3

CAL YR 1988 TOTAL 451.19 MEAN 1.23 MAX 8.6 MIN .01 AC-FT 895
WTR YR 1989 TOTAL 328.33 MEAN .90 MAX 5.3 MIN .00 AC-FT 651

e Estimated

YELLOWSTONE RIVER BASIN

06307740 OTTER CREEK AT ASHLAND, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975-85, 1988 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1980 to August 1985.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1981-85): Maximum daily, 3,850 microsiemens, Dec. 3, 1983; minimum daily, 942 microsiemens, Feb. 19, 1982.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)
OCT										
13...	0750	0.55	--	--	2330	2.5	9.5	--	--	--
NOV										
16...	1445	0.70	50	1	2500	5.5	2.0	687	12.0	97
DEC										
28...	1520	0.84	--	--	2900	-10.0	0.0	--	--	--
FEB										
15...	1300	0.78	--	--	2650	0.0	0.0	--	--	--
APR										
10...	1045	1.7	0	0	2640	2.0	4.5	697	11.0	94
MAY										
09...	1200	1.8	--	--	2970	18.0	18.0	--	--	--
JUN										
30...	1400	0.60	--	0	2720	37.0	29.0	679	6.3	93
AUG										
08...	1400	0.04	20	1	2900	32.0	24.5	665	8.5	118
SEP										
29...	1250	0.03	--	--	3420	--	18.0	--	--	--

DATE	TIME	PH (STANDARD UNITS) (00400)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)
NOV									
16...	1445	8.4	700	65	130	350	6	20	563
APR									
10...	1045	8.4	720	75	130	360	6	16	460
JUN									
30...	1400	8.3	760	73	140	390	6	21	567
AUG									
08...	1400	8.6	770	59	150	440	7	25	610

DATE	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)
NOV									
16...	920	10	0.80	6.8	1840	2.50	3.48	<0.100	0.030
APR									
10...	1100	9.0	0.70	5.3	1970	2.68	9.05	<0.100	0.030
JUN									
30...	1000	13	0.90	8.8	1990	2.70	3.22	<0.100	0.020
AUG									
08...	1100	9.6	1.0	15	2170	2.95	0.23	<0.100	0.050

YELLOWSTONE RIVER BASIN

06307740 OTTER CREEK AT ASHLAND, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	BORON, DISSOLVED (UG/L AS B) (01020)	IRON, DISSOLVED (UG/L AS FE) (01046)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV 16...	0.57	0.60	0.010	550	10	23	0.04	72
APR 10...	0.87	0.90	0.030	430	20	65	0.30	70
JUN 30...	0.68	0.70	0.040	610	20	161	0.26	83
AUG 08...	1.0	1.1	0.090	710	20	111	0.01	94

DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BERYLLIUM, TOTAL RECOVERABLE (UG/L AS BE) (01012)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR) (01034)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)
JUN 30...	1400	2	2	<10	<10	1	<1	3	<1	13	1	2100
AUG 08...	1400	--	5	--	<10	--	<1	--	<1	--	<1	--

DATE	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY TOTAL RECOVERABLE (UG/L AS HG) (71900)	MERCURY DISSOLVED (UG/L AS HG) (71890)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI) (01067)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, TOTAL (UG/L AS SE) (01147)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)
JUN 30...	3	<1	160	40	0.10	0.2	11	2	<1	<1	20	<10
AUG 08...	--	<1	--	20	--	0.2	--	<1	--	<1	--	<10

YELLOWSTONE RIVER BASIN

06308500 TONGUE RIVER AT MILES CITY, MT
(National stream quality accounting network station)

LOCATION.--Lat 46°20'44", long 105°48'10", in NE1/4NE1/4SE1/4 sec.23, T.7 N., R.47 E., Custer County, Hydrologic Unit 10090102, on right bank 4 mi south of Miles City and at mile 8.1.

DRAINAGE AREA.--5,379 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1938 to April 1942, April 1946 to current year. Published as "near Miles City" April 1938 to April 1942. Not equivalent to records published as "near Miles City" May 1929 to October 1932. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,375.76 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). April 1938 to April 1942, nonrecording gage at site 8 mi upstream at different datum. April 1946 to Sept. 30, 1963, at datum 1.00 ft higher.

REMARKS.--Estimated daily discharges: Nov. 16 to Mar. 25. Water-discharge records good except those for estimated daily discharges and Aug. 7-29, which are poor. Flow regulation by Tongue River Reservoir (station 06307000), and many small reservoirs in Wyoming (combined capacity about 15,000 acre-ft). Diversions for irrigation of about 100,800 acres upstream from station. U. S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--46 years (1938-41, 1946-89), 422 ft^3/s, 305,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,300 ft^3/s, June 15, 1962, gage height, 12.33 ft, present datum, from rating curve extended above 8,220 ft^3/s on basis of float measurement; maximum gage height, 13.27 ft, Mar. 19, 1960, Feb. 15, 1971, ice jam, present datum; no flow July 9-19, Aug. 13, 14, Sept. 28, 1940.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,900 ft^3/s, Mar. 27, gage height, 4.67 ft; maximum gage height, 7.74 ft, Mar. 10, backwater from ice; minimum daily discharge, 13 ft^3/s, July 12,13.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	78	e90	e50	e100	e70	310	1460	121	56	61	75
2	34	75	e80	e55	e60	e70	293	1070	104	46	53	67
3	33	74	e70	e60	e50	e70	279	744	70	31	59	48
4	32	72	e80	e62	e60	e60	264	647	64	25	66	32
5	32	72	e100	e58	e90	e70	256	498	61	18	47	29
6	32	72	e80	e58	e130	e100	255	402	62	15	62	31
7	32	70	e70	e50	e130	e130	246	360	61	14	54	32
8	31	66	e60	e40	e110	e200	241	336	50	23	55	31
9	31	66	e65	e42	e130	e350	237	327	38	33	54	31
10	31	68	e65	e47	e150	e600	350	315	32	22	63	30
11	31	70	e75	e50	e160	e800	377	312	76	14	56	36
12	31	68	e90	e54	e170	e900	389	380	118	13	43	70
13	31	66	e100	e58	e160	e860	375	678	75	13	51	75
14	31	64	e80	e62	e150	e750	365	485	63	16	72	66
15	31	63	e50	e60	e150	e500	372	373	66	102	67	69
16	36	e50	e60	e70	e140	e300	368	278	72	127	64	84
17	52	e20	e80	e90	e130	e330	428	422	94	95	59	85
18	42	e25	e100	e70	e140	e350	439	425	94	83	86	95
19	38	e35	e90	e75	e150	e370	443	445	78	92	75	98
20	72	e60	e70	e67	e170	e370	449	428	78	85	73	94
21	75	e100	e70	e70	e160	e380	442	414	80	87	75	87
22	66	e115	e75	e73	e150	e400	420	418	94	118	79	80
23	64	e80	e64	e80	e170	e450	325	418	97	124	71	81
24	64	e60	e64	e100	e190	e560	329	403	107	119	71	87
25	64	e45	e60	e120	e180	e700	352	304	112	117	62	84
26	64	e30	e50	e140	e150	750	367	257	95	104	58	88
27	80	e22	e42	e160	e120	1230	456	233	94	105	59	83
28	75	e30	e35	e150	e100	1080	583	217	81	157	71	76
29	87	e40	e45	e180	---	500	861	224	78	109	78	75
30	80	e70	e56	e200	---	399	1450	246	70	84	71	82
31	78	---	e60	e160	---	334	---	182	---	66	65	---
TOTAL	1514	1826	2176	2611	3750	14033	12321	13701	2385	2113	1980	2001
MEAN	48.8	60.9	70.2	84.2	134	453	411	442	79.5	68.2	63.9	66.7
MAX	87	115	100	200	190	1230	1450	1460	121	157	86	98
MIN	31	20	35	40	50	60	237	182	32	13	43	29
AC-FT	3000	3620	4320	5180	7440	27830	24440	27180	4730	4190	3930	3970

CAL YR 1988 TOTAL 69390 MEAN 190 MAX 1610 MIN 19 AC-FT 137600
WTR YR 1989 TOTAL 60411 MEAN 166 MAX 1460 MIN 13 AC-FT 119800

e Estimated

06308500 TONGUE RIVER AT MILES CITY, MT--Continued
(National stream quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1946 to current year. October 1977 to December 1985 samples collected at private ranch bridge 11 mi upstream from gaging station.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1965 to September 1981.
WATER TEMPERATURE: April 1949 to September 1983.
SUSPENDED-SEDIMENT DISCHARGE: April 1946 to September 1951. October 1977 to December 1985.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1965-81): Maximum daily, 1,520 microsiemens, May 24, 1981; minimum daily, 215 microsiemens, Feb. 16, 1971.
WATER TEMPERATURE (water years 1949-83): Maximum recorded, 31.0°C July 14, 1983; minimum 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATION (water years 1946-51, 1977-85): Maximum daily mean, 18,900 mg/L, Aug. 13, 1946; minimum daily mean, 1 mg/L, Aug. 14, 15, 1947.
SEDIMENT LOAD (water years 1946-51, 1977-85): Maximum daily, 122,000 tons, June 5, 1948; minimum daily, <0.1 ton on many days in August and September 1949.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)
OCT 04...	1240	32	--	--	790	12.0	7.5	--
NOV 17...	1050	16	50	1	1100	-5.0	0.0	699
DEC 29...	1030	45	--	--	1310	-15.0	0.0	--
FEB 16...	1400	130	100	2	960	-15.0	0.0	721
APR 13...	0900	376	--	--	1120	14.5	9.5	--
MAY 18...	0845	407	60	1	710	23.0	17.0	694
JUN 27...	1340	98	--	--	668	27.0	25.0	--
JUL 06...	1250	14	--	--	1020	26.5	26.5	--
AUG 07...	1225	50	0	0	692	27.0	22.0	707
SEP 26...	1330	90	--	--	920	15.0	11.0	--

DATE	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
NOV 17...	13.2	99	K4	31	361	0	289
FEB 16...	11.0	80	K3	29	303	0	242
MAY 18...	8.6	98	K340	2800	--	--	--
AUG 07...	8.0	99	27	K11	265	5	226

DATE	TIME	PH (STANDARD UNITS) (00400)	TURBIDITY (NTU) (00076)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)
NOV 17...	1050	8.1	17	410	130	73	56	110	2	5.6
FEB 16...	1400	7.7	6.1	430	190	80	55	64	1	4.8
MAY 18...	0845	8.1	120	310	86	56	40	55	1	4.9
AUG 07...	1225	8.5	11	280	57	52	37	68	2	4.7

YELLOWSTONE RIVER BASIN

06308500 TONGUE RIVER AT MILES CITY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)
NOV 17...	302	310	5.6	0.30	11	747	747	1.02	32.3	<0.010
FEB 16...	291	240	4.3	0.30	8.9	647	605	0.88	227	<0.010
MAY 18...	220	210	3.5	0.30	2.4	510	505	0.69	560	<0.010
AUG 07...	224	190	3.7	0.30	8.5	497	501	0.68	67.1	0.020

DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)
NOV 17...	0.240	0.030	0.040	0.30	0.010	0.010	<0.010	<10	1	60
FEB 16...	0.280	0.020	0.010	0.40	0.010	<0.010	<0.010	<10	<1	63
MAY 18...	<0.100	0.030	0.040	<0.20	0.020	0.010	<0.010	20	1	77
AUG 07...	0.110	0.040	0.050	0.40	0.020	<0.010	<0.010	70	2	62

DATE	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)
NOV 17...	<0.5	<1	<1	<3	2	7	<5	32	24	<0.1
FEB 16...	<0.5	1	<1	<3	3	9	<5	32	7	<0.1
MAY 18...	<0.5	<1	<1	<3	3	19	1	24	3	<0.1
AUG 07...	<0.5	<1	1	<3	7	38	5	26	25	0.1

DATE	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV 17...	<10	4	<1	<1.0	800	<6	5	41	1.8	94
FEB 16...	<10	4	<1	1.0	750	<6	16	157	55	67
MAY 18...	<10	2	<1	<1.0	620	<6	12	365	401	93
AUG 07...	<10	5	<1	<1.0	590	<6	38	60	8.1	97

YELLOWSTONE RIVER BASIN

06309000 YELLOWSTONE RIVER AT MILES CITY, MT

LOCATION.--Lat 46°25'18", long 105°51'38", in NE1/4SW1/4NW1/4 sec.28, T.8 N., R.47 E., Custer County, Hydrologic Unit 10100001, on left bank at upstream side of bridge on State Highway 22 at Miles City, 0.8 mi downstream from Tongue River, and at mile 184.2.

DRAINAGE AREA.--48,253 mi^2.

PERIOD OF RECORD.--September 1922 to September 1923, August 1928 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,333.3 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to May 6, 1929, nonrecording gages at pumping plant 1.2 mi downstream at different datums. May 6, 1929, to Sept. 30, 1931, nonrecording gage, and Oct. 1, 1931, to Nov. 10, 1937, water-stage recorder 300 ft upstream from present site at same datum. Nov. 11, 1937, to Sept. 30, 1946, water-stage recorder at pumping plant 1.2 mi downstream at different datum. Oct. 1, 1946, to Mar. 15, 1979, water-stage recorder at site 300 ft upstream at present datum. Mar. 16, 1979, to Sept. 21, 1979, nonrecording gage at present site and datum. Sept. 22, 1979, recording gage established at same site and datum.

REMARKS.--Estimated daily discharges: Dec. 21 to Mar. 26. Records good except those for estimated daily discharges, which are poor. Some regulation by reservoirs on tributary streams. Diversions for irrigation of about 1,100,000 acres upstream from station (does not include flood irrigation). Several observations of water temperature and specific conductance were obtained during the year. U.S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--62 years (1922-23, 1928-89), 11,450 ft^3/s, 8,296,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 102,000 ft^3/s, May 22, 1978, gage height, 16.50 ft, result of discharge measurement; maximum gage height, 21.7 ft, Mar. 20, 1944 (ice jam, from floodmark, at site 300 ft upstream at present datum); minimum discharge, 996 ft^3/s, Dec. 14, 1932.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 36,600 ft^3/s, June 19, gage height, 9.10 ft; maximum gage height, 13.06 ft, Mar. 11, backwater from ice; minimum daily discharge, 1,800 ft^3/s, Feb. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4320	4290	4830	e4400	e4500	e4200	7790	15100	18800	18200	8640	6230
2	4240	4320	4990	e4300	e3100	e3900	7310	13200	18500	18500	8140	6050
3	4220	4340	5030	e4600	e2100	e3200	6960	11600	17500	18900	7570	5840
4	4170	4340	5030	e4800	e1800	e2700	6550	10700	18000	18300	7380	5720
5	4220	4500	4980	e4500	e2200	e2600	6380	10900	20200	17400	7290	5660
6	4250	4470	4930	e4100	e2900	e2600	6280	11300	20800	16700	7300	5530
7	4190	4490	4940	e3600	e3500	e3300	6180	11200	19100	16200	7070	5340
8	4430	4460	4950	e3200	e4300	e4000	6000	10900	21100	15500	6700	5210
9	4190	4500	4980	e2700	e4700	e5000	6030	13000	25400	14500	6280	5150
10	4000	4510	4880	e3000	e4700	e6000	6530	18700	28300	13600	5980	5340
11	3960	4570	4950	e3400	e4500	e8500	7070	23600	29800	13400	5900	5510
12	3940	4620	5100	e3900	e4500	e11000	7030	24900	30500	13500	5850	5840
13	3920	4610	5110	e4400	e4500	e13000	6660	28900	31400	13700	5800	6080
14	3920	4640	5050	e4800	e4600	e15000	6370	30000	28200	13400	5970	6100
15	3900	4670	4920	e5000	e4600	e13000	6310	26400	25800	14000	6110	6010
16	3940	4810	5060	e4900	e4400	e11000	6350	22100	26100	15300	6090	5880
17	4140	4800	4700	e5600	e4100	e8500	6570	20400	26200	14500	5820	5790
18	4220	4850	4810	e5200	e3600	e5600	7140	20600	31000	13600	5600	5630
19	4380	4880	4680	e5000	e3300	e4400	7860	20700	35700	12600	5390	5580
20	4650	4960	4510	e4900	e3700	e4400	8310	20300	30500	11400	5320	5590
21	4640	4920	e4400	e4900	e4100	e5600	8150	21500	27400	10300	5420	5530
22	4490	4940	e4200	e4900	e4500	e6400	8250	21000	29500	9820	5820	5520
23	4350	4950	e4000	e4900	e4800	e7000	9390	18600	27400	9560	6220	5510
24	4300	5090	e4000	e4700	e5000	e7600	11300	18700	22800	9610	5820	5460
25	4270	5200	e3800	e4200	e5000	e9000	13800	20300	20400	9950	5590	5420
26	4250	5250	e3300	e3200	e5100	e15000	14600	22500	19000	9700	6180	5320
27	4250	5090	e2900	e3600	e4700	15800	14100	21900	18000	9310	6560	5190
28	4210	5130	e2600	e3900	e4700	15200	14300	18700	17300	9040	6620	5090
29	4230	5090	e2900	e4200	---	11600	15800	17100	16800	8810	6660	4980
30	4270	4910	e3400	e4500	---	9920	16300	16900	17500	8770	6540	4990
31	4260	---	e3800	e5000	---	8530	---	17400	---	8910	6440	---
TOTAL	130720	142200	137730	134300	113500	243550	261670	579100	719000	406980	198070	167090
MEAN	4217	4740	4443	4332	4054	7856	8722	18680	23970	13130	6389	5570
MAX	4650	5250	5110	5600	5100	15800	16300	30000	35700	18900	8640	6230
MIN	3900	4290	2600	2700	1800	2600	6000	10700	16800	8770	5320	4980
AC-FT	259300	282100	273200	266400	225100	483100	519000	1149000	1426000	807200	392900	331400

CAL YR 1988 TOTAL 2660600 MEAN 7269 MAX 33000 MIN 2600 AC-FT 5277000
WTR YR 1989 TOTAL 3233910 MEAN 8860 MAX 35700 MIN 1800 AC-FT 6414000

e Estimated

YELLOWSTONE RIVER BASIN

06324500 POWDER RIVER AT MOORHEAD, MT

LOCATION.--Lat 45°04'04", long 105°52'10", in NW1/4SE1/4NW1/4 sec.8, T.9 S., R.48 E., Powder River County, Hydrologic Unit 10090207, on left bank 500 ft downstream from discontinued post office at Moorhead, 6.2 mi upstream from Buffalo Creek, and at mile 184.8.

DRAINAGE AREA.--8,088 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1929 to September 1972, October 1974 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1309: 1932(M). WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,334.6 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Aug. 28, 1931, nonrecording gage at site 0.3 mi upstream at different datum. Aug. 28, 1931, to Mar. 21, 1956, water-stage recorder at site 1.2 mi upstream at different datum. Mar. 22 to July 24, 1956, nonrecording gage at site 0.3 mi downstream at different datum. July 25 to Sept. 12, 1956, nonrecording gage at present site and datum.

REMARKS.--Estimated daily discharges: Oct. 28, Nov. 11,12, Nov. 16 to Mar. 27. Water-discharge records fair except those for period of estimated daily discharges, which are poor. Some regulation by three reservoirs in Wyoming with combined usable capacity of 36,800 acre-ft. Diversions for irrigation of about 66,300 acres upstream from station.

AVERAGE DISCHARGE.--58 years, 449 ft^3/s, 325,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 33,000 ft^3/s, May 20, 1978, gage height, 15.24 ft; maximum gage height, 17.7 ft, Mar. 21, 1956, site and datum then in use, ice jam; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Sept. 30, 1923, reached a stage of 19 ft, site and datum used 1931-56, from information by local residents.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 12	1930	*ice jam	*7.05	No peak greater than base discharge this year.			

Minimum discharge, 18 ft^3/s, Sept. 2,5,6,7.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	78	132	e120	e70	e100	e65	308	418	132	187	79	28
2	81	137	e100	e80	e70	e60	282	360	128	159	64	22
3	77	131	e90	e90	e40	e60	265	317	292	155	86	22
4	70	156	e100	e110	e45	e45	257	301	492	135	79	26
5	67	172	e100	e90	e50	e60	233	280	360	109	67	25
6	72	157	e110	e80	e60	e80	233	254	273	84	60	20
7	74	156	e100	e60	e65	e100	225	221	307	71	60	20
8	76	154	e90	e50	e60	e200	225	218	269	56	57	24
9	75	155	e100	e70	e65	e300	225	217	240	43	56	36
10	75	160	e100	e90	e70	e400	218	199	190	52	53	39
11	77	e160	e120	e85	e75	e600	217	183	458	86	45	43
12	80	e160	e130	e80	e80	e800	209	188	601	61	52	56
13	91	163	e150	e90	e75	e600	227	250	495	52	42	81
14	91	174	e120	e120	e70	e500	224	273	388	396	42	127
15	95	177	e70	e140	e65	e200	209	222	293	175	40	156
16	95	e170	e80	e160	e55	e220	195	345	229	310	44	141
17	136	e150	e90	e170	e60	e210	210	354	199	344	59	127
18	152	e120	e110	e160	e65	e240	211	361	204	148	61	119
19	148	e90	e100	e170	e70	e250	206	321	262	98	60	106
20	153	e80	e100	e150	e80	e230	195	332	233	70	66	91
21	140	e90	e100	e170	e80	e270	184	269	202	60	51	88
22	139	e80	e100	e160	e70	e600	187	228	205	63	38	77
23	134	e90	e90	e150	e90	e610	244	192	248	58	60	181
24	137	e110	e80	e140	e100	e560	249	169	210	115	61	485
25	143	e100	e70	e110	e80	e540	233	158	179	85	59	346
26	145	e90	e65	e90	e70	e560	262	153	174	89	59	250
27	145	e80	e70	e120	e70	e450	405	145	177	166	53	192
28	e140	e90	e60	e110	e65	443	439	128	171	135	57	165
29	123	e100	e70	e150	---	418	368	117	217	107	50	151
30	125	e110	e80	e180	---	393	433	118	222	88	41	144
31	130	---	e75	e150	---	353	---	125	---	108	32	---
TOTAL	3364	3894	2940	3645	1945	10417	7578	7416	8050	3865	1733	3388
MEAN	109	130	94.8	118	69.5	336	253	239	268	125	55.9	113
MAX	153	177	150	180	100	800	439	418	601	396	86	485
MIN	67	80	60	50	40	45	184	117	128	43	32	20
AC-FT	6670	7720	5830	7230	3860	20660	15030	14710	15970	7670	3440	6720

CAL YR 1988 TOTAL 89821.66 MEAN 245 MAX 1810 MIN .78 AC-FT 178200
WTR YR 1989 TOTAL 58235 MEAN 160 MAX 800 MIN 20 AC-FT 115500

e Estimated

06324500 POWDER RIVER AT MOORHEAD, MT--Continued

WATER-QUALITY RECORDS

LOCATION.--Samples collected at bridge on county road, 1.2 mi upstream from gaging station.

PERIOD OF RECORD.--Water years 1951-53, 1956-57, 1969-72, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: July 1986 to current year.
WATER TEMPERATURE: February 1951 to September 1953, October 1955 to September 1957, October 1974 to September 1977, March 1978 to September 1981 (seasonal records only).
SUSPENDED-SEDIMENT DISCHARGE: October 1974 to September 1977, March 1978 to current year (seasonal records only).

REMARKS.--Flow regulated by reservoirs and diversions for irrigation upstream from station. Unpublished records of once-daily water temperature are available in files of Montana District office.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 4,150 microsiemens, Jul. 17, 1988; minimum daily, 642 microsiemens, May 20, 1988.
WATER TEMPERATURE (water years 1951-53, 1955-57, 1975-81): Maximum daily, 33.0°C, July 13, 1981; minimum daily, 0.0°C on many days during winter.
SEDIMENT CONCENTRATION: Maximum daily mean, 53,500 mg/L, May 27, 1980; minimum daily mean, 5 mg/L, Sept. 15, 1975.
SEDIMENT LOAD: Maximum daily, 2,230,000 tons, May 20, 1978; minimum daily, 0.17 ton, Aug. 1, 1988.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 3,800 microsiemens, Sep. 24; minimum daily, 1,260 microsiemens, Jul. 17.
SEDIMENT CONCENTRATION: Maximum daily mean, 29,900 mg/L, Sep. 25; minimum daily mean, 78 mg/L, Aug. 15.
SEDIMENT LOAD: Maximum daily, 35,500 tons, Sep. 24; minimum daily, 5.7 ton, Sep. 7.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)
OCT 19...	0940	154	100	52	2880	8.0	7.5	675	9.6	91
DEC 06...	0935	105	70	1	2800	3.0	0.0	679	13.0	101
JAN 24...	1045	138	0	0	2520	-8.0	0.0	680	5.0	39
FEB 28...	0950	65	100	72	2120	-10.0	0.0	680	12.0	93
APR 11...	0945	235	0	0	2440	3.0	4.0	682	11.0	95
MAY 16...	1500	525	100	2	2040	23.0	20.0	666	7.0	89
JUN 28...	1400	178	80	1	2240	30.0	26.5	684	6.9	97
AUG 10...	1200	47	30	1	1620	31.0	24.5	675	7.6	104
23...	1830	60	30	1	--	30.0	25.0	--	--	--
SEP 26...	1545	217	50	1	2620	25.0	18.0	673	--	--

DATE	PH (STANDARD UNITS) (00400)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)
OCT 19...	8.30	520	100	66	390	7	9.2	245	770	280
DEC 06...	8.70	690	150	76	320	5	6.9	309	820	200
JAN 24...	7.80	630	140	67	340	6	6.6	377	660	160
FEB 28...	8.60	510	110	57	280	5	6.8	292	530	190
APR 11...	8.40	530	110	62	340	6	6.7	243	740	240
MAY 16...	8.30	400	86	44	310	7	5.6	227	530	200
JUN 28...	8.40	530	120	56	300	6	7.3	197	730	190
AUG 10...	8.60	610	130	69	140	2	7.9	172	730	37
23...	--	--	--	--	--	--	--	--	--	--
SEP 26...	8.30	430	94	48	380	8	9.3	223	860	150

YELLOWSTONE RIVER BASIN

06324500 POWDER RIVER AT MOORHEAD, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT										
19...	0.50	6.1	1770	2.41	735	<0.100	0.020	--	--	--
DEC										
06...	0.40	9.5	1770	2.41	502	0.250	0.010	--	--	--
JAN										
24...	0.40	8.0	1610	2.19	600	0.270	0.190	--	--	--
FEB										
28...	0.50	12	1360	1.85	239	0.400	0.060	--	--	--
APR										
11...	0.50	7.3	1650	2.25	1050	0.170	0.020	818	519	95
MAY										
16...	0.60	8.3	1320	1.80	1870	0.280	2.90	4920	6970	90
JUN										
28...	0.50	7.1	1530	2.08	735	<0.100	0.360	804	386	96
AUG										
10...	0.30	5.6	1220	1.66	155	<0.100	<0.010	204	26	99
23...	--	--	--	--	--	--	--	262	42	99
SEP										
26...	0.60	4.0	1680	2.29	986	0.610	0.300	25900	15200	99

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND	TEMPERATURE WATER (DEG C)	DICAMBA (MEDIBEN) (BANVEL D) TOTAL (UG/L)	PICLORAM (TORDON) (AMDON) TOTAL (UG/L)	2,4-D, TOTAL (UG/L)	2, 4-DP TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
JUN									
07...	1500	361	20.0	<0.01	0.02	<0.01	<0.01	<0.01	<0.01
SEP									
13...	1850	90	18.0	0.03	0.26	0.07	<0.01	<0.01	<0.01

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2450	2570	2450	2770	2440	2170	2200	1810	2640	2650	3090	2160
2	2510	2580	2350	2750	2510	2230	2260	1680	2580	2670	3110	2090
3	2600	2640	2320	2710	2650	2230	2240	1690	2760	2460	3030	2140
4	2520	2600	2530	2740	2780	2230	2280	1810	2980	2200	2020	2070
5	2470	2330	2530	2720	2930	2240	2310	1860	2660	2190	1760	2000
6	2590	2400	2550	2770	3010	2260	2320	2010	2680	2420	1680	2070
7	2570	2410	2570	2780	2840	2430	2350	2090	2560	2640	1540	2140
8	2760	2430	2680	2830	2700	2270	2330	2110	2390	2800	1620	2120
9	2950	2410	2800	2790	2650	---	2370	2150	2390	3050	1620	1980
10	2790	2380	3160	2840	2660	---	2390	2220	2350	3170	1560	1940
11	2760	2410	2950	2830	2670	---	2390	2290	2250	2890	1610	1950
12	2820	2210	2610	2730	2640	---	2440	2310	2480	2010	1600	1850
13	2680	2350	2400	2620	2640	2190	2450	2170	2350	2980	1680	1810
14	2600	2380	2300	2690	2860	2170	2480	2140	2290	2800	1690	1650
15	2660	2320	2380	2730	2950	2090	2480	2160	2200	1410	1590	3570
16	2650	2170	2450	2700	2860	2080	2360	2070	2210	2070	1610	3130
17	2420	2430	2470	2670	2770	2230	2330	2290	2200	1260	1580	2560
18	2610	2530	2650	2720	2730	2180	2450	2170	2350	1310	1560	2500
19	2610	2590	2670	2760	2670	2190	2420	2710	2200	1380	1470	2340
20	2630	2640	2720	2830	2580	2130	2410	2640	1910	1810	1450	2280
21	2590	2840	2770	2890	2580	2250	2430	2400	1780	2080	1550	2360
22	2570	2800	2690	2870	2480	2430	2440	2310	1900	2100	1500	2390
23	2650	2150	2700	2630	2380	2240	2490	2330	1770	2610	1500	2540
24	2600	2260	2690	---	2350	2120	2170	2430	1850	2460	2940	3800
25	2570	2380	2780	2520	2280	2050	2130	2340	2070	2430	2800	3030
26	2530	3450	2890	2500	2050	1960	2050	2330	2280	2510	2440	2660
27	2340	3480	3010	2470	2060	2050	2120	2360	2150	1860	2480	2550
28	2510	3450	3130	2440	2070	1990	2000	2430	2160	1640	2480	2510
29	2500	3450	3220	2460	---	1920	1830	2510	2280	1590	2530	2450
30	2580	2780	3090	2470	---	1960	1740	2530	2600	1550	2390	2300
31	2580	---	2940	2450	---	2040	---	2600	---	1570	2230	---
MEAN	2600	2590	2690	2690	2600	2160	2290	2220	2310	2210	1990	2360

WTR YEAR 1989 MEAN 2390 MAX 3800 MIN 1260

YELLOWSTONE RIVER BASIN

06324500 POWDER RIVER AT MOORHEAD, MT--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1											155	27
2											187	30
3											193	31
4											186	23
5											198	32
6											194	42
7											196	53
8											193	104
9											186	151
10											193	208
11											164	266
12											1100	2380
13											3130	5070
14											1720	2320
15											620	335
16											840	499
17											450	255
18											175	113
19											152	103
20											177	110
21											340	248
22											700	1130
23											1880	3100
24											2230	3370
25											3580	5220
26											4720	7140
27											4880	5930
28											3290	3940
29											2600	2930
30											1900	2020
31											1680	1600
TOTAL											---	48780

	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1450	1210	2880	3250	880	314	2280	1150	1300	277	430	33
2	1390	1060	2200	2140	860	297	1670	717	1700	294	260	15
3	1290	923	2050	1750	4300	3390	1880	787	6700	1560	168	10
4	1220	847	2400	1950	9400	12500	1120	408	3300	704	104	7.3
5	1100	692	2280	1720	13900	13500	660	194	1550	280	140	9.5
6	1040	654	1930	1320	16600	12200	432	98	502	81	135	7.3
7	1060	644	1790	1070	15500	12800	321	62	283	46	106	5.7
8	975	592	1800	1060	10000	7260	255	39	158	24	134	8.7
9	920	559	1650	967	8600	5570	200	23	158	24	160	16
10	940	553	1460	784	8100	4160	232	33	180	26	144	15
11	930	545	1370	677	11600	14300	6000	1390	190	23	160	19
12	1000	564	1290	655	13400	21700	3800	626	169	24	238	36
13	1080	662	1610	1090	16500	22100	800	112	139	16	390	85
14	1190	720	1780	1310	22300	23400	15900	17000	102	12	3600	1230
15	1060	598	1400	839	17400	13800	6800	3210	78	8.4	6210	2620
16	1130	595	3700	3450	11500	7110	8000	6700	101	12	9580	3650
17	1140	646	5620	5370	7500	4030	7000	6500	186	30	13200	4530
18	1070	610	10100	9840	6200	3410	1500	599	159	26	11900	3820
19	1040	578	16400	14200	4300	3040	400	106	140	23	6800	1950
20	1020	537	14100	12600	1560	981	196	37	267	48	2820	693
21	900	447	8300	6030	1020	556	128	21	309	43	1510	359
22	840	424	5110	3150	885	490	121	21	152	16	1020	212
23	1320	870	4020	2080	980	656	84	13	300	49	2800	1370
24	1000	672	4870	2220	900	510	297	92	332	55	27100	35500
25	930	585	3680	1570	880	425	170	39	700	112	29900	27900
26	1000	707	2350	971	1080	507	195	47	1340	213	27100	18300
27	3050	3340	1920	752	1110	530	650	291	1130	162	20200	10500
28	3340	3960	1400	484	900	416	380	139	600	92	16900	7530
29	2380	2360	1080	341	2000	1170	211	61	940	127	13400	5460
30	3400	3970	820	261	2800	1680	150	36	1740	193	8700	3380
31	---	---	830	280	---	---	450	131	1060	92	---	---
TOTAL	---	31124	---	84181	---	192802	---	40682	---	4692.4	---	129271.5

TOTAL LOAD FOR YEAR 531532.9 TONS

YELLOWSTONE RIVER BASIN

06324710 POWDER RIVER AT BROADUS, MT

LOCATION.--Lat 45°25'37", long 105°24'05", in NE1/4NE1/4SE1/4 sec.3, T.5 S., R.51 E., Powder River County, Hydrologic Unit 10090207, on the right bank on the bridge approach on U.S. Highway 212, 0.4 mi downstream from Doyle Creek, 1.0 mi south of Broadus, 7.0 mi upstream from Little Powder River, and at mile 162.0.

DRAINAGE AREA.--8,748 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1975 to current year. Station operated seasonally March 1982 to current year.

REVISED RECORDS.--WDR MT-78-1: 1976(M), 1977(M).

GAGE.--Nonrecording gage. Datum of gage is 3,016.30 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Mar. 1-22. Water-discharge records fair except those for estimated daily discharges, which are poor. Some regulation by three reservoirs in Wyoming with combined usable capacity of 36,800 acre-feet. Diversions for irrigation of about 70,000 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--6 years (1976-1981), 488 ft^3/s, 353,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 30,000 ft^3/s, May 21, 1978, gage height, 12.96 ft; minimum discharge, 4.4 ft^3/s, Sept. 8, 9, 1988.

EXTREMES FOR CURRENT SEASON.--Peak discharges greater than base discharge of 4,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 13	----	ice jam	*7.75	No peak greater than base discharge this year.			

Minimum discharge, 5.5 ft^3/s, Sept. 10, 11.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						e75	404	404	100	214	56	26
2						e70	360	438	113	185	58	20
3						e70	326	364	134	157	44	17
4						e60	310	326	172	140	37	17
5						e70	310	299	446	126	43	11
6						e80	295	273	356	91	35	11
7						e100	280	251	262	61	26	17
8						e150	273	219	276	37	20	11
9						e250	262	209	245	20	19	9.2
10						e350	272	212	238	16	19	7.1
11						e600	262	189	212	20	18	7.6
12						e1000	251	159	403	15	22	15
13						e900	251	174	576	16	22	25
14						e700	255	225	499	51	24	31
15						e350	265	244	387	239	22	51
16						e300	248	225	299	178	21	101
17						e280	225	263	273	209	27	111
18						e320	222	359	201	318	19	103
19						e340	197	342	180	159	29	100
20						e300	191	337	194	101	35	92
21						e500	175	311	244	78	40	82
22						e800	164	242	195	47	45	77
23						582	154	206	169	40	37	75
24						768	200	180	228	42	28	78
25						662	218	147	212	25	34	366
26						577	219	124	177	67	38	284
27						594	302	127	159	42	38	216
28						448	493	127	174	71	32	179
29						462	483	119	198	97	28	153
30						405	405	102	170	73	33	134
31						428		98		54	32	
TOTAL						12591	8272	7295	7492	2989	981	2426.9
MEAN						406	276	235	250	96.4	31.6	80.9
MAX						1000	493	438	576	318	58	366
MIN						60	154	98	100	15	18	7.1
AC-FT						24970	16410	14470	14860	5930	1950	4810

e Estimated

YELLOWSTONE RIVER BASIN

06324710 POWDER RIVER AT BROADUS, MT--Continued

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: March 1976 to September 1979.
SUSPENDED-SEDIMENT DISCHARGE: October 1975 to September 1978, March 1979 to current year (seasonal record only).

REMARKS.--Unpublished records of once-daily water temperature are available in files of District office.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE (water years 1976-79): Maximum daily observed, 34.0°C, July 12, 1976; minimum daily, 0.0°C, on many days during winter.
SEDIMENT CONCENTRATION: Maximum daily mean, 44,100 mg/L July 29, 1977; minimum daily mean, 16 mg/L Sept. 27, 1981.
SEDIMENT LOAD: Maximum daily, 1,570,000 tons May 21, 1978; minimum daily, 0.64 ton Aug. 7, 1988.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATION: Maximum daily mean, 30,100 mg/L, Sep. 25; minimum daily mean, 55 mg/L Sep. 10.
SEDIMENT LOAD: Maximum daily, 29,700 tons, Sep. 25; minimum daily, 1.1 ton Sep. 10.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)
OCT										
19...	1350	141	70	1	2960	16.0	10.5	682	9.2	93
DEC										
06...	1255	152	90	1	2650	4.0	0.0	685	12.6	97
JAN										
24...	1600	109	0	0	2910	-10.0	0.0	687	4.4	34
FEB										
28...	1240	E65	100	72	2370	-15.0	0.0	688	11.0	84
APR										
10...	1425	271	0	0	2480	7.0	7.0	689	10.9	100
MAY										
17...	1015	221	20	1	2310	13.0	16.0	678	8.5	98
JUN										
29...	0915	177	--	0	2260	20.0	19.5	682	7.4	91
AUG										
11...	1000	18	70	1	2420	22.0	22.0	682	7.5	97
23...	1510	35	40	1	--	35.0	26.5	--	--	--
SEP										
28...	1000	183	0	0	2700	14.5	16.0	--	--	--

DATE	PH (STANDARD UNITS) (00400)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)
OCT										
19...	8.2	570	100	78	390	7	3.0	233	880	260
DEC										
06...	8.7	660	130	82	290	5	7.0	295	820	170
JAN										
24...	7.8	450	100	48	260	5	4.6	357	750	7.7
FEB										
28...	8.4	560	120	63	330	6	7.0	319	620	240
APR										
10...	8.3	570	120	65	340	6	7.0	244	780	200
MAY										
17...	8.4	470	100	53	340	7	6.2	235	650	220
JUN										
29...	8.3	490	110	52	300	6	7.6	189	740	190
AUG										
11...	8.4	800	170	90	290	4	11	192	1000	120
23...	--	--	--	--	--	--	--	--	--	--
SEP										
28...	8.3	450	99	50	440	9	10	236	970	180

YELLOWSTONE RIVER BASIN

06324710 POWDER RIVER AT BROADUS, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, 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-PHOROUS TOTAL (MG/L AS P) (00665)	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										
19...	0.50	6.0	1860	2.53	707	<0.100	0.020	--	--	--
DEC										
06...	0.40	9.6	1690	2.29	692	0.280	0.010	--	--	--
JAN										
24...	0.20	6.8	1390	1.89	409	<0.100	0.020	--	--	--
FEB										
28...	0.70	13	1590	2.16	E278	0.350	0.140	--	--	--
APR										
10...	0.50	7.9	1670	2.27	1220	0.240	0.020	1010	739	79
MAY										
17...	0.60	9.3	1520	2.07	908	0.220	0.660	1430	853	88
JUN										
29...	0.50	8.2	1520	2.07	727	0.130	0.210	3020	1440	96
AUG										
11...	0.40	10	1810	2.46	87.8	<0.100	<0.010	172	8.4	98
23...	--	--	--	--	--	--	--	132	12	99
SEP										
28...	0.80	5.0	1900	2.58	939	0.850	5.70	28000	13800	99

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1											220	45
2											263	50
3											255	48
4											220	36
5											241	46
6											231	50
7											262	71
8											288	117
9											249	168
10											370	350
11											880	1430
12											1200	3240
13											1390	3380
14											3180	6010
15											1680	1590
16											1410	1140
17											1520	1150
18											2260	1950
19											430	395
20											140	113
21											970	1310
22											2860	6180
23											2450	3850
24											3530	7320
25											6220	11100
26											7600	11800
27											8560	13700
28											6420	7770
29											4030	5030
30											2910	3180
31											2530	2920
TOTAL											---	95539

YELLOWSTONE RIVER BASIN

06324710 POWDER RIVER AT BROADUS, MT--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2200	2400	2680	2920	980	265	1840	1060	199	30	69	4.8
2	1860	1810	3080	3640	980	299	2020	1010	182	29	69	3.7
3	1680	1480	3380	3320	1050	380	1940	822	160	19	76	3.5
4	1640	1370	2930	2580	2490	1160	1450	548	172	17	73	3.4
5	1650	1380	2270	1830	8340	10000	1190	405	365	42	62	1.8
6	1560	1240	2220	1640	9210	8850	880	216	985	93	64	1.9
7	1550	1170	2110	1430	12100	8560	610	100	975	68	73	3.4
8	1410	1040	1730	1020	17500	13000	330	33	380	21	68	2.0
9	1240	877	1480	835	14200	9390	176	9.5	200	10	66	1.6
10	1160	852	1660	950	10200	6550	204	8.8	125	6.4	55	1.1
11	1150	814	1450	740	7410	4240	147	7.9	140	6.8	64	1.3
12	1130	766	1160	498	10200	11100	108	4.4	160	9.5	63	2.6
13	1050	712	1180	554	11600	18000	156	6.7	140	8.3	75	5.1
14	1070	737	1440	875	12400	16700	1400	193	128	8.3	200	17
15	1370	980	1350	889	18000	18800	9500	6130	105	6.2	318	44
16	1230	824	1480	899	18200	14700	11400	5480	109	6.2	700	191
17	1120	680	2110	1500	15900	11700	9400	5300	122	8.9	2200	659
18	1030	617	3900	3780	10700	5810	10900	9360	110	5.6	4400	1220
19	1000	532	5500	5080	6700	3260	5650	2430	125	9.8	10500	2840
20	950	490	17200	15700	6300	3300	2600	709	158	15	14100	3500
21	820	387	15900	13400	5550	3660	850	179	189	20	11100	2460
22	680	301	11700	7640	2230	1170	323	41	182	22	6600	1370
23	720	299	7990	4440	1150	525	200	22	132	13	2700	547
24	920	497	5000	2430	1650	1020	196	22	90	6.8	1800	379
25	1150	677	3280	1300	1370	784	171	12	124	11	30100	29700
26	920	544	3190	1070	970	464	444	80	122	13	29400	22500
27	1180	962	3070	1050	910	391	167	19	103	11	28200	16400
28	2600	3460	2490	854	1260	592	438	84	111	9.6	26700	12900
29	3480	4540	1850	594	2640	1410	591	155	101	7.6	20600	8510
30	2650	2900	1400	386	1230	565	280	55	102	9.1	17100	6190
31	---	---	1100	291	---	---	176	26	90	7.8	---	---
TOTAL	---	35338	---	84135	---	176645	---	34528.3	---	550.9	---	109463.2

TOTAL LOAD FOR YEAR: 536199.4 TONS.

YELLOWSTONE RIVER BASIN

06324970 LITTLE POWDER RIVER ABOVE DRY CREEK, NEAR WESTON, WY

LOCATION.--Lat 44°55'37", long 105°21'10", in NW1/4SW1/4SW1/4 sec.13, T.57 N., R.71 W., Campbell County, Hydrologic Unit 10090208, on left bank 3.1 mi upstream from Dry Creek, 5.0 mi south of the Wyoming-Montana State line, and 20 mi north of Weston.

DRAINAGE AREA.--1,235 mi^2.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS.--WDR WY-77-1: Drainage area. WDR WY-78-1: 1976(M).

GAGE.--Water-stage recorder. Elevation of gage is 3,410 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 17 to Dec. 3, Dec. 7 to Jan. 8, Jan. 14-19, Feb. 1 to Apr. 10, and Aug. 27 to Sept. 17. Records fair except those for estimated daily discharges, which are poor. Diversion upstream from station for irrigation of about 80 acres downstream from station. Flow occasionally augmented by mine dewatering.

AVERAGE DISCHARGE.--17 years, 20.1 ft^3/s, 14,560 acre-ft/yr.

EXTREMES FOR PERIOD OR RECORD.--Maximum discharge, 5,300 ft^3/s, May 19, 1978, gage height, 11.62 ft; maximum gage height, 11.63 ft, Mar. 20, 1978 (backwater from ice); no flow at times some years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 130 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 23	1030	ice jam	*5.24	No other peak greater than base discharge.			
May 14	1200	*184	4.86				

No flow for several days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.01	.25	1.1	.27	2.2	2.0	6.3	5.2	3.7	3.3	.01	.0
2	.01	.44	1.3	.32	1.6	5.0	5.9	6.2	3.7	2.2	.01	.0
3	.01	.30	1.4	.37	.90	2.8	5.6	5.9	3.8	1.4	.0	.0
4	.01	.17	1.5	.45	.58	1.8	5.2	5.1	5.2	.71	.0	.0
5	.01	.33	1.5	.55	.34	1.2	4.8	4.4	4.0	.34	.0	.0
6	.01	.23	1.5	.67	.20	.83	4.5	3.9	3.0	.14	.0	.0
7	.01	.20	1.3	.79	.17	2.1	4.4	3.3	2.5	.06	.0	.00
8	.01	.20	1.0	.64	.20	12	4.2	3.0	1.8	.04	.0	.08
9	.01	.25	.85	.50	.22	53	4.2	3.3	1.6	.02	.0	.13
10	.01	.31	.91	.52	.24	47	4.2	3.9	1.3	.04	.0	.27
11	.02	.31	1.1	.64	.27	30	4.2	3.0	1.2	.04	.0	.19
12	.02	.34	1.2	.63	.26	20	4.5	3.9	5.1	.02	.0	.11
13	.03	.74	1.5	.56	.28	13	4.1	16	14	.04	.0	.08
14	.03	1.1	1.1	.70	.32	9.8	3.8	136	6.7	.11	.0	.06
15	.03	1.2	.80	.83	.34	7.9	3.7	65	3.6	26	.0	.03
16	.04	1.0	.61	.78	.33	7.0	3.5	69	2.0	81	.0	.02
17	.07	.92	.50	.90	.32	6.5	3.9	42	2.1	26	.0	.01
18	.06	.85	.53	1.0	.30	6.0	3.8	27	1.6	11	.0	.03
19	.06	.79	.57	1.1	.29	6.8	3.3	18	.87	8.8	.0	.01
20	8.5	.73	.64	1.2	.27	7.6	3.2	15	.66	6.5	.0	.01
21	4.9	.67	.69	1.4	.25	8.5	3.1	8.0	3.2	4.9	.0	.01
22	2.9	.77	.75	1.7	.27	9.9	2.8	7.4	2.3	3.6	.0	.01
23	1.7	.89	.66	1.9	.32	11	2.5	6.3	1.6	2.4	.0	.01
24	1.3	.97	.57	2.4	.37	14	2.4	5.3	2.5	1.7	.0	.01
25	.67	1.0	.48	2.5	.43	16	2.3	4.7	5.6	1.0	.0	.01
26	.46	.97	.40	2.6	.48	13	2.3	4.0	68	.42	.0	.01
27	.58	.80	.34	2.4	.54	11	3.9	3.6	27	.13	.0	.01
28	.39	.74	.28	2.6	.62	9.3	5.0	3.1	9.9	.05	.0	.01
29	.35	.85	.24	2.4	---	8.2	4.6	2.7	8.0	.03	.0	.01
30	.27	.92	.21	2.5	---	7.4	4.7	3.0	5.5	.02	.0	.01
31	.16	---	.23	2.9	---	6.8	---	3.6	---	.02	.0	---
TOTAL	22.64	19.24	25.76	38.72	12.91	357.43	120.9	490.8	202.03	182.03	0.02	1.13
MEAN	.73	.64	.83	1.25	.46	11.5	4.03	15.8	6.73	5.87	.001	.038
MAX	8.5	1.2	1.5	2.9	2.2	53	6.3	136	68	81	.01	.27
MIN	.01	.17	.21	.27	.17	.83	2.3	2.7	.66	.02	.00	.00
AC-FT	45	38	51	77	26	709	240	974	401	361	.04	2.2

CAL YR 1988 TOTAL 1893.08 MEAN 5.17 MAX 109 MIN .00 AC-FT 3750
WTR YR 1989 TOTAL 1473.61 MEAN 4.04 MAX 136 MIN .00 AC-FT 2920

06324970 LITTLE POWDER RIVER ABOVE DRY CREEK, NEAR WESTON, WY--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975-82, 1985 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND	TEMPER-ATURE WATER (DEG C)	HARD-NESS TOTAL (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY LAB (MG/L AS CACO3)
OCT										
31...	1235	0.15	9.5	1100	200	150	590	8	29	280
JAN										
11...	0930	0.56	0.0	1200	250	150	700	9	24	--
APR										
11...	0940	4.2	5.0	900	180	110	510	8	22	250
JUN										
12...	1535	11	19.5	960	170	130	580	8	22	340

DATE	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	PHOS-PHOROUS TOTAL (MG/L AS P)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)
OCT										
31...	2100	2.6	0.6	6.4	3250	4.42	1.31	<0.1	<0.03	<5
JAN										
11...	1700	96	0.7	15	2940	3.99	4.44	<0.1	<0.03	<5
APR										
11...	1500	27	0.6	8.5	2510	3.41	28.4	<0.1	<0.03	<5
JUN										
12...	1800	35	0.7	3.0	2950	4.01	87.6	0.9	0.04	<5

YELLOWSTONE RIVER BASIN

06325550 LITTLE POWDER RIVER AT MOUTH, NEAR BROADUS, MT

LOCATION.--Lat 45°27'39", long 105°19'39", in NW1/4SW1/4NE1/4 sec.29, T.4 S., R.52 E., Powder River County, Hydrologic Unit 10090208, at county bridge, 0.4 mi upstream from mouth and 4.0 mi northeast of Broadus.

PERIOD OF RECORD.--July 1988 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
OCT										
18...	1130	1.7	--	--	2100	15.0	10.0	691	9.7	96
DEC										
05...	1110	2.8	0	0	2120	4.0	0.0	688	12.8	98
JAN										
23...	1345	4.9	100	72	--	-4.5	0.0	688	10.9	--
FEB										
27...	1205	0.39	100	74	1880	-7.0	0.0	682	11.6	89
APR										
11...	1345	11	20	1	2190	11.0	10.0	690	10.6	105
MAY										
17...	1215	69	25	1	1560	18.0	17.0	678	7.2	84
JUN										
30...	0900	22	--	0	3240	24.0	22.0	690	6.6	85
AUG										
09...	0930	0.22	80	1	2480	25.0	18.0	660	5.9	73
SEP										
29...	0915	0.72	--	0	2000	18.0	14.0	686	7.1	77

DATE	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	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)
OCT										
18...	8.3	190	40	21	400	13	9.5	428	600	6.1
DEC										
05...	8.8	190	45	20	390	12	3.6	454	590	5.7
JAN										
23...	8.0	270	57	32	380	10	5.0	319	800	
FEB										
27...	8.7	240	53	27	350	10	5.2	391	640	8.2
APR										
11...	8.3	370	72	45	380	9	8.0	366	810	14
MAY										
17...	8.2	280	58	33	240	6	8.8	208	520	19
JUN										
30...	8.4	660	120	87	510	9	13	289	1400	32
AUG										
09...	8.2	310	61	39	440	11	10	448	910	8.8
SEP										
29...	8.6	160	29	21	410	14	5.6	421	630	5.4

06325550 LITTLE POWDER RIVER AT MOUTH, NEAR BROADUS, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, 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-PHOROUS TOTAL (MG/L AS P) (00665)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT										
18...	0.30	2.9	1340	1.82	6.13	<0.100	0.020	--	--	--
DEC										
05...	0.20	12	1340	1.82	10.1	<0.100	0.030	--	--	--
JAN										
23...	0.50	14	--	--	--	0.410	0.130	--	--	--
FEB										
27...	0.30	10	1330	1.81	1.40	0.140	0.030	--	--	--
APR										
11...	0.30	10	1560	2.12	46.3	<0.100	0.020	183	5.4	93
MAY										
17...	0.40	8.7	1010	1.38	189	0.340	--	--	--	--
JUN										
30...	0.40	5.3	2340	3.18	139	<0.100	0.490	--	--	--
AUG										
09...	0.40	13	1750	2.38	1.04	<0.100	0.020	--	--	--
SEP										
29...	0.30	3.0	1360	1.85	2.64	<0.100	0.080	--	--	--

YELLOWSTONE RIVER BASIN

06325650 POWDER RIVER NEAR POWDERVILLE, MT

LOCATION.--Lat 45°45'08", long 105°05'15", in SW1/4SE1/4NW1/4 sec.17, T.1 S., R.54 E., Powder River County, Hydrologic Unit 10090209, at bridge on Powderville road, 1.4 mi upstream from Timber Creek, 1.4 mi southeast of Powderville, and at mile 99.7.

PERIOD OF RECORD.--July 1988 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)
OCT									
20...	0900	124	--	--	2950	8.5	8.0	688	10.0
DEC									
07...	0845	121	95	1	2910	-1.0	0.0	701	13.0
JAN									
25...	0950	110	0	0	2800	-12.0	0.0	697	4.6
MAR									
01...	0825	66	100	72	2750	-15.0	0.0	694	13.0
APR									
12...	0840	260	0	0	2510	4.0	5.5	696	10.6
MAY									
18...	1000	276	40	1	2370	19.0	18.0	680	8.2
JUN									
29...	1145	178	--	0	2210	31.5	25.5	688	7.5
AUG									
09...	1130	22	100	1	3450	31.0	22.5	660	8.1
SEP									
27...	1045	231	20	1	3850	20.0	14.5	685	--

DATE	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	PH (STANDARD UNITS) (00400)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)
OCT									
20...	95	8.2	610	110	81	390	7	8.4	234
DEC									
07...	98	8.6	630	120	80	360	6	7.5	308
JAN									
25...	35	7.7	700	150	80	400	7	7.6	382
MAR									
01...	99	8.4	610	130	70	380	7	7.3	371
APR									
12...	93	8.3	570	120	65	350	6	7.4	248
MAY									
18...	98	8.4	480	100	57	370	7	7.8	245
JUN									
29...	103	8.4	530	120	56	320	6	8.0	206
AUG									
09...	110	8.4	770	170	85	500	8	13	211
SEP									
27...	--	8.3	630	130	74	630	11	12	285

06325650 POWDER RIVER NEAR POWDERVILLE, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

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, 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-PHOROUS TOTAL (MG/L AS P) (00665)
OCT									
20...	950	240	0.40	6.0	1930	2.62	645	<0.100	0.020
DEC									
07...	870	210	0.40	9.9	1840	2.51	602	0.260	0.090
JAN									
25...	850	280	0.50	14	2010	2.74	598	0.410	0.140
MAR									
01...	720	260	0.60	14	1810	2.46	322	0.350	0.050
APR									
12...	820	200	0.50	8.6	1720	2.34	1210	0.240	0.020
MAY									
18...	800	160	0.60	9.1	1650	2.25	1230	0.220	0.690
JUN									
29...	790	170	0.50	9.4	1600	2.17	768	<0.100	0.460
AUG									
09...	1300	300	0.50	10	2510	3.41	149	<0.100	<0.010
SEP									
27...	1100	500	0.70	5.0	2620	3.57	1640	0.490	0.280

YELLOWSTONE RIVER BASIN

06326000 POWDER RIVER NEAR MIZPAH, MT

LOCATION.--Lat. 46°14'43", long 105°15'51", in SE1/4NW1/4SE1/4 sec. 30, T.6 N., R.52 E., Custer County, Hydrologic Unit 10090209, at county bridge 0.3 mi east of Mizpah, 1.5 mi upstream of Mizpah Creek, and at mile 46.8.

PERIOD OF RECORD.--May to September 1989.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)
MAY									
16...	1045	311	90	2	2060	22.0	16.5	692	8.6
JUN									
27...	0815	236	0	0	1820	22.0	18.0	693	8.3
SEP									
28...	0855	208	0	0	3300	18.0	14.5	702	8.6

DATE	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
MAY									
16...	98	8.1	460	92	55	370	8	7.3	213
JUN									
27...	97	8.5	520	120	54	260	5	7.8	200
SEP									
28...	93	8.3	710	150	82	440	7	11	227

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, 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-PHOROUS TOTAL (MG/L AS P) (00665)
MAY									
16...	890	120	0.50	11	1670	2.28	1410	0.290	0.100
JUN									
27...	750	120	0.50	9.2	1440	1.96	919	0.140	0.950
SEP									
28...	1100	270	0.50	6.0	2200	2.99	1230	0.340	7.10

06326200 MIZPAH CREEK NEAR VOLBORG, MT

LOCATION.--Lat 45°56'00", long 105°23'27", in SW1/4SE1/4SW1/4 sec. 9, T.2 N., R.51 E., Custer County, Hydrologic Unit 10090210, at bridge on county road approximately 2 mi downstream from Spring Creek and 15.1 mi northeast of Volborg.

PERIOD OF RECORD.--May 1989.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)
MAY 18...	1430	0.09	40	1	3210	19.5	23.0	675	12.0

DATE	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
MAY 18...	160	8.2	650	110	91	540	9	8.1	455

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, 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-PHOROUS TOTAL (MG/L AS P) (00665)
MAY 18...	1400	4.6	0.30	9.3	2440	3.31	0.59	<0.100	0.030

YELLOWSTONE RIVER BASIN

06326300 MIZPAH CREEK NEAR MIZPAH, MT

LOCATION.--Lat 46°15'39", long 105°17'34", in NW1/4NE1/4SW1/4 sec. 24, T.6 N., R.51 E., Custer County, Hydrologic Unit 10090210, on left bank 20 ft downstream from county bridge, 1.0 mi upstream from mouth, and 1.6 mi northwest of Mizpah.

PERIOD OF RECORD.--Water years 1976-84, October 1988 to June 1989.

REMARKS .--Some scheduled sampling was not done as there were periods of no streamflow.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)
OCT									
20...	1100	0.50	80	1	1240	12.5	8.5	697	8.8
DEC									
08...	0940	0.30	80	1	4200	1.0	0.0	710	12.4
JAN									
25...	1305	0.05	0	0	3200	-5.0	0.0	703	8.8
APR									
12...	0832	0.53	0	0	1120	14.0	6.5	699	9.4
MAY									
16...	0825	5.8	0	0	831	21.5	15.5	692	8.0
JUN									
27...	1005	2.1	0	0	--	25.0	19.5	693	6.2

DATE	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
OCT									
20...	83	8.3	80	19	8.0	250	12	5.1	248
DEC									
08...	93	8.6	300	54	39	770	19	8.8	807
JAN									
25...	66	8.1	250	46	33	660	18	8.9	657
APR									
12...	84	8.5	99	24	9.6	190	8	4.1	198
MAY									
16...	89	8.6	70	17	6.7	180	9	3.8	181
JUN									
27...	--	8.1	170	40	17	330	11	6.3	343

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, 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-PHOROUS TOTAL (MG/L AS P) (00665)
OCT									
20...	410	11	0.60	23	885	1.20	1.19	2.20	0.290
DEC									
08...	1300	13	0.60	13	2680	3.65	2.17	0.190	0.040
JAN									
25...	1100	14	0.40	12	2270	3.09	0.31	0.250	0.080
APR									
12...	340	4.0	0.40	7.2	705	0.96	1.01	1.50	0.130
MAY									
16...	320	11	0.50	8.9	664	0.90	10.4	1.70	0.230
JUN									
27...	560	4.1	0.60	4.5	1170	1.59	6.62	<0.100	0.120

YELLOWSTONE RIVER BASIN

06326500 POWDER RIVER NEAR LOCATE, MT
(National stream quality accounting network station)

LOCATION.--Lat 46°26'56", long 105°18'44", in NW1/4SW1/4 sec.14, T.8 N., R.51 E., Custer County, Hydrologic Unit 10090209, on left bank 1.5 mi downstream from bridge on old U.S. Highway 12 at present site of Locate, 1.5 mi upstream from Locate Creek, 5 mi west of former site of Locate, 25 mi east of Miles City, and at mile 27.9.

DRAINAGE AREA.--13,194 mi^2. Drainage area of site 1.5 mi upstream, 13,189 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1938 to current year.

REVISED RECORDS.--WSP 926: 1939. WSP 1309: 1938-39 (M). WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,384.79 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to July 11, 1947, nonrecording gage at bridge 1.5 mi upstream, and July 11 1947, to Sept. 30, 1965, water-stage recorder at site near upstream bridge at different datum. Oct. 1, 1965, to Oct. 4, 1966, nonrecording gage, and Oct. 5, 1966, to Mar. 21, 1978, water-stage recorder at present site and datum. Mar. 22, 1978, to Apr. 23, 1981, water-stage recorder 1.5 mi upstream at different datum, Apr. 24 to Aug. 20, 1981, water-stage recorder at present site and datum, and Aug. 21, 1981, to Sept. 30, 1981, water-stage recorder 1.5 mi upstream at different datum.

REMARKS.--Estimated daily discharges: Oct. 28, Nov. 9 to Mar. 10, 15-25, Apr. 1-5, and July 28 to Aug. 7. Water-discharge records fair except those for estimated daily discharges, which are poor. Some regulation by three reservoirs in Wyoming with combined usable capacity of 36,800 acre-ft. Diversions for irrigation of about 101,800 acres upstream from station. U.S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--51 years, 587 ft^3/s, 425,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 31,000 ft^3/s, Feb. 19, 1943; maximum gage height, 12.2 ft, Mar. 16, 1978, backwater from ice; no flow on many days in 1950, 1960-61, and 1988.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 5,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 10	1900	*unknown	a*7.60	No peaks greater than base discharge this year.			

a-- result of backwater from ice.

Minimum discharge, 5.1 ft^3/s, Aug. 31.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	118	e130	e75	e90	e65	e430	1260	123	156	e18	15
2	33	114	e120	e80	e60	e65	e430	747	100	173	e15	14
3	32	102	e110	e90	e50	e60	e430	602	95	151	e12	9.6
4	31	103	e110	e100	e35	e40	e420	591	79	161	e10	9.4
5	28	106	e120	e90	e50	e60	e420	433	80	137	e9.0	7.9
6	23	108	e100	e80	e70	e100	416	374	97	113	e8.0	8.3
7	24	111	e90	e70	e80	e200	396	329	204	94	e7.0	12
8	27	111	e85	e45	e65	e500	355	318	340	85	6.3	11
9	28	e110	e90	e70	e70	e1000	310	296	289	70	5.6	9.4
10	30	e105	e90	e75	e80	e2700	304	264	229	61	9.2	13
11	39	e110	e100	e80	e75	2370	304	222	275	49	12	15
12	40	e105	e120	e80	e85	1840	292	216	241	37	10	15
13	39	e110	e160	e90	e85	776	288	259	218	27	8.6	17
14	41	e120	e120	e100	e80	411	273	267	319	31	12	16
15	41	e115	e70	e120	e70	e290	265	269	431	48	12	15
16	49	e110	e100	e150	e60	e250	260	342	397	88	9.1	12
17	64	e90	e120	e190	e55	e200	276	304	345	55	7.4	10
18	67	e70	e150	e150	e70	e130	285	363	295	113	8.6	8.8
19	63	e60	e130	e160	e80	e150	266	315	254	167	13	15
20	61	e70	e110	e140	e90	e130	248	435	248	201	10	39
21	70	e80	e115	e160	e80	e150	240	357	190	298	9.7	49
22	86	e85	e120	e170	e75	e200	224	357	179	181	8.9	52
23	98	e90	e110	e150	e85	e350	206	317	210	116	8.2	55
24	103	e110	e110	e120	e95	e700	188	305	235	93	6.4	55
25	103	e100	e95	e80	e85	e1000	176	220	226	76	9.5	57
26	104	e90	e90	e95	e80	1330	170	191	198	52	11	58
27	105	e75	e80	e100	e75	1820	336	183	225	40	11	80
28	e105	e90	e55	e95	e70	1010	424	153	198	e35	9.9	192
29	106	e100	e70	e130	---	725	851	132	174	e30	8.9	169
30	110	e110	e80	e190	---	534	1250	122	160	e26	6.6	148
31	115	---	e85	e120	---	454	---	125	---	e22	7.2	---
TOTAL	1899	2978	3235	3445	2045	19610	10733	10668	6654	2986	300.1	1187.4
MEAN	61.3	99.3	104	111	73.0	633	358	344	222	96.3	9.68	39.6
MAX	115	120	160	190	95	2700	1250	1260	431	298	18	192
MIN	23	60	55	45	35	40	170	122	79	22	5.6	7.9
AC-FT	3770	5910	6420	6830	4060	38900	21290	21160	13200	5920	595	2360

CAL YR 1988 TOTAL 73157.58 MEAN 200 MAX 1730 MIN .00 AC-FT 145100
WTR YR 1989 TOTAL 65740.5 MEAN 180 MAX 2700 MIN 5.6 AC-FT 130400

e Estimated

YELLOWSTONE RIVER BASIN

06326500 POWDER RIVER NEAR LOCATE, MT--Continued
(National stream quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1946, 1948-63, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to September 1981, July 1988 to current year.
WATER TEMPERATURE: March 1951 to July 1963, October 1974 to September 1979.
SUSPENDED-SEDIMENT DISCHARGE: March 1950 to September 1953, October 1974 to September 1984.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 4,000 microsiemens, Aug. 1, 1977; minimum daily, 523 microsiemens, Mar. 11, 12, 1989.
WATER TEMPERATURE (water years 1951-63, 1975-79): Maximum, 30.0°C, July 26, 1959; minimum, 0.0°C, on many days during winter periods.
SEDIMENT CONCENTRATION (water years 1950-53, 1975-84): Maximum daily mean, 60,000 mg/L, Aug. 6, 1953; minimum daily mean, 17 mg/L, Dec, 3. 1974.
SEDIMENT LOAD (water years 1950-53, 1975-84): Maximum daily, 1,020,000 tons, May 26, 1952; minimum daily, less than 1 ton on several days during September 1950.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 3,780 microsiemens, Sep. 20; minimum daily, 523 microsiemens, Mar. 11, 12.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)
OCT								
05...	1020	30	--	--	3100	5.0	6.0	--
21...	0810	67	60	1	3200	6.0	5.0	703
DEC								
07...	1245	93	10	1	3460	-2.0	0.0	713
JAN								
26...	1110	95	0	0	2870	-5.0	0.0	706
MAR								
02...	0910	66	100	74	2920	-20.0	0.0	698
APR								
12...	1145	304	0	0	2470	12.0	9.0	702
MAY								
17...	0850	304	0	0	2090	17.0	15.0	695
JUN								
28...	0850	201	100	53	1900	21.5	20.0	697
AUG								
08...	0945	7.4	0	0	2690	25.0	18.5	702
SEP								
28...	1110	202	0	0	3490	23.0	15.5	707

DATE	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)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
OCT							
05...	--	--	--	--	--	--	--
21...	10.2	88	K400	K140	379	0	317
DEC							
07...	12.8	95	--	--	--	--	--
JAN							
26...	4.4	33	K3	33	508	0	410
MAR							
02...	8.6	65	K10	110	478	0	384
APR							
12...	10.2	97	--	--	--	--	--
MAY							
17...	8.8	96	320	K16000	--	--	--
JUN							
28...	7.5	91	300	K160	242	28	240
AUG							
08...	8.0	94	3500	K10	272	11	246
SEP							
28...	8.0	88	--	--	--	--	--

YELLOWSTONE RIVER BASIN

06326500 POWDER RIVER NEAR LOCATE, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	PH (STAND-ARD UNITS) (00400)	TUR-BID-ITY (NTU) (00076)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)
OCT									
21...	0810	8.2	62	660	350	130	82	430	7
DEC									
07...	1245	8.7	--	760	430	160	88	440	7
JAN									
26...	1110	7.9	48	670	260	140	77	400	7
MAR									
02...	0910	8.2	44	650	270	140	73	420	7
APR									
12...	1145	8.4	--	480	280	110	51	290	6
MAY									
17...	0850	8.2	590	460	250	96	54	350	7
JUN									
28...	0850	8.8	970	510	270	120	50	280	6
AUG									
08...	0945	8.4	4.2	610	360	110	80	500	9
SEP									
28...	1110	8.2	--	720	500	150	85	450	7

DATE	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)
OCT									
21...	9.2	245	1100	240	0.40	6.0	2170	2190	2.95
DEC									
07...	8.6	330	1100	270	0.40	11	--	2280	3.10
JAN									
26...	7.7	375	880	260	0.30	13	1970	2030	2.68
MAR									
02...	7.8	324	840	280	0.50	14	2510	2010	3.41
APR									
12...	7.9	210	800	210	0.50	9.0	--	1610	2.18
MAY									
17...	8.1	216	830	140	0.50	11	1660	1620	2.26
JUN									
28...	7.6	197	790	140	0.10	9.6	1590	1540	2.16
AUG									
08...	11	248	1300	190	0.40	14	2280	2360	3.10
SEP									
28...	12	228	1300	230	0.50	6.0	--	2370	3.23

DATE	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, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHOROUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
OCT									
21...	393	<0.010	<0.100	0.020	0.020	0.40	0.020	0.010	<0.010
DEC									
07...	572	--	0.270	--	--	--	0.040	--	--
JAN									
26...	505	0.020	0.380	0.110	0.120	0.60	0.040	0.010	<0.010
MAR									
02...	447	0.030	0.270	0.110	0.120	0.90	0.050	<0.010	0.010
APR									
12...	1320	--	0.190	--	--	--	0.200	--	--
MAY									
17...	1360	<0.010	0.330	0.040	0.050	0.40	0.030	0.020	0.010
JUN									
28...	863	0.030	0.160	0.390	0.070	0.50	0.030	0.020	0.030
AUG									
08...	45.6	<0.010	<0.100	0.050	0.020	0.50	0.010	<0.010	<0.010
SEP									
28...	1290	--	0.290	--	--	--	5.70	--	--

YELLOWSTONE RIVER BASIN

06326500 POWDER RIVER NEAR LOCATE, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)
OCT												
21...	0810	30	1	61	<0.5	1	<1	<3	3	25	<5	91
MAR												
02...	0910	10	1	<100	<10	<1	<1	<1	1	10	<5	100
MAY												
17...	0850	--	--	--	--	--	--	--	--	--	--	--
JUN												
28...	0850	50	2	45	<1	<2	2	<6	5	29	3	72
AUG												
08...	0945	10	1	100	<10	4	<1	<1	3	20	2	100

DATE	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT												
21...	6	0.2	<10	3	1	<1.0	1500	<6	8	247	45	95
MAR												
02...	40	<0.1	2	<1	1	<1.0	1900	1	<10	255	45	93
MAY												
17...	--	--	--	--	--	--	--	--	--	1760	1440	91
JUN												
28...	3	0.2	<20	1	2	<1.0	1500	<12	25	1900	1030	99
AUG												
08...	10	0.2	4	2	<1	<1.0	2000	3	<10	68	1.4	97

SPECIFIC CONDUCTANCE (MICROSIEMENS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2720	2770	3350	3260	2830	2920	2080	968	2640	2330	3010	3160
2	2830	2680	3220	3330	3020	2910	2100	1280	2640	2470	3220	3190
3	2720	2740	3270	3330	3130	2900	2060	1640	2660	2600	---	3250
4	2770	2680	3390	3360	3250	2810	1830	1560	2690	2620	3070	3270
5	2830	2670	3400	3230	3370	2730	1950	1780	---	2620	3110	3220
6	2850	2750	2960	3190	3320	2660	2150	1960	2780	2700	3090	3290
7	2930	2740	3130	3230	3270	2540	2180	1970	2790	2890	3050	3370
8	2900	2710	3550	3290	3230	2450	2250	1980	2830	3000	3050	3300
9	2940	2740	3520	3280	3290	1240	2310	2040	3020	2990	3000	3300
10	3020	2780	3400	3260	3260	673	2370	2140	2980	2920	3000	3270
11	3000	2730	2920	3200	3250	523	2400	2230	2840	2900	2950	3160
12	2990	2580	2560	3150	3260	533	2440	2290	2630	2900	2920	3160
13	2990	2570	2470	3100	3300	812	2460	2300	2710	2910	2970	3090
14	2930	2550	2480	3060	3300	1280	2480	2230	2670	2490	3080	3160
15	2920	2620	2650	3080	3330	1680	2500	2170	2650	2300	3140	3190
16	2910	2820	2800	3140	3310	1670	2510	2360	2500	1890	3110	3250
17	2680	2930	2940	3090	3310	1610	2510	2310	2550	1470	3110	3260
18	2740	2890	3010	3060	3270	1980	2540	2370	2570	2160	3140	3300
19	2860	2740	3120	3020	3100	2100	2540	2390	2470	2750	2920	3310
20	2890	2830	3170	3070	3060	2180	2560	2490	2480	2640	2980	3780
21	2950	2970	3290	3030	3040	2250	2590	2210	2440	2450	3000	3020
22	2870	3000	3170	2930	2980	2150	2550	2190	2150	2200	3080	2520
23	2830	2920	3080	2870	3020	2010	2490	2330	2390	2200	3100	3510
24	2830	2550	3110	2860	3080	1190	2530	2600	2480	2160	3170	3560
25	2800	2650	3160	2860	3020	1400	2630	2720	2260	2160	3100	3230
26	2790	2870	3180	2840	2940	1780	2590	---	2080	2340	3130	2990
27	2790	3110	3130	2840	2900	1490	2180	2650	2060	2530	3220	2910
28	3080	3280	3180	2870	2920	1460	1700	2620	2170	2710	3180	3170
29	2860	3320	3250	2910	---	1800	1140	2540	2190	2760	3160	3610
30	2710	3380	3250	2950	---	1940	1030	2580	2190	2870	3160	3720
31	2720	---	3280	1720	---	1990	---	2630	---	2980	3170	---
MEAN	2860	2820	3110	3050	3160	1860	2260	2180	2530	2550	3080	3250

WTR YR 1989 MEAN 2720 MAX 3780 MIN 523

06326520 POWDER RIVER AT MOUTH, NEAR TERRY, MT

LOCATION.--Lat 46°41'13", long 105°25'42", in NE1/4NE1/4SE1/4 sec. 4, T.11 N., R.50 E., Custer County, Hydrologic Unit 10090209, at bridge on old U.S. Highway 10, 0.5 mi upstream of Yellowstone River, and 6 mi southwest of Terry.

PERIOD OF RECORD.--Water years 1978, 1980-82, May to September 1989.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)
MAY									
17...	1355	316	60	1	2180	22.0	19.5	700	8.2
JUN									
28...	1345	211	100	53	1860	25.5	21.0	704	7.6
SEP									
28...	1450	198	0	0	3700	27.0	18.0	710	8.0

DATE	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	ALKA-LINITY LAB (MG/L AS CACO3) (90410)
MAY									
17...	98	8.3	480	98	56	370	7	7.6	228
JUN									
28...	93	8.4	500	110	54	270	5	8.3	192
SEP									
28...	92	8.3	660	130	81	510	9	12	259

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, 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-PHOROUS TOTAL (MG/L AS P) (00665)
MAY									
17...	790	130	0.50	10	1600	2.18	1370	0.580	0.050
JUN									
28...	780	120	0.60	15	1470	2.01	840	0.310	1.10
SEP									
28...	1300	230	0.60	7.0	2430	3.30	1300	0.640	0.180

YELLOWSTONE RIVER BASIN

06326600 O'FALLON CREEK NEAR ISMAY, MT

LOCATION.--Lat 46°25'17", long 104°45'40", in NE1/4SE1/4 sec. 30, T.8 N., R.56 E., Fallon County, Hydrologic Unit 10100005, on left bank, about 350 ft upstream of U.S. Highway 12, 1 mi east of road to Ismay, 6.5 mi southeast of Ismay, 11.5 mi west of Plevna, and at mile 58.3.

DRAINAGE AREA.--669 mi^2.

PERIOD OF RECORD.--October 1977 to current year. Crest-stage partial-record data collected July 1962 to September 1977.

GAGE.--Water-stage recorder. Elevation of gage is 2,590 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Jan. 15 to Mar. 25. Records fair except those for estimated daily discharges, which are poor. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--12 years, 16.7 ft^3/s, 12,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,100 ft^3/s, Mar. 22, 1978, gage height, 9.35 ft; maximum gage height, 9.60 ft, Feb. 26, 1986, backwater from ice; no flow on many days most years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge 1963-77, 4,700 ft^3/s, July 3, 1976, extension of crest-stage gage rating above 3,860 ft^3/s.

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

Date	Time	Discharge (ft^3/s)	Gage Height (ft)	Date	Time	Discharge (ft^3/s)	Gage Height (ft)
Mar. 10	0715	ice jam	a*4.70	Apr. 30	2100	*245	3.88

a--backwater from ice.

No flow on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	e.00	e.00	9.5	157	2.2	.23	.00	.00
2	.00	.00	.00	.00	e.00	e.00	8.9	92	3.5	.19	.00	.00
3	.00	.00	.00	.00	e.00	e.00	7.9	50	4.3	.12	.00	.00
4	.00	.00	.00	.00	e.00	e.00	16	40	2.2	.09	.00	.00
5	.00	.00	.00	.00	e.00	e.00	19	26	1.8	.05	.00	.00
6	.00	.00	.00	.00	e.00	e.70	11	19	1.4	.02	.00	.00
7	.00	.00	.00	.00	e.00	e10	8.1	15	1.3	.00	.00	.00
8	.00	.00	.00	.00	e.00	e40	7.6	12	1.2	.00	.00	.00
9	.00	.00	.00	.00	e.00	e60	6.5	9.3	1.0	.00	.00	.00
10	.00	.00	.00	.00	e.00	e85	6.3	7.2	.82	.00	.00	.00
11	.00	.00	.00	.00	e.00	e90	5.6	6.1	1.2	.00	.00	.00
12	.00	.00	.00	.00	e.00	e90	5.3	4.7	4.3	.00	.00	.00
13	.00	.00	.00	.00	e.00	e70	4.4	5.2	3.0	.00	.00	.00
14	.00	.00	.00	.00	e.00	e50	4.2	5.2	1.9	.00	.00	.00
15	.00	.00	.00	e.00	e.00	e35	3.9	4.4	1.2	.01	.00	.00
16	.00	.00	.00	e.00	e.00	e25	3.4	4.2	.81	.01	.00	.00
17	.00	.00	.00	e.00	e.00	e20	3.2	3.7	.78	.01	.00	.00
18	.00	.00	.00	e.01	e.00	e13	3.1	3.7	.66	.00	.00	.00
19	.00	.00	.00	e.00	e.00	e12	2.9	7.9	.57	.00	.00	.00
20	.00	.00	.00	e.00	e.00	e12	2.5	4.8	.40	.00	.00	.00
21	.00	.00	.00	e.00	e.00	e12	2.3	4.8	.37	.00	.00	.00
22	.00	.00	.00	e.00	e.00	e13	2.2	4.0	.41	.00	.00	.00
23	.00	.00	.00	e.00	e.02	e15	2.1	3.1	.38	.00	.00	.00
24	.00	.00	.00	e.00	e.01	e18	1.7	2.6	.38	.00	.00	.00
25	.00	.00	.00	e.00	e.00	e25	1.5	2.4	.44	.00	.00	.00
26	.00	.00	.00	e.00	e.00	30	1.7	2.2	.47	.00	.00	.00
27	.00	.00	.00	e.00	e.00	39	49	1.8	.45	.00	.00	.00
28	.00	.00	.00	e.00	e.00	32	58	1.7	.36	.00	.00	.00
29	.00	.00	.00	e.00	---	21	108	1.9	.31	.00	.00	.00
30	.00	.00	.00	e.00	---	14	202	2.1	.30	.00	.00	.00
31	.00	---	.00	e.00	---	14	---	2.6	---	.00	.00	---
TOTAL	0.00	0.00	0.00	0.01	0.03	845.70	567.8	506.6	38.41	0.73	0.00	0.00
MEAN	.000	.000	.000	.000	.001	27.3	18.9	16.3	1.28	.024	.000	.000
MAX	.00	.00	.00	.01	.02	90	202	157	4.3	.23	.00	.00
MIN	.00	.00	.00	.00	.00	.00	1.5	1.7	.30	.00	.00	.00
AC-FT	.00	.00	.00	.02	.06	1680	1130	1000	76	1.4	.00	.00

CAL YR 1988 TOTAL 734.59 MEAN 2.01 MAX 261 MIN .00 AC-FT 1460
WTR YR 1989 TOTAL 1959.28 MEAN 5.37 MAX 202 MIN .00 AC-FT 3890

e Estimated

YELLOWSTONE RIVER BASIN

06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT
(National stream quality accounting network station)

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^2. Area at site 4.5 mi upstream, 68,812 mi^2.

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. 31. Water-discharge records good except those for 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. U. S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--77 years, 12,830 ft^3/s, 9,295,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 159,000 ft^3/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^3/s, May 17, 1961, gage height, 2.73 ft, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 37,600 ft^3/s, June 20, gage height, 11.80 ft; maximum gage height osberved., 14.20 ft, Mar. 29; mininum daily discharge, 800 ft^3/s, Jan. 2, result of freezeup.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4550	4350	e5100	e1000	e4500	e4000	9810	20500	16500	14900	6760	5830
2	4520	4350	e5000	e800	e4200	e3800	8560	19000	17700	15700	6750	5310
3	4480	4380	e5000	e1000	e4000	e3700	8090	15700	18100	16000	6430	5050
4	4370	4400	e5000	e2500	e3500	e3500	7870	13100	17000	16200	6060	4900
5	4320	4400	e5100	e4500	e3000	e3500	7620	11400	17000	16000	5960	4750
6	4320	4410	e5100	e4900	e3000	e4000	7140	10800	18600	15000	5590	4670
7	4340	4500	e5000	e4600	e3000	e4500	6830	10800	20400	14200	5530	4580
8	4370	4500	e5000	e4200	e2800	e4500	6570	11000	18500	13700	5470	4470
9	4310	4540	e5000	e3800	e3500	e4500	6370	10500	19400	13000	5230	4340
10	4460	4540	e5000	e3400	e4500	e5500	6160	10900	23700	12300	4960	4270
11	4300	4540	e5000	e3000	e5000	e6500	6230	15400	27700	11400	4650	4210
12	4140	4570	e5000	e4000	e5000	e8000	6650	21100	30100	11000	4400	4500
13	4120	4630	e5000	e4000	e4800	e9000	6970	23300	30500	11000	4330	4660
14	4120	4680	e5200	e4000	e4800	e13000	6770	27600	31700	11500	4250	4950
15	4100	4720	e5200	e4500	e4800	e14000	6440	30800	29600	13600	4200	5100
16	4100	4720	e5100	e5000	e4900	e16000	6280	29000	26400	12100	4310	5130
17	4100	e4500	e5000	e5000	e4800	e15000	6270	24100	26300	13500	4400	5080
18	4160	e4900	e5100	e5000	e4600	e12000	6290	21400	26500	13200	4360	4970
19	4310	e4900	e4800	e5800	e4400	e9000	6520	21000	30100	12000	4220	4860
20	4410	e4900	e4900	e5400	e4000	e6000	7080	21000	36700	11300	4070	4750
21	4530	e5000	e4800	e5000	e3500	e5500	7700	20700	33000	10100	3950	4720
22	4690	e5000	e4600	e5000	e4000	e5500	7850	21200	28100	8900	3840	4710
23	4690	e5000	e4500	e5000	e4200	e6000	7730	21600	28900	8230	3850	4680
24	4570	e5000	e4300	e5000	e4500	e10000	8240	19400	28300	7930	4220	4730
25	4470	e5000	e4200	e5000	e4700	e14000	9870	18100	23200	7610	4490	4830
26	4410	e5100	e3800	e4800	e4500	e15000	12300	19200	19900	7760	4260	4790
27	4350	e5300	e3200	e4500	e4400	e20000	14700	21300	18200	7700	4100	4940
28	4350	e5300	e2500	e4500	e4200	e25000	15900	22100	16800	7630	5070	5040
29	4350	e5100	e2000	e4500	---	e30000	16700	19800	15900	7240	5280	5050
30	4300	e5200	e2000	e5000	---	e15000	18300	19300	15100	6930	5170	4970
31	4350	---	e1500	e5000	---	e12000	---	17000	---	6780	5980	---
TOTAL	134960	142430	138000	129700	117100	308000	259810	588100	709900	354410	152140	144840
MEAN	4354	4748	4452	4184	4182	9935	8660	18970	23660	11430	4908	4828
MAX	4690	5300	5200	5800	5000	30000	18300	30800	36700	16200	6760	5830
MIN	4100	4350	1500	800	2800	3500	6160	10500	15100	6780	3840	4210
AC-FT	267700	282500	273700	257300	232300	610900	515300	1166000	1408000	703000	301800	287300

CAL YR 1988 TOTAL 2551510 MEAN 6971 MAX 32200 MIN 1390 AC-FT 5061000
WTR YR 1989 TOTAL 3179390 MEAN 8711 MAX 36700 MIN 800 AC-FT 6306000

e Estimated

YELLOWSTONE RIVER BASIN

06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT--Continued
(National stream quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1948 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1964 to September 1981.
WATER TEMPERATURE: January 1951 to September 1985.
SUSPENDED-SEDIMENT DISCHARGE: October 1971 to September 1981, October 1982 to current year.

REMARKS.--Unpublished records of once-daily water temperature are available in files of District office. Prior to July 1972, sediment sampling and record computation under supervision of U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1965-81): Maximum daily, 1,220 microsiemens, Apr. 6, 1979; minimum daily, 261 microsiemens, June 4, 1966.
WATER TEMPERATURE (water years 1951-85): Maximum, 29.0°C July 23, 1960; minimum, 0.0°C on many days during winter.
SEDIMENT CONCENTRATION: Maximum daily mean, 26,800 mg/L May 8, 1975; minimum daily mean, 8 mg/L Jan. 9, 1973.
SEDIMENT LOAD: Maximum daily, 3,030,000 tons May 8, 1975; minimum daily, 63 tons Jan. 2, 1989.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATION: Maximum daily mean, 4,710 mg/L, Apr. 30; minimum daily mean, 16 mg/L, Jan. 31.
SEDIMENT LOAD: Maximum daily, 364,000 tons, Mar. 29; minimum daily, 63 tons, Jan. 2.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, IN CUBIC FEET PER SECOND (00060)	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)
OCT											
25...	1500	--	4390	99	3	920	5.0	7.5	719	10.9	97
DEC											
07...	0830	E5000	--	98	3	910	-3.0	0.0	727	11.0	79
MAR											
29...	1300	--	29700	99	3	815	1.0	0.0	716	8.4	61
MAY											
24...	1130	--	19200	80	2	398	14.0	17.0	705	6.7	75
JUN											
08...	1030	--	18300	0	0	321	19.0	18.0	717	8.7	98
AUG											
10...	1100	--	4860	0	0	610	30.0	22.5	714	7.6	94
23...	0750	--	3850	10	1	--	25.5	22.0	--	--	--

DATE	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STAND-ARD UNITS) (00400)	TUR-BID-ITY (NTU) (00076)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)
OCT										
25...	<1	K6	215	0	173	8.2	7.2	290	63	31
DEC										
07...	K4	76	193	0	162	8.1	6.3	280	65	28
MAR										
29...	K160	K100	139	0	114	7.8	1100	230	52	23
MAY										
24...	590	830	114	0	91	7.9	130	130	31	12
JUN										
08...	K74	K42	94	0	76	8.0	42	110	26	10
AUG										
10...	K42	K33	143	14	136	8.5	21	200	47	20

YELLOWSTONE RIVER BASIN

06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	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)
OCT										
25...	86	2	4.4	169	270	15	0.50	1.7	587	579
DEC										
07...	77	2	3.8	182	240	13	0.50	8.9	540	534
MAR										
29...	92	3	4.4	137	260	20	0.40	7.8	540	531
MAY										
24...	30	1	2.4	96	82	7.0	0.20	12	231	234
JUN										
08...	26	1	2.1	81	72	5.8	0.30	11	188	200
AUG										
10...	55	2	3.5	140	160	8.2	0.40	11	394	405

DATE	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, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHOROUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
OCT										
25...	0.80	6960	<0.010	0.130	0.020	0.020	0.40	0.020	0.020	<0.010
DEC										
07...	0.73	E7290	0.020	0.570	<0.010	0.020	0.40	0.010	<0.010	<0.010
MAR										
29...	0.73	43300	0.010	0.590	0.130	0.150	0.60	2.20	0.020	<0.010
MAY										
24...	0.31	12000	<0.010	0.240	0.030	0.050	<0.20	0.040	0.030	0.020
JUN										
08...	0.26	9290	<0.010	<0.100	0.020	<0.010	<0.20	0.030	0.010	0.010
AUG										
10...	0.54	5170	<0.010	<0.100	0.030	<0.010	0.50	0.030	<0.010	<0.010

DATE	TIME	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)
OCT											
25...	1500	<10	5	56	<0.5	<1	<1	<3	3	7	<5
MAR											
29...	1300	20	2	50	<0.5	<1	<1	<3	3	16	<5
JUN											
08...	1030	20	7	31	<0.5	<1	<1	<3	2	15	<1
AUG											
10...	1100	10	8	53	<0.5	<1	<1	<3	3	4	<1

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)	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										
25...	51	8	<0.1	<10	1	1	1.0	720	<6	7
MAR										
29...	38	7	0.7	<10	1	1	<1.0	580	<6	4
JUN										
08...	20	2	<0.1	<10	1	<1	<1.0	260	<6	4
AUG										
10...	43	3	0.2	<10	2	1	<1.0	500	<6	6

YELLOWSTONE RIVER BASIN

06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	TEMPERATURE WATER (DEG C) (00010)	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .002 MM (70337)	SED. SUSP. FALL DIAM. % FINER THAN .004 MM (70338)	SED. SUSP. FALL DIAM. % FINER THAN .008 MM (70339)	SED. SUSP. FALL DIAM. % FINER THAN .016 MM (70340)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT										
25...	1500	7.5	4390	236	2800	--	--	--	--	93
MAR										
29...	1300	0.0	29700	4060	326000	48	64	76	87	100
MAY										
24...	1130	17.0	19200	458	23700	--	--	--	--	62
JUN										
08...	1030	18.0	18300	340	16800	--	--	--	--	58
AUG										
10...	1100	22.5	4860	60	787	--	--	--	--	87
23...	0750	22.0	3850	25	260	--	--	--	--	92

DATE	TIME	BED MAT. FALL DIAM. % FINER THAN .004 MM (80157)	BED MAT. SIEVE DIAM. % FINER THAN .062 MM (80164)	BED MAT. SIEVE DIAM. % FINER THAN .125 MM (80165)	BED MAT. SIEVE DIAM. % FINER THAN .250 MM (80166)	BED MAT. SIEVE DIAM. % FINER THAN .500 MM (80167)	BED MAT. SIEVE DIAM. % FINER THAN 1.00 MM (80168)	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM (80169)	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM (80170)	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM (80171)	BED MAT. SIEVE DIAM. % FINER THAN 16.0 MM (80172)	BED MAT. SIEVE DIAM. % FINER THAN 32.0 MM (80173)
OCT												
25...	1500	16	36	60	82	85	86	87	89	96	100	--
MAY												
24...	1130	--	0.1	3	39	74	77	78	80	85	97	100
AUG												
10...	1100	--	1.5	13	74	99	100	--	--	--	--	--

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)	MEAN CONCENTRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	124	1520	39	458	88	1210	38	103	19	231	99	1070
2	175	2140	41	482	99	1340	29	63	25	283	111	1140
3	209	2530	55	650	104	1400	36	97	29	313	112	1120
4	213	2510	61	725	100	1350	82	553	32	302	98	926
5	140	1630	58	689	94	1290	112	1360	35	283	81	765
6	56	653	56	667	88	1210	121	1600	38	308	60	648
7	47	551	67	814	74	999	119	1480	39	316	52	632
8	40	472	70	850	58	783	108	1220	40	302	53	644
9	42	489	59	723	51	688	92	944	42	397	57	693
10	42	506	52	637	64	864	78	716	43	522	240	3560
11	39	453	55	674	74	999	66	535	43	580	1170	20500
12	34	380	57	703	83	1120	52	562	42	567	1180	25500
13	32	356	57	713	94	1270	44	475	42	544	1770	43000
14	31	345	58	733	79	1110	42	454	42	544	1420	49800
15	32	354	60	765	37	519	41	498	47	609	1520	57500
16	34	376	68	867	24	330	41	553	64	847	910	39300
17	34	376	79	960	31	418	39	526	87	1130	440	17800
18	28	314	81	1070	40	551	38	513	108	1340	340	11000
19	26	303	77	1020	44	570	37	579	106	1260	260	6320
20	28	333	80	1060	39	516	36	525	87	940	195	3160
21	40	489	91	1230	26	337	36	486	64	605	165	2450
22	66	836	80	1080	20	248	37	499	38	410	205	3040
23	59	747	51	688	25	304	38	513	32	363	300	4860
24	56	691	63	850	25	290	38	513	43	522	500	13500
25	136	1640	95	1280	19	215	36	486	60	761	880	33300
26	58	691	103	1420	28	287	34	441	79	960	1210	49000
27	49	576	91	1300	51	441	32	389	92	1090	1250	67500
28	48	564	81	1160	46	310	27	328	94	1070	3800	257000
29	44	517	80	1100	32	173	21	255	---	---	4500	365000
30	42	488	82	1150	32	173	17	229	---	---	3360	136000
31	41	482	---	---	49	198	16	216	---	---	1900	61600
TOTAL	---	24312	---	26518	---	21513	---	17711	---	17399	---	1278328

YELLOWSTONE RIVER BASIN

06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1260	33400	4470	247000	775	34500	268	10800	114	2080	2470	38900
2	940	21700	4410	226000	630	30100	310	13100	91	1660	725	10400
3	840	18300	2810	119000	465	22700	312	13500	86	1490	123	1680
4	650	13800	1610	56900	320	14700	332	14500	86	1410	95	1260
5	1000	20600	1210	37200	308	14100	336	14500	85	1370	77	988
6	840	16200	960	28000	360	18100	276	11200	78	1180	62	782
7	630	11600	660	19200	438	24100	248	9510	70	1050	50	618
8	400	7100	555	16500	328	16400	218	8060	63	930	40	483
9	308	5300	310	8790	404	21200	170	5970	60	847	32	375
10	220	3660	410	12100	625	40000	128	4250	57	763	29	334
11	190	3200	800	33300	805	60200	114	3510	53	665	28	318
12	210	3770	1400	79800	1140	92600	110	3270	52	618	29	352
13	226	4250	1490	93700	882	72600	108	3210	49	573	33	415
14	193	3530	1930	144000	960	82200	142	4410	41	470	38	508
15	165	2870	1760	146000	720	57500	428	15700	41	465	43	592
16	152	2580	1290	101000	540	38500	523	17100	37	431	42	582
17	160	2710	1140	74200	525	37300	754	27500	30	356	39	535
18	164	2790	840	48500	528	37800	610	21700	27	318	33	443
19	152	2680	760	43100	675	54900	424	13700	24	273	26	341
20	171	3270	700	39700	1220	121000	325	9920	19	209	22	282
21	239	4970	625	34900	1000	89100	274	7470	17	181	20	255
22	249	5280	540	30900	700	53100	222	5330	19	197	22	280
23	176	3670	510	29700	585	45600	172	3820	26	270	23	291
24	250	5560	475	24900	500	38200	157	3360	31	353	21	268
25	256	6820	455	22200	320	20000	172	3530	31	376	20	261
26	717	23800	450	23300	410	22000	162	3390	28	322	22	285
27	1080	42900	525	30200	390	19200	122	2540	27	299	26	347
28	1880	80700	650	38800	322	14600	198	4080	73	999	31	422
29	3670	165000	750	40100	315	13500	434	8480	1640	23400	47	641
30	4710	233000	3700	193000	270	11000	280	5240	745	10400	72	966
31	---	---	1400	64300	---	---	185	3390	400	6460	---	---
TOTAL	---	755010	---	2106290	---	1216800	---	276040	---	60415	---	64204

TOTAL LOAD FOR YEAR 5864540 TONS

MISSOURI RIVER BASIN

Smaller Reservoirs in Missouri River Basin in Montana

060122000 LIMA RESERVOIR.--Lat 44°39'16", long 112°21'54", in SW1/4 sec.32, T.13 S., R.6 W., Beaverhead County, Hydrologic Unit 10020001, at Lima Dam on Red Rock River, 7 mi northwest of Monida, and at mile 2,542.2. DRAINAGE AREA, 570 mi^2. PERIOD OF RECORD, April 1940 to current year. Records prior to October 1950, published only in WSP 1309, and those for April 1955, published only in WSP 1729. Records of daily elevations available in files of Helena district office. Nonrecording gage read twice daily. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by Montana Department of Natural Resources and Conservation).

Reservoir is formed by earthfill dam with concrete spillway completed in 1902. Usable capacity, 84,050 acre-ft between elevation 6,537.30 ft, bottom of tunnel, and 6,582.7 ft, spillway crest. No dead storage. Figures given herein represent usable contents. Water is used for irrigation, flood control, and recreation. Records furnished by Water Users Irrigation Co.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 85,870 acre-ft, May 27, 28, June 14, 15, 1984, elevation, 6,582.98 ft; no usable storage Sept. 20-26, 1979, Sept. 13-30, 1987, October 1987.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 40,180 acre-ft, May 19, elevation, 6,573.55 ft; minimum contents, 3,900 acre-ft, July 20, elevation, 6,552.43 ft.

06020500 RUBY RIVER RESERVOIR.--Lat 45°14'21", long 112°06'35", in NE1/4NE1/4SE1/4 sec.8, T.7 S., R.4 W., Madison County Hydrologic Unit 10020003, at dam on Ruby River, 6 mi south of Alder, and at mile 47.9. DRAINAGE AREA, 596 mi^2 (1,544 km^2). PERIOD OF RECORD, July 1938 to April 1950, September 1954, May 19, September to November 1955, and February to September 1960 (total contents), October 1960 to current year (usable contents). Records prior to October 1939, published only in WSP 1309, and those for September 1954, published only in WSP 1729. Elevations are determined by measuring from reference points in the middle and at or near the end of the month. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by Montana Department of Natural Resources and Conservation).

Reservoir is formed by earthfill dam with concrete spillway, completed in 1938. Usable capacity, 39,740, revised 39,740, revised, acre-ft between elevation 5,300.0 ft, bottom of tunnel, and 5,392.0 ft, spillway crest. Dead storage, 100 ft below elevation 5,300.0 ft. Figures given herein represent usable contents. Water is used for irrigation and recreation. Records furnished by Montana Department of Natural Resources and Conservation. REVISED RECORDS, WSP 1729: Drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 46,040 acre-ft, Aug. 25, 1975, elevation, 5,399.0 ft; no storage at times in 1938, 1955, 1961.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 40,040 acre-ft, May 15, elevation, 5,393.2 ft; minimum contents observed, 1,500 acre-ft, Oct. 1, estimated.

06036000 WILLOW CREEK RESERVOIR.--Lat 45°42'51", long 111°41'57", in NW1/4NW1/4NW1/4 sec.35, T.1 S., R.1 W., Madison County, Hydrologic Unit 10020005, at dam on Willow Creek, 4 mi east of Harrison, and at mile 11.5. DRAINAGE AREA, 153 mi^2. PERIOD OF RECORD, February 1938 to March 1958 (total contents), April 1958 to current year (usable contents). Records prior to October 1939, published only in WSP 1309 and November, December 1951, published only in WSP 1729. Prior to October 1949, published as Harrison Lake near Harrison. Elevations determined by measuring from reference marks in the middle and at or near the end of the month. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by Montana Department of Natural Resources and Conservation).

Reservoir is formed by earth and rockfill dam with concrete spillway completed in 1938. Usable capacity, 17,730 acre-ft between elevation 4,666.5 ft, tunnel inlet, and 4,736.0 ft, spillway crest. Dead storage, 270 acre-ft below elevation 4,666.5 ft. Figures given herein represent usable contents. Water is used for irrigation and recreation. Records furnished by Montana Department of Natural Resources and Conservation. REVISED RECORDS, WSP 1629: 1958. WSP 1729: 1948(M), 1951-52, 1956-57.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 19,230 acre-ft, June 30, 1963, elevation, 4,736.7 ft; minimum observed, 2,270 acre-ft, Nov. 15, 1970, elevation, 4,705.0 ft.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 17,730 acre-ft, Apr. 15, May 1,15, June 1,15, elevation, 4,736.0 ft; minimum observed, 3,040 acre-ft, Oct. 1, elevation, 4,709.0 ft.

06038000 HEBGEN LAKE.--Lat 44°51'51", long 111°20'09", in SW1/4NW1/4 sec.23, T.11 S., R.3 E., Gallatin County, Hydrologic Unit 10020007, at Hebgen Dam on Madison River, 18 mi northwest of West Yellowstone, and at mile 103. DRAINAGE AREA, 904 mi^2. PERIOD OF RECORD, January 1936 to current year. Records prior to October 1939, published only in WSP 1309. Figures of contents published in WSP 1629, 1709, and 1729 have been found to be in error and should not be used. Prior to Oct. 1, 1949, published as Hebgen Reservoir near West Yellowstone. Records of daily elevations since October 1955 on file in Helena district office. Nonrecording gage read about twice daily. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by The Montana Power Co.). Prior to earthquake of Aug. 17, 1959, datum of gage was 9.74 ft higher, also at National Geodetic Vertical Datum of 1929. Reservoir is formed by earthfill dam with concrete core and spillway completed in 1915, repaired in 1960 following severe earthquake of Aug. 17, 1959, which lowered dam 9.74 ft and deformed reservoir area. Subsequent usable capacity, 377,500 acre-ft between elevation 6,473.00 ft, bottom of outlet tower, and 6,534.87 ft, spillway crest. Dead storage, 7,340 acre-ft below elevation 6,473.00 ft. Prior to Aug. 17, 1959, usable capacity, 344,700 acre-ft between 6,483.11 ft, bottom of outlet tower, and 6,544.61 ft, spillway crest. Dead storage, 7,340 acre-ft below elevation 6,473.00 ft. Observations of reservoir level prior and subsequent to earthquake indicate smaller increases in capacity than indicated by new capacity table. Figures given herein represent usable contents. Water is used for power and recreation. Records furnished by The Montana Power Co. REVISED RECORDS, WSP 1916: 1959-60.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 380,500 acre-ft, July 21, 1987, elevation, 6,535.0 ft; minimum monthend, 670 acre-ft, Dec. 31, 1936, by capacity table used prior to August 1959.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 378,800 acre-ft, July 14, elevation, 6,534.87 ft; minimum observed, 254,400 acre-ft, Apr. 18,19, elevation, 6,524.16 ft.

Smaller reservoirs in Missouri River basin in Montana--Continued

06040500 ENNIS LAKE.--Lat 45°28'12", long 111°38'15", in NW1/4SW1/4 sec.20, T.4 S., R.1 E., Madison County, Hydrologic Unit 10020007, at Madison Dam on Madison River, 5 mi northeast of McAllister, and at mile 40.3. DRAINAGE AREA, 2,181 mi². PERIOD OF RECORD, January 1936 to September 1975 (total contents), October 1975 to current year (usable contents). Records prior to October 1939, published only in WSP 1309. Prior to 1949, published as Madison Reservoir near McAllister. Records of daily elevations since October 1955 on file in Helena district office. Nonrecording gage read about twice daily. Datum of gage is at Montana Power Company datum (levels by The Montana Power Co.).

Reservoir is formed by timber crib dam completed in 1900. Usable capacity, 41,020 acre-ft between elevation 4,826.5 ft, bottom of penstock, and 4,841.5 ft, top of flashboards. Dead storage, 1,040 acre-ft below elevation 4,826.5 ft. Not normally drawn below 4,831.0 ft, 6,810 acre-ft. Figures given herein represent usable contents Water is used for power and recreation. Records furnished by The Montana Power Co.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 40,830 acre-ft, June 20, 1968, elevation, 4,841.45 ft; minimum observed, 2,600 acre-ft, Mar. 31, 1937, elevation, 4,828.8 ft.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 38,070 acre-ft, June 17, elevation, 4,841.00 ft; minimum observed, 26,740 acre-ft, Feb. 7, elevation, 4,837.90 ft.

06049500 MIDDLE CREEK RESERVOIR.--Lat 45°29'18", long 110°58'42", in NW1/4SW1/4 sec.15, T.4 S., R.6 E., Gallatin County, Hydrologic Unit 10020008, at dam on Hyalite Creek, 14 mi south of Bozeman, and at mile 28.9. DRAINAGE AREA, 27.4 mi². PERIOD OF RECORD, April 1951 to current year. Nonrecording gage read in the middle and at or near the end of month. Elevation of lake at full pond is about 6,700 ft, from topographic map.

Reservoir is formed by earthfill dam with conduit control works completed in 1951. Storage began in March 1951. Usable capacity, 8,030 acre-ft between gage height 125 ft, bottom of outlet, and 200.75 ft, spillway crest. Dead storage, 209 acre-ft below gage height 125 ft. Figures given herein represent usable contents. Water is used for irrigation and municipal purposes. Records furnished by Montana Department of Natural Resources and Conservation.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 8,480 acre-ft, July 10, 1983, gage height, 202.8 ft, from capacity table then in use; minimum observed, 120 acre-ft, Oct. 18, 1965, gage height, 129.0 ft.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 8,260 acre-ft, June 30, elevation, 6,712.77 ft; minimum observed, 3,030 acre-ft, Oct. 15, gage height, 6,678.91 ft.

06058600 HELENA VALLEY RESERVOIR.--Lat 46°38'17", long 111°52'56", in NW1/4NW1/4SE1/4 sec.8, T.10 N., R.2 W., Lewis and Clark County, Hydrologic Unit 10030101, at dam 5.8 mi east of Helena. PERIOD OF RECORD, September 1960 to current year. Nonrecording gage read one or more times per month. U.S. Geological Survey began publishing data October 1983. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation).

This is an offstream reservoir formed by an earthfill dam and dike completed in 1958. Closure and first fill of reservoir in March 1959. Stored water is diverted from Missouri River at Canyon Ferry Dam in W1/2SE1/41/4SE1/4 sec.4, T.10 N., R.1 W., 17 mi east of Helena. Usable capacity, 5,900 acre-ft between elevation 3,805.0 ft, invert of City of Helena municipal outlet, and 3,820.07 ft, top of active conservation pool (maximum normal water-surface elevation). Dead storage, 1,260 acre-ft, below elevation 3,787.75 ft, and inactive storage, 3,290 acre-ft, below elevation 3,805.0 ft. Figures given herein represent usable contents. Water is used for irrigation and municipal use by the City of Helena. Records furnished by U.S. Bureau of Reclamation. Capacity table effective Jan. 1, 1961.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 9,470 acre-ft, June 2, 1975, elevation, 3,820.60 ft; no usable contents observed October and November 1977, result of construction work.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 8,880 acre-ft, Aug. 14, elevation, 3,819.47 ft; minimum observed, 3,670 acre-ft, Apr. 11, elevation, 3,806.32 ft.

06064500 LAKE HELENA.--Lat 46°45'58", long 111°53'10", in SE1/4SW1/4 sec. 29, T.12 N., R.2 W., Lewis and Clark County, Hydrologic Unit 10030101, at Hauser Dam on Missouri River, 13 mi northeast of Helena, and at mile 2,239.1. DRAINAGE AREA, 610 mi² above dam and control works on Prickly Pear Creek. PERIOD OF RECORD, May 1945 to current year. April to July 1953 scattered daily elevation and contents, published in WSP 1320-B. May to June 1964 daily elevations and contents, published in WSP 1840-B. Records of daily elevations since October 1955 on file in Helena district office. Nonrecording gage at Hauser Dam read hourly. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by The Montana Power Co.).

Gage heights collected at Hauser Dam are effective on Lake Helena at control dam. Prior to April 1945, contents of Lake Helena included with records of Hauser Lake. Since that date, a dam and control works has separated the two lakes to allow independent regulation of Lake Helena, if needed. Usable capacity, 10,450 acre-ft between elevation 3,624.00 ft, bottom of control works, and 3,635.00 ft, top of flashboards. No dead storage. Figures given herein represent usable contents. Water is used for recreation, wildlife, and power production through Hauser Dam. Records furnished by The Montana Power Co.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 11,790 acre-ft, Aug. 2, 1960, Dec. 10, 1962, July 19, 20, Sept. 4, 1963, Aug. 15, 1968, Apr. 6, 1973, June 26, 1980, elevation, 3,635.60 ft; no storage Mar. 29 to Apr. 7, 1958, Feb. 12, 20, 1962, May 4-10, 1979.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 11,360 acre-ft, Feb. 12-16, June 1, elevation, 3,635.40 ft; minimum observed, 10,450 acre-ft, Feb. 27, June 20, elevation, 3,635.00 ft.

Smaller reservoirs in Missouri River basin in Montana--Continued

06065000 HAUSER LAKE.--Lat 46°45'58", long 111°53'10", in SE1/4SW1/4 sec.29, T.12 N., R.2 W., Lewis and Clark County, Hydrologic Unit 10030101, at Hauser Dam on Missouri River, 1.6 mi downstream from Prickly Pear Creek, 13 mi northeast of Helena, and at mile 2,226.4. DRAINAGE AREA, 16,876 mi². PERIOD OF RECORD, January 1936 to current year. Records prior to October 1939, published only in WSP 1309. April to July 1953 scattered daily elevations and contents, published in WSP 1320-B. May to June 1964 daily elevations and contents, published in WSP 1840-B. Monthend contents prior to May 1945 include contents of Lake Helena, excluded thereafter. Records of daily elevations since October 1955 on file in Helena district office. Nonrecording gage read hourly. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by The Montana Power Co.).

Reservoir is formed by concrete dam completed in 1907; separated from Lake Helena in April 1945. Usable contents, 51,420 acre-ft between elevation 3,617.00 ft, bottom of tunnel, and 3,635.00 ft top of flashboards. Dead storage, 46,810 acre-ft below elevation 3,617.00 ft. Prior to Nov. 28, 1949, usable capacity, 52,090 acre-ft at elevation 3,635.00 ft, decrease caused by construction of Canyon Ferry Dam in backwater of Hauser Dam. Not normally drawn below 3,621.00 ft, 8,870 acre-ft. Figures given herein represent usable contents. Water is used for power and recreation. Records furnished by The Montana Power Co. REVISED RECORDS, WSP 1729: 1949-57.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed since May 1945, 53,630 acre-ft, Aug. 2, 1960, Dec. 10, 1961, July 19, 20, Sept. 4, 1963, Aug. 15, 1968, Apr. 6, 1973, June 26, 1980, elevation, 3,635.60 ft; no storage Jan. 31, Feb. 29, 1936.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 52,890 acre-ft, Feb. 12-16, June 1, elevation, 3,635.40 ft; minimum observed, 51,420 acre-ft, Feb. 27, June 20, elevation, 3,635.00 ft.

06066000 HOLTER LAKE.--Lat 46°59'28", long 112°00'17", on line between SE1/4 sec.5 and NE1/4 sec.8, T.14 N., R.3 W., Lewis and Clark County, Hydrologic Unit 10030101, at Holter Dam on Missouri River, 3.3 mi east of Wolf Creek, and at mile 2,211.1. DRAINAGE AREA, 17,149 mi². PERIOD OF RECORD, January 1936 to current year. Records prior to October 1939, published only in WSP 1309. April to July 1953 scattered daily elevations and contents, published in WSP 1320-B. May to June 1964 daily elevations and contents, published in WSP 1840-B. Records of daily elevations since October 1955 on file in Helena district office. Prior to 1950, published as Holter Reservoir near Wolf Creek. Nonrecording gage read three times daily. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by The Montana Power Co.).

Reservoir is formed by concrete dam completed in 1918. Usable capacity, 81,920 acre-ft between elevation 3,543.00 ft, bottom of tunnel, and 3,564.00 ft, top of flashboards. Dead storage, 158,500 acre-ft below elevation 3,543.00 ft. Not normally drawn below 3,548.00 ft, 16,660 acre-ft. Figures given herein represent usable contents. Water is used for power and recreation. Records furnished by The Montana Power Co.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 85,250 acre-ft, June 19, 1970, elevation, 3,564.70 ft; no storage Feb. 29, Dec. 31, 1936.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 82,100 acre-ft, Jan. 17, elevation, 3,564.04 ft; minimum observed, 64,550 acre-ft, Feb. 10, elevation, 3,560.23 ft.

06075000 SMITH RIVER RESERVOIR.--Lat 46°37'27", long 110°44'48", near center of south line of sec.17, T.10 N., R.8 W., Meagher County, Hydrologic Unit 10030103, at dam on Smith River, 9 mi northeast of White Sulphur Springs, and at mile 22.8. DRAINAGE AREA, 72.3 mi². PERIOD OF RECORD, April 1938 to September 1950 (scattered records 1947-50) and April to October 1959 (total contents), November 1959 to current year (usable contents). Records for some periods published only in WSP 1309 and for April 1959, published only in WSP 1729. Elevations determined by measuring from reference marks at or near middle and end of month. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by Montana Department of Natural Resources and Conservation).

Reservoir is formed by earthfill dam with concrete spillway completed in 1936. Usable capacity, 10,650 acre-ft between elevation, 5,415.0 ft, bottom of outlet, and 5,486.0 ft, spillway crest. Dead storage, 52 acre-ft below elevation 5,415.0 ft. Figures given herein represent usable contents. Water is used for irrigation and recreation. Records furnished by Montana Department of Natural Resources and Conservation. REVISED RECORDS, WSP 1729: 1960.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 11,650 acre-ft, June 1, 1978, elevation, 5,489.1 ft; no usable storage September through October 1987.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 8,040 acre-ft, June 1, elevation, 5,477.0 ft; minimum contents observed, 300 acre-ft, Oct. 5, estimated.

06079500 GIBSON RESERVOIR.--Lat 47°36'09", long 112°45'39", in NE1/4NW1/4SE1/4 sec.4, T.21 N., R.9 W., Teton County, Hydrologic Unit 10030104, at Gibson Dam on Sun River, 19 mi northwest of Augusta, and at mile 100.8. DRAINAGE AREA, 575 mi². PERIOD OF RECORD, January 1930 to current year. Records prior to October 1940, published only in WSP 1309. April to July 1953 scattered daily elevations and contents, published in WSP 1320-B. May to June 1964 daily elevations and contents, published in WSP 1840-B. Nonrecording gage read daily. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation).

Reservoir is formed by concrete dam with glory-hole spillway completed in 1929. Usable capacity, 99,050 acre-ft, between elevation 4,557.5 ft, bottom of outlet, and 4,724.0 ft, top of glory-hole, by capacity table effective Aug. 1, 1975; see previous reports for superseded figures. Dead storage, 11 acre-ft, below elevation 4,557.5 ft. Figures given herein represent usable contents. Water is used for irrigation and recreation. Records furnished by U.S. Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD: Maximum contents, 116,300 acre-ft, June 8, 1964, elevation, 4,732.23 ft, from floodmark, of which 11,600 acre-ft was uncontrolled storage, by capacity table used Oct. 1, 1965, to July 30, 1975; minimum observed, 11 acre-ft, Oct. 13, 1936, elevation, 4,560.9 ft, by capacity table used prior to 1939.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 98,790 acre-ft, June 21, elevation, 4,723.8 ft; minimum observed, 4,530 acre-ft, Oct. 7, elevation, 4,605.7 ft.

Smaller reservoirs in Missouri River basin in Montana--Continued

06080500 PISHKUN RESERVOIR.--Lat 47°40'36", long 112°29'48", in W1/2 sec.10, T.22 N., R.7 W., Teton County, Hydrologic Unit 10030104, at dam 14 mi northwest of Augusta, and at mile 97.3. PERIOD OF RECORD, January 1936 to current year. Records prior to October 1940, published only in WSP 1309. April to July 1953 scattered daily elevations and contents, published in WSP 1320-B. Nonrecording gage read one or more times a month. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation). This is an off-stream reservoir formed by two earthfill dams completed in 1919. Stored water is diverted from Sun River in sec.36, T.22 N., R.9 W., 18 mi northwest of Augusta. Usable capacity, 30,420 acre-ft, between elevation 4,342.0 ft, bottom of outlet, and 4,370.0 ft, maximum pool. Dead storage, 16,250 acre-ft, below elevation 4,342.0 ft. Prior to 1940, usable capacity varied from 3,600 to 21,750 acre-ft. Figures given herein represent usable contents. Water is used for irrigation, recreation, and wildlife. Records furnished by U.S. Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 32,700 acre-ft, July 4-6, 1953, elevation 4,371.4 ft; no storage October 1939 to March 1940, Oct. 31, 1967.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 30,420 acre-ft, May 22, elevation, 4,370.0 ft; minimum observed, 7,700 acre-ft, Sept. 25, elevation, 4,351.4 ft.

06082000 WILLOW CREEK RESERVOIR.--Lat 47°32'48", long 112°25'45", in SW1/4NW1/4 sec.30, T.21 N., R.6 W., Lewis and Clark County, Hydrologic Unit 10030104, at dam on Willow Creek, 4 mi northwest of Augusta, and at mile 2.8. PERIOD OF RECORD, January 1936 to September 1960 (total contents), October 1960 to current year (usable contents. Records prior to October 1940, published only in WSP 1309. April to July 1953 scattered daily elevations and contents, published in WSP 1320-B. Nonrecording gage read one or more times a month. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation).

Reservoir is formed by earthfill dam completed in 1911. Usable capacity, 32,230 acre-ft between elevation 4,085.28 ft, bottom of outlet, and 4,142.0 ft, maximum pool. Dead storage, 67 acre-ft below elevation 4,085.28 ft. Prior to 1941, total capacity was 16,700 acre-ft. Supplemental water diverted from Sun River in sec.36, T.22 N., R.9 W., 18 mi northwest of Augusta. Figures given herein represent usable contents. Water is used for irrigation, recreation, and wildlife. Records furnished by U.S. Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 35,230 acre-ft, June 22, 1975, elevation, 4,144.0 ft; no storage July 31, Aug. 31, 1940.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 31,510 acre-ft, July 14, elevation, 4,141.5 ft; minimum observed, 7,090 acre-ft, Oct. 1, elevation, 4,118.2 ft.

06083000 NILAN RESERVOIR.--Lat 47°29'06", long 112°32'24", in S1/2NE1/4 sec.18, T.20 N., R.7 W., Lewis and Clark County, Hydrologic Unit 10030104, at north dam, lat 47°28'18", long 112°30'54", in SE1/4NE1/4 sec. 20, T.20 N., R.7 W., at east dam, 6 mi west of Augusta. PERIOD OF RECORD, December 1951 to current year. April to July 1953 scattered daily contents, published in WSP 1320-B. Records for November 1958 to March 1959, published only in WSP 1729. Nonrecording gage read at middle and end of month. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by Montana Department of Natural Resources and Conservation).

This is an offstream reservoir formed by two earthfill dams completed in 1951. Usable capacity, 10,090 acre-ft between elevation 4,402.0 ft, bottom of outlet, and 4,442.5 ft, spillway crest. Dead storage, 900 acre-ft below elevation 4,402.0 ft, not including contents of old lake. Stored water is diverted from Smith Creek in NE1/4 sec.4, T.19 N., R.8 W., and from Ford Creek in SW1/4 sec.26, T.20 N., R.8 W., at points 12 mi and 10 mi, respectively, southwest of Augusta. Figures given herein represent total contents. Water is used for irrigation and recreation. Records furnished by Montana Department of Natural Resources and Conservation.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 13,520 acre-ft, May 31, 1963, elevation, 4,448.5 ft; no contents observed Sept. 8, 1984.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 9,690 acre-ft, May 27, elevation, 4,441.8 ft; minimum observed, 3,030 acre-ft, Jan. 7, elevation, 4,424.2 ft.

06090900 LOWER TWO MEDICINE LAKE.--Lat 48°29'39", long 113°15'49", in NE1/4 sec.34, T.32 N., R.13 W., Glacier County, Hydrologic Unit 10030201, at dam on Two Medicine River, 4 mi northwest of East Glacier. DRAINAGE AREA, 50.2 mi^2. PERIOD OF RECORD, September 1938 to June 1964 (dam destroyed), December 1967 to current year. Figures of no storage prior to April 1961 may be in error and should be used with caution. Records prior to October 1940, published only in WSP 1309. Aprilto July 1953 scattered daily elevations and contents, published in WSP 1320-B. May to June 1964 occasional elevations and contents, published in WSP 1840-B. Prior to 1942, published as Two Medicine Lake near East Glacier. Nonrecording gage read at or near end of month. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation) and is 8.22 ft higher than datum for destroyed dam (levels by Bureau of Indian Affairs).

Reservoir is formed by earthfill dam with concrete spillway and control works; construction began in September 1965, completed in November 1967. Storage began Dec. 1, 1967. Former dam 250 ft upstream completed in 1913 and destroyed by flood of June 8, 1964. Usable capacity at new dam, 11,880 acre-ft between elevation 4,861.0 ft, bottom of outlet, and 4,882.0 ft, spillway crest. Dead storage, about 2,000 acre-ft near upper end of reservoir below elevation 4,861.0 ft. Prior to June 8, 1964, at site and datum then in use, usable capacity was 16,620 acre-ft between elevation 4,848.00 ft elevation of natural outlet, and 4,878.0 ft, spillway crest. Dead storage was unknown. Figures given herein represent usable contents. Water is used for irrigation and recreation. Records furnished by Bureau of Indian Affairs. REVISED RECORDS, WSP 1729: Drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 20,930 acre-ft, June 8, 1964, elevation, 4,883.8 ft, datum and capacity table then in use, dam overtopped; no storage at times in some years.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 12,490 acre-ft, May 1,31, elevation, 4,883.0 ft; minimum contents observed, 7,780 acre-ft, Nov. 3, elevation, 4,876.4 ft.

MISSOURI RIVER BASIN

Smaller reservoirs in Missouri River basin in Montana--Continued

06093000 FOUR HORNS LAKE.--Lat 48°20'33", long 112°41'48", in SW1/4NW1/4SE1/4 sec.19, T.30 N., R.8 W., Glacier County, Hydrologic Unit 10030201, at dam 7 mi northeast of Heart Butte. PERIOD OF RECORD, September 1938 to current year. Records prior to October 1940, published only in WSP 1309 and those for December 1958 to August 1959, published only in WSP 1729. April to July 1953 scattered daily elevations and contents, published in WSP 1320-B. Prior to 1950, published as Four Horns Reservoir near Heart Butte. Nonrecording gage read at or near end of month. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by Bureau of Indian Affairs). This is an offstream reservoir formed by earthfill dam completed in 1932.

Stored water is diverted from Badger Creek in NE1/4 sec.24, T.30 N., R.10 W., 5 mi north of Heart Butte. Usable capacity, 19,250 acre-ft between elevation 4,081.0 ft, gage sill, and 4,115.0 ft, maximum design level. No dead storage. Figures given herein represent usable contents. Water is used for irrigation and recreation. Records furnished by Bureau of Indian Affairs.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 16,320 acre-ft, Aug. 5, 1958, elevation, 4,111.6 ft, from capacity table then in use; minimum observed, 2,840 acre-ft, July 31, 1949, elevation, 4,090.0 ft.

EXTREMES FOR CURRENT YEAR: Maximum contents, 14,050 acre-ft, Sept. 30, interpolated; minimum observed, 6,380 acre-ft, Nov. 3, elevation, 4,098.5 ft.

06094000 SWIFT RESERVOIR.--Lat 48°09'53", long 112°52'20", in NE1/4 sec.27, T.28 N., R.10 W., Pondera County, Hydro-Hydrologic Unit 10030201, at Swift Dam on Birch Creek, 17 mi west of Dupuyer, and at mile 60.5. DRAINAGE AREA, 75.3 mi^2. PERIOD OF RECORD, January 1936 to June 1964 (dam destroyed), June 1967 to current year. Records prior to October 1940, published only in WSP 1309. April to July 1953 scattered daily elevations and contents, published in WSP 1320-B. April to June 1964 scattered daily elevations and contents, published in WSP 1840-B. Prior to 1950, published as Birch Creek Reservoir near Dupuyer. Nonrecording gage read monthly. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation) and is 63.7 ft lower than datum for destroyed dam (levels by Pondera County Canal and Reservoir Co.).

Reservoir is formed by concrete arch dam; construction began in 1965; completed in 1967. Storage began June 22, 1967. Former dam, in same location, was built about 1915 and destroyed by flood of June 8, 1964. Usable capacity at new dam, 29,980 acre-ft between elevation 4,748.0 ft, bottom of outlet, and 4,883.5 ft, spillway crest. Dead storage, 35 acre-ft below elevation 4,808.2 ft, bottom of outlet, and 4,947.0 ft, spillway crest. Figures given herein represent usable contents. Water is used for irrigation. Records furnished by Pondera County Canal and Reservoir Co. REVISED RECORDS, WSP 1729: Drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 34,300 acre-ft, June 8, 1964, elevation, 4,956.3 ft, datum then in use; minimum observed, 20 acre-ft, Sept. 30, 1952, elevation, 4,810.0 ft, datum then in use.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 28,740 acre-ft, June 30, elevation, 4,880.7 ft; minimum, 5,560 acre-ft, Oct. 31, elevation, 4,812.7 ft.

06095500 LAKE FRANCES.--Lat 48°15'48", long 112°12'24", in NE1/4NE1/4 sec.23, T.29 N., R.5 W., Pondera County, Hydrologic Unit 10030203, at dam 3 mi southeast of Valier. PERIOD OF RECORD, January 1936 to current year. Records prior to October 1940, published only in WSP 1309. April to July 1953 scattered daily elevations and contents, published in WSP 1320-B. Nonrecording gage read at or near end of month. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by Pondera County Canal and Reservoir Co.).

This is an offstream reservoir formed by earthfill dam completed about 1931. Stored water is diverted from Birch Creek in sec.28, T.29 N., R.8 W., and Dupuyer Creek in sec.28, T.29 N., R.6 W., at points 20 mi and 6 mi, respectively, west of dam. Usable capacity, 111,900 acre-ft between elevation 3,787.40 ft, outlet sill, and 3,816.00 ft, maximum design level. Dead storage is estimated at 5,000 acre-ft below elevation 3,787.40 ft. Figures given herein represent usable contents. Water is used for irrigation. Records furnished by Pondera County Canal and Reservoir Co.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 111,400 acre-ft, June 4, 1953, elevation, 3,815.92 ft; minimum observed, 4,560 acre-ft, Jan. 31, 1938, elevation, 3,789.36 ft.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 104,300 acre-ft, June 30, elevation, 3,814.60 ft; minimum, 41,640 acre-ft, Jan. 31, elevation, 3,801.05 ft.

06110500 ACKLEY LAKE.--Lat 46°57'19", long 109°55'55", in SE1/4 sec.22, T.14 N., R.14 E., Judith Basin County, Hydrologic Unit 10040103, at dam 4 mi southwest of Hobson. PERIOD OF RECORD, June 1938 to September 1960 (total contents), October 1960 to current year (usable contents). Records prior to October 1939, published only in WSP 1309. Nonrecording gage read usually at or near middle and end of month.

This is an offstream reservoir formed by earthfill dam with concrete conduits completed in 1938. Water is diverted from Judith River near center of east line of sec.14, T.14 N., R.13 E., 7.5 mi west of Hobson. Usable capacity, 5,820 acre-ft between gage height 45.0 ft, bottom of outlet, and 82.67 ft, spillway crest. Dead storage, 325 acre-ft below gage height 45.0 ft. Figures given herein represent usable contents. Water is used for irrigation. Records furnished by Montana Department of Natural Resources and Conservation.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 6,180 acre-ft, May 30, June 30, 1989, elevation, 2,984.1 ft; minimum observed, 784 acre-ft, Aug. 25, 1984, elevation, 2,954.0 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents observed, 6,180 acre-ft, May 30, June 30, elevation, 2,984.1 ft; minimum observed, 2,650 acre-ft, Mar. 31, estimated.

Smaller reservoirs in Missouri River Basin in Montana--Continued

06116500 BAIR RESERVOIR.--Lat 46°34'47", long 110°33'24", in SE1/4SE1/4SW1/4 sec.35, T.10 N., R.9 E., Meagher County, Hydrologic Unit 10040201, at dam on North Fork Musselshell River, 1 mi northwest of Delpine, 14 mi northwest of Martinsdale, and at mile 24.7. DRAINAGE AREA, 48.6 mi^2. PERIOD OF RECORD, November 1939 to September 1960 (total contents), winter records incomplete some years during 1951-59, October 1960 to current year (usable contents). Records for November 1939, published only WSP 1309. Prior to October 1969, published as "Durand Reservoir." Nonrecording gage read at or near middle and end of month. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by Montana Department of Natural Resources and onservation).

Reservoir is formed by earthfill dam with concrete spillway completed in 1939. Usable capacity, 7,000 acre-ft between elevation 5,253.2 ft, bottom of inlet, and 5,325.0 ft, spillway crest. Dead storage, 24 acre-ft below elevation 5,253.2 ft. Supplemental water can be diverted from Checkerboard Creek in S1/2 sec.5, T.9 N., R.9 E., but seldom used. Figures given herein represent usable contents. Water is used for irrigation. Records furnished by Montana Department of Natural Resources and Conservation. REVISED RECORDS, WSP 1729: Drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 7,390 acre-ft, July 1, 1979, elevation, 5,326.3 ft; no storage July 31, 1961, September, October 1984, July to October 1985, and July through October 1988.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 4,390 acre-ft, May 15, elevation, 5,313.6 ft; no contents observed Oct. 5.

06119000 MARTINSDALE RESERVOIR.--Lat 46°27'17", long 110°16'02", in NE1/4NW1/4SE1/4 sec.18, T.8 N., R.12 E., Wheatland County, Hydrologic Unit 10040201, at north dam 2 mi east of Martinsdale, lat 46°26'33", long 110°15'30", in NE1/4 sec.20, T.8 N., R.12 E., at south dam 3 mi southeast of Martinsdale. PERIOD OF RECORD, November 1939 to September 1960 (total contents), winter records incomplete for some years during 1951-59, October 1960 to current year (usable contents). Records for November 1939, published only in WSP 1309. Nonrecording gage read at or near middle and end of month. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by Montana Department of Natural Resources and Conservation).

This is an offstream reservoir formed by two earthfill dams with concrete conduit and spillway completed in 1939. Stored water is diverted from South Fork Musselshell River in N1/2 sec.15, T.8 N., R.11 E., at a point 1 mi west of Martinsdale. Usable capacity, 23,110 acre-ft between elevation 4,714.67 ft, bottom of outlet, and 4,779.0 ft, spillway crest. Dead storage, 73 acre-ft below elevation 4,714.67 ft. South Fork Musselshell River flow above diversion is supplemented at times with return flow from lands irrigated by water diverted from North Fork Musselshell River. Figures given herein represent usable contents. Water is used for irrigation. Records urnished by Montana Department of Natural Resources and Conservation.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 23,910 acre-ft, June 15, 1980, elevation, 4,779.84 ft; no storage July 31, Aug. 31, Sept. 30, Oct. 31, 1961.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 15,090 acre-ft, July 1, elevation, 4,769.8 ft; minimum observed, 195 acre-ft, Feb. 1, elevation, 4,722.4 ft.

06122500 DEADMAN'S BASIN RESERVOIR.--Lat 46°20'24", long 109°24'35", in NE1/4 sec.25, T.7 N., R.18 E., Wheatland County, Hydrologic Unit 10040201, at dam 6 mi east of Shawmut. PERIOD OF RECORD, June 1941 to June 1955 (some contents may be total), July 1955 to current year (usable contents), incomplete 1942, 1951-59. Nonrecording gage read at or near middle and end of month. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by Montana Department of Natural Resources and Conservation).

This is an offstream reservoir formed by earthfill dam completed in 1941. Stored water is diverted from Musselshell River in NW1/4 sec.8, T.7 N., R.17 E., 6 mi northwest of Shawmut. Usable capacity, 72,220 acre-ft between elevation 3,872.0 ft, bottom of outlet, and 3,921.0 ft, maximum design level. Prior to 1958, usable capacity was 52,500 acre-ft at elevation 3,911.0 ft. Dead storage, 4,600 acre-ft below elevation 3,872.0 ft. Figures given herein represent usable contents. Water is used for irrigation. Records furnished by Montana Department of Natural Resources and Conservation.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 73,240 acre-ft, June 7, 1978, elevation, 3,921.5 ft; minimum observed, 3,290 acre-ft, Oct. 31, 1961, elevation, 3,867.3 ft.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 34,470 acre-ft, June 1, elevation, 3,900.8 ft; minimum observed, 7,360 acre-ft, Oct. 1,13,15, Nov. 2, elevation, 3,880.7 ft.

06136500 FRESNO RESERVOIR.--Lat 48°36'04", long 109°56'45", in SE1/4 sec.19, T.33 N., R.14 E., Hill County, Hydrologic Unit 10050002, at dam on Milk River, 13 mi west of Havre and at mile 437.3. DRAINAGE AREA, 3,766 mi^2 of which 670 mi^2 is probably noncontributing. PERIOD OF RECORD, January 1 940 to current year. Records prior to September 1940, published only in WSP 1309. March to May, 1952 daily elevations and contents, published in WSP 1260-B. April to July 1953 scattered daily elevations and contents, published in WSP 1320-B. Records of daily contents in files of Helena district office. Nonrecording gage read daily. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation).

Reservoir is formed by earthfill dam with concrete spillway completed in 1939. Usable capacity, 103,000 acre-ft, between elevation 2,530.00 ft, invert of tunnel inlet, and 2,575.00 ft, spillway crest, from revised capacity table effective Feb. 1, 1983. Elevation of maximum water surface is 2,592.93 ft, 224,700 acre-ft. Crest of dam is 2,596.10 ft. There are no gates in the spillway. Dead storage, 544 acre-ft, below elevation 2,530.00 ft. Figures given herein represent usable contents. Water is used for irrigation and recreation. Records furnished by U.S. Bureau of Reclamation. REVISED RECORDS, WSP 1729: Drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 154,000 acre-ft, Apr. 3, 1952, elevation, 2,579.3 ft, of which 26,800 acre-ft was uncontrolled storage, capacity table then in use; no storage Feb. 18 to Mar. 6, 1950.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 75,570 acre-ft, May 20, elevation, 2,568.55 ft; minimum observed, 4,000 acre-ft, Mar. 9, elevation, 2,536.56 ft.

Smaller reservoirs in Missouri River Basin in Montana--Continued

06155000 NELSON RESERVOIR.--Lat 48°31'42", long 107°31'00", in SE1/4 sec.14, T.32 N., R.32 E., Phillips County, Hydrologic Unit 10050004, at dam 10 mi northwest of Saco. PERIOD OF RECORD, March 1928 to current year. Records prior to October 1940, published only in WSP 1309. Nonrecording gage read on first and last day of month and more often during high stages. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation).

This is an offstream reservoir formed by earthfill dam completed in 1922. Stored water is diverted from Milk River at Dodson Dam in SE1/4 sec.26, T.31 N., R.26 E., 6 mi west of Dodson. Usable capacity, 60,570 acre-ft, between elevation 2,200 ft, gage sill, and 2,221.6 ft, top of active conservation pool. Dead storage, 18,650 acre-ft below elevation 2,200.0 ft. Reservoir has never been operated to maximum capacity which is 66,800 acre-ft at elevation 2,223.0 ft, maximum design level. Figures given herein represent usable contents. Water is used for irrigation, recreation, and wildlife. Records furnished by U.S. Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 60,570 acre-ft, July 12-14, 1965, elevation, 2,221. ft; minimum observed, 842 acre-ft, Aug. 31, 1984, elevation, 2,200.5 ft.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 37,030 acre-ft, Sept. 30, elevation, 2,215.60 ft; minimum observed, 2,950 acre-ft, Feb. 28, elevation, 2,201.70 ft.

06204000 MYSTIC LAKE.--Lat 45°13'30", long 109°45'36", in sec.9, T.7 S., R.16 E., (unsurveyed), Stillwater County, Hydrologic Unit 10070005, at dam on West Rosebud Creek, 15 mi southwest of Roscoe, 25 mi southwest of Absarokee and at mile 28.8. DRAINAGE AREA, 46.9 mi^2. PERIOD OF RECORD, January 1936 to current year. Records prior to September 1939, published only in WSP 1309. Record of daily elevations since October 1965 available in files of Helena district office. Water-stage recorder. Prior to October 1965, only monthend figures furnished. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by The Montana Power Co.).

Reservoir is formed by thin-section reinforced concrete arch dam completed in 1925. Usable capacity, 21,000 acre-ft between elevation 7,612.00 ft, minimum operating level, and 7,673.50 ft, top of 3.5 ft stop logs. No dead storage. Figures given herein represent usable contents. Water is used for power development and recreation. Records furnished by The Montana Power Co. REVISED RECORDS, WSP 1916: Drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 21,130 acre-ft, July 10, 1983, elevation, 7,673.8 ft; no storage most days Mar. 23 to May 5, 1981, Apr. 10 to May 19, 1982, May 4, 5, 1983, May 14, 1984, Mar. 23, 26, 27, 1986, and Apr. 8-11, 1988.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 21,090 acre-ft, July 23, elevation, 7,673.69 ft; minimum, 505 acre-ft, Apr. 18, elevation, 7,613,80 ft.

06212000 COONEY RESERVOIR.--Lat 45°26'47", long 109°11'57", in N1/2NE1/4 sec.36, T.4 S., R.20 E., Carbon County, Hydrologic Unit 10070006, at dam on Red Lodge Creek, 1 mi upstream from Cottonwood Creek, 6.6 mi west of Boyd, and at mile 12.0. DRAINAGE AREA, 206 mi^2. PERIOD OF RECORD, May 1937 to September 1960 (total contents), incomplete 1954-60, October 1960 to current year (usable contents). Records prior to October 1939, published only in WSP 1309. Nonrecording gage read at or near middle and end of month. Datum of gage is at National Geodetic Vertical Datum of 1929.

Reservoir is formed by earthfill dam with concrete spillway completed in 1936. Usable capacity, 27,400 acre-ft between elevation 4,175.0 ft, bottom of tunnel, and 4,250.0 ft, top of 4 ft flashboards. Dead storage, 90 acre-ft below elevation 4,175.0 ft. Figures given herein represent usable contents. Water is used for irrigation. Records furnished by Montana Department of Natural Resources and Conservation. REVISED RECORDS, WSP 1729: Drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 28,140 acre-ft, May 31, 1987, elevation, 4,251.0 ft; no contents observed Sept. 30, 1960, Oct. 31, 1981 through Feb. 28, 1982.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 25,370 acre-ft, June 15, elevation, 4,247.80 ft; minimum, 11,110 acre-ft, Oct. 1, interpolated.

06307000 TONGUE RIVER RESERVOIR.--Lat 45°07'48", long 106°46'13", in SE1/4SE1/4NE1/4 sec.13, T.8 W., R.40 E., Big Horn County, Hydrologic Unit 10090101, at dam on Tongue River, 4 mi upstream from Post Creek, 7 mi northeast of Decker, and at mile 189.1. DRAINAGE AREA, 1,770 mi^2. PERIOD OF RECORD, December 1938 to current year. Record prior to September 1939, published only in WSP 1309 and those for January, February 1956, published only in WSP 1729. Nonrecording gage read daily but only weekly readings supplied. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation).

Reservoir is formed by earthfill dam with concrete spillway completed in May 1939. Usable capacity, 68,040 acre-ft between elevation 3,374.4 ft, bottom of outlet, and 3,424.4 ft, spillway crest. Prior to October 1947, usable contents was 73,950 acre-ft at same elevations, due to sedimentation study. Dead storage, 1,400 acre-ft below elevation, 3,374.4 ft. Figures given herein represent usable contents. Water is used for irrigation. Records furnished by Montana Department of Natural Resources and Conservation. REVISED RECORDS, WSP 1309: 1947-50. WSP 1729: 1951, drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 77,040 acre-ft, May 26, 1978, elevation, 3,426.8 ft, from extension of rating curve; no storage October 1939 to February 1940.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 48,240 acre-ft, June 29 to July 1, elevation, 3,417.9 ft; minimum observed, 19,940 acre-ft, Sept. 30, elevation, 3,403.1 ft.

Smaller reservoirs in Missouri River basin in Montana--Continued

Monthend contents, in acre-feet, water year October 1988 to September 1989

Date	Lima Reservoir	Ruby River Reservoir	Willow Creek Reservoir	Hebgen Lake	Ennis Lake	Middle Creek Reservoir	Helena Valley Reservoir
Sept. 30	5,110	c1,500	b3,040	314,400	36,740	3,020	6,780
Oct. 31	6,380	c6,000	b3,610	308,500	36,550	3,170	5,940
Nov. 30	7,730	b11,500	b4,000	297,500	30,480	4,560	5,400
Dec. 31	8,760	b16,450	b5,570	265,100	28,320	4,940	5,120
Jan. 31	9,820	a21,180	b7,220	266,300	31,020	3,900	4,890
Feb. 28	11,010	b24,810	b11,230	263,200	30,840	4,040	4,550
Mar. 31	13,160	a29,810	b16,140	264,500	30,840	4,310	3,760
Apr. 30	32,100	36,480	b17,730	259,700	32,460	5,040	8,190
May 31	36,090	37,520	b17,730	318,400	35,800	7,490	7,140
June 30	16,130	27,760	b16,140	374,700	37,690	8,260	6,850
July 31	4,090	16,220	b10,080	376,900	37,120	6,080	7,290
Aug. 31	4,540	a6,650	b6,910	352,900	37,690	3,340	7,340
Sept. 30	6,100	c1,800	b5,570	329,500	37,120	3,080	5,150

Date	Lake Helena	Hauser Lake	Holter Lake	Smith River Reservoir	Gibson Reservoir	Pishkun Reservoir	Willow Creek Reservoir
Sept. 30	10,890	52,150	81,440	a395	6,540	11,100	7,090
Oct. 31	10,890	52,150	80,490	b739	10,300	19,290	8,160
Nov. 30	10,890	52,150	80,970	b1,060	13,910	20,200	16,990
Dec. 31	10,670	51,780	80,020	a1,440	17,390	19,940	22,800
Jan. 31	10,890	52,150	80,640	b1,470	24,740	19,680	22,940
Feb. 28	10,670	51,780	78,300	b1,520	30,200	19,420	23,080
Mar. 31	10,890	52,150	78,110	b2,810	38,230	19,940	24,440
Apr. 30	10,670	51,780	80,490	b5,700	79,560	19,810	25,120
May 31	11,110	52,520	80,540	b8,040	80,400	27,170	29,620
June 30	10,890	52,150	80,160	b6,620	98,140	21,620	31,070
July 31	10,890	52,150	81,350	b3,860	69,430	18,910	29,910
Aug. 31	10,890	52,150	80,730	b1,460	65,620	12,310	29,200
Sept. 30	10,670	51,780	81,110	b1,190	70,990	7,700	29,480

Date	Nilan Reservoir	Lower Two Medicine Lake	Four Horns Lake	Swift Reservoir	Lake Frances	Ackley Lake	Bair Reservoir
Sept. 30	c2,800	a8,050	a 6,600	6,180	45,150	a2,840	0
Oct. 31	--	a7,810	a 6,380	5,560	42,860	---	b142
Nov. 30	--	a10,710	a12,600	7,700	42,260	---	b312
Dec. 31	c3,000	11,880	13,980	9,840	41,800	---	a550
Jan. 31	a3,400	11,880	13,980	11,610	41,640	---	b599
Feb. 28	a3,960	c11,880	c13,980	13,050	41,840	---	b626
Mar. 31	a4,580	11,880	13,980	14,700	45,640	c2,650	b1,200
Apr. 30	a6,330	b12,490	b13,980	12,230	64,510	3,520	b3,020
May 31	--	12,490	a12,910	19,330	80,530	a6,180	b3,730
June 30	--	12,190	11,840	28,740	104,300	6,180	b4,150
July 31	--	a11,760	13,240	20,620	94,090	b4,480	b3,650
Aug. 31	b7,720	a12,090	a13,480	16,320	95,570	a3,930	b3,510
Sept. 30	a7,800	a11,980	a14,050	14,240	96,290	b4,170	b2,780

Date	Martinsdale Reservoir	Deadman's Basin Reservoir	Fresno Reservoir	Nelson Reservoir	Mystic Lake	Cooney Reservoir	Tongue River Reservoir
Sept. 30	a248	b7,360	15,850	5,550	19,860	10,980	b21,900
Oct. 31	b236	a7,360	13,160	6,320	19,540	b14,880	27,740
Nov. 30	b221	b9,150	10,810	4,980	13,000	a16,390	b33,800
Dec. 31	a211	a10,630	8,420	4,230	7,640	a18,030	b37,220
Jan. 31	b195	a12,760	6,600	3,680	5,580	19,220	b39,120
Feb. 28	c200	a15,430	4,580	2,950	2,250	b19,930	b37,010
Mar. 31	b269	b20,140	32,210	8,310	1,130	b21,220	b39,340
Apr. 30	b5,260	a26,820	60,500	20,440	853	22,890	b35,400
May 31	b14,870	b34,470	74,080	35,260	5,010	b24,520	42,250
June 30	b15,090	b30,270	69,840	33,190	20,510	24,380	b48,240
July 31	b11,210	11,920	b45,720	26,630	20,920	24,400	b34,400
Aug. 31	b7,310	b11,310	31,550	29,420	19,120	a21,730	28,930
Sept. 30	b7,710	a13,030	48,680	37,030	17,510	17,430	19,940

a Interpolated.
b Figure of contents for first day of following month.
c Estimate.

LITTLE MISSOURI RIVER BASIN

06334500 LITTLE MISSOURI RIVER AT CAMP CROOK, SD

LOCATION.--Lat 45°32'49", long 103°58'23", in SW1/4 sec.2, T.18 N., R.1 E., Harding County, Hydrologic Unit 10110201, on left bank 15 ft upstream from bridge on State Highway 20 at east edge of Camp Crook.

DRAINAGE AREA.--1,970 mi^2, approximately.

PERIOD OF RECORD.--September 1903 to November 1906, May 1956 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS.--WSP 1309: 1904. WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,108.98 ft above National Geodetic Vertical Datum of 1929. Sept. 2, 1903, to Nov. 30, 1906, nonrecording gage at site 0.5 mi upstream at different datum. May 1956 to Oct. 8, 1957, nonrecording gage at site 15 ft downstream, and Oct. 9, 1957, to Sept. 30, 1976, water-stage recorder at present site both at datum 2.00 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Small diversions upstream from station for irrigation. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--36 years, 127 ft^3/s, 92,000 acre-ft/yr; median of yearly mean discharges, 110 ft^3/s, 79,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,420 ft^3/s, Mar. 24, 1978, gage height, 16.90 ft, present datum; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of 1952 reached a stage of about 18 ft, present datum, from local residents.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 4	1100	*1,530	*8.27	No other peak greater than base discharge.			

Minimum daily discharge, 0.35 ft^3/s, Feb. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.3	2.6	2.8	1.2	e2.0	e2.5	194	671	22	16	12	1.3
2	1.6	2.8	2.9	1.4	e1.0	e2.4	131	962	21	14	9.5	1.7
3	1.6	2.5	2.4	1.5	e.35	e2.4	92	1130	20	16	8.1	.79
4	8.1	2.4	2.2	1.1	e.40	e2.3	70	1460	18	11	7.0	1.1
5	8.3	2.5	2.4	1.1	e.60	e2.2	63	1230	15	6.9	5.6	.98
6	4.3	2.3	2.7	1.1	e.80	e2.4	53	496	13	6.7	6.1	.72
7	2.7	2.5	2.0	e1.0	e1.0	e2.7	48	416	11	3.5	5.5	.47
8	2.9	2.6	2.1	e.80	e.80	e3.0	43	358	9.6	2.4	4.3	.49
9	2.5	2.8	1.7	e.60	e1.2	e3.5	35	262	11	1.5	4.1	.41
10	1.9	2.7	1.7	e.80	e1.6	e4.0	25	176	12	3.7	3.7	.45
11	1.9	2.8	1.7	e1.0	e1.6	e4.5	28	117	14	3.9	3.0	.74
12	1.7	2.7	2.1	e1.2	e1.8	e4.0	26	83	13	2.8	2.2	.47
13	1.7	3.0	2.2	e1.2	e2.0	e3.8	23	71	10	5.9	1.7	.47
14	1.7	3.0	e2.1	e1.1	e1.8	e3.6	20	60	11	277	1.4	.83
15	1.7	2.7	e1.8	e1.0	e1.6	e3.4	19	345	11	113	1.4	.89
16	1.7	2.4	1.6	e1.4	e1.4	e3.2	16	454	9.4	460	1.1	.66
17	2.8	2.8	1.5	e1.8	e1.4	e3.0	12	372	10	597	1.2	.41
18	2.5	2.8	1.6	e2.0	e1.6	e3.2	13	345	8.1	500	.94	.42
19	3.4	2.9	1.7	e2.2	e1.8	e3.3	13	220	6.6	320	1.1	.42
20	2.8	2.5	1.7	e2.1	e2.1	e3.4	12	194	5.6	243	1.6	2.2
21	2.8	3.3	1.4	e2.0	e2.3	e3.5	11	158	6.4	145	1.5	2.4
22	2.6	3.1	1.6	e2.2	e2.2	e3.7	9.7	117	7.7	91	1.3	.71
23	2.7	3.5	e1.3	e2.2	e2.4	e4.0	8.8	87	9.5	63	1.4	.90
24	2.3	3.5	1.1	e2.0	e2.8	e4.5	8.0	65	9.2	48	1.1	1.2
25	2.5	2.4	e1.0	e1.8	e3.1	e5.0	7.9	52	25	39	1.0	1.2
26	2.4	3.1	e.65	e1.9	e3.0	e10	10	47	13	32	1.0	1.2
27	2.1	e2.6	e.76	e2.0	e2.8	e30	19	42	9.7	27	.99	1.5
28	1.9	2.8	.81	e2.1	e2.6	e145	258	38	7.6	22	1.4	1.7
29	2.1	3.0	.80	e2.2	---	469	144	34	6.3	19	1.3	1.6
30	2.6	2.8	1.1	e2.4	---	569	155	30	15	16	.97	1.5
31	2.8	---	1.1	e2.5	---	338	---	25	---	17	1.0	---
TOTAL	84.9	83.4	52.52	48.90	48.05	1644.5	1567.4	10117	360.7	3123.3	94.50	29.83
MEAN	2.74	2.78	1.69	1.58	1.72	53.0	52.2	326	12.0	101	3.05	.99
MAX	8.3	3.5	2.9	2.5	3.1	569	258	1460	25	597	12	2.4
MIN	1.6	2.3	.65	.60	.35	2.2	7.9	25	5.6	1.5	.94	.41
AC-FT	168	165	104	97	95	3260	3110	20070	715	6200	187	59

CAL YR 1988 TOTAL 3230.31 MEAN 8.83 MAX 113 MIN .00 AC-FT 6410
WTR YR 1989 TOTAL 17255.00 MEAN 47.3 MAX 1460 MIN .35 AC-FT 34230

e Estimated

LITTLE MISSOURI RIVER BASIN

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^2, 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 above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 1-9 and 14-21. Water-discharge records fair.

AVERAGE DISCHARGE.--6 years (water years 1978-83), 33.3 ft^3/s, 24,130 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,720 ft^3/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, 966 ft^3/s, Mar. 11, gage height, 11.55 ft; no flow for many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1					.00	e.00	85	21	108	6.1	.00	.00
2					.00	e.00	64	27	62	11	.00	.00
3					.00	e.00	60	48	43	8.4	.00	.00
4					.00	e.00	55	87	32	6.5	.00	.00
5					.00	e.00	48	80	24	4.9	.00	.00
6					.00	e.00	41	62	19	3.8	.00	.00
7					.00	e1.0	37	45	16	3.1	.00	.00
8					.00	e50	34	34	14	2.8	.00	.00
9					.00	e140	30	29	12	2.4	.00	.00
10					.00	772	28	25	9.7	2.7	.00	.00
11					.00	807	26	23	9.7	3.7	.00	.00
12					.00	499	25	21	9.3	3.6	.00	.00
13					.00	333	23	19	7.9	3.1	.00	.00
14					.00	e185	21	18	7.2	3.0	.00	.00
15					.00	e70	19	17	6.3	3.1	.00	.00
16					.00	e60	18	15	5.4	2.9	.00	.00
17					.00	e50	18	15	5.3	2.2	.00	.00
18					.00	e45	17	13	5.2	1.9	.00	.00
19					.00	e50	16	11	4.8	1.8	.00	.00
20					.00	e45	15	10	4.7	1.5	.00	.00
21					.00	e50	14	9.5	5.3	1.1	.00	.00
22					.00	52	13	9.2	5.9	.83	.00	.00
23					.00	52	12	8.5	6.3	.59	.00	.00
24					.00	47	12	7.6	6.5	.37	.00	.00
25					.00	45	12	7.5	6.8	.26	.00	.00
26					.00	45	12	8.3	6.8	.11	.00	.00
27					.00	45	17	8.4	6.7	.04	.00	.00
28					.00	58	21	7.7	6.3	.0	.00	.00
29					---	142	22	11	7.1	.00	.00	.00
30					---	175	20	352	7.0	.00	.00	.00
31					---	115	---	209	---	.00	.00	---
TOTAL					0.00	3933.00	835	1258.7	470.2	81.80	0.00	0.00
MEAN					.00	127	27.8	40.6	15.7	2.64	.00	.00
MAX					.00	807	85	352	108	11	.00	.00
MIN					.00	.00	12	7.5	4.7	.00	.00	.00
AC-FT					.0	7800	1660	2500	933	162	.0	.0

e - Estimated

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 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (STAND-ARD UNITS) (00400)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD-SORP-TION RATIO (00931)
MAR												
09...	1150	59	360	8.05	5.5	0.5	100	23	11	25	30	1
27...	1255	44	1220	--	6.5	1.0	--	--	--	--	--	--
APR												
10...	1210	29	1750	--	6.5	4.0	--	--	--	--	--	--
MAY												
15...	1200	17	1940	--	26.0	18.0	--	--	--	--	--	--
JUN												
21...	1000	4.9	2100	--	26.5	20.0	--	--	--	--	--	--
JUL												
25...	0910	0.29	2420	8.70	28.0	22.5	450	34	88	400	65	8

DATE	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	BICAR-BONATE, FET-LAB (MG/L AS HCO3) (95440)	CAR-BONATE, FET-LAB (MG/L AS CO3) (95445)	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)
MAR												
09...	17	140	0	114	2.0	71	4.9	0.10	9.6	274	230	0.37
JUL												
25...	13	280	23	270	0.9	1000	11	0.20	0.70	1760	1730	2.39

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	LEAD, DIS-SOLVED (UG/L AS PB) (01049)	LITHIUM DIS-SOLVED (UG/L AS LI) (01130)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	MERCURY DIS-SOLVED (UG/L AS HG) (71890)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO) (01060)	SELE-NIUM, DIS-SOLVED (UG/L AS SE) (01145)	STRON-TIUM, DIS-SOLVED (UG/L AS SR) (01080)
MAR											
09...	43.8	1	90	170	1	6	80	0.1	1	<10	140
JUL											
25...	1.38	1	840	50	1	70	10	0.1	2	1	570

KOOTENAI RIVER BASIN

12300110 LAKE KOOCANUSA AT INTERNATIONAL BOUNDARY

LOCATION.--Lat 48°59'44", long 115°10'43", in NE1/4SW1/4SE1/4 sec.1, T.37 N., R.28 W., Lincoln County, Hydrologic Unit 17010101, 0.3 mi south of international boundary, in middle of old channel 1.9 mi upstream from Young Creek, and 6.4 mi north of Rexford.

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	SAMPLING DEPTH (FEET) (00003)	WEATHER (WMO CODE NUMBER) (00041)	TEMPERATURE AIR (DEG C) (00020)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT											
13...	1000	10.0	3	8.5	1.9	<0.100	--	0.40	<0.002	0.006	1.6
13...	1035	98.0	3	--	3.7	<0.100	--	0.30	0.002	0.006	1.3
JUN											
15...	0930	10.0	3	15.0	4.5	<0.100	<0.100	<0.20	<0.001	<0.001	1.7
15...	1030	100	3	--	5.1	0.100	0.170	<0.20	<0.001	<0.001	1.0
JUL											
20...	0900	10.0	1	20.0	3.3	<0.100	--	<0.20	<0.001	<0.001	1.9
20...	1000	137	1	--	5.2	0.200	--	<0.20	<0.001	<0.001	1.6
AUG											
16...	0900	10.0	3	12.0	2.7	<0.100	<0.100	<0.20	<0.011	<0.001	1.6
16...	1000	131	3	--	5.1	0.200	0.170	<0.20	<0.001	<0.001	1.6
SEP											
13...	0930	10.0	40	8.0	3.3	<0.100	--	0.30	0.004	<0.001	1.4
13...	1030	132	40	--	5.7	0.200	--	<0.20	0.003	0.001	1.8

DATE	TIME	SAMPLING DEPTH (FEET) (00003)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)
JUN								
15...	0930	10.0	96	10	27	7.0	1.7	0.1
15...	1030	100	110	15	31	8.3	2.3	0.1
AUG								
16...	0900	10.0	100	10	28	7.5	2.0	0.1
16...	1000	131	110	14	31	7.9	2.1	0.1

DATE	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)
JUN							
15...	0.40	86	13	3.4	0.10	109	0.15
15...	0.50	97	17	2.1	0.10	125	0.17
AUG							
16...	0.50	91	14	1.6	0.10	111	0.15
16...	0.50	96	13	1.7	0.10	120	0.16

KOOTENAI RIVER BASIN

12300110 LAKE KOOCANUSA AT INTERNATIONAL BOUNDARY--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SAMPLING DEPTH (FEET) (00003)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	LIGHT INCIDENT PERCENT REMAINING AT DEPTH (00031)	LIGHT TRANSMISSION 1 METER PATHLENGTH (%) (00074)
OCT							
13...	0.0	243	8.4	14.9	9.4	100	27
13...	0.50	--	--	--	--	90	--
13...	2.00	241	8.4	14.9	9.4	--	24
13...	2.60	--	--	--	--	60	--
13...	5.00	240	8.4	14.9	9.4	--	24
13...	10.0	237	8.4	14.9	9.4	--	25
13...	10.8	--	--	--	--	30	--
13...	15.0	236	8.4	14.9	9.4	--	25
13...	19.7	--	--	--	--	15	--
13...	20.0	234	8.4	14.9	9.4	--	25
13...	25.0	233	8.4	14.9	9.4	--	25
13...	30.0	232	8.4	14.9	9.5	--	25
13...	32.8	--	--	--	--	5.0	--
13...	40.0	230	8.4	14.9	9.5	--	24
13...	50.0	229	8.4	14.9	9.5	--	24
13...	50.2	--	--	--	--	1.0	--
13...	60.0	238	8.3	14.5	9.4	--	16
13...	70.0	244	8.2	14.1	9.4	--	15
13...	75.5	--	--	--	--	0.1	--
13...	80.0	257	8.1	13.0	9.4	--	4.1
13...	90.0	263	8.2	12.6	9.5	--	2.6
13...	98.0	265	8.2	12.5	9.6	--	1.7
13...	100	265	8.2	12.5	9.6	--	1.7
13...	108	265	8.2	12.5	9.6	--	0.81
JUN							
15...	0.0	195	8.5	16.2	10.0	100	0.81
15...	0.50	--	--	--	--	90	--
15...	1.60	--	--	--	--	60	--
15...	2.00	194	8.4	16.2	10.1	--	0.71
15...	3.90	--	--	--	--	30	--
15...	5.00	192	8.4	15.7	10.0	--	0.53
15...	6.00	--	--	--	--	15	--
15...	9.60	--	--	--	--	5.0	--
15...	10.0	187	8.4	15.2	9.9	--	0.28
15...	13.8	--	--	--	--	1.0	--
15...	15.0	182	8.3	14.5	9.7	--	0.10
15...	15.6	--	--	--	--	0.1	--
15...	20.0	176	8.3	14.0	9.7	--	<0.01
15...	25.0	172	8.2	12.8	9.8	--	<0.01
15...	30.0	168	8.2	12.0	9.7	--	<0.01
15...	35.0	165	8.2	11.7	9.8	--	<0.01
15...	40.0	164	8.2	11.7	10.0	--	<0.01
15...	45.0	163	8.2	11.6	10.0	--	<0.01
15...	50.0	162	8.2	11.6	10.0	--	<0.01
15...	60.0	161	8.3	11.4	10.0	--	<0.01
15...	70.0	164	8.3	10.8	10.0	--	<0.01
15...	80.0	164	8.3	10.5	10.0	--	<0.01
15...	90.0	164	8.4	10.1	10.0	--	<0.01
15...	100	180	8.3	9.2	9.8	--	<0.01
15...	110	180	8.3	9.2	9.8	--	<0.01

12300110 LAKE KOOCANUSA AT INTERNATIONAL BOUNDARY--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SAMPLING DEPTH (FEET) (00003)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	LIGHT INCIDENT PERCENT REMAINING AT DEPTH (00031)	LIGHT TRANSMISSION 1 METER PATHLENGTH (%) (00074)
JUL							
20...	0.0	191	8.7	20.4	5.6	100	7.9
20...	0.50	--	--	--	--	90	--
20...	2.00	190	8.7	20.3	6.8	--	7.9
20...	3.90	--	--	--	--	60	--
20...	5.00	188	8.7	20.3	8.3	--	7.3
20...	8.20	--	--	--	--	30	--
20...	10.0	188	8.7	19.2	9.8	--	6.3
20...	13.1	--	--	--	--	15	--
20...	15.0	190	8.5	18.5	9.5	--	18
20...	20.0	190	8.5	18.1	9.5	--	24
20...	23.3	--	--	--	--	5.0	--
20...	25.0	188	8.5	17.7	9.5	--	24
20...	30.0	188	8.5	17.5	9.6	--	21
20...	35.0	187	8.4	16.5	9.5	--	27
20...	40.0	194	8.3	16.1	9.6	--	30
20...	42.7	--	--	--	--	1.0	--
20...	45.0	195	8.4	15.9	9.9	--	33
20...	50.0	197	8.3	15.5	10.0	--	35
20...	60.0	197	8.3	14.3	10.1	--	23
20...	70.0	196	8.3	13.9	10.4	--	18
20...	80.0	189	8.2	12.7	10.2	--	11
20...	90.0	185	8.2	11.0	10.3	--	7.3
20...	100	192	8.2	10.1	10.1	--	3.8
20...	110	193	8.2	9.9	9.8	--	1.3
20...	120	196	8.1	9.7	9.7	--	0.92
20...	130	198	8.1	9.6	9.6	--	0.81
20...	137	204	8.1	9.0	9.2	--	0.33
20...	147	204	8.1	8.9	9.2	--	0.33
AUG							
16...	0.0	199	8.7	20.9	8.7	100	28
16...	0.50	--	--	--	--	90	--
16...	2.00	199	8.7	20.9	8.7	--	28
16...	5.00	198	8.7	20.9	8.7	--	28
16...	6.20	--	--	--	--	60	--
16...	10.0	198	8.7	20.9	8.7	--	28
16...	15.0	197	8.7	20.9	8.7	--	24
16...	15.4	--	--	--	--	30	--
16...	20.0	197	8.7	20.8	8.7	--	23
16...	22.6	--	--	--	--	15	--
16...	25.0	196	8.7	20.7	8.7	--	17
16...	30.0	195	8.6	19.5	8.8	--	19
16...	35.0	197	8.5	18.5	8.6	--	18
16...	35.4	--	--	--	--	5.0	--
16...	40.0	199	8.3	17.5	8.2	--	20
16...	45.0	209	8.1	17.0	7.9	--	28
16...	50.0	214	8.1	17.0	7.8	--	32
16...	60.0	216	8.0	15.7	7.6	--	25
16...	65.6	--	--	--	--	1.0	--
16...	70.0	202	7.9	14.2	7.6	--	18
16...	75.0	189	7.8	12.6	7.8	--	21
16...	80.0	188	7.7	12.3	7.9	--	16
16...	90.0	188	7.6	11.4	7.8	--	21
16...	100	190	7.6	11.1	7.8	--	21
16...	110	192	7.6	10.6	7.8	--	19
16...	120	197	7.6	10.1	7.8	--	13
16...	131	199	7.8	9.8	7.9	--	4.5
16...	141	199	7.8	9.8	7.9	--	--

KOOTENAI RIVER BASIN

12300110 LAKE KOOCANUSA AT INTERNATIONAL BOUNDARY--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SAMPLING DEPTH (FEET) (00003)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	LIGHT INCIDENT PERCENT REMAINING AT DEPTH (00031)	LIGHT TRANSMISSION 1 METER PATHLENGTH (%) (00074)
SEP							
13...	0.0	206	8.5	16.7	8.6	100	28
13...	0.50	--	--	--	--	90	--
13...	2.00	207	8.6	16.7	8.8	--	28
13...	5.00	208	8.6	16.7	9.1	--	32
13...	6.00	--	--	--	--	60	--
13...	10.0	209	8.6	16.7	9.1	--	28
13...	14.0	--	--	--	--	30	--
13...	15.0	209	8.6	16.7	9.1	--	28
13...	20.0	208	8.6	16.7	9.2	--	28
13...	22.5	--	--	--	--	15	--
13...	25.0	207	8.6	16.7	9.1	--	28
13...	30.0	206	8.5	16.7	9.1	--	28
13...	37.1	--	--	--	--	5.0	--
13...	40.0	206	8.5	16.7	9.1	--	28
13...	45.0	209	8.5	16.5	8.7	--	32
13...	50.0	214	8.2	16.1	8.0	--	32
13...	55.0	217	8.3	15.1	8.4	--	24
13...	59.1	--	--	--	--	1.0	--
13...	60.0	217	8.3	14.9	8.7	--	21
13...	70.0	217	8.3	14.7	8.6	--	21
13...	80.0	218	8.3	14.4	8.8	--	18
13...	90.0	222	8.2	13.7	8.6	--	7.3
13...	100	222	8.1	13.6	8.4	--	7.3
13...	105	209	7.9	12.8	7.2	--	7.3
13...	110	208	7.7	11.9	6.2	--	7.3
13...	115	204	7.6	11.0	6.2	--	7.3
13...	120	203	7.6	10.4	6.3	--	4.5
13...	130	207	7.6	9.8	6.3	--	1.5
13...	132	207	7.6	9.6	6.3	--	1.5
13...	142	210	7.6	9.5	6.3	--	1.5

KOOTENAI RIVER BASIN

12301300 TOBACCO RIVER NEAR EUREKA, MT

LOCATION.--Lat 48°53'37", long 115°05'13", in NW1/4SE1/4SE1/4 sec.9, T.36 N., R.27 W., Lincoln County, Hydrologic Unit 17010101, on right bank 0.2 mi upstream from Indian Creek, 1.8 mi northwest of Eureka, and 2.8 mi upstream from Lake Koocanusa flow line.

DRAINAGE AREA.--440 mi^2.

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Datum of gage is 2,518.85 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Dec. 23 to Feb. 26, Mar. 1-4. Records good except those for estimated daily discharges, which are poor. Diversions for irrigation of about 4,500 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--31 years, 261 ft^3/s, 8.05 in/yr, 189,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,470 ft^3/s, June 18, 1974, gage height, 6.86 ft; maximum gage height, 7.12 ft, May 27, 1961; minimum daily discharge, 20 ft^3/s, Jan. 11, 1963.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of about May 22, 1948, reached a discharge of 2,810 ft^3/s, from slope-area measurement of peak flow at site 1.5 mi downstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,350 ft^3/s, Apr. 22, gage height, 5.08 ft; minimum, 31 ft^3/s, Feb. 1, gage height, 1.88 ft, result of the freezeup.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40	88	84	e54	e40	e54	142	698	600	349	104	137
2	39	88	84	e56	e35	e52	135	802	700	342	102	187
3	38	100	82	e58	e40	e50	125	919	775	321	104	210
4	38	106	77	e62	e42	e52	128	966	807	300	104	198
5	37	106	73	e60	e47	55	128	931	829	287	100	210
6	35	130	78	e56	e50	60	173	984	902	274	94	216
7	35	152	78	e50	e50	73	243	1140	972	261	88	207
8	35	140	77	e48	e49	66	335	1290	954	249	92	195
9	35	128	77	e49	e50	91	357	1250	954	240	96	192
10	35	119	77	e50	e50	296	314	1210	914	255	114	189
11	37	119	75	e52	e52	149	307	1130	851	237	108	178
12	37	114	77	e52	e54	147	332	948	781	216	104	170
13	38	112	98	e52	e54	144	390	813	754	216	102	165
14	37	106	98	e52	e52	149	479	728	770	219	98	160
15	39	102	77	e52	e52	137	619	673	754	204	100	152
16	130	100	82	e52	e52	123	807	683	749	201	92	144
17	195	98	70	e54	e50	108	797	728	673	201	94	144
18	149	98	78	e56	e54	106	643	744	605	190	88	149
19	130	96	78	e56	e56	112	663	708	581	184	86	152
20	116	94	82	e54	e58	114	818	638	549	184	86	147
21	102	94	80	e54	e60	114	1080	577	514	178	96	140
22	86	96	82	e52	e58	114	1280	545	475	167	112	135
23	80	104	e78	e52	e60	114	1220	596	454	160	110	132
24	75	108	e72	e48	e60	110	978	668	438	152	142	125
25	73	102	e64	e52	e58	119	838	638	442	144	181	123
26	92	98	e50	e52	e56	125	818	586	438	135	173	121
27	96	84	e52	e54	52	128	813	572	422	132	178	119
28	96	88	e54	e52	55	137	739	563	402	125	170	116
29	90	90	e56	e54	---	147	663	558	379	114	165	114
30	94	88	e58	e58	---	144	653	531	364	114	152	114
31	92	---	e58	e56	---	140	---	527	---	110	142	---
TOTAL	2251	3148	2306	1659	1446	3530	17017	24344	19802	6461	3577	4741
MEAN	72.6	105	74.4	53.5	51.6	114	567	785	660	208	115	158
MAX	195	152	98	62	60	296	1280	1290	972	349	181	216
MIN	35	84	50	48	35	50	125	527	364	110	86	114
AC-FT	4460	6240	4570	3290	2870	7000	33750	48290	39280	12820	7090	9400

CAL YR 1988 TOTAL 50517 MEAN 138 MAX 632 MIN 22 AC-FT 100200
WTR YR 1989 TOTAL 90282 MEAN 247 MAX 1290 MIN 35 AC-FT 179100

e Estimated

KOOTENAI RIVER BASIN

12301830 LAKE KOOCANUSA AT TENMILE CREEK, NEAR LIBBY, MT

LOCATION.--Lat 48°35'06", long 115°13'52", in NW1/4NE1/4NW1/4 sec.33, T.33 N., R.28 W., Lincoln County, Hydrologic Unit 17010101, in middle of old channel at Tenmile Creek, and 20.1 mi northeast of Libby.

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	SAMPLING DEPTH (FEET) (00003)	WEATHER (WMO CODE NUMBER) (00041)	TEMPERATURE AIR (DEG C) (00020)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, TOTAL (MG/L AS N) (00600)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT												
12...	1115	10.0	--	15.0	1.7	<0.100	--	0.30	--	0.004	--	1.8
12...	1230	213	--	--	5.8	0.200	--	0.30	0.50	0.007	0.010	1.5
APR												
18...	0930	10.0	0	6.0	4.2	<0.100	<0.100	<0.20	--	0.013	<0.001	1.4
18...	1030	125	0	--	5.8	0.140	0.160	<0.20	--	0.007	<0.001	1.1
MAY												
16...	0830	10.0	61	9.5	6.0	0.100	--	<0.20	--	0.006	<0.001	2.7
16...	0930	173	61	--	5.6	0.200	--	<0.20	--	0.007	0.002	1.4
JUN												
14...	1100	10.0	3	20.0	5.4	<0.100	--	0.40	--	0.005	<0.001	2.3
14...	1200	202	3	--	5.8	0.100	--	<0.20	--	<0.001	<0.001	2.5
JUL												
19...	1130	10.0	--	--	2.8	<0.100	--	0.30	--	<0.001	<0.001	2.6
19...	1230	238	--	--	5.6	0.100	--	0.40	0.50	<0.001	0.002	1.5
AUG												
15...	1030	10.0	1	20.0	2.9	<0.100	<0.100	<0.20	--	<0.001	<0.001	1.7
15...	1130	245	1	--	5.7	0.200	0.150	<0.20	--	<0.001	<0.001	1.4
SEP												
12...	1030	10.0	--	15.0	3.2	<0.100	--	0.20	--	0.004	0.001	1.6
12...	1130	240	--	--	6.0	0.200	--	<0.20	--	0.002	0.001	1.3

DATE	TIME	SAMPLING DEPTH (FEET) (00003)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
APR											
18...	0930	10.0	140	23	38	11	4.1	0.2	0.60	117	26
18...	1030	125	160	29	43	13	5.5	0.2	0.70	132	30
AUG											
15...	1030	10.0	100	12	28	7.4	1.9	0.1	0.30	89	12
15...	1130	245	150	23	40	11	4.4	0.2	0.60	122	27

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	ARSENIC TOTAL (UG/L AS AS) (01002)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)
APR									
18...	4.0	0.10	158	0.22	<1	40	<5	20	40
18...	5.1	0.20	183	0.25	<1	150	<5	40	50
AUG									
15...	1.6	0.10	108	0.15	<1	10	1	<10	20
15...	4.7	0.10	167	0.23	<1	90	1	20	20

12301830 LAKE KOOCANUSA AT TENMILE CREEK, NEAR LIBBY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SAMPLING DEPTH (FEET) (00003)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L) (70954)
OCT			
12...	0.5	1.55	<0.026
12...	10.0	1.38	<0.026
12...	53.0	1.87	<0.042
APR			
18...	0.5	1.69	<0.04
18...	9.5	1.49	<0.02
18...	52.0	1.63	<0.04
MAY			
16...	0.5	4.14	<0.092
16...	3.3	5.03	0.085
16...	15.1	2.88	<0.042
JUN			
14...	0.5	3.68	<0.071
14...	5.9	3.29	<0.071
14...	27.2	1.30	<0.024
JUL			
19...	0.5	0.39	<0.018
19...	9.0	2.32	<0.072
19...	38.0	0.73	<0.021
AUG			
15...	0.5	0.805	<0.028
15...	11.5	0.946	<0.023
15...	50.0	1.58	<0.037
SEP			
12...	0.5	0.497	<0.024
12...	12.5	1.19	<0.024
12...	65.0	0.920	<0.024

DATE	SAMPLING DEPTH (FEET) (00003)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	LIGHT INCIDENT PERCENT REMAINING AT DEPTH (00031)	LIGHT TRANSMISSION 1 METER PATHLENGTH (%) (00074)
OCT							
12...	0.0	216	8.5	15.1	9.6	100	41
12...	0.50	--	--	--	--	90	--
12...	2.00	220	8.5	15.1	9.6	--	39
12...	3.20	--	--	--	--	60	--
12...	5.00	217	8.5	15.1	9.7	--	37
12...	10.0	216	8.5	15.1	9.7	30	37
12...	15.0	214	8.5	15.1	9.8	--	37
12...	16.5	--	--	--	--	15	--
12...	20.0	213	8.5	15.1	9.7	--	37
12...	25.0	211	8.5	15.1	9.7	--	37
12...	30.0	210	8.5	15.1	9.7	--	37
12...	31.5	--	--	--	--	5.0	--
12...	40.0	208	8.5	15.1	9.7	--	37
12...	50.0	208	8.5	15.1	9.7	--	37
12...	53.0	--	--	--	--	1.0	--
12...	60.0	207	8.6	15.1	9.7	--	37
12...	70.0	206	8.7	15.1	9.7	--	37
12...	76.0	--	--	--	--	0.1	--
12...	80.0	206	8.7	15.1	9.7	--	37
12...	85.0	207	8.7	15.0	9.3	--	39
12...	90.0	212	8.3	13.8	7.5	--	41
12...	95.0	206	8.1	12.8	7.3	--	41
12...	100	206	8.1	11.9	7.3	--	28
12...	110	207	8.1	11.2	7.3	--	27
12...	120	211	8.1	10.2	7.3	--	19
12...	130	219	8.2	9.8	7.4	--	15
12...	140	220	8.2	9.5	7.5	--	18
12...	150	228	8.3	9.1	7.5	--	12
12...	160	236	8.3	8.3	7.8	--	3.4
12...	170	257	8.3	7.1	7.8	--	2.6
12...	180	271	8.3	6.4	8.0	--	2.6
12...	190	280	8.3	5.9	8.0	--	4.5
12...	200	283	8.3	5.6	8.1	--	2.6
12...	210	284	8.3	5.5	8.1	--	1.5
12...	213	284	8.3	5.5	8.1	--	1.5
12...	220	284	8.3	5.4	8.2	--	0.23

KOOTENAI RIVER BASIN

12301830 LAKE KOOCANUSA AT TENMILE CREEK, NEAR LIBBY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SAMPLING DEPTH (FEET) (00003)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	LIGHT INCIDENT PERCENT REMAINING AT DEPTH (00031)	LIGHT TRANSMISSION 1 METER PATHLENGTH (%) (00074)
APR							
18...	0.0	276	8.1	3.7	12.0	100	25
18...	0.50	--	--	--	--	90	--
18...	2.00	278	8.1	3.7	12.0	--	24
18...	2.60	--	--	--	--	60	--
18...	5.00	276	8.1	3.7	12.0	--	24
18...	9.50	--	--	--	--	30	--
18...	10.0	273	8.1	3.6	12.1	--	24
18...	15.0	271	8.1	3.6	12.0	--	24
18...	17.1	--	--	--	--	15	--
18...	20.0	269	8.2	3.6	12.0	--	24
18...	25.0	268	8.2	3.6	12.0	--	24
18...	30.0	267	8.2	3.6	12.1	--	24
18...	31.8	--	--	--	--	5.0	--
18...	40.0	266	8.2	3.5	12.0	--	24
18...	50.0	266	8.2	3.5	12.0	--	24
18...	52.0	--	--	--	--	1.0	--
18...	60.0	266	8.2	3.5	12.1	--	23
18...	70.0	267	8.2	3.5	12.0	--	21
18...	73.8	--	--	--	--	0.1	--
18...	80.0	267	8.2	3.5	12.0	--	20
18...	90.0	268	8.2	3.5	12.0	--	19
18...	100	269	8.2	3.5	11.9	--	18
18...	110	268	8.2	3.5	11.9	--	14
18...	120	286	8.1	3.4	11.7	--	0.71
18...	125	293	7.9	2.8	10.1	--	0.33
18...	135	293	7.9	2.8	10.1	--	0.19
MAY							
16...	0.0	228	8.2	10.7	10.5	100	0.23
16...	0.50	--	--	--	--	90	--
16...	1.60	--	--	--	--	60	--
16...	2.00	228	8.2	10.7	10.5	--	0.23
16...	3.30	--	--	--	--	30	--
16...	5.00	226	8.2	10.7	10.5	--	0.19
16...	5.60	--	--	--	--	15	--
16...	9.20	--	--	--	--	5.0	--
16...	10.0	224	8.2	10.4	10.4	--	0.28
16...	15.0	222	8.2	10.4	10.4	--	0.46
16...	15.1	--	--	--	--	1.0	--
16...	19.7	--	--	--	--	0.1	--
16...	20.0	221	8.2	10.3	10.4	--	0.23
16...	25.0	225	8.2	10.2	10.4	--	0.10
16...	30.0	225	8.1	9.7	10.3	--	1.1
16...	35.0	222	8.1	9.6	10.3	--	1.5
16...	40.0	220	8.1	9.6	10.3	--	0.92
16...	50.0	223	8.1	9.0	10.1	--	1.1
16...	55.0	232	8.1	8.1	10.2	--	0.71
16...	60.0	232	8.0	7.7	10.4	--	0.81
16...	65.0	237	8.0	7.5	10.6	--	0.53
16...	75.0	251	8.1	6.4	10.8	--	19
16...	85.0	256	8.1	5.7	10.9	--	27
16...	95.0	256	8.1	5.2	11.0	--	30
16...	105	258	8.1	5.0	11.0	--	30
16...	115	259	8.0	4.9	11.0	--	30
16...	125	261	8.0	4.8	11.0	--	27
16...	135	262	8.0	4.5	10.9	--	23
16...	145	274	7.9	3.9	10.5	--	13
16...	155	280	7.8	3.6	10.3	--	6.8
16...	165	281	7.8	3.6	10.2	--	0.73
16...	173	281	7.8	3.5	10.2	--	<0.01
16...	183	281	7.8	3.5	10.2	--	--

12301830 LAKE KOOCANUSA AT TENMILE CREEK, NEAR LIBBY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SAMPLING DEPTH (FEET) (00003)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	LIGHT INCIDENT PERCENT REMAINING AT DEPTH (00031)	LIGHT TRANSMISSION 1 METER PATHLENGTH (%) (00074)
JUN							
14...	0.0	213	8.6	16.9	11.1	100	7.3
14...	0.50	--	--	--	--	90	--
14...	1.60	--	--	--	--	60	--
14...	2.00	213	8.6	16.9	11.1	--	7.3
14...	5.00	212	8.6	16.4	11.1	--	7.9
14...	5.90	--	--	--	--	30	--
14...	9.80	--	--	--	--	15	--
14...	10.0	209	8.5	15.6	10.7	--	9.2
14...	15.0	207	8.5	15.1	10.9	--	9.2
14...	17.1	--	--	--	--	5.0	--
14...	20.0	204	8.5	15.0	10.7	--	11
14...	25.0	202	8.5	14.5	10.6	--	11
14...	27.2	--	--	--	--	1.0	--
14...	30.0	202	8.4	14.3	10.6	--	12
14...	35.0	203	8.4	13.4	10.5	--	12
14...	40.0	205	8.3	12.2	10.2	--	11
14...	42.7	--	--	--	--	0.1	--
14...	50.0	212	8.3	11.2	10.3	--	8.5
14...	60.0	208	8.3	10.7	10.3	--	9.2
14...	70.0	203	8.3	10.2	10.3	--	9.8
14...	80.0	207	8.2	9.7	10.3	--	6.8
14...	90.0	200	8.2	9.5	10.3	--	6.3
14...	100	200	8.2	9.3	10.2	--	4.5
14...	110	203	8.1	9.0	10.2	--	4.5
14...	120	209	8.1	8.7	10.1	--	3.1
14...	125	219	8.1	7.9	10.2	--	2.8
14...	130	222	8.0	7.6	10.3	--	3.4
14...	140	240	8.0	6.7	10.3	--	3.8
14...	150	252	8.0	5.6	10.2	--	3.8
14...	160	263	8.0	5.2	10.2	--	2.1
14...	170	268	8.0	4.7	10.2	--	1.3
14...	180	271	8.0	4.4	10.3	--	1.1
14...	190	272	8.0	4.3	10.3	--	1.1
14...	202	273	8.0	4.2	10.3	--	0.62
14...	212	273	8.0	4.2	10.3	--	0.62
JUL							
19...	0.0	198	8.8	20.0	10.1	100	13
19...	0.50	--	--	--	--	90	--
19...	2.00	200	8.8	20.0	10.1	--	13
19...	3.30	--	--	--	--	60	--
19...	5.00	196	8.8	19.6	10.9	--	7.9
19...	9.00	--	--	--	--	30	--
19...	10.0	197	8.8	19.0	11.7	--	7.3
19...	14.0	--	--	--	--	15	--
19...	15.0	196	8.8	18.9	11.8	--	8.5
19...	20.0	194	8.7	17.9	11.2	--	15
19...	23.6	--	--	--	--	5.0	--
19...	25.0	192	8.5	16.7	10.6	--	23
19...	30.0	188	8.2	14.8	9.8	--	27
19...	38.0	--	--	--	--	1.0	--
19...	40.0	184	8.1	13.5	9.7	--	24
19...	50.0	180	8.1	12.8	9.8	--	24
19...	60.0	178	8.2	12.3	10.0	--	21
19...	66.0	--	--	--	--	0.1	--
19...	70.0	181	8.2	11.9	10.1	--	20
19...	80.0	185	8.2	11.2	10.1	--	19
19...	90.0	192	8.3	10.8	10.1	--	23
19...	100	201	8.3	10.3	10.1	--	24
19...	110	205	8.3	9.9	10.3	--	27
19...	120	208	8.3	9.6	10.5	--	24
19...	130	211	8.3	9.3	10.5	--	23
19...	140	213	8.3	8.9	10.4	--	21
19...	150	215	8.3	8.6	10.3	--	15
19...	160	222	8.2	7.8	10.1	--	5.8
19...	170	233	8.2	7.2	10.1	--	4.9
19...	180	247	8.1	6.3	10.1	--	3.8
19...	190	261	8.1	5.3	10.1	--	3.1
19...	200	267	8.1	4.9	10.3	--	2.6
19...	210	270	8.1	4.7	10.3	--	2.3
19...	220	273	8.1	4.5	10.3	--	1.7
19...	230	275	8.1	4.3	10.4	--	1.7
19...	238	276	8.1	4.3	10.4	--	0.81
19...	248	275	8.1	4.3	10.2	--	0.81

KOOTENAI RIVER BASIN

12301830 LAKE KOOCANUSA AT TENMILE CREEK, NEAR LIBBY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SAMPLING DEPTH (FEET) (00003)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	LIGHT INCIDENT PERCENT REMAINING AT DEPTH (00031)	LIGHT TRANSMISSION 1 METER PATHLENGTH (%) (00074)
AUG							
15...	0.0	198	8.7	20.6	6.8	100	28
15...	0.50	--	--	--	--	90	--
15...	2.00	198	8.7	20.5	6.9	--	28
15...	4.30	--	--	--	--	60	--
15...	5.00	196	8.6	20.5	8.7	--	25
15...	10.0	196	8.6	20.4	8.9	--	25
15...	11.5	--	--	--	--	30	--
15...	15.0	194	8.7	20.2	8.9	--	25
15...	18.4	--	--	--	--	15	--
15...	20.0	193	8.7	20.1	9.0	--	16
15...	25.0	192	8.7	20.0	9.0	--	18
15...	30.0	191	8.6	19.1	8.7	--	24
15...	35.0	191	8.6	17.7	9.2	--	25
15...	37.7	--	--	--	--	5.0	--
15...	40.0	191	8.5	17.4	9.3	--	27
15...	50.0	190	8.3	16.1	9.1	1.0	32
15...	60.0	190	8.2	15.3	9.0	--	32
15...	70.0	185	8.1	14.1	8.8	--	32
15...	80.0	182	8.0	13.4	8.8	--	32
15...	90.0	178	8.0	12.3	8.7	--	19
15...	100	186	8.0	11.4	9.0	--	28
15...	110	194	8.1	10.7	9.4	--	37
15...	120	195	8.1	10.1	9.6	--	39
15...	130	202	8.1	9.5	9.9	--	28
15...	140	208	8.1	9.0	9.9	--	32
15...	150	212	8.1	8.6	10.1	--	27
15...	160	219	8.1	8.0	10.1	--	20
15...	170	227	8.1	7.4	10.2	--	12
15...	180	246	8.1	5.9	10.1	--	4.9
15...	190	258	8.1	5.4	10.2	--	3.8
15...	200	263	8.1	5.0	10.3	--	4.1
15...	210	266	8.0	4.8	10.3	--	4.5
15...	220	270	8.0	4.5	10.2	--	0.81
15...	230	272	8.0	4.4	10.2	--	0.0
15...	245	274	8.0	4.4	10.1	--	0.0
15...	255	274	8.0	4.4	10.1	--	0.0
SEP							
12...	0.0	192	8.6	17.0	8.5	100	50
12...	0.50	--	--	--	--	90	--
12...	2.00	194	8.6	17.0	8.7	--	50
12...	3.30	--	--	--	--	60	--
12...	5.00	195	8.6	17.0	8.9	--	48
12...	10.0	195	8.6	17.0	8.9	--	45
12...	12.5	--	--	--	--	30	--
12...	15.0	195	8.6	17.0	8.8	--	45
12...	20.0	194	8.6	17.0	8.9	--	45
12...	23.0	--	--	--	--	15	--
12...	25.0	194	8.6	17.0	8.9	--	45
12...	30.0	193	8.6	17.0	8.8	--	45
12...	40.0	193	8.6	16.9	8.8	--	45
12...	42.0	--	--	--	--	5.0	--
12...	50.0	192	8.6	17.0	8.8	--	45
12...	60.0	195	8.5	16.7	8.5	--	50
12...	65.0	199	8.4	16.3	8.2	1.0	52
12...	70.0	201	8.1	14.9	6.9	--	52
12...	75.0	193	8.0	13.9	7.0	--	52
12...	80.0	189	7.9	13.5	7.0	--	52
12...	90.0	186	7.9	12.3	7.3	--	52
12...	100	187	7.8	11.3	7.6	--	50
12...	102	--	--	--	--	0.1	--
12...	110	195	7.7	10.4	8.0	--	48
12...	120	199	7.7	10.0	8.2	--	43
12...	130	204	7.7	9.6	8.3	--	41
12...	140	209	7.8	9.2	8.5	--	30
12...	150	214	7.8	8.7	8.5	--	30
12...	160	222	7.9	8.2	8.5	--	27
12...	170	228	7.9	7.8	8.5	--	24
12...	180	239	8.0	6.9	8.5	--	19
12...	190	248	8.0	6.4	8.5	--	14
12...	200	257	7.9	5.8	8.4	--	11
12...	210	264	7.9	5.3	8.3	--	7.9
12...	220	269	7.9	5.0	8.2	--	5.8
12...	230	271	8.0	5.0	8.2	--	4.5
12...	240	271	8.0	4.9	8.3	--	2.8
12...	250	271	7.9	4.9	8.3	--	2.3

KOOTENAI RIVER BASIN

12301919 LAKE KOOCANUSA AT FOREBAY, NEAR LIBBY, MT

LOCATION.--Lat 48°24'43", long 115°18'35", in SW1/4NW1/4NE1/4 sec.33, T.31 N., R.29 W., Lincoln County, Hydrologic Unit 17010101, in middle of old channel 0.2 mi upstream from Libby Dam, and 11.6 mi east of Libby.

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

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	SAMPLING DEPTH (FEET) (00003)	WEATHER (WMO CODE NUMBER) (00041)	TEMPERATURE AIR (DEG C) (00020)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITROGEN, TOTAL (MG/L AS N) (00600)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT												
12...	1400	10.0	--	17.0	1.7	<0.100	--	0.30	--	0.003	0.004	1.8
12...	1500	285	--	--	5.7	0.200	--	<0.20	--	0.007	0.008	1.4
APR												
18...	1200	10.0	--	13.0	3.9	<0.100	<0.100	0.30	--	0.008	<0.001	1.4
18...	1300	195	--	--	7.4	0.200	0.240	0.20	0.40	0.013	0.008	1.2
MAY												
16...	1300	10.0	1	16.0	6.0	0.300	--	0.30	0.60	0.007	<0.001	2.4
16...	1400	243	1	--	6.9	0.200	--	<0.20	--	0.008	0.004	1.0
JUN												
14...	1430	10.0	3	21.0	5.9	<0.100	--	<0.20	--	0.004	<0.001	2.7
14...	1530	271	3	--	5.1	<0.100	--	<0.20	--	0.001	<0.001	1.6
JUL												
19...	1400	10.0	1	23.0	3.2	<0.100	--	0.40	--	<0.001	<0.001	2.5
19...	1500	308	1	--	5.9	0.200	--	<0.20	--	<0.001	0.001	1.0
AUG												
15...	1330	10.0	1	22.0	2.6	<0.100	<0.100	<0.20	--	0.003	<0.001	2.1
15...	1430	316	1	--	5.7	0.200	0.170	0.90	1.1	0.003	<0.001	1.1
SEP												
12...	1300	10.0	--	15.0	3.0	<0.100	--	0.30	--	<0.001	<0.001	1.9
12...	1400	313	--	--	6.0	0.200	--	<0.20	--	0.006	0.003	1.2

DATE	TIME	SAMPLING DEPTH (FEET) (00003)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	SODIUM, DISSOLVED (MG/L AS NA) (00930)	SODIUM ADSORPTION RATIO (00931)
APR								
18...	1200	10.0	130	19	36	10	3.8	0.1
18...	1300	195	190	45	52	15	6.6	0.2
AUG								
15...	1330	10.0	100	12	28	7.4	2.1	0.1
15...	1430	316	150	24	41	12	4.7	0.2

DATE	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)
APR							
18...	0.70	112	23	3.5	0.10	148	0.20
18...	0.80	147	34	6.1	0.20	211	0.29
AUG							
15...	0.40	89	14	1.6	0.10	110	0.15
15...	0.70	128	28	4.1	0.10	174	0.24

KOOTENAI RIVER BASIN

12301919 LAKE KOOCANUSA AT FOREBAY, NEAR LIBBY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SAMPLING DEPTH (FEET) (00003)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	LIGHT INCIDENT PERCENT REMAINING AT DEPTH (00031)	LIGHT TRANSMISSION 1 METER PATHLENGTH (%) (00074)
OCT							
12...	0.0	215	8.5	15.8	9.4	100	33
12...	0.50	--	--	--	--	90	--
12...	2.00	216	8.5	15.7	9.4	--	33
12...	3.30	--	--	--	--	60	--
12...	5.00	216	8.5	15.7	9.5	--	30
12...	10.0	213	8.5	15.5	9.4	--	30
12...	13.1	--	--	--	--	30	--
12...	15.0	211	8.5	15.5	9.4	--	30
12...	20.0	209	8.5	15.4	9.4	--	28
12...	22.0	--	--	--	--	15	--
12...	25.0	208	8.5	15.5	9.5	--	28
12...	30.0	207	8.5	15.4	9.4	--	28
12...	35.0	--	--	--	--	5.0	--
12...	40.0	205	8.5	15.4	9.4	--	30
12...	50.0	205	8.5	15.4	9.4	--	30
12...	52.5	--	--	--	--	1.0	--
12...	60.0	204	8.4	15.4	9.4	--	30
12...	70.0	203	8.4	15.4	9.4	--	30
12...	78.5	--	--	--	--	0.1	--
12...	80.0	205	8.1	15.0	8.4	--	32
12...	85.0	205	7.6	14.2	7.4	--	39
12...	90.0	202	7.5	13.2	7.3	--	41
12...	100	203	7.5	11.4	7.3	--	45
12...	110	208	7.5	10.5	7.8	--	48
12...	120	212	7.6	9.9	8.1	--	48
12...	130	216	7.6	9.6	8.3	--	43
12...	140	225	7.8	9.1	8.5	--	43
12...	155	234	7.9	8.7	8.6	--	33
12...	170	266	8.0	7.2	8.4	--	20
12...	185	282	8.1	5.8	8.3	--	23
12...	200	284	8.2	5.2	8.5	--	24
12...	215	284	8.3	5.0	8.7	--	20
12...	230	284	8.3	4.9	8.8	--	11
12...	245	284	8.3	4.8	8.8	--	7.9
12...	260	284	8.3	4.8	8.8	--	7.9
12...	275	284	8.3	4.7	8.7	--	2.6
12...	285	284	8.2	4.7	8.5	--	2.6
12...	295	284	8.2	4.7	8.5	--	2.6
APR							
18...	0.0	260	8.0	4.5	12.0	100	27
18...	0.50	--	--	--	--	90	--
18...	2.00	260	8.0	4.5	12.1	--	25
18...	4.60	--	--	--	--	60	--
18...	5.00	260	8.0	4.5	12.0	--	25
18...	9.80	--	--	--	--	30	--
18...	10.0	257	8.0	4.3	12.0	--	24
18...	14.8	--	--	--	--	15	--
18...	15.0	255	8.0	4.3	12.0	--	24
18...	20.0	253	8.0	4.2	12.0	--	24
18...	25.0	251	8.0	4.2	12.0	--	24
18...	27.2	--	--	--	--	5.0	--
18...	30.0	250	8.0	4.2	12.0	--	24
18...	37.3	--	--	--	--	1.0	--
18...	40.0	249	8.0	4.2	12.0	--	23
18...	50.0	248	8.0	4.1	12.0	--	23
18...	60.0	248	8.0	4.1	12.0	--	23
18...	68.2	--	--	--	--	0.1	--
18...	75.0	249	8.0	4.1	11.9	--	23
18...	90.0	250	8.0	4.0	11.8	--	21
18...	105	255	7.9	3.6	11.6	--	19
18...	120	268	7.9	3.3	11.2	--	15
18...	130	277	7.9	3.0	11.0	--	9.8
18...	135	289	7.8	2.7	10.4	--	9.2
18...	145	309	7.7	2.3	9.6	--	6.8
18...	155	319	7.7	2.3	9.3	--	6.3
18...	165	322	7.7	2.3	8.9	--	4.9
18...	175	325	7.7	2.3	8.7	--	4.5
18...	185	328	7.7	2.3	8.5	--	1.7
18...	195	331	7.7	2.3	8.1	--	<0.01
18...	205	331	7.7	2.3	8.1	--	<0.01

12301919 LAKE KOOCANUSA AT FOREBAY, NEAR LIBBY, MT--Continued
WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SAMPLING DEPTH (FEET) (00003)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	LIGHT INCIDENT PERCENT REMAINING AT DEPTH (00031)	LIGHT TRANSMISSION 1[B METER PATHLEN[BGTH (%) (00074)
MAY							
16...	0.0	259	8.4	13.4	11.4	100	4.1
16...	0.50	--	--	--	--	90	--
16...	2.00	258	8.4	13.4	11.6	--	4.1
16...	2.30	--	--	--	--	60	--
16...	5.00	257	8.3	13.2	11.6	--	3.8B
16...	5.60	--	--	--	--	30	--
16...	9.20	--	--	--	--	15	--
16...	10.0	254	8.3	12.9	11.5	--	3.8
16...	15.0	252	8.3	12.8	11.5	--	4.5
16...	15.4	--	--	--	--	5.0	--
16...	20.0	249	8.3	12.4	11.5	--	4.5
16...	23.3	--	--	--	--	1.0	--
16...	25.0	248	8.2	12.1	11.4	--	4.9
16...	29.5	--	--	--	--	0.1	--
16...	30.0	248	8.2	11.6	11.4	--	4.9
16...	40.0	249	8.2	11.4	11.2	--	6.3
16...	50.0	251	8.1	9.6	10.9	--	9.8
16...	60.0	248	8.0	8.9	10.9	--	13
16...	70.0	252	7.9	7.3	10.8	--	19
16...	80.0	251	7.8	5.6	10.4	--	37
16...	90.0	251	7.8	4.6	10.5	--	37
16...	100	254	7.8	4.5	10.8	--	37
16...	110	258	7.7	3.9	10.7	--	41
16...	120	266	7.7	3.7	10.6	--	41
16...	130	270	7.7	3.4	10.5	--	41
16...	140	277	7.7	3.2	10.3	--	45
16...	150	284	7.7	3.0	10.2	--	37
16...	160	294	7.7	2.8	9.9	--	37
16...	170	300	7.7	2.7	9.6	--	37
16...	180	307	7.8	2.6	9.3	--	37
16...	190	308	7.8	2.5	9.2	--	33
16...	200	309	7.8	2.5	9.2	--	21
16...	210	312	7.9	2.5	8.9	--	14
16...	220	316	7.9	2.4	8.7	--	9.8
16...	230	317	7.9	2.4	8.6	--	4.5
16...	240	318	7.9	2.4	8.5	--	1.1
16...	243	319	7.9	2.4	8.4	--	0.16
16...	253	319	7.9	2.4	8.4	--	0.16
JUN							
14...	0.0	234	8.7	19.2	10.8	100	9.8
14...	0.50	--	--	--	--	90	--
14...	1.60	--	--	--	--	60	--
14...	2.00	234	8.7	18.9	10.8	--	9.8
14...	5.00	233	8.5	17.1	10.5	--	6.3
14...	5.20	--	--	--	--	30	--
14...	9.50	--	--	--	--	15	--
14...	10.0	233	8.4	15.8	10.3	--	5.3
14...	15.0	230	8.3	15.3	10.3	--	7.9
14...	16.4	--	--	--	--	5.0	--
14...	20.0	226	8.3	14.7	10.2	--	8.5
14...	23.6	--	--	--	--	1.0	--
14...	25.0	227	8.2	14.6	10.2	--	7.9
14...	30.0	222	8.2	14.0	10.2	--	8.5
14...	30.2	--	--	--	--	0.1	--
14...	40.0	223	8.1	12.8	10.2	--	6.3
14...	50.0	224	8.0	11.5	10.1	--	6.3
14...	60.0	225	7.9	10.6	9.9	--	5.3
14...	70.0	224	7.8	9.9	9.8	--	5.3
14...	80.0	224	7.7	9.6	9.9	--	5.3
14...	90.0	222	7.7	9.2	9.9	--	5.3
14...	100	225	7.7	8.9	10.0	--	6.3
14...	110	226	7.8	8.6	10.1	--	7.3
14...	120	232	7.9	8.4	10.1	--	11
14...	130	235	8.0	8.0	10.3	--	12
14...	140	242	8.0	7.7	10.3	--	20
14...	150	245	8.1	6.7	10.3	--	24
14...	160	251	8.1	6.2	10.5	--	30
14...	170	256	8.2	4.8	10.4	--	30
14...	180	264	8.1	4.3	10.5	--	27
14...	190	268	8.1	3.9	10.4	--	17
14...	200	276	8.1	3.7	10.4	--	13
14...	210	281	8.0	3.4	10.1	--	7.9
14...	220	284	8.0	3.4	9.9	--	4.1
14...	230	288	8.0	3.2	9.9	--	2.6
14...	240	293	8.0	3.2	9.8	--	2.1
14...	250	294	7.9	3.1	9.6	--	1.7
14...	260	297	7.9	3.0	9.5	--	1.3
14...	271	298	7.9	3.0	9.4	--	0.62
14...	281	299	7.9	3.0	9.4	--	0.33

KOOTENAI RIVER BASIN

12301919 LAKE KOOCANUSA AT FOREBAY, NEAR LIBBY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SAMPLING DEPTH (FEET) (00003)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	LIGHT INCIDENT PERCENT REMAINING AT DEPTH (00031)	LIGHT TRANSMISSION 1 METER PATHLENGTH (%) (00074)
JUL							
19...	0.0	202	8.7	20.2	10.0	100	17
19...	0.50	--	--	--	--	90	--
19...	2.00	202	8.7	20.2	10.0	--	6.8
19...	3.60	--	--	--	--	60	--
19...	5.00	202	8.7	19.9	10.0	--	4.9
19...	10.0	202	8.6	19.7	10.4	--	4.9
19...	11.2	--	--	--	--	30	--
19...	15.0	202	8.7	18.5	11.0	--	3.8
19...	16.4	--	--	--	--	15	--
19...	20.0	200	8.6	17.6	11.1	--	2.6
19...	24.9	--	--	--	--	5.0	--
19...	25.0	197	8.5	17.0	11.2	--	2.6
19...	30.0	196	8.3	16.6	11.2	--	5.3
19...	35.0	195	8.0	15.4	10.3	--	6.8
19...	36.1	--	--	--	--	1.0	--
19...	40.0	195	7.8	14.2	9.7	--	4.5
19...	50.0	197	7.7	12.9	9.4	--	2.6
19...	52.2	--	--	--	--	0.1	--
19...	60.0	196	7.8	12.3	9.7	--	0.71
19...	70.0	199	7.8	11.7	9.9	--	0.33
19...	80.0	205	7.8	11.2	10.3	--	0.33
19...	90.0	210	7.9	10.8	10.4	--	0.23
19...	100	214	8.0	10.5	10.6	--	0.23
19...	115	219	8.0	9.8	10.5	--	2.3
19...	130	220	8.1	9.2	10.6	--	1.7
19...	145	227	8.1	8.5	10.6	--	4.5
19...	160	238	8.1	7.6	10.7	--	4.9
19...	175	244	8.2	7.0	10.8	--	5.8
19...	190	253	8.2	5.9	11.0	--	7.9
19...	205	259	8.2	5.1	11.1	--	11
19...	220	264	8.2	4.6	11.1	--	11
19...	235	271	8.2	4.2	10.9	--	9.2
19...	250	277	8.2	3.9	10.7	--	5.8
19...	265	282	8.1	3.7	10.5	--	7.3
19...	280	283	8.1	3.6	10.4	--	3.8
19...	295	289	8.1	3.4	9.8	--	3.4
19...	308	289	8.1	3.4	9.8	--	--
19...	318	289	8.1	3.4	9.8	--	--
AUG							
15...	0.0	193	8.7	22.5	8.4	100	20
15...	0.50	--	--	--	--	90	--
15...	2.00	193	8.7	22.5	8.4	--	20
15...	5.00	193	8.7	22.5	8.4	--	18
15...	5.90	--	--	--	--	60	--
15...	10.0	193	8.7	22.5	8.5	--	17
15...	11.8	--	--	--	--	30	--
15...	15.0	192	8.7	22.4	8.6	--	16
15...	19.0	--	--	--	--	15	--
15...	20.0	191	8.8	21.9	8.8	--	13
15...	30.0	190	8.8	21.0	9.2	--	8.5
15...	33.1	--	--	--	--	5.0	--
15...	40.0	189	8.7	19.3	9.0	--	19
15...	50.0	191	8.5	18.2	8.7	--	21
15...	55.0	187	8.0	16.1	8.0	--	35
15...	60.0	186	7.9	15.4	7.8	--	35
15...	70.0	184	7.7	13.5	7.6	--	41
15...	80.0	184	7.6	12.5	8.0	--	37
15...	90.0	196	7.6	11.4	8.2	--	33
15...	100	199	7.8	10.8	8.4	--	37
15...	115	214	7.9	10.0	8.6	--	33
15...	130	217	8.1	9.2	8.7	--	37
15...	145	223	8.2	8.5	8.9	--	37
15...	160	230	8.2	7.7	9.0	--	33
15...	175	235	8.2	7.2	9.3	--	33
15...	190	244	8.2	6.5	9.3	--	37
15...	205	256	8.2	5.5	9.3	--	27
15...	220	267	8.1	4.8	9.2	--	27
15...	235	274	8.1	4.1	9.0	--	27
15...	250	281	8.1	3.8	8.9	--	27
15...	265	283	8.1	3.7	8.8	--	24
15...	280	285	8.1	3.6	8.7	--	21
15...	295	285	8.1	3.5	--	--	15
15...	310	286	8.1	3.6	--	--	--
15...	316	285	8.1	3.6	--	--	--
15...	326	285	8.1	3.6	--	--	--

12301919 LAKE KOOCANUSA AT FOREBAY, NEAR LIBBY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SAMPLING DEPTH (FEET) (00003)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DISSOLVED (MG/L) (00300)	LIGHT INCIDENT PERCENT REMAINING AT DEPTH (00031)	LIGHT TRANSMISSION 1 METER PATHLENGTH (%) (00074)
SEP							
12...	0.0	191	8.5	17.9	8.6	100	52
12...	0.50	--	--	--	--	90	--
12...	2.00	192	8.6	17.9	8.5	--	52
12...	5.00	192	8.6	17.7	8.8	--	50
12...	6.00	--	--	--	--	60	--
12...	10.0	193	8.6	17.7	8.8	--	50
12...	15.0	192	8.6	17.6	8.8	--	48
12...	16.0	--	--	--	--	30	--
12...	20.0	192	8.6	17.6	8.8	--	48
12...	25.0	192	8.6	17.6	8.8	--	48
12...	26.0	--	--	--	--	15	--
12...	30.0	191	8.6	17.6	8.8	--	48
12...	40.0	191	8.5	17.5	8.7	--	50
12...	45.0	191	8.1	16.5	7.3	5.0	52
12...	50.0	192	8.0	16.1	7.1	--	52
12...	60.0	191	7.9	15.3	7.1	--	52
12...	70.0	188	7.8	14.7	7.0	--	52
12...	80.0	184	7.8	13.2	7.1	--	52
12...	90.0	184	7.8	12.0	7.4	--	50
12...	92.0	--	--	--	--	1.0	--
12...	100	194	7.8	11.0	7.9	--	45
12...	110	204	7.7	10.4	8.4	--	43
12...	120	210	7.7	9.8	8.5	--	41
12...	135	217	7.7	9.0	8.7	--	41
12...	150	223	7.8	8.5	8.9	--	41
12...	165	236	7.9	7.4	9.3	--	35
12...	180	245	8.0	6.6	9.3	--	37
12...	195	259	8.0	5.7	9.1	--	24
12...	210	265	8.0	5.2	9.1	--	27
12...	225	271	8.0	4.8	9.0	--	24
12...	240	274	8.1	4.6	8.9	--	28
12...	255	277	8.1	4.4	9.0	--	28
12...	270	279	8.1	4.3	8.9	--	35
12...	285	281	8.1	4.2	8.8	--	35
12...	300	283	8.1	4.1	8.7	--	28
12...	313	284	8.0	4.0	8.3	--	--
12...	323	284	8.0	4.0	8.3	--	--

KOOTENAI RIVER BASIN

12301920 LAKE KOOCANUSA NEAR LIBBY, MT

LOCATION.--Lat 48°24'38", long 115°18'47", in NW1/4 sec.33, T.31 N., R.29 W., Lincoln County, Hydrologic Unit 17010101, Kootenai National Forest, in block 18 of Libby Dam on Kootenai River, 11 mi east of Libby and at mile 221.9.

DRAINAGE AREA.--8,985 mi^2, approximately.

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

GAGE.--Water-stage recorder. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to July 2, 1973, nonrecording gage on upstream face of dam at same datum.

REMARKS.--Reservoir and flow completely controlled by gravity type dam with taintor gated spillway; construction began in 1967; completed in 1973. Storage began Mar. 21, 1972. Usable capacity, 5,748,000 acre-ft between elevation 2,201.5 ft, bottom of sluice gate, and 2,459 ft, controlled spillway elevation. Dead storage, 121,200 acre-ft below elevation 2,201.5 ft. Minimum operating level, 768,700 acre-ft, elevation 2,287.0 ft for on-site power generation. Figures given herein represent usable contents. Water is used for power production, flood control, irrigation, and recreation.

COOPERATION.--Capacity table and elevations provided by U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 5,753,000 acre-ft, Aug. 6, 1976 and Aug. 16, 1982, maximum elevation, 2,459.12 ft, Aug. 16, 1982; minimum contents observed since normal low operating level reached in May 1972, 139,600 acre-ft, Dec. 16-21, 1972, elevation, 2,226.5 ft.

EXTREMES FOR CURRENT YR.--Maximum contents, 5,456,000 acre-ft, July 31, elevation, 2,452.63 ft; minimum, 1,362,000 acre-ft, Mar. 8, elevation, 2,321.22 ft.

Capacity table (elevation, in feet, and contents, in acre-feet)

Elevation	Contents	Elevation	Contents
2,310	1,150,000	2,400	3,367,000
2,340	1,759,000	2,420	4,085,000
2,360	2,232,000	2,440	4,899,000
2,380	2,765,000	2,460	5,795,000

ELEVATION (FEET NGVD), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
OBSERVATION AT 24:00 VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2422.54	2406.45	2384.76	2353.20	2338.06	2322.55	2321.73	2340.29	2392.42	2439.77	2452.25	2442.22
2	2422.44	2405.56	2383.46	2353.15	2336.40	2322.31	2321.73	2341.68	2393.82	2440.58	2451.80	2442.29
3	2422.32	2404.65	2383.41	2353.00	2334.72	2321.57	2321.74	2343.24	2395.67	2441.38	2451.30	2442.54
4	2421.60	2403.76	2383.34	2353.05	2333.08	2321.47	2321.75	2345.05	2397.68	2442.01	2450.90	2442.81
5	2420.65	2403.41	2382.11	2353.07	2331.46	2321.39	2321.78	2346.82	2399.74	2442.61	2450.85	2443.11
6	2419.72	2403.15	2380.94	2353.02	2329.76	2321.32	2321.83	2348.80	2402.14	2443.20	2450.85	2443.29
7	2418.80	2402.65	2379.75	2352.89	2328.12	2321.29	2321.97	2351.34	2404.64	2443.77	2450.42	2443.52
8	2418.48	2401.81	2378.51	2352.85	2326.45	2321.22	2322.16	2354.42	2407.27	2444.34	2449.80	2443.63
9	2418.16	2400.95	2377.39	2352.72	2324.79	2321.29	2322.32	2357.62	2409.72	2444.92	2449.30	2443.73
10	2417.41	2400.01	2377.33	2352.54	2324.60	2321.32	2322.46	2360.76	2412.05	2445.52	2448.75	2443.92
11	2416.45	2399.11	2377.22	2352.30	2324.45	2321.39	2322.60	2363.93	2414.14	2446.03	2448.25	2443.98
12	2415.34	2398.66	2376.58	2351.40	2324.31	2321.45	2322.75	2366.75	2416.09	2446.52	2448.25	2444.11
13	2414.22	2398.32	2375.73	2349.90	2324.18	2321.48	2323.00	2369.02	2417.96	2447.12	2448.30	2444.17
14	2413.16	2397.48	2374.87	2348.51	2324.05	2321.50	2323.29	2370.88	2419.98	2447.71	2447.93	2444.25
15	2412.86	2396.47	2373.96	2347.16	2323.94	2321.54	2323.77	2372.47	2422.02	2448.27	2447.26	2444.29
16	2412.74	2395.52	2373.02	2345.73	2323.81	2321.59	2324.53	2373.97	2424.10	2448.83	2446.61	2444.43
17	2412.17	2394.48	2371.99	2344.27	2323.66	2321.54	2325.22	2375.52	2426.08	2449.41	2445.97	2444.50
18	2411.30	2393.41	2370.96	2342.80	2323.49	2321.51	2325.84	2377.05	2427.72	2449.99	2445.45	2444.48
19	2410.29	2392.92	2369.83	2341.40	2323.33	2321.49	2326.55	2378.64	2429.09	2450.54	2445.45	2444.53
20	2409.34	2392.39	2368.54	2339.96	2323.18	2321.46	2327.42	2379.95	2430.21	2450.94	2445.45	2444.34
21	2408.80	2391.48	2367.20	2339.87	2323.05	2321.45	2328.68	2381.12	2431.26	2451.21	2445.12	2444.02
22	2408.96	2390.40	2365.98	2339.82	2322.85	2321.45	2330.34	2382.22	2432.16	2451.51	2444.57	2443.78
23	2409.02	2389.41	2364.64	2339.70	2322.85	2321.44	2332.00	2383.46	2432.94	2451.74	2444.09	2443.75
24	2409.09	2389.41	2363.33	2339.47	2322.79	2321.44	2333.30	2384.70	2433.73	2451.88	2443.67	2443.71
25	2409.15	2389.41	2361.89	2339.30	2322.76	2321.44	2334.61	2385.85	2434.56	2451.96	2443.39	2443.28
26	2409.23	2389.42	2360.47	2339.16	2322.69	2321.45	2335.75	2386.85	2435.46	2451.91	2443.53	2442.99
27	2409.21	2389.27	2359.18	2339.02	2322.70	2321.50	2336.72	2387.90	2436.41	2452.04	2443.67	2442.73
28	2408.84	2388.22	2357.70	2338.88	2322.63	2321.56	2337.60	2388.84	2437.38	2452.08	2443.58	2442.30
29	2408.44	2387.12	2356.29	2338.76	---	2321.61	2338.40	2389.67	2438.24	2452.25	2443.54	2441.85
30	2408.03	2385.99	2354.82	2338.63	---	2321.66	2339.23	2390.53	2438.97	2452.52	2443.17	2441.74
31	2407.36	---	2353.47	2338.77	---	2321.71	---	2391.39	---	2452.63	2442.66	---
MAX	2422.54	2406.45	2384.76	2353.20	2338.06	2322.55	2339.23	2391.39	2438.97	2452.63	2452.25	2444.53
MIN	2407.36	2385.99	2353.47	2338.63	2322.63	2321.22	2321.73	2340.29	2392.42	2439.77	2442.66	2441.74
†	3617	2936	2072	1731	1390	1372	1742	3096	4855	5456	5014	4974
††	-572000	-681000	-864000	-341000	-341000	-18000	+370000	1354000	1759000	-601000	-442000	-40000

CAL YR 1988.....†† -1,042,000
WTR YR 1989.....†† +785,000

† Contents, in thousands of acre-ft, at end of month.
†† Change in contents, in acre-ft.

KOOTENAI RIVER BASIN

12301933 KOOTENAI RIVER BELOW LIBBY DAM, NEAR LIBBY, MT

LOCATION.--Lat 48°24'03", long 115°19'11", in SW1/4SW1/4SW1/4 sec.33, T.31 N., R.29 W., Lincoln County, Hydrologic Unit 17010101, Kootenai National Forest, on right bank 0.7 mi downstream from Libby Dam, 2.8 mi upstream from Fisher River, 11 mi east of Libby, and at mile 221.0.

DRAINAGE AREA.--8,985 mi^2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1971 to current year.

GAGE.--Water-stage recorder. Datum of gage is 2,100.00 ft above National Geodetic Vertical Datum of 1929 (U.S. Army Corps of Engineers bench mark). Prior to Feb. 13, 1974, nonrecording gage at site 0.4 mi upstream at same datum.

REMARKS.--No estimated daily discharges. Water-discharge records excellent. Flow completely regulated by Lake Koocanusa since Mar. 21, 1972 (see preceding page). Diversions for irrigation of about 14,000 acres, from tributaries upstream from station in Canada and the United States. U.S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--18 years, 10,860 ft^3/s, 16.41 in/yr, 7,868,000 acre-ft/yr, adjusted for change in contents in Lake Koocanusa since Mar. 21, 1972.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 47,200 ft^3/s, Aug. 5, 1974, gage height, 27.50 ft; minimum daily, 1,900 ft^3/s, Jan. 29, 1972.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 26,700 ft^3/s, Oct. 12,13, gage height, 24.06 ft; minimum daily, 2,970 ft^3/s, June 13.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8100	20800	21600	5620	8200	2980	3030	3040	3020	3040	19500	22100
2	7910	20800	22500	4020	20200	4460	3020	3020	3020	3010	19700	7940
3	7910	20800	4920	4020	20200	9650	3020	3020	3030	3010	19800	5970
4	19600	20800	4450	4020	20000	3050	3010	3020	3020	3010	17900	5980
5	25200	11600	21300	4010	20100	3010	3020	3000	3040	3010	8060	5980
6	23500	10500	21500	4000	20000	3030	3030	3000	3010	3010	7950	5990
7	24000	16400	20500	4020	19900	3020	3020	3010	3010	3010	17400	7540
8	11400	20800	20500	4020	20000	3030	3020	3010	3010	3010	23300	7970
9	10900	20900	20100	4020	19900	3010	3010	2980	3020	3000	23300	7960
10	19700	20800	4470	4030	4650	3020	3020	3010	3010	3010	23300	5900
11	23700	20800	4170	5040	4040	3000	3020	2990	3020	3010	21100	8160
12	25900	12400	12400	13200	4040	3030	3020	2990	3020	3020	8440	6520
13	26100	11900	16300	20300	4020	3040	3050	3000	2970	3020	7950	6490
14	25100	17700	16300	20100	4030	3030	3020	3010	3000	3010	16000	6480
15	11300	20800	16300	20200	4010	3010	3020	2990	3020	4670	22500	6470
16	10400	20800	16300	20300	4020	3030	3020	3050	3010	3020	23500	4280
17	19300	20800	16300	20400	4020	3000	3010	3040	3020	3030	23500	5960
18	25100	20800	16200	20400	4040	3000	3020	3030	3020	3000	20200	6000
19	25200	12700	19000	20100	3980	3020	3000	3020	3010	3000	8060	5980
20	25200	12300	20200	20100	4020	3030	3010	3020	3010	3030	7980	11200
21	13900	18100	20200	4670	4020	3040	3020	3010	3340	7400	16100	13500
22	5000	20600	20200	4020	4020	3030	3000	3010	4030	8010	22600	11400
23	4030	20500	20300	4010	3070	3050	2990	3020	4040	7960	23300	6720
24	4030	4810	20200	4010	3000	3030	3040	3010	4030	9110	22300	6510
25	4180	4210	20100	4030	3000	3040	3010	3000	4020	9590	18700	15900
26	4250	4200	20200	3990	3000	3040	3020	3020	4040	9560	8070	11300
27	4240	4460	20100	4000	3010	3020	3030	3020	4040	10000	8630	11200
28	10900	20200	20100	4010	2990	3020	3040	3010	4020	9440	14800	15000
29	11800	20600	20400	4020	---	3010	3030	3000	4000	4150	15300	15100
30	11100	20600	20900	4040	---	3010	3000	3020	4020	4010	20000	8070
31	16600	---	21100	4000	---	3040	---	3030	---	8440	23300	---
TOTAL	465550	493480	539110	266720	239480	101780	90570	93400	99870	149600	532540	265570
MEAN	15020	16450	17390	8604	8553	3283	3019	3013	3329	4826	17180	8852
MAX	26100	20900	22500	20400	20200	9650	3050	3050	4040	10000	23500	22100
MIN	4030	4200	4170	3990	2990	2980	2990	2980	2970	3000	7950	4280
AC-FT	923400	978800	1069000	529000	475000	201900	179600	185300	198100	296700	1056000	526800
MEAN †	5715	5005	3334	3057	2413	2991	9236	25030	32890	14600	9986	8181
CFSM †	.64	.56	.37	.34	.27	.33	1.03	2.79	3.65	1.62	1.11	.91
IN †	.73	.62	.43	.39	.28	.38	1.15	3.21	4.08	1.87	1.28	1.02
AC-FT †	351400	297800	205000	188000	134000	183900	549600	1539300	1957100	897700	614000	486800

OBSERVED

CAL YR 1988	TOTAL	3679860	MEAN	10050	MAX	26100	MIN	2820	AC-FT	7299000
WTR YR 1989	TOTAL	3337670	MEAN	9144	MAX	26100	MIN	2970	AC-FT	6620000

ADJUSTED

CAL YR 1988	TOTAL	3154475	MEAN	8619	CFSM	0.96	IN	13.06	AC-FT	6256900
WTR YR 1989	TOTAL	3733099	MEAN	10230	CFSM	1.14	IN	15.45	AC-FT	7404600

(†) Adjusted for change in contents in Lake Koocanusa.

KOOTENAI RIVER BASIN

12301933 KOOTENAI RIVER BELOW LIBBY DAM, NEAR LIBBY, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967 to current year. Prior to March 25, 1974, at site, 3.2 mi downstream.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1967 to September 1969.
WATER TEMPERATURE: October 1967 to September 1977.
SUSPENDED SEDIMENT DISCHARGE: October 1967 to January 1976.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1968-69): Maximum, 525 microsiemens, Dec. 24, 1967; minimum, 174 microsiemens, May 26, 1969.
WATER TEMPERATURE (water years 1967-77): Maximum, 21.5°C, Aug. 6, 1970; minimum 0.0°C on many days during winter periods most years prior to Libby Dam.
SEDIMENT CONCENTRATION (water years 1967-76): Maximum daily mean, 1,200 mg/L, June 5, 1968; minimum daily mean, 1 mg/L on many days in 1968, 1969, 1972-75.
SEDIMENT LOAD (water years 1967-76): Maximum daily, 200,000 tons, June 5, 1968; minimum daily, 5.4 tons, Jan. 28, 1972.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH (STANDARD UNITS) (00400)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BAROMETRIC PRESSURE (MM OF HG) (00025)	OXYGEN, DISSOLVED (MG/L) (00300)
OCT										
13...	1300	26500	50	2	228	8.0	15.5	12.0	700	8.8
NOV										
21...	1400	20500	100	3	258	7.9	5.5	9.0	700	8.4
DEC										
15...	1130	16300	20	1	265	7.6	-7.0	8.0	729	9.6
JAN										
12...	1015	12200	100	2	250	8.1	-7.0	6.5	723	10.4
FEB										
15...	0930	3990	100	3	292	8.0	-10.0	2.0	720	12.0
MAR										
13...	1600	3040	100	3	295	8.0	6.0	2.5	704	11.0
APR										
17...	1400	3020	--	1	271	8.2	12.0	4.5	712	12.2
MAY										
15...	1345	2990	40	1	277	8.3	22.0	9.5	709	12.0
JUN										
15...	1330	3020	98	3	253	8.2	25.0	11.0	707	11.2
JUL										
20...	1330	3040	10	1	232	8.3	31.0	13.5	709	10.9
AUG										
16...	1400	23500	100	62	204	8.2	13.0	13.5	710	8.8
28...	1515	14600	--	--	218	--	22.0	13.0	--	--
SEP										
13...	1330	7890	0	0	210	8.0	19.0	12.5	714	8.5

12301933 KOOTENAI RIVER BELOW LIBBY DAM, NEAR LIBBY, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, TOTAL (MG/L AS N) (00600)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)
OCT										
13...	89	96	3.6	0.100	--	0.20	0.30	<0.002	<0.001	1.8
NOV										
21...	79	101	4.2	0.100	--	<0.20	--	<0.002	<0.001	1.5
DEC										
15...	85	106	3.4	<0.100	--	<0.20	--	0.004	0.005	1.7
JAN										
12...	89	96	3.0	<0.100	--	0.30	--	0.004	0.003	1.3
FEB										
15...	92	104	3.4	<0.100	--	<0.20	--	0.001	<0.001	1.2
MAR										
13...	87	113	4.3	<0.100	--	0.40	--	0.004	0.004	0.6
APR										
17...	101	108	3.9	<0.100	<0.100	<0.20	--	0.005	<0.001	1.3
MAY										
15...	113	108	5.4	<0.100	--	0.40	--	0.007	0.001	2.0
JUN										
15...	110	98	--	<0.100	--	<0.20	--	<0.001	<0.001	1.6
JUL										
20...	113	94	4.3	<0.100	--	<0.20	--	0.002	<0.001	2.2
AUG										
16...	91	91	4.2	<0.100	<0.100	<0.20	--	0.007	<0.001	1.9
28...	--	--	--	--	--	--	--	--	--	--
SEP										
13...	85	90	4.5	0.100	--	<0.20	--	0.004	<0.001	1.8

DATE	TIME	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	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)
APR										
17...	1400	140	37	11	4.0	0.1	0.60	112	24	3.6
AUG										
16...	1400	110	30	7.8	2.4	0.1	0.20	92	15	1.9

DATE	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	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)	ARSENIC TOTAL (UG/L AS AS) (01002)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB) (01051)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)
APR									
17...	0.10	149	0.20	1220	<1	70	<5	10	50
AUG									
16...	0.10	116	0.16	7370	1	20	2	<10	70

KOOTENAI RIVER BASIN

12302055 FISHER RIVER NEAR LIBBY, MT

LOCATION.--Lat 48°21'20", long 115°18'50", in NW1/4 NE1/4NW1/4 sec.21, T.30 N., R.29 W., Lincoln County, Hydrologic Unit 17010102, on left bank 0.8 mi upstream from mouth and 11.4 mi east of Libby.

DRAINAGE AREA.--838 mi^2.

PERIOD OF RECORD.--September 1967 to current year.

GAGE.--Water-stage recorder. Datum of gage is 2,134.10 ft above National Geodetic Vertical Datum of 1929 (U.S. Army Corps of Engineers bench mark).

REMARKS.--Estimated daily discharges: Dec. 27-30, Jan. 9-30, Feb. 2 to Mar. 13. Records good except those for estimated daily discharges, which are poor. Diversions of about 700 acres upstream from station. Several observations of water temperature and specific conductance were made during the year. U.S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--22 years, 474 ft^3/s, 7.68 in/yr, 343,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,720 ft^3/s, Jan 16, 1974, gage height, 9.29 ft; minimum, 29 ft^3/s, Jan. 2, 1977, gage height, 2.37 ft, result of freezeup.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of about May 22, 1948, reached a discharge of 6,560 ft^3/s, by slope-area measurement at site 0.5 mi upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,960 ft^3/s, Apr. 22, gage height, 6.48 ft; minimum, 42 ft^3/s, Feb. 2, gage height, 2.56 ft, result of freezeup.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	74	94	149	202	133	e140	675	1450	1120	292	128	136
2	73	94	140	177	e60	e130	662	1580	1290	285	123	151
3	73	112	143	166	e54	e130	618	1710	1310	274	128	159
4	71	167	131	181	e56	e140	584	1790	1250	268	123	154
5	71	164	123	175	e60	e150	605	1830	1170	257	121	144
6	72	238	138	157	e80	e160	1020	1880	1140	245	117	138
7	72	370	139	153	e85	e200	1690	2100	1150	232	114	133
8	71	280	133	117	e90	e180	2180	2350	1060	222	112	131
9	69	235	131	e120	e94	e200	1960	2150	988	215	121	127
10	69	206	128	e135	e98	e400	1670	2030	926	215	131	123
11	69	196	127	e140	e100	e500	1500	1890	832	212	125	119
12	69	189	130	e140	e110	e540	1450	1550	778	201	122	118
13	68	186	185	e140	e120	e585	1520	1320	740	245	134	116
14	69	172	223	e140	e125	616	1740	1140	708	267	136	113
15	77	162	187	e130	e125	586	2090	1040	720	232	124	110
16	314	152	163	e140	e120	544	2580	1010	712	215	119	107
17	476	147	150	e150	e115	505	2580	1040	635	207	120	106
18	258	141	152	e160	e110	458	2240	1120	564	208	116	118
19	190	136	187	e150	e120	434	2140	1090	528	194	112	125
20	160	133	172	e140	e130	417	2390	970	491	204	111	118
21	142	136	178	e150	e140	399	2770	873	457	197	110	114
22	130	143	166	e140	e150	423	2930	812	427	177	124	110
23	119	240	171	e120	e160	420	2680	846	410	168	136	108
24	111	258	159	e110	e160	414	2240	945	395	162	163	106
25	106	220	122	e115	e150	424	1930	881	379	155	221	104
26	105	200	110	e120	e140	467	1840	805	361	150	215	102
27	102	182	e90	e130	e130	519	1780	767	350	148	190	101
28	99	179	e100	e135	e150	574	1640	1010	325	142	174	100
29	97	169	e125	e145	---	655	1480	1110	307	137	160	100
30	96	159	e160	e150	---	673	1390	1040	299	134	148	100
31	96	---	192	197	---	674	---	1010	---	133	139	---
TOTAL	3668	5460	4604	4525	3165	12657	52574	41139	21822	6393	4217	3591
MEAN	118	182	149	146	113	408	1752	1327	727	206	136	120
MAX	476	370	223	202	160	674	2930	2350	1310	292	221	159
MIN	68	94	90	110	54	130	584	767	299	133	110	100
AC-FT	7280	10830	9130	8980	6280	25110	104300	81600	43280	12680	8360	7120

CAL YR 1988 TOTAL 107851 MEAN 295 MAX 2180 MIN 56 AC-FT 213900
WTR YR 1989 TOTAL 163815 MEAN 449 MAX 2930 MIN 54 AC-FT 324900

e Estimated

KOOTENAI RIVER BASIN

12303000 KOOTENAI RIVER AT LIBBY, MT

LOCATION.--Lat 48°24'03", long 115°33'08", in SW1/4SE1/4SW1/4 sec.34, T.31 N., R.31 W., Lincoln County, Hydrologic Unit 17010101, on right bank 1,800 ft downstream from highway bridge at Libby, 0.8 mi downstream from Libby Creek, and at mile 204.3.

DRAINAGE AREA.--10,240 mi^2, approximately.

PERIOD OF RECORD.--October 1910 to current year. Monthly discharge only for some periods, published in WSP 1316.

REVISED RECORDS.--WSP 1042: 1933. WSP 1246: 1912(M), 1915(M), 1916, 1918-19(M), 1924-27(M).

GAGE.--Water-stage recorder. Datum of gage is 2,041.54 ft above National Geodetic Vertical Datum of 1929. Prior to Apr. 28, 1931, nonrecording gages at site 1,800 ft upstream at different datum.

REMARKS.--No estimated daily discharges this year. Records good. Flow regulated by Lake Koocanusa (station number 12301920) since Mar. 21, 1972. Diversions for irrigation of about 14,500 acres from tributaries upstream from station in Canada and the United States. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--79 years, 12,020 ft^3/s, 15.94 in/yr, 8,708,000 acre-ft/yr, adjusted for change in contents in Lake Koocanusa since Mar. 21, 1972.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 121,000 ft^3/s, June 21, 1916, gage height, 20.7 ft, present datum, derived from gage-relation study; minimum observed, 895 ft^3/s, Jan. 11, 1930, result of discharge measurement.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 26,600 ft^3/s, Oct. 17, gage height, 8.42 ft; minimum daily, 3,130 ft^3/s, Mar. 1.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9460	20600	21300	8610	5870	3130	4130	5300	5260	3990	17500	22900
2	8030	20600	22900	4360	19800	3310	4100	5610	5780	3660	19400	9360
3	8000	20800	7790	4340	19700	9910	4030	5820	5760	3610	19500	6500
4	17000	21000	4650	4380	19600	4210	3960	6010	5570	3560	18400	6220
5	24900	16300	18600	4390	19700	3200	4050	6200	5420	3590	9590	6180
6	23300	13600	21800	4340	19800	3260	5080	6370	5420	3550	8150	6150
7	23800	17200	20500	4300	19800	3320	6500	6970	5510	3530	15200	7290
8	13100	21200	20500	4250	19800	3300	6910	7240	5260	3530	22600	8130
9	11000	21100	20500	4270	20000	3360	6320	6830	5130	3500	23000	8080
10	17900	21000	11300	4290	7280	3710	5760	6720	4980	3500	23100	6440
11	23500	20900	10200	4300	4370	4000	5470	6380	4720	3470	21700	7670
12	25600	14000	13200	11900	4360	4110	5370	5660	4630	3470	9840	6950
13	26000	12300	16500	20000	4330	4270	5540	5200	4560	3690	8170	6610
14	25100	16600	16600	20000	4320	4230	5900	4900	4570	3720	14000	6600
15	13400	20700	16600	20100	4270	4120	6570	4750	4610	5150	21700	6580
16	12600	20800	16600	20200	4290	4040	7470	4850	4570	3590	23100	4700
17	18900	20800	16700	20400	4280	3950	7360	5070	4330	3540	23000	5950
18	25800	20700	16700	20400	4290	3840	6770	5210	4170	3500	20600	6090
19	25700	14100	18700	20200	4260	3810	6650	5000	4110	3450	9330	6090
20	25600	12500	20300	20300	4270	3780	7160	4700	4030	3450	7980	9640
21	18600	17000	20300	7450	4270	3770	7890	4530	4030	6500	13900	13400
22	7140	20600	20300	4480	4270	3800	8100	4420	4810	8480	21700	12200
23	6990	20900	20300	4420	3510	3810	7460	4660	4810	8180	22900	7240
24	6990	7830	20300	4310	3210	3770	6690	4760	4800	9070	22500	6780
25	6990	4820	20100	4330	3190	3790	6210	4560	4790	9820	19100	14400
26	6990	4750	20100	4320	3190	3880	5960	4400	4780	9800	9640	11900
27	6990	4690	20000	4340	3190	3950	5820	4360	4800	10000	8260	11600
28	9930	17900	20100	4320	3160	4020	5610	5090	4710	9960	14400	14300
29	12400	20600	20300	4330	---	4120	5350	5140	4670	5360	14700	15100
30	11200	20600	20900	4370	---	4120	5210	4890	4680	4320	18900	9770
31	15300	---	21200	4470	---	4130	---	4860	---	7430	22800	---
TOTAL	488210	506490	555840	276470	242380	124020	179400	166460	145270	161970	524660	270820
MEAN	15750	16880	17930	8918	8656	4001	5980	5370	4842	5225	16920	9027
MAX	26000	21200	22900	20400	20000	9910	8100	7240	5780	10000	23100	22900
MIN	6990	4690	4650	4250	3160	3130	3960	4360	4030	3450	7980	4700
AC-FT	968400	1005000	1103000	548400	480800	246000	355800	330200	288100	321300	1041000	537200
MEAN †	6447	5445	3887	3373	2517	3708	12200	27390	34400	15000	9742	8356
CFSM †	.63	.53	.38	.33	.25	.36	1.19	2.67	3.36	1.46	.95	.82
IN †	.73	.59	.44	.38	.26	.42	1.33	3.08	3.75	1.69	1.10	.91
AC-FT †	396400	324000	239000	207400	139800	228000	725800	1684000	2047000	922300	599000	497200

OBSERVED

CAL YR 1988	TOTAL	3900170	MEAN	10660	MAX	26000	MIN	3120	AC-FT	7736000
WTR YR 1989	TOTAL	3641990	MEAN	9978	MAX	26000	MIN	3130	AC-FT	7224000

ADJUSTED

CAL YR 1988	TOTAL	3375146	MEAN	9222	CFSM	0.90	IN	12.26	AC-FT	6695000
WTR YR 1989	TOTAL	4038417	MEAN	11060	CFS	1.08	IN	14.67	AC-FT	8010000

(†) Adjusted for change in contents in Lake Koocanusa.

KOOTENAI RIVER BASIN

12303100 FLOWER CREEK NEAR LIBBY, MT

LOCATION.--Lat 48°20'41", long 115°36'20", in NW1/4SE1/4SE1/4 sec.19, T.30 N., R.31 W., Lincoln County, Hydrologic Unit 17010101, Kootenai National Forest, on left bank 30 ft downstream from road bridge, 0.3 mi upstream from South Fork, 1.0 mi upstream from reservoir, 4.0 mi southwest of Libby, and at mile 4.5 mi.

DRAINAGE AREA.--11.1 mi^2.

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

REVISED RECORDS.--WDR MT-1972: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 2,866 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Dec. 2,4-6, 15-23, 25-29, Jan. 7-9, 24-26, Feb. 1-5. Records good except those for estimated daily discharges, which are poor. No known regulation or diversion upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--29 years, 26.2 ft^3/s, 32.04 in/yr, 18,980 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 709 ft^3/s, Jan. 16, 1974, gage height, 5.53 ft; maximum gage height, 6.10 ft, Jan. 15, 1974, backwater from ice; minimum discharge, 3.1 ft^3/s, Nov. 20, 1979; minimum gage height, 1.35 ft, Jan. 11, 1975.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 7	2200	*173	*3.25	No peaks greater than base discharge this year.			

Minimum discharge, 3.6 ft^3/s, Oct. 13, gage height, 1.60 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.6	6.8	8.4	6.3	e5.4	4.7	11	47	106	32	11	12
2	4.4	7.3	e8.0	6.3	e5.2	4.7	11	69	130	31	11	18
3	4.2	10	7.9	6.3	e5.0	4.7	10	71	137	30	10	16
4	4.2	11	e7.8	7.1	e4.8	4.7	9.7	83	127	29	10	14
5	4.2	10	e7.8	6.8	e5.4	4.4	11	98	125	28	10	13
6	4.2	53	e8.0	6.8	5.8	5.6	28	118	139	26	10	13
7	4.2	37	7.9	e6.7	5.6	5.3	52	161	136	24	9.7	12
8	4.0	26	7.6	e6.4	5.3	5.1	53	146	120	24	9.3	11
9	4.0	20	7.3	e6.8	5.3	5.6	40	134	117	22	11	11
10	4.0	17	7.3	7.1	5.1	28	33	143	104	22	11	10
11	3.8	16	7.1	6.3	5.1	13	30	112	87	21	10	9.7
12	3.8	15	7.9	6.0	5.1	15	31	77	83	20	10	9.3
13	3.6	13	11	6.0	5.1	17	36	61	84	32	9.7	8.7
14	6.3	12	9.3	6.0	5.0	15	48	52	88	32	9.3	8.4
15	12	11	e9.0	6.3	4.9	14	72	51	84	28	8.7	8.1
16	48	11	e8.0	6.8	4.9	13	92	63	81	24	8.7	7.7
17	43	10	e7.6	7.1	4.9	12	74	88	64	23	9.3	7.5
18	24	10	e7.4	7.6	4.9	11	62	89	56	21	8.7	8.1
19	17	9.3	e7.6	7.9	4.9	10	71	65	53	20	8.1	7.7
20	14	9.3	e7.4	7.3	4.9	10	99	51	49	18	8.1	7.3
21	11	9.3	e7.2	7.3	4.7	9.7	117	47	43	17	9.3	7.1
22	10	11	e7.2	7.1	4.7	9.7	109	49	40	16	10	6.8
23	8.7	17	e7.1	6.0	4.9	8.7	83	70	38	15	10	6.7
24	8.1	13	7.1	e5.4	4.9	8.7	62	66	38	14	15	6.5
25	7.9	12	e7.0	e5.5	4.7	8.7	53	51	38	14	19	6.2
26	7.6	11	e6.8	e5.7	4.7	8.7	47	45	38	13	30	6.0
27	7.1	10	e6.4	6.0	4.7	9.3	43	55	38	13	22	5.8
28	6.8	11	e6.6	5.8	4.7	10	39	101	36	12	19	5.8
29	6.3	9.7	e6.7	5.8	---	11	36	71	34	12	16	5.6
30	6.8	8.7	6.8	6.3	---	11	36	61	34	11	14	5.7
31	6.8	---	6.8	6.3	---	11	---	69	---	11	13	---
TOTAL	304.6	427.4	236.0	201.1	140.6	309.3	1498.7	2464	2347	655	370.9	274.7
MEAN	9.83	14.2	7.61	6.49	5.02	9.98	50.0	79.5	78.2	21.1	12.0	9.16
MAX	48	53	11	7.9	5.8	28	117	161	139	32	30	18
MIN	3.6	6.8	6.4	5.4	4.7	4.4	9.7	45	34	11	8.1	5.6
AC-FT	604	848	468	399	279	613	2970	4890	4660	1300	736	545

CAL YR 1988 TOTAL 6679.6 MEAN 18.3 MAX 115 MIN 3.3 AC-FT 13250
WTR YR 1989 TOTAL 9229.3 MEAN 25.3 MAX 161 MIN 3.6 AC-FT 18310

e Estimated

KOOTENAI RIVER BASIN

12303500 LAKE CREEK AT TROY, MT

LOCATION.--Lat 48°26'49", long 115°52'34" in SE1/4NW1/4SW1/4 sec.18, T.31 N., R.33 W., Lincoln County, Hydrologic Unit 17010101, Kootenai National Forest, on right bank 1,000 ft upstream from bridge on U.S. Highway 2, 0.4 mi upstream from mouth, 0.6 mi downstream from Montana Light and Power Company Dam (Troy Dam), and 1.3 mi southeast of Troy.

DRAINAGE AREA.--210 mi^2.

PERIOD OF RECORD.--January 1945 to September 1957, October 1982 to current year.

REVISED RECORDS.--WSP 1216: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 1,900 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to Nov. 1, 1946, wire-weight gage at site 0.2 mi upstream at different datum. Jan. 11, 1945, to Sept. 30, 1957, water-stage recorder at same site at different datum.

REMARKS.--No estimated daily discharges this year. Records good. Diurnal fluctuation caused by small hydroelectric plant 0.6 mi upstream. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--19 years (1946-57, 1982-89), 453 ft^3/s, 29.30 in/yr, 328,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,250 ft^3/s, May 30, 1948, gage height, 8.28 ft; minimum, 2.0 ft^3/s, Sept. 1, 1947, Sept. 15, 1948.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,800 ft^3/s, May 5, gage height, 4.47 ft; minimum daily, 78 ft^3/s, Oct. 8.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	100	117	163	139	122	117	304	853	924	472	207	151
2	86	119	149	150	165	118	306	983	1170	449	206	164
3	99	153	148	121	198	115	294	1060	1190	445	194	162
4	86	169	148	165	134	110	290	1120	1230	410	188	155
5	103	163	142	158	143	120	324	1200	1230	407	189	154
6	84	300	155	150	136	137	433	1280	1250	369	177	146
7	81	302	147	144	131	147	583	1520	1260	361	187	146
8	78	256	143	137	127	136	682	1630	1210	333	177	143
9	91	241	139	140	131	141	654	1570	1180	333	188	134
10	90	229	138	143	126	249	584	1610	1130	340	201	163
11	86	244	131	137	131	229	607	1580	1080	332	180	127
12	84	236	135	134	139	291	533	1350	1050	317	178	122
13	95	233	170	138	140	304	584	1220	998	355	177	127
14	83	214	167	135	136	291	612	1110	953	326	179	136
15	123	202	138	142	130	295	773	1060	912	317	169	139
16	202	191	146	173	130	273	959	1070	906	299	160	138
17	300	183	146	195	125	261	947	1120	857	297	175	108
18	231	175	143	209	130	245	913	1180	773	275	181	128
19	223	169	142	210	134	245	906	1120	785	281	167	129
20	202	169	140	156	128	242	1050	1010	793	271	166	147
21	176	94	140	181	126	229	1260	938	728	261	169	150
22	180	162	135	183	117	241	1320	909	656	250	181	123
23	162	288	143	169	137	245	1200	1020	634	237	180	122
24	159	220	139	166	127	220	1070	1090	621	238	192	123
25	141	213	135	157	129	232	997	1020	588	235	202	121
26	158	194	119	158	123	241	944	958	577	223	182	119
27	195	179	131	152	120	251	882	897	575	218	180	120
28	132	186	140	144	116	300	835	1020	546	223	195	116
29	126	171	131	151	---	313	795	1040	534	207	194	117
30	123	168	146	160	---	311	823	1000	484	208	154	117
31	120	---	145	185	---	316	---	857	---	209	156	---
TOTAL	4199	5940	4434	4882	3731	6965	22464	35395	26824	9498	5631	4047
MEAN	135	198	143	157	133	225	749	1142	894	306	182	135
MAX	300	302	170	210	198	316	1320	1630	1260	472	207	164
MIN	78	94	119	121	116	110	290	853	484	207	154	108
AC-FT	8330	11780	8790	9680	7400	13820	44560	70210	53210	18840	11170	8030

CAL YR 1988 TOTAL 99256 MEAN 271 MAX 1370 MIN 75 AC-FT 196900
WTR YR 1989 TOTAL 134010 MEAN 367 MAX 1630 MIN 78 AC-FT 265800

KOOTENAI RIVER BASIN

12304500 YAAK RIVER NEAR TROY, MT

LOCATION.--Lat 48°33'43", long 115°58'09", in NE1/4SE1/4SE1/4 sec.5, T.32 N., R.34 W., Lincoln County, Hydrologic Unit 17010103, Kootenai National Forest, on right bank 500 ft upstream from bridge on U.S. Highway 2, 0.2 mi upstream from mouth, and 7.7 mi northwest of Troy.

DRAINAGE AREA.--766 mi^2.

PERIOD OF RECORD.--October 1910 to September 1916 (fragmentary record), March 1956 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,839.2 ft above National Geodetic Vertical Datum of 1929. Oct. 15, 1910, to Sept. 30, 1916, nonrecording gage at several sites within 11 mi of present site at various datums.

REMARKS.--Estimated daily discharges: Dec. 25 to Jan. 28, Feb. 1 to Mar. 19. Records good except those for estimated daily discharges, which are poor. Diversions for irrigation of about 30 acres upstream from station. Several observations of water temperature and specific conductance were made during the year. U.S. Army Corps of Engineers satellite telemeter at station.

AVERAGE DISCHARGE.--33 years, 867 ft^3/s, 15.37 in/yr, 628,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,100 ft^3/s, May 21, 1956, gage height, 9.70 ft, in gage well, 10.8 ft, from outside gage; minimum daily, 50 ft^3/s, Dec. 9, 1972.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in May to June 1948 reached a stage of 11.0 ft, from floodmarks; discharge, 12,500 ft^3/s. Flood in May 1954 reached a stage of 11.4 ft, from floodmarks; discharge, 13,400 ft^3/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 5,000 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 21	2245	5,310	7.41	May 8	0145	*6,060	*7.69

Minimum, 82 ft^3/s, Oct. 13,14, gage height, 2.88 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	127	116	163	e240	e220	e180	641	3010	2420	559	183	230
2	115	122	145	e230	e120	e170	614	3680	2780	538	179	258
3	107	156	157	e235	e90	e160	565	4430	2820	511	181	283
4	101	183	145	e240	e95	e150	530	4380	2730	479	178	259
5	97	195	138	e250	e100	e170	607	4410	2680	452	177	237
6	94	526	149	e230	e105	e190	1110	4700	2740	427	171	229
7	92	578	162	e210	e110	e230	1830	5390	2670	404	164	222
8	90	387	161	e180	e115	e280	2190	5630	2410	382	157	220
9	87	289	159	e190	e120	e350	1740	5330	2240	366	167	212
10	86	245	155	e200	e125	e450	1460	5240	2020	362	208	196
11	84	230	154	e210	e130	e550	1380	4660	1840	375	196	187
12	84	222	158	e210	e140	e600	1480	3850	1690	352	178	182
13	83	211	253	e210	e150	e640	1750	3220	1560	402	176	178
14	87	190	308	e210	e160	e670	2310	2760	1470	464	178	181
15	121	168	226	e215	e160	e650	3170	2600	1410	428	178	176
16	265	163	171	e220	e150	e600	3880	2660	1400	367	166	165
17	436	175	141	e225	e145	e540	3470	2840	1240	343	162	159
18	284	174	128	e230	e140	e470	3030	2990	1080	326	161	160
19	200	165	178	e220	e150	e425	3350	2640	1050	312	157	164
20	168	165	213	e210	e160	414	4060	2250	1030	299	151	165
21	152	164	212	e210	e170	395	4990	2050	930	282	169	158
22	148	184	211	e200	e180	410	5120	2020	859	265	194	152
23	141	321	205	e180	e190	407	4500	2610	838	250	192	149
24	132	297	192	e160	e200	395	3770	2860	784	240	242	146
25	125	240	e150	e170	e210	403	3410	2440	752	233	351	141
26	122	207	e135	e180	e210	436	3170	2250	784	225	369	139
27	126	177	e120	e190	e210	507	2970	2190	795	218	344	135
28	124	175	e140	e200	e200	636	2640	2570	692	210	372	132
29	118	176	e170	212	---	724	2480	2380	630	200	335	135
30	113	176	e200	228	---	680	2620	2170	590	194	285	134
31	118	---	e250	303	---	659	---	2160	---	188	249	---
TOTAL	4227	6777	5449	6598	4255	13541	74837	102370	46934	10653	6570	5484
MEAN	136	226	176	213	152	437	2495	3302	1564	344	212	183
MAX	436	578	308	303	220	724	5120	5630	2820	559	372	283
MIN	83	116	120	160	90	150	530	2020	590	188	151	132
AC-FT	8380	13440	10810	13090	8440	26860	148400	203100	93090	21130	13030	10880

CAL YR 1988 TOTAL 202725 MEAN 554 MAX 5490 MIN 62 AC-FT 402100
WTR YR 1989 TOTAL 287695 MEAN 788 MAX 5630 MIN 83 AC-FT 570600

e Estimated

KOOTENAI RIVER BASIN

12305000 KOOTENAI RIVER AT LEONIA, ID

LOCATION.--Lat 48° 37'04", long 116° 02'47", in NW1/4 NW1/4 NW1/4 sec.20, T.33 N., R.34 W., principal Meridian, Lincoln County, MT, Hydrologic Unit 17010104, on right bank at Leonia, 450 ft east of Montana-Idaho State line, 0.5 mi upstream from Boulder Creek, and at mile 171.6.

DRAINAGE AREA.--11,740 mi^2, approximately.

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

GAGE.--Water-stage recorder. Datum of gage is 1,790.25 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1970, at datum 90 ft lower. Prior to Nov. 13, 1928, nonrecording gage on bridge 250 ft upstream at datum 90.41 ft lower.

REMARKS.--No estimated daily discharges. Records good. Diversions above station for irrigation of about 14,600 acres. Flow regulated by Lake Koocanusa since Mar. 21, 1972.

AVERAGE DISCHARGE.--61 years, 13,800 ft^3/s, 15.96 in./yr, 9,998,000 acre-ft/yr (flows not adjusted for storage change in upstream reservoir).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 123,000 ft^3/s, May 28, 1948, gage height, 33.40 ft; minimum, 996 ft^3/s, Dec. 9, 1936; minimum gage height, 7.56 ft, Dec. 10, 1929.

EXTREMES OUTSIDE PERIOD OF RECORD.--Floods of June 1894 and 1916 reached stages of 34.6 and 31.6 ft, respectively, present datum, from information by Great Northern Railway.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 29,300 ft^3/s, gage height, 18.26 ft, Oct. 17, 18; minimum, 3,690 ft^3/s, Mar. 1, 2, 3, gage height, 9.79 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13600	21800	22200	13500	4880	3720	5710	10900	10200	5830	15600	24700
2	8560	21900	24700	5110	16300	3720	5670	12400	11600	5150	20600	13500
3	8490	22200	12900	4940	20100	7960	5530	13800	11800	5030	20700	7870
4	14100	22500	5390	5050	20100	6780	5390	14300	11500	4880	19900	6940
5	26600	15900	15300	5150	20200	3830	5530	14700	11200	4840	13100	6850
6	24800	12900	23800	5060	20700	3870	7160	15500	11300	4770	8790	6800
7	25400	16200	21900	4900	21100	3950	9900	17600	11300	4700	13100	7270
8	16600	23400	21900	4800	21200	3930	11500	18500	10700	4630	23500	8790
9	11300	23200	21900	4810	21300	3980	10500	17500	10200	4600	24600	8680
10	15800	23000	11500	4840	11800	4580	9300	17300	9670	4580	24900	7640
11	25000	22900	5180	4800	5040	5090	8780	15900	8980	4570	23900	7080
12	27300	16900	8210	9900	4930	5530	8640	13300	8610	4490	13400	8010
13	28300	13000	17300	19500	4870	5930	9080	11600	8370	4730	8890	7180
14	27000	15800	17600	21300	4830	5950	10200	10600	8110	4920	11900	7160
15	17000	22400	17300	21400	4760	5730	12200	10100	8020	5080	22600	7140
16	13100	22400	17100	21600	4770	5500	14900	10300	8090	5720	24700	6470
17	18300	22500	17100	21900	4750	5310	14400	11000	7530	4550	24700	5770
18	28400	22400	17000	22100	4750	5090	13000	11500	6950	4490	22600	6580
19	27900	16700	18700	21800	4730	4980	13100	10700	6790	4400	12800	6540
20	27700	13100	21600	21800	4730	4930	14800	9590	6640	4360	8630	7350
21	22200	16100	21700	12200	4730	4880	17700	8980	6370	5300	11800	13700
22	7440	22200	21700	5310	4720	4940	18300	8760	6790	9490	22600	13200
23	5200	23100	21700	5090	4390	4950	16500	9930	6930	8910	24500	9320
24	4920	13000	21700	4890	3860	4880	14100	10500	6820	9350	24900	7310
25	4850	5720	21400	4880	3830	4890	12800	9650	6740	10400	21000	12000
26	5010	5480	21200	4920	3810	5030	12100	9050	6720	10400	13100	13600
27	5040	5330	21200	4900	3810	5240	11500	8820	6710	10300	9230	12300
28	6160	15000	21300	4860	3800	5530	10900	10200	6500	10500	13600	13100
29	13600	22000	21600	4870	---	5800	10300	10200	6300	7950	15400	15700
30	11600	22100	22400	4940	---	5780	10300	9480	6200	4990	19000	13300
31	14400	---	22700	5180	---	5740	---	9380	---	5980	23700	---
TOTAL	505670	541130	577180	306300	258790	158020	329790	372040	253640	189890	557740	291850
MEAN	16310	18040	18620	9881	9242	5097	10990	12000	8455	6125	17990	9728
MAX	28400	23400	24700	22100	21300	7960	18300	18500	11800	10500	24900	24700
MIN	4850	5330	5180	4800	3800	3720	5390	8760	6200	4360	8630	5770
AC-FT	1003000	1073000	1145000	607500	513300	313400	654100	737900	503100	376600	1106000	578900

CAL YR 1988 TOTAL 4404650 MEAN 12030 MAX 28400 MIN 3590 AC-FT 8737000
WTR YR 1989 TOTAL 4342040 MEAN 11900 MAX 28400 MIN 3720 AC-FT 8612000

PEND OREILLE RIVER BASIN

12323170 SILVER BOW CREEK ABOVE BLACKTAIL CREEK, AT BUTTE, MT

LOCATION.--Lat 46°00'08", long 112°30'43", in SE1/4NE1/4NE1/4 sec.19, T.3 N., R.7 W., Silver Bow County, Hydrologic Unit 17010201, on right bank in Butte, about 200 ft west of Continental Drive and Texas Avenue, 0.3 mi downstream of Horse Canyon, about 0.3 mi upstream of Harrison Ave. bridge, 1.2 mi upstream of Blacktail Creek, and at mile 22.7.

DRAINAGE AREA.--Indeterminate.

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

GAGE.--Water-stage recorder and V-notch sharp-crested weir. Datum of gage is 5,470.80 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--No estimated daily discharges this year. Records good except those for March, which are poor. Flow regulated by Anaconda Minerals Company operations.

AVERAGE DISCHARGE.--6 years, 0.045 ft^3/s, 32.6 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 15 ft^3/s, June 28, 1986, gage height, 2.80 ft; no flow on many days most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3.4 ft^3/s, Sept. 18, gage height, 2.31 ft; no flow most days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.08	.00
2	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00
3	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
4	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
5	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
6	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
7	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
8	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
9	.00	.00	.00	.00	.00	.37	.00	.00	.00	.00	.00	.00
10	.00	.00	.00	.00	.00	.57	.00	.00	.00	.00	.00	.00
11	.00	.00	.00	.00	.00	.23	.00	.00	.00	.00	.00	.00
12	.00	.00	.00	.00	.00	.38	.00	.00	.00	.00	.00	.00
13	.00	.00	.00	.00	.00	.06	.00	.00	.00	.00	.00	.00
14	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
15	.00	.00	.00	.00	.00	.03	.00	.00	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
17	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.15
18	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.34
19	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
20	.00	.00	.00	.00	.00	.02	.00	.00	.00	.00	.00	.00
21	.00	.00	.00	.00	.00	.06	.00	.00	.00	.00	.00	.00
22	.00	.00	.00	.00	.00	.05	.00	.00	.00	.00	.00	.00
23	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.12	.00
24	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.11	.00
25	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
26	.00	.00	.00	.00	.00	.00	.00	.00	.00	.05	.00	.00
27	.00	.00	.00	.00	.00	.00	.00	.00	.01	.02	.00	.00
28	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
29	.00	.00	.00	.00	---	.00	.00	.00	.00	.00	.00	.00
30	.00	.00	.00	.00	---	.00	.00	.00	.00	.00	.00	.00
31	.00	---	.00	.00	---	.00	---	.00	---	.00	.00	---
TOTAL	0.00	0.00	0.00	0.00	0.00	1.77	0.00	0.00	0.01	0.07	0.32	0.49
MEAN	.000	.000	.000	.000	.000	.057	.000	.000	.000	.002	.010	.016
MAX	.00	.00	.00	.00	.00	.57	.00	.00	.01	.05	.12	.34
MIN	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
AC-FT	.00	.00	.00	.00	.00	3.5	.00	.00	.02	.1	.6	1.0

CAL YR 1988 TOTAL 1.29 MEAN .004 MAX .32 MIN .00 AC-FT 2.6
WTR YR 1989 TOTAL 2.66 MEAN .007 MAX .57 MIN .00 AC-FT 5.3

PEND OREILLE RIVER BASIN

12323240 BLACKTAIL CREEK AT BUTTE, MT

LOCATION.--Lat 45°54'38", long 112°31'38", in SW1/4NE1/4SE1/4 sec.24, T.3 N., R.8 W., Silver Bow County, Hydrologic Unit 17010201, on left bank, 70 feet upstream of culvert under George Street, and 0.2 mi upstream of Silver Bow Creek.

DRAINAGE AREA.--95.4 mi^2.

PERIOD OF RECORD.--October 1988 to September 1989.

GAGE.--Water-stage recorder. Elevation of gage is 5,430 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Dec. 26 to Feb. 20, Mar. 2-4. Records good except those for April to May, which are fair, and those for estimated daily discharges, which are poor. Slight regulation by Basin Creek Reservoir. Diversions for irrigation of about 1,400 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 63 ft^3/s, Mar. 10, 1989, gage height, 2.85 ft; minimum daily discharge, 6.5 ft^3/s, Feb. 5, 1989.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 40 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 10	2100	*63	*2.85	Only peak above base discharge this year.			

Minimum daily, 6.5 ft^3/s, Feb. 5.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.5	9.4	8.8	e8.0	e7.5	7.2	11	15	15	8.7	11	9.9
2	8.4	9.4	8.8	e8.0	e7.0	e7.1	11	15	14	8.6	10	9.9
3	8.5	12	8.8	e8.0	e6.8	e7.0	11	16	14	8.4	9.4	9.7
4	8.3	9.5	8.8	e8.0	e6.6	e7.0	12	17	13	8.4	9.4	9.3
5	8.2	9.4	8.6	e7.9	e6.5	7.4	15	16	13	7.7	9.0	9.7
6	8.1	10	8.5	e7.8	e6.6	8.5	25	15	12	7.4	8.8	9.8
7	8.2	9.4	8.8	e7.8	e6.7	9.4	29	14	12	6.9	9.1	10
8	8.1	9.4	8.8	e7.6	e6.8	9.8	27	15	11	7.0	9.5	9.5
9	8.4	9.4	9.1	e7.7	e6.9	16	24	17	13	7.1	9.9	9.5
10	8.8	9.2	9.1	e7.7	e7.0	29	17	17	16	7.6	9.7	9.5
11	8.8	9.1	9.1	e7.8	e7.3	46	16	17	13	7.4	10	9.8
12	8.8	9.0	10	e7.8	e7.4	29	16	17	11	7.3	10	9.7
13	8.8	8.9	9.6	e7.8	e7.5	27	19	17	11	8.3	11	9.6
14	8.8	9.4	9.4	e7.9	e7.7	17	21	17	11	7.5	11	9.5
15	8.8	9.0	8.8	e7.9	e7.5	14	20	21	14	8.7	11	9.4
16	9.2	9.1	8.6	e8.0	e6.7	12	19	23	13	8.5	12	9.3
17	14	9.3	8.5	e8.0	e6.6	10	19	23	13	8.6	11	13
18	9.4	9.4	8.3	e8.0	e6.6	11	16	20	10	8.3	11	21
19	9.8	9.4	8.2	e8.0	e6.8	10	18	19	11	7.5	11	13
20	9.2	9.3	8.2	e8.0	e7.0	10	18	20	11	7.9	13	12
21	9.1	9.5	8.2	e7.9	7.4	11	17	19	11	11	12	11
22	9.0	9.4	8.2	e7.9	7.2	12	18	18	11	9.6	12	10
23	9.1	9.7	8.2	e7.8	7.7	12	18	17	11	9.3	17	10
24	9.1	9.5	8.0	e7.6	7.9	11	18	15	10	8.9	17	10
25	9.1	9.0	7.9	e7.5	7.9	15	16	14	10	8.8	14	11
26	9.1	9.2	e7.8	e7.5	7.4	17	15	14	11	11	13	10
27	9.1	8.9	e7.8	e7.5	7.2	18	15	13	11	12	13	9.9
28	9.1	8.9	e8.0	e7.5	7.2	18	15	17	10	9.9	12	11
29	9.2	9.1	e8.0	e7.6	---	15	15	17	9.9	9.2	11	11
30	9.4	8.9	e8.0	e7.7	---	14	14	17	8.9	9.1	11	11
31	9.4	---	e8.0	e7.8	---	13	---	15	---	9.9	11	---
TOTAL	279.8	281.1	264.9	242.0	199.4	450.4	525	527	354.8	266.5	349.8	318.0
MEAN	9.03	9.37	8.55	7.81	7.12	14.5	17.5	17.0	11.8	8.60	11.3	10.6
MAX	14	12	10	8.0	7.9	46	29	23	16	12	17	21
MIN	8.1	8.9	7.8	7.5	6.5	7.0	11	13	8.9	6.9	8.8	9.3
AC-FT	555	558	525	480	396	893	1040	1050	704	529	694	631

WTR YR 1989 TOTAL 4058.7 MEAN 11.1 MAX 46 MIN 6.5 AC-FT 8050

e Estimated

PEND OREILLE RIVER BASIN

12323250 SILVER BOW CREEK BELOW BLACKTAIL CREEK, AT BUTTE, MT

LOCATION.--Lat 45°59'49", long 112°33'43", in SW1/4SE1/4NW1/4 sec.23, T.3 N., R.8 W., Silver Bow County, Hydrologic Unit 17010201, on right bank 150 ft upstream of Interstate Highway 90 overpass in Butte, 0.8 mi upstream of Whiskey Gulch, 1.3 mi downstream of Blacktail Creek, and at mile 20.2.

DRAINAGE AREA.--103 mi^2.

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

GAGE.--Water-stage recorder. Datum of gage is 5,410.87 ft above National Geodetic Vertical Datum of 1929 (levels by Stiller and Associates).

REMARKS.--Estimated daily discharges: Feb. 1-5, Mar. 4. Records fair. Flow slightly regulated by Silver Bow County sewage treatment plant. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--6 years, 23.2 ft^3/s, 16,810 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 424 ft^3/s, May 25, 1987, gage height, 3.49 ft; maximum gage height, 3.91 ft, June 28, 1986; minimum discharge, 9.3 ft^3/s, Dec. 27,30,31, 1988 and Jan. 8,12,13, 1989.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 215 ft^3/s, Mar. 10, gage height, 2.83 ft; minimum, 9.3 ft^3/s, Dec. 27,30,31, Jan. 8,12,13.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	19	18	13	e13	16	22	23	18	16	24	20
2	17	20	18	13	e13	16	22	23	19	15	21	19
3	17	25	18	13	e12	16	21	24	18	15	18	19
4	16	18	16	13	e12	e16	20	24	17	15	18	18
5	17	17	16	13	e15	16	22	21	17	15	18	20
6	17	20	16	13	17	19	40	20	16	15	17	20
7	17	19	16	13	16	23	58	21	16	15	19	21
8	17	18	16	13	16	26	50	22	16	15	19	19
9	17	18	17	14	16	52	43	23	18	15	20	20
10	18	18	16	13	16	86	30	23	26	16	19	20
11	17	18	15	13	16	118	28	22	18	15	20	21
12	18	19	18	13	16	60	28	23	17	15	21	20
13	18	18	17	13	17	47	32	22	15	18	21	20
14	18	19	16	13	16	29	32	22	15	16	22	20
15	18	18	16	13	17	25	34	38	26	19	23	20
16	19	19	16	13	17	22	33	30	20	19	23	20
17	32	20	16	13	17	19	32	29	19	19	21	32
18	17	19	16	13	18	23	27	27	16	18	20	52
19	18	19	16	14	17	20	26	24	18	17	20	20
20	17	19	16	13	17	20	25	22	20	18	24	19
21	17	20	15	13	17	22	26	20	17	31	22	18
22	17	19	15	14	16	23	35	19	18	20	23	18
23	17	20	14	14	17	23	32	19	18	20	39	17
24	18	19	14	13	18	21	30	17	17	19	34	17
25	18	18	12	14	18	26	26	17	17	20	25	17
26	18	18	13	14	16	30	24	17	18	29	23	17
27	17	18	14	14	16	33	25	16	23	28	23	18
28	18	19	14	14	15	30	24	29	18	19	23	18
29	19	19	13	14	---	26	23	21	17	18	20	17
30	18	18	12	15	---	24	22	21	16	18	20	19
31	19	---	12	15	---	23	---	20	---	20	23	---
TOTAL	559	568	477	416	447	950	892	699	544	568	683	616
MEAN	18.0	18.9	15.4	13.4	16.0	30.6	29.7	22.5	18.1	18.3	22.0	20.5
MAX	32	25	18	15	18	118	58	38	26	31	39	52
MIN	16	17	12	13	12	16	20	16	15	15	17	17
AC-FT	1110	1130	946	825	887	1880	1770	1390	1080	1130	1350	1220

CAL YR 1988 TOTAL 7446 MEAN 20.3 MAX 65 MIN 12 AC-FT 14770
WTR YR 1989 TOTAL 7419 MEAN 20.3 MAX 118 MIN 12 AC-FT 14720

e Estimated

PEND OREILLE RIVER BASIN

12323600 SILVER BOW CREEK AT OPPORTUNITY, MT

LOCATION.--Lat 46°06'28", long 112°48'17", in SE1/4SW1/4SE1/4 sec.11, T.4 N., R.10 W., Deer Lodge County, Hydrologic Unit 17010201, on left bank 200 ft downstream from Stuart Street bridge, 0.5 mi east of Opportunity, and 1.0 mi upstream from Mill Creek.

DRAINAGE AREA.--284 mi^2.

PERIOD OF RECORD.--July 1988 to current year (seasonal records only).

GAGE.--Water-stage recorder. Datum of gage is 4,912.37 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Mar. 1-9, 14-20,24. Records good except those for July and August, which are fair. Numerous diversions upstream from station for irrigation and municipal use. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 654 ft^3/s, Mar. 9, 1989, gage height, 5.61 ft; minimum daily, 14 ft^3/s, Aug. 3-11, 1988.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 654 ft^3/s, Mar. 9, gage height, 5.61 ft; minimum daily, 18 ft^3/s, Aug. 13.

REVISIONS.--The maximum discharge for the 1988 season has been revised to 80 ft^3/s, Oct. 17, 1988, gage height, 2.51 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	26	28				e34	49	72	64	33	30	30
2	26	28				e32	49	73	66	34	28	28
3	27	34				e30	47	75	69	31	21	27
4	26	30				e33	46	78	68	30	19	26
5	26	28				e40	50	72	68	28	22	28
6	26	29				e50	88	76	68	28	19	38
7	26	29				e62	129	82	67	26	19	40
8	26	30				e100	98	86	67	22	20	39
9	27	42				e200	83	88	68	27	21	40
10	27	34				336	67	94	91	28	33	39
11	28	41				243	62	98	72	29	22	39
12	28	34				127	61	86	66	29	19	38
13	28	35				104	66	81	62	31	18	38
14	28	36				e70	70	81	58	21	19	37
15	28	34				e55	77	84	65	25	22	36
16	28	36				e50	86	99	76	34	24	36
17	49	37				e47	81	88	68	36	20	38
18	33	38				e45	75	89	54	30	20	68
19	33	36				e44	77	80	55	22	19	45
20	31	37				e45	87	73	55	22	22	41
21	31	38				47	90	69	58	26	23	39
22	30	38				51	101	69	55	37	25	38
23	30	40				51	97	76	50	25	51	38
24	31	e33				e48	94	74	46	23	71	37
25	33	e33				53	85	74	42	22	48	38
26	40	e31				63	81	66	42	36	38	38
27	28	e30				61	81	62	44	53	39	38
28	28	e32				61	76	65	45	35	50	39
29	29	e32				56	73	80	39	32	46	37
30	29	e31				52	73	71	34	30	45	36
31	29					51		67		26	46	
TOTAL	915	1014				2341	2299	2428	1782	911	919	1129
MEAN	29.5	33.8				75.5	76.6	78.3	59.4	29.4	29.6	37.6
MAX	49	42				336	129	99	91	53	71	68
MIN	26	28				30	46	62	34	21	18	26
AC-FT	1810	2010				4640	4560	4820	3530	1810	1820	2240

e Estimated

PEND OREILLE RIVER BASIN

12323770 WARM SPRINGS CREEK AT WARM SPRINGS, MT

LOCATION.--Lat 46°10'51", long 112°47'07", in SW1/4SW1/4SW1/4 sec.18, T.5 N., R.9 W., Deer Lodge County, Hydrologic Unit 17010201, on left bank at county road bridge 0.2 mi southeast of Warm Springs post office, and at mile 0.9.

DRAINAGE AREA.--163 mi^2.

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

GAGE.--Water-stage recorder. Datum of gage is 4,811.25 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 28, 29, Dec. 3, 6-15, Jan. 7-16, Jan. 24 to Mar. 8, Mar. 17, 18, July 22 to Aug. 1, Aug. 25-29. Records good except those for flows less than 10 ft^3/s, which are fair, and those for estimated daily discharges, which are poor. Numerous diversions upstream from station for irrigation and municipal use.

AVERAGE DISCHARGE.--6 years, 44.0 ft^3/s, 31,890 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 462 ft^3/s, June 21, 1984, gage height, 4.61 ft; maximum gage height, 5.7 ft, in winter of 1985-86, backwater from ice; no flow Aug. 4,5, 1988.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 208 ft^3/s, June 16, gage height, 3.04 ft; maximum gage height, 3.85 ft, Feb. 24, backwater from ice; minimum daily discharge, 2.6 ft^3/s, Aug. 7.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.2	19	17	8.8	e9.0	e15	29	45	42	66	e5.5	9.5
2	5.0	19	16	9.4	e6.0	e13	29	48	52	62	4.7	7.9
3	4.9	20	e17	11	e5.0	e12	28	48	73	56	3.8	7.4
4	4.9	20	18	12	e5.5	e13	27	49	80	53	3.3	7.1
5	4.9	19	18	13	e6.0	e15	28	49	95	51	3.0	6.3
6	4.6	22	e18	13	e7.0	e20	32	47	115	48	3.0	5.9
7	5.0	22	e17	e8.0	e7.0	e25	38	53	141	36	2.6	6.0
8	5.2	22	e15	e6.0	e7.5	e30	37	75	140	31	2.7	5.7
9	5.4	22	e16	e6.5	e7.5	71	34	89	145	30	3.1	6.0
10	8.4	20	e17	e6.5	e8.0	99	31	99	161	29	3.0	6.3
11	11	21	e17	e6.5	e9.0	54	30	128	152	27	3.4	5.9
12	11	21	e18	e6.6	e10	45	30	116	138	25	4.0	5.6
13	12	21	e19	e6.6	e9.0	41	32	81	130	32	4.4	5.8
14	12	22	e15	e6.8	e8.5	35	33	55	115	28	4.6	5.1
15	12	18	e10	e6.8	e8.0	33	36	47	145	23	4.5	4.6
16	13	22	8.9	e7.0	e8.0	33	39	46	188	23	4.8	4.4
17	28	22	9.0	7.1	e8.5	e30	41	43	147	24	3.4	4.7
18	22	22	8.7	7.8	e9.0	e31	38	64	116	22	3.2	6.4
19	18	21	9.5	13	e10	33	39	64	101	16	3.4	5.5
20	17	21	9.2	18	e11	31	45	53	100	14	4.7	4.8
21	16	21	9.7	21	e15	31	51	48	109	15	5.5	4.3
22	16	21	8.6	26	e20	32	58	44	98	e13	5.5	3.8
23	16	24	9.5	25	e18	31	58	48	84	e11	9.1	3.5
24	16	22	7.4	e15	e19	29	54	56	75	e10	15	3.4
25	15	20	7.4	e13	e20	32	51	51	73	e9.0	e12	3.4
26	16	20	6.8	e14	e30	34	50	43	71	e9.5	e9.0	3.3
27	19	16	6.4	e15	e25	32	50	42	71	e10	e9.0	3.2
28	19	e17	6.3	e17	e20	31	48	51	76	e8.0	e11	3.4
29	19	e18	6.0	e20	---	30	45	55	73	e7.0	e10	3.3
30	19	19	7.3	e25	---	29	46	47	69	e6.0	9.3	3.3
31	19	---	8.3	e15	---	29	---	43	---	e5.0	10	---
TOTAL	399.5	614	377.0	386.4	326.5	1019	1187	1827	3175	799.5	180.5	155.8
MEAN	12.9	20.5	12.2	12.5	11.7	32.9	39.6	58.9	106	25.8	5.82	5.19
MAX	28	24	19	26	30	99	58	128	188	66	15	9.5
MIN	4.6	16	6.0	6.0	5.0	12	27	42	42	5.0	2.6	3.2
AC-FT	792	1220	748	766	648	2020	2350	3620	6300	1590	358	309

CAL YR 1988 TOTAL 7869.28 MEAN 21.5 MAX 135 MIN .00 AC-FT 15610
WTR YR 1989 TOTAL 10447.2 MEAN 28.6 MAX 188 MIN 2.6 AC-FT 20720

e Estimated

PEND OREILLE RIVER BASIN

12323800 CLARK FORK NEAR GALEN, MT

LOCATION.--Lat 46°12'30", long 112°45'59", in NE1/4NE1/4NE1/4 sec.7, T.5 N., R.9 W., Deer Lodge County, Hydrologic Unit 17010201, on right bank at upstream side of bridge on county road, 2.6 mi downstream from Silver Bow Creek and Warm Springs Creek, 2 mi south of Galen, and at mile 482.7.

DRAINAGE AREA.--793 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1988 to current year.

GAGE.--Water-stage recorder. Datum of gage is 4,749.24 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 27, Dec. 3-10, 15-18,20, 22-31, Jan. 1-18, 23-29, Feb. 1 to Mar. 6, Mar. 18. Water-discharge records good except those for estimated daily discharges, which are poor. Some regulation by settling ponds on Silver Bow Creek near Warm Springs. Numerous diversions upstream of station for irrigation and municipal use. Satellite telemeter at station. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 737 ft^3/s, Mar. 10, 1989, gage height, 3.78 ft; minimum daily, 9.6 ft^3/s, Aug. 18, 1988.

EXTREMES FOR CURRENT YEAR.--Maximimum discharge, 737 ft^3/s, Mar. 10, gage height, 3.78 ft; minimum daily, 16 ft^3/s, Aug. 10,11.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	31	51	61	e43	e60	e55	92	149	170	113	37	66
2	31	51	59	e44	e35	e50	97	152	178	107	36	54
3	30	49	e60	e45	e30	e45	96	156	201	101	32	48
4	31	46	e58	e47	e32	e55	105	154	216	92	31	41
5	31	51	e58	e54	e35	e68	108	157	232	88	27	36
6	31	53	e60	e50	e37	e80	113	158	267	83	24	35
7	30	53	e56	e40	e39	92	141	175	307	70	19	35
8	30	51	e58	e35	e41	98	181	223	301	59	18	36
9	29	50	e60	e39	e43	203	171	263	305	57	17	43
10	35	49	e62	e45	e47	483	154	291	342	55	16	44
11	41	46	63	e45	e55	552	134	337	338	52	16	44
12	41	50	64	e43	e60	447	122	325	305	49	18	46
13	41	48	68	e44	e55	288	121	268	280	62	19	51
14	40	50	64	e45	e50	192	124	233	243	52	20	51
15	41	53	e56	e47	e45	139	133	211	280	38	20	48
16	42	53	e52	e50	e46	108	140	212	396	40	20	46
17	56	56	e50	e54	e47	128	153	211	322	43	20	43
18	53	62	e48	e58	e48	e125	154	225	255	42	19	52
19	49	67	46	61	e50	118	154	235	212	39	19	62
20	50	68	e47	65	e55	126	160	209	205	46	22	63
21	50	72	46	67	e60	125	171	185	210	60	24	61
22	44	72	e50	75	e65	112	200	174	189	42	24	59
23	44	75	e47	e76	e60	109	208	182	160	35	35	55
24	43	74	e45	e70	e60	105	213	187	153	33	57	52
25	43	69	e42	e60	e65	108	207	176	146	31	72	52
26	42	67	e39	e65	e75	114	188	165	144	29	73	49
27	45	e66	e35	e65	e64	119	176	157	140	37	59	44
28	45	65	e37	e70	e60	109	170	168	143	44	77	49
29	45	65	e40	e80	---	86	162	199	136	48	75	47
30	46	64	e42	84	---	94	156	185	122	46	66	44
31	49	---	e42	78	---	93	---	174	---	37	71	---
TOTAL	1259	1746	1615	1744	1419	4626	4504	6296	6898	1730	1083	1456
MEAN	40.6	58.2	52.1	56.3	50.7	149	150	203	230	55.8	34.9	48.5
MAX	56	75	68	84	75	552	213	337	396	113	77	66
MIN	29	46	35	35	30	45	92	149	122	29	16	35
AC-FT	2500	3460	3200	3460	2810	9180	8930	12490	13680	3430	2150	2890

WTR YR 1989 TOTAL 34376 MEAN 94.2 MAX 552 MIN 16 AC-FT 68180

e Estimated

PEND OREILLE RIVER BASIN

12323800 CLARK FORK NEAR GALEN, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1971-74, 1988 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (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											
04...	1335	30	--	--	683	16.0	12.0	--	--	--	--
NOV											
17...	1200	56	--	--	656	3.0	1.5	--	--	--	--
JAN											
05...	1330	53	--	--	715	4.0	0.5	--	--	--	--
FEB											
10...	1510	45	--	--	740	-2.0	0.0	--	--	--	--
21...	1620	60	--	--	647	4.5	0.0	--	--	--	--
23...	1345	E64	10	1	670	5.0	0.5	7.9	300	160	90
MAR											
07...	1440	88	70	2	620	7.0	2.5	7.9	280	150	84
09...	1430	206	--	--	429	12.0	3.0	--	--	--	--
10...	1520	370	80	2	445	9.5	5.0	7.5	170	83	51
21...	1120	127	--	--	503	5.0	3.0	--	--	--	--
APR											
04...	1650	113	--	--	566	6.0	5.0	--	--	--	--
MAY											
10...	1140	299	70	2	320	16.0	13.0	8.1	140	64	41
23...	1020	182	--	--	377	16.0	10.0	--	--	--	--
JUN											
09...	1040	318	10	1	225	20.0	12.0	7.7	96	47	29
JUL											
06...	1405	89	--	--	346	30.0	18.0	--	--	--	--
13...	2015	62	0	0	450	24.0	22.5	7.9	200	110	61
AUG											
04...	1130	33	--	--	579	16.0	17.0	--	--	--	--
16...	1415	23	--	--	648	21.0	19.5	--	--	--	--
17...	1100	21	0	0	670	15.5	15.5	8.0	300	190	87

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)
FEB											
23...	18	180	0	143	11	5	3	<1	58	9	600
MAR											
07...	17	158	0	128	18	10	1	<1	90	39	930
10...	11	115	0	90	60	28	2	1	240	50	9200
MAY											
10...	8.3	89	0	73	28	19	<1	<1	59	12	1200
JUN											
09...	5.7	61	0	49	18	12	<1	<1	33	11	650
JUL											
13...	12	116	0	91	15	10	1	<1	32	15	210
AUG											
17...	19	129	0	102	14	10	<1	<1	13	9	120

DATE	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, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	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)
FEB										
23...	9	<5	<5	770	360	200	110	12	E2.1	--
MAR										
07...	45	14	<5	640	360	190	110	17	4.0	65
10...	110	28	<5	1400	340	360	86	338	338	73
MAY										
10...	18	17	<1	490	81	130	12	58	47	71
JUN										
09...	25	6	1	300	79	100	9	20	17	68
JUL										
13...	11	5	1	200	140	40	17	2	0.33	88
AUG										
17...	9	2	1	170	110	20	13	3	0.17	72

PEND OREILLE RIVER BASIN

12324200 CLARK FORK AT DEER LODGE, MT

LOCATION.--Lat 46°23'52", long 112°44'31", in SW1/4SW1/4SW1/4 sec.33, T.8 N., R.9 W., Powell County, Hydrologic Unit 17010201, on left bank 35 ft upstream from Milwaukee Avenue Bridge in Deer Lodge, 0.05 mi upstream from Taylor Creek, 0.24 mi downstream from Tin Cup Joe Creek, and at mile 461.2.

DRAINAGE AREA.--1,005 mi^2.

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 4,502.24 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 30 to Dec. 11, Dec. 15-30, Jan. 7-15, 24-30, Feb. 1-24, Mar. 1-4. Water-discharge records good except those for estimated daily discharges, which are fair. Diversions upstream from station for irrigation of about 31,000 acres. Some regulation by settling ponds on Silver Bow Creek near Warm Springs.

AVERAGE DISCHARGE.--11 years, 292 ft^3/s, 211,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,500 ft^3/s, May 23, 1981, gage height, 5.35 ft; minimum daily, 22 ft^3/s, Aug. 18, 1988.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,000 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Mar. 9	1900	*1,430	*4.51	No other peak greater than base discharge.			

Minimum daily discharge, 42 ft^3/s, Aug. 12.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	94	152	e150	146	e110	e155	209	251	216	149	52	184
2	93	153	e150	144	e85	e150	215	251	215	140	56	169
3	92	153	e155	153	e70	e140	213	280	235	130	52	159
4	91	146	e160	163	e80	e180	211	259	270	118	49	165
5	88	140	e165	165	e90	199	225	255	278	105	47	158
6	87	152	e160	165	e100	326	236	254	314	97	46	157
7	87	147	e150	e150	e105	496	256	260	346	89	46	156
8	90	144	e140	e120	e110	410	303	311	363	77	48	155
9	89	144	e150	e130	e115	734	298	353	349	66	47	162
10	94	145	e160	e135	e125	858	275	369	389	64	45	169
11	104	145	e170	e140	e130	706	257	410	401	60	43	169
12	110	144	188	e140	e140	624	232	424	370	60	42	171
13	109	145	206	e140	e140	496	227	365	340	90	45	176
14	106	149	191	e145	e135	372	231	325	317	103	49	179
15	107	143	e155	e150	e130	293	239	297	321	64	53	176
16	111	147	e130	158	e130	258	250	295	459	58	57	167
17	130	157	e130	159	e125	219	261	275	440	70	57	165
18	137	163	e130	164	e130	262	271	285	349	73	54	184
19	136	167	e135	178	e135	259	268	314	286	69	51	196
20	133	164	e135	193	e140	246	269	294	254	65	52	195
21	129	173	e140	182	e160	263	285	267	272	70	58	188
22	128	177	e135	184	e180	269	328	253	253	74	64	188
23	121	183	e130	186	e170	268	354	246	221	68	79	183
24	122	181	e125	e160	e190	246	353	245	201	73	134	175
25	125	155	e120	e140	213	258	341	239	200	60	164	171
26	128	160	e100	e145	214	264	323	220	191	45	179	166
27	134	153	e90	e150	196	257	301	207	178	57	161	162
28	148	162	e100	e160	179	257	298	202	182	56	169	164
29	148	173	e115	e170	---	217	279	260	173	49	180	167
30	149	e160	e130	198	---	209	267	253	159	55	171	166
31	151	---	141	231	---	225	---	234	---	58	182	---
TOTAL	3571	4677	4436	4944	3827	10116	8075	8753	8542	2412	2532	5142
MEAN	115	156	143	159	137	326	269	282	285	77.8	81.7	171
MAX	151	183	206	231	214	858	354	424	459	149	182	196
MIN	87	140	90	120	70	140	209	202	159	45	42	155
AC-FT	7080	9280	8800	9810	7590	20070	16020	17360	16940	4780	5020	10200

CAL YR 1988 TOTAL 53830 MEAN 147 MAX 391 MIN 22 AC-FT 106800
WTR YR 1989 TOTAL 67027 MEAN 184 MAX 858 MIN 42 AC-FT 132900

e Estimated

PEND OREILLE RIVER BASIN

12324200 CLARK FORK AT DEER LODGE, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969-71, 1979-83, 1985 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: October 1978 to September 1983.
SUSPENDED-SEDIMENT DISCHARGE: March 1985 to August 1986, April 1987 to current year.

REMARKS.--Unpublished records of once-daily water temperature are available in files of District office.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE (water years 1978-1983): Maximum, 23.0°C, on several days in 1979, 1980, and 1983; minimum, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATION: Maximum daily mean, 760 mg/L, Mar. 10, 1989; minimum daily mean, 3 mg/L, on several days in 1986, 1987 and 1988.
SEDIMENT LOAD: Maximum daily, 2,840 tons, Feb. 24, 1986; minimum daily, 0.19 ton, Aug. 10, 1988.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATION: Maximum daily mean, 760 mg/L, Mar. 10; minimum daily mean, 4 mg/L, Aug. 5.
SEDIMENT LOAD: Maximum daily, 2,030 tons Mar. 9; minimum daily, 0.51 ton Aug. 5.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
OCT										
04...	1200	93	0	0	628	10.0	10.0	--	--	--
NOV										
17...	1010	160	100	71	642	-3.0	1.0	--	--	--
JAN										
05...	1155	165	100	2	608	3.5	0.0	--	--	--
FEB										
10...	1250	121	--	--	630	-3.0	0.0	--	--	--
21...	1205	161	60	1	594	5.0	1.0	--	--	--
23...	1630	196	10	2	600	3.0	1.5	196	0	156
MAR										
07...	1700	615	50	1	480	5.0	2.5	116	0	92
09...	1840	1430	--	--	350	--	--	--	--	--
10...	1200	890	80	1	400	8.0	2.0	88	0	71
APR										
04...	1340	210	60	1	607	8.5	6.5	--	--	--
MAY										
10...	1400	369	70	1	410	22.0	16.5	126	0	103
16...	1125	299	--	--	432	15.0	11.0	--	--	--
JUL										
06...	1230	97	5	0	456	24.0	19.0	--	--	--
12...	1930	65	100	65	475	--	20.0	168	0	133
13...	1745	88	--	--	510	--	23.0	--	--	--
AUG										
14...	1945	62	--	--	450	--	16.5	155	0	124
16...	1330	58	--	--	565	20.0	17.0	--	--	--
17...	1330	58	0	0	578	26.5	17.5	216	0	175

DATE	TIME	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)
FEB										
23...	1630	7.8	270	81	17	13	7	2	<1	63
MAR										
07...	1700	7.4	190	56	13	66	30	2	<1	590
10...	1200	7.4	160	47	9.7	200	21	5	<1	1500
MAY										
10...	1400	8.3	180	53	11	31	17	<1	<1	87
JUL										
12...	1930	7.9	200	59	12	21	14	3	2	330
AUG										
14...	1945	7.9	190	56	11	16	12	<1	<1	48
17...	1330	8.1	250	76	15	14	13	<1	<1	16

12324200 CLARK FORK AT DEER LODGE, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	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, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
FEB									
23...	7	1200	7	<5	<5	280	44	110	39
MAR									
07...	47	19000	120	80	<5	1600	93	590	43
10...	34	26000	150	200	<5	4600	120	1700	50
MAY									
10...	13	1900	13	14	2	380	22	110	6
JUL									
12...	120	1500	10	15	<1	490	400	560	230
AUG									
14...	9	3500	7	39	1	220	<1	90	9
17...	9	150	6	2	2	70	31	20	7

DATE	TIME	TEMPER-ATURE WATER (DEG C) (00010)	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .002 MM (70337)	SED. SUSP. FALL DIAM. % FINER THAN .004 MM (70338)
OCT							
04...	1200	10.0	93	35	8.8	--	--
NOV							
17...	1010	1.0	160	36	16	--	--
JAN							
05...	1155	0.0	165	22	9.8	--	--
FEB							
21...	1205	1.0	161	26	11	--	--
23...	1200	2.0	179	30	14	--	--
23...	1630	1.5	196	45	24	--	--
MAR							
07...	1345	2.0	476	350	450	--	--
07...	1700	2.5	615	931	1550	27	34
07...	1845	--	643	762	1320	--	--
09...	0935	2.0	374	152	153	--	--
09...	1840	--	1430	2250	8690	--	--
10...	0820	2.0	865	770	1800	--	--
10...	1200	2.0	890	862	2070	27	38
10...	1430	4.5	801	576	1250	--	--
APR							
04...	1340	6.5	210	26	15	--	--
08...	1300	7.0	309	89	74	--	--
MAY							
10...	1400	16.5	369	69	69	--	--
16...	1125	11.0	299	28	23	--	--
JUL							
06...	1230	19.0	97	2	0.52	--	--
12...	1930	20.0	65	47	8.2	--	--
13...	1745	23.0	88	8	1.9	--	--
AUG							
14...	1945	16.5	62	176	29	--	--
17...	1330	17.5	58	24	3.8	--	--

PEND OREILLE RIVER BASIN

12324200 CLARK FORK AT DEER LODGE, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SED. SUSP. FALL DIAM. % FINER THAN .008 MM (70339)	SED. SUSP. FALL DIAM. % FINER THAN .016 MM (70340)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343)	SED. SUSP. FALL DIAM. % FINER THAN .250 MM (70344)	SED. SUSP. FALL DIAM. % FINER THAN .500 MM (70345)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT							
04...	--	--	--	--	--	--	61
NOV							
17...	--	--	--	--	--	--	65
JAN							
05...	--	--	--	--	--	--	77
FEB							
21...	--	--	--	--	--	--	68
23...	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	68
MAR							
07...	--	--	--	--	--	--	--
07...	42	52	77	87	97	100	--
07...	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--
10...	49	61	84	90	96	100	--
10...	--	--	--	--	--	--	--
APR							
04...	--	--	--	--	--	--	81
08...	--	--	--	--	--	--	--
MAY							
10...	--	--	--	--	--	--	58
16...	--	--	--	--	--	--	--
JUL							
06...	--	--	--	--	--	--	81
12...	--	--	--	--	--	--	99
13...	--	--	--	--	--	--	--
AUG							
14...	--	--	--	--	--	--	95
17...	--	--	--	--	--	--	45

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	18	4.6	20	8.2	24	9.7	36	14	27	8.0	46	19
2	19	4.8	25	10	26	11	48	19	20	4.6	40	16
3	24	6.0	21	8.7	19	8.0	35	14	16	3.0	38	14
4	33	8.1	20	7.9	18	7.8	32	14	15	3.2	42	20
5	32	7.6	20	7.6	24	11	24	11	15	3.6	45	24
6	27	6.3	28	11	27	12	37	16	15	4.1	398	529
7	21	4.9	26	10	26	11	39	16	15	4.3	460	616
8	16	3.9	20	7.8	25	9.5	37	12	17	5.0	280	310
9	15	3.6	14	5.4	25	10	34	12	22	6.8	641	2030
10	16	4.1	16	6.3	23	9.9	31	11	27	9.1	760	1760
11	17	4.8	24	9.4	19	8.7	31	12	33	12	370	705
12	16	4.8	26	10	25	13	35	13	33	12	200	337
13	16	4.7	26	10	33	18	37	14	29	11	150	201
14	16	4.6	26	10	23	12	35	14	24	8.7	90	90
15	16	4.6	26	10	17	7.1	34	14	20	7.0	70	55
16	16	4.8	27	11	17	6.0	61	26	18	6.3	60	42
17	24	8.4	31	13	20	7.0	40	17	19	6.4	58	34
18	27	10	27	12	21	7.4	38	17	20	7.0	63	45
19	20	7.3	30	14	23	8.4	42	20	59	22	51	36
20	15	5.4	25	11	24	8.7	53	28	46	17	49	33
21	15	5.2	20	9.3	38	14	27	13	31	13	50	36
22	15	5.2	18	8.6	34	12	29	14	27	13	43	31
23	15	4.9	18	8.9	28	9.8	35	18	35	16	32	23
24	16	5.3	18	8.8	20	6.8	37	16	63	32	34	23
25	16	5.4	20	8.4	12	3.9	38	14	52	30	36	25
26	15	5.2	20	8.6	9	2.4	37	14	73	42	32	23
27	14	5.1	15	6.2	13	3.2	35	14	70	37	30	21
28	14	5.6	17	7.4	14	3.8	34	15	55	27	30	21
29	14	5.6	20	9.3	13	4.0	34	16	---	---	28	16
30	14	5.6	19	8.2	14	4.9	45	24	---	---	25	14
31	14	5.7	---	---	25	9.5	36	22	---	---	23	14
TOTAL	---	172.1	---	277.0	---	270.5	---	494	---	371.1	---	7163

PEND OREILLE RIVER BASIN

12324200 CLARK FORK AT DEER LODGE, MT--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	21	12	20	14	6	3.5	6	2.4	12	1.7	9	4.5
2	20	12	28	19	6	3.5	6	2.3	13	2.0	8	3.7
3	20	12	28	21	7	4.4	6	2.1	10	1.4	8	3.4
4	21	12	16	11	10	7.3	8	2.5	7	.93	8	3.6
5	20	12	18	12	11	8.3	6	1.7	4	.51	8	3.4
6	30	19	16	11	15	13	5	1.3	5	.62	8	3.4
7	41	28	22	15	20	19	9	2.2	6	.75	10	4.2
8	80	65	38	32	22	22	8	1.7	8	1.0	13	5.4
9	66	53	57	54	21	20	8	1.4	8	1.0	11	4.8
10	47	35	78	78	40	42	8	1.4	9	1.1	8	3.7
11	42	29	126	139	29	31	8	1.3	10	1.2	9	4.1
12	36	23	104	119	19	19	16	2.6	11	1.2	10	4.6
13	27	17	42	41	14	13	15	3.6	13	1.6	12	5.7
14	24	15	31	27	13	11	10	2.8	30	4.0	14	6.8
15	28	18	26	21	15	13	10	1.7	30	4.3	11	5.2
16	35	24	23	18	58	72	12	1.9	32	4.9	9	4.1
17	39	27	17	13	40	48	14	2.6	24	3.7	9	4.0
18	37	27	24	18	20	19	15	3.0	16	2.3	11	5.5
19	36	26	33	28	17	13	15	2.8	12	1.7	13	6.9
20	36	26	18	14	13	8.9	16	2.8	12	1.7	12	6.3
21	43	33	11	7.9	14	10	18	3.4	21	3.3	10	5.1
22	62	55	10	6.8	12	8.2	11	2.2	17	2.9	8	4.1
23	78	75	9	6.0	10	6.0	10	1.8	16	3.4	9	4.4
24	61	58	9	6.0	8	4.3	10	2.0	24	8.7	9	4.3
25	56	52	7	4.5	8	4.3	10	1.6	25	11	9	4.2
26	47	41	6	3.6	9	4.6	8	.97	23	11	9	4.0
27	40	33	6	3.4	7	3.4	13	2.0	12	5.2	9	3.9
28	36	29	5	2.7	7	3.4	10	1.5	10	4.6	9	4.0
29	30	23	12	8.4	7	3.3	8	1.1	11	5.3	9	4.1
30	28	20	10	6.8	6	2.6	7	1.0	8	3.7	9	4.0
31	---	---	7	4.4	---	---	10	1.6	10	4.9	---	---
TOTAL	---	911	---	765.5	---	441.0	---	63.27	---	101.61	---	135.4

TOTAL LOAD FOR YEAR: 11165.48 TONS

PEND OREILLE RIVER BASIN

12324590 LITTLE BLACKFOOT RIVER NEAR GARRISON, MT

LOCATION.--Lat 46°32'12", long 112°43'33", in SE1/4NE1/4 sec.16, T.9 N., R.9 W., Powell County, Hydrologic Unit 17010201, on left bank 200 ft downstream from bridge on county road, 4 mi east of Garrison, and at mile 4.0.

DRAINAGE AREA.--398 mi^2.

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Elevation of gage is 4,430 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 27, Dec. 1-11, Dec. 15 to Mar. 9. Water-discharge records good except those for estimated daily discharges, which are poor. A few minor irrigation holding reservoirs in upper reaches of drainage. Diversions for irrigation of about 10,500 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--17 years, 165 ft^3/s, 119,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,650 ft^3/s, May 21, 1981, gage height, 8.79 ft, from floodmark; minimum, 6.0 ft^3/s, Aug. 24, 1977, gage height, 2.94 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 900 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 7	2100	*2,220	*6.13	No other peaks greater than base discharge.			

Minimum daily discharge, 20 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	43	e47	e35	e35	e42	100	331	228	98	77	67
2	35	43	e45	e37	e25	e38	101	353	224	94	79	64
3	34	44	e46	e39	e20	e35	88	370	224	86	75	59
4	35	43	e47	e40	e21	e40	88	378	226	74	68	57
5	36	43	e48	e42	e24	e45	164	390	215	70	63	56
6	35	45	e47	e36	e26	e55	940	411	202	67	60	54
7	34	46	e45	e33	e27	e70	1370	470	197	61	57	54
8	34	46	e42	e30	e29	e100	758	541	193	51	55	54
9	34	46	e44	e32	e30	e200	336	566	185	50	49	56
10	36	45	e46	e34	e32	529	254	566	227	56	52	57
11	41	45	e48	e35	e35	615	234	605	226	56	51	61
12	41	46	50	e35	e38	441	238	576	210	51	50	69
13	42	46	54	e37	e40	295	280	520	187	60	46	58
14	41	46	51	e37	e37	173	300	481	172	63	39	56
15	41	44	e45	e38	e35	130	323	428	193	62	37	55
16	42	44	e35	e38	e33	106	376	416	214	66	44	53
17	53	47	e36	e38	e30	84	345	385	193	73	45	52
18	49	49	e36	e40	e32	98	313	382	180	75	44	59
19	48	47	e37	e42	e34	84	351	391	167	70	43	60
20	43	47	e38	e45	e36	76	420	358	158	70	42	57
21	42	48	e40	e43	e40	74	482	333	156	84	43	55
22	41	49	e39	e42	e45	92	587	310	143	82	42	55
23	39	52	e37	e42	e43	98	616	290	139	83	50	56
24	40	48	e35	e38	e50	79	539	276	137	76	69	53
25	40	47	e34	e30	e56	86	476	275	131	69	67	52
26	40	47	e29	e31	e60	145	431	276	129	63	65	50
27	40	e47	e27	e32	e55	163	406	263	129	93	58	48
28	41	48	e29	e33	e50	171	384	256	133	99	62	46
29	41	48	e33	e35	---	134	348	286	121	86	61	47
30	41	48	e34	e40	---	112	344	278	112	79	60	47
31	42	---	e35	e50	---	113	---	253	---	77	67	---
TOTAL	1235	1387	1259	1159	1018	4523	11992	12014	5351	2244	1720	1667
MEAN	39.8	46.2	40.6	37.4	36.4	146	400	388	178	72.4	55.5	55.6
MAX	53	52	54	50	60	615	1370	605	228	99	79	69
MIN	34	43	27	30	20	35	88	253	112	50	37	46
AC-FT	2450	2750	2500	2300	2020	8970	23790	23830	10610	4450	3410	3310

CAL YR 1988 TOTAL 26295.9 MEAN 71.8 MAX 401 MIN 9.9 AC-FT 52160
WTR YR 1989 TOTAL 45569 MEAN 125 MAX 1370 MIN 20 AC-FT 90390

e Estimated

12324590 LITTLE BLACKFOOT RIVER NEAR GARRISON, MT--Continued

WATER QUALITY RECORDS

PERIOD OF RECORD.--Water years 1985 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	PH (STANDARD UNITS) (00400)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	HARDNESS NONCARB WH WAT TOT FLD MG/L AS CACO3 (00902)	CALCIUM DISSOLVED (MG/L AS CA) (00915)
OCT											
04...	0845	34	--	--	288	4.0	8.0	--	--	--	--
NOV											
17...	1600	45	--	--	277	2.0	3.5	--	--	--	--
JAN											
05...	0940	41	--	--	280	0.0	0.0	--	--	--	--
FEB											
10...	1000	32	--	--	289	-10.0	0.0	--	--	--	--
21...	0955	40	--	--	270	-1.0	0.0	--	--	--	--
MAR											
10...	1800	295	--	--	176	6.0	2.0	--	--	--	--
11...	1630	495	20	1	160	9.0	0.5	7.4	63	9	18
13...	1120	236	--	--	189	9.5	2.0	--	--	--	--
APR											
04...	1120	84	--	--	289	6.0	3.0	--	--	--	--
06...	1200	562	90	2	150	16.0	3.0	7.4	63	7	18
07...	1945	2080	50	1	120	12.0	6.5	7.0	51	15	15
10...	1155	220	--	--	235	8.5	3.0	--	--	--	--
20...	1145	433	0	0	190	18.0	7.0	7.8	90	15	26
MAY											
02...	1250	360	--	--	195	11.0	8.0	--	--	--	--
07...	1320	485	100	2	160	20.0	10.0	7.7	70	5	20
11...	1135	626	--	--	163	6.5	8.0	--	--	--	--
JUL											
06...	1030	67	--	--	272	26.0	14.5	--	--	--	--
AUG											
15...	1215	35	50	1	280	18.0	15.5	8.1	130	8	40
18...	1150	46	--	--	276	17.5	13.5	--	--	--	--

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)
MAR											
11...	4.5	68	0	55	8	6	1	<1	10	5	2100
APR											
06...	4.4	71	0	56	8	5	<1	<1	9	2	3000
07...	3.3	47	0	36	15	6	1	<1	45	3	25000
20...	6.0	93	0	75	7	5	<1	<1	12	3	1900
MAY											
07...	4.9	82	0	65	8	5	<1	<1	5	2	720
AUG											
15...	8.5	160	0	127	7	7	<1	<1	3	1	70

DATE	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
MAR										
11...	77	<5	<5	220	30	30	10	115	154	54
APR										
06...	73	<5	<5	180	21	30	15	138	209	54
07...	120	21	<5	920	9	140	11	1410	7920	52
20...	55	<5	<5	80	8	100	<3	60	70	61
MAY										
07...	32	3	<1	40	8	20	<3	26	34	49
AUG										
15...	6	1	2	20	5	<10	<3	3	0.28	91

PEND OREILLE RIVER BASIN

12324680 CLARK FORK AT GOLDCREEK, MT

LOCATION.--Lat 46°35'26", long 112°55'40", in SE1/4NW1/4SW1/4 sec.25, T.10 N., R.11 W., Powell County, Hydrologic Unit 17010203, on right bank at county road bridge, 0.4 mi north of the town of Goldcreek, 1.1 mi downstream from Gold Creek, and at mile 436.9.

DRAINAGE AREA.--1,704 mi^2.

PERIOD OF RECORD.--October 1977 to current year.

GAGE.--Water-stage recorder. Datum of gage is 4,172.80 ft above National Geodetic Vertical Datum of 1929. June 13 to Oct. 21, 1982, nonrecording gage at site 350 ft downstream at same datum.

REMARKS.--Estimated daily discharges: Nov. 30 to Dec. 10, Dec. 17 to Jan. 2, Jan. 8-17, 21,22,24-29, Feb. 1 to Mar. 10. Records good except those for estimated daily discharges, which are poor. Some regulation by settling ponds on Silver Bow Creek near Warm Springs. Diversion for irrigation of about 40,100 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--12 years, 578 ft^3/s, 418,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,000 ft^3/s, May 22, 1981, gage height, 11.17 ft, from flood-marks, from rating curve extended above 6,500 ft^3/s on basis of contracted-opening measurement of peak flow; minimum daily, 55 ft^3/s, Sept. 4, 1988.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,900 ft^3/s, Apr. 7, gage height, 6.99 ft; maximum gage height, 8.47 ft, Mar. 10, backwater from ice; minimum daily discharge, 110 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	169	230	e235	e220	e170	e240	413	712	517	294	193	332
2	166	230	e230	e230	e130	e220	412	725	493	274	201	315
3	169	238	e240	242	e110	e200	393	769	499	260	187	301
4	166	232	e250	255	e125	e230	385	784	528	221	176	303
5	168	227	e255	252	e140	e300	427	790	537	205	176	300
6	167	235	e245	245	e150	e500	1630	815	559	192	173	295
7	166	237	e230	211	e160	e800	2240	891	616	183	166	295
8	169	238	e220	e170	e170	e700	1590	1050	646	166	162	300
9	169	237	e230	e190	e180	e1500	842	1140	608	151	162	300
10	170	234	e240	e200	e190	e2000	688	1170	678	151	158	309
11	177	237	247	e210	e200	1830	634	1300	711	147	152	316
12	191	236	255	e220	e220	1400	614	1310	669	136	149	326
13	196	238	285	e220	e215	1160	647	1170	612	183	150	328
14	196	236	280	e230	e210	761	662	1060	551	190	150	320
15	196	237	253	e240	e200	573	689	957	546	180	159	317
16	199	237	207	e240	e190	487	753	912	693	176	178	307
17	237	246	e210	e250	e170	366	743	863	813	196	173	295
18	223	252	e210	264	e180	411	723	847	691	199	166	313
19	223	259	e210	271	e190	439	740	901	614	194	159	329
20	217	254	e215	324	e220	403	822	819	531	188	155	331
21	217	259	e220	e310	e250	411	918	749	560	208	161	324
22	223	264	e215	e300	e270	464	1070	693	506	214	169	315
23	211	280	e210	275	e250	485	1200	647	449	204	195	311
24	207	280	e200	e240	e300	415	1110	604	408	200	259	287
25	209	253	e180	e210	e320	431	1010	588	383	199	295	281
26	213	251	e140	e220	e330	543	928	591	377	180	315	271
27	212	242	e130	e230	e300	567	860	559	355	186	303	261
28	223	246	e150	e240	e270	594	834	547	373	214	300	252
29	226	246	e170	e260	---	502	769	622	369	196	309	253
30	226	e240	e190	302	---	436	743	631	329	187	306	259
31	228	---	e210	333	---	448	---	569	---	183	320	---
TOTAL	6129	7331	6762	7604	5810	19816	25489	25785	16221	6057	6277	9046
MEAN	198	244	218	245	207	639	850	832	541	195	202	302
MAX	237	280	285	333	330	2000	2240	1310	813	294	320	332
MIN	166	227	130	170	110	200	385	547	329	136	149	252
AC-FT	12160	14540	13410	15080	11520	39310	50560	51140	32170	12010	12450	17940

CAL YR 1988 TOTAL 94293 MEAN 258 MAX 992 MIN 55 AC-FT 187000
WTR YR 1989 TOTAL 142327 MEAN 390 MAX 2240 MIN 110 AC-FT 282300

e Estimated

PEND OREILLE RIVER BASIN

12325500 FLINT CREEK NEAR SOUTHERN CROSS, MT

LOCATION.--Lat 46°13'59", long 113°17'56", in SE1/4NW1/4 sec.36, T.6 N., R.14 W., Granite County, Hydrologic Unit 17010202, on left wing of weir 0.5 mi downstream from power plant, 2.0 mi downstream from Georgetown Dam, 3.5 mi northwest of Southern Cross, 6.8 mi south of Philipsburg, and at mile 36.8.

DRAINAGE AREA.--52.6 mi^2.

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

REVISED RECORDS.--WSP 1216: 1942(M). WSP 1246: Drainage area.

GAGE.--Water-stage recorder and sharp-crested, contracted, rectangular weir. Elevation of gage is 5,630 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to June 3, 1982, nonrecording gage at same site and datum. Prior to Nov. 27, 1973, gage at same site and datum 0.20 ft higher.

REMARKS.--No estimated daily discharges during year. Records good. Flow regulated by Georgetown Lake (station number 12325000). Several observations of water temperature and specific conductance were made during the water year. Flow may be augumented by transbasin diversion from Silver Lake to Georgetown Lake or reduced by pumping from Georgetown Lake to Silver Lake.

AVERAGE DISCHARGE.--49 years, 29.7 ft^3/s, 21,520 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 174 ft^3/s, June 13, 1942, gage height, 1.86 ft; maximum gage height observed, 2.60 ft June 19-23, 1980; probably no flow for parts of May 23, 1942, Aug. 20, 1943, Oct. 6, 1954, Nov. 29, Dec. 1, 1966, and no flow Nov. 30, 1966, when generator was shut down.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 58 ft^3/s, July 4, gage height, 1.32 ft; minimum daily, 12 ft^3/s, on many days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	12	13	14	14	16	18	20	14	30	30	29
2	30	12	14	13	14	16	18	20	14	30	30	28
3	30	12	14	13	14	16	18	20	14	30	29	28
4	30	12	14	13	14	17	18	20	14	34	29	28
5	30	12	14	13	14	17	18	20	14	32	29	29
6	30	12	14	14	15	17	18	20	14	31	29	29
7	30	12	14	14	15	17	19	20	21	32	30	29
8	30	12	14	14	15	16	19	20	27	31	30	29
9	30	12	13	14	15	17	19	20	31	31	30	30
10	30	12	13	14	15	17	19	20	31	30	30	30
11	30	12	13	14	15	17	19	20	31	30	30	29
12	30	12	13	14	15	17	19	20	31	30	30	29
13	30	12	13	14	15	17	19	20	31	30	30	29
14	30	12	13	14	15	17	20	20	31	29	30	29
15	30	13	13	14	15	17	20	20	31	29	30	29
16	30	13	13	14	15	17	20	19	31	30	30	29
17	20	13	13	14	15	17	20	19	31	30	30	29
18	13	13	13	14	16	17	20	20	31	31	30	28
19	13	13	14	14	16	17	20	20	31	31	30	28
20	12	13	14	14	16	17	20	20	31	31	30	28
21	12	13	14	14	16	17	21	20	31	31	30	28
22	12	13	14	14	16	17	21	20	31	31	30	28
23	12	13	14	14	16	17	21	20	31	31	30	28
24	12	13	14	14	16	17	21	19	31	31	30	28
25	12	13	14	14	16	17	20	15	31	30	29	28
26	12	13	14	14	16	17	20	14	31	30	29	28
27	12	13	14	14	16	17	20	14	31	30	29	29
28	12	13	14	14	16	18	20	14	31	30	29	29
29	12	13	14	14	---	18	20	14	31	30	29	29
30	12	13	14	14	---	18	20	14	31	30	29	29
31	12	---	14	14	---	18	---	14	---	30	29	---
TOTAL	670	376	423	430	426	527	585	576	814	946	919	860
MEAN	21.6	12.5	13.6	13.9	15.2	17.0	19.5	18.6	27.1	30.5	29.6	28.7
MAX	30	13	14	14	16	18	21	20	31	34	30	30
MIN	12	12	13	13	14	16	18	14	14	29	29	28
AC-FT	1330	746	839	853	845	1050	1160	1140	1610	1880	1820	1710

CAL YR 1988 TOTAL 7262 MEAN 19.8 MAX 72 MIN 12 AC-FT 14400
WTR YR 1989 TOTAL 7552 MEAN 20.7 MAX 34 MIN 12 AC-FT 14980

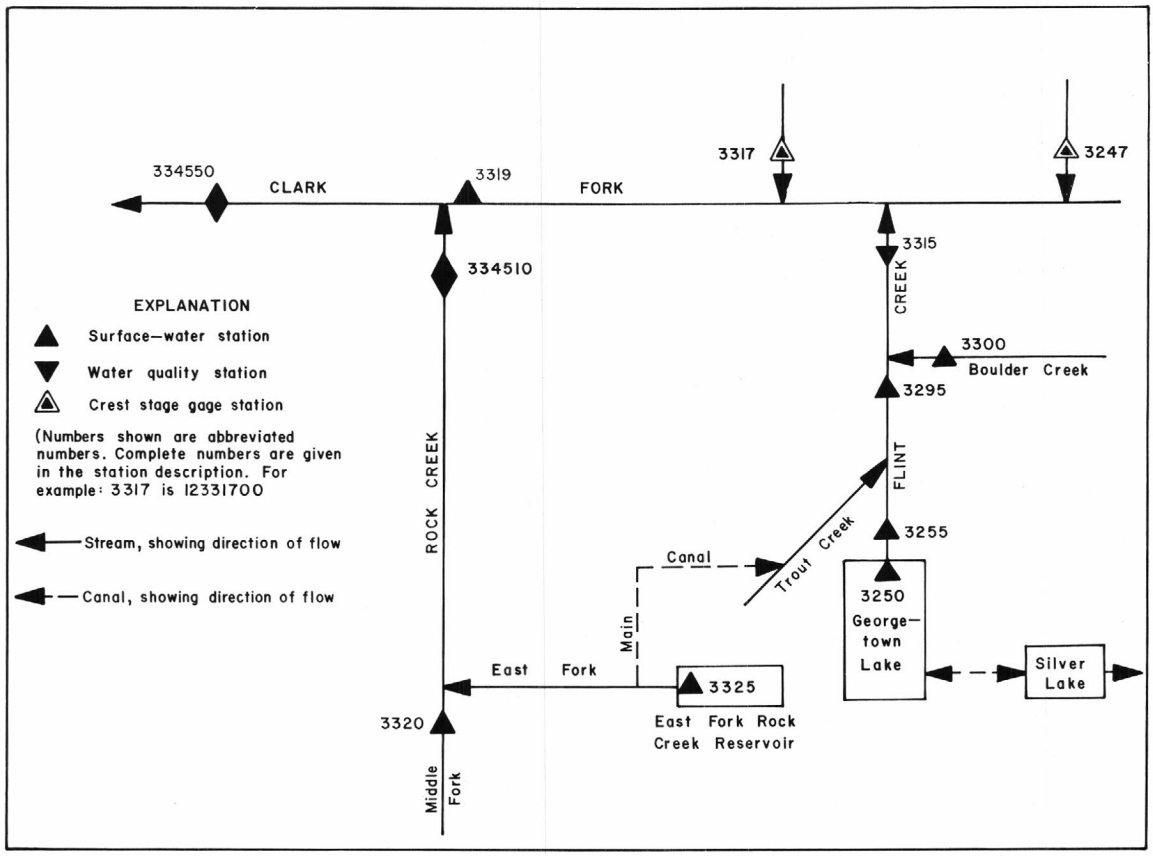


Figure 14.--Schematic diagram showing diversions and storage in Flint and Rock Creek basins.

PEND OREILLE RIVER BASIN

12329500 FLINT CREEK AT MAXVILLE, MT

LOCATION.--Lat 46°27'50", long 113°14'20", in NE1/4SW1/4NW1/4 sec.9, T.8 N., R.13 W., Granite County, Hydrologic Unit 17010202, on right bank 0.4 mi west of Maxville and 1.0 mi upstream from Boulder Creek.

DRAINAGE AREA.--208 mi^2.

PERIOD OF RECORD.--August 1941 to current year. April 1939 to September 1941 at site 0.5 mi upstream; records not equivalent owing to diversions.

REVISED RECORDS.--WSP 1216: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 4,828.38 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 15 to Mar. 10, Mar. 15-21, 23,24. Records good except those for estimated daily discharges, which are poor. Several observations of water temperature and specific conductance were made during the year. Some regulation by Georgetown Lake (station number 12325000). Diversions for irrigation of about 8,200 acres upstream from station. During irrigation season, flow is supplemented by water from East Fork Rock Creek which is diverted in sec.5, T.4 N., R.14 W., 500 ft below Rock Creek Dam, through a canal into Trout Creek, thence into Flint Creek.

AVERAGE DISCHARGE.--48 years, 100 ft^3/s, 72,450 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,680 ft^3/s, Mar. 28, 1943, gage height, 6.79 ft, from rating curve extended above 600 ft^3/s; maximum gage height, 8.08 ft, Feb. 4, 1963, backwater from ice; minimum daily discharge, 15 ft^3/s, Feb. 25, 1962.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 530 ft^3/s, Mar. 11, gage height, 4.95 ft; minimum daily, 25 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	58	e53	e40	e40	e48	67	83	54	60	79	67
2	66	59	e54	e42	e30	e45	66	85	61	59	77	66
3	62	62	e54	e44	e25	e43	62	88	84	55	81	64
4	65	60	e58	e47	e26	e45	62	85	85	57	79	64
5	64	59	e62	e50	e27	e48	68	85	86	55	75	63
6	66	60	e65	e47	e29	e51	176	91	97	59	73	62
7	67	60	e70	e40	e30	e55	254	105	109	64	69	62
8	66	59	e68	e35	e31	e63	181	126	117	70	80	61
9	74	58	e65	e37	e34	e75	106	124	118	73	92	63
10	74	57	e63	e38	e36	e200	89	130	132	74	97	63
11	71	57	e62	e39	e38	368	84	151	130	74	94	63
12	69	56	e60	e39	e36	262	84	119	112	77	84	63
13	68	55	e58	e39	e35	208	90	96	102	127	78	64
14	67	56	e56	e38	e33	94	93	86	98	111	75	64
15	67	e52	e52	e37	e31	e77	100	79	127	105	67	64
16	67	e58	e40	e38	e29	e70	108	78	198	117	63	63
17	83	e57	e42	e40	e30	e65	108	77	161	135	63	64
18	71	e55	e45	e43	e32	e70	103	85	126	128	61	68
19	68	e55	e50	e48	e35	e68	103	89	109	119	59	65
20	68	e57	e47	e50	e39	e64	117	77	103	105	56	63
21	68	e60	e45	e53	e43	e60	132	74	101	97	58	62
22	65	e65	e44	e48	e47	102	147	70	91	100	58	61
23	64	e68	e42	e40	e52	e75	146	65	83	94	73	60
24	63	e60	e41	e35	e56	e66	136	67	77	95	85	60
25	62	e57	e35	e36	e64	71	121	63	77	87	79	60
26	61	e55	e32	e37	e62	104	110	57	81	83	74	60
27	59	e54	e33	e38	e60	89	109	54	72	89	69	60
28	59	e53	e35	e40	e51	87	105	63	71	88	70	60
29	59	e56	e38	e43	---	75	95	70	80	91	67	58
30	59	e52	e40	e47	---	68	90	61	69	83	64	57
31	58	---	e38	e55	---	71	---	56	---	77	76	---
TOTAL	2048	1730	1547	1303	1081	2887	3312	2639	3011	2708	2275	1874
MEAN	66.1	57.7	49.9	42.0	38.6	93.1	110	85.1	100	87.4	73.4	62.5
MAX	83	68	70	55	64	368	254	151	198	135	97	68
MIN	58	52	32	35	25	43	62	54	54	55	56	57
AC-FT	4060	3430	3070	2580	2140	5730	6570	5230	5970	5370	4510	3720

CAL YR 1988 TOTAL 21239 MEAN 58.0 MAX 151 MIN 31 AC-FT 42130
WTR YR 1989 TOTAL 26415 MEAN 72.4 MAX 368 MIN 25 AC-FT 52390

e Estimated

PEND OREILLE RIVER BASIN

12330000 BOULDER CREEK AT MAXVILLE, MT

LOCATION.--Lat 46°28'20", long 113°13'59", in SE1/4NE1/4SW1/4 sec.4, T.8 N., R.13 W., Granite County, Hydrologic Unit 17010202, on right bank 0.2 mi upstream from mouth and 0.7 mi north of Maxville.

DRAINAGE AREA.--71.3 mi^2.

PERIOD OF RECORD.--April 1939 to current year. Monthly discharge only for some periods, published in WSP 1316.

GAGE.--Water-stage recorder. Elevation of gage is 4,750 ft above National Geodetic Vertical Datum of 1929, from topographic map. Apr. 15, 1939, to July 7, 1941, nonrecording gage at site 75 ft upstream at different datum. July 8-20, 1941, nonrecording gage at site 175 ft upstream at datum 1.03 ft higher.

REMARKS.--Estimated daily discharges: Nov. 14 to Mar. 24. Records fair except those for estimated daily discharges, which are poor. Several observations of water temperature and specific conductance were made during the year. Diversions upstream for irrigation of about 240 acres near the station.

AVERAGE DISCHARGE.--50 years, 46.9 ft^3/s, 33,980 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,460 ft^3/s, June 19, 1975, gage height, 4.55 ft, in gage well, 4.80 ft, from floodmarks; minimum, 3.0 ft^3/s about Mar. 24, 1964, gage height, 0.73 ft, result of freezeup.
EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 220 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 11	0200	*231	*2.81	No other peak greater than base discharge.			

Minimum daily discharge, 4.5 ft^3/s, Oct. 7.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	13	e13	e12	e12	e15	14	31	67	36	12	9.1
2	5.9	12	e13	e12	e9.0	e14	14	32	89	34	15	7.2
3	8.5	9.0	e14	e13	e7.0	e13	14	36	125	30	16	6.8
4	9.4	10	e14	e14	e7.0	e13	14	36	127	26	18	6.3
5	11	11	e15	e17	e8.0	e14	15	41	146	25	17	5.9
6	8.9	12	e17	e16	e8.0	e16	17	56	169	24	16	5.5
7	4.5	13	e19	e14	e9.0	e17	19	94	174	22	16	5.3
8	4.8	13	e21	e12	e10	e18	20	124	157	21	15	4.9
9	5.1	13	e20	e12	e10	e19	18	133	161	18	8.3	5.1
10	4.8	13	e19	e13	e11	e22	17	178	168	17	5.3	4.9
11	4.6	14	e19	e13	e12	e25	17	199	143	17	5.2	4.7
12	6.8	14	e18	e13	e11	e24	17	129	128	15	7.5	5.0
13	7.6	14	e18	e13	e11	e23	18	97	117	18	7.1	9.8
14	4.6	e15	e17	e12	e11	e20	20	79	109	17	7.8	13
15	7.9	e16	e15	e12	e10	e18	22	73	129	16	9.9	11
16	7.7	e16	e13	e12	e10	e16	25	73	157	20	11	11
17	13	e16	e14	e13	e10	e15	26	78	120	21	9.2	11
18	10	e16	e14	e13	e10	e14	24	96	99	18	9.9	13
19	9.5	e15	e15	e15	e11	e14	27	79	84	15	10	12
20	9.4	e15	e14	e16	e12	e14	35	67	80	14	7.9	12
21	10	e16	e14	e17	e13	e15	47	65	77	15	6.9	11
22	9.3	e17	e14	e16	e15	e16	63	64	72	16	7.1	11
23	9.3	e18	e13	e14	e16	e15	63	77	61	15	12	11
24	11	e17	e12	e11	e18	e14	54	80	56	14	17	11
25	13	e16	e11	e12	e20	14	47	67	52	13	19	11
26	13	e15	e10	e12	e20	15	44	59	48	13	17	11
27	13	e14	e11	e12	e19	15	42	60	46	15	8.1	11
28	13	e13	e11	e13	e17	15	38	71	44	14	8.7	11
29	12	e14	e12	e13	---	14	35	68	41	13	7.0	11
30	9.9	e13	e12	e15	---	14	33	62	37	12	6.4	10
31	11	---	e11	e16	---	14	---	60	---	11	13	---
TOTAL	280.5	423.0	453	418	337.0	505	859	2464	3083	575	346.3	272.5
MEAN	9.05	14.1	14.6	13.5	12.0	16.3	28.6	79.5	103	18.5	11.2	9.08
MAX	13	18	21	17	20	25	63	199	174	36	19	13
MIN	4.5	9.0	10	11	7.0	13	14	31	37	11	5.2	4.7
AC-FT	556	839	899	829	668	1000	1700	4890	6120	1140	687	541

CAL YR 1988 TOTAL 8560.5 MEAN 23.4 MAX 194 MIN 4.1 AC-FT 16980
WTR YR 1989 TOTAL 10016.3 MEAN 27.4 MAX 199 MIN 4.5 AC-FT 19870

e Estimated

12331500 FLINT CREEK NEAR DRUMMOND, MT.

LOCATION.--Lat 46°37'44", long 113°09'00", in NE1/4NW1/4NE1/4 sec. 18, T.10 N., R.12 W., Granite County, at former gaging station site at bridge on county road, 2.0 mi upstream from mouth, and 2.7 mi south of Drummond.

DRAINAGE AREA.--490 mi².

PERIOD OF RECORD.--Water years 1972-73, 1985 to current year.

REMARKS.--Flow affected by diversions for irrigation upstream from station.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (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											
11...	1230	602	60	1	210	5.0	2.0	7.5	75	5	19
APR											
06...	1500	295	80	1	250	18.0	7.0	7.7	110	24	30
20...	1530	208	20	1	260	23.0	13.0	8.4	130	6	34
MAY											
07...	1645	256	80	1	220	19.5	12.0	8.1	97	10	26
11...	1045	457	100	2	135	11.0	8.0	8.0	73	8	20
AUG											
15...	1500	31	30	1	500	24.0	19.0	8.4	240	6	65

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)
MAR											
11...	6.6	90	0	70	50	13	1	<1	32	4	7200
APR											
06...	9.6	114	0	91	37	12	1	<1	23	4	4800
20...	9.9	139	5	120	18	9	<1	<1	7	2	1300
MAY											
07...	7.7	108	0	87	17	8	<1	<1	10	3	1100
11...	5.6	80	0	65	21	7	<1	<1	12	3	1500
AUG											
15...	18	281	2	231	12	11	<1	<1	4	1	240

DATE	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, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	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)
MAR										
11...	190	87	<5	1600	120	290	27	556	904	28
APR										
06...	44	43	<5	780	77	170	25	198	158	84
20...	35	12	<5	170	33	30	11	38	21	75
MAY										
07...	38	14	1	250	43	40	14	51	35	60
11...	60	23	7	380	41	70	6	99	122	58
AUG										
15...	12	2	<1	110	43	10	3	22	1.8	57

PEND OREILLE RIVER BASIN

12331900 CLARK FORK NEAR CLINTON, MT

LOCATION.--Lat 46°43'05", long 113°35'17", in SE1/4SW1/4SE1/4 sec.10, T.11 N., R.16 W., Missoula County, Hydrologic Unit 17010201, on downstream side of county road bridge, 4.5 mi above Rock Creek, 6.5 mi southeast of Clinton, and at mile 386.6.

DRAINAGE AREA.--2,629 mi^2.

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

REVISED RECORDS.--WDR MT-81-2: Drainage area.

GAGE.--Nonrecording gage and crest-stage gage. Elevation of gage is 3,580 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Oct. 4,14,29,31, Nov. 4,16, Dec. 2-6, Dec. 15 to Jan. 16, 21-28, Feb. 1 to Mar. 6,20,25, May 11,23, June 23,29, Aug. 26, Sept. 16. Records fair except those for estimated daily discharges, which are poor. Some regulation by settling ponds on Silver Bow Creek near Anaconda and by Georgetown Lake (station number 12325000) on Flint Creek. Diversions for irrigation of about 88,400 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--10 years, 851 ft^3/s, 616,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,000 ft^3/s, May 24, 1981, gage height, 10.90 ft, from floodmarks; minimum observed, 95 ft^3/s, Sept. 3, 1988, gage height, 3.20 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge observed, 4,540 ft^3/s, Mar. 11, gage height, 7.70 ft; minimum daily, 200 ft^3/s, Feb. 4, 5.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	317	461	402	e350	e360	e380	814	1090	623	439	370	532
2	322	460	e410	e360	e250	e360	791	1060	615	408	406	530
3	324	454	e400	e370	e230	e350	745	1110	631	398	406	517
4	e326	e460	e400	e370	e200	e350	715	1120	656	368	385	524
5	327	461	e410	e360	e200	e370	736	1120	670	337	373	531
6	325	464	e420	e350	e210	e420	1490	1130	666	325	366	517
7	324	462	459	e330	e230	473	2880	1210	726	295	360	508
8	323	461	455	e330	e260	685	2660	1400	768	254	341	517
9	320	461	452	e320	e280	960	1730	1570	777	234	329	525
10	320	461	467	e330	e310	1310	1270	1630	812	236	335	526
11	321	464	462	e330	e340	2850	1150	e1750	865	235	303	537
12	334	462	458	e320	e360	2960	1080	1760	863	221	279	553
13	375	462	471	e320	e360	2550	1100	1650	812	229	281	561
14	e380	470	489	e320	e350	1720	1120	1440	761	279	292	569
15	379	459	e420	e320	e340	1210	1140	1360	791	304	287	565
16	394	e450	e390	e360	e330	1040	1170	1230	936	312	277	e550
17	441	479	e370	390	e330	826	1250	1140	1060	378	272	525
18	461	479	e340	405	e340	684	1230	1070	1010	389	268	551
19	461	479	e330	431	e360	759	1190	1080	910	379	263	562
20	461	481	e320	428	e390	e760	1230	1050	805	368	262	555
21	459	476	e340	e400	e420	741	1330	950	767	396	262	507
22	466	475	e350	e380	e460	835	1460	883	738	408	265	507
23	449	495	e350	e360	e440	973	1690	e810	e660	392	290	507
24	447	502	e340	e340	e440	883	1740	783	621	381	398	504
25	455	498	e330	e340	e450	e870	1600	737	571	395	454	499
26	453	464	e320	e360	e470	1010	1470	701	543	404	e504	497
27	440	419	e310	e370	e480	1070	1360	673	527	391	504	476
28	432	413	e310	e350	e420	1160	1300	671	505	402	514	459
29	e435	423	e310	401	---	1070	1240	715	e480	399	490	443
30	436	425	e320	436	---	890	1150	761	471	376	487	450
31	e450	---	e330	509	---	883	---	689	---	367	516	---
TOTAL	12157	13880	11935	11340	9610	31402	39831	34343	21640	10699	11139	15604
MEAN	392	463	385	366	343	1013	1328	1108	721	345	359	520
MAX	466	502	489	509	480	2960	2880	1760	1060	439	516	569
MIN	317	413	310	320	200	350	715	671	471	221	262	443
AC-FT	24110	27530	23670	22490	19060	62290	79000	68120	42920	21220	22090	30950

CAL YR 1988 TOTAL 149229 MEAN 408 MAX 1330 MIN 96 AC-FT 296000
WTR YR 1989 TOTAL 223580 MEAN 613 MAX 2960 MIN 200 AC-FT 443500

e Estimated

PEND OREILLE RIVER BASIN

12332000 MIDDLE FORK ROCK CREEK NEAR PHILIPSBURG, MT

LOCATION.--Lat 46°11'42", long 113°30'00", in SW1/4SE1/4 sec.8, T.5 N., R.15 W., Granite County, Hydrologic Unit 17010202, on right bank 0.3 mi upstream from East Fork, 2.3 mi upstream from West Fork, and 13.7 mi southwest of Philipsburg.

DRAINAGE AREA.--123 mi^2.

PERIOD OF RECORD.--September 1937 to current year. Monthly discharges only January to March 1938, published in WSP 1316.

GAGE.--Water-stage recorder. Datum of gage is 5,385.84 ft above National Geodetic Vertical Datum of 1929. Sept. 21, 1937, to May 10, 1942, nonrecording gage at site 600 ft upstream at different datum. May 11, 1942, to May 11, 1954, nonrecording gages at site 400 ft downstream at different datum. May 12, 1954, to Sept. 30, 1955, non-recording gage at site 300 ft upstream at datum 5.74 ft higher.

REMARKS.--Estimated daily discharges: Nov. 13 to Apr. 10. Records good except those for estimated daily discharges, which are poor. Several observations of water temperature and specific conductance were made during the year. A few small diversions for irrigation upstream from station.

AVERAGE DISCHARGE.--52 years, 121 ft^3/s, 13.36 in/yr, 87,660 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,680 ft^3/s, June 16, 1974, gage height, 5.58 ft; minimum daily, 5.3 ft^3/s, Feb. 9, 1953.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 650 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft3/s)	Gage height (ft)
June 16	0600	*702	*4.07	No other peaks greater than base discharge.			

Minimum daily discharge, 10 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	33	31	e30	e21	e20	e25	e27	84	209	185	74	63
2	33	31	e29	e22	e15	e23	e26	90	235	172	82	59
3	32	35	e29	e25	e10	e21	e26	95	289	165	73	57
4	31	36	e28	e35	e11	e22	e25	97	305	160	68	55
5	30	34	e33	e33	e12	e23	e30	107	350	158	65	54
6	30	36	e37	e29	e13	e25	e35	126	434	149	63	53
7	31	37	e40	e23	e14	e27	e44	175	487	141	62	52
8	30	35	e38	e22	e15	e30	e50	242	476	137	60	51
9	29	34	e37	e23	e17	e33	e49	282	495	132	58	52
10	29	34	e36	e25	e22	e40	e48	387	514	126	56	51
11	28	34	e35	e24	e26	e60	48	529	461	121	56	50
12	28	33	e37	e25	e25	e50	48	415	416	118	55	49
13	29	e33	e38	e27	e25	e43	54	329	394	145	53	48
14	29	e33	e36	e26	e24	e35	61	277	385	125	53	46
15	29	e33	e30	e25	e24	e30	71	252	506	114	53	45
16	31	e35	e25	e26	e23	e26	80	250	643	123	51	44
17	46	e36	e26	e27	e24	e24	86	244	490	147	48	45
18	44	e35	e27	e28	e24	e23	85	275	378	122	47	49
19	38	e34	e28	e29	e24	e24	96	253	339	109	46	47
20	37	e35	e24	e30	e25	e24	118	232	333	104	50	45
21	35	e36	e25	e28	e25	e26	141	226	302	103	56	44
22	34	e38	e25	e25	e25	e27	170	222	270	104	54	43
23	33	e40	e23	e22	e26	e26	173	241	248	97	71	42
24	32	e37	e21	e20	e27	e25	170	242	231	102	97	42
25	32	e32	e19	e21	e30	e28	160	226	218	93	92	40
26	32	e30	e18	e22	e33	e30	154	210	208	88	83	39
27	32	e29	e19	e23	e31	e31	151	204	205	89	74	39
28	32	e31	e20	e26	e28	e30	143	230	211	82	72	39
29	31	e33	e21	e28	---	e29	133	233	198	77	66	39
30	31	e31	e23	e32	---	e28	83	219	193	74	63	38
31	31	---	e20	e25	---	e27	---	205	---	72	70	---
TOTAL	1002	1021	877	797	618	915	2585	7199	10423	3734	1971	1420
MEAN	32.3	34.0	28.3	25.7	22.1	29.5	86.2	232	347	120	63.6	47.3
MAX	46	40	40	35	33	60	173	529	643	185	97	63
MIN	28	29	18	20	10	21	25	84	193	72	46	38
AC-FT	1990	2030	1740	1580	1230	1810	5130	14280	20670	7410	3910	2820

CAL YR 1988 TOTAL 26668 MEAN 72.9 MAX 532 MIN 18 AC-FT 52900
WTR YR 1989 TOTAL 32562 MEAN 89.2 MAX 643 MIN 10 AC-FT 64590

e Estimated

PEND OREILLE RIVER BASIN

12334510 ROCK CREEK NEAR CLINTON, MT

LOCATION.--Lat 46°43'21", long 113°40'56", in NW1/4NE1/4SW1/4 sec.12, T.11 N., R.17 W., Missoula County, Hydrologic Unit 17010202, on left bank 100 ft downstream from private road bridge, 0.2 mi upstream from mouth, and 3.7 mi southeast of Clinton.

DRAINAGE AREA.--885 mi^2.

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 3,519.46 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Dec. 1-7, Dec. 15 to Jan. 14, 25-28, Feb. 1-20, Mar. 4,5. Water-discharge records good except those for estimated daily discharges, which are poor. Some regulation by East Fork Rock Creek Reservoir (station number 12332500). During irrigation season water is diverted from East Fork Rock Creek in sec.5, T.4 N., R.14 W., 500 ft below Rock Creek Dam, through a canal into Trout Creek, thence into Flint Creek. Diversions for irrigation of about 16,100 acres.

AVERAGE DISCHARGE.--17 years, 550 ft^3/s, 8.44 in/yr, 398,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,520 ft^3/s, June 20, 1975, gage height, 7.49 ft, rating then in use; maximum gage height, 7.53 ft, May 22, 1981, and June 17, 1982; minimum discharge, 41 ft^3/s, Dec. 27, 1988, result of freezeup, but may have been less during the period of ice effect, Feb. 1-20, 1989.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1972 reached a stage of 8.52 ft, from floodmark, discharge, 6,500 ft^3/s; local residents report flood of 1927 reached a stage of about 9.5 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,610 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 11	1630	*3,090	*6.46	June 10	1630	1,830	5.54
June 16	1700	2,080	5.72				

Minimum discharge, 41 ft^3/s, Dec. 27, result of freezeup, but may have been less during period of ice effect.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	207	175	e160	e120	e110	146	237	637	894	659	362	360
2	201	177	e150	e130	e80	130	232	673	963	623	392	334
3	196	189	e150	e140	e60	118	222	744	1210	582	388	311
4	191	194	e140	e140	e45	e110	211	782	1290	552	353	300
5	188	193	e130	e120	e55	e110	213	826	1350	528	331	289
6	186	196	e150	e110	e65	130	289	929	1500	510	314	281
7	182	203	e170	e100	e80	149	494	1190	1640	493	303	276
8	181	201	175	e90	e90	162	577	1630	1640	474	293	269
9	178	193	170	e110	e100	179	466	1890	1620	462	294	264
10	175	189	169	e125	e110	206	395	2040	1720	450	290	261
11	174	186	157	e120	e120	409	366	2850	1670	444	289	255
12	172	190	174	e120	e130	406	361	2570	1460	432	288	248
13	169	183	183	e115	e120	406	396	1980	1370	565	289	241
14	169	180	180	e130	e110	314	452	1670	1290	601	284	231
15	171	175	e120	135	e100	262	538	1450	1420	541	271	225
16	190	164	e100	144	e100	238	649	1370	1950	528	263	223
17	269	184	e90	160	e100	220	694	1310	1710	589	255	217
18	304	182	e85	158	e110	197	648	1350	1360	559	247	230
19	257	172	e80	155	e120	204	666	1360	1200	485	242	232
20	230	169	e75	146	e130	217	831	1220	1120	443	236	219
21	217	175	e85	141	134	214	1050	1150	1110	429	245	219
22	206	175	e90	154	139	235	1300	1110	1000	416	256	220
23	198	201	e90	150	138	238	1330	1160	925	391	275	216
24	193	193	e85	129	140	216	1160	1210	869	378	372	215
25	190	170	e75	e100	140	219	989	1150	829	375	452	214
26	186	175	e65	e105	147	262	877	1060	797	374	411	212
27	181	157	e50	e110	148	263	811	979	756	425	380	209
28	179	165	e60	e120	142	273	760	984	737	399	361	206
29	179	177	e80	138	---	260	690	1070	725	371	338	207
30	176	165	e90	159	---	241	647	995	685	360	318	209
31	175	---	e100	179	---	240	---	925	---	359	342	---
TOTAL	6070	5448	3678	4053	3063	6974	18551	40264	36810	14797	9734	7393
MEAN	196	182	119	131	109	225	618	1299	1227	477	314	246
MAX	304	203	183	179	148	409	1330	2850	1950	659	452	360
MIN	169	157	50	90	45	110	211	637	685	359	236	206
AC-FT	12040	10810	7300	8040	6080	13830	36800	79860	73010	29350	19310	14660

CAL YR 1988 TOTAL 122081 MEAN 334 MAX 1750 MIN 50 AC-FT 242100
WTR YR 1989 TOTAL 156835 MEAN 430 MAX 2850 MIN 45 AC-FT 311100

e Estimated

12334510 ROCK CREEK NEAR CLINTON, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1979-83, 1985 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: September 1979 to September 1983.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE (water years 1979-83): Maximum, 20.5°C, July 23, 1980; minimum, 0.0°C, on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DISCHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PERCENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPECIFIC CONDUCTANCE (US/CM) (00095)	TEMPERATURE AIR (DEG C) (00020)	TEMPERATURE WATER (DEG C) (00010)	BICARBONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CARBONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKALINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
NOV										
08...	1100	198	--	--	156	3.0	4.0	--	--	--
DEC										
19...	1155	80	--	--	165	-5.0	0.0	--	--	--
JAN										
30...	1630	162	--	--	155	4.0	3.0	--	--	--
MAR										
16...	1515	238	--	--	146	-3.0	2.0	--	--	--
APR										
07...	1620	515	60	1	120	13.0	6.5	64	0	50
20...	1815	897	30	1	90	23.0	11.0	51	0	42
MAY										
07...	1945	1260	80	1	75	18.0	10.0	39	0	31
11...	1340	3010	100	2	55	12.5	7.0	26	0	22
17...	1220	1310	--	--	97	--	--	--	--	--
JUN										
06...	0745	1430	--	--	99	14.0	11.0	--	--	--
JUL										
19...	1145	486	--	--	146	22.0	16.0	--	--	--
AUG										
16...	1040	258	20	1	145	15.5	13.5	86	0	70
SEP										
20...	1110	223	--	--	153	12.0	9.0	--	--	--

DATE	TIME	PH (STANDARD UNITS) (00400)	HARDNESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DISSOLVED (MG/L AS CA) (00915)	MAGNESIUM, DISSOLVED (MG/L AS MG) (00925)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD) (01027)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	COPPER, TOTAL RECOVERABLE (UG/L AS CU) (01042)	COPPER, DISSOLVED (UG/L AS CU) (01040)
APR											
07...	1620	7.4	55	14	4.9	1	<1	<1	<1	17	1
20...	1815	8.3	40	10	3.7	1	<1	<1	<1	2	2
MAY											
07...	1945	7.5	30	7.7	2.7	<1	<1	<1	<1	7	2
11...	1340	7.5	26	6.6	2.2	2	<1	<1	<1	7	2
AUG											
16...	1040	7.9	66	17	5.7	1	<1	<1	<1	2	1

DATE	IRON, TOTAL RECOVERABLE (UG/L AS FE) (01045)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, TOTAL RECOVERABLE (UG/L AS PB) (01051)	LEAD, DISSOLVED (UG/L AS PB) (01049)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN) (01055)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN) (01092)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
APR											
07...	2100	38	<5	<5	70	3	30	5	102	142	95
20...	540	54	6	<5	20	2	<10	<3	24	58	55
MAY											
07...	560	42	5	1	30	4	30	<3	30	102	48
11...	1600	66	4	1	90	4	20	6	157	1280	40
AUG											
16...	80	15	<1	<1	20	2	<10	5	3	2.1	74

PEND OREILLE RIVER BASIN

12334550 CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MT

LOCATION.--Lat 46°49'34", long 113°48'48", in SW1/4NW1/4SW1/4 sec. 1, T.12, N., R.18 W., Missoula County, Hydrologic Unit 17010203, on left bank 0.8 mi southeast of Turah, 4 mi southeast of Bonner, and at mile 370.2.

DRAINAGE AREA.--3,641 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1985 to current year. Water-discharge records for the period March 1985 to September 1985 are available in files of the Helena district office.

GAGE.--Water-stage recorder. Elevation of gage is 3,320 ft, from topographic map. Prior to May 9, 1986, non-recording gage at same site at datum 2.00 ft higher.

REMARKS.--Estimated daily discharges: Dec. 2 to Mar. 12. Water-discharge records good except those for estimated daily discharges, which are poor. Several observations of water temperature and specific conductance were made during the year. Some regulation by settling ponds on Silver Bow Creek near Anaconda and by Georgetown Lake (station number 12325000) on Flint Creek. Diversions for irrigation of about 100,000 acres upstream from station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,700 ft^3/s, Feb. 25, 1986, gage height, 6.52 ft, from graph based on gage readings, datum then in use; maximum gage height, 6.72 ft May 30, 1986; minimum discharge, 231 ft^3/s, Sept. 4-6, 1988, gage height, 1.67 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 4,000 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 11	1900	*4,690	*5.80	Only peak greater than base discharge.			

Minimum daily discharge, 300 ft^3/s, Feb. 4,5.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	540	651	598	e490	e500	e530	1150	1940	1640	1130	705	920
2	541	658	e560	e490	e400	e480	1100	1940	1630	1090	764	885
3	537	670	e580	e520	e350	e490	1060	2030	1810	1020	768	853
4	532	677	e560	e500	e300	e500	1010	2090	1900	959	718	849
5	528	665	e540	e480	e300	e520	1000	2130	1970	917	680	838
6	531	666	e600	e450	e320	e540	1470	2230	2070	883	656	825
7	525	676	e620	e440	e350	e560	3340	2490	2230	832	631	811
8	522	678	e600	e430	e380	e700	3480	3090	2310	794	614	817
9	518	668	e610	e430	e410	e900	2300	3530	2310	745	605	820
10	518	660	e620	e470	e440	e1300	1810	3670	2380	719	593	820
11	515	658	e630	e470	e470	e2500	1620	4370	2460	703	578	827
12	520	662	e650	e460	e500	e3000	1540	4460	2290	681	555	826
13	529	656	e660	e460	e490	2810	1570	3940	2160	795	551	832
14	540	650	e620	e460	e480	2080	1650	3450	2000	899	557	823
15	551	633	e560	e460	e470	1550	1750	3080	2080	854	544	809
16	578	621	e520	e490	e460	1350	1930	2830	2650	830	529	795
17	688	662	e480	e540	e450	1150	2070	2660	2680	918	534	783
18	778	668	e470	e600	e470	960	2010	2590	2350	947	519	809
19	753	660	e460	e620	e510	1020	1970	2640	2070	882	497	826
20	716	656	e450	e600	e540	1010	2180	2510	1880	827	481	825
21	695	665	e490	e570	e560	995	2510	2320	1830	807	493	808
22	681	665	e520	e540	e580	1100	2880	2200	1730	811	517	794
23	670	710	e520	e510	e580	1310	3200	2150	1590	777	551	784
24	654	709	e500	e480	e580	1170	3150	2130	1480	748	701	772
25	645	673	e470	e480	e570	1050	2850	2040	1390	754	883	750
26	638	656	e430	e500	e580	1230	2640	1930	1340	757	893	737
27	635	620	e390	e540	e600	1390	2460	1810	1280	792	890	725
28	631	627	e390	e510	e580	1530	2340	1770	1230	776	894	707
29	635	661	e400	e550	---	1420	2170	1850	1220	755	862	691
30	640	658	e450	e620	---	1220	2030	1820	1180	724	841	686
31	645	---	e500	e680	---	1210	---	1730	---	708	868	---
TOTAL	18629	19839	16448	15840	13220	37575	62240	79420	57140	25834	20472	24047
MEAN	601	661	531	511	472	1212	2075	2562	1905	833	660	802
MAX	778	710	660	680	600	3000	3480	4460	2680	1130	894	920
MIN	515	620	390	430	300	480	1000	1730	1180	681	481	686
AC-FT	36950	39350	32620	31420	26220	74530	123500	157500	113300	51240	40610	47700

CAL YR 1988 TOTAL 285258 MEAN 779 MAX 2620 MIN 233 AC-FT 565800
WTR YR 1989 TOTAL 390704 MEAN 1070 MAX 4460 MIN 300 AC-FT 775000

e Estimated

12334550 CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MT.--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1985 to current year.

PERIOD OF DAILY RECORD.--
SUSPENDED-SEDIMENT DISCHARGE: March 1985 to current year.

REMARKS.--Unpublished records of once-daily water temperatures are available in files of District office.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SEDIMENT CONCENTRATION: Maximum daily mean, 1,140 mg/L, Feb. 25, 1986; minimum daily mean, 1 mg/L, Sep. 12, 1987.
SEDIMENT LOAD: Maximum daily, 24,400 tons, Feb. 25, 1986; minimum daily 1.1 tons, Sep. 12, 1987.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATION: Maximum daily mean, 734 mg/L, Apr. 7; minimum daily mean, 2 mg/L, on July 10.
SEDIMENT LOAD: Maximum daily, 6,800 tons, Apr. 7; minimum daily, 2.6 tons, Feb. 6.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
DEC										
19...	1430	456	100	72	483	-7.0	1.0	--	--	--
JAN										
31...	1130	672	100	73	425	0.0	2.0	--	--	--
FEB										
24...	1515	591	50	2	440	3.0	3.0	183	0	147
MAR										
08...	1400	795	100	68	445	4.5	3.0	170	0	136
10...	1840	1380	--	--	350	--	4.0	--	--	--
11...	0745	4090	50	1	260	3.0	1.0	86	0	68
11...	1010	3850	--	--	260	--	1.5	--	--	--
14...	1300	2080	100	10	348	5.0	2.5	--	--	--
APR										
06...	1820	1930	90	1	420	18.0	9.5	162	0	128
06...	2000	2000	--	--	420	--	9.5	--	--	--
07...	1315	3810	100	2	225	15.0	7.0	83	0	65
07...	1450	3750	--	--	225	--	7.0	--	--	--
MAY										
02...	1430	1930	100	51	270	15.0	10.5	--	--	--
08...	1220	3130	50	1	205	17.0	13.0	83	0	66
11...	1600	4500	--	--	160	--	10.5	--	--	--
12...	1115	4460	50	1	160	10.0	8.0	67	0	52
JUN										
06...	1045	2000	--	0	216	28.0	14.0	--	--	--
JUL										
18...	1315	957	10	1	327	23.5	16.5	--	--	--
AUG										
16...	1300	535	10	1	375	18.0	16.5	154	4	131
SEP										
15...	1230	827	20	2	396	22.0	11.0	--	--	--

DATE	TIME	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)
FEB										
24...	1515	8.2	200	58	14	7	5	<1	<1	16
MAR										
08...	1400	8.0	200	58	14	8	6	<1	<1	30
11...	0745	7.4	98	28	6.8	110	17	2	<1	440
APR										
06...	1820	8.0	190	53	13	21	8	1	<1	150
07...	1315	7.5	94	27	6.4	41	9	3	<1	500
MAY										
08...	1220	8.0	89	25	6.5	8	4	<1	<1	34
12...	1115	7.6	76	22	5.2	11	5	<1	<1	56
AUG										
16...	1300	8.5	170	48	12	6	5	<1	<1	6

PEND OREILLE RIVER BASIN

12334550 CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MT.--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	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, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
FEB									
24...	3	370	6	<5	<5	80	5	40	10
MAR									
08...	6	680	7	15	<5	100	9	70	16
11...	23	16000	170	100	<5	1800	28	1100	30
APR									
06...	5	5200	15	19	<5	470	13	260	13
07...	11	19000	47	64	<5	2000	4	820	15
MAY									
08...	4	1300	17	7	<1	140	8	60	4
12...	6	2100	44	11	1	200	12	90	21
AUG									
16...	7	80	6	<1	1	20	6	10	3

DATE	TIME	TEMPER-ATURE WATER (DEG C) (00010)	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. % FINER THAN .002 MM (70337)	SED. SUSP. FALL DIAM. % FINER THAN .004 MM (70338)
NOV							
08...	1230	4.0	657	12	21	--	--
DEC							
19...	1430	1.0	456	11	14	--	--
JAN							
31...	1130	2.0	672	22	40	--	--
FEB							
23...	0945	2.0	603	34	55	--	--
24...	1515	3.0	591	20	32	--	--
MAR							
08...	0800	2.5	702	25	47	--	--
08...	1400	3.0	795	43	92	--	--
08...	1715	3.5	838	108	244	--	--
09...	0740	3.0	985	132	351	--	--
10...	1840	4.0	1380	190	708	--	--
11...	0745	1.0	4090	902	9960	28	34
11...	1010	1.5	3850	730	7590	--	--
14...	1300	2.5	2080	144	809	--	--
29...	1455	--	1420	60	230	--	--
APR							
06...	1820	9.5	1930	258	1340	--	--
06...	2000	9.5	2000	334	1800	--	--
07...	1315	7.0	3810	971	9990	28	39
07...	1450	7.0	3750	924	9360	--	--
21...	1110	11.0	2450	72	476	--	--
MAY							
02...	1430	10.5	1930	12	63	--	--
08...	1220	13.0	3130	68	575	--	--
11...	1600	10.5	4500	250	3040	--	--
12...	1115	8.0	4460	136	1640	--	--
JUN							
06...	1045	14.0	2000	12	65	--	--
09...	1705	17.5	2240	9	54	--	--
JUL							
18...	1315	16.5	957	11	28	--	--
AUG							
16...	1300	16.5	535	4	5.8	--	--
SEP							
15...	1230	11.0	827	11	25	--	--

12334550 CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MT.--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	SED. SUSP. FALL DIAM. % FINER THAN .008 MM (70339)	SED. SUSP. FALL DIAM. % FINER THAN .016 MM (70340)	SED. SUSP. FALL DIAM. % FINER THAN .062 MM (70342)	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343)	SED. SUSP. FALL DIAM. % FINER THAN .250 MM (70344)	SED. SUSP. FALL DIAM. % FINER THAN .500 MM (70345)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV							
08...	--	--	--	--	--	--	86
DEC							
19...	--	--	--	--	--	--	85
JAN							
31...	--	--	--	--	--	--	68
FEB							
23...	--	--	--	--	--	--	--
24...	--	--	--	--	--	--	63
MAR							
08...	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	55
08...	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--
11...	41	58	76	87	96	100	--
11...	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	71
29...	--	--	--	--	--	--	--
APR							
06...	--	--	--	--	--	--	72
06...	--	--	--	--	--	--	--
07...	--	63	86	92	98	100	--
07...	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--
MAY							
02...	--	--	--	--	--	--	60
08...	--	--	--	--	--	--	56
11...	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	46
JUN							
06...	--	--	--	--	--	--	68
09...	--	--	--	--	--	--	--
JUL							
18...	--	--	--	--	--	--	73
AUG							
16...	--	--	--	--	--	--	60
SEP							
15...	--	--	--	--	--	--	71

PEND OREILLE RIVER BASIN

12334550 CLARK FORK AT TURAH BRIDGE, NEAR BONNER, MT.--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	15	22	8	14	7	11	12	16	20	27	13	19
2	13	19	11	20	10	15	12	16	12	13	8	10
3	12	17	13	24	12	19	11	15	7	6.6	9	12
4	11	16	19	35	15	23	11	15	5	4.1	11	15
5	11	16	16	29	8	12	12	16	5	4.1	14	20
6	18	26	14	25	15	24	12	15	3	2.6	15	22
7	11	16	9	16	16	27	13	15	8	7.6	17	26
8	10	14	9	16	19	31	16	19	18	18	60	113
9	9	13	8	14	19	31	24	28	20	22	130	316
10	9	13	8	14	17	28	23	29	16	19	175	614
11	9	13	7	12	8	14	18	23	8	10	645	4350
12	9	13	8	14	12	21	14	17	17	23	260	2110
13	28	40	7	12	15	27	10	12	17	22	230	1750
14	18	26	6	11	18	30	7	8.7	14	18	155	870
15	14	21	5	8.5	11	17	7	8.7	12	15	85	356
16	18	28	5	8.4	15	21	9	12	14	17	64	233
17	37	69	6	11	20	26	13	19	7	8.5	50	155
18	32	67	6	11	23	29	15	24	9	11	28	73
19	23	47	6	11	12	15	13	22	21	29	26	72
20	20	39	7	12	16	19	11	18	22	32	28	76
21	16	30	8	14	9	12	10	15	27	41	28	75
22	14	26	9	16	18	25	16	23	27	42	39	116
23	10	18	10	19	21	29	15	21	31	49	81	286
24	9	16	10	19	19	26	13	17	22	34	45	142
25	9	16	8	15	15	19	13	17	21	32	27	77
26	8	14	6	11	13	15	14	19	21	33	53	176
27	7	12	7	12	18	19	15	22	16	26	76	285
28	6	10	6	10	16	17	17	23	12	19	160	661
29	6	10	9	16	14	15	18	27	---	---	65	249
30	6	10	8	14	22	27	19	32	---	---	30	99
31	6	10	---	---	19	26	21	39	---	---	31	101
TOTAL	---	707	---	463.9	---	670	---	603.4	---	585.5	---	13479
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	22	68	12	63	7	31	9	27	8	15	18	45
2	16	48	12	63	10	44	6	18	10	21	20	48
3	15	43	13	71	10	49	5	14	11	23	22	51
4	14	38	14	79	8	41	4	10	9	17	24	55
5	15	40	17	98	9	48	3	7.4	7	13	21	48
6	133	689	21	126	13	73	4	9.5	7	12	18	40
7	734	6800	31	208	14	84	4	9.0	6	10	18	39
8	650	6110	65	542	11	69	4	8.6	6	9.9	18	40
9	230	1430	93	886	10	62	4	8.0	4	6.5	16	35
10	65	318	90	892	19	122	2	3.9	4	6.4	13	29
11	43	188	205	2420	15	100	3	5.7	5	7.8	10	22
12	36	150	150	1810	10	62	3	5.5	6	9.0	9	20
13	34	144	83	883	9	52	8	17	6	8.9	10	22
14	35	156	54	503	9	49	11	27	4	6.0	10	22
15	42	198	40	333	8	45	11	25	3	4.4	10	22
16	45	234	32	245	31	222	11	25	3	4.3	12	26
17	46	257	27	194	31	224	13	32	3	4.3	11	23
18	34	185	25	175	18	114	12	31	3	4.2	11	24
19	28	149	24	171	9	50	11	26	4	5.4	12	27
20	42	247	19	129	7	36	12	27	5	6.5	12	27
21	73	495	16	100	6	30	11	24	4	5.3	12	26
22	112	871	18	107	5	23	13	28	4	5.6	13	28
23	134	1160	15	87	5	21	13	27	7	10	14	30
24	92	782	12	69	5	20	12	24	15	28	14	29
25	55	423	10	55	6	23	11	22	25	60	14	28
26	43	307	10	52	4	14	12	25	20	48	12	24
27	32	213	11	54	4	14	14	30	19	46	10	20
28	25	158	10	48	5	17	11	23	16	39	8	15
29	20	117	9	45	10	33	11	22	14	33	7	13
30	15	82	7	34	8	25	11	22	13	30	6	11
31	---	---	6	28	---	---	9	17	13	30	---	---
TOTAL	---	22100	---	10570	---	1797	---	600.6	---	529.5	---	889

TOTAL LOAD FOR YEAR 52994.9 TONS

12335500 NEVADA CREEK ABOVE RESERVOIR, NEAR FINN, MT

LOCATION.--Lat 46°46'42", long 112°46'00", in SW1/4NW1/4SW1/4 sec.20, T.12 N., R.9 W., Powell County, Hydrologic Unit 17010203, on right bank 0.7 mi upstream from Nevada Lake, 1.1 mi downstream from Gallagher Creek, 4.0 mi west of Finn, and 11 mi southeast of Helmville.

DRAINAGE AREA.--116 mi^2.

PERIOD OF RECORD.--April 1939 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 4,640 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to Apr. 30, 1942, nonrecording gage at site 0.1 mi revised, downstream at different datum. Apr. 30, 1942 to July 26, 1953, water-stage recorder at site 0.2 mi downstream at different datum. July 26, 1953, to Nov. 6, 1978, water-stage recorder at site 0.8 mi upstream at different datum.

REMARKS.--Estimated daily discharges: Nov. 10 to Apr. 5. Records good except those for estimated daily discharges which are poor. Diversions for irrigation of about 2,900 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--50 years, 37.1 ft^3/s, 26,880 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,800 ft^3/s, June 2, 1953, gage height, 6.00 ft, site and datum then in use, from rating curve extended above 400 ft^3/s on basis of inflow-outflow study of Nevada Lake; maximum gage height, 7.40 ft, May 29, 1953, site and datum then in use, backwater from diversion dam; minimum discharge, probably less than 2.0 ft^3/s at times in 1944, 1957, 1972-73, 1989.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 290 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Apr. 7	1900	*1,240	*4.68	No other peak greater than base discharge.			

Minimum daily discharge, 3.5 ft^3/s, Feb. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.2	5.7	e6.6	e5.8	e5.4	e5.0	e16	39	42	26	26	24
2	5.2	6.1	e6.0	e6.2	e4.5	e4.8	e15	40	44	24	27	20
3	4.8	6.1	e5.6	e6.4	e3.8	e4.6	e15	47	48	21	20	18
4	4.3	6.1	e5.4	e6.4	e3.5	e4.5	e15	56	48	20	18	17
5	4.9	5.7	e5.4	e6.2	e3.7	e4.4	e60	49	49	18	17	16
6	4.7	6.3	e6.2	e5.4	e3.8	e4.8	527	58	44	17	15	15
7	4.4	6.3	e6.0	e4.6	e4.0	e5.5	797	104	46	15	14	14
8	4.6	6.0	e5.8	e4.2	e4.1	e6.5	253	165	46	13	14	14
9	4.6	6.0	e6.2	e4.8	e4.2	e10	98	167	55	12	15	14
10	4.4	e5.4	e6.8	e5.2	e4.5	e20	74	161	58	13	15	13
11	4.4	e5.6	e7.4	e5.4	e4.7	e30	73	200	52	13	14	14
12	4.6	e5.6	e8.8	e5.6	e5.0	e25	80	171	44	12	14	14
13	4.5	e5.6	e11	e5.8	e5.0	e20	86	130	39	17	17	14
14	4.2	e5.6	e8.0	e5.8	e4.5	e17	83	102	34	14	16	14
15	4.3	e5.2	e5.6	e6.2	e4.3	e15	86	89	46	14	22	12
16	5.3	e5.2	e5.2	e6.5	e4.2	e13	95	79	71	19	22	12
17	18	e5.4	e5.0	e7.0	e4.1	e12	79	74	47	19	16	13
18	9.6	e5.4	e4.9	e7.4	e4.2	e10	74	93	42	15	14	16
19	8.4	e5.4	e4.9	e7.2	e4.5	e9.0	72	91	36	15	13	16
20	7.4	e5.4	e4.9	e7.0	e4.7	e9.0	94	76	34	14	13	15
21	6.7	e5.6	e4.9	e6.4	e5.0	e10	123	66	33	15	15	12
22	6.3	e6.0	e4.9	e6.0	e5.4	e11	147	60	31	17	15	11
23	5.7	e6.0	e4.8	e5.6	e5.6	e11	155	56	31	15	33	11
24	5.7	e5.6	e4.5	e5.2	e6.0	e10	124	63	32	17	43	11
25	5.7	e5.0	e4.3	e5.0	e6.0	e12	99	60	30	15	30	11
26	5.6	e4.7	e4.0	e5.2	e5.8	e15	77	56	30	16	26	11
27	5.3	e4.9	e4.2	e5.4	e5.4	e18	66	50	32	18	30	11
28	5.4	e5.8	e4.5	e6.0	e5.2	e20	60	55	31	17	36	10
29	5.4	e6.8	e4.7	e7.0	---	e18	49	61	37	16	26	10
30	5.6	e7.4	e5.2	e7.8	---	e17	42	52	28	20	23	12
31	5.8	---	e5.6	e7.0	---	e16	---	45	---	25	27	---
TOTAL	181.0	171.9	177.3	185.7	131.1	388.1	3634	2615	1240	522	646	415
MEAN	5.84	5.73	5.72	5.99	4.68	12.5	121	84.4	41.3	16.8	20.8	13.8
MAX	18	7.4	11	7.8	6.0	30	797	200	71	26	43	24
MIN	4.2	4.7	4.0	4.2	3.5	4.4	15	39	28	12	13	10
AC-FT	359	341	352	368	260	770	7210	5190	2460	1040	1280	823

CAL YR 1988 TOTAL 4336.7 MEAN 11.8 MAX 86 MIN 2.7 AC-FT 8600
WTR YR 1989 TOTAL 10307.1 MEAN 28.2 MAX 797 MIN 3.5 AC-FT 20440

e Estimated

PEND OREILLE RIVER BASIN

12339450 CLEARWATER RIVER NEAR CLEARWATER, MT

LOCATION.--Lat 47°01'09", long 113°23'12", in NW1/4NW1/4NW1/4 sec.33, T.15 N., R.14 W., Missoula County, Hydrologic Unit 17010203, Clearwater State Forest, on left bank 700 ft upstream from Blanchard Lake, 1.3 mi northwest of Clearwater, and at mile 5.2.

DRAINAGE AREA.--345 mi^2.

PERIOD OF RECORD.--October 1974 to current year.

GAGE.--Water-stage recorder. Datum of gage is 3,814.23 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Dec. 25-29, Jan. 5-14,20, Jan. 23 to Mar. 9. Records good except those for estimated daily discharges, which are poor. A few minor diversions for irrigation upstream from station. During summer months Elbow Lake, 1.5 mi upstream, may be regulated for recreational purposes. Several observations of water temperture and specific conductance were made during the year.

AVERAGE DISCHARGE.--15 years, 283 ft^3/s, 11.14 in/yr, 205,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,900 ft^3/s, May 17, 1975, gage height, 7.85 ft; maximum gage height, 7.87 ft, Apr. 24, 1989; minimum discharge, 16 ft^3/s, Sept. 7-19, 21, 1988, gage height, 3.56 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,790 ft^3/s, Apr. 24, gage height, 7.87 ft; minimum, 23 ft^3/s, Oct. 1, gage height, 3.66 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	94	109	97	e80	e64	171	1550	694	392	134	141
2	25	94	104	98	e72	e62	187	1490	712	371	132	140
3	25	94	99	99	e66	e62	192	1490	771	326	127	135
4	25	94	94	97	e62	e62	193	1550	860	327	123	130
5	25	94	90	e95	e60	e62	201	1650	931	310	119	122
6	26	96	88	e94	e60	e64	229	1740	996	293	114	114
7	26	97	89	e92	e62	e68	276	1870	1070	277	99	108
8	26	99	87	e92	e64	e72	382	2100	1140	261	93	100
9	27	100	88	e92	e64	e78	535	2280	1180	245	95	95
10	28	101	87	e94	e66	87	667	2310	1230	234	94	92
11	28	102	87	e95	e66	91	741	2400	1310	224	92	89
12	28	104	86	e96	e68	95	767	2410	1290	217	91	86
13	29	112	91	e98	e70	101	783	2150	1220	222	89	84
14	28	136	96	e100	e70	108	850	1860	1160	225	87	82
15	29	161	98	102	e71	113	973	1610	1110	223	86	80
16	33	173	95	101	e71	121	1190	1420	1100	227	83	79
17	45	171	89	101	e70	125	1420	1310	1040	238	82	78
18	74	162	87	103	e68	147	1560	1250	935	244	81	81
19	113	152	87	103	e68	137	1590	1220	826	242	79	84
20	139	142	88	e96	e66	138	1700	1150	730	232	80	85
21	151	135	90	98	e66	138	2020	1050	658	223	78	86
22	154	129	93	99	e66	139	2400	933	591	215	78	86
23	149	131	94	e98	e66	140	2720	861	542	204	81	84
24	138	128	95	e94	e66	138	2740	833	500	190	89	83
25	129	124	e95	e90	e68	139	2530	826	467	176	105	83
26	121	122	e90	e85	e68	141	2340	799	437	164	120	83
27	114	117	e85	e84	e68	144	2160	744	424	158	134	83
28	107	114	e85	e82	e66	149	2000	710	416	151	147	82
29	103	114	e86	e82	---	155	1810	713	405	144	154	81
30	98	112	91	e82	---	159	1670	715	401	135	148	80
31	95	---	95	e82	---	163	---	704	---	132	145	---
TOTAL	2161	3604	2838	2921	1878	3462	36997	43698	25146	7222	3259	2836
MEAN	69.7	120	91.5	94.2	67.1	112	1233	1410	838	233	105	94.5
MAX	154	173	109	103	80	163	2740	2410	1310	392	154	141
MIN	23	94	85	82	60	62	171	704	401	132	78	78
AC-FT	4290	7150	5630	5790	3730	6870	73380	86670	49880	14320	6460	5630

CAL YR 1988 TOTAL 65190 MEAN 178 MAX 1210 MIN 16 AC-FT 129300
WTR YR 1989 TOTAL 136022 MEAN 373 MAX 2740 MIN 23 AC-FT 269800

e Estimated

PEND OREILLE RIVER BASIN

12340000 BLACKFOOT RIVER NEAR BONNER, MT

LOCATION.--Lat 46°53'59", long 113°45'20", in SE1/4SE1/4W1/4 sec.9, T.13 N., R.17 W., Missoula County, Hydrologic Unit 17010203, Lolo National Forest, on right bank 5.0 mi downstream from Union Creek, 5.6 mi northeast of Bonner, and at mile 7.9.

DRAINAGE AREA.--2,290 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July to November 1898, March 1899 to September 1901, May 1903 to January 1905, March to October 1905, October 1939 to current year. Monthly discharge only for some periods, published in WSP 1316. Published as "at Bonner" 1898-99 and as Big Blackfoot near Bonner 1903-05.

REVISED RECORDS.--WSP 1216: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,344.76 ft above National Geodetic Vertical Datum of 1929. July 7, 1898 to June 30, 1901, and May 15, 1903, to Oct. 31, 1905, nonrecording gage at site 7 mi downstream at different datum. Oct. 4, 1939, to Sept. 30, 1955, nonrecording gage at site 1.3 mi downstream at datum 21.82 ft lower.

REMARKS.--Estimated daily discharges: Dec. 3-7, Dec. 18 to Mar. 11. Water-discharge records good except those for estimated daily discharges, which are poor. Diversions for irrigation of about 20,000 acres upstream from station.

AVERAGE DISCHARGE.--53 years (water years 1900-01, 1904, 1940-89), 1,601 ft^3/s, 9.49 in/yr, 1,160,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,200 ft^3/s, June 10, 1964, gage height, 10.89 ft; minimum, 156 ft^3/s, Feb. 2, 1989, gage height, 1.20 ft, but may have been less during water year 1989 period of ice effect.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 10,300 ft^3/s, May 11, gage height, 8.38 ft; minimum, 156 ft^3/s, Feb. 2, gage height, 1.20 ft, but may have been less during period of ice effect.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	375	483	501	e410	e300	e450	971	4210	3470	2170	991	1110
2	373	485	476	e420	e280	e420	920	4260	3680	2080	1130	1100
3	369	502	e465	e430	e260	e420	864	4500	4140	1990	1140	1060
4	369	517	e460	e410	e250	e430	829	4850	4480	1860	1110	1020
5	369	517	e460	e390	e260	e440	874	5150	4830	1780	1050	989
6	369	519	e480	e380	e280	e450	1290	5630	5200	1670	999	959
7	369	523	e490	e360	e300	e470	2510	6700	5560	1600	961	935
8	369	529	499	e360	e320	e490	3280	8090	5700	1530	918	915
9	369	529	501	e380	e350	e520	2730	8590	5750	1460	900	903
10	368	528	501	e390	e380	e550	2350	8850	5840	1410	896	903
11	368	527	494	e390	e400	e580	2260	9880	5950	1380	888	899
12	365	534	505	e380	e420	638	2250	9600	5550	1340	849	887
13	364	534	569	e380	e410	839	2400	8370	5160	1420	867	874
14	364	555	581	e380	e400	969	2650	7160	4960	1600	925	855
15	370	569	521	e400	e390	855	3090	6210	4810	1500	920	832
16	402	585	498	e420	e390	776	3770	5670	4930	1450	890	804
17	456	595	483	e450	e390	620	4080	5430	4730	1470	870	810
18	501	590	e470	e500	e400	524	4060	5380	4280	1450	845	813
19	548	575	e470	e505	e430	591	4180	5330	3920	1370	816	808
20	553	565	e460	e500	e450	618	4860	4960	3670	1310	797	798
21	553	559	e480	e460	e480	609	6040	4620	3440	1260	792	784
22	550	559	e480	e430	e490	659	7410	4310	3150	1210	794	769
23	542	584	e460	e410	e490	704	8000	4210	2920	1130	808	757
24	538	582	e440	e400	e480	727	7590	4300	2770	1110	899	747
25	525	566	e420	e420	e480	736	6690	4220	2630	1060	1000	739
26	515	555	e400	e450	e500	750	6040	4000	2550	1060	1140	731
27	510	516	e400	e450	e500	827	5520	3780	2470	1080	1150	721
28	512	537	e410	e430	e480	1030	5110	3750	2400	1070	1190	713
29	496	537	e420	e470	---	1140	4700	3760	2310	1010	1200	706
30	489	527	e420	e530	---	1090	4380	3630	2230	968	1150	701
31	485	---	e420	e600	---	1050	---	3510	---	951	1120	---
TOTAL	13705	16283	14634	13285	10960	20972	111698	172910	123480	43749	30005	25642
MEAN	442	543	472	429	391	677	3723	5578	4116	1411	968	855
MAX	553	595	581	600	500	1140	8000	9880	5950	2170	1200	1110
MIN	364	483	400	360	250	420	829	3510	2230	951	792	701
AC-FT	27180	32300	29030	26350	21740	41600	221600	343000	244900	86780	59510	50860

CAL YR 1988 TOTAL 295309 MEAN 807 MAX 3600 MIN 280 AC-FT 585700
WTR YR 1989 TOTAL 597323 MEAN 1637 MAX 9880 MIN 250 AC-FT 1185000

PEND OREILLE RIVER BASIN

12340000 BLACKFOOT RIVER NEAR BONNER, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1956-59, 1985 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: October 1955 to September 1959.
SUSPENDED-SEDIMENT DISCHARGE: July 1986 to April 1987, June 1988 to current year.

REMARKS.--Unpublished records of once-daily water temperatures are available in files of District office.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE (water years 1956-59): Maximum, 21.0°C, Jul. 23-25, 30, 1956; minimum, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATION: Maximum daily mean, 243 mg/L, May 11, 1989; minimum daily mean, 1 mg/L on many days.
SEDIMENT LOAD: Maximum daily, 6,480 tons, May 11, 1989; minimum daily, 0.70 ton, Feb. 5, 1989.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATION: Maximum daily mean, 243 mg/L, May 11; minimum daily mean, 1 mg/L, on several days in winter period.
SEDIMENT LOAD: Maximum daily, 6,480 tons, May 11; minimum daily, 0.70 ton, Feb. 5.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	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										
07...	1430	523	100	3	--	5.0	6.5	4	5.6	73
DEC										
20...	0930	454	100	3	258	-7.0	0.5	5	6.1	75
JAN										
30...	1315	530	80	1	240	10.0	3.0	6	8.6	82
MAR										
13...	1330	822	100	54	227	2.0	1.0	20	44	72
APR										
07...	0935	2370	100	2	190	13.0	5.0	104	665	82
21...	0900	5990	50	1	150	10.5	7.0	86	1390	60
MAY										
03...	0930	4460	100	10	161	10.5	7.0	--	--	--
08...	0900	8060	50	1	145	13.0	8.5	116	2520	62
11...	1710	10300	60	1	140	12.0	8.0	271	7540	67
12...	0945	9760	--	--	--	--	7.0	176	4640	--
JUN										
05...	1415	4960	--	0	175	26.0	14.0	31	415	71
09...	1500	5880	30	1	150	22.0	13.0	48	762	74
JUL										
18...	1530	1430	10	1	231	24.0	20.5	4	15	80
AUG										
16...	1500	885	60	1	250	18.5	17.0	5	12	77
SEP										
18...	1415	816	90	61	--	18.0	13.5	2	4.4	78
28...	1600	731	--	--	253	23.0	16.0	--	--	--

DATE	TIME	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS-SOLVED (UG/L AS AS) (01000)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD) (01027)	CADMIUM DIS-SOLVED (UG/L AS CD) (01025)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU) (01042)
APR										
07...	0935	7.7	92	23	8.3	2	1	<1	<1	21
21...	0900	7.7	83	22	6.9	1	<1	<1	<1	29
MAY										
08...	0900	7.8	73	19	6.2	1	<1	<1	2	18
11...	1710	7.8	75	20	6.2	2	1	<1	<1	19
JUN										
09...	1500	8.1	73	19	6.3	<1	<1	<1	<1	15
AUG										
16...	1500	8.5	140	35	12	1	2	<1	<1	7

PEND OREILLE RIVER BASIN

12340000 BLACKFOOT RIVER NEAR BONNER, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	COPPER, DIS-SOLVED (UG/L AS CU) (01040)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE) (01045)	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, TOTAL RECOV-ERABLE (UG/L AS MN) (01055)	MANGA-NESE, DIS-SOLVED (UG/L AS MN) (01056)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN) (01092)	ZINC, DIS-SOLVED (UG/L AS ZN) (01090)
APR									
07...	2	2400	66	<5	<5	150	11	50	15
21...	5	1700	50	14	<5	90	4	60	10
MAY									
08...	3	1600	28	15	2	90	5	20	3
11...	6	3600	42	7	3	180	6	50	7
JUN									
09...	2	820	16	4	<1	40	4	10	<3
AUG									
16...	4	80	7	1	<1	10	2	<10	3

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	4	4.1	2	2.6	3	4.1	8	8.9	17	14	4	4.9
2	2	2.0	2	2.6	2	2.6	4	4.5	15	11	1	1.1
3	2	2.0	6	8.1	10	13	4	4.6	12	8.4	4	4.5
4	2	2.0	18	25	5	6.2	4	4.4	2	1.4	4	4.6
5	4	4.0	8	11	5	6.2	4	4.2	1	.70	4	4.8
6	9	9.0	8	11	2	2.6	4	4.1	1	.76	5	6.1
7	4	4.0	5	7.1	4	5.3	4	3.9	2	1.6	6	7.6
8	2	2.0	1	1.4	2	2.7	4	3.9	3	2.6	5	6.6
9	2	2.0	2	2.9	4	5.4	3	3.1	2	1.9	4	5.6
10	2	2.0	1	1.4	3	4.1	3	3.2	1	1.0	4	5.9
11	2	2.0	1	1.4	1	1.3	2	2.1	3	3.2	8	13
12	2	2.0	2	2.9	2	2.7	4	4.1	8	9.1	12	21
13	2	2.0	2	2.9	2	3.1	3	3.1	5	5.5	19	43
14	4	3.9	2	3.0	2	3.1	2	2.1	3	3.2	20	52
15	2	2.0	2	3.1	1	1.4	2	2.2	3	3.2	14	32
16	6	6.5	3	4.7	8	11	4	4.5	2	2.1	8	17
17	7	8.6	3	4.8	13	17	4	4.9	4	4.2	10	17
18	4	5.4	4	6.4	4	5.1	4	5.4	4	4.3	4	5.7
19	3	4.4	2	3.1	5	6.3	3	4.1	3	3.5	3	4.8
20	4	6.0	2	3.1	3	3.7	3	4.1	3	3.6	3	5.0
21	4	6.0	2	3.0	1	1.3	3	3.7	7	9.1	5	8.2
22	3	4.5	2	3.0	1	1.3	3	3.5	6	7.9	9	16
23	2	2.9	6	9.5	1	1.2	4	4.4	6	7.9	13	25
24	3	4.4	6	9.4	2	2.4	7	7.6	4	5.2	15	29
25	5	7.1	2	3.1	5	5.7	8	9.1	4	5.2	12	24
26	4	5.6	8	12	10	11	6	7.3	4	5.4	12	24
27	3	4.1	6	8.4	4	4.3	9	11	6	8.1	13	29
28	6	8.3	2	2.9	1	1.1	5	5.8	5	6.5	23	64
29	2	2.7	1	1.4	2	2.3	4	5.1	---	---	26	80
30	2	2.6	1	1.4	6	6.8	7	10	---	---	22	65
31	5	6.5	---	---	8	9.1	21	34	---	---	21	60
TOTAL	---	130.6	---	162.6	---	153.4	---	182.9	---	140.56	---	686.4

PEND OREILLE RIVER BASIN

12340000 BLACKFOOT RIVER NEAR BONNER, MT--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	15	39	14	159	10	94	5	29	9	24	6	18
2	13	32	14	161	13	129	6	34	89	272	7	21
3	9	21	14	170	19	212	10	54	77	237	5	14
4	7	16	19	249	21	254	5	25	33	99	5	14
5	8	19	28	389	27	352	8	38	15	43	6	16
6	40	139	38	578	39	548	6	27	10	27	6	16
7	150	1020	74	1340	49	736	4	17	10	26	6	15
8	200	1770	135	2950	51	785	5	21	7	17	5	12
9	80	590	142	3290	50	776	4	16	8	19	5	12
10	27	171	170	4060	51	804	3	11	9	22	4	9.8
11	21	128	243	6480	48	771	3	11	5	12	3	7.3
12	15	91	175	4540	41	614	5	18	5	11	3	7.2
13	16	104	110	2490	35	488	6	23	5	12	3	7.1
14	17	122	78	1510	26	348	7	30	4	10	3	6.9
15	26	217	61	1020	20	260	8	32	4	9.9	3	6.7
16	42	428	46	704	23	306	6	23	4	9.6	3	6.5
17	31	341	35	513	29	370	7	28	4	9.4	4	8.7
18	22	241	33	479	24	277	8	31	3	6.8	2	4.4
19	27	305	30	432	17	180	6	22	3	6.6	2	4.4
20	56	735	26	348	13	129	4	14	3	6.5	3	6.5
21	106	1730	22	274	10	93	5	17	3	6.4	2	4.2
22	150	3000	22	256	11	94	4	13	3	6.4	2	4.2
23	128	2760	20	227	9	71	5	15	4	8.7	2	4.1
24	76	1560	19	221	10	75	4	12	4	9.7	2	4.0
25	48	867	17	194	10	71	3	8.6	7	19	2	4.0
26	50	815	14	151	7	48	8	23	10	31	2	3.9
27	30	447	14	143	6	40	13	38	12	37	2	3.9
28	20	276	14	142	6	39	7	20	11	35	2	3.9
29	18	228	14	142	6	37	5	14	8	26	2	3.8
30	16	189	10	98	5	30	6	16	7	22	2	3.8
31	---	---	9	85	---	---	5	13	6	18	---	---
TOTAL	---	18401	---	33795	---	9031	---	693.6	---	1099.0	---	253.3

TOTAL LOAD FOR YEAR: 64729.36 TONS.

PEND OREILLE RIVER BASIN

12340500 CLARK FORK ABOVE MISSOULA, MT

LOCATION.--Lat 46°52'38", long 113°55'53", in NW1/4NW1/4NW1/4 sec.19, T.13 N., R.18 W., Missoula County, Hydrologic Unit 17010204, on right bank 0.2 mi downstream from county road bridge, 2.8 mi east of Missoula, 2.8 mi downstream from Milltown Dam, 3.0 mi downstream from Blackfoot River, and at mile 361.6.

DRAINAGE AREA.--5,999 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1929 to current year. Monthly discharge only for some period, published in WSP 1316.

REVISED RECORDS.--WSP 1042: 1936. WSP 1152: 1942. WSP 1246: 1929-30, 1935, drainage area. WSP 1316: 1932-33.

GAGE.--Water-stage recorder. Datum of gage is 3,198.30 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to May 27, 1929, nonrecording gage.

REMARKS.--Estimated daily discharges: Dec. 3-8, Dec. 17 to Jan. 26, Feb. 1-26. Water-discharge records good except those for estimated daily discharges, which are poor. Diurnal fluctuation caused by powerplant at Milltown. Diversions for irrigation of about 120,000 acres upstream from station.

AVERAGE DISCHARGE.--60 years, 2,982 ft^3/s, 2,160,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 32,300 ft^3/s, June 21, 1975, gage height, 13.75 ft; minimum, 115 ft^3/s, Oct. 25, 1943, gage height, 0.64 ft, powerplant shutdown; minimum daily, 340 ft^3/s, Sept. 27, 1937.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1908 reached a discharge of 48,000 ft^3/s, provided by The Montana Power Company.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 15,300 ft^3/s, May 11, gage height, 9.27 ft; minimum daily, 500 ft^3/s, Feb. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	892	1120	1130	e900	e800	925	2090	6090	5070	3310	1690	1960
2	891	1130	997	e920	e600	851	1990	6080	5230	3170	1880	1940
3	883	1160	e960	e940	e540	855	1890	6410	5850	3020	1920	1870
4	879	1190	e920	e900	e500	871	1810	6830	6340	2800	1850	1820
5	874	1180	e940	e860	e520	929	1800	7160	6800	2660	1740	1780
6	882	1180	e980	e840	e560	1020	2430	7730	7200	2540	1670	1750
7	879	1190	e1050	e820	e600	1160	5380	8950	7710	2410	1600	1700
8	879	1200	e1120	e800	e660	1200	6670	10900	7960	2310	1540	1660
9	874	1200	1160	e820	e720	1470	5100	11900	7990	2190	1520	1670
10	915	1200	1170	e860	e800	1730	4110	12300	8150	2130	1510	1670
11	909	1190	1150	e840	e860	3950	3820	13700	8470	2080	1480	1670
12	887	1200	1160	e830	e920	3670	3710	14300	7870	2000	1410	1660
13	892	1200	1230	e820	e920	3650	3820	12400	7320	2160	1410	1660
14	901	1200	1300	e830	e900	3150	4140	10700	6980	2450	1460	1650
15	909	1220	1200	e850	e860	2440	4680	9390	6870	2360	1490	1590
16	945	1210	1040	e900	e840	2140	5520	8570	7480	2290	1460	1560
17	1100	1240	e980	e1000	e840	1720	6090	8180	7470	2350	1420	1560
18	1220	1260	e940	e1050	e900	1510	6010	8020	6700	2410	1390	1570
19	1270	1250	e900	e1100	e940	1540	6030	8030	6000	2260	1330	1630
20	1240	1220	e900	e1050	e1000	1660	6830	7520	5630	2140	1300	1590
21	1230	1220	e940	e1000	e1040	1580	8330	6960	5320	2050	1180	1560
22	1210	1220	e1000	e950	e1080	1700	10000	6510	4940	2030	1130	1540
23	1190	1280	e1050	e900	e1100	1950	11000	6350	4570	1920	1260	1510
24	1170	1300	e1000	e880	e1080	1880	10700	6420	4280	1860	1380	1490
25	1160	1260	e950	e900	e1040	1760	9590	6290	4040	1820	1810	1490
26	1150	1230	e900	e950	e1060	1890	8700	5950	3890	1800	1950	1520
27	1130	1180	e860	982	1090	2150	7980	5610	3760	1890	1970	1450
28	1130	1150	e880	1000	1040	2490	7450	5490	3620	1860	2000	1410
29	1120	1210	e900	1030	---	2540	6860	5610	3530	1780	2020	1370
30	1120	1190	e920	1130	---	2300	6370	5480	3430	1700	1930	1360
31	1140	---	e920	1240	---	2200	---	5250	---	1670	1930	---
TOTAL	31871	36180	31547	28892	23810	58881	170900	251080	180470	69420	49630	48660
MEAN	1028	1206	1018	932	850	1899	5697	8099	6016	2239	1601	1622
MAX	1270	1300	1300	1240	1100	3950	11000	14300	8470	3310	2020	1960
MIN	874	1120	860	800	500	851	1800	5250	3430	1670	1130	1360
AC-FT	63220	71760	62570	57310	47230	116800	339000	498000	358000	137700	98440	96520

CAL YR 1988 TOTAL 572516 MEAN 1564 MAX 6000 MIN 558 AC-FT 1136000
WTR YR 1989 TOTAL 981341 MEAN 2689 MAX 14300 MIN 500 AC-FT 1946000

e Estimated

PEND OREILLE RIVER BASIN

12340500 CLARK FORK ABOVE MISSOULA, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969-71, 1977-83, 1986 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: June 1977 to September 1983.
SUSPENDED-SEDIMENT DISCHARGE: July 1986 to April 1987, June 1988 to current year.

REMARKS.--Unpublished records of once daily water temperatures are available in files of District office.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE (water years 1977-83): Maximum, 22.5°C, Aug.7, 8, 1983; minimum, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATION: Maximum daily mean, 370 mg/L, Feb. 1, 1987; minimum daily mean, 2 mg/L, Sep. 19, 1988, Feb. 7, 8, 1989.
SEDIMENT LOAD: Maximum daily, 7,180 tons, May 11, 1989; minimum daily, 3.2 tons, Feb. 7, 1989.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATION: Maximum daily mean, 285 mg/L, Apr. 8; minimum daily mean, 2 mg/L, Feb. 7, 8.
SEDIMENT LOAD: Maximum daily, 7,180 tons, May 11; minimum daily, 3.2 tons, Feb. 7.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	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										
09...	1245	1210	80	3	--	6.0	5.0	5	16	93
DEC										
22...	0845	1040	80	1	365	-5.0	0.5	6	17	76
JAN										
31...	0845	1260	--	--	348	5.0	2.0	6	20	79
MAR										
08...	0915	1140	--	--	--	--	1.5	5	15	--
14...	0915	3150	100	10	308	4.0	2.0	80	680	91
29...	1245	2560	--	--	--	--	--	32	221	--
APR										
07...	1135	6170	--	--	230	--	--	297	4950	--
MAY										
03...	1100	6350	100	10	191	10.5	9.0	--	--	--
11...	1945	14500	--	--	145	--	--	196	7670	--
12...	0830	15100	--	0	--	7.0	7.0	157	6400	62
JUN										
06...	1300	7000	0	0	177	28.0	14.0	29	548	66
JUL										
19...	0830	2290	0	0	275	17.0	17.5	6	37	97
SEP										
14...	1645	1650	0	0	--	28.0	12.0	5	22	83
27...	1255	1420	--	--	332	21.0	15.0	--	--	--

PEND OREILLE RIVER BASIN

12340500 CLARK FORK ABOVE MISSOULA, MT--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	8	19	6	18	7	21	17	41	21	45	3	7.5
2	6	14	5	15	3	8.1	14	35	29	47	3	6.9
3	5	12	5	16	3	7.8	12	30	19	28	5	12
4	6	14	5	16	5	12	10	24	10	13	6	14
5	6	14	6	19	7	18	8	19	13	18	5	13
6	5	12	10	32	7	19	7	16	7	11	4	11
7	6	14	29	93	8	23	7	15	2	3.2	5	16
8	5	12	8	26	7	21	7	15	2	3.6	7	23
9	5	12	4	13	5	16	11	24	3	5.8	16	64
10	6	15	3	9.7	4	13	7	16	5	11	37	173
11	6	15	3	9.6	6	19	9	20	11	26	260	2770
12	7	17	3	9.7	7	22	6	13	12	30	182	1800
13	35	84	3	9.7	8	27	4	8.9	5	12	145	1430
14	27	66	3	9.7	9	32	5	11	5	12	78	663
15	8	20	4	13	6	19	7	16	5	12	40	264
16	7	18	5	16	8	22	6	15	4	9.1	26	150
17	18	53	8	27	8	21	9	24	5	11	24	111
18	13	43	7	24	6	15	8	23	4	9.7	20	82
19	12	41	3	10	6	15	5	15	4	10	13	54
20	10	33	3	9.9	12	29	7	20	5	13	13	58
21	7	23	3	9.9	6	15	4	11	6	17	12	51
22	6	20	3	9.9	6	16	6	15	8	23	15	69
23	5	16	11	38	3	8.5	8	19	8	24	28	147
24	5	16	8	28	4	11	7	17	7	20	23	117
25	5	16	5	17	6	15	6	15	7	20	16	76
26	5	16	3	10	11	27	7	18	4	11	17	87
27	4	12	5	16	7	16	7	19	4	12	28	163
28	3	9.2	3	9.3	7	17	5	13	4	11	40	269
29	3	9.1	4	13	8	19	5	14	---	---	34	233
30	4	12	6	19	14	35	6	18	---	---	27	168
31	8	25	---	---	20	50	8	27	---	---	25	148
TOTAL	---	702.3	---	566.4	---	609.4	---	586.9	---	468.4	---	9250.4
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	21	119	21	345	10	137	16	143	10	46	6	32
2	16	86	22	361	12	169	13	111	11	56	7	37
3	12	61	22	381	19	300	13	106	37	192	5	25
4	13	64	25	461	19	325	11	83	29	145	5	25
5	14	68	30	580	22	404	15	108	16	75	5	24
6	33	217	39	814	29	564	13	89	13	59	5	24
7	235	3410	67	1620	36	749	9	59	11	48	5	23
8	285	5130	131	3860	39	838	10	62	11	46	5	22
9	120	1650	135	4340	39	841	9	53	12	49	5	23
10	43	477	142	4720	44	968	7	40	12	49	4	18
11	36	371	194	7180	45	1030	7	39	12	48	3	14
12	35	351	154	5950	36	765	8	43	12	46	3	13
13	32	330	121	4050	30	593	14	82	12	46	4	18
14	28	313	87	2510	28	528	11	73	16	63	5	22
15	45	569	59	1500	25	464	10	64	14	56	5	21
16	53	790	42	972	32	646	13	80	14	55	5	21
17	40	658	35	773	34	686	10	63	16	61	5	21
18	33	535	37	801	31	561	6	39	18	68	5	21
19	33	537	37	802	29	470	8	49	17	61	5	22
20	60	1110	30	609	15	228	9	52	17	60	4	17
21	88	1980	24	451	13	187	9	50	16	51	4	17
22	107	2890	21	369	12	160	10	55	7	21	4	17
23	109	3240	21	360	12	148	10	52	5	17	4	16
24	75	2170	19	329	12	139	9	45	5	19	4	16
25	50	1290	24	408	11	120	9	44	14	68	4	16
26	40	940	16	257	10	105	11	53	8	42	6	25
27	34	733	15	227	11	112	18	92	9	48	6	23
28	28	563	15	222	12	117	12	60	7	38	6	23
29	24	445	14	212	14	133	11	53	6	33	6	22
30	21	361	12	178	13	120	13	60	6	31	6	22
31	---	---	10	142	---	---	11	50	7	36	---	---
TOTAL	---	31458	---	45784	---	12607	---	2052	---	1733	---	640

TOTAL LOAD FOR YEAR: 106457.8 TONS

PEND OREILLE RIVER BASIN

12342500 WEST FORK BITTERROOT RIVER NEAR CONNER, MT

LOCATION.--Lat 45°43'30", long 114°16'50", in SE1/4NE1/4NW1/4 sec.26, T.1 S., R.22 W., Ravalli County, Hydrologic Unit 17010205, on right bank 0.6 mi downstream from Painted Rocks Lake, 6.4 mi upstream from Nez Perce Creek, 16.1 mi southwest of Conner, and at mile 19.2.

DRAINAGE AREA.--317 mi^2.

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

REVISED RECORDS.--WSP 1246: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 4,581.4 ft above National Geodetic Vertical Datum of 1929 (U.S. Forest Service bench mark).

REMARKS.--Estimated daily discharges: Dec. 4-5,20, Dec. 23 to Jan. 18, Jan. 24-29, Feb. 1 to Mar. 7. Records good except those for estimated daily discharges, which are poor. Flow regulated by Painted Rocks Lake (station 12342000). Diversions for irrigation of about 200 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--48 years, 280 ft^3/s, 202,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,060 ft^3/s, May 9, 1947, gage height, 6.18 ft; minimum, 0.2 ft^3/s, Nov. 25, 1952; minimum daily, 0.6 ft^3/s, May 3-7, 1954.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,450 ft^3/s, May 11, gage height, 3.77 ft; minimum daily, 35 ft^3/s, Feb. 5.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	155	55	81	e52	e45	e48	44	88	516	227	265	348
2	150	55	81	e52	e40	e45	45	88	547	216	265	346
3	145	56	80	e54	e38	e44	46	88	620	207	265	342
4	139	58	e80	e54	e37	e44	47	89	667	193	265	339
5	132	59	e65	e52	e35	e45	48	88	713	183	262	336
6	122	59	52	e49	e36	e48	50	90	772	176	261	316
7	80	61	53	e45	e37	e56	52	90	831	165	261	297
8	65	62	53	e44	e38	56	55	92	854	154	261	289
9	63	60	54	e45	e39	55	57	94	850	148	261	288
10	61	59	58	e46	e39	69	59	114	823	143	260	285
11	58	58	59	e47	e40	94	61	1150	755	140	290	285
12	57	58	60	e48	e41	107	62	1310	685	137	393	281
13	56	56	65	e49	e41	124	63	1070	640	152	391	279
14	55	56	65	e49	e41	115	64	888	603	146	388	277
15	55	55	54	e48	e41	101	66	764	625	137	387	273
16	54	55	51	e49	e41	98	68	699	666	138	383	269
17	56	56	49	e50	e41	94	69	662	593	148	383	266
18	60	56	49	e52	e42	84	71	698	528	143	382	262
19	61	56	50	52	e44	87	73	693	481	133	378	259
20	62	55	e51	52	e47	77	74	647	453	126	378	256
21	62	56	52	52	e50	83	77	611	434	119	374	252
22	61	55	53	52	e50	86	80	582	399	118	374	247
23	60	55	e52	52	e52	84	82	578	377	115	371	243
24	59	56	e50	e50	e52	76	83	582	348	109	369	238
25	59	56	e46	e48	e52	88	84	569	319	103	369	234
26	59	57	e45	e48	e52	91	86	540	299	99	365	230
27	58	55	e44	e48	e52	97	86	515	284	99	363	225
28	57	67	e45	e50	e50	103	86	538	272	97	360	221
29	56	82	e47	e50	---	101	88	560	257	96	358	215
30	56	82	e49	52	---	94	88	541	242	222	355	210
31	56	---	e52	52	---	64	---	518	---	270	351	---
TOTAL	2329	1766	1745	1543	1213	2458	2014	15636	16453	4659	10388	8208
MEAN	75.1	58.9	56.3	49.8	43.3	79.3	67.1	504	548	150	335	274
MAX	155	82	81	54	52	124	88	1310	854	270	393	348
MIN	54	55	44	44	35	44	44	88	242	96	260	210
AC-FT	4620	3500	3460	3060	2410	4880	3990	31010	32630	9240	20600	16280

CAL YR 1988 TOTAL 61806 MEAN 169 MAX 992 MIN 37 AC-FT 122600
WTR YR 1989 TOTAL 68412 MEAN 187 MAX 1310 MIN 35 AC-FT 135700

e Estimated

PEND OREILLE RIVER BASIN

12344000 BITTERROOT RIVER NEAR DARBY, MT

LOCATION.--Lat 45°58'20", long 114°08'26", in SW1/4SE1/4NE1/4 sec.36, T.3 N., R.21 W., Ravalli County, Hydrologic Unit 17010205, on left bank 50 ft upstream from bridge on U.S. Highway 93, 0.3 mi downstream from Chaffin Creek, 4.1 mi southeast of Darby, and at mile 77.2.

DRAINAGE AREA.--1,049 mi^2.

PERIOD OF RECORD.--April 1937 to current year. Monthly discharge only for April 1937, published in WSP 1316.

REVISED RECORDS.--WSP 1246: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,942.14 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1987, at datum 1.00 ft higher. Prior to Aug. 2, 1939, nonrecording gage at highway bridge 45 ft upstream at same datum.

REMARKS.--Estimated daily discharges: Jan. 26,27, Jan. 31 to Feb. 12, Feb. 15, Mar. 4. Records good except those for estimated daily discharges, which are poor. Some regulation by Painted Rocks Lake (station number 12342000). Diversions for irrigation of about 5,000 acres upstream of station. Ditch bypassing station irrigates about 500 acres downstream from station. U.S. Geological Survey satellite telemeter at station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--52 years, 905 ft^3/s, 655,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,500 ft^3/s, May 9, 1947, gage height, 8.18 ft; maximum gage height, 8.42 ft, June 17, 1974, backwater from log jam; minimum discharge observed, about 71 ft^3/s, Feb. 9, 1939.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,370 ft^3/s, May 11, gage height, 5.92 ft; minimum daily, 100 ft^3/s, Feb. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	254	190	155	185	e130	168	292	898	1680	1120	494	529
2	242	191	169	184	e110	166	292	1100	2020	995	520	516
3	237	221	210	189	e100	166	276	1150	2410	969	495	507
4	237	240	181	183	e105	e170	263	1140	2390	940	474	499
5	225	226	186	182	e110	165	277	1220	2680	907	460	493
6	214	239	236	178	e115	190	374	1410	3020	833	451	481
7	198	276	236	161	e120	225	691	2130	3230	785	445	451
8	163	249	221	151	e130	233	908	2710	3130	757	439	441
9	157	238	217	173	e140	276	768	2680	3200	707	444	440
10	154	226	217	176	e145	369	654	3010	3170	648	443	434
11	154	226	211	171	e155	402	595	4230	2860	614	447	430
12	155	223	219	176	e160	443	571	3710	2680	590	552	424
13	149	205	252	176	152	484	635	3000	2610	687	566	418
14	145	215	242	175	155	455	798	2530	2520	652	558	406
15	145	189	153	172	e170	397	1020	2230	3140	589	551	396
16	163	216	135	178	145	369	1260	2170	3470	639	534	389
17	527	225	157	181	142	343	1300	2150	2600	759	524	394
18	362	216	177	181	148	317	1170	2440	2150	643	517	404
19	294	194	201	181	152	331	1300	2220	2040	568	512	401
20	285	199	214	170	150	306	1850	1960	1930	542	511	394
21	251	215	215	178	153	306	2140	1830	1670	531	519	392
22	233	221	208	182	155	326	2280	1760	1460	527	519	384
23	227	241	200	178	166	321	1870	1850	1350	482	551	379
24	217	219	172	160	168	298	1480	1830	1290	465	616	371
25	210	212	174	156	174	314	1260	1720	1260	428	609	364
26	205	199	167	e165	176	336	1140	1600	1220	402	572	359
27	199	161	159	e167	173	353	1080	1510	1210	418	555	359
28	196	216	161	163	169	370	993	1660	1230	395	548	350
29	196	216	164	179	---	368	897	1820	1190	364	537	345
30	193	173	187	184	---	344	865	1730	1170	398	533	341
31	190	---	189	e160	---	338	---	1620	---	493	548	---
TOTAL	6777	6477	5985	5395	4068	9649	29299	63018	65980	19847	16044	12491
MEAN	219	216	193	174	145	311	977	2033	2199	640	518	416
MAX	527	276	252	189	176	484	2280	4230	3470	1120	616	529
MIN	145	161	135	151	100	165	263	898	1170	364	439	341
AC-FT	13440	12850	11870	10700	8070	19140	58110	125000	130900	39370	31820	24780

CAL YR 1988 TOTAL 211354 MEAN 577 MAX 3420 MIN 90 AC-FT 419200
WTR YR 1989 TOTAL 245030 MEAN 671 MAX 4230 MIN 100 AC-FT 486000

e Estimated

PEND OREILLE RIVER BASIN

12350250 BITTERROOT RIVER AT BELL CROSSING, NEAR VICTOR, MT

LOCATION.--Lat 46°26'36", long 114°07'22", in NW1/4W1/4NE1/4 sec. 20, T.8 N., R.20 W., Ravalli County, Hydrologic Unit 17010205, on right bank 20 ft downstream from highway bridge at Bell Crossing, 1.5 mi northeast of Victor, 2.0 mi upstream from Big Creek, and at mile 38.3.

DRAINAGE AREA.--1,963 mi^2.

PERIOD OF RECORD.--April 1987 to current year (seasonal records only).

GAGE.--Water-stage recorder. Elevation of gage is 3,330 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Oct. 26-31. Seasonal records good. Some regulation by Painted Rocks Lake (station number 12342000). Diversions for irrigation of about 80,000 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,600 ft^3/s, June 16, 1989, gage height, 9.18 ft; minimum, 60 ft^3/s, July 16, 17, 1987, gage height, 2.21 ft.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 10,600 ft^3/s, June 16, gage height, 9.18 ft; minimum, 189 ft^3/s, Aug. 9, gage height, 2.73 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	349						737	1820	3060	2120	271	631
2	307						706	1960	3890	1820	293	603
3	300						692	2240	4910	1660	323	577
4	301						655	2220	5040	1580	300	564
5	294						650	2420	5760	1480	299	542
6	274						785	2870	6640	1290	292	519
7	269						1310	4530	7310	1130	294	495
8	263						2040	6380	7060	971	279	457
9	242						1940	6510	7050	860	263	436
10	235						1700	6880	7090	765	261	422
11	235						1510	9010	6500	716	284	419
12	228						1410	7640	5890	650	295	424
13	222						1450	5870	5750	611	357	410
14	216						1700	4840	5680	626	362	407
15	213						2140	4150	6990	555	357	420
16	236						2820	4050	9650	569	347	420
17	779						3180	4120	7500	810	327	413
18	998						2850	4840	5430	779	311	460
19	677						2920	4510	4700	637	301	467
20	650						4140	3750	4290	557	304	450
21	595						5040	3380	3710	543	344	415
22	530						5700	3200	3060	527	360	384
23	490						4890	3400	2600	469	421	365
24	467						3880	3510	2410	419	548	358
25	446						3190	3200	2380	379	711	363
26	e430						2720	2930	2320	301	697	357
27	e420						2550	2730	2340	275	677	341
28	e420						2370	2990	2290	280	658	335
29	e410						2060	3470	2200	250	632	341
30	e410						1880	3270	2210	212	607	405
31	e400						---	2970	---	244	644	---
TOTAL	12306						69615	125660	145710	24085	12419	13200
MEAN	397						2320	4054	4857	777	401	440
MAX	998						5700	9010	9650	2120	711	631
MIN	213						650	1820	2200	212	261	335
AC-FT	24410						138100	249200	289000	47770	24630	26180

e Estimated

PEND OREILLE RIVER BASIN

12352500 BITTERROOT RIVER NEAR MISSOULA, MT

LOCATION.--Lat 46°49'20", long 114°04'20", in SW1/4NE1/4NE1/4 sec.1, T.12 N., R.20 W., Missoula County, Hydrologic Unit 17010205, on right bank 40 ft downstream from bridge on U.S. Highway 93, 0.5 mi south of Fort Missoula, and at mile 5.7.

DRAINAGE AREA.--2,814 mi^2.

PERIOD OF RECORD.--July 1898 to November 1901, May 1903 to December 1904, July 1989 to September 1989.

GAGE.--Water-stage recorder. Elevation of gage is 3,110 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to Jan. 1, 1905, nonrecording gage at site 1.5 mi upstream at different datum.

REMARKS.--Estimated daily discharges: July 1-6. Records good. Some regulation by Painted Rocks Lake (station number 12342000). Diversions for irrigation of about 111,000 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 38,300 ft^3/s, June 20, 1899, gage height, 11.55 ft, site and datum then in use; minimum observed, 370 ft^3/s, Sept. 16-29, 1904, gage height, 1.12 ft, site and datum then in use.

EXTREMES FOR JULY TO SEPTEMBER 1989.--Maximum discharge recorded, 2,120 ft^3/s, July 6, gage height, 4.01 ft; minimum, 629 ft^3/s, Aug. 9, gage height, 2.51 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1										e3500	664	1120
2										e3100	683	1090
3										e2800	709	1050
4										e2600	718	1010
5										e2400	695	993
6										e2200	679	958
7										1970	674	928
8										1760	657	886
9										1580	643	858
10										1460	646	835
11										1350	654	824
12										1250	672	821
13										1360	701	819
14										1340	760	805
15										1270	756	786
16										1250	742	762
17										1420	721	742
18										1550	690	778
19										1410	686	809
20										1250	698	796
21										1160	722	768
22										1120	758	740
23										1080	823	723
24										992	954	705
25										906	1170	689
26										825	1220	683
27										790	1190	672
28										788	1180	658
29										763	1160	653
30										701	1100	674
31										650	1110	---
TOTAL										46595	25235	24635
MEAN										1503	814	821
MAX										3500	1220	1120
MIN										650	643	653
AC-FT										92420	50050	48860

e Estimated

PEND OREILLE RIVER BASIN

12353000 CLARK FORK BELOW MISSOULA, MT

(National stream quality accounting network station)

LOCATION.--Lat 46°52'09", long 114°07'33", in NW1/4NE1/4SE1/4 sec.21, T.13 N., R.20 W., Missoula County, Hydrologic Unit 17010204, on right bank 1.0 mi downstream from Bitterroot River, 4.5 mi west of Missoula, and at mile 348.8.

DRAINAGE AREA.--9,003 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1929 to current year.

REVISED RECORDS.--WSP 1042: 1931. WSP 1246: Drainage area. WSP 1316: 1932(M), 1935(M), 1946(M).

GAGE.--Water-stage recorder. Datum of gage is 3,083.88 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers).

REMARKS.--Estimated daily discharges: May 16 to June 5. Water-discharge records excellent except those for estimated daily discharges, which are poor. Some diurnal fluctuation at low flow caused by powerplant at Milltown 14.9 mi upstream. Diversions for irrigation of about 235,000 acres upstream from station.

AVERAGE DISCHARGE.--60 years, 5,424 ft^3/s, 3,930,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 52,800 ft^3/s, May 23, 1948, gage height, 12.08 ft; minimum, 388 ft^3/s, Jan. 18, 1933; minimum gage height, -0.05 ft, Feb. 3, 1989.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 26,300 ft^3/s, May 11, gage height, 8.32 ft; minimum, 510 ft^3/s, Feb. 3, gage height, -0.05 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1420	1760	1870	1820	1390	1480	3330	9310	e10500	6800	2400	3170
2	1450	1760	1660	1790	609	1210	3190	9290	e11000	6420	2580	3130
3	1410	1800	1650	1820	597	1210	3080	9960	e12000	5930	2690	3040
4	1400	1910	1690	1840	664	1240	2950	10500	e13000	5570	2640	2940
5	1400	1950	1640	1820	806	1460	2890	11000	e14500	5280	2510	2880
6	1390	1940	1800	1830	987	1660	3450	11900	15300	4920	2400	2820
7	1390	2040	2090	1640	1170	1900	6660	14600	16800	4560	2320	2760
8	1370	2130	2000	1250	1310	2280	9150	19300	17200	4240	2240	2650
9	1350	2100	1940	1270	1390	2670	8200	21100	17100	3950	2190	2630
10	1360	2070	1950	1530	1420	3450	6840	21500	17200	3770	2200	2600
11	1350	2040	1920	1680	1470	5120	6230	24100	17500	3610	2180	2590
12	1320	2030	1930	1640	1530	5370	5900	25300	16100	3390	2130	2570
13	1320	2030	2040	1680	1570	5180	5940	21200	15100	3600	2150	2560
14	1310	2040	2200	1680	1540	4890	6430	18000	14600	3890	2270	2540
15	1310	2020	2110	1680	1500	4150	7420	15600	14700	3780	2300	2470
16	1360	1990	1650	1720	1520	3710	9080	e14500	17800	3720	2240	2390
17	1870	2010	1440	1810	1460	3240	10600	e14000	18500	3890	2180	2370
18	2590	2050	1360	1860	1450	2870	10400	e14000	15000	4100	2110	2440
19	2480	2030	1450	1890	1490	2820	10100	e14500	12900	3850	2040	2490
20	2320	1980	1710	1820	1520	2960	11800	e14500	12000	3560	2020	2420
21	2240	1970	1840	1760	1600	2920	14700	e14000	11100	3340	1990	2360
22	2130	1970	1890	1820	1650	2990	17400	e13500	10000	3240	1890	2310
23	2030	2060	1870	1890	1680	3230	18600	e13500	8970	3100	2110	2250
24	1960	2150	1850	1700	1770	3180	17300	e13000	8280	2940	2320	2220
25	1910	2090	1600	1540	1770	3000	15200	e13000	7910	2800	3000	2190
26	1870	2030	1290	1540	1770	3070	13500	e12500	7700	2700	3240	2200
27	1840	1960	1070	1560	1770	3370	12300	e12000	7510	2760	3240	2170
28	1820	1890	1180	1590	1710	3690	11600	e11500	7280	2740	3290	2080
29	1790	1970	1300	1630	---	3830	10600	e11500	7080	2640	3270	2040
30	1780	1970	1630	1760	---	3610	9760	e11000	6940	2500	3140	2060
31	1780	---	1880	1920	---	3440	---	e11000	---	2390	3110	---
TOTAL	52320	59740	53500	52780	39113	95200	274600	450660	381570	119980	76390	75340
MEAN	1688	1991	1726	1703	1397	3071	9153	14540	12720	3870	2464	2511
MAX	2590	2150	2200	1920	1770	5370	18600	25300	18500	6800	3290	3170
MIN	1310	1760	1070	1250	597	1210	2890	9290	6940	2390	1890	2040
AC-FT	103800	118500	106100	104700	77580	188800	544700	893900	756800	238000	151500	149400

CAL YR 1988 TOTAL 1125114 MEAN 3074 MAX 14100 MIN 824 AC-FT 2232000
WTR YR 1989 TOTAL 1731193 MEAN 4743 MAX 25300 MIN 597 AC-FT 3434000

e Estimated

12353000 CLARK FORK BELOW MISSOULA, MT--Continued
(National stream quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1960-64, 1977 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1978 to September 1981.
WATER TEMPERATURE: October 1959 to September 1964, June 1977 to September 1982.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1979-81): Maximum, 351 microsiemems, Jan. 27, 1980; minimum, 119 microsiemens, Jun. 21, 1980.
WATER TEMPERATURE (water years 1960-64, 1977-1982): Maximum, 25.0°C, Aug.19, 22, 24, 1961; minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)
OCT								
26...	1100	1880	80	1	273	12.0	8.5	678
NOV								
09...	1040	2170	--	--	284	3.5	5.0	--
DEC								
20...	1345	--	--	--	311	--	--	--
JAN								
05...	1130	1840	100	71	269	0.5	1.5	675
31...	1315	--	--	--	294	--	--	--
MAR								
07...	1200	1880	90	1	285	8.0	2.0	680
16...	0945	3680	--	--	305	2.5	2.0	--
APR								
18...	1030	10400	0	0	148	8.0	6.0	687
MAY								
03...	1245	--	--	--	193	11.0	9.0	--
05...	0945	10900	--	--	183	7.0	9.0	--
JUN								
08...	1200	17000	0	0	108	23.0	13.5	680
JUL								
26...	1600	--	--	--	280	--	--	--
AUG								
22...	1100	1850	90	1	246	18.0	14.0	679
SEP								
19...	1220	--	--	--	308	14.0	12.5	--
27...	1610	2200	--	--	287	22.0	18.0	--

DATE	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)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
OCT							
26...	10.0	96	44	K13	136	0	112
JAN							
05...	12.4	100	30	27	128	0	107
MAR							
07...	12.8	104	110	340	136	0	111
APR							
18...	11.7	104	33	K22	72	0	59
JUN							
08...	9.6	103	54	39	56	0	47
AUG							
22...	9.2	100	35	31	131	3	112

PEND OREILLE RIVER BASIN

12353000 CLARK FORK BELOW MISSOULA, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	PH (STAND-ARD UNITS) (00400)	TUR-BID-ITY (NTU) (00076)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
OCT										
26...	1100	8.1	1.0	130	19	36	10	7.3	0.3	1.9
JAN										
05...	1130	8.1	1.0	120	11	32	9.2	6.7	0.3	1.8
MAR										
07...	1200	7.7	3.6	130	22	37	9.8	7.4	0.3	1.8
APR										
18...	1030	7.9	7.3	69	10	19	5.2	3.6	0.2	1.2
JUN										
08...	1200	8.0	7.5	50	3	14	3.7	2.2	0.1	0.70
AUG										
22...	1100	8.3	0.80	120	7	33	8.8	6.2	0.3	1.8

DATE	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)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)
OCT										
26...	115	28	3.2	0.20	13	157	167	0.21	797	<0.010
JAN										
05...	109	26	2.4	0.20	12	157	155	0.21	780	<0.010
MAR										
07...	110	30	2.6	0.20	13	159	170	0.22	807	<0.010
APR										
18...	61	12	1.3	0.10	11	97	89	0.13	2720	<0.010
JUN										
08...	47	6.0	0.60	0.10	8.4	90	64	0.12	4130	<0.010
AUG										
22...	112	14	4.2	0.20	12	151	148	0.21	754	<0.010

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 + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	PHOS-PHOROUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	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										
26...	<0.100	<0.010	0.050	<0.20	0.020	0.020	<0.010	9	46	87
JAN										
05...	0.140	0.050	0.040	0.40	0.020	0.020	0.010	14	70	--
MAR										
07...	0.190	0.050	0.050	0.30	0.040	0.030	0.030	14	71	66
APR										
18...	0.100	0.030	0.020	0.30	0.050	<0.010	<0.010	44	1240	53
JUN										
08...	<0.100	0.020	0.020	0.30	0.030	<0.010	0.010	49	2250	52
AUG										
22...	<0.100	0.010	0.020	<0.20	0.020	<0.010	0.010	5	25	78

DATE	TIME	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)
OCT											
26...	1100	<10	2	100	3	<1	<1	<3	4	20	<5
MAR											
07...	1200	<10	2	100	<0.5	<1	<1	<3	2	17	<5
JUN											
08...	1200	30	1	61	<0.5	<1	<1	<3	2	23	1
AUG											
22...	1100	<10	2	120	<0.5	<1	<1	<3	4	10	<1

PEND OREILLE RIVER BASIN

12353000 CLARK FORK BELOW MISSOULA, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

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)	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										
26...	12	5	<0.1	<10	<1	<1	<1.0	140	<6	7
MAR										
07...	<4	8	<0.1	<10	1	<1	<1.0	150	<6	4
JUN										
08...	<4	6	<0.1	<10	<1	<1	<1.0	50	<6	<3
AUG										
22...	7	6	<0.1	<10	<1	<1	<1.0	120	<6	7

PEND OREILLE RIVER BASIN

12353450 FISH CREEK BELOW WEST FORK NEAR TARKIO, MT.

LOCATION.--Lat 46°57'22", long 114°40'12", in NW1/4NW1/4SW1/4 sec. 20, T.14 N., R.24 W., Mineral County, Hydrologic Unit 17010204, on right bank, at bridge on county road, 5.5 miles southeast of Tarkio, 9 miles southwest of Alberton, and at mile 6.5.

DRAINAGE AREA.--242 mi^2.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: July 1985 to current year.

INSTRUMENTATION.--Temperature recorder since July 20, 1985.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: Maximum, 18.0, July 27, 1987; minimum, 0.0°C on several days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURE: Maximum, 17.5°C, July 20, 21; minimum, 0.0°C, on several days in February and March.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
JUL 26...	1700	184	0	153	30.0	15.0
AUG 30...	1025	116	1	170	16.0	9.0

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	13.0	7.0	9.5	9.0	5.5	7.0	5.0	3.0	3.5	4.0	3.0	3.5
2	12.5	6.5	9.0	8.0	7.0	7.5	4.5	2.5	3.5	4.0	3.0	3.5
3	12.0	6.5	9.0	8.0	7.0	7.5	4.5	3.0	3.5	5.0	3.5	4.0
4	12.0	6.5	8.5	8.0	6.5	7.0	4.5	2.5	3.0	5.0	3.5	4.0
5	12.0	6.0	8.5	8.0	6.5	7.0	4.5	2.5	3.5	4.5	3.5	4.0
6	11.5	6.0	8.0	7.5	6.0	7.0	4.5	4.0	4.0	4.5	3.0	3.5
7	11.5	6.0	8.0	7.0	5.5	6.0	5.0	4.0	4.0	3.0	2.0	2.5
8	11.0	6.0	8.5	6.5	5.5	6.0	4.5	4.0	4.5	3.0	2.0	2.5
9	12.0	6.5	8.5	7.0	5.5	6.0	5.0	4.5	4.5	4.0	2.5	3.0
10	11.5	6.0	8.5	6.0	4.5	5.5	5.0	4.0	4.5	4.0	3.0	3.0
11	11.5	6.0	8.5	6.0	5.5	5.5	5.0	4.0	4.5	4.5	2.5	3.0
12	11.0	6.0	8.0	5.5	4.0	5.0	6.0	5.0	5.5	4.0	2.5	3.0
13	10.5	6.5	8.5	6.0	4.5	5.0	5.5	3.5	4.5	4.0	2.5	3.0
14	9.0	7.0	8.0	6.0	4.5	5.0	4.0	3.0	3.5	3.5	2.5	3.0
15	9.0	8.0	8.5	5.0	4.0	4.5	3.5	2.0	2.5	4.0	2.5	3.0
16	10.5	8.5	9.5	5.5	4.5	5.0	3.5	2.0	2.5	5.0	3.5	4.0
17	10.5	7.0	8.5	6.0	5.0	5.0	3.5	2.0	2.0	5.0	4.0	4.5
18	7.0	5.5	6.5	6.0	5.0	5.5	3.5	2.0	2.5	6.0	4.0	4.5
19	9.0	7.0	8.0	6.0	4.5	5.0	4.0	.5	2.5	5.5	3.5	4.0
20	10.0	8.0	8.5	6.5	5.0	5.5	3.5	1.5	2.5	5.0	2.5	3.5
21	10.5	6.5	8.0	6.0	5.0	5.5	3.5	2.5	3.0	4.5	3.5	4.0
22	10.0	7.5	8.5	6.0	5.5	5.5	3.5	2.5	3.0	4.5	3.5	3.5
23	10.0	6.0	7.5	5.5	4.5	5.0	4.0	2.5	3.0	4.5	2.5	3.0
24	9.0	7.0	8.0	4.5	3.5	4.0	3.0	2.0	2.5	4.0	2.0	3.0
25	9.0	6.0	7.5	5.0	4.0	4.5	3.0	1.5	2.5	4.5	2.5	3.0
26	9.5	6.5	7.5	5.0	3.0	4.0	2.5	1.0	1.5	5.0	2.5	3.5
27	8.0	4.5	6.0	4.5	3.0	3.5	3.0	1.5	2.5	4.5	3.0	3.5
28	7.5	5.0	6.0	4.5	3.5	4.0	3.0	2.0	2.0	4.5	2.0	3.0
29	7.5	4.0	5.5	5.0	4.0	4.5	3.5	2.0	3.0	4.5	2.5	3.5
30	8.5	5.5	6.5	4.5	3.5	4.0	4.5	3.0	3.5	6.0	4.0	4.5
31	9.0	5.5	7.0	---	---	---	4.5	3.0	3.5	4.5	2.5	3.5
MONTH	13.0	4.0	8.0	9.0	3.0	5.5	6.0	.5	3.5	6.0	2.0	3.5

PEND OREILLE RIVER BASIN

12353450 FISH CREEK BELOW WEST FORK NEAR TARKIO, MT.--Continued

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

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

PEND OREILLE RIVER BASIN

12353650 CLARK FORK AT SUPERIOR, MT

LOCATION.--Lat 47°11'47", long 114°53'22", in NW1/4NW1/4NE1/4 sec.34, T.17 N., R.26 W., Mineral County, Hydrologic Unit 17010204, on left bank, at bridge on River Street in town of Superior and at mile 282.2.

DRAINAGE AREA.--10,210 mi².

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: July 1985 to current year.

INSTRUMENTATION.--Temperature recorder since July 19, 1985.

REMARKS.-- Missing record July 21-26 due to vandalism at probe.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: Maximum, 23.5°C, July 27, 29, 1987; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURE: Maximum recorded, 22.5°C, July 28, 30, 31, Aug. 1, but may have been higher during instrument malfunction; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	14.0	11.0	12.5	7.5	5.5	6.5	2.5	2.0	2.0	.5	.0	.5
2	14.5	11.5	13.0	8.0	7.0	7.5	2.0	1.0	1.5	.5	.5	.5
3	14.0	12.0	13.0	8.5	7.5	8.0	1.5	1.0	1.0	1.0	.5	.5
4	14.0	11.5	13.0	8.5	7.5	8.0	1.0	.5	1.0	1.0	.5	.5
5	14.0	11.5	12.5	8.0	7.5	8.0	1.0	.0	.5	1.0	.5	.5
6	13.0	11.0	12.0	8.0	7.5	7.5	1.5	1.0	1.0	1.5	.5	1.0
7	13.0	10.5	12.0	7.5	6.5	7.0	2.5	1.5	2.0	1.0	.0	.5
8	12.5	10.5	11.5	6.5	6.0	6.5	3.0	2.5	2.5	.0	.0	.0
9	13.0	10.5	11.5	6.5	5.5	6.0	3.0	2.5	3.0	.5	.0	.5
10	13.0	10.5	11.5	5.5	5.0	5.5	3.5	2.5	3.0	1.0	.5	.5
11	12.5	10.5	11.5	5.0	4.5	5.0	3.5	3.0	3.0	.5	.0	.5
12	12.5	10.5	11.5	5.0	4.5	4.5	4.0	3.0	3.5	.5	.0	.0
13	12.5	10.5	11.5	4.5	4.0	4.5	4.0	3.5	4.0	.5	.0	.5
14	11.5	10.5	11.0	4.5	3.5	4.0	3.5	2.5	3.5	.5	.0	.5
15	12.0	11.0	11.5	4.0	3.5	4.0	2.5	1.5	2.0	.5	.0	.5
16	12.5	11.0	11.5	4.0	3.5	3.5	1.5	.0	1.0	1.0	.5	.5
17	12.5	11.5	12.0	4.0	3.5	3.5	.0	.0	.0	1.5	1.0	1.0
18	11.0	9.5	10.5	4.0	3.5	4.0	.0	.0	.0	3.0	1.0	2.0
19	10.0	9.5	9.5	4.5	4.0	4.0	.5	.0	.0	3.5	2.0	2.5
20	10.5	9.5	10.0	4.5	3.5	4.0	.5	.0	.0	2.5	2.0	2.0
21	10.5	9.0	10.0	5.0	4.0	4.5	.5	.0	.5	2.0	1.5	2.0
22	10.5	9.0	10.0	5.0	4.5	4.5	.5	.0	.5	2.5	2.0	2.0
23	10.5	9.0	9.5	5.5	4.5	5.0	.5	.0	.5	2.0	1.5	2.0
24	10.5	9.0	9.5	4.5	4.0	4.5	.5	.0	.0	2.0	1.0	1.5
25	10.5	9.0	9.5	4.0	3.5	4.0	.0	.0	.0	1.0	.5	1.0
26	9.5	8.5	9.0	3.5	3.0	3.0	.0	.0	.0	1.5	.5	1.0
27	8.5	7.5	8.0	2.5	2.0	2.5	.0	.0	.0	2.0	.5	1.0
28	7.5	6.0	7.0	2.5	2.0	2.5	.0	.0	.0	1.5	.5	1.0
29	7.0	5.5	6.0	2.5	2.5	2.5	.5	.0	.0	1.5	.5	1.0
30	6.5	5.0	6.0	3.0	2.5	2.5	.5	.0	.5	3.0	1.5	2.0
31	7.0	5.5	6.5	---	---	---	.5	.5	.5	3.0	2.5	2.5
MONTH	14.5	5.0	10.5	8.5	2.0	5.0	4.0	.0	1.0	3.5	.0	1.0

PEND OREILLE RIVER BASIN

12353650 CLARK FORK AT SUPERIOR, MT--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	2.0	.0	1.0	.0	.0	.0	7.5	6.0	6.5	9.5	9.5	9.5
2	.0	.0	.0	.5	.0	.0	7.5	6.0	6.5	10.0	9.5	10.0
3	.0	.0	.0	.5	.0	.5	7.0	5.5	6.0	10.0	9.5	10.0
4	.0	.0	.0	.5	.0	.5	7.0	6.0	6.5	10.5	9.5	10.0
5	.0	.0	.0	1.0	.0	.5	7.0	6.5	6.5	11.0	9.5	10.5
6	.0	.0	.0	2.0	.5	1.0	8.5	6.5	7.5	11.5	10.5	11.0
7	.0	.0	.0	2.0	.5	1.0	9.0	8.0	8.5	11.5	11.0	11.5
8	.0	.0	.0	1.5	.5	1.0	8.5	7.0	7.5	11.5	10.0	10.5
9	.0	.0	.0	2.0	1.0	1.5	7.0	6.0	6.5	11.0	10.0	10.5
10	.0	.0	.0	3.5	2.0	2.5	6.5	6.0	6.0	11.5	10.5	11.0
11	.0	.0	.0	3.0	2.0	2.5	7.0	6.0	6.5	11.5	10.0	10.5
12	.5	.0	.0	2.5	1.5	2.0	8.0	6.5	7.5	9.5	8.5	9.0
13	.5	.0	.0	3.0	2.5	2.5	9.5	7.5	8.5	9.0	8.5	8.5
14	.0	.0	.0	3.0	2.5	3.0	10.0	9.0	9.5	9.5	8.5	9.0
15	.0	.0	.0	3.5	2.5	3.0	10.0	9.5	9.5	11.0	9.0	10.0
16	.0	.0	.0	4.0	3.0	3.5	9.5	9.0	9.0	11.0	10.5	11.0
17	.0	.0	.0	3.5	2.5	3.0	9.0	7.5	8.5	11.0	10.0	10.5
18	.0	.0	.0	3.5	2.0	2.5	7.5	7.0	7.0	11.5	10.5	10.5
19	.0	.0	.0	4.5	2.5	3.5	9.5	7.5	8.5	10.0	8.5	9.0
20	.0	.0	.0	6.0	3.5	4.5	10.5	9.0	9.5	9.0	7.5	8.0
21	.5	.0	.0	6.5	4.5	5.5	10.5	9.5	10.0	10.5	9.0	9.5
22	.5	.0	.0	6.0	5.0	5.5	10.0	9.0	9.5	11.0	10.0	10.5
23	1.0	.0	.5	6.5	5.0	5.5	9.0	8.0	8.5	11.5	11.0	11.0
24	1.0	.0	.5	5.5	4.5	5.0	8.5	7.5	8.0	11.0	10.0	10.5
25	1.5	.0	.5	6.0	5.0	5.5	8.0	7.0	7.5	10.0	9.5	9.5
26	1.0	.0	.5	6.5	5.0	5.5	8.0	7.0	7.5	10.0	9.0	9.5
27	.5	.5	.5	7.0	5.5	6.0	8.5	8.0	8.5	10.5	10.0	10.5
28	.5	.0	.5	7.5	6.0	6.5	8.0	7.5	8.0	11.0	10.0	10.5
29	---	---	---	7.0	6.5	6.5	8.0	7.0	7.5	10.0	9.5	9.5
30	---	---	---	7.5	6.0	6.5	9.5	8.0	8.5	10.5	9.5	10.0
31	---	---	---	7.5	6.0	7.0	---	---	---	11.5	10.5	11.0
MONTH	2.0	.0	.0	7.5	.0	3.5	10.5	5.5	8.0	11.5	7.5	10.0
		JUNE			JULY			AUGUST			SEPTEMBER	
1	12.5	11.5	12.0	17.5	16.0	17.0	22.5	19.5	20.5	17.5	15.0	16.0
2	12.5	12.0	12.5	17.0	15.5	16.0	19.5	18.0	19.0	16.0	15.0	15.5
3	12.5	12.0	12.0	18.0	16.0	17.0	18.0	16.5	17.0	15.5	14.5	15.0
4	12.5	11.5	12.0	19.0	17.0	18.0	18.0	15.5	17.0	16.5	14.0	15.0
5	14.0	12.0	13.0	19.5	17.5	18.5	20.0	15.5	17.5	16.5	14.0	15.0
6	14.5	13.0	14.0	20.0	18.0	18.5	21.0	16.5	18.5	15.5	13.5	14.5
7	14.5	13.0	14.0	20.5	18.0	19.0	21.5	17.5	19.5	16.0	13.0	14.5
8	14.5	13.0	14.0	20.5	18.5	19.0	22.0	18.5	20.0	15.0	13.5	14.0
9	15.0	13.5	14.5	19.0	17.5	18.0	21.5	19.0	20.0	15.0	12.5	13.5
10	14.5	13.5	14.0	19.5	17.0	18.0	21.5	18.0	19.5	14.5	12.0	13.0
11	14.0	13.0	13.5	19.5	17.0	18.0	21.5	18.0	19.5	14.5	11.5	13.0
12	15.0	13.5	14.0	19.0	17.5	18.0	21.5	17.5	19.5	14.5	11.0	12.5
13	15.5	14.5	15.0	19.5	18.0	18.5	21.0	18.0	19.5	14.5	11.5	13.0
14	15.5	14.5	15.0	21.0	18.0	19.5	21.5	17.5	19.5	15.0	12.0	13.5
15	15.0	13.5	14.0	21.5	19.5	20.5	21.0	18.0	19.5	15.5	12.5	14.0
16	14.0	13.0	13.5	20.0	18.0	19.5	19.5	17.0	18.0	15.5	12.5	14.0
17	14.0	13.0	13.5	19.0	18.0	18.5	19.0	16.0	17.5	14.0	13.5	13.5
18	14.0	12.5	13.5	19.5	17.0	18.0	20.0	16.0	18.0	13.5	12.0	13.0
19	14.0	13.5	14.0	20.5	17.5	19.0	19.5	16.0	18.0	13.5	11.5	12.5
20	13.5	12.5	13.0	22.0	19.0	20.0	18.5	16.5	17.5	14.0	11.0	12.5
21	12.5	12.0	12.5	22.0	20.0	---	18.0	16.5	17.0	14.5	11.5	13.0
22	13.5	12.5	13.0	---	---	---	17.0	15.5	16.0	15.0	12.0	13.0
23	14.0	13.0	13.5	---	---	---	16.0	15.0	15.5	15.5	12.0	13.5
24	14.5	13.0	14.0	---	---	---	15.5	14.5	15.0	15.5	12.5	14.0
25	15.5	14.5	15.0	---	---	---	15.5	14.0	14.5	15.5	12.5	14.0
26	16.0	15.0	15.5	---	---	---	16.0	13.5	14.5	16.0	13.5	14.5
27	16.0	14.5	15.5	22.0	---	---	15.5	14.0	14.5	16.5	13.5	15.0
28	16.5	15.0	16.0	22.5	19.0	20.5	15.0	14.0	14.5	16.0	13.5	15.0
29	17.5	16.0	16.5	22.0	18.5	20.0	16.0	14.0	15.0	16.0	13.5	14.5
30	18.0	16.5	17.5	22.5	19.0	20.5	16.0	14.0	15.0	14.5	13.5	14.0
31	---	---	---	22.5	19.0	20.5	17.0	14.5	15.5	---	---	---
MONTH	18.0	11.5	14.0	---	---	---	22.5	13.5	17.5	17.5	11.0	14.0

PEND OREILLE RIVER BASIN

12354000 ST. REGIS RIVER NEAR ST. REGIS, MT

LOCATION.--Lat 47°17'49", long 115°07'18", near center of NW1/4NE1/4 sec. 26, T.18 N., R.28 W., Mineral County, Hydrologic Unit 17010204, on left bank 50 ft downstream from road bridge, 500 ft upstream from Little Joe Creek, 1.2 mi west of St. Regis, and 1.7 mi upstream from mouth.

DRAINAGE AREA.--303 mi^2.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: July 1985 to current year.

INSTRUMENTATION.--Temperature recorder since July 31, 1985.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: Maximum, 21.0°C, July 27, 29, 1987; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURE: Maximum, 20.5°C, July 20; minimum, 0.0°C on several days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
JUL						
18...	0715	202	0	88	17.5	13.0
AUG						
28...	1300	145	1	97	24.0	12.5

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	13.5	9.5	11.0	7.0	5.0	6.5	3.0	1.5	2.5	3.0	2.5	2.5
2	13.5	9.0	11.0	8.5	7.0	8.0	2.0	1.5	1.5	3.5	2.5	3.0
3	12.5	9.0	10.5	8.0	7.5	8.0	3.0	2.0	2.5	4.0	3.0	3.5
4	12.5	8.5	10.0	7.5	7.0	7.5	3.0	1.5	2.0	4.5	3.5	4.0
5	12.0	8.0	10.0	7.5	7.0	7.0	3.0	1.5	2.0	4.0	3.0	3.5
6	12.0	8.0	10.0	7.5	6.5	7.0	4.0	3.0	3.5	3.5	2.0	2.5
7	12.0	8.0	10.0	6.5	5.5	6.0	5.0	4.0	4.5	2.0	.5	1.0
8	12.0	8.0	10.0	6.0	5.0	5.5	4.5	4.0	4.0	.5	.5	.5
9	12.5	8.5	10.0	6.5	5.5	5.5	5.0	4.0	4.5	1.5	.5	1.0
10	12.0	8.0	10.0	5.5	4.5	5.0	5.0	4.0	4.5	2.0	1.5	1.5
11	12.0	8.0	9.5	5.5	5.0	5.0	4.5	3.5	4.0	1.5	.5	1.0
12	11.0	7.5	9.5	5.0	3.5	4.5	5.0	4.5	5.0	2.0	.5	1.0
13	11.5	8.0	9.5	5.0	4.0	4.5	5.0	3.0	4.0	2.5	1.5	2.0
14	10.5	9.0	9.5	5.0	3.0	4.0	3.0	2.0	2.5	2.0	1.5	1.5
15	11.0	9.5	10.0	4.5	4.0	4.5	2.0	.5	1.0	2.0	1.0	1.5
16	11.0	10.5	10.5	5.0	4.5	4.5	.5	.0	.5	3.0	2.0	2.5
17	10.5	8.5	9.5	5.5	5.0	5.0	.5	.0	.5	4.5	3.0	3.5
18	8.0	7.0	7.5	5.5	5.0	5.0	.5	.0	.5	4.0	3.5	3.5
19	9.5	7.5	8.5	5.0	4.5	5.0	.5	.5	.5	3.0	2.0	2.5
20	11.0	9.0	9.5	5.5	4.5	5.0	1.0	.5	.5	2.5	1.5	2.0
21	10.5	8.5	9.0	6.0	5.0	5.5	2.5	1.0	2.0	3.0	2.5	2.5
22	10.0	8.0	9.0	5.5	5.0	5.5	2.5	2.0	2.5	3.0	2.0	2.5
23	8.5	6.5	7.5	5.5	4.0	5.0	3.0	2.5	2.5	2.5	1.0	2.0
24	9.0	6.5	8.0	4.0	3.5	3.5	2.5	.5	1.5	1.5	1.0	1.0
25	9.0	6.5	8.0	4.0	3.5	3.5	.5	.0	.5	2.0	1.0	1.5
26	8.5	6.5	7.5	3.5	2.5	3.0	.5	.0	.5	3.5	2.0	2.5
27	6.5	4.5	5.5	2.5	2.0	2.5	.5	.5	.5	3.5	2.5	3.0
28	6.0	4.5	5.0	4.0	2.5	3.5	.5	.5	.5	2.5	1.5	2.0
29	6.0	4.0	5.0	4.5	4.0	4.0	.5	.5	.5	3.0	1.5	2.0
30	6.5	4.5	5.5	4.5	2.5	3.5	2.0	.5	1.0	5.0	3.0	4.0
31	7.5	5.5	6.5	---	---	---	3.0	2.0	2.5	4.5	1.0	3.0
MONTH	13.5	4.0	8.8	8.5	2.0	5.1	5.0	.0	2.1	5.0	.5	2.3

PEND OREILLE RIVER BASIN

12354000 ST. REGIS RIVER NEAR ST. REGIS, MT--Continued

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.5	.0	.5	.5	.5	.5	5.0	2.5	4.0	8.0	4.0	6.0
2	.5	.5	.5	.5	.5	.5	5.0	3.0	4.0	6.5	5.0	6.0
3	.5	.5	.5	1.5	.5	.5	5.5	2.0	4.0	8.0	5.0	6.0
4	.5	.5	.5	1.5	.0	.5	5.5	3.0	4.0	9.0	5.0	7.0
5	.5	.5	.5	1.5	.5	1.0	5.0	3.5	4.5	8.5	4.5	6.5
6	.5	.5	.5	1.5	.5	1.0	6.0	3.0	4.5	9.0	4.5	6.5
7	.5	.5	.5	4.5	1.5	3.0	5.0	3.5	4.0	8.5	5.5	6.5
8	.5	.5	.5	3.5	1.5	2.5	5.5	2.0	3.5	9.0	5.0	6.5
9	.5	.5	.5	3.5	2.5	3.0	6.0	2.0	4.0	9.5	4.5	7.0
10	.5	.5	.5	5.0	2.5	3.5	6.0	2.0	4.0	7.5	5.5	6.5
11	.5	.5	.5	4.5	2.5	3.5	6.5	2.0	4.5	6.5	5.0	5.5
12	1.0	.5	.5	5.5	3.0	4.0	7.5	2.5	5.0	7.0	3.5	5.5
13	1.0	.5	.5	3.5	2.5	3.0	7.5	3.0	5.0	7.0	4.0	5.5
14	1.0	.5	.5	4.0	2.0	3.0	7.0	3.0	5.0	8.5	5.0	7.0
15	1.0	.5	.5	4.0	2.5	3.0	6.0	3.5	5.0	9.5	5.0	7.0
16	.5	.5	.5	3.5	2.0	3.0	6.5	3.5	5.0	8.0	5.5	6.5
17	.5	.5	.5	2.5	.5	1.5	6.5	3.5	5.0	8.5	6.0	7.0
18	1.0	.5	.5	4.0	2.0	3.0	7.5	3.0	5.0	7.5	5.5	6.5
19	1.0	.5	.5	6.0	3.0	4.0	8.0	3.5	5.5	6.0	4.5	5.5
20	1.0	.5	1.0	6.5	2.5	4.0	8.0	3.5	5.5	9.0	4.0	6.0
21	1.5	.5	1.0	5.0	3.5	4.0	7.5	4.0	5.5	8.5	4.5	7.0
22	1.5	1.0	1.0	4.5	3.0	3.5	6.5	4.5	5.0	9.5	5.0	7.5
23	2.0	.5	1.0	6.5	2.5	4.0	6.0	4.0	5.0	8.5	6.5	7.0
24	3.5	.5	2.0	4.5	2.0	3.5	6.5	3.5	5.0	7.5	5.0	6.0
25	3.0	1.5	2.5	5.5	3.0	4.0	6.0	4.5	5.0	7.5	5.0	6.0
26	4.5	2.0	3.0	6.5	3.5	4.5	7.5	4.5	5.5	8.5	5.0	6.5
27	3.0	2.5	2.5	5.0	3.0	4.5	5.5	4.0	5.0	8.5	6.5	7.5
28	2.5	.5	1.0	6.0	3.5	4.5	6.5	4.0	5.0	8.0	6.0	7.0
29	---	---	---	5.0	2.5	3.5	8.5	3.5	5.5	9.0	5.5	7.0
30	---	---	---	6.5	3.0	4.5	9.0	4.0	6.5	10.0	6.0	8.0
31	---	---	---	6.0	4.0	5.0	---	---	---	9.5	6.5	8.0
MONTH	4.5	.0	.9	6.5	.0	3.0	9.0	2.0	4.8	10.0	3.5	6.6
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	10.5	7.0	9.0	13.5	11.0	12.5	19.0	14.0	16.0	14.5	10.0	12.5
2	9.5	7.0	8.5	14.5	10.0	12.0	15.5	12.5	14.0	13.5	11.5	12.0
3	10.0	7.0	8.5	16.5	10.0	13.0	14.0	11.0	12.5	13.5	10.0	11.5
4	11.5	6.0	9.0	17.0	11.0	14.0	15.0	10.5	13.0	15.0	10.0	12.0
5	12.0	6.5	9.0	17.0	11.5	14.5	18.5	11.5	14.5	14.5	10.0	12.0
6	12.5	7.0	9.5	17.5	11.0	14.5	19.5	12.5	16.0	14.5	9.5	11.5
7	12.0	7.0	9.5	18.0	12.0	15.0	18.5	13.5	16.0	14.5	9.0	11.5
8	12.5	7.5	10.0	17.5	12.0	15.0	18.5	13.5	16.0	12.0	10.5	11.5
9	12.0	8.0	10.0	14.5	10.5	12.5	17.0	14.0	15.5	14.0	9.0	11.0
10	10.5	8.0	9.0	16.5	10.5	13.0	18.0	12.0	15.0	13.0	8.5	10.5
11	13.0	8.0	10.0	17.5	10.5	14.0	18.5	13.5	16.0	13.0	8.0	10.0
12	13.5	8.0	11.0	15.0	12.0	13.5	18.5	13.5	16.0	13.0	7.5	10.0
13	12.0	9.0	10.5	16.0	12.0	14.0	19.0	14.0	16.5	14.0	8.5	11.0
14	11.0	9.5	10.5	18.5	12.5	15.5	18.5	13.5	16.0	14.5	9.0	11.5
15	11.0	9.5	10.0	16.5	14.0	15.5	17.5	14.0	15.5	14.0	9.0	11.5
16	11.0	9.0	9.5	16.0	12.0	14.0	15.0	11.5	13.5	13.0	9.0	11.0
17	11.0	7.5	9.0	17.0	12.0	14.0	16.5	11.5	13.5	11.5	10.5	11.0
18	12.5	8.0	10.0	18.0	12.0	14.5	18.0	11.5	14.5	11.0	9.5	10.5
19	11.5	8.5	10.0	19.0	13.0	16.0	16.5	12.5	14.5	12.5	9.0	10.0
20	9.5	7.5	9.0	20.5	14.5	17.5	15.5	12.5	14.0	13.0	8.5	10.5
21	10.5	7.5	9.0	18.0	14.0	16.0	15.5	13.0	13.5	13.0	8.5	10.5
22	12.0	8.5	10.0	19.0	12.0	15.5	13.0	12.5	12.5	13.5	9.0	11.0
23	13.0	8.5	11.0	19.0	12.5	16.0	13.0	12.0	12.5	13.5	9.5	11.0
24	14.5	9.0	11.5	19.0	13.5	16.0	12.5	11.5	12.0	13.5	9.5	11.0
25	14.5	10.0	12.5	20.0	14.0	17.0	13.5	11.0	12.0	13.5	9.0	11.0
26	15.5	10.0	12.5	16.5	13.0	15.0	14.0	11.5	12.5	14.0	10.5	12.0
27	15.0	9.5	12.5	19.0	12.5	15.5	15.5	11.5	13.0	13.5	10.0	11.5
28	15.5	9.5	12.5	19.5	13.5	16.5	14.0	11.0	12.5	13.0	9.0	11.0
29	16.0	11.5	13.5	19.5	13.0	16.0	15.0	11.0	12.5	13.0	9.0	11.0
30	15.5	11.0	13.5	18.5	13.5	16.0	15.0	11.5	13.0	11.0	10.0	10.5
31	---	---	---	19.0	13.5	16.0	15.0	11.0	12.5	---	---	---
MONTH	16.0	6.0	10.3	20.5	10.0	14.8	19.5	10.5	14.1	15.0	7.5	11.1

PEND OREILLE RIVER BASIN

12354500 CLARK FORK AT ST. REGIS, MT

LOCATION.--Lat 47°18'07", long 115°05'11", in NW1/4SE1/4SW1/4 sec.19, T.18 N., R.27 W., Mineral County, Hydrologic Unit 17010204, on left bank at St. Regis, 0.4 mi downstream from St. Regis River, and at mile 270.3.

DRAINAGE AREA.--10,709 mi^2.

PERIOD OF RECORD.--October 1910 to current year. Monthly discharge only for some periods, published in WSP 1316.

REVISED RECORDS.--WSP 1246: Drainage area. WSP 1316: 1916-17, 1920, 1929-31(M), 1933(M).

GAGE.--Water-stage recorder. Datum of gage is 2,600.37 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Nov. 29, 1933, nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Feb. 3-25. Records excellent except those for estimated daily discharges, which are poor. Diversions for irrigation of about 244,000 acres upstream from station. Several observations of water temperature and specific conductance were made during the year. Bonneville Power Administration satellite telemeter at station.

AVERAGE DISCHARGE.--79 years, 7,447 ft^3/s, 5,395,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 68,900 ft^3/s, May 24, 1948, gage height, 19.96 ft, from graph based on gage readings; minimum, 732 ft^3/s, Feb. 3, 1989, gage height, 3.29 ft, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 32,900 ft^3/s, May 12, gage height, 14.19 ft; minimum, 732 ft^3/s, Feb. 3, gage height, 3.29 ft, result of freezeup.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1910	2320	2570	2450	2440	2050	4420	13000	12800	8370	3080	3700
2	1930	2340	2450	2430	1270	1640	4300	12900	13500	8120	3060	3760
3	1950	2500	2290	2370	e800	1620	4160	13400	15300	7610	3210	3760
4	1920	2540	2250	2380	e900	1810	4010	14500	17300	7110	3290	3640
5	1910	2570	2250	2390	e1000	1920	3930	15500	18100	6730	3260	3540
6	1900	2670	2240	2360	e1200	2390	4400	16600	19500	6370	3130	3480
7	1900	2740	2390	2350	e1400	2600	6310	19600	21000	5970	3030	3400
8	1890	2730	2620	2110	e1600	2710	10900	25100	22000	5600	2950	3340
9	1880	2770	2580	1860	e1800	3000	11900	28600	21800	5280	2910	3240
10	1860	2740	2530	1870	e1900	3640	10100	29700	21600	5010	2850	3210
11	1860	2710	2530	2050	e2000	4440	8890	30300	21700	4800	2840	3180
12	1850	2680	2510	2180	e2050	6490	8340	32400	20800	4590	2800	3160
13	1840	2680	2690	2190	e2100	6070	8240	29700	19400	4530	2770	3150
14	1830	2690	2800	2220	e2200	6050	8750	25000	18500	4670	2770	3130
15	1840	2670	2810	2210	e2200	5530	9850	21900	18200	4790	2850	3090
16	1890	2640	2640	2210	e2200	4890	12100	19700	19700	4660	2860	3030
17	2040	2610	2150	2250	e2200	4530	14200	18800	22400	4630	2820	2980
18	2400	2610	2030	2340	e2200	3990	14600	18800	20100	4780	2780	3080
19	3040	2630	2090	2410	e2100	3710	14300	19100	16900	4850	2700	3100
20	2950	2610	2130	2420	e2200	3650	15600	18100	15200	4620	2650	3120
21	2820	2570	2370	2390	e2300	3750	19300	16500	14200	4350	2630	3070
22	2740	2570	2460	2340	e2350	3750	23100	15300	13000	4170	2640	3000
23	2650	2740	2490	2350	e2350	3820	25000	14700	11800	4060	2650	2950
24	2580	2780	2440	2380	e2450	4000	23800	14600	10700	3890	2870	2890
25	2510	2790	2520	2230	e2500	3960	21200	14600	10100	3740	3140	2850
26	2460	2740	2130	2100	2490	3860	18900	13900	9740	3580	3650	2820
27	2420	2660	1860	2080	2440	4000	17200	13100	9390	3490	3830	2820
28	2380	2600	1780	2090	2370	4290	15900	13200	9100	3510	3850	2770
29	2360	2540	1760	2100	---	4640	14700	13200	8810	3430	3870	2700
30	2340	2570	1920	2140	---	4690	13600	13500	8530	3320	3840	2660
31	2330	---	2220	2320	---	4510	---	13100	---	3190	3720	---
TOTAL	68180	79010	72500	69570	55010	118000	372000	578400	481170	153820	95300	94620
MEAN	2199	2634	2339	2244	1965	3806	12400	18660	16040	4962	3074	3154
MAX	3040	2790	2810	2450	2500	6490	25000	32400	22400	8370	3870	3760
MIN	1830	2320	1760	1860	800	1620	3930	12900	8530	3190	2630	2660
AC-FT	135200	156700	143800	138000	109100	234100	737900	1147000	954400	305100	189000	187700

CAL YR 1988 TOTAL 1517140 MEAN 4145 MAX 17300 MIN 1200 AC-FT 3009000
WTR YR 1989 TOTAL 2237580 MEAN 6130 MAX 32400 MIN 800 AC-FT 4438000

e Estimated

PEND OREILLE RIVER BASIN

12354700 CLARK FORK NEAR PARADISE, MT

LOCATION.--Lat 47°19'19", long 114°53'24", in NE1/4SW1/4NE1/4 sec. 15, T.18 N., R.25 W., Sanders County, Hydrologic Unit 17010204, on right bank at bridge on State Highway 461, 6.3 mi southwest of Paradise, 12.5 road miles downstream from St. Regis and at mile 255.5.

DRAINAGE AREA.--10,794 mi2.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: July 1985 to current year.

INSTRUMENTATION.--Temperature recorder since July 31, 1985.

REMARKS.--No record January 25 to Febuary 22, and March 17 to April 30 due to equipment malfunction.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: Maximum, 22.5°C, July 27, 30, 1987; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURE: Maximum, 22.0°C, July 25; minimum, 0.0°C, on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	13.5	12.0	13.0	7.0	6.0	6.5	2.0	1.5	2.0	.5	.0	.5
2	14.0	12.0	13.0	7.5	7.0	7.5	1.5	1.0	1.5	.5	.5	.5
3	14.0	12.5	13.0	8.0	7.5	8.0	1.5	1.0	1.5	1.0	.5	.5
4	13.5	12.0	13.0	8.0	7.5	8.0	1.0	1.0	1.0	1.5	1.0	1.0
5	13.5	12.0	13.0	8.0	7.5	7.5	1.0	.5	.5	1.0	1.0	1.0
6	13.0	11.5	12.5	7.5	7.5	7.5	1.5	1.0	1.0	1.0	.5	1.0
7	13.0	11.5	12.5	7.5	6.5	7.0	2.5	1.5	2.0	.5	.0	.0
8	12.5	11.0	12.0	6.5	6.0	6.0	2.5	2.0	2.5	.0	.0	.0
9	12.5	11.0	12.0	6.0	6.0	6.0	3.0	2.5	3.0	.5	.0	.5
10	12.5	11.0	12.0	6.0	5.0	5.5	3.5	3.0	3.0	.5	.5	.5
11	12.5	11.0	12.0	5.0	5.0	5.0	3.5	3.0	3.0	.5	.0	.5
12	12.5	11.0	11.5	5.0	4.0	4.5	4.0	3.5	3.5	.5	.0	.5
13	12.0	11.0	11.5	4.5	4.5	4.5	4.0	3.5	4.0	.5	.0	.5
14	12.0	11.0	11.5	4.5	4.0	4.0	3.5	2.5	3.0	.5	.0	.5
15	12.0	11.0	11.5	4.0	4.0	4.0	2.5	1.0	1.5	.5	.0	.0
16	12.0	12.0	12.0	4.0	3.5	4.0	1.0	.0	.5	1.0	.5	.5
17	12.0	11.0	11.5	4.0	3.5	4.0	1.0	.0	.0	2.0	1.0	1.5
18	12.0	9.5	10.5	4.0	3.5	4.0	.0	.0	.0	2.0	1.5	2.0
19	10.5	9.5	10.0	4.0	4.0	4.0	.5	.0	.0	2.5	2.0	2.0
20	10.5	10.0	10.0	4.5	4.0	4.0	.5	.0	.0	2.0	2.0	2.0
21	10.5	10.0	10.0	4.5	4.0	4.5	.5	.0	.0	2.5	2.0	2.0
22	10.5	10.0	10.0	5.0	4.5	4.5	.5	.0	.5	2.0	1.5	2.0
23	10.0	9.0	9.5	5.0	4.5	5.0	.5	.5	.5	2.0	1.5	1.5
24	10.0	9.0	9.5	4.5	4.0	4.0	.5	.0	.5	1.5	1.0	1.0
25	9.5	9.0	9.5	4.0	3.5	3.5	.0	.0	.0	---	---	---
26	9.5	8.5	9.0	3.5	3.0	3.0	.5	.0	.0	---	---	---
27	8.0	7.5	7.5	3.0	2.0	2.5	.5	.0	.5	---	---	---
28	7.5	6.5	7.0	2.5	2.0	2.5	.5	.0	.5	---	---	---
29	6.5	6.0	6.5	3.0	2.5	2.5	.5	.0	.5	---	---	---
30	6.5	5.5	6.0	2.5	2.0	2.5	.5	.0	.0	---	---	---
31	7.0	5.5	6.5	---	---	---	.5	.0	.5	---	---	---
MONTH	14.0	5.5	10.5	8.0	2.0	5.0	4.0	.0	1.0	2.5	.0	1.0

PEND OREILLE RIVER BASIN

12354700 CLARK FORK NEAR PARADISE, MT--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	.5	.0	.5	---	---	---	10.0	---	---
2	---	---	---	.5	.5	.5	---	---	---	9.5	9.0	9.5
3	---	---	---	.5	.0	.5	---	---	---	10.5	9.0	9.5
4	---	---	---	.5	.0	.5	---	---	---	10.5	9.0	10.0
5	---	---	---	.5	.5	.5	---	---	---	10.5	9.5	10.0
6	---	---	---	.5	.0	.5	---	---	---	11.0	10.0	10.5
7	---	---	---	.5	.0	.5	---	---	---	11.5	10.5	11.0
8	---	---	---	.5	.0	.5	---	---	---	11.0	10.0	10.5
9	---	---	---	.5	.0	.0	---	---	---	11.0	10.0	10.5
10	---	---	---	2.5	.0	1.0	---	---	---	11.0	10.5	10.5
11	---	---	---	3.5	2.5	3.0	---	---	---	10.5	10.0	10.5
12	---	---	---	3.5	2.0	3.0	---	---	---	10.0	8.5	9.0
13	---	---	---	3.0	2.0	2.5	---	---	---	9.0	8.5	8.5
14	---	---	---	3.5	2.5	3.0	---	---	---	9.5	8.5	9.0
15	---	---	---	3.5	2.5	3.0	---	---	---	10.5	9.0	10.0
16	---	---	---	3.5	3.0	3.0	---	---	---	11.0	10.0	10.5
17	---	---	---	---	---	---	---	---	---	11.0	10.5	10.5
18	---	---	---	---	---	---	---	---	---	10.5	10.0	10.5
19	---	---	---	---	---	---	---	---	---	10.0	8.5	9.5
20	---	---	---	---	---	---	---	---	---	9.0	7.5	8.5
21	---	---	---	---	---	---	---	---	---	10.0	8.5	9.5
22	---	---	---	---	---	---	---	---	---	11.5	9.5	10.5
23	.5	.0	.5	---	---	---	---	---	---	11.5	10.5	11.0
24	.5	.0	.5	---	---	---	---	---	---	11.0	10.0	10.5
25	.5	.0	.5	---	---	---	---	---	---	10.0	9.5	10.0
26	.5	.5	.5	---	---	---	---	---	---	10.0	9.0	9.5
27	.5	.5	.5	---	---	---	---	---	---	11.0	9.5	10.0
28	.5	.0	.5	---	---	---	---	---	---	11.0	10.0	10.5
29	---	---	---	---	---	---	---	---	---	10.5	9.5	10.0
30	---	---	---	---	---	---	---	---	---	11.0	9.0	10.0
31	---	---	---	---	---	---	---	---	---	11.5	10.0	11.0
MONTH	.5	.0	.5	3.5	.0	1.5	---	---	---	11.5	7.5	10.0
		JUNE			JULY			AUGUST			SEPTEMBER	
1	12.5	11.0	11.5	17.5	16.0	17.0	21.0	20.0	20.5	16.5	15.0	16.0
2	13.0	12.0	12.5	17.5	15.5	16.5	20.5	18.5	19.0	16.5	15.0	15.5
3	13.0	11.5	12.0	18.0	15.0	16.5	18.5	17.0	17.5	16.0	14.5	15.0
4	13.0	11.5	12.0	19.0	16.0	17.5	17.5	15.5	16.5	15.5	14.0	15.0
5	13.5	12.0	12.5	19.5	16.5	18.0	18.5	16.0	17.5	15.5	14.5	15.0
6	14.5	13.5	14.0	20.0	17.0	18.5	19.5	17.5	18.5	15.5	14.0	14.5
7	14.5	13.5	14.0	20.0	17.5	19.0	20.0	19.0	19.5	15.0	13.5	14.5
8	14.5	13.5	14.0	20.0	18.0	19.0	20.0	19.0	19.5	15.0	13.5	14.5
9	14.5	14.0	14.0	19.5	17.0	18.0	20.5	20.0	20.0	14.5	13.0	13.5
10	14.5	13.5	14.0	18.5	16.5	17.5	20.0	18.5	19.5	14.0	13.0	13.0
11	14.0	13.0	13.5	19.5	17.0	18.0	20.5	19.0	19.5	13.5	12.0	13.0
12	15.0	13.5	14.0	19.0	17.5	18.0	20.0	18.5	19.5	13.0	12.0	12.5
13	15.0	14.5	15.0	19.5	17.5	18.0	20.0	19.0	19.5	13.5	12.5	13.0
14	15.0	15.0	15.0	20.5	18.0	19.0	20.0	18.5	19.5	14.0	13.0	13.5
15	15.0	14.0	14.5	20.5	19.0	20.0	20.0	19.0	19.5	14.0	13.0	13.5
16	14.0	13.5	13.5	20.0	19.0	19.5	19.0	18.0	18.5	14.0	13.5	14.0
17	14.0	13.0	13.5	19.0	17.5	18.5	18.5	16.5	17.5	14.0	13.0	13.5
18	14.0	13.0	13.5	19.5	17.0	18.0	18.5	16.5	17.5	13.0	12.5	13.0
19	14.0	13.5	13.5	20.5	17.5	19.0	18.5	17.5	18.0	13.0	12.0	12.5
20	14.0	13.0	13.5	21.5	19.5	20.5	18.0	17.0	17.5	13.0	12.0	12.5
21	13.0	12.0	12.5	21.5	20.0	20.5	17.5	16.5	17.0	13.0	12.0	12.5
22	13.5	12.0	13.0	21.0	19.0	20.5	17.0	15.5	16.5	13.5	13.0	13.0
23	14.5	12.5	13.5	21.0	19.5	20.5	15.5	15.5	15.5	14.0	13.0	13.5
24	15.5	13.0	14.0	21.5	20.0	20.5	15.5	14.5	15.0	14.0	13.5	14.0
25	16.5	13.5	15.0	22.0	20.0	21.0	14.5	14.5	14.5	14.5	13.5	14.0
26	16.5	14.0	15.5	21.5	20.0	20.5	15.0	14.5	14.5	15.0	14.0	14.5
27	16.5	14.5	15.5	21.5	19.5	20.5	15.5	15.0	15.0	15.0	14.0	14.5
28	17.0	14.5	16.0	21.0	19.5	20.5	15.5	14.0	14.5	15.0	14.0	14.5
29	17.5	15.5	16.5	21.0	19.5	20.5	15.5	14.0	14.5	15.0	14.0	14.5
30	18.5	15.5	17.0	21.0	19.5	20.5	16.0	15.0	15.5	15.0	13.5	14.5
31	---	---	---	21.0	19.5	20.5	16.5	14.5	15.5	---	---	---
MONTH	18.5	11.0	14.0	22.0	15.0	19.0	21.0	14.0	17.5	16.5	12.0	14.0

PEND OREILLE RIVER BASIN

12355000 FLATHEAD RIVER AT FLATHEAD, BRITISH COLUMBIA
(National Stream Quality Accounting Network)
(International gaging station)

LOCATION.--Lat 49°00'02", long 114°28'35", Hydrologic Unit 17010206, on right bank 45 ft north of international boundary at Flathead, British Columbia, 1.6 mi upstream from Sage Creek, 6.5 mi northwest of Trail Creek, MT, and at mile 216.6.

DRAINAGE AREA.--427 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1929 to current year (no winter records prior to 1952). Prior to October 1934, published as Flathead River near Trail Creek, MT. October 1970 to September 1972, published as North Fork Flathead River at Flathead, British Columbia.

REVISED RECORDS.--WSP 1092: 1933 (maximum gage height only).

GAGE.--Water-stage recorder. Datum of gage is 3,968.16 ft above National Geodetic Vertical Datum of 1929. Prior to Sept. 1, 1949, nonrecording gage, and Sept. 1, 1949, to Oct. 4, 1964, water-stage recorder, at site 1,200 ft upstream at datum 7.80 ft higher. Oct. 5, 1964, to Aug. 1, 1973, water-stage recorder at site on left bank 155 ft upstream at datum 1.42 ft lower.

REMARKS.--Estimated daily discharges: Dec. 6, Dec. 17 to Mar. 26, July 5-12. Water-discharge records good except those for estimated daily discharges, which are poor.

COOPERATION.--This is one of a number of stations which are maintained jointly by Canada and the United States.

AVERAGE DISCHARGE.--38 years (1951-89), 918 ft^3/s, 29.19 in/yr, 665,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,300 ft^3/s, June 8, 1964, gage height, 8.00 ft, in gage well, 8.6 ft, from outside floodmarks, site and datum then in use, from rating curve extended above 8,000 ft^3/s on basis of slope-area measurement of peak flow; minimum daily, 62 ft^3/s, Jan. 2, 1977, but may have been less during periods of no winter record.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,640 ft^3/s, May 8, gage height, 5.44 ft; minimum daily, 86 ft^3/s, Feb. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	277	283	240	e155	e124	e109	156	2120	2850	1450	410	441
2	279	302	260	e155	e99	e102	158	2790	3890	1540	405	656
3	270	355	236	e162	e88	e99	155	2920	4230	1530	403	770
4	261	379	227	e177	e86	e104	150	3010	4050	1500	403	666
5	252	374	218	e176	e94	e111	162	3430	4250	e1440	394	627
6	244	595	e219	e155	e106	e120	184	4570	4830	e1270	376	642
7	234	869	219	e141	e117	e129	250	5910	5080	e1160	359	611
8	225	683	227	e136	e123	e133	282	6400	4690	e985	356	566
9	218	596	219	e131	e124	e138	266	5970	4380	e883	355	538
10	208	533	208	e125	e124	e145	266	5870	4360	e809	369	519
11	211	505	208	e124	e123	e155	275	5290	4390	e773	351	494
12	205	473	216	e122	e123	e152	294	4300	4220	e727	343	467
13	202	436	241	e134	e124	e154	361	3640	3750	755	339	441
14	204	402	230	e147	e124	e150	449	3110	3480	857	328	422
15	306	365	179	e150	e124	e145	685	2990	3440	790	329	406
16	988	357	147	e161	e123	e138	1060	3290	3380	745	317	392
17	1050	344	e141	e164	e122	e136	1050	3660	3220	716	318	379
18	747	327	e141	e168	e121	e134	969	3450	3060	681	308	374
19	604	320	e142	e170	e122	e136	1120	2930	3050	651	302	369
20	526	314	e153	e139	e124	e145	1600	2440	2790	632	293	350
21	468	302	e161	e131	e125	e162	2580	2240	2430	596	298	335
22	436	316	e160	e120	e127	e167	3510	2330	2170	564	303	326
23	400	352	e158	e113	e131	e166	3080	2840	2030	546	301	317
24	367	311	e148	e108	e129	e162	2390	2600	2070	526	317	309
25	339	295	e123	e106	e131	e164	2060	2240	1930	506	376	303
26	352	267	e115	e111	e130	e173	1770	2100	1740	491	382	295
27	352	242	e118	e124	e128	171	1600	2010	1610	477	452	288
28	319	289	e127	e134	e127	165	1430	1910	1540	474	515	283
29	295	276	e138	e148	---	163	1410	1740	1500	448	534	278
30	281	243	e156	e166	---	159	1650	1670	1450	432	493	278
31	280	---	e160	e175	---	155	---	1910	---	419	466	---
TOTAL	11400	11705	5635	4428	3343	4442	31372	101680	95860	25373	11495	13142
MEAN	368	390	182	143	119	143	1046	3280	3195	818	371	438
MAX	1050	869	260	177	131	173	3510	6400	5080	1540	534	770
MIN	202	242	115	106	86	99	150	1670	1450	419	293	278
AC-FT	22610	23220	11180	8780	6630	8810	62230	201700	190100	50330	22800	26070
CFSM	.86	.91	.43	.33	.28	.34	2.45	7.68	7.48	1.92	.87	1.03
IN.	.99	1.02	.49	.39	.29	.39	2.73	8.86	8.35	2.21	1.00	1.14

CAL YR 1988 TOTAL 248818 MEAN 680 MAX 5260 MIN 88 AC-FT 493500 CFSM 1.59 IN. 21.68
WTR YR 1989 TOTAL 319875 MEAN 876 MAX 6400 MIN 86 AC-FT 634500 CFSM 2.05 IN. 27.87

e Estimated

PEND OREILLE RIVER BASIN

12355000 FLATHEAD RIVER AT FLATHEAD, BRITISH COLUMBIA--Continued
(National stream quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1949-50, 1965, 1970, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to September 1981.
WATER TEMPERATURE: November 1974 to current year.
SUSPENDED-SEDIMENT DISCHARGE: April 1975 to October 1978, August 1985 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 1, 1975.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1975-81): Maximum, 309 microsiemens, Jan. 12, 28, 1975, Jan. 20, 1980; minimum, 130 microsiemens, May 20, 1976.
WATER TEMPERATURE: Maximum (water years 1975-80, 1982-85), 19.5°C Aug. 2, 1977; minimum, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATION: Maximum daily mean, 1,310 mg/L, June 20, 1975; minimum daily mean, 1 mg/L on many days most years.
SEDIMENT LOAD: Maximum daily, 36,100 tons, June 20, 1975; minimum daily, 0.24, ton Feb. 1, 23, 1988.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 18.0°C, Aug. 1; minimum, 0.0°C on many days during winter period.
SEDIMENT CONCENTRATION: Maximum daily mean, 331 mg/L, May 7; minimum daily mean, 1 mg/L on many days during the year.
SEDIMENT LOAD: Maximum daily, 5,280 tons, May 7; minimum daily, 0.38 tons, Dec. 17, 18, 19.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
DEC											
06...	1030	237	100	1	259	1.0	0.0	660	12.9	102	<1
MAR											
08...	1400	133	95	73	315	4.0	0.0	661	12.2	96	<1
MAY											
09...	1230	5880	10	1	152	13.0	3.5	663	11.4	99	K14
JUN											
06...	1430	4670	10	1	163	25.0	8.5	--	--	--	--
AUG											
22...	1030	314	100	51	246	16.5	10.5	659	10.0	104	K3

DATE	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)	PH (STAND-ARD UNITS) (00400)	TUR-BID-ITY (NTU) (00076)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)
DEC											
06...	<1	164	0	133	8.2	0.30	150	44	9.5	1.0	0.0
MAR											
08...	<1	171	0	140	7.9	0.20	150	45	9.7	0.90	0.0
MAY											
09...	K3	106	0	87	8.1	24	94	28	5.8	0.70	0.0
JUN											
06...	--	--	--	--	--	--	--	--	--	--	--
AUG											
22...	K6	171	0	139	8.4	0.40	150	45	9.0	0.90	0.0

12355000 FLATHEAD RIVER AT FLATHEAD, BRITISH COLUMBIA--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)
DEC											
06...	0.30	138	6.1	0.30	0.10	4.6	135	147	0.18	86.4	<0.010
MAR											
08...	0.30	144	6.5	0.20	0.10	4.5	156	151	0.21	56.0	<0.010
MAY											
09...	0.40	89	3.0	0.20	0.10	4.4	100	95	0.14	1590	<0.010
JUN											
06...	--	--	--	--	--	--	--	--	--	--	--
AUG											
22...	0.30	141	5.0	0.20	0.10	5.0	156	150	0.21	132	<0.010

DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHOROUS TOTAL (MG/L AS P) (00665)	PHOSPHOROUS DISSOLVED (MG/L AS P) (00666)	PHOSPHOROUS ORTHO, DISSOLVED (MG/L AS P) (00671)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)
DEC										
06...	<0.100	<0.010	<0.010	0.20	<0.002	<0.002	<0.001	<10	<1	54
MAR										
08...	<0.100	<0.010	0.020	<0.20	0.002	<0.001	0.002	<10	<1	55
MAY										
09...	<0.100	0.010	0.020	<0.20	0.016	0.005	0.003	20	<1	36
JUN										
06...	--	--	--	--	--	--	--	--	--	--
AUG										
22...	<0.100	0.010	0.020	<0.20	0.002	<0.001	<0.001	20	<1	62

DATE	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)
DEC										
06...	<0.5	1	<1	<3	1	5	<5	5	2	<0.1
MAR										
08...	<0.5	<1	<1	<3	1	<3	<5	<4	<1	<0.1
MAY										
09...	<0.5	<1	<1	<3	18	24	3	<4	4	<0.1
JUN										
06...	--	--	--	--	--	--	--	--	--	--
AUG										
22...	<0.5	<1	<1	<3	2	<3	1	4	<1	<0.1

DATE	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
DEC										
06...	<10	5	<1	<1.0	59	<6	21	4	2.6	95
MAR										
08...	<10	1	<1	<1.0	62	<6	9	12	4.3	53
MAY										
09...	<10	10	<1	<1.0	41	<6	9	112	1780	57
JUN										
06...	--	--	--	--	--	--	--	100	1260	60
AUG										
22...	<10	<1	<1	<1.0	60	<6	8	1	0.85	92

PEND OREILLE RIVER BASIN

12355000 FLATHEAD RIVER AT FLATHEAD, BRITISH COLUMBIA--Continued

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	10.5	7.0	9.0	6.0	4.0	5.0	.5	.0	.0	.0	.0	.0
2	10.5	6.5	9.0	6.0	5.0	5.5	.0	.0	.0	.0	.0	.0
3	10.0	6.5	8.5	5.5	5.0	5.0	.5	.0	.0	.0	.0	.0
4	9.5	6.0	8.0	5.0	4.5	4.5	.0	.0	.0	.0	.0	.0
5	9.5	6.0	8.0	4.5	4.0	4.5	.0	.0	.0	.0	.0	.0
6	9.0	6.0	8.0	5.0	4.0	4.5	.5	.0	.0	.0	.0	.0
7	9.5	5.5	8.0	4.0	3.0	3.5	1.0	.0	.5	.0	.0	.0
8	10.0	6.5	8.5	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0
9	10.0	6.5	8.5	3.0	2.5	3.0	1.5	.0	.5	.0	.0	.0
10	9.5	6.0	8.0	3.0	2.0	2.5	1.5	.5	1.0	.0	.0	.0
11	9.5	6.0	8.0	3.0	2.0	2.5	.5	.0	.0	.0	.0	.0
12	9.0	6.0	8.0	2.5	1.5	2.0	2.5	.0	1.5	.0	.0	.0
13	8.5	6.0	7.5	2.5	1.5	2.0	2.0	1.5	1.5	.0	.0	.0
14	8.5	7.5	8.0	2.0	1.0	1.5	1.5	.0	1.0	.0	.0	.0
15	8.0	7.5	7.5	2.0	1.0	1.5	.0	.0	.0	.0	.0	.0
16	8.0	7.0	7.5	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
17	7.0	5.5	6.0	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
18	5.5	4.0	5.0	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
19	6.0	5.0	5.5	2.0	1.5	2.0	.0	.0	.0	.0	.0	.0
20	7.5	6.0	6.5	2.0	1.5	2.0	.0	.0	.0	.0	.0	.0
21	8.0	5.5	7.0	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
22	7.5	6.0	6.5	2.5	2.0	2.0	.0	.0	.0	.0	.0	.0
23	6.0	5.0	5.5	2.5	1.0	2.0	.0	.0	.0	.0	.0	.0
24	6.5	4.5	5.5	1.0	.5	1.0	.0	.0	.0	.0	.0	.0
25	6.0	4.5	5.5	.5	.0	.5	.0	.0	.0	.0	.0	.0
26	5.5	3.5	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	3.0	1.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	3.0	1.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	2.5	.5	2.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
30	4.5	2.0	3.5	.5	.0	.5	.0	.0	.0	.0	.0	.0
31	6.5	4.0	5.5	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	10.5	.5	6.6	6.0	.0	2.3	2.5	.0	.2	.0	.0	.0
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	3.5	1.5	2.5	7.5	3.0	5.5
2	.0	.0	.0	.0	.0	.0	3.5	1.5	2.0	6.0	4.0	4.5
3	.0	.0	.0	.0	.0	.0	4.0	.5	2.0	6.0	3.5	4.5
4	.0	.0	.0	.0	.0	.0	4.0	1.5	2.5	7.5	3.0	5.0
5	.0	.0	.0	.0	.0	.0	3.0	.5	1.5	8.0	3.5	5.5
6	.0	.0	.0	.0	.0	.0	3.0	1.5	2.0	7.5	3.5	5.5
7	.0	.0	.0	.0	.0	.0	5.0	2.0	3.5	7.0	4.0	5.5
8	.0	.0	.0	.0	.0	.0	4.5	1.5	3.0	7.5	3.5	5.5
9	.0	.0	.0	.0	.0	.0	5.0	.5	2.5	8.0	3.5	5.5
10	.0	.0	.0	.0	.0	.0	6.5	.5	3.5	6.0	4.0	5.0
11	.0	.0	.0	.0	.0	.0	6.5	1.5	4.0	6.0	3.5	5.0
12	.0	.0	.0	.0	.0	.0	7.0	1.5	4.5	7.5	3.0	5.0
13	.0	.0	.0	.0	.0	.0	7.0	2.5	4.5	5.5	4.0	5.0
14	.0	.0	.0	.0	.0	.0	7.0	2.0	4.5	7.0	4.0	5.5
15	.0	.0	.0	.0	.0	.0	6.0	2.5	4.0	8.5	3.5	6.0
16	.0	.0	.0	.0	.0	.0	3.0	1.5	2.0	6.5	4.5	5.5
17	.0	.0	.0	.0	.0	.0	5.0	1.0	2.5	5.5	4.5	5.0
18	.0	.0	.0	.0	.0	.0	7.0	1.5	4.0	6.5	4.0	5.0
19	.0	.0	.0	.0	.0	.0	6.5	2.5	4.5	5.0	3.5	4.0
20	.0	.0	.0	.0	.0	.0	6.5	2.0	4.0	8.0	3.0	5.0
21	.0	.0	.0	.0	.0	.0	5.5	2.0	3.5	8.5	4.0	6.5
22	.0	.0	.0	.0	.0	.0	4.5	2.0	3.0	9.0	4.5	7.0
23	.0	.0	.0	.0	.0	.0	4.5	2.0	3.0	7.5	4.5	5.5
24	.0	.0	.0	.0	.0	.0	6.0	2.5	4.0	5.0	3.5	4.0
25	.0	.0	.0	.0	.0	.0	4.5	3.0	3.5	7.5	4.0	5.5
26	.0	.0	.0	.5	.0	.0	5.5	2.5	4.0	7.5	5.0	6.0
27	.0	.0	.0	2.5	1.0	1.5	4.5	3.0	3.5	6.0	5.0	5.5
28	.0	.0	.0	3.5	1.5	2.5	6.5	2.5	4.5	4.5	3.5	4.0
29	---	---	---	2.5	1.5	2.0	8.0	2.5	5.0	6.5	3.0	4.5
30	---	---	---	3.5	.5	2.0	8.5	3.0	5.5	9.0	4.0	6.5
31	---	---	---	4.5	2.0	3.0	---	---	---	10.5	5.5	8.0
MONTH	.0	.0	.0	4.5	.0	.4	8.5	.5	3.4	10.5	3.0	5.4

PEND OREILLE RIVER BASIN

12355000 FLATHEAD RIVER AT FLATHEAD, BRITISH COLUMBIA--Continued

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	10.5	6.0	8.0	11.5	8.5	10.5	18.0	13.0	15.5	13.0	7.5	10.5
2	9.0	6.0	7.5	12.5	8.5	10.0	14.5	11.0	13.0	11.5	10.0	10.5
3	8.0	6.0	7.0	14.5	8.0	11.0	11.5	10.5	11.0	12.0	9.0	10.0
4	10.0	4.5	7.0	14.0	8.5	11.5	12.5	9.0	11.0	12.5	8.5	10.5
5	11.0	5.5	8.0	14.0	9.0	11.5	17.0	10.0	13.0	10.5	8.5	9.5
6	11.0	6.5	8.5	15.0	8.5	12.0	17.5	11.0	14.5	11.5	7.0	9.0
7	10.5	6.5	8.5	15.0	9.5	12.5	17.5	12.0	15.0	11.0	7.5	9.5
8	10.5	6.5	8.5	14.5	10.0	12.5	17.0	11.5	15.0	10.0	8.0	9.0
9	8.5	7.0	8.0	13.0	8.5	11.0	16.0	12.5	13.5	10.0	6.0	8.0
10	7.5	6.0	6.5	12.5	9.5	11.0	16.0	10.5	13.0	10.5	7.0	9.0
11	9.0	5.5	7.0	15.5	9.0	12.0	16.0	11.5	14.0	10.5	6.0	8.0
12	11.0	6.0	8.5	16.0	10.0	13.0	17.5	10.5	14.0	11.0	6.0	8.5
13	11.0	7.0	9.0	14.5	11.0	12.0	17.5	13.0	15.5	11.5	7.0	9.5
14	9.5	8.0	8.5	16.5	10.0	13.0	15.5	12.0	14.0	12.0	7.5	10.0
15	10.5	7.0	9.0	16.0	11.5	14.0	16.0	12.0	14.0	12.0	7.5	10.0
16	10.5	7.5	9.0	15.0	11.0	13.0	13.0	10.5	12.0	10.5	7.5	9.5
17	9.0	7.0	8.0	13.0	10.5	11.5	12.5	10.0	11.0	9.5	8.0	9.0
18	11.0	7.0	8.5	15.5	8.5	12.0	15.0	8.0	11.5	8.5	7.0	8.0
19	9.0	7.0	8.0	16.0	10.5	13.5	14.5	10.0	12.5	10.5	6.5	8.0
20	9.5	6.5	8.0	17.0	11.5	14.0	14.0	10.5	12.0	10.5	6.0	8.5
21	11.5	6.0	8.5	17.0	12.0	14.5	13.0	11.0	12.0	11.0	6.5	8.5
22	10.0	7.0	9.0	16.5	10.5	13.5	12.0	10.5	11.5	11.5	7.0	9.5
23	11.0	7.5	9.0	16.5	10.5	13.5	11.5	10.0	11.0	11.5	7.0	9.5
24	11.0	7.0	9.0	16.5	10.5	13.5	10.5	10.0	10.5	11.5	7.5	9.5
25	12.5	7.5	10.0	17.0	11.5	14.5	13.0	9.0	11.0	11.5	7.0	9.5
26	12.5	8.5	10.5	17.0	11.5	14.5	11.5	9.0	10.5	12.0	8.0	10.5
27	12.5	7.5	10.0	17.5	12.0	15.0	11.5	9.5	10.5	11.5	8.0	10.0
28	12.5	7.5	10.0	17.5	12.0	15.0	12.0	9.0	10.5	11.0	7.0	9.0
29	14.0	9.0	11.5	17.5	11.0	14.5	12.5	8.5	10.5	11.0	6.5	9.0
30	14.0	9.0	11.5	17.0	12.5	15.0	12.5	8.5	10.5	9.0	7.0	8.0
31	---	---	---	17.5	11.5	14.5	11.5	9.0	10.0	---	---	---
MONTH	14.0	4.5	8.7	17.5	8.0	12.9	18.0	8.0	12.4	13.0	6.0	9.2

PEND OREILLE RIVER BASIN

12355000 FLATHEAD RIVER AT FLATHEAD, BRITISH COLUMBIA--Continued

SUSPENDED-SEDIMENT, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN-TRATION (MG/L)	LOADS (T/DAY)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	2	1.5	1	.76	3	1.9	2	.84	3	1.0	5	1.5
2	2	1.5	1	.82	2	1.4	2	.84	3	.80	5	1.4
3	2	1.5	1	.96	2	1.3	2	.87	3	.71	4	1.1
4	2	1.4	2	2.0	2	1.2	2	.96	3	.70	4	1.1
5	2	1.4	2	2.0	2	1.2	2	.95	3	.76	3	.90
6	1	.66	10	16	2	1.2	2	.84	3	.86	3	.97
7	1	.63	17	40	1	.59	2	.76	3	.95	2	.70
8	1	.61	10	18	1	.61	2	.73	3	1.0	2	.72
9	1	.59	8	13	2	1.2	2	.71	3	1.0	2	.75
10	1	.56	7	10	1	.56	2	.68	3	1.0	2	.78
11	2	1.1	6	8.2	1	.56	2	.67	3	1.0	2	.84
12	2	1.1	5	6.4	1	.58	2	.66	3	1.0	2	.82
13	2	1.1	4	4.7	1	.65	3	1.1	3	1.0	2	.83
14	2	1.1	3	3.3	1	.62	3	1.2	3	1.0	1	.41
15	3	2.5	3	3.0	1	.48	3	1.2	3	1.0	1	.39
16	22	59	2	1.9	1	.40	3	1.3	3	1.0	2	.75
17	17	48	2	1.9	1	.38	3	1.3	3	.99	2	.73
18	6	12	2	1.8	1	.38	3	1.4	3	.98	2	.72
19	4	6.5	2	1.7	1	.38	3	1.4	3	.99	2	.73
20	3	4.3	2	1.7	1	.41	3	1.1	3	1.0	2	.78
21	2	2.5	2	1.6	2	.87	3	1.1	3	1.0	3	1.3
22	1	1.2	3	2.6	2	.86	3	.97	4	1.4	3	1.4
23	1	1.1	8	7.6	3	1.3	3	.92	4	1.4	3	1.3
24	1	.99	6	5.0	3	1.2	4	1.2	4	1.4	3	1.3
25	1	.92	6	4.8	3	1.0	4	1.1	5	1.8	3	1.3
26	1	.95	4	2.9	3	.93	3	.90	5	1.8	3	1.4
27	1	.95	5	3.3	4	1.3	3	1.0	5	1.7	3	1.4
28	1	.86	10	7.8	4	1.4	3	1.1	5	1.7	3	1.3
29	1	.80	8	6.0	3	1.1	3	1.2	---	---	4	1.8
30	1	.76	5	3.3	2	.84	3	1.3	---	---	4	1.7
31	1	.76	---	---	2	.86	3	1.4	---	---	4	1.7
TOTAL	---	158.84	---	183.04	---	27.66	---	31.70	---	30.94	---	32.82
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	4	1.7	53	303	33	254	5	20	1	1.1	5	6.0
2	4	1.7	82	618	69	725	5	21	2	2.2	12	21
3	5	2.1	50	394	94	1070	5	21	2	2.2	14	29
4	5	2.0	39	317	70	765	4	16	3	3.3	6	11
5	5	2.2	57	528	48	551	3	12	3	3.2	3	5.1
6	7	3.5	174	2150	92	1200	2	6.9	3	3.0	3	5.2
7	16	11	331	5280	99	1360	4	13	2	1.9	3	4.9
8	17	13	291	5030	68	861	4	11	1	.96	3	4.6
9	6	4.3	173	2790	52	615	5	12	1	.96	2	2.9
10	12	8.6	64	1010	43	506	5	11	1	1.0	1	1.4
11	7	5.2	48	686	32	379	5	10	1	.95	1	1.3
12	12	9.5	40	464	25	285	4	7.9	1	.93	1	1.3
13	16	16	43	423	22	223	4	8.2	1	.92	1	1.2
14	18	22	42	353	18	169	5	12	1	.89	1	1.1
15	68	126	39	315	15	139	2	4.3	1	.89	1	1.1
16	51	146	38	338	15	137	3	6.0	1	.86	2	2.1
17	40	113	45	445	15	130	2	3.9	2	1.7	1	1.0
18	30	78	31	289	11	91	1	1.8	1	.83	1	1.0
19	33	100	19	150	10	82	1	1.8	1	.82	1	1.0
20	104	449	15	99	7	53	1	1.7	1	.79	1	.95
21	158	1100	14	85	6	39	1	1.6	1	.80	1	.90
22	218	2070	12	75	5	29	1	1.5	2	1.6	1	.88
23	87	723	24	184	6	33	2	2.9	1	.81	1	.86
24	46	297	14	98	13	73	2	2.8	1	.86	1	.83
25	38	211	12	73	17	89	2	2.7	1	1.0	1	.82
26	31	148	12	68	13	61	2	2.7	2	2.1	1	.80
27	33	143	12	65	9	39	1	1.3	3	3.7	1	.78
28	31	120	13	67	6	25	1	1.3	7	9.7	1	.76
29	21	80	18	85	4	16	2	2.4	6	8.7	1	.75
30	27	120	13	59	4	16	2	2.3	5	6.7	1	.75
31	---	---	20	103	---	---	1	1.1	5	6.3	---	---
TOTAL	---	6126.8	---	22944	---	10015	---	224.1	---	71.67	---	111.28

TOTAL LOAD FOR YEAR: 39957.85 TONS

PEND OREILLE RIVER BASIN

12355500 NORTH FORK FLATHEAD RIVER NEAR COLUMBIA FALLS, MT

LOCATION.--Lat 48°29'44", long 114°07'36", in NE1/4SW1/4NW1/4 sec.35, T.32 N., R.20 W., Flathead County, Hydrologic Unit 17010206, on right bank 1.5 mi downstream from Canyon Creek, 3.8 mi upstream from Middle Fork, 8.8 mi northeast of Columbia Falls, and at mile 162.1.

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

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1910 to September 1917 (no winter records in water years 1913, 1916, 1917), April 1929 to February 1935 (incomplete), June 1935 to current year. Monthly discharge only for some periods, published in WSP 1316. Published as Flathead River near Columbia Falls 1915-17, 1929-70.

REVISED RECORDS.--WSP 1216: Drainage area. WSP 1246: 1911, 1912(M), 1915-17(M), 1929 (M), 1938-39(M), 1946(M).

GAGE.--Water-stage recorder. Datum of gage is 3,145.59 ft above National Geodetic Vertical Datum of 1929. September 1910 to September 1917 and April to August 1929, nonrecording gages, and May 1, 1930, to Sept. 30, 1962, water-stage recorder, all at site 2.7 mi downstream at different datums.

REMARKS.--Estimated daily discharges: Dec. 3,4, Dec. 16 to Jan. 31, Feb. 4 to Mar. 17, May 8-10, 13-15,18,20-22. Water-discharge records good except those for estimated daily discharges, which are poor. A few small diversions from tributaries for irrigation of hay meadows upstream from station. U. S. Bureau of Reclamation statellite at station.

AVERAGE DISCHARGE.--58 years (1910-12, 1913-15, 1935-89), 2,940 ft^3/s, 25.79 in/yr, 2,130,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 69,100 ft^3/s, June 9, 1964, gage height, 18.60 ft, from flood-mark, from rating curve extended above 37,000 ft^3/s on basis of slope-area measurement of peak flow; minimum, 198 ft^3/s, Jan. 8, 1953, gage height, 0.86 ft, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 16,500 ft^3/s, May 10, gage height, 8.71 ft; minimum, 255 ft^3/s, Feb. 1, gage height, 1.09 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	864	1040	895	e800	351	e400	794	6060	6060	5090	1820	1910
2	849	1030	857	e840	309	e370	786	7250	8140	4880	1760	2070
3	834	1140	e860	e860	397	e400	756	8640	10300	4510	1740	2510
4	819	1230	e840	e900	e460	e430	747	8900	11000	4210	1700	2550
5	806	1250	860	e880	e480	e400	778	9170	11200	4010	1650	2420
6	794	1350	870	e820	e500	e430	943	10600	12400	3850	1570	2430
7	780	1820	874	e700	e500	e470	1380	13600	14100	3680	1500	2360
8	762	1880	803	e640	e520	e450	1940	e15900	14000	3530	1460	2240
9	744	1730	803	e680	e520	e450	1880	e15500	13600	3430	1460	2110
10	729	1630	795	e760	e520	e570	1790	e15900	13500	3330	1530	2030
11	716	1570	765	e740	e540	e650	1820	15800	13600	3300	1530	1920
12	703	1530	779	e720	e540	e700	1920	13800	12500	3080	1510	1830
13	701	1480	944	e720	e550	e750	2240	e11500	11700	3110	1530	1740
14	702	1380	953	e700	e540	e800	2770	e9900	11500	3310	1480	1660
15	756	1300	800	e680	e520	e850	3600	e8900	11200	3250	1500	1590
16	1290	1250	e740	e700	e490	e800	5000	8820	11300	3190	1450	1520
17	2710	1210	e720	e720	e470	e740	4820	9480	10300	3150	1420	1510
18	2400	1170	e720	e740	e480	747	4370	e9950	8970	3040	1380	1550
19	2090	1130	e900	e760	e490	762	4720	9180	8100	2850	1320	1520
20	1870	1110	e940	e720	e500	755	5900	e8100	7630	2840	1290	1450
21	1690	1090	e960	e700	e490	730	8200	e7150	6920	2800	1310	1400
22	1580	1120	e940	e680	e480	730	10600	e6850	6300	2690	1370	1360
23	1480	1290	e900	e640	e490	721	10700	7150	5960	2580	1430	1310
24	1390	1230	e850	e560	e490	694	8880	7770	5670	2440	1550	1290
25	1300	1140	e800	e600	e480	710	7870	7240	5670	2330	1750	1260
26	1260	1090	e700	e600	e480	760	7010	6670	5740	2230	1890	1230
27	1300	928	e660	e600	e470	800	6390	6340	5720	2140	1960	1190
28	1220	990	e750	e580	e440	812	5720	6260	5470	2120	2090	1160
29	1140	1010	e850	e580	---	839	5360	5910	5220	2030	2150	1140
30	1090	957	e880	e630	---	818	5460	5540	5120	1950	2110	1130
31	1060	---	e900	e600	---	798	---	5380	---	1880	2000	---
TOTAL	36429	38075	25908	21850	13497	20336	125144	289210	278890	96830	50210	51390
MEAN	1175	1269	836	705	482	656	4171	9329	9296	3124	1620	1713
MAX	2710	1880	960	900	550	850	10700	15900	14100	5090	2150	2550
MIN	701	928	660	560	309	370	747	5380	5120	1880	1290	1130
AC-FT	72260	75520	51390	43340	26770	40340	248200	573600	553200	192100	99590	101900

CAL YR 1988 TOTAL 755684 MEAN 2065 MAX 11500 MIN 350 AC-FT 1499000
WTR YR 1989 TOTAL 1047769 MEAN 2871 MAX 15900 MIN 309 AC-FT 2078000

e Estimated

PEND OREILLE RIVER BASIN

12355500 NORTH FORK FLATHEAD RIVER NEAR COLUMBIA FALLS, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1950, 1965, 1970, 1976 to current year.
PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1975 to October 1978.
WATER TEMPERATURE: October 1975 to current year.
SUSPENDED-SEDIMENT DISCHARGE: October 1975 to November 1978.
INSTRUMENTATION.--Temperature recorder since Oct. 1, 1975.
EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1976-79): Maximun daily, 246 microsiemens, Dec. 31, 1976; minimum daily, 128 microsiemens, June 30, July 1, 1976.
WATER TEMPERATURE: Maximum, 19.5°C, July 28, 1987; minimum, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATION (water years 1976-79): Maximum daily mean, 931 mg/L, May 11, 1976; minimum daily mean, 1 mg/L on many days each year.
SEDIMENT LOAD (water years 1976-79): Maximum daily, 56,800 tons, May 11, 1976; minimum daily, 1.1 tons, Mar. 3, 1978.
EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURE: Maximum, 18.5°C, July 27, Aug. 13; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
OCT					
03...	1340	860	224	24.0	10.5
NOV					
29...	1300	936	206	1.0	0.0
JAN					
17...	1510	721	214	5.0	0.0
FEB					
15...	1230	506	238	-10.0	0.0
MAR					
23...	1255	745	215	5.0	2.5
APR					
25...	1230	7770	155	4.0	4.5
MAY					
10...	1500	15800	140	18.0	6.0
JUL					
27...	1115	2070	189	26.0	16.0

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	11.0	9.5	10.5	6.0	4.5	5.5	1.0	.0	.0	.0	.0	.0
2	11.0	9.0	10.5	6.5	6.0	6.5	.0	.0	.0	.0	.0	.0
3	10.5	9.0	10.0	6.5	6.0	6.5	.0	.0	.0	.0	.0	.0
4	10.0	8.0	9.5	6.0	6.0	6.0	.0	.0	.0	.0	.0	.0
5	9.5	8.0	9.0	6.0	5.5	5.5	.0	.0	.0	.0	.0	.0
6	9.5	8.0	9.0	5.5	5.0	5.5	.0	.0	.0	.0	.0	.0
7	9.5	7.5	8.5	5.0	4.0	4.5	.5	.0	.5	.0	.0	.0
8	9.5	8.0	9.0	4.0	3.5	3.5	.5	.0	.0	.0	.0	.0
9	10.0	8.0	9.5	3.5	3.5	3.5	1.0	.0	.5	.0	.0	.0
10	10.0	8.0	9.0	3.5	2.5	3.0	1.0	.5	1.0	.0	.0	.0
11	9.5	8.0	9.0	3.0	3.0	3.0	1.0	1.0	1.0	.0	.0	.0
12	9.5	8.0	9.0	3.0	2.5	3.0	2.0	1.0	1.5	.0	.0	.0
13	9.5	7.5	8.5	3.0	2.5	2.5	2.5	2.0	2.5	.0	.0	.0
14	8.5	8.5	8.5	2.5	2.0	2.5	2.0	.0	1.0	.0	.0	.0
15	9.0	8.5	9.0	2.5	2.0	2.5	.0	.0	.0	.0	.0	.0
16	9.5	8.5	9.0	2.5	2.5	2.5	.0	.0	.0	.0	.0	.0
17	8.5	7.0	7.5	3.0	2.5	3.0	.0	.0	.0	.0	.0	.0
18	7.0	6.0	6.5	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0
19	7.0	6.0	6.5	2.5	2.0	2.5	.0	.0	.0	.0	.0	.0
20	8.0	7.0	7.5	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
21	8.5	7.0	8.0	3.0	2.5	2.5	.0	.0	.0	.0	.0	.0
22	8.5	7.5	8.0	3.5	3.0	3.0	.0	.0	.0	.0	.0	.0
23	7.5	7.0	7.0	3.5	2.5	3.5	.0	.0	.0	.0	.0	.0
24	7.5	6.5	7.0	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
25	7.0	6.0	6.5	1.5	.5	1.0	.0	.0	.0	.0	.0	.0
26	6.5	6.0	6.5	1.0	.0	.5	.0	.0	.0	.0	.0	.0
27	6.0	3.5	4.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	3.5	2.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	3.0	2.5	3.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
30	3.5	2.5	3.0	1.5	.5	1.0	.0	.0	.0	.0	.0	.0
31	5.5	3.5	4.5	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	11.0	2.0	7.6	6.5	.0	3.0	2.5	.0	.3	.0	.0	.0

PEND OREILLE RIVER BASIN

12355500 NORTH FORK FLATHEAD RIVER NEAR COLUMBIA FALLS, MT--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	4.0	3.0	3.5	8.0	5.5	6.5
2	.0	.0	.0	.0	.0	.0	3.0	2.5	3.0	7.0	5.0	6.0
3	.0	.0	.0	.0	.0	.0	3.5	2.0	2.5	6.5	4.5	5.5
4	.0	.0	.0	.0	.0	.0	3.0	2.5	3.0	7.0	5.0	6.0
5	.0	.0	.0	.0	.0	.0	3.0	2.0	2.5	7.5	5.5	6.5
6	.0	.0	.0	.0	.0	.0	3.5	2.5	3.0	8.0	5.5	7.0
7	.0	.0	.0	.0	.0	.0	4.0	2.5	3.0	7.5	6.0	7.0
8	.0	.0	.0	.0	.0	.0	3.5	2.0	3.0	8.0	5.5	6.5
9	.0	.0	.0	.0	.0	.0	4.0	1.0	2.5	8.0	5.5	7.0
10	.0	.0	.0	.0	.0	.0	5.0	2.0	3.5	7.5	6.0	7.0
11	.0	.0	.0	.0	.0	.0	5.0	2.5	4.0	6.5	5.0	6.0
12	.0	.0	.0	.0	.0	.0	5.5	3.0	4.5	7.0	4.5	5.5
13	.0	.0	.0	.0	.0	.0	6.0	3.5	5.0	7.0	5.5	6.0
14	.0	.0	.0	.0	.0	.0	6.0	3.5	5.0	7.5	5.5	6.5
15	.0	.0	.0	.0	.0	.0	5.5	3.5	4.5	8.5	5.5	6.5
16	.0	.0	.0	.0	.0	.0	5.0	2.0	3.0	7.5	6.5	7.0
17	.0	.0	.0	.0	.0	.0	5.0	1.5	3.0	7.0	6.0	6.5
18	.0	.0	.0	.5	.0	.0	6.5	3.0	4.5	7.0	5.5	6.5
19	.0	.0	.0	1.5	.5	1.0	6.5	4.0	5.5	6.5	5.0	5.5
20	.0	.0	.0	2.0	1.5	1.5	7.0	4.0	5.5	7.5	4.5	5.5
21	.0	.0	.0	2.0	1.5	1.5	6.0	4.0	5.0	8.0	5.5	7.0
22	.0	.0	.0	2.0	1.5	2.0	5.0	4.0	4.5	8.5	6.5	7.5
23	.0	.0	.0	2.5	1.5	2.0	4.5	3.0	4.0	8.5	6.5	7.5
24	.0	.0	.0	3.0	1.5	2.0	6.0	3.5	4.5	6.0	5.0	5.5
25	.0	.0	.0	2.5	2.0	2.5	6.0	4.5	5.0	7.5	5.0	6.0
26	.0	.0	.0	3.0	2.5	2.5	6.0	4.0	5.0	8.0	6.0	7.0
27	.0	.0	.0	2.5	1.5	2.0	5.5	4.0	4.5	8.0	7.0	7.0
28	.0	.0	.0	3.5	1.5	2.5	7.0	3.5	5.0	6.5	5.0	5.5
29	---	---	---	3.5	1.5	2.5	7.5	4.5	6.0	5.5	4.0	4.5
30	---	---	---	3.5	2.5	3.0	8.0	5.0	6.5	8.5	5.0	6.5
31	---	---	---	4.0	2.5	3.5	---	---	---	10.5	7.5	9.0
MONTH	.0	.0	.0	4.0	.0	.9	8.0	1.0	4.1	10.5	4.0	6.4
		JUNE			JULY			AUGUST			SEPTEMBER	
1	10.5	8.5	9.5	13.5	11.5	12.0	18.0	16.5	17.5	13.5	11.5	12.5
2	10.0	8.0	9.0	13.0	10.5	11.5	17.5	14.5	15.5	13.5	12.0	12.5
3	9.0	8.0	8.5	14.0	10.5	12.5	14.5	13.0	13.5	12.0	11.0	11.5
4	10.0	6.5	8.0	15.0	11.5	13.5	14.0	12.0	13.0	12.5	10.5	11.5
5	10.5	8.0	9.0	14.5	12.0	13.5	16.0	12.5	14.5	12.5	11.5	12.0
6	10.5	8.5	9.5	15.0	12.0	13.5	17.5	14.5	16.0	12.0	10.0	11.5
7	10.0	8.5	9.5	15.5	12.5	14.0	18.0	15.5	17.0	12.0	10.5	11.0
8	11.0	8.5	9.5	15.5	13.5	14.5	18.0	15.0	16.5	11.5	10.5	11.0
9	10.0	9.0	9.5	15.0	12.0	12.5	18.0	16.0	17.0	10.5	8.5	9.5
10	9.0	7.5	8.0	13.0	11.5	12.5	16.5	14.5	15.5	11.5	10.0	10.5
11	10.0	7.0	8.5	15.0	11.0	13.0	17.5	15.0	16.0	11.0	8.5	10.0
12	11.0	8.0	9.5	15.0	13.0	14.5	17.0	14.5	16.0	11.0	8.5	10.0
13	11.5	9.0	10.5	15.0	14.0	14.5	18.5	16.0	17.0	11.5	9.5	10.5
14	11.0	9.0	10.0	17.0	13.0	14.5	17.5	15.5	17.0	12.5	10.5	11.5
15	10.0	9.0	9.5	17.0	15.0	16.0	17.0	15.0	16.0	12.0	10.5	11.5
16	10.5	9.0	9.5	16.5	14.5	15.5	15.5	13.5	14.5	12.0	10.5	11.5
17	10.0	8.0	9.0	15.5	13.5	14.0	13.5	12.0	12.5	11.5	10.5	11.0
18	10.5	8.0	9.5	15.5	12.0	13.5	15.0	11.5	13.0	10.5	9.5	9.5
19	10.5	8.5	9.0	17.0	14.0	15.0	15.5	13.0	14.5	10.5	9.0	9.5
20	10.0	8.0	9.0	18.0	15.0	16.5	15.5	13.5	14.5	11.0	9.0	10.0
21	10.5	8.0	9.0	18.0	16.0	17.0	14.5	13.5	14.0	11.0	9.0	10.0
22	10.5	9.0	10.0	17.5	14.5	16.0	14.0	13.0	13.0	11.5	9.5	10.5
23	11.0	9.0	10.0	17.0	14.5	16.0	13.0	12.5	13.0	11.5	9.5	11.0
24	12.0	9.0	10.5	17.5	15.0	16.5	12.5	12.0	12.0	11.5	10.0	11.0
25	13.0	10.0	11.5	18.0	15.5	16.5	13.0	11.5	12.0	11.5	10.0	11.0
26	13.5	10.5	12.0	17.5	15.5	17.0	14.0	12.0	13.0	12.5	10.5	11.5
27	12.5	10.0	11.5	18.5	15.5	17.0	13.5	12.0	12.5	12.5	11.0	12.0
28	13.0	10.5	12.0	18.0	16.0	17.0	13.5	12.0	12.5	12.0	10.0	11.5
29	14.5	11.5	13.0	17.5	15.5	16.5	13.5	11.5	12.5	11.0	9.5	10.5
30	14.5	12.0	13.0	18.0	16.5	17.5	13.5	11.5	12.5	11.0	9.5	10.0
31	---	---	---	18.0	15.5	17.0	13.5	12.0	13.0	---	---	---
MONTH	14.5	6.5	9.9	18.5	10.5	14.9	18.5	11.5	14.4	13.5	8.5	10.9

PEND OREILLE RIVER BASIN

12358500 MIDDLE FORK FLATHEAD RIVER NEAR WEST GLACIER, MT

LOCATION.--Lat 48°29'43", long 114°00'33", in S1/2SW1/NE1/4 sec.34, T.32 N., R.19 W., Flathead County, Hydrologic Unit 17010207, on left bank 0.8 mi downstream from McDonald Creek, 1.3 mi west of West Glacier, and at mile 3.8.

DRAINAGE AREA.--1,128 mi^2.

PERIOD OF RECORD.--October 1939 to current year. Prior to October 1947, published as "near Belton."

REVISED RECORDS.--WSP 1216: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 3,128.72 ft above National Geodetic Vertical Datum of 1929. Prior to Nov. 22, 1950, nonrecording gage at present site and datum.

REMARKS.--Estimated daily discharges: Feb. 6-11. Records excellent except those for estimated daily discharges, which are fair. U.S. Bureau of Reclamation satellite at station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--50 years, 2,883 ft^3/s, 34.71 in/yr, 2,089,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 140,000 ft^3/s, June 9, 1964, gage height, 36.46 ft, from floodmarks, from rating curve extended above 31,000 ft^3/s, on basis of contracted opening measurement at gage height, 19.42 ft and flood volume-hydrographic comparison; minimum, less than 173 ft^3/s, Nov. 27, 1952 (stage below intake pipe).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 19,000 ft^3/s, May 11, gage height, 8.14 ft; minimum, 282 ft^3/s, Feb. 2, gage height, 1.17 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	506	1000	842	618	341	351	798	4930	5830	5740	1870	1530
2	492	1020	840	655	303	338	786	6050	8720	5390	1890	1490
3	478	1150	821	666	359	357	764	7630	11300	4830	1790	1600
4	465	1330	792	715	404	388	748	8530	11500	4580	1640	1650
5	453	1350	727	703	428	361	778	8820	11800	4470	1540	1590
6	442	1420	735	659	e460	405	1010	10500	13000	4200	1470	1610
7	432	1720	763	542	e460	460	2500	13900	14500	3970	1430	1550
8	425	1720	749	493	e470	443	3890	16800	14100	3900	1410	1480
9	418	1630	735	532	e470	434	3380	16000	13900	3710	1420	1430
10	412	1530	726	599	e470	545	2940	16100	13900	3420	1480	1410
11	408	1450	717	585	e480	616	2690	18100	15300	3270	1410	1350
12	408	1390	721	569	480	682	2540	15200	14200	3090	1350	1300
13	402	1330	868	568	486	747	2640	12100	13200	3440	1330	1250
14	404	1250	970	562	471	806	3050	10100	12800	4070	1310	1210
15	551	1180	896	540	457	802	3980	9020	12500	3620	1360	1170
16	2050	1120	783	559	438	766	6170	9080	12700	4560	1320	1140
17	3740	1080	678	578	417	722	5970	10000	11100	4170	1230	1140
18	2640	1030	669	589	431	740	4980	10400	9430	3720	1160	1230
19	2020	999	787	601	439	738	4860	9630	8900	3340	1110	1220
20	1750	975	836	567	444	721	6060	8410	8260	3170	1080	1190
21	1580	959	822	562	434	708	9190	7510	7200	3190	1060	1160
22	1450	959	813	556	426	720	11000	6940	6350	3020	1190	1130
23	1340	1040	790	506	432	704	10900	7300	6060	2760	1210	1100
24	1240	1060	759	457	432	685	8980	7820	5860	2560	1230	1090
25	1150	999	676	504	423	689	7460	7330	5930	2450	1540	1070
26	1140	964	521	507	423	743	6370	6560	6020	2350	1950	1050
27	1240	898	562	502	420	779	5750	6030	5910	2310	1860	1030
28	1140	875	633	494	395	804	5250	5920	5720	2260	1780	1020
29	1070	871	669	489	---	822	4800	5660	5540	2130	1720	998
30	1020	854	685	519	---	808	4670	5300	5700	2000	1620	988
31	1000	---	696	556	---	805	---	5200	---	1920	1590	---
TOTAL	32266	35153	23281	17552	12093	19689	134904	292870	297230	107610	45350	38176
MEAN	1041	1172	751	566	432	635	4497	9447	9908	3471	1463	1273
MAX	3740	1720	970	715	486	822	11000	18100	15300	5740	1950	1650
MIN	402	854	521	457	303	338	748	4930	5540	1920	1060	988
AC-FT	64000	69730	46180	34810	23990	39050	267600	580900	589600	213400	89950	75720

CAL YR 1988 TOTAL 710714 MEAN 1942 MAX 12600 MIN 269 AC-FT 1410000
WTR YR 1989 TOTAL 1056174 MEAN 2894 MAX 18100 MIN 303 AC-FT 2095000

e Estimated

PEND OREILLE RIVER BASIN

12359800 SOUTH FORK FLATHEAD RIVER ABOVE TWIN CREEK, NEAR HUNGRY HORSE, MT

LOCATION.--Lat 47°58'45", long 113°33'36", in NE1/4NW1/4NE1/4 sec.36, T.26 N., R.16 W., Flathead County, Hydrologic Unit 17010209, Flathead National Forest, on left bank 0.1 mi downstream from Tin Creek, 0.4 mi upstream from Twin Creek, 36.3 mi southeast of Hungry Horse, and at mile 46.7.

DRAINAGE AREA.--1,160 mi^2.

PERIOD OF RECORD.--October 1964 to September 1982, October 1984 to current year (no winter records).

GAGE.--Water-stage recorder. Elevation of gage is 3,575 ft, from river-profile map.

REMARKS.--No estimated daily discharges this season. Seasonal records excellent. No known regulation or diversions upstream of station. Several observations of water temperature and specific conductance were made during the year. U.S. Bureau of Reclamation satellite telemeter at station.

AVERAGE DISCHARGE.--18 years (water years, 1965-82), 2,310 ft^3/s, 27.05 in/yr, 1,674,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 30,200 ft^3/s, June 16, 1974, gage height, 15.20 ft; minimum, 127 ft^3/s, Nov. 30, 1979, gage height, 4.13 ft.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of June 8, 1964, reached a stage of 20.87 ft, from high-water profile; discharge, 50,900 ft^3/s, by slope-area measurement of peak flow.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 17,300 ft^3/s, May 11, gage height, 12.50 ft; minimum daily, 218 ft^3/s, Oct. 13.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	255	827					701	4210	5590	4790	1250	943
2	249	915					696	5230	7870	4360	1260	915
3	245	1150					685	6240	10100	3910	1170	932
4	243	1320					675	6450	9940	3710	1100	925
5	239	1270					723	6610	10700	3570	1030	890
6	237	1420					1600	7900	11800	3270	970	874
7	233	1680					3440	10900	13200	3040	920	828
8	231	1580					3870	14000	12900	2920	886	790
9	227	1480					3300	13600	12900	2770	880	767
10	225	1360					2880	14300	13300	2570	865	759
11	222	1300					2640	16500	13100	2390	859	733
12	220	1220					2500	13000	11300	2210	807	707
13	218	1160					2630	10100	10700	2520	830	680
14	222	1090					3050	8200	10800	2800	795	655
15	262	1020					3860	7220	10500	2460	821	630
16	1390	960					4760	7290	10600	2490	769	605
17	5150	930					4640	7510	9060	2430	731	596
18	3420	894					4090	7930	7620	2360	701	619
19	2490	855					4210	7420	7220	2110	670	626
20	2090	831					5620	6420	6670	1960	649	608
21	1800	818					7960	5830	5690	1970	648	585
22	1590	799					9150	5490	4940	1840	663	567
23	1400	908					8870	6020	4570	1700	678	550
24	1240	879					7360	6580	4400	1580	785	536
25	1120	825					6120	6080	4560	1500	1140	522
26	1070	801					5350	5450	4500	1440	1360	509
27	1080	729					4890	5030	4580	1820	1240	520
28	978	761					4410	5180	4630	1650	1170	503
29	903	746					4040	5000	4610	1470	1110	488
30	854	711					3950	4740	4770	1360	1040	483
31	833							4790		1270	998	
TOTAL	30936	31239					118670	241220	253120	76240	28795	20345
MEAN	998	1041					3956	7781	8437	2459	929	678
MAX	5150	1680					9150	16500	13300	4790	1360	943
MIN	218	711					675	4210	4400	1270	648	483
AC FT	61360	61960					235400	478500	502100	151200	57110	40350

PEND OREILLE RIVER BASIN

12362000 HUNGRY HORSE RESERVOIR NEAR HUNGRY HORSE, MT

LOCATION.--Lat 48°20'28", long 114°00'48", in NE1/4NE1/4NW1/4 sec.27, T.30 N., R.19 W., Flathead County, Hydrologic Unit 17010209, in block 14 of Hungry Horse Dam on South Fork Flathead River, 3.8 mi southeast of Hungry Horse, and at mile 5.2.

DRAINAGE AREA.--1,654 mi^2.

PERIOD OF RECORD.--September 1951 to current year.

GAGE.--Water-stage recorder equipped with remote indicator in power house. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by U.S. Bureau of Reclamation). During construction and prior to May 1, 1953, various types of nonrecording gages were used.

REMARKS.--Reservoir and flow completely controlled by concrete arch-gravity dam; construction began in 1948; completed in 1952. Storage began Sept. 21, 1951. Usable capacity, 3,451,000 acre-ft, top of 1.0 ft flashboards; 3,428,000 acre-ft between elevations 3,196 ft, lowest outlet, and 3,560 ft, controlled spillway elevation. Dead storage, 40,140 acre-ft below elevation 3,196 ft. Minimum operating level, 445,900 acre-ft, elevation, 3,336 ft for on-site power generation. Water is used for power production, flood control, irrigation and recreation. Controlled spillway is an adjustable ring gate with 1.0 ft flashboards. Figures given herein represent usable contents.

COOPERATION.--Capacity table and daily elevations provided by U.S. Bureau of Reclamation.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents observed, 3,461,000 acre-ft, July 3, 4, 1955, Aug. 6, 1956; maximum elevation observed, 3,561.40 ft, July 3, 4, 1955; minimum contents observed since normal low operating level reached in May 1952, 607,700 acre-ft, Jan. 13, 1953, elevation, 3,362.50 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 3,090,000 acre-ft, July 16, elevation, 3,545.30 ft; minimum, 1,123,000 acre-ft, Apr. 5, elevation, 3,422.27 ft.

Capacity table (elevation, in feet, and contents, in acre-ft)

3,420	1,099,000	3,520	2,560,000
3,480	1,859,000	3,565	3,548,000

ELEVATION (FEET NGVD), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
OBSERVATION AT 23:59 VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3468.82	3467.74	3469.30	3464.45	3455.80	3437.19	3422.66	3458.10	3506.23	3541.55	3539.26	3522.16
2	3468.57	3467.69	3469.16	3464.27	3454.35	3436.29	3422.55	3459.57	3507.50	3542.07	3538.59	3522.34
3	3468.32	3467.77	3468.99	3464.10	3452.90	3435.54	3422.41	3461.31	3509.11	3542.49	3537.85	3522.45
4	3468.06	3467.89	3468.83	3463.90	3451.45	3435.10	3422.29	3463.08	3510.63	3542.90	3537.22	3522.49
5	3467.79	3468.03	3468.63	3463.74	3450.02	3434.70	3422.27	3464.86	3512.31	3543.31	3537.25	3521.67
6	3467.50	3468.24	3468.51	3463.56	3449.02	3433.85	3422.78	3466.87	3514.17	3543.66	3537.35	3520.82
7	3467.22	3468.50	3468.37	3463.30	3448.70	3432.96	3424.07	3469.54	3516.18	3544.00	3536.82	3519.97
8	3466.94	3468.77	3468.22	3463.00	3448.36	3432.05	3425.50	3472.67	3518.10	3544.29	3536.08	3519.10
9	3466.66	3469.05	3468.07	3462.71	3448.02	3431.18	3426.62	3475.55	3520.00	3544.59	3535.29	3518.19
10	3466.37	3469.22	3467.90	3462.48	3447.69	3430.52	3427.55	3478.44	3521.99	3544.78	3534.57	3517.33
11	3466.08	3469.40	3467.70	3462.26	3447.35	3430.32	3428.36	3481.58	3523.86	3545.06	3533.76	3516.47
12	3465.78	3469.56	3467.59	3462.03	3447.04	3430.17	3429.14	3483.95	3525.47	3545.25	3533.75	3515.55
13	3465.39	3469.64	3467.63	3461.76	3446.74	3429.29	3429.98	3485.77	3526.95	3544.97	3533.80	3514.65
14	3464.97	3469.75	3467.59	3461.55	3446.42	3428.69	3431.01	3487.20	3528.43	3544.74	3533.03	3513.74
15	3464.77	3469.75	3467.50	3461.33	3446.05	3427.96	3432.34	3488.50	3529.81	3545.00	3532.28	3512.80
16	3464.94	3469.76	3467.31	3461.13	3445.81	3427.16	3433.96	3489.86	3531.22	3545.30	3531.48	3511.85
17	3465.74	3469.77	3467.09	3460.93	3445.47	3426.38	3435.44	3491.26	3532.41	3545.04	3530.70	3510.97
18	3466.31	3469.77	3466.88	3460.79	3444.77	3426.28	3436.72	3492.81	3533.40	3544.57	3529.88	3510.07
19	3466.75	3469.73	3466.75	3460.55	3444.08	3426.14	3438.03	3494.14	3534.33	3543.98	3529.84	3509.10
20	3467.10	3469.71	3466.63	3460.28	3443.38	3425.77	3439.86	3495.25	3535.21	3543.40	3529.78	3508.15
21	3467.35	3469.69	3466.51	3460.09	3442.65	3425.64	3442.36	3496.25	3535.88	3542.80	3529.00	3507.17
22	3467.55	3469.70	3466.39	3459.83	3441.97	3425.44	3445.05	3497.16	3536.53	3542.99	3528.21	3506.18
23	3467.70	3469.70	3466.30	3459.56	3441.29	3425.24	3447.58	3498.17	3537.10	3543.17	3527.38	3505.19
24	3467.81	3469.74	3466.15	3459.23	3440.59	3425.02	3449.47	3499.36	3537.60	3542.77	3526.65	3504.19
25	3467.84	3469.72	3465.94	3458.91	3440.23	3424.83	3451.14	3500.36	3538.24	3542.08	3525.96	3503.60
26	3467.88	3469.67	3465.66	3458.65	3439.89	3424.68	3452.51	3501.25	3538.77	3541.45	3526.06	3502.60
27	3467.90	3469.63	3465.38	3458.37	3439.03	3424.37	3453.78	3502.10	3539.34	3540.81	3526.24	3501.52
28	3467.90	3469.57	3465.13	3458.07	3438.12	3424.02	3454.87	3502.96	3539.88	3540.18	3525.43	3500.46
29	3467.90	3469.50	3464.95	3457.82	---	3423.60	3455.93	3503.79	3540.45	3540.35	3524.64	3499.41
30	3467.84	3469.40	3464.79	3457.62	---	3423.22	3456.99	3504.55	3540.98	3540.46	3523.88	3498.35
31	3467.79	---	3464.62	3457.22	---	3422.76	---	3505.32	---	3540.03	3523.03	---
MAX	3468.82	3469.77	3469.30	3464.45	3455.80	3437.19	3456.99	3505.32	3540.98	3545.30	3539.26	3522.49
MIN	3464.77	3467.69	3464.62	3457.22	3438.12	3422.76	3422.27	3458.10	3506.23	3540.03	3523.03	3498.35
†	1676	1699	1631	1530	1296	1128	1527	2281	2996	2975	2620	2157
††	-18000	+23000	-68000	-101000	-234000	-168000	+399000	+754000	+715000	-21000	-355000	-463000

CAL YR 1988 . . . . . †† -413,000
WTR YR 1989 . . . . . †† +463,000

† Contents, in thousands of acre-feet, at end of month.
†† Change in contents, in acre-feet.

PEND OREILLE RIVER BASIN
12362500 SOUTH FORK FLATHEAD RIVER NEAR COLUMBIA FALLS, MT

LOCATION.--Lat 48°21'24", long 114°02'12", in SW1/4SE1/4SW1/4 sec.16, T.30 N., R.19 W., Flathead County, Hydrologic Unit 17010209, on right bank 1.7 mi downstream from Hungry Horse Dam, 6.8 mi east of Columbia Falls, and at mile 3.5.
DRAINAGE AREA.--1,663 mi^2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1910 to January 1911 (discharge measurements only), February 1911 to September 1913 (no winter records), October 1913 to August 1916 (scattered daily discharge only), water years 1917-22 (annual maximum), April 1923 to November 1924 (no winter records), July to October 1925, May to November 1927, May 1928 to current year. Monthly discharge only for some periods, published in WSP 1316.
REVISED RECORDS.--WSP 1216: Drainage area. WSP 1316: 1923-24(M), 1926-27(M), 1932(M), 1935-36(M). WSP 1636: 1958 (adjusted runoff).
GAGE.--Water-stage recorder. Datum of gage is 3,040 ft above National Geodetic Vertical Datum of 1929 (levels by the U.S. Bureau of Reclamation). September 1910 to September 1916, nonrecording gage, Apr. 23, 1923, to Sept. 30, 1928, water-stage recorder at site 3 mi downstream at different datum. Oct. 1, 1928, to Sept. 30, 1952, water-stage recorder at site 1.5 mi downstream at different datum. U.S. Bureau of Reclamation satellite telemeter at station.
REMARKS.--Estimated daily discharge: Feb. 18. Water-discharge records excellent. Flow regulated by Hungry Horse Reservoir since Sept. 21, 1951 (see preceding page).
AVERAGE DISCHARGE.--61 years (water years, 1929-89), 3,522 ft^3/s, 28.76 in/yr, 2,552,000 acre-ft/yr, adjusted for change in contents in Hungry Horse Reservoir since Oct. 1, 1951.
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 46,200 ft^3/s, June 19, 1916, gage height, 16.6 ft, site and datum then in use, from rating curve extended above 20,000 ft^3/s; minimum observed, 7.3 ft^3/s, Sept. 24, 1951, gage height, 0.52 ft, dam closure, site and datum then in use; minimum daily, 7.3 ft^3/s, Sept. 24, 1951.
EXTREMES FOR CURRENT YEAR.--Maximum discharge, 10,500 ft^3/s, Sept. 28, gage height, 10.51 ft; minimum daily, 153 ft^3/s, May 31.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2220	1540	1780	2320	9620	5920	1890	206	167	180	9490	9760
2	2220	1560	2000	2310	9780	5890	1890	218	199	181	9530	659
3	2230	1460	2130	2360	9740	4940	1920	537	197	180	9530	292
4	2360	1150	2040	2080	9730	3090	1960	248	203	174	8570	808
5	2430	1030	2180	2090	9730	2840	1910	241	211	203	454	9850
6	2420	956	2160	2170	7410	5910	1650	248	223	217	541	9820
7	2420	498	2050	2480	5480	5860	522	527	234	192	7140	9810
8	2420	193	2050	2880	2790	5960	249	246	233	177	9470	9850
9	2420	329	2150	2900	2780	5960	243	220	224	174	9530	9900
10	2420	488	2200	2550	2760	4860	240	215	219	952	9530	9880
11	2460	616	2190	2450	2760	2350	220	213	232	190	9570	9910
12	2500	676	2190	2470	2720	2150	206	195	216	906	1160	9930
13	3150	768	1990	2480	2650	6340	207	182	206	6750	708	9930
14	3680	939	1810	2480	2640	5250	216	171	204	6280	9230	9970
15	2490	1110	1900	2480	2650	5550	217	168	933	195	9630	9980
16	1750	1260	2320	2480	2650	5680	225	175	205	168	9610	10000
17	224	1270	2490	2250	2680	5600	215	183	198	6070	9610	10100
18	206	1370	2630	2170	e5040	1990	209	193	183	8390	9520	10100
19	207	1440	2430	2360	5040	2000	213	180	180	9430	1220	10100
20	209	1440	2210	2430	5040	3170	209	171	203	9480	1570	10100
21	333	1510	2160	2430	4980	2140	219	166	199	9420	9650	10100
22	691	1570	2060	2430	4840	2180	230	166	176	386	9690	10200
23	706	1370	2060	2610	4950	2180	230	176	178	208	9620	10200
24	889	1260	2060	2750	4960	2410	224	176	188	6370	9720	10200
25	1070	1390	2270	2780	2740	2240	218	177	199	9370	9590	6390
26	1140	1510	2670	2520	2740	2180	217	180	193	9260	385	10300
27	1130	1690	2780	2510	5920	3140	211	165	194	9350	612	10300
28	1150	1780	2730	2510	5900	3460	206	164	185	9250	9710	10400
29	1300	1680	2470	2510	---	3690	207	162	194	284	9760	10400
30	1450	1720	2380	2510	---	3380	207	154	179	202	9640	10400
31	1510	---	2320	3840	---	3840	---	153	---	6800	9780	---
TOTAL	51805	35573	68860	77590	140720	122150	16780	6576	6755	111389	223770	269639
MEAN	1671	1186	2221	2503	5026	3940	559	212	225	3593	7218	8988
MAX	3680	1780	2780	3840	9780	6340	1960	537	933	9480	9780	10400
MIN	206	193	1780	2080	2640	1990	206	153	167	168	385	292
AC-FT	102800	70560	136600	153900	279100	242300	33280	13040	13400	220900	443800	534800
MEAN †	1379	1572	1116	860	812	1208	7265	12475	12241	3251	1444	1207
CFSM †	.83	.95	.67	.52	.49	.73	4.37	7.50	7.36	1.95	.87	.73
IN †	.96	1.05	.77	.60	.51	.84	4.87	8.65	8.21	2.25	1.00	.81
AC-FT †	84800	93560	68600	52900	45100	74300	432280	767040	728400	199900	88800	71800

OBSERVED

CAL YR 1988	TOTAL	1124048	MEAN	3071	MAX	11200	MIN	147	AC-FT	2230000
WTR YR 1989	TOTAL	1131607	MEAN	3100	MAX	10400	MIN	153	AC-FT	2245000

ADJUSTED

CAL YR 1988	TOTAL	915845	MEAN	2502	CFSM	1.50	IN	20.48	AC-FT	1817000
WTR YR 1989	TOTAL	1365001	MEAN	3740	CFSM	2.25	IN	30.53	AC-FT	2707000

e Estimated

† Adjusted for change in contents in Hungry Horse Reservoir.

PEND OREILLE RIVER BASIN

12362500 SOUTH FORK FLATHEAD RIVER NEAR COLUMBIA FALLS, MT--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1949-50, 1965-68, 1979 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: October 1964 to September 1968, March 1979 to current year.

INSTRUMENTATION.--Temperature recorder since Mar. 30, 1979.

REMARKS.-Prior to March 1979, thermograph records furnished by Montana Department of Fish, Wildlife, and Parks.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: Maximum, 19.0°C Aug. 9-11, 1966, Aug. 2-6, 1968; minimum (water years 1965-68, 1979-81, 1983-88), 2.0°C on many days during winter periods most years.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURE: Maximum, 8.0°C, Nov. 6, 20; minimum, 2.0°C, on several days in February.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)
JUN 06...	1545	210	178	28.0	7.0

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	6.0	6.0	6.0	6.5	6.0	6.5	6.5	6.5	6.5	4.5	4.5	4.5
2	6.5	6.0	6.0	6.5	6.0	6.0	7.0	6.5	6.5	4.5	4.5	4.5
3	6.5	6.0	6.5	7.0	6.0	6.5	6.5	6.5	6.5	4.5	4.5	4.5
4	6.5	6.0	6.5	7.0	6.5	6.5	6.5	6.0	6.5	4.5	4.5	4.5
5	6.5	6.0	6.5	7.5	7.0	7.5	6.5	6.0	6.0	4.5	4.5	4.5
6	6.5	6.0	6.0	8.0	6.5	7.5	6.0	6.0	6.0	4.5	4.5	4.5
7	6.5	6.0	6.5	6.0	5.5	6.0	6.0	6.0	6.0	4.5	4.5	4.5
8	6.5	6.5	6.5	7.0	5.5	6.5	6.0	6.0	6.0	4.5	4.0	4.5
9	6.5	6.0	6.5	7.5	6.5	7.0	6.0	6.0	6.0	4.5	4.0	4.0
10	6.5	6.5	6.5	7.5	6.0	6.5	6.5	5.5	6.0	4.5	4.0	4.0
11	6.5	6.5	6.5	7.5	6.5	7.0	6.0	6.0	6.0	4.0	4.0	4.0
12	6.5	6.5	6.5	6.5	5.5	6.0	6.0	6.0	6.0	4.0	4.0	4.0
13	6.5	6.5	6.5	7.0	6.0	6.5	6.0	5.5	6.0	4.0	3.5	3.5
14	6.5	6.0	6.5	6.5	6.0	6.5	6.0	5.5	5.5	4.0	3.5	3.5
15	6.5	6.0	6.5	7.5	6.5	7.0	6.0	5.5	5.5	4.0	3.5	3.5
16	7.0	6.5	6.5	7.5	6.5	7.0	6.0	6.0	6.0	3.5	3.5	3.5
17	7.0	6.5	7.0	6.5	6.0	6.5	6.0	5.5	6.0	3.5	2.5	3.5
18	7.5	7.0	7.5	6.5	6.0	6.0	6.0	5.5	5.5	3.5	3.5	3.5
19	7.5	6.5	7.0	7.0	6.0	6.5	5.5	5.5	5.5	4.0	3.5	3.5
20	7.0	6.5	6.5	8.0	7.0	7.5	5.5	5.5	5.5	3.5	3.5	3.5
21	7.0	6.5	6.5	7.5	6.5	7.0	5.5	5.5	5.5	4.0	3.5	3.5
22	6.5	6.0	6.5	7.0	6.5	7.0	5.5	5.5	5.5	3.5	3.5	3.5
23	7.5	6.0	7.0	7.5	6.5	7.0	5.5	5.5	5.5	3.5	3.0	3.5
24	7.5	6.5	7.0	6.5	6.0	6.5	5.5	5.0	5.5	3.5	3.0	3.5
25	6.5	6.0	6.5	7.5	6.0	6.5	5.0	5.0	5.0	3.5	3.0	3.5
26	7.0	6.0	6.5	7.5	6.5	7.0	5.0	5.0	5.0	3.5	3.5	3.5
27	7.0	5.5	6.0	6.5	6.0	6.0	5.0	5.0	5.0	3.5	3.0	3.5
28	7.5	6.5	7.0	6.5	6.0	6.0	5.0	5.0	5.0	3.5	3.5	3.5
29	7.5	6.0	6.5	6.5	6.0	6.0	5.0	5.0	5.0	3.5	3.5	3.5
30	7.5	6.5	7.0	6.5	6.0	6.0	5.0	5.0	5.0	3.5	3.0	3.5
31	7.0	6.5	6.5	---	---	---	5.0	4.5	4.5	4.0	3.0	3.5
MONTH	7.5	5.5	6.6	8.0	5.5	6.6	7.0	4.5	5.7	4.5	2.5	3.8

PEND OREILLE RIVER BASIN

12362500 SOUTH FORK FLATHEAD RIVER NEAR COLUMBIA FALLS, MT--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	4.0	2.5	3.0	2.5	2.5	2.5	2.5	2.5	2.5	5.5	4.0	4.5
2	2.5	2.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	4.5	4.5	4.5
3	2.5	2.0	2.0	2.5	2.5	2.5	3.0	2.5	2.5	5.0	4.0	4.0
4	2.5	2.0	2.0	2.5	2.5	2.5	2.5	2.5	2.5	5.5	4.0	5.0
5	2.0	2.0	2.0	2.5	2.5	2.5	2.5	2.5	2.5	6.0	4.5	5.0
6	2.0	2.0	2.0	3.0	2.5	2.5	2.5	2.5	2.5	6.0	4.5	5.0
7	2.0	2.0	2.0	2.5	2.5	2.5	4.0	2.5	3.0	5.0	4.0	4.5
8	2.5	2.0	2.5	2.5	2.5	2.5	3.5	3.0	3.0	6.0	4.5	5.0
9	2.5	2.5	2.5	2.5	2.5	2.5	4.0	3.0	3.5	6.5	4.5	5.5
10	2.5	2.5	2.5	2.5	2.5	2.5	4.0	2.5	3.5	5.5	4.5	5.0
11	2.5	2.5	2.5	2.5	2.5	2.5	4.0	3.0	3.5	5.5	4.5	5.0
12	2.5	2.5	2.5	3.0	2.5	2.5	4.5	3.0	3.5	6.0	4.0	5.0
13	2.5	2.5	2.5	2.5	2.5	2.5	4.5	3.0	3.5	5.5	4.5	5.0
14	2.5	2.5	2.5	2.5	2.5	2.5	4.5	3.0	3.5	6.5	4.5	5.5
15	2.5	2.5	2.5	2.5	2.5	2.5	4.0	3.5	3.5	6.5	4.5	5.5
16	2.5	2.5	2.5	2.5	2.5	2.5	3.5	3.0	3.5	6.0	5.0	5.5
17	2.5	2.5	2.5	2.5	2.5	2.5	4.5	3.0	3.5	6.0	5.0	5.5
18	2.5	2.5	2.5	2.5	2.5	2.5	5.0	3.0	4.0	5.5	4.5	5.0
19	2.5	2.5	2.5	2.5	2.5	2.5	4.5	3.5	4.0	5.0	4.5	4.5
20	2.5	2.5	2.5	2.5	2.5	2.5	5.0	3.5	4.0	6.5	4.5	5.5
21	3.0	2.5	2.5	2.5	2.5	2.5	4.5	3.5	4.0	6.0	4.5	5.5
22	3.0	2.5	2.5	2.5	2.5	2.5	4.5	3.5	4.0	6.5	5.0	5.5
23	3.0	2.5	2.5	2.5	2.5	2.5	4.5	3.5	4.0	6.0	5.0	5.0
24	3.0	2.5	3.0	2.5	2.5	2.5	5.0	3.5	4.0	5.5	4.5	5.0
25	3.0	2.5	3.0	2.5	2.5	2.5	4.5	3.5	4.0	5.5	4.5	5.0
26	3.0	2.5	2.5	2.5	2.5	2.5	5.0	4.0	4.5	6.0	5.0	5.5
27	3.0	2.5	2.5	2.5	2.5	2.5	4.5	4.0	4.0	6.0	5.0	5.5
28	2.5	2.5	2.5	2.5	2.5	2.5	5.0	4.0	4.5	5.0	4.5	5.0
29	---	---	---	2.5	2.5	2.5	5.5	3.5	4.5	4.5	4.5	4.5
30	---	---	---	2.5	2.5	2.5	5.5	4.0	4.5	6.5	4.5	5.5
31	---	---	---	2.5	2.5	2.5	---	---	---	6.5	5.0	5.5
MONTH	4.0	2.0	2.5	3.0	2.5	2.5	5.5	2.5	3.5	6.5	4.0	5.1
		JUNE			JULY			AUGUST			SEPTEMBER	
1	6.5	5.0	6.0	6.5	5.5	6.0	4.5	4.0	4.5	5.0	4.5	5.0
2	6.5	5.0	5.5	7.0	5.0	6.0	4.5	4.0	4.5	5.5	5.0	5.0
3	6.0	5.0	5.5	7.5	5.0	6.0	4.5	4.0	4.5	6.5	5.0	6.0
4	7.0	4.5	5.5	7.5	5.5	6.5	4.5	4.5	4.5	7.0	5.0	6.0
5	7.0	5.0	6.0	7.0	5.5	6.0	6.5	4.0	5.0	5.0	4.5	4.5
6	7.5	5.0	6.0	7.0	5.0	6.0	6.0	4.5	5.0	5.0	4.5	5.0
7	7.5	5.0	6.0	7.0	5.0	6.0	5.0	4.5	4.5	5.0	5.0	5.0
8	7.0	5.0	6.0	7.5	5.5	6.5	4.5	4.5	4.5	5.0	5.0	5.0
9	6.5	5.0	5.5	6.0	5.0	5.5	---	---	---	5.0	5.0	5.0
10	5.5	5.0	5.5	6.0	4.0	5.0	---	---	---	5.0	5.0	5.0
11	7.0	5.0	6.0	7.0	4.5	5.5	---	---	---	5.0	5.0	5.0
12	7.5	5.0	6.0	6.5	4.0	5.0	---	---	---	5.5	5.0	5.0
13	7.5	5.0	6.5	4.0	4.0	4.0	---	---	---	5.5	5.0	5.0
14	6.5	6.0	6.0	4.0	4.0	4.0	---	---	---	5.5	5.0	5.0
15	7.0	4.0	5.5	7.0	4.0	5.5	---	---	---	5.5	5.0	5.5
16	7.5	5.0	6.0	7.5	5.5	6.5	---	---	---	5.5	5.0	5.0
17	7.5	5.5	6.5	6.0	4.0	4.5	---	---	---	5.5	5.0	5.0
18	7.5	5.0	6.0	4.0	4.0	4.0	5.0	4.5	4.5	6.0	5.0	5.5
19	6.5	5.5	6.0	4.0	4.0	4.0	5.0	4.5	5.0	5.5	5.5	5.5
20	6.0	5.0	5.5	4.5	4.0	4.0	5.0	4.5	4.5	5.5	5.0	5.5
21	6.5	4.5	5.5	4.5	4.0	4.0	4.5	4.5	4.5	5.5	5.5	5.5
22	6.5	5.0	6.0	7.0	4.0	5.5	4.5	4.5	4.5	5.5	5.5	5.5
23	6.5	5.0	6.0	7.0	5.0	6.0	4.5	4.5	4.5	6.0	5.5	5.5
24	7.0	5.0	5.5	5.5	4.0	4.5	4.5	4.5	4.5	6.0	5.5	6.0
25	7.0	4.5	6.0	4.5	4.0	4.0	5.0	4.5	4.5	6.0	5.5	6.0
26	7.0	5.0	6.0	4.5	4.0	4.5	6.5	5.0	5.5	6.0	5.5	5.5
27	7.0	5.0	6.0	4.5	4.5	4.5	6.0	4.5	5.5	6.5	5.5	6.0
28	7.5	5.0	6.0	4.5	4.0	4.0	4.5	4.5	4.5	6.0	5.5	5.5
29	7.0	5.0	6.0	7.0	4.0	5.5	5.0	4.5	4.5	6.5	6.0	6.0
30	7.0	5.5	6.0	7.0	5.5	6.0	5.0	4.5	5.0	6.5	6.0	6.0
31	---	---	---	6.0	4.0	4.5	5.0	4.5	5.0	---	---	---
MONTH	7.5	4.0	5.9	7.5	4.0	5.1	---	---	---	7.0	4.5	5.4

PEND OREILLE RIVER BASIN

12363000 FLATHEAD RIVER AT COLUMBIA FALLS, MT
(National stream quality accounting network station)

LOCATION.--Lat 48°21'43", long 114°11'02", in NW1/4NW1/4SE1/4 sec.17, T.30 N., R.20 W., Flathead County, Hydrologic Unit 17010208, on right bank 200 ft downstream from county road bridge at Columbia Falls, 5.7 mi downstream from South Fork, and at mile 143.0.
DRAINAGE AREA.--4,464 mi^2.

WATER DISCHARGE RECORDS

PERIOD OF RECORD.--May 1922 to September 1923 (fragmentary), June 1928 to current year. Monthly discharge only for some periods, published in WSP 1316.
REVISED RECORDS.--WSP 1092: 1923. WSP 1216: Drainage area. WSP 1636: 1958 (adjusted runoff).
GAGE.--Water-stage recorder. Datum of gage is 2,977.67 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Nov. 12, 1928, nonrecording gage on bridge 200 ft upstream at datum 0.19 ft higher.
REMARKS.--No estimated daily discharges this year. Water-discharge records excellent. South Fork Flathead River, which contributes about one-third of flow, completely regulated by Hungry Horse Reservoir 10.9 mi upstream since Sept. 21, 1951 (see station number 12362000). U.S. Bureau of Reclamation satellite telemeter at station.
AVERAGE DISCHARGE.--61 years, 9,613 ft^3/s, 29.24 in/yr, 6,965,000 acre-ft/yr, adjusted for change in contents in Hungry Horse Reservoir since Oct. 1, 1951.
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 176,000 ft^3/s, June 9, 1964, gage height, 25.58 ft, from floodmarks, from rating curve extended above 95,000 ft^3/s on basis of slope-area measurement of peak flow; minimum, 798 ft^3/s, Dec. 8, 1929, gage height, -0.08 ft.
EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1894 reached a stage of 22.7 ft, from floodmarks, discharge 142,000 ft^3/s, from rating curve extended above 95,000 ft^3/s on basis of slope-area measurement of peak flow in 1964.
EXTREMES FOR CURRENT YEAR.--Maximum discharge, 37,300 ft^3/s, May 11, gage height, 11.70 ft; minimum daily, 3,540 ft^3/s, Oct. 3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3580	3650	3650	3750	10300	6930	3880	11900	12400	11600	13600	13500
2	3550	3680	3690	3780	10400	6860	3840	14100	17200	11100	13600	5270
3	3540	3800	3930	3870	10400	5780	3800	17600	22400	10100	13500	4560
4	3630	3820	3760	3810	10600	4360	3820	18600	23900	9500	12300	4580
5	3680	3760	3710	3830	10800	3960	3870	19200	24400	9200	4780	13900
6	3650	3800	3790	3770	9000	6820	4040	22200	26700	8780	3840	14200
7	3630	4030	3790	3730	3970	6910	4710	28800	30100	8320	9530	14000
8	3610	3870	3730	3920	3920	7220	6680	35300	29900	8060	12700	13900
9	3570	3740	3750	4170	3930	7120	6260	34800	29200	7750	12800	13800
10	3570	3720	3820	3980	3920	6540	5630	34100	29100	8260	12900	13600
11	3590	3710	3770	3870	3930	4060	5330	36200	30700	7190	12900	13500
12	3620	3700	3770	3870	3930	3950	5220	31500	28700	7210	4870	13400
13	4310	3680	3920	3900	3870	7640	5570	25600	26600	13300	3850	13300
14	4740	3690	3920	3930	3870	7860	6520	21600	25900	14200	11400	13200
15	3750	3730	3770	3900	3860	7420	8240	19200	25900	7940	12800	13100
16	4570	3740	3790	3940	3830	7340	11900	18900	25700	8140	12700	13000
17	6580	3680	3750	3810	3790	7140	12100	20600	23200	13000	12600	13000
18	5460	3690	3930	3720	5800	3930	10600	21600	19800	15800	12500	13200
19	4460	3690	4000	3860	6190	3820	10600	20300	18100	16300	4610	13200
20	3920	3660	3920	3860	6220	4930	12700	17900	16900	16000	4010	13100
21	3650	3680	3910	3870	6240	3880	18100	15900	15200	16000	11900	13000
22	3780	3740	3820	3860	6060	3940	22800	14700	13500	7330	12500	13000
23	3630	3820	3760	3810	6160	3910	23500	15200	12900	5900	12400	13000
24	3620	3700	3720	3830	6170	4080	19700	16600	12300	10900	12800	12900
25	3630	3670	3640	3960	4280	3950	16800	15700	12300	14600	13200	9290
26	3630	3690	3780	3850	3970	3980	14800	14300	12500	14300	5190	12900
27	3760	3630	3870	3840	6750	5050	13400	13400	12400	14300	4470	12900
28	3620	3700	4050	3860	6990	5440	12200	13100	12000	14100	13400	12900
29	3600	3690	3880	3840	---	5690	11300	12600	11500	5470	13900	12900
30	3640	3660	3890	3900	---	5360	11200	11800	11500	4460	13700	12900
31	3650	---	3870	4700	---	5770	---	11400	---	10400	13700	---
TOTAL	121220	111820	118350	120590	169150	171640	299110	624700	612900	329510	328950	369000
MEAN	3910	3727	3818	3890	6041	5537	9970	20150	20430	10630	10610	12300
MAX	6580	4030	4050	4700	10800	7860	23500	36200	30700	16300	13900	14200
MIN	3540	3630	3640	3720	3790	3820	3800	11400	11500	4460	3840	4560
AC-FT	240400	221800	234700	239200	335500	340400	593300	1239000	1216000	653600	652500	731900
MEAN †	3617	4114	2711	2248	1828	2804	16676	32413	32451	10288	4838	4519
CFSM †	.81	.92	.61	.50	.41	.63	3.74	7.26	7.27	2.30	1.08	1.01
IN †	.93	1.03	.70	.58	.43	.72	4.17	8.37	8.11	2.66	1.25	1.13
AC-FT†	222400	244800	166700	138200	101500	172400	992300	1993000	1931000	632600	297500	268900

OBSERVED

CAl YR 1988	TOTAL	2619030	MEAN	7156	MAX	14300	MIN	3160	AC-FT	5195000
WTR YR 1989	TOTAL	3376940	MEAN	9252	MAX	36200	MIN	3540	AC-FT	6698000

ADJUSTED

CAL YR 1988	TOTAL	2410789	MEAN	6587	CFSM	1.48	IN	20.08	AC-FT	4782000
WTR YR 1989	TOTAL	3610434	MEAN	9892	CFSM	2.22	IN	30.08	AC-FT	7161000

† Adjusted for change in contents in Hungry Horse Reservoir.

12363000 FLATHEAD RIVER AT COLUMBIA FALLS, MT--Continued
(National stream quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1949-50, 1963-67, 1970, 1979 to current year. Water years 1968-69 published as Flathead River near Kalispell (station 12363500) 15 mi downstream. No appreciable inflow or outlfow occurs between the two points.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1964 to September 1967, March 1979 to September 1981.
WATER TEMPERATURE: January 1949 to September 1950, August 1963 to September 1969, March 1979 to current year.
SUSPENDED-SEDIMENT DISCHARGE: July 1965 to September 1969.

INSTRUMENTATION.--Temperature recorder since Mar. 27, 1979.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1965-67, 1979-81): Maximum daily, 290 microsiemens, April 6, 1980; minimum daily, 121 microsiemens, May 28, 1979.
WATER TEMPERATURE: Maximum, 21.0°C, Aug. 23, 1963, Aug. 8, 1968; minimum, 0.0°C on several days during winter periods most years.
SEDIMENT CONCENTRATION (water years 1965-69): Maximum daily, 980 mg/L, May 21, 1967; Minumum daily, 1 mg/L on several days most years.
SEDIMENT LOAD (water years 1965-69): Maximum daily, 140,000 tons, May 23, 1967; minimum daily, 4 tons, March 4-6, 1967.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURE: Maximum, 18.5°C, July 30; minimum, 0.0°C, Feb. 16 ,17.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)
OCT								
03...	1030	3580	--	--	160	15.0	8.0	--
DEC								
05...	1300	3670	--	40	184	-3.0	3.5	686
MAR								
07...	1300	10700	40	1	178	10.0	3.0	681
MAY								
08...	1100	35800	10	1	145	12.0	6.0	691
AUG								
23...	1100	12600	100	51	155	17.0	7.0	684

DATE	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)	BICAR-BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR-BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	ALKA-LINITY WAT WH TOT FET FIELD MG/L AS CACO3 (00410)
DEC							
05...	11.7	98	<1	K4	105	0	84
MAR							
07...	11.7	97	<1	<1	99	0	81
MAY							
08...	11.4	101	27	32	81	0	67
AUG							
23...	10.4	96	K2	K9	103	0	83

DATE	TIME	PH (STAND-ARD UNITS) (00400)	TUR-BID-ITY (NTU) (00076)	HARD-NESS TOTAL (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)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)
DEC										
05...	1300	7.7	0.50	95	11	27	6.7	1.0	0.0	0.40
MAR										
07...	1300	8.1	0.50	84	3	24	5.9	0.90	0.0	0.40
MAY										
08...	1100	8.0	100	70	3	20	4.9	0.80	0.0	0.40
AUG										
23...	1100	8.1	0.40	89	6	26	5.9	0.90	0.0	0.30

PEND OREILLE RIVER BASIN

12363000 FLATHEAD RIVER AT COLUMBIA FALLS, MT--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	ALKALINITY LAB (MG/L AS CACO3) (90410)	SULFATE DISSOLVED (MG/L AS SO4) (00945)	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NITRITE DISSOLVED (MG/L AS N) (00613)
DEC										
05...	88	5.1	0.30	<0.10	4.3	99	96	0.13	981	<0.010
MAR										
07...	84	3.3	0.40	0.10	4.1	87	88	0.12	2510	0.010
MAY										
08...	72	3.0	0.30	0.10	4.7	74	75	0.10	7150	0.010
AUG										
23...	84	3.0	0.20	0.10	4.5	107	91	0.15	3640	<0.010

DATE	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DISSOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DISSOLVED (MG/L AS P) (00671)	ALUMINUM, DISSOLVED (UG/L AS AL) (01106)	ARSENIC DISSOLVED (UG/L AS AS) (01000)	BARIUM, DISSOLVED (UG/L AS BA) (01005)
DEC										
05...	0.100	<0.010	0.020	0.30	<0.002	<0.002	<0.001	<10	<1	110
MAR										
07...	<0.100	0.030	0.020	<0.20	0.039	<0.001	<0.001	<10	<1	110
MAY										
08...	0.180	0.030	--	<0.20	0.028	<0.002	0.002	40	<1	62
AUG										
23...	<0.100	<0.010	<0.010	0.20	0.005	0.001	<0.001	<10	<1	110

DATE	BERYLLIUM, DISSOLVED (UG/L AS BE) (01010)	CADMIUM DISSOLVED (UG/L AS CD) (01025)	CHROMIUM, DISSOLVED (UG/L AS CR) (01030)	COBALT, DISSOLVED (UG/L AS CO) (01035)	COPPER, DISSOLVED (UG/L AS CU) (01040)	IRON, DISSOLVED (UG/L AS FE) (01046)	LEAD, DISSOLVED (UG/L AS PB) (01049)	LITHIUM DISSOLVED (UG/L AS LI) (01130)	MANGANESE, DISSOLVED (UG/L AS MN) (01056)	MERCURY DISSOLVED (UG/L AS HG) (71890)
DEC										
05...	<0.5	<1	<1	<3	1	5	<5	<4	2	<0.1
MAR										
07...	<0.5	<1	<1	<3	2	<3	<5	<4	<1	<0.1
MAY										
08...	<0.5	<1	<1	<3	2	40	2	<4	6	<0.1
AUG										
23...	<0.5	<1	2	<3	4	8	<1	<4	2	<0.1

DATE	MOLYBDENUM, DISSOLVED (UG/L AS MO) (01060)	NICKEL, DISSOLVED (UG/L AS NI) (01065)	SELENIUM, DISSOLVED (UG/L AS SE) (01145)	SILVER, DISSOLVED (UG/L AS AG) (01075)	STRONTIUM, DISSOLVED (UG/L AS SR) (01080)	VANADIUM, DISSOLVED (UG/L AS V) (01085)	ZINC, DISSOLVED (UG/L AS ZN) (01090)	SEDIMENT, SUSPENDED (MG/L) (80154)	SEDIMENT, DISCHARGE, SUSPENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
DEC										
05...	<10	5	<1	<1.0	46	<6	10	1	9.9	88
MAR										
07...	<10	1	<1	1.0	40	<6	<3	7	202	73
MAY										
08...	<10	1	<1	<1.0	38	<6	14	561	54200	62
AUG										
23...	<10	1	<1	<1.0	41	<6	17	2	68	79

PEND OREILLE RIVER BASIN

12363000 FLATHEAD RIVER AT COLUMBIA FALLS, MT--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	10.5	8.0	9.0	7.0	6.0	6.5	4.5	3.0	3.5	3.0	1.5	2.0
2	10.5	7.5	8.5	7.0	6.0	6.5	4.0	3.0	3.5	3.5	2.0	3.0
3	10.0	7.5	8.5	7.0	6.5	6.5	4.5	3.5	4.0	3.5	2.5	3.0
4	10.0	7.5	8.5	7.0	6.0	6.5	4.0	3.0	3.5	3.0	2.5	3.0
5	9.5	7.0	8.0	6.5	6.0	6.5	4.0	3.0	3.5	3.0	2.0	2.5
6	9.0	7.0	8.0	7.0	5.5	6.5	3.5	3.5	3.5	2.0	1.0	1.5
7	9.5	7.0	8.0	6.0	5.0	5.5	4.0	3.5	3.5	2.0	1.0	1.5
8	9.5	7.0	8.0	5.0	4.5	4.5	4.0	3.5	3.5	3.0	1.5	2.0
9	9.5	7.0	8.0	4.5	4.0	4.5	4.5	3.5	4.0	3.0	2.0	2.5
10	9.5	7.0	8.0	4.0	3.5	4.0	5.0	4.0	4.5	3.0	2.0	2.5
11	9.5	7.0	8.0	4.5	3.5	4.0	4.5	4.0	4.5	3.0	2.0	2.5
12	9.0	7.0	8.0	4.5	4.0	4.0	5.0	4.0	4.5	3.0	2.0	2.5
13	8.0	7.0	7.5	5.0	3.5	4.0	5.0	4.0	4.5	3.0	2.0	2.5
14	7.5	7.0	7.0	4.5	3.5	4.0	4.0	3.0	3.5	2.5	1.5	2.0
15	8.0	7.5	7.5	4.5	4.0	4.0	3.0	2.0	2.5	2.5	2.0	2.0
16	8.5	7.5	8.0	5.0	4.0	4.5	3.5	2.0	2.5	2.5	2.0	2.5
17	8.5	8.0	8.5	5.5	4.0	4.5	4.0	2.5	3.0	3.0	2.0	2.5
18	7.5	7.0	7.0	5.0	4.0	4.5	4.0	3.0	3.5	3.0	2.5	2.5
19	7.5	6.5	7.0	4.5	4.0	4.5	3.5	2.5	3.0	3.0	2.0	2.5
20	9.0	7.0	8.0	5.0	4.5	4.5	3.5	2.5	3.0	3.0	2.0	2.5
21	9.5	7.5	8.5	5.0	4.5	5.0	3.0	2.5	3.0	3.0	2.5	2.5
22	9.5	8.0	8.5	5.5	5.0	5.0	3.5	2.5	3.0	3.0	2.0	2.5
23	8.0	7.5	8.0	5.5	4.5	5.0	3.0	2.5	3.0	3.0	1.0	2.0
24	9.0	7.5	8.0	4.5	3.5	4.0	3.5	2.0	3.0	3.0	1.5	2.0
25	8.0	7.0	7.5	3.5	3.0	3.5	2.5	1.5	2.0	3.0	2.0	2.5
26	8.0	6.5	7.0	4.0	2.5	3.5	3.0	1.5	2.0	3.0	2.0	2.5
27	6.5	4.5	5.5	3.0	2.5	2.5	4.0	2.5	3.0	3.0	2.0	2.5
28	5.5	4.0	4.5	3.5	2.5	3.0	3.5	2.5	3.0	3.0	2.0	2.5
29	5.5	4.0	4.5	3.5	3.0	3.5	3.0	2.0	2.5	3.0	2.0	2.5
30	6.0	4.5	5.0	4.5	3.5	4.0	3.5	2.5	2.5	3.5	3.0	3.0
31	7.0	5.5	6.0	---	---	---	3.0	1.5	2.5	3.0	.5	1.5
MONTH	10.5	4.0	7.5	7.0	2.5	4.6	5.0	1.5	3.3	3.5	.5	2.4
		FEBRUARY			MARCH			APRIL			MAY	
1	2.5	1.0	2.0	3.0	.5	1.5	4.0	3.0	3.5	7.5	6.0	7.0
2	2.5	1.0	1.5	3.0	.5	1.5	4.0	3.0	3.5	7.5	6.0	6.5
3	2.5	1.0	1.5	3.5	.5	1.5	4.5	2.5	3.5	6.5	5.0	6.0
4	3.0	1.5	2.0	3.5	1.0	2.0	4.0	2.5	3.5	7.0	5.5	6.0
5	3.0	1.5	2.0	3.0	1.5	2.0	3.0	3.0	3.0	7.5	6.0	7.0
6	2.5	1.0	2.0	3.5	1.5	2.5	3.5	3.0	3.0	7.5	6.5	7.0
7	2.5	.5	1.5	3.5	2.0	2.5	5.0	3.5	4.0	7.5	6.5	7.0
8	2.5	.5	1.5	2.5	1.5	2.0	4.0	2.5	3.0	7.5	6.0	6.5
9	3.0	.5	1.5	2.5	2.0	2.5	4.0	2.0	3.0	7.5	6.0	7.0
10	3.0	1.0	1.5	3.0	2.0	2.5	5.0	2.5	3.5	7.5	6.5	7.0
11	3.0	1.0	1.5	3.0	1.5	2.0	5.5	4.0	4.5	7.0	5.5	6.0
12	3.0	1.5	2.0	3.0	1.5	2.0	6.5	4.0	5.0	6.5	5.0	5.5
13	3.0	1.5	2.0	2.5	1.5	2.0	7.0	5.0	6.0	6.5	5.5	6.0
14	3.0	1.5	2.0	2.5	1.0	2.0	6.5	5.5	6.0	7.0	6.0	6.5
15	2.5	1.0	2.0	2.5	1.5	2.0	6.0	5.0	5.5	8.0	6.0	7.0
16	1.5	.0	.5	2.5	.5	1.5	6.0	3.0	4.5	8.0	7.5	7.5
17	2.0	.0	1.0	2.5	.5	1.5	4.5	2.0	3.0	7.5	6.5	7.0
18	2.5	1.0	2.0	3.0	1.5	2.0	6.0	4.0	5.0	6.5	6.0	6.5
19	3.0	1.5	2.0	4.0	1.5	2.5	6.5	5.5	6.0	6.0	4.5	5.5
20	3.0	1.5	2.5	3.5	2.0	2.5	7.0	5.0	6.0	7.0	4.5	5.5
21	3.5	2.0	2.5	3.0	2.5	2.5	7.0	5.0	6.0	7.5	6.5	7.0
22	3.0	1.5	2.0	3.5	2.0	2.5	6.0	5.0	5.0	8.5	7.0	7.5
23	3.5	2.0	2.5	5.0	2.0	3.5	5.0	4.0	4.5	8.5	7.0	8.0
24	3.5	1.5	2.5	4.0	2.0	3.0	5.5	4.0	5.0	6.5	5.5	6.0
25	3.5	1.5	2.5	3.5	2.5	3.0	5.5	4.5	5.0	7.0	5.0	6.0
26	3.5	1.5	2.5	5.0	2.5	3.5	6.0	4.5	5.0	7.5	6.5	7.0
27	3.0	1.5	2.0	3.5	2.5	3.0	6.0	4.5	5.0	8.0	7.0	7.5
28	2.5	.5	1.5	3.5	2.5	3.0	6.5	4.0	5.0	7.0	5.0	6.0
29	---	---	---	3.5	2.5	3.0	7.0	5.0	6.0	5.0	4.5	4.5
30	---	---	---	4.0	2.5	3.0	7.5	6.0	7.0	8.5	4.5	6.5
31	---	---	---	3.5	3.0	3.0	---	---	---	10.0	8.0	9.0
MONTH	3.5	.0	1.9	5.0	.5	2.4	7.5	2.0	4.6	10.0	4.5	6.6

PEND OREILLE RIVER BASIN

12363000 FLATHEAD RIVER AT COLUMBIA FALLS, MT--Continued

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	10.5	9.0	9.5	13.5	11.5	12.5	10.0	8.5	9.0	8.5	7.0	7.5
2	10.0	9.0	9.5	12.0	10.5	11.5	8.5	7.5	8.0	13.0	7.5	11.0
3	9.0	8.0	8.5	14.0	11.0	12.5	7.5	7.0	7.0	12.5	11.0	12.0
4	9.5	7.5	8.0	14.5	13.0	13.5	11.5	7.0	7.5	13.5	11.0	12.0
5	10.0	8.5	9.0	14.0	13.0	13.5	16.0	7.0	12.5	12.5	7.0	8.0
6	10.5	9.0	9.5	14.5	12.5	13.5	17.0	14.0	15.5	8.0	6.5	7.5
7	10.0	9.0	9.5	15.5	14.0	14.5	16.0	8.0	11.5	8.0	7.0	7.5
8	10.5	9.0	9.5	16.0	14.0	15.0	9.0	7.5	8.5	7.0	6.5	7.0
9	10.5	9.0	9.5	14.5	12.5	13.0	8.5	8.0	8.0	7.5	6.5	7.0
10	9.5	7.5	8.5	13.5	11.0	12.0	8.5	7.5	8.0	8.0	6.5	7.0
11	9.5	7.5	8.0	15.0	12.0	13.5	8.5	7.5	8.0	7.5	6.5	7.0
12	10.5	8.5	9.5	15.5	12.5	14.5	16.5	8.0	13.0	7.5	6.0	7.0
13	11.0	10.0	10.5	12.5	9.0	10.5	17.0	11.5	15.0	7.5	6.0	7.0
14	11.0	9.0	10.0	13.0	9.0	10.5	15.5	8.0	9.5	8.0	6.5	7.0
15	10.0	9.0	9.5	17.0	11.0	15.5	9.0	7.5	8.0	8.0	6.5	7.0
16	9.5	9.0	9.5	16.0	15.0	15.5	8.0	7.0	7.5	7.5	6.5	7.0
17	9.5	8.5	9.0	15.0	8.5	11.5	7.5	6.5	7.0	7.0	6.5	6.5
18	10.5	8.5	9.5	10.5	8.5	9.0	8.0	6.5	7.0	7.0	6.0	6.5
19	10.5	9.0	9.5	10.0	9.0	9.5	14.0	7.0	11.5	7.5	6.5	7.0
20	9.0	8.0	8.5	11.0	9.5	10.0	14.0	11.5	12.5	7.5	6.5	7.0
21	10.5	8.0	9.0	11.0	10.0	10.5	12.5	7.0	7.5	7.5	6.5	7.0
22	10.5	9.5	10.0	17.0	9.5	15.0	7.0	6.5	7.0	7.5	6.5	7.0
23	11.5	9.5	10.5	17.5	15.0	16.0	7.5	6.5	7.0	7.5	6.5	7.0
24	11.5	10.0	11.0	16.5	9.5	13.0	7.0	6.5	7.0	8.0	7.0	7.0
25	12.5	11.0	11.5	10.5	9.0	9.5	7.5	6.5	7.0	11.0	7.0	8.0
26	13.0	11.5	12.0	10.5	9.0	9.5	13.5	7.0	11.0	7.5	6.5	7.0
27	12.5	11.0	12.0	11.0	9.0	9.5	13.5	12.5	12.5	8.0	7.0	7.5
28	13.0	11.0	12.0	10.5	9.0	9.5	12.5	7.0	8.0	7.5	6.5	7.0
29	14.0	12.0	13.0	18.0	9.0	15.0	8.5	7.0	7.5	8.0	6.5	7.0
30	14.0	13.0	13.5	18.5	16.5	17.5	8.5	7.5	8.0	7.0	7.0	7.0
31	---	---	---	17.5	9.0	12.5	8.0	7.5	7.5	---	---	---
MONTH	14.0	7.5	10.0	18.5	8.5	12.5	17.0	6.5	9.2	13.5	6.0	7.6

PEND OREILLE RIVER BASIN

12365000 STILLWATER RIVER NEAR WHITEFISH, MT

LOCATION.--Lat 48°19'08", long 114°23'11", in NE1/4SW1/4 sec.34, T.30 N., R.22 W., Flathead County, Hydrologic Unit 17010210, on right bank 600 ft downstream from road bridge, 6.2 mi southwest of Whitefish, 10.6 mi upstream from Whitefish River, and at mile 13.6.

DRAINAGE AREA.--524 mi^2.

PERIOD OF RECORD.--October and November 1930 (monthly discharge only, published in WSP 1316), December 1930 to September 1950, October 1972 to September 1985, April 1986 to current year.

REVISED RECORDS.--WSP 1736: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,953.26 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 26 to Dec. 1, Dec. 3 to Apr. 4. Records good April to June, otherwise fair except those for estimated daily discharges, which are poor. Several observations of water temperature and specific conductance were made during the year. Diversions for irrigation of about 200 acres upstream from station.

AVERAGE DISCHARGE.--36 years (water years 1931-50, 1973-85, 1987-89), 330 ft^3/s, 8.55 in/yr, 239,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,330 ft^3/s, May 26, 1948, gage height, 20.90 ft, from floodmark; minimum, 32 ft^3/s, Sept. 9, 1988.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,870 ft^3/s, May 12, gage height, 12.74 ft; minimum daily, 45 ft^3/s, Feb. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	84	80	e85	e74	e67	e57	e175	1430	873	377	210	220
2	84	79	80	e78	e57	e55	e180	1350	866	362	205	209
3	81	80	e77	e80	e48	e53	e180	1350	846	352	203	213
4	80	82	e73	e82	e45	e52	e180	1390	836	338	198	216
5	78	85	e70	e80	e47	e55	187	1470	836	321	195	206
6	78	89	e73	e75	e52	e65	195	1540	838	303	195	201
7	75	97	e74	e68	e54	e70	220	1600	841	288	191	200
8	74	104	e74	e70	e57	e75	262	1660	845	276	184	196
9	73	105	e77	e70	e60	e80	296	1750	863	260	183	190
10	69	105	e80	e73	e60	e85	333	1820	882	249	188	187
11	66	104	e80	e73	e63	e95	387	1860	908	248	198	183
12	64	104	e83	e75	e65	e100	434	1870	925	250	201	175
13	65	105	e86	e75	e65	e110	486	1840	897	253	204	169
14	64	104	e90	e77	e63	e105	559	1760	855	277	209	163
15	63	103	e85	e80	e63	e105	657	1640	817	294	209	158
16	69	100	e80	e80	e60	e105	796	1500	794	294	203	153
17	78	97	e75	e83	e57	e100	963	1370	768	291	193	151
18	90	95	e75	e85	e58	e95	1090	1280	734	279	187	154
19	95	92	e78	e87	e60	e105	1180	1220	700	269	184	156
20	97	90	e80	e85	e62	e110	1240	1170	663	262	176	158
21	97	89	e77	e80	e63	e115	1300	1130	625	250	170	156
22	97	90	e77	e80	e60	e120	1410	1080	587	244	169	153
23	97	92	e77	e77	e65	e120	1560	1020	556	236	168	149
24	92	99	e75	e74	e73	e120	1740	992	530	230	183	147
25	90	105	e70	e77	e70	e125	1850	975	503	223	223	145
26	89	e100	e66	e80	e65	e135	1860	955	480	217	252	141
27	90	e93	e68	e80	e65	e140	1820	929	459	216	264	139
28	91	e87	e70	e80	e63	e150	1740	902	437	220	278	137
29	88	e85	e73	e85	---	e160	1640	892	422	220	274	134
30	85	e87	e77	e90	---	e165	1540	894	399	216	258	133
31	82	---	e77	e85	---	e170	---	884	---	215	239	---
TOTAL	2525	2827	2382	2438	1687	3197	26460	41523	21585	8330	6394	5092
MEAN	81.5	94.2	76.8	78.6	60.2	103	882	1339	719	269	206	170
MAX	97	105	90	90	73	170	1860	1870	925	377	278	220
MIN	63	79	66	68	45	52	175	884	399	215	168	133
AC-FT	5010	5610	4720	4840	3350	6340	52480	82360	42810	16520	12680	10100

CAL YR 1988 TOTAL 69165 MEAN 189 MAX 888 MIN 33 AC-FT 137200
WTR YR 1989 TOTAL 124440 MEAN 341 MAX 1870 MIN 45 AC-FT 246800

e Estimated

PEND OREILLE RIVER BASIN

12366000 WHITEFISH RIVER NEAR KALISPELL, MT

LOCATION.--Lat 48°19'13", long 114°16'39", in SW1/4SE1/4NW1/4 sec.34, T.30 N., R.21 W., Flathead County, Hydrologic Unit 17010210, on right bank 160 ft upstream from road bridge, 8.0 mi north of Kalispell, and at mile 8.3.

DRAINAGE AREA.--170 mi^2.

PERIOD OF RECORD.--July to November 1928, April 1929 to September 1950, annual maximum, water year 1964, October 1972 to September 1985, April 1986 to current year. Prior to 1964, published as Whitefish Creek near Kalispell.

GAGE.--Water-stage recorder. Datum of gage is 2,969.83 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 16, 1930, nonrecording gage at site 200 ft downstream at datum 10.00 ft lower. Oct. 16, 1930, to Sept. 30, 1950, water-stage recorder on left bank at same datum.

REMARKS.--Estimated daily discharges: Dec. 16 to Apr. 2, 9-12. Records good except those for estimated daily discharges, which are poor. Some regulation by Whitefish Lake. Diversion for irrigation of about 650 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--37 years (1929-50, 1972-85, 1987-89), 188 ft^3/s, 136,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,580 ft^3/s, June 24, 1974, gage height, 4.91 ft; minimum, 4.5 ft^3/s, Oct. 18, 1934, gage height, 0.83 ft.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 795 ft^3/s, May 12, gage height, 3.49 ft; minimum daily, 29 ft^3/s, Feb. 4; minimum gage height, 1.12 ft, Oct. 14.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	41	45	52	e50	e40	e38	e85	476	536	345	131	110
2	42	45	50	e52	e35	e37	e87	497	533	329	126	114
3	43	45	50	e53	e30	e35	86	556	536	317	121	112
4	43	45	49	e54	e29	e36	90	577	548	295	117	110
5	43	46	48	e53	e30	e38	94	585	561	277	114	109
6	43	48	49	e50	e32	e40	110	597	581	265	112	107
7	43	50	50	e48	e33	e43	112	640	606	254	112	105
8	43	50	50	e47	e34	e45	127	692	627	239	107	103
9	41	50	52	e48	e36	e47	e117	723	635	228	107	101
10	41	48	52	e49	e37	e50	e115	745	652	222	107	99
11	41	48	54	e50	e38	e55	e110	782	670	217	105	96
12	40	50	54	e50	e39	e60	e114	792	670	208	105	96
13	40	50	59	e50	e39	e63	119	791	665	217	110	94
14	40	48	61	e51	e38	e65	131	782	657	217	107	92
15	41	48	57	e52	e37	e67	153	763	657	208	110	92
16	43	48	e53	e55	e37	e70	171	745	652	200	107	90
17	46	48	e50	e57	e36	e67	179	741	644	197	105	92
18	46	50	e50	e58	e35	e67	184	736	627	189	101	94
19	46	50	e53	e57	e36	e70	197	732	606	181	99	96
20	46	50	e55	e57	e36	e67	219	714	581	179	99	94
21	46	50	e55	e56	e37	e65	265	687	556	173	96	92
22	45	50	e55	e54	e37	e65	329	665	529	166	101	90
23	45	52	e55	e52	e40	e65	397	648	508	161	101	88
24	45	52	e53	e50	e42	e65	424	640	486	157	112	86
25	45	52	e50	e49	e43	e65	441	631	469	153	124	83
26	45	52	e47	e49	e43	e67	469	618	451	148	124	83
27	46	52	e45	e49	e42	e70	479	606	431	145	124	81
28	45	52	e44	e49	e40	e75	472	589	407	145	121	81
29	45	52	e46	e50	---	e77	469	581	381	143	119	79
30	45	52	e48	e52	---	e80	469	568	361	138	117	79
31	45	---	e49	e52	---	e83	---	548	---	136	112	---
TOTAL	1349	1478	1595	1603	1031	1837	6814	20447	16823	6449	3453	2848
MEAN	43.5	49.3	51.5	51.7	36.8	59.3	227	660	561	208	111	94.9
MAX	46	52	61	58	43	83	479	792	670	345	131	114
MIN	40	45	44	47	29	35	85	476	361	136	96	79
AC-FT	2680	2930	3160	3180	2040	3640	13520	40560	33370	12790	6850	5650

CAL YR 1988 TOTAL 40235 MEAN 110 MAX 469 MIN 27 AC-FT 79810
WTR YR 1989 TOTAL 65727 MEAN 180 MAX 792 MIN 29 AC-FT 130400

e Estimated

PEND OREILLE RIVER BASIN

12369200 SWAN RIVER NEAR CONDON, MT

LOCATION.--Lat 47°25'21", long 113°40'12", NE1/4SW1/4NW1/4 sec.8, T.19 N., R.16 W., Missoula County, Hydrologic Unit 17010211, Flathead National Forest, on right bank 25 ft downstream from road bridge, 0.5 mi downstream from Beaver Creek, 4.0 mi downstream from Lindberg Lake, 8.1 mi southeast of Condon, and at mile 66.5.

DRAINAGE AREA.--69.1 mi^2.

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

REVISED RECORDS.--WDR MT-80-2: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 4,015 ft, by barometer.

REMARKS.--Estimated daily discharges: Dec. 16-18, 24-31, Jan. 7-16,20, 24-28, Jan. 31 to Mar. 10, Mar. 17. Records good except those for estimated daily discharges, which are poor. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--17 years, 159 ft^3/s, 31.25 in/yr, 115,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,540 ft^3/s, June 18, 1974, gage height, 4.88 ft; minimum, 17 ft^3/s, Sept. 9, 10, 15, 16, 17, 1988.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 942 ft^3/s, May 11, gage height, 4.09 ft; minimum, 21 ft^3/s, gage height, 1.40 ft, Oct. 12,13,14.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	67	69	61	e44	e47	85	288	296	440	153	112
2	25	69	67	59	e40	e45	85	313	371	444	146	110
3	25	88	65	58	e35	e43	85	358	456	424	137	111
4	24	99	61	57	e33	e42	84	419	484	407	128	106
5	24	100	59	57	e34	e47	95	451	526	398	120	100
6	24	113	63	58	e35	e54	215	484	584	387	112	94
7	23	132	64	e56	e36	e60	359	616	667	369	106	88
8	23	129	62	e54	e36	e68	458	741	720	357	102	82
9	22	126	62	e56	e36	e75	411	746	789	347	101	78
10	22	116	61	e60	e36	e80	365	789	860	333	97	75
11	22	110	58	e64	e36	89	323	904	856	308	93	72
12	21	105	62	e69	e38	98	290	752	778	287	91	68
13	21	103	89	e65	e39	105	286	609	733	303	90	65
14	21	98	91	e62	e38	112	306	501	727	330	87	62
15	28	90	80	e59	e37	112	358	435	748	338	86	58
16	129	86	e78	e56	e36	109	436	422	817	341	82	56
17	426	83	e77	56	e36	e107	466	441	775	378	79	55
18	412	80	e75	55	e36	105	434	468	665	418	75	60
19	342	77	74	54	e37	101	437	439	589	386	72	62
20	279	75	73	e52	e38	96	540	381	539	340	69	60
21	224	74	71	51	e39	91	665	335	480	323	68	59
22	181	75	69	53	e39	91	735	308	416	309	71	57
23	148	84	69	51	e40	86	698	317	367	285	75	56
24	127	81	e68	e49	e43	82	585	352	335	257	91	54
25	112	79	e66	e47	e45	83	493	340	324	234	122	52
26	102	78	e62	e48	e45	87	480	306	327	216	132	50
27	96	75	e58	e49	e48	87	423	276	342	203	132	52
28	86	76	e54	e50	e49	90	368	307	359	191	136	51
29	79	75	e56	52	---	91	323	310	375	179	134	50
30	74	73	e58	46	---	89	295	290	403	169	129	49
31	71	---	e60	e46	---	87	---	281	---	160	122	---
TOTAL	3238	2716	2081	1710	1084	2559	11183	13979	16708	9861	3238	2104
MEAN	104	90.5	67.1	55.2	38.7	82.5	373	451	557	318	104	70.1
MAX	426	132	91	69	49	112	735	904	860	444	153	112
MIN	21	67	54	46	33	42	84	276	296	160	68	49
AC-FT	6420	5390	4130	3390	2150	5080	22180	27730	33140	19560	6420	4170

CAL YR 1988 TOTAL 45817 MEAN 125 MAX 575 MIN 18 AC-FT 90880
WTR YR 1989 TOTAL 70461 MEAN 193 MAX 904 MIN 21 AC-FT 139800

e Estimated

PEND OREILLE RIVER BASIN

12370000 SWAN RIVER NEAR BIGFORK, MT

LOCATION.--Lat 48°01'28", long 113°58'44", near center of S1/2SW1/4 sec.11, T.26 N., R.19 W., Lake County, Hydrologic Unit 17010211, on left bank 0.2 mi downstream from Johnson Creek, 0.4 mi downstream from Swan Lake, 5.1 mi southeast of Bigfork, and at mile 14.0.

DRAINAGE AREA.--671 mi^2.

PERIOD OF RECORD.--October 1910 to May 1911 (gage heights only), April 1922 to current year. Monthly discharge only for some periods, published in WSP 1316.

REVISED RECORDS.--WSP 1216: Drainage area. WSP 1246: 1923-24(M), 1930. WSP 1316: 1923.

GAGE.--Water-stage recorder. Datum of gage is 3,062.6 ft above National Geodetic Vertical Datum of 1929 (from river-profile survey). Oct. 10, 1910, to May 22, 1911, nonrecording gage at site 10 mi upstream at different datum. Apr. 28, 1922, to Oct. 14, 1930, nonrecording gage at site 800 ft upstream at datum 1.9 ft higher.

REMARKS.--Estimated daily discharges: Feb. 2-22, Feb. 28 to Mar. 7, Mar. 17-19. Records excellent except those for estimated daily discharges, which are poor. Diversions for irrigation of about 360 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--67 years, 1,160 ft^3/s, 23.48 in/yr, 840,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,890 ft^3/s, June 20, 1974, gage height, 7.34 ft; minimum observed, 193 ft^3/s, Jan. 26-29, 1930, gage height, 0.04 ft, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,940 ft^3/s, May 12, gage height, 5.49 ft; minimum, 249 ft^3/s, Oct. 14, gage height, 2.01 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	318	492	494	423	384	e340	818	2350	2030	2110	949	807
2	314	478	468	429	e340	e320	839	2320	2060	2160	905	779
3	308	495	459	437	e290	e330	848	2490	2290	2160	877	765
4	304	510	448	436	e280	e340	848	2700	2600	2080	856	757
5	295	532	432	438	e290	e330	849	2880	2920	2010	839	740
6	292	547	432	443	e290	e340	936	3000	3180	1950	817	720
7	288	571	443	432	e300	e350	1250	3190	3500	1880	787	705
8	285	600	456	412	e300	370	1860	3600	3860	1800	752	690
9	280	627	453	411	e300	385	2310	4170	4120	1740	742	660
10	283	638	448	419	e300	406	2380	4530	4360	1670	738	642
11	278	621	441	423	e300	441	2330	4720	4560	1610	719	626
12	279	622	437	426	e310	473	2220	4920	4610	1550	700	610
13	279	603	476	426	e310	516	2150	4730	4430	1530	689	591
14	275	583	530	425	e320	575	2160	4180	4200	1560	682	580
15	281	570	552	421	e320	611	2260	3640	4100	1570	704	566
16	313	551	522	424	e310	629	2450	3230	4040	1530	694	547
17	389	528	495	429	e310	e620	2730	2990	4060	1520	676	531
18	571	521	476	441	e300	e620	2870	2940	3960	1550	657	557
19	726	517	463	441	e300	e620	2810	2970	3660	1540	645	569
20	809	510	480	449	e310	614	2790	2880	3390	1510	630	560
21	835	505	484	441	e310	612	2950	2700	3150	1450	630	554
22	794	515	486	446	e300	610	3340	2500	2880	1400	635	546
23	770	530	491	437	311	602	3700	2350	2610	1350	639	532
24	717	551	487	430	346	600	3810	2340	2390	1290	674	523
25	681	561	476	411	345	598	3580	2380	2240	1220	774	514
26	632	547	428	407	346	608	3360	2340	2170	1190	852	505
27	607	546	389	398	360	631	3210	2250	2090	1130	881	508
28	571	521	376	392	e350	661	3030	2170	2070	1090	896	499
29	546	509	389	384	---	704	2760	2120	2060	1050	877	490
30	525	501	409	387	---	751	2510	2090	2050	1020	844	491
31	509	---	417	397	---	788	---	2050	---	971	835	---
TOTAL	14354	16402	14237	13115	8832	16395	69958	93720	95640	48191	23595	18164
MEAN	463	547	459	423	315	529	2332	3023	3188	1555	761	605
MAX	835	638	552	449	384	788	3810	4920	4610	2160	949	807
MIN	275	478	376	384	280	320	818	2050	2030	971	630	490
AC-FT	28470	32530	28240	26010	17520	32520	138800	185900	189700	95590	46800	36030

CAL YR 1988 TOTAL 296369 MEAN 810 MAX 3090 MIN 250 AC-FT 587800
WTR YR 1989 TOTAL 432603 MEAN 1185 MAX 4920 MIN 275 AC-FT 858100

e Estimated

PEND OREILLE RIVER BASIN

12371500 FLATHEAD LAKE AT SOMERS, MT

LOCATION.--Lat 48°04'22", long 114°13'30", in NE1/4NE1/4SE1/4 sec.26, T.27 N., R.21 W., Flathead County, Hydrologic Unit 17010208, at steamboat dock at Somers.

DRAINAGE AREA.--7,086 mi^2.

PERIOD OF RECORD.--April to August 1900, daily lake elevations only, at site near Holt, 6 mi east of Somers (datum unknown). August 1908 to November 1909 (fragmentary), January 1910 to current year. Monthend contents only for some periods, published in WSP 1316. Prior to April 1923, published as "at Polson." Oct. 1, 1941, to current year, unpublished daily lake elevations at Polson are available in files of Helena district office.

GAGE.--Water-stage recorder. Datum of gage is at Somers datum. Subtract 1.00 ft to convert Somers datum to National Geodetic Vertical Datum of 1929, supplementary adjustment of 1947. July 1 to Dec. 12, 1923, non-recording gage at same site and datum.

REMARKS.--Natural storage in Flathead Lake increased by construction of Kerr Dam 4 mi downstream from natural lake outlet; storage began Apr. 11, 1938. Usable capacity, 1,791,000 acre-ft at controlled spillway elevation 2,893.00 ft. Dead storage unknown below 2,878 ft, elevation of natural outlet. Minimum operating level, 572,300 acre-ft, elevation, 2,883.00 ft for on-site power generation. Water is used for power production, flood control, recreation, and irrigation. Figures given herein represent usable contents.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 2,208,000 acre-ft, June 19, 1933, elevation, 2,896.26 ft; minimum 347,000 acre-ft, Dec. 5, 1936, elevation, 2.881.07 ft.

EXTREMES OUTSIDE PERIOD OF RECORD.--Lake reached an elevation of 2,900 ft during flood in June 1894.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 1,816,000 acre-ft, July 2, elevation, 2,893.20 ft; minimum, 655,200 acre-ft, Apr. 7, elevation, 2,883.70 ft.

Capacity table (elevation, in feet and contents, in acre-ft)

2,883	572,300	2,890	1,417,000
2,886	930,300	2,892	1,665,000
2,888	1,172,000	2,894	1,917,000

ELEVATION (FEET NGVD), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
OBSERVATION AT 24:00 VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2892.13	2890.45	2887.98	2885.62	2885.05	2884.61	2883.86	2886.18	2890.82	2893.17	2892.86	2892.84
2	2892.07	2890.36	2887.95	2885.55	2885.08	2884.58	2883.81	2886.36	2890.92	2893.13	2892.90	2892.86
3	2892.05	2890.28	2887.88	2885.54	2885.05	2884.53	2883.79	2886.54	2891.08	2893.07	2892.90	2892.82
4	2892.01	2890.20	2887.82	2885.44	2885.08	2884.47	2883.77	2886.72	2891.31	2893.03	2892.90	2892.75
5	2891.98	2890.06	2887.74	2885.39	2885.11	2884.39	2883.78	2886.92	2891.56	2893.04	2892.86	2892.72
6	2891.92	2890.05	2887.70	2885.36	2885.13	2884.34	2883.71	2887.13	2891.81	2893.03	2892.77	2892.74
7	2891.85	2889.98	2887.61	2885.36	2885.03	2884.34	2883.76	2887.46	2892.04	2893.01	2892.73	2892.72
8	2891.77	2889.98	2887.55	2885.33	2885.01	2884.33	2883.78	2887.83	2892.26	2893.00	2892.80	2892.74
9	2891.68	2889.91	2887.46	2885.35	2885.01	2884.34	2883.82	2888.12	2892.38	2892.94	2892.90	2892.76
10	2891.60	2889.85	2887.37	2885.37	2885.00	2884.33	2883.83	2888.38	2892.56	2892.93	2892.92	2892.82
11	2891.53	2889.73	2887.30	2885.37	2884.98	2884.30	2883.85	2888.66	2892.70	2892.91	2892.97	2892.85
12	2891.47	2889.65	2887.28	2885.38	2884.97	2884.24	2883.87	2888.91	2892.78	2892.91	2892.94	2892.86
13	2891.40	2889.47	2887.19	2885.38	2884.98	2884.22	2883.90	2889.05	2892.80	2892.96	2892.85	2892.89
14	2891.39	2889.40	2887.08	2885.33	2884.98	2884.25	2883.92	2889.13	2892.81	2892.98	2892.89	2892.90
15	2891.33	2889.29	2886.98	2885.42	2884.98	2884.25	2883.94	2889.17	2892.89	2892.98	2892.95	2892.94
16	2891.25	2889.16	2886.91	2885.35	2884.95	2884.28	2884.13	2889.22	2892.92	2892.95	2892.95	2892.94
17	2891.19	2889.07	2886.80	2885.21	2884.98	2884.28	2884.19	2889.30	2892.95	2892.91	2892.96	2892.92
18	2891.15	2889.01	2886.72	2885.18	2884.96	2884.24	2884.31	2889.52	2892.91	2892.92	2892.99	2892.98
19	2891.13	2888.96	2886.66	2885.12	2884.93	2884.19	2884.41	2889.60	2892.93	2892.97	2892.93	2892.99
20	2891.07	2888.91	2886.57	2885.13	2884.91	2884.14	2884.53	2889.81	2893.06	2893.06	2892.85	2892.98
21	2891.10	2888.83	2886.52	2885.11	2884.90	2884.07	2884.87	2889.94	2893.13	2893.11	2892.83	2892.97
22	2891.02	2888.76	2886.40	2885.08	2884.85	2884.05	2884.98	2890.01	2893.06	2893.01	2892.83	2892.98
23	2891.00	2888.62	2886.34	2885.07	2884.82	2884.01	2885.23	2890.14	2892.95	2892.93	2892.88	2892.99
24	2890.98	2888.50	2886.20	2885.07	2884.78	2883.96	2885.42	2890.25	2892.92	2892.87	2893.02	2892.99
25	2890.97	2888.41	2886.12	2885.06	2884.72	2883.94	2885.63	2890.34	2892.94	2892.90	2893.04	2892.93
26	2890.93	2888.28	2886.05	2885.05	2884.63	2883.91	2885.76	2890.40	2892.98	2892.98	2892.84	2892.94
27	2890.88	2888.19	2885.92	2885.05	2884.67	2883.88	2885.87	2890.44	2893.04	2893.01	2892.79	2892.92
28	2890.83	2888.14	2885.86	2885.06	2884.62	2883.88	2885.98	2890.55	2893.07	2893.02	2892.80	2892.92
29	2890.73	2888.04	2885.76	2885.15	---	2883.89	2886.04	2890.64	2893.09	2892.95	2892.80	2892.92
30	2890.65	2887.99	2885.72	2885.14	---	2883.89	2886.09	2890.70	2893.12	2892.86	2892.80	2892.96
31	2890.54	---	2885.64	2884.94	---	2883.87	---	2890.74	---	2892.81	2892.85	---
MAX	2892.13	2890.45	2887.98	2885.62	2885.13	2884.61	2886.09	2890.74	2893.74	2893.17	2893.04	2892.99
MIN	2890.54	2887.99	2885.64	2884.94	2884.62	2883.87	2883.71	2886.18	2886.18	2892.81	2892.73	2892.72
(†)	1484	1171	887.0	802.9	764.7	675.3	941.2	1509	1806	1767	1772	1786
(††)	-206000	-313000	-284000	-84100	-38200	-89400	+265900	+567800	+297000	-39000	+5000	+14000

CAL YR 1988.....†† -42,100
WTR YR 1989.....†† +96,000

† Contents, in thousands of acre-feet, at end of month.
†† Change in contents, in acre-feet.

PEND OREILLE RIVER BASIN

12372000 FLATHEAD RIVER NEAR POLSON, MT

LOCATION.--Lat 47°40'49", long 114°14'45", in SW1/4NE1/4SE1/4 sec. 11, T.22 N., R.21 W., Lake County, Hydrologic Unit 17010212, on left bank 0.5 mi downstream from Kerr Dam, 4.0 mi west of Polson, 5.0 mi downstream from Flathead Lake, and at mile 71.5.
DRAINAGE AREA.--7,096 mi^2.
PERIOD OF RECORD.--July 1907 to current year.
REVISED RECORDS.--WSP 652: 1926. WSP 752: 1932. WSP 1182: 1948. WSP 1216: Drainage area. WSP 1246: 1928(M). WSP 1636: 1958 (adjusted runoff).
GAGE.--Water-stage recorder. Datum of gage is 2,692.70 ft above National Geodetic Vertical Datum of 1929 (levels by The Montana Power Co.). Prior to Oct. 1, 1941, nonrecording gages or water-stage recorder at several sites near highway bridge at old site of Michell's ferry 6 mi downstream from present site, all at datum 2,629.20 ft National Geodetic Vertical Datum of 1929 (from river-profile survey).
REMARKS.--No estimated daily discharges. Records excellent. Flow regulated by Flathead Lake (Kerr Dam) since April 1938 (station number 12371500) and Hungry Horse Reservoir (station number 12362000) since September 1951. Diversions upstream from station for irrigation of about 10,000 acres. Flathead project pumps can divert up to 12,000 acre-ft per month when required for irrigation of lands downstream from station.
AVERAGE DISCHARGE.--82 years, 11,560 ft^3/s, 22.13 in/yr, 8,375,000 acre-ft/yr, adjusted for change in contents in Hungry Horse Reservoir and Flathead Lake.
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 82,800 ft^3/s, May 29, 1928, gage height, 17.2 ft, site and datum then in use; minimum probably less than 5.0 ft^3/s, Apr. 13, 1938; minimum daily, 32 ft^3/s, Apr. 12, 1938.
EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1894 reached a stage of about 21 ft, present datum; discharge, about 110,000 ft^3/s, from lake elevation-discharge study.
EXTREMES FOR CURRENT YEAR.--Maximum discharge, 31,500 ft^3/s, June 14, gage height, 12.48 ft; minimum daily, 4,280 ft^3/s, Jan. 12.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7810	10400	5240	7360	6440	8740	6530	11000	11500	12000	10900	12200
2	5320	9360	5790	6410	6530	9970	6740	10600	11500	15100	11100	10600
3	6100	9100	8300	8600	8990	9260	6740	10100	11900	14700	11400	7740
4	6840	9010	8340	5850	8680	9230	5550	10600	11500	12800	10200	8510
5	6200	11100	8190	5550	8590	8500	7540	10700	12100	11300	9700	11700
6	6780	7300	9160	5980	9540	8530	6440	11800	12300	11100	8900	12900
7	8410	5710	9520	6250	10200	8120	6390	11900	16600	10800	9610	12900
8	8450	4810	9600	5680	5690	8000	6940	16500	20300	9970	8220	12500
9	9380	7820	9430	5840	4290	7830	6050	21700	22800	9730	8670	11900
10	9100	10200	9850	5350	5180	8730	7240	23600	24900	9240	8240	8690
11	7940	10500	8790	4320	5120	7250	6380	23600	24900	10500	9290	12900
12	7490	11000	9250	4280	5310	8810	7000	22700	28300	8930	10100	12300
13	8650	11000	9250	5050	4670	7830	7190	23900	31200	12600	9850	11200
14	7520	11300	8650	5570	4480	8180	6900	23600	29400	13200	8670	12300
15	7030	10600	9990	5350	4460	8050	7180	22400	28000	12800	10200	11500
16	8240	9880	8700	7420	6090	8170	6990	20200	27500	12700	9820	12600
17	8920	10800	10200	8590	5580	8170	7230	17600	26800	13200	9720	13000
18	8620	8800	9130	5910	7780	7880	8010	15100	26700	13100	11200	13000
19	8050	6990	8050	5830	8350	7660	7650	14300	19400	12700	10800	12700
20	6470	7070	8330	4960	8440	8390	8260	11700	13000	12800	11400	12600
21	4490	8930	9840	4650	7440	7920	8240	12100	14300	13500	11600	12700
22	6640	10100	10600	4900	7270	7570	10100	12600	17700	14900	11500	12800
23	4560	10900	8790	5160	8550	6960	11300	12200	23600	12800	10700	12600
24	4600	10500	9450	4980	8820	7160	11500	12800	16000	12600	11100	12400
25	4960	10700	9590	4910	8860	7530	12200	12700	13800	11300	14400	12900
26	4940	9760	9560	4460	8850	6920	12800	12600	12900	11500	18500	12900
27	6200	9210	11100	5250	8830	6540	11800	11500	11300	10900	12100	12800
28	6460	9240	9380	4340	8900	7390	12000	11400	11000	13500	12000	12400
29	10100	9030	9810	4420	---	6950	11500	11500	11300	11900	12800	12400
30	10200	5840	6880	4480	---	6250	12400	11500	11700	11600	12900	12500
31	10300	---	7410	5670	---	7670	---	11200	---	10600	12800	---
TOTAL	226770	276960	276170	173370	201930	246160	252790	465700	554200	374370	338390	360140
MEAN	7315	9232	8909	5593	7212	7941	8426	15020	18470	12080	10920	12000
MAX	10300	11300	11100	8600	10200	9970	12800	23900	31200	15100	18500	13000
MIN	4490	4810	5240	4280	4290	6250	5550	10100	11000	8930	8220	7740
AC-FT	449800	549400	547800	343900	400500	488300	501400	923700	1099000	742600	671200	714300
MEAN	† 3672	4359	3184	2583	2310	3755	19600	36519	35476	11101	5224	4458
CFSM	†† .52	.61	.45	.36	.33	.53	2.76	5.15	5.00	1.56	.74	.63
IN	†† .60	.69	.52	.42	.34	.61	3.08	5.93	5.58	1.80	.85	.70
AC-FT	†† 225800	259400	195800	158800	128300	230900	1166300	2245500	2111000	682600	321200	265300

OBSERVED

CAL YR 1988	TOTAL	2894570	MEAN	7909	MAX	13300	MIN	3170	AC-FT	5741000	† -455100
WTR YR 1989	TOTAL	3746950	MEAN	10270	MAX	31200	MIN	4280	AC-FT	7432000	† +559000

ADJUSTED

CAL YR 1988	TOTAL	2665136	MEAN	7282	CFSM	1.03	IN	13.97	AC-FT	5286300
WTR YR 1989	TOTAL	4028685	MEAN	11040	CFSM	1.56	IN	21.11	AC-FT	7990900

† Change in contents, in acre-ft, in Hungry Horse Reservoir and Flathead Lake.
†† Adjusted for change in contents.

PEND OREILLE RIVER BASIN

12374250 MILL CREEK ABOVE BASSOO CREEK, NEAR NIARADA, MT

LOCATION.--Lat 47°49'49", long 114°41'45", in SE1/4NW1/4NE1/4 sec.20, T.24 N., R.24 W., Sanders County, Hydrologic Unit 17010212, Flathead Indian Reservation, on right bank 0.2 mi upstream from Bassoo Creek, and 4.1 mi northwest of Niarada.

DRAINAGE AREA.--19.6 mi^2.

PERIOD OF RECORD.--October 1982 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 3,000 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to Sept. 23, 1987, at site 30 ft downstream at same datum.

REMARKS.--Estimated daily discharges: Nov. 27,28, Dec. 1-7, 15-18, 26-31, Jan. 1, Feb. 1-22, Mar. 10,11. Records good below 20 ft^3/s except those for estimated daily discharges and those above 20 ft^3/s, which are poor. No known regulation or diversion upstream of station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--7 years, 7.09 ft^3/s, 4.91 in/yr, 5,140 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 79 ft^3/s, Apr. 22, 1989, gage height, 6.76 ft; minimum, 0.85 ft^3/s, Jan. 6, 1988, gage height, 5.00 ft.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 35 ft^3/s and maximums(*):

Date	Time	Discharge (ft^3/s)	Gage Height (ft)	Date	Time	Discharge (ft^3/s)	Gage Height (ft)
Apr. 7	1230	45	6.52	May 8	1300	70	6.71
Apr. 22	0830	*79	*6.76				

Minimum daily discharge, 1.2 ft^3/s, Feb. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.8	1.8	e1.9	e2.2	e1.8	1.8	5.2	21	14	6.9	2.8	2.9
2	1.8	2.1	e1.8	2.4	e1.4	1.8	5.0	29	14	6.7	2.6	3.4
3	1.8	3.6	e1.7	2.3	e1.3	1.8	4.7	34	15	6.3	2.6	3.1
4	1.8	3.0	e1.6	2.3	e1.2	1.7	4.5	34	16	5.9	2.6	2.9
5	1.7	2.4	e1.6	2.4	e1.3	1.7	5.9	38	17	5.5	2.6	2.8
6	1.7	2.9	e1.8	2.2	e1.5	1.8	10	40	17	5.4	2.5	2.8
7	1.7	3.1	e2.0	2.1	e1.6	2.2	26	46	18	5.0	2.4	2.8
8	1.7	2.3	2.1	2.0	e1.7	2.0	40	54	18	4.7	2.3	2.8
9	1.7	2.3	2.0	2.1	e1.8	2.2	20	51	17	4.7	2.4	2.9
10	1.7	2.2	2.0	2.1	e1.9	e2.3	16	56	17	4.9	2.8	2.8
11	1.7	2.2	1.9	2.1	e2.0	e2.8	16	52	17	4.9	2.5	2.6
12	1.7	2.2	2.1	2.0	e2.1	3.4	16	48	16	4.7	2.5	2.6
13	1.7	2.2	5.5	2.0	e2.2	3.5	20	38	15	7.9	2.5	2.6
14	1.7	2.2	3.9	2.0	e2.1	3.5	37	40	14	5.5	2.5	2.6
15	1.7	2.1	e3.2	2.0	e1.9	3.4	45	35	14	4.5	2.4	2.5
16	2.5	2.1	e2.0	2.1	e2.0	3.2	46	28	14	4.4	2.2	2.4
17	3.1	2.1	e1.7	2.3	e2.0	3.1	44	20	13	4.2	2.3	2.5
18	2.1	2.1	e2.0	2.3	e2.0	2.9	38	21	12	4.1	2.2	3.6
19	2.0	2.1	2.1	2.4	e2.0	2.9	40	20	11	3.9	2.2	3.2
20	2.0	2.1	2.2	2.1	e2.0	2.9	42	19	11	3.8	2.2	2.8
21	1.9	2.1	2.3	2.1	e2.0	2.9	52	18	10	3.5	2.3	2.6
22	1.9	2.2	2.2	2.1	e2.1	3.5	60	18	9.8	3.4	2.9	2.5
23	1.9	3.8	2.1	2.1	2.1	3.4	54	17	9.4	3.4	3.2	2.5
24	1.8	2.5	2.0	1.9	2.1	3.4	46	16	8.9	3.2	4.4	2.4
25	1.8	2.2	1.7	2.0	2.1	3.4	38	16	8.6	3.2	5.7	2.4
26	1.8	2.1	e1.5	2.0	2.0	3.6	37	15	8.4	3.1	3.6	2.4
27	1.8	e1.9	e1.6	2.0	2.0	4.1	34	15	7.9	3.1	4.2	2.4
28	1.8	e2.0	e1.8	2.0	1.9	4.7	31	17	7.5	3.1	3.9	2.4
29	1.8	2.1	e1.9	2.0	---	5.0	24	16	7.3	2.9	3.2	2.4
30	1.8	2.1	e2.0	2.3	---	4.9	22	15	6.7	2.9	3.0	2.4
31	1.8	---	e2.1	3.4	---	5.0	---	14	---	2.8	3.0	---
TOTAL	57.7	70.1	66.3	67.3	52.1	94.8	879.3	901	384.5	138.5	88.5	81.0
MEAN	1.86	2.34	2.14	2.17	1.86	3.06	29.3	29.1	12.8	4.47	2.85	2.70
MAX	3.1	3.8	5.5	3.4	2.2	5.0	60	56	18	7.9	5.7	3.6
MIN	1.7	1.8	1.5	1.9	1.2	1.7	4.5	14	6.7	2.8	2.2	2.4
AC-FT	114	139	132	133	103	188	1740	1790	763	275	176	161

CAL YR 1988 TOTAL 1567.0 MEAN 4.28 MAX 17 MIN 1.5 AC-FT 3110
WTR YR 1989 TOTAL 2881.1 MEAN 7.89 MAX 60 MIN 1.2 AC-FT 5710

e Estimated

PEND OREILLE RIVER BASIN

12374800 CROMWELL CREEK NEAR NIARADA, MT

LOCATION.--Lat 47°52'54", long 114°30'04", in NW1/4NW1/4SE1/4 sec.36, T.25 N., R.23 W., Flathead County, Hydrologic Unit 17010212, on left bank 6.7 mi northeast of Niarada and 8.2 mi northwest of Elmo.

DRAINAGE AREA.--14.3 mi^2.

PERIOD OF RECORD.--October 1982 to September 1987, October 1987 to current year (no winter records).

GAGE.--Water-stage recorder. Elevation of gage is 3,220 ft above National Geodetic Vertical datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Oct. 4-31. Records fair except those for estimated daily discharges, which are poor. No known regulation or diversion upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--5 years (water years, 1983-87), 0.66 ft^3/s, 478 acre-ft/year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14 ft^3/s, Mar. 4, 1986, gage height, 2.76 ft; maximum gage height, 3.10 ft, Feb. 24, 1986, backwater from ice; no flow at times most years..

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 9.2 ft^3/s, Apr. 26, gage height, 2.38 ft; no flow July 31, Aug. 1,2, 6-9,11,12.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.04						1.5	2.4	.82	.18	.01	.14
2	.04						1.5	4.6	.79	.19	.01	.21
3	.04						1.4	4.2	.79	.18	.02	.17
4	e.04						1.4	3.7	.70	.16	.02	.17
5	e.03						1.5	2.7	.67	.14	.01	.17
6	e.03						3.3	2.5	.56	.14	.01	.16
7	e.03						5.7	2.5	.54	.12	.01	.14
8	e.03						5.4	2.4	.51	.11	.01	.12
9	e.03						4.3	1.8	.48	.10	.01	.12
10	e.03						4.0	1.9	.51	.12	.01	.12
11	e.03						3.7	1.8	.59	.14	.01	.13
12	e.03						3.7	1.6	.49	.13	.01	.14
13	e.03						4.3	1.5	.42	.22	.02	.14
14	e.02						5.2	1.4	.44	.18	.02	.14
15	e.04						6.0	1.4	.51	.14	.04	.13
16	e.08						6.4	1.4	.54	.13	.02	.12
17	e.10						6.0	1.3	.46	.13	.02	.14
18	e.07						5.7	1.3	.44	.11	.02	.27
19	e.06						6.0	1.2	.38	.09	.01	.22
20	e.06						6.0	1.2	.38	.09	.02	.18
21	e.05						5.9	1.1	.36	.08	.03	.17
22	e.05						5.7	.99	.34	.07	.06	.17
23	e.05						5.2	1.1	.32	.06	.09	.17
24	e.04						5.0	1.1	.30	.05	.24	.16
25	e.04						6.0	.99	.29	.06	.27	.16
26	e.04						7.2	.92	.27	.06	.18	.16
27	e.04						5.4	.88	.24	.04	.27	.14
28	e.04						5.2	.99	.22	.03	.26	.13
29	e.04						4.3	1.0	.21	.02	.21	.13
30	e.04						3.5	.92	.19	.01	.18	.14
31	e.04						---	.82	---	.01	.17	---
TOTAL	1.33						136.4	53.61	13.76	3.29	2.27	4.66
MEAN	.043						4.55	1.73	.46	.11	.073	.16
MAX	.10						7.2	4.6	.82	.22	.27	.27
MIN	.02						1.4	.82	.19	.01	.01	.12
AC-FT	2.6						271	106	27	6.5	4.5	9.2

e Estimated

12375800 LITTLE BITTERROOT RIVER NEAR PERMA, MT

LOCATION.-- Lat 47°28'45", long 114°27'17", in NW1/4NW1/4SW1/4 sec.19, T.20 N., R.22 W., Sanders County, Hydrologic Unit 17010212, Flathead Indian Reservation, 7.3 mi east of Camas Prairie, 10 mi northeast of Perma, and 11.1 mi upstream from mouth.

PERIOD OF RECORD.--Water years 1987 to current year.

REMARKS.--March 15 sample collected at alternate site 9 miles downstream, 0.2 mile upstream from mouth.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (STAND-ARD UNITS) (00400)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)
NOV												
21...	1200	11	100	3	260	8.2	9.5	3.0	688	12.4	102	74
JAN												
19...	1045	28	0	0	290	7.8	5.0	0.0	700	11.1	83	61
MAR												
15...	1530	515	100	3	178	8.0	10.0	0.5	690	12.0	92	50
JUN												
07...	1430	2.7	75	2	320	8.3	32.0	23.0	688	8.6	112	89
JUL												
18...	1645	9.6	75	2	267	8.4	30.0	26.5	694	8.7	119	81
AUG												
30...	1500	17	90	3	330	8.1	20.0	18.5	685	8.4	100	82

DATE	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	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, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)
NOV												
21...	19	6.5	28	1	3.4	115	16	6.2	0.70	18	167	0.23
JAN												
19...	16	5.0	39	2	6.6	112	30	11	0.80	17	193	0.26
MAR												
15...	14	3.7	11	0.7	9.8	75	8.0	5.4	0.20	12	110	0.15
JUN												
07...	23	7.6	41	2	4.6	141	23	7.8	0.60	14	206	0.28
JUL												
18...	22	6.4	30	1	5.1	119	14	7.6	0.60	19	176	0.24
AUG												
30...	21	7.1	40	2	6.2	132	22	9.4	0.70	20	206	0.28

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	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											
21...	4.96	<0.100	0.040	0.66	0.70	0.110	70	55	49	1.5	99
JAN											
19...	14.6	0.300	0.340	1.4	1.7	0.410	90	200	160	12	96
MAR											
15...	153	0.300	0.560	1.5	2.1	0.650	30	670	824	1150	94
JUN											
07...	1.50	<0.100	0.100	0.90	1.0	0.170	80	45	104	0.76	99
JUL											
18...	4.57	<0.100	0.060	0.94	1.0	0.240	70	110	65	1.7	98
AUG											
30...	9.44	<0.100	0.050	1.0	1.1	0.210	80	100	81	3.7	98

PEND OREILLE RIVER BASIN

12375900 SOUTH CROW CREEK NEAR RONAN, MT

LOCATION.--Lat 47°29'30", long 114°01'33", in NW1/4NE1/4SW1/4 sec.16, T.20 N., R.19 W., Lake County, Hydrologic Unit 17010212, Flathead Indian Reservation, on right bank 200 ft upstream of Pablo Feeder Canal, 2.2 mi northeast of Kicking Horse Reservoir, and 4.5 mi southeast of Ronan.

DRAINAGE AREA.--7.57 mi^2.

PERIOD OF RECORD.--October 1982 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 3,320 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Oct. 20-22, Dec. 25-28, Jan. 7-12,24,31, Feb. 1-22. Records good except those for estimated daily discharges, which are fair. No known regulation or diversion upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--7 years, 20.9 ft^3/s, 37.49 in/yr, 15,140 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 480 ft^3/s, May 29, 1986, gage height, 3.52 ft; maximum gage height, 3.60 ft, June 30, 1983; minimum discharge, 4.8 ft^3/s, Feb. 4, 1989, gage height, 1.66 ft, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 175 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
June 16	1115	*134	*2.94	No peak greater than base discharge this year.			

Minimum discharge, 4.8 ft^3/s, Feb. 4, gage height, 1.66 ft, result of freezeup.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.4	6.6	7.1	6.9	e6.0	6.0	7.3	17	32	55	17	13
2	6.4	6.7	7.1	6.9	e5.6	6.0	7.3	35	42	57	17	14
3	6.4	7.7	6.9	6.9	e5.2	6.0	7.3	43	53	54	16	14
4	6.2	7.8	6.9	6.9	e4.8	5.8	7.1	37	64	50	15	14
5	5.8	7.4	6.7	6.9	e4.9	5.8	7.1	36	74	48	15	13
6	6.6	7.2	6.9	7.3	e5.0	6.1	9.2	39	85	45	15	13
7	6.1	7.3	7.3	e6.8	e5.1	6.6	16	53	112	42	14	12
8	6.7	7.2	7.3	e6.6	e5.1	6.4	16	64	108	39	13	12
9	6.2	6.9	7.3	e6.4	e5.2	6.4	13	66	107	37	13	12
10	6.0	6.2	7.3	e6.7	e5.2	13	11	72	106	36	14	12
11	6.0	6.3	7.3	e6.9	e5.4	14	10	72	99	33	13	11
12	6.3	6.7	7.4	e7.1	e5.6	13	10	57	80	31	13	11
13	6.4	7.2	8.9	7.3	e5.9	14	12	48	79	35	13	10
14	6.4	7.1	9.0	7.3	e6.0	14	15	41	86	34	12	10
15	6.5	7.1	8.1	7.3	e5.4	12	20	37	90	32	13	10
16	6.7	7.1	7.5	7.2	e5.5	11	26	48	120	33	12	9.6
17	7.5	7.1	7.5	7.1	e5.6	10	23	43	109	39	12	9.8
18	7.4	7.1	7.3	7.1	e5.8	9.0	19	49	81	38	11	13
19	7.2	7.1	7.3	7.0	e5.8	8.9	21	43	75	34	11	13
20	e7.2	7.1	7.1	6.8	e6.0	8.3	27	37	70	30	11	11
21	e7.2	7.0	7.1	6.9	e6.0	8.0	36	35	62	28	11	10
22	e7.2	6.9	7.1	7.2	e6.1	7.9	42	33	55	26	12	10
23	6.9	7.1	7.1	6.9	6.2	7.5	33	34	49	25	12	9.7
24	6.6	7.1	7.1	e6.8	6.2	7.3	25	37	46	24	18	9.7
25	6.6	7.1	e6.9	6.6	6.2	7.3	21	36	46	23	20	9.4
26	6.6	7.1	e6.8	6.6	6.0	7.4	22	34	48	22	18	8.7
27	6.6	7.1	e6.7	6.6	5.9	7.7	21	32	50	20	17	8.5
28	6.6	7.1	e6.6	6.6	6.0	7.8	18	37	52	20	17	9.1
29	6.6	7.1	6.7	6.4	---	7.8	17	36	53	19	16	9.1
30	6.6	7.1	6.9	6.4	---	7.7	16	32	55	18	14	9.1
31	6.6	---	6.9	e6.4	---	7.4	---	32	---	18	14	---
TOTAL	204.5	211.6	224.1	212.8	157.7	266.1	535.3	1315	2188	1045	439	330.7
MEAN	6.60	7.05	7.23	6.86	5.63	8.58	17.8	42.4	72.9	33.7	14.2	11.0
MAX	7.5	7.8	9.0	7.3	6.2	14	42	72	120	57	20	14
MIN	5.8	6.2	6.6	6.4	4.8	5.8	7.1	17	32	18	11	8.5
AC-FT	406	420	445	422	313	528	1060	2610	4340	2070	871	656

CAL YR 1988 TOTAL 5072.9 MEAN 13.9 MAX 66 MIN 5.6 AC-FT 10060
WTR YR 1989 TOTAL 7129.8 MEAN 19.5 MAX 120 MIN 4.8 AC-FT 14140

e Estimated

PEND OREILLE RIVER BASIN

12376900 CROW CREEK AT MOUTH NEAR RONAN, MT

LOCATION.--Lat 47°28'14", long 114°16'41", in NE1/4NE1/4NW1/4 sec.28, T.20 N., R.21 W., Lake County, Hydrologic Unit 17010212, Flathead Indian Reservation, 0.2 mi upstream from mouth, 7.9 mi southwest of Ronan on Moiese Valley Road.

PERIOD OF RECORD.--Water years 1987 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)
NOV												
02...	1230	23	100	2	290	12.5	8.0	683	11.1	105	8.5	140
MAR												
10...	1000	22	10	1	371	7.0	3.5	702	12.4	101	8.2	150
APR												
20...	1030	38	5	1	301	14.0	5.5	697	12.5	109	8.4	130
MAY												
25...	0930	21	100	2	302	11.0	9.0	699	11.9	112	8.5	130
JUL												
05...	1100	26	5	1	261	25.0	17.0	705	9.6	108	8.5	120
AUG												
10...	1045	24	10	1	231	21.0	18.0	700	9.6	111	8.4	110

DATE	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	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, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)
NOV												
02...	38	11	7.3	0.3	2.3	154	6.0	2.3	0.10	8.9	168	0.23
MAR												
10...	42	12	9.3	0.3	2.4	172	8.2	3.3	0.10	11	191	0.26
APR												
20...	34	11	13	0.5	5.5	142	9.4	4.6	0.10	9.4	172	0.23
MAY												
25...	35	11	12	0.5	4.3	146	9.0	3.7	0.10	9.7	172	0.23
JUL												
05...	32	9.4	8.6	0.3	2.8	130	5.0	2.5	0.10	7.7	146	0.20
AUG												
10...	29	8.9	7.7	0.3	2.4	116	4.0	2.0	0.10	9.3	133	0.18

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	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											
02...	10.4	0.400	0.020	0.18	0.20	0.020	<10	9	24	1.5	92
MAR											
10...	11.4	0.800	0.040	0.56	0.60	0.050	<10	11	25	1.5	94
APR											
20...	17.7	0.600	0.170	0.83	1.0	0.150	<10	43	21	2.2	94
MAY											
25...	9.77	0.400	0.070	0.43	0.50	0.140	10	28	24	1.4	97
JUL											
05...	10.3	0.200	0.030	0.37	0.40	0.110	20	15	15	1.1	90
AUG											
10...	8.62	0.400	0.030	0.57	0.60	0.100	10	21	21	1.4	98

PEND OREILLE RIVER BASIN

12377150 MISSION CREEK ABOVE RESERVOIR, NEAR ST. IGNATIUS, MT

LOCATION.--Lat 47°19'23", long 113°58'43", in NW1/4SW1/4NE1/4 sec.14, T.18 N., R.19 W., Lake County, Hydrologic Unit 17010212, Flathead Indian Reservation, on right bank, 0.2 mi southwest of upper BIA campground, 0.5 mi upstream from Mission Reservoir, and 5.3 mi east of St. Ignatius.

DRAINAGE AREA.--12.4 mi^2.

PERIOD OF RECORD.--October 1982 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 3,460 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Dec. 26, Jan. 6-13,24, Jan. 31 to Mar. 7, 16-21, Mar. 24 to May 2. Records good except those for estimated daily discharges, which are fair. Several observations of water temperature and specific conductance were made during the year. No known regulation or diversions upstream from station.

AVERAGE DISCHARGE.--7 years, 48.2 ft^3/s, 52.79 in/yr, 34,920 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 547 ft^3/s, June 30, 1983, gage height, 4.19 ft; minimum discharge, 5.9 ft^3/s, Feb. 18, 1985, gage height, 0.72 ft, but may have been less during period of ice effect.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 300 ft^3/s and maximums (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
June 7	0615	302	3.21	June 16	0915	*352	*3.38

Minimum daily discharge, 7.4 ft^3/s, Feb. 4, Mar. 3,4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	18	15	12	e9.0	e7.6	e12	e35	76	197	77	47
2	15	18	14	12	e8.4	e7.5	e11	e46	120	164	76	48
3	15	19	14	12	e7.9	e7.4	e11	54	163	149	65	49
4	15	19	14	12	e7.4	e7.4	e11	54	162	159	58	47
5	15	19	14	12	e7.5	e7.6	e11	52	183	164	54	45
6	15	19	14	e12	e7.6	e8.1	e13	60	236	149	53	43
7	14	19	15	e11	e7.7	e8.5	e16	107	282	145	53	41
8	14	19	15	e10	e7.8	8.8	e21	158	255	148	55	39
9	14	19	15	e11	e7.8	9.2	e24	156	252	139	57	38
10	14	19	15	e12	e7.9	13	e22	199	267	123	55	37
11	14	19	14	e12	e8.0	15	e20	218	244	115	51	36
12	14	18	14	e12	e8.0	16	e18	133	214	113	50	34
13	14	18	15	e12	e8.1	16	e18	97	227	172	50	33
14	14	18	15	12	e8.0	16	e19	79	239	170	48	32
15	15	17	14	12	e7.8	15	e23	75	249	140	49	31
16	20	17	13	12	e7.8	e14	e29	86	331	136	46	30
17	50	17	13	11	e7.8	e14	e37	88	258	158	42	31
18	43	16	13	11	e7.8	e13	e34	96	180	142	40	38
19	36	16	13	11	e7.8	e13	e36	84	176	119	38	37
20	32	16	13	11	e7.8	e12	e45	72	164	117	38	34
21	29	16	13	11	e7.8	e11	e56	66	136	129	40	33
22	27	16	13	11	e7.8	11	e66	65	116	115	44	32
23	25	17	13	11	e7.8	11	e60	76	110	102	45	31
24	24	16	13	e11	e7.6	e11	e40	81	112	98	51	30
25	24	16	13	11	e7.6	e11	e35	74	126	95	61	30
26	22	16	e12	11	e7.6	e11	e35	64	135	92	62	30
27	21	16	12	11	e7.6	e11	e35	60	152	91	56	30
28	20	16	12	10	e7.6	e12	e32	68	159	88	56	30
29	19	16	12	10	---	e12	e28	67	171	82	57	29
30	19	15	12	10	---	e12	e30	64	191	77	54	31
31	18	---	12	e10	---	e12	---	66	---	76	51	---
TOTAL	646	520	419	349	219.3	354.1	848	2700	5686	3964	1632	1076
MEAN	20.8	17.3	13.5	11.3	7.83	11.4	28.3	87.1	190	128	52.6	35.9
MAX	50	19	15	12	9.0	16	66	218	331	197	77	49
MIN	14	15	12	10	7.4	7.4	11	35	76	76	38	29
AC-FT	1280	1030	831	692	435	702	1680	5360	11280	7860	3240	2130

CAL YR 1988 TOTAL 13404.7 MEAN 36.6 MAX 244 MIN 7.8 AC-FT 26590
WTR YR 1989 TOTAL 18413.4 MEAN 50.4 MAX 331 MIN 7.4 AC-FT 36520

e Estimated

PEND OREILLE RIVER BASIN

12379600 MISSION CREEK AT NATIONAL BISON RANGE AT MOIESE, MT

LOCATION.--Lat 47°22'11", long 114°14'58", in NW1/4NE1/4NE1/4 sec.34, T.19N., R.21W., Lake County, Hydrologic Unit 17010212, Flathead Indian Reservation, on the National Bison Range, 0.7 mi east of Moiese, and 4.5 mi upstream from mouth.

PERIOD OF RECORD.--Water years 1987 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)
NOV												
02...	1430	113	100	2	301	12.0	9.0	682	11.4	110	8.4	150
MAR												
10...	1130	170	15	1	328	8.0	4.0	703	10.6	88	8.1	130
APR												
20...	1200	112	--	0	310	21.0	12.0	696	11.7	119	8.6	160
MAY												
25...	1100	105	100	2	293	12.0	11.0	699	11.4	113	8.5	140
JUL												
05...	1300	166	2	1	250	25.5	18.0	704	9.8	112	8.5	120
AUG												
10...	1230	187	20	1	243	24.5	17.0	699	9.8	111	8.4	120

DATE	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	SODIUM AD-SORP-TION RATIO (00931)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	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, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)
NOV												
02...	36	15	8.1	0.3	1.3	163	5.3	1.7	0.10	8.3	174	0.24
MAR												
10...	32	13	8.8	0.3	10	151	14	6.7	0.10	10	185	0.25
APR												
20...	39	15	8.6	0.3	1.3	161	4.6	1.9	0.10	7.1	174	0.24
MAY												
25...	33	13	8.1	0.3	1.6	148	6.0	1.7	0.10	9.1	161	0.22
JUL												
05...	30	11	6.4	0.3	2.0	130	3.0	1.3	0.10	10	142	0.19
AUG												
10...	30	11	6.7	0.3	2.3	130	4.0	1.5	0.10	11	145	0.20

DATE	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	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											
02...	52.9	0.200	0.010	--	<0.20	<0.010	<10	3	3	0.92	86
MAR											
10...	85.0	0.300	1.10	3.2	4.3	0.310	10	100	116	53	91
APR											
20...	52.7	0.100	0.020	0.28	0.30	0.020	10	14	15	4.5	93
MAY											
25...	45.7	0.100	0.020	0.48	0.50	0.050	<10	19	28	7.9	94
JUL											
05...	63.5	<0.100	0.040	0.36	0.40	0.050	<10	29	18	8.1	94
AUG											
10...	73.0	<0.100	0.020	0.38	0.40	0.050	20	28	17	8.6	66

PEND OREILLE RIVER BASIN

12381400 SOUTH FORK JOCKO RIVER NEAR ARLEE, MT

LOCATION.--Lat 47°11'44", long 113°50'59", in NE1/4NW1/4NE1/4 sec.35, T.17 N., R.18 W., Lake County, Hydrologic Unit 17010212, Flathead Indian Reservation, on right bank 600 ft upstream from confluence with Jocko River and Twin Campground and 12 mi northeast of Arlee, MT.

DRAINAGE AREA.--56.0 mi^2.

PERIOD OF RECORD.--October 1982 to current year. Records published as "near Jocko" 1912-16 and in WSP 1246, 1316 are not equivalent.

GAGE.--Water-stage recorder. Elevation of gage is 3,970 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Oct. 5,6, Nov. 15,16, Nov. 23 to Dec. 7, Dec. 15 to Mar. 24. Records good except those for estimated daily discharges, which are poor. Several observations of water temperature and specific conductance were made during the year. No known regulation or diversion upstream from station.

AVERAGE DISCHARGE.--7 years, 55.2 ft^3/s, 13.39 in/yr, 39,990 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 596 ft^3/s, May 10, 1989, gage height, 3.54 ft; maximum gage height, 4.98 ft, Feb. 15, 1989, backwater from ice; minimum daily discharge, 2.0 ft^3/s, Feb. 4, 1989.

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

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 15	2230	a	*4.98	May 10	2400	*596	3.54

a--backwater from ice.

Minimum daily discharge, 2.0 ft^3/s, Feb. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	14	e13	e11	e2.7	e4.5	10	112	220	108	45	31
2	15	15	e13	e11	e2.4	e4.4	10	122	268	102	45	31
3	15	17	e12	e11	e2.2	e4.2	10	151	309	96	45	31
4	15	17	e12	e11	e2.0	e4.0	10	193	294	91	44	29
5	e15	16	e12	e11	e2.5	e4.5	10	225	303	88	42	28
6	e15	16	e12	e10	e3.0	e5.0	23	260	323	86	42	28
7	14	15	e12	e9.0	e3.5	e5.6	33	376	330	82	40	27
8	14	14	13	e8.5	e4.0	e6.4	39	478	315	81	40	26
9	14	15	13	e9.0	e4.5	e7.2	36	477	308	77	40	26
10	14	14	13	e9.5	e5.0	e8.0	33	511	308	77	39	26
11	14	14	13	e10	e6.0	e8.6	32	542	289	76	38	25
12	14	14	13	e10	e7.0	e8.4	31	408	272	74	38	24
13	14	14	18	e10	e7.5	e8.4	35	329	255	91	36	24
14	14	14	16	e10	e7.8	e8.6	44	286	243	79	37	24
15	15	e14	e13	e10	e6.0	e9.0	58	265	236	73	35	23
16	29	e14	e12	e10	e6.2	e8.6	86	263	242	78	35	23
17	59	14	e12	e10	e6.4	e8.4	87	264	218	78	33	23
18	27	13	e12	e10	e6.6	e8.0	79	290	196	72	33	30
19	27	13	e12	e9.5	e6.8	e8.4	83	263	181	68	31	28
20	22	13	e12	e9.0	e7.0	e8.6	116	234	174	64	31	25
21	19	13	e12	e8.5	e7.0	e8.8	157	225	164	63	34	24
22	17	13	e12	e7.0	e7.0	e9.0	186	217	153	60	36	23
23	16	e15	e12	e4.5	e7.0	e9.0	174	222	145	58	38	23
24	15	e13	e12	e3.0	e6.8	e9.3	148	229	138	56	41	22
25	15	e14	e11	e3.5	e6.6	10	131	218	130	55	41	22
26	15	e13	e10	e4.0	e6.6	10	122	202	125	53	38	21
27	14	e12	e9.6	e5.0	e6.6	10	118	195	122	59	36	22
28	14	e13	e9.4	e6.0	e5.4	10	110	221	114	58	40	21
29	14	e14	e9.7	e7.0	---	10	104	214	109	50	35	21
30	14	e14	e10	e8.0	---	10	106	201	107	46	32	21
31	14	---	e11	e5.0	---	10	---	202	---	45	34	---
TOTAL	549	424	376.7	261.0	152.1	244.9	2221	8395	6591	2244	1174	752
MEAN	17.7	14.1	12.2	8.42	5.43	7.90	74.0	271	220	72.4	37.9	25.1
MAX	59	17	18	11	7.8	10	186	542	330	108	45	31
MIN	14	12	9.4	3.0	2.0	4.0	10	112	107	45	31	21
AC-FT	1090	841	747	518	302	486	4410	16650	13070	4450	2330	1490

CAL YR 1988 TOTAL 15474.9 MEAN 42.3 MAX 289 MIN 4.4 AC-FT 30690
WTR YR 1989 TOTAL 23384.7 MEAN 64.1 MAX 542 MIN 2.0 AC-FT 46380

e Estimated

PEND OREILLE RIVER BASIN

12383500 BIG KNIFE CREEK NEAR ARLEE, MT

LOCATION.--Lat 47°08'51", long 113°58'24", in NW1/4SW1/4NW/4 sec.14, T.16 N., R.19 W., Lake County, Hydrologic Unit 17020212, Flathead Indian Reservation, on left bank, 150 ft upstream of S Canal, 1 mi upstream of mouth, and 5.5 mi east of Arlee.

DRAINAGE AREA.--6.88 mi^2.

PERIOD OF RECORD.--August 1910 to September 1916 (no winter records), October 1982 to current year. Monthly discharge only for some periods, published in WSP 1316. Published as "near Jocko" 1910-16 and in WSP 916, and as "above Big Knife Canal, near Jocko" in WSP 1246, 1316.

REVISED RECORDS.--WSP 1246: 1916. WSP 1316: 1910-12, 1915-16.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 3,720 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Dec. 26-28, Jan. 8,9, Feb. 2-11. Records good except those for estimated daily discharges, which are fair. Several observations of water temperature and specific conductance were made during the year. No known regulation or diversion upstream from station.

AVERAGE DISCHARGE.--7 years, 10.7 ft^3/s, 21.12 in/yr, 7,750 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 78 ft^3/s, June 30, 1916, gage height, 3.65 ft, site and datum then in use; minimum, 1.3 ft^3/s, Feb. 4, 1989, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 39 ft^3/s, June 10, gage height, 1.59 ft; maximum gage height, 2.37 ft, Feb. 6, backwater from ice; minimum discharge, 1.3 ft^3/s, Feb. 4, gage height, 0.89 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.5	5.3	4.8	3.6	2.1	2.9	2.8	6.8	14	22	16	10
2	6.5	5.3	4.8	3.6	e1.9	2.8	2.8	6.8	19	22	16	12
3	6.3	5.3	4.8	3.6	e1.8	2.8	2.6	7.7	24	21	15	10
4	6.2	5.3	4.8	3.9	e1.7	2.8	2.6	9.0	25	20	15	9.8
5	6.0	5.1	4.8	3.8	e1.9	2.8	2.8	9.8	26	20	14	9.8
6	5.9	5.0	4.8	3.8	e2.2	3.1	3.1	11	30	20	14	9.8
7	5.9	5.0	4.8	3.8	e2.4	3.4	3.7	18	33	20	14	9.2
8	5.9	5.0	4.8	e3.8	e2.6	2.7	3.8	23	33	20	14	9.0
9	5.9	5.0	4.8	e3.7	e2.9	3.0	3.6	26	34	20	14	9.0
10	5.9	5.0	4.8	3.8	e3.2	3.5	3.6	26	35	20	14	9.1
11	5.6	5.0	4.8	3.6	e3.5	3.4	3.2	31	32	19	14	9.4
12	5.6	5.0	4.8	3.6	3.6	3.4	3.2	26	32	19	13	9.1
13	5.6	5.0	5.1	3.6	3.6	3.2	3.3	20	32	22	13	9.0
14	5.6	5.0	4.7	3.6	3.6	2.9	3.5	17	32	19	13	9.0
15	5.6	5.0	4.5	3.6	3.4	2.8	3.7	15	33	21	13	9.0
16	5.8	5.0	4.5	3.6	3.4	2.8	4.3	14	37	21	12	9.0
17	6.3	5.0	4.5	3.6	3.4	2.8	5.4	14	36	21	12	9.2
18	5.9	5.0	4.5	3.6	3.4	2.8	5.9	17	32	19	12	11
19	5.9	5.0	4.3	3.6	3.4	2.8	5.9	16	30	18	12	9.8
20	5.3	5.0	4.3	3.6	3.4	2.8	6.0	14	29	18	12	9.0
21	5.3	5.0	4.3	3.6	3.4	2.9	8.2	14	27	18	13	9.0
22	5.3	5.0	4.3	3.6	3.4	3.1	13	14	25	18	13	9.0
23	5.3	5.3	4.3	3.6	3.3	3.0	11	14	25	18	13	8.6
24	5.3	4.8	4.3	3.4	3.2	2.8	9.1	14	24	17	14	8.6
25	5.3	4.8	4.0	3.6	3.2	2.8	8.5	14	24	17	13	8.3
26	5.3	4.8	e3.9	3.6	3.2	3.0	8.2	13	24	17	13	8.4
27	5.3	4.8	e3.8	3.6	2.9	3.0	7.5	13	24	17	12	8.6
28	5.3	4.8	e3.8	3.6	3.0	3.0	7.1	14	23	17	13	8.2
29	5.3	4.8	3.8	3.6	---	2.9	7.1	14	23	16	11	8.2
30	5.3	4.8	3.8	3.7	---	2.9	7.1	14	22	16	11	8.4
31	5.3	---	3.8	3.7	---	2.8	---	14	---	16	11	---
TOTAL	176.5	150.2	138.1	113.0	83.0	91.7	162.6	480.1	839	589	409	276.5
MEAN	5.69	5.01	4.45	3.65	2.96	2.96	5.42	15.5	28.0	19.0	13.2	9.22
MAX	6.5	5.3	5.1	3.9	3.6	3.5	13	31	37	22	16	12
MIN	5.3	4.8	3.8	3.4	1.7	2.7	2.6	6.8	14	16	11	8.2
AC-FT	350	298	274	224	165	182	323	952	1660	1170	811	548

CAL YR 1988 TOTAL 3035.7 MEAN 8.29 MAX 29 MIN 3.6 AC-FT 6020
WTR YR 1989 TOTAL 3508.7 MEAN 9.61 MAX 37 MIN 1.7 AC-FT 6960

e Estimated

PEND OREILLE RIVER BASIN

12387450 VALLEY CREEK NEAR ARLEE, MT

LOCATION.--Lat 47°10'13", long 114°13'47", in NE1/4SE1/4SE1/4 sec.3, T.16 N., R.21 W., Sanders County, Hydrologic Unit 17010212, Flathead Indian Reservation, on right bank, 1.4 mi upstream of East Fork, 6.7 mi west of Arlee, and 7.4 mi southwest of Ravalli.

DRAINAGE AREA.--15.3 mi^2.

PERIOD OF RECORD.--October 1982 to current season (seasonal records only).

GAGE.--Water-stage recorder. Elevation of gage is 3,450 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--No estimated daily discharges this season. Seasonal records good. No known regulation or diversion upstream from station. Several observations of water temperature and specific conductance were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 85 ft^3/s, May 28, 1986, gage height, 2.92 ft; maximum gage height, 2.97 ft, May 26, 1983; minimum daily discharge, 5.5 ft^3/s, Apr. 1, 1988.

EXTREMES FOR CURRENT SEASON.--Maximum discharge, 63 ft^3/s, May 8, gage height, 2.66 ft; minimum daily, 5.6 ft^3/s, Oct. 12-14.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.2						8.0	18	20	12	9.6	8.1
2	6.2						8.0	20	27	12	9.5	8.6
3	6.2						7.9	22	33	12	9.4	8.4
4	6.1						7.9	25	33	11	9.2	8.1
5	6.1						8.2	29	35	11	9.2	7.9
6	6.0						9.9	36	35	11	9.1	7.9
7	5.9						11	51	35	11	9.0	7.9
8	5.8						11	59	33	11	8.9	7.8
9	5.7						11	56	31	11	8.9	7.8
10	5.7						10	59	32	11	8.9	7.8
11	5.7						9.9	56	29	11	8.6	7.6
12	5.6						9.9	46	26	11	8.5	7.5
13	5.6						11	37	24	11	8.6	7.5
14	5.6						11	31	24	11	8.5	7.4
15	5.7						13	28	24	11	9.1	7.4
16	6.0						16	27	24	11	8.6	7.4
17	6.5						15	28	21	11	8.4	8.0
18	6.2						14	29	19	11	8.4	9.5
19	6.6						15	26	18	10	8.2	8.4
20	6.1						20	25	17	10	8.5	8.0
21	5.9						24	23	16	10	8.6	7.9
22	6.0						31	22	16	10	8.5	7.9
23	6.0						30	22	15	10	9.1	7.8
24	6.0						25	21	15	9.9	9.6	7.6
25	5.9						22	20	14	9.8	10	7.5
26	5.9						21	19	14	9.8	9.4	7.5
27	6.0						20	18	13	9.8	8.9	7.6
28	6.0						19	21	12	9.6	8.7	7.5
29	6.0						18	20	12	9.5	8.6	7.4
30	6.0						18	19	12	9.4	8.5	7.4
31	6.0							18		9.4	8.4	
TOTAL	185.2						455.7	931	679	328.2	275.4	235.1
MEAN	5.97						15.2	30.0	22.6	10.6	8.88	7.84
MAX	6.6						31	59	35	12	10	9.5
MIN	5.6						7.9	18	12	9.4	8.2	7.4
AC-FT	367						904	1850	1350	651	546	466

PEND OREILLE RIVER BASIN

12388200 JOCKO RIVER AT DIXON, MT

LOCATION.--Lat 47°18'43", long 114°17'48", in NW1/4NW1/4NE1/4 sec.20, T.18 N., R.21 W., Sanders County, Hydrologic Unit 17010212, Flathead Indian Reservation, at State Highway 212 bridge, 0.8 mi east of Dixon, and 1.0 mi upstream from mouth.

PERIOD OF RECORD.--Water years 1987 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH (STAND-ARD UNITS) (00400)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)
NOV												
03...	1030	139	100	2	261	8.3	12.5	8.5	683	11.2	107	130
MAR												
10...	1300	302	20	1	179	7.9	7.5	2.5	705	11.7	93	74
APR												
20...	1400	285	--	0	192	8.3	23.0	11.0	696	11.5	114	94
MAY												
25...	1230	486	100	2	197	8.5	13.0	9.0	701	11.2	105	95
JUL												
05...	1430	235	5	1	235	8.5	28.0	17.0	705	9.4	105	110
AUG												
10...	1400	184	--	--	255	8.4	29.5	17.0	695	9.5	108	130

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)	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, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)
NOV												
03...	0	34	12	3.8	0.1	1.3	141	3.3	0.90	0.10	9.9	150
MAR												
10...	0	19	6.5	3.3	0.2	4.8	83	8.4	2.0	0.10	7.9	102
APR												
20...	0	25	7.6	3.2	0.1	1.1	94	2.7	1.0	0.10	9.8	107
MAY												
25...	0	26	7.4	2.4	0.1	0.70	99	3.0	0.50	0.10	9.1	109
JUL												
05...	0	30	9.5	3.2	0.1	1.0	121	2.0	0.70	0.10	9.1	128
AUG												
10...	0	35	11	4.0	0.2	1.2	137	3.0	0.80	0.10	10	147

DATE	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	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												
03...	0.20	56.2	0.100	0.020	--	<0.20	<0.010	10	4	2	0.75	68
MAR												
10...	0.14	83.0	0.200	0.210	0.69	0.90	0.330	<10	62	65	53	90
APR												
20...	0.15	82.2	<0.100	0.040	0.56	0.60	0.020	<10	19	21	16	76
MAY												
25...	0.15	142	<0.100	<0.010	--	<0.20	0.020	<10	6	23	30	87
JUL												
05...	0.17	81.3	<0.100	0.030	--	<0.20	<0.010	10	5	6	3.8	69
AUG												
10...	0.20	73.2	<0.100	0.010	--	<0.20	0.010	<10	5	8	4.0	61

PEND OREILLE RIVER BASIN

12388400 REVAIS CREEK BELOW WEST FORK, NEAR DIXON, MT

LOCATION.--Lat 47°16'00", long 114°24'21", in SE1/4NE1/4NW1/4 sec.4, T.17 N., R.22 W., Sanders County, Hydrologic Unit 17010212, Flathead Indian Reservation, on right bank, 0.3 mi downstream of West Fork, and 7.3 mi southwest of Dixon, MT.

DRAINAGE AREA.--23.4 mi^2.

PERIOD OF RECORD.--October 1982 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 3,420 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Dec. 4-6, 15-21, 24-29, Jan.8, 24,25,31, Feb. 1-21, Mar. 4,10. Records good except those for estimated daily discharges, which are poor. No known regulation or diversion upstream of station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--7 years, 16.9 ft ^{3}/s, 9.81 in/yr, 12,240 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 262 ft^3/s, May 28, 1986, gage height, 4.08 ft; maximum gage height, 6.93 ft, Dec. 5, 1984, backwater from ice; minimum daily discharge, 2.5 ft^3/s, Feb. 4, 1989.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 70 ft ^{3}/s and maximums(*):

Date	Time	Discharge (ft^3/s)	Gage Height (ft)	Date	Time	Discharge (ft^3/s)	Gage Height (ft)
Feb. 7	0600	a	*3.80	May 8	0100	*153	3.71
Apr. 22	1020	96	3.46	June 3	0300	87	3.41

a--backwater from ice.

Minimum daily discharge, 2.5 ft ^{3}/s, Feb. 4.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.4	4.2	4.4	4.2	e3.4	3.6	5.7	32	46	19	8.1	7.0
2	4.4	4.2	4.4	4.2	e2.8	3.6	5.7	33	64	18	8.1	7.5
3	4.4	6.8	4.4	4.2	e2.6	3.6	5.4	42	84	18	8.0	7.5
4	4.3	5.4	e4.4	4.2	e2.5	e3.2	4.9	52	81	17	7.7	7.0
5	4.0	4.4	e4.2	4.2	e2.6	2.9	6.6	60	81	17	7.7	6.9
6	3.9	4.6	e4.4	4.2	e2.7	3.8	11	78	84	16	7.5	6.6
7	3.8	4.6	4.4	3.8	e2.9	4.4	18	126	84	15	7.0	6.6
8	3.8	4.6	4.4	e3.6	e3.0	4.1	19	142	77	14	7.0	6.3
9	3.8	4.4	4.3	3.8	e3.2	4.6	16	129	73	14	7.0	6.3
10	3.8	4.4	4.2	3.8	e3.4	e7.5	13	138	70	14	7.0	6.3
11	3.8	4.4	4.2	3.7	e3.6	7.3	13	132	62	13	6.9	6.0
12	3.8	4.4	4.4	3.6	e3.8	6.6	13	97	59	13	6.3	5.9
13	3.8	4.4	7.5	3.6	e4.4	6.3	14	75	55	14	6.3	5.7
14	3.8	4.4	5.6	3.6	e4.2	6.2	18	63	52	13	6.3	5.6
15	3.9	4.4	e4.5	3.6	e3.9	5.4	25	58	51	13	7.6	5.1
16	4.1	4.4	e4.2	3.6	e3.8	4.9	35	57	50	13	6.8	5.1
17	4.6	4.4	e4.4	3.6	e3.8	4.9	34	59	45	13	6.3	6.2
18	4.4	4.4	e4.4	3.6	e3.9	4.9	31	65	41	12	6.2	9.5
19	4.9	4.4	e4.4	3.6	e4.0	4.7	34	60	37	11	5.9	7.5
20	4.6	4.4	e4.2	3.6	e4.2	4.6	60	52	34	11	5.7	7.0
21	4.4	4.4	e4.4	3.6	e4.4	4.7	80	50	32	11	5.7	6.6
22	4.4	4.8	4.4	3.6	4.2	4.9	93	49	30	11	5.9	6.3
23	4.4	7.9	4.4	3.6	3.7	4.9	78	49	28	10	6.7	6.0
24	4.4	5.2	e4.4	e3.4	3.6	4.9	63	49	27	10	8.1	5.9
25	4.4	4.6	e4.2	e3.4	3.6	4.9	53	47	26	10	10	5.7
26	4.4	4.6	e4.2	3.5	3.6	4.9	47	43	25	10	8.3	5.7
27	4.4	4.4	e4.2	3.4	3.6	5.0	41	41	23	10	7.7	7.1
28	4.4	4.4	e4.0	3.4	3.6	5.6	38	45	22	9.8	7.7	6.2
29	4.4	4.4	e4.4	3.4	---	5.8	34	44	21	8.7	7.6	6.0
30	4.4	4.4	4.4	3.6	---	5.4	32	43	20	8.4	7.0	6.0
31	4.2	---	4.4	e4.0	---	5.5	---	43	---	8.1	7.0	---
TOTAL	130.5	140.7	138.7	115.2	99.0	153.6	941.3	2053	1484	395.0	221.1	193.1
MEAN	4.21	4.69	4.47	3.72	3.54	4.95	31.4	66.2	49.5	12.7	7.13	6.44
MAX	4.9	7.9	7.5	4.2	4.4	7.5	93	142	84	19	10	9.5
MIN	3.8	4.2	4.0	3.4	2.5	2.9	4.9	32	20	8.1	5.7	5.1
AC-FT	259	279	275	228	196	305	1870	4070	2940	783	439	383

CAL YR 1988 TOTAL 4703.8 MEAN 12.9 MAX 92 MIN 3.6 AC-FT 9330
WTR YR 1989 TOTAL 6065.2 MEAN 16.6 MAX 142 MIN 2.5 AC-FT 12030

PEND OREILLE RIVER BASIN

12388700 FLATHEAD RIVER AT PERMA, MT

LOCATION.--Lat 47°22'03", long 114°35'03", in SE1/4NE1/4NE1/4 sec.36, T.19 N., R.24 W., Sanders County, Hydrologic Unit 17010212, Flathead Indian Reservation, on right bank 0.3 mi north of Perma, 0.4 mi downstream from Camas Creek, and at mile 10.9.

DRAINAGE AREA.--8,795 mi^2.

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 2,469.31 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Dec. 27 to Jan. 13, Feb. 1 to Mar. 6, June 20. Water-discharge records good except those for estimated daily discharges, which are fair. Flow affected by regulation from Hungry Horse Reservoir (station no. 12362000) and by Flathead Lake (station no. 12371500). Diversions for irrigation of about 160,500 acres upstream from station.

AVERAGE DISCHARGE.--6 years, 10,650 ft^3/s, 7,716,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 40,700 ft^3/s, June 4, 1986, gage height, 18.50 ft; maximum gage height, 20.38 ft, Nov. 29, 1985, backwater from ice; minimum daily discharge, 2,670 ft^3/s, May 29, 1984.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 31,800 ft^3/s, June 14, gage height, 16.19 ft; minimum daily, 4,500 ft^3/s, Feb. 10.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10300	10600	6580	e8500	e6500	e9000	7970	12700	12300	12600	12100	13700
2	7270	10700	5510	e8500	e7000	e9000	7740	11700	12900	13600	12100	12700
3	5730	10000	7020	e8000	e8000	e10500	6960	11700	13300	16800	12300	10700
4	6770	9770	8500	e9500	e9200	e9500	7240	11400	12800	15500	12200	8430
5	7250	10400	8990	e7500	e9000	e9500	7000	11600	13500	13100	11500	10800
6	6590	10500	9280	e6500	e9000	e9000	7740	12000	13800	12300	10100	13700
7	7740	8390	9800	e6700	e10000	8610	7170	13200	14300	12500	10900	13900
8	9140	5720	10000	e7000	e10500	9200	7630	14600	21100	11500	9170	13800
9	8980	5630	10400	e6500	e6500	8270	7220	21400	22300	10800	9850	13200
10	9510	9410	9950	e6700	e4500	9280	7340	25000	25700	10500	9230	11100
11	9780	10700	9880	e6000	e5500	8830	7750	26000	26200	10800	9280	11900
12	8360	11100	9850	e5000	e5500	9230	6870	25900	26500	10800	11000	13700
13	8240	11900	10100	e5000	e5700	9030	7860	25300	31000	11600	11500	12200
14	9200	11900	9860	5650	e5300	10000	7890	25300	31500	14000	10100	13300
15	7860	11500	10200	6450	e5000	9570	7350	24800	29100	14000	10700	13000
16	7900	11300	10400	6440	e5000	9290	7710	22500	29100	13900	11200	13100
17	8890	11100	9280	8570	e6500	9490	8790	21500	28300	14000	10500	13900
18	10700	9750	10400	9290	e6300	8660	7980	17100	28000	14300	11500	14200
19	8550	10100	8740	6130	e8500	8300	8590	16800	27000	13900	12100	14200
20	8420	7580	9100	6580	e8700	8970	8000	14400	e16800	13900	12600	13700
21	6560	8210	9100	5120	e9000	8800	9780	13200	14500	13900	12600	13800
22	5670	9200	10900	5210	e8000	8960	10300	13400	16400	15400	12800	13800
23	6790	11000	11400	5410	e7700	9280	11800	13800	21600	14900	12200	13700
24	5220	11600	9090	5600	e9000	8470	13000	13300	22600	13700	12300	13500
25	5210	11800	10400	5310	e9000	8290	12900	13900	15500	12900	13300	14000
26	5480	11000	9990	5410	e9000	8540	14000	13900	14900	12500	18500	14000
27	5690	9990	e10000	5310	e9000	8250	13500	13200	13400	12300	16700	13900
28	6980	10100	e12000	5370	e9000	8070	12900	12600	12300	12700	13100	13900
29	8340	9260	e10500	4990	---	8180	12700	12400	12500	14000	13800	13500
30	10600	9020	e11000	4870	---	7530	12800	13000	12500	13000	14100	13400
31	10700	---	e8000	5330	---	7090	---	12600	---	12200	13900	---
TOTAL	244420	299230	296220	198440	211900	274690	276480	510200	591700	407900	373230	392730
MEAN	7885	9974	9555	6401	7568	8861	9216	16460	19720	13160	12040	13090
MAX	10700	11900	12000	9500	10500	10500	14000	26000	31500	16800	18500	14200
MIN	5210	5630	5510	4870	4500	7090	6870	11400	12300	10500	9170	8430
AC-FT	484800	593500	587600	393600	420300	544800	548400	1012000	1174000	809100	740300	779000

CAL YR 1988 TOTAL 3139840 MEAN 8579 MAX 14300 MIN 3850 AC-FT 6228000
WTR YR 1989 TOTAL 4077140 MEAN 11170 MAX 31500 MIN 4500 AC-FT 8087000

e Estimated

PEND OREILLE RIVER BASIN

12388700 FLATHEAD RIVER AT PERMA, MT--Continued

WATER QUALITY RECORDS

PERIOD OF RECORD.--Water years 1971-73, 1984 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	CLOUD COVER (PER-CENT) (00032)	WEATHER (WMO CODE NUMBER) (00041)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	TEMPER-ATURE AIR (DEG C) (00020)	TEMPER-ATURE WATER (DEG C) (00010)	BARO-METRIC PRES-SURE (MM OF HG) (00025)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	PH (STAND-ARD UNITS) (00400)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)
OCT												
06...	1030	7000	--	--	160	9.0	14.0	--	--	--	--	--
NOV												
22...	1100	10100	100	54	174	4.5	5.5	684	11.5	102	8.1	93
JAN												
19...	1500	6610	25	1	182	7.5	2.0	704	13.1	103	8.1	93
MAR												
16...	1215	10300	100	74	187	-1.0	1.0	688	12.8	100	8.2	91
JUN												
07...	1130	14200	75	2	175	25.0	15.5	692	9.7	107	8.3	91
JUL												
18...	0800	14200	75	2	167	16.0	20.0	699	8.2	99	8.1	110
AUG												
30...	1130	14200	90	3	170	18.0	18.0	688	8.9	104	8.3	85

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)	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, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L) (70301)
NOV												
22...	0	26	6.9	1.6	0.1	0.50	93	4.4	0.40	0.10	4.6	100
JAN												
19...	0	26	6.8	2.1	0.1	0.60	96	4.4	0.60	0.10	4.5	103
MAR												
16...	1	26	6.4	2.4	0.1	1.6	90	5.4	1.3	0.10	5.3	103
JUN												
07...	2	26	6.4	1.5	0.1	0.40	89	4.0	0.30	0.10	4.3	96
JUL												
18...	19	32	6.3	3.7	0.2	1.0	87	3.0	0.40	0.10	4.7	103
AUG												
30...	0	24	6.1	1.6	0.1	0.50	86	3.0	0.30	0.10	4.3	91

DATE	SOLIDS, DIS-SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS-SOLVED (TONS PER DAY) (70302)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N) (00605)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	BORON, DIS-SOLVED (UG/L AS B) (01020)	IRON, DIS-SOLVED (UG/L AS FE) (01046)	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												
22...	0.14	2730	<0.100	0.020	0.38	0.40	<0.010	<10	10	3	82	81
JAN												
19...	0.14	1830	<0.100	0.010	0.29	0.30	<0.010	<10	<3	4	71	90
MAR												
16...	0.14	2850	<0.100	0.100	0.30	0.40	0.060	<10	64	65	1810	98
JUN												
07...	0.13	3690	<0.100	0.020	0.18	0.20	<0.010	<10	3	5	192	82
JUL												
18...	0.14	3970	<0.100	0.130	0.37	0.50	0.010	20	100	3	115	84
AUG												
30...	0.12	3510	<0.100	<0.010	--	<0.20	<0.010	<10	5	4	153	80

PEND OREILLE RIVER BASIN

12389000 CLARK FORK NEAR PLAINS, MT

LOCATION.--Lat 47°25'47", long 114°51'18", in E1/2SW1/4 sec.1, T.19 N., R.26 W., Sanders County, Hydrologic Unit 17010213, on right bank 2.4 mi southeast of Plains, 6.0 mi downstream from Flathead River, and at mile 239.0.

DRAINAGE AREA.--19,958 mi^2.

PERIOD OF RECORD.--October 1910 to current year. Monthly discharge only for some periods, published in WSP 1316.

REVISED RECORDS.--WSP 1246: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 2,449.11 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Nov. 28, 1911, nonrecording gage at site 50 ft upstream at same datum.

REMARKS.--No estimated daily discharges this year. Records excellent. Flow partly regulated by Hungry Horse Reservoir (station number 12362000) and by Flathead Lake (station number 12371500). Diversions for irrigation of about 335,000 acres upstream from station. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--79 years, 19,740 ft^3/s, 14,302,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 134,000 ft^3/s, June 5, 1948, gage height, 19.17 ft; minimum, 3,200 ft^3/s, Feb. 8, 1936, Dec. 10, 1940; minimum gage height, 2.70 ft, from partly estimated gage-height record, Sept. 2, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 58,800 ft^3/s, May 12, gage height, 11.78 ft; minimum, 5,050 ft^3/s, Feb. 3, gage height, 3.21 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11300	12900	9060	10300	7440	10800	12500	26900	25500	21300	14500	17400
2	9890	13100	8220	10300	6560	10000	11500	25200	26600	21800	14700	16700
3	7810	12600	8740	9410	5850	11500	11300	25600	28300	24600	15000	14800
4	8460	12200	10700	11400	8820	12600	11100	26100	30300	23300	15200	12200
5	9050	12500	11000	8830	10800	12700	10100	27600	31600	20400	14500	12900
6	8600	13600	11300	8520	12400	11700	11900	28900	33100	18900	13000	16700
7	9210	10900	11900	8840	13500	11500	12400	32400	34900	18400	13100	17300
8	10800	8850	12600	9020	15400	11300	16900	38500	42100	17400	12400	17300
9	10700	8150	12700	7920	11000	11100	19700	48800	44400	16100	11800	16600
10	11600	11200	12400	8190	8240	12200	17800	54200	47700	15500	11900	15300
11	11500	13500	12700	8150	8550	13600	17400	56200	48800	15200	11500	13600
12	10300	13700	12000	7370	9220	14400	15600	58000	48400	15600	12900	16800
13	9880	14500	12500	7480	8840	15900	16100	56300	51600	15300	13800	15700
14	11000	14600	12700	7550	8020	15300	16700	52400	51800	18700	12900	15800
15	9760	14400	12500	8170	8000	15400	17200	48500	49100	19000	12400	16100
16	9370	14000	13200	8210	7510	14400	19500	44000	49400	18800	13600	15700
17	10700	13500	11400	10100	8630	14100	22200	41400	51200	18700	13200	16700
18	12200	13200	12400	11300	8550	12700	23300	37300	50100	19200	13400	17300
19	11700	12300	11500	8920	10700	12100	23300	36400	46200	19000	14500	17400
20	11700	10200	10700	8760	11900	12100	23800	34200	34400	18600	14600	16800
21	9830	10300	11300	8040	12000	12400	27900	30800	29700	18400	14800	16800
22	7870	11800	13100	7450	11100	12700	32400	29600	30100	19300	15200	16800
23	9620	13500	13800	7680	10700	12900	36500	29200	33800	19600	14900	16700
24	7860	14400	11700	7890	12400	12200	37500	28500	35500	17700	14600	16300
25	7580	14400	12400	7770	12500	12100	35500	29200	27000	16900	15800	16600
26	7770	14000	12100	7430	12300	12300	34200	28700	25500	15900	21000	16800
27	7940	12900	13300	7150	12100	12000	32100	27400	23700	15600	22000	16700
28	9030	12400	13300	7510	11700	11800	30000	26300	21900	15500	16900	16600
29	9880	11800	12300	7030	---	12600	28700	26300	21600	17700	17600	16100
30	12800	12100	11800	6950	---	12300	27300	27000	21100	16100	17900	15900
31	13000	---	9710	7270	---	11300	---	26400	---	15400	17800	---
TOTAL	308710	377500	365030	260910	284730	390000	652400	1108300	1095400	563900	457400	484400
MEAN	9958	12580	11780	8416	10170	12580	21750	35750	36510	18190	14750	16150
MAX	13000	14600	13800	11400	15400	15900	37500	58000	51800	24600	22000	17400
MIN	7580	8150	8220	6950	5850	10000	10100	25200	21100	15200	11500	12200
AC-FT	612300	748800	724000	517500	564800	773600	1294000	2198000	2173000	1118000	907300	960800

CAL YR 1988 TOTAL 4690170 MEAN 12810 MAX 28700 MIN 4930 AC-FT 9303000
WTR YR 1989 TOTAL 6348680 MEAN 17390 MAX 58000 MIN 5850 AC-FT 12590000

PEND OREILLE RIVER BASIN

12389500 THOMPSON RIVER NEAR THOMPSON FALLS, MT

LOCATION.--Lat 47°35'31", long 115°13'43", in NW1/4NE1/4SE1/4 sec.7, T.21 N., R.28 W., Sanders County, Hydrologic Unit 17010213, Lolo National Forest, on right bank 1.3 mi upstream from mouth and 5.5 mi east of Thompson Falls.

DRAINAGE AREA.--642 mi^2.

PERIOD OF RECORD.--March to September 1911, October 1911 to September 1916 (occasional gage heights, discharges, and discharge measurements), April 1956 to current year. Records for January and February 1911, published in WSP 916, have been found to be unreliable and should not be used.

REVISED RECORDS.--WSP 1246: 1911. See also PERIOD OF RECORD.

GAGE.--Water-stage recorder. Datum of gage is 2,429.97 ft above National Geodetic Vertical Datum of 1929 (Bureau of Public Roads bench mark). October 1911 to September 1916, nonrecording gage at site 0.2 mi upstream at different datum.

REMARKS.--Estimated daily discharges: Dec. 27,28, Jan. 24,25, Feb. 1-12, Mar. 25 to May 2. Records excellent except those for estimated daily discharges, which are poor. Minor diversions upstream from station for irrigation, acreage unknown. Diversion from headwaters of Alder Creek in SW1/4 sec.16, T.23 N., R.25 W., to supplement water supply for storage in Upper Dry Fork Reservoir in Little Bitterroot River basin. Several observations of water temperature and specific conductance were made during the year.

AVERAGE DISCHARGE.--33 years, 450 ft^3/s, 9.52 in/yr, 326,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,080 ft^3/s, June 9, 1964, gage height, 8.53 ft; minimum, 60 ft^3/s, Nov. 20, 1977, gage height, 1.96 ft, result of freezeup; minimum gage height, 1.01 ft, Dec. 17, 1964, result of freezeup.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in May to June 1948 reached a discharge of 6,190 ft^3/s, by slope-area measurement of peak flow at site 0.2 mi downstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,080 ft^3/s, May 8, gage height, 5.06 ft; minimum, 67 ft^3/s, Feb. 2, gage height, 2.00 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	120	111	123	126	e125	114	e310	e1050	819	417	225	203
2	117	120	105	129	e100	108	e300	e1060	950	412	225	214
3	117	144	114	132	e95	108	e290	1120	1080	401	221	214
4	116	151	102	138	e90	106	e400	1240	1100	386	221	206
5	114	147	102	141	e100	116	e600	1350	1110	371	218	199
6	114	157	123	138	e105	131	e800	1470	1130	356	214	196
7	114	164	129	126	e110	139	e1000	1730	1140	351	206	192
8	111	154	132	111	e115	139	e1150	2030	1090	337	203	188
9	111	147	132	123	e120	152	e1050	1980	1030	332	210	188
10	111	141	129	128	e125	199	e1000	1940	983	332	210	185
11	111	144	126	117	e135	245	e950	1860	911	328	206	181
12	111	144	132	111	e145	278	e900	1640	834	318	203	181
13	111	141	196	126	146	314	e1000	1390	774	366	206	178
14	108	138	217	123	136	314	e1150	1190	753	351	203	178
15	120	135	164	120	125	287	e1300	1070	774	318	199	175
16	141	132	123	126	128	270	e1400	1000	782	309	196	171
17	147	132	114	144	128	245	e1350	975	710	305	196	178
18	135	129	129	154	125	225	e1300	1020	656	300	192	196
19	132	129	135	160	128	229	e1200	1020	617	291	188	196
20	126	129	126	151	125	225	e1600	951	597	286	192	185
21	120	129	132	157	125	233	e1800	879	566	278	196	178
22	117	132	141	154	123	265	e1850	826	536	270	203	175
23	117	157	141	144	125	270	e1700	819	512	265	214	171
24	114	157	141	e110	125	261	e1550	841	494	261	245	171
25	114	147	114	e120	122	e265	e1400	811	477	257	278	168
26	117	141	89	138	125	e260	e1300	760	460	253	257	168
27	114	132	e105	138	125	e280	e1250	731	449	249	253	165
28	114	138	e115	126	122	e290	e1200	834	438	241	241	161
29	114	135	120	135	---	e300	e1150	841	428	237	225	165
30	114	135	126	144	---	e300	e1100	796	422	233	215	165
31	114	---	123	181	---	e310	---	782	---	229	206	---
TOTAL	3656	4192	4000	4171	3398	6978	33350	36006	22622	9640	6667	5491
MEAN	118	140	129	135	121	225	1112	1161	754	311	215	183
MAX	147	164	217	181	146	314	1850	2030	1140	417	278	214
MIN	108	111	89	110	90	106	290	731	422	229	188	161
AC-FT	7250	8310	7930	8270	6740	13840	66150	71420	44870	19120	13220	10890

CAL YR 1988 TOTAL 84746 MEAN 232 MAX 982 MIN 86 AC-FT 168100
WTR YR 1989 TOTAL 140171 MEAN 384 MAX 2030 MIN 89 AC-FT 278000

e Estimated

12390700 PROSPECT CREEK AT THOMPSON FALLS, MT

LOCATION.--Lat 47°35'10", long 115°21'15", in lot 12, SE1/4SE1/4SE1/4 sec.7, T.21 N., R.29 W., Sanders County, Hydrologic Unit 17010213, on right bank 500 ft downstream from Dry Creek, 0.5 mi upstream from mouth, and 0.7 mi south of Thompson Falls.

DRAINAGE AREA.--182 mi^2.

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

GAGE.--Water-stage recorder. Datum of gage is 2,382.40 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Feb. 1-7, Apr. 30 to May 2, June 23 to July 5, Sept. 20-30. Records excellent except those for periods of estimated daily discharges, which are fair. Several observations of water temperature and specific conductance were made during the year. No known regulation or diversions upstream from station.

AVERAGE DISCHARGE.--33 years, 244 ft^3/s, 18.21 in/yr, 176,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,490 ft^3/s, Jan. 16, 1974, gage height, 9.86 ft; minimum, 24 ft^3/s, Jan. 4, 5, 1988; minimum gage height, -0.18 ft, Jan. 4, 1988.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,560 ft^3/s, Apr. 22, gage height, 5.29 ft; minimum, 32 ft^3/s, Oct. 30-31, Nov. 1; minimum gage height, 0.15 ft, Oct. 31, Nov. 1.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	32	46	75	e65	58	218	e620	483	e175	87	68
2	35	34	47	75	e57	58	218	e616	566	e170	88	74
3	35	38	49	75	e55	58	213	646	646	e165	87	67
4	35	37	50	75	e53	57	203	696	638	e155	86	65
5	35	35	54	74	e57	57	210	791	620	e145	84	63
6	35	39	61	72	e60	62	518	871	620	141	83	63
7	35	37	64	70	e62	60	894	1150	605	137	81	63
8	35	35	65	69	65	63	1180	1380	575	134	80	62
9	34	35	66	69	66	66	975	1250	541	133	84	62
10	34	34	66	69	68	76	853	1220	511	131	81	62
11	34	38	66	66	73	86	753	1090	459	127	79	62
12	34	38	69	65	75	99	708	853	416	126	78	62
13	34	37	77	65	72	114	720	712	389	129	79	61
14	34	38	78	64	70	118	809	631	373	122	76	60
15	35	36	75	63	69	122	951	583	399	119	75	58
16	36	36	72	65	68	166	1150	576	383	117	75	58
17	35	37	71	70	67	176	1140	601	342	116	75	59
18	35	37	70	72	66	172	1000	646	311	112	73	66
19	35	37	73	74	66	170	956	616	293	110	72	59
20	34	38	75	71	65	164	1140	552	278	110	71	e57
21	33	39	78	71	64	166	1440	505	260	107	73	e58
22	33	40	79	70	63	181	1540	471	242	104	74	e57
23	33	46	79	69	64	181	1350	477	e230	102	75	e56
24	33	43	78	68	63	178	1060	489	e220	99	79	e55
25	33	42	77	66	62	175	932	462	e210	98	81	e54
26	33	42	75	66	61	178	858	433	e200	97	75	e54
27	33	43	75	66	60	183	791	410	e195	94	73	e53
28	33	44	75	65	60	198	745	492	e190	92	72	e52
29	33	44	76	64	---	210	704	483	e185	91	70	e52
30	32	45	78	66	---	211	e660	471	e180	90	69	e51
31	32	---	76	75	---	217	---	462	---	89	67	---
TOTAL	1055	1156	2140	2144	1796	4080	24889	21255	11560	3737	2402	1793
MEAN	34.0	38.5	69.0	69.2	64.1	132	830	686	385	121	77.5	59.8
MAX	36	46	79	75	75	217	1540	1380	646	175	88	74
MIN	32	32	46	63	53	57	203	410	180	89	67	51
AC-FT	2090	2290	4240	4250	3560	8090	49370	42160	22930	7410	4760	3560

CAL YR 1988 TOTAL 47244 MEAN 129 MAX 932 MIN 27 AC-FT 93710
WTR YR 1989 TOTAL 78007 MEAN 214 MAX 1540 MIN 32 AC-FT 154700

e Estimated

PEND OREILLE RIVER BASIN

12391400 CLARK FORK BELOW NOXON RAPIDS DAM, NEAR NOXON, MT

LOCATION.--Lat 47°57'40", long 115°43'58", in SW1/4 sec.33, T.26 N., R.32 W., Sanders County, Hydrologic Unit 17010213, at Noxon Rapids Dam 1 mi upstream from Rock Creek, 3 mi southeast of Noxon, and at mile 169.7.

DRAINAGE AREA.--21,833 mi^2.

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

GAGE.--Plant generator rating for discharge through powerplant. Water-stage recorder on reservoir determines head on taintor gates. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by The Washington Water Power Co.).

REMARKS.--Records good. Flow regulated by Hungry Horse Reservoir (station 12362000) and Flathead Lake (station 12371500). Diversions for irrigation of about 350,000 acres upstream from station. Some sub-surface flow indicated by comparison with records for adjacent gaging stations. Figures of discharge given herein are combined flows through turbines and spillway.

COOPERATION.--Records collected by the Washington Water Power Co., under general supervison of the Geological Survey, in connection with a Federal Power Commission project.

AVERAGE DISCHARGE.--29 years, 17,620 ft^3/s, 14,770,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 124,900 ft^3/s, June 12, 1964; minimum daily, 60 ft^3/s, Jan. 29, 1989.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 60,700 ft^3/s, May 12; minimum daily, 60 ft^3/s, Jan. 29.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7250	15000	12600	6880	15800	9140	15600	29400	28200	25300	10200	23900
2	8280	12500	6900	10200	12200	12900	15500	29700	30100	20800	17900	16200
3	8330	14800	5780	15300	6660	10300	15400	29900	21900	23000	13300	12100
4	10000	11100	8910	11500	13300	8560	15100	29300	27700	19500	14400	6640
5	7780	9840	12100	6730	11600	6830	8090	33900	33400	23400	15500	18000
6	7300	9560	10800	8000	12300	11000	4990	29700	33500	22100	14900	11500
7	11000	15300	10000	6870	11900	13300	13700	31300	41700	21600	12200	17800
8	8040	11700	12300	6710	17200	15300	17700	44900	47600	18700	7230	20600
9	8500	11600	7630	8630	12200	13000	16400	46900	42400	12100	11400	14400
10	12400	9020	16700	10200	6730	9470	20900	52100	44100	14200	12400	10200
11	10500	4850	10900	7090	6620	10200	18600	59900	47600	15300	12800	16900
12	10700	12300	13300	8230	8890	13000	17400	60700	47000	16400	13000	15000
13	11200	12500	9490	8160	8590	17000	19900	58700	47000	18200	12100	14700
14	13500	14100	9850	4830	6230	15000	19900	54900	51200	19000	13600	11000
15	6540	13400	19200	3300	7720	17800	19100	51300	50700	16400	13200	18300
16	5080	15600	10400	10200	10500	18000	21400	51800	47200	18500	10600	14900
17	15200	15500	14600	10600	5690	21900	26600	42300	48500	23400	13100	15000
18	11900	10400	5090	10400	5160	13200	27500	43900	50100	18700	16100	19600
19	9690	9210	13300	9620	5990	12200	26700	40200	46700	12900	17100	16700
20	8900	9310	12400	9650	8520	13300	28800	33000	40700	17900	10800	18000
21	10700	13200	12900	8490	10500	13200	29400	28200	33900	20100	15100	13500
22	10500	12400	14700	5840	16800	11300	34400	31900	36000	16400	14000	17000
23	4320	10900	12200	7920	11900	9530	43000	30700	31300	20800	15400	17800
24	12000	10700	13600	7510	12500	10600	42000	30700	29900	17700	16600	14800
25	13900	13500	2940	11500	5800	12300	44400	31400	25800	19600	17900	14000
26	7160	14800	12800	8960	4650	6800	37300	31700	25500	18300	17100	16500
27	7550	11300	16000	11100	19300	13600	34900	29300	26000	18100	21500	15200
28	4710	13900	10900	5080	18800	11500	30300	30600	24000	13600	19200	15500
29	7270	14400	10500	60	---	12900	31400	30500	20800	12800	18500	19000
30	10200	10900	8230	7600	---	8500	28400	30300	21400	13100	13300	14900
31	13400	---	15100	5980	---	9130	---	26100	---	17200	17700	---
TOTAL	293800	363590	352120	253140	294050	380760	724780	1185200	1101900	565100	448130	469640
MEAN	9477	12120	11360	8166	10500	12280	24160	38230	36730	18230	14460	15650
MAX	15200	15600	19200	15300	19300	21900	44400	60700	51200	25300	21500	23900
MIN	4320	4850	2940	60	4650	6800	4990	26100	20800	12100	7230	6640
AC-FT	582800	721200	698400	502100	583200	755200	1438000	2351000	2186000	1121000	888900	931500

CAL YR 1988 TOTAL 4650710 MEAN 12710 MAX 32200 MIN 990 AC-FT 9225000
WTR YR 1989 TOTAL 6432210 MEAN 17620 MAX 60700 MIN 60 AC-FT 12760000

PEND OREILLE RIVER BASIN

12392000 CLARK FORK AT WHITEHORSE RAPIDS, NEAR CABINET, ID

LOCATION.--Lat 48°05'18", long 116°04'16", in SW1/4 NW1/4 sec.27, T.55 N., R.3 E., Bonner County, Hydrologic Unit 17010213, on right bank 0.8 mi downstream from Cabinet Gorge Dam at cableway, 2.1 mi downstream from Blue Creek, 6.1 mi southeast of Clark Fork, and at mile 149.1. Discharge computed at Whitehorse Rapids, 2.3 mi downstream.

DRAINAGE AREA.--22,073 mi^2, revised. (Based on area of 22,067 mi^2 for site 0.4 mi upstream prior to Oct. 1, 1964.)

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1928 to current year. Prior to October 1952, published as "near Heron, Mont."

REVISED RECORDS.--WSP 1182: 1936. WSP 1736: 1931, 1936(m), 1937.

GAGE.--Water-stage recorder. Datum of gage is 2,060.00 ft above National Geodetic Vertical Datum of 1929 (levels by Washington Water Power Co). See WSP 1933 for history of changes made prior to Sept. 30, 1952. Water-stage recorder at site 0.4 mi upstream at datum 60.00 ft lower Oct. 1, 1952, to Sept. 30, 1964, and at present datum Oct. 1, 1964, to May 21, 1973.

REMARKS.--No estimated daily discharges. Records good. Flow regulated by Hungry Horse Reservoir, Flathead Lake, and Noxon Rapids Reservoir. Extreme diurnal fluctuation caused by powerplant at Cabinet Gorge Dam. Diversions above station for irrigation of about 354,000 acres. Discharge measurements indicate about 800 ft^3/s groundwater inflow between Cabinet Gorge Dam and Whitehorse Rapids. Records given herein represent flow at Whitehorse Rapids, computed by adding 600 ft^3/s to observed flows at the measuring cableway, and are considered comparable to records at former site near Heron, except for minor surface inflow from additional drainage area. To determine flow at Cabinet Gorge Dam, 800 ft^3/s should be deducted from discharges published herein.

AVERAGE DISCHARGE.--61 years, 22,110 ft^3/s, 16,020,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 153,000 ft^3/s, May 29 to June 1, 1948; maximum gage height, 50.97 ft, May 31, 1948, site and datum then in use; minimum observed, 270 ft^3/s, Aug. 12, 1952 (discharge measurement), at sites in use since October 1952, during filling of Cabinet Gorge Reservoir; minimum daily since reservoir filled, 762 ft^3/s, Sept. 2, 1962.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1894 reached a discharge of 195,000 ft^3/s, from floodmark, elevation of 2,137.1 ft, at site about 4 mi upstream and 0.1 mi below near Heron site.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 72,500 ft^3/s, May 15, gage height, 20.76 ft; minimum, 1,250 ft^3/s, July 19, gage height, 4.46 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8440	16500	13200	7840	19000	11100	19700	34900	32900	27500	11900	23800
2	10200	16100	9360	12200	14700	13700	18600	35900	34400	27200	20800	19400
3	10200	16000	6130	17100	8040	11500	18500	35900	28300	23500	16100	13900
4	10800	13800	10700	14500	15600	11400	19200	35900	31200	25400	16200	8760
5	9830	10700	14400	8620	12300	9120	9230	36000	40700	25400	18500	20800
6	9370	11900	11800	10300	14300	12700	6980	36000	38300	28000	17300	13900
7	12600	18000	11200	7300	13500	16500	17100	36800	45900	24400	13500	20000
8	9700	15100	14900	7850	19600	17000	21500	51200	54100	21700	9900	22500
9	10600	12700	9330	10900	14000	15000	21500	53800	48500	15000	13300	18600
10	14000	10500	19700	12000	10000	10100	24300	58300	49500	16800	14600	11000
11	12100	5740	12700	7290	5960	11200	22500	65100	53400	18100	15500	19600
12	13600	13900	15300	9530	10100	16300	20800	65300	52700	21600	15600	16800
13	13000	15000	10900	10300	11600	18900	24500	63100	52100	18600	14500	17600
14	15700	15900	11900	6240	9020	17700	24300	60300	55900	22700	16600	14400
15	8040	16600	22500	4140	8030	20500	23500	56700	56400	21200	16900	19000
16	7300	17000	10100	10300	12600	21000	26000	58300	52400	22300	13200	16300
17	19100	17700	17000	13300	8080	25000	32900	47100	53100	25300	14200	18300
18	15100	13500	7520	12200	6280	16200	34100	49500	55100	22700	17000	23500
19	10400	9410	15900	11000	6760	14900	30100	46200	52200	17100	21300	20000
20	10900	12000	13800	11200	10400	15200	34100	38400	45500	19900	13200	20400
21	11900	14300	15200	9080	11300	16000	35200	33600	38200	22200	17200	16500
22	12800	14000	16800	8240	19300	13700	40200	35600	39600	18400	15900	18000
23	5800	14500	12900	10400	14500	10700	48700	36400	36500	23300	19100	20300
24	14400	12100	17200	9560	13300	13100	47700	35600	34300	22400	19900	17200
25	16200	15900	4990	11900	8100	14800	50700	35700	30000	21600	19800	17100
26	8130	17100	14100	10300	5970	8800	43200	35800	29100	20700	19000	17200
27	9670	13600	18400	13900	21400	16000	41500	35600	31500	20300	24800	17900
28	6820	16800	13100	6910	21500	14000	35900	34400	27200	16600	22900	18500
29	8370	15900	12000	4140	---	16400	34900	35400	24100	15300	21200	21600
30	12500	14200	9920	5750	---	9970	34000	33300	26800	16500	17600	17000
31	14400	---	16900	7550	---	10800	---	33000	---	18900	20700	---
TOTAL	351970	426450	409850	301840	345240	449290	861410	1349100	1249900	660600	528200	539860
MEAN	11350	14210	13220	9737	12330	14490	28710	43520	41660	21310	17040	18000
MAX	19100	18000	22500	17100	21500	25000	50700	65300	56400	28000	24800	23800
MIN	5800	5740	4990	4140	5960	8800	6980	33000	24100	15000	9900	8760
AC-FT	698100	845900	812900	598700	684800	891200	1709000	2676000	2479000	1310000	1048000	1071000

CAL YR 1988 TOTAL 5512430 MEAN 15060 MAX 36300 MIN 3740 AC-FT 10930000
WTR YR 1989 TOTAL 7473710 MEAN 20480 MAX 65300 MIN 4140 AC-FT 14820000

PEND OREILLE RIVER BASIN

12392000 CLARK FORK AT WHITEHORSE RAPIDS, NEAR CABINET, ID--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.-May 1984 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND	TEMPER-ATURE AIR (DEG C)	TEMPER-ATURE WATER (DEG C)	SPE-CIFIC CON-DUCT-ANCE (US/CM)	PHOS-PHOROUS TOTAL (MG/L AS P)	PHOS-PHOROUS DIS-SOLVED (MG/L AS P)	PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)
OCT											
17...	1225	24600	16.0	12.0	183	0.014	0.008	0.004	0.14	0.070	0.018
31...	1000	22500	9.5	19.0	195	0.016	0.007	0.001	0.16	0.028	0.010
NOV											
14...	1000	22500	--	13.0	191	0.011	0.003	0.003	0.14	0.055	0.005
28...	1000	23900	7.0	10.5	187	0.006	0.005	0.004	0.14	0.067	0.014
DEC											
12...	0916	24300	5.5	5.0	187	0.006	0.004	0.003	0.10	0.025	0.012
27...	1159	29700	-2.5	2.5	187	0.004	0.002	<0.002	0.09	0.021	0.009
JAN											
09...	1000	10300	-0.5	4.5	162	0.008	0.006	0.003	0.11	0.106	0.081
23...	1110	29000	0.5	4.0	187	0.006	0.003	0.001	0.10	0.053	0.031
FEB											
06...	1238	15600	2.0	0.5	195	0.011	0.010	0.004	0.33	0.050	0.030
21...	1102	14900	5.0	3.0	195	0.006	0.003	0.001	0.15	0.035	0.011
MAR											
06...	1030	15600	--	4.5	192	0.005	0.005	--	0.08	0.084	0.038
20...	1100	19600	7.0	4.0	--	0.007	0.004	--	0.11	0.103	0.014
APR											
04...	0910	29600	3.5	3.5	189	0.026	0.019	0.010	0.21	0.105	0.057
10...	1045	31900	12.0	5.5	178	0.031	0.024	0.015	0.18	0.091	0.057
17...	0900	33400	--	--	--	0.023	0.012	0.008	0.28	0.040	0.028
24...	0920	43700	9.0	9.0	151	0.024	0.009	0.004	0.24	0.040	0.031
MAY											
01...	0925	35100	9.5	15.0	152	0.026	0.024	0.009	0.24	0.066	0.034
08...	1040	47600	22.0	10.5	134	0.021	0.009	0.007	0.09	0.045	0.017
15...	1205	52500	17.0	7.0	153	0.033	0.011	0.008	0.18	0.003	0.029
23...	0930	37600	10.5	10.5	141	0.021	0.011	0.002	0.15	0.043	0.035
30...	1015	33900	21.0	12.0	140	0.016	0.008	0.005	0.17	0.042	0.023
JUN											
05...	1045	35300	20.0	14.0	161	0.016	0.008	0.002	0.22	0.037	0.024
12...	0928	52500	27.0	15.0	137	0.016	0.012	0.004	0.05	0.009	0.020
19...	0910	51600	16.0	15.5	144	0.011	0.004	0.004	0.14	0.025	0.026
26...	0910	32400	18.0	15.0	147	0.015	0.009	0.005	0.16	0.024	0.018
JUL											
10...	1015	22300	28.0	18.0	163	0.011	0.004	0.002	0.27	0.004	0.025
24...	1020	22400	26.0	20.5	173	0.011	0.010	0.002	0.18	0.025	0.072
AUG											
07...	1315	16700	26.0	21.0	179	0.016	0.007	0.004	0.25	0.006	0.035
21...	0939	22600	15.0	19.5	179	0.016	0.015	0.008	0.21	0.016	0.043
SEP											
05...	0900	29200	15.0	18.0	183	0.014	0.007	0.004	0.15	0.022	0.020
18...	1115	30400	10.0	11.0	178	0.012	0.007	0.003	0.18	0.028	0.108

Smaller reservoirs in Pend Oreille River basin in Montana

12325000 GEORGETOWN LAKE.--Lat 46°12'55", long 113°16'40", in SW1/4 sec.6, T.5 N., R.13 W., Granite County, Hydrologic Unit 17010202, at dam on Flint Creek, 2 mi west of Southern Cross, 8 mi south of Philipsburg, and at mile 38.8. DRAINAGE AREA, 50.1 mi^2. PERIOD OF RECORD, October 1939 to current year. May to July 1948 daily elevations and contents, published in WSP 1080. Records of daily elevations since October 1940 are in files of Helena district office. Nonrecording gage read daily. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by The Montana Power Co.).

Reservoir is formed by masonry and concrete dam. Storage began about 1905 to store water for pumpage into Warm Springs Creek for use of reduction works of Anaconda Copper Mining Co. at Anaconda, or for release through Flint Creek for irrigation, power development, and recreation. Usable capacity, 31,040 acre-ft between elevation 6,398.00 ft, bottom of outlet pipes, and 6,429.50 ft, maximum design level. Figures given herein represent usable contents. Records furnished by The Montana Power Co. REVISED RECORDS, WSP 1316: Drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 31,700 acre-ft, July 8, 9, 1980, elevation, 6,429.72 ft; minimum observed, 15,990 acre-ft, Apr. 28, 29, 1957, elevation, 6,424.15 ft.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 29,250 acre-ft, June 22, elevation, 6,428.90 ft; minimum observed, 24,410 acre-ft, Oct. 27 to Nov. 3, elevation, 6,427.22 ft.

12332500 EAST FORK ROCK CREEK RESERVOIR.--Lat 46°07'54", long 113°22'48", in NE1/4 sec.6, T.4 N., R.14 W., Granite County, Hydrologic Unit 17010202, at dam on East Fork Rock Creek, 14 mi southwest of Philipsburg, and at mile 9.7. DRAINAGE AREA, 30.3 mi^2. PERIOD OF RECORD, October 1939 to current year (seasonal records only for most years 1946-60, 1964, 1968). Records for October 1955 to April 1956, published in WSP 1446, have been found to be in error and should not be used. May to August 1948 scattered daily contents, published in WSP 1080. Elevations determined by hand levels from reference points at indefinite intervals. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by Montana Department of Natural Resources and Conservation).

Reservoir is formed by earthfill dam with concrete spillway completed in 1937; storage began in 1936. Usable capacity, 16,040 acre-ft between elevation 5,990.0 ft, bottom of outlet, and 6,055.5 ft, spillway crest. Dead storage unknown. Figures given herein represent usable contents. Water is used for irrigation and recreation. Records furnished by Montana Department of Natural Resources and Conservation. REVISED RECORDS, WSP 1316: Drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, in excess of 16,000 acre-ft, when reservoir was full and spilling at times in several years; no storage at times in 1955, 1961, 1966, 1973, 1977, and 1978.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 6,850 acre-ft, May 25, elevation, 6,028.0 ft; minimum observed, 123 acre-feet, Sept. 12, elevation, 5,991.9 ft.

12336500 NEVADA LAKE.--Lat 46°48'06", long 112°48'42", in NE1/4 sec.14, T.12 N., R.10 W., Powell County, Hydrologic Unit 17010203, at dam on Nevada Creek, 7 mi west of Finn. DRAINAGE AREA, 145 mi^2. PERIOD OF RECORD, October 1939 to current year (incomplete 1948, 1950-58, 1961-62, 1965-66, 1969-70). Nonrecording gage usually read at or near end of month. Prior to October 1976, published as Nevada Creek Reservoir near Finn. Prior to 1961, elevations determined by hand level from spillway. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by Montana Department of Natural Resources and Conservation).

Reservoir is formed by earthfill dam with concrete spillway completed in 1938. Usable capacity, 12,640 acre-ft between elevation, 4,551.5 ft, bottom of outlet, and 4,616.0 ft, spillway crest. Dead storage, 12 acre-ft below elevation, 4,551.5 ft. Figures given herein represent usable contents. Water is used for irrigation and recreation. Records furnished by Montana Department of Natural Resources and Conservation.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 13,520 acre-ft, June 3, 1953, elevation, 4,618.3 ft; no storage Aug. 14 to Oct. 31, 1973, Sept. 18, 1977, Sept. 15, 1988.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 12,760 acre-ft, May 15, elevation, 4,617.00 ft; minimum observed, 200 acre-ft, Oct. 2, estimated.

12342000 PAINTED ROCKS LAKE.--Lat 45°43'06", long 114°16'45", in NE1/4SE1/4 sec.26, T.1 S., R.22 W., Ravalli County Hydrologic Unit 17010205, at dam on West Fork Bitterroot River, 7 mi upstream from Nez Perce Creek, 16.5 mi southwest of Conner, 23 mi south of Darby, and at mile 19.8. DRAINAGE AREA, 317 mi^2. PERIOD OF RECORD, June 1940 to current year (incomplete 1956-58, 1960-61). Prior to December 1958, figures of contents may be total or usable. Records for August 1954, published only in WSP 1736. May to September 1948 scattered daily contents published in WSP 1080. Prior to October 1959, published as West Fork Bitterroot River Reservoir near Conner. Elevations determined at or near end of month by hand levels from spillway or from staff gage on right wingwall above spillway. Prior to 1959, elevations determined by measuring from floor of control tower. Datum of gage is at National Geodetic Vertical Datum of 1929.

Reservoir is formed by earthfill dam with concrete spillway completed in 1940. Usable capacity, 31,700 acre-ft between elevation 4,625.5 ft, bottom of outlet, and 4,725.5 ft, spillway crest. Dead storage, 656 acre-ft below elevation 4,625.5 ft. Figures given herein represent usable contents. Water is used for irrigation and recreation. Records furnished by Montana Department of Natural Resources and Conservation. REVISED RECORDS, WSP 1316: Drainage area.

EXTREMES OF PERIOD OF RECORD: Maximum contents observed, 33,930 acre-ft, June 18, 1974, elevation, 4,728.7 ft; no storage October 1940 to January 1941, March 1942, March, April 1954, Apr. 25, 1973, winter of 1973-74, 1974-75, November, December 1976, January through March 1982, November 1985 through February 1986, October 1987 to March 1988.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 33,300 acre-ft, Aug. 12, elevation, 4,727.8 ft; no storage during winter months.

COLUMBIA RIVER BASIN

PEND OREILLE RIVER BASIN

Smaller reservoirs in Pend Oreille River basin in Montana--Continued

12344500 LAKE COMO.--Lat 46°03'40", long 114°14'00", in NE1/4NW1/4 sec.32, T.4 N., R.21 W., Ravalli County, Hydrologic Unit 17010205, at dam on Rock Creek, 4 mi northwest of Darby, and at mile 3.6. DRAINAGE AREA, 54.6 mi^2. PERIOD OF RECORD: October 1939 to current year. April to August 1948 scattered daily gage height and content published in WSP 1080. Prior to October 1967, published as Como Lake. Nonrecording gage read at or near end of month in winter and more often during irrigation season but only monthend figures supplied. Datum of gage is at National Geodetic Vertical Datum of 1929.

Reservoir is formed by earthfill dam with concrete spillway completed in 1909. Usable capacity, 34,920 acre-ft between elevation 4,188.0 ft, bottom of outlet, and 4,242.5 ft, spillway crest. Dead storage unknown below elevation, 4,188.0 ft, elevation of natural lake outlet. Figures given herein represent usable contents. Water is used for irrigation and recreation. Records furnished by Bitterroot Irrigation District. REVISED RECORDS, WSP 1316: Drainage area.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 36,920 acre-ft, June 30, 1957, June 30, 1960, July 1, 1963, June 1, 1964, elevation, 4,244 ft; no storage at times in several years.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 35,410 acre-ft, June 30, elevation, 4,243.0 ft; minimum observed, 3,370 acre-ft, Oct. 11, elevation, 4,200.9 ft.

CAMAS RESERVOIRS.--A group of four reservoirs in the Little Bitterroot River basin operated for irrigation and recreation. Nonrecording gages are set to approximate National Geodetic Vertical Datum of 1929 and are read on the last day of the month. Figures given herein represent usable contents. Records furnished by Bureau of Indian Affairs. May to July 1948 scattered daily contents for individual reservoirs, published in WSP 1080.

12372500 LITTLE BITTERROOT LAKE.--Lat 48°05'34", long 114°14'51", in SE1/4SE1/4SW1/4 sec.16, T.27 N., R.24 W., Flathead County, Hydrologic Unit 17010212, at dam on Little Bitterroot River, 2 mi southwest of Marion and at mile 70.3. DRAINAGE AREA, 31.8 mi^2. PERIOD OF RECORD, December 1939, April 1940, September 1940 to current year.

Reservoir is formed by earthfill dam; storage began in 1918. Usable capacity, 26,400 acre-ft between elevation 3,897.98 ft and 3,906.48 ft. No dead storage. Prior to 1960, usable capacity, 24,000 acre-ft.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 26,800 acre-ft, May 31, 1959, elevation, 3.906.60 ft; no storage at times in 1939-46.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 8,150 acre-ft, May 31, elevation, 3,901.28 ft; minimum observed, 3,250 acre-ft, Jan. 31, Feb. 28, elevation, 3,899.48 ft.

12373500 HUBBART RESERVOIR.--Lat 47°55'43", long 114°43'53", in SE1/4NE1/4 sec.18, T.25 N., R.24 W., Flathead County, Hydrologic Unit 17010212, at dam on Little Bitterroot River, 9 mi northwest of Niarada and at mile 55.8. DRAINAGE AREA: 114 mi^2. PERIOD OF RECORD, December 1939, April 1940, September 1940 to current year.

Reservoir is formed by concrete variable-radium dam; storage began in 1924. Usable capacity, 12,120 acre-ft between elevation 3,140.0 ft and 3,210.0 ft. No dead storage.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 13,050 acre-ft, May 31, 1959, elevation, 3,220.92 ft; no storage September to December 1959, Sept. 30, Oct. 1, 1973, October through November 1987.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 9,370 acre-ft, May 31, elevation, 3,212.4 ft; minimum observed, 865 acre-ft, Oct. 31, elevation, 3,175.5 ft.

12375000 UPPER DRY FORK RESERVOIR.--Lat 47°44'55", long 114°40'53", in SE1/4SE1/4SW1/4 sec. 16, T.23 N., R.24 W., Sanders County, Hydrologic Unit 17010212, at dam on Dry Fork Creek, 4 mi northwest of Lonepine. DRAINAGE AREA, 8.53 mi^2. PERIOD OF RECORD. April 1940, September 1940 to current year.

Reservoir is formed by earthfill dam; storage began in 1940. Usable capacity, 2,810 acre-ft between elevation 2,900.0 ft and 2,928.5 ft. No dead storage. Prior to 1960, usable capacity, 2,700 acre-ft. Natural flow of Alder Creek in Thompson River basin is diverted in SW1/4 sec 16, T.23 N., R.25 W., and carried by inter-basin canal to upper Dry Fork Creek for storage in this reservoir.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 3,140 acre-ft, May 31, 1980, elevation, 2,929.5 ft; no storage at times in 1940, 1942, 1943.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 2,690 acre-ft, June 30, elevation, 2,928.1 ft; minimum observed, 406 acre-ft, Oct. 31, elevation, 2,914.9 ft.

12375500 DRY FORK RESERVOIR.--Lat 47°42'00", long 114°40'02", in SW1/4NW1/4NW1/4 sec.3, T.22 N., R.24 W., Sanders County, Hydrologic Unit 17010212, at dam on Dry Fork Creek, 1 mi west of Lonepine. DRAINAGE AREA, 17.8 mi^2. PERIOD OF RECORD, December 1939, April 1940, September 1940 to current year. Records published in WSP 1316 were listed in error and should not be used.

Reservoir is formed by earthfill dam; storage began in 1921. Usable capacity, 3,860 acre-ft between elevation is 2,830.5 ft and 2,856.3 ft. No dead storage. Prior to 1960, usable capacity, 4,000 acre-ft.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 4,270 acre-ft, May 31, 1980, elevation, 2,857.4 ft; no storage Aug. 31, 1944, Aug. 31, Sept. 30, 1946, Oct. 31, 1951.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 3,860 acre-ft, Apr. 30, elevation, 2,856.3 ft; minimum observed, 1,050 acre-ft, Oct. 31 to Feb. 28, elevation, 2,845.2 ft.

Smaller reservoirs in Pend Oreille River basin in Montana--Continued

MISSION VALLEY RESERVOIRS.--A group of eight reservoirs, in an area east of and tributary to Flathead River and between Flathead Lake and Jocko River, Lake County, Hydrologic Unit 17010212, is operated for irrigation.

PERIOD OF RECORD, December 1939, September 1940 to current year. Nonrecording gages are set to approximate National Geodetic Vertical Datum of 1929, and are read on the last day of the month. Figures given herein represent usable contents. Records furnished by Bureau of Indian Affairs. April to July 1948 monthend contents and daily maximum for individual reservoirs, published in WSP 1080.

12371000 TURTLE LAKE.--Lat 47°40'19", long 114°04'32", in SW1/4NW1/4NE1/4 sec.18, T.22 N., R.19 W., at outlet works 4 mi southeast of Polson, fed entirely by various canals; storage began in 1932. Prior to October 1968, published as "Twin Reservoir." Usable capacity, 899 acre-ft between elevation 3,061.0 ft and 3,090.5 ft. No dead storage.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 899 acre-ft, June 30, 1956, June 30, 1964, elevation, 3,090.5 ft; no storage at times in July 1941, August, September 1944, October 1957, July, August, September 1977.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 629 acre-ft, June 30, elevation, 3,085.9 ft; minimum observed, 131 acre-ft, Mar. 31, elevation, 3,070.0 ft.

12376700 LOWER CROW RESERVOIR.--Lat 47°30'09", long 114°13'35", in SW1/4SE1/4SE1/4 sec.11, T.20 N., R.21 W., at outlet works on Crow Creek, 5.2 mi northwest of Charlo, at at mile 3.44; storage began in 1933. Usable capacity 10,350 acre-ft between elevation 2,800 ft and 2,877.0 ft. No dead storage.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 10,770 acre-ft, May 21, 22, 1948, elevation, 2,878.2 ft; no storage Sept. 30, 1963, Oct. 31, Nov. 30, 1981.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 9,840 acre-ft, Apr. 30, elevation, 2,875.5 ft; minimum observed, 1,430 acre-ft, Oct. 31, elevation 2,833.3 ft.

12377200 MISSION RESERVOIR.--Lat 47°18'54", long 114°01'15", in NW1/4SW1/4SE1/4 sec.15, T.18 N., R.19 W., at outlet works on Mission Creek, 4 mi east of St. Ignatius and at mile 16.7; storage began in 1935. Usable capacity 7,250 acre-ft between elevation 3,340.7 ft and 3,406.0 ft.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 8,370 acre-ft, June 30, 1970, June 30, 1976, elevation, 3,409.8 ft; no storage at times during September 1949, February, March, 1964.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 7,960 acre-ft, June 30, elevation, 3,408.4 ft; minimum observed, 325 acre-ft, Oct. 31, elevation, 3,370.4 ft.

12377300 ST. MARYS LAKE.--Lat 47°15'58", long 113°56'08", in SW1/4NE1/4NE1/4 sec.6, T.17 N., R.18 W., at outlet works on Dry Creek, 8 mi southwest of St. Ignatius, fed by water diverted from Jocko River; storage began in 1919. Prior to October 1968, published as "Tabor Reservoir." Usable capacity, 23,300 acre-ft between elevation 3,911.5 ft and 4,025.0 ft, not including contents of natural lake. No dead storage.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 23,510, acre-ft, June 30, 1976, June 30, 1978, elevation, 4,025.7 ft; no storage Sept. 30, 1969.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 22,910 acre-ft, June 30, elevation, 4,023.6 ft; minimum observed, 183 acre-feet, Mar. 31, elevation, 3,912.7 ft.

12377900 PABLO RESERVOIR.--Lat 47°38'25", long 114°08'33", in SW1/4SW1/4NE1/4 sec.27, T.22 N., R.20 W., at outlet works 3 mi south of Polson, 3 mi northwest of Pablo, fed entirely by various canals, some water supplies by Flathead pumping plant; storage began in 1914. Usable capacity, 27,100 acre-ft between elevation 3,179 ft, gate sill, and 3,210.2 ft. No dead storage.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 28,120 acre-ft, June 30, 1968, elevation, 3,210.77 ft; no storage at times in several years.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 23,720 acre-ft, May 31, elevation, 3,208.6 ft; minimum observed, 10,230 acre-ft, Oct. 31 to Mar. 31, elevation, 3,199.4 ft.

12378200 McDONALD RESERVOIR.--Lat 47°25'31", long 113°59'27", in SE1/4NE1/4NE1/4 sec.10, T.19 N., R.19 W.,at outlet works on Post Creek, 9 mi east of Charlo, and at mile 12.4; storage began in 1919. Usable capacity, 8,220 acre-ft between elevation 3,545.0 ft, and 3,59 8.0 ft, not including contents of natural lake. No dead storage.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 8,330 acre-ft, June 30, 1983, elevation, 3,598.5 ft; no storage Aug. 31, 1961, Aug. 30, 1966, Oct. 31, 1971, Apr. 30, 1972.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 6,780 acre-ft, July 31, elevation, 3,590.8 ft; minimum observed, 417 acre-ft, Oct. 31, elevation, 3,549.3 ft.

12378300 KICKING HORSE RESERVOIR.--Lat 47°27'25", long 114°04'35", in SE1/4NE1/4NE1/4 sec.36, T.20 N., R.20 W.,at outlet works 4 mi northeast of Charlo, fed entirely by various canals; storage began in 1930. Usable capacity 8,350 acre-ft between elevation 3,062.14 ft and 3,061.94 ft. Dead storage, 70 acre-ft below elevation 3,042.0 ft. Formerly published as 12379700 Kicking Horse Reservoir prior to 1988 water year.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 10,320 acre-ft, June 30, 1976, May 31, 1980, elevation, 3,064.4 ft; no storage Aug. 31, 1961.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 8,510 acre-ft, July 31, elevation, 3,062.14 ft; minimum observed, 1,610 acre-ft, Dec. 31, elevation, 3,050.30 ft.

COLUMBIA RIVER BASIN

PEND OREILLE RIVER BASIN

Smaller reservoirs in Pend Oreille River basin in Montana--Continued

12378400 NINEPIPE RESERVOIR.--Lat 47°27'20", long 114°08'08", in NE1/4NW1/4NW1/4 sec.34, T.20 N., R.20 W., at outlet works 2 mi northeast of Charlo, fed entirely by various canals; storage began in 1911. Usable capacity 14,870 acre-ft between elevation 2,895.4 ft and 3,010.0 ft. No dead storage. Formerly published as 12380000 Ninepipe Reservoir prior to 1988 water year.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 16,950 acre-ft, June 30, 1974, elevation, 3,012.3 ft; no storage Aug. 31, 1961.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 14,560 acre-ft, June 30, elevation, 3,009.8 ft; minimum observed, 1,050 acre-ft, Oct. 31, elevation, 2,995.8 ft.

12380000 UPPER JOCKO LAKE.--Lat 47°11'34", long 113°42'44, in NE1/4NW1/4 sec. 36, T. 17 N., R. 17 W., Missoula County, Hydrologic Unit 17010212, at dam on Jocko River, 17.3 mi southeast of Arlee, and at mile 41.8. DRAINAGE AREA, 2.99 mi^2. PERIOD OF RECORD, April 1968 to current year. Nonrecording gage read at end of month. U.S. Geological Survey began publishing data October 1988. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by Bureau of Indian Affairs).

Reservoir is formed by earthfill dam; storage began in 1967. Was previously known as "Black Lake" prior to dam construction. Usable capacity, 4,440 acre-ft between elevation 4,390.0 ft, outlet sill, and 4,440.0 ft, spillway elevation. Dead storage, 763 acre-ft. Transmountain diversion takes water from Placid Creek in Clearwater River basin in SW1/4 sec. 29, T. 17 N., R. 16 W., to Upper Jocko Lake, thence to Lower Jocko Lake. Some water may then be diverted to St. Mary's Lake for use in the Mission Valley. Figures given herein represent usable contents. Water is used for irrigation and recreation. Records furnished by Bureau of Indian Affairs.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 4,290 acre-ft, May 31, 1971, elevation, 4,439.1 ft; no storage at times each year.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 2,520 acre-ft, June 30, elevation, 4,426.6 ft; no storage most of year.

12380500 LOWER JOCKO LAKE.--Lat 47°12'10", long 113°45'35", in NW1/4SW1/4NW1/4 sec.27, T.17 N., R.17 W., Missoula County, Hydrologic Unit 17010212, at dam on Jocko River, 15 mi east of Arlee, and at mile 39.3. DRAINAGE AREA, 7.39 mi^2. PERIOD OF RECORD, December 1939, April 1940, September, 1940, to current year (no winter records most years since 1947). Records for November 1957, published only in WSP 1736. May to July 1948 scattered daily contents, published in WSP 1080. Nonrecording gage read at end of month. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by Bureau of Indian Affairs).

Reservoir is formed by earthfill dam; storage began in 1937. Usable capacity, 5,380 acre-ft between elevation 4,267.0 ft and 4,340.0 ft. Prior to 1960, usable capacity, 7,600 acre-ft at elevation 4,350 ft. Dead storage unknown below elevation 4,267 ft, elevation of natural lake outlet. Transmountain diversion takes water from Placid Creek in Clearwater River basin in SW1/4 sec.29, T.17 N., R.16 W., to Upper Jocko Lake, thence to Lower Jocko Lake. Some water may then be diverted to St. Mary's Lake for use in the Mission Valley. Figures given herein represent usable contents. Water is used for irrigation and recreation. Records furnished by Bureau of Indian Affairs.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 6,700 acre-ft, June 9, 1948, elevation, 4,342.7 ft; no storage at times.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 3,100 acre-ft, July 31, elevation, 4,308.1 ft; no storage most of year.

12390000 THOMPSON FALLS RESERVOIR.--Lat 47°35'42", long 115°21'36", in NE1/4 sec.7, T.21 N., R.29 W., Sanders County, Hydrologic Unit 17010213, at dam on Clark Fork at Thompson Falls, at mile 208.0. DRAINAGE AREA, 20,968 mi^2. PERIOD OF RECORD, October 1939 to current year. Nonrecording gage is read several times daily but only monthend figures supplied. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by The Montana Power Company).

Reservoir is formed by two concrete dams, first generator installed July 1915. Usable capacity, 14,970 acre-ft between elevation 2,380.0 ft, spillway crest, and 2,396.0 ft, top of flashboards. Dead storage unknown. Figures given herein represent usable contents. Water is used for power development and recreation. Records furnished by The Montana Power Company.

EXTREMES FOR PERIOD OF RECORD: Maximum contents observed, 16,060 acre-ft, Nov. 30, 1949, elevation, 2,396.7 ft; no storage July 31, 1958.

EXTREMES FOR CURRENT YEAR: Maximum contents observed, 15,890 acre-ft, Feb. 28, Aug. 31, elevation, 2,396.6 ft; minimum observed, 3,990 acre-ft, Oct. 31, elevation, 2,386.2 ft.

12391300 NOXON RAPIDS RESERVOIR.--Lat 47°57'38", long 115°44'00", in NE1/4SW1/4SW1/4 sec.33, T.26 N., R.32 W., Sanders County, Hydrologic Unit 17010213, at dam on Clark Fork, 3 mi southeast of Noxon, 7.2 mi upstream from Bull River, and at mile 169.7. DRAINAGE AREA, 21,833 mi^2. PERIOD OF RECORD, April 1959 to current year. Prior to October 1962, published as "Noxon Reservoir." Record of daily elevation on file in Helena district office. Water-stage recorder, midnight readings. Datum of gage is at National Geodetic Vertical Datum of 1929 (levels by the Washington Water Power Company).

Reservoir is formed by concrete and earthfill dam, construction began in 1955, completed in 1959. Storage began Apr. 3, 1959. Usable capacity, 334,600 acre-ft between elevation 2,270.00 ft, minimum operating level, and 2,331.00 ft. Figures given herein represent usable contents. Water is used for power production, flood control, and recreation. Records furnished by The Washington Water Power Company.

EXTREMES FOR PERIOD OF RECORD: Maximum contents, 335,400 acre-ft, Apr. 7, 1960, elevation, 2,331.10 ft; minimum since first filling, 26,380 acre-ft, May 10, 1967, elevation, 2,277.15 ft.

EXTREMES FOR CURRENT YEAR: Maximum contents, 334,000 acre-ft, May 10, 11, 13, elevation, 2,330.92 ft; minimum, 257,800 acre-ft, Feb. 16, elevation, 2,320.70 ft.

COLUMBIA RIVER BASIN

PEND OREILLE RIVER BASIN

Smaller reservoirs in Pend Oreille River basin in Montana--Continued

Monthend contents, in acre-feet, water year October 1988 to September 1989

Date	Georgetown Lake	East Fork Rock Creek Reservoir	Nevada Lake	Painted Rocks Lake	Lake Como	Camas Reservoir	Mission Valley Reservoirs
Sept. 30	25,050	c 150	c 200	c 1,000	a 3,270	6,200	6,560
Oct. 31	24,410	--	c 450	0	a 4,550	6,320	16,450
Nov. 30	24,660	--	a 738	0	a 5,980	6,250	18,340
Dec. 31	24,940	--	b 896	0	a 8,270	6,250	20,540
Jan. 31	25,330	--	a 975	0	9,930	6,150	21,720
Feb. 28	25,410	--	b 1,190	0	a 11,140	6,210	21,760
Mar. 31	25,740	--	3,860	0	a 17,660	9,880	27,800
Apr. 30	26,330	a 5,080	b 12,230	a 8,130	b 24,180	19,920	40,340
May 31	27,800	a 6,750	b 12,450	a 31,710	b 29,260	23,560	67,010
June 30	29,160	a 6,270	b 10,020	31,710	35,410	21,720	85,380
July 31	28,240	a 1,800	b 8,860	a 33,150	25,220	16,950	65,440
Aug. 31	27,320	a446	b 8,600	c 30,000	7,970	13,500	44,680
Sept. 30	26,020	a463	b 7,760	c 20,000	a 4,040	13,430	41,620

Date	Upper Jocko Lake	Lower Jocko Lake	Thompson Falls Reservoir	Noxon Rapids Reservoir
Sept. 30	0	0	14,390	318,300
Oct. 31	0	0	3,990	323,000
Nov. 30	0	0	15,730	317,400
Dec. 31	0	0	14,970	318,400
Jan. 31	0	0	14,970	325,100
Feb. 28	0	0	15,890	260,500
Mar. 31	0	0	15,280	304,300
Apr. 30	1,190	1,540	7,780	318,200
May 31	2,100	2,870	6,370	315,100
June 30	2,520	2,990	15,730	320,100
July 31	807	3,100	15,730	317,400
Aug. 31	0	1,400	15,890	318,200
Sept. 30	0	1,060	13,670	321,300

a Interpolated.
b Figure of contents for first day of following month.
c Estimate.

CHEMICAL QUALITY OF PRECIPITATION

PRICKLY PEAR CREEK BASIN

462905112035401 MC BEATH RESIDENCE NEAR CLANCY, MT (MT07)
(National trends network)

LOCATION.--Lat 46°29'05", long 112°03'54", in NE1/4NW1/4NE1/4 sec.2, T.8 N., R.4 W., Jefferson County, at National Forest boundary fence at private residence on Lump Gulch Road, 5.1 mi west of Clancy and 10 mi south of Helena.

PERIOD OF RECORD.--Water years 1981-1982, 1984 to current year. Prior to Oct. 1984, published as 462905112034001

EQUIPMENT.--The sample collector is an Aerochem Metrics Model 301 precipitation collector. An automatic sensor detects occurrences of precipitation, activating a motor which removes a cover from the wetfall collection vessel. When precipitation ceases the cycle is reversed. The sampling vessel is polyethylene and has a collection diameter of 28.6 cm and a capacity of 13 liters. Precipitation is measured using a Belfort Universal rain gage, series 5-780 with a event recorder.*

REMARKS.--Because laboratory quality assurance may not have been completed, data contained in the tables are considered preliminary and are subject to updating.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	---	.24	.00	.00	.00	.00	.27	.00
2	.00	.01	.00	.00	---	.26	.13	.12	.05	.00	.00	.00
3	.00	.03	.00	.00	---	.03	.00	.00	.14	.00	.00	.00
4	.00	.00	.00	.00	---	.00	.00	.02	.00	.00	.00	.00
5	.00	.00	.00	.05	---	.00	.00	.00	.00	.00	.00	.00
6	.00	.08	.06	.24	.00	.00	.00	.00	.00	.00	.00	.00
7	.00	.01	.04	.00	.00	.02	.00	.01	.00	.00	.00	.00
8	.00	.00	.00	.00	.00	.00	.18	.15	.00	.00	.00	.04
9	.00	.00	.00	.09	.00	.00	.00	.00	.36	.00	.00	.06
10	.00	.00	.00	.01	.00	.00	.00	.16	.29	.00	.03	.11
11	.00	.00	.00	.00	.00	.00	.00	.00	.02	.00	.01	.00
12	.00	.03	.00	.00	.05	.00	.00	.04	.00	.59	.02	.00
13	.00	.01	.00	.00	.07	.08	.00	.19	.00	.03	.00	.00
14	.00	.14	.06	.02	.00	.00	.00	.00	.04	.00	.06	.00
15	.00	.00	.00	.00	.00	.00	.00	.05	1.41	.07	.04	.00
16	.44	.00	.00	.00	.02	.20	.06	.00	.00	.29	.00	.00
17	.16	.00	.00	.00	.04	.48	.08	.00	.00	.00	.00	.77
18	.04	.02	.00	.00	.02	.00	.00	.18	.01	.00	.00	.42
19	.01	.00	.17	.00	.08	.02	.00	.00	.00	.00	.02	.00
20	.00	.00	.00	.00	.00	.00	.00	.00	.01	.02	.00	.00
21	.00	.00	.00	.08	.00	.00	.00	.00	.00	.62	.00	.00
22	.00	.00	.00	.28	.00	.03	.20	.00	.00	.00	.14	.00
23	.00	.10	.00	.15	.01	.08	.12	.02	.00	.46	.32	.00
24	.00	.00	.00	.01	.03	.00	.00	.03	.00	.00	.13	.00
25	.00	.00	.08	.00	.00	.00	.04	.00	.02	.00	.00	.00
26	.06	.14	.04	.00	.03	.00	.24	.00	.00	.49	.06	.02
27	.07	.00	.00	.00	.13	.00	.61	.00	.06	.03	.16	.00
28	.00	.07	.00	.00	.08	.00	.06	.06	.11	.00	.00	.00
29	.00	.00	.00	.00	---	.00	.00	.21	.00	.00	.00	.00
30	.00	.00	.00	.00	---	.00	.00	.00	.00	.00	.13	.00
31	.00	---	.00	.20	---	.00	---	.07	---	.04	.00	---
TOTAL	0.78	0.64	0.45	1.13	---	1.44	1.72	1.31	2.52	2.64	1.39	1.42

*The use of the brand name in this report is for identificaton purposes only and does not imply endorsement by the U.S. Geological Survey.

CHEMICAL QUALITY OF PRECIPITATION

PRICKLY PEAR CREEK BASIN

462905112035401 MC BEATH RESIDENCE NEAR CLANCY, MT (MT07)--Continued

CHEMICAL ANALYSES, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TOTAL PRECIP-ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDUC-TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	PH FIELD ATM DEP WET T (UNITS) (83106)	CALCIUM ATM DEP WET DIS (MG/L) (82932)	MAG-NESIUM ATM DEP WET DIS (MG/L) (83002)	SODIUM ATM DEP WET DIS (MG/L) (83138)	POTAS-SIUM ATM DEP WET DIS (MG/L) (83120)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	CHLO-RIDE ATM DEP WET DIS (MG/L) (82944)	NI-TROGEN NITRATE ATM DEP WET DIS AS NO3 (MG/L) (83071)	NI-TROGEN AMMON. ATM DEP WET DIS AS NH4 (MG/L) (83047)	PHOS-PHOROUS ORTHO ATM DEP WET DIS AS PO4 (MG/L) (83111)
SEP 27-OCT 04	0.0	--	--	--	--	--	--	--	--	--	--	--
OCT 04-11	0.0	--	--	--	--	--	--	--	--	--	--	--
OCT 11-18	0.60	2.3	5.26	0.010	0.005	0.016	<0.003	0.06	<0.03	0.04	<0.020	<0.020
OCT 18-25	0.05	--	--	0.210	0.029	0.253	0.038	1.58	0.09	0.09	<0.020	0.330
OCT 25-NOV 01	0.13	7.9	5.25	0.390	0.047	0.190	0.101	0.53	0.10	0.56	<0.020	<0.020
NOV 01-08	0.13	7.2	4.86	0.060	0.017	0.062	<0.003	0.15	0.06	<0.03	<0.020	0.070
NOV 08-15	0.18	5.9	4.91	0.050	0.004	0.064	0.006	0.37	0.06	0.46	0.080	<0.020
NOV 15-22	0.02	--	--	--	--	--	--	--	--	--	--	--
NOV 22-29	0.31	2.7	5.29	0.070	0.005	0.026	<0.003	0.08	<0.03	0.12	<0.020	<0.020
NOV 29-DEC 06	0.0	--	--	--	--	--	--	--	--	--	--	--
DEC 06-13	0.10	12.9	4.59	0.130	0.025	0.204	0.018	0.49	0.10	0.06	<0.020	0.160
DEC 13-20	0.23	4.1	5.09	0.040	0.008	0.033	0.004	0.19	0.04	0.17	<0.020	<0.020
DEC 20-27	0.12	--	--	0.130	0.019	0.198	<0.019	0.38	0.26	0.83	<0.130	<0.130
DEC 27 1988-JAN 03 1989	0.0	--	--	--	--	--	--	--	--	--	--	--
JAN 03-10	0.39	5.4	5.02	0.050	0.007	0.024	0.005	0.24	<0.03	0.56	<0.020	<0.020
JAN 10-17	0.02	--	--	0.080	0.025	0.179	0.017	0.28	0.14	0.09	0.090	0.310
JAN 17-24	0.52	4.4	5.08	0.050	0.003	0.037	0.007	0.42	0.05	0.39	0.030	<0.020
JAN 24-31	0.0	--	--	--	--	--	--	--	--	--	--	--
JAN 31-FEB 07	0.54	5.6	4.98	0.080	0.009	0.081	0.003	0.39	0.06	0.42	0.060	<0.020
FEB 07-14	0.12	5.9	4.95	0.070	0.012	0.083	0.033	0.33	0.08	0.62	0.030	<0.020
FEB 14-21	0.16	14.3	4.52	0.050	0.011	0.061	0.009	0.56	0.06	1.16	0.060	0.040
FEB 21-28	0.23	10.9	4.66	0.060	0.012	0.076	0.003	0.69	0.07	0.58	0.090	0.020
FEB 28-MAR 07	0.58	8.3	4.77	0.030	0.006	0.016	<0.003	0.35	<0.03	0.48	<0.020	<0.020
MAR 07-14	0.10	15.7	4.49	0.220	0.032	0.167	<0.003	0.42	0.09	0.30	<0.020	<0.020
MAR 14-21	0.70	5.8	4.95	0.060	0.007	0.039	<0.003	0.31	0.05	0.16	<0.020	<0.020
MAR 21-28	0.11	20.9	4.34	0.090	0.015	0.039	0.013	0.61	0.04	0.48	<0.020	<0.020
MAR 28-APR 04	0.13	9.1	4.71	0.080	0.013	0.158	0.012	0.35	0.06	0.08	<0.020	<0.020

CHEMICAL QUALITY OF PRECIPITATION

PRICKLY PEAR CREEK BASIN

462905112035401 MC BEATH RESIDENCE NEAR CLANCY, MT (MT07)--Continued

CHEMICAL ANALYSES, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TOTAL PRECIP-ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDUC-TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	PH FIELD ATM DEP WET T (UNITS) (83106)	CALCIUM ATM DEP WET DIS (MG/L) (82932)	MAG-NESIUM ATM DEP WET DIS (MG/L) (83002)	SODIUM ATM DEP WET DIS (MG/L) (83138)	POTAS-SIUM ATM DEP WET DIS (MG/L) (83120)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	CHLO-RIDE ATM DEP WET DIS (MG/L) (82944)	NI-TROGEN NITRATE ATM DEP WET DIS AS NO3 (MG/L) (83071)	NI-TROGEN AMMON. ATM DEP WET DIS AS NH4 (MG/L) (83047)	PHOS-PHOROUS ORTHO ATM DEP WET DIS AS PO4 (MG/L) (83111)
APR 1989 04-11	0.18	16.1	4.49	0.210	0.028	0.060	0.021	1.16	0.10	0.49	<0.020	<0.020
APR 11-18	0.14	11.1	4.70	0.110	0.023	0.189	0.008	0.72	0.10	0.48	<0.020	<0.020
APR 18-25	0.34	71.6	7.16	7.39	0.636	4.80	0.342	4.81	4.76	1.57	0.220	<0.020
APR 25-MAY 02	0.93	4.9	5.24	0.160	0.020	0.080	<0.003	0.33	0.08	0.32	0.050	<0.020
MAY 02-09	0.30	7.0	5.10	0.140	0.020	0.079	0.007	0.81	0.06	0.59	0.160	<0.020
MAY 09-16	0.44	13.2	5.27	0.690	0.076	0.152	0.055	1.26	0.21	1.30	0.510	<0.020
MAY 16-23	0.18	12.3	5.26	0.750	0.074	0.260	0.031	1.19	0.19	1.04	0.400	<0.020
MAY 23-30	0.32	9.6	5.20	0.510	0.057	0.192	0.035	0.71	0.28	1.45	0.240	<0.020
MAY 30-JUN 06	0.26	13.5	4.64	0.210	0.028	0.084	0.020	1.61	0.06	0.56	0.410	<0.020
JUN 06-13	0.67	12.6	4.60	0.170	0.022	0.063	0.022	0.86	0.05	0.52	0.120	<0.020
JUN 13-20	1.46	4.0	5.60	0.110	0.014	0.029	0.018	0.32	0.07	0.43	0.240	<0.020
JUN 20-27	0.03	--	--	0.290	0.041	0.435	0.088	1.04	0.24	1.66	0.050	0.110
JUN 27-JUL 04	0.17	14.8	4.94	0.430	0.057	0.309	0.077	1.42	0.30	2.06	0.520	<0.020
JUL 04-11	0.0	--	--	--	--	--	--	--	--	--	--	--
JUL 11-18	0.98	11.7	4.75	0.230	0.028	0.037	0.050	1.42	0.09	1.02	0.340	<0.020
JUL 18-25	1.10	14.0	4.64	0.130	0.014	0.030	0.030	0.87	0.08	0.83	0.170	<0.020
JUL 25-AUG 01	0.56	10.2	4.93	0.240	0.029	0.031	0.025	1.12	0.11	0.94	0.240	0.040
AUG 01-08	0.27	7.1	5.59	0.390	0.041	0.074	0.034	0.79	0.17	1.01	0.360	<0.020
AUG 08-15	0.12	20.7	4.64	0.550	0.055	0.053	0.061	2.20	0.19	2.35	0.530	0.120
AUG 15-22	0.06	12.6	5.06	0.250	0.035	0.065	0.047	1.03	0.20	1.85	0.450	<0.020
AUG 22-29	0.81	12.0	4.86	0.250	0.033	0.063	0.034	0.88	0.20	1.09	0.250	<0.020
AUG 29-SEP 05	0.13	13.1	6.23	0.890	0.107	0.339	0.106	1.36	0.51	2.35	0.320	<0.020
SEP 05-12	0.21	10.1	4.81	0.060	0.007	0.008	0.006	0.72	0.05	0.39	0.130	<0.020
SEP 12-19	1.19	7.5	4.92	0.060	0.007	0.013	0.005	0.37	0.04	0.30	0.050	<0.020
SEP 19-26	0.0	--	--	--	--	--	--	--	--	--	--	--
SEP 26-OCT 03	0.24	8.5	5.12	0.190	0.022	0.221	0.018	0.77	0.20	0.70	0.200	<0.020

CHEMICAL QUALITY OF PRECIPITATION

MILK RIVER BASIN

482958109475101 NORTHERN MONTANA AGRICULTURAL RESEARCH CENTER NEAR HAVRE, MT (MT98)
(National trends network)

LOCATION.--Lat 48°29'58", long 109°47'51", in NE1/4SW1/4SW1/4 sec.28, T.32 N., R.15 E., Hill County, at Northern Montana Agricultural Research Center Experiment Station, 3/4 mile south of U.S. Highway 87, 5.7 miles southwest of Havre.

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

EQUIPMENT.--The sample collector is an Aerochem Metrics Model 301 precipitation collector. An automatic sensor detects occurrences of precipitation, activating a motor which removes a cover from the wetfall collection vessel. When precipitation ceases the cycle is reversed. The sampling vessel is polyethylene and has a collection diameter of 28.6 cm and a capacity of 13 liters. Precipitation is measured using a Belfort Universal rain gage, series 5-780 with a event recorder.*

REMARKS.--Because laboratory quality assurance may not have been completed, data contained in the tables are considered preliminary and are subject to updating.

RAINFALL ACCUMULATED (INCHES), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
SUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.03	.00
2	.00	.00	.00	.00	.00	.02	.00	.03	.10	.00	.00	.00
3	.00	.00	.00	.00	.00	.01	.00	.00	.06	.00	.00	.00
4	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.02	.00
5	.00	.00	.00	.05	.15	.00	.04	.00	.00	.00	.00	.00
6	.00	.00	.00	.37	.00	.00	.01	.00	.03	.00	.00	.00
7	.00	.00	.00	.05	.00	.00	.01	.03	.03	.00	.00	.00
8	.00	.00	.00	.00	.00	.00	.03	.55	.00	.00	.00	.00
9	.00	.00	.00	.00	.00	.00	.00	.00	.02	.00	.43	.00
10	.00	.00	.01	.04	.00	.00	.00	.05	.18	.08	.00	.00
11	.00	.00	.00	.00	.00	.00	.00	.00	.21	.00	.00	.00
12	.00	.00	.00	.00	.00	.00	.00	.06	.00	.00	.00	.00
13	.00	.00	.05	.00	.00	.20	.00	.00	.00	.06	.00	.00
14	.00	.26	.00	.05	.00	.13	.00	.30	.00	.32	.00	.00
15	.06	.00	.00	.00	.00	.00	.00	.03	.12	.00	.05	.00
16	.10	.00	.00	.00	.10	.00	.17	.00	.04	.00	.63	.00
17	.00	.00	.00	.00	.03	.00	.01	.00	.00	.26	.00	.15
18	.00	.00	.00	.00	.00	.00	.00	.02	.00	---	.00	.70
19	.00	.00	.00	.00	.00	.08	.02	.00	.00	---	.00	.00
20	.00	.00	.10	.00	.00	.00	.00	.00	.00	---	.00	.00
21	.00	.00	.03	.00	.00	.00	.03	.00	.05	---	.00	.00
22	.00	.00	.01	.00	.00	.02	.10	.00	.15	---	.62	.00
23	.00	.00	.00	.00	.00	.00	.19	.10	.11	---	.02	.00
24	.00	.00	.00	.00	.00	.00	.03	.05	.00	---	1.40	.00
25	.00	.00	.01	.00	.04	.00	.00	.10	.47	.00	.51	.00
26	.19	.10	.02	.00	.00	.00	.60	.00	.75	.00	.00	.00
27	.00	.00	.00	.00	.00	.00	.55	.00	.23	.08	.24	.00
28	.00	.00	.00	.00	.00	.00	.00	.10	.00	.00	.12	.00
29	.00	.00	.00	.00	---	.00	.00	.82	.00	.00	.10	.00
30	.00	.00	.01	.00	---	.00	.00	.25	.00	.00	.05	.30
31	.00	---	.00	.03	---	.00	---	.05	---	.00	.12	---
TOTAL	0.35	0.36	0.24	0.59	0.32	0.47	1.79	2.54	2.55	---	4.34	1.15

*The use of the brand name in this report is for identificaton purposes only and does not imply endorsement by the U.S. Geological Survey.

CHEMICAL QUALITY OF PRECIPITATION

MILK RIVER BASIN

482958109475101 NORTHERN MONTANA AGRICULTURAL RESEARCH CENTER NEAR HAVRE, MT (MT98)--Continued

CHEMICAL ANALYSES, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TOTAL PRECIP-ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDUC-TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	PH FIELD ATM DEP WET T (UNITS) (83106)	CALCIUM ATM DEP WET DIS (MG/L) (82932)	MAG-NESIUM ATM DEP WET DIS (MG/L) (83002)	SODIUM ATM DEP WET DIS (MG/L) (83138)	POTAS-SIUM ATM DEP WET DIS (MG/L) (83120)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	CHLO-RIDE ATM DEP WET DIS (MG/L) (82944)	NI-TROGEN NITRATE ATM DEP WET DIS AS NO3 (MG/L) (83071)	NI-TROGEN AMMON. ATM DEP WET DIS AS NH4 (MG/L) (83047)	PHOS-PHOROUS ORTHO ATM DEP WET DIS AS PO4 (MG/L) (83111)
SEP 27-OCT 04	0.11	4.8	5.29	0.120	0.025	0.102	0.015	0.16	0.06	0.37	0.040	0.060
OCT 04-11	0.0	--	--	--	--	--	--	--	--	--	--	--
OCT 11-18	0.16	6.8	5.13	0.130	0.026	0.083	0.036	0.42	0.08	0.63	0.050	<0.020
OCT 18-25	0.0	--	--	--	--	--	--	--	--	--	--	--
OCT 25-31	0.19	7.1	4.93	0.100	0.022	0.056	0.024	0.56	0.05	0.52	0.110	0.070
OCT 31-NOV 08	0.0	--	--	--	--	--	--	--	--	--	--	--
NOV 08-15	0.26	5.2	4.82	0.030	0.005	0.092	<0.003	0.29	0.04	0.38	<0.020	<0.020
NOV 15-22	0.0	--	--	--	--	--	--	--	--	--	--	--
NOV 22-29	0.10	4.9	5.51	0.140	0.042	0.078	0.041	0.23	0.10	0.72	0.210	0.290
NOV 29-DEC 06	0.0	--	--	--	--	--	--	--	--	--	--	--
DEC 06-13	0.03	--	--	0.120	0.031	0.348	0.007	0.33	0.19	0.37	0.100	0.060
DEC 13-20	0.13	10.6	4.71	--	--	--	--	--	--	--	--	--
DEC 20-27	0.07	5.9	4.77	0.050	0.012	0.093	<0.003	0.20	0.17	0.68	0.070	<0.020
DEC 27 1988-JAN 03 1989	0.01	--	--	0.120	0.016	0.078	<0.009	0.13	0.09	<0.09	<0.060	<0.060
JAN 03-10	0.47	3.1	5.22	0.070	0.019	0.026	0.009	0.21	0.06	0.22	0.070	<0.020
JAN 10-17	0.09	8.8	4.73	0.040	0.017	0.095	<0.003	0.23	0.10	0.53	<0.020	0.200
JAN 17-24	0.0	--	--	--	--	--	--	--	--	--	--	--
JAN 24-31	0.03	--	--	--	--	--	--	--	--	--	--	--
JAN 31-FEB 07	0.15	--	--	--	--	--	--	--	--	--	--	--
FEB 07-14	0.0	--	--	--	--	--	--	--	--	--	--	--
FEB 14-20	0.13	--	--	--	--	--	--	--	--	--	--	--
FEB 20-27	0.04	--	--	0.110	0.029	0.089	0.010	0.53	0.11	1.17	0.300	<0.020
FEB 27-MAR 09	0.04	--	--	0.010	<0.003	0.047	<0.003	<0.03	0.08	<0.03	<0.020	0.050
MAR 09-14	0.33	15.1	5.51	0.410	0.064	0.886	0.136	1.85	0.31	1.77	0.980	<0.020
MAR 14-21	0.08	17.2	4.49	0.080	0.021	0.310	<0.003	0.47	0.14	0.14	<0.020	<0.020
MAR 21-28	0.02	--	--	0.300	0.064	0.681	<0.015	0.54	0.15	<0.15	<0.100	<0.100
MAR 28-APR 04	--	--	--	--	--	--	--	--	--	--	--	--

CHEMICAL QUALITY OF PRECIPITATION

MILK RIVER BASIN

482958109475101 NORTHERN MONTANA AGRICULTURAL RESEARCH CENTER NEAR HAVRE, MT (MT98)--Continued

CHEMICAL ANALYSES, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TOTAL PRECIP-ITATION FOR DEFINED PERIOD (IN) (00193)	SPEC. CONDUC-TANCE FIELD ATM DEP WET TOT (US/CM) (83154)	PH FIELD ATM DEP WET T (UNITS) (83106)	CALCIUM ATM DEP WET DIS (MG/L) (82932)	MAG-NESIUM ATM DEP WET DIS (MG/L) (83002)	SODIUM ATM DEP WET DIS (MG/L) (83138)	POTAS-SIUM ATM DEP WET DIS (MG/L) (83120)	SULFATE ATM DEP WET DIS AS SO4 (MG/L) (83160)	CHLO-RIDE ATM DEP WET DIS (MG/L) (82944)	NI-TROGEN NITRATE ATM DEP WET DIS AS NO3 (MG/L) (83071)	NI-TROGEN AMMON. ATM DEP WET DIS AS NH4 (MG/L) (83047)	PHOS-PHOROUS ORTHO ATM DEP WET DIS AS PO4 (MG/L) (83111)
APR 1989 04-11	0.09	24.7	4.32	0.100	0.021	0.171	0.011	0.56	0.08	0.86	0.230	<0.020
APR 11-18	0.18	19.3	4.59	0.340	0.054	0.404	0.019	2.05	0.13	1.50	0.720	<0.020
APR 18-25	0.37	20.6	6.70	1.64	0.188	1.08	0.087	1.59	1.13	1.35	0.590	<0.020
APR 25-MAY 02	1.15	6.9	5.24	0.190	0.030	0.051	0.005	0.78	0.06	0.67	0.360	<0.020
MAY 02-09	0.61	7.6	5.22	0.110	0.022	0.058	0.034	0.70	0.07	0.94	0.120	<0.020
MAY 09-16	0.44	8.8	6.15	0.530	0.084	0.144	0.054	1.09	0.12	1.01	0.590	<0.020
MAY 16-23	0.02	--	--	0.740	0.135	0.609	0.008	0.70	0.27	0.86	0.180	0.020
MAY 23-30	1.17	6.3	5.01	0.110	0.017	0.050	<0.003	0.51	0.06	0.52	0.220	<0.020
MAY 30-JUN 06	0.46	10.3	4.82	0.190	0.034	0.046	0.033	1.30	0.06	1.23	0.520	<0.020
JUN 06-13	0.47	7.3	5.20	0.310	0.052	0.125	0.038	0.99	0.07	1.02	0.280	<0.020
JUN 13-20	0.16	4.7	5.07	0.270	0.037	0.167	0.016	0.22	0.12	0.71	0.160	<0.020
JUN 20-27	1.53	5.3	5.03	0.070	0.013	0.032	0.019	0.44	0.06	0.45	0.270	<0.020
JUN 27-JUL 05	0.23	8.2	4.75	0.140	0.031	0.050	0.048	0.39	0.08	0.61	<0.020	<0.020
JUL 05-11	0.08	26.2	4.33	0.390	0.070	0.293	0.075	1.36	0.26	1.84	0.480	0.030
JUL 11-18	0.64	--	--	0.050	0.011	0.024	0.012	0.46	0.08	0.72	0.280	<0.020
JUL 18-25	--	40.8	4.07	0.380	0.066	0.120	0.069	1.90	0.17	2.90	0.960	<0.020
JUL 25-AUG 01	0.11	21.8	5.43	1.63	0.289	0.144	0.253	3.60	0.36	4.50	1.25	<0.020
AUG 01-08	0.02	--	--	0.290	0.055	0.359	<0.041	1.11	0.69	1.11	0.690	<0.280
AUG 08-15	0.43	3.5	5.27	0.150	0.027	0.018	0.030	0.27	0.06	0.37	0.060	<0.020
AUG 15-22	0.68	6.9	4.96	0.100	0.018	0.015	0.016	0.57	0.07	0.72	0.180	<0.020
AUG 22-29	3.01	5.0	6.28	0.670	0.134	0.041	0.120	0.55	0.08	0.60	0.130	<0.020
AUG 29-SEP 05	0.17	8.6	4.86	0.110	0.021	0.055	0.047	0.72	0.13	1.41	0.460	0.090
SEP 05-12	0.0	--	--	--	--	--	--	--	--	--	--	--
SEP 12-19	0.85	5.8	4.95	0.100	0.020	0.024	0.029	0.34	0.06	0.38	0.100	<0.020
SEP 19-26	0.0	--	--	--	--	--	--	--	--	--	--	--
SEP 26-OCT 03	0.30	18.0	4.46	0.240	0.038	0.178	0.061	1.47	0.11	1.09	0.340	<0.020

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October 1, 1978

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).

Multiply inch-pound units	By	To obtain SI units
	Length	
inches (in)	2.54×10^{1}	millimeters (mm)
	2.54×10^{-2}	meters (m)
feet (ft)	3.048×10^{-1}	meters (m)
miles (mi)	1.609×10^{0}	kilometers (km)
	Area	
acres	4.047×10^{3}	square meters (m^2)
	4.047×10^{-1}	square hectometers (hm^2)
	4.047×10^{-3}	square kilometers (km^2)
square miles (mi^2)	2.590×10^{0}	square kilometers (km^2)
	Volume	
gallons (gal)	3.785×10^{0}	liters (L)
	3.785×10^{0}	cubic decimeters (dm^3)
	3.785×10^{-3}	cubic meters (m^3)
million gallons	3.785×10^{3}	cubic meters (m^3)
	3.785×10^{-3}	cubic hectometers (hm^3)
cubic feet (ft^3)	2.832×10^{1}	cubic decimeters (dm^3)
	2.832×10^{-2}	cubic meters (m^3)
cfs-days	2.447×10^{3}	cubic meters (m^3)
	2.447×10^{-3}	cubic hectometers (hm^3)
acre-feet (acre-ft)	1.233×10^{3}	cubic meters (m^3)
	1.233×10^{-3}	cubic hectometers (hm^3)
	1.233×10^{-6}	cubic kilometers (km^3)
	Flow	
cubic feet per second (ft^3/s)	2.832×10^{1}	liters per second (L/s)
	2.832×10^{1}	cubic decimeters per second (dm^3/s)
	2.832×10^{-2}	cubic meters per second (m^3/s)
gallons per minute (gal/min)	6.309×10^{-2}	liters per second (L/s)
	6.309×10^{-2}	cubic decimeters per second (dm^3/s)
	6.309×10^{-5}	cubic meters per second (m^3/s)
million gallons per day	4.381×10^{1}	cubic decimeters per second (dm^3/s)
	4.381×10^{-2}	cubic meters per second (m^3/s)
	Mass	
tons (short)	9.072×10^{-1}	megagrams (Mg) or metric tons

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