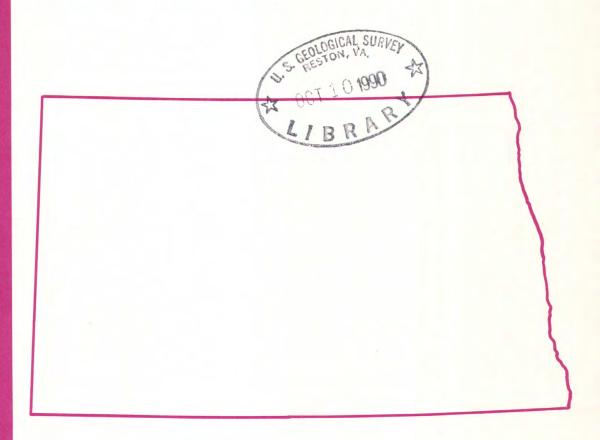


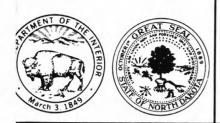
Water Resources Data North Dakota Water Year 1989



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

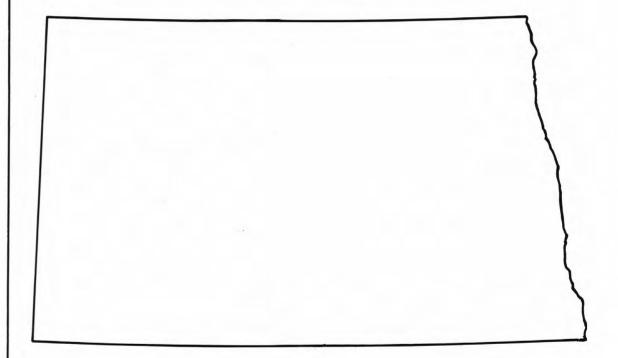
CALENDAR FOR WATER YEAR 1989

			3	-						1988	3							-		
							 		_	1000	_									_
		ОСТ	ОВЕ	R					NOV	ЕМЕ	BER					DEC	EMI	BER		
S	М	Т	W	Т	F	S	S	М	Т.	W	Т	F	S	S	М	T	W	Т	F	S
2	3	4	5	6	7	1 8	6	7	1 8	9	3	4	5	4	5	6	7	1 8	9	3
9	10 17	11 18	12 19	13	14 21	15 22	13	14 21	15 22	16 23	17 24	18 25	19 26	11	12 19	13 20	14 21	15 22	16 23	17 24
23	24	25	26	27	28	29	27	28	29	30	24	20	20	25	26	27	28	29	30	31
30	31																			
										198	9			 						
		JA	ANU	ARY					FE	BRU	ARY					M	ARC	Н		
S	M	Т	W	T	F	S	S	M	T	W	T	F	S	S	M	Т	W	T	F	S
1	9	3	4	5	6	7	5	6	7	1 8	9	3	4	5	6	7	1	9	3	4
15 22	16 23	17 24	18 25	19 26	20 27	21 28	12	13	14 21	15 22	16 23	17 24	18 25	12	13	14 21	15 22	16 23	17 24	18 25
29	30	31					26	27	28					26	27	28	29	30	31	
			4.00								,							1 12		
S	М	T	APRI W	Т	F	S	S	М	Т	MAY	Т	F	S	S	М	T	JUNE	T	F	S
						1		1	2	3	4	5	6					1	2	3
9	3	4	5	6	7	8 15	7 14	8 15	9	10	11	12	13 20	4	5	6	7	8 15	9	10 17
16 23	17 24	18 25	19 26	20 27	21 28	22	21 28	22 29	23 30	24 31	25	26	27	18 25	19 26	20 27	21	22	23	24
30																				
0			JUL'		_	0	0			JGU:		-	0	0		SEP				0
S	М	Т	W	Т	F	S 1	S	M	T 1	W 2	T 3	F 4	5	S	М	Т	W	Т	F 1	S 2
9	3	4	5	6	7	8	6	7	8	9	10 17	11 18	12 19	3	4	5	6	7	8	9
16 23	17 24	18 25	19	20 27	21 28	22	20	21 28	22	23	24	25	26	17 24	18 25	19 26	20 27	21 28	22 29	23
30	31	20	20	21	20	29	21	20	29	30	31			24	25	20	21	20	29	30



Water Resources Data North Dakota Water Year 1989

by R.E. Harkness, N.D. Haffield and W.R. Berkas



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

DEPARTMENT OF THE INTERIOR

MANUEL LUJAN, JR., SECRETARY

U.S. GEOLOGICAL SURVEY

Dallas L. Peck, Director

For information on the water program in North Dakota write to
District Chief, Water Resources Division
U.S. Geological Survey
821 East Interstate Avenue
Bismarck, North Dakota 58501-1199

PREFACE

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

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

Bismarck District Office

L.	L.	Albright	J.	D.	Heidt	В.	A.	Sether
L.	A.	Cottengaim	C.	S.	Helgesen	М.	J.	Voigt
В.	T.	Dowhanik	М.	C.	Pokladnik	J.	E.	Wagner
٧.	M.	Dressler	S.	W.	Norbeck	G.	В.	Wald
T.	A.	Gleich	K.	M.	Rowland			

Grand Forks Field Headquarters

Dickinson Field Headquarters

K.	L.	Boespflug	G.	L.	Ryan	D.	L.	Ellenbecker
G.	J.	Burkhart	J.	T.	Stenslie	G.	J.	Klug
G.	S.	Heyne	S.	F.	Swanson	R.	W.	Riehl
S.	I.	Nordby	W.	R.	Westensee			

This report was prepared in cooperation with the State of North Dakota and with other agencies under the general supervision of William F. Horak, District Chief, North Dakota.

50272 -101

REPORT DOCUMENTATION L REPORT NO. USGS/WRD/HD-90-270	3. Recipient's Accession No.
Water Resources Data, North Dakota, Water Year 1989	S. Report Date Published May 1990 6.
R. E. Harkness, N. D. Haffield and W. R. Berkas	8. Performing Organization Rept. No. USGS-WDR-ND-89-1
U.S. Geological Survey, Water Resources Division 821 East Interstate Avenue Bismarck, North Dakota 58501-1199	10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G)
12. Scentering Organization Name and Address U.S. Geological Survey, Water Resources Division 821 East Interstate Avenue Bismarck, North Dakota 58501-1199	13. Type of Report & Period Covered Annual - Oct. 1, 1988, to Sept. 30, 1989

15. Supplementary Notes

Prepared in cooperation with the State of North Dakota and with other agencies.

16. Abstract (Limit: 200 words)

Water-resources data for the 1989 water year for North Dakota consist of records of discharge, stage, and water quality for streams; contents, stage, and water quality for lakes and reservoirs; and water levels and water quality for ground-water wells. This report contains records of water discharge for 108 streamflow-gaging stations; stage only for 22 river-stage stations; contents and/or stage for 13 lake or reservoir stations; annual maximum discharge for 8 crest-stage stations; water levels for 30 ground-water wells; and water quality for 97 streamflow-gaging stations, 4 river-stage stations, 10 lake or reservoir stations, 5 crest-stage stations, and 29 ground-water wells. Also included are discharge measurement data for 131 miscellaneous sites and water-quality data for 2 precipitation-chemistry stations. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in North Dakota.

17. Document Analysis. a. Descriptors

*North Dakota, *Hydrologic data, *Surface water, *Ground water, *Water quality, Flow rate, Gaging stations, Lakes, Reservoirs, Chemical ananlyses, Sediments, Water temperatures, Sampling sites, Water levels, Water analyses, Floods, Drought.

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement No restriction on distribution. This report may be purchased from: National	19. Security Class (This Report) Unclassified	21. No. of Pages 396
Technical Information Service, Springfield, VA 22161	20. Security Class (This Page) Unclassified	22. Price

CONTENTS

	Page
Preface	iii
List of gaging stations, in downstream order, for which records are published	vii
List of ground-water wells, by county, for which records are published	1 1
Cooperation	1
Summary of hydrologic conditions	5
Climate	5
Streamflow	8
Chemical quality of streamflow	11
Ground-water levels	13
Special networks and programs	15
Explanation of the records	15
Station identification numbers	15
Downstream order system	15
Latitude-longitude system	15
Local well numbers	16
Records of stage and water discharge	16
Data collection and computation	16
Data presentation	18
Identifying estimated daily discharge	19
Accuracy of the records	19
Other records available	19
Records of surface-water quality	20
Classification of records	20
Arrangement of records	20
On-site measurements and sample collection	20
Water temperature	26
Sediment	26
Laboratory measurements	26
Data presentation	26
Remark codes	27
Records of ground-water levels	27
Data collection and computation	27
Data presentation	28 28
Availability of data	29
Records of ground-water quality	34
Data presentation	34
Access to WATSTORE data	34
Definition of terms	34
Publications on techniques of water-resources investigations	39
Station records, surface water.	42
Discharge measurements at partial record and miscellaneous sites	354
Crest-stage partial-record stations	354
Miscellaneous discharge measurement sites	356
Analysis of samples collected at water-quality partial-record and	
miscellaneous sites	360
Station records, ground water	362
Ground-water levels	362
Quality of ground water	372
Chemical quality of precipitation	377
Index	383

ILLUSTRATIONS

			Page
Figure	1.	Map showing location of active surface-water gaging stations	2
64.0	2.	Map showing location of active surface-water-quality stations	3
	3.	Map showing location of selected ground-water observation wells	4
	4.	Comparison, by climatological division, of total monthly precipitation,	
	5.	water year 1989, to normal monthly precipitation, 1951-80	6
	6.	monthly discharge for the period of record	9
	7.	level for the period of record	14
	8.	Stark CountySystem for numbering wells and miscellaneous sites (latitude and	14
	_	longitude)	17
	9.	System for numbering wells and miscellaneous sites (township and range) Example of computer printout of annual peak discharges for the period	17
	11.	of record on the Knife River at Hazen Example of computer printout for annual peak flow frequency analysis	21
	12.	for the Knife River at Hazen Example of computer printout for peak flow frequency curve for the	22
	13.	Knife River at Hazen Example of computer printout for statistics computed for monthly mean discharges for the period of record for the Knife River at	23
		Hazen	24
	14.	Example of computer printout for quartile percentages of monthly mean discharges for the period of record for the Knife River at Hazen	24
	15.	Example of "primary computation" computer printout for the Knife River at Hazen	25
	16b.	Burleigh County, 1962-75	30
	17.	Burleigh County, 1976-89	31
	18.	Delta aquifer, Richland County, water year 1989	32
		Benson County, and monthly maximum water levels for Devils Lake, 1970-89	33
		TABLES	
Table	1a.	Palmer drought severity index on selected dates for water year 1988 for the nine National Weather Service climatological divisions in	
	1b.	North Dakota Palmer drought severity index on selected dates for water year 1989 for the nine National Weather Service climatological divisions in	7
	2.	North Dakota	7
	3.	for period of record at selected streamflow-gaging stations	10
	4.	water year 1989	12
			00

[Letter after station name designates type of data: (d) discharge, (e) elevation, gage height, or contents, (c) chemical, (b) biological, (m) microbiological, (t) water temperature, (s) sediment, (r) radiochemical, (p) pesticides]

DSON BAY BASIN	Page
Lake Winnipeg (head of Nelson River)	
RED RIVER OF THE NORTH BASIN	12
Red River of the North at Wahpeton (dc)	42
Wild Rice River near Rutland (dc)	46
Wild Rice River near Abercrombie (dc)	48
Red River of the North at Fargo (dc)	50
Sheyenne River above Harvey (dc)	52
Sheyenne River near Warwick (dc)	54
Devils Lake:	
Mauvais Coulee (head of Big Coulee)	56
Mauvais Coulee Tributary #3 near Cando (dc)	58
Edmore Coulee near Edmore (dc)	60
Edmore Coulee Tributary near Webster (dc)	62
Morrison Lake near Webster (e)	64
Starkweather Coulee near Webster (dc)	65
Dry Lake near Penn (e)	67
Little Coulee near Brinsmade (d)	68
Big Coulee near Churchs Ferry (dc)	69 71
Devils Lake near Devils Lake (e)	74
Sheyenne River near Cooperstown (dc)	75
Lake Ashtabula:	
Baldhill Creek near Dazey (dc)	77
Lake Ashtabula at Baldhill Dam (e)	79
Sheyenne River below Baldhill Dam (dc)	80
Sheyenne River at Valley City (ec)	82 84
Sheyenne River at Lisbon (dc)	86
Sheyenne River near Horace (ec)	89
Sheyenne River at West Fargo (dc)	91
Maple River near Hope (dc)	93
Maple River near Enderlin (dc)	95
Rush River at Amenia (dc)	97
Red River of the North at Halstad, MN (dcmsr)	99
Goose River: Beaver Creek near Finley (dcms)	102
Goose River at Hillsboro (dc)	104
Red River of the North at Grand Forks (dc)	106
Forest River:	
Middle Branch Forest River near Whitman (d)	108
Forest River near Fordville (dc)	109
Forest River at Minto (dc)	111
South Branch Park River (head of Park River): Homme Reservoir near Park River (e)	113
South Branch Park River below Homme Dam (dc)	114
Park River at Grafton (dc)	116
Red River of the North at Drayton (dc)	118
Pembina River:	
Hidden Island Coulee near Hansboro (dc)	120
Cypress Creek above International Boundary near Sarles (dc)	122
Snowflake Creek near Snowflake, Manitoba (d)	
Pembina River near Windygates, Manitoba (d)	126
Pembina River at Walhalla (dc)	127
Pembina River at Neche (dc)	129
Tongue River at Akra (dc)	131
Red River of the North at Emerson, Manitoba (dcmst)	133
Assiniboine River:	
Souris (Mouse) River: Long Creek at Western Crossing of International Boundary, Saskatchewan (d)	137
Long Creek at Western Crossing of International Boundary, Saskatchewan (d)	138
East Branch Short Creek Reservoir near Columbus (e)	140
Short Creek below International Boundary, near Roche Percee, Saskatchewan (d)	141
Souris (Mouse) River near Sherwood (dct)	142
Lake Darling near Grano (c)	148
Lake Darling near Foxholm (e)	150
Souris (Mouse) River near Foxholm (dc)	
Des Lacs River near Kenmare (dc)	154 156
Des Lacs River at Foxholm (dc)	1)0

HUDSON BAY BASINContinued	
Souris (Mouse) River above Minot (dc)	159
Souris (Mouse) River near Verendrye (dc)	161
Wintering River near Karlsruhe (dc)	164
Souris (Mouse) River near Bantry (dcs)	167
Willow Creek near Willow City (dcs)	170
Stone Creek near Kramer (dcs)	173
Deep River near Upham (dc)	176
Cut Bank Creek at Upham (dc)	178
Deep River below Cut Bank Creek near Upham (cs)	180
Boundary Creek near Landa (dcs)	182
Souris (Mouse) River near Westhope (dcmsr)	185
MISSOURI RIVER BASIN	
Missouri River near Culbertson, MT (d)	189
Missouri River Stage Gage No. 4 near Nohly, MT (e)	190
Missouri River Stage Gage No. 5 at Nohly, MT (e)	191
Yellowstone River near Sidney, MT (d)	192
Yellowstone River Stage Gage No. 1 near Fairview, MT (e)	193
Yellowstone River Stage Gage No. 2 near Cartwright (e)	194
Yellowstone River Stage Gage No. 3 near Buford (e)	195
Missouri River Stage Gage No. 5A at Buford (e)	196
Missouri River Stage Gage No. 6 near Buford (e)	197
Missouri River Stage Gage No. 7 near Trenton (e)	198
Missouri River near Williston (e)	199
Missouri River Stage Gage No. 9 at Williston (e)	200
LITTLE MUDDY RIVER BASIN	
Little Muddy River below Cow Creek near Williston (dc)	201
BEAR DEN CREEK BASIN	
Bear Den Creek near Mandaree (dcmsr)	203
LITTLE MISSOURI RIVER BASIN	
Little Missouri River at Marmarth (dc)	206
Beaver Creek near Trotters (dc)	208
Little Missouri River near Watford City (dcms)	210
Lake Sakakawea near Riverdale (e)	213
Missouri River at Garrison Dam (dcmt)	218
KNIFE RIVER BASIN	210
Knife River at Manning (dc)	219
Knife River near Golden Valley (dc)	221
Brush Creek near Beulah (dcs)	223
Spring Creek at Zap (dc)	225
Knife River at Hazen (dcms)	227
Missouri River near Stanton (e)	230
Missouri River near Hensler (e)	231
COAL LAKE COULEE BASIN	
Coal Lake Coulee near Hensler (d)	232
Missouri River at Washburn (e)	233
TURTLE CREEK BASIN	
Turtle Creek above Washburn (dc)	234
Painted Woods Creek Basin Painted Woods Creek near Wilton (dc)	236
Missouri Diver of Drice (a)	238
Missouri River at Price (e)	250
Square Butte Creek below Center (dc)	239
BURNT CREEK BASIN	
Burnt Creek near Bismarck (dc)	241
Missouri River at Bismarck (d)	243
HEART RIVER BASIN	
E. A. Patterson Lake near Dickinson (ec)	245
Heart River at Dickinson (dc)	248
Green River near New Hradec (dc)	250
Heart River near Richardton (dc)	252
Heart River above Lake Tschida near Glen Ullin (dc)	254
Lake Tschida near Glen Ullin (ec)	257
Heart River near Lark (dc)	260
Heart River at Stark Bridge near Judson (dc)	262 264
Missouri River below Mandan (e)	267
APPLE CREEK BASIN	201
Long Lake Pool 3 near Moffit (c)	268
Long Lake Creek above Long Lake (dc)	269
Long Lake Pool 2 near Moffit (c)	271
Long Lake Pool 1 near Moffit (c)	272
Long Lake Creek below Long Lake (dc)	273
Apple Creek near Menoken (dc)	275
Missouri River near Schmidt (e)	277
CANNONBALL RIVER BASIN	
Cannonball River at Regent (dc)	278

SURFACE-WATER STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED	ix
MISSOURI RIVER BASINContinued Cedar Creek:	
White Butte Fork Cedar Creek near Scranton (dc)	280
Cedar Creek near Haynes (dc)	282
Cedar Creek near Raleigh (dc)	284
Cannonball River at Breien (dcms)BEAVER CREEK BASIN	286
Beaver Creek at Linton (dc)	289
GRAND RIVER BASIN Bowman-Haley Lake near Haley (e)	291
North Fork Grand River at Haley (dc)	292
Lake Oahe near Pierre, SD (e)	294
JAMES RIVER BASIN James River near Manfred (dbcs)	205
James River near Grace City (dbcs)	295 297
Juanita Lake Tributary near Grace City (dbcs)	300
James River above Arrowwood Lake near Kensal (dbcsp)	302
Kelly Creek below Niccum Reservoir near Bordulac (dbcs)	306
Arrowwood Lake open-water site (cbt)	309 311
Jim Lake near Pingree (cbt)	313
Jamestown Reservoir near Jamestown (ec)	315
Pipestem Creek near Pingree (dc)	318
James River at Jamestown (dbcs)	320 323
Bear Creek near Oakes (dc)	330
James River at Oakes (ebcts)	332
James River at Dakota Lake Dam near Ludden (dbctsp)	338
James River at ND-SD State Line (e)	349 350
Elm River:	2.5/1
Maple River at ND-SD State line (d)	353
GROUND-WATER WELLS, BY COUNTY, FOR WHICH RECORDS ARE PUBLISHED	
GROUND-WATER LEVELS	Page
	Lage
BENSON COUNTY	760
Well 480228098482501, Local number 153-063-30CBC	362 362
Well 481041099442701, Local number 154-071-11AAD1	362
BOWMAN COUNTY	767
Well 461534103491701, Local number 132-105-16BDB	363
Well 464943100305801, Local number 139-078-27CBB	363
Well 485649103155701, Local number 163-097-15BCC	363
DUNN COUNTY Well 471323102290101, Local number 143-093-09BCB	76.4
EDDY COUNTY	364
Well 473720098592401, Local number 148-065-19DAA	364
Well 463632100171901, Local number 136-076-07CBC	364
GRAND FORKS COUNTY Well 474957097343501, Local number 150-054-04CCD	365
GRIGGS COUNTY	707
Well 471612098113101, Local number 144-059-20CCC	365
Well 473425098232901, Local number 147-061-01CCC	365
Well 473600098065901, Local number 148-059-36AAB	366
Well 463153102521001, Local number 135-097-04DCA	366
KIDDER COUNTY	
Well 470638099324301, Local number 142-070-16DDD	366
Well 473752101055301, Local number 148-082-23BBB	367
Well 470642101162701, Local number 142-084-24BBA	367
PEMBINA COUNTY Well 485239097501702, Local number 162-056-01CCC2	
PIERCE COUNTY	367
WALL 47/5707400000404 [AAA]	367
Well 475323100092101, Local number 151-074-20AAA	367 368
RICHLAND COUNTY Well 462633097163402, Local number 134-052-06CCD2	
RICHLAND COUNTY Well 462633097163402, Local number 134-052-06CCD2STARK COUNTY	368
RICHLAND COUNTY Well 462633097163402, Local number 134-052-06CCD2. STARK COUNTY Well 465755102410701, Local number 140-095-08AAA	368 368 368
RICHLAND COUNTY Well 462633097163402, Local number 134-052-06CCD2	368 368

		GROUND-WATER LEVELS	Page
TRAILL COUNTY			
	Local numb	er 147-051-22BBB	369
WALSH COUNTY	20001 Hamb	141-031-22000	505
Well 481657097473601	Local number	er 156-056-36CCC1	370
Well 482408097443201	Local number	er 157-055-21DBC	370
Well 482449098095801	Local number	er 157-058-18DDD	370
WARD COUNTY			
	Local number	er 154-082-24ABA	371
WELLS COUNTY			
Well 474419099371201	Local number	er 149-070-09DAA1	371
WILLIAMS COUNTY			
Well 483048103373101	Local number	er 158-100-17ADA	371
		QUALITY OF GROUND WATER	
BOWMAN COUNTY			
	Local number	er 130-099-01BBB	372-376
Well 460645103021801.	Local number		372-376
Well 460705103025601	Local number		372-376
Well 460645103033302,	Local number	er 130-099-04ADD2	372-376
Well 460705103041101.	Local number	er 130-099-04BAA	372-376
Well 461355103055701,	Local number	er 131-099-19DDD	372-376
Well 460902103043601,	Local number	er 131-099-21CCB1	372-376
			372-376
Well 460856103024401,	Local number	er 131-099-22DCC1	372-376
Well 460856103020701,	Local number	er 131-099-23CCC1	372-376
Well 460856103020702,	Local number	er 131-099-23CCC2	372-376
Well 460804103010101,	Local number	er 131-099-26DDC1	372-376
Well 460843103032001,	Local number		372-376
Well 460843103032003,	Local number		372-376
Well 460825105050501,	Local number		372-376
Well 460816103032701,	Local number		372-376
Well 460816103032702,	Local number		372-376
			372-376
Well 460849103053201,	Local number		372-376
Well 460034103053501,	Local number		372-376
Well 460025105055201,	Local number		372 - 376
Well 460804103052301,	Local number		372 - 376
Well 460751103044501	Local number		372-376 372-376
Wall 460751105044501,	Local number		
Well 4607181030433002	Local number		372-376 372-376
Well 460747103032902,	Local number	r 131-099-33ADA3	372 - 376
Well 460747103021601	Local number		372 - 376
Well 460744103014801	Local number		372 - 376
400/44/0/0/400/	LOCAL HUMBE		112-110
PRECI	PITATION SIT	TES, FOR WHICH CHEMICAL QUALITY DATA ARE PUBLISHED	
PEMBINA COUNTY			
	Icelandic S	State Park	377
STUTSMAN COUNTY			
Site 470732099140204	Woodworth		380

INTRODUCTION

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

This report series includes records of discharge, stage, and water quality for streams; contents, stage, and water quality for lakes and reservoirs; and water levels and water quality for ground-water wells. This volume contains records of water discharge for 108 streamflow-gaging stations; stage only for 22 river-stage stations; contents and/or stage for 13 lake or reservoir stations; annual maximum discharge for 8 crest-stage stations; water levels for 30 ground-water wells; and water quality for 97 streamflow-gaging stations, 4 river-stage stations, 10 lake or reservoir stations, 5 crest-stage stations, and 29 ground-water wells. Locations of these stations and wells are shown in figures 1, 2, and 3. Also included are discharge measurement data for miscellaneous sites (15 discharge measurements made by U.S. Geological Survey personnel for 13 miscellaneous sites and 116 discharge measurements made by North Dakota State Water Commission personnel for 21 miscellaneous sites). Data are included for 2 precipitation-chemistry stations. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in North Dakota.

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

Prior to introduction of this series and for several water years concurrent with it, water-resources data for North Dakota were published in U.S. Geological Survey Water-Supply Papers. Data on stream discharge and stage and on lake or reservoir contents and stage, through September 1960, were published annually under the title "Surface-Water Supply of the United States, Parts 5 and 6." For the 1961 through 1970 water years, the data were published in two 5-year reports. Data on chemical quality, temperature, and suspended sediment for the 1941 through 1970 water years were published annually under the title "Quality of Surface Waters of the United States," and ground-water levels for the 1935 through 1974 water years were published under the title "Ground-Water Levels in the United States." The above mentioned Water-Supply Papers may be consulted in the libraries of the principal cities of the United States and may be purchased from U.S. Geological Survey, Books and Open-File Reports, Federal Center, Building 810, Box 25425, Denver, CO 80225.

Publications similar to this report are published annually by the U.S. Geological Survey for all States. These official Survey reports have an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and the volume number. For example this volume is identified as "U.S. Geological Survey Water-Data Report ND-89-1." For archiving and general distribution, the reports for 1971-74 water years also are identified as water-data reports. These water-data reports are for sale in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.

Additional information, including current prices, for ordering specific reports may be obtained from the District Chief at the address given on the back of the title page or by telephoning (701) 250-4604.

COOPERATION

The U.S. Geological Survey and agencies of the State of North Dakota have had cooperative agreements for the collection of streamflow records since 1903, ground-water levels since 1937, and water-quality records since 1946. Organizations that assisted in collecting the data in this report through cooperative agreement with the Survey are:

North Dakota State Water Commission, Vernon Fahy, succeeded by David A. Sprynczynatyk, Chief Engineer; North Dakota Public Service Commission, Dale V. Sandstrom, President; Lower Heart River Water Resources District, W.S. Russell, Chairman; Oliver County Board of Commissioners, Donald Albers, Chairman; City of Minot, George M. Christensen, Mayor; City of Dickinson, R.B. Baird, Mayor.

Assistance with funds or services was given by the U.S. Army Corps of Engineers for 26 streamflow-gaging stations, 19 river-stage stations, 4 reservoir stations, 3 crest-stage stations, 55 ground-water wells, and water quality for 8 streamflow-gaging stations; the U.S. Bureau of Reclamation for 5 streamflow-gaging stations, 1 river-stage station, 2 reservoir stations, and water quality for 11 streamflow-gaging stations and for 5 lake or reservoir stations; the U.S. Fish and Wildlife Service for 7 streamflow-gaging stations, and water quality for 2 streamflow-gaging stations; the International Joint Commission of the U.S. State Department for 11 streamflow-gaging stations and 1 reservoir station; the U.S. Soil Conservation Service for 1 streamflow-gaging station and 1 crest-stage station; and other U.S. Department of the Interior agencies concerned with the Missouri River basin for 6 streamflow-gaging stations, 3 river-stage stations, 3 reservoir stations, and water quality for 8 streamflow-gaging, river-stage, or reservoir stations.

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

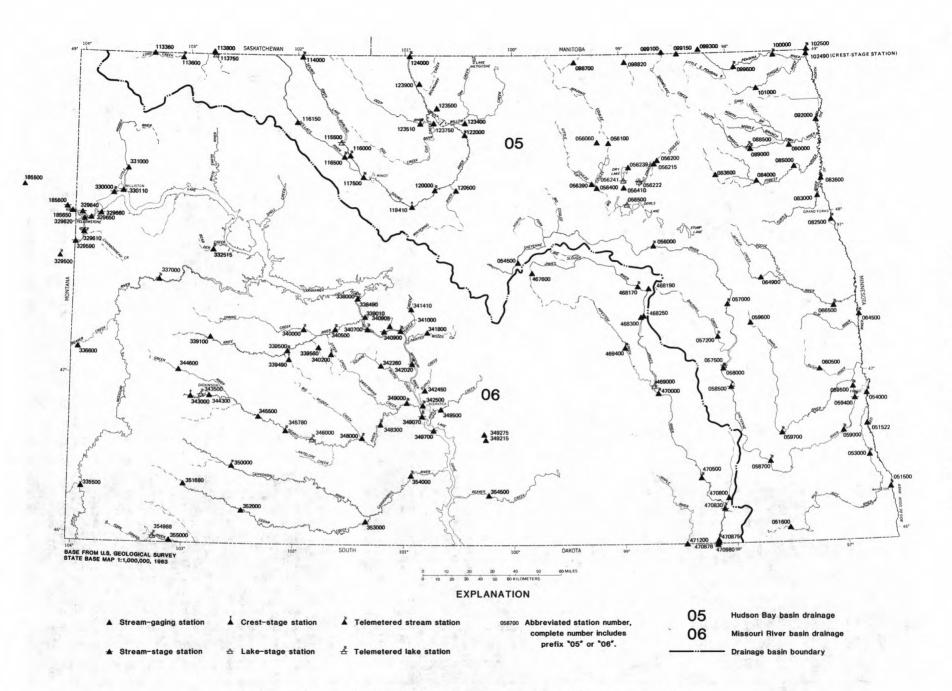


Figure 1.--Location of active surface-water gaging stations.

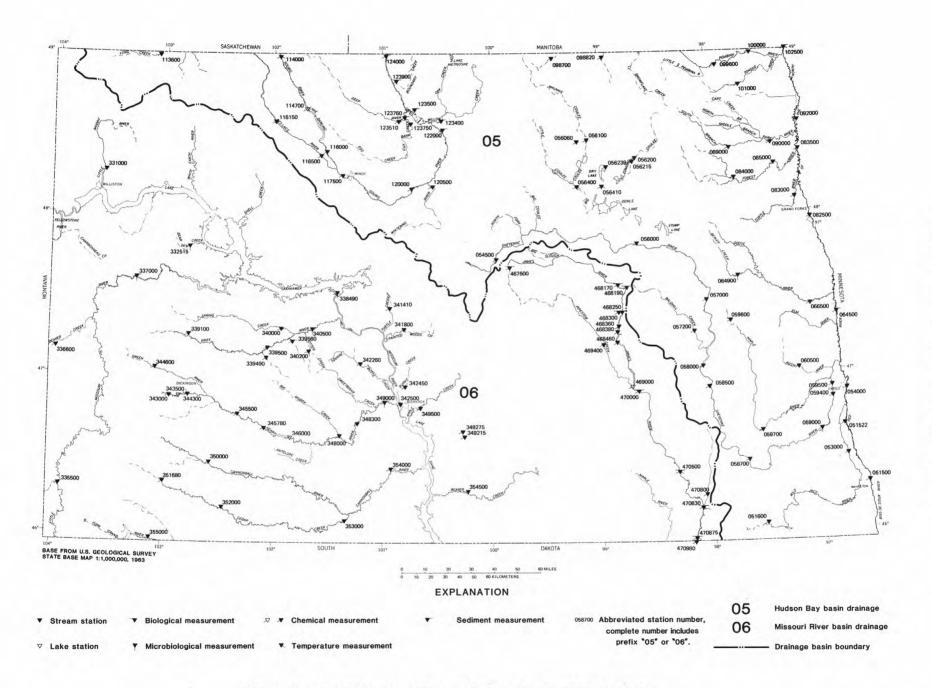


Figure 2.--Location of active surface-water-quality stations.



O 137-062-26DDD Well for which water-level measurements

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

SUMMARY OF HYDROLOGIC CONDITIONS

Climate

In North Dakota, normal annual precipitation ranges from about 15 inches in the western part of the State to about 20 inches in the eastern part of the State. Three-fourths of this precipitation for the entire State occurs during June. Normal, as related to meteorological data in this report, is an average value of meteorological data for the reference period 1951 through 1980. Meteorological data were obtained from publications of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, 1988, 1989, Climatological data, North Dakota: Asheville, North Carolina, v. 97, no. 10-12, v. 98, no. 1-9).

Precipitation during water year 1989 ranged from about 4 inches less than normal in the north-western part of the State, to about 0.5 inch less than normal in the southeastern part of the State.

A comparison of total monthly precipitation for water year 1989 to normal monthly precipitation for 1951-80 for the nine National Weather Service climatological divisions in North Dakota is shown in figure 4. The data displayed in figure 4 are simple averages of the total monthly precipitation for reporting stations within each climatological division; no attempt was made to area-weight the division totals.

Precipitation during the usually dry fall and winter months of October through February generally was near normal statewide for the period as a whole, but varied considerably from month to month. Precipitation during October, which was very dry, was about 25 percent of normal. Precipitation during November was near to or slightly greater than normal in all nine divisions, except the southwest division, which had about 50 percent of normal precipitation, and the north-central division, which had about 200 percent of normal precipitation. Precipitation during December and January was greater than normal statewide. Some areas in the northern and eastern parts of the State had as much as 300 percent of normal precipitation during January. Precipitation during February was about 50 percent of normal statewide.

Normal monthly precipitation during March is greater than that for the winter months of December through February. During March of 1989, the eastern part of the State received greater than normal precipitation. Several reporting stations in the southeast division received 2 to 3 inches of precipitation, mostly in the form of snow. The southwest corner of the State had greater than normal precipitation in April, but the remainder of the State had only 30 to 60 percent of normal precipitation. May precipitation was near to or less than normal statewide. During June, which has the greatest normal monthly precipitation statewide, precipitation averaged only about 50 percent of normal except in the north-central division where it was near normal. The precipitation deficiency continued during July, August, and September, except when August thunderstorms produced adequate rainfall to bring monthly totals to 50 percent greater than normal in the southeast quarter of the State.

Average monthly temperatures across the State during water year 1989 were near normal, within about 3 °C (about 5 °F), except during January and February. January temperatures were about 4 °C (about 7 °F) greater than normal and February temperatures were about 6 °C (about 10 °F) less than normal.

During 1989, temperatures for March and April, the months when spring breakup generally occurs, were characterized by above freezing daytime temperatures and below freezing nighttime temperatures. March temperatures averaged about 6 °C (about 10 °F) below freezing statewide. During the last week of March and the first week of April, several nighttime temperatures did not get below freezing, particularly in the southern fringe of the State. Spring breakup in southeastern North Dakota, the only area to experience significant flooding during the snowmelt period, occurred at this time. During the second week in April, nighttime temperatures again were below freezing. April temperatures averaged about 6 °C (about 10 °F) above freezing and were as high as about 27 °C (about 80 °F) at almost all reporting stations near monthend. Record high temperatures, as high as 34 °C (94 °F) on April 23, were recorded at several reporting stations in southwestern North Dakota.

The Palmer Drought Severity Index on selected dates for the nine National Weather Service divisions in North Dakota is shown in tables 1a and 1b (M. T. Roletto, National Weather Service, written commun., 1989 and 1990). "The Palmer Drought Index is widely used as a measure of the severity of drought. Positive values indicate a moisture excess, values near zero indicate normal conditions, and values less than zero indicate drier than normal. An index of less than -3 is termed a severe drought, and an index of less than -4 is the worst condition, termed extreme drought." (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, U.S. drought 1988 --A climate assessment: NOAA Climate Office, Rockville, MD, 1988, p. 2). Table 1a shows the values for the 1988 water year and table 1b shows the values for the 1989 water year. A comparison of values at the beginning of the 1988 water year (see table 1a, 10/3/87) with those at the beginning of the 1989 water year (see table 1a, 10/1/88) shows that drought conditions were much more severe at the beginning of the 1989 water year. However, in the 1988 water year the drought condition intensified more rapidly than during the 1989 water year and the lowest Palmer Drought Severity Indexes recorded statewide (see table 1a, 9/10/88) during the 1988 water year indicated much more severe conditions than for the worst condition (see table 1b, 8/5/89) during the 1989 water year. Comparison of index values for 10/1/88 with those for 9/30/89 (see table 1b) indicate only a minor improvement of drought conditions statewide. The drought had not been broken by the end of the 1989 water year.

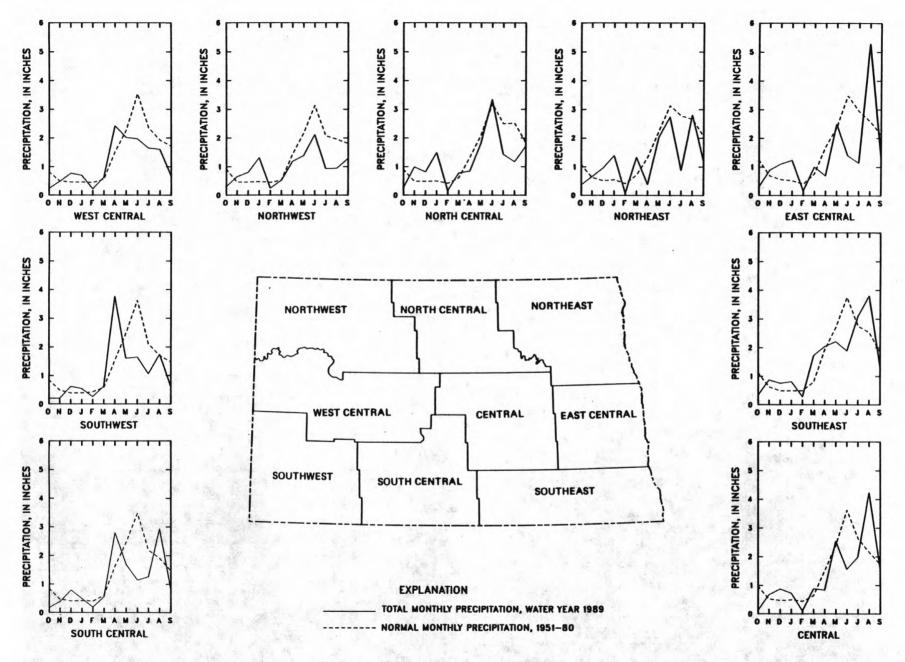


Figure 4.--Comparison, by climatological division, of total monthly precipitation, water year 1989, to normal monthly precipitation, 1951-80.

Table 1a.--Palmer Drought Severity Index on selected dates for water year 1988 for the nine National Weather Service climatological divisions in North Dakota (M. T. Roletto, National Weather Service, written commun., 1989)

[Below -4.0, extreme drought; -3.9 to -3.0, severe drought; -2.9 to -2.0, moderate drought; -1.9 to -1.0, mild drought; -0.9 to -0.5, incipient drought, -0.4 to +0.4, near normal; +0.5 to +0.9, incipient moist spell; +1.0 to +1.9, moist spell; +2.0 to +2.9, unusual moist spell; +3.0 to +3.9, very moist spell; +4.0 and above, extreme moist spell]

		Palmer Drough	t Severity In	idex by date of	f computation	
National Weather Service climatological division	10/3/87	1/1/88	4/2/88	5/14/88	7/2/88	9/10/88
Northwest North central	+1.5 +2.4	-2.7 -1.6	-2.5 -1.1	-3.0 -1.8	-5.6 -4.2	-7.0 -6.5
Northeast	+2.4	-1.2	+0.3	-2.0	-4.2	-5.4
West central Central	+1.3	-1.8 -1.4	-1.7 -1.5	-2.3 -2.2	-5.3 -4.5	-7.5 -6.0
East central	+3.5	+1.9	+1.7	-1.6	-4. 5 -3. 8	-5.2
Southwest	+2.4	-1.2	-1.1	+0.8	-4.1	-6.5
South central Southeast	+3.8 -2.3	-1.4 -2.4	-1.4 -2.8	-2.1 -4.1	-4.3 -6.3	-5.8 -7.2

Table 1b.--Palmer Drought Severity Index on selected dates for water year 1989 for the nine National Weather Service climatological division in North Dakota (M. T. Roletto, National Weather Service, written commun., 1990)

[Below -4.0, extreme drought; -3.9 to -3.0, severe drought; -2.9 to -2.0, moderate drought; -1.9 to -1.0, mild drought; -0.9 to -0.5, incipient drought, -0.4 to +0.4, near normal; +0.5 to +0.9, incipient moist spell; +1.0 to +1.9, moist spell; +2.0 to +2.9, unusual moist spell; +3.0 to +3.9, very moist spell; +4.0 and above, extreme moist spell]

	Palmer Drought Severity Index by date of computation									
National Weather Service climatological division	10/1/88	12/31/88	4/1/89	4/29/89	7/1/89	8/5/89	9/30/89			
Northwest	-5.9	-4.2	-3.0	+1.1	-3.3	-5.2	-5.5			
North central .	-5.3	-3.4	-3.0	-2.1	-2.2	-4.4	-4.3			
Northeast	-5.4	-4.5	-3.8	-3.0	-3.6	-5.6	-5.3			
West central	-6.8	-5.4	-4.5	-3.3	-4.7	-5.8	-5.8			
Central	-5.6	-4.4	-3.9	-3.7	-5.1	-6.2	-3.4			
East central	-3.9	-2.8	-1.8	+0.9	-3.2	-5.3	-2.4			
Southwest	-6.0	-4.5	-4.5	-2.9	-4.4	-4.9	-4.8			
South central	-5.4	-3.6	-3.3	-2.4	-4.2	-5.6	-2.9			
Southeast	-5.5	-3.6	-2.5	+1.2	-3.4	-4.2	-1.5			

Streamflow

The greatest mean monthly discharge of North Dakota rivers generally is coincident with snowmelt runoff. Because springtime temperatures usually are higher in the southwestern part of the State than in the northeastern part, snowmelt usually begins on the Missouri River tributaries in western North Dakota and progresses from west to east across the State. Hydrographs of mean monthly discharge (fig. 5) for the period of record verify this trend. For example, the greatest mean monthly discharge for Bear Den Creek near Mandaree, which is in the National Weather Service west-central division, occurs in March, whereas the greatest mean monthly discharge for the remaining streamflow-gaging stations occurs in April. Mean monthly discharge for March is almost as large as mean monthly discharge for April for Cedar Creek near Haynes and Beaver Creek at Linton, further substantiating the general trend of snowmelt progressing from west to east in North Dakota.

Although many inferences can be made about hydrologic conditions of the State by using precipitation data shown in figure 4 and streamflow data shown in figure 5, sound hydrologic judgment should be used. Variability of rainfall intensity and distribution should be considered when making conclusions about hydrologic response to rainfall, especially for small basins. Problems may occur because different reporting periods are used for the normal monthly precipitation data and the mean monthly discharge data in the two figures. Normal monthly precipitation is computed using a 30-year reference period from 1951 to 1980, but mean monthly discharges are computed using data for the period of record at each streamflow-gaging station--1967-89 (23 years), in the case of Bear Den Creek near Mandaree.

As a result of the drought of 1988, zero discharge was recorded at most of the streamflow-gaging stations shown in figure 5 for October 1988 through February 1989. Monthly mean discharges recorded at most of the streamflow-gaging stations were less than the period-of-record mean monthly discharges throughout the 1989 water year. Notable exceptions occurred during April for the Wild River near Abercrombie and the Rush River at Amenia and during August for Beaver Creek near Linton (see fig. 5).

Dean T. Braata (National Weather Service, written commun., March 10, 1989) noted that the snowpack upstream from Wahpeton, N.Dak., had a water equivalent of about 4 inches and that a near record snow cover existed in parts of the Red River of the North basin. The Wild Rice and Rush River basins lie within an area of near record snow cover. Snow-water equivalent in the Red River of the North basin was greater in the Minnesota part of the basin than in the North Dakota part.

In late March and early April, rain combined with warm temperatures rapidly melted the snow cover in the southeast corner of the State. The Wild Rice River near Abercrombie had the second highest peak discharge in the 57-year period of record (table 2) on April 7. The peak stage of the Red River of the North at Wahpeton exceeded the 1897 record stage of 17.0 feet. The downstream cities of Fargo and Grand Forks were preparing for record flooding; however, cooler temperatures prevailed after the initial snowmelt and the expected record flooding did not occur. No record peaks, either stage or discharge, were set in the downstream areas of the basin in North Dakota during the 1989 water year.

Flooding in the Red River of the North basin downstream from Fargo was further reduced due to lack of runoff from the Sheyenne River. The Sheyenne River enters the mainstream of the Red River a short distance downstream of Fargo and usually is a major contributing tributary. Runoff from the Sheyenne River basin upstream from Lake Ashtabula was less in water year 1989 than in water year 1988.

The Devils Lake basin is a 3,800 square-mile closed basin adjacent to the headwaters of the Sheyenne River. Less than normal runoff in the Devils Lake basin during water years 1988 and 1989 has been a major cause of declining water levels in Devils Lake. Since reaching a record high-water level (of this century) of 1,428.89 feet above sea level on August 2, 1987, the water level in Devils Lake had fallen almost 4 feet, to an elevation of 1,425.08 feet, by the end of the 1989 water year.

Flows for Beaver Creek at Linton were near normal in March, but declined rapidly until reaching "zero flow" in July. A late August thunderstorm produced more than 4 inches of rain in Linton. Localized flooding and some residential damage occurred. Peak discharge for Beaver Creek at Linton was $4,450~\rm ft^3/s$, which was the second highest peak attributable to rainfall rather than spring snowmelt for the 40-year period of record.

To further substantiate the extreme deficiency in streamflow caused by the 1988-89 drought, selected streamflow statistics for the nine streamflow-gaging stations shown in figure 5 are summarized in table 2. Mean and peak discharges for water years 1988 and 1989 for each streamflow-gaging station are ranked against similar data for each year during the period of record. The lowest annual mean discharge for each streamflow-gaging station and the lowest annual peak discharge for each streamflow-gaging station are given a rating of 1. A comparison of the rankings of means and peaks for water year 1988 with those for water year 1989 shows that the effect of the drought on streamflow, at least for these nine streamflow-gaging stations, was much more severe in 1988 than in 1989. Exceptions are the James River near Grace City where the mean and peak discharges for the 1989 water year were slightly less than those for the 1988 water year and the Park River at Grafton where the mean discharge for the 1989 water year was less than for the 1988 water year. Peak discharges for the Park River at Grafton for 1988 and 1989 were identical.

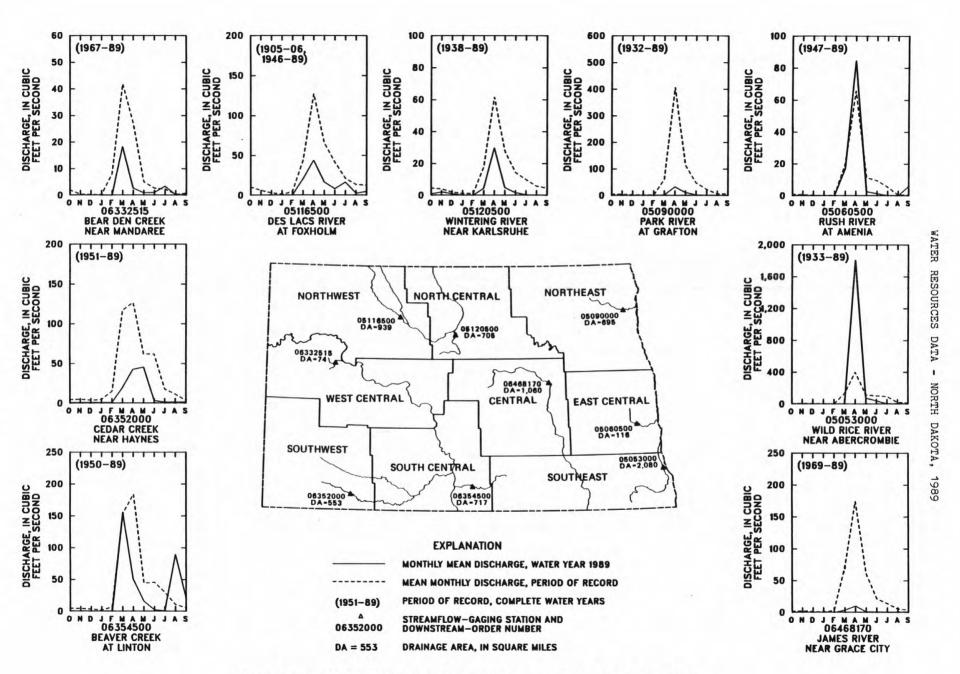


Figure 5.--Comparison of monthly mean discharge during water year 1989 to mean monthly discharge for the period of record.

Table 2.--Period-of-record mean annual and median annual discharges, water years 1988 and 1989 mean and peak discharges, and ranking of water years 1988 and 1989 data versus record low mean and low peak discharges for period of record at selected streamflow-gaging stations

[ft3/s, cubic feet per second]

	Per	Period of record			Water year 1988				Water year 1989			
Streamflow- gaging- station	Number of years	Mean annual dis- charge (ft ³ /s)	Median annual dis- charge (ft ³ /s)	Mean dis- charge (ft ³ /s)	Ranking of mean from lowest annual mean discharge for period of record	Peak dis- charge (ft ³ /s)	Ranking of peak from lowest annual peak discharge for period of record	Mean dis- charge (ft ³ /s)	Ranking of mean from lowest annual mean discharge for period of record	Peak dis- charge (ft ³ /s)	Ranking of peak from lowest annual peak discharge for period of record	
Beaver Creek at Linton	40	41.0	28	4.54	2	39	1	28.3	21	4,450	34	
Cedar Creek near Haynes	39	35.9	30	3.98	3	28	1	9.99	10	591	14	
Bear Den Creek near Mandaree	23	7.49	7.7	.27	1	12	2	2.25	8	375	9	
Des Lacs River at Foxholm	46	28.9	16	•93	2	4.2	1	9.34	15	240	12	
Wintering River near Karlsruhe	52	12.9	11	3.31	10	64	15	3.69	12	120	23	
Park River at Grafton	58	56.2	42	5.13	8	143	5	3.96	6	143	5	
Rush River at Amenia	43	9.47	6.6	1.13	4	30	3	9.16	26	602	32	
Wild Rice River near Abercrombie	57	73.9	36	3.99	3	105	6	158	49	7,150	56	
James River near Grace City	21	30.0	19	5.01	4	150	5	1.29	3	100	4	

Chemical Quality of Streamflow

The chemical quality of streamflow at any particular site is dependent upon many factors, including source of streamflow, composition of rocks over which water flows, location, and time of year; therefore, the quality of streamflow varies considerably across the State. The chemical quality also is dependent on the volume of streamflow. During periods of low flow, most of the flow is derived from ground-water inflow, which is mineralized, and the resulting streamflow has large dissolved-solids concentrations. During periods of high flow, most of the flow is derived from snowmelt or rainfall runoff, which is not mineralized, and the resulting streamflow has small dissolved-solids concentrations.

Five stations were selected from around the State to show the variability in stream water quality among the different river drainages. Specific conductance, an indicator of mineralization in water, is used to show the water-quality variability among these stations and among months at a given station. The mean, maximum, and minimum specific conductance for the period of record and the specific conductances measured during the 1989 water year for each station are shown in table 3.

Specific conductance also is used as an indicator of the suitability of water for irrigation and other uses. The U.S. Salinity Laboratory (U.S. Salinity Laboratory Staff, 1954, Diagnosis and improvement of saline and alkali soils: U.S. Department of Agriculture Handbook 60, 160 p.) has developed an index using specific conductance as an indicator of salinity hazard for irrigation water. The salinity hazard and corresponding specific conductance are as follow:

Salinity hazard	Specific conductance (microsiemens per centimeter at 25 °C)
Low	less than 250
Medium	250 - 750
High	750 - 2,250
Very high	2,250 - 5,000

The Red River of the North drains eastern North Dakota and western Minnesota. Water from the Red River of the North at Grand Forks was the least mineralized and had the smallest mean and smallest range in specific conductance of the five stations listed in table 3. This is partly due to more precipitation occurring in the Red River of the North basin than in other parts of North Dakota. In 1989, specific conductance for the Red River of the North at Grand Forks was smallest during snowmelt runoff in the spring and largest during low flows in the summer, fall, and winter. In March, before snowmelt runoff, the largest specific conductance for the March period of record was measured. The salinity hazard of stream water for irrigation use was high during the winter and medium during snowmelt runoff and during low flow in the summer and fall.

The Souris River drains south-central Canada. Water from the Souris River near Sherwood was much more mineralized than water from the Red River of the North. In 1989, specific conductance was smallest during snowmelt runoff in the spring and largest during low flows in the summer. The salinity hazard of stream water for irrigation use was medium during snowmelt runoff and high during low flow in the summer.

The Little Missouri River drains southwestern North Dakota and southeastern Montana. Of the five stations, water from the Little Missouri River near Watford City had the largest mean and largest maximum specific conductance measured during 1989. In 1989, specific conductance was smallest during snowmelt runoff in the spring and largest during low flow in the summer; a new record low specific conductance for the month of May was measured in 1989. The salinity hazard of stream water for irrigation use was high throughout the year.

The Cannonball River drains southwestern North Dakota. Water from the Cannonball River at Breien also was some of the most mineralized in the State. Water from this station had the greatest range in specific conductance among the five stations. In 1989, specific conductance was smallest during snowmelt runoff in the spring and largest during low flow in the summer, fall, and winter. A new record high specific conductance for October was measured in 1989. The salinity hazard of stream water for irrigation use was medium during snowmelt runoff and high the rest of the year. A very high salinity hazard occurred in February.

The James River drains central North Dakota. A number of reservoirs control the flow in the James River basin. These reservoirs are filled by snowmelt runoff, so releases from the reservoirs during the summer typically have specific conductances similar to those measured during periods of snowmelt runoff. Water from the James River is less mineralized than water in rivers draining the northern and western parts of the State, but James River water is more mineralized than the water in the Red River of the North. In 1989, specific conductance of water from the James River at LaMoure was smallest during snowmelt runoff in the spring and largest during low flows in the summer, fall, and winter. The largest specific conductance on record for this location was measured in January 1989. All of the specific conductances measured during months of low flow in 1989 were greater than the mean for that month. These greater specific conductances may be due to an increase of mineralization in the reservoirs caused by high evaporation and low inflows. The salinity hazard of stream water for irrigation use was medium during the snowmelt runoff period and high during the remainder of the year.

Table 3.--Statistical summary of specific-conductance measurements for the period of record and listing of specific-conductance measurements for water year 1989.

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

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	year	Period of record
05082500 Red	River	of th	ne Nort	h at	Grand :	Forks	(period	of re	ecord,	water	years	1949,	1956-8	39)
Mean Maximum Minimum Number of values	516 700 399 64	587 790 440 36	611 976 468 45	579 870 275 44	559 830 400 40	489 *910 305 72	458 747 200 150	558 702 325 85	546 699 348 71	497 640 280 70	504 625 360 52		639 *910 298 15	520 976 200 773
Measured values for water year 1989	665	-	900	760	765	*910	298 505	535 545 610 600	600	600	620	670	-	-
05114000	O Sou	iris Ri	iver ne	ar She	erwood	(peri	od of r	ecord	, water	r years	1970	, 1972-	89)	
		1,880	1,630 2,230 1,250 14	2,770	2,200	2,180	626 1,280 277 41	784 1,160 345 20	1,020 1,340 520 25	1,030 1,420 540 21		1,060 1,240 755 16		1,120 2,770 128 283
Measured values for water year 1989	-					288	410 710 990		1,100	1,080	-			_
06337000 L	ittle	Missou	ıri Riv	er nea	ar Wat:	ford C	ity (pe	riod (of rec	ord, wa	ater ye	ears 19	72 - 89)	
Mean Maximum Minimum Number of values	720	2,610	2,890 5,000 1,730 9	3,350	1,220 2,030 640 5	1,760	2,700	1,730 3,100 *780 16	2,780	3,000 1,080	2,520	1,750 2,390 900 12	1,930	1,740 5,000 400 172
Measured values for water year 1989							1,240	*780	1,930	1,150	1,900	-	_	
06354000	O Car	nonbal	ll Rive	rati	Breien	(perio	od of r	ecord	, water	r years	1950	, 1971-	89)	
Mean Maximum *: Minimum Number of values	903	2,170 3,070 1600 18	284	2,410 3,800 680 23	4,860	3,100 190	2,260	1,800 2,930 481 21	3,020 610	3,000	1,510 2,800 575 19	1,640 2,300 730 20	1,630 3,200 395 10	1,660 4,860 190 274
Measured values for water year 1989 *:	2,400		-	2,400	3,200		1,140	2,040	-	1,730	4	1,170		
064'	70500	James	s River	at La	Moure	(perio	od of r	ecord	, water	years	1957-	-89)		
Mean Maximum Minimum Number of values	837 1,130 480 30		1,150 1,550* 890 11			615 1,350 185 31	519 919 160 40	793 1,210 500 24	807 1,180 170 26	781 1,280 170 19	763 1,140 485 21	870 1,210* 480 27	900 1,800 200 11	848 1,800 160 288
Measured values for water year 1989	930	1,120	*	1,800	1,480	200 220	300 630	1,020		1,120	1,080	-	-	-

^{* -} New extreme value, maximum or minimum, occurred during 1989.

Ground-Water Levels

Water levels measured during water years 1987, 1988, and 1989 for well 134-052-06CCD2 completed in the Sheyenne Delta aquifer in Richland County are shown in figure 6. Water levels measured during the same period for well 140-095-08AAA completed in the Sentinel Butte aquifer in Stark County are shown in figure 7. The highest monthly water level, the mean of monthly water levels, and the lowest monthly water level for each of the two wells for the period of record prior to water year 1988 also are shown.

Water-level fluctuations in both wells (figs. 6 and 7) appear to follow the typical pattern of rises during the wet spring months and general declines during the rest of the year for all 3 water years. However, the effect of the drought of 1988 and continued drought of 1989 is shown by the general overall decline of the water levels (figs. 6 and 7).

Water levels in the Richland County well were near normal (fig. 6) until June 1987. However, lack of precipitation, especially during April and June 1987, probably caused the near record low water levels by the end of the 1987 water year. Lack of precipitation and the ensuing drought conditions during the spring of 1988 resulted in very little recovery in water level. From April 1988 through February 1989 new record low monthly water levels were measured. Because this well is located in an area of no significant ground-water withdrawals (D. P. Ripley, North Dakota State Water Commission, oral commun., 1990), fluctuations in the water level mainly are a result of natural climatic conditions.

The Richland County well is in the southeast corner of the State where flooding occurred during April of 1989. The water-level recovery from the all-time record low set in February 1989 was greater than 3 feet, but as the drought continued, water levels again fell to near record lows by the end of the 1989 water year.

Stark County well 140-095-08AAA is completed in the Sentinel Butte aquifer. Water from the Sentinel Butte aquifer generally is used for livestock watering and domestic supplies (Henry Trapp, Jr., and M. G. Croft, 1975, Geology and ground-water resources of Hettinger and Stark Counties, North Dakota: North Dakota State Water Commission, County Ground-Water Studies 16, Part I, 51 p.). Generally low yield and large dissolved mineral concentration of the water make the Sentinel Butte aquifer unsuitable for irrigation. Thus, changes in water levels in well 140-095-08AAA generally reflect natural climatic conditions rather than pumping-induced stresses.

Water levels in the Stark County well remained above or near normal through March of 1988 (fig. 7). The extreme deficiency in precipitation in April 1988, when most locations in the southwest division reported either no precipitation or only a trace for the month (normal precipitation for April in the southwest division is 1.5 inches), contributed to the rapid decline in water levels from April through September 1988. During April through September 1988, each month had less than normal precipitation in the southwest division. The total precipitation for April through September 1988 was about 6.5 inches, or only 50 percent of normal. The continued drought conditions resulted in record low or near record low water levels from September 1988 through February 1989. Although the water levels increased from March through June 1989, they remained more than a foot below normal and declined to a new record low for the month of September, the end of the 1989 water year.

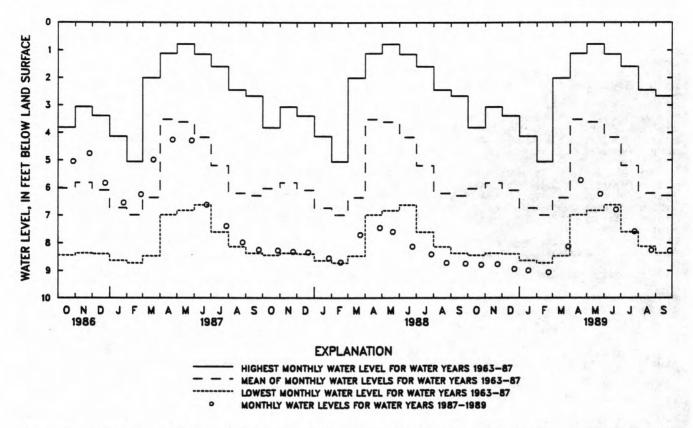


Figure 6.--Water levels for well 134-052-06CCD2 completed in Sheyenne Delta aquifer, Richland County.

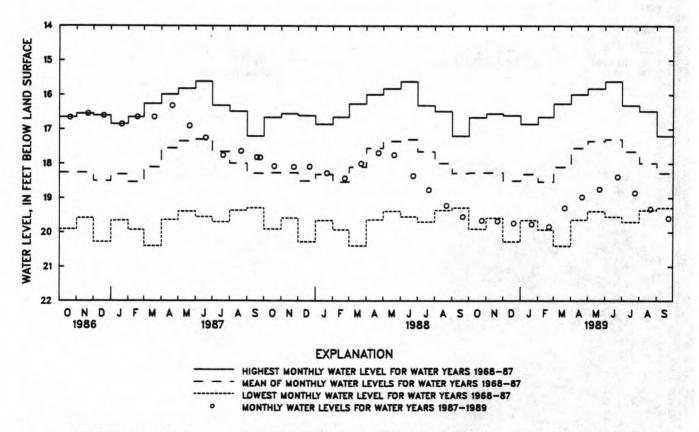


Figure 7.--Water levels for well 140-095-08AAA completed in Sentinel Butte aquifer, Stark County.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic bench-mark network is a network of 57 sites in small drainage basins around the country whose purpose is to provide consistent data on the hydrology, including water quality, and continuing basis to compare and contrast conditions observed in basins more obviously affected by the activities of man.

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

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

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

EXPLANATION OF THE RECORDS

The surface-water and ground-water records published in this report are for the 1988 water year that began October 1, 1987, and ended September 30, 1988. A calendar of the water year is provided on the inside of the front cover. The records contain streamflow data, stage and content data for lakes and reservoirs, water-quality data for surface- and ground-water, and ground-water-level data. The locations of the stations and wells where the data were collected are shown in figures 1, 2, and 3. The following sections of the introductory text are presented to provide users with a more detailed explanation of how the hydrologic data published in this report were collected, analyzed, computed, and arranged for presentation.

Station Identification Numbers

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

Downstream Order System

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

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

Latitude-Longitude System

The identification numbers for wells and miscellaneous surface-water sites are assigned according to the grid system of latitude and longitude. The number consists of 15 digits. The first six digits denote the degrees, minutes, and seconds of latitude, the next seven digits

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

Local Well Numbers

In order to compare data for wells in other publications in North Dakota, such as the county ground-water studies, the wells in this report also are numbered according to a system based on the location in the public-land classification of the U.S. Bureau of Land Management. The system is illustrated in figure 9. The first number denotes the township north of a base line, the second number denotes the range west of the fifth principal meridian, and the third numeral denotes the section in which the well is located. The letters A, B, C, and D designate, respectively, the northeast, northwest, southwest, and southeast quarter section, quarter-quarter section, and quarter-quarter section (10-acre tract). For example, well 139-049-15ADC is in the SW1/4SE1/4NE1/4 sec. 15, T. 139 N., R. 049 W. Consecutive terminal numbers are added if more than one well is recorded within a 10-acre tract.

Records of Stage and Water Discharge

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

By contrast, partial records are obtained through discrete measurements without using a continuous stage-recording device and pertain only to a few flow characteristics, or perhaps only one. The nature of the partial record is indicated by table titles such as "Crest-stage partial records," or "Low-flow partial records." Records of miscellaneous discharge measurements or of measurements from special studies, such as low-flow seepage studies, may be considered as partial records. Locations of all complete-record and crest-stage partial-record stations for which data are given in this report are shown in figure 1.

Data Collection and Computation

The data obtained at a complete-record gaging station on a stream or canal consist of a continuous record of stage, individual measurements of discharge throughout a range of stages, and notations regarding factors that may affect the relationships between stage and discharge. These data, together with supplemental information, such as weather records, are used to compute daily discharges. The data obtained at a complete-record gaging station on a lake or reservoir consist of a record of stage and of notations regarding factors that may affect the relationship between stage and lake content. These data are used with stage-area and stage-capacity curves or tables to compute water-surface areas and lake storage.

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

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

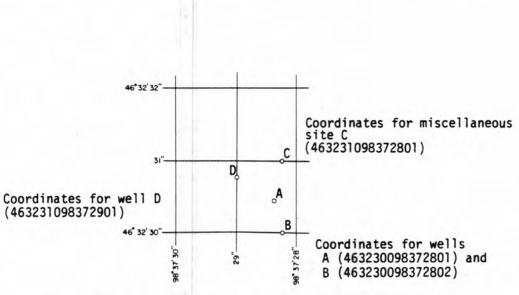


Figure 8.--System for numbering wells and miscellaneous sites (latitude and longitude).

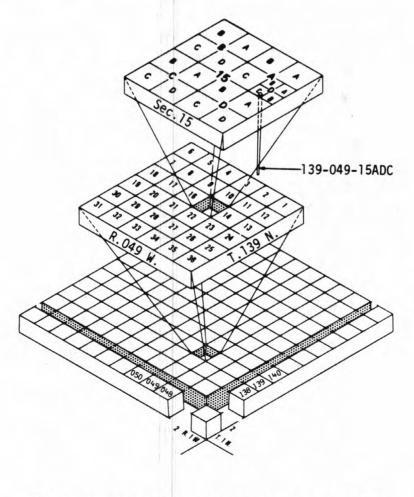


Figure 9.--System for numbering wells and miscellaneous sites (township and range).

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

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

Data Presentation

The records published for each gaging station consist of two parts, the manuscript or station description and the data table for the current water year. The manuscript provides, under various headings, descriptive information, such as station location; period of record; average discharge; historical extremes; record accuracy; and other remarks pertinent to station operation and regulation. The following information, as appropriate, is provided with each continuous record of discharge or lake content. Comments to follow clarify information presented under the various headings of the station description.

LOCATION.--Information on locations is obtained from the most accurate maps available. The location of the gage with respect to the cultural and physical features in the vicinity and with respect to the reference place mentioned in the station name is given. River mileages, given for only a few stations, were provided by the U.S. Army Corps of Engineers.

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

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

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

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

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

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

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

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

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

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

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

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

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

Data for crest-stage stations and measurements at miscellaneous sites are presented in two tables following the information for continuous-record sites.

Identifying Estimated Daily Discharge

Estimated daily-discharge values published in the water-discharge tables of annual State data reports are identified either by flagging individual daily values with the letter symbol "e" and printing a table footnote, "e-Estimated," or by listing the dates of the estimated record in the REMARKS paragraph of the station description.

Accuracy of the Records

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

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

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

Other Records Available

Information used in the preparation of the records in this publication, such as discharge-measurement notes, gage-height records, temperature measurements, and rating tables is on file in the North Dakota District Office. Also, most of the daily mean discharges are in computer-readable

form and have been analyzed statistically. An example of a computer listing of annual peak discharges for the Knife River at Hazen, N. Dak., gaging station (06340500) is shown in figure 10. An example of the computer generated Log-Pearson Type III annual peak-flow frequency analysis for these data, following the U.S. Water Resources Council guidelines in Bulletin 17B, is shown in tabular form by figure 11 and shown graphically by figure 12.

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

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

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

Records of Surface-Water Quality

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

Classification of Records

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

A careful distinction needs to be made between "continuing records", as used in this report, and "continuous recordings," which refers ao a continuous graph or a series of discrete values punched at short intervals on a paper tape. Some records of water quality, such as temperature and specific conductance, may be obtained through continuous recordings; however, because of costs, most data are obtained only monthly or less frequently. Locations of stations for which records on the quality of surface water appear in this report are shown in figure 2.

Arrangement of Records

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

On-Site Measurements and Sample Collection

In obtaining water-quality data, a major concern needs to be assuring that the data obtained represent the in situ quality of the water. To assure this, certain measurements, such as water temperature, pH, and dissolved oxygen, need to be made on-site when the samples are taken. To assure that measurements made in the laboratory also represent the in situ water, carefully prescribed procedures need to be followed in collecting the samples, in treating the samples to prevent changes in quality pending analysis, and in shipping the samples to the laboratory. Procedures for onsite measurements and for collecting, treating, and shipping samples are given in publications on "Techniques of Water-Resources Investigations," Book 1, Chap. D2; Book 3, Chap. C2; Book 5, Chap. A1, A3, and A4. All of these references are listed under "PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS" which appears at the end of the introductory text. Also, detailed information on collecting, treating, and shipping samples may be obtained from the U.S. Geological Survey North Dakota District office.

One sample can define adequately the water quality at a given time if the mixture of solutes throughout the stream cross section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled through several vertical sections to obtain a representative sample needed for an accurate mean concentration and for use in calculating load. All samples obtained for the

STATION 06340500

KNIFE RIVER AT HAZEN, ND

AGENCY: STATE:	USGS 38		N LOCATOR			DRAINAGE AR		2240.00	SQ MI
COUNTY: DISTRICT:	057 38	LAT 4717	C. LONG. 706 101372			CONTRIBUTI DRAINAGE GAGE DATUM BASE DISCH	: 1:	2240.00 1712.35 1500.00	(NGVD)
WATER YEAR	DATE	PEAK DISCHARGE (CFS)	DISC	GAGE HEIGHT (FT)	GH CODES	MAX GAGE HEIGHT (FT)	DAT	E	GH CODES
1930 1931 1932 1933 1938 1939 1940 1941 1942 1943	02/21/30 09/22/31 06/14/32 03/17/33 07/05/38 03/24/39 07/29/40 06/09/41 06/07/42 03/26/43	3070.00 1450.00 1300.00 2200.00 7540.00 9300.00 1150.00 4110.00 3120.00 26500.00		23.20 11.60 11.10 14.50 23.00 24.47 10.92 20.23 17.10 26.30	1				
1945 1946 1947	04/03/44 03/15/45 03/03/46 06/25/47	8010.00 8690.00 3500.00 6000.00		23.39 23.99 19.30 21.70	1 2	21.95	03/25	/47	1
1948 1949 1950 1951 1952 1953 1954	03/24/48 04/06/49 04/17/50 03/30/51 04/07/52 06/14/53 04/08/54	7070.00 7760.00 22700.00 9000.00 20200.00 3440.00 3880.00		23.62 23.30 25.93 25.36 25.83 17.31	1 2 1	24.10	04/03	/49	1
1955 1956 1957 1958 1959 1960 1961 1962 1963	03/13/55 03/21/56 03/01/57 03/28/58 03/24/59 03/27/60 03/03/61 05/31/62 06/10/63	1400.00 6630.00 1590.00 3500.00 4930.00 7230.00 488.00 3860.00 1050.00	2	18.06 11.35 23.76 12.49 19.82 20.14 23.13 9.62 17.48 9.63	1 1 1 1 12	9.72	03/02	/61	1
1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974	06/18/64 04/15/65 06/24/66 03/25/67 03/06/68 04/07/69 05/11/70 03/17/71 03/15/72 03/02/73 03/03/74	5170.00 3330.00 35300.00 7980.00 1800.00 11800.00 8180.00 4320.00 19000.00 3900.00 1350.00		20.17 15.99 27.01 23.88 18.37 24.75 23.83 18.79 26.17 21.44 14.28	1 1 1 1 1				
1975 1976	05/01/75 03/19/76	6600.00 3000.00		22.60 18.00	1	23.37	04/24	/75	1
1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1986 1987 1988	03/11/89	1200.00 1200.00 11000.00 5440.00 900.00 10500.00 5300.00 2500.00 1540.00 8800.00 8550.00 450.00		9.75 25.10 20.26 10.58 9.92 25.14 23.00 14.50 10.10 24.00 23.80 7.47	1 1 1 1 1	11.69	03/11	/77	1

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

PLOT BCPU LGPT NODB PPOS NORS EXPR CLIM

OPTIONS IN EFFECT --STATION - 06340500

/USGS

KNIFE RIVER AT HAZEN, ND

1930-1989

06340500

/USGS

INPUT DATA SUMMARY

YEARS OF	RECORD	HISTORIC	GENERALIZED	STD. ERROR OF GENERAL. SKEW	SKEW	GAGE BASE	USER-SET OUTL:	IER CRITERIA
SYSTEMATIC	HISTORIC	PEAKS	SKEW		OPTION	DISCHARGE	HIGH OUTLIER	LOW OUTLIER
56	0	0	-0.400	W	RC WEIGHTED	0.0		

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

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.

WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION.

WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE.

65855.2

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE DISCHARGE	FLOOD BASE EXCEEDANCE PROBABILITY	LOGARITHMIC MEAN	LOGARITHMIC STANDARD DEVIATION	LOGARITHMIC SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.6158	0.4279	-0.131
W R C ESTIMATE	0.0	1.0000	3.6158	0.4279	-0.198

ANNUAL FREQUENCY CURVE ORDINATES -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	W R C ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFI FOR W R C LOWER	DENCE LIMITS ESTIMATES UPPER
0.9950	271.9	289.2	229.2	155.6	414.1
0.9900	362.0	379.8	319.2	217.3	533.2
0.9500	774.1	788.0	736.3	524.4	1050.2
0.9000	1146.2	1153.1	1104.6	821.3	1499.4
0.8000	1821.7	1814.4	1789.2	1381.7	2304.5
0.5000	4265.1	4218.4	4265.1	3427.8	5315.7
0.2000	9537.8	9514.8	9688.1	7531.1	12600.4
0.1000	14266.5	14382.8	14707.4	10943.9	19798.4
0.0400	21626.0	22146.7	22713.2	15969.6	31837.6
0.0200	28088.2	29126.5	30176.7	20192.9	43038.6
0.0100	35363.7	37144.9	38723.2	24797.1	56204.6
0.0050	43489.6	46278.9	48982.4	29794.9	71485.6
0.0020	55597.0	60202.3	63470.9	37023.2	95191.7

E

K

I

T

DE

L O G #0

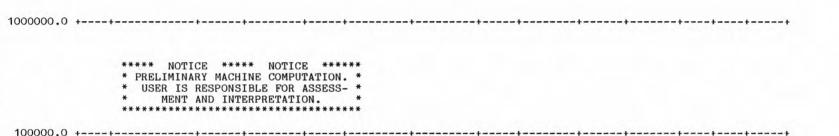
/USGS

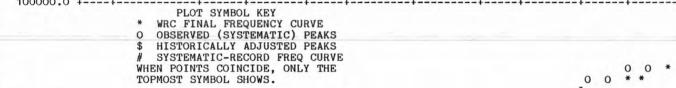
KNIFE RIVER AT HAZEN, ND

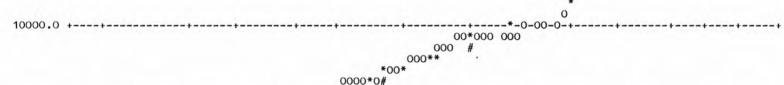
1930-1989

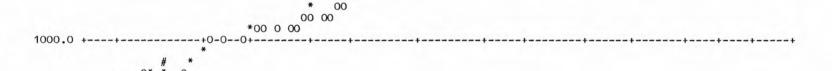
06340500

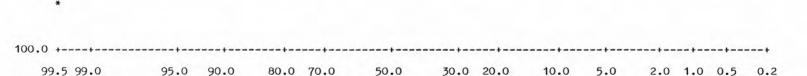
/USGS











ANNUAL EXCEEDANCE PROBABILITY, PERCENT (NORMAL SCALE)

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

WATER RESOURCES DATA -

NORTH DAKOTA, 1989

WATER RESOURCES DATA

NORTH DAKOTA, 1989

STATISTICS ON NORMAL MONTHLY MEANS (ALL DAYS)

OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT
	BY ROWS	(NUMBER, MEA	N, VARIANCE,	STANDARD I	DEVIATION, SK	EWNESS, COEFF	. OF VARIAT	TION, PERCENT	TAGE OF AVER	AGE VALUE)	
56.00	56.00	56.00	56.00	56.00	56.00	57.00	56.00	57.00	57.00	57.00	58.00
37.12	31.39	21.52	20.26	89.97	714.86	572.44	174.43	249.44	113.38	47.80	35.59
2367.35	837.24	157.97	613.34	24377.43	564397.25	734071.50	60720.80	63317.88	22267.66	1814.61	909.65
48.66	28.94	12.57	24.77	156.13	751.26	856.78	246.42	251.63	149.22	42.60	30.16
5.83	5.46	2.33	3.41	3.33	1.58	2.54	3.67	1.48	4.02	1.90	2.05
1.31	0.92	0.58	1.22	1.74	1.05	1.50	1.41	1.01	1.32	0.89	0.85
1.76	1.49	1.02	0.96	4.27	33.91	27.15	8.27	11.83	5.38	2.27	1.69

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

STATION	06340500 KM	IFE RIVER AT HAZEN, ND			
DISCHARGE- NORMAL MON	(CFS) THLY MEANS(ALL DAYS)				
OCT	NOV	DEC	JAN	FEB	MARCH
		TWENTY FIFTH P	ERCENTILE		
17.4	19.4	13.0	7.66	9.68	172.2
		FIFTIETH PER	CENTILE		
27.0	25.6	19.5	13.0	21.6	412.2
		SEVENTY FIFTH	PERCENTILE		
40.2	35.6	28.4	19.5	109.1	1111
APRIL	MAY	JUNE	JULY	AUG	SEPT
		TWENTY FIFTH P	ERCENTILE		
97.2	56.8	65.1	29.8	16.5	17.9
		FIFTIETH PER	CENTILE		
181.4	91.6	158.6	73.7	36.2	27.1
		SEVENTY FIFTH	PERCENTILE		
742.7	178.6	330.5	139.7	68.0	44.3
NOTE PE	RCENTILES BASED ON AVAILA	BLE DATA			

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

PRIMARY COMPUTATIONS OF GAGE HEIGHT AND DISCHARGE DATE PROCESSED: 02-26-1990 @ 16:34 BY REHARKNESS

RATINGS USED --INPUT 13.0 09/01/79 (0015)

KNIFE RIVER AT HAZEN, ND

STNRD 16.0 10/01/87 (0015)

OUTPUT PARAMETER 00060 STORE STATISTIC(S) 00003 PROVISIONAL DATA FOR WATER YEAR ENDING SEPT. 30, 1989

TEST DIFF: 10.00 PUNCH INTERVAL: 15 MIN

DATE	MAX GH /DISCH <time></time>	MIN GH /DISCH <time></time>	MEAN GH	MEAN DISCH	SHIFT ADJ	DATUM CORR		0200	0300	0400	0500	0600	FEET, 0700 1900	0800	0900	1000	1100	
05/29/89	1.89 46 <2000>	1.70 31 <0015>	1.82	40	-0.11W		170 182	173 182	173 182		176 186	178 187	180 188	182 189	182 189	182 189	182 189	182 189
05/30/89	2.27 82 <2400>	1.89 46 <0015>	2.07	63	-0.11W		189 208	189 208	193 208	197 208	201 209	204 210	206 213	208 216	208 218	208 222	208 224	208 227
05/31/89	2.71 132 <2345>	2.28 83 <0015>	2.56	114	-0.11W		231 261	235 261	239 261	244 261	249 261	253 261	255 262	258 264	260 266	261 268	261 269	261 271
06/01/89	4.58 414 <1245>	2.71 132 <0015>	4.00	323	-0.04W		272 458	275 458	283 457	301 454	327 450	359 445	389 439	413 434	431 429	445 423	452 419	456 413
06/02/89	4.11 334 <0015>	3.30 211 <2400>	3.63	260	-0.06W		407 358	402 354	397 349	392 346	387 344	383 340	379 337	375 335	371 333	368 332	364 331	361 330
06/03/89	3.30 211 <0015>	2.87 152 <2330>	3.08	181	-0.08W		329 306	326 305	324 303	321 301	320 299	318 297	316 295	315 293	313 292	311 291	310 289	308 287
06/04/89	2.87 152 <0015>	2.53 111 <2315>	2.68	129	-0.09W		285 267	283 265	281 264	280 263		277 260	275 258	274 257	272 256	271 254	269 254	268 253
06/05/89	2.52 111 <0015>	2.31 88 <2245>	2.41	99	-0.09W		252 240	250 239	249 238		248 236	247 236	246 235	244 234	244 233	243 232	242 231	241 231
06/06/89	2.31 88 <1045>	2.25 82 <2345>	2.29	86	-0.09W		229 231	229 231	229 231	229 231	229 231	229 230	229 229	229 228	229 227	230 227	231 226	231 225
06/07/89	2.25 82 <0015>	2.11 68 <2045>	2.17	74	-0.09W		224 216	224 215	223 215			221 213	220 212	219 212	219 211	218 211	218 211	217 211
06/08/89	2.11 68 <0015>	2.00 59 <2000>	2.06	64	-0.09W		211 206	211 205	210 205	1000000		209 203	209 203	208 201	208 201	207 200	207 200	206 200
PERIOD	4.58 414	1.70 31				TIMI	E CORRI	ECTIO	0	.0								

NOTE. SYMBOLS USED ABOVE HAVE THE FOLLOWING MEANINGS --

W - SHIFT VARIES BY TIME AND VALUE - V SHIFT

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

WATER RESOURCES DATA -

NORTH DAKOTA, 1989

National Stream Quality Accounting Network (see definitions) are obtained from at least several verticals. Whether samples are obtained from the centroid of flow or from several verticals depends on flow conditions and other factors which must be evaluated by the collector.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum, minimum, and mean values for each constituent measured and are based upon hourly punches beginning at 0100 hours and ending at 2400 hours for the day of record. More detailed records (hourly values) may be obtained from the U.S. Geological Survey North Dakota District office whose address is given on the back of the title page of this report.

Water Temperature

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

At stations where recording instruments are used, either mean temperatures or maximum, minimum, and mean temperatures for each day are published. Water temperatures measured at the time of water-discharge measurements are published with the water-quality records for each surface-water station in this report.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section. Although data collected periodically may represent conditions only at the time of observations, such data are useful in establishing seasonal relations between quality and streamflow and in predicting long-term sediment-discharge characteristics of the stream.

In addition to the records of suspended-sediment discharge, records of the periodic measurements of the particle-size distribution of the suspended sediment and bed material are included for some stations.

Laboratory Measurements

Samples for biochemical-oxygen demand (BOD) and samples for indicator bacteria are analyzed locally. Sediment samples are analyzed in the U.S. Geological Survey laboratory in Iowa City, Iowa. All other samples are analyzed in either the U.S. Geological Survey laboratory in Arvada, Colo., or the North Dakota State Water Commission laboratory in Bismarck, N. Dak. Methods used in analyzing sediment samples and computing sediment records are given in TWRI, Book 5, Chap. C1. Methods used by the U.S. Geological Survey laboratory are given in TWRI, Book 1, Chap. D2; Book 3, Chap. C2; Book 5, Chap. A1, A3, and A4.

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, and dissolved oxygen then follow in sequence.

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

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

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

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

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

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

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

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

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

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

When the water-quality data for this report was prepared for publication, not all of the parameter values requested from the analyzing laboratories were available. As these data values are received the computer files will be updated, but no attempt to publish these data will be made

As part of the quality assurance procedures for the samples analyzed at the North Dakota State Water Commission laboratory, about 5 percent of the samples include a "split" sample which is sent to the U.S. Geological Survey laboratory in Arvada. The "split" samples analyzed in Arvada are included in this report and identified with footnotes. The sampling times indicated on the "splits" are one minute later than the regular samples.

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
К	Results based on colony count outside the acceptance range (non-ideal colony count)
, ND	Not detected. No colonies were present on the least dilute sample prepared.
	Records of Ground-Water Levels

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

The complete statewide network included more than 800 wells during 1987. About one-half of these wells were measured annually and the others at a variety of frequencies. Forty wells were equipped with continuous water-level recorders.

Data Collection and Computation

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

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

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

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

Data Presentation

Each well record consists of two parts, the station description and the data table of water levels measured during the water year. The description of the well is presented first through use of descriptive headings preceding the tabular data. The comments to follow clarify information presented under the various headings.

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

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

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

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

DATUM.--This entry describes both the measuring point and the land-surface elevation at the well. The measuring point is described physically (such as top of collar, notch in top of casing, plug in pump base and so on), and in relation to land surface (such as 1.3 feet above land-surface datum). The elevation of the land-surface datum is described in feet above (or below) National Geodetic Vertical Datum of 1929 (NGVD of 1929); it is reported with a precision depending on the method of determination.

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

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

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

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

Availability of Data

All water-level measurements and recorder data are stored in computer as well as office files and are available in a tabular listing similar to those published in this report. However,

ground-water data usually are more easily analyzed when displayed graphically. Examples of computer-generated hydrographs for water levels in four wells published in this report are presented in figures 16a-18.

The hydrograph for well 139-078-27CBB in the McKenzie aquifer in Burleigh County is shown in figures 16a and 16b, and the reported water use for irrigation from the McKenzie aquifer (C. D. Bader, North Dakota State Water Commission, oral commun., 1989) is shown in table 4. Very little fluctuation in water level occurred from 1963 until about 1972 (fig. 16a), and water-use data for the McKenzie aquifer (table 4) indicate that irrigation was insignificant until about 1972. Only annual water-level measurements at the end of the year were made during 1972-74 and the effect of irrigation withdrawals on the aquifer during the irrigation season cannot be detected on the hydrograph. Beginning in 1975, the frequency of water-level measurements was increased, and the annual declines in water level during the irrigation season and the recovery during the winter and spring can be seen in figure 16b. The largest annual decline in the water level, more than 7 feet, during the period of record for this well occurred during 1977. This decline corresponds to the largest reported water use for irrigation from the McKenzie aquifer (table 4).

Due to above normal precipitation during the 1986 irrigation season, reported water use for irrigation from the McKenzie aquifer (table 4) was the lowest since 1969. Reported water use also was less in 1987 than any year since 1970. The section of hydrograph for the 1986 through 1987 period for well 139-078-27CBB (see fig. 16b) does not show the decline in water level, during the irrigation season, that has become typical in recent years of larger withdrawals. Due to the drought of 1988, irrigation withdrawals increased to about 600 acre-feet in the McKenzie aquifer. With this increase in ground-water withdrawal from the aquifer, well 139-078-27CBB again experienced a significant decline during the irrigation season and a subsequent water-level recovery. Although the drought continued in 1989, it was not as severe as during 1988. Estimated water use for irrigation, 412 acre-feet, was less than the previous year.

Year	Water use	Year	Water use	Year	Water use
1969	0	1976	338	1983	486
1970	75	1977	781	1984	624
1971	150	1978	183	1985	477
1972 .	436	1979	314	1986	20-
1973	416	1980	475	1987	118
1974	400	1981	230	1988	600
1975	182	1982	348	1989	412

Table 4.--Reported water use, by year, for irrigation from the McKenzie aquifer, in acre-feet

The 1989 hydrograph of water levels in well 134-052-06CCD2 completed in the Sheyenne Delta aquifer in Richland County and equipped with a continuous recorder is shown in figure 17. The maximum and minimum recorded daily water levels and the periodic water-level measurements are shown. The periodic measurements were made with a steel tape. A dotted line was drawn between the periodic measurements to illustrate the definition of changes indicated by periodic taped measurements as compared to definition of changes in water level that is provided when continuous recorder data are available. Although the general trend in water-level changes is provided by the periodic measurements (fig. 17), the water level in this well may fluctuate more than 2 feet between measurements. Straight-line interpolation between measurements would have been in error by more than one foot at this site at times during the water year.

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

Records of Ground-Water Quality

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

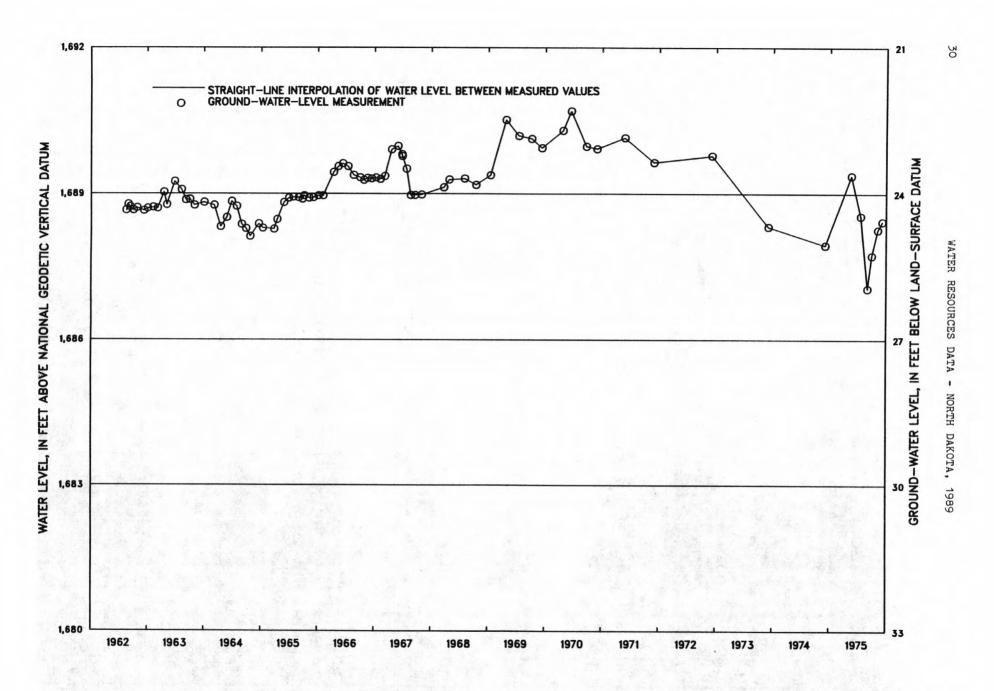


Figure 16a.--Water levels for well 139-078-27CBB completed in McKenzie aquifer, Burleigh County, 1962-75.

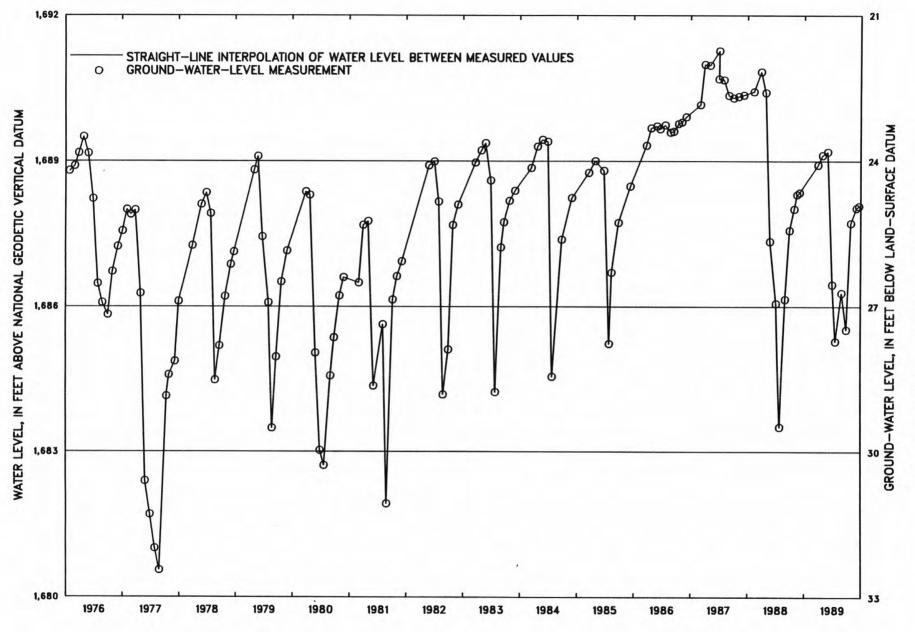


Figure 16b.--Water levels for well 139-078-27CBB completed in McKenzie aquifer, Burleigh County, 1976-89.



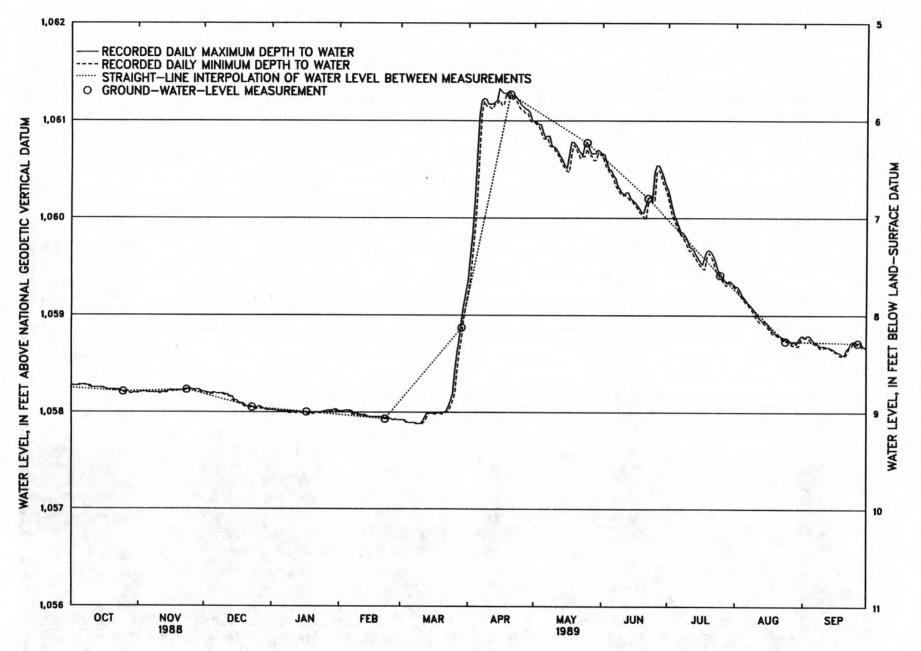


Figure 17.--Water levels for recorder well 134-052-06CCD2 completed in Sheyenne Delta aquifer, Richland County, water year 1989.

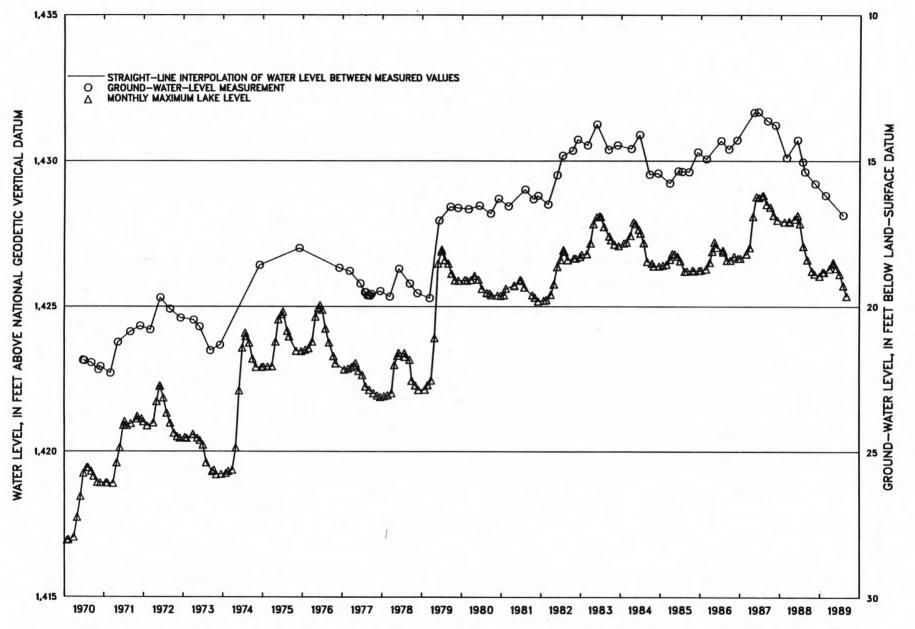


Figure 18.--Water levels for well 153-063-30CBC completed in Spiritwood aquifer, Benson County, and monthly maximum water levels for Devils Lake, 1970-89.

Data Collection and Computation

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

Most methods for collecting and analyzing water samples are described in the "U.S. Geological Survey Techniques of Water-Resources Investigations" manuals listed at the end of the introductory text. The values in this report represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. All samples were obtained by trained personnel. The wells sampled were pumped long enough to assure that the water collected came directly from the aquifer and had not stood for a long time in the well casing where it would have been exposed to the atmosphere and to the material, possibly metal, comprising the casing.

Data Presentation

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

ACCESS TO WATSTORE DATA

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

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

General inquiries about WATSTORE may be directed to:

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

DEFINITION OF TERMS

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

 $\frac{\text{Acre-foot}}{\text{and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.}$

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

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

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

Fecal coliform bacteria are bacteria that are present in the intestine or feces of warmblooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory they are defined as all organisms that produce blue colonies within 24 hours when incubated at 44.50C plus or minus 0.20C 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 35oC plus or minus 1.0oC on KF-streptococcus medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

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

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

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

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

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

<u>Contents</u> 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.

<u>Control</u> 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.

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

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

Cubic foot 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.

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

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

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

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

<u>Dissolved-solids concentration</u> 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.

<u>Drainage area</u> 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.

<u>Drainage basin</u> 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.

<u>Hardness</u> 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 (CaCO3).

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

 $\underline{\text{Micrograms per gram}}$ (ug/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.

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

Milligrams per liter (MG/L, mg/L) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter 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.

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

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

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

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

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

Classification	Size (mm	<u>)</u>	Method of analysi	s
Clay Silt Sand Gravel	0.00024 - 0 .004062 2.0 - 6	.062	Sedimentation Sedimentation Sedimentation of Sieve	r sieve

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

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

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

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

 $\frac{\text{Picocurie}}{\text{curie}} \text{ (PC, pCi) is one trillionth (1 x 10-12) of the amount of radioactivity represented} \\ \text{by a curie (Ci).} \quad \text{A curie is the amount of radioactivity that yields 3.7 x 1010 radioactive} \\ \text{disintegrations per second.} \quad \text{A picocurie yields 2.22 dpm (disintegrations per minute).} \\$

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

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

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

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

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

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

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

 $\underline{\textbf{Suspended-sediment load}} \text{ is a general term that refers to material in suspension.} \\ \text{is not synonymous with either discharge or concentration.} \\$

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 25oC. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in microsiemens). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

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

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

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

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

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

Suspended, recoverable is the amount of a given constituent that is in solution after the 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 used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to determine when the results should be reported as "suspended, total."

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

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

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of 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 of water from the stream each day for the year.

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

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

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

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

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

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

 $\underline{\text{WDR}}$ 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 this charges. 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.

 $\frac{\text{WSP}}{\text{VSP}}$ is used as an abbreviaton for "Water-Supply Paper" in reference to previously published reports.

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

The reports listed below are for sale by the U.S. Geological Survey, Books and Open-File Reports Section, Federal Center, Box 25425, Denver, Colorado 80225 (authorized agent of the Superintendent of Documents, Government Printing Office). Prepayment is required. Remittance should be sent by check or money order payable to the U.S. Geological Survey. Prices are not included because they are subject to change. Current prices can be obtained by writing to the above address. When ordering or inquiring about prices for any of these publications, please give the title, book number, chapter number, and "U.S. Geological Survey Techniques of Water-Resources Investigations."

- 1-Dl. 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 Dl. 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-El. Application of borehole geophysics to water-resources investigations, by W. S. Keys and L. M. MacCary: USGS-TWRI Book 2, Chapter El. 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-Al. General field and office procedures for indirect discharge measurements, by M. A. Benson and Tate Dalrymple: USGS--TWRI Book 3, Chapter Al. 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.
- 3-A7. Stage measurements at gaging stations, by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3. Chapter A7. 1968.
- 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-AlO. Discharge ratings at gaging stations, by E. J. Kennedy: USGS--TWRI Book 3, Chapter AlO. 1984. 59 pages.
- 3-All. Measurement of discharge by moving-boat method, by G. F. Smoot and C. E. Novak: USGS--TWRI Book 3, Chapter All. 1969, 22 pages.
- 3-Al2. Fluorometric procedures for dye tracing, by J. F. Wilson, Jr., E. D. Cobb, and F. A. Kilpatrick: USGS-TWRI Book 3, Chapter Al2. 1986. 41 pages.
- 3-Al3. Computation of continuous records of streamflow, by E. J. Kennedy: USGS--TWRI Book 3, Chapter Al3. 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.
- 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-Al8. 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 Al8. 1989. 52 pages.

- 3-Bl. Aquifer-test design, observation, and data analysis, by R. W. Stallman: USGS--TWRI Book 3, Chapter Bl. 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 0. 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 Bl. 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-Al. Methods for determination of inorganic substances in water and fluvial sediments, by M. J. Fishman and L. C. Friedman: USGS--TWRI Book 5, Chapter Al. 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-Cl. Laboratory theory and methods for sediment analysis, by H. P. Guy: USGS--TWRI Book 5, Chapter Cl. 1969. 58 pages.
- 6-Al. A modular three-dimensional finite-difference ground-water flow model, by M. G. McDonald and A. W. Harbaugh: USGS--TWRI Book 6, Chapter Al. 1988. 586 pages.
- 7-Cl. 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 Cl. 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-Al. Methods of measuring water levels in deep wells, by M. S. Garber and F. C. Koopman: USGS--TWRI Book 8, Chapter Al. 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.

05051500 RED RIVER OF THE NORTH AT WAHPETON, ND

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

DRAINAGE AREA .-- 4,010 mi2, approximately.

WATER-DISCHARGE RECORDS

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

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

REMARKS.--Estimated daily discharges: Nov. 18 to Apr. 7 and May 26-29. Records good except those for period of estimated daily discharge, which are fair. Flow regulated by Orwell Reservoir, capacity, 14,100 acre-ft at elevation 1,070 ft above National Geodetic Vertical Datum of 1929, adjustment of 1912; Lake Traverse, capacity, 137,000 acre-ft, available for flood control; numerous other controlled lakes and ponds, and several powerplants.

AVERAGE DISCHARGE.--46 years (1944-89), 549 ft^3/s , 397,800 acre-ft/yr; median of yearly mean discharges, 497 ft^3/s , 360,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,200 ft³/s, Apr. 10, 1969, gage height, 16.34 ft; maximum gage height, 17.95 ft, Apr. 5, 1989; minimum daily, 1.7 ft³/s, Aug. 28 to Sept. 5, 9, 10, 1976.

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

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 8,370 ft³/s, Apr. 5, gage height, 17.95 ft, backwater from ice; minimum daily, 29 ft⁵/s, Nov. 17.

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

			9008 P. O. C.		N	EAN VALU	ES					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	65	69	e52	e54	e163	e170	e3540	1220	1120	488	215	149
	61	67	e57	e53	e153	e167	e4180	1220	1090	514	210	174
	59	65	e58	e47	e207	e198	e5940	1200	1020	514	211	227
	58	66	e57	e42	e215	e210	e7770	1190	1010	444	222	243
	59	68	e56	e50	e220	e219	e8310	1150	1000	312	214	245
6 7 8 9	59 58 59 63 83	55 74 71 67 65	e56 e56 e52 e45 e46	e52 e54 e51 e31 e43	e215 e182 e165 e140 e140	e210 e204 e211 e211 e229	e7860 e6830 5490 4310 3420	1130 1130 1120 1110 1100	930 769 736 742 732	317 443 431 379 367	192 190 155 84 65	239 214 164 162 184
11	87	50	e40	e50	e110	e243	2840	1090	725	357	57	196
12	73	72	e50	e56	e110	e295	2440	1080	772	341	56	196
13	68	80	e52	e61	e100	e337	2130	1070	771	331	85	195
14	67	80	e50	e64	e102	e377	1980	1060	755	304	81	189
15	68	74	e48	e67	e114	e383	1950	1050	740	274	97	188
16	68	53	e41	e77	e117	e374	1940	1040	707	255	188	179
17	71	29	e55	e81	e116	e371	1880	1050	685	249	231	167
18	72	e45	e54	e82	e156	e402	1810	1080	676	269	239	162
19	71	e76	e56	e80	e186	e435	1570	1090	666	274	234	169
20	72	e71	e56	e85	e180	e476	1410	1120	629	297	154	222
21	72	e64	e53	e76	e179	e531	1360	1100	571	300	146	276
22	67	e63	e54	e79	e176	e569	1330	1090	572	271	146	273
23	65	e62	e56	e83	e161	e581	1260	1080	554	252	135	350
24	64	e63	e50	e82	e165	e592	1230	1080	589	246	130	357
25	65	e64	e45	e81	e176	e604	1220	1010	633	238	127	355
26 27 28 29 30 31	67 91 67 60 70 83	e63 e56 e36 e40 e46	e47 e50 e54 e48 e52 e54	e81 e93 e106 e121 e128 e117	e185 e152 e170	e649 e714 e870 e1590 e2420 e3080	1210 1200 1210 1230 1230	e980 e970 e1000 e1100 1430 1280	594 555 523 500 483	214 212 236 269 237 221	150 112 148 146 138 153	292 179 181 205 246
TOTAL	2112	1854	1600	2227	4455	17922	90080	34420	21849	9856	4711	6578
MEAN	68.1	61.8	51.6	71.8	159	578	3003	1110	728	318	152	219
MAX	91	80	58	128	220	3080	8310	1430	1120	514	239	357
MIN	58	29	40	31	100	167	1200	970	483	212	56	149
AC-FT	4190	3680	3170	4420	8840	35550	178700	68270	43340	19550	9340	13050

CAL YR 1988 TOTAL 72636 MEAN 198 MAX 855 MIN 29 AC-FT 144100 WTR YR 1989 TOTAL 197664 MEAN 542 MAX 8310 MIN 29 AC-FT 392100

e - Estimated

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

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECONI (00061)	CIFIC CON- DUCT- ANCE (US/CM)		TEMPER- ATURE AIR (DEG C) (00020)	ATURE WATER (DEG C	(MG/ R AS C) CACO	CALCI L DIS- L SOLV (MG/ 3) AS C	DIS- ED SOLVI L (MG/I A) AS MO	M, SODIUM - DIS- ED SOLVEI L (MG/I G) AS NA	SODIU	r RATIO
OCT 04	1420	58	530		10.0	9.	_					
NOV	1420))(-	10.0	9.	. 5				-	
17 22 JAN	1150 1150	24 63	565 590		-5.0 -3.0			=	=	- :	: :	=
10 MAR	1500	46	645		-28.5	0.	.0					
01 APR	1335	157	610		-15.0	0.	.0			-		
04	1105	6540	252		3.0							
04	1805	7990	252		3.0				77	7.7		
05	1340	8310	300		7.0			10 27	10	8.0		
08	1330 1035	5740 2020	425		-3.0 7.0							
MAY	1000	2020	44,		7.0	4.	. 5	-				
24 JUL	1330	1130	575		18.5	19.	.0					-
14 AUG	0940	332	490)	22.0	23.	.0				-	
31	1100	157	420	8.50	19.5	20.	.0 2	10 36	28	11	1	0.3
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE, FET-LAE (MG/L AS HCO3) (95440)	BONATE, B FET-LAE (MG/L AS CO3)	LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFAT DIS- SOLVE (MG/L AS SO4	DIS- ED SOLV (MG/	, RIDE DIS ED SOLV L (MG/ L) AS F	, DIS- - SOLVI ED (MG/I L AS) SIO2	AT 180 ED DEG. L DIS- SOLVE) (MG/I	JÉ SUM OF CONSTICE TUENTS DIS-ED SOLVE	SOLIDS, DIS- SOLVED (TONS PER AC-FT)
APR												
05 AUG	5.2	86	0	70	6.8	45	5.	7 0.	20 10	17	77 15	4 0.24
31	4.3	250	0	200	1.2	32	11	0.	10 14	25	54 25	0.35
	\$	SOLVED (TONS PER DAY)	ARSENIC DIS- SOLVED (UG/L AS AS)	DIS- SOLVED (UG/L AS B)	DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB) 01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
APR 05. AUG	39	970	3	30	120	1	20	40	0.1	1	2	160
31.		108	4	80	50	1	10	10	<0.1	2	<10	190

05051522 RED RIVER OF THE NORTH AT HICKSON, ND

LOCATION.--Lat 46°39'35", long 96°47'44", in SW1/4 sec.19, T.137 N., R.48 W., Clay County, MN, Hydrologic Unit 09020104, on right bank 60 ft downstream from bridge on township road, and 1 mi southeast of Hickson, ND.

DRAINAGE AREA. -- 4,300 mi2, approximately.

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder and concrete control. Datum of gage is 877.06 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Feb. 6 to Apr. 19. Records good except those for period of estimated daily discharge, which are fair. Flow regulated by Orwell Reservoir, capacity, 14,100 acre-ft at elevation 1,070 ft above National Geodetic Vertical Datum of 1929, adjustment of 1912; Lake Traverse, capacity, 137,000 acre-ft, available for flood control, numerous other controlled lakes and ponds, and several powerplants.

AVERAGE DISCHARGE.--14 years, 616 ft³/s, 446,300 acre-ft/yr; median of yearly mean discharges, 570 ft³/s, 413,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,900 ft3/s, Apr. 7, 1989, gage height, 35.81 ft; no flow Oct. 26, 1976 to Jan. 9, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 12,900 ft³/s, Apr. 7, gage height, 35.81 ft; minimum daily, 36 ft³/s, Dec. 2.

		DISCHARGE,	CUBIC	FEET PER	SECOND,	WATER YE	AR OCTOBER	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	66 67 63 59	72 77 77 72 68	43 36 49 59 61	53 55 58 60 61	123 147 156 158 169	e164 e160 e160 e160	e2330 e2840 e3550 e4290 e5550	1250 1250 1250 1250 1250	1420 1260 1170 1110 1070	527 508 511 524 517	248 230 221 216 213	150 151 146 170 224
6 7 8 9	65 72 75 74 71	69 70 68 64 69	61 60 56 51	59 59 58 58 59	e180 e192 e208 e220 e202	e160 e160 e164 e168 e172	e8200 e12000 e11100 e8990 e7800	1200 1180 1180 1180 1180	1050 1020 910 813 791	412 310 354 471 454	222 212 200 197 161	246 253 253 218 175
11 12 13 14 15	67 69 79 79 74	70 66 66 64 66	44 40 39 41 45	61 48 40 40 40	e184 e161 e137 e107 e106	e176 e180 e202 e216 e251	e6780 e5700 e4620 e3640 e3080	1170 1160 1140 1130 1120	786 781 793 816 809	408 397 384 374 355	97 70 64 56 72	165 182 193 192 191
16 17 18 19 20	71 70 71 72 72	73 49 44 55 53	48 52 53 49 53	45 51 57 66 74	e110 e108 e124 e135 e138	e293 e337 e373 e395 e412	e2680 e2390 e2180 e2030 1840	1110 1100 1100 1120 1130	799 773 743 720 705	317 283 277 282 283	80 85 165 235 258	188 189 180 165 165
21 22 23 24 25	71 72 68 69 68	49 66 72 72 72	55 58 61 61 59	83 88 89 86 86	e150 e160 e164 e178 e176	e432 e459 e496 e504 e529	1580 1460 1410 1360 1310	1140 1150 1140 1140 1140	711 671 613 601 603	291 317 302 266 254	225 159 145 141 128	184 251 274 287 362
26 27 28 29 30 31	64 63 64 67 72 69	72 71 69 58 53	62 63 54 53 53	95 99 94 90 99	e174 e170 e168	e548 e547 e580 e731 e937 e1500	1280 1250 1240 1240 1240	1110 1070 1040 1010 1050 1330	657 653 612 580 551	251 231 214 228 266 278	125 130 163 138 142 157	381 378 302 200 178
TOTAL MEAN MAX MIN AC-FT	2142 69.1 79 59 4250	65.5 5 77 44	633 52.7 63 36 3240	2120 68.4 109 40 4210	4405 157 220 106 8740	11726 378 1500 160 23260	114960 3832 12000 1240 228000	35750 1153 1330 1010 70910	24591 820 1420 551 48780	10846 350 527 214 21510	4955 160 258 56 9830	6593 220 381 146 13080

CAL YR 1988 TOTAL 74248 MEAN 203 MAX 818 MIN 36 AC-FT 147300 WTR YR 1989 TOTAL 221687 MEAN 607 MAX 12000 MIN 36 AC-FT 439700

e - Estimated

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

WATER-QUALITY RECORDS

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

DATE		TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	, SPE- CIFIC CON- DUCT ANCE D (US/C	PH - (STAN ARI M) UNITS	AI (DEG	RE R C)	TEMPER ATURE WATER (DEG C	(MG, AS C) CAC	AL /L	CALCIU DIS- SOLVE (MG/I AS CA	DIS ED SOLV (MG,	JM, S- /ED /L /G)	SODIU DIS- SOLVE (MG/ AS N	D L	SODIU PERCEN (00932	T	SODIUM AD- SORP- TION RATIO (00931)
OCT			2.5															
06		1135	65	40	50	1	2.0	10.	5			-					-	
15 MAR	•	1530	67	5	35		0.0	2.	.0		-	-					-	
03 APR		1145	160	6	25	1	2.5	0.	.0			-						
07		1405	14100	2	38 7.	70 -	1.0	1.	0	92	21	q	.5	7.	5		14	0.4
09		1555	8710		08		2.0	1.						, .			-	
11		1415	6770		32		3.5	3.				-						
14		1535	3500		10	1	0.5	5.				-					-	
JUN																		
JUL O1		1615	1470	4:	55	2	3.0	16.	5			-					-	
19 SEP		1450	286	5	50	3	0.0	26.	5		-	-						
01		1425	152	4:	30 8.	40 2	1.5	21.	5 2	210	37	28		11			10	0.3
DATE	S (POTAS- SIUM, DIS- SOLVED MG/L AS K) 00935)	BICAR BONATE FET-LA (MG/L AS HC03) (95440	BONATI B FET-L (MG/I AS CO3	AB LAB L (MG/ AS) CACO	Y DIOX DI L SOL (MG	S- VED /L (O2)	SULFAT DIS- SOLVE (MG/I AS SO4	DIS- D SOLV (MG/	E, /ED /L CL)	FLUO- RIDE, DIS- SOLVE (MG/L AS F)	DIS- SOLV ED (MG) AS SIO2	/ED /L	SOLID RESID AT 18 DEG. DIS SOLV (MG/ (7030	UE C ED L)	SOLIDS SUM OF CONSTITUENTS DIS- SOLVE (MG/I		SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 07		5.2	85	0	70		2.7	45	3.	.6	0.1	10 12		1	68	14	16	0.23
SEP 01		4.3	240	0	200		1.5	37	10		0.1	0 14		2	57	26	52	0.35
	DATE	SC	DLIDS, DIS- SOLVED (TONS PER DAY)	ARSENIC DIS- SOLVED (UG/L AS AS) (O1000)	BORON, DIS- SOLVED (UG/L AS B) (O1020)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	L S (LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	N S (A	IANGA- IESE, DIS- SOLVED UG/L S MN)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	S (A	OLYB- ENUM, DIS- OLVED UG/L S MO) 1060)	SI N: SC (I	ELE- IUM, DIS- OLVED UG/L S SE) 1145)	ST SC (U	PRON- PIUM, DIS- DLVED JG/L S SR)
APR O7 SEP	7	64	100	3	60	60		<1	9		40	0.3		1		<10		110
0, 2Fb	1		105	4	60	60		2	10		<10	<0.1		2		<10		210

05051600 WILD RICE RIVER NEAR RUTLAND, ND

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

DRAINAGE AREA .-- 546 mi2, of which about 250 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS .-- WSP 1728: Drainage area.

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

REMARKS. -- Estimated daily discharges: Mar. 28 to Apr. 4. Records good except for period of estimated discharge, which are fair.

AVERAGE DISCHARGE.--23 years (water years 1960-82), 8.08 ft³/s, 5,850 acre-ft/yr; median of yearly mean discharges, 4.7 ft³/s; 3,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 1,270 ft³/s, Apr. 8, 1969, gage height, 8.77 ft, backwater from ice; maximum gage height, 8.78 ft, Apr. 8, 1969, backwater from ice; no flow for several months each year.

EXTREMES FOR CURRENT YEAR. -- Maximum discharge, about 700 ft3/s, Mar. 31, gage height, 8.47 ft, backwater from ice; no flow for several months.

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

					111	JAN VADOBL						
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						.00	e600	21	4.6	1.4	.00	.00
							e580	20	4.3	.86	.00	.00
2 3 4 5						.00			7.0			.00
2						.00	e550	20	3.8	- 47	.00	
4						.00	e480	18	3.5	.29	.00	.00
5						.00	415	17	3.1	.15	.00	.00
6						.00	332	14	2.7	.07	.00	.00
7						.00	244	13	2.2	.02	.00	.00
8						.00	189	12	2.0	.14	.00	.00
Q						.00	142	11	1.9	.08	.00	.00
6 7 8 9						.00	109	11	1.6	.04	.00	.00
11						.00	101	10	1.3	.01	.00	.00
40						.00	07	9.1	1.2	.01	.00	.00
12 13						.00	93 69	9.1				
13						.00	69	7.6	1.1	.00	.00	.00
14						.00	59	7.0	1.2	.00	.00	.00
15						.00	54	7.0 6.7	1.2	.00	.00	.00
16						.00	50	5.9	1.0	.00	.00	.00
17						.00	62	5.6	.68	.00	.00	.00
18						.00	60	6.1	.54	.00	.00	.00
19						.00	46	6.2	.35	.00	.00	.00
19							36	6.2 5.5	.22	.00	.00	.00
20						.00	90	5.5	.22	.00	.00	.00
21 22 23						.00	28	4.9	.58	.00	.00	.00
22						.00	24	4.2	.43	.00	.00	.00
23						.00	21	4.0	.39	.00	.00	.00
24						.00	17	3.8	.70	.00	.00	.00
24 25						.00	15	3.4	1.2	.00	.00	.00
26						.00	14	3.0	1.3	.00	.00	.00
27						.00	17	2.6	1.3	.00	.00	.00
27 28						.00 e1.0	27	2.1	2.0	.00	.00	.00
28						e1.0	23	2.1			.00	
29						e10	23 22	2.5	1.7	.00		.00
30					•	e600		2.8	1.6	.00	.00	.00
29 30 31					•	e650		4.4		.00	.00	
TOTAL						1261.00	4475	264.4	49.99	3.54	0.00	0.00
MEAN						40.7	149	8.53	1.67	.11	.00	.00
MAX						650	600	21	4.6	1.4	.00	.00
MIN						.00	14	2.1	.22	.00	.00	.00
									99	7.0	.00	.0
AC-FT						2500	8880	524	99	7.0	.0	.0

47

RED RIVER OF THE NORTH BASIN

05051600 WILD RICE RIVER NEAR RUTLAND, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD .-- March 1989 to May 1989.

MAR 30 1630 595 255 0.0 0.5	DATE	TIME	CHARG INST CUBI FEE PER SECO (OOO6	E, SPE CIFIC C CON- T DUCT- ANCE ND (US/CN	PH (STAND ARD M) UNITS)	AIR (DEG	E ATU WAT C) (DEG	RE ER C)	HARD- NESS TOTAL (MG/L AS CACO3	CALCI DIS- SOLV (MG,	/ED /L CA)	MAGNE SIUM DIS- SOLVE (MG/L AS MG (00925	, SODIU DIS- D SOLVE (MG/	D L IA) P	SODIUM PERCENT	RATIO
31 1600 686 250 6.90 10.0 1.0 95 23 9.0 5.5 10 0.3 APR 03 1630 548 260 5.0 1.0 MAY 16 1500 5.6 1360 26.0 22.0 POTAS- BICAR- CAR- ALKA- CARBON CHLO- FLUO- SILICA, RESIDUE SUM OF SOLIDS, SIUM, BONATE, BONATE, LINITY DIOXIDE SULFATE RIDE, RIDE, DIS- AT 180 CONSTI- DIS- SOLVED SOLVED (MG/L MG/L MG/L MG/L MG/L MG/L MG/L MG/L	MAR															
31 1600 686 250 6.90 10.0 1.0 95 23 9.0 5.5 10 0.3 APR 03 1630 548 260 5.0 1.0 MAY 16 1500 5.6 1360 26.0 22.0 POTAS- BICAR- CAR- ALKA- CARBON CHLO- FLUO- SILICA, RESIDUE SUM OF SOLIDS, SIUM, BONATE, BONATE, LINITY DIOXIDE SULFATE RIDE, RIDE, DIS- AT 180 CONSTI- DIS- DIS- FET-LAB FET-LAB LAB DIS- DIS- DIS- DIS- DIS- SOLVED DEG. C TUENTS, SOLVED SOLVED (MG/L AS AS AS AS (MG/L (MG/L (MG/L AS AS AS AS (MG/L (MG/L (MG/L AS AS AS AS (MG/L (MG/L (MG/L AS SOLVED SOLVED SOLVED SOLVED SOLVED SOLVED PER (00935) (95440) (95445) (90410) (00405) (00945) (00940) (00950) (00955) (70300) (70301) (70303) MAR 31 8.5 7 0 62 1.5 52 3.4 0.10 9.2 170 115 0.23 SOLIDS, DIS- ARSENIC BORON, IRON, LEAD, LITHIUM NESE, MERCURY DENUM, NIUM, TIUM, SOLVED PER (UG/L	30	1630	595	25	55 -	- 0	0.0	0.5		-		-	-			
APR O3 1630 548 260 5.0 1.0	31	1600								95 23		9.0	5.	5	10	0.3
MAY 16 1500 5.6 1360 26.0 22.0 POTAS- BICAR- CAR- ALKA- CARBON CHLO- FLUO- SILICA, RESIDUE SUM OF SOLIDS, SIUM, BONATE, BONATE, LINITY DIOXIDE SULFATE RIDE, RIDE, DIS- AT 180 CONSTI- DIS- DIS- FET-LAB FET-LAB LAB DIS- DIS- DIS- DIS- SOLVED DEG. C TUENTS, SOLVED (MG/L AS AS AS (MG/L (MG/L (MG/L (MG/L AS SOLVED SOLVED SOLVED SOLVED SOLVED SOLVED PER AS K) HC03) C03) CAC03) AS C02) AS S04) AS CL) AS F) SIO2) (MG/L) (MG/L) AC-FT) DATE (00935) (95440) (95445) (90410) (00405) (00945) (00940) (00950) (00955) (70300) (70301) (70303) MAR 31 8.5 7 0 62 1.5 52 3.4 0.10 9.2 170 115 0.23 SOLIDS, DIS- ARSENIC BORON, IRON, LEAD, LITHIUM NESE, MERCURY DENUM, NIUM, TIUM, SOLVED DIS- DIS- DIS- DIS- DIS- DIS- DIS- DIS				-								, , ,				3.55
MAY 16 1500 5.6 1360 26.0 22.0 POTAS- BICAR- CAR- ALKA- CARBON CHLO- FLUO- SILICA, RESIDUE SUM OF SOLIDS, SIUM, BONATE, BONATE, LINITY DIOXIDE SULFATE RIDE, RIDE, DIS- AT 180 CONSTI- DIS- DIS- FET-LAB FET-LAB LAB DIS- DIS- DIS- DIS- SOLVED DEG. C TUENTS, SOLVED (MG/L AS AS AS (MG/L (MG/L (MG/L (MG/L AS SOLVED SOLVED SOLVED SOLVED SOLVED SOLVED PER AS K) HC03) C03) CAC03) AS C02) AS S04) AS CL) AS F) SIO2) (MG/L) (MG/L) AC-FT) DATE (00935) (95440) (95445) (90410) (00405) (00945) (00940) (00950) (00955) (70300) (70301) (70303) MAR 31 8.5 7 0 62 1.5 52 3.4 0.10 9.2 170 115 0.23 SOLIDS, DIS- ARSENIC BORON, IRON, LEAD, LITHIUM NESE, MERCURY DENUM, NIUM, TIUM, SOLVED DIS- DIS- DIS- DIS- DIS- DIS- DIS- DIS		1630	548	26	50 -	_ 5	0.0	1.0		-		_	4			
POTAS- BICAR- CAR- ALKA- CARBON CHLO- FLUO- SILICA, RESIDUE SUM OF SOLIDS, SIUM, BONATE, BONATE, LINITY DIOXIDE SULFATE RIDE, RIDE, DIS- AT 180 CONSTI- DIS- DIS- DIS- DIS- DIS- DIS- DIS- DI			,,,,	-												
POTAS- BICAR- CAR- ALKA- CARBON CHLO- FLUO- SILICA, RESIDUE SUM OF SOLIDS, SIUM, BONATE, BONATE, LINITY DIOXIDE SULFATE RIDE, RIDE, DIS- AT 180 CONSTI- DIS- DIS- DIS- DIS- DIS- DIS- DIS- DI		1500	5.	6 136	50 -	- 26	.0 2	2.0		-		-	-			
POTAS- BICAR- CAR- ALKA- CARBON CHLO- FLUO- SILICA, RESIDUÉ SUM OF SOLIDS, SIUM, BONATE, BONATE, LINITY DIOXIDE SULFATE RIDE, RIDE, DIS- AT 180 CONSTI- DIS- DIS- BOLVED SOLVED SOLVED DIS- DIS- DIS- DIS- DIS- DIS- DIS- DIS		100	-													
31 8.5 7 0 62 1.5 52 3.4 0.10 9.2 170 115 0.23 SOLIDS, DIS- ARSENIC BORON, IRON, LEAD, LITHIUM NESE, MERCURY DENUM, NIUM, TIUM, SOLVED DIS- DIS- DIS- DIS- DIS- DIS- DIS- DIS		SIUM DIS- SOLVEI (MG/L AS K)	BONAT FET-L (MG/ AS HC03	E, BONATE AB FET-LA L (MG/I AS) CO3	E, LINITY AB LAB L (MG/L AS CACO3	DIOXI DIS SOLV (MG/	DE SULF DIS ED SOL L (MG	VED	RIDE, DIS- SOLVE (MG/L AS CL	RIDE DIS ED SOLV (MG/	E, S- /ED /L F)	DIS- SOLVE (MG/L AS SIO2)	, RESID AT 18 D DEG. DIS SOLV	OUÉ S SO C C T S- VED	OM OF CONSTI- CUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)
SOLIDS, DIS- ARSENIC BORON, IRON, LEAD, LITHIUM NESE, MERCURY DENUM, NIUM, TIUM, SOLVED DIS- DIS- DIS- DIS- DIS- DIS- DIS- DIS			- 2	- 2			100		20							
DIS- ARSENIC BORON, IRON, LEAD, LITHIUM NESE, MERCURY DENUM, NIUM, TIUM, SOLVED DIS- DIS- DIS- DIS- DIS- DIS- DIS- DIS	31	8.5	7	0	62	1	.5 52		3.4	0.	.10	9.2	1	70	115	0.23
			DIS- SOLVED (TONS PER DAY)	DIS- SOLVED (UG/L AS AS)	DIS- SOLVED (UG/L AS B)	DIS- SOLVED (UG/L AS FE)	DIS- SOLVED (UG/L AS PB)	S (DIS- OLVED UG/L S LI)	NESE, DIS- SOLVED (UG/L AS MN)	S (DIS- OLVED UG/L S HG)	DENUM, DIS- SOLVED (UG/L AS MO)	NIU DI SOL (UG AS	M, S- VED /L SE)	TIUM, DIS- SOLVED (UG/L AS SR)
31 315 1 30 100 <1 10 30 0.4 <1 <10 120			200	44	1421										300	
	31		315	1	30	100	<1		10	30		0.4	<1		<10	120

05053000 WILD RICE RIVER NEAR ABERCROMBIE, ND

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

DRAINAGE AREA .-- 2,080 mi2, of which about 590 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- April 1932 to current year. Monthly discharge only for some periods, published in WSP 1308. REVISED RECORDS. -- WSP 1388: 1939, 1941(M). WSP 1728: Drainage area.

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

REMARKS.--Estimated daily discharges: Mar. 29 to Apr. 14 and July 21 to Aug. 30. Records good, except those for period with ice effect, Mar. 29 to Apr. 14, which are fair; and those for period of missing record, July 21 to Aug. 30, which are poor. Some regulation by Fish and Wildlife Service reservoirs, of which Lake Tewaukon is the largest. Some small diversions for irrigation.

AVERAGE DISCHARGE.--57 years, 73.9 ft^3/s , 53,540 acre-ft/yr; median of yearly mean discharges, 36 ft^3/s , 26,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 9,540 ft³/s, Apr. 11, 1969, gage height, 24.58 ft; no flow at times most years.

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

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 300 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 6	0330 0015	ice backwater	*23.62 23.27	May 31	0230	350	3.42

No flow much of the time.

		DISCHARGE,	CUBIC	FEET PER		WATER YEAR N VALUES	OCTOBER	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	e442	86	221	6.4	e1.5	.49
2	.00	.00	.00	.00	.00	.00	e1190	82	156	5.9	e2.0	1.0
3	.00	.00	.00	.00	.00	.00	e2600	82	102	5.7	e3.5	1.2
4	.00	.00	.00	.00	.00	.00	e4920	82	73	6.0	e3.0	1.0
5	.00	•00	.00	.00	.00	.00	e6440	84	59	5.9	e2.8	•79
6	.00	.00	.00	.00	.00	.00	e6770	79	49	4.8	e2.6	.60
7	.00	.00	.00	.00	.00	.00	e7110	75	44	3.9	e2.4	.43
8	.00	.00	.00	.00	.00	.00	e6110	74	38	4.1	e2.2	.33
9	.00	.00	.00	.00	.00	.00	e3640	71	34	3.9	e2.0	.26
10	.00	.00	.00	.00	.00	.00	e2680	69	31	3.2	e1.8	.19
11	.00	.00	.00	.00	.00	.00	e2090	64	29	2.5	e1.6	.19
12	.00	.00	.00	.00	.00	.00	e1770	60	29	1.9	e1.4	.15
13	.00	.00	.00	.00	.00	.00	e1470	56	28	1.3	e1.4	.12
14	.00	.00	.00	.00	.00	.00	e1210	52	26	1.1	e1.2	.10
15	.00	.00	.00	.00	.00	.00	1010	49	24	.71	e.50	.08
16	.00	.00	.00	.00	.00	.00	844	46	22	.46	e.30	.07
17	.00	.00	.00	.00	.00	.00	707	45	19	.30	e.15	.06
18	.00	.00	.00	.00	.00	.00	584	43	18	.50	e.10	.05
19	.00	.00	.00	.00	.00	.00	450	42	14	.44	e.08	.04
20	.00	.00	.00	.00	.00	.00	346	40	12	.62	e.04	.05
21	.00	.00	.00	.00	.00	.00	296	39	11	e.50	e.02	.29 .35 .26
22	.00	.00	.00	.00	.00	.00	266	39	11	e.50	e.02	.35
23	.00	.00	.00	.00	.00	.00	236	38	9.0	e.45	e.02	.26
24	.00	.00	.00	.00	.00	.00	212	41	7.0	e.40	e.02	.23
25	.00	.00	.00	.00	.00	.00	189	42	11	e.40	e.02	.21
26	.00	.00	.00	.00	.00	.00	169	43	12	e.35	e.10	.17
27	.00	.00	.00	.00	.00	.00	151	42	11	e.35	e.50	.14
28	.00	.00	.00	.00	.00	.00	131	39	8.5	e.35	e.60	.12
29	.00	.00	.00	.00		e.01	113	42	6.8	e.40	e.50	.09
30	.00	.00	.00	.00		e3.5	97	196	6.1	e.50	e.40	.08
31	.00		.00	.00		e110		319		e1.0	.28	
TOTAL	0.00	0.00	0.00	0.00	0.00	113.51	54243	2161	1121.4	64.83	33.05	9.14
MEAN	.00	.00	.00	.00	.00	3.66	1808	69.7	37.4	2.09	1.07	.30
MAX	.00	.00	.00	.00	.00	110	7110	319	221	6.4	3.5	1.2
MIN	.00	.00	.00	.00	.00	.00	97	38	6.1	.30	.02	.04
AC-FT	.0	.0	.0	.0	.0	225	107600	4290	2220	129	66	18
									10007			

CAL YR 1988 TOTAL 1461.96 MEAN 3.99 MAX 90 MIN .00 AC-FT 2900 WTR YR 1989 TOTAL 57745.93 MEAN 158 MAX 7110 MIN .00 AC-FT 114500

05053000 WILD RICE RIVER NEAR ABERCROMBIE, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	CIFIC CON- DUCT- ANCE	PH (STAND- ARD UNITS) (OO4OO)	AIR (DEG C	ATURE WATER) (DEG C	(MG/I AS CACO	CALCI DIS- L SOLV (MG/	DIS- ED SOLVE L (MG/L A) AS MG	DIS- DIS- DIS- MG/L AS NA	SODIUM) PERCENT	SODIUM AD- SORP- TION RATIO (00931)
APR												
04 05 11	1440 1230 1115 1320	5170 6380 2100 1200	150 152 298 500	7.10	7.0	3.	0 5	51 13	4.5	8.5	24	0.5
MAY 24	1610	42	1220		20.0	20.	0			_		
JUL	1010	42	1220		20.0	20.			77		- 177	(44)
19	1100	0.40	1280		25.0	23.	5 .	-				
31	1445	0.28	1440	8.30	24.0	20.	5 50	50 120	63	120	31	2
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE, FET-LAB (MG/L AS HCO3) (95440)	BONATE, FET-LAB (MG/L AS CO3)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBOI DIOXIDE DIS- SOLVEI (MG/L AS CO2 (00405)	SULFAT DIS- SOLVE (MG/L) AS SO4	DIS- D SOLVI (MG/I	RIDE DIS ED SOLV L (MG/ L) AS F	DIS- SOLVE ED (MG/L L AS) SIO2)	AT 180 DEG. DIS- SOLVE (MG/L	E SUM OF CONSTI- C TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR												
05 AUG	5.4	51	0	42	6.	1 11	4.	4 0.	10 3.3	8:	76	0.11
31	16	450	0	370	3.6	390	51	0.	30 22	104	1010	1.41
		SOLVED (TONS PER DAY)	DIS- SOLVED (UG/L AS AS)	DIS- SOLVED (UG/L AS B)	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)	NIUM, DIS- SOLVED (UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) 01080)
APR 05.	1	430	1	30	240	1	10	50	0.1	<1	1	100
AUG			100		2.45							6.10
31.	• • •	0.79	12	280	50	1	90	130	<0.1	6	<1	640

05054000 RED RIVER OF THE NORTH AT FARGO, ND

LOCATION.--Lat 46°51'40", long 96°47'00", in NW1/4NE1/4 sec.18, T.139 N., R.48 W., Cass County, Hydrologic Unit 09020104, at waterplant on 4th St. S. in Fargo, 25 mi upstream from mouth of Sheyenne River, and at mi 453.

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

WATER-DISCHARGE RECORDS

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

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

GAGE. -- Water-stage recorder and concrete control. Datum of gage is 861.8 ft above National Geodetic Vertical Datum of 1929. Oct. 1, 1960, to Sept. 30, 1962, water-stage recorder at present site at datum 5.6 ft higher. See WSP 1728 or 1913 for history of changes prior to Oct. 1, 1960.

REMARKS.--Estimated daily discharges: Feb. 1 to Apr. 21. Records good except those for period of estimated daily discharges, which are fair. Flow regulated by Orwell Reservoir, capacity, 14,100 acre-ft at elevation 1,070 ft above National Geodetic Vertical Datum of 1929, adjustment of 1912; Lake Traverse, capacity 137,000 acre-ft, available for flood control, other controlled lakes and ponds, and several powerplants. Some small diversions for municipal supply. Figures of daily discharge do not include diversions to cities of Fargo and Moorhead and from Shevenne River.

AVERAGE DISCHARGE (UNADJUSTED) .-- 88 years, 578 ft3/s, 418,800 acre-ft/yr; median of yearly mean discharges, 470 ft3/s, 340,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 25,300 ft³/s, Apr. 15, 1969, gage height, 37.34 ft; no flow for many days in each year for period 1932-41, Sept. 30, Oct. 1-2, 1970, Oct. 10-19, 1976.

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

EXTREMES_FOR CURRENT YEAR. -- Maximum discharge, 18,900 ft3/s, Apr. 9, gage height, 35.39 ft; minimum daily, 22 ft3/s, Dec. 15 and Jan. 15.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES DAY OCT NOV DEC FEB APR TUN. .IIII. AUG SEP JAN MAR MAY e82 e158 e1710 1370 e90 e162 e2840 e102 e4210 e168 e128 e5360 e176 e6470 e145 e182 e158 e190 e9240 e176 e200 e13300 e17400 e192 e188 e200 e18600 e180 e184 e172 e17600 e162 e168 e15400 e12900 e146 e166 27 e10900 e135 e164 e9230 e161 e104 e178 e7940 e100 e187 e6730 31 e108 e198 e5550 e4390 e112 e227 e120 e251 e3230 e126 e267 e2330 e132 e2050 e274 34 e304 668 e142 e320 e148 36 e156 e307 e158 e330 e158 e405 e158 e417 e158 e407 e626 e813 e1090 TOTAL 48.6 30.9 46.9 MEAN 56.3 MAX MIN AC-FT MEAN* 78.2 68.8 49.2 65.0 AC-FT* OBSERVED ADJUSTED

TOTAL 74596

TOTAL 292606

CAL YR 1988 WTR YR 1989

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

MEAN 204 MAX 924 MIN 15 AC-FT 148000 MEAN 802 MAX 18600 MIN 22 AC-FT 580400

AC-FT

AC-FT

MEAN

MEAN

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

e - Estimated

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

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	CIFIC CON- DUCT- ANCE	PH (STAND- ARD UNITS)	AIR (DEG C	ATURE WATER) (DEG ((MG/ R AS C) CACO	CALCI L DIS- L SOLV (MG/ 3) AS C	DIS- ED SOLVE L (MG/L A) AS MG	DIS- DIS- SOLVED (MG/L AS NA	SODIUM) PERCENT	SODIUM AD- SORP- TION RATIO (00931)
OCT												
06	1435	44	52	8	17.	0 12.	.0					
NOA												
16 JAN	0905	49	63	0	-3.	5 1.	.5			-		
04	1350	45	80	5	-12.	0 0.	0					
MAR	1,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,											
01	1635	158	55							-		
14 APR	1420	161	-		-5.	5 0.	.0			-		
05	1735	6650				- 0.	0					
06	0945	8830										
07	1120	15800	18			0 1.	.5					
08	1225	17900	21	2007				85 21	8.0		13	0.3
09	1155	18800	7.4							-		
14 JUN	1845	8760	34	.0	8.)).	.0					
01 JUL	1110	1510	64	.0	18.	0 18.	.0					
12 AUG	1430	351	50	0	33.	5 28.	.0	-				
17	1005	50	-		- 24.	0 22.	.5			-		
29	0940	134	63	0								
SEP 01	0920	155	70	0 9 7/	17	- 00	- 4	00 74	24	44	14	0.5
01	0920	155	39	0 8.30	17.	5 20.	.5 1	80 34	24	14	14	0.5
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BONATE FET-LA	BONATE B FET-LA (MG/L AS CO3)	B LAB (MG/L AS CACO3)		DIS- D SOLVE (MG/I) AS SO	DIS- ED SOLV (MG/	, RIDE DIS ED SOLV L (MG/ L) AS F	DIS- SOLVE ED (MG/L L AS) SIO2)	AT 180 DEG. DIS- SOLVEI (MG/L	E SUM OF CONSTI- C TUENTS, DIS- D SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 08	5.2	85	0	70	1.	7 33	4.	0 0.	10 14	14	0 134	0.19
SEP												
01	4.4	190	0	150	1.	5 44	9.	9 0.	10 11	23	7 234	0.32
D		OLIDS, 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)	NIUM, DIS- SOLVED (UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) O1080)
APR 08. SEP	6	770	2	100	30	<1	8	60	0.3	1	<10	79
01.	••	99.2	1	70	30	2	20	<10	<0.1	2	<10	180

05054500 SHEYENNE RIVER ABOVE HARVEY, ND

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

DRAINAGE AREA. -- 424 mi², of which about 270 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS .-- WSP 1728: Drainage area.

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

REMARKS .-- Estimated daily discharges: Oct. 1 to Sept. 30. Records poor.

AVERAGE DISCHARGE.--34 years, 8.24 ft3/s, 5,970 acre-ft/yr; median of yearly mean discharges, 6.8 ft3/s, 4,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,000 ft³/s, Apr. 20, 1979, gage height, 9.45 ft; maximum gage height, 10.30 ft, Apr. 1, 1971, backwater from ice; no flow at times most years.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 25 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 11 Mar. 12	1340 1445	ab40	a*8.72	Mar. 29	1130	b*70	a7.95

DISCHARGE. CUBIC FEET PER SECOND. WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

No flow for many days. a - Backwater from ice b - Estimate

		DIBOIL	inde, cobi	o real ren		MEAN VALUE	S	1 1900 10	OBI TEMBE	1505			
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
1	e.50	e1.5	e2.0	e.01	e.00	e.00	e45	e3.0	e1.9	e1.2	e1.1	e2.0	
2	e.45	e1.4	e2.2	e.00	e.00	e.00	e35	e2.8	e1.8	e1.1	e1.0	e1.8	
3	e.40	e1.4	e2.0	e.00	e.00	e.00	e30	e2.5	e1.7	e1.0	e.90	e3.0	
4	e.35	e1.4	e2.0	e.00	e.00	e.00	e25	e3.0	e1.7	e1.0	e.75	e2.5	
5	e.35	e1.3	e2.1	e.00	e.00	e.00	e18	e2.8	e1.7	e.90	e.75	e1.6	
	6.77	61.7	62.1	e.00	6.00	e.00	610	62.0	61.1	0.70			
6	e.30	e1.4	e2.0	e.00	e.00	e.00	e15	e2.5	e1.6	e.90	e.74	e1.4	
7	e.35	e1.4	e1.5	e.00	e.00	e.00	e14	e2.3	e1.8	e.90	e.70	e1.2	
8	e.35	e1.4	e1.0	e.00	e.00	e.00	e13	e2.2	e1.7	e.85	e.70	e1.2	
9	e.35	e1.2	e.70	e.00	e.00	e.30	e12	e2.0	e1.6	e.85	e.65	e1.2	
10	e.35	e1.1	e.50	e.00	e.00	e2.5	e11	e2.0	e1.6	e.85	e.60	e1.4	
10	6.77	61.1	6.70	e.00	6.00	62.7	611	62.0	41.0	0.07			
11	e.35	e1.1	e.45	e.00	e.00	e20	e9.1	e1.9	e2.3	e1.0	e.70	e3.0	
12	e.35	e1.1	e.45	e.00	e.00	e35	e8.5	e1.8	e4.0	e.98	e.90	e2.8	
13	e.35	e1.1	e.60	e.00	e.00	e25	e8.5	e1.7	e3.9	e.95	e.85	e2.0	
14	e.35	e1.1	e.50	e.00	e.00	e20	e7.9	e1.6	e3.5	e.90	e.80	e1.5	
15	e.35	e1.2	e.40	e.00	e.00	e18	e7.4	e1.5	e2.5	e.90	e.80	e1.5	
										ries to			
16	e.35	e1.2	e.40	e.00	e.00	e15	e6.0	e1.5	e2.0	e.90	e.75	e1.5	
17	e.33	e1.2	e.42	e.00	e.00	e10	e4.5	e1.9	e1.9	e1.5	e.70	e1.5	
18	e.32	e1.3	e.44	e.00	e.00	e7.0	e3.8	e1.7	e1.8	e1.4	e1.0	e2.0	
19	e.30	e1.3	e.45	e.00	e.00	e6.0	e3.6	e1.8	e1.5	e1.2	e4.0	e3.0	
20	e.35	e1.4	e.40	e.00	e.00	e5.0	e3.9	e1.6	e1.3	e1.1	e2.5	e2.5	
21	e.40	e1.4	e.40	e.00	e.00	e3.5	e3.6	e1.5	e1.3	e1.0	e2.0	e2.0	
22	e.60	e1.4	e.40	e.00	e.00	e3.0	e3.6	e1.4	e1.2	e.90	e2.0	e1.6	
	e.58	e1.5	e.35	e.00	e.00	e3.5	e3.5	e1.3	e1.1	e.85	e1.5	e1.5	
23								e2.0	e1.1	e.85	e1.1	e1.5	
24	e.50	e1.5	e.30	e.00	e.00	e4.5	e3.4			e.85	e1.0	e1.6	
25	e.50	e1.5	e.25	e.00	e.00	e10	e3.5	e2.0	e1.1	e.05	e1.0	61.0	
26	e.45	e1.3	e.20	e.00	e.00	e19	e4.0	e1.8	e1.1	e.80	e1.0	e1.7	
27	e.45	e1.2	e.15	e.00	e.00	e20	e3.7	e1.5	e1.0	e.80	e1.1	e1.7	
28	e.42	e1.2	e.10	e.00	e.00	e25	e3.3	e1.5	e1.0	e1.2	e2.0	e1.7	
29	e1.0	e1.5	e.07	e.00		e60	e3.3	e3.0	e2.5	e2.0	e1.8	e1.6	
30	e2.0	e1.6	e.04	e.00		e55	e3.2	e2.9	e2.0	e1.8	e1.6	e1.6	
31	e1.5		e.03	e.00		e50		e2.3		e1.4	e1.7		
21	e1.5		e.05	e.00		600		62.5		61.4			
TOTAL	15.55	39.6	22.80	0.01	0.00	417.30	316.3	63.3	55.2	32.83	37.69	55.1	
MEAN	.50	1.32	.74	.000	.00	13.5	10.5	2.04	1.84	1.06	1.22	1.84	
MAX	2.0	1.6	2.2	.01	.00	60	45	3.0	4.0	2.0	4.0	3.0	
MIN	.30	1.1	.03	.00	.00	.00	3.2	1.3	1.0	.80	.60	1.2	
AC-FT	31	79	45	.02	.0	828	627	126	109	65	75	109	
	-								-				

TOTAL 708.87 MEAN 1.94 MAX 80 MIN .00 AC-FT 1410 TOTAL 1055.68 MEAN 2.89 MAX 60 MIN .00 AC-FT 2090 CAL YR 1988 WTR YR 1989

e - Estimated

05054500 SHEYENNE RIVER ABOVE HARVEY, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	CIFIC CON- DUCT- ANCE D (US/CM)	PH (STAND- ARD UNITS) (00400)	TEMPE ATUR AIR (DEG (0002	E ATUI WATI C) (DEG	RE ER C)	COLOR (PLAT- INUM- COBALT UNITS) (OOO80)	OXYGEN DIS- SOLVE (MG/I (00300	CEN D SATU) ATIO	- HAF ED NES - TOT T (MC R- AS N) CAC	SS TAL G/L	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	DIS- SOLVED (MG/L AS MG)
OCT 14	1025	0.3	5 1360	8.81	16	.0	9.0	50	6.	8	59	100	24	10
NOV 21	1405	1.4	1480	8.33	0	.0	0.0	23	11.	4	78	110	26	12
MAR 27	1434	19	860	7.58	4	.0	0.5	100	9.	0	63	140	29	16
APR 06	1324	15	860		5	.0	0.5			20				
MAY 24	1051	2.0	1280	8.04	18	.0 1	5.5		6.	0	61	150	32	16
AUG 03	1142	0.8	9 1390				6.0	110	4.		50	86	20	8.7
SEP 07	1306	1.2					8.5	80	8.		93	110	25	11
DATE	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIU PERCEN	T RATIO	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	LAB	Y SULFA DIS- L SOL' (MG,	ATE VED /L	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVE (MG/L AS F)	DIS- SOLV D (MG/ AS SIO2	AT TED DEC	IDUE	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLVED (TONS PER AC-FT)
OCT	740											075	045	4 05
NOV NOV	310		6 14	4.4	566	180		16	0.3			935	915	
21 MAR_	290		4 12	4.9	586	210		17	0.4			976	952	
27 MAY	160		0 6	9.6	287	180		11	0.1			603	600	
24 AUG	250		8 9	5.4	528	180		14	0.3			883	844	
03 SEP	310		8 15	7.2	577	180		17	0.4			958	927	
07	270	- 8	4 12	5.6	528	170		15	0.3	0 36		873	850	1.19
DATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NO2+NO DIS- SOLVE (MG/L AS N)	PHOS- PHOROUS DIS- D SOLVED (MG/L AS P)	DIS-	ARSEN DIS SOLV (UG/ AS A	DIS- ED SOLVI L (UG	ED /L BA)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIU DIS- SOLVE (UG/L AS CD	DIS- D SOLV (UG/) AS C	COBA DIS ED SOLV L (UC R) AS	S- VED G/L CO)	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	IRON, DIS- SOLVED (UG/L AS FE) (01046)
OCT 14	0.88	<0.10	0 0.140			_		860		_				
NOV 21	3.74	<0.10	0 0.140					750	-	-				44
MAR 27	31.6	0.25	0 0.340	90		2	42	360	<	1	2	<1	1	310
MAY 24	4.67	<0.10	0 0.250					680		_				
AUG 03	2.30	<0.10	0.360	100		3	45	890	<	1	<1	1	8	220
SEP 07	2.83	<0.10	0 0.180	- 2				730	-	-				
		LEAD, DIS- SOLVED (UG/L AS PB) 01049)	LITHIUM DIS- SOLVED (UG/L AS LI)	DIS- SOLVED (UG/L AS MN)	ERCURY DIS- SOLVED (UG/L AS HG) 71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	D S (A	CKEL, IS- OLVED UG/L S NI)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) D1145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVEI (UG/L AS V) (01085)) S(OLVED UG/L S ZN)	YANIDE TOTAL (MG/L AS CN) 00720)
MAR 27.		<5	71	170	<0.1	<1		1	<1	150	8	3	20	<0.010
AUG 03.		1	120	51	<0.1	<4		7	<1	140	2	2	<3	<0.010

05056000 SHEYENNE RIVER NEAR WARWICK, ND

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

DRAINAGE AREA.--2,070 $\rm mi^2$, approximately, of which about 1,310 $\rm mi^2$ is probably noncontributing, including 227 $\rm mi^2$ in closed basins.

WATER-DISCHARGE RECORDS

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

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

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

REMARKS.--Estimated daily discharges: Nov. 15-17, Feb. 1-4, and Apr. 13-16. Records good except those for periods of estimated daily discharge, which are fair.

AVERAGE DISCHARGE.--40 years, 56.0 ft3/s, 40,570 acre-ft/yr; median of yearly mean discharges, 51 ft3/s, 36,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,660 ft³/s, Apr. 14, 1969, gage height, 7.51 ft; maximum gage height, 7.83 ft, Apr. 18, 1956; no flow Aug. 7 to Sept. 1, Sept. 3-9, 1961.

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

EXTREMES FOR CURRENT YEAR. -- Peak discharges greater than base discharge of 200 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 7	1945	710	4.02	No other pea	k greater t	chan base discharge.	

Minimum daily discharge, 0.17 ft3/s, Aug. 6-8.

		5100iii		0 1001 1011	M	EAN VALUE	S .	, 500 10		,-,			
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
1 2 3 4 5	1.5 2.2 2.9 3.7 4.7	3.3 3.4 3.6 4.3 4.4	3.6 3.7 3.8 3.6 3.7	3.7 3.8 3.7 3.7 4.0	e4.2 e4.0 e3.8 e3.8	3.5 3.2 3.3 3.2 3.2	15 30 62 80 176	35 34 33 35 33	11 9.8 11 10 9.1	.63 .59 .57 .51	.40 .26 .26 .23	.54 .43 .78 .72 .65	
6 7 8 9	5.5 5.1 3.1 2.0	4.4 4.7 4.4 4.5 4.4	3.9 3.9 3.7 3.4 3.2	4.2 4.4 4.2 4.0 4.0	4.0 3.9 3.6 3.4 3.4	3.2 3.2 3.3 3.4	417 662 620 513 419	32 27 25 25 22	8.1 6.7 6.3 5.4 4.5	.37 .38 .30 .39 .29	.17 .17 .17 .18	.79 1.2 1.4 .88 .76	
11 12 13 14 15	.86 .83 .98 2.1 2.7	4.3 4.5 4.5 4.0 e4.5	2.7 2.7 3.1 3.4 3.2	3.9 3.4 3.6 3.7 3.7	3.4 3.5 3.5 3.5 3.6	3.7 3.7 3.8 4.0	350 319 e280 e250 e215	23 23 24 23 19	4.1 4.4 4.0 4.8 4.2	.37 .36 .26 .22 .20	.19 .23 .25 .27 .29	1.3 .77 .70 .64	
16 17 18 19 20	1.5 1.8 2.3 2.4 2.7	e4.0 e3.9 3.7 3.7	3.0 3.2 3.2 3.7 3.7	3.7 3.7 3.7 3.7 3.7	3.5 3.4 3.2 3.2 3.2	4.1 4.0 4.0 4.0 4.1	e200 160 117 104 87	17 19 21 25 28	3.7 3.6 3.7 3.4 3.1	.20 .27 .29 .23 .22	.31 2.0 2.1 .45	.69 .76 .66 .66	
21 22 23 24 25	2.1 2.8 2.2 2.3 2.8	3.7 3.7 3.8 4.0	3.9 3.9 4.0 4.0	3.7 3.7 4.0 4.0	3.2 3.2 3.1 3.0 3.3	4.0 4.5 4.6 4.8	71 63 60 52 54	26 24 21 19 16	2.8 2.5 3.2 2.8 3.6	.23 .22 .25 .27 .29	.38 .38 .32 .26	.66 .58 .76 .76	
26 27 28 29 30 31	2.4 2.7 2.0 2.2 2.7 3.4	3.9 4.0 4.1 3.9 3.7	4.2 4.1 4.0 4.0 3.9 3.7	4.0 4.0 4.0 4.0 4.0	3.5 3.4 3.3	5.0 5.9 7.1 7.8 8.0 9.7	55 50 43 35 35	14 15 15 16 14 12	3.0 .90 .83 .91 .62	.25 .22 .41 .71 .63	.30 .26 .47 .36 .27	.76 .76 .75 .67	
TOTAL MEAN MAX MIN AC-FT	77.46 2.50 5.5 .83 154	120.7 4.02 4.7 3.3 239	112.1 3.62 4.2 2.7 222	120.2 3.88 4.4 3.4 238	98.0 3.50 4.2 3.0 194	137.5 4.44 9.7 3.2 273	5594 186 662 15 11100	715 23.1 35 12 1420	142.06 4.74 11 .62 282	11.05 .36 .71 .20 22	12.33 .40 2.1 .17 24	22.90 .76 1.4 .43 45	

CAL YR 1988 TOTAL 5444.08 MEAN 14.9 MAX 143 MIN .01 AC-FT 10800 WTR YR 1989 TOTAL 7163.30 MEAN 19.6 MAX 662 MIN .17 AC-FT 14210

e - Estimated

05056000 SHEYENNE RIVER NEAR WARWICK, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DISCHARGINST CUBI FEE PER SECO (0006	E, SPE- CIFIC CON- DUCT- ANCE ND (US/CM	PH (STAND- ARD) UNITS)	AIR (DEG C	ATURE WATER () (DEG C	(MG/I AS CACO	CALCIU L DIS- L SOLVE (MG/L 3) AS CA	DIS- ED SOLVE (MG/L	DIS- DIS- DIS- MG/L AS NA	SODIUI) PERCEN	C RATIO
OCT 13	1050	1.	0 69	0	- 11.	0 13.	.0					
NOV 17	1040	3.	9 66	5	6.	0 3.	.0					
29	1055	4.	0 63	0	-16.	0 0.	5		200			
FEB 21	1530	3.	1 66	5	-7.	0 0.	.0					-
MAR 16	1005	4.	99	0	-18.	5 0.	.0					
APR 14	1015	211	60	0 7.12	2 4.	5 0.	5 16	60 34	19	57	4:	2 2
MAY 22	1055	25	91	5	17.	5 18.	.0 .					
JUL 11	0945	0.	42 52	0	. 22.	0 19.	.0					
AUG 03	1130	0.:	29 45	0 7.53	32.	5 27.	.0 20	00 42	22	25	2.	0.8
SEP 27	1105	0.	90 48	0	17.	0 10.	.0					
DATE	POTAS SIUM DIS- SOLVE (MG/L AS K) (00935	, BONAT FET-L D (MG/I AS HCO3	E, BONATE AB FET-LA L (MG/L AS) CO3)	B LAB (MG/L AS CACO3)		DIS- DIS- DIS- MG/L AS SO4	DIS- D SOLVI (MG/I	, RIDE, DIS- ED SOLVE L (MG/L L) AS F)	DIS- SOLVE D (MG/L AS SIO2)	AT 180 DEG. DIS- SOLVE (MG/L	E SUM OF CONSTIC TUENTS DIS-D SOLVED) (MG/L	SOLIDS, DIS- SOLVED (TONS PER AC-FT)
APR	7.0	400	0	450		470			0 44	46	8 36	0.61
14 AUG	7.9	190		150	23	130	9.1					
03	3.7		0	220	12	51	6.8		20 10	29		
D		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) (O1130)	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) (O1145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
APR 14. AUG		267	1	100	50	1	40	80	0.1	1	<10	180
03.	••	0.23	5	90	20	<1	20	10	0.1	1	2	190

05056060 MAUVAIS COULEE TRIBUTARY NO. 3 NEAR CANDO, ND

LOCATION.--Lat 48°27'28, long 99°14'06", in NW1/4 NW1/4 sec.6, T.157 N., R.66 W., Towner County, Hydrologic Unit 09020201, at bridge 2.1 mi south of Cando

DRAINAGE AREA .-- 60.2 mi2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--1955-71 (annual maximum discharges only), 1986-88 (discharge measurements only), March 1989 to September 1989.

GAGE. -- Non-recording gage. Elevation of gage is 1,460 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Apr. 6 to May 9. Records poor.

EXTREMES FOR CURRENT PERIOD. -- Maximum discharge, about 125 ft3/s on Apr. 11, gage height, unknown; no flow most of the time.

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
4						.00	.00	1.1	.00	.00	.00	.00
-								1.1				.00
1 2 3 4 5						.00	.00	.80 .56	.00	.00	.00	.00
2						.00	.00	.56	.00	.00	.00	.00
4						.00	.00	. 40	.00	.00	.00	.00
5						.00	•00	.25	.00	.00	.00	.00
6						.00	.36	.14	.00	.00	.00	.00
7						.00	3.0	.07	.00	.00	.00	.00
8						.00	15	.03	.00	.00	.00	.00
9						.00	15 86	.01	.00	.00	.00	.00
6 7 8 9						.00	110	.00	.00	.00	.00	.00
11						00	120	.00	.00	.00	.00	.00
						.00						
12						.00	110	.00	.00	.00	.00	.00
13						.00	90	.00	.00	.00	.00	.00
14						.00	78	.00	.00	.00	.00	.00
15						.00	70	.00	.00	.00	.00	.00
16						.00	63	.00	.00	.00	.00	.00
17						.00	63 56	.00	.00	.00	.00	.00
18						.00	54	.00	.00	.00	.00	.00
10							54	.00	.00	.00	.00	.00
19						.00	52	.00	.00			.00
20						.00	44	.00	.00	.00	.00	.00
21						.00	37	.00	00	.00	.00	.00
22						.00	31	.00	.00	.00	.00	.00
23						.00	25	.00	.00	.00	.00	.00
24						.00	19	.00	.00	.00	.00	.00
23 24 25						.00	19 14	.00	.00	.00	.00	.00
26						.00	9.0	.00	.00	.00	.00	.00
26 27						.00	6.0	.00	.00	.00	.00	.00
27											.00	.00
28						.00	3.5	.00	.00	.00	.00	.00
29						.00	2.5	.00	.00	.00	.00	.00
30						.00	1.7	.00	.00	.00	.00	.00
28 29 30 31						.00		.00		.00	.00	
TOTAL						0.00	1100.06	3.36	0.00	0.00	0.00	0.00
MEAN						.00	36.7	.11	.00	.00	.00	.00
MAX						.00	120	1.1	.00	.00	.00	.00
MIN						.00	.00	.00	.00	.00	.00	.00
MIN						.00	.00	.00	.00	.00	.00	.00

05056060 MAUVAIS COULEE TRIB NO. 3 NEAR CANDO, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1986 to current year.

PER ANCE ARD AIR WATER S SECOND (US/CM) UNITS) (DEG C) (DEG C) DATE TIME (00061) (00095) (00400) (00020) (00010) (0		L (A) (5)
APR 09 1220 86 295 6.86 2.0 0.0	12.8 89 110 26	
MAGNE- SIUM, SODIUM, SODIUM SIUM, BONATE, DIS- SOLVED SOLVED SORP- (MG/L (MG/L SODIUM TION (MG/L AS AS MG) AS NA) PERCENT RATIO AS K) HCO3) DATE (00925) (00930) (00932) (00931) (00935) (95440)	E, BONATE, LINITY DIOXIDE AB FET-LAB LAB DIS- (MG/L (MG/L SOLVED AS AS (MG/L CO3) CACO3) AS CO2)	
APR		
09 11 7.0 11 0.3 8.3 81	0 66 18	
SOLIDS, SOLIDS	SOLIDS, SOLIDS, - DIS- DIS- ARSENIC S, SOLVED SOLVED DIS (TONS (TONS SOLVED D PER PER (UG/L -) AC-FT) DAY) AS AS)	
APR		
09 54 4.4 0.10 11 168 162	52 0.23 39.0 1	
BORON, IRON, LEAD, LITHIUM NESE, MERCURY DIS- DIS- DIS- DIS- DIS- DIS- SOLVED SOLVED SOLVED SOLVED (UG/L (UG	DIS-	
APR 09 30 60 <1 10 20 0.	.1 1 4 130	

05056100 MAUVAIS COULEE NEAR CANDO. ND

LOCATION.--Lat 48°26'53", long 99°06'08", in SE1/4NE1/4SE1/4 sec.1, T.157 N., R.66 W., Towner County, Hydrologic Unit 09020201, on left bank 0.3 mi upstream from highway bridge, about 4 mi upstream from West Fork, 5.5 mi southeast of Cando, and 7 mi northeast of Maza.

DRAINAGE AREA .-- 387 mi2, of which about 10 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

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

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

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 14. Records good except those for period of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--26 years (water years 1957-82), 19.2 ft³/s, 13,910 acre-ft/yr; median of yearly mean discharges, 13 ft³/s, 9,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,660 ft³/s, Apr. 25, 1979, gage height, 11.18 ft; no flow at times each year.

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

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period March to September, 154 ft³/s, Apr. 15, gage height, 5.03 ft; maximum gage height, 5.71 ft, Apr. 14, backwater from ice; no flow Mar. 1-31 and July 20 to Sept. 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 2 3 4 5						e.00 e.00	e.01 e.02	9.8	.44	.05	.00	.00
3 .						e.00	e.05	7.1	.30	.06	.00	.00
4						e.00	e.10	6.1	.23	.05	.00	.00
5						e.00	e.20	5.4	.23	.04	.00	.00
6 7 8 9						e.00	e.30	5.0	.21	.03	.00	.00
7						e.00	e.60	4.7	.20	.02	.00	.00
8						e.00	e1.0	4.3	.16	.02	.00	.00
9						e.00	e2.0	4.2	.13	.03	.00	.00
10						e.00	e3.0	4.2 3.8	.11	.03	.00	.00
11						e.00	e10	6.3	.13	.03	.00	.00
12 13 14						e.00	e30	5.1	.25	.03	.00	.00
13						e.00	e50	5.6	.37	.02	.00	.00
14						e.00	e100	4.9	.38	.02	.00	.00
15						e.00	121	4.9 3.2	.37 .38 .26	.02	.00	.00
16						e.00	77	2.1	.19	.02	.00	.00
17						e.00	68	1.7	.16	.01	.00	.00
17 18						e.00	70	1.7	.15	.01	.00	.00
19						e.00	69	1.5	12	.01	.00	.00
20						e.00	69 66	1.5	.08	.0	.00	.00
21						e.00	63	1.2	.07	.00	.00	.00
22						e.00	63 55	1.0	.06	.00	.00	.00
23						e.00	44	1.0	.06	.00	.00	.00
24						e.00	34	.95	.05	.00	.00	.00
22 23 24 25						e.00	26	.87	.05	.0	.00	.00
26						e.00	21	.76	.05	.00	.00	.00
27						e.00	16	.69	.04	.00	.00	.00
28						e.00	13	.82	.04	.00	.00	.00
29						e.00	12	.71	.08	.00	.00	.00
30						e.00	11	.56	.07	.00	.00	.00
26 27 28 29 30 31						e.00		.56 .51		.00	.00	
TOTAL						0.00	963.28	101.53	5.03	0.56	0.00	0.00
MEAN						.00	32.1	3.28	.17	.018	.00	.00
MAX						.00	121	9.8	.44	.06	.00	.00
MIN						.00	.01	.51	.04	.00	.00	.00
AC-FT						.0	1910	201	10	1.1	.0	.0
AU-FI						.0	1310	201			.0	.0

e - Estimated

05056100 MAUVAIS COULEE NEAR CANDO, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	CIFIC CON- DUCT- ANCE (US/CM)		AIR (DEG C)	ATURE WATER (DEG C)	DIS- SOLVED (MG/L)	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)
APR 06 16 22	1735 1530 1100	0.32 74 56	240 400 450	6.82	0.0	5.0	9.1	72 83	150 200	37 47	15 19
10 JUN	1530	3.5	775	7.80	27.0	18.5	8.8	95	350	80	36
19	1525	0.12	1200		29.0	22.0					
DATE	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	RATIO	DIS- SOLVED (MG/L AS K)	BONATE, FET-LAB (MG/L AS HCO3)	(MG/L AS CO3)	(MG/L AS CACO3)	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)
APR 16 22	13 14	14 13			100 140	0	82 120	24 5.4	96 100	5.8 7.4	0.10 0.10
10	29	15	0.7	13	240	0	190	5.9	200	16	0.10
DATE	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. O DIS- SOLVED (MG/L) (70300)	SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)	DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (OO631)	GEN, AMMONIA DIS-	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 ORGANIC TOTAL (MG/L AS P) (00670)
APR 16 22	14 19	285 321				3.10 0.030	0.210 0.060	1.2	0.425	1.06	0.42
10	22	524	513	0.71	4.97	0.050	0.050	1.5	0.243	0.900	0.24
DAT	SOL (UG AS	S- D VED SO J/L (U AS) AS	IS- D LVED SO G/L (U B) AS	IS- D LVED SO G/L (U FE) AS	LVED SOI G/L (UC PB) AS	HIUM NE IS- D LVED SO G/L (U LI) AS	IS- D LVED SOI G/L (UG MN) AS	CURY DEN IS- DI LVED SOL G/L (UG	/L (UG MO) AS	M, TI S- DI VED SOL /L (UG SE) AS	SR)
APR 16 22 MAY 10		1 2 3	20 20 50	40 40 40	1 1	10 20 30		0.1 (0.1 (0.1		<10 <10	170 190 330
10			50	40		00	50		-	-	220

05056200 EDMORE COULEE NEAR EDMORE, ND

LOCATION.--Lat 48°20'14, long 98°39'33", in NW1/4 NW1/4 sec.17, T.156 N., R.62 W., Ramsey County, Hydrologic Unit 09020201, on right bank 50 ft upstream from bridge on county highway, 11 mi southwest of Edmore, and about 13 mi upstream from Sweetwater Lake.

DRAINAGE AREA .- - 382 mi2, of which about 100 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS .-- WSP 1728: Drainage area.

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

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

REMARKS .-- Estimated daily discharges: Apr. 6 to May. 2. Records fair.

AVERAGE DISCHARGE.--25 years (1957-82), 13.3 ft^3/s , 9,640 acre-ft/yr; median of yearly mean discharges, 9.2 ft^3/s , 6,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,110 ft³/s, Apr. 25, 1979, gage height, 87.10 ft; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 191 ft3/s, Apr. 18, gage height 84.75 ft; maximum observed gage height, 85.25 ft, Apr. 9, backwater from ice; no flow for 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	e35	.01	.00	.00	.00
2						.00	.00	e30	.01	.00	.00	.00
3						.00	.00	27	.0	.00	.00	.00
4						.00	.00		.0	.00	.00	.00
2 3 4 5						.00	.00	19 12	.00	.00	.00	.00
6						.00	e.01	8.2	.00	.00	.00	.00
7	*					.00	e.02	5.4	.00	.00	.00	.00
6 7 8 9						.00	e1.0	3.5	.00	.00	.00	.00
0						.00	e15	2.7	.00	.00	.00	.00
10						.00	e20	2.1	.00	.00	.00	.00
11						.00	e25	1.5	.00	.00	.00	.00
12								1.5	.00	.00	.00	.00
						.00	e30	1.2			.00	.00
13						.00	e35	.89	.00	.00		
14						.00	e40	-43	.00	.00	.00	.00
15						.00	e50	.17	.00	.00	.00	.00
16						.00	e70	.08	.00	.00	.00	.00
17						.00	e150	.07	.00	.00	.00	.00
18						.00	e180	.13	.00	.00	.00	.00
19						.00	e160	.10	.00	.00	.00	.00
20						.00	e140	.07	.00	.00	.00	.00
21						.00	e110	.06	.00	.00	.00	.00
22						.00	e100	.04	.00	.00	.00	.00
23						.00	e85	.04	.00	.00	.00	.00
21						.00	e75	.04	.00	.00	.00	.00
22 23 24 25						.00	e70	.03	.00	.00	.00	.00
26						.00	e62	.03	.00	.00	.00	.00
27						.00	e55	.02	.00	.00	.00	.00
20						.00	e50	.02	.00	.00	.00	.00
28 29									.00	.00	.00	.00
29						.00	e45	.02				
30 31						.00	e40	.01	.00	.00	.00	.00
31						.00		.01		.00	.00	
TOTAL						0.00	1608.03	149.86	0.02	0.00	0.00	0.00
MEAN						.00	53.6	4.83	.001	.00	.00	.00
MAX						.00	180	35	.01	.00	.00	.00
MIN						.00	.00	.01	.00	.00	.00	.00
AC-FT						.0	3190	297	.04	.0	.0	.0
									(Siesa)			

e - Estimated

05056200 EDMORE COULEE NEAR EDMORE, ND--CONTINUED

WATER-QUALITY RECORDS

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

		WALL	W-GOWDIII	DATA, WA	IBR IBAR	OCTOBER 1	900 10 001	I IIII III	,0)		
DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)			AIR (DEG C)	TEMPER- ATURE WATER (DEG C) (OOO10)	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)
APR 09 16 21	1830 1035 1500	20 59 112	275 430 430		7.0			66 72	100 150	26 38	8.5
MAY 11	1250	1.6	716	7.50	26.0	15.5	8.7	88	290	73	25
DATE	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)		DIS- SOLVED (MG/L AS K)	BONATE, FET-LAB (MG/L AS HCO3)	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)
APR 09	11	18	0.5	6.5	77	0	63	17	60	5.3	0.10
21	22	23			140	ő	120	8.4	78	6.9	0.10
MAY 11	36	20	1	16	260	0	210	13	150	12	0.20
DATE	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. O DIS- SOLVED (MG/L) (70300)	CONSTI-	SOLVED (TONS PER AC-FT)	DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS- PHOROUS TOTAL (MG/L AS P) (00665)	PHOS- PHOROUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)
APR 09 21	9.3	203 279	212 275			10.6	0.270	1.2	0.254	0.710	0.25
MAY 11	32	496				0.010		1.6	0.352	0.860	0.35
DA:	ARSE DI SOL (UG AS	NIC BO S- D VED SO /L (U AS) AS	RON, IR IS- D LVED SO G/L (U B) AS	ON, LE IS- D LVED SO G/L (U FE) AS	AD, LITI	MAHIUM NE IS- D LVED SO G/L (U LI) AS	NGA- SE, MERC IS- DI LVED SOL G/L (UG	MOLURY DEN S- DI VED SOL /L (UG HG) AS	YB- SEL IUM, NIU S- DI VED SOL (/L (UG MO) AS	E- STR M, TI S- DI VED SOL /L (UG SE) AS	ON- UM, S- VED /L SR)
APR 09 21 MAY	•	1 2	20 20	60 40	<1 8	10 20	30 10	0.1	<1 1	<10	120 160
11	•	5	60	30	1	30	30	0.1	4	3	280

05056215 EDMORE COULEE TRIBUTARY NEAR WEBSTER, ND

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

DRAINAGE AREA. -- 148 mi2, approximately, of which about 44 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- March 1986 to current year (seasonal). Discharge record available for 1986 water year in Bismarck.

GAGE.--Water-stage recorder. Datum of gage is 1400.00 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to October 1986 nonrecording gage at present site and datum.

REMARKS .-- Estimated daily discharges: Apr. 9-17, June 18, 21-24, and July 6. Records poor.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 739 ft3/s, Apr. 9, 1987, gage height, 72.48 ft; no flow at times most years.

EXTREMES OUTSIDE PERIOD OF RECORD. -- Flood in spring of 1959 reached a stage of about 75.00 ft, from conversation with local residents.

EXTREMES FOR CURRENT YEAR.--Maximum discharge observed, 100 ft³/s, Apr. 17, gage height, 70.90 ft; no flow for several months.

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

MEAN VALUES JUL AUG SEP DAY OCT NOV FEB MAR APR MAY JUN DEC TAN. .00 .00 5.3 .00 .00 .00 .00 .00 .00 2 .00 .00 .00 .00 3 .00 .00 .00 .00 .00 .00 1.0 .00 4 5 .00 .00 .94 .00 .00 .00 .83 .00 .00 .00 .00 .00 6 .00 .00 .62 .00 e.00 .00 .00 .00 .56 .00 .00 .00 .00 .00 8 .00 .00 .53 .00 .00 .00 .00 9 .00 .00 .48 .00 .00 .00 .00 10 .00 e.07 .48 .00 .00 .00 .00 11 .00 e.10 .16 .00 .00 .00 .00 12 .00 e.16 .00 .00 .00 .00 .00 13 .00 e.40 .00 .00 .00 .00 .00 .00 e2.0 .00 .00 .00 .00 .00 .00 15 .00 e7.6 .00 .00 .00 .00 .00 .00 .00 .00 .00 16 .00 e30 .00 .00 .00 .00 .00 17 .00 e100 .00 .00 .00 .00 e.40 18 .00 80 .00 .00 .00 .00 19 62 -00 1.8 .00 .00 .00 20 .00 50 .00 3.0 .00 .00 36 31 25 .00 .00 21 e4.0 .00 .00 .00 e2.8 .00 .00 .00 22 .00 .00 e2.0 .00 .00 .00 23 17 .00 .00 .00 .00 e1.5 24 .00 .00 .00 .00 25 .00 14 1.1 .00 .00 .00 12 .00 .53 .00 26 .00 .00 .29 .00 .00 .00 27 12 .00 .00 .00 28 .00 12 .00 .00 .02 .00 .00 .00 29 .00 13 .00 30 .00 9.0 .00 .00 .00 .00 31 .00 .00 .00 .00 ---0.00 17.44 0.00 0.00 TOTAL 0.00 513.33 13.00 MEAN .42 .58 .00 .00 17.1 .00 .00 .00 100 5.3 .00 -00 .00 MAX .00 .00 .00 .00 .00 -00 -00 .0 .0 1020 26 35 .0 .0 AC-FT

e - Estimated

05056215 EDMORE COULEE TRIBUTARY NEAR WEBSTER, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1986 to current year.

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	CIFIC CON- DUCT- ANCE (US/CM)		AIR (DEG C)	ATURE WATER (DEG C	(MG/I AS) CACO	CALCI L DIS- L SOLV (MG/	DIS- ED SOLVE L (MG/L A) AS MG	DIS- D SOLVED (MG/L) AS NA	SODIUM) PERCENT	
APR 15 17 21 JUN	1615 1530 1700	7.6 100 33	450 340 430	6.81	1.0	4.	5 1	30 33	₁₁ -	- - 14 -	- 18	0.6
19	1615	1.7	-		30.0	23.	5 .	-				
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE, FET-LAE (MG/L AS HCO3) (95440)	BONATE, FET-LAE (MG/L AS CO3)	LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVEI (MG/L AS CO2)	SULFAT DIS- DIS- DIS- DIS- DIS- DIS- DIS- DIS-	DIS- D SOLVI (MG/I	RIDE DIS SOLV (MG/L) AS F	DIS- SOLVE ED (MG/L AS SIO2)	AT 180 D DEG. DIS- SOLVE (MG/L	E SUM OF CONSTI- C TUENTS, DIS- D SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS
APR 17	8.3	99	0	81	24	79	4.	7 0.	10 17	24	0 216	0.33
D.	(OLVED TONS PER DAY)	ARSENIC DIS- SOLVED (UG/L AS AS) O1000) (BORON, DIS- SOLVED (UG/L AS B) O1020) (IRON, DIS- SOLVED (UG/L AS FE)		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)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) O1080)
APR 17.		64.5	3	20	40	1	10	30	0.1	1	1	140

05056222 MORRISON LAKE NEAR WEBSTER, ND

LOCATION.--Lat 48°15'35", long 98°50'48", in NW1/4 sec.11, T.155 N., R.64 W., Ramsey County, Hydrologic Unit 09020201, on northwest shoreline of Morrison Lake.

DRAINAGE AREA. -- 501 mi2, approximately.

GAGE-HEIGHT RECORDS

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

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

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

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height recorded, 62.02 ft, Apr. 13, 1987; minimum recorded, 55.86 ft, Sept. 30, 1989.

EXTREMES FOR CURRENT YEAR. -- Maximum gage height recorded, 58.23 ft, May 18; minimum recorded, 55.86 ft, Sept. 30.

GAGE HEIGHT,	FEET,	WATER YEAR	ROCTOBER	1988	TO	SEPTEMBER	1989	
		MEAN	VALUES					

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	56.25	56.06	56.06	56.06	56.30			57.33	57.36			
2	56.25	56.06	56.06	56.06	56.30			57.37				
3	56.19	56.06	56.06	56.08	56.30			57.41				
4	56.21	56.06	56.06	56.11	56.30			57.38				
5	56.19	56.06	56.06	56.13	56.30		56.29	57.31				
6	56.19	56.06	56.06	56.13	56.30		56.22	57.35				
7	56.20	56.06	56.06	56.14	56.30		56.20	57.40		56.96		
8	56.19	56.07	56.06	56.17	56.31		56.22	57.40				
9	56.16	56.06	56.06	56.17	56.31		56.21	57.41				
10	56.13	56.04	56.06	56.19	56.31		56.19	57.43				-
11	56.13	56.04	56.06	56.22	56.32		56.18	57.48				
12	56.15	56.04	56.05	56.24		56.31	56.17	57.54				
13	56.16	56.02	56.05	56.25		56.31		57.53				
14	56.15	56.01	56.05	56.26		56.32		57.48				
15	56.14	56.03	56.05	56.27		56.27		57.44				
16	56.13	56.04	56.05	56.27		56.29		57.62				
17	56.14	56.04	56.05	56.28				57.91				
18	56.14	56.04	56.05	56.28				58.09				
19	56.15	56.04	56.05	56.28				57.74				
20	56.14	56.04	56.05	56.28				57.64				
21	56.12	56.04	56.05	56.28				57.89				
22	56.15	56.05	56.05	56.28				57.73				
23	56.05	56.06	56.05	56.28				57.76				
24	56.08	56.07	56.05	56.28				57.79				
25	56.07	56.07	56.05	56.28				57.80				
26	56.08	56.06	56.05	56.29			56.93	57.71	57.10			56.16
27	56.02	56.06	56.05	56.30			57.07	57.73	57.04			56.07
28	56.03	56.06	56.04	56.30			57.12	57.67				56.07
29	56.05	56.06	56.05	56.30			57.18	57.48				56.06
30	56.06	56.06	56.06	56.30			57.26	57.36				55.98
31	56.06		56.06	56.30				57.33				
MEAN	56.13	56.05	56.05	56.23				57.56				
MAX	56.25	56.07	56.06	56.30				58.09				
MIN	56.02	56.01	56.04	56.06				57.31				

05056239 STARKWEATHER COULEE NEAR WEBSTER, ND

LOCATION.--Lat 48°19'13", long 98°56'23", in NW1/4SW1/4NW1/4 sec.19, T.156 N., R.64 W., Ramsey County, Hydrologic Unit 09020201, on right bank 3.8 mi northwest of Webster.

DRAINAGE AREA. -- About 310 mi2, of which about 100 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- October 1979 to current year (seasonal records only since 1988).

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

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 13. Records good except those for period of estimated daily discharges, which are fair.

AVERAGE DISCHARGE. -- 8 years (water years 1980-87), 11.1 ft3/s, 8,040 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge observed, 570 $\rm ft^3/s$, Apr. 11, 1987, gage height, 8.50 $\rm ft$; maximum gage height, 10.05 $\rm ft$, Apr. 6, 1989, backwater from ice; no flow for many months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 292 ft³/s, Apr. 16, gage height, 7.55 ft; maximum gage height, 10.05 ft, Apr. 6, backwater from ice; no flow for several months.

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
	001		DEC	OAN	rab							
1						e.00	e.00	9.2	.04	.00	.00	.00
2						e.00	e.00	6.5	.01	.00	.00	.00
3						e.00	e.00	4.6	.00	.00	.00	.00
4						e.00	e.00	4.4	.00	.00	.00	.00
2 3 4 5						e.00	e.00	4.2	.00	.00	.00	.00
6						e.00	e2.0	2.8	.00	.00	.00	.00
7						e.00	e9.0	2.7	.00	.00	.00	.00
à						e.00	e20	1.9	.00	.00	.00	.00
a						e.00	e40	1.3	.00	.00	.00	.00
6 7 8 9						e.00	e60	.84	.00	.00	.00	.00
11						e.00	e75	.49	.00	.00	.00	.00
12						e.00			.00	.00	.00	.00
12							e95	.24				
13						e.00	e110	.16	.00	.00	.00	.00
14						e.00	124	.19	.00	.00	.00	.00
15						e.00	267	.16	.00	.00	.00	.00
16						e.00	289	.07	.00	.00	.00	.00
17						e.00	251	.13	.00	.00	.00	.00
18						e.00	213	.88	.00	.00	.00	.00
19						e.00	199	.98	.00	.00	.00	.00
20						e.00	187	2.8	.00	.00	.00	.00
21						e.00	176	1.7	.00	.00	.00	.00
21								1.1				
22						e.00	159	1.1	.00	.00	.00	.00
23 24						e.00	140	1.1	.00	.00	.00	.00
24						e.00	115	•99	.00	.00	.00	.00
25						e.00	93	.69	.00	.00	.00	.00
26						e.00	80	.53	.00	.00	.00	.00
27						e.00	65	.29	.00	.00	.00	.00
27 28 29						e.00	42	.22	.00	.00	.00	.00
20						e.00	26	.11	.00	.00	.00	.00
30						e.00	17	.08	.00	.00	.00	.00
30 31							17	.07		.00	.00	
31						e.00	-	.07		.00	.00	
TOTAL						0.00	2854.00	51.42	0.05	0.00	0.00	0.00
MEAN						.00	95.1	1.66	.002	.00	.00	.00
MAX						.00	289	9.2	.04	.00	.00	.00
MIN						.00	.00	.07	.00	.00	.00	.00
AC-FT						.0	5660	102	.1	.0	.0	.0
AC-FI						.0	2000	102				

e - Estimated

05056239 STARKWEATHER COULEE NEAR WEBSTER, ND--CONTINUED

WATER-QUALITY RECORDS

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

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)	OXYGEN, DIS- SOLVEI (MG/L) (00300)	CENT SATUR- ATION)	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 07 15 21	1110 1345 1135	9.5 275 178	155 375 420	7.00 6.80	2.0 13.5 16.5	0.0 6.0 10.0	9.9 11.8	96	51 140	13 34	4.5 13
04	1245 1630	4.2	630 575	7.70	18.5 22.5	15.5 18.5	9.2		280	72	25
DATE	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	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)		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)
APR 07 15 MAY	6.0 14	18 17	0.4	6.2 10	42 98	0	34 80	6.7 25	17 84	3.2 12	0.10 0.10
04	18	11	0.5	15	240	0	190	7.5	110	10	0.20
DATE	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVEI (MG/L AS N) (00608)	GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS- PHOROUS TOTAL (MG/L AS P) (00665)	PHOS- PHOROUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)
APR 07 15 MAY	15 17	93 261	150 272	0.13 0.35	2.39 194	14.5 9.01	0.260		0.364	1.04	0.36
04	33	435	402	0.59	4.97	0.410	0.057	1.7	0.314	0.732	0.31
Ŋ	SOI (UC	IS- DI LVED SOL G/L (UG AS) AS	VED SOL L/L (UC B) AS	IS- DI LVED SOI I/L (UC FE) AS	IS- DI LVED SOI I/L (UC PB) AS	HIUM NES IS- DI LVED SOI I/L (UC LI) AS	IS- II LVED SO G/L (I MN) AS	CURY DEN DIS- DI DLVED SOI JG/L (UC	MO) AS	M, TI S- DI VED SOL /L (UG SE) AS	VED J/L SR)
APR 07 15 MAY 04	•	2 3 5	20 20 20	310 40 20	<1 1	10 20 20	20 10	0.1 0.1 <0.1	<1 1 3	2 1 <10	50 150 260

05056241 DRY LAKE NEAR PENN, ND

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

DRAINAGE AREA .-- 920 mi2, approximately.

GAGE-HEIGHT RECORDS

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

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

REMARKS .-- Stage affected by wind.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height recorded, 50.32 ft, Apr. 20, 1987, affected by wind; minimum recorded, 43.57 ft, Sept. 29, 1989, affected by wind.

EXTREMES FOR CURRENT YEAR.--Maximum gage height recorded, 45.96 ft, May 4, affected by wind; minimum recorded, 43.57 ft, Sept. 29.

GAGE	HEIGHT,	FEET,	WATER	YEAR	OCTOBER	1988	TO	SEPTEMBER	1989
			N	MEAN Y	VALUES				

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1								45.28	44.98	44.74		
2								45.29	45.07	44.85	44.37	
3								45.24	45.03	44.82	44.38	
4								45.41	44.96	44.70		
5											44.32	
	242							45.52	44.97	44.75	44.49	
6								45.23	44.88	44.81	44.35	
7								45.21	45.16	44.65	44.31	
8								45.28	44.98	44.69	44.29	
9								45.23	44.93	44.76	44.26	
10								45.13	44.83	44.76	44.21	
11								44.88	44.85	44.74	44.21	11 76
12								45.03	45.13		44.21	44.36
13								45.14		44.76		
14									45.22	44.71	44.38	
15						44.05		45.14	45.00	44.67	44.27	
15							44.35	45.10	44.95	44.65	44.16	
16							44.71	44.95	44.83	44.60		
17							44.61	45.06	44.93	44.53		
18							44.70	45.14	44.91	44.65		
19							44.80	45.16	44.87	44.60	44.20	
20							44.89	45.08	44.84	44.57	44.20	
21							44.91	45.08	44.92	44.51		
22							44.94	45.14	44.86	44.42		
23							45.07	45.14	44.87	44.42		
24							45.25					
25							1, 30 m. / 37 m.	45.12	44.82	44.41		
2)								45.14	44.83	44.39		
26							45.39	45.15	44.73	44.53		43.68
27							45.43	44.92	44.79	44.53		43.72
28							45.38	45.25	44.75	44.44		43.87
29							45.39	45.20	44.86	44.46		43.72
30							45.31	45.07	44.84	44.46		43.72
31								45.03		44.40	44.21	47.12
MEAN								45 45	44.00			
MAX								45.15	44.92	44.61		
MIN								45.52	45.22	44.85		
MIN								44.88	44.73	44.39		

05056390 LITTLE COULEE NEAR BRINSMADE, ND

LOCATION.--Lat 48°11'15", long 99°14'34", in SW1/4 sec.2, T.154 N., R.67 W., Benson County, Hydrologic Unit 09020201, on right bank 100 ft downstream from bridge on township road, 0.5 mi downstream from Silver Lake, and 4 mi east of Brinsmade.

DRAINAGE AREA .-- 350 mi2, of which about 160 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

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

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

REMARKS.--Estimated daily discharges: Mar. 1 to Apr. 19. Records good except those for period of estimated daily discharge, which are poor.

AVERAGE DISCHARGE. -- 7 years (water years 1976-82), 7.02 ft3/s, 5,090 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 425 ft³/s, May 1, 1979, gage height, 10.43 ft; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 0.30 ft3/s, Apr. 6, gage height, 7.42 ft, backwater from ice; maximum gage height, 7.58 ft, Apr. 3, backwater from ice; no flow for many months.

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	.00	.00	.00	.00	.00
2						e.00	e.00	.00	.00	.00	.00	.00
~							e.00			.00	.00	.00
2 3 4 5						e.00	e.00	.00	.00			.00
4						e.00	e.00	.00	.00	.00	.00	.00
5						e.00	e.10	.00	.00	.00	.00	.00
6 7 8 9						e.00	e.20	.00	.00	.00	.00	.00
7						e.00	e.15	.00	.00	.00	.00	.00
8						e.00	e.10	.00	.00	.00	.00	.00
9						e.00	e.08	.00	.00	.00	.00	.00
10						e.00	e.07	.00	.00	.00	.00	.00
						6.00						
11						e.00	e.06	.00	.00	.00	.00	.00
12						e.00	e.05	.00	.00	.00	.00	.00
13						e.00	e.05	.00	.00	.00	.00	.00
14						e.00	e.04	.00	.00	.00	.00	.00
15						e.00	e.02	.00	.00	.00	.00	.00
16						e.00	e.00	.00	.00	.00	.00	.00
17						e.00	e.00	.00	.00	.00	.00	.00
18						e.00	e.00	.00	.00	.00	.00	.00
19						e.00	e.00	-00	.00	.00	.00	.00
20						e.00	.00	.00	.00	.00	.00	.00
21						e.00	.00	.00	.00	.00	.00	.00
22						e.00	.00	.00	.00	.00	.00	.00
23						e.00 e.00	.00	.00	.00	.00	.00	.00
24						e.00	.00	.00	.00	.00	.00	.00
25						e.00	.00	.00	.00	.00	.00	.00
26 27						e.00	.00	.00	.00	.00	.00	.00
27						e.00	.00	.00	.00	.00	.00	.00
28						e.00	.00	.00	.00	.00	.00	.00
29						e.00	.00	.00	.00	.00	.00	.00
30						e.00	.00	.00	.00	.00	.00	.00
28 29 30 31						e.00		.00		.00	.00	
21						6.00	-	.00	-	.00	.00	
TOTAL						0.00	0.92	0.00	0.00	0.00	0.00	0.00
MEAN						.00	.031	.00	.00	.00	.00	.00
MAX						.00	.20	.00	.00	.00	.00	.00
MIN						.00	.00	.00	.00	.00	.00	.00
AC-FT						.0	1.8	.0	.0	.0	.0	.0
										11.4		

e - Estimated

05056400 BIG COULEE NEAR CHURCHS FERRY, ND

LOCATION.--Lat 48°10'40", long 99°13'15", in NW1/4NW1/4 sec.12, T.154 N., R.67 W., Benson County, Hydrologic Unit 09020201, on right bank on downstream side of bridge on U.S. Highway 281, 1 mi downstream from Little Coulee, and 6 mi south of Churchs Ferry.

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

WATER-DISCHARGE RECORDS

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

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

REMARKS.--Estimated daily discharges: Mar. 27 to Apr. 11. Records fair except those for period of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--11 years (water years 1979-89), 38.1 ft³/s, 27,600 acre-ft/yr; median of yearly mean discharges, 16 ft³/s, 11,590 acre-ft/yr. Twenty-eight years prior to construction of Channel A (water years 1951-78), 37.3 ft³/s, 27,020 acre-ft/yr; median of yearly mean discharges (1951-78), 7.8 ft³/s, 5,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 1,420 ft³/s, May 6, 1979, gage height, 7.59 ft; no flow at times each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 25 ft³/s, Apr. 14, gage height, 1.61 ft; maximum gage height, 2.26 ft, Apr. 2, backwater from ice; no flow for several months.

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 .00 .00 .00 .00 .00 e2.0 .32 .08 .00 .00 .00 2 .00 .00 .00 .00 .00 .00 e3.0 .21 .08 .00 .00 .00 3 .00 .00 .00 .00 .00 .00 e4.0 .20 .07 .00 .00 .00 .00 .00 .00 .00 e5.0 .15 .06 .00 .00 .00 5 .00 .00 .00 .00 .00 .00 e6.0 .10 .05 .00 .00 .00 6 .00 .00 -00 .00 .00 .00 .00 .00 e5.0 .11 -04 .00 .00 .00 .00 .00 .00 .00 .00 e4.7 .13 -04 .00 .00 8 .00 .00 -00 .00 .00 .00 e4.4 .13 .04 .00 .00 .00 .00 9 .00 -00 -00 .00 .00 .00 e4.0 .12 .05 -00 .00 10 .00 .00 -00 -00 -00 -00 -00 .00 e3.7 .12 -04 -00 .00 .00 .00 .00 .00 .00 11 -00 -00 -00 .05 e3.1 .12 .00 .00 .00 -00 -00 .00 -00 .00 .00 .12 -09 12 4.1 .00 .00 .00 .00 -00 -00 .00 7.0 -10 13 -00 -00 .11 .00 .00 .00 .00 .00 .00 14 -00 -00 -00 16 -10 .11 .00 .00 .00 15 .00 .00 .00 -00 .09 .00 -00 12 -10 16 .00 .00 .00 .00 .00 6.2 .09 .07 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .10 .05 .00 .00 .00 17 3.4 .00 .00 .00 .00 .00 .02 .00 .00 .00 18 .00 .11 19 .00 .00 .00 .00 .00 .00 1.3 .09 .00 .00 .00 .00 20 .00 .00 .00 .00 .00 .00 1.0 .09 .00 .00 .00 .00 21 .00 .00 .00 .00 .00 .00 .50 .09 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 2.1 .09 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 3.8 .09 .00 .00 .00 .00 24 .00 .00 .00 .00 .00 .00 1.9 .10 .00 .00 .00 .00 25 .00 .00 .00 .00 .00 .00 1.5 .09 .00 .00 .00 -00 00 26 .00 .00 .00 .00 .00 .00 1.3 .09 .00 .00 .00 27 .00 .00 .00 .00 .00 e.02 .09 .00 .00 .00 .00 .93 -00 28 .00 .00 .00 .00 .00 e.04 .09 .00 .00 .00 29 .00 .00 .00 .00 e.10 .56 .09 .00 .00 .00 -00 .00 30 .00 .00 .00 .00 e.50 .38 .09 .00 .00 -00 31 .00 .00 .00 e1.0 .09 ---.00 .00 ---0.00 0.00 0.00 0.00 TOTAL 0.00 0.00 3.62 1.13 0.00 0.00 1.66 112.17 .00 .00 .00 .00 .00 .038 .00 MEAN .00 -00 .054 3.74 .12 .00 .00 .00 .00 .00 .00 .32 .00 .00 16 .11 MAX 1.0 .09 .00 .00 .00 .00 .00 .00 .00 .00 -00 -00 . 38 MTN 2.2 .0 .0 -0 .0 .0 3.3 222 AC-FT -0 -0

CAL YR 1988 TOTAL 408.59 MEAN 1.12 MAX 18 MIN .00 AC-FT 810 WTR YR 1989 TOTAL 118.58 MEAN .32 MAX 16 MIN .00 AC-FT 235

e - Estimated

05056400 BIG COULEE NEAR CHURCHS FERRY, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (OO4OO)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER- ATURE WATER (DEG C) (00010)	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)
APR 06 14 20	1445 1325 1700	5.4 19 1.2	1200 970 1500		8.0 6.0 14.5	1.0 3.0 13.5	6.4	45 119	390 560	97 140	36 51
DATE	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	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)
APR 06 20	94 130	33 33	2 2	16 21	140 190	0	110 160	33 24	410 600	48 49	0.10
DATE	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI-	SOLIDS, DIS- SOLVED (TONS	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (OO631)	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 ORGANIC TOTAL (MG/L AS P) (00670)
APR 06 20	12 20	792 1170			11.5 3.63	8.36 4.24	0.340	1.6	0.402 0.505	1.13 1.33	0.40
DA:	SOI (UC AS	IS- D LVED SO G/L (U AS) AS	IS- D LVED SO G/L (U B) AS	LVED SOI G/L (UC FE) AS	IS- DI LVED SOL	IIUM NES IS- DI IVED SOL I/L (UC LI) AS	IS- DI LVED SOL I/L (UG MN) AS	CURY DEN S- DI VED SOL I/L (UG HG) AS	S- DI VED SOL (UG MO) AS	M, TI S- DI VED SOL /L (UG SE) AS	UM, S- VED /L SR)
APR 06 20		2 , 5	90 110	70 40	1	50 70	370 250	0.1	4 5	3 2	330 460

05056410 CHANNEL A NEAR PENN, ND

LOCATION.--Lat 48°10'00", long 98°58'47", in SE1/4SW1/4Sw1/4 sec.11, T.154 N., R.65 W., Ramsey County, Hydrologic Unit 09020201, on right bank 200 ft upstream from U.S. Highway 2, 9 mi northwest of Devils Lake and 7 mi southeast of Penn.

DRAINAGE AREA .-- 930 mi2, approximately.

WATER-DISCHARGE RECORDS

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

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

REMARKS.--Estimated daily discharges: Oct. 1-11, 25-27, Nov. 15 to Apr. 14, July 27, 28, and Aug. 4-26. Records fair. Flow regulated by gate control on Dry Lake (station 05056241) 3 mi upstream.

AVERAGE DISCHARGE.--6 years (water years 1984-1989), 22.7 ft3/s, 16,450 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,090 ft³/s, Apr. 20, 1987, gage height, 42.87 ft; no flow at times each year.

EXTREMES FOR CURRENT YEAR. -- Maximum discharge, 73 ft³/s, May 4, gage height, 38.99 ft; no flow for several months.

DISCHARGE, CURIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

		DISCHA	RGE, CUBIC	FEET PER		WATER YI EAN VALUI	EAR OCTOBER ES	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e.01	.01	e.05	e.00	e.00	e.00	e.26	3.3	.04	.01	.01	.01
2	e.01	.05	e.05	e.00	e.00	e.00	e.55	4.0	.01	.01	.01	.01
3	e.01	.19	e.04	e.00	e.00	e.00	e1.8	2.8	.02	.01	.01	.01
3	e.01	.28	e.04	e.00	e.00	e.00	e3.0	17	.01	.01	e.01	.01
5	e.01	.16	e.03	e.00	e.00	e.00	e3.0	43	.02	.01	e.01	.01
6	e.01	.05	e.02	e.00	e.00	e.00	e2.9	6.8	.10	.01	e.01	.01
7	e.01	.18	e.01	e.00	e.00	e.00	e2.5	1.3	.16	.01	e.01	.01
8	e.01	.44	e.00	e.00	e.00	e.00	e1.5	2.6	.01	.01	e.01	.01
9	e.01	.26	e.00	e.00	e.00	e.01	e1.0	.82	.01	.01	e.01	.01
10	e.01	.24	e.00	e.00	e.00	e.02	e1.5	.51	.01	.01	e.01	.01
11	e.01	.26	e.00	e.00	e.00	e.02	e3.0	.15	.03	.01	e.01	.01
12	.01	.28	e.00	e.00	e.00	e.01	e6.0	.12	.17	.01	e.01	.01
13	.01	.28	e.00	e.00	e.00	e.01	e8.0	.16	.08	.01	e.01	.01
14	.02	.20	e.00	e.00	e.00	e.01	e7.2	.35	.01	.01	e.01	.01
15	.05	e.17	e.00	e.00	e.00	e.00	4.3	.41	.01	.01	e.01	.03
16	.13	e.14	e.00	e.00	e.00	e.00	2.5	.12	.01	.01	e.01	.01
17	.07	e.12	e.00	e.00	e.00	e.00	1.3	.29	.01	.01	e.01	.01
18	.02	e.10	e.00	e.00	e.00	e.00	1.5	.21	.01	.01	e.01	.01
19	.02	e.10	e.00	e.00	e.00	e.00	1.8	.15	.01	.01	e.01	.01
20	.03	e.10	e.00	e.00	e.00	e.00	1.9	.21	.01	.01	e.01	.01
21	.01	e.10	e.00	e.00	e.00	e.00	.95	.26	01	.01	e.01	.01
22	.01	e.10	e.00	e.00	e.00	e.00	.70	.23	.01	.01	e.01	.01
23	.01	e.09	e.00	e.00	e.00	e.00	.25	.22	.01	.01	e.01	.01
24	.01	e.08	e.00	e.00	e.00	e.00	3.9	.30	.01	.01	e.01	.01
25	e.01	e.07	e.00	e.00	e.00	e.00	7.0	.12	.01	.01	e.01	.01
26	e.01	e.06	e.00	e.00	e.00	e.00	5.8	.18	.01	.01	e.01	.01
27	e.01	e.05	e.00	e.00	e.00	e.00	12	.14	.01	e.01	.01	.01
28	1.4	e.04	e.00	e.00	e.00	e.00	11	.12	.01	e.01	.01	.01
29	.29	e.04	e.00	e.00		e.01	12	.02	.02	.01	.01	.01
30	.02	e.04	e.00	e.00		e.02	5.9	.01	.01	.01	.01	.01
31	.05		e.00	e.00		e.07		.07		.01	.01	
TOTAL	2.30	4.28	0.24	0.00	0.00	0.18	115.01	85.97	0.85	0.31	0.31	0.32
MEAN	.074	.14	.008	.00	.00	.006	3.83	2.77	.028	.010	.010	.011
MAX	1.4	.44	.05	.00	.00	.07	12	43	.17	.01	.01	.03
MIN	.01	.01	.00	.00	.00	.00	.25	.01	.01	.01	.01	.01
AC-FT	4.6	8.5	.5	.0	.0	.4	228	171	1.7	.6	.6	.6
AU-FI	4.0	0.5	.,	.0	.0	• •	220		6.7 (

CAL YR 1988 TOTAL 695.81 MEAN 1.90 MAX 65 MIN .00 AC-FT 1380 WTR YR 1989 TOTAL 209.77 MEAN .57 MAX 43 MIN .00 AC-FT 416

e - Estimated

05056410 CHANNEL A NEAR PENN, ND--CONTINUED

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORDS.-SPECIFIC CONDUCTANCE: October 1983 to September 1987 and April 1989 to current year.
WATER TEMPERATURE: October 1983 to September 1987 and April 1989 to current year.

INSTRUMENTATION. -- Water-quality monitor from October 1983 to September 1987 and April 1989 to current year.

EXTREMES FOR PERIOD OF DAILY RECORD.-SPECIFIC CONDUCTANCE: Maximum, 2,880 microsiemens, June 9, 1984; minimum, 230 microsiemens, Apr. 16, 1984.
WATER TEMPERATURE: Maximum recorded, 32.6 °C, Aug. 1, 1987; minimum recorded, 0.0 °C on many days.

WATER-QUALITY	DATA.	WATER	VEAR	OCTOBER	1088	TO	SEPTEMBER	1989

		"""	on downer	. Dain, "	A101 101	AIL 00101	July 19	00 10 011	I DI I DUIT I J			
DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECONI (OOO61)	CIFIC CON- DUCT- ANCE (US/CM		AIF (DEG	RE AT R WA	MPER- TURE ATER EG C)	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)
NOV												
18	1250	0.10	265	- 0	9	9.0	0.5					
MAR 13	1550	0.0	-			4.5	0.0					
APR	1,550	0.0				+•>	0.0					
07	1555	2.4	116			0.5	0.0	12.5	87	390	83	45
14	1830 1050	7.2 1.6	116 146			8.0 8.5	0.0	9.9	74	430	93	47
MAY	1050	1.0	140	0.0	0	3.7	2.5	9.9	74	450	95	4.7
04	0930	1.9	117	7.4	6 19	9.5	12.0	9.0	85	380	67	51
JUN 19	4740	0.00	045									
SEP	1310	0.0	1 215	-	- 28	3.5	23.5					
26	1300	0.0	240		- 14	4.0	10.0					
DATE	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932	r RATIO	DIS- SOLVE (MG/L AS K)	, BONAT FET-I D (MG/ AS HCOS	TE, BON LAB FET /L (N	AR- NATE, I-LAB MG/L AS CO3) 5445)	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)
APR												
07	110	31	7 2	9.9		(120	37	480	20	0.10
20 MAY	120	3	7 3	8.6	170	()	140	69	520	17	0.10
04	110	31	7 3	28	280	()	230	16	360	39	0.20
DATE	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS RESIDUR AT 180 DEG. (DIS- SOLVEI (MG/L)	SOLIDS SUM OF CONSTICTUENTS DIS- SOLVE	SOLIDS DIS- SOLVE (TONS PER AC-FT	DIS D SOLV (TON PER) DAY	OS, 00 S- NO2 VED 1 NS SO R (M	TRO- SEN, 2+NO3 DIS- DLVED MG/L S N) 0631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (OO625)	PHOS- PHOROUS TOTAL (MG/L AS P) (00665)	PHOS- PHOROUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)
APR												
07	11	833	84	1.1	3 5.	.51	3.63	0.360	1.1	0.191	0.330	0.19
20	13	97	90	7 1.3			.440	0.140	1.1	0.120	0.360	0.12
MAY 04	8.1	83	80	3 1.1	3 4.	.35	.030	0.038	2.5	0.108	0.156	0.11
		S- I	DIS-	DIS-	EAD, I DIS- OLVED	LITHIUM DIS- SOLVED	MAN NES DI SOL	E, MERC S- DI	S- DI	UM, NIU S- DI	M, TI S- DI	ON- UM, S- VED
DA	(UC	AS) AS	JG/L (1 5 B) A:	JG/L (S FE) A	UG/L S PB)	(UG/L AS LI) (01130)	(UG AS (010	/L (UG MN) AS	/L (UG HG) AS	/L (UG MO) AS	/L (UG SE) AS	/L SR)
					/	,			. , , , , , ,		,	
APR		4	120	60	/1	70		650	0.1	7	<10	430
07 20		1 2	120 110	60 60	<1 <1	70 80			0.1	3		430 520
MAY												
04	•	2	100	10	<1	80		70 <	0.1	4	<10	370

O5056410 CHANNEL A NEAR PENN, ND--CONTINUED

SPECIFIC CONDUCTANCE, MICROSIEMENS/CM AT 25 DEGREES CENTIGRADE. WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

SPECIE	FIC CON	DUCTANC	E, MICROSI	EMENS/CM	AT 25 DEG	REES CE	NTIGRADE,	WATER Y	EAR OCTOBER	1988 TO	SEPTEMB	ER 1989
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		APRIL			MAY			JUNE			JULY	
1							1970	1710	1840			
2							2100	1810	1930			
3							2120	1760	1950			
4							1980	1830	1920			
5				809	612	710	2070	1850	1940			
6				877	557	707	2220	1670	1960			
7				1110	863	962	2080	1910	2010			
8				1160	1070	1120	2270	1840	2020			
9				1250	1030	1130	2300	2030	2170			
10				1290	1140	1220	2370	2100	2230			
11				1270	1160	1210	2230	2070	2130			
12				1360	1190	1270	2110	1920	2030			
13				1510	1250	1370	1910	1730	1800			
14 15				1620 1750	1230 1500	1400	1940	1440	1760 2000			
15				1750	1500	1630	2110	1860	2000			
16				1750	1560	1680	2200	1910	2060			
17				1820	1580	1700	2060	1960	2010			
18 19				2100	1690	1850	2160	1930	2040			
20				1970 1900	1790 1670	1890 1790						
				1,500	1070	1750						
21	1770	1150	1420	1950	1710	1840						
22	2060	1500	1760	1890	1740	1820						
23 24	2390 2720	1970 1720	2120 2310	2050 1940	1740 1690	1880						
25	1500	1080	1270	1690	1570	1790 1650						
26	1540	1260	1360	1800	1480	1630						
27	1240	967	1100	1900	1630	1760						
28 29	1200 1110	976 963	1070 1040	1950 1790	1710 1560	1810 1690						
30	1130	947	1040	1720	1560	1670						
31				1840	1650	1740						
MONIMIT												
MONTH												
MONIH				E. DEGREE	S CELSIUS	. WATER	YEAR OCTO	DBER 1988	TO SEPTEM	BER 1989		
		WATER	TEMPERATUR						TO SEPTEM			Antico
DAY	MAX			RE, DEGREE	S CELSIUS MIN	, WATER MEAN	YEAR OCTO	OBER 1988	TO SEPTEM	BER 1989 MAX	MIN	MEAN
	MAX	WATER MIN	TEMPERATUR		MIN			MIN				MEAN
	MAX	WATER	TEMPERATUR								MIN JULY	MEAN
DAY 1		WATER MIN APRIL	TEMPERATUF MEAN		MIN MAY	MEAN	MAX 20.5	MIN JUNE 14.2	MEAN 17.0	MAX	JULY	
DAY 1 2		WATER MIN	TEMPERATUR MEAN	MAX	MIN MAY	MEAN	MAX 20.5 21.4	MIN JUNE 14.2 16.4	MEAN 17.0 18.5	MAX	JULY	==
DAY 1 2	=	WATER MIN	TEMPERATUR MEAN	MAX	MIN MAY	MEAN	MAX 20.5 21.4 22.0	MIN JUNE 14.2 16.4 15.8	MEAN 17.0 18.5 18.7	MAX	JULY	
DAY 1 2 3 4		WATER MIN	TEMPERATUR MEAN	MAX	MIN MAY	MEAN	20.5 21.4 22.0 19.2	MIN JUNE 14.2 16.4 15.8 15.8	MEAN 17.0 18.5 18.7 17.8	MAX	JULY	==
DAY 1 2 3 4 5	=	WATER MIN APRIL	TEMPERATUR MEAN	MAX	MIN MAY 2.9	MEAN	20.5 21.4 22.0 19.2 21.2	MIN JUNE 14.2 16.4 15.8 15.8	17.0 18.5 18.7 17.8 18.5	MAX	JULY	=
DAY 1 2 3 4 5 6	=======================================	WATER MIN APRIL	MEAN	MAX 7.8 11.8	MIN MAY 2.9	MEAN	MAX 20.5 21.4 22.0 19.2 21.2	MIN JUNE 14.2 16.4 15.8 15.8 16.4	17.0 18.5 18.7 17.8 18.5	MAX	JULY	
DAY 1 2 3 4 5 6 7	=======================================	WATER MIN APRIL	MEAN	MAX 7.8 11.8 15.9	MIN MAY 2.9 0.7 9.0	MEAN	MAX 20.5 21.4 22.0 19.2 21.2 23.2 21.0	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0	17.0 18.5 18.7 17.8 18.5	MAX	JULY	=======================================
DAY 1 2 3 4 5 6 7 8	=======================================	WATER MIN APRIL	TEMPERATUF MEAN	MAX 7.8 11.8 15.9 16.1	MIN MAY 2.9 0.7 9.0 11.8	MEAN	20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.0	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7	17.0 18.5 18.7 17.8 18.5	MAX	JULY	
DAY 1 2 3 4 5 6 7	=======================================	WATER MIN APRIL	MEAN	MAX 7.8 11.8 15.9	MIN MAY 2.9 0.7 9.0	MEAN	MAX 20.5 21.4 22.0 19.2 21.2 23.2 21.0	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0	17.0 18.5 18.7 17.8 18.5	MAX	JULY	=======================================
DAY 1 2 3 4 5 6 7 8 9 10	=======================================	MATER MIN	MEAN	MAX 7.8 11.8 15.9 16.1 21.0 20.5	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8	MEAN 5.3 5.8 12.1 14.1 16.6 18.1	MAX 20.5 21.4 22.0 19.2 21.2 21.2 23.2 21.0 22.0 22.5 23.5	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1	17.0 18.5 18.7 17.8 18.5 20.4 17.1 19.6 20.9	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11		MATER MIN	MEAN	MAX 7.8 11.8 15.9 16.1 21.0 20.5	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8	MEAN 5.3 5.8 12.1 14.1 16.6 18.1	MAX 20.5 21.4 22.0 19.2 21.2 23.2 23.2 23.5 23.5	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1	17.0 18.5 18.7 17.8 18.5 20.4 17.1 19.6 20.9	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12	=======================================	MATER MIN	MEAN	7.8 11.8 15.9 16.1 20.5	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8	MEAN 5.3 5.8 12.1 14.1 16.6 18.1	MAX 20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.5 23.5 21.0 19.1	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1	17.0 18.5 18.7 17.8 18.5 20.4 17.6 17.1 19.6 20.9	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13		MATER MIN APRIL	MEAN	MAX 7.8 11.8 15.9 16.1 21.0 20.5	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8	MEAN 5.3 5.8 12.1 14.1 16.6 18.1 15.6 15.3 17.1	MAX 20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.5 23.5	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5	17.0 18.5 18.7 17.8 18.5 20.4 17.6 17.1 19.6 20.9	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12		MATER MIN APRIL	MEAN	MAX 7.8 11.8 15.9 16.1 21.0 20.5	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8	MEAN 5.3 5.8 12.1 14.1 16.6 18.1	MAX 20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.5 23.5 21.0 19.1	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1	17.0 18.5 18.7 17.8 18.5 20.4 17.6 17.1 19.6 20.9	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15		MATER MIN APRIL	MEAN	7.8 11.8 15.9 16.1 20.5 17.0 20.5	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.7 15.7 18.1	MEAN 5.3 5.8 12.1 14.1 15.6 18.1 15.6 17.1 18.7 21.0	MAX 20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.0 22.5 23.5 21.0 19.1 14.4 18.6 21.9	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 12.4 9.7 16.4	17.0 18.5 18.7 17.8 18.5 20.4 17.6 17.1 19.6 20.9 19.3 16.9 13.0 14.3 19.2	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16		MATER MIN APRIL	MEAN MEAN	MAX 7.8 11.8 15.9 16.1 21.0 20.5 17.0 17.5 20.6 21.9 23.8	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.7 15.7 18.1	MEAN 5.3 5.8 12.1 14.1 16.6 18.1 15.6 17.1 18.7 21.0	MAX 20.5 21.4 22.0 19.2 21.2 21.2 21.0 22.5 23.5 21.0 19.1 14.4 18.6 21.9	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 12.4 9.7	MEAN 17.0 18.5 18.7 17.8 18.5 20.4 17.1 19.6 20.9 19.3 16.9 14.3 19.2 20.8	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15		MATER MIN APRIL	MEAN	7.8 11.8 15.9 16.1 20.5 17.0 20.5	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.7 15.7 18.1	MEAN 5.3 5.8 12.1 14.1 16.6 18.1 15.6 17.1 18.7 21.0	MAX 20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.0 22.5 23.5 21.0 19.1 14.4 18.6 21.9	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 12.4 9.7 16.4	17.0 18.5 18.7 17.8 18.5 20.4 17.6 17.1 19.6 20.9 19.3 16.9 13.0 14.3 19.2	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19		MATER MIN APRIL	MEAN	MAX	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.7 15.7 18.1	MEAN 5.3 5.8 12.1 14.1 16.6 18.1 15.6 17.1 18.7 21.0 20.3 18.4 19.7 18.7	20.5 21.4 22.0 19.2 21.2 21.0 22.5 23.5 21.0 19.1 14.4 18.6 21.9 23.4 20.9 23.4	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 12.4 17.9 18.6	MEAN 17.0 18.5 18.7 17.8 18.5 20.4 17.1 19.6 20.9 19.3 16.9 13.0 14.3 19.2 20.8 19.7	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18		MATER MIN APRIL	MEAN	MAX 7.8 11.8 15.9 16.1 21.0 20.5 17.0 17.5 20.6 21.9 23.8 22.1 19.6 24.4	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.7 15.7 18.1	MEAN 5.3 5.8 12.1 14.1 16.6 18.1 15.6 15.3 17.1 18.7 21.0 20.3 18.4 19.7	MAX 20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.5 23.5 21.0 19.1 14.4 18.6 21.9 23.4 20.9 23.3	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 12.4 9.7 16.4	MEAN 17.0 18.5 18.7 17.8 18.5 20.4 17.6 17.1 19.6 20.9 19.3 16.9 13.0 14.3 19.2 20.8 19.7 20.7	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		MATER MIN APRIL	MEAN MEAN	MAX 7.8 11.8 15.9 16.1 21.0 20.5 17.0 17.5 20.6 21.9 23.8 22.1 19.6 24.4 21.1 17.8	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.1 15.7 18.1 18.6 17.3 16.2 16.4 12.9	MEAN 5.3 5.8 12.1 14.1 16.6 18.1 15.6 15.3 17.1 18.7 21.0 20.3 18.4 19.7 18.7	20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.5 23.5 21.0 19.1 14.4 18.6 21.9 23.4 20.9 23.3	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 12.4 17.9 18.6 18.2	17.0 18.5 18.7 17.8 18.5 20.4 17.6 17.1 19.6 20.9 19.3 16.9 13.0 14.3 19.2 20.8 19.7 20.7	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21		MATER MIN APRIL	MEAN	MAX	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.7 15.7 15.7 15.7 16.4 12.9	MEAN 5.3 5.8 12.1 14.1 16.6 18.1 15.6 17.1 18.7 21.0 20.3 18.4 19.7 18.7	20.5 21.4 22.0 19.2 21.2 21.0 22.5 23.5 21.0 19.1 14.4 18.6 21.9 23.4 20.9 23.4	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 12.4 9.7 16.4 17.9 18.6	MEAN 17.0 18.5 18.7 17.8 18.5 20.4 17.1 19.6 20.9 19.3 16.9 13.0 14.3 19.2 20.8 19.7	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23	9.66	MATER MIN APRIL	MEAN	MAX 7.8 11.8 15.9 16.1 21.0 20.5 17.0 17.5 20.6 21.9 23.8 22.1 19.6 24.4 21.1 17.8	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.1 15.7 18.1 18.6 17.3 16.2 16.4 12.9	MEAN 5.3 5.8 12.1 16.6 18.1 15.6 15.3 17.1 18.7 21.0 20.3 18.4 19.7 15.6 16.9 17.6 19.3	MAX 20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.5 23.5 21.0 19.1 14.4 18.6 21.9 23.4 20.9 23.3	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 12.4 17.9 18.6 18.2	MEAN 17.0 18.5 18.7 17.8 18.5 20.4 17.1 19.6 20.9 19.3 16.9 13.3 19.2 20.8 19.7 20.7	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	9.66 13.77 17.66	MATER MIN APRIL	MEAN	MAX 7.8 11.8 15.9 16.1 21.0 20.5 17.5 20.6 21.9 23.8 22.1 19.6 24.4 21.1 17.8 19.9 19.8 23.1 20.0	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.1 13.7 18.1 18.6 17.3 16.2 16.4 12.9 14.0 15.3	MEAN 5.3 5.8 12.1 14.1 16.6 18.1 15.6 17.1 18.7 21.0 20.3 18.4 19.7 15.6 16.9 17.3 17.3	MAX 20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.5 23.5 21.0 19.1 14.4 18.6 21.9 23.4 20.9 23.3	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 12.4 9.7 16.4	MEAN 17.0 18.5 18.7 17.8 18.5 20.4 17.6 17.1 19.6 20.9 19.3 16.9 13.0 14.3 19.2 20.8 19.7 20.7	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23	9.66	MATER MIN APRIL	MEAN	MAX 7.8 11.8 15.9 16.1 21.0 20.5 17.0 17.5 20.6 21.9 23.8 22.1 19.6 24.4 21.1 17.8	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.1 15.7 18.1 18.6 17.3 16.2 16.4 12.9	MEAN 5.3 5.8 12.1 16.6 18.1 15.6 15.3 17.1 18.7 21.0 20.3 18.4 19.7 15.6 16.9 17.6 19.3	20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.5 23.5 21.0 19.1 14.4 18.6 21.9 23.4 20.9 23.3	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 12.4 17.9 18.6 18.2	MEAN 17.0 18.5 18.7 17.8 18.5 20.4 17.1 19.6 20.9 19.3 16.9 13.3 19.2 20.8 19.7 20.7	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	9.66 13.76 14.0	MATER MIN APRIL	MEAN	MAX 7.8 11.8 15.9 16.1 21.0 20.5 17.5 20.6 21.9 23.8 22.1 19.6 24.4 21.1 17.8 19.9 19.8 23.1 20.0	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.1 17.7 18.1 18.6 17.3 16.2 16.4 12.9 14.0 15.6 16.0 15.3	MEAN 5.3 5.8 12.1 16.6 18.1 15.6 15.3 17.1 18.7 21.0 20.3 18.4 19.7 15.6 16.9 17.6 19.3 17.3	MAX 20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.5 23.5 21.0 19.1 14.4 18.6 21.9 23.4 20.9 23.3	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 12.4 9.7 16.4	MEAN 17.0 18.5 18.7 17.8 18.5 20.4 17.6 17.1 19.6 20.9 19.3 16.9 13.0 14.3 19.2 20.8 19.7 20.7	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	9.66 13.77 17.66 14.00	MATER MIN APRIL	MEAN	MAX	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.7 15.7 18.1 18.6 17.3 16.4 12.9 14.0 15.6 16.0 15.3 12.4	MEAN 5.3 5.8 12.1 14.1 16.6 18.1 15.6 17.1 18.7 21.0 20.3 18.4 19.7 15.6 16.9 17.3 17.3	MAX 20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.5 23.5 21.0 19.1 144.6 21.9 23.4 20.9 23.3	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 19.7 16.4 17.9 18.6 18.2	MEAN 17.0 18.5 18.7 17.8 18.5 20.4 17.6 17.1 19.6 20.9 19.3 16.9 14.3 19.2 20.8 19.7 20.7	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	9.6 13.7 17.6 14.0 15.1 11.5	MATER MIN APRIL	MEAN MEAN	MAX 7.8 11.8 15.9 16.1 21.0 20.5 17.0 17.5 20.6 21.9 23.8 22.1 19.6 24.4 21.1 17.8 19.9 19.8 23.1 20.0 15.4	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.17 15.7 18.1 18.6 17.3 16.4 12.9 14.0 15.6 16.0 15.3 12.4	MEAN 5.3 5.8 12.1 14.1 16.6 18.1 15.6 15.3 17.1 18.7 21.0 20.3 18.4 19.7 15.6 16.9 17.6 19.3 17.3 14.1 13.7	20.5 21.4 22.0 19.2 21.2 21.2 23.2 21.0 22.5 23.5 21.0 22.5 23.5 21.0 22.5 23.5	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 19.7 16.4 17.9 18.6 18.2	MEAN 17.0 18.5 18.7 17.8 18.5 20.4 17.1 19.6 20.9 19.3 16.9 14.3 19.2 20.8 19.7 20.7	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29	9.6 13.7 17.6 14.0 15.4 13.1 11.5 9.0	MATER MIN APRIL	MEAN MEAN	MAX 7.8 11.8 15.9 16.1 21.0 20.5 17.0 17.5 20.6 21.9 23.8 22.1 19.6 24.4 21.1 17.8 19.9 19.8 23.1 20.0 15.4 17.6 19.4 19.6	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.1 15.7 18.1 18.6 17.3 16.2 16.4 12.9 14.0 15.6 16.0 15.3 12.4 10.4 13.5 15.0 11.0	MEAN 5.3 5.8 12.1 16.6 18.1 15.6 15.3 17.1 18.7 21.0 20.3 18.4 19.7 15.6 16.9 17.3 14.1 13.7 16.4 17.3	20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.5 23.5 21.0 19.1 14.4 18.6 21.9 23.4 20.9 23.3	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 12.4 17.9 18.6 18.2	MEAN 17.0 18.5 18.7 17.8 18.5 20.4 17.6 17.1 19.6 20.9 19.3 16.9 13.0 14.3 19.2 20.8 19.7 20.7	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	9.6 13.7 17.6 14.0 15.1 11.5	MATER MIN APRIL	MEAN MEAN	7.8 11.8 15.9 17.0 20.5 17.0 20.5 17.5 20.6 21.9 23.8 22.1 17.8 19.9 19.8 23.1 21.1 17.8 19.9 19.8 23.1 20.0 15.4	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.1 15.7 18.1 18.6 17.3 16.2 16.4 12.9 14.0 15.3 12.4	MEAN 5.3 5.8 12.1 16.6 18.1 15.6 17.1 18.7 21.0 20.3 18.4 19.7 15.6 19.7 15.6 19.7 15.6 19.7 15.6 19.7 15.6 19.7 15.6 19.7 18.7 17.1 18.7 17.1 18.7 17.1 18.7 18.7	20.5 21.4 22.0 19.2 21.2 21.2 23.2 21.0 22.5 23.5 21.0 22.5 23.5 21.0 22.5 23.5	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 19.7 16.4 17.9 18.6 18.2	MEAN 17.0 18.5 18.7 17.8 18.5 20.4 17.1 19.6 20.9 19.3 16.9 14.3 19.2 20.8 19.7 20.7	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	9.6 13.7 17.6 14.0 15.4 11.5 9.0 9.1	MATER MIN APRIL	MEAN MEAN	MAX 7.8 11.8 15.9 16.1 21.0 20.5 17.0 17.5 20.6 21.9 23.8 22.1 19.6 24.4 21.1 17.8 19.9 19.8 23.1 20.0 15.4 17.6 19.8 15.9 14.9 18.1	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.1 15.7 18.1 18.6 17.3 16.2 16.4 12.9 14.0 15.3 16.4 12.9 14.0 15.3 12.4	MEAN 5.3 5.8 12.1 16.6 18.1 15.6 15.3 17.1 18.7 21.0 20.3 18.4 19.7 15.6 16.9 17.6 19.3 17.3 14.1 13.7 15.6 16.9 17.6 17.6 17.6 17.6 17.6 17.6 17.6 17.6	20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.5 23.5 21.0 19.1 14.4 18.6 21.9 23.4 20.9 23.3	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 12.7 16.4 17.9 18.6 18.2	MEAN 17.0 18.5 18.7 17.8 18.5 20.4 17.6 17.1 19.6 20.9 19.3 16.9 14.3 19.2 20.8 19.7 20.7	MAX	JULY	
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	9.66 13.76 14.0 15.4 13.1 11.5 9.0 9.1	MATER MIN APRIL	MEAN MEAN 5.6 10.1 13.3 12.1 10.6 10.3 7.4 7.4 6.4 6.4	7.8 11.8 15.9 17.0 20.5 17.0 20.5 17.5 20.6 21.9 23.8 22.1 17.8 19.9 19.8 23.1 21.1 17.8 19.9 19.8 23.1 20.0 15.4	MIN MAY 2.9 0.7 9.0 11.8 13.1 15.8 14.0 13.1 15.7 18.1 18.6 17.3 16.2 16.4 12.9 14.0 15.3 12.4	MEAN 5.3 5.8 12.1 16.6 18.1 15.6 17.1 18.7 21.0 20.3 18.4 19.7 15.6 19.7 15.6 19.7 15.6 19.7 15.6 19.7 15.6 19.7 15.6 19.7 18.7 17.1 18.7 17.1 18.7 17.1 18.7 18.7	20.5 21.4 22.0 19.2 21.2 23.2 21.0 22.5 23.5 21.0 19.1 14.4 18.6 21.9 23.4 20.9 23.3	MIN JUNE 14.2 16.4 15.8 15.8 16.4 18.0 14.7 13.2 16.6 18.1 18.3 14.5 12.4 17.9 18.6 18.2	MEAN 17.0 18.5 18.7 17.8 18.5 20.4 17.6 17.1 19.6 20.9 19.3 16.9 13.0 14.3 19.2 20.8 19.7 20.7	MAX	JULY	

05056500 DEVILS LAKE NEAR DEVILS LAKE, ND

LOCATION.--Lat 48°04'00", long 98°56'07", in SW1/4 sec.18, T.153 N., R.64 W., Ramsey County, Hydrologic Unit 09020201, at Lakewood, on east bank of Creel Bay, 4.5 mi southwest of city of Devils Lake. Creel Bay, which is 0.5 mi wide, is an arm of Devils Lake and extends 2 mi to the north of the lake.

DRAINAGE AREA .-- 3,130 mi2, approximately, of which about 1,000 mi2 is probably noncontributing.

GAGE-HEIGHT RECORDS

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

REVISED RECORDS .-- WSP 1913: Drainage area.

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

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

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

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

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,426.51 ft, May 4; minimum, 1,425.05 ft, Sept. 26.

MONTHEND ELEVATION, IN FEET, AT 2400, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

Oct.	31	1.425.92	Jan. 31	1.426.12	Apr. 30	1,426.43	July 31 1,425.71
Nov.	30	1.425.92	Feb. 28	. 1,426.12	May 31	1,426.28	Aug. 31 1,425.29
Dec.	31	1.426.04	Mar. 31	1.426.27	June 30	1.426.08	Sept.30 1,425.07

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES

						DAN VADOL						
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	26.19 26.15 26.15 26.15 26.15	25.92 25.95 25.93 25.94 25.94	25.93 25.94 25.93 25.92 25.93	26.04 26.04 26.03 26.03 26.04	26.12 26.11 26.11 26.11 26.12	26.12 26.13 26.13 26.13 26.14	26.29 26.30 26.30 26.31 26.32	26.44 26.43 26.43 26.43	26.28 26.25 26.25 26.23 26.22	26.08 26.07 26.09 26.06 26.04	25.69 25.64 25.65 25.66 25.58	25.30 25.29 25.26 25.33 25.28
6 7 8 9	26.14 26.14 26.13 26.15 26.13	25.94 25.96 25.96 25.96 25.96	25.93 25.92 25.91 25.91 25.91	26.05 26.09 26.10 26.10 26.09	26.13 26.13 26.13 26.13 26.13	26.13 26.13 26.13 26.14 26.14	26.33 26.35 26.37 26.37 26.37	26.40 26.39 26.37 26.41 26.39	26.22 26.20 26.20 26.21 26.19	26.03 26.03 25.95 25.88 25.94	25.53 25.53 25.53 25.49 25.49	25.27 25.31 25.28 25.25 25.21
11 12 13 14 15	26.11 26.11 26.09 26.08 26.09	25.96 25.95 25.99 25.90 25.97	25.90 25.92 25.94 25.98 25.98	26.11 26.12 26.12 26.13 26.13	26.14 26.13 26.14 26.13 26.13	26.14 26.15 26.16 26.15 26.14	26.39 26.38 26.39 26.39 26.40	26.37 26.34 26.35 26.34 26.35	26.17 26.24 26.14 26.19 26.19	25.92 25.93 25.93 25.93 25.92	25.48 25.48 25.44 25.40 25.41	25.24 25.25 25.23 25.21 25.21
16 17 18 19 20	26.10 26.08 26.09 26.08 26.08	25.95 25.94 25.92 25.94 25.92	25.98 25.97 25.98 25.97 25.97	26.14 26.14 26.14 26.14 26.13	26.12 26.12 26.12 26.13 26.13	26.14 26.14 26.14 26.14 26.16	26.41 26.40 26.40 26.41 26.40	26.33 26.35 26.40 26.41 26.42	26.18 26.13 26.15 26.16 26.11	25.89 25.84 25.80 25.84 25.85	25.39 25.38 25.37 25.40 25.38	25.22 25.21 25.21 25.22 25.20
21 22 23 24 25	26.06 26.07 26.09 26.00 26.03	25.93 25.93 25.93 25.94 25.93	25.98 25.97 25.99 25.99 25.99	26.14 26.14 26.13 26.12 26.13	26.13 26.12 26.12 26.15 26.13	26.15 26.14 26.17 26.17 26.17	26.41 26.40 26.42 26.42 26.43	26.36 26.34 26.32 26.31 26.37	26.14 26.14 26.12 26.12 26.11	25.85 25.82 25.80 25.77 25.76	25.37 25.36 25.36 25.35 25.33	25.19 25.15 25.11 25.12 25.13
26 27 28 29 30 31	25.97 26.05 25.97 25.92 25.93 25.94	25.93 25.93 25.92 25.92 25.92	26.00 26.03 26.03 26.03 26.03 26.03	26.13 26.14 26.14 26.14 26.14 26.13	26.12 26.13 26.13	26.18 26.18 26.21 26.25 26.27 26.28	26.42 26.39 26.43 26.40 26.42	26.32 26.30 26.23 26.23 26.27 26.28	26.13 26.06 26.02 25.99 26.06	25.72 25.69 25.66 25.68 25.71 25.71	25.36 25.34 25.35 25.38 25.24 25.22	25.07 25.09 25.09 25.09 25.08
MEAN MAX MIN	26.08 26.19 25.92	25.94 25.99 25.90	25.96 26.03 25.90	26.11 26.14 26.03	26.13 26.15 26.11	26.16 26.28 26.12	26.38 26.43 26.29	26.36 26.44 26.23	26.16 26.28 25.99	25.88 26.09 25.66	25.44 25.69 25.22	25.20 25.33 25.07

05057000 SHEYENNE RIVER NEAR COOPERSTOWN, ND

LOCATION.--Lat 47°25'58", long 98°01'38", in NW1/4NW1/4SW1/4 sec.26, T.146 N., R.58 W., Griggs County, Hydrologic Unit 09020203, on right bank 150 ft upstream from county bridge, and 5 mi east of Cooperstown.

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

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- October 1944 to current year. Monthly discharge only for some periods, published in WSP 1308. REVISED RECORDS. -- WSP 1728: Drainage area. WRD ND-80-1: Gage datum.

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

REMARKS.--Estimated daily discharges: Nov. 15 to Dec. 1, Dec. 8 to Mar. 25, and Apr. 5-10. Records fair.

AVERAGE DISCHARGE.--45 years, 107 ft³/s, 77,520 acre-ft/yr; median of yearly mean discharges, 85 ft³/s, 61,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 7,830 ft³/s, Apr. 17, 1950, gage height, 18.69 ft; no flow at times.

EXTREMES FOR CURRENT YEAR. -- Peak discharges greater than base discharge of 200 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Da te	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 7		320	a10.91	Apr. 16	0900	*796	*11.95

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

No flow, Oct. 11, Aug. 8-11, 15-17, 25, and Sept. 23.

					M	EAN VALUE	S					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	3.8 3.8 2.4 1.2	10 10 10 11 11	e12 12 11 11	e3.0 e2.5 e3.5 e4.0 e3.0	e9.0 e8.0 e7.0 e7.0	e5.5 e5.0 e5.0 e4.5 e4.0	28 41 73 101 e180	110 104 99 93 87	48 47 45 44 43	21 19 17 15	1.0 1.0 1.2 .84 .26	20 17 24 22 17
6 7 8 9	2.7 6.8 8.0 8.7 5.4	12 13 13 15 17	10 10 e11 e9.0 e7.5	e2.5 e2.0 e1.8 e1.5 e1.2	e7.5 e7.5 e7.5 e7.5	e4.0 e4.5 e6.0 e7.5 e10	e250 e300 e270 e240 e220	88 91 96 97 87	43 40 38 37 34	14 13 10 11 10	.15 .07 .00 .00	24 21 14 8.4 4.5
11 12 13 14 15	.00 .19 .36 .87	20 13 14 13 e14	e7.0 e7.0 e8.0 e8.0 e7.0	e1.2 e1.2 e1.2 e1.2	e7.5 e8.0 e10 e9.0 e8.0	e13 e14 e14 e13 e13	240 276 356 474 635	78 74 71 67 62	33 31 31 33 44	11 10 9.3 6.5 5.7	.00 .73 1.4 .16	3.4 2.8 2.5 3.0 2.6
16 17 18 19 20	.33 1.8 3.6 1.3	e14 e14 e13 e13	e7.0 e7.0 e7.0 e7.0 e6.0	e1.5 e1.7 e1.7 e1.9	e7.0 e7.0 e7.0 e7.0	e11 e9.0 e7.0 e7.0	755 781 750 636 479	57 53 53 54 52	57 61 55 50 42	5.2 6.7 7.8 5.2 5.1	.00 .00 .37 7.6 2.5	3.3 3.2 5.2 4.7 3.1
21 22 23 24 25	.11 2.1 5.4 4.9 3.5	e12 e12 e12 e12	e6.0 e6.0 e6.0 e5.5 e5.0	e2.5 e3.0 e2.8 e2.5 e2.2	e7.0 e7.0 e7.0 e8.0 e8.0	e8.0 e8.5 e12 e15 e15	374 309 255 225 196	52 49 48 50 49	37 33 32 30 29	5.1 3.7 3.0 3.0 3.0	2.2 2.1 .52 .01	1.8 1.5 .00 .45 1.3
26 27 28 29 30 31	3.9 7.3 6.1 4.5 8.6	e12 e12 e11 e11 e11	e4.5 e4.0 e3.6 e3.0 e3.0	e2.2 e3.0 e3.0 e3.5 e7.0	e8.5 e8.0 e6.0	18 19 21 21 22 25	173 158 143 127 117	49 48 47 49 51 50	26 24 23 23 21	3.2 1.9 2.6 3.9 2.1	.82 1.4 7.5 4.0 3.1	.60 .32 .84 .29 .59
TOTAL MEAN MAX MIN AC-FT	110.71 3.57 10 .00 220	381 12.7 20 10 756	225.1 7.26 12 3.0 446	81.4 2.63 10 1.2 161	212.5 7.59 10 6.0 421	348.5 11.2 25 4.0 691	9162 305 781 28 18170	2115 68.2 110 47 4200	1134 37.8 61 21 2250	249.98 8.06 21 .98 496	57.93 1.87 19 .00 115	213.39 7.11 24 .00 423

CAL YR 1988 TOTAL 16208.16 MEAN 44.3 MAX 382 MIN .00 AC-FT 32150 WTR YR 1989 TOTAL 14291.51 MEAN 39.2 MAX 781 MIN .00 AC-FT 28350

05057000 SHEYENNE RIVER NEAR COOPERSTOWN, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECONE (OOO61)	CIFIC CON- DUCT- ANCE (US/CM)		TEMPER- ATURE AIR (DEG C) (00020)	WATER (DEG C	(MG/ AS C) CACO	CALCI L DIS- L SOLV (MG/ 3) AS C	DIS- ED SOLVE L (MG/I A) AS MO	M, SODIUM, DIS- ED SOLVED (MG/L AS NA)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)
OCT O5	1310	1.4	910		10.0	10.	.0	_			_	-
09	1325	16	840		6.0	4.	5	3				
28	1535	3.7	620		-28.0	0.	0				11-11-1-	
FEB 16	1305	7.3	600		-30.0	0.	.0					
APR 06 21	1915 1250	248 371	430 635		7.5			00 46	21	53	35	2
MAY 10	1135	88	915		24.0	15.	0					
JUN 12	1405	31	925		14.0	18.	5	-				
JUL 20	1115	5.0	510	8.50	26.0	24.	5 3	10 69	34	72	33	2
SEP 06	0835	24	640		17.0	18.	0					1 1
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE, FET-LAE (MG/L AS HCO3) (95440)	BONATE, B FET-LAE (MG/L AS CO3)	LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFAT DIS- SOLVE (MG/L AS SO4	DIS- SOLV (MG/	, RIDE DIS- ED SOLVE L (MG/I L) AS F	DIS- SOLVE ED (MG/L AS SIO2)	AT 180 DEG. C DIS- SOLVED (MG/L)	CONSTI- TUENTS, DIS-	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 21	8.3	200	0	160	1	140	11	0.	10 5.9	393	383	0.53
JUL 20	8.6	350	10	300	1.8	140	15	0.	30 29	558	563	0.76
	\$	SOLVED (TONS PER DAY)	ARSENIC DIS- SOLVED (UG/L AS AS)	DIS- SOLVED (UG/L AS B)	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)	DENUM, DIS- SOLVED (UG/L AS MO)	NIUM, DIS- SOLVED (UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) D1080)
APR 21.		394	<1	90	30	<1	40	110	0.1	1	1	240
JUL 20.		7.49	9	190	20	<1	70	1200	0.1	3	<10	400

05057200 BALDHILL CREEK NEAR DAZEY, ND

LOCATION.--Lat 47°13'45", long 98°07'28", in NW14SE14SW14 sec.2, T.143 N., R.59 W., Barnes County, Hydrologic Unit 09020203, on left bank 500 ft upstream from bridge on county highway, 4.5 mi northeast of Dazey, and 14 mi upstream from mouth.

DRAINAGE AREA .-- 691 mi2, of which about 340 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS .-- WSP 1728: Drainage area.

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

REMARKS.--Estimated daily discharges: Dec. 16 to Mar. 31 and Sept. 6-30. Records good except those for periods of estimated daily discharge, which are fair.

AVERAGE DISCHARGE.--33 years, 15.8 ft3/s, 11,450 acre-ft/yr; median of yearly mean discharges, 12 ft3/s, 8,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, about 9,000 ft³/s, Apr. 19, 1979, on basis of contracted opening measurement of peak flow at site 4.5 mi downstream, gage height, 17.78 ft, from floodmark; no flow at times.

EXTREMES FOR CURRENT YEAR. -- Peak discharges greater than base discharge of 60 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 3	0515	*303	*6.64	No other peak	greater t	than base discharge.	

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

No flow July 27 and Aug. 4-18.

			,			MEAN VALUES	3	,,,,,	201000			
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	.52 .78 .84 .67	1.5 1.5 1.6 1.9 2.2	2.1 2.4 2.7 2.5 2.4	e.95 e.95 e.95 e.95	e.75 e.75 e.70 e.65 e.65	e.08 e.08 e.07 e.07	85 133 236 163 156	9.6 8.8 7.9 9.2 8.6	4.6 3.9 3.2 2.9 3.0	.08 .06 .05 .03	.02 .01 .01 .00	24 15 14 10 6.3
6 7 8 9	.50 .55 .57 .77 .82	2.4 2.2 1.8 2.1 2.2	2.3 2.4 2.4 2.1 1.9	e.95 e.90 e.90 e.85 e.80	e.62 e.62 e.60 e.60	e.07 e.07 e.08 e.10 e.70	148 118 91 71 61	6.9 6.6 7.1 6.9	2.4 1.9 1.1 1.0 .88	.01 .01 .01 .01	.00 .00 .00	e4.0 e2.0 e2.5 e2.6 e2.8
11 12 13 14 15	.71 .68 .63 .74	2.7 2.9 2.4 1.7	1.6 1.4 1.7 2.0 1.6	e.75 e.75 e.75 e.75 e.75	e.60 e.62 e.62 e.63 e.63	e1.5 e1.5 e1.5 e1.5	56 49 46 39 34	5.8 5.5 5.4 5.2 5.1	.20 .28 .22 2.0 1.5	.01 .01 .01 .01	.00 .00 .00	e2.9 e2.5 e2.5 e3.0 e2.5
16 17 18 19 20	1.2 1.1 1.2 1.1	2.3 2.3 2.3 2.3 2.3	e1.4 e1.3 e1.3 e1.3	e.75 e.75 e.75 e.75 e.75	e.60 e.55 e.50 e.25 e.20	e1.4 e1.3 e1.3 e1.3 e1.3	32 27 26 23 21	4.5 5.3 5.6 4.8	.60 .12 .11 .29	.01 .01 .03 .04	.00 .00 .00 .06	e2.4 e2.4 e2.2 e2.2 e3.2
21 22 23 24 25	1.2 1.2 1.4 1.2 1.8	2.3 2.4 2.4 2.4	e1.3 e1.3 e1.3 e1.2 e1.1	e.75 e.75 e.75 e.75 e.75	e.10 e.10 e.09 e.08 e.09	e1.3 e1.3 e1.7 e2.7 e2.9	19 17 17 16 14	4.0 3.8 3.4 7.0 8.8	1.1 1.7 4.8 5.0 3.6	.03 .02 .02 .01	2.7 3.7 2.9 2.3	e3.2 e3.2 e3.2 e2.8 e2.8
26 27 28 29 30 31	1.2 .98 .62 .93 1.1 1.5	2.5 2.4 2.1 2.0 2.1	e1.0 e.98 e.95 e.95 e.95 e.95	e.75 e.75 e.75 e.75 e.75 e.80	e.09 e.09 e.09	e8.0 e25 e35 e50 e40 e50	13 13 11 10 10	7.7 5.3 4.7 5.7 5.5	2.0 1.1 .99 .99	.01 .00 .01 .02 .03	1.7 .97 1.4 1.7 2.4	e2.3 e1.8 e1.6 e1.3 e1.1
TOTAL MEAN MAX MIN AC-FT	29.19 .94 1.8 .50 58	65.5 2.18 2.9 1.5 130	50.08 1.62 2.7 .95 99	24.95 .80 .95 .75 49	12.47 .45 .75 .08 25	233.29 7.53 50 .07 463	1755 58.5 236 10 3480	190.5 6.15 9.6 3.4 378	51.86 1.73 5.0 .11 103	0.65 .021 .08 .00	61.04 1.97 39 .00 121	132.3 4.41 24 1.1 262

CAL YR 1988 TOTAL 2680.66 MEAN 7.32 MAX 100 MIN .02 AC-FT 5320 WTR YR 1989 TOTAL 2606.83 MEAN 7.14 MAX 236 MIN .00 AC-FT 5170

05057200 BALDHILL CREEK NEAR DAZEY, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIM	E	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	CIFIC CON- DUCT- ANCE (US/CN	PH (STAN ARD UNITS) (DEG	E A W	MPER- TURE ATER EG C)	(MG/L AS CACO3	CALCI DIS- SOLV (MG/	UM S ED SO L (M (A) AS	GNE- IUM, IS- LVED G/L MG) 1925)	SODIUM DIS- SOLVED (MG/L AS NA (00930	SODI	TI	SODIUM AD- SORP- TION RATIO (00931)
OCT		_												17		
05	111	0	0.63	88	30	8	.5	10.0	•	-		100		47		H-818
09	110	5	2.2	88	30	6	.0	4.0	-	-				- 1		-
28	132	0	0.95	5 51	0	30	.0	0.0	-	-			-	There's		175
FEB 15	130	5	0.65	5 50)5	32	.0	0.0	_	_			-			
MAR 24	104	5	2.5	68	301		.5	0.0		_						
30	103		34	34			.5	0.5		-		1				
APR 04	092	5	147	35	5 7.	80 1	.5	1.0	12	0 30	1	2	15		19	0.6
11 MAY	164		62	63			.5	0.5		-			-	-		- 501
10	100	5	7.3	97	5	22	.0	14.0	-	-			-			
JUN 12	113	5	0.36	5 101	0	12	.5	18.5	_	-			-			
JUL 11	104	5	0.01	104	0 7.		.5	20.0		0 47	7	9	130		49	3
SEP										0 41		,	150			
05	133 164		6.2 3.2	67 60			.5	19.0		-					==	
DATE	POTA SIU DIS SOLV (MG/ AS K	M, ED L	BICAR- BONATE, FET-LAE (MG/L AS HCO3) (95440)	BONATE B FET-LA (MG/L AS CO3)	AB LAB (MG/I	Y DIOXI DIS L SOLV (MG/	DE SU ED S L (2) AS	LFATE IS- OLVED MG/L SO4) 0945)	DIS-	RIDE DIS D SOLV (MG/	DI SO ED (M L A	ICA, S- LVED G/L S O2)	RESIDU AT 180 DEG. O DIS- SOLVEI (MG/L (70300	CONST C TUENT DIS D SOLV) (MG/	F I- S, ED L)	DS, SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR			07	•	70						40 4		200			0.00
O4	9.	4	87	0	72		2	73	5.8			1	20		00	0.28
11	11		280	0	230	5	.5 2	80	41	0.	20 1	2	71:	2 6	97	0.97
	ATE	S()	DLVED CONS PER DAY)	ARSENIC DIS- SOLVED (UG/L AS AS)	BORON, DIS- SOLVED (UG/L AS B) (01020)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD DIS SOLV (UG/ AS P	ED L B)	ITHIUM DIS- SOLVED (UG/L AS LI) O1130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCUR DIS- SOLVE (UG/L AS HG (71890	Y [D S ()	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) 01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	S (TRON- TIUM, DIS- OLVED UG/L S SR) 1080)
APR			33.0	<1	30	150		1	20	120	0.	1	1	<10		160
JUL																
11.			0.02	4	290	40		1	80	340	0.	2	2	1		420

05057500 LAKE ASHTABULA AT BALDHILL DAM, ND

LOCATION.--Lat 47°02'00", long 98°05'00", in NW1/4 sec.18, T.141 N., R.58 W., Barnes County, Hydrologic Unit 09020203 at Baldhill Dam on Sheyenne River, and 8 mi northwest of Valley City.

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

MONTHEND-ELEVATION AND CONTENTS RECORDS

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

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

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

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

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

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

EXTREMES FOR CURRENT YEAR.--Maximum contents, 72,420 acre-ft, May 29, elevation, 1,266.32 ft; minimum, 51,210 acre-ft, Apr. 9, elevation, 1,262.27 ft.

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

I	Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.	30	1.264.53	62,420	
oct.	31	1.264.23	60,760	-1,660
lov.	30	1.264.14	60,270	-490
ec.	31	1,263.88	58,900	-1,370
CAL	YR 1988	-	-	-2,080
an.	31	1.263.54	57,200	-1,700
eb.	28	1,262.95	54,280	-2,920
ar.	31	1,262.79	53,560	-720
pr.	30	1,265,62	68,470	+14,910
ay	31	1,266.25	72,020	+3,550
une	30	1.266.03	70,770	-1,250
uly	31	1,265.30	66,680	-4,090
ug.	31	1,265.08	65,450	-1,230
ept.	30	1,264.56	62,580	-2,870
WTR	YR 1989			+160

05058000 SHEYENNE RIVER BELOW BALDHILL DAM, ND

LOCATION.--Lat 47°01'50", long 98°05'50", in NW1/4 sec.18, T.141 N., R.58 W., Barnes County, Hydrologic Unit 09020204, on right bank 600 ft downstream from Baldhill Dam, 8 mi northwest of Valley City, and at mile 270.5.

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

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- October 1949 to current year. Monthly discharge only for some periods, published in WSP 1308. REVISED RECORDS. -- WSP 1728: Drainage area.

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

REMARKS.--Records good. Flow completely regulated by Lake Ashtabula (station 05057500). Records 1955 to 1972 include releases at Baldhill Dam to the fish-rearing ponds of the Fish and Wildlife Service. Small diversions are still made but not published.

AVERAGE DISCHARGE (UNADJUSTED).--40 years, 127 ft^3/s , 92,010 acre-ft/yr; median of yearly mean discharges, 92 ft^3/s , 66,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,740 ft³/s, Apr. 24, 1979, gage height, 36.26 ft; no flow at times in 1950, 1952-53, 1970.

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

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 642 ft³/s, Apr. 4, gage height, 27.60 ft; minimum daily, 8.0 ft³/s, Nov. 17 and Apr. 24.

MEAN VALUES DAY OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP 8.8 36 36 8.9 9.1 36 9.9 55 54 54 73 77 37 57 38 37 36 8.0 57 55 33 36 75 9.5 36 8.0 27 27 23 21 ------5949.5 413.7 TOTAL 714.0 24.9 35 19 19.8 21.7 20.0 25.4 MEAN 13.3 23.8 35.5 45.8 56.2 MAX 8.8 8.0 MIN 8.0 AC-FT

CAL YR 1988 TOTAL 15722.4 MEAN 43.0 MAX 133 MIN 6.7 AC-FT 31190 WTR YR 1989 TOTAL 17920.2 MEAN 49.1 MAX 641 MIN 8.0 AC-FT 35540

05058000 SHEYENNE RIVER BELOW BALDHILL DAM, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIM	DIS CHARG INST CUBI FEE PER SECO (0006	E, SPE- CIFIC C CON- T DUCT- ANCE ND (US/CM	PH (STAND- ARD) UNITS)	AIR (DEG (E ATURE WATER C) (DEG (E (MG/ R AS C) CACO	CALCI L DIS- L SOLV (MG/	DIS ED SOLV L (MG/ CA) AS M	M, SODIUM - DIS- ED SOLVEN L (MG/M G) AS NA	SODI A) PERCE	NT RATIO
NOV												
18 JAN	1400	26	85	0	-5.	.5 1.	.5					
06 MAR	1030	25	89	0	-8.	.0 0.	.5				-	
07	1320	57	92	0	-5.	.0 2.	.0					
04	1305	642	92	2	6.	.0 5.	.0				-	
21	1300		106					70 69	47	100		36 2
31 JUL	1440	64	74	5	19.	.0 14.	.5					
17 SEP	1315	18	67	0	21.	.0 23	.0					
06	1750	21	69	5 8.50	22.	.0 20.	.0 2	30 44	29	59		35 2
DATE	POTAS SIUM DIS- SOLVE (MG/I AS K)	M, BONAT FET-L ED (MG/ AS HCO3	E, BONATE AB FET-LA (MG/L AS) CO3)	B LAB (MG/L AS CACO3)	CARBO DIOXID DIS- SOLVE (MG/L AS CO2 (00405	DE SULFATED DIS- ED SOLVE (MG/I	DIS- ED SOLV (MG/	, RIDE DIS ED SOLV L (MG/ L) AS F	DIS- SOLV ED (MG/ L AS) SIO2	AT 180 ED DEG. L DIS- SOLVE) (MG/I	JÉ SUM OD CONSTI C TUENTS - DIS- ED SOLVI	F SOLIDS, DIS- S, SOLVED (TONS ED PER AC-FT)
APR												
21 SEP	14	390	0	320	6.	.2 200	22	0.	30 30	70	02 6'	77 0.95
06	10	260	0	210	1.	3 130	14	0.	20 16	44	47 43	0.61
	DATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	DIS- SOLVED (UG/L AS B)	IRON, DIS- SOLVED (UG/L AS FE) 01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
APR 21 SEP		24.8	5	180	20	1	80	1700	<1.0	1	1	450
06	• • •	25.7	3	130	50	1	50	70	0.1	2	<1	290

RED RIVER OF THE NORTH BASIN

05058500 SHEYENNE RIVER AT VALLEY CITY. ND

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

DRAINAGE AREA.--7,810 $\rm mi^2$, approximately, of which about 5,700 $\rm mi^2$ is probably noncontributing, includes 3,800 $\rm mi^2$ in closed basins.

GAGE-HEIGHT RECORDS

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

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

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

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

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

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,580 ft³/s, Apr. 28, 1948, gage height, 17.51 ft; maximum gage height, 17.62 ft, Apr. 19, 1969; no flow during several periods in 1938-41.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

EXTREMES FOR CURRENT YEAR. -- Maximum discharge, 850 ft3/s, Mar. 30, gage height, 8.38 ft, minimum not determined.

				,		EAN VALUE		10 001 1011	DDI. 1909			
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.87	2.93	3.06	2.99	3.34		7.67	2.85	3.24	2.83	3.01	2.95
2	2.82	2.93	3.06	2.99	3.32		7.29	2.88	3.24	2.84	3.02	2.89
3	2.84	2.93	3.06	2.99	3.42		6.57	2.87	3.23	2.85	2.98	2.97
4	2.82	2.94	3.06	2.98	3.48		6.32	2.91	3.22	2.86	2.97	2.94
5	2.81	2.95	3.06	2.98	3.51		6.26	2.89	3.10	2.86	2.97	2.89
6	2.85	2.93	3.06	3.00	3.53		6.21	2.83	2.94	2.83	2.96	2.88
7	2.85	2.95	3.06	2.98	3.45	3.49	6.19	2.83	2.89	2.80	2.96	2.84
8	2.85	2.95	3.05	3.00	3.51	3.55	6.14	2.88	2.93	2.80	2.96	2.84
9	2.88	2.95	3.05	3.00	3.55	3.52	5.57	2.88	2.96	2.83	2.95	2.85
10	2.90	2.94	3.05	2.99	3.53	3.56	4.39	2.88	2.94	2.82	2.95	2.87
11	2.89	2.93	3.05	2.98	3.45	3.81	3.32	2.82	2.93	2.90	2.94	2.90
12	2.89	2.95	3.06	3.00	3.41	3.81	2.96	2.81	2.96	2.88	2.94	2.89
13	2.89	2.96	3.07	3.05	3.26	3.73	2.95	2.80	2.91	2.87	2.95	2.87
14	2.89	2.95	3.07	3.03	3.15	3.77	2.94	2.80	2.89	2.94	2.94	2.87
15	2.91	2.95	3.05	2.98		3.68	2.96	2.81	2.86	2.94	2.94	2.87
16	2.91	2.95	3.05	2.96		3.64	3.02	2.82	2.83	2.92	2.93	2.87
17	2.93	2.92	3.06	2.95		3.58	2.99	2.85	2.87	2.94	2.93	2.87
18	2.94	2.90	3.06	3.13		3.52	2.98	2.88	2.88	2.95	2.97	2.88
19	2.92	2.93	3.06	3.19		3.59	2.97	2.89	2.86	2.93	3.07	2.90
20	2.93	3.03	3.05	3.19		3.62	2.96	2.91	2.91	2.97	2.96	2.87
21	2.94	3.04	3.05	3.19		3.56	2.95	2.90	3.02	2.99	2.96	2.88
22	2.93	3.05	3.05	3.20		3.50	2.94	2.95	3.03	2.99	2.97	2.87
23	2.95	3.08	3.06	3.17		3.60	2.97	2.95	3.02	2.96	2.91	2.87
24	2.92	3.08	3.05	3.19		3.87	2.98	3.02	3.01	2.97	2.87	2.85
25	2.93	3.08	3.05	3.18		4.04	2.96	2.99	3.01	2.98	2.85	2.88
26	2.92	3.08	3.08	3.20		4.73	2.92	2.98	2.99	2.98	2.96	2.90
27	2.95	3.06	3.06	3.20		7.72	2.90	3.02	2.95	3.00	2.91	2.90
28	2.92	3.05	3.04	3.20		5.27	2.88	3.08	2.88	3.03	2.97	2.90
29	2.92	3.08	3.01	3.21		6.77	2.87	3.12	2.86	3.04	2.91	2.89
30	2.93	3.07	2.99	3.20		7.79	2.85	3.25	2.84	3.01	2.91	2.88
31	2.94		2.99	3.11		7.19		3.27		2.98	3.02	
MEAN	2.90	2.98	3.05	3.08			4.06	2.92	2.97	2.92	2.95	2.88
MAX	2.95	3.08	3.08	3.21			7.67	3.27	3.24	3.04	3.07	2.97
MIN	2.81	2.90	2.99	2.95			2.85	2.80	2.83	2.80	2.85	2.84

05058500 SHEYENNE RIVER AT VALLEY CITY, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIM	CHARC INST CUB: FEI PEF SECC E (0006	E, SPE- C. CIF: C CON- ET DUC'S ANCI DND (US/O	IC PH F- (STAND E ARD CM) UNITS)	AIR (DEG C	WATE () (DEG	E (MG/I R AS C) CACO	CALCII DIS- SOLVI (MG/I	DIS- ED SOLVE L (MG/L A) AS MG	, SODIUM DIS- D SOLVED (MG/L) AS NA	SODIUM) PERCENT	RATIO
APR 04	1850	0 708		344 7.8	0 7.	.0 4	.0 29	90 56	36	78	36	2
DATE	POTA: SIUI DIS- SOLVI (MG/I AS K	M, BONAT FET-I ED (MG, L AS) HCOS	TE, BONAT LAB FET-1 L (MG, AS) CO	TE, LINITY LAB LAB /L (MG/L S AS 3) CACO3	(MG/L) AS CO2	DE SULFA DIS- ED SOLV (MG/2) AS SO	DIS- ED SOLVE L (MG/I 4) AS CI	RIDE DIS- ED SOLVI (MG/I	DIS- SOLVE ED (MG/L L AS) SIO2)	AT 180 D DEG. (DIS- SOLVEI (MG/L)	E SUM OF CONSTI- TUENTS, DIS- D SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS
APR 04	12	340	0	280	8.	5 170	19	0.:	20 25	583	3 564	0.79
	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)	NIUM, DIS- SOLVED (UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) O1080)
APR O4		1110	2	160	30	<1	60	190	0.2	1	<10	310

05058700 SHEYENNE RIVER AT LISBON. ND

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

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

WATER-DISCHARGE RECORDS

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

REVISED RECORDS .-- WSP 1728: Drainage area.

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

REMARKS.--Estimated daily discharges: Dec. 29 to Apr. 12. Records good except those for period of estimated daily discharges, which are fair. Flow regulated by Lake Ashtabula (station 05057500) 108.5 mi upstream.

AVERAGE DISCHARGE.--33 years, 159 ft³/s, 115,200 acre-ft/yr; median of yearly mean discharges, 157 ft³/s, 113,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,270 ft³/s, July 1, 1975, gage height, 19.04 ft; no flow Sept. 19-21, Oct. 23, 24, 1956, Aug. 16, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,000 ft³/s, Apr. 4, gage height, 8.36 ft; maximum gage height, 10.14 ft, Mar. 30, backwater from ice; minimum daily, 7.4 ft³/s, July 15.

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

					M	EAN VALUE	S					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	10 9.0 8.8 9.0	22 24 24 25 28	35 37 41 41 40	e28 e27 e28 e30 e32	e43 e42 e41 e41 e40	e51 e51 e51 e51 e51	e860 e867 e878 e912 e968	48 43 39 40 37	57 68 85 81 78	36 32 25 20 16	31 31 34 31 28	29 31 34 32 58
6 7 8 9	11 9.9 9.9 10 9.9	27 29 28 29 27	39 39 38 34 30	e32 e32 e32 e32 e32	e40 e40 e39 e39 e39	e51 e50 e49 e49 e50	e932 e851 e796 e756 e740	33 33 32 32 32	77 78 75 64 47	12 9.7 13 12	27 27 23 21 20	53 37 36 33 26
11 12 13 14 15	9.4 9.3 9.8 9.8	26 30 30 29 31	26 25 27 30 31	e32 e32 e31 e31 e30	e47 e55 e54 e52 e50	e78 e95 e79 e62 e73	e641 e465 284 184 129	28 25 23 24 25	37 37 30 34 34	11 11 9.4 8.3 7.4	20 18 19 21 21	26 20 20 20 19
16 17 18 19 20	16 18 19 16 16	24 18 26 23 25	31 33 33 34 34	e29 e29 e28 e30 e33	e48 e48 e48 e48	e100 e110 e100 e89 e72	111 121 115 108 63	22 21 20 19 16	31 35 36 31 29	8.0 13 29 30 25	19 19 20 28 27	20 19 20 20 22
21 22 23 24 25	17 19 19 20 21	25 23 21 23 35	35 37 37 36 32	e36 e38 e43 e48 e54	e47 e47 e47 e49 e51	e66 e60 e65 e119 e210	49 73 73 68 68	14 15 16 25 32	27 22 24 24 30	21 17 18 17 16	30 29 34 46 36	26 26 27 27 26
26 27 28 29 30 31	20 26 18 23 23 24	41 41 40 35 36	36 36 33 e33 e31 e29	e52 e53 e50 e48 e47 e45	e51 e51 e51 	e434 e800 e811 e820 e835 e850	66 65 63 57 52	35 52 53 54 51 50	41 45 43 44 40	19 20 22 35 37 37	30 27 40 31 27 26	24 24 23 19 17
TOTAL MEAN MAX MIN AC-FT	462.8 14.9 26 8.8 918	845 28.2 41 18 1680	1053 34.0 41 25 2090	1124 36.3 54 27 2230	1296 46.3 55 39 2570	6432 207 850 49 12760	11415 380 968 49 22640	987 31.8 54 14 1960	1384 46.1 85 22 2750	597.8 19.3 37 7.4 1190	841 27.1 46 18 1670	814 27.1 58 17 1610

CAL YR 1988 TOTAL 19610.9 MEAN 53.6 MAX 250 MIN 1.1 AC-FT 38900 WTR YR 1989 TOTAL 27251.6 MEAN 74.7 MAX 968 MIN 7.4 AC-FT 54050

e - Estimated

05058700 SHEYENNE RIVER AT LISBON, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	CIFIC CON- DUCT- ANCE (US/CM)		TEMPER- ATURE AIR (DEG C) (00020)	ATURE WATER (DEG 0	(MG/I R AS C) CACO	CALCIU DIS- SOLVE (MG/L S) AS CA	DIS- D SOLVE (MG/L) AS MG	, SODIUM DIS- D SOLVED (MG/L) AS NA	SODIUI) PERCEN	RATIO
OCT 05	1050	11	945		6.5	10.	.0 -					
17 JAN	1605	16	1100		-4.5	1.	.0					
05 MAR	1110	31	1200		-12.0	0.	.0					
02 31	1450 1330	50 868	1060 350		-10.0 3.0			= =	: :	: :	: :	
05 13	1205 1600	998 260	669 870		9.0 16.0			48	28	- 59	- 3	
25 JUL	1300	37	1160		15.5	19.	.0		-			
14 AUG	1005	7.9	1040		20.5	25.	.0 -					-
30	1005	28	850	8.40	15.0	21.	.0 26	50 51	33	84	40	2
DATE	POTAS- SIUM DIS- SOLVEI (MG/L AS K)	, BONATE FET-LA O (MG/L AS HCO3)	BONATE, B FET-LAB (MG/L AS CO3)	LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (OO405)	SULFAT	DIS- ED SOLVE (MG/I	RIDE, DIS- ED SOLVE (MG/L L) AS F)	AS SIO2)	AT 180 D DEG. DIS- SOLVE (MG/L	E SUM OF CONSTICE TUENTS DIS-D SOLVED) (MG/L	SOLIDS, DIS- SOLVED (TONS PER AC-FT)
APR 05	11	250	0	210	4.0	140	17	0.2	0 19	44	8 44	0.61
30	12	300	0	250	1.9	170	36	0.3	0 16	55	3 55	0.75
		SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000) (DIS- SOLVED (UG/L AS B)	DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB) 01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
APR 05. AUG		1210	2	130	30	<1	50	180	0.1	<1	1	220
30.		41.5	3	220	70	<1	60	30	<0.1	3	<10	410

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

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

DRAINAGE AREA.--8,800 $\rm mi^2$, approximately, of which about 5,780 $\rm mi^2$ is probably noncontributing, including 3,800 $\rm mi^2$ in closed basins.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS .-- WSP 1728: Drainage area.

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

REMARKS.--Estimated daily discharges: Oct. 4-11, 22-30, Nov. 16,17, Mar. 16 to Apr. 13 and Aug. 5-15.
Records fair except those for periods of estimated daily discharges, which are poor. Flow regulated to a large degree by Lake Ashtabula (station 05057500) 202 mi upstream and several small reservoirs.

AVERAGE DISCHARGE.--40 years, 200 ft³/s, 144,900 acre-ft/yr; median of yearly mean discharges, 161 ft³/s, 117,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,690 ft³/s, Apr. 15, 1969, gage height, 21.03 ft; maximum gage height, 21.66 ft, July 6, 1975; minimum daily discharge, 13 ft³/s, Nov. 13, 1955, Aug. 22-24, 1959.

EXTREMES OUTSIDE PERIOD OF RECORD.--Spring flood in 1947 or 1948 reached a stage of 22.1 ft from floodmarks, discharge about 3,600 ft³/s.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,430 ft³/s, Apr. 3, gage height, 15.01 ft, backwater from ice; minimum daily, 14 ft³/s, Dec. 15.

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

					M	EAN VALUE	S					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40	50	32	45	54	56	e1250	131	89	66	48	48
2	34	48	42	44	47	59	e1350	128	87	64	40	44
3	26	40	46	40	53	60	e1400	123	81	60	37	46
4	e26	36	44	41	59	65	e1350	119	78	57	37	44
5	e26	36	48	40	63	66	e1300	114	83	53	e35	41
6 7 8 9	e26 e26 e26 e26	36 37 39 40 41	50 46 33 26 21	43 46 43 38 37	71 68 55 44 45	66 70 71 75 77	e1250 e1300 e1350 e1250 e1200	108 105 101 95 90	92 100 98 89 86	51 46 43 40 37	e32 e31 e32 e32 e32	40 41 42 44 54
11	e26	40	20	35	43	79	e1200	89	86	33	e32	50
12	27	43	24	34	49	81	e1150	87	90	32	e31	46
13	33	44	33	33	52	83	e1100	83	84	31	e31	44
14	33	44	28	33	49	84	1030	78	77	29	e30	46
15	33	46	14	32	41	79	660	75	72	27	e30	44
16	33	e30	25	33	38	e85	475	72	66	25	36	42
17	33	e20	19	33	43	e100	355	74	61	25	36	40
18	36	32	26	34	53	e110	284	82	60	32	27	38
19	37	34	29	33	60	e130	246	78	60	34	24	34
20	38	35	27	31	61	e140	232	75	59	31	15	28
21	39	37	29	31	60	e140	217	70	70	33	19	40
22	e39	33	40	34	58	e160	204	66	64	40	37	43
23	e40	33	41	35	59	e170	185	65	62	39	40	43
24	e40	36	27	31	67	e140	154	68	62	37	39	43
25	e40	39	25	28	67	e130	155	70	63	34	38	43
26 27 28 29 30 31	e42 e45 e40 e31 e32	40 39 29 28 28	37 46 40 38 43	31 41 40 40 50 58	61 59 54 	e140 e200 e300 e500 e800 e1100	153 147 140 136 133	66 64 66 68 73 83	69 70 63 60 60	35 25 25 30 33 31	43 38 45 54 49	42 42 42 43 43
TOTAL	1066	1113	1043	1167	1533	5416	21356	2666	2241	1178	1099	1280
MEAN	34.4	37.1	33.6	37.6	54.7	175	712	86.0	74.7	38.0	35.5	42.7
MAX	67	50	50	58	71	1100	1400	131	100	66	54	54
MIN	26	20	14	28	38	56	133	64	59	25	15	28
AC-FT	2110	2210	2070	2310	3040	10740	42360	5290	4450	2340	2180	2540

CAL YR 1988 TOTAL 29145 MEAN 79.6 MAX 442 MIN 11 AC-FT 57810 WTR YR 1989 TOTAL 41158 MEAN 113 MAX 1400 MIN 14 AC-FT 81640

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

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (OOO95)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (00020)		JRE TER G C)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	O.7 UM-MF	KF AGAR (COLS. / PER) 100 ML)
OCT	4455	27	050	0.00					0.0	75		5 7
12 NOV	1155	27	850	8.20	6.0		7.0	4.3	9.2	75		
15 JAN	1335	46	920	8.40	0.0		1.0	3.5	14.6	103	M	0 85
11 FEB	1145	38	1020	7.80	-24.5		0.0				-	-
22 APR	1500	64		8.40	-15.0		0.0	3.6	6.5	45	-	
03	1530 1740	1400 1290	350		2.0		0.5				-	
26	1445	153	348 720	8.50	8.5 13.0	1	0.5	15	11.6	108	1.	
JUN 06 29	1315 1350	93 59	1020 930	8.40	29.0 31.0		19.5	4.5	7.2	80	8	
JUL 25	0910	38	900		27.0	2	26.5				_	
AUG O1	1305	50	825	8.30	32.0		28.0	16	6.8	87	6	1 95
SEP 07	1505	42	875		21.5	2	20.0				_	
DATE	HARD NESS TOTA (MG/ AS CACO (OO9O	CALC L DIS L SOL (MG 3) AS	VED SOL /L (MG CA) AS	UM, SODI S- DIS VED SOLV /L (MG MG) AS	ED F/L SOI NA) PERO	OIUM CENT	SODIU AD- SORP- TION RATIO	SOLV (MG)	JM, WAT S- TOT /ED FIE /L MG/I K) CAC	TY BON. WH WA' IT WH CLD FIL AS MG/1	ATE BOY FER WATE IT WATE ELD FOR	CAR- NATE ATER H IT IELD /L AS CO3 O447)
OCT												
12 NOV	3	30 79	31	65	i	30	2	7	.3	276	336	0
15 FEB	3	40 79	35	77		32	2	8	.0	242	291	2
22 APR	3	50 77	39	89)	35	2	10		311	367	6
26 JUN	3	00 72	30	57		28	1	8.	.9	256	283	14
06 AUG	4	00 88	43	100	1	35	2	11		290	337	8
01	3	00 73	29	63		31	2	8.	.3	228	180	48.
DATE	SULFA DIS- SOLV (MG/ AS SO (0094	DIS ED SOL L (MG 4) AS	E, RID - DI VED SOL /L (MG CL) AS	E, DIS S- SOL VED (MG /L AS	VED DEC	DUÉ 180 G. C IS- LVED	SOLIDS SUM OF CONSTI TUENTS DIS- SOLVE (MG/L (70301	S SOLI S, SOLV TOP ED PER	VED SOL NS (TO R PE	DS, GI S- NITI VED DO ONS SOI CR (MC	EN, CRITE NOZ	ITRO- GEN, 2+NO3 IIS- DLVED MG/L 5 N) 0631)
OCT	140	74		20 20		E 4 7	E7		74 40	0 10	010 4	0.100
12 NOV	140	31		.20 20		543	53					
15 FEB	130	67		.30 14		594	55					0.100
22 APR	200	29		.20 26		675	66		.92 118			0.840
26 JUN	150	23		.30 15		518	50		70 214	<0.	.010 <	0.100
06 AUG	220	37	0	.30 19		665	69	92 0.	90 167	<0.	.010 <	0.100
01	150	27	0	.40 23		473	51	11 0.	.64 64	.4 <0.	.010 <	0.100

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

DATE	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)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)
OCT										
12 NOV	0.030	0.020	0.50	0.080	0.040	0.030	0.08	<10	5	120
15 FEB	0.030	0.030	0.70	0.060	0.020	0.020	0.06	-		-
22 APR	0.500	0.450	1.1	0.160	0.160	0.140	0.16	<10	4	97
26 JUN	0.030	0.020	1.3	0.080	0.040	0.020	0.08	<10	5	88
06 AUG	0.030	0.020	0.60	0.100	0.030	0.040	0.10			
01	0.030	<0.010	0.90	0.140	0.060	0.060	0.14	10	12	100
DATE	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)
OCT										
12 FEB	<0.5	<1	1	<3	2	9	<5	56	65	<0.1
22 APR	<0.5	<1	<1	<3	4	14	<5	68	88	<0.1
26 AUG	<0.5	<1	<1	<3	<2	7	<1	48	84	<0.1
01	<0.5	<1	<1	<3	5	3	1	55	2	<0.1
DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT							1			
12 NOV	<10	5	<1	<1.0	350	<6	4	35	2.6	71
15 FEB							-	31	3.9	97
22 APR	<10	9	<1	<1.0	390	<6	13	25	4.4	69
26 AUG	<10	5	<1	<1.0	320	<6	<3	52	21	77
01	<10	6	<1	<1.0	370	<6	<3	70	9.4	95

JUL

AUG

SEP

RED RIVER OF THE NORTH BASIN

05059400 SHEYENNE RIVER NEAR HORACE, ND

LOCATION.--Lat 46°48'13", long 96°54'13", in NW1/4NW1/4 sec.5, T.138 N., R.49 W., Cass County, Hydrologic Unit 09020204, at bridge on county road 3 mi north and 0.1 mi east of Horace.

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

GAGE-HEIGHT RECORDS

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

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

REMARKS.--Flow regulated to a large degree by Lake Ashtabula (station 05057500) 241 mi upstream. Above 3,000 ft³/s overflow occurs upstream between Kindred and Horace. This overflow bypasses the station by flowing into the Maple River to the west and into the Wild Rice River to the east.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,960 ft³/s, Mar. 28, 1987, determined from a hydrographic comparison with stations 05059000, Sheyenne River near Kindred, ND and 05059500, Sheyenne River at West Fargo, ND; maximum recorded gage height, 22.06 ft, Mar. 28, 1987, ice jam; minimum not determined.

EXTREMES FOR CURRENT YEAR. -- Maximum discharge, 1,420 ft³/s, Apr. 5, gage height, 19.66 ft, ice jam; minimum not determined.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

					MEAN	VALUES			
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
1	4.61	4.63	4.82	5.59				6.38	5.48
2	4.62	4.82	4.88	5.61				6.33	5.63

1	4.61	4.63	4.82	5.59	 		6.38	5.48	5.02	4.67	4.98
2	4.62	4.82	4.88	5.61	 		6.33	5.63	5.05	4.70	4.92
3	4.58	4.82	4.91	5.61	 	19.08	6.28	5.71	5.09	4.84	4.93
4	4.51	4.75	4.97	5.60	 	19.50	6.20	5.64	5.05	4.85	4.89
5	4.44	4.70	5.04	5.64	 	19.54	6.14	5.53	5.02	4.82	4.84
	4.44	4.70	2.04	3.04	 	19.04	0.14	2.22	2.02	4.02	4.04
6	4.42	4.70	5.06	5.66	 	19.01	6.05	5.51	4.98	4.73	4.81
7	4.40	4.71	5.08	5.77	 	18.72	5.96	5.58	4.94	4.61	4.77
8	4.38	4.69	5.10	5.83	 6.90	18.69	5.89	5.71	4.85	4.56	4.76
9	4.38	4.70	5.14	5.81	 6.97	18.71	5.86	5.74	4.77	4.54	4.76
10	4.35	4.73	5.16		 7.01	18.35	5.82	5.65	4.74	4.59	4.76
11	4.34	4.74	5.10		 7.03	17.59	5.76	5.56	4.69	4.54	4.86
12	4.34	4.77	5.12		 7.04	17.02	5.70	5.57	4.64	4.49	4.99
13	4.35	4.78	5.09		 7.04	16.64	5.67	5.56	4.60	4.51	4.94
14	4.42	4.80	5.12		 7.06	16.18	5.61	5.55	4.55	4.44	4.85
15	4.47	4.82	5.10		 7.05		5.57	5.43	4.52	4.44	4.82
16	4.47	4.68	5.09		 7.10		5.49	5.33	4.45	4.44	4.78
17	4.48	4.55	5.10		 7.08		5.46	5.26	4.40	4.45	4.74
18	4.47	4.40	5.11		 7.08		5.50	5.17	4.47	4.52	4.68
19	4.47	4.27	5.12		 7.39		5.61	5.09	4.50	4.59	4.63
20	4.46	4.32	5.10		 7.82		5.60	5.06	4.56	4.52	4.60
-0	4.40	4.72	2.10	2.20	 7.02	222	7.00	7.00	4.50	4.72	4.00
21	4.46	4.42	5.14		 8.35	7.68	5.52	5.08	4.53	4.45	4.63
22	4.45	4.46	5.20		 8.37	7.56	5.46	5.13	4.50	4.45	4.67
23	4.47	4.48	5.27		 8.36	7.37	5.42	5.19	4.64	4.45	4.76
24	4.51	4.41	5.32		 8.34	7.18	5.43	5.15	4.70	4.58	4.77
25	4.54	4.43	5.37		 8.50	6.82	5.43	5.21	4.68	4.63	4.76
26	4.56	4.50	5.43		 8.59	6.66	5.41	5.20	4.65	4.67	4.77
27	4.56	4.57	5.53		 8.39	6.67	5.38	5.18	4.61	4.68	4.77
28	4.52	4.59	5.55		 7.91	6.60	5.32	5.11	4.63	4.75	4.76
29	4.33	4.75	5.59		 8.52	6.50	5.32	5.08	4.65	4.68	4.73
30	4.44	4.84	5.60						4.63	4.77	4.71
					 9.75	6.43	5.33	5.04			
31	4.50		5.57		 13.78		5.39		4.68	5.03	
MEAN	4.46	4.63	5.19		 		5.69	5.37	4.70	4.61	4.79
MAX	4.62	4.84	5.60		 		6.38	5.74	5.09	5.03	4.99
MIN	4.33	4.27	4.82		 		5.32	5.04	4.40	4.44	4.60

05059400 SHEYENNE RIVER NEAR HORACE, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	CIFIC CON- DUCT- ANCE	PH (STAND- ARD UNITS) (OO4OO)	TEMPER- ATURE AIR (DEG C) (00020)	ATURE WATER (DEG ((MG/I R AS C) CACO	CALCIU DIS- SOLVE (MG/I	DIS- ED SOLVEI (MG/L A) AS MG	DIS- SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD- SORP- TION RATIO (00931)
APR 06	1015	1540	348	7.90	2.0	1.	.0 1	30 31	12	20	24	0.8
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE, FET-LAB (MG/L AS HCO3) (95440)	BONATE,	ALKA- LINITY LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVEI (MG/L AS CO2)	DIS- DIS- DIS- DIS- DIS- DIS- DIS- DIS-	DIS- ED SOLVE (MG/I	RIDE, DIS- ED SOLVE (MG/I	DIS- SOLVEI MG/L AS SIO2)	AT 180 DEG. 0 DIS- SOLVED (MG/L)	SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 06	8.5	140	0	110	2.8	58	9.5	5 0.1	10 14	231	222	0.31
		SOLVED (TONS PER DAY)	DIS- SOLVED (UG/L AS AS)	(UG/L AS B)	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)	DIS- SOLVED (UG/L AS MO)	NIUM, DIS- SOLVED (UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) 01080)
APR Of	5	960	2	90	70	<1	20	140	0.1	1	1	140

05059500 SHEYENNE RIVER AT WEST FARGO, ND

LOCATION.--Lat 46°53'28", long 96°54'24", in SE1/4SE1/4 sec.31, T.140 N., R.49 W., Cass County, Hydrologic Unit O9020204, on right bank at downstream side of county highway bridge, 1 mi north of West Fargo, 3 mi upstream from Maple River, and at mile 24.5.

DRAINAGE AREA.--8,870 $\rm mi^2$, approximately, of which about 5,780 $\rm mi^2$ is probably noncontributing, including 3,800 $\rm mi^2$ in closed basins.

WATER-DISCHARGE RECORDS

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

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

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

REMARKS.--Estimated daily discharges: Nov. 16 to Apr. 15. Records good except those for period Nov. 16 to Apr. 1, which are fair. Flow regulated to a large degree by Lake Ashtabula (station 05057500) 246 mi upstream. Above 3,000 ft²/s overflow that occurs upstream from the gaging station Sheyenne River near Horace (station 05059400) bypasses this station by flowing into the Maple River drainage to the west or into the Wild Rice River drainage to the east. This overflow is not included in the flow for this station. During some years, flow is diverted from just above the station into the Red River of the North in order to maintain adequate supply for municipal uses. Figures of daily discharge do not include this diversion.

AVERAGE DISCHARGE (ADJUSTED).--62 years (water years 1904-5, 1930-89), 180 ft3/s, 130,400 acre-ft/yr; median of yearly mean discharges, 150 ft3/s, 109,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,480 ft³/s, Apr. 21, 1979, gage height, 22.12 ft, backwater from Red and/or Maple Rivers; maximum gage height, 22.25 ft, July 5, 1975, backwater from Red and/or Maple Rivers; minimum daily, 1.0 ft³/s, Sept. 23, 1976, caused by diversion to Red River of the North.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,420 ft³/s, Apr. 4, gage height, 20.53 ft, backwater from ice; minimum daily, 22 ft³/s, Dec. 10 and Aug. 23.

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

1 2 3 4	38 41	33										
2	11		e39	e39	e48	e56	e1000	132	88	65	36	70
3	41	47	e40	e40	e40	e57	e1300	129	97	64	35	61
	41	51	e38	e40	e38	e58	e1350	127	104	68	42	71
4	39	49	e38	e40	e36	e59	e1400	123	101	66	46	64
5	35	44	e39	e40	e38	e60	e1400	119	95	62	46	56
	"		633	640	670	600	61400	119	30	02	40	,0
6	32	43	e38	e40	e42	e60	e1300	116	93	59	43	54
7	31	45	e33	e40	e50	e60	e1300	111	94	54	36	51
8	30	44	e27	e40	e52	e62	e1200	106	103	52	32	48
	29	43	e24	e40					108	47	30	47
9					e54	e64	e1250	105				47
10	30	44	e22	e40	e52	e64	e1280	103	105	44	32	47
11	30	44	e24	e40	e50	e66	e1300	100	100	40	33	51
12	31	48	e26	e40	e50	e67	e1250	98	99	37	44	51 60
13	30	47	e28	e40				95	99	33	31	62
					e49	e68	e1200	95				02
14	32	47	e28	e41	e48	e70	e1160	93	99	32	27	57
15	35	49	e28	e41	e47	e68	e1070	91	94	30	26	53
16	37	e45	e28	e41	e49	e66	646	88	87	28	25	51
17	37	e43	e28	e42	e50	e68	428	93	82	25	25	51 48
18	36		e28						77	30	31	45
		e37		e42	e54	e70	334	90		50		45
19	34	e31	e28	e42	e56	e74	279	93	71	29	44	42
20	34	e27	e29	e43	e55	e78	239	97	68	30	35	40
21	32	e29	e29	e43	e54	e90	215	93	72	32	31	46 45 48
22	33	e31	e29	e43	e53	e120	203	91	72	29	26	45
23		e32							74	32	22	40
25	33		e30	e44	e54	e150	189	87			22	40
24	35	e32	e31	e44	e54	e140	177	94	75	40	29	54 53
25	37	e32	e32	e45	e55	e135	157	91	82	39	38	53
26	39	e31	e33	e46	e56	e140	145	87	77	36	46	53
27	38	e30	e34	e47	e56	e135	145	86	76	32	42	53 54
28	37								72	77	54	54
28		e30	e35	e48	e56	e130	143	82	12	33		54 53
29	33	e31	e36	e49		e200	138	81	70	35	45	22
30	36	e40	e37	e50		e350	135	81	67	34	46	52
31	33		e38	e49		e600		84		34	91	
TOTAL	1068	1179	977	1319	1396	3485	22333	3066	2601	1271	1169	1590
	34.5	39.3	31.5	42.5	49.9	112	744	98.9	86.7	41.0	37.7	53.0
MAX	41	51	40	50	56	600	1400	132	108	68	91	71
MIN	29	27	22	39	36	56	135	81	67	25	22	40
AC-FT	2120	2340	1940	2620	2770	6910	44300	6080	5160	2520	2320	3150

CAL YR 1988 TOTAL 31754.8 MEAN 86.8 MAX 440 MIN 4.9 AC-FT 62990 WTR YR 1989 TOTAL 41454 MEAN 114 MAX 1400 MIN 22 AC-FT 82220

05059500 SHEYENNE RIVER AT WEST FARGO, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE		TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	CIFI CON- DUCT ANCE DUCT (US/C	PH - (STAI ARI M) UNITS	AII (DEG	RE R C)	TEMPER ATURE WATER (DEG (R- 1 R- (R R) (C)	HARD- NESS POTAL (MG/L AS CACO3)		DIS ED SOLV (MG,	UM, S- VED /L MG)	SODIU DIS- SOLVE (MG/ AS M	D L	SODIU PERCEN (00932	SOF M TI T RAT	ION
OCT																		
07 NOV		0915	30	9	65		7.5	9.	.0								-	
16 JAN		1120	37	9	55		3.0	0.	.5	-		-						
17 MAR		1625	41	10	40		1.0	0.	.0	-	- 50	70.5 6						
08		1725	62	9	00		1.0	0.	.0			-						
APR 03		1110	1360	3	38		2.0	0.	5			other.						
05		0955	1390		30		4.0	o.										
08		1510	1190				2.0	1.		140	33	13		23		2	5	0.9
15 JUN		1405	1110		20		0.0	2.	.0							E PLAN		
05 JUL		1545	91	10	50	2	1.0	19.	.0			-					-	
20 SEP		1210	32	8	95	2	3.0	25.	.0			-				-	-	
07		1845	50	8	80 8.	50 2	1.5	20.	0	320	74	32		76		3	3	2
01		1045	,,,		00	. , 0	,	20.	.0	220	, , , ,	72				1		-
	S	OTAS- SIUM, DIS- OLVED MG/L	BICAR BONATE FET-LA (MG/L AS	B FET-L	AB LAI	TY DIOX	IDE S- VED	SULFAT DIS- SOLVE (MG/I	ED S	CHLO- RIDE, DIS- BOLVED (MG/L	FLUO- RIDE, DIS- SOLVI (MG/I	DIS- SOLVED (MG)	/ED	RESIDED AT 18 DEG. DIS	OUE C C	SOLIDS SUM OF CONSTI TUENTS DIS- SOLVE	SOLI DI , SOL (TO	LVED ONS
DATE	A	S K)	HC03) (95440	C03) CAC)3) AS C	02)	AS SO4 (00945	1) A	S CL)	AS F	SIO	2)	(MG/	L)	(MG/L (70301) AC-	-FT)
APR			X.															
O8		9.0	150	0	120		1.9	69		9.0	0.	10 16			260	24	5	0.35
07		9.8	310	0	250		1.6	170		39	0.3	30 20		5	76	57	4 0	0.78
2	DATE	S (DLIDS, DIS- GOLVED (TONS PER DAY)	ARSENIC DIS- SOLVED (UG/L AS AS)	BORON, DIS- SOLVED (UG/L AS B)	IRON, DIS- SOLVED (UG/L AS FE)	S (EAD, DIS- SOLVED UG/L LS PB)	LITHI DIS SOLV (UG/ AS I	ED L L	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	D S (OLYB- ENUM, DIS- OLVED UG/L S MO)	N Sc (1	ELE- IUM, DIS- OLVED UG/L S SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR)	·)
	DALE	(1	70302)	(01000)	(01020)	(01046)	,,,	1049)	(0113	,0, (01056)	(71890)	(0	1060)	(0	1145)	(01080)	2.1
APR 08 SEP	•••	8	335	2	80	40		<1		18	140	0.3		1		<10	150)
			77.4	6	210	60		1		60	<10	0.1		4		<1	410)

05059600 MAPLE RIVER NEAR HOPE, ND

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

DRAINAGE AREA .-- 20.2 mi2, of which about 2.8 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

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

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

REMARKS .-- Estimated daily discharges: Mar. 1-31. Records fair.

AVERAGE DISCHARGE.--18 years (water years 1965-82), 2.82 ft3/s, 2,040 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 900 ft³/s, Apr. 18, 1979, gage height, 5.86 ft, backwater from ice; maximum gage height, 6.49 ft, Mar. 21, 1987; no flow for many months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 217 ft³/s, Apr. 5, gage height, 4.11 ft, no flow for several months.

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

NOV DEC JAN FEB MAR APR MAY JUN JU

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5						e.00	51	.25	1.5	.00	.00	.08
2						e.00	83	.20	.66	.00	.00	.29
3						e.00	133	.17	.38	.00	.00	.17
4						e.00	78	.15	.22	.00	.00	.12
5						e.00	170	.13	.17	.00	.00	.02
						6.00	170	• 15		.00	.00	.02
6 7 8						e.00	150	.12	.14	.00	.00	.00
7						e.00	86	.11	.25	.00	.00	.00
8						e.00	26	.07	.21 .15	.00	.00	.00
9						e.00	14	.00	.15	.00	.00	.00
10						e.00	13	.00	.12	.00	.00	.00
11						e.00	7.4	.00	.11	.00	.00	.00
10							7.4					
12 13 14						e.00	5.5	.00	.08	.00	.00	.00
13						e.00	5.5	.00	.00	.00	.00	.00
14						e.00	5.5	.00	.00	.00	.00	.00
15						e.00	6.4	.00	.00	.00	.00	.00
16						e.00	7.0	.00	.00	.00	.00	.00
17						e.00	6.0	.00	.00	.00	.00	.00
18						e.00	5.9	.00	.00	.00	.00	.00
19						e.00		.00	.00	.00	.00	.00
20							5.5 5.2				.00	
20						e.00	5.2	.00	.00	.00	.00	.00
21						e.00	5.2 3.7	.00	.00	.00	.00	.00
22						e.00	3.7	.00	.00	.00	.00	.00
23						e.00	1.5	.00	.00	.00	.00	.00
23 24						e.00	1.4	.20	.00	.00	.00	.00
25						e.00	1.2	.78	.00	.00	.00	.00
26						e.00	1.0	27	.00	.00	.00	.00
20								.27				.00
27 28 29						e.00	•79	3.8	.00	.00	.00	.00
28						e.50	-54	3.2	.00	.00	.00	.00
29						e2.0	. 43	2.9	.00	.00	.00	.00
30 31						e5.0	.29	2.8	.00	.00	.00	.00
31						e20		2.6		.00	.02	
TOTAL						27.50	879.95	17.75	3.99	0.00	0.02	0.68
MEAN						.89	29.3	.57	.13	.00	.001	.023
MAX						20	170	3.8	1.5	.00	.02	.29
							170					
MIN						.00	.29	.00	.00	.00	.00	.00
AC-FT						55	1750	35	7.9	.0	.04	1.3

e - Estimated

05059600 MAPLE RIVER NEAR HOPE, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (OOO95)	PH (STAND- ARD UNITS) (OO4OO)	TEMPERATURE AIR (DEG C	ATUR WATE) (DEG	E (MG/ R AS C) CACO	CALC: L DIS- L SOL' (MG,	DIS /ED SOLV /L (MG/	M, SODIU - DIS- ED SOLVE L (MG/ G) AS N	D L SODIU (A) PERCEN	NT RATIO
MAR												
31 APR	1500	3.9	350		7.0	0	.5		-			
03	1205	127	345	7.80	3.0	0 0	.5 1	10 27	11	17		23 0.7
04	1530	82	360		6.0		.5					
08	1115	54	470		-4.0	2	.0					
15	1650	7.4	670		19.0	0 10	.5					
24	1010	1.3	1180		16.5	5 12	.5					
MAY												
O4	1250	0.15	1440		19.	5 18	.5					
05	1630	0.02			27.0	18	.0					- 7
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)	CARBOI DIOXIDI DIS- SOLVEI (MG/L AS CO2 (00405)	DIS- DIS- D SOLVI (MG/I	DIS- ED SOLV L (MG/ 4) AS C	ED SOLV L (MG,	E, DIS- S- SOLV VED (MG/ L AS F) SIO2	AT 18 ED DEG. L DIS SOLV) (MG/	UE SUM OF CONSTRUCT C TUENTS - DIS- ED SOLVE L) (MG/I	SOLIDS, DIS- SOLVED (TONS PER L) AC-FT)
APR									•			
03	7.7	78	0	64	2.0	71	7.	3 0.	10 12	2	09 19	0.28
	5	SOLVED (TONS S PER DAY)	DIS- SOLVED (UG/L AS AS)	DIS- SOLVED (UG/L AS B)	IRON, DIS- SOLVED (UG/L AS FE) 01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
APR												
03.	•••	71.7	1	40	80	2	20	10	0.4	1	2	180

05059700 MAPLE RIVER NEAR ENDERLIN, ND

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

DRAINAGE AREA .-- 843 mi2, of which about 47 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS. -- WSP 1728: Drainage area.

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

REMARKS .-- Estimated daily discharges: Oct. 1 to Mar. 29 and June 5-22. Records fair.

AVERAGE DISCHARGE.--33 years, 40.8 ft³/s, 29,560 acre-ft/yr; median of yearly mean discharges, 28 ft³/s, 20,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,610 ft³/s, June 30, 1975, gage height, 15.41 ft; minimum daily, 0.1 ft³/s, Dec. 7-9, 1963.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 100 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 31	2045	*981	*8.42	No other p	eaks greater	than base discharg	ge.

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

Minimum daily discharge, 1.3 ft3/s, Sept. 2.

		DISCHAR	GE, COBIC	FEET FER	SECOND	MEAN VALUES	OCTOBER	1900 10	SET TEMBER	1909		
DAY	OCT	NOV	DEC	JAN	FEB	MAR ·	APR	MAY	JUN	JUL	AUG	SEP
1	e1.9	e2.0	e1.9	e2.0	e2.1	e2.1	842	26	3.2	1.9	2.1	1.4
2	e2.1	e2.0	e1.9	e2.1	e2.1	e2.1	849	25	2.7	2.0	2.1	1.3
3	e2.0	e2.0	e1.9	e2.1	e2.0	e2.1	745	22	2.4	1.9	2.3	2.4
4	e2.5	e2.0	e1.9	e2.1	e2.0	e2.1	725	21	2.3	1.7	2.4	1.8
5	e1.9	e2.0	e1.9	e2.2	e2.0	e2.1	701	20	e2.3	1.8	2.5	1.8
6	e1.8	e2.0	e2.0	e2.2	e2.0	e2.1	608	19	e2.2	2.5	2.4	2.0
7	e1.8	e2.0	e2.1	e2.2	e2.0	e2.1	523	16	e2.1	3.2	2.4	1.8
8	e1.8	e2.0	e2.1	e2.2	e2.0	e2.2	436	15	e2.0	2.3	2.4	1.9
9	e1.8	e2.0	e2.0	e2.2	e2.0	e2.4	322	15	e2.0	1.9	2.2	2.0
10	e1.7	e2.0	e2.1	e2.2	e2.0	e2.9	236	14	e2.0	1.7	2.0	2.0
11	e1.7	e2.0	e1.9	e2.2	e2.0	e3.5	240	11	e2.0	1.8	2.1	2.0
12	e1.7	e2.1	e1.9	e2.2	e2.0	e2.8	265	10	e2.2	2.1	2.3	1.8
13	e1.7	e2.1	e2.0	e2.2	e2.1	e2.7	245	10	e2.4	2.1	2.6	1.7
14	e1.7	e2.1	e1.9	e2.2	e2.2	e2.7	201	9.5	e2.3	2.0	2.6	1.5
15	e1.8	e2.1	e1.8	e2.2	e2.1	e2.7	174	8.8	e2.2	2.1	2.7	1.4
16	e1.8	e2.2	e1.8	e2.2	e2.0	e2.8	152	8.8	e2.2	1.5	2.5	1.5
17	e1.8	e2.2	e1.8	e2.3	e2.0	e2.8	132	7.8	e2.2	1.9	2.3	1.5
18	e1.8	e2.2	e1.8	e2.4	e2.0	e2.8	114	7.2	e2.5	2.3	2.3	1.7
19	e1.8	e2.2	e1.9	e2.5	e2.0	e2.8	95	6.3	e2.3	2.0	2.7	1.6
20	e1.8	e2.1	e1.9	e2.4	e2.0	e2.7	80	5.8	e2.3	1.8	2.3	1.6
21	e1.8	e2.1	e1.8	e2.4	e2.0	e2.6	66	4.8	e2.7	1.9	3.5	2.1
22	e1.8	e2.1	e2.0	e2.4	e2.0	e2.6	57	4.7	e2.4	2.1	4.6	2.1
23	e1.9	e2.1	e2.0	e2.4	e2.0	e3.0	51	4.4	1.8	2.1	5.9	1.6
24	e1.9	e2.1	e1.9	e2.4	e2.0	e20	46	4.9	1.8	2.2	7.4	1.5
25	e1.9	e2.1	e1.8	e2.4	e2.1	e61	42	4.4	2.1	2.0	4.9	1.6
26	e1.9	e2.0	e2.0	e2.4	e2.1	e263	38	3.6	1.9	2.1	4.0	1.7
27	e2.0	e2.0	e2.1	e2.3	e2.1	e400	35	3.6	2.8	1.9	3.0	1.4
28	e2.1	e1.9	e2.0	e2.3	e2.1	e300	32	3.5	2.7	2.0	3.2	1.9
29	e2.1	e1.9	e2.0	e2.2		e700	30	3.5	3.1	3.3	2.3	1.9
30	e2.0	e1.9	e2.0	e2.2		759	28	3.3	2.2	2.1	1.6	1.5
31	e2.0		e2.0	e2.3		845		3.3		1.9	1.6	
TOTAL	58.3	61.5	60.1	70.0	57.0	3406.7	8110	322.2	69.3	64.1	89.2	52.0
MEAN	1.88	2.05	1.94	2.26	2.04	110	270	10.4	2.31	2.07	2.88	1.73
MAX	2.5	2.2	2.1	2.5	2.2	845	849	26	3.2	3.3	7.4	2.4
MIN	1.7	1.9	1.8	2.0	2.0	2.1	28	3.3	1.8	1.5	1.6	1.3
AC-FT	116	122	119	139	113		16090	639	137	127	177	103
AO LL						N=307 70						

CAL YR 1988 TOTAL 4876.54 MEAN 13.3 MAX 171 MIN .62 AC-FT 9670 WTR YR 1989 TOTAL 12420.4 MEAN 34.0 MAX 849 MIN 1.3 AC-FT 24640

05059700 MAPLE RIVER NEAR ENDERLIN, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	CIFIC CON- DUCT- ANCE D (US/CM	PH (STAND- ARD) UNITS)) (00400)	TEMPER- ATURE AIR (DEG C) (OOO2O)	ATURE WATER (DEG C	(MG/I R AS C) CACO	CALCII DIS- SOLVI (MG/I	DIS- ED SOLVE L (MG/I A) AS MO	DIS- DIS- OMBO SOLVED (MG/L AS NA	SODIU	T RATIO
OCT												
05 NOV	1335	1.8	176	0	12.0	9.	.0	-	50 P	-		
18 JAN	1025	2.1	179	0	-5.5	2.	.0	-	100	38 35	9 303	-
05 MAR	1330	2.1	165	0	-6.0	0.	.5		-	-		-
02	1630	2.1	102	0	-8.5	1.	.0	-			_	
31 APR	1525		32		3.0			-	-	-	-	
05	1600	705	38	9 8.00	10.0	6.	.0 10	50 40	14	16	1	7 0.6
20 MAY	1635	79	69		20.0				- 11	-	-	
25 JUN	1455	3.8	148	0	17.0	16.	5	-		-		
22 JUL	1155	2.0	150	0	24.0	20.	.0	-	-			
18	1545	2.2	157	0	29.0	23.	.0	-	-		-	
30	1225	1.7	158	7.80	16.0	17.	5 7	30 190	61	88	2	1 1
DATE	POTAS SIUM DIS- SOLVE (MG/L AS K) (00935	, BONATE FET-LA D (MG/L AS HCO3)	BONATE B FET-LA (MG/L AS CO3)	B LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFAT DIS- SOLVE (MG/L AS SO4	DIS- D SOLVI (MG/I	RIDE DIS- ED SOLVE (MG/I	DIS- SOLVE MG/I L AS SI02)	AT 180 D DEG. DIS- SOLVE (MG/L	E SUM OF CONSTICT TUENTS DIS- DIS- CD SOLVE (MG/L	SOLIDS, DIS- SOLVED (TONS PER) AC-FT)
APR												
05 AUG	11	120	0	100	2.0	89	10	0.	10 15	27	1 25	6 0.37
30	11	460	0	370	12	460	60	0.:	20 26	117	0 112	0 1.59
	ATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	DIS- SOLVED (UG/L AS B)	IRON, DIS- SOLVED (UG/L AS FE) 01046) (LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
APR 05. AUG	••	516	3	50	60	<1	20	40	0.1	<1	. 2	120
30.	••	5.34	3	250	70	1	120	720	0.1	3	<10	860

05060500 RUSH RIVER AT AMENIA, ND

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

DRAINAGE AREA .-- 116 mi2.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS .-- WSP 1728: Drainage area.

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

REMARKS.--Estimated daily discharges: Mar. 26 to Apr. 10 and Aug. 30 to Sept. 5. Records good except those for periods of estimated discharge, which are fair.

AVERAGE DISCHARGE.--43 years, 9.47 ft³/s, 6,860 acre-ft/yr; median of yearly mean discharges, 6.6 ft³/s, 4,780 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,490 ft³/s, Apr. 19, 1979, gage height, 10.37 ft; maximum gage height, 12.15 ft, Mar. 23, 1966, backwater from ice; no flow at times each year.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 27 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 30		ice jam	*9.96	Apr. 2		*602	backwater from ice

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

No flow for several months.

					MEAN	VALUES							
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
1	.00	.00	.00	.00	.00	.00	e377	3.1	12	.00	.00	e.00	
	.00	.00	.00	.00	.00	.00	e537	2.1	9.6	.00	.00	e.00	
2	.00	.00	.00	.00	.00	.00	e429	1.3	5.3	.00	.00	e6.0	
4	.00	.00	.00	.00	.00	.00	e222	1.1	3.3	.00	.00	e11	
5	.00	.00	.00	.00	.00	.00	e154	1.5	2.2	.00	.00	e16	
6 7	.00	.00	.00	.00	.00	.00	e108	1.7	1.4	.00	.00	21	
7	.00	.00	.00	.00	.00	.00	e99	1.7	.52	.00	.00	25	
8	.00	.00	.00	.00	.00	.00	e95	1.3	.26	.00	.00	20	
9	.00	.00	.00	.00	.00	.00	e74	.97	.21	.00	.00	15	
10	.00	.00	.00	.00	.00	.00	e53	.87	.12	.00	.00	11	
11	.00	.00	.00	.00	.00	.00	54	.73	.05	.00	.00	8.2	
12	.00	.00	.00	.00	00	.00	46	.48	.04	.00	.00	6.8	
13	.00	.00	.00	.00	.00	.00	42	.31	.04	.00	.00	5.8	
14	.00	.00	.00	.00	.00	.00	37	.21	.02	.00	.00	5.5	
15	.00	.00	.00	.00	.00	.00	35	.13	.02	.00	.00	4.1	
16	.00	.00	.00	.00	.00	.00	32	.09	.02	.00	.00	3.2	
17	.00	.00	.00	.00	.00	.00	28	.07	.02	.00	.00	2.8	
18	.00	.00	.00	.00	.00	.00	24	.07	.03	.00	.00	2.5	
19	.00	.00	.00	.00	.00	.00	20	.06	.02	.00	.00	2.0	
20	.00	.00	.00	.00	.00	.00	16	06	.01	.00	.00	1.7	
21	.00	.00	.00	.00	.00	.00	11	.08	.02	.00	.00	1.3	
22	.00	.00	.00	.00	.00	.00	8.1	.15	.03	.00	.00	1.3	
23	.00	.00	.00	.00	.00	.00	6.7	.32	.02	.00	.00	1.3	
24	.00	.00	.00	.00	.00	.00	5.7	.45	.02	.00	.00	1.1	
25	.00	.00	.00	.00	.00	.00	5.5	2.8	.02	.00	.00	.98	
26	.00	.00	.00	.00	.00	e.00	5.4	10	.02	.00	.00	.62	
27	.00	.00	.00	.00	.00	e10	4.7	15	.01	.00	.00	.31	
28	.00	.00	.00	.00	.00	e40	4.4	9.5	.0	.00	.00	.54	
29	.00	.00	.00	.00		e60	3.8	5.7	.00	.00	.00	.48	
30	.00	.00	.00	.00		e160	3.4	4.8	.00	.00	e.00	.53	
31	.00		.00	.00		e250		6.0		.00	e.00		
TOTAL	0.00	0.00	0.00	0.00	0.00	520.00	2540.7	72.65	35.32	0.00	0.00	176.06	
MEAN	.00	.00	.00	.00	.00	16.8	84.7	2.34	1.18	.00	.00	5.87	
MAX	.00	.00	.00	.00	.00	250	537	15	12	.00	.00	25	
MIN	.00	.00	.00	.00	.00	.00	3.4	.06	.00	.00	.00	.00	
AC-FT	.0	.0	.0	.0	.0	1030	5040	144	70	.0	.0	349	

CAL YR 1988 TOTAL 378.74 MEAN 1.03 MAX 21 MIN .00 AC-FT 751 WTR YR 1989 TOTAL 3344.73 MEAN 9.16 MAX 537 MIN .00 AC-FT 6630

e - Estimated

05060500 RUSH RIVER AT AMENIA, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TI	ME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	CIFIC CON- DUCT- ANCE (US/CN	PH (STANI ARD () UNITS)	AIR (DEG	E ATUF WATE C) (DEG	RE (MG, CR AS C) CAC	S CALC AL DIS /L SOL (MG 03) AS	IUM S VED SO /L (!	AGNE- SIUM, DIS- OLVED MG/L S MG) 0925)	SODIUM DIS- SOLVEI (MG/I AS NA	SODI	NT RATIO
MAR 31	. 17	50	252	28	30 -	0	.0 (0.5			1.			
03 06 10 19 26	08 15	00	429 108 42 21 5.5	32 44 51 78 100	5 8.0 0 -	00 6 1 17	.0	0.5 0.5 1.0 1.0	190 47	Ξ.	17	16		15 0.5
04 23 JUN			1.0	124				5.5	= -	=		4	-	
23 SEP	. 13	30	0.02	148	8.4	40 26	.0 22	2.0	750 180		73	78		18 1
06 26	15 16	00 15	20 0.59	130				0.0	=	=			-	
DATE	DI	UM, S- VED /L K)	BICAR- BONATE, FET-LAE (MG/L AS HCO3) (95440)	BONATE FET-LA (MG/I AS CO3)	AB LAB (MG/I AS CACO	DIOXI DIS L SOLV (MG/	DE SULFA DIS- ED SOLV L (MG/ 2) AS SO	DIS- VED SOLV L (MG,	E, RID DI ZED SOL ZL (MG CL) AS	E, D: S- SC VED (1)/L F) S:	LICA, IS- OLVED MG/L AS IO2) 0955)	AT 180 DEG. DIS- SOLVE (MG/I	JÉ SUM O CONST C TUENT DIS SOLV	F SOLIDS, I- DIS- S, SOLVED - (TONS ED PER L) AC-FT)
APR 06	c	.6	130	0	111	•	.1 110	6.	0 0	.20	13	31	14 2	85 0.43
JUN 23			220	0	180		.4 620	20		.20	5.6	114	S and	00 1.55
	DATE	so s (LIDS, DIS- A OLVED TONS PER DAY)	ARSENIC DIS- SOLVED (UG/L AS AS)	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)	MERCUI DIS-	RY ED L	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) 01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
APR OG JUN	i		91.6	3	70	50	<1	25	90	0	.3	1	3	200
23	3		0.06	6	330	60	<1	160	200	0	. 1	3	<10	910

O5064500 RED RIVER OF THE NORTH AT HALSTAD, MN (National stream quality accounting network station and radiochemical program station)

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

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

WATER-DISCHARGE RECORDS

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

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

GAGE.--Water-stage recorder. Datum of gage is 826.65 ft above National Geodetic Vertical Datum of 1929. Prior to July 17, 1961, nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Nov. 16 to Apr. 19. Records good except those for period of estimated daily discharges, which are fair.

AVERAGE DISCHARGE.--28 years (1961-89), 1,798 ft^3/s , 1,303,000 acre-ft/yr; median of yearly mean discharges, 1,760 ft^3/s , 1,280,000 acre-ft/yr.

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

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

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 26,000 ft³/s, Apr. 9, gage height, 35.65 ft, backwater from ice; minimum daily, 131 ft³/s, Oct. 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 TIII. AUG SEP e245 e145 e209 e309 e5000 e250 e145 e213 e8000 e313 e235 e213 e315 e10000 e140 e230 e140 e215 e319 e13000 e225 e140 e217 e321 e19000 e225 e220 e320 e22000 e225 e140 e228 e321 e24500 e225 e140 e236 e323 e25100 q e220 e140 e243 e321 e25500 e220 e140 e252 e319 e25600 e220 e140 e270 e330 e25600 e215 e140 e285 e25200 e346 e300 e215 e365 e145 e24500 e215 e150 e290 e379 e23400 e215 e150 e278 e386 e22000 e205 e155 e210 e266 e393 e20500 e200 e210 e150 e258 e392 e18700 e190 e200 e143 e246 e392 e16700 e200 e190 e137 e238 e395 e14500 e220 e180 e133 e227 e230 e185 e133 e136 P424 e223 e250 e185 e235 e445 e260 e190 e139 e242 P467 e255 e180 e144 e249 e490 e250 e175 e150 e268 e530 e245 e170 e157 e276 e650 e240 e169 e165 e284 e800 e240 e165 e181 e298 e1000 e240 e160 e1300 e193 ---e240 e155 e203 e1800 e150 e205 e2500 TOTAL MEAN MAX MIN AC-FT

CAL YR 1988 TOTAL 240210 MEAN 656 MAX 4940 MIN 64 AC-FT 476500 WTR YR 1989 TOTAL 643286 MEAN 1762 MAX 25600 MIN 131 AC-FT 1276000

e - Estimated

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

WATER-QUALITY RECORDS

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

		DIS- CHARGE, INST.	SPE- CIFIC	DAIR, WA	LER TEAR C	CIOBER 13	00 10 SEF	TEMBER 19	OXYGEN, DIS- SOLVED	COLI- FORM, FECAL.	STREP- TOCOCCI FECAL,
DATE	TIME	CUBIC FEET PER SECOND (00061)	CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER- ATURE WATER (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	(PER- CENT SATUR- ATION) (00301)	0.7 UM-MF (COLS./ 100 ML) (31625)	FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT											
14 NOV	1415	135	735	9.00	16.5	8.5	14	9.2	78	12	46
14 JAN	1225	202	N980	8.60	0.0	1.0	8.2	14.4	102		
18 FEB	1600	143	750		-2.0	0.0					
24 APR	1300	253		8.60	-10.0	0.0	2.6	6.0	41	-	
06	1400	22100	255		4.0	0.5					
07	1325	24500	280		2.0	0.5					
09	1040 1305	24800 25600	260 272		-3.5	0.5					
13	1130	24500	260		2.5 6.0	1.0					=
17	1510	18500	390		2.0	5.5					
27	1230	3490	575	8.30	8.0	5.5 12.0	87	11.5	107	12	770
JUN 07 AUG	1350	1990	632	8.20	14.5	19.0	91	7.0	77	27	1400
02 SEP	1150	292	680	8.50	30.5	27.5	83	6.7	85	39	
08	1500	1020			22.0	20.0					
	HARD- NESS TOTAL (MG/L AS CACO3)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L	SODIUM, DIS- SOLVED (MG/L	SODIUM	SODIUM AD- SORP- TION	POTAS- SIUM, DIS- SOLVED (MG/L	ALKA- LINITY WAT WH TOT IT FIELD MG/L AS	BICAR- BONATE WATER WH IT FIELD MG/L AS	CAR- BONATE WATER WH IT FIELD MG/L AS	SULFATE DIS- SOLVED (MG/L
DATE	(00900)	(00915)	AS MG) (00925)	AS NA) (00930)	PERCENT (00932)	RATIO (00931)	AS K) (00935)	CAC03 (00419)	HC03 (00450)	CO3 (00447)	AS SO4) (00945)
OCT											
NOV NOV	310		37	46	24	1	7.6	248	255	23	120
14 FEB	350	71	43	77	31	2	8,5	286	334	7	170
24 APR	360	76	41	41	19	1	9.3	308	353	11	97
27 JUN	260		27	20	14	0.6	6.9	190	232	0	94
07 AUG	290		32	24	15	0.6	6.2	202	246	0	110
02	260	53	32	39	24	1	7.2	206	232	10	88
	RII DIS SOI (MG	LVED SOL	E, DIS S- SOL VED (MG /L AS	VED DEC	DUÉ SUM 80 CONS . C TUEN S- DI .VED SOL	OF SOLI TI- DI TS, SOL S- (TO VED PE	S- DI VED SOL NS (TO R PE	S- NITR VED DI NS SOL R (MG	N, GE ATE NITR S- DI VED SOL /L (MG	N, GE ITE NO2+ S- DI VED SOL /L (MG	NÓ3 S- VED /L
DAT		CL) AS 940) (009				/L) AC- 01) (703		Y) AS 02) (006			N) 31)
OCT 14	2	4 0	.30 7	.6	460	450 0	.63 168	- 00	<0.	010 <0.	100
NOV 14	36	6 0	.30 10		595		.81 325				
FEB 24	2	3 0	.20 22	E	525	499 0	.71 359	0.	750 0.	010 0.	760
APR 27	1:	2 0	.20 16		395	349 0	.54 3720	0.	220 0.	020 0.	240
JUN 07	1:	2 0	.20 12		403	383 0	.55 2170	0.	610 0.	070 0.	680
AUG 02	25	5 0	.40 17		422	392 0	.57 333	1.	28 0.	020 1.	30

O5064500 RED RIVER OF THE NORTH AT HALSTAD, MN--CONTINUED (National stream quality accounting network station and radiochemical program station)

DATE	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)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)
OCT										
14 FEB	0.040	0.020	0.80	0.330	0.170	0.140	0.33	<10	4	61
24	0.240	0.210	1.1	0.120	0.120	0.100	0.12	<10	2	86
APR 27	0.240	0.260	0.90	0.190	0.160	0.130	0.19	20	4	59
JUN 07	0.100	0.070	1.9	0.430	0.200	0.210	0.43			
AUG O2	0.040		1.2	0.500		0.410	0.50	20	7	64
02		<0.010		0.500	0.430	0.410	0.90	20		04
DATE	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (O1035)	COPPER, DIS- SOLVED (UG/L AS CU) (O1040)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (O1049)	LITHIUM DIS- SOLVED (UG/L AS LI) (O1130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)
OCT	40 5				_	0	15		<1	(0.1
14 FEB	<0.5	<1	<1	<3	3	9	<5	44		<0.1
24 APR	<0.5	<1	2	<3	3	19	<5	39	42	<0.1
27 AUG	<0.5	<1	<1	<3	<3	23	<1	27	1	<0.1
02	<0.5	<1	<1	<3	8	12	1	35	3	<0.1
DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT										
14 NOV	<10	2	<1	<1.0	260	<6	3	45	16	73
14 FEB								21	11	91
24	<10	6	<1	<1.0	290	<6	15	17	12	81
APR 27	<10	3	<1	<1.0	200	<6	9	215	2030	100
AUG 02	<10	14	1	<1.0	230	7	5	154	121	99

O5064900 BEAVER CREEK NEAR FINLEY, ND (Hydrologic bench-mark station)

LOCATION.--Lat 47°35'40", long 97°42'18", in NE1/4 sec.31, T.148 N., R.55 W., Steele County, Hydrologic Unit 09020109, on right bank 500 ft upstream from bridge on county highway, and 7 mi northeast of Finley.

DRAINAGE AREA .-- 160 mi2, approximately.

WATER-DISCHARGE RECORDS

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

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

REMARKS.--Estimated daily discharges: Mar. 14 to Apr. 11, May 13-23, 25, and 27 to June 11. Records fair except those for periods of estimated daily discharge, which are poor. Flow affected since June, 1987 by flood-control dam 2.0 mi upstream.

AVERAGE DISCHARGE.--25 years, 8.92 ft³/s, 6,460 acre-ft/yr; median of yearly mean discharges, 8.7 ft³/s, 6,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,900 ft³/s, Apr. 19, 1979, gage height, 8.35 ft, backwater from ice; maximum gage height, 9.70 ft, Mar. 14, 1966, backwater from ice; no flow for several months each year.

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

EXTREMES FOR CURRENT YEAR. -- Maximum discharge, 230 ft3/s, Apr. 5, gage height, 4.55 ft, backwater from ice; no flow for several months.

MEAN VALUES DAY OCT NOV DEC FEB JUN .IIII. AUG SEP JAN MAR APR MAY .00 .00 .00 -00 .00 13 e2.2 -00 -00 -00 .00 e20 2 .00 .00 .00 -00 -00 11 .00 .00 .00 .00 e30 e2.0 3 .00 .00 .00 -00 .00 -00 e40 8.8 .00 .00 .00 e1.8 .00 .00 .00 .00 .00 .00 .00 e50 .00 .00 e1.6 5 .00 .00 .00 .00 .00 6.2 .00 .00 .00 -00 e100 e1.4 6 .00 .00 .00 .00 .00 .00 .00 .00 e190 5.0 e1.2 .00 .00 .00 .00 4.4 3.9 3.8 .00 .00 .00 .00 .00 .00 e115 e1.0 8 .00 .00 .00 .00 .00 .00 .00 e72 .00 .00 e.80 .00 .00 .00 .00 .00 .00 e.60 .00 .00 .00 e107 10 .00 .00 .00 .00 .00 3.7 .00 .00 .00 .00 e62 e.40 11 .00 .00 .00 .00 e.20 .00 .00 .00 .00 e51 3.3 -00 12 .00 .00 .00 2.8 .00 .00 .00 .00 54 .12 .00 .00 13 .00 .00 .00 .00 83 e2.7 .13 .00 .00 .00 .00 14 .00 .00 .00 .00 .00 e.00 145 e2.6 .00 .00 .00 15 -00 -00 .00 .00 .00 139 .16 .00 .00 .00 e.00 e2.5 .00 16 .00 .00 .00 .00 e.00 126 e2.4 .09 .00 .00 .00 17 .00 .00 .00 .00 .00 e.00 128 e2.3 .03 .00 .00 .00 e.00 96 65 18 -00 -00 .00 .00 .00 e2.2 .03 .00 .00 .00 19 -00 .00 -00 .00 .00 e.00 e2.1 .02 -00 .00 -00 -00 20 .00 .00 .00 .00 e.00 50 e2.0 .00 .00 .00 .00 21 .00 -00 -00 -00 e.00 -00 .00 -00 -00 -00 38 e1.9 22 .00 .00 .00 .00 .00 e.00 29 e1.8 .00 .00 .00 .00 23 .00 -00 -00 25 .00 -00 .00 -00 -00 e.00 e1.7 .00 24 .00 .00 .00 .00 -00 .00 .00 .00 .00 e.00 4.6 25 .00 .00 .00 .00 -00 e.00 13 e3.6 .00 .00 .00 .00 26 .00 .00 .00 .00 .00 e.50 14 2.8 .00 .00 .00 .00 27 .00 .00 .00 .00 .00 e2.0 .00 .00 .00 .00 34 e2.7 28 .00 .00 .00 .00 .00 34 .00 .00 .00 .00 e5.0 e2.6 29 .00 .00 .00 .00 e10 27 e2.6 .00 .00 .00 .00 ---.00 19 .00 .00 .00 e15 e2.5 .00 .00 .00 .00 31 .00 .00 e7.0 .00 .00 .00 TOTAL 0.00 0.00 0.00 0.00 0.00 39.50 1975 121.6 13.97 0.00 0.00 0.00 MEAN .00 .00 .00 .00 .00 1.27 65.8 3.92 .47 .00 .00 .00 13 2.2 MAX .00 .00 .00 .00 .00 15 190 .00 .00 .00 MIN .00 .00 .00 .00 .00 .00 13 .00 .00 .00 .00 .0 AC-FT -0 .0 .0 .0 .0 78 3920 241 28 .0 .0

CAL YR 1988 TOTAL 1795.06 MEAN 4.90 MAX 130 MIN .00 AC-FT 3560 WTR YR 1989 TOTAL 2150.07 MEAN 5.89 MAX 190 MIN .00 AC-FT 4260

e - Estimated

103

RED RIVER OF THE NORTH BASIN

O5064900 BEAVER CREEK NEAR FINLEY, ND--CONTINUED (Hydrologic bench-mark station)

WATER-QUALITY RECORDS

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

DATE		DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE CIF CON DUC ANC (US/	TIC I- PI T- (STA E AF (CM) UNIT	AND- A RD TS) (D	MPER- TURE AIR EG C) 0020)	TEMF ATU WAT (DEG	RE ER C) (TUR- BID- ITY NTU	- DI SOL) (MC	SEN, (F SEN, (F SEN, (F SEN, (F SEN, (F SEN, (F))	DIS- FO DLVED FE PER- O. CENT UN TUR- (CO PION) 100	7 M-MF DLS./	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
APR 08	1410	74			3.20	-3.0			12		3.2	91	40	6000
11	1320 1130	48 18		620 790	=	4.0 18.0		1.0 3.0		=			==	
JUN 12	1535	0.14		960		15.0	1	7.0						
DATE	HARD NESS TOTA (MG/ AS CACO	L SO (M	CIUM S- LVED IG/L CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM DIS- SOLVED (MG/L AS NA	SOI) PER	DIUM CENT 932)	SODIU AD- SORP- TION RATIO (00931		POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	HCO3	AS S	S- LVED S/L SO4)
APR 08	1	60 3	59	16	28		26	1		6.5	98	120	130	i
DATE	CHLC RIDE DIS- SOLV (MG/ AS C	FL, RI	UO- DE, DIS- DLVED IG/L F)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS RESIDU AT 180 DEG. DIS- SOLVE (MG/L	E SUM CONS C TUES D SOS	IDS, OF STI- NTS, IS- LVED G/L) 301)	SOLIDS DIS- SOLVE (TONS PER AC-FT (70303	, s		NITRO- GEN, NITRATE	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N)	NIT GE NO2+ DI SOL (MG AS	RO- N, NO3 S- VED /L N)
APR 08	6.	9	0.10	10	310	6	305	0.4	3	63.3	1.82	0.080	1.	90
DATE	NITR GEN AMMON TOTA (MG/ AS N	O- G , AMM IA D L SO L (M	TRO- EN, ONIA OIS- DLVED G/L N)	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-	PHO PHOI S D: SOI (MC	OS- ROUS IS- LVED G/L P) 666)	PHOS- PHOROU ORTHO DIS- SOLVED (MG/L AS P) (00671	s , F	PHOS- PHOROUS DRGANIC TOTAL (MG/L AS P) (00670)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	DIS- SOLVED (UG/L AS AS)	DIS SOLV (UG AS	ED /L BA)
APR 08	0.3	20 0	.320	1.7	0.300	2 0	.240	0.19	0	0.30	40	2		27
DATE	BERY LIUM DIS- SOLV (UG/ AS E	L- , CAD ED SO L (U E) AS	MIUM OIS- OLVED G/L CD) 025)	CHRO- MIUM, DIS-	COBALT DIS- SOLVED (UG/L AS CO	COPI DIS SOI (UC	PER, S- LVED G/L CU)	IRON, DIS- SOLVE (UG/L AS FE	D)	LEAD, DIS- SOLVED (UG/L AS PB)	LITHIUM DIS- SOLVED (UG/L AS LI)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERC DI SOL (UG AS	URY S- VED /L HG)
APR 08	<0	•5	<1	1	<	3	12	8	5	<5	16	250	<	0.1
DATE	MOLY DENU DIS SOLV (UG/ AS M	M, NIC - DI ED SO L (U	KEL, S- LVED G/L NI)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER DIS- SOLVEI (UG/L AS AG	D SOI (UC)	RON- IUM, IS- LVED G/L SR)	VANA- DIUM, DIS- SOLVE (UG/L AS V)		ZINC, DIS- SOLVED (UG/L AS ZN)	SEDI- MENT, SUS- PENDED (MG/L)	(T/DAY)	SU SIE DI % FI TH	AM. NER AN MM
	(0106	0) (01	065)	(01145)	(01075)	, (010	080)	(01085	, ((01090)	(80154)	(80155)	(703	21)
APR 08	<	10	8	1	1.0)	140	<	6	11	24	4.8		98

05066500 GOOSE RIVER AT HILLSBORO, ND

LOCATION.--Lat 47°24'34", long 97°03'39", in NW1/4 sec.5, T.145 N., R.50 W., Traill County, Hydrologic Unit 09020109, on right bank 600 ft upstream from Foogman Dam in Hillsboro, and 27.5 mi upstream from mouth.

DRAINAGE AREA. -- 1,203 mi2, of which about 110 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

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

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

REMARKS.--Estimated daily discharges: Dec. 26-29, Jan. 6-8, 26, 27, 31 to Feb. 17, Apr. 2-8, 21 to Sept. 10. Records good except those for periods of estimated daily discharges, which are fair.

AVERAGE DISCHARGE.--56 years (1931-32, 1934-89), 72.0 ft³/s, 52,160 acre-ft/yr; median of yearly mean discharges, 43 ft³/s, 31,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 14,800 ft³/s, Apr. 21, 1979, gage height, 16.76 ft; no flow at times.

EXTREMES FOR CURRENT YEAR. -- Peak discharges greater than base discharge of 200 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 8	0730	*3,000	a*9.80	Apr. 17	2400	1,100	3.82

Minimum daily discharge, 0.33 ft^3/s , Oct. 13. a - Backwater from ice

		DISCHARGE	CUBIC	FEET PER	SECOND,	WATER YEAR	OCTOBER	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.4	1.2	3.5	4.3	e5.3	3.3	90	e132	e46	e10	e1.2	e1.5
	.43	1.4	3.5	4.6	e4.9	3.3	e198	e120	e44	e9.9	e1.2	e1.5
3	.64	1.3	3.5	4.7	e4.7	3.4	e499	e110	e42	e9.6	e1.2	e1.6
2 3 4	.50	1.4	3.5	4.9	e4.5	3.6	e802	e96	e40	e9.4	e1.2	e1.6
5	.71	1.4	3.5			7.0	e1360		e38	e8.2	e1.2	e1.6
,	• / 1	1.4	5.5	4.7	e4.7	3.3	e1500	e84	670	60.2	61.2	61.0
6	.93	1.2	3.9	e5.4	e4.8	3.2	e1980	e72	e32	e8.2	e1.2	e1.6
7	.91	1.6	4.2	e6.4	e5.0	3.0	e2470	e60	e30	e5.9	e1.2	e1.6
8	.93	1.6	3.6	e5.1	e4.7	3.0	e2660	e48	e28	e5.0	e1.2	e1.6
9	1.2	1.6	2.9	4.0	e4.8	3.3	1890	e35	e26	e3.5	e1.3	e1.6
10	.79	1.5	2.7	4.1	e4.8	3.5	988	e36	e24	e2.9	e1.3	e1.6
11	.41	1.6	3.1	4.4	e4.9	2.6	845	e36	e22	e2.3	e1.3	1.5
12	.51	2.2	3.8	4.4	e5.0	2.5	732	e34	e20	e1.7	e1.3	1.5
13		2.2	4.1	4.4	e4.8	2.5	102		e18	e1.1	e1.3	1.5
	.33						595	e33				
14	.41	2.6	3.6	4.8	e4.5	2.7	585	e32	e16	e1.1	e1.3	1.5
15	.68	2.7	3.6	4.7	e4.3	2.3	686	e32	e14	e1.1	e1.3	1.5
16	1.3	2.3	3.5	4.3	e3.9	2.5	827	e30	e14	e1.1	e1.3	1.5
17	1.2	2.5	4.2	4.4	e3.7	2.5	1030	e30	e14	e1.1	e1.3	1.4
18	1.4	3.1	3.6	4.9	3.4	2.5	1080	e27	e14	e1.1	e1.3	1.4
19	.52	3.2	3.5	4.7	3.0	2.6	987	e30	e13	e1.1	e1.4	1.4
20	.42	3.0	3.5	3.8	2.8	3.0	763	e34	e13	e1.1	e1.4	1.4
								100				
21	.51	3.1	3.6	4.0	3.2	3.0	e525	e36	e13	e1.1	e1.4	1.4
22	.68	3.0	4.2	4.0	3.8	2.8	e393	e38	e12	e1.1	e1.4	1.3
23	.66	3.5	4.2	4.0	3.8	3.4	e323	e40	e12	e1.1	e1.4	1.3
24	.64	3.5	4.2	4.2	3.2	3.6	e274	e44	e12	e1.1	e1.4	1.3
25	.58	3.8	4.2	4.2	3.6	3.7	e236	e46	e12	e1.1	e1.4	1.3
26	•53	4.2	≥4.1	e4.3	4.1	8.1	e207	e47	e12	e1.1	e1.4	1.3
27	•79		4.1	e4.6	3.3	11	e188	e47	e11	e1.1	e1.4	1.3
28	.63		4.1	4.5	3.0	19	e168	e47	e11	e1.1	e1.4	1.2
29	.64		4.0	4.7		19	e156	e50	e11	e1.1	e1.4	1.2
30	.64	3.5	4.3	4.8		25	e144	e50	e10	e1.2	e1.4	1.2
31	.85		4.2	e5.5		43		e48		e1.2	e1.5	
TOTAL	22.77	75.1 1	16.5	142.1	116.5	200.2	23681	1604	624	97.7	40.9	43.2
MEAN	.73		3.76	4.58	4.16	6.46	789	51.7	20.8	3.15	1.32	1.44
MAX	1.4	4.2	4.3	6.4	5.3	43	2660	132	46	10	1.5	1.6
MIN	.33	1.2	2.7	3.8	2.8	2.3	90	27	10	1.1	1.2	1.2
AC-FT	45	149	231	282	231	397	46970	3180	1240	194	81	86
AC-FI	47	147	2)1	202	2)1	751	40910	7100	1240	1,74		

CAL YR 1988 TOTAL 21028.49 MEAN 57.5 MAX 1010 MIN .00 AC-FT 41710 WTR YR 1989 TOTAL 26763.97 MEAN 73.3 MAX 2660 MIN .33 AC-FT 53090

05066500 GOOSE RIVER AT HILLSBORO, ND--CONTINUED

WATER-QUALITY RECORDS

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

SECOND (US/CM) UNITS) (DEG C) (DEG C) CACO3) AS CA) A	MG/L (N S MG) AS	IS- LVED MG/L SODIUI S NA) PERCENT 10930) (00932	RATIO
OCT			
13 1200 0.27 13.0 8.0			
25 1345 4.1 1840 1.5 2.0 JAN			
11 1540 5.4 27008.0 0.0			
06 1515 2.8 18507.5 0.0 APR		-	
	25 2	28 18	
JUN		7	
19 1320 14 1360 24.5 17.5 JUL			
20 1515 1.1 1480 32.5 27.5 SEP			-
08 1030 1.6 1460 8.20 18.0 19.0 550 110	67 12	20 3	1 2
SIUM, BONATE, BONATE, LINITY DIOXIDE SULFATE RIDE, RIDE, DIS- DIS- DIS- DIS- DIS- DIS- SULFATE DIS- DIS- DIS- DIS- SUS- DIS- DIS-	LICA, RESIS- AT OLVED DE MG/L DE AS SCIO2) (M	LIDS, SOLIDS SIDUE SUM OF 180 CONSTI- EG. C TUENTS DIS- OLVED SOLVEI MG/L) (MG/L 0300) (70301	SOLIDS, DIS- SOLVED (TONS PER AC-FT)
APR			
SEP	16	456 422	0.62
08 14 300 0 250 3.0 470 74 0.40	16	1060 1020	1.44
SOLIDS,	ED SOLVE L (UG/L G) AS MO	M, NIUM, - DIS- ED SOLVED L (UG/L O) AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
	.1	2 . <10	280
SEP 08 4.52 5 260 20 <1 100 680 0	.1	5 1	730

05082500 RED RIVER OF THE NORTH AT GRAND FORKS. ND

LOCATION.--Lat 47°55'38", long 97°01'34", in sec.2, T.151 N., R.50 W., Grand Forks County, Hydrologic Unit 09020301, on the right bank, 200 ft upstream from the DeMers Avenue bridge, .4 mi downstream from Red Lake River, and at mile 293.8.

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

WATER-DISCHARGE RECORDS

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

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

GAGE.--Water-stage recorder. Datum of gage is 779.00 ft above National Geodetic Vertical Datum of 1929. Oct. 1, 1983, to Sept. 30, 1986, datum of gage was 780.00 ft at same site. Apr. 14, 1965, to Sept. 30, 1983, water-stage recorder 1.9 mi downstream at a datum of 778.35 ft. Nov. 3, 1933, to Apr. 13, 1965, water-stage recorder 0.3 mi upstream at 778.35 ft datum. See WSP 1728 or 1913 for history of changes prior to Nov. 3, 1933.

REMARKS.--Estimated daily discharges: Nov. 20 to Mar. 22 and Apr. 3-30. Records good except those for periods of estimated daily discharge, which are fair.

AVERAGE DISCHARGE.--85 years (water year 1905-89), 2,601 ft^3/s , 1,884,000 acre-ft/yr; median of yearly mean discharge, 2,320 ft^3/s , 1,683,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, about 85,000 ft³/s, Apr. 10, 1897, gage height, 50.2 ft, site and datum then in use, from rating curve extended above 54,000 ft³/s; minimum, 1.8 ft³/s, Sept. 2, 1977, caused by unusual regulation during repair of dam at Grand Forks.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 39,600 ft³/s, Apr. 13, gage height, 43.21 ft, occurred on the recession following the peak gage height of 44.37 ft on Apr. 12; minimum daily, 208 ft³/s, Dec. 14-15.

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

					N	MEAN VALU	IES					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	431	366	e316	e278	e332	e360	2450	5310	2890	1750	488	614
	409	381	e308	e281	e341	e335	3650	5100	2840	1570	484	2020
3	359	367	e299	e282	e350	e344	e5600	4880	2930	1440	457	3080
2 3 4	355	373	e300	e281	e355	e352	e9900	4360	3090	1310	453	2630
5	340	374	e299	e280					3100	1170		
,	540	3/4	6299	e280	e360	e361	e16000	3850	3100	1170	435	2160
6	332	389	e290	e276	e360	e370	e22000	3640	2940	1070	445	1900
7	313	390	e294	e271	e352	e379	e26600	3470	2720	1040	434	1640
8	313	396	e293	e266	e356	e388	e30100	3320	2530	1050	429	1310
9	300	391	e277	e262	e360	e397	e33000	3220	2350	1120	442	1050
10	279	386	e258	e262	e364	e406	e35100	3130	2190	1040	447	922
11	285	775	e242	e262	-760	-700	77000	7060	2060	040		0.1.1
		375			e368	e396	e37000	3060		948	440	844
12	274	375	e225	e260	e372	e406	e37900	3000	1890	876	423	761
13	263	379	e212	e260	e376	e416	e39500	2990	1740	870	392	680
14	256	387	e208	e259	e381	e427	e39300	2950	1670	843	390	619
15	251	377	e208	e262	e376	e435	e37700	2920	1630	825	405	575
16	252	314	e216	e265	e370	e442	e37000	2820	1580	783	482	520
17	261	237	e225	e271	e372	e450	e36100	2710	1570	748	471	527
18	260	221	e228	e275	e374	e458	e34800	2710	1670	705	384	521
19	275	255	e234	e270	e376	e466		2780	1650	686	372	492
20	281	e268	e235	e281	e378	e474	e28400	3030	1460	664	331	462
20	201	6200	62))	6201	6)10	64/4	620400	5050	1400	004	551	402
21	282	e281	e235	e278	e380	e483	e23500	3160	1420	624	329	443
22	313	e294	e242	e279	e370	e491	e18700	3090	1360	610	347	417
23	301	e304	e253	e269	e362	499	e14600	2990	1410	590	437	453
24	330	e321	e252	e267	e360	507	e11900	2860	1560	580	517	441
25	340	e334	e264	e284	e225	507	e9900	2780	1870	568	494	462
26	356	e347	e269	e291	e360	544	e8200	2970	1970	540	507	493
27	344	e360	e270	e298	e340	592	e7000	3230	1820	545	450	496
28	368	e345	e270	e303	e350	678	e6250	3300	1790	556	460	544
29	322	e333	e272	e312		846	e5800	3320	1850	551	473	623
30	310	e322	e274	e319		1050	e5400	3200	1860	527	531	637
31	331		e276	e323		1470		3030		524	601	
TOTAL	9686	10242	8044	8627	10020	15729	655550	103180	61410	26723	13750	28336
MEAN	312	341	259	278	358	507	21850	3328	2047	862	444	945
MAX	431	396	316	323	381	1470	39500	5310	3100	1750	601	3080
MIN	251	221	208	259	225	335	2450	2710	1360	524	329	417
AC-FT	19210	20320	15960	17110	19870	31200	1300000	204700	121800	53010	27270	56200
AC-FI	13210	20720	17300	1/110	13010	11200	100000	204100	121000	22010	21210	10200

CAL YR 1988 TOTAL 361115 MEAN 987 MAX 8400 MIN 168 AC-FT 716300 WTR YR 1989 TOTAL 951297 MEAN 2606 MAX 39500 MIN 208 AC-FT 1887000

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

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (OO4OO)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER ATURE WATER (DEG C	(MG/L AS CACO3)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)
OCT												
20 DEC	1140	278	665		6.0	9.	5					
28 JAN	1315	270	900		-15.0	0.	0					
26 FEB	1400	298	760		-7.0	0.	0					
23 MAR	1455	364	765		-14.0	0.	0					
27 APR	1455	618	910		0.0	0.	0				-	
14	1235	39300	298	7.20	4.0	3.	0 120	30	11	11	16	0.5
16	1720	36900			-3.5	2.	0					
24	1525	11700			14.0	11.						
27 MAY	1900	6780	505		10.0	8.	0		-			
03	1240	4870	535		18.0	13.						
08	1225	3280	545		15.0	12.						
16	1345	2800	610		25.0	18.						
26 JUN	1305	2970	600		15.0	17.	0		-			105
26 JUL	1250	2030	600		23.0	23.	0		-			
28 AUG	1545	558	600		24.0	26.	0					
28 SEP	1650	499	620		22.5	23.	0		-			
28	1145	508	670		18.0	15.	5					
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)	SULFAT DIS- SOLVE (MG/L AS SO4 (00945	DIS- D SOLVED (MG/L) AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR						22					465	
14	6.6	120	0	95	12	33	5.3	0.10	11	158	165	0.21
D		SOLVED (TONS PER DAY)	DIS- SOLVED (UG/L AS AS)	DIS- SOLVED (UG/L AS B)	DIS- SOLVED S (UG/L (AS FE) A	DIS- SOLVED (UG/L AS PB)	LITHIUM DIS- SOLVED (UG/L AS LI)	DIS- SOLVED (UG/L AS MN)	ERCURY DIS- SOLVED (UG/L AS HG)	DENUM, M DIS- SOLVED S (UG/L (AS MO) A	DIS- SOLVED S (UG/L (AS SE)	STRON- TIUM, DIS- SOLVED UG/L AS SR)
APR 14.	16	800	2	30	220	2	20	50	0.1	1	1	140

05083600 MIDDLE BRANCH FOREST RIVER NEAR WHITMAN, ND

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

DRAINAGE AREA .-- 47.7 mi2, of which about 9 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

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

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

REMARKS.--Estimated daily discharges: Apr. 3-21. Records good except those for period of estimated daily discharges, which are fair.

AVERAGE DISCHARGE.--29 years, 2.82 ft³/s, 2,040 acre-ft/yr; median of yearly mean discharges, 2.2 ft³/s, 1,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 984 ft³/s, May 19, 1974, gage height, 7.11 ft; maximum gage height, 7.96 ft Apr. 4, 1987; no flow for many months each year.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 70 ft3/s and maximum (*):

Date	Time	Discharge (ft3/s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 22	0830	*34	*4.62				

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

No flow for several months.

OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
-00	-00	-00	-00	-00	-00	-00	1.1	.00	.00	.00	.00
											.00
											.00
											.00
							.67	-00			.00
.00	.00	.00	.00	.00	.00						
.00	.00	.00	.00	.00	.00		.56				.00
.00	.00	.00	.00	.00	.00	e.00	.52	.00			.00
.00	.00	.00	.00	.00	.00	e.00	.48	.00	.00		.00
.00						e.00		.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	e.00	.37	.00	.00	.00	.00
00	00	00	00	00	00	e 00	20	00	.00	.00	.00
							23				.00
											.00
											.00
				-00							.00
.00	.00	•00	.00	.00	.00	-1.1	.15	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	e2.2	.12	.00	.00	.00	.00
							.11				.00
.00	.00	.00	.00	.00	.00						.00
.00	.00	.00	.00	.00	.00		.16				.00
.00	.00	.00	.00	.00	.00	e10	.15	.00	.00	.00	.00
.00	.00	.00	-00	.00	.00	e ₂₀	.12	.00	.00	.00	.00
								-00			.00
						21					.00
											.00
.00	.00	.00	.00	.00	.00	7.8	.07	.00	.00	.00	.00
00	00	00	00	00	00	5 3	.07	.00	-00	.00	.00
						3.6			.00		.00
											.00
											.00
											.00
.00		.00	.00		.00		.00		.00	.00	
0.00	0.00	0.00	0.00	0.00	0.00	132.50	9.07	0.00	0.00	0.00	0.00
.00	.00	.00	.00	.00	.00	4.42					.00
.00	.00	.00	.00	.00	.00	29	1.1				.00
			.00		.00	.00	.00	.00	.00	.00	.00
		.0	.0		.0	263	18	.0	.0	.0	.0
	.00 .00 .00 .00 .00 .00 .00 .00 .00 .00	.00 .00 .00 .00 .00 .00 .00 .00 .00 .00	.00	.00	.00	.00	.00	.00	.00	.00	.00

CAL YR 1988 TOTAL 182.31 MEAN .50 MAX 19 MIN .00 AC-FT 362 WTR YR 1989 TOTAL 141.57 MEAN .39 MAX 29 MIN .00 AC-FT 281

e Estimated

05084000 FOREST RIVER NEAR FORDVILLE, ND

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

DRAINAGE AREA. -- 456 mi², of which about 120 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

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

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

REMARKS.--Estimated daily discharges: Dec. 9 to Apr. 10. Records good except those for period of estimated discharge, which are fair. Some regulation of high flows by temporary retention in several retarding basins above station. Retarding basins have a combined capacity of about 14,000 acre-ft.

AVERAGE DISCHARGE.--49 years, 37.6 ft³/s, 27,240 acre-ft/yr; median of yearly mean discharges, 36 ft³/s, 26,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,400 ft³/s, Apr. 18, 1950, gage height, 14.48 ft, from flood-mark, from rating curve extended above 5,600 ft³/s on basis of contracted opening and slope-area measurements of peak flow; no flow Apr. 1-13, Sept. 3, 1940.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 158 ft3/s, Apr. 16, gage height 2.79 ft; minimum daily, 2.0 ft3/s, Aug. 16, 17.

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

					N	EAN VALU	ES					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	23 24 24 25 29	4.5 4.6 4.9 5.2 5.0	7.0 7.8 7.5 7.2 7.6	e6.2 e6.2 e6.2 e6.2	e7.0 e6.0 e5.0 e4.2 e4.2	e5.4 e5.4 e5.4 e5.4	e7.2 e8.4 e10 e12 e15	44 39 35 36 34	13 13 12 12 12	13 14 13 11	5.9 4.9 4.4 4.2 3.6	4.9 4.8 5.9 6.0 5.3
6 7 8 9 10	29 27 26 25 25	4.8 5.4 5.6 5.6	7.9 7.7 7.2 e6.9 e6.8	e6.2 e6.1 e6.1 e6.0 e6.0	e4.3 e4.4 e4.2 e4.2	e5.4 e5.5 e5.6 e5.8	e16 e17 e18 e19 e20	32 30 29 27 25	11 12 12 12 12	9.5 8.0 7.8 7.9 7.7	3.6 3.3 3.0 4.4 4.8	5.4 5.8 5.5 5.7
11 12 13 14 15	26 25 23 24 23	5.1 5.7 5.3 4.6 4.8	e6.5 e6.4 e6.5 e6.5	e6.0 e6.0 e6.1 e6.5 e6.9	e4.2 e4.3 e4.4 e4.4	e6.0 e6.2 e6.4 e6.4	21 24 34 70 97	23 20 18 24 31	12 19 22 22 18	7.3 7.5 7.3 7.1 6.8	5.2 5.2 4.9 4.5 2.2	5.8 5.8 5.8 5.8
16 17 18 19 20	22 22 22 37 16	5.0 5.2 5.4 5.6 5.8	e6.5 e6.5 e6.5 e6.5	e7.6 e8.0 e7.8 e7.6 e7.6	e4.2 e4.3 e4.4 e4.4	e5.8 e5.8 e5.5 e5.5	134 113 107 97 104	30 30 33 32 31	15 14 13 11	6.6 6.5 6.6 6.5 6.2	2.0 2.0 3.0 6.6 5.1	5.8 5.8 5.8 5.5
21 22 23 24 25	7.5 6.0 5.7 5.4 5.0	5.9 6.3 6.6 7.5 7.8	e6.5 e6.5 e6.4 e6.4	e7.8 e8.0 e7.9 e7.8 e7.8	e4.5 e4.6 e4.7 e4.8 e4.8	e5.3 e5.3 e5.3 e5.5 e5.8	97 94 90 88 81	29 28 26 27 26	9.9 8.7 10 11	6.3 6.2 6.2 6.4 6.3	4.3 5.1 5.6 5.4 4.3	5.5 5.4 5.2 5.3 5.2
26 27 28 29 30 31	4.8 5.0 4.1 4.2 4.8 5.0	7.3 7.3 6.8 7.0 7.0	e6.4 e6.3 e6.2 e6.2 e6.2	e7.6 e7.8 e7.6 e7.8 e7.6	e4.9 e5.0 e5.2	e6.0 e6.2 e6.5 e6.5 e6.5 e6.2	75 70 61 53 48	25 21 13 13 13 13	11 9.5 9.2 12 12	6.2 6.2 6.2 5.9 6.0 6.2	4.0 4.1 4.4 3.9 4.1 5.2	5.4 5.3 5.1 5.3 5.7
TOTAL MEAN MAX MIN AC-FT	554.5 17.9 37 4.1 1100	173.0 5.77 7.8 4.5 343	208.3 6.72 7.9 6.2 413	216.6 6.99 8.0 6.0 430	129.9 4.64 7.0 4.2 258	179.2 5.78 6.5 5.3 355	1700.6 56.7 134 7.2 3370	837 27.0 44 13 1660	382.3 12.7 22 8.7 758	239.4 7.72 14 5.9 475	133.2 4.30 6.6 2.0 264	166.2 5.54 6.0 4.8 330

CAL YR 1988 TOTAL 5705.73 MEAN 15.6 MAX 195 MIN .32 AC-FT 11320 WTR YR 1989 TOTAL 4920.2 MEAN 13.5 MAX 134 MIN 2.0 AC-FT 9760

e - Estimated

05084000 FOREST RIVER NEAR FORDVILLE, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECOND (00061)	CIFIC CON- DUCT- ANCE (US/CM)	PH (STAND- ARD UNITS) (OO4OO)	TEMPER- ATURE AIR (DEG C) (OOO2O)	ATURE WATER (DEG C	(MG/I AS CACO3	CALCIUM DIS- SOLVEM (MG/L S) AS CA	DIS- SOLVE (MG/L) AS MG	, SODIUM, DIS- D SOLVED (MG/L) AS NA)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)
OCT												
27 DEC	1345	5.2	720		-1.0	2.	0 -	-		-	desi	
O8	0940	7.0	680		-17.0	0.	5 -					11111
25 MAR	1300	7.8	830			0.	0 -				- A	
01	1500	5.3	1110		-12.0	0.	0 -			-		
APR 11	1355	21	490		2.0	3.	0 -					
15 MAY	1120	102	570		10.0			50 56	22	29	21	0.9
09	1145	29	878		20.5	13.	5 -		-			
JUN 20	1130	9.8	780		25.5	24.	0 -					
JUL 19	1235	6.6	755	8.20	24.0	25.	0 31	10 74	31	35	19	0.9
SEP	0.05											
07	0925	5.4	700	-	15.0	17.	0 -	-	•	-		
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE FET-LAI (MG/L AS HCO3) (95440)	BONATE, B FET-LAB (MG/L AS CO3)	(MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (OO405)	SULFAT DIS- SOLVE (MG/L AS SO4	DIS- D SOLVE (MG/I	RIDE, DIS- ED SOLVE (MG/L AS F)	DIS- SOLVE (MG/L AS SIO2)	AT 180 D DEG. C DIS- SOLVED (MG/L)	CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 15	7.0	180	0	140	3.5	120	9.7	7 0.10	0 6.6	363	338	0.49
JUL											38	
19	6.0	280	0	230	2.9	150	10	0.3	0 29	460	476	0.63
	S	TONS PER DAY)	DIS- SOLVED (UG/L AS AS)	DIS- SOLVED (UG/L AS B)	DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB) 01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	DENUM, DIS- SOLVED (UG/L AS MO)	NIUM, DIS- SOLVED (UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) 01080)
APR 15.		100	1	60	80	<1	20	360	0.2	1	<10	210
JUL 19.		8.20	5	60	20	<1	40	210	0.1	2	<10	310

05085000 FOREST RIVER AT MINTO, ND

LOCATION.--Lat 48°16'10", long 97°22'10", in SE1/4 sec.31, T.156 N., R.52 W., Walsh County, Hydrologic Unit 09020308, on right bank 30 ft upstream from dam in Minto, 150 ft upstream from Burlington Northern Railway bridge, and 900 ft east of U.S. Highway 81.

DRAINAGE AREA. -- 740 mi², of which about 120 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

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

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

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

REMARKS.--Estimated daily discharges: Nov. 15 to Apr. 17. Records good except those for period of estimated daily discharges, which are fair. Occasionally during high stages, particularly when the channel is filled with snow, overflow occurs 0.5 mi below the municipality of Forest River and bypasses the gage 3 mi south of Minto and flows into Lake Ardoch. Bypass flow is not included in computation of discharge record for station at Minto.

AVERAGE DISCHARGE.--45 years, 49.1 ft^3/s , 35,570 acre-ft/yr; median of yearly mean discharges, 43 ft^3/s , 31,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,600 ft³/s, Apr. 18, 1950, gage height, 11.80 ft from flood-marks, from rating curve extended above 7,200 ft³/s, on basis of contracted opening measurement of peak flow; no flow at times each year 1945-47, 1953-55, 1959-64, 1977, 1985, 1988.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 200 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 18	1745	*371	*2.49				

No flow Aug. 10-22, Aug. 31 to Sept. 8, Sept. 17-30.

		DISCHARGE	E, IN C	UBIC FEET	PER SECONI	D, WATER EAN VALUE	YEAR OCTOB	ER 1987	TO SEPTEM	IBER 1988		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	.51 .73 1.0 1.4 2.0	5.1 5.4 5.8 6.1 5.3	e1.1 e1.1 e1.1 e1.1	e1.1 e1.1 e1.1 e1.1	e1.1 e1.1 e1.1 e1.1	e1.0 e1.0 e1.0 e1.0	e1.0 e1.2 e1.4 e1.6 e2.0	66 61 58 55 50	11 8.4 8.8 8.2 7.5	4.7 4.7 4.6 4.6 4.7	1.1 1.2 .78 .47 .33	.00 .00 .00
6 7 8 9	2.0 2.5 3.2 3.6 6.3	4.6 4.9 4.7 4.6 4.5	e1.1 e1.1 e1.1 e1.1	e1.1 e1.1 e1.1 e1.1	e1.1 e1.1 e1.1 e1.1	e1.0 e1.0 e1.0 e1.0	e4.0 e9.5 e10 e7.0 e10	51 48 45 41 41	8.2 8.4 7.8 7.7 7.7	3.7 3.8 3.7 3.6 3.2	.25 .15 .04 .02	.00 .00 .00 .01
11 12 13 14 15	7.2 6.6 4.1 3.5 4.7	3.9 4.3 4.2 3.6 e3.2	e1.1 e1.1 e1.1 e1.1	e1.1 e1.1 e1.1 e1.1	e1.1 e1.1 e1.1 e1.1	e1.0 e1.0 e1.0 e1.0	e12 e16 e24 e35 e70	38 34 32 30 28	8.3 11 13 13 15	2.9 2.6 2.2 2.1 2.0	.00 .00 .00	.05 .06 .08 .08
16 17 18 19 20	5.9 3.6 3.9 4.5 5.2	e2.9 e2.5 e2.3 e2.1 e2.0	e1.1 e1.1 e1.1 e1.1	e1.1 e1.1 e1.1 e1.1	e1.1 e1.1 e1.1 e1.1	e1.0 e1.0 e1.0 e1.0	e180 e200 297 290 259	26 23 25 28 20	15 14 12 9.9 8.5	2.0 1.9 1.8 1.4	.00 .00 .00	.01 .00 .00 .00
21 22 23 24 25	14 18 12 8.7 7.0	e1.9 e1.7 e1.6 e1.5 e1.4	e1.1 e1.1 e1.1 e1.1	e1.2 e1.2 e1.2 e1.2	e1.1 e1.1 e1.1 e1.1	e1.0 e1.0 e1.0 e1.0	193 206 181 131 121	19 20 14 15 16	7.4 6.8 6.8 5.7 5.4	1.2 1.3 1.3 1.2	.00 .00 .01 .02	.00 .00 .00
26 27 28 29 30 31	5.4 5.7 4.1 4.5 4.6	e1.3 e1.2 e1.1 e1.1	e1.1 e1.1 e1.1 e1.1 e1.1	e1.2 e1.2 e1.2 e1.2 e1.2	e1.1 e1.1 e1.1	e1.0 e1.0 e1.0 e1.0 e1.0	110 101 92 81 72	15 14 13 10 10	5.1 5.2 5.6 5.6 5.1	.75 .60 .66 .67 .81	.09 .05 .04 .03 .01	.00 .00 .00
TOTAL MEAN MAX MIN AC-FT	161.14 5.20 18 .51 320	95.9 3.20 6.1 1.1 190	34.1 1.10 1.1 1.1 68	35.2 1.14 1.2 1.1 70	30.8 1.10 1.1 1.1 61	31.0 1.00 1.0 1.0 61	2718.7 90.6 297 1.0 5390	957 30.9 66 10 1900	262.1 8.74 15 5.1 520	72.02 2.32 4.7 .60 143	4.64 .15 1.2 .00 9.2	0.34 .011 .08 .00

CAL YR 1988 TOTAL 8019.26 MEAN 21.9 MAX 771 MIN .00 AC-FT 15910 WTR YR 1989 TOTAL 4402.94 MEAN 12.1 MAX 297 MIN .00 AC-FT 8730

e Estimated

05085000 FOREST RIVER AT MINTO, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	CIFIC CON- DUCT- ANCE (US/CM)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER ATURE WATER (DEG C	(MG/L AS CACO3	CALCIUM DIS- SOLVED (MG/L) AS CA)	MAGNE- SIUM DIS- SOLVEI (MG/L AS MG (00925	DIS- D SOLVED (MG/L) AS NA)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)
OCT 24	1030	9.5	860		-3.0	3.	0 -		-		-	1 -
05	1420	1.1	1150		9.0	1.	0 -		_			
JAN 23	1245	1.2	820			0.	0 -		-			
MAR 21	1130	1.0	665		-3.5	0.	5 -		-		-	
APR 21	1010	153	615	8.00	9.5	6.	0 22	0 54	21	36	25	1
MAY 11	0915	38	825		16.0	16.	5 -	_	-			(<u>-</u>
JUN 22	1230	6.9	940		25.0	21.	5 -		-		-2	
JUL 31	1000	0.99	922	8.30	27.5	25.	5 37	0 84	38	49	22	1
AUG 25	0930	0.03	910		18.0	22.	0 -		-			
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE, FET-LAE (MG/L AS HCO3) (95440)	BONATE, FET-LAB (MG/L AS CO3)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (OO405)		DIS- D SOLVE (MG/L) AS CL	RIDE, DIS- D SOLVED (MG/L) AS F)	SILICA DIS- SOLVEI (MG/L AS SIO2) (00955	AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR												
21 JUL	6.7	140	0	120	2.3	100	21	0.10	2.0	388	362	0.53
31	9.1	320	0	270	2.6	160	34	0.20	31	582	566	0.79
	\$	SOLVED (TONS PER DAY)	DIS- SOLVED (UG/L AS AS)	DIS- SOLVED S (UG/L AS B)	DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB) 01049)	DIS- SOLVED (UG/L AS LI) (01130)	DIS- SOLVED (UG/L AS MN)	ERCURY DIS- SOLVED (UG/L AS HG) 71890)	DENUM, N DIS- SOLVED S (UG/L (AS MO) A	DIS- SOLVED S UG/L AS SE)	TIUM, DIS- SOLVED (UG/L AS SR) 01080)
APR 21. JUL		160	<1	50	30	<1	20	170	0.1	1	3	230
31.		1.56	11	110	40	1	40	470	0.1	4	2	340

05088500 HOMME RESERVOIR NEAR PARK RIVER, ND

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

DRAINAGE AREA . -- 226 mi2.

MONTHEND-ELEVATION AND CONTENTS RECORDS

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

REVISED RECORDS .-- WSP 1728: Drainage area.

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

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

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

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

EXTREMES FOR CURRENT YEAR.--Maximum contents, 2,904 acre-ft, Apr. 24, elevation, 1,080.32 ft; minimum, 1,694 acre-ft, Apr. 12, elevation, 1,072.95 ft.

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

1	Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.	30	1.076.13	2,170	
Oct.	31	1,076.17	2,180	+10
Nov.	30	1.076.34	2,210	+30
Dec.	31	1,076.46	2,230	+20
CAL	YR 1988		-	-70
Jan.	31	1,077.37	2,380	+150
Feb.	28	1.077.76	2,450	+70
Mar.	31	1.073.80	1,800	-650
Apr.	30	1,080.25	2,890	+1,090
May	31	1.079.93	2,830	-60
June	30	1.079.80	2,800	-30
July	31	1,079.59	2,770	-30
Aug.	31	1,079.50	2,750	-20
Sept.	30	1,079.29	2,710	-40
WTR	YR 1989			+540

05089000 SOUTH BRANCH PARK RIVER BELOW HOMME DAM, ND

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

DRAINAGE AREA .-- 226 mi2.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS .-- WSP 1728: Drainage area.

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

REMARKS.--Estimated daily discharges: Dec. 5 to Mar. 12. Records fair. Flow regulated by Homme Reservoir (station 05088500).

AVERAGE DISCHARGE.--40 years, 25.1 ft³/s, 18,180 acre-ft/yr; median of yearly mean discharges, 20 ft³/s, 14.500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 13,000 ft³/s, Apr. 24, 1950, gage height, 37.52 ft, from rating curve extended above 5,500 ft³/s, result of failure of emergency embankment at site of Homme Dam; no flow Oct. 1 to Dec. 3, 1949, Oct. 1-4, 1969, Sept. 21, 1970, July 1, 1974, and Sept. 10, 1988.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 61 ft³/s, Apr. 24, gage height, 23.45 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 FEB APR MAY JUN JUL AUG SEP JAN MAR .01 .02 .02 e.05 e.15 4.8 11 .40 .12 .00 .06 e.15 2 .01 .03 .02 e.05 e.14 e.12 10 .41 .38 .00 .03 5.1 3 .01 .03 .02 e.05 e.13 e.10 5.1 9.1 .09 .00 .05 .01 .02 .02 e.05 e.12 e.08 15 .08 .07 5 .01 .02 e.02 e.05 e.12 e.06 8.7 .20 .06 .00 .04 6 .01 .01 e.02 e.05 e.12 e.06 5.6 .81 .16 .04 .00 .03 .01 .01 e.02 e.05 e.12 e.06 2.1 .36 .03 .00 .03 e.02 e.10 6.5 8 .01 .01 e.05 e.12 4.7 .24 .03 .00 .02 .01 .01 e.02 e.04 .11 .14 .00 -01 10 .01 .01 e.02 e.04 e.12 e12 5.9 4.7 .11 .08 .00 .00 -01 .07 .00 11 .01 .01 e.02 e.04 e.12 e18 7.2 4.5 .13 .00 12 .01 .01 e.02 e.04 e.13 e24 6.9 3.1 9.6 -06 .03 .04 .00 2.7 -04 13 .01 .01 e.02 e.05 e.12 30 7.1 1.1 .02 .00 .05 e.02 -62 14 .01 .01 e.05 e.12 20 2.6 .01 .00 .01 2.3 .85 15 -01 .01 e.02 e.05 e.11 14 .29 .57 .00 .00 .01 -01 .01 e.02 e.06 1.0 16 e.11 11 . 25 1.6 .20 .61 .00 .00 .00 .01 e.07 12 17 -01 e.02 e.10 .17 .00 .01 .01 e.04 e.07 12 .00 .00 18 e.08 1.1 6.4 .00 e.04 e.06 12 .42 .00 .09 -01 .01 e.07 .17 19 .17 .01 e.06 12 .16 20 .01 e.04 e.07 .01 .00 21 .01 e.04 e.10 e.06 12 .16 .02 22 e.06 13 .17 .30 .00 .08 .00 .02 .01 e.06 .15 e.12 23 .02 .02 e.06 e.12 e.25 .13 .19 .00 .08 .00 24 .02 .02 e.06 e.12 e.55 13 2.0 .16 .00 .00 .00 25 .01 .02 e.05 e.12 e.50 13 39 4.5 .15 .00 .00 .00 26 .01 .02 e.05 13 2.6 .00 .00 .00 .01 .02 e.05 e.12 e.23 13 23 .23 .57 .00 .00 .00 28 .01 .02 e.05 e.13 e.20 13 19 .12 .17 .00 .04 .00 .06 29 .01 .02 e.05 e.14 14 16 .10 .17 .00 .00 30 .01 .02 e.05 e.08 13 .10 .18 .00 -06 .00 31 .02 e.05 e.16 8.8 .10 .00 .06 ---23.28 0.53 0.49 114.91 1.25 4.37 313.45 TOTAL 0.35 0.45 1.03 2.38 317.73 .016 .78 .040 10.2 MEAN .011 .015 .033 .077 10.4 3.71 .07 .09 9.6 .38 MAX .02 .03 .06 .16 .55 30 55 15 .00 .00 .00 .06 .06 .15 .10 MIN .01 .01 -02 .04 .11 2.5 1.0 622 AC-FT .7 .9 2.0 4.7 8.7 630 228

CAL YR 1988 TOTAL 959.21 MEAN 2.62 MAX 25 MIN .00 AC-FT 1900 WTR YR 1989 TOTAL 780.22 MEAN 2.14 MAX 55 MIN .00 AC-FT 1550

e Estimated

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

WATER-QUALITY RECORDS

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

DATE	TIM	4E	DIS- CHARGE INST. CUBIC FEED PER SECON (00061	S, SPE- CIFI CON- DUCT ANCE US/C	PH - (STAN ARD M) UNITS) (DEG	(E C)	TEMPER ATURE WATER (DEG C	(MG AS	S AL /L	CALCIU DIS- SOLVE (MG/L AS CA	DIS- D SOLVE (MG/I	DI ED SOL (M	OIUM, IS- LVED MG/L S NA) 0930)	SODII PERCEI (00933	T	SODIUM AD- SORP- TION RATIO (00931)
OCT																	
27 DEC	083	30	0.0	01 8	70	(0.0	2.	5		-		-				
07 JAN	160	00	0.0	2 11	90	(0.0	0.	5		-		-				
24 MAR	151	10	0.1	12 9	80			0.	0		-		-				
13 APR	142	25	32	8	70	6	5.5	4.	5		-		-			••	
11	120	00	6.5	5 4	70		1.5	3.	0								
18	143		0.2				2.5	10.		390	91	40	4	16		20	1
MAY					17					,,,							
09 JUN	143	35	5.0	7	80	24	1.5	15.	0		-		-				
13	124	15	0.9	96 8	20	10	0.5	17.	0		-		-				
DATE	POTA SIL DIS SOLV (MG/ AS F	JM, S- /ED /L ()	BICAF BONATE FET-LA (MG/I AS HCO3)	BONAT AB FET-L (MG/ AS CO3	AB LAB L (MG/ AS) CACO	Y DIOXI DIS L SOLV (MG/ 3) AS CO	DE S- VED /L (2)	SULFAT DIS- SOLVE (MG/L AS SO4 (00945	D SOL' (MG	VED /L CL)	FLUO- RIDE, DIS- SOLVE (MG/L AS F) (00950	D (MG/I AS SIO2)	A, RES	IDS, IDUE 180 IG. C DIS- DLVED IG/L)	SUM OF	F I- S, ED L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR	0	7	240	0	400			260	40		0.0	0 5		647	-	38	0.88
18	9.	.3	240	0	190		1.9	260	18		0.2	0 5.2		047	50	50	0.08
D	ATE	S (LIDS, DIS- OLVED TONS PER DAY) 0302)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON, DIS- SOLVED (UG/L AS B) (01020)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	SO (I	EAD, DIS- OLVED UG/L S PB) 1049)	LITHIUM DIS- SOLVED (UG/L AS LI) (O1130)	N S (DIS- SOLVED UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYE DENUM DIS- SOLVE (UG/L AS MO	i, ED	SELE- NIUM, DIS- SOLVED (UG/L AS SE) 01145)	SC (I	PRON- PIUM, DIS- DLVED JG/L S SR)
APR 18.			0.35	<1	90	50		1	60		820	0.1		3	<10		460

05090000 PARK RIVER AT GRAFTON, ND

LOCATION.--Lat 48°25'29", long 97°24'42", in NE1/4 sec.13, T.157 N., R.53 W., Walsh County, Hydrologic Unit O9020310, on right bank at the upstream corner of Highway 81 bridge in Grafton, and 3.5 mi downstream from South Branch.

DRAINAGE AREA .-- 695 mi2, approximately.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS.--WSP 955: 1941. WSP 1438: 1932, 1933(M), 1936-37(M), 1939(M), 1944. WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 811.00 ft above National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1984, gage located on right bank 30 ft upstream of Wakeman Avenue bridge. Datum of gage was 807.39 ft. Prior to Sept. 30, 1940, nonrecording gage at site 30 ft downstream at same datum. Oct. 1, 1940, to Sept. 17, 1946, nonrecording gage at site 2 mi downstream above masonry dam at same datum. Sept. 18, 1946, to July 25, 1952, nonrecording gage at site 30 ft downstream at same datum.

REMARKS.--Estimated daily discharges: Oct. 24 to Dec. 10, Jan. 7 to Apr. 2, July 21-26, and Aug. 24 to Sept. 8.

Records good except those below 1 ft³/s, which are poor. Flow regulated by Homme Reservoir (station 05088500) and several small reservoirs.

AVERAGE DISCHARGE.--58 years, 56.2 ft^3/s , 40,720 acre-ft/yr; median of yearly mean discharges, 42 ft^3/s , 30,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,600 ft³/s, Apr. 19, 1950, gage height, 20.13 ft, from rating curve extended above 9,000 ft³/s; no flow at times in most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 143 ft³/s, Apr. 24, gage height, 7.79 ft; no flow, Dec. 11 to Feb. 24, July 27 to Aug. 18, and Sept. 9-30.

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 e.01 .01 e.04 e.04 .00 e.00 e.02 e16 48 .79 .00 .55 2 .01 e.04 e.04 .00 e.00 e.02 e18 42 .94 .00 e.01 3 .02 e.04 e.04 .00 e.00 e.02 20 35 .81 .00 e.01 .53 45 .02 e.04 e.04 .00 e.00 e.02 16 31 .46 .00 e.01 -02 24 e.04 e.04 .00 e.00 e.02 19 .57 .00 e.01 6 .02 e.04 e.04 -00 e.02 17 .57 .36 e.01 e-00 24 .00 .05 e.04 .00 e.03 e.00 e.00 e.02 16 17 .75 .31 e.01 8 .46 e.04 e.00 e.01 .08 15 .00 e.03 e.00 e.02 12 .28 .08 e.04 e.00 e.02 8.0 1.2 .00 e.00 e.02 .00 10 .06 e.04 e.01 e.00 17 .74 .00 .00 e.00 e.02 8.8 .03 11 e.04 .00 e.00 e.00 e.02 17 .48 .63 .00 .00 7.9 12 .04 e.04 .00 e.00 2.6 .00 .00 e.00 .55 e.02 15 7.5 13 .03 e.04 .00 e.02 18 4.3 2.2 .00 .00 e.00 e.00 .30 14 .02 e.04 .00 e.00 e.02 12 .00 .00 e.00 23 15 .04 e.04 .00 e.00 32 .24 .00 .00 e.00 e-02 4.9 11 16 .12 e.04 .00 e.00 e.00 e.02 37 4.0 2.6 .14 .00 .00 16 17 .11 e.04 .00 e.00 e.00 e.02 4.7 .10 .00 .00 1.1 18 .09 e.04 .00 e.00 e.00 e.02 19 7.4 1.4 .07 .00 .00 e.04 12 19 .02 .00 e.00 e.00 e.02 5.3 .92 .04 .00 20 .01 e.04 .00 .11 e.00 e.00 e.02 8.9 .49 .00 .00 21 .01 e.04 .00 e.00 e.00 e.02 6.1 8.5 .47 e.00 .06 .00 22 .02 e.04 .00 e.00 e.00 e.02 7.8 8.5 .47 e.02 .13 .00 23 .08 e.04 .00 e.00 e.00 e.50 21 5.8 1.4 e.02 .10 .00 e.04 24 e.04. .00 e.00 e.00 e2.0 61 2.3 .63 e.02 e.01 .00 25 e.04 e.04 .00 e.00 e.01 e6.0 129 1.2 .48 e.02 e.01 .00 26 e12 .00 e.04 e.04 .00 e.00 e.02 106 .97 .52 e.02 e.01 27 e.04 e.04 .00 e.00 e.02 e11 89 .86 .37 .00 e.01 .00 .00 71 .00 28 e.04 e.04 e.00 e.02 e10 1.6 .38 .00 e.01 e.04 .00 29 e.04 e.00 60 1.0 .00 e.01 --e10 1.0 .00 --e.04 e.01 30 e.04 1.0 .85 .00 .00 e.00 e10 55 .00 .70 .00 e.01 e.04 e.00 e10 ---TOTAL 1.31 1.20 0.33 0.00 0.07 339.13 46.58 9.03 0.78 0.08 71.94 974.8 .011 2.32 .29 .042 .040 .00 32.5 10.9 1.55 .025 .003 MEAN .002 129 .12 .04 .04 .00 .02 12 12 .30 .01 48 MAX .01 .04 .00 .00 .02 6.1 .70 .36 .00 .00 .00 MIN .00 92 1.5 AC-FT 2.6 2.4 .0 673 18 143 1930 .2

CAL YR 1988 TOTAL 1870.61 MEAN 5.11 MAX 129 MIN .00 AC-FT 3710 WTR YR 1989 TOTAL 1445.25 MEAN 3.96 MAX 129 MIN .00 AC-FT 2870

e - Estimated

05090000 PARK RIVER AT GRAFTON, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE		TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	CIFIC CON- DUCT- ANCE D (US/CN	PH (STAND- ARD UNITS)	AIR (DEG (E ATURE WATER C) (DEG ((MG/ R AS C) CACO	CALCI L DIS- L SOLV (MG/ 3) AS (DIS ZED SOLV L (MG/ CA) AS M	M, SODIUM - DIS- ED SOLVED L (MG/L G) AS NA	SODIUM	RATIO
OCT		4075	0.0										
24 DEC		1235	0.0	5 203		- 0.	.0 4.	.0				•	
05 APR		1255	0.0	4 187	0 -	- 5.	.0 2.	.0					
21 26 JUN		1215 1340	6.2 105	43					90 67	 29	⁷⁶	36	
22 JUL		1055	0.4	3 167	0 -	- 24.	5 20.	.5					
19		0900	0.0	5 170	7.9	0 21.	.0 24.	.5 3	20 70	36	230	60	6
DATE	S (OTAS- SIUM, DIS- SOLVED MG/L S K)	BICAR BONATE FET-LA (MG/L AS HCO3) (95440	, BONATE B FET-LA (MG/I AS CO3)	AB LAB (MG/L AS CACO3		DE SULFATED SOLVE (MG/I 2) AS SO4	DIS- ED SOLV (MG/	, RIDE DIS ED SOLV L (MG/ L) AS E	S, DIS- S- SOLV YED (MG/ /L AS F) SIO2	AT 180 ED DEG. (L DIS- SOLVEI) (MG/L	E SUM OF CONSTI- C TUENTS DIS- D SOLVEI (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)
APR 21		7.4	180	0	150	1.	.8 210	70	0.	30 10	579	9 558	0.79
JUL 19		13	300	0	240	5.	9 270	240	0.	60 19	1040	1030	1.41
	DATE	s (OLVED TONS PER DAY)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON, DIS- SOLVED (UG/L AS B) (01020)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
APR	1		9.75	<1	150	40	1	40	210	0.2	2	<10	340
JUL													
19			0.14	10	630	10	<1	80	460	0.1	3	<10	500

05092000 RED RIVER OF THE NORTH AT DRAYTON, ND

LOCATION.--Lat 48°34'20", long 97°08'50", in SE1/4SE1/4SE1/4 sec.24, T.159 N., R.51 W., Pembina County, Hydrologic Unit 09020311, on downstream end of east pier of interstate highway bridge, 1.5 mi northeast of Drayton, and at mile 206.7.

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

WATER-DISCHARGE RECORDS

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

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

GAGE.--Water-stage recorder and concrete control. Datum of gage is 755.00 ft above National Geodetic Vertical Datum of 1929 (Minnesota highway benchmark). Prior to Nov. 30, 1954, nonrecording gage at site 1.5 mi upstream at datum 1.59 ft higher.

REMARKS.--Estimated daily discharges: Nov. 18 to Dec. 12, 15-17, 27 to June 8, and Aug. 18 to Sept. 2. Records good. Some regulation by reservoirs on tributaries.

AVERAGE DISCHARGE.--40 years (water years 1950-89), 3,817 ft³/s, 2,765,000 acre-ft/yr; median of yearly mean discharges, 3,360 ft³/s, 2,430,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 92,900 ft³/s, Apr. 28, 1979, gage height, 43.66 ft; minimum observed, 7.7 ft³/s, Oct. 16, 1936, gage height, 1.75 ft, former site and datum.

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

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 41,800 ft³/s, Apr. 19, gage height, 39.35 ft; maximum gage height, 39.70 ft, Apr. 21; minimum daily discharge, 225 ft³/s, Dec. 16 and 17.

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

DAY OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP						M	EAN VALU	IES					
2 613 552 e322 e269 e315 e315 e320 e11800 e3150 2010 605 e550 3 578 318 e320 e267 e310 e315 e1670 e10300 e2980 1930 596 763 4 553 555 e315 e265 e320 e315 e5550 e9100 e2830 1790 597 2080 5 524 559 e310 e262 e330 e320 e6730 e8000 e2780 1650 564 2910 6 481 369 e305 e258 e345 e330 e10300 e68000 e2780 1650 564 2910 6 481 369 e305 e258 e345 e330 e10300 e68000 e2780 1650 564 2910 8 415 376 e295 e244 e350 e360 e15800 e4000 e3010 1450 514 2580 8 413 376 e295 e244 e350 e360 e15800 e4000 e3000 1370 499 2270 9 376 379 e290 e244 e350 e360 e15800 e4000 e3000 1370 499 2270 10 325 389 e280 e240 e350 e360 e19800 e3680 2620 1320 487 1730 11 308 414 e270 e240 e350 e390 e22900 e3490 2480 1340 492 2000 12 303 418 e260 e240 e360 e370 e26200 e3380 2570 1320 487 1730 11 269 406 266 e250 e360 e370 e26200 e3380 2270 1270 470 1180 14 269 393 259 e260 e360 e360 e370 e22200 e3380 2270 1270 470 1180 14 269 393 259 e260 e360 e360 e370 e22200 e3380 e300 e300 e300 e300 e300 e300 e	DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
2 613 552 e322 e269 e315 e315 e320 e11800 e3150 2010 605 e550 3 578 318 e320 e267 e310 e315 e1670 e10300 e2980 1930 596 763 4 553 555 e315 e265 e320 e315 e5550 e9100 e2830 1790 597 2080 5 524 559 e310 e262 e330 e320 e6730 e8000 e2780 1650 564 2910 6 481 369 e305 e258 e345 e330 e10300 e68000 e2780 1650 564 2910 6 481 369 e305 e258 e345 e330 e10300 e68000 e2780 1650 564 2910 8 415 376 e295 e244 e350 e360 e15800 e4000 e3010 1450 514 2580 8 413 376 e295 e244 e350 e360 e15800 e4000 e3000 1370 499 2270 9 376 379 e290 e244 e350 e360 e15800 e4000 e3000 1370 499 2270 10 325 389 e280 e240 e350 e360 e19800 e3680 2620 1320 487 1730 11 308 414 e270 e240 e350 e390 e22900 e3490 2480 1340 492 2000 12 303 418 e260 e240 e360 e370 e26200 e3380 2570 1320 487 1730 11 269 406 266 e250 e360 e370 e26200 e3380 2270 1270 470 1180 14 269 393 259 e260 e360 e360 e370 e22200 e3380 2270 1270 470 1180 14 269 393 259 e260 e360 e360 e370 e22200 e3380 e300 e300 e300 e300 e300 e300 e	1	676	368	e325	e270	e320	e315	e715	e13800	e3280	2030	615	e500
3 578 318 e320 e267 e310 e315 e1670 e10300 e2980 1930 596 763 4 553 355 e310 e265 e320 e315 e350 e8000 e2780 1650 564 2910 6 481 369 e305 e258 e345 e330 e10300 e6800 e260 1540 533 2840 7 445 376 e300 e258 e355 e340 e13300 e5000 e3010 1450 514 2580 8 413 376 e295 e244 e350 e360 e15800 e4400 e3000 1370 499 2270 9 376 379 e290 e244 e350 e360 e17800 e4000 e3000 1370 499 2270 10 325 389 e280 e244 e350 e360 e370 e26200 e3480													
5 524 359 e310 e262 e330 e320 e6730 e8000 e2780 1650 564 2910 6 481 369 e305 e258 e334 e3300 e5800 e3600 e3010 e3501 e3501 e3010 e3010 1450 533 2840 8 413 376 e295 e244 e350 e360 e15800 e4400 e3000 1370 499 2270 9 376 379 e290 e244 e350 e370 e17800 e4400 e3000 1340 492 22000 10 325 389 e280 e240 e360 e390 e28900 e3490 2480 1340 479 1490 12 303 418 e260 e240 e360 e375 e27200 e3380 2270 1270 470 1180 13 289 406 266 e250 e360 <td>3</td> <td></td>	3												
5 524 359 e310 e262 e330 e320 e6730 e8000 e2780 1650 564 2910 6 481 369 e305 e258 e334 e3300 e5800 e3600 e3010 e3501 e3501 e3010 e3010 1450 533 2840 8 413 376 e295 e244 e350 e360 e15800 e4400 e3000 1370 499 2270 9 376 379 e290 e244 e350 e370 e17800 e4400 e3000 1340 492 22000 10 325 389 e280 e240 e360 e390 e28900 e3490 2480 1340 479 1490 12 303 418 e260 e240 e360 e375 e27200 e3380 2270 1270 470 1180 13 289 406 266 e250 e360 <td>1</td> <td></td>	1												
6 481 369 e305 e258 e355 e330 e10300 e6800 e2860 1540 533 2840 7 445 376 e300 e258 e353 e340 e13300 e5500 e3010 1450 514 2580 8413 376 e295 e244 e350 e360 e15800 e4400 e3000 1370 499 2270 9 376 379 e290 e244 e350 e360 e17800 e4300 2780 1340 492 2000 10 325 389 e280 e240 e350 e380 e19800 e3680 2620 1320 487 1730 11 308 414 e270 e240 e366 e370 e17800 e4300 2780 1340 492 2000 11 305 389 e280 e240 e360 e370 e22900 e3490 2480 1340 479 1490 11 308 418 e260 e240 e366 e370 e26200 e3380 2370 1320 487 1730 11 20 303 418 e260 e240 e360 e370 e26200 e3380 2370 1320 475 1320 13 289 406 266 e250 e360 e375 e27200 e3280 2270 1270 470 1180 14 269 393 259 e260 e360 e380 e2960 e3190 2160 1090 455 1040 15 257 361 e230 e255 e360 e380 e33400 e3120 2030 1040 442 845 16 245 316 e225 e255 e366 e380 e3300 e3100 e3100 2030 1040 442 845 17 239 265 e225 e260 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 229 e260 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 229 e260 e380 e400 e4000 e2780 1860 908 e390 572 12 258 e265 234 e293 e380 e450 e41700 e2780 1860 908 e390 572 12 258 e265 234 e293 e380 e450 e41700 e2780 1860 908 e390 572 12 258 e265 234 e293 e380 e450 e41700 e2780 1860 908 e390 572 12 258 e265 234 e293 e380 e450 e41700 e2780 1860 908 e390 572 12 258 e260 230 e279 e380 e450 e41700 e2780 1860 908 e390 572 12 258 e260 230 e276 e288 e390 e355 e520 e34600 e3010 1870 763 e350 408 279 e380 e450 e341700 e2780 1860 908 e390 572 12 258 e360 249 e290 e385 e520 e34600 e3000 1870 773 e340 376 12 258 e320 276 e288 e390 e355 e520 e34600 e3010 1870 763 e350 408 279 e380 e490 e24100 e2800 e2800 1680 845 e360 457 e390 e2800 e360 1680 845 e360 457 e390 e360 e360 e360 e360 e360 e360 e360 e36	5												
7 445 376 e300 e258 e353 e340 e13300 e300 e3000 1450 514 2580 8 413 376 e295 e244 e350 e360 e15800 e4400 e3000 1370 499 2270 9 376 379 e290 e244 e350 e360 e15800 e4400 e3000 1370 499 2270 10 325 389 e280 e240 e350 e380 e19800 e3680 2620 1520 487 1730 11 308 414 e270 e240 e360 e370 e26200 e3380 2620 1520 487 1730 11 308 414 e270 e240 e360 e370 e26200 e3380 2370 1320 475 1320 13 289 406 266 e250 e360 e375 e27200 e3280 2270 1270 470 1180 14 269 393 259 e260 e360 e380 e39600 e3180 270 1270 470 1180 15 257 361 e230 e255 e360 e380 e33400 e3120 2030 1040 442 845 16 245 316 e230 e255 e365 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e40300 e3060 1880 972 420 646 19 251 e260 229 e260 e380 e400 e40400 e3001 1850 951 e410 618 19 251 e260 227 e260 e380 e400 e40700 e3060 1880 972 420 646 19 256 e260 227 e260 e380 e400 e40700 e3060 1880 972 420 646 19 251 e260 229 e260 e380 e400 e40700 e3060 1880 972 420 646 19 251 e260 229 e260 e380 e400 e40700 e3060 1880 972 420 646 19 251 e260 229 e260 e380 e400 e40700 e3060 1880 972 420 646 19 251 e260 229 e260 e380 e400 e40700 e3060 1800 972 420 646 19 251 e260 227 e260 e380 e400 e40700 e3060 1800 972 420 646 19 251 e260 227 e260 e380 e400 e3060 1800 972 420 646 20 252 e260 e380 e400 e3060 1800 972 420 646 20 252 e260 e380 e400 e3060 1800 972 420 646 20 270 256 e260 227 e260 e380 e400 e3060 1800 972 420 646 20 270 256 e260 227 e260 e380 e400 e3060 1800 970 830 1800 971 8400 692 256 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 258 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 258 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 258 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 258 e320 276 e286 e385 e520 e3600 e300 1860 845 e360 457 e370 e340 376 e380 e380 e340 e340 e340 e340 e340 e340 e340 e34		724	223	6310	6202	e550	6520	60/20	68000	62760	1050	504	2910
8 413 376 e295 e244 e350 e360 e15800 e4000 e3000 1370 499 2270 9 376 379 e290 e244 e350 e370 e17800 e4300 2780 1340 492 2000 10 325 389 e280 e240 e350 e380 e19800 e3680 2620 1320 487 1730 11 308 414 e270 e240 e360 e370 e26200 e3490 2480 1340 479 1490 12 303 418 e260 e240 e360 e370 e26200 e3380 2370 1320 475 1320 13 289 406 266 e250 e360 e370 e26200 e3380 2270 1270 470 1180 14 269 393 259 e260 e360 e380 e29600 e3190 2160 1090 455 1040 15 257 361 e230 e255 e360 e380 e400 e41300 e3000 1880 972 420 646 16 245 316 e225 e266 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e40400 e3010 1850 951 e410 648 19 251 e260 229 e260 e380 e400 e41400 e3010 1850 951 e410 648 19 251 e260 229 e260 e380 e400 e41700 e2780 1860 908 e390 572 21 258 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e260 229 e260 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e260 229 e260 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e260 230 e279 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e260 230 e279 e380 e450 e4100 e2770 1820 897 e380 510 22 258 e260 230 e279 e380 e450 e41700 e2780 1860 908 e390 572 24 258 e360 249 e290 e385 e520 e34600 e3080 1680 845 e350 465 24 258 e300 252 e288 e390 e525 e32000 e3200 1660 814 e357 409 25 258 e320 276 e288 e390 e340 e2300 e380 1680 845 e350 457 27 288 e300 252 e288 e390 e340 e2930 e380 e28700 e3120 1680 773 e340 376 26 258 e315 270 e283 e370 e535 e26400 e3700 e2780 2140 685 e400 376 27 258 e320 276 e288 e390 e340 e2930 e380 e28700 e3120 1680 773 e340 376 26 258 e315 270 e283 e370 e340 e3200 1660 814 e357 409 25 258 e320 276 e288 e390 e340 e2930 e380 1680 845 e350 430 376 e340 e335 e340 e335 e340 e355 e340 e3200 665 e375 416 30 356 e300 e270 e315 e570 e16700 e3210 2030 628 e350 430 376 e340 8355 9978 13170 771065 141860 68750 35506 13996 31451 MAX 676 418 325 345 390 620 41800 13800 3	6			e305	e258	e345	e330	e10300	e6800	e2860	1540	533	
8 413 376 e295 e244 e350 e360 e15800 e4400 e3000 1370 499 2270 9 376 379 e290 e244 e350 e370 e17800 e4300 2780 1340 492 2000 10 325 389 e280 e240 e350 e380 e19800 e3680 2620 1320 487 1730 11 308 414 e270 e240 e360 e370 e26200 e380 2620 1320 487 1730 11 308 414 e260 e240 e360 e370 e26200 e380 2370 1320 475 1320 13 289 406 266 e250 e360 e360 e370 e26200 e380 2270 1270 470 1180 14 269 393 259 e260 e360 e360 e380 e29600 e3190 2160 1090 455 1040 15 257 361 e230 e255 e360 e380 e400 e3102 2030 1040 442 845 16 245 316 e225 e255 e366 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e41400 e3010 1850 951 e410 648 19 251 e260 229 e260 e380 e400 e41400 e3010 1850 951 e410 648 19 251 e260 229 e260 e380 e400 e41400 e3010 1850 951 e410 648 19 251 e260 229 e260 e380 e400 e41700 e2780 1860 908 e390 572 21 258 e260 230 e279 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e260 230 e279 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e260 230 e279 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e260 230 e279 e380 e460 e40000 e2770 1820 897 e380 510 22 258 e265 234 e293 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e260 230 e279 e380 e460 e40000 e2770 1820 897 e380 645 24 258 e360 249 e290 e385 e520 e34600 e3080 1680 845 e350 457 25 258 e320 276 e288 e385 e530 e28700 e3200 1660 814 e357 409 25 258 e320 276 e288 e390 e340 e24100 e2870 2070 704 e400 384 28 321 e310 e280 e286 e385 e530 e28700 e3120 1680 773 e340 376 26 258 e315 e285 e280 e346 e285 e340 e21400 e2870 2070 704 e400 384 28 321 e310 e280 e286 e320 e540 e21400 e2870 2070 704 e400 384 28 321 e310 e280 e286 e320 e540 e21400 e2870 2070 704 e400 384 28 321 e310 e280 e286 e360 e340 e21400 e2870 2070 704 e400 384 28 321 e310 e280 e286 e340 e340 e21400 e2870 2070 704 e400 384 28 321 e310 e280 e286 e340 e293 e340 e3400 e21800 e2780 2140 685 e400 376 27 258 e310 e280 e286 e340 e340 e340 e3400 e3200 1660 814 e357 409 29 350 e310 e3280 235 240 310 3170 71065 141860 68750 35506 13996 31451 MAX 676 418 325 345 390 620 41800 13800 3280 2030 615 340 376	7	445	376	e300	e258	e353	e340	e13300	e5300	e3010	1450	514	2580
9 376 379 e290 e244 e350 e370 e17800 e4300 2780 1340 492 2000 10 325 389 e280 e240 e350 e380 e19800 e3680 2620 1320 487 1730 11 308 414 e270 e240 e360 e370 e26200 e3380 2370 1320 475 1320 13 289 406 266 e250 e360 e375 e27200 e3280 2270 1270 470 1180 14 269 393 259 e260 e360 e380 e390 e390 2160 1090 455 1040 15 257 361 e230 e255 e360 e380 e3300 e3100 2030 1040 442 845 16 245 316 e225 e260 e380 e400 e40300 e3000 1880 972 420 646 18 244 e260 252 e260 e380 e400 e40300 e3000 1880 972 420 646 18 244 e260 229 e260 e380 e400 e40300 e3000 1850 951 e410 618 19 251 e260 229 e260 e380 e455 e41800 e2780 1860 908 e390 572 12 258 e260 227 e260 e380 e455 e41700 e2780 1860 908 e390 572 12 258 e260 249 e260 e380 e450 e4500 e3000 e2830 1740 876 e370 425 258 e360 249 e290 e380 e450 e4500 e3800 e3000 1860 988 e400 609 e3000 1860 988 e300 650 1880 972 420 646 189 251 e260 229 e260 e380 e455 e41800 e2900 1840 918 e400 609 e300 e3500	8	413	376	e295	e244		e360	e15800	e4400	e3000	1370	499	2270
10 325 389 e280 e240 e350 e19800 e19800 e3680 2620 1320 487 1730 11 308 414 e270 e240 e360 e390 e22900 e3490 2480 1340 479 1490 12 303 418 e260 e240 e360 e3770 e26200 e3380 2370 1320 475 1320 13 289 406 266 e250 e360 e375 e27200 e3280 2270 1270 470 1180 14 269 393 259 e260 e360 e380 e29600 e3190 2160 1090 455 1040 15 257 361 e230 e255 e360 e380 e33400 e3120 2030 1040 442 845 16 245 316 e225 e255 e365 e385 e380 e300 e3100 2030 1040 442 845 17 239 265 e225 e260 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e41400 e3010 1850 951 e410 618 19 251 e260 227 e260 e380 e425 e41800 e2900 1840 918 e400 609 20 256 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e265 234 e293 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e265 234 e293 e380 e475 e41700 e2780 1860 908 e390 572 21 258 e265 234 e293 e380 e475 e41700 e2780 1860 908 e390 572 21 258 e265 234 e293 e380 e475 e41800 e2900 1840 918 e400 609 22 258 e265 234 e293 e380 e475 e41700 e2780 1860 908 e390 572 24 258 e300 252 e288 e390 e325 e34600 e3080 1680 845 e366 6570 425 258 e300 252 e288 e390 e325 e32600 e3260 e3260 e3260 e3260 e3260 e3260 e3360 e360 e3600 e360													
11 308 414 e270 e240 e360 e390 e22900 e3490 2480 1340 479 1490 12 303 418 e260 e240 e360 e370 e26200 e3380 2370 1320 475 1320 13 289 406 266 e250 e360 e375 e27200 e280 2270 1270 470 1180 15 257 361 e230 e255 e360 e360 e380 e29600 e3190 2160 1090 455 1040 15 257 361 e230 e255 e360 e380 e33400 e3120 2030 1040 442 845 16 245 316 e225 e260 e360 e380 e33400 e3120 2030 1040 442 845 17 239 265 e225 e260 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e40300 e3060 1880 972 420 646 19 251 e260 229 e260 e380 e400 e40300 e3060 1880 972 420 646 19 251 e260 229 e260 e380 e400 e41400 e2900 1840 918 e400 609 20 256 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 12 258 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 12 258 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 12 258 e260 234 e293 e380 e450 e41700 e2780 1860 908 e390 572 12 258 e260 234 e293 e380 e450 e450 e3400 e3060 1880 972 e380 510 e360 e450 e3600 e3600 e3060													
12 303 418 e260 e240 e360 e370 e26200 e3380 2370 1320 475 1320 13 289 406 266 e250 e360 e360 e375 e27200 e3280 2270 1270 470 1180 15 257 361 e230 e255 e360 e380 e29600 e3190 2160 1090 455 1040 15 257 361 e230 e255 e360 e380 e33400 e3120 2030 1040 442 845 16 245 316 e225 e255 e365 e385 e38400 e3070 1940 994 431 704 17 239 265 e225 e260 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e41400 e3010 1850 951 e410 618 19 251 e260 229 e260 e380 e400 e41400 e2010 1850 951 e410 618 19 251 e260 229 e260 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e265 234 e293 e380 e450 e4100 e2770 1820 897 e380 510 22 258 e265 234 e293 e380 e475 e39900 e2830 1740 876 e370 425 23 258 e265 234 e293 e380 e475 e39900 e2830 1740 876 e370 425 24 258 e300 252 e288 e390 e525 e32000 e3200 1660 814 e357 409 25 258 e320 276 e286 e385 e520 e34600 e3010 1870 763 e340 376 26 258 e315 270 e283 e370 e535 e28700 e3120 1680 773 e340 376 26 258 e312 e285 e280 e349 e290 e340 e28700 e3120 1680 773 e340 376 27 258 e312 e285 e280 e340 e293 e340 e2870 e3120 1680 773 e340 376 28 321 e310 e280 e286 e385 e530 e28700 e3120 1680 773 e340 376 28 321 e310 e280 e286 e320 e540 e24100 e2870 2070 704 e400 384 28 321 e310 e280 e286 e320 e540 e21800 e2780 2140 685 e400 376 29 350 e310 e280 e286 e320 e540 e21800 e2780 2140 685 e400 376 29 350 e310 e280 e286 e320 e540 e21800 e2780 2140 685 e400 376 29 350 e310 e280 e286 e320 e540 e21800 e2780 2140 685 e400 376 29 350 e310 e280 e286 e320 e540 e21800 e2780 2140 685 e400 376 29 350 e310 e280 e293 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e570 e1660 623 340 376 MAX 676 418 325 345 390 620 41800 13800 3280 2030 615 2910 MIN 239 260 225 240 310 310 315 715 2770 1660 623 340 376		3-3	,,,,	0200	0240	0,50	0,00	0.,000	0,000	2020	.,,	40.	.,,,,,
13 289 406 266 e250 e360 e375 e27200 e3280 2270 1270 470 1180 14 269 393 259 e260 e360 e380 e29600 e3190 2160 1090 455 1040 15 257 361 e230 e255 e360 e380 e38400 e3120 2030 1040 442 845 16 245 316 e225 e255 e366 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e41400 e3010 1850 951 e410 618 200 e256 e260 e260 e380 e450 e41400 e2780 1860 908 e390 572 e260 e380 e450 e41700 e2780 1860 908 e390 572 e260 e380 e450 e41700 e2780 1860 908 e390 572 e260 e380 e450 e41700 e2780 1860 908 e390 572 e260 e380 e450 e41700 e2780 1860 908 e390 572 e260 e380 e450 e41700 e2780 1860 908 e390 572 e260 e380 e450 e41700 e2780 1860 908 e390 572 e260 e380 e450 e450 e360 e360 e360 1680 845 e360 457 e39900 e2830 1740 876 e370 425 e360 e360 e360 e360 e360 e360 e360 e360		308	414	e270	e240	e360	e390	e22900	e3490	2480	1340	479	1490
13 289 406 266 e250 e360 e375 e27200 e3280 2270 1270 470 1180 14 269 393 259 e260 e360 e380 e29600 e3190 2160 1090 455 1040 15 257 361 e230 e255 e366 e380 e38400 e3120 2030 1040 442 845 16 245 316 e225 e255 e365 e385 e38400 e3070 1940 994 431 704 17 239 265 e225 e260 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e40400 e3010 1850 951 e410 618 19 251 e260 229 e260 e380 e450 e41800 e2900 1840 918 e400 609 20 256 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e260 230 e279 e380 e460 e40000 e2770 1820 897 e380 510 22 258 e265 234 e293 e380 e475 e39900 e2830 1740 876 e370 425 23 258 e280 249 e290 e385 e520 e34600 e3080 1680 845 e360 467 24 258 e300 252 e288 e390 e525 e32000 e3200 1660 814 e3557 409 25 258 e320 276 e286 e385 e530 e28700 e3120 1680 773 e340 376 26 258 e315 270 e283 e370 e535 e26400 e3010 1870 763 e350 408 27 258 e310 e280 e293 e380 e4960 e24100 e2870 2070 704 e400 384 28 321 e310 e280 e296 e385 e530 e28700 e3120 1680 773 e340 376 28 321 e310 e280 e296 e335 e540 e24100 e2870 2090 665 e375 416 28 321 e310 e280 e296 e345 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e570 e16700 e3210 2030 628 e350 433 31 371 e270 e345 e620 e3270 e3270 623 e450	12	303	418	e260	e240	e360	e370	e26200	e3380	2370	1320	475	1320
14 269 393 259 e260 e360 e380 e23600 e3190 2160 1090 455 1040 15 257 361 e230 e255 e360 e380 e33400 e3120 2030 1040 442 845 16 245 316 e225 e260 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e4100 e3010 1850 951 e410 646 18 244 e260 229 e260 e380 e400 e41800 e2900 1840 918 e400 609 20 256 e260 227 e260 e380 e425 e41800 e2900 1840 918 e400 609 21 258 e260 230 e279 e380 e460 e40000 e2770 1820 897 e380 510 22 258 e265 234 e293	13	289	406	266	e250	e360		e27200	e3280	2270	1270		1180
15		269	393	259							1090		1040
16													
17 239 265 e225 e260 e380 e400 e40300 e3060 1880 972 420 646 18 244 e260 252 e260 e380 e400 e41400 e3010 1850 951 e410 618 19 251 e260 229 e260 e380 e450 e41700 e2780 1840 918 e400 609 20 256 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 21 258 e260 230 e279 e380 e460 e40000 e2770 1820 897 e380 510 22 258 e265 234 e293 e380 e475 e39900 e2830 1740 876 e370 425 23 258 e280 249 e290 e385 e520 e34600 e3080 1680 845 e360 467 24 258 e300 252 e288 e390 e525 e32000 e3220 1660 814 e357 25 258 e320 276 e286 e385 e530 e28700 e3120 1680 773 e340 376 26 258 e315 270 e283 e370 e535 e26400 e3010 1870 763 e350 408 27 258 e312 e285 e280 e340 e540 e24100 e2870 2070 704 e400 384 28 321 e310 e280 e286 e320 e540 e21800 e2780 2140 685 e400 376 29 350 e310 e280 e286 e320 e540 e21800 e2780 2140 685 e400 376 29 350 e310 e280 e286 e393 e540 e18400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e570 e16700 e3210 2030 628 e350 433 31 371 e270 e345 e620 e3270 623 e450 TOTAL 10849 9966 8401 8355 9978 13170 717065 141860 68750 35506 13996 31451 MBAN 350 332 271 270 356 425 23900 4576 2292 1145 451 1048 MAX 676 418 325 345 390 620 41800 13800 3280 2030 615 2910 MIN 239 260 225 240 310 315 715 2770 1660 623 340 376							0,00	0),400					
18													
19 251 e260 229 e260 e380 e425 e41800 e2900 1840 918 e400 609 20 256 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 e380 e260 227 e260 e380 e450 e41700 e2780 1860 908 e390 572 e380 e380 e450 e41700 e2780 1860 908 e390 572 e380 e380 e450 e41700 e2770 1820 897 e380 510 e22 258 e265 234 e293 e380 e475 e39900 e2830 1740 876 e3770 425 e380 e380 e380 e380 e380 e380 e380 e380						e380	e400	e40300	e3060		972	420	646
20	18			252	e260	e380	e400	e41400	e3010	1850	951	e410	618
21	19	251	e260	229	e260	e380	e425	e41800	e2900	1840	918	e400	609
22 258 e265 234 e293 e380 e475 e39900 e2830 1740 876 e370 425 23 258 e280 249 e290 e385 e520 e34600 e5080 1680 845 e360 467 24 258 e300 252 e288 e390 e525 e32000 e3200 1660 814 e357 409 25 258 e320 276 e286 e385 e530 e28700 e3120 1660 814 e357 409 26 258 e315 270 e283 e370 e535 e26400 e3010 1870 763 e350 408 27 258 e312 e285 e280 e340 e540 e24100 e2870 2070 704 e400 384 28 321 e310 e280 e286 e320 e540 e21800 e2780 2140 685 e400 376 29 350 e310 e280 e293	20	256	e260	227	e260	e380	e450	e41700	e2780	1860	908	e390	572
22 258 e265 234 e293 e380 e475 e39900 e2830 1740 876 e370 425 23 258 e280 249 e290 e385 e520 e34600 e5080 1680 845 e360 467 24 258 e300 252 e288 e390 e525 e32000 e3200 1660 814 e357 409 25 258 e320 276 e286 e385 e530 e28700 e3120 1660 814 e357 409 26 258 e315 270 e283 e370 e535 e26400 e3010 1870 763 e350 408 27 258 e312 e285 e280 e340 e540 e24100 e2870 2070 704 e400 384 28 321 e310 e280 e286 e320 e540 e21800 e2780 2140 685 e400 376 29 350 e310 e280 e293	21	258	e260	230	0270	0380	0460	040000	02770	1820	807	9380	510
23													
24 258 e300 252 e288 e390 e525 e32000 e3200 1660 814 e357 409 25 258 e3200 276 e286 e385 e530 e28700 e3120 1680 773 e340 376 26 258 e315 270 e283 e370 e535 e26400 e3010 1870 763 e350 408 27 258 e312 e285 e280 e340 e540 e24100 e2870 2070 704 e400 384 28 321 e310 e280 e286 e320 e540 e21800 e2780 2140 685 e400 376 29 350 e310 e280 e293 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e570 e16700 e3210 2030 628 e350 433 31 371 e270 e345 e620 e3270 623 e450 E70 E100 E100 E100 E100 E100 E100 E100													
25	21												
26	24												409
27 258 e312 e285 e280 e340 e540 e24100 e2870 2070 704 e400 384 28 321 e310 e280 e286 e320 e540 e21800 e2780 2140 685 e400 376 29 350 e310 e280 e293 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e570 e16700 e3210 2030 628 e350 433 31 371 e270 e345 e620 e3270 623 e450 TOTAL 10849 9966 8401 8355 9978 13170 717065 141860 68750 35506 13996 31451 MEAN 350 332 271 270 356 425 23900 4576 2292 1145 451 1048 MAX 676 418 325 345 390 620 41800 13800 3280 2030 615 2910 MIN 239 260 225 </td <td>25</td> <td>256</td> <td>e520</td> <td>2/6</td> <td>e286</td> <td>e 285</td> <td>e550</td> <td>e28700</td> <td>e5120</td> <td>1080</td> <td>113</td> <td>e340</td> <td>3/6</td>	25	256	e520	2/6	e286	e 285	e550	e28700	e5120	1080	113	e340	3/6
28 321 e310 e280 e286 e320 e540 e21800 e2780 2140 685 e400 376 29 350 e310 e280 e293 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e570 e16700 e3210 2030 628 e350 433 371 e270 e345 e620 e3270 623 e450 TOTAL 10849 9966 8401 8355 9978 13170 717065 141860 68750 35506 13996 31451 MEAN 350 332 271 270 356 425 23900 4576 2292 1145 451 1048 MAX 676 418 325 345 390 620 41800 13800 3280 2030 615 2910 MIN 239 260 225 240 310 315 715 2770 1660 623 340 376	26						e535						
29 350 e310 e280 e293 e540 e19400 e2960 2090 665 e375 416 30 356 e300 e270 e315 e570 e16700 e3210 2030 628 e350 433 31 371 e270 e345 e620 e3270 623 e450 TOTAL 10849 9966 8401 8355 9978 13170 717065 141860 68750 35506 13996 31451 MEAN 350 332 271 270 356 425 23900 4576 2292 1145 451 1048 MAX 676 418 325 345 390 620 41800 13800 3280 2030 615 2910 MIN 239 260 225 240 310 315 715 2770 1660 623 340 376		258	e312	e285	e280	e340	e540	e24100	e2870			e400	
30 356 e300 e270 e315 e570 e16700 e3210 2030 628 e350 433 e450 E70 e620 e3270 623 e450 E70 e450 E7	28	321	e310	e280	e286	e320	e540	e21800	e2780	2140	685	e400	376
30 356 e300 e270 e315 e570 e16700 e3210 2030 628 e350 433 e450 E70 e620 e3270 623 e450 E70 e450 E7	29	350	e310	e280	e293		e540	e19400	e2960	2090	665	e375	416
31 371 e270 e345 e620 e3270 623 e450 TOTAL 10849 9966 8401 8355 9978 13170 717065 141860 68750 35506 13996 31451 MEAN 350 332 271 270 356 425 23900 4576 2292 1145 451 1048 MAX 676 418 325 345 390 620 41800 13800 3280 2030 615 2910 MIN 239 260 225 240 310 315 715 2770 1660 623 340 376			e300	e270				e16700	e3210	2030	628	e350	433
MEAN 350 332 271 270 356 425 23900 4576 2292 1145 451 1048 MAX 676 418 325 345 390 620 41800 13800 3280 2030 615 2910 MIN 239 260 225 240 310 315 715 2770 1660 623 340 376	31							200100000000000000000000000000000000000					
MEAN 350 332 271 270 356 425 23900 4576 2292 1145 451 1048 MAX 676 418 325 345 390 620 41800 13800 3280 2030 615 2910 MIN 239 260 225 240 310 315 715 2770 1660 623 340 376	momat.	10010	0066	0406	0755	0070	47470	747065	444060	60750	75506	17006	74.154
MAX 676 418 325 345 390 620 41800 13800 3280 2030 615 2910 MIN 239 260 225 240 310 315 715 2770 1660 623 340 376													
MIN 239 260 225 240 310 315 715 2770 1660 623 340 376													
AC-FT 21520 19770 16660 16570 19790 26120 1422000 281400 136400 70430 27760 62380													
	AC-FT	21520	19770	16660	16570	19790	26120	1422000	281400	136400	70430	27760	62380

CAL YR 1988 TOTAL 422676 MEAN 1155 MAX 13800 MIN 144 AC-FT 838400 WTR YR 1989 TOTAL 1069347 MEAN 2930 MAX 41800 MIN 225 AC-FT 2121000

e - Estimated

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

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECONI (00061)	CIFIC CON- DUCT- ANCE (US/CM)		TEMPER- ATURE AIR (DEG C) (00020)	ATURE WATER (DEG C	(MG/ AS C) CACO	CALC L DIS- L SOL' (MG,	IUM VED SO /L (I	AGNE- SIUM, DIS- OLVED MG/L S MG) 0925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)
OCT 24	1545	260	1000)	0.0	5.	5						
DEC 30	1210	270	670		-11.0	0.	0						
JAN													
20	1400 1410	261 257	1410		-6.0 -10.5								
27	1400	280	860		-3.0	0.							
FEB 06	1420	349	785		-12.5	0.	.0						
24	1435	389			2.5	0.							
MAR 03	1440	317				. 0.	0					- 22	
10	1345	379			2.5	0.	.0						
20	1540 1540	450 540	-		-7.0 2.0				==		=	==	
APR			077										
16	1230 1225	38500 41300	275 300		11.5			20 30		12	9.0	13	0.4
20	1315	41400	540)	12.0	5.	.0						
25 MAY	1325	28700	610)	9.0	9.	.5						
01	1140	13900	870		10.0								
05	1215 1305	8050 3070	900 782		4.0 31.0							-	
JUN													
09	1200	2780	735	,	21.5	19.	.0						
07 AUG	1345	1430	760	8.70	25.0	26.	5 2	90 65		32	40	22	1
24	1320	351	650		28.5	26.	0						
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BONATE FET-LAI (MG/L AS HCO3)	BONATE, B FET-LAE (MG/L AS CO3)	(MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFAT DIS- SOLVE (MG/L AS SO4	DIS- D SOLV (MG/	RIDED SOL'L (MGL) AS	E, D S- Si VED (1 /L F) S	LICA, IS- OLVED MG/L AS IO2) 0955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 18	5.8	120	0	95	3.7	40	5.	8 0	.20	11	179	171	0.24
JUL	10	290	0	240	1 5 5							448	0.61
07	10	290	0	240	0.9	91	50	O	.20	14	449		
2		SOLVED (TONS PER DAY)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	DIS- SOLVED (UG/L AS B)	DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (O1130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCUI DIS- SOLVI (UG/I AS HI (71890	RY I ED : L G)	DENUM, I DIS- SOLVED S (UG/L AS MO)	VIUM, DIS- SOLVED ((UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) D1080)
APR 18.	20	000	3	40	90	1	10	30	<0	.1	1	1	150
JUL 07.		730	5	100	30	1	40	10		.2	4	<10	330
07.		100	,	100	50		40	10	U	• ~	4	110	220

05098700 HIDDEN ISLAND COULEE NEAR HANSBORO, ND (International gaging station)

LOCATION.--Lat 48°57'10", long 99°25'35", in SE1/45W1/4 sec.11, T.163 N., R.68 W., Towner County, Hydrologic Unit 09020313, on right bank 400 ft downstream from bridge on county highway, and 2.5 mi west of Hansboro.

DRAINAGE AREA . -- 38 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- October 1961 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,615 ft above National Geodetic Vertical Datum of 1929 from topographic map. Prior to May 20, 1962, nonrecording gage 400 ft upstream at same datum.

REMARKS.--Estimated daily discharges: Apr. 1 to Apr. 8. Records good except those for period of estimated discharge, which are poor.

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

AVERAGE DISCHARGE.--28 years, 3.20 ft³/s, 2,320 acre-ft/yr; median of yearly mean discharges, 2.1 ft³/s, 1,520 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 1,200 ft³/s Apr. 23, 1979, gage height, 10.50 ft, from floodmark, backwater from ice; no flow for several months each year.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 25 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
a		snow backwater	7.36	Apr. 8	1830	66.0	6.23

a - Sometime during period Apr. 6-8

b - From floodmark

No flow for several months.

		DISCHARGE,	CUBIC	FEET PER	SECOND,	WATER YE	AR OCTOBER S	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN'	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	e.10	.23	.00	.00	.00	.00
2	.00	.00	.00	.00	.00	.00	e.50	.20	.00	.00	.00	.00
3	.00	.00	.00	.00	.00	.00	e1.0	.18	.00	.00	.00	.00
1	.00	.00	.00	.00	.00	.00	e2.5	.14	.00	.00	.00	.00
5	.00	.00	.00	.00	.00	.00	e5.0	.11	.00	.00	.00	.00
6	.00	.00	.00	.00	.00	.00	e10	.08	.00	.00	.00	.00
7	.00	.00	.00	.00	.00	.00	e15	.08	.00	.00	.00	.00
8	.00	.00	.00	.00	.00	.00	e20	.09	.00	.00	.00	.00
g	.00	.00	.00	.00	.00	.00	13	.08	.00	.00	.00	.00
7 8 9 10	.00	.00	.00	.00	.00	.00	8.0	.06	.00	.00	.00	.00
11	.00	.00	.00	.00	.00	.00	6.8	.05	.00	.00	.00	.00
12	.00	.00	.00	.00	.00	.00	6.0	.04	.00	.00	.00	.00
13	.00	.00	.00	.00	.00	.00	7.4	.04	.10	.00	.00	.00
14	.00	.00	.00	.00	.00	.00	6.6	.04	.08	.00	.00	.00
15	.00	.00	.00	.00	.00	.00	3.6	.03	.04	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	1.5	.03	.03	.00	.00	.00
17	.00	.00	.00	.00	.00	.00	1.9	.06	.01	.00	.00	.00
18	.00	.00	.00	.00	.00	.00	1.9	.09	.0	.00	.00	.00
							1.7	.06	.00	.00	.00	.00
19	.00	.00	.00	.00	.00	.00	1.7		.00	.00	.00	.00
20	.00	.00	.00	.00	.00	.00	1.0	.05				
21	.00	.00	.00	.00	.00	.00	.91	.03	.00	.00	.00	.00
22	.00	.00	.00	.00	.00	.00	.71	.03	.00	.00	.00	.00
23	.00	.00	.00	.00	.00	.00	.83	.03	.00	.00	.00	.00
24	.00	.00	.00	.00	.00	.00	.95	.03	.00	.00	.00	.00
25	.00	.00	.00	.00	.00	.00	.95	.03	.00	.00	.00	.00
26	.00	.00	.00	.00	.00	.00	.72	.03	.00	.00	.00	.00
27	.00	.00	.00	.00	.00	.00	.59	.03	.00	.00	.00	.00
28	.00	.00	.00	.00	.00	.00	.43	.02	.00	.00	.00	.00
29	.00	.00	.00	.00		.00	.32	.0	.00	.00	.00	.00
30	.00	.00	.00	.00		.00	.23	.00	.00	.00	.00	.00
31	.00		.00	.00		.00		.00		.00	.00	
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00	120.02	1.97	0.26	0.00	0.00	0.00
MEAN	.00	.00	.00	.00	.00	.00	4.00	.064	.009	.00	.00	.00
MAX	.00	.00	.00	.00	.00	.00	20	.23	.10	.00	.00	.00
MIN	.00	.00	.00	.00	.00	.00	.10	.00	.00	.00	.00	.00
AC-FT	.00	.00	.00	.00	.00	.00	238	3.9	.5	.0	.0	.00
AC-FI	.0	.0	.0	.0	.0	.0	2,0	2.5	.,		13/19/2	.0

CAL YR 1988 TOTAL 9.84 MEAN .027 MAX 1.9 MIN .00 AC-FT 20 WTR YR 1989 TOTAL 122.25 MEAN .33 MAX 20 MIN .00 AC-FT 242

e - Estimated

121

RED RIVER OF THE NORTH BASIN

05098700 HIDDEN ISLAND COULEE NEAR HANSBORO, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DISCHARGED INSTITUTE CUBIC FEED PER SECOLO006	E, SPE- CIFIC CON- DUCT- ANCE ND (US/CM		AIR (DEG C	WATER () (DEG (E (MG/ R AS C) CACO	CALCI L DIS- L SOLV (MG/	DIS- VED SOLVE /L (MG/I CA) AS MO	DIS- ED SOLVE (MG/I	D L SODIU A) PERCEI	NT RATIO
APR												
08	1625	14	40	0	1.	0 0.	.5		:			
09		8.	5 -							-		
13												
17				2 7.90				70 64	27	24		16 0.7
20	1750	1.	5 -		- 18.	5 9.	.5			-		
MAY		1			2.2	1						
03	1540	0.	16 -		- 18.	0 12.	.0			-		
DATE	POTAS SIUM DIS- SOLVE (MG/L AS K) (00935	, BONATI FET-L D (MG/I AS HCO3	E, BONATE AB FET-LA L (MG/L AS) CO3)	B LAB (MG/L AS CACO3		DIS- DIS- D SOLVE (MG/L	DIS- ED SOLV (MG/ 4) AS C	ED SOLV	E, DIS- S- SOLVE VED (MG/I /L AS F) SIO2	AT 180 ED DEG. DIS- SOLV (MG/)	UE SUM OF CONST. C TUENTS DIS- ED SOLVEL) (MG/1	SOLIDS, DIS- SOLVED (TONS PER L) AC-FT)
APR					_							0.50
17	9.6	180	0	150	3.	6 180	9.	7 0.	.10 15	4	31 4	18 0.59
		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) (O1130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
APR 17	7	2.37	2	50	30	1	30	20	0.2	2	4	290

O5098820 CYPRESS CREEK ABOVE INTERNATIONAL BOUNDARY NEAR SARLES, ND (International gaging station)

LOCATION.--Lat 48°58'37", long 98°56'04", in NW1/4NW1/4 sec.3, T.163 N., R.64 W., Cavalier County, Hydrologic Unit 09020313, on right bank 12 ft downstream of bridge on State Highway 20, 4.5 mi northeast of Sarles.

DRAINAGE AREA .-- 83 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. --October 1, 1988 to Sept. 30, 1989. Records for May 1961 to Sept. 1988, published as Cypress Creek near Sarles, ND (station 05098800) at site 3 mi upstream, are not equivalent because of difference in drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 1,550 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Apr. 5-8. Records good except those for period Apr. 5-8, which are poor.

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

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 50 ft3/s and maximum (*).

Date	Time	Discharge (ft3/s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 8	1225	100	*ab13.97	No other	r peak greater	than base discha	arge.

a - Observed b - From floodmark

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

MEAN VALUES

OCT NOV DEC JAN FEB MAR APR MAY JUN JUL

.00 .00 .00 .00 .00 .00 .26 .05 .00

1	DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
2					.00	.00	.00	.00	.26	.05	.02		.00
3 .00 .00 .00 .00 .00 .00 .00 .00 .00 .0	2	.00	.00	.00	.00	.00	.00		.21	.05	.01	.00	.00
4 .00 .00 .00 .00 .00 .00 .00 .00 .00 .13 .05 .00 .00 .00 .00 .00 .00 .00 .00 .00		.00	.00									.00	.00
5 .00 .00 .00 .00 .00 .00 .00 .00 e1.0 .08 .05 .00 .00 .00 .00 .00 .00 .00 .00 .00										-05			.00
7													.00
7	6	00	00	00	00	00	00	015	06	06	00	00	00
8 .00 .00 .00 .00 .00 .00 .00 .00 .00 .45 .03 .06 .00 .00 .00 .00 .00 .00 .00 .00 .00	7									.06			.00
9 .00 .00 .00 .00 .00 .00 .00 .00 .00 .0	6												
10													
11	49							45					.00
12	10	.00	.00	.00	.00	.00	.00	33	.02	.05	.00	.00	.00
12	11							23					.00
14 .00 .00 .00 .00 .00 .00 .00 .00 .00 .58 .01 .12 .00 .00 .00 .00 .00 .00 .00 .00 .00 .0					.00		.00	29	.01	.08			.00
14	13	.00	.00	.00	.00	.00	.00	46	.01	.11	.00	.00	.00
15 .00 .00 .00 .00 .00 .00 .00 .39 .01 .11 .00 .00 .00 .00 .00 .00 .00 .00		.00	.00	.00	.00					.12	.00	.00	.00
17								39					
17	16	.00	-00	.00	.00	.00	.00	30	.01	.10	-00	.00	.00
18								16					
19 .00 .00 .00 .00 .00 .00 .00 .00 8.2 .01 .07 .00 .00 .00 .00 .00 .00 .00 .00 .00											.00		.00
20 .00 .00 .00 .00 .00 .00 .00 .00 6.0 .01 .05 .00 .00 .00 .00 .00 .00 .00 .00 .00													
21													
22 .00 .00 .00 .00 .00 .00 .00	20	.00	.00	.00	.00	.00	.00	6.0	.01	.05	.00	.00	.00
23													.00
24 .00 .00 .00 .00 .00 .00 .00 .00 .00 .0	22	.00			.00	.00	.00		.01				
24 .00 .00 .00 .00 .00 .00 .00 .00 .00 .0	23	.00	.00	.00	.00	.00	.00	2.7	.01	.04	.00	.00	.00
25 .00 .00 .00 .00 .00 .00 1.9 .01 .03 .00 .00 .00 .00 .00 .00 .00 .00 .00	24	.00	.00	.00	.00	.00		2.1	.01	.03	.00	.00	.00
27	25											.00	.00
27	26	.00	.00	.00	.00	.00	.00	1.4	.01	.02	.00	.00	.00
28 .00 .00 .00 .00 .00 .00 .00 .66 .01 .01 .00 .00 .00 .00 .00 .00 .00 .00	27												-00
29 .00 .00 .00 .00 .00 .00 .00 .00 .00 .0	28												
30	20												
31 .0000 .00000300 .00 TOTAL 0.00 0.00 0.00 0.00 0.00 499.84 1.30 1.69 0.04 0.00 0.00 MEAN .00 .00 .00 .00 .00 .00 16.7 .042 .056 .001 .00 .00 MAX .00 .00 .00 .00 .00 .00 80 .26 .12 .02 .00 .00	29												
TOTAL 0.00 0.00 0.00 0.00 0.00 0.00 499.84 1.30 1.69 0.04 0.00 0.00 MEAN .00 .00 .00 .00 .00 .00 16.7 .042 .056 .001 .00 .00 MAX .00 .00 .00 .00 .00 .00 80 .26 .12 .02 .00 .00	50												
MEAN .00 .00 .00 .00 .00 .00 16.7 .042 .056 .001 .00 .00 MAX .00 .00 .00 .00 .00 .00 80 .26 .12 .02 .00 .00	31	.00		.00	.00		.00		.03		.00	.00	
MAX .00 .00 .00 .00 .00 .00 80 .26 .12 .02 .00 .00													
MAX .00 .00 .00 .00 .00 .00 80 .26 .12 .02 .00 .00		.00	.00	.00	.00	.00	.00		.042				
	MAX	.00	.00	.00	.00	.00	.00	80	.26	.12	.02		
MIN .00 .00 .00 .00 .00 .00 .00 .01 .01 .00 .00	MIN	.00	.00	.00	.00	.00	.00	.00	.01	.01	.00	.00	.00
AC-FT .0 .0 .0 .0 .0 .0 991 2.6 3.4 .08 .0 .0													

WTR YR 1989 TOTAL 502.87 MEAN 1.38 MAX 80 MIN .00 AC-FT 997

e - Estimated

05098820 CYPRESS CREEK ABOVE INTERNATIONAL BOUNDARY NEAR SARLES, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD .-- April 1989 to May 1989.

DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	CIFIC CON- DUCT- ANCE		AIR (DEG C	ATURI WATEI) (DEG	E (MG/ R AS C) CACO	CALCIL L DIS- L SOLVI (MG/1	DIS- ED SOLVE L (MG/L A) AS MG	, SODIUM DIS- D SOLVED (MG/L) AS NA	SODIUM	RATIO
APR 08 09 13 17 20	1350 1545 1735 1645 1640	77 54 45 14 6.1	380 610 460	7.90	2.	0 1 0 2 5 3	.0 .0 .0 1	80 44	16	21	20	0.7
03 03 31 31	1150 1300 1215 1505	0.1 0.2 0.0 0.1	20	; ==	19.	0 13	.0				: :	=
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BONATE FET-LA (MG/L AS HCO3)	BONATE, AB FET-LAB (MG/L AS CO3)	LAB (MG/L AS CACO3)		DIS- D SOLVI (MG/I	DIS- ED SOLV L (MG/ 4) AS C	, RIDE DIS- ED SOLVI L (MG/I L) AS F	DIS- SOLVE MG/L AS SI02)	AT 180 D DEG. DIS- SOLVE (MG/L	E SUM OF CONSTI- C TUENTS, DIS- D SOLVED) (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)
APR 17	7.5	130	0	110	2.	7 100	7.	1 0	20 19	29	9 282	0.41
1		OLIDS, 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) (O1049)	LITHIUM DIS- SOLVED (UG/L AS LI) (O1130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) 01080)
APR 17.		11.2	3	60	30	1	20	20	0.3	2	1	240

05099100 SNOWFLAKE CREEK NEAR SNOWFLAKE, MAN (International gaging station)

LOCATION.--Lat 49°01'17", long 98°36'13", in SW1/4 sec.10, T.1, R.9 W., 1st meridian, at traffic bridge, 2.5 mi east, and 1.5 mi south of Snowflake.

DRAINAGE AREA .-- 348 mi2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- March 1961 to current year.

GAGE.--Water-stage recorder since March 1968 and nonrecording gage prior thereto. Datum of gage is Geodetic Survey of Canada Datum of 1929. Prior to Jan. 1, 1987, recording gage at same site at datum of 1221.66 ft above Geodetic Survey of Canada Datum of 1929. Prior to Apr. 2, 1964, nonrecording gage at present site and datum. Apr. 2, 1964, to May 10, 1965, nonrecording gage at site 0.5 mi downstream at present datum.

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

AVERAGE DISCHARGE.--28 years, 14.6 ft³/s, 10,580 acre-ft/yr; median of yearly mean discharges, 7.4 ft³/s, 5,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,130 ft3/s, Apr. 21, 1979, gage height, 1229.94 ft; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 185 ft³/s, Apr.14, gage height, 1226.64 ft; no flow for several months.

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

					M	EAN VALU	ES					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	e.00	e.00	e.00	e.00	6.0	.07	.00	.00	.00
	.00	.00	.00	e.00	e.00	e.00	e.00	5.6	.07	.00	.00	.00
2 3	.00	.00	.00	e.00	e.00	e.00	e.00	4.4	.04	.00	.00	.00
4	.00	.00	.00	e.00	e.00	e.00	e.00	3.6	.00	.00	.00	.00
5	.00	.00	.00	e.00	e.00	e.00	e.14	2.5	.00	.00	.00	.00
2	.00	.00	.00	e.00	e.00	e.00	e.14	2.5	.00	.00	.00	.00
6	.00	.00	.00	e.00	e.00	e.00	e.11	1.7	.00	.00	.00	.00
7	.00	.00	.00	e.00	e.00	e.00	e1.4	1.3	.00	.00	.00	.00
8	.00	.00	.00	e.00	e.00	e.00	e3.1	1.1	.00	.00	.00	.00
9	.00	.00	.00	e.00	e.00	e.00	e.35	.74	.00	.00	.00	.00
10	.00	.00	.00	e.00	e.00	e.00	e3.1	.56	.00	.00	.00	.00
11	.00	.00	.00	e.00	e.00	e.00	e2.8	.39	.00	.00	.00	.00
12	.00	.00	.00	e.00	e.00	e.00	e7.4	.28	.00	.00	.00	.00
13	.00	.00	.00	e.00	e.00	e.00	32	.25	.04	.00	.00	.00
14	.00	.00	.00	e.00	e.00	e.00	107	.25	.04	.00	.00	.00
15	.00	.00	.00	e.00	e.00	e.00	112	.21	.04	.00	.00	.00
16	.00	.00	.00	e.00	e.00	e.00	76	.18	.00	.00	00	.00
17	.00	.00	.00	e.00	e.00	e.00	48	.25	.00	.00	.00	.00
18	.00	.00	.00	e.00					.00	.00	.00	.00
					e.00	e.00	25	.39			.00	
19	.00	.00	.00	e.00	e.00	e.00	23	.32	.00	.00		.00
20	.00	.00	.00	e.00	e.00	e.00	29	.28	.00	.00	.00	.00
21	.00	.00	.00	e.00	e.00	e.00	24	.21	.00	.00	.00	.00
22	.00	.00	.00	e.00	e.00	e.00	19	.18	.00	.00	.00	.00
23	.00	.00	.00	e.00	e.00	e.00	39	.18	.00	.00	.00	.00
24	.00	.00	.00	e.00	e.00	e.00	67	.21	.00	.00	.00	.00
25	.00	.00	.00	e.00	e.00	e.00	45	.21	.00	.00	.00	.00
06								40	00	00		00
26	.00	.00	.00	e.00	e.00	e.00	29	.18	.00	.00	.00	.00
27	.00	.00	.00	e.00	e.00	e.00	17	.14	.00	.00	.00	
28	.00	.00	.00	e.00	e.00	e.00	9.3	.18	.00	.00	.00	.00
29	.00	.00	.00	e.00		e.00	5.9	.11	.00	.00	.00	.00
29 30	.00	.00	.00	e.00		e.00	5.7	.11	.00	.00	.00	.00
31	.00		.00	e.00		e.00		.07		.00	.00	
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00	731.30	32.08	0.30	0.00	0.00	0.00
MEAN	.00	.00	.00	.00	.00	.00	24.4	1.03	.010	.00	.00	.00
MAX	.00	.00	.00	.00	.00	.00	112	6.0	.07	.00	.00	.00
MIN		.00	.00	.00	.00	.00	.00	.07	.00	.00	.00	.00
	.00							64	.6	.00	.00	.00
AC-FT	.0	.0	.0	.0	.0	.0	1450	04	.0	.0	.0	.0

CAL YR 1988 TOTAL 137.50 MEAN .38 MAX 18 MIN .00 AC-FT 273 WTR YR 1989 TOTAL 763.68 MEAN 2.09 MAX 112 MIN .00 AC-FT 1510

e - Estimated

05099150 MOWBRAY CREEK NEAR MOWBRAY, MAN (International gaging station)

LOCATION.--Lat 49°00'00", long 98°27'15", in SE1/4 sec.3, T.1, R.8 W., 1st meridian, on downstream side of bridge on Municipal Road on international boundary, and 1.5 mi east of Mowbray.

DRAINAGE AREA .-- 93.9 mi2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- March 1962 to current year (seasonal records only most years).

GAGE.--Water-stage recorder operated March 1 to October 31 each year. Datum of gage is Geodetic Survey of Canada datum of 1929. Nonrecording gage prior to 1971.

COOPERATION .-- Records furnished by the Water Survey of Canada.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 943 ft³/s, Apr. 6, 1987, gage height, 1,534.57 ft; no flow for several months each year.

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

EXTREMES FOR CURRENT YEAR.—Maximum discharge, $392 \text{ ft}^3/\text{s}$, Apr. 19, gage height, 1,532.59 ft, backwater from ice; no flow for several months.

		DIOUINI	Nab, cobic	, , , , , , , , , , , , , , , , , , , ,		EAN VALU	IES COTOBB	1 1900 10	551 1511551	. 1,50,5		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	.00	7.4	.78	.00	.00	.00
2	.00	.00	.00	.00	.00	.00	.00	6.0	.53	.00	.00	.00
2 3 4	.00	.00	.00	.00	.00	.00	.00	4.9	.25	.00	.00	.00
í	.00	.00	.00	.00	.00	.00	.00	3.7	.07	.00	.00	.00
4											.00	.00
5	.00	.00	.00	.00	.00	.00	.00	2.6	.04	.00	.00	.00
6	.00	.00	.00	.00	.00	.00	.00	2.0	.00	.00	.00	.00
7	.00	.00	.00	.00	.00	.00	e.14	1.6	.00	.00	.00	.00
8	.00	.00	.00	.00	.00	.00	e5.0	1.4	.00	.00	.00	.00
9	.00	.00	.00	.00	.00	.00	e3.4	.78	.00	.00	.00	.00
10	.00	.00	.00	.00	.00		e6.1	.64	.00	.00	.00	.00
10	.00	.00	.00	.00	.00	.00	e0.1	.04	.00	.00	.00	.00
11	.00	.00	.00	.00	.00	.00	e4.1	.46	.00	.00	.00	.00
12	.00	.00	.00	.00	.00	.00	e9.6	.35	.00	.00	.00	.00
13	.00	.00	.00	.00	.00	.00	e19	.32	.00	.00	.00	.00
14	.00	.00	.00	.00	.00	.00	e22	.21	.00	.00	.00	.00
15	.00	.00	.00	.00	.00	.00	e36	.11	.00	.00	.00	.00
15	.00	.00	.00	.00	.00	.00	630		.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	e38	.07	.00	.00	.00	.00
17	.00	.00	.00	.00	.00	.00	e104	.04	.00	.00	.00	.00
18	.00	.00	.00	.00	.00	.00	e169	.04	.00	.00	.00	.00
19	.00	.00	.00	.00	.00	.00	e232	3.8	.00	.00	.00	.00
20	.00	.00	.00	.00	.00	.00	97	4.2	.00	.00	.00	.00
20	.00	.00	.00	.00	.00	.00	31	4.2	.00	.00		
21	.00	.00	.00	.00	.00	.00	61	3.6	.00	.00	.00	.00
22	.00	.00	.00	.00	.00	.00	38	3.2	.00	.00	.00	.00
23	.00	.00	.00	.00	.00	.00	47	-2.7	.00	.00	.00	.00
21	.00	.00	.00	.00	.00	.00		2.4	.00	.00	.00	.00
24 25							36 26				.00	.00
25	.00	.00	.00	.00	.00	.00	20	2.2	.00	.00	.00	.00
26	.00	.00	.00	.00	.00	.00	19	1.8	.00	.00	.00	.00
27	.00	.00	.00	.00	.00	.00	14	1.6	.00	.00	.00	.00
28	.00	.00	.00	.00	.00	.00	12	1.5	.00	.00	.00	.00
29	.00	.00	.00	.00		.00	10	1.3	.00	.00	.00	.00
30	.00	.00	.00	.00		.00	8.9	1.2	.00	.00	.00	.00
50											.00	
31	.00		.00	.00		.00		1.0		.00	.00	
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00	1017.24	63.12	1.67	0.00	0.00	0.00
MEAN	.00	.00	.00	.00	.00	.00	33.9	2.04	.056	.00	.00	.00
MAX	.00	.00	.00	.00	.00	.00	232	7.4	.78	.00	.00	.00
MIN	.00	.00	.00	.00	.00	.00	.00	.04	.00	.00	.00	.00
AC-FT	.00	.00	.00	.00	.00	.00	2020	125	3.3	.0	.0	.0
AC-LI						.0	2020	12)	2.0			.0

CAL YR 1988 TOTAL 299.82 MEAN .82 MAX 39 MIN .00 AC-FT 595 WTR YR 1989 TOTAL 1082.03 MEAN 2.96 MAX 232 MIN .00 AC-FT 2150

e - Estimated

05099300 PEMBINA RIVER NEAR WINDYGATES, MAN (International gaging station)

LOCATION.--Lat 49°01'53", long 98°16'40", in SE1/4 sec.13, T.1, R.7 W., 1st meridian, on left bank 0.2 mi down-stream from bridge, and 3 mi northeast of Windygates.

DRAINAGE AREA. -- 3.020 mi2.

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is Geodetic Survey of Canada datum of 1929. Prior to Jan. 1, 1985, datum of gage at 1102.02 ft above Geodetic Survey of Canada datum of 1929.

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

AVERAGE DISCHARGE.--27 years, 191 ft³/s, 138,400 acre-ft/yr; median of yearly mean discharges, 130 ft³/s, 9,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,500 ft³/s, Apr. 26, 1974, gage height, 1,121.52 ft; no flow in some years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 441 ft3/s, Apr. 16, gage height, 1,106.79 ft; no flow for many days.

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

		DIDONA	itab, cobi	C PEET PE	M SECOND,	EAN VALU	ES OCTOBER	1900 10	JEF TEMBE	1909		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	.00	97	43 36	3.5	.07	.00
2	.00	.00	.00	.00	.00	.00	.00	93	36	4.5	.04	.00
3	.00	.00	.00	.00	.00	.00	.00	88	28	3.1	.00	.00
4	.00	.00	.00	.00	.00	.00	.00	85	24	2.2	.00	.00
2 3 4 5	.00	.00	.00	.00	.00	.00	.00	82	23	2.0	.00	.00
6	.00	.00	.00	.00	.00	.00	.00	82	25	1.3	.00	.00
7	.00	.00	.00	.00	.00	.00	.00	85	42	.78	.00	.00
8	.00	.00	.00	.00	.00	.00	.00	90	37	1.4	.00	.00
9	.00	.00	.00	.00	.00	.00	.00	83	31	4.2	.00	.00
10	.00	.00	.00	.00	.00	.00	.00	81	26	2.0	.00	.00
11	.00	.00	.00	.00	.00	.00	.00	82	31	1.8	.00	.00
12	.00	.00	.00	.00	.00	.00	e4.2	80	40	2.1	.00	.00
13	.00	.00	.00	.00	.00	.00	e47	76	49	2.5	.00	.00
14	.00	.00	.00	.00	.00	.00	162	72	42	1.9	.00	.00
15	.00	.00	.00	.00	.00	.00	254	69	34	1.3	.00	.00
16	.00	.00	.00	.00	.00	.00	381	72	30	.99	.00	.00
17	.00	.00	.00	.00	.00	.00	227	74	28	.56	.00	.00
18	.00	.00	.00	.00	.00	.00	287	73	28	.42	.00	.00
19	.00	.00	.00	.00	.00	.00	338	70	26	.35	.00	.00
20	00	.00	.00	.00	.00	.00	311	67	25	.25	.00	.00
21	.00	.00	.00	.00	.00	.00	237	69	21	.25	.00	.00
22	.00	.00	.00	.00	.00	.00	186	67	19	.14	.00	.00
22 23	.00	.00	.00	.00	.00	.00	167	67	18	.11	.00	.00
24	.00	.00	.00	.00	.00	.00	170	66	15	.14	.00	.00
24 25	.00	.00	.00	.00	.00	.00	179	64	12	.07	.00	.00
26	.00	.00	.00	.00	.00	.00	160	59	9.8	.11	.00	.00
27	.00	.00	.00	.00	.00	.00	141	58	7.5	.18	.00	.00
28	.00	.00	.00	.00	.00	.00	114	55	5.9	.18	.00	.00
29	.00	.00	.00	.00		.00	112	52	7.7	.18	.00	.00
30	.00	.00	.00	.00		.00	106	50	6.8	.11	.00	.00
31	.00		.00	.00		.00		47		.11	.00	
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00	3583.20	2255	770.7	38.73	0.11	0.00
MEAN	.00	.00	.00	.00	.00	.00	119	72.7	25.7	1.25	.004	.00
MAX	.00	.00	.00	.00	.00	.00	381	97	49	4.5	.07	.00
MIN	.00	.00	.00	.00	.00	.00	.00	47	5.9	.07	.00	.00
AC-FT	.0	.0	.0	.0	.0	.0	7110	4470	1530	77	.2	.0
							=			100000000		1100 0 2000

CAL YR 1988 TOTAL 3495.04 MEAN 9.55 MAX 142 MIN .00 AC-FT 6930 WTR YR 1989 TOTAL 6647.74 MEAN 18.2 MAX 381 MIN .00 AC-FT 13190

e - Estimated

05099600 PEMBINA RIVER AT WALHALLA. ND

LOCATION.--Lat 48°54'50", long 97°55'00", in NE1/4NE1/4 sec.29, T.163 N., R.56 W., Pembina County, Hydrologic Unit 09020313, on left bank at downstream side of bridge on State Highway 32, at south edge of Walhalla, and 7 mi downstream from Little South Pembina River.

DRAINAGE AREA. -- 3,350 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- October 1939 to current year. Prior to October 1963, published as "near Walhalla."

REVISED RECORDS. -- WSP 1388: 1943, 1950(P). WSP 1558: 1957. WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 934 ft above National Geodetic Vertical Datum of 1929 from topographic map. Prior to Nov. 10, 1943, nonrecording gage and Nov. 10, 1943, to Sept. 30, 1963, water-stage recorder at site 5.5 mi upstream at different datum.

REMARKS.--Estimated daily discharges: Oct. 1 to Apr. 16 and July 12 to Sept. 30. Records fair except those for periods of estimated daily discharge, which are poor.

AVERAGE DISCHARGE.--50 years, 222 ft3/s, 160,800 acre-ft/yr; median of yearly mean discharges, 160 ft3/s, 116,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 20,400 ft³/s, Apr. 18, 1950, gage height, 19.2 ft former site and datum, 16.2 ft present site and datum, from rating curve extended above 7,000 ft³/s on basis of contracted-opening measurement of peak flow; no flow at times in some years.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 400 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 16		a*1.000	b*6.67	No other	r peak greater	than base disch	narge.

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

Minimum discharge, 0.05 ft3/s, Sept. 23-28

a - About b - Backwater from ice

		DISCHA	RGE, CUBI	C FEET PI		EAN VALU	ES OCTOBE	K 1988 10	SEPTEMB	EK 1909		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e2.8	e3.2	e3.7	e2.6	e1.8	e.30	e1.1	129	42	27	e.75	e.44
2	e2.7	e3.3	e3.6	e2.6	e1.4	e.30	e1.8	121	41	25	e.70	e.28
3	e2.7	e3.3	e3.5	e2.6	e1.4	e.30	e1.9	109	38	22	e.50	e.49
4	e2.9	e3.3	e3.4	e2.6	e1.2	e.29	e2.0	103	34	18	e1.0	e.92
5	e2.9	e3.4	e3.4	e2.6	e1.2	e.29	e2.2	100	33	18	e.70	e.60
6	e2.9	e3.4	e3.4	e2.4	e1.1	e.28	e2.6	95	38	16	e.60	e.60
7	e2.9	e3.5	e3.4	e2.2	e1.1	e.28	e2.9	92	48	11	e.50	e.78
8	e2.9	e3.5	e3.4	e2.2	e1.1	e.28	e2.5	99	59	10	e.50	e2.5
9	e2.8	e3.6	e3.4	e2.2	e1.0	e.38	e2.5	101	58	10	e.50	e1.2
10	e2.8	e3.6	e3.3	e2.1	e1.0	e.40	e5.0	92	48	10	e.50	e.38
11	e2.8	e3.6	e3.3	e2.0	e1.0	e.45	e4.8	87	43	13	e.50	e.38
12	e2.7	e3.6	e3.3	e2.0	e1.0	e.40	e5.5	85	64	e11	e.50	e.66
13	e2.7	e3.6	e3.3	e2.3	e.94	e.37	e10	80	97	e9.0	e.50	e.99
14	e2.7	e3.6	e3.3	e2.6	e.72	e.35	e86	77	94	e7.0	e.50	e.66
15	e2.6	e4.2	e3.3	e2.6	e.61	e.30	e300	74	62	e5.0	e1.0	e1.5
16	e2.6	e4.2	e3.2	e2.6	e.47	e.30	e700	69	46	e3.0	e1.0	e.54
17	e2.6	e4.2	e3.2	e2.6	e.44	e.30	510	68	35	e2.0	e1.6	e.15
18	e2.5	e4.2	e3.1	e2.6	e.43	e.30	330	76	32	e1.8	e1.9	e.54
19	e2.5	e4.2	e3.1	e2.6	e.43	e.30	385	73	29	e1.4	e2.9	e.33
20	e2.4	e4.1	e3.0	e2.6	e.42	e.30	401	69	28	e1.8	e2.7	e.20
								200				
21	e2.4	e4.1	e2.9	e2.7	e.42	e.30	326	66	26	e2.4	e2.2	e.10
22	e2.4	e4.1	e3.0	e2.7	e.42	e.30	280	65	24	e1.6	e1.0	e.08
23	e2.4	e4.1	e3.0	e2.7	e.41	e.45	272	66	21	e1.7	e.36	e.05
24	e2.4	e4.1	e2.9	e2.5	e.40	e.55	220	66	20	e1.3	e.24	e.05
25	e2.3	e4.0	e2.9	e2.5	e.39	e.75	194	66	19	e1.4	e2.7	e.05
26	e2.5	e4.0	e2.8	e2.5	e.38	e1.2	169	66	18	e.93	e.95	e.05
27	e2.7	e3.8	e2.8	e2.6	e.38	e1.0	151	60	29	e.85	e6.0	e.05
28	e2.9	e3.7	e2.8	e2.6	e.34	e.85	145	59	32	e.99	e.44	e.05
29	e3.0	e3.7	e2.7	e2.5		e.85	139	56	36	e.99	e.85	e5.0
30	e3.1	e3.7	e2.7	e2.5		e.75	143	53	35	e.85	e1.1	e2.1
31	e3.2		e2.6	e2.2		e.65		50		e.80	e.65	
TOTAL	83.7	112.9	97.7	76.6	21.90	14.12	4795.8	2472	1229	235.81	35.84	21.72
MEAN	2.70	3.76	3.15	2.47	.78	.46	160	79.7	41.0	7.61	1.16	.72
MAX	3.2	4.2	3.7	2.7	1.8	1.2	700	129	97	27	6.0	5.0
MIN	2.3	3.2	2.6	2.0	.34	.28	1.1	50	18	.80	.24	.05
AC-FT	166	224	194	152	43	28	9510	4900	2440	468	71	43
AC-FI	100		174	1,72	45	20	3310	4500	2440	400	1.1	42

TOTAL 6134.45 MEAN 16.8 MAX 258 MIN .00 AC-FT 12170 TOTAL 9197.09 MEAN 25.2 MAX 700 MIN .05 AC-FT 18240 CAL YR 1988 WTR YR 1989

05099600 PEMBINA RIVER AT WALHALLA, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1962 to current year.

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	CIFIC CON- DUCT- ANCE (US/CM)		TEMPER- ATURE AIR (DEG C) (OOO20)	TEMPER ATURE WATER (DEG C	(MG/I AS CACO	CALCIU DIS- SOLVE (MG/L	DIS- CD SOLVE (MG/L A) AS MG	DIS- DIS- DIS- DIS- DIS- DIS- DIS- DIS-	SODIUM PERCENT	RATIO
25 DEC	1410	2.2	730		0.0	2.	5 .	- 8 -			-19.04	
07 JAN	1000	3.4	520		0.5	-10.	0 -					-
23 MAR	1710	2.7	500			0.	0 -					
01	0930	0.29	545		-17.0	0.	0 -	-10.				
14	1025	96			7.0	1.	0 .					
17	1500	402	472		4.0			50 40	13	29	28	
04 JUN	0920	102	778		11.5	12.	5 -		-	- 0 -		
01 JUL	1600	41	690		25.0	24.	0 -		-		- 4	-
17	1620	2.0	900	7.90	32.5	24.	5 3	70 97	31	42	19	1
22	1640	1.5	810		27.5	26.	0 -		-			· W-
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE, FET-LAE (MG/L AS HCO3) (95440)	BONATE, FET-LAB (MG/L AS CO3)	LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFAT DIS-	DIS- D SOLVE (MG/I	RIDE, DIS- ED SOLVE (MG/L) AS F)	DIS- SOLVE D (MG/L AS SIO2)	AT 180 DEG. (DIS- SOLVEI (MG/L)	SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)
APR 17 JUL	6.4	130	0	110	2.6	130	9.6	0.2	0 14	293	3 307	0.40
17	9.4	330	0	270	6.7	180	13	0.4	0 24	587	7 562	0.80
	DATE (SOLVED (TONS PER DAY)	DIS- SOLVED (UG/L AS AS)	DIS- SOLVED (UG/L AS B)	DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB) 01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145) (STRON- TIUM, DIS- SOLVED (UG/L AS SR) 01080)
APR 17 JUL		318	<1	50	170	2	30	370	0.1	4	5	230
		3.11	2	150	30	1	70	290	0.2	9	2	490

05100000 PEMBINA RIVER AT NECHE, ND (International gaging station)

LOCATION.--Lat 48°59'20", long 97°33'05", in SE1/4NW1/4 sec.31, T.164 N., R.53 W., Pembina County, Hydrologic Unit 09020313, on right bank 0.3 mi east of State Highway 18, and at north edge of Neche.

DRAINAGE AREA. -- 3,410 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1903 to September 1908, June 1909 to September 1915, April 1919 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WSP 1308: 1904-8, 1910-15, 1920, 1921, 1923, 1924. WSP 1388: 1904(M), 1914, 1915(M), 1931(M), 1933, 1938(M). WSP 1728: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 809.69 ft above National Geodetic Vertical Datum of 1929. Prior to May 24, 1932, nonrecording gage at Burlington Northern Railway bridge 1 mi upstream, at same datum. May 25, 1932, to Apr. 17, 1939, nonrecording gage on bridge on State Highway 18, 500 ft downstream from railway bridge, at same datum.

REMARKS.--Estimated daily discharges: Oct. 1 to Jan. 20, Apr. 13-18, and Aug. 5-27. Records good except those for periods of estimated daily discharge, which are fair.

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

AVERAGE DISCHARGE.--81 years (1904-8, 1910-15, 1920-89), 189 ft^3/s , 136,900 acre-ft/yr; median of yearly mean discharges, 150 ft^3/s , 109,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft³/s, Apr. 20, 1950, gage height, 21.58 ft, backwater from ice; from rating curve extended above 5,300 ft³/s; maximum gage height, 23.64 ft, Apr. 20, 1979, backwater from ice; no flow at times each year 1932-41, 1953, 1960-62.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 400 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 17		1,000	a*10.08	No other	peak greater	than base discha	arge.

No flow Jan. 21 to Apr. 12 and Aug. 28 to Sept. 30. a - Backwater from ice

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES SEP DAY OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG 4.2 37 33 e.03 e1.5 e6.0 e.35 .00 .00 .00 169 .00 e.35 -00 2 e.03 e2.0 e5.8 .00 .00 .00 165 59 e.35 e.35 3 e.03 e2.5 e5.6 .00 .00 .00 153 56 31 1.9 -00 .00 e.03 e2.5 e5.4 .00 .00 141 54 28 1.2 .00 5 e.03 e2.5 e5.4 e.30 .00 .00 .00 123 52 25 e1.0 -00 e.03 e.80 -00 6 17 e2.5 e.30 .00 -00 .00 124 22 .00 e.06 46 20 e.76 e2.5 e5.2 e.30 .00 .00 .00 121 .00 e2.5 e.73 46 18 Я e.06 e5.0 e.30 -00 .00 -00 118 47 .00 e.70 q e.06 e2.4 e4.8 e.30 -00 00 .00 117 17 .00 16 10 e.03 e2.4 e4.0 e.30 .00 .00 .00 118 50 e.65 e.30 e.30 e.30 e.03 .00 .00 113 15 e.60 .00 11 e2.5 e3.7 -00 52 52 .00 106 13 e.50 .00 12 e.08 e2.4 e3.4 .00 -00 11 e2.3 .00 .00 e.08 104 54 e.40 .00 13 e.16 e.30 64 e.20 e2.3 .00 .00 e6.0 104 11 e.35 .00 e3.1 14 15 e.22 e2.3 e3.1 e.30 .00 .00 e10 102 103 11 e.30 .00 16 e.22 e3.0 e3.0 e.30 -00 .00 e20 97 118 10 e.25 .00 17 e.22 e.25 .00 .00 e500 92 90 9.2 e.22 .00 e3.5 e2.7 18 e.25 e3.8 e2.6 e.20 .00 .00 e630 91 73 7.0 e.20 .00 19 e.29 e4.0 e2.5 e.15 .00 .00 450 89 62 e.18 -00 20 e.34 e.05 487 89 58 1.8 e.15 .00 -00 21 e3.5 e2.2 .00 .00 .00 509 87 52 7.6 e.12 .00 22 e.95 e4.0 e2.1 .00 .00 .00 466 84 50 7.7 e.10 .00 .00 49 e.08 23 e.98 e3.0 e1.9 .00 .00 376 82 6.6 e.06 .00 47 6.2 24 e.93 e2.0 e1.4 .00 .00 .00 353 80 .00 .00 e.04 25 e.93 e1.5 e1.0 .00 .00 326 79 44 5.8 e.93 e.90 42 5.1 e.02 .00 .00 285 79 26 e1.5 .00 -00 79 39 e.01 .00 272 4.4 27 e.98 e1.5 e.90 .00 -00 .00 38 74 .00 .00 e.95 .00 4.6 .00 .00 246 28 e2.0 e.90 71 40 4.8 .00 .00 e.95 .00 .00 214 29 e2.5 e.60 --e.95 e6.2 .00 70 39 5.8 .00 .00 e.45 -00 185 ---30 31 5.1 e1.0 67 .00 -00 e.40 .00 3188 1686 399.94 18.22 0.00 TOTAL 12.39 80.1 94.85 5.65 0.00 0.00 5335.08 12.9 .00 .40 2.67 3.06 .18 .00 .00 178 103 56.2 .59 MEAN 1.0 6.2 630 169 118 37 4.2 .00 6.0 .35 .00 .00 MAX .03 .00 .00 .00 67 38 24 .00 .00 .40 .00 MIN AC-FT 159 188 10580 6320 3340 793 36 .0 .0

CAL YR 1988 TOTAL 8422.81 MEAN 23.0 MAX 396 MIN .03 AC-FT 16710 WTR YR 1989 TOTAL 10820.23 MEAN 29.6 MAX 630 MIN .00 AC-FT 21460

05100000 PEMBINA RIVER AT NECHE, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (OOO61)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (OO4OO)	TEMPER- ATURE AIR (DEG C) (00020)	ATURE WATER (DEG C	(MG/I AS) CACO3	CALCIU DIS- SOLVE (MG/L S) AS CA	DIS- D SOLVEI (MG/L AS MG)	DIS- SOLVED (MG/L AS NA)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)
OCT												
25 DEC	1150	0.93	850		-5.0	2.	0 -	75 -5	- 3	-	-	7 40 7
07	1315	5.1	1160		4.0	2.	0 -		-			
18	1100 1055	603 282	435 730	7.70	3.0 7.5			10 36	12	27	28	1
JUN	16.76											
02 JUL	1515	57	810		23.0	19.	5 -	1/2/	•			11 1/
18	0845	7.3	780	7.90	21.0	23.	5 40	00 99	38	50	21	1
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)	SULFAT DIS- SOLVE (MG/L AS SO4	DIS- D SOLVE (MG/I) AS CI	RIDE, DIS- ED SOLVE (MG/L) AS F)	DIS- SOLVEI (MG/L AS SIO2)	AT 180 DEG. C DIS- SOLVED (MG/L)	CONSTI-	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 18	7.0	120	0	100	3.9	110	7.3	0.3	0.30	255	262	0.35
JUL 18	12	340	0	280	6.9	200	26	0.3	0 23	633	619	0.86
		SOLVED (TONS PER DAY)	DIS- SOLVED S (UG/L AS AS)	DIS- SOLVED (UG/L AS B)	DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB) 01049)	DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	DENUM, DIS- SOLVED (UG/L AS MO)	NIUM, DIS- SOLVED ((UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) D1080)
APR		415	2	80	200	7	70	200	0.2	7	7,5-17	230
JUL					200	3	30	290		4	4	
18	• • •	12.4	6	160	40	<1	80	780	0.2	13	2	530

05101000 TONGUE RIVER AT AKRA, ND

LOCATION.--Lat 48°46'42", long 97°44'43", in SW1/4 sec.10, T.161 N., R.55 W., Pembina County, Hydrologic Unit 09020313, on left bank 300 ft downstream from Renwick Dam, 0.9 mi northwest of Akra, and 6 mi west of Cavalier.

DRAINAGE AREA .-- 160 mi2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- April to June 1950 (WSP 1137-B), October 1951 to current year (seasonal record since 1983).

REVISED RECORDS .-- WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 930.00 ft above National Geodetic Vertical Datum of 1929. Prior to July 10, 1954, nonrecording gage 1.2 mi downstream at datum 30.00 ft lower. July 23, 1954, to Dec. 19, 1973, water stage recorder 2.7 mi downstream at datum 9.10 ft lower.

REMARKS.--Estimated daily discharges: Mar. 1 to Sept. 30. Records poor. Flow regulated by temporary retention in ten retarding basins beginning 300 ft above station, four of which have slow release outlet structures to regulate the flow. Retarding basins were completed during the period 1955 to 1961 and have a combined capacity of 19,245 acre-ft.

AVERAGE DISCHARGE.--31 years (water years 1952-82), 21.4 ft³/s, 15,500 acre-ft/yr; median of yearly mean discharges, 19 ft³/s, 13,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. --Maximum discharge, 11,800 ft³/s, Apr. 18, 1950, gage height, 48.7 ft, from flood-marks, site and datum then in use, from rating curve extended above 1,500 ft3/s on basis of contracted-opening measurement of peak flow; no flow at times. This flood is the highest known since settlement of the region in about 1860.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 49 ft3/s, Apr. 24, gage height, 9.48 ft; minimum daily discharge, no flow, Sept. 25-30.

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						e1.4	e28	e25	e2.2	e4.0	e.60	e.55
2						e1.4	e27	e21	e1.4	e3.8	e.60	e.50
3						e1.4	e26	e17	e.85	e3.6	e.98	e.45
4						e1.4	e24	e13	e.71	e3.2	e1.2	e.15
2 3 4 5						e1.4	e20	e8.7	e.70	e2.8	e1.4	e.13
6 7 8 9						e1.4	e2.4	e5.3	e.68	e1.9	e1.4	e.12
7						e1.4	e.10	e4.5	e2.3	e.86	e2.1	e.11
8						e1.4	e.10	e5.1	e2.5	e.59	e2.2	e.10
ā						e1.4	e.05	e4.6	e2.6	e.63	e1.8	e.09
10						e1.6	e.04	e3.6	e2.4	e.38	e3.4	e.08
11						e1.5	e.03	e2.6	e2.3	e.28	e3.4	e.02
									e6.0	e.33	e3.2	e.27
12						e1.4	e.02	e2.1				
13						e1.4	e.02	e2.1	e11	e.32	e2.9	e.05
14						e1.4	e.01	e2.0	e19	e.32	e2.8	e.05
15						e1.4	e.10	e2.0	e20	e.32	e2.7	e.04
16						e1.3	e.13	e1.9	e16	e.32	e2.5	e.04
17						e1.2	e.14	e1.9	e10	e.31	e2.2	e.03
18						e17	e.08	e2.2	e7.5	e.31	e1.7	e.03
19						e38	e.07	e2.0	e4.5	e.31	e1.6	e.02
20						e38	e.29	e2.1	e3.3	e.27	e1.5	e.01
21						e37	e4.2	e2.0	e3.3	e.27	e1.3	e.01
22						e36	e8.8	e2.0	e3.3	e.26	e1.2	e.01
23						e35	e26	e2.0	e3.4	e.26	e1.0	e.01
24						e35	e42	e2.0	e3.5	e.25	e.68	e.01
25						e34	e48	e2.6	e3.5	e.25	e.45	e.00
26						e33	e43	e2.5	e3.4	e.24	e.55	e.00
20								e2.4		e.24	e.50	e.00
27						e32	e38		e3.4			
28						e31	e34	e2.5	e3.4	e.50	e.45	e.00
29						e31	e32	e2.4	e3.8	e.65	e.40	e.00
30 31						e30	e28	e2.4	e4.2	e.62	e.32	e.00
31						e29		e2.3		e.62	e.56	
TOTAL						479.8	432.58	153.8	151.14	29.01	47.59	2.88
MEAN						15.5	14.4	4.96	5.04	.94	1.54	.096
MAX						38	48	25	20	4.0	3.4	.55
MIN						1.2	.01	1.9	.68	.24	.32	.00
AC-FT						952	858	305	300	58	94	5.7
HO-11						372	0,0	202	500	,,,	27	2.1

e - Estimated

05101000 TONGUE RIVER AT AKRA, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	2	!IME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	, SPE- CIFIC CON- DUCT- ANCE D (US/CM	PH (STAND ARD I) UNITS)	AIR (DEG	E ATURI WATEI C) (DEG	E (MG/ R AS C) CACO	CALCI L DIS- L SOLV (MG/ 3) AS (DISTED SOLVE (MG/CA) AS M	JM, SODIUM S- DIS- VED SOLVE /L (MG/ MG) AS N	D L SODI A) PERCE	NT RATIO
OCT			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	, (200)	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	, (00)0	.,,	., (, ,,,,,,	
25 FEB		940	8.6	51	0 -	6.	.0 3	.0				-	
28	1	1445	1.3	75	58 -	6.	.0 -0	.5				-	
17	. 1	1155	0.1	4 56	55 8.0	00 1	.0 4	.0 3	10 80	26	22		13 0.6
03 JUN	. 1	300	18	96	55 -	- 11.	.5 9	.5				-	
02		1105	1.3	54	15 -	- 17	.5 16	.5					
JUL 12	. 1	130	0.4	0 53	55 6.4	10 22	.5 24	.0 2	00 47	19	28		23 0.9
AUG 22	. 1	300	1.2	54	10 -	- 24	.0 20	.0					
DATE	SC (N AS	OTAS- SIUM, DIS- DLVED MG/L S K) D935)	BICAR BONATE FET-LA (MG/L AS HCO3) (95440	BONATE B FET-LA (MG/L AS CO3)	AB LAB (MG/I AS CACO3	DIOXII DIS- SOLVI (MG/I	DE SULFA DIS- ED SOLVI L (MG/1 2) AS SO	DIS- ED SOLV L (MG/ 4) AS C	, RIDE DIS ED SOLV L (MG, L) AS I	E, DIS- S- SOLV /ED (MG/ /L AS F) SIO2	AT 18 VED DEG. /L DIS SOLV (2) (MG/	UÉ SUM O CONST C TUENT DIS ED SOLV L) (MG/	F SOLIDS, I- DIS- S, SOLVED - (TONS ED PER L) AC-FT)
APR 17		6.2	330	0	270	5	.2 72	9.	6 0	20 20	1	08 3	99 0.55
JUL													
12	DATE	s (OLVED TONS PER DAY)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	150 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) (O1130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (O1056)	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) (O1145)	16 0.43 STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
APR	·		0.15	<1	50	50	6	30	2100	0.1	2	<10	300
JUL			0.34	9	100	30	<1	40	920	0.1	2	<10	290
12			3.74	,	.00	50	.,	40	,20		-		

O5102500 RED RIVER OF THE NORTH AT EMERSON, MAN (National stream-quality accounting network station) (International gaging station)

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

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

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 700.00 ft above National Geodetic Vertical Datum of 1929, by Survey of Canada. See WSP 1728 or 1913 for history of changes prior to Apr. 10, 1953.

REMARKS.--Estimated daily discharges: Oct. 27 to Nov. 2 and Nov. 14 to Apr. 20. Discharge partially regulated by reservoirs on tributaries.

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

AVERAGE DISCHARGE.--76 years (water years 1913-88), 3,380 ft^3/s , 2,445,000 acre-ft/yr; median of yearly mean discharges, 2,890 ft^3/s , 2,090,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 95,500 ft³/s, May 13, 1950, gage height, 90.89 ft; maximum gage height, 91.19 ft, May 1, 1979; minimum observed discharge, 0.9 ft³/s, Feb. 6-8, 1937.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 42,700 ft 3 /s, Apr. 23, gage height, 72.86 ft; minimum daily, 177 ft 3 /s, Nov. 16.

		DISCHA	ARGE, CUBI	C FEET PE	R SECOND	, WATER T	YEAR OCTOB	ER 1988 T	O SEPTEMBE	R 1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	706	e348	e313	e242	e284	e349	e576	26600	3850	2300	498	445
2	632	e349	e315	e244	e287	e330	e607	23700	3780	2240	498	459
3	597	318	e327	e247	e290	e313	e674	20800	3640	2180	519	508
3	572	288	e328	e249	e297	e309	e893	17100	3520	2060	498	508
5	547	286	e323	e252	e304	e304	e1780					639
	241	200	6727	6252	e304	e504	e1780	13500	3430	1910	470	1660
6	523	299	e317	e252	e311	e304	e3500	10300	3430	1780	445	2680
7	477	307	e313	e255	e321	e303	e5330	7910	3500	1650	431	2650
8	431	319	e303	e257	e335	e307	e6810	6250	3470	1510	434	2470
9	381	323	e295	e261	e351	e311	e8440	5260	3360	1390	434	2260
10	339	323	e286	e256	e360	e325	e9890	4770	3180	1300	434	2030
		,_,	0200	02)0	6,000	6727	69090	4110	5180	1500	454	2000
11	289	313	e271	e253	e371	e334	e11200	4340	2980	1250	427	1810
12	265	339	e263	e255	e378	e339	e12600	4170	2880	1230	427	1580
13	257	352	e262	e260	e388	e346	e13900	4100	2780	1200	424	1370
14	251	e318	e262	e269	e392	e357	e15400	3950	2670	1130	413	1200
15	244	e239	e256	e269	e395	e367	e18000	3850	2500	1050	399	1070
											,,,	.0,0
16	237	e177	e245	e266	e406	e378	e21200	3780	2360	1000	399	964
17	228	e212	e227	e264	e410	e385	e24900	3670	2250	957	392	862
18	224	e247	e212	e263	e417	e392	e29500	3600	2160	897	395	798
19	231	e302	e212	e263	e431	e403	e34600	3510	2100	851	470	724
20	237	e331	e212	e263	e445	e413	e37800	3430	2070	816	512	650
21	245	e357	e210	e263	-467	- 47.4	40600	7750	2050	-		600
22	237	e364	e209	e262	e463 e470	e434	40600	3350	2050	777	537	600
23	242	e350	e213			e448	41700	3360	2020	734	498	547
				e263	e463	e459	42400	3450	1970	689	424	487
24 25	240	e325	e216	e267	e456	e466	42400	3530	1900	643	371	456
25	241	e316	e219	e273	e431	e480	41300	3530	1890	604	328	445
26	244	e313	e215	e276	e413	e494	39900	3520	1970	576	306	406
27	e250	e322	e211	e279	e395	e505	38500	3510	2080	544	306	392
28	e240	e321	e215	e281	e371	e516	36400	3510	2240	519	353	399
	e250	e321	e228	e281		e526	33500	3600	2360	508	417	388
29 30	e275	e319	e234	e282		e544	30000	3710	2360	498	448	392
31	e323		e242	e282		e561		3810		494	452	752
-	40.55			2.02			-		5341.7816			
TOTAL	10455	9298	7954	8149	10635	12302	644300	213470	80750	35287	13359	31341
MEAN	337	310	257	263	380	397	21480	6886	2692	1138	431	1045
MAX	706	364	328	282	470	561	42400	26600	3850	2300	537	2680
MIN	224	177	209	242	284	303	576	3350	1890	494	306	388
AC-FT	20740	18440	15780	16160	21090	24400	1278000	423400	160200	69990	26500	62160

CAL YR 1988 TOTAL 436278 MEAN 1192 MAX 15700 MIN 177 AC-FT 865400 WTR YR 1989 TOTAL 1077300 MEAN 2952 MAX 42400 MIN 177 AC-FT 2137000

e - Estimated

O5102500 RED RIVER AT EMERSON, MANITOBA--CONTINUED (National stream-quality accounting network station)

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORD.--SPECIFIC CONDUCTANCE: October 1977 to current year. WATER TEMPERATURE: October 1977 to current year.

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

EXTREMES FOR PERIOD OF DAILY RECORD.-SPECIFIC CONDUCTANCE: Maximum daily mean, 1,480 microsiemens, Nov. 12, 1987; minimum daily mean, 330 microsiemens, Apr. 10, 16 and 17, 1978.

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

EXTREMES FOR CURRENT YEAR.-SPECIFIC CONDUCTANCE: Maximum daily mean, 2,180 microsiemens, Dec. 8; minimum daily mean, 259 microsiemens, Apr. 14.

WATER TEMPERATURES: Maximum daily mean, 26.4°C, July 22; minimum daily mean, 0.0°C, Mar. 17 and 19.

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) (OOO2O)	TEMPER- ATURE WATER (DEG C) (OOO10)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT 04	1115		690	- 8.70	4.5	9.0	80	9.3	80	7	110
NOV OB	1050		1260	8.90	1.5	3.5	12	12.2	92	0	60
MAR 09	1130	315	815	8.10	6.0	0.0	3.7	9.8	67	960	64
MAY 17	1040	3000	780	8.50	20.0	19.5	5.3	8.3	89	10	80
JUL 06	1300		710	8.50	24.0	27.0	120	5.4	68	16	8
SEP 01	1115	454	965	8.50	20.5	19.5	58	9.0	101	35	15
DATE	HARD- NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	BICAR- BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR- BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)
OCT O4 NOV	270	54	33	38	23	1	7.0	264	308	7	88
08	350	69	43	120	42	3	12	229	240	19	140
MAR 09	350	76	38	36	18	0.9	7.2		381	0	83
MAY 17	300	70	31	37	21	1	4.5	206	232	10	120
JUL 06	280	61	30	33	20	0.9	7.2	226	242	17	100
SEP 01	290	63	32	81	37	2	7.2	196	210		

O5102500 RED RIVER AT EMERSON, MANITOBA--CONTINUED (National stream-quality accounting network station)

DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)
OCT										
NOV O4	33	0.30	9.3	396	421	0.54	0.0		<0.010	<0.100
O8	170	0.40	6.2	733	699	1.0	0.0		<0.010	<0.100
09 MAY	22	0.30	21	485	475	0.66	412	0.900	0.010	0.910
17 JUL	35	0.20	7.2	437	429	0.59	3540		<0.010	<0.100
06 SEP	34	0.20	9.6	379	413	0.52	0.0	0.380	0.020	0.400
01	110	0.30	14	558	535	0.76	684		<0.010	0.120
DATE	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)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)
OCT				Adame.	********	387.31.30	100000			
04 NOV	0.030	0.010	0.90	0.160	0.090	0.040	0.16	20	5	53
O8	0.040	0.040	1.3	0.400	0.310	0.240	0.40			
09 MAY	0.170	0.160	1.2	0.140	0.140	0.150	0.14	<10	2	71
17	0.050	0.050	1.6	0.110	0.080	0.040	0.11	40	3	61
JUL 06	0.060	0.110	0.80	0.090	0.090	0.100	0.09			
SEP 01	0.070	0.080	1.1	0.150	0.080	0.070	0.15	60	. 5	62
DATE	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	COPPER, DIS- SOLVED (UG/L AS CU) (O1040)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)
OCT	40.5						45	7.5		
O4 MAR	<0.5	<1	2	<3	4	21	<5	35	7	0.1
09 MAY	<0.5	<1	2	<3	5	18	<5	34	31	0.2
17	<0.5	<1	1	<3	7	50	1	32	8	<0.1
01	<0.5	<1	1	<3	5	79	<1	46	11	<0.1
DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT	V42	11	42		127				205	-
NOV	<10	<1	<1	<1.0	230	<6	7	148	229	98
O8								22	19	99
09 MAY	<10	8	<1	<1.0	270	<6	24	25	22	83
17 JUL	<10	5	<1	<1.0	270	<6	10	150	1220	100
06 SEP								276	735	99
01	10	3	<1	<1.0	310	<6	23	153	188	98

O5102500 RED RIVER AT EMERSON, MANITOBA--CONTINUED (National stream-quality accounting network station)

	SPECIFIC	CONDU	CTANCE,	US/CM @ 25	DEGREES	CENTIGRADE, MEAN VALUES	WATER YE	EAR OCTOBER	1988	TO SEPTEMBER	1989	
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	714 732 735 707 681	891 942 912 893 1100	934 1060 1350 1570 1850	1650 1670 1700 1770 1800	727 723 718 708 702	693 697 702 706 704	851 960 1050 932 830	480 504 546 600 635	735 738 747 775 771	743 720 703 685 703	748 752 748 756 768	965 1060 1200 1180 961
6 7 8 9	631 643 627 641 648	1160 1190 1060 1020 1040	2030 2160 2180 2120 2050	1760 1770 1760 1710 1660	697 694 694 691 692	703 700 697 696 694	745 597 417 334 307	671 689 733 749 730	769 756 758 754 768	707 705 722 736 735	775 777 785 798 801	882 616 616 639 392
11 12 13 14 15	656 618 573 638 699	989 1020 1030 1200 1200	1970 1880 1770 1750 1750	1580 1490 1360 1300 1300	692 695 695 695	680 680 678 669 691	297 266 262 259 260	725 705 682 680 673	774 765 766 764 774	729 721 741 756 766	800 810 817 835 865	381 366 381 399 413
16 17 18 19 20	702 708 742 767 768	1110 957 916 922 980	1710 1670 1660 1690 1740	1300 1310 1320 1290 1240	692 696 691 685 653	722 726 729 734 750	263 265 271 288 298	654 669 709 718 722	767 784 824 829 836	776 778 747 734 739	941 966 959 884 839	435 455 461 464 483
21 22 23 24 25	779 813 809 822 899	1170 1170 954 972 943	1770 1760 1720 1660 1620	1200 1140 1080 1020 984	647 662 699 702 700	753 755 758 762 759	306 315 326 336 350	775 745 769 754 729	837 847 843 857 871	747 757 764 763 753	832 815 851 849 854	492 513 545 553 574
26 27 28 29 30 31	964 990 989 938 952 922	942 901 896 933 926	1600 1580 1570 1590 1620 1650	950 905 869 844 812 792	698 692 707 	750 747 758 782 809 806	372 397 427 445 464	705 703 733 789 781 748	808 800 813 814 768	740 733 737 744 740 741	845 842 851 893 943 947	594 629 703 755 786
MT 4 **	758	1010	1710	1330	694	725	450	694	790	738	837	630
MEAN	170	1010	1710	1,550	054	123	450	094	190	100	0)1	0,0
MEAN					S CELSIU	S, WATER YEA MEAN VALUES					031	0,0
MEAN					S CELSIU	S, WATER YEA					AUG	SEP
	V	VATER	TEMPERAT	JRE, DEGREE	S CELSIU	S, WATER YEA MEAN VALUES	AR OCTOBE	ER 1988 TO	SEPTEM	IBER 1989		
DAY 1 2 3 4	OCT 14.9 14.4 13.7 12.2	NOV 4.2 3.9 4.1 4.9	DEC 1.6 1.7 1.6 1.6 1.6	JAN	FEB	S, WATER YEA MEAN VALUES MAR	APR .1 .1 .1	MAY 7.5 7.9 8.4 8.8	JUN 15.1 15.3 15.3	JUL 20.2 20.7 20.6 21.1	AUG 24.6 25.8 26.7 26.3	SEP 20.6 21.1 21.4 21.3
DAY 1 2 3 4 5 6 6 7 8	OCT 14.9 14.4 13.7 12.2 9.4 9.7 10.8 10.9 11.0	NOV 4.2 3.9 4.1 4.9 5.4 5.5 4.5 3.6	DEC 1.6 1.7 1.6 1.5 1.7 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	JAN	FEB .4 .4 .3 .3 .3 .3	S, WATER YEAMEAN VALUES MAR .1 .2 .3 .3 .3 .3	APR .1 .1 .1 .1 .1 .1 .1 .3 .3 .4	MAY 7.5 7.9 8.4 8.8 8.6 8.2 8.4 8.9 9.5	JUN 15.1 15.3 15.3 15.1 15.4 15.6 14.9 15.6	JUL 20.2 20.7 20.6 21.1 21.8 22.5 23.0 23.0	AUG 24.6 25.8 26.7 26.3 24.6 22.4 22.4 23.0 23.8	SEP 20.6 21.1 21.4 21.3 21.4 20.4 19.8 19.5 18.7
DAY 1 2 3 4 5 6 7 8 9 10 11 12 3 14	OCT 14.9 14.4 13.7 12.2 9.4 9.7 10.8 10.9 11.0 10.9 10.3 10.0 9.6 10.0	NATER NOV 4.29 4.19 5.4 5.5 4.5 5.5 5.5 2.4 2.4	DEC 1.6 1.7 1.6 1.6 1.5 1.7 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.4	JAN	FEB .4 .4 .3 .3 .3 .3 .3 .3 .2	S, WATER YEAMEAN VALUES MAR .1 .2 .3 .3 .3 .3 .1 .1 .2 .1 .1 .2 .2	APR .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1	MAY 7.5 7.9 8.4 8.8 8.6 8.2 8.4 8.9 9.5 10.5	JUN 15.3 15.3 15.1 15.4 6.9 15.6 1 16.2 15.8 15.0 14.9	JUL 20.2 20.7 20.6 21.1 21.8 22.5 23.2 23.0 23.0 23.0 22.7 22.8 23.1	AUG 24.6 25.8 26.7 26.3 24.6 22.4 23.0 23.8 24.4	SEP 20.6 21.1 21.4 21.3 21.4 20.4 19.8 19.5 18.7 17.8
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	OCT 14.9 14.4 13.7 12.2 9.4 9.7 10.8 10.9 11.0 10.9 11.0 10.9 11.1 11.1 10.7 10.2 9.0	NATER NOV 2.91194.914.94 45.4 5.54.46.5 5.44.6.3 10.00	DEC 1.6 1.7 1.6 1.6 1.5 1.7 1.5 1.5 1.5 1.5 1.5 1.6 1.4 1.4 1.4 1.5 1.0	JAN .4 .4 .5 .5 .4 .4 .4 .3 .3 .3 .3 .3	FEB .4 .4 .3 .3 .3 .3 .3 .3 .3 .2 .2 .2 .2	S, WATER YEAMEAN VALUES MAR .1 .2 .3 .3 .3 .2 .1 .1 .2 .2 .2 .3 .3 .3 .2 .1 .1 .0 .1 .0	APR .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1	MAY 7.5 7.9 8.4 8.8 8.6 8.2 8.4 8.9 9.5 10.5 11.3 12.7 13.8 14.5 15.5 16.1 16.1 16.2	JUN 15.3 15.4 15.6 115.6 115.8 16.6 7 15.8 16.7 17.8	JUL 20.2 20.7 20.6 21.1 21.8 22.5 23.0 23.0 23.0 22.7 22.8 23.1 23.2 23.2 23.1 23.2 23.1 23.2 23.1	AUG 24.6 25.8 26.7 24.6 22.4 23.0 23.8 24.4 25.1 25.1 25.3 23.7 23.2 24.2 23.8	SEP 20.6 21.1 21.4 21.3 21.4 20.4 19.8 19.5 18.7 17.8 17.1 16.5 16.4 16.9 17.4 17.9 18.9
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	OCT 14.9 14.4 13.7 12.2 9.4 9.7 10.8 10.9 11.0 10.9 10.3 10.0 9.6 10.0 11.1 11.1 10.7 10.2 9.0 9.0 8.5 7.5 7.6 6.6	NATER NOV 2.91.94 45.4.65 54.4.63 100.97 89	DEC 1.6 1.7 1.6 1.5 1.7 1.5 1.5 1.5 1.5 1.5 1.5 1.6 7 7 6 7 6 7 7 6 6 6 7 7 6 6 7 7 6 6 6 7 7 7 6 6 6 7 7 7 6 6 6 7 7 7 6 6 6 7 7 7 6 6 6 7 7 7 8 7 8	JAN .4 .4 .5 .5 .4 .4 .4 .4 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3 .3	FEB .4 .4 .3 .3 .3 .3 .3 .3 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2 .2	S, WATER YEAMEAN VALUES MAR .1 .2 .3 .3 .3 .2 .1 .1 .2 .2 .2 .3 .3 .2 .1 .1 .1 .0 .1 .0 .1 .1 .1 .1 .1 .1 .1	APR .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1	MAY 7.5 7.9 8.4 8.6 8.2 8.9 9.5 11.3 7 13.8 14.5 16.1 16.0 15.3 15.1 15.3 15.1	JUN 15.3 15.4 6.9 15.6 1 15.0 9 16.7 9 18.5 18.6 18.6	JUL 20.2 20.7 20.6 21.1 21.8 22.5 23.0 23.0 23.0 23.0 23.0 22.7 22.8 23.1 23.2 23.1 23.2 23.4 23.5 24.1 24.7 25.0 25.9 26.4 25.9 25.6	AUG 24.6 25.8 26.7 24.6 22.4 23.0 23.8 24.4 25.6 25.3 7 23.2 24.2 25.3 23.2 24.2 23.8 24.2 23.8 24.2 23.2 24.2 23.2 24.2 23.2 24.2 23.2 24.2 25.3 26.3 26.3 26.3 26.3 26.3 26.3 26.3 26	SEP 20.6 21.1 21.4 21.3 21.4 20.4 19.5 18.7 17.8 17.1 16.2 16.4 16.9 17.4 17.9 18.8 18.3

O5113360 LONG CREEK AT WESTERN CROSSING OF INTERNATIONAL BOUNDARY, SASK (International gaging station)

LOCATION.--Lat 49°00'01", long 103°21'08", in SE1/4 sec.1, T.1, R.11 W., 2d meridian, Hydrologic Unit 09010001, and on right bank 10 mi south of Outram.

DRAINAGE AREA .-- 1.320 mi2.

DAY

OCT

NOV

DEC

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder and artificial control. Datum of gage is 1,894.00 ft above National Geodetic Vertical Datum of 1929, international boundary survey.

REMARKS .-- Estimated daily discharges: Mar. 28 to Apr. 8. Records good.

JAN

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

AVERAGE DISCHARGE.--30 years, 34.8 ft³/s, 25,210 acre-ft/yr; median of yearly mean discharges, 16 ft³/s, 11,600 acre-ft/yr.

FEB

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,690 ft³/s, Apr. 1, 1976, gage height, 12.05 ft; maximum gage height, 12.70 ft, Mar. 31, 1976 backwater from ice; no flow for several months each year.

EXTREMES FOR CURRENT YEAR. -- Maximum discharge, 1,090 ft3/s, Mar. 29, gage height 7.42 ft, backwater from ice; no flow, Oct. 1 to Mar. 27 and May 28 to Sept. 30.

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

MAR

APR

MAY

JUN

JUL

AUG

SEP

.00 -00 .00 .00 .00 -00 e802 8.4 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 e565 7.2 .00 .00 .00 .00 .00 .00 .00 .00 -00 -00 e381 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 -00 .00 .00 .00 e249 5 .00 .00 .00 .00 .00 -00 3.6 .00 .00 .00 .00 e170 6 .00 .00 .00 .00 .00 2.9 .00 .00 .00 e154 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 e100 8 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 e78 1.4 .00 .00 .00 .00 .00 .00 61 .00 .00 .00 .00 .85 10 .00 .00 .00 .00 .00 .00 -00 -00 49 .39 -00 .00 11 .00 .00 43 38 33 32 .00 .00 .00 .00 .25 .00 .00 .00 .00 .00 .00 .00 12 .00 .00 .00 .18 .00 .00 .00 .00 13 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .14 .00 .00 .00 .00 .00 .00 14 -00 .11 .00 .00 .00 15 .00 .00 .00 -00 -00 -00 44 .07 .00 .00 .00 .00 16 .00 .00 .00 .00 .00 .00 38 .14 .00 .00 .00 .00 .00 32 27 17 .00 .00 .00 .00 .00 .00 .00 .00 .00 .39 18 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 19 .00 .00 .00 .00 .00 .00 .00 24 .00 .00 .00 .07 20 .00 .00 .00 .00 .00 .00 .00 .04 .00 .00 .00 21 .00 .00 .00 .00 .00 29 .04 .00 .00 .00 .00 .00 34 22 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 23 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 24 .00 .00 .00 .00 .00 .00 24 .04 .00 .00 .00 .00 25 .00 .00 .00 .00 .00 .00 24 .00 .00 .00 -04 -00 26 .00 .00 .00 .00 .00 .04 .00 .00 .00 .00 .00 18 27 .00 .00 .00 .00 .00 .04 .00 .00 .00 .00 .00 16

CAL YR 1988 TOTAL 0.00 MEAN .00 MAX .00 MIN .00 AC-FT .0 WTR YR 1989 TOTAL 5688.15 MEAN 15.6 MAX 1030 MIN .00 AC-FT 11280

.00

.00

.00

.00

0.00

.00

.00

.00

.0

.00

0.00

.00

.00

.00

.0

e110

e1030

e692

e667

2499.00

80.6

1030

4960

.00

15

11

3150.1

9.1

105

802

9.1

6250

.04

.00

.00

.00

39.05

1.26

8.4

.00

77

.00

.00

.00

0.00

.00

.00

.00

.0

.00

.00

.00

.00

0.00

.00

.00

.00

.0

.00

.00

.00

.00

0.00

.00

.00

.00

.0

.00

.00

.00

0.00

.00

.00

.00

.0

.00

.00

.00

.00

0.00

.00

.00

.00

.0

29

TOTAL

MEAN

MAX

MIN

AC-FT

.00

.00

.00

0.00

.00

.00

.00

.0

.00

.00

.00

.00

0.00

.00

.00

.00

.0

e - Estimated

05113600 LONG CREEK NEAR NOONAN, ND (International gaging station)

LOCATION.--Lat 48°58'52", long 103°04'34", near north line of NE1/4 sec.1, T.163 N., R.96 W., Divide County, Hydrologic Unit 09010001, on right bank 150 ft upstream from county highway bridge, 1.5 mi upstream from international boundary, and 7 mi northwest of Noonan.

DRAINAGE AREA.--1,790 mi², approximately, of which about 1,160 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS .-- WSP 2113: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 1,840 ft, from topographic map. Prior to Aug. 18, 1960, non-recording gage at same site and datum.

REMARKS.--Estimated daily discharges: Mar. 17 to Apr. 1. Records fair except those for estimated daily discharges, which are poor.

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

AVERAGE DISCHARGE.--30 years, 45.2 ft³/s, 32,750 acre-ft/yr; median of yearly mean discharges, 21 ft³/s, 15,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,310 ft3/s, Mar. 31, 1976, gage height, 17.61 ft; no flow at times most years.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 200 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 29	2200	970	a9.78	Apr. 1	2000	*1,180	a*10.02

a - Backwater from ice
No flow much of the time.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES DAY OCT SEP NOV DEC JAN FEB MAR APR MAY JUN JUL AUG .00 .00 .00 .00 .00 .00 e986 13 .02 .00 .00 .00 2 .00 .00 .00 .00 .00 .00 e991 11 .03 .00 .00 .00 3 .00 .00 .00 .00 .00 .00 586 10 .04 -00 .00 .00 .00 -00 .00 .00 .00 .00 398 9.2 .06 .00 .00 .00 5 .00 .00 .00 .00 .00 .00 267 8.5 .02 .00 .00 .00 6 .00 .00 .00 -00 .00 .00 225 7.1 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 180 5.5 .00 -00 .00 .00 8 .00 .00 5.1 -00 .00 .00 .00 .00 -00 .00 .00 126 .00 .00 q -00 4.4 -00 -00 -00 -00 -00 .00 -00 96 10 -00 .00 -00 -00 79 -00 -00 .00 -00 -00 .00 3.7 .00 .00 .00 .00 .00 .00 .00 .00 11 -00 .00 64 2.9 55 50 12 13 .00 .00 .00 .00 .00 .00 .00 -00 .00 -00 2.0 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 1.6 43 14 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 1.3 15 .00 .00 .00 .00 .92 .00 .00 .00 .00 .00 .00 16 .00 .00 .00 .00 .00 .00 49 .62 .00 .00 .00 .00 .00 40 .00 .00 17 .00 .00 .00 .00 e.20 .48 .00 .00 18 .00 .00 .00 .00 .00 e.50 36 .35 .00 .00 .00 .00 19 .00 .00 .00 .00 .00 e.80 33 .20 .00 .00 .00 .00 20 .00 .00 .00 .00 .00 e1.0 30 .11 .00 .00 .00 .00 21 .00 .00 .00 .00 .00 e1.3 28 .07 .00 .00 .00 .00 22 .00 .00 .00 .00 .00 e1.8 34 .05 .00 .00 .00 .00 23 .00 .00 .00 .00 .00 e1.8 40 .04 .00 .00 .00 .00 24 .00 .00 .00 .00 .00 e1.7 35 .09 .00 .00 .00 .00 29 .00 .00 .00 .00 .00 e2.0 .15 .00 .00 .00 .00 .00 27 .23 .00 .00 -00 26 .00 .00 .00 .00 .00 e5.1 27 28 .00 .00 .00 .00 .00 .00 e111 22 .17 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 e271 18 .10 29 30 .00 .00 .00 .00 -00 -00 .00 .00 e753 17 -06 .00 .00 .00 .03 .00 .00 -00 .00 .00 --e851 15 .00 31 .00 .00 -00 -00 e774 .02 ------0.17 0.00 0.00 0.00 TOTAL 0.00 0.00 0.00 4641 88.99 0.00 0.00 2776,20 2.87 .006 .00 .00 155 991 .00 .00 -00 MEAN .00 .00 .00 89.6 .00 .00 .00 .00 .06 .00 .00 .00 -00 851 13 MAX .00 .00 .00 .00 .02 .00 .00 .00 .00 -00 -00 15 MTN 5510 9210 177 -0 .0 .0 AC-FT .0 .0 .0 .3

CAL YR 1988 TOTAL 6.27 MEAN .017 MAX .20 MIN .00 AC-FT 12 WTR YR 1989 TOTAL 7506.36 MEAN 20.6 MAX 991 MIN .00 AC-FT 14890

05113600 LONG CREEK NEAR NOONAN, ND--CONTINUED

WATER-QUALITY RECORDS

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

MAR 28		70.	4	<1	50	280	<1	9	110	<1.0	1	2	80
	DATE	SOLID DIS SOLV (TON PER DAY (7030	ED S S	RSENIC DIS- SOLVED (UG/L AS AS) 01000)	BORON, DIS- SOLVED (UG/L AS B) (01020)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
MAR 28	8.	3 5	7	0	46	5	.7 39	3.	2 0.	10 7.8	11	7 11	8 0.16
DATE	POTA SIU DIS SOLV (MG/ AS K	M, BO FE ED (L	SICAR- NATE, T-LAB MG/L AS (CO3) (5440)	CAR- BONATE FET-LA (MG/L AS CO3) (95445	B LAB (MG/L AS CACO3	DIOXI DIS SOLV (MG/) AS CO	DE SULFA DIS- ED SOLV L (MG/ 2) AS SO	DIS- ED SOLV L (MG/ 4) AS C	, RIDE DIS ED SOLV L (MG/ L) AS F	DIS- SOLVE ED (MG/L L AS) SIO2)	D DEG. DIS- SOLVEI (MG/L	E SUM OF CONSTIC TUENTS DIS- DIS- O SOLVE (MG/L	SOLIDS, DIS- SOLVED (TONS PER) AC-FT)
MAY 16	123	0	0.60	125	0 -	- 26	.0 20	.5					
04 24			96 34	33 111		- 7 - 11		.0	=	77.			: :
MAR 22 28 30 APR	111	0 2	1.7 23 05	34 20 30	0 7.2		.5 1	.0	52 11	6.0	14	3	3 0.9
DATE	TIM	CH I C	DIS- ARGE, NST. UBIC FEET PER ECOND 00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM (OOO95	PH (STAND ARD UNITS)	AIR (DEG	E ATUR WATE C) (DEG	E (MG/ R AS C) CACO	CALCI L DIS- L SOLV (MG/ 3) AS 0	DIS- ED SOLVE L (MG/L A) AS MG	DIS- D SOLVED (MG/L) AS NA	SODIU	T RATIO

05113750 EAST BRANCH SHORT CREEK RESERVOIR NEAR COLUMBUS, ND

LOCATION.--Lat 48°59'26", long 102°47'07", in SW1/4NW1/4 sec.32, T.164 N., R.93 W., Burke County, Hydrologic Unit 09010001, on left bank of reservoir on East Branch Short Creek, 0.5 mi south of international boundary, and 6.0 mi north of Columbus.

DRAINAGE AREA. -- 280 mi2, of which 175 mi2 is probably noncontributing.

RESERVOIR-GAGE HEIGHT AND CONTENTS RECORDS

PERIOD OF RECORD .-- April 1963 to current year.

GAGE .-- Water-stage recorder. Datum of gage is 1,860.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair. Reservoir is formed by earth-fill dam; storage began April 1963. Outlet of lake is a fixed-crest concrete dam; average crest elevation, 1,886.90 ft National Geodetic Vertical Datum of 1929. Reservoir capacity at crest elevation, 1,200 acre-ft. The reservoir is operated for water supply and recreation. Records of daily reservoir stage and contents are available from files at the Bismarck District office.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 1,850 acre-ft, Mar. 28, 1976, gage height, 32.13 ft; minimum, 770 acre-ft, Dec. 10, 1988, gage height, 22.57 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 1,550 acre-ft, Apr. 1, gage height, 29.93 ft; minimum contents, 770 acre-ft, Dec. 10, gage height, 22.57 ft.

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

I	Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)	
Sept.	30	22.96	810		
Oct.	31	22.69	780	-30	
lov.	30	22.67	780	- 0	
ec.	31	22.64	780	0	
CAL	YR 1988	-	-	-230	
Tan.	31	22.67	780	0	
eb.	28		*780	0	
far.	31	29.41	1,490	+710	
pr.	30	27.65	1,280	-210	
lay	31	27.17	1,220	-60	
June	30	26.95	1,190	-30	
July	31	26.42	1,140	-50	
Aug.	31	25.77	1.070	-70	
Sept.	30	25.67	1,060	-10	
	YR 1989			+250	

^{* -} Estimated

O5113800 SHORT CREEK BELOW INTERNATIONAL BOUNDARY NEAR ROCHE PERCEE, SASK (International gaging station)

LOCATION.--Lat 49°01'42", long 102°51'00", in SW1/4 sec.14, T.1, R.7 W., 2d meridian, Hydrologic Unit 09010001, 4 mi southwest of Roche Percee, Saskatchewan, and 5 mi upstream from mouth.

DRAINAGE AREA. -- 480 mi2.

WATER-DISCHARGE RECORDS

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

GAGE .-- Water-stage recorder.

REMARKS.--Estimated daily discharges: Jan. 1 to Apr. 1 and May 5 to June 4. Records good except those for Mar. 9 to Apr. 1, which are fair.

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

AVERAGE DISCHARGE.--29 years, 11.8 ft³/s, 8,550 acre-ft/yr; median of yearly mean discharges, 4.9 ft³/s, 3,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,700 ft3/s, Apr. 7, 1969, gage height, 14.33 ft; maximum gage height, 14.39 ft, Mar. 28, 1960; no flow on many days each year.

EXTREMES FOR CURRENT YEAR .-- Maximum discharge, 285 ft3/s, Apr. 1, gage height, 6.36 ft; no flow for many days.

		DISCHARGE	, CUBIC	FEET PER		, WATER YE	EAR OCTOBER	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	e.00	e.00	e.00	e221	2.0	e.00	.00	.00	.00
2	.00	.00	.00	e.00	e.00	e.00	223	1.9	e.00	.00	.00	.00
3	.00	.00	.00	e.00	e.00	e.00	168	2.2	e.00	.00	.00	.00
4	.00	.00	.00	e.00	e.00	e.00	113	1.7	e.00	.07	.00	.00
5	.00	.00	.00	e.00	e.00	e.00	76	e1.6	.60	.11	.00	.00
6	.00	.00	.00	e.00	e.00	e.00	54	e1.2	.21	.04	.00	.00
7	.00	.00	.00	e.00	e.00	e.00	48	e1.1	.00	.04	.00	.00
8	.00	.00	.00	e.00	e.00	e.00	41	e.92	.00	.04	.00	.00
9	.00	.00	.00	e.00	e.00	e.04	33	e.78	.00	.00	.00	.00
10	.00	.00	.00	e.00	e.00	e.18	28	e.71	.00	.00	.00	.00
11	.00	.00	.00	e.00	e.00	e.18	24	e.56	.04	.00	.00	.00
12	.00	.00	.00	e.00	e.00	e.14	20	e.46	.07	.04	.00	.00
13	.00	.00	.00	e.00	e.00	e.04	18	e.42	.07	.04	.00	.00
14	.00	.00	.00	e.00	e.00	e.04	15	e.35	.11	.04	.00	.00
15	.00	.00	.00	e.00	e.00	e.04	13	e.32	.11	.04	.00	.00
16	.00	.00	.00	e.00	e.00	e.04	10	e.28	.07	.00	.00	.00
17	.00	.00	.00	e.00	e.00	e.04	7.5	e.35	.07	.00	.00	.00
18	.00	.00	.00	e.00	e.00	e.07	6.5	e.28	.07	.00	.00	.00
19	.00	.00	.00	e.00	e.00	e.07	6.1	e.21	.07	.00	.00	.00
20	.00	.00	.00	e.00	e.00	e.11	5.3	e.18	.07	.00	.00	.00
21	.00	.00	.00	e.00	e.00	e.11	4.8	e.18	.07	.00	.00	.00
22	.00	.00	.00	e.00	e.00	e.11	4.3	e.14	.04	.00	.00	.00
23	.00	.00	.00	e.00	e.00	e.11	3.5	e.11	.04	.00	.00	.00
24	.00	.00	.00	e.00	e.00	e.14	3.6	e.21	.04	.00	.00	.00
25	.00	.00	.00	e.00	e.00	e.32	3.1	e.14	.00	.00	.00	.00
26	.00	.00	.00	e.00	e.00	e2.5	2.5	e.11	.00	.00	.00	.00
27	.00	.00	.00	e.00	e.00	e133	2.3	e.07	.00	.00	.00	.00
28	.00	.00	.00	e.00	e.00	e151	2.1	e.07	.04	.00	.00	.00
29	.00	.00	.00	e.00		e225	2.0	e.04	.00	.00	.00	.00
30	.00	.00	.00	e.00		e154	2.0	e.04	.00	.00	.00	.00
31	.00		.00	e.00		e161		e.00		.00	.00	
TOTAL	0.00		0.00	0.00	0.00	828.28	1160.6	18.63	1.79	0.46	0.00	0.00
MEAN	.00	.00	.00	.00	.00	26.7	38.7	.60	.060	.015	.00	.00
MAX	.00	.00	.00	.00	.00	225	223	2.2	.60	.11	.00	.00
MIN	.00	.00	.00	.00	.00	.00	2.0	.00	.00	.00	.00	.00
AC-FT	.0	.0	.0	.0	.0	1640	2300	37	3.6	.9	.0	.0

CAL YR 1988 TOTAL 7.78 MEAN .021 MAX .21 MIN .00 AC-FT 15 WTR YR 1989 TOTAL 2009.76 MEAN 5.51 MAX 225 MIN .00 AC-FT 3990

e - Estimated

05114000 SOURIS (MOUSE) RIVER NEAR SHERWOOD, ND (International gaging station)

LOCATION.--Lat 48°59'24", long 101°57'28", in NW1/4SE1/4NE1/4 sec.33, T.164 N., R.87 W., Renville County, Hydrologic Unit 09010001, on right bank 0.8 mi downstream from international boundary, 16 mi northwest of Sherwood, and at mile 511.4.

DRAINAGE AREA. -- 8,940 mi², approximately, of which about 5,900 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- March 1930 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS. -- WSP 1308: 1934, 1945. WSP 2113: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,603.73 ft above National Geodetic Vertical Datum of 1929. Prior to Apr. 8, 1935, nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Mar. 26 to Apr. 5, ice effect, May 24 to June 7 and June 10 to July 18, beaver activity. Records good except periods of estimated discharge, which are fair. Some regulation by reservoirs in Canada. Some small diversions for irrigation and municipal supply.

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

AVERAGE DISCHARGE.--59 years, 132 ft3/s, 95,630 acre-ft/yr; median of yearly mean discharges, 66 ft3/s, 47,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 14,800 ft³/s, Apr. 10, 1976, gage height, 25.15 ft; no flow at times in some years.

EXTREMES OUTSIDE PERIOD OF RECORD. -- Flood in 1927 reached a stage of about 22 ft and flood in 1904 reached a stage of about 25.8 ft from information by local residents.

DISCHARGE. CUBIC FEET PER SECOND. WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,250 ft³/s, Apr. 3, gage height, 13.43 ft; no flow, Oct. 1 to Mar. 26 and July 31 to Sept. 30.

		DISCHAP	GE, COBI	C FEET PE	R SECOND	MEAN VALUE	S COLOBE	K 1900 10	SEFIEMBE	1909		
DAY	OCT	NOA	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	e200	19	e3.1	e.50	.00	.00
2	.00	.00	.00	.00	.00	.00	e800	20	e3.0	e.48	.00	.00
3	.00	.00	.00	.00	.00	.00	e1200	22	e2.8	e.45	.00	.00
3 4	.00	.00	.00	.00	.00	.00	e1000	22	e2.7	e.42	.00	.00
5	.00	.00	.00	.00	.00	.00	e900	22	e2.5	e.40	.00	.00
	00	00	00	00			-	00	-0.7	- 70	.00	.00
6	.00	.00	.00	.00	.00	.00	737	22	e2.3	e.38		.00
7	.00	.00	.00	.00	.00	.00	520	20	e3.0	e.35	.00	.00
8	.00	.00	.00	.00	.00	.00	321	18	1.9	e.33	.00	.00
9	.00	.00	.00	.00	.00	.00	256	17	1.6	e.30	.00	.00
10	.00	.00	.00	.00	.00	.00	182	16	e1.5	e.28	.00	.00
11	.00	.00	.00	.00	.00	.00	140	15	e1.4	e.26	.00	.00
12	.00	.00	.00	.00	.00	.00	117	14	e1.3	e.26	.00	.00
13	.00	.00	.00	.00	.00	.00	104	13	e1.2	e.23	.00	.00
14	.00	.00	.00	.00	.00	.00	91	12	e1.6	e.20	.00	.00
15	.00						87	11	e1.0	e.17	.00	.00
15	•00	.00	.00	.00	.00	•00	07	11	61.0	e.17	•00	.00
16	.00	.00	.00	.00	.00	.00	88	9.3	e.90	e.14	.00	.00
17	.00	.00	.00	.00	.00	.00	73	8.4	e.85	e.30	.00	.00
18	.00	.00	00	.00	.00	.00	60	7.3	e.80	e.20	.00	.00
19	.00	.00	.00	.00	.00	.00	52	6.4	e.85	.08	.00	.00
20	.00	.00	.00	.00	.00	.00	48	5.9	e.80	.06	.00	.00
21	.00	.00	.00	.00	.00	.00	45	5.2	e1.6	.04	.00	.00
22	.00	.00	.00	.00	.00	.00	41	4.6	e.70	.03	.00	.00
27	.00	.00	.00	.00	.00	.00	39	4.5	e.65	.03	.00	.00
23												.00
24	.00	.00	.00	.00	.00	.00	38	e4.2	e.60	.03	.00	
25	.00	.00	.00	.00	.00	.00	34	e4.0	e.55	.02	.00	.00
26	.00	.00	.00	.00	.00	e.50	27	e3.8	e.50	.02	.00	.00
27	.00	.00	.00	.00	.00	e10	26	e3.6	e.45	.01	.00	.00
28	.00	.00	.00	.00	.00	e30	24	e3.5	e.45	.01	.00	.00
29	.00	.00	.00	.00		e60	23	e3.4	e.55	.01	.00	.00
30	.00	.00	.00	.00		e45	21	e3.3	e.53	.01	.00	.00
31	.00		.00	.00		e50		e3.2		.00	.00	
- 111		2.02					14.0					
TOTAL	0.00	0.00	0.00	0.00	0.00	195.50	7294	343.6	41.68	6.00	0.00	0.00
MEAN	.00	.00	.00	.00	.00	6.31	243	11.1	1.39	.19	.00	.00
MAX	.00	.00	.00	.00	.00	60	1200	22	3.1	.50	.00	.00
MIN	.00	.00	.00	.00	.00	.00	21	3.2	. 45	.00	.00	.00
AC-FT	.0	.0	.0	.0	.0	388	14470	682	83	12	.0	.0
	-							100				12.0

CAL YR 1988 TOTAL 183.24 MEAN .50 MAX 4.9 MIN .00 AC-FT 363 WTR YR 1989 TOTAL 7880.78 MEAN 21.6 MAX 1200 MIN .00 AC-FT 15630

05114000 SOURIS RIVER NEAR SHERWOOD, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD .-- Water years 1970, 1972 to current year.

PERIOD OF DAILY RECORD. --SPECIFIC CONDUCTANCE: August 1983 to current year. WATER TEMPERATURE: August 1983 to current year.

INSTRUMENTATION .-- Water quality monitor since August 1983.

REMARKS. -- No flow for several months (see table of daily mean discharge for this station).

EXTREMES FOR PERIOD OF DAILY RECORD .--

SPECIFIC CONDUCTANCE: Maximum daily, 2,190 microsiemens, Dec. 15, 1983; minimum, 310 micromsiemens, Apr. 5, 1989.
WATER TEMPERATURE: Maximum, 28.6°C, June 7, 11, 1988; minimum, 0.0°C several days during winter months

each year.
EXTREMES FOR CURRENT YEAR.--

SPECIFIC CONDUCTANCE: Maximum, 1,180 microsiemens, June 6; minimum, 310 microsiemens, Apr. 5. WATER TEMPERATURE: Maximum, 26.8°C, July 25; minimum, 0.0°C on many days during winter months.

		******	. downerr	DALA, WAL	DIC IDAN	JOIODBIL 13	,00 10 551	I DI I DE L	,0,		
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)	COLOR (PLAT- INUM- COBALT UNITS) (00080)	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)
MAR					21.40	4 10.2					
30	1515	44	288		2.0	0.0					1.75
04	1445	1010	410	7.59	12.5	0.5 7.5	45	9.2	64	66	15
13	1715	103	710	7.97	13.0		100	10.8	90	130	27
26 JUN	1400	26	990	8.30	8.5	12.0	55	6.3	58	190	40
14 JUL	1300	1.1	1100	8.59	21.0	16.5	50	9.0	91	240	46
20	1600	0.05	1080	8.98	34.5	28.0	30	10.6	135	240	47
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY 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)
APR											
04 13 26 JUN	6.8 14 22	54 96 140	61 60 60	3 4 5	7.4 9.0 10	73 125 199	92 160 210	18 39 59	0.10 0.20 0.20	4.3 6.1 5.3	241 451 638
14	31	150	56	4	12	299	190	68	0.20	2.1	705
JUL 20	30	160	58	5	11	365	140	72	0.30	3.7	716
DATE	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOS- PHOROUS TOTAL (MG/L AS P) (00665)	PHOS- PHOROUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	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)
APR											
04	244	0.33	657	0.270	0.210	0.280	0.090	0.28	70	1	30
13	428	0.61	125	0.230	0.340	0.240	0.080	0.24			
26	607	0.87	45.3	<0.100	0.030	0.200	0.080	0.20			
JUN 14	679	0.96	2.06	<0.100					-		
JUL 20	686	0.97	0.10	<0.100	0.040	0.910	0.800	0.91	10	13	36

05114000 SOURIS RIVER NEAR SHERWOOD, ND--CONTINUED

DATE	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)
APR										
04	320	<1	1	<1	2	240	<5	11	81	0.3
13	420									
26 JUN	520							-		
JUL 14	430								-	
20	350	<1	<1	<1	1	17	<1	43	17	<0.1
DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)
APR										
O4	3	10	5	<1	<1	130	3	30	7	<0.010
20	1	4	3	<1	<1	320	2	<10	5	<0.010

05114000 SOURIS RIVER NEAR SHERWOOD, ND--CONTINUED

SPECIFIC CONDUCTANCE, MICROSIEMENS/CM AT 25 DEGREES CENTIGRADE, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY MAX MIN MEAN MAX MIN MEAN MAX MIN MEAN MAX MIN MEAN

OCTOBER NOVEMBER DECEMBER JANUARY

MONTH												
SPECIF	IC CONE	DUCTANCE,	MICROSIEM	ENS/CM	AT 25 DE	GREES CEN	TIGRADE,	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 3 4 5										1050	1030	1030
2										1050	1030	1040
3							740	430	562	1070	1040	1050
4							440	330	404	1070	1060	1060
5							370	310	337	1100	1070	1080
6							500	380	434	1170	1100	1140
7							490	470	481	1170	1130	1140
7 8 9							540	470	495	1140	1110	1120
							600	540	578	1130	1120	1130
10							600	560	588	1140	1130	1130
11							620	560	590	1140	1130	1140
12							670	610	627	1150	1130	1140
13							750	660	707	1150	1140	1150
14							830	750	788	1160	1140	1150
15		No flow	February	1 to W	mah 25		870	830	849	1160	1140	1150
16		NO TIOM	rebruary	I CO ME	iren 25		890	870	877	1150	1140	1140
17							900	880	891	1140	1130	1140
18							920	900	908	1140	1130	1130
19							940	920		1150	1130	1140
20									924		1130	1140
20							940	930	932	1150	1150	1140
21							950	930	940	1160	1130	1150
22							940	930	936	1170	1140	1150
23							960	930	938	1160	1150	1160
24							980	950	962	1160	1120	1140
24 25							990	970	980	1140	1120	1130
26							1000	980	991	1140	1120	1120
27							1010	990	1000	1150	1120	1140
28							1020	990	1010	1150	1130	1140
29							1020	1010	1020	1150	1130	1140
30							1030	1020	1020	1140	1120	1130
31										1150	1130	1140
MONTH										1170	1030	1130

O5114000 SOURIS RIVER NEAR SHERWOOD, ND--CONTINUED

SPECIFIC CONDUCTANCE, MICROSIEMENS/CM AT 25 DEGREES CENTIGRADE, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

0. 202.		DOULANDE	,	5.10, O.1 A.	L L) Dudie	DDO 00.	· L L GILLA	Du, mai			,	00. 10	.,,,,
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN		MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			A	UGUST			SEPTEMBER	
1	1150	1140	1140	1110	1090	1100							
	1150	1130	1140	1120	1090	1100							
3	1140	1130	1140	1120	1080	1100							
2 3 4 5	1140	1140	1140	1130	1090	1120							
5	1150	1140	1140	1130	1110	1120							
	1150	1140	1140	1170	1110	1120							
6 7 8 9	1180	1130	1150	1140	1100	1120							
7	1150	1140	1150	1130	1120	1130							
8	1170	1130	1150	1130	1090	1120							
9	1160	1140	1150	1140	1110	1120							
10	1160	1150	1150	1130	1090	1120							
			1150	1150	1030	1120							
11	1160	1130	1150	1130	1090	1120							
12	1140	1110	1130 -	1130	1110	1120							
13	1140	1130	1130	1130	1120	1120							
14	1140	1120	1130	1130	1100	1120							
15	1140	1120	1130	1130	1100	1120							
.,	1140	1120	1170	1150	1100	1120			No flow	July 31 to	Sept	ember 30	
16	1140	1130	1130	1130	1080	1110							
17	1140	1120	1130	1130	1090	1110							
18	1150	1120	1140	1130	1080	1110							
19	1160	1130	1150	1110	1080	1080							
20	1160	1140	1150	1110	1080	1080							
20	1100	1140	1150	1110	1080	1000							
21	1170	1150	1160	1120	1080	1100							
22	1170	1150	1160	1110	1080	1100							
23	1170	1130	1160	1120	1080	1100							
24	1150	1110	1140	1120	1080	1100							
25	1150	1120	1140	1120	1100	1110							
25	1150	1120	1140	1120	1100	1110							
26	1140	1120	1130	1130	1100	1120							
27	1150	1130	1140	1130	1110	1120							
28	1150	1080	1130	1120	1110	1120							
29	1140	1090	1100	1120	1100	1110							
30	1110	1080	1100	1110	1080	1100							
30 31				1110	1080	1100							
51													
MONTH	1180	1080	1140										
		WATER I	EMPERATURE,	DEGREES	CELSIUS,	WATER	YEAR	OCTOBER	1988	TO SEPTEMBER	1989		
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN		MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBE	:R	1	NOVEMBER			DE	CEMBER			JANUARY	
		002000										,	
4													

No flow October 1 to January 31

05114000 SOURIS RIVER NEAR SHERWOOD, ND--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 3 4 5							.0 .1 .1 .4 1.0	.0	.0 .0 .0 .2	11.8 13.2 13.3 12.5 11.9	7.7 9.8 11.5 10.9 9.3	9.8 11.5 12.4 11.7 10.8
6 7 8 9 10							1.0 1.0 1.2 1.7	.0 .3 .0 .3	.6 .5 1.1 1.5	13.2 13.6 15.6 17.0 16.4	8.5 11.8 12.6 14.3 14.8	10.8 13.0 14.1 15.7 15.6
11 12 13 14 15		No elev	February	1 to Mar	aah 25		2.7 4.5 7.2 8.3 9.3	1.4 1.5 4.2 5.6 6.2	1.9 2.9 5.4 6.7 7.5	18.0 18.6 20.3 21.1 21.6	14.4 16.1 16.5 17.6 17.6	15.9 17.3 18.2 19.0 19.4
16 17 18 19 20		NO IIOW	rebruary	1 CO MAI	ron 25		8.3 6.7 8.0 9.7 12.0	6.5 4.7 4.3 5.7 7.9	7.7 5.7 5.9 7.4 9.7	19.8 19.6 20.9 19.6 16.7	18.5 17.0 16.5 16.7 14.1	19.0 18.2 18.5 17.7 15.5
21 22 23 24 25							13.2 16.0 16.8 15.9 15.1	9.3 10.9 12.7 13.1 11.3	11.1 13.2 14.8 14.0 13.3	17.1 18.6 19.2 18.8 15.9	13.0 14.2 15.3 15.9 13.6	15.3 16.4 17.4 17.2 14.6
26 27 28 29 30 31				000000000000000000000000000000000000000	.0	.0	14.8 11.8 12.3 12.3 10.0	12.1 9.7 8.5 8.6 8.0	12.9 10.9 10.5 9.8 9.0	15.6 17.8 17.9 17.2 15.1 17.1	12.2 13.0 14.7 14.8 13.6 13.6	13.8 15.1 16.7 15.5 14.4 15.3
MONTH							16.8	.0	6.2	21.6	7.7	15.3
		WATER TEM	PERATURE,	DEGREES	CELSIUS,	WATER	YEAR OCTO	BER 1988 T	O SEPTE	MBER 1989		
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1 2 3 4 5	16.2 17.8 19.1 18.0 20.7	14.7 15.3 15.4 16.4 17.0	15.6 16.3 17.0 17.3 18.4	24.2 24.9 23.3 23.6 26.3	21.7 22.1 20.7 21.3 22.7	23.0 23.6 22.3 22.6 24.0						
6 7 8 9	21.4 19.7 18.1 19.0 17.6	18.9 16.8 14.6 14.8 16.2	19.8 18.5 16.5 16.7 16.9	24.5 24.3 24.6 24.8 23.2	22.1 21.3 22.0 22.1 21.2	23.3 22.7 23.2 23.4 22.0						
11 12 13 14 15	19.7 18.8 18.8 19.1 19.5	16.6 15.8 14.3 14.6 15.6	17.8 17.7 16.3 16.9 17.4	22.6 23.5 22.9 22.8 22.7	20.3 21.0 20.9 21.0 20.3	21.5 22.2 21.9 22.0 21.7		No. £low	Iuly 3	1 to Septe	amber 30	
16 17 18 19 20	21.0 21.6 21.9 20.7 23.2	16.5 19.1 17.7 18.2 19.7	18.3 20.1 19.6 19.7 21.3	22.5 22.2 24.6 23.8 24.6	20.0 20.4 19.8 20.4 21.0	21.4 21.4 21.7 22.2 22.8		WO 110M	July 5	, w sepu	suber 50	
21 22 23 24 25	21.3 21.3 19.9 19.8 21.0	18.9 16.7 17.6 16.3 17.9	19.8 18.7 18.6 17.9 19.3	24.4 24.1 24.8 25.3 26.8	21.2 21.0 22.0 22.2 22.0	22.9 22.5 23.2 23.6 23.7						
26 27 28 29 30	19.7 19.1 19.8 21.3 22.9	17.0 16.0 18.1 19.2 20.6	18.4 17.6 18.9 20.2 21.8	25.5 22.6 21.8 24.0 23.8	20.7 19.6 18.0 19.0	22.9 20.5 19.5 20.9 21.4						
31 MONTH	23.2	14.3	18.3									

05114700 LAKE DARLING NEAR GRANO, ND

LOCATION.--Lat 48°36'49", long 101°37'01", in NW1/4 sec.11, T.159 N., R.85 W., Renville County, Hydrologic Unit 09010001, at highway bridge 1.3 mi west of Grano.

WATER-QUALITY RECORDS

PERIOD OF RECORD .-- Water years 1986 to current year.

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (OOO95)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (OOO2O)	TEMPER- ATURE WATER (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (OOO80)	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)
NOV 15	1500	1090	8.52	-1.5	0.0	19			280	54	36
FEB								-			
28 APR	1545	1520	7.86	-17.5	0.0	20	3.5	24	440	85	54
13 26 JUN	1315 0900	1360 810	7.98 8.72	7.5 7.0	3.5 8.0	30 30	6.8	51 108	360 210	68 40	46 26
14	1630	965	8.83	22.0	17.5	20	9.9	102	250	49	32
JUL 20	0915	940	8.40	26.0	22.5	25	5.7	65	240	47	29
SEP											
11	1505	1050	8.68	13.0	12.0	12	7.8		260	53	31
DATE	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	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)
NOV	470	40		47	740	200		0.70		740	607
15 FEB	130	49	3	13	317	220	35	0.30	2.7	718	683
28 APR	190	47	4	18	469	310	51	0.40	11	1010	1000
13	160	48	4	15	407	270	45	0.30	8.8	898	860
26 JUN	100	50	3	11	231	160	25	0.20	3.9	519	505
14 JUL	120	49	3	15	282	190	30	0.20	2.9	626	608
20 SEP	110	48	3	15	269	190	28	0.30	16	520	599
11	130	50	4	15	283	220	31	0.30	16	686	667
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)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOS- PHOROUS TOTAL (MG/L AS P) (00665)	PHOS- PHOROUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)
NOV											
15 FEB	0.98	0.0		0.150	0.240	0.280	0.180	0.28			
28 APR	1.37	0.0		0.170	0.890	0.640	0.510	0.64	<10	10	110
13 26 JUN	1.22 0.71	0.0	28	0.160	0.440	0.470	0.330	0.47	<10 	7	79
14	0.85	0.0			0.010	0.310		0.31			
JUL 20	0.71	0.0		<0.100	0.030	0.520	0.400	0.52	10	14	69
SEP 11	0.93	0.0		<0.100	0.040	0.390	0.290	0.39			

RED RIVER OF THE NORTH BASIN O5114700 LAKE DARLING NEAR GRANO, ND--CONTINUED

DATE	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (O1049)	LITHIUM DIS- SOLVED (UG/L AS LI) (O1130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)
NOV										
15 FEB	310									
28 APR	140	<1	2	<1	1	24	<5	65	750	<0.1
13	350	<1	<1	<1	1	33	<5	56	350	0.1
26 JUN	200							12		
14 JUL	270				()					
20 SEP	290	<1	1	<1	2	9	<1	38	30	<0.1
11	300									
DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)
FEB 28	6	<1	3	<1	<1	530	3	160	20	<0.010
APR 13	29	4	7	<1	1	410	3	20	5	<0.010
JUL 20	3	2	3	<1	<1	300	2	<10	9	<0.010

05115500 LAKE DARLING NEAR FOXHOLM, ND

LOCATION.--Lat 48°27'27", long 101°35'14", in NE1/4NE1/4 sec.1, T.157 N., R.85 W., Ward County, Hydrologic Unit 09010001, on control structure of Lake Darling Dam, reservoir of Fish and Wildlife Service, on Souris River about 6 mi north of Foxholm, and at mile 430.0.

DRAINAGE AREA. -- 9,450 mi², approximately, of which about 6,200 mi² is probably noncontributing.

RESERVOIR-GAGE HEIGHT AND CONTENTS RECORDS

PERIOD OF RECORD. -- April 1936 to current year (no winter records 1936-39).

REVISED RECORDS. -- WSP 1338: 1942. WSP 2113: Drainage area.

GAGE. -- Nonrecording gage. Datum of gage is 1,577.00 ft National Geodetic Vertical Datum of 1929. April 1936 to Aug. 8, 1963, nonrecording gages at same site and datum.

REMARKS.--Reservoir is formed by earth dam; storage began in April 1936; dam completed in July 1936. Usable capacity, 108,500 acre-ft between gage heights of 0.0 ft, sill of control gages, and 21.0 ft, crest of spillway. Dead storage, 3,500 acre-ft. Figures given herein represent total contents based on capacity table dated June 7, 1943. Water is used during periods of low flow at wildlife refuge downstream.

COOPERATION .-- Period gage readings furnished by Fish and Wildlife Service.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 145,400 acre-ft Apr. 17, 1976, gage height, 24.24 ft; minimum observed since April 1943 when reservoir was first filled to spillway level, 31,200 acre-ft, Feb. 18 and 25, 1963, gage height, 10.04 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents observed, 74,600 acre-ft, Apr. 18, gage height, 16.90 ft; minimum observed, 54,100 acre-ft, Oct. 31, Nov. 30, and Dec. 1, gage height, 14.30 ft.

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

1	Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.	30	14.43	55,000	
Oct.	31	14.30	54,100	-910
Nov.	30	14.30	54,100	0
Dec.	31	14.39	54,700	+600
CA	YR 1988	-	-	-24,400
	31		*55,100	+400
Jan.)		55.100	+400
	28	14.48	55,400	+300
Feb.	를 통해 있는데 전에 있다면 다른데 이번 이번 시간 이번 시간 사람이 되었다면 보면 하는데 되었다면 보다 되었다면 하는데 되었다면 하는데 되었다면 보다 모습니다. 그런데 보다 다른데 보다 다른데 보다 다른데 보다 되었다면 보니요. 보다 되었다면 보다 되			
Feb. Mar.	28	14.48	55,400	+300
Feb. Mar. Apr.	28	14.48 14.80	55,400 57,600	+300 +2,200
Feb. Mar. Apr. May	28 31	14.48 14.80 16.86	55,400 57,600 74,300	+300 +2,200 +16,700
Feb. Mar. Apr. May June	28 31	14.48 14.80 16.86 16.59	55,400 57,600 74,300 72,000	+300 +2,200 +16,700 -2,300
Jan. Feb. Mar. Apr. May June July Aug.	28	14.48 14.80 16.86 16.59 16.42	55,400 57,600 74,300 72,000 70,600	+300 +2,200 +16,700 -2,300 -1,400
Feb. Mar. Apr. May June July	28	14.48 14.80 16.86 16.59 16.42 15.73	55,400 57,600 74,300 72,000 70,600 64,800	+300 +2,200 +16,700 -2,300 -1,400 -5,800

^{* -} Estimated

05116000 SOURIS (MOUSE) RIVER NEAR FOXHOLM, ND

LOCATION.--Lat 48°22'20", long 101°30'18", in SW1/4SE1/4 sec.34, T.157 N., R.84 W., Ward County, Hydrologic Unit 09010001, on left bank 30 ft upstream from county highway bridge, 3 mi east of Foxholm, 19 mi upstream from Des Lacs River, and at mile 414.5.

DRAINAGE AREA. -- 9,470 mi2, approximately, of which about 6,200 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1904 to November 1905, March to July 1906 (gage heights only), October 1936 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as Mouse River near Foxholm, 1904-6.

REVISED RECORDS. -- WSP 1308: 1905. WSP 2113: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,560.73 ft above National Geodetic Vertical Datum of 1929. June 23, 1904, to July 31, 1906, nonrecording gage at site 3.2 mi upstream at different datum. Apr. 1, 1937, to Mar. 25, 1938, nonrecording gage at site 600 ft downstream at datum about 0.5 ft higher.

REMARKS.--Estimated daily discharges: Jan. 13-17. Records good above 1.0 ft³/s and poor below. Flow almost completely regulated since 1936 by Lake Darling (station 05115500) 15 mi upstream and several small reservoirs, combined capacity, about 184,000 acre-ft. Some small diversions for irrigation and municipal supply.

AVERAGE DISCHARGE.--53 years, 136 ft³/s, 98,530 acre-ft/yr; median of yearly mean discharges, 59 ft 3/s, 42.700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,600 ft³/s, Apr. 17, 1976, gage height, 17.17 ft; maximum reverse flow, 25 ft³/s, Apr. 4, 1949 caused by backwater from the Des Lacs River; no flow at times in many years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 85 ft³/s, Aug. 9, gage height, 5.50 ft; no flow on many days.

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

					N	EAN VALUE	S					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	-MAY	JUN	JUL	AUG	SEP
1	.13	.00	.07	.07	.07	.15	1.4	.83	7.9	.00	.11	.93
2	.07	.00	.07	.07	.07	.15	1.6	.57	7.9	.00	.07	.81
3	.00	.00	.08	.07	.07	.18	1.4	.41	8.2	.00	.11	.91
2 3 4	.00	.10	.15	.07	.07	.21	1.4	.29	8.9	.00	.15	.68
5	.00	.15	.15	.07	.07	.16	1.3	.29	9.0	.00	.15	.41
6 7	.00	.15	.15	.07	.07	.15	1.3	.18	9.5	.00	.15	.37
7	.00	.15	.15	.07	.10	.15	1.4	.07	9.6	.00	.14	.37
8	.00	.12	.15	.11	.13	.17	1.3	.07	9.6	.00	7.2	.37
9	.03	.09	.09	.07	.07	.17	1.2	.13	10	.00	73	.25
10	.07	.15	.07	.07	.08	.24	1.2	.15	9.7	.00	49	.16
11	.08	.11	.07	.07	.12	.29	1.2	.04	8.8	.02	34	.25
12	.14	.07	.07	.07	.12	.29	1.2	.00	8.8	.29	2.1	.29
13	.15	.07	.07	e.05	.14	.29	1.2	.00	8.8	.10	1.1	.18
14	.16	.09	.13	e.05	.15	.25	1.3	.00	6.5	.00	1.1	.06
15	.22	.19	.10	e.05	.15	.18	1.3	.00	1.0	.00	1.2	.00
16	.22	.16	.11	e.05	.15	.18	.89	.00	.26	.00	1.2	.00
17	.29	.15	.15	e.05	.15	.17	.49	.04	.07	.04	1.1	.00
18	.29	.11	.15	.07	.15	.17	.33	.11	.04	.20	1.1	.00
19	.19	.07	.15	.07	.15	.18	.29	.26	.00	.29	1.1	.00
20	.15	.07	.10	.07	.15	.16	.32	.29	.00	.45	1.1	.00
21	.11	.07	.07	.07	.15	.18	.41	.15	.00	.52	1.1	.06
22	.09	.07	.07	.07	.15	.16	.44	.15	.00	.52	1.1	.15
23	.05	.07	.07	.07	.15	.18	.31	.21	.00	.45	1.1	.15
24	.00	.10	.07	.07	.15	.17	.15	.36	.00	.48	.82	.13
25	.00	.15	.07	.07	.15	.26	.15	.26	.00	.48	.66	.04
26	.00	.15	.07	.07	.15	.42	.71	.41	.00	.27	.79	.00
27	.00	.15	.07	.07	.15	.66	1.4	.26	.00	.12	.92	.00
28	.00	.15	.07	.07	.15	.76	2.2	.37	.00	.07	1.1	.02
29	.00	.15	.07	.07		1.1	13	3.9	.07	.12	1.1	.01
30	.00	.09	.07	.07		1.3	2.2	7.0	.09	.15	1.0	.09
31	.00		.07	.07		1.3		7.9		.17	.96	
TOTAL	2.44	3.15	3.00	2.11	3.43	10.38	42.99	24.70	124.73	4.74	185.83	6.65
MEAN	.079	.10	.097	.068	.12	.33	1.43	.80	4.16	.15	5.99	.22
MAX	.29	.19	.15	.11	.15	1.3	13	7.9	10	.52	73	.93
MIN	.00	.00	.07	.05	.07	.15	.15	.00	.00	.00	.07	.00
AC-FT	4.8	6.2	6.0	4.2	6.8	21	85	49	247	9.4	369	13
				100								

CAL YR 1988 TOTAL 2704.25 MEAN 7.39 MAX 92 MIN .00 AC-FT 5360 WTR YR 1989 TOTAL 414.15 MEAN 1.13 MAX 73 MIN .00 AC-FT 821

e - Estimated

05116000 SOURIS RIVER NEAR FOXHOLM, ND--CONTINUED

WATER-QUALITY RECORDS

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

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) (OOO10)	COLOR (PLAT- INUM- COBALT UNITS) (OOO80)	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)
NOV 15	1045	0.12	1360	8.46	-3.5	3.0	25		_	300	54
JAN 04	.0945	0.04	1530		0.0	1.0					
FEB 28	1130	0.10	1860	7.48	-16.0	0.0	55	0	0	540	100
APR 05	1030	1.3	975	8.16	6.5	1.5	40	10.8	77	260	49
25 JUN	0945	0.12	790	8.46	10.0	12.5	30	7.7	72	210	41
15 JUL	1115	1.1	1060	8.45	22.5	16.5	30	9.9	101	270	48
19 SEP	1345	0.30	1020	9.32	32.0	26.5	40	13.5	166	230	35
06	1215	0.40	1180	9.08	18.5	18.0	40	9.0	95	270	41
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY 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)
NOV 15	40	140	49	4	14	344	230	30	0.30	0.64	758
FEB 28	70	220	49	4	22	344		39 70	0.30	20	
APR 05	33					619	330 190	32	0.20	8.3	1260
0)											633
25	27	110 92	47 47	3	12 11	286 241	140	26	0.20	5.5	508
25 JUN 15	27 37										687
25 JUN 15 JUL 19	27	92	47	3	11	241	140	26	0.20	5.5	
25 JUN 15 JUL	27 37	92 130	47 49	3	11 17	241 342	140	26 39	0.20	5.5 1.6	687
25 JUN 15 JUL 19 SEP	27 37 34	92 130 140	47 49 56	3 4 4	11 17 13	241342330	140 180 170	26 39 42	0.20 0.30 0.30	5.5 1.6 1.2	687 676
25 JUN 15 JUL 19 SEP 06 DATE	37 34 40 SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	92 130 140 160 SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	47 49 56 55 SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	3 4 4 4 NITRO- GEN, NO2+NO3 DIS- SOLVED SOLVED (AS N) (00631)	11 17 13 16 NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	241 342 330 366 PHOS-PHOROUS TOTAL (MG/L AS P) (00665)	140 180 170 210 PHOS-PHOROUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	26 39 42 46 PHOS-PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	0.20 0.30 0.30 0.30 ALUM-INUM, DIS-SOLVED (UG/L AS AL)	5.5 1.6 1.2 0.30 ARSENIC DIS- SOLVED (UG/L AS AS)	687 676 807 BARIUM, DIS- SOLVED (UG/L AS BA)
25 JUN 15 JUL 19 SEP 06 DATE NOV 15 FEB	27 37 34 40 SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	92 130 140 160 SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	47 49 56 55 SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	3 4 4 4 NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631) <0.100	11 17 13 16 NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	241 342 330 366 PHOS- PHOROUS TOTAL (MG/L AS P) (00665)	140 180 170 210 PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	26 39 42 46 PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	0.20 0.30 0.30 0.30 ALUM- INUM, DIS- SOLVED (UG/L (O1106)	5.5 1.6 1.2 0.30 ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	687 676 807 BARIUM, DIS- SOLVED (UG/L AS BA) (01005)
25 JUN 15 JUL 19 SEP 06 DATE NOV 15 FEB 28 APR	27 37 34 40 SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	92 130 140 160 SOLIDS, DIS- SOLVED (TOMS PER AC-FT) (70303) 1.03	47 49 56 55 SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	3 4 4 4 NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631) <0.100 <0.100	11 17 13 16 NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610) 0.040 4.80	241 342 330 366 PHOS-PHOROUS TOTAL (MG/L AS P) (00665) 0.490 2.20	140 180 170 210 PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671) 0.260 1.20	26 39 42 46 PHOS-PHOROUS ORGANIC TOTAL (MG/L AS P) (00670) 0.49 2.2	0.20 0.30 0.30 0.30 ALUM-INUM, DIS-SOLVED (UG/L AS AL)	5.5 1.6 1.2 0.30 ARSENIC DIS- SOLVED (UG/L AS AS)	687 676 807 BARIUM, DIS- SOLVED (UG/L AS BA)
25 JUN 15 JUL 19 SEP 06 DATE NOV 15 FEB 28 APR 05 25	27 37 34 40 SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L) (70301)	92 130 140 160 SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	47 49 56 55 SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	3 4 4 4 NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631) <0.100	11 17 13 16 NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	241 342 330 366 PHOS- PHOROUS TOTAL (MG/L AS P) (00665)	140 180 170 210 PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	26 39 42 46 PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	0.20 0.30 0.30 0.30 ALUM- INUM, DIS- SOLVED (UG/L (O1106)	5.5 1.6 1.2 0.30 ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	687 676 807 BARIUM, DIS- SOLVED (UG/L AS BA) (01005)
25 JUN 15 JUL 19 SEP 06 DATE NOV 15 FEB 28 APR 05 25 JUN 15	27 37 34 40 SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301) 725 1210	92 130 140 160 SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303) 1.03 1.71 0.86	47 49 56 55 SOLIDS, DIS- SOLVED (TONS PER DAY) (70302) 0.25 0.34 2.22	3 4 4 4 NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631) <0.100 <0.100	11 17 13 16 NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610) 0.040 4.80 0.230	241 342 330 366 PHOS-PHOROUS TOTAL (MG/L AS P) (00665) 0.490 2.20 0.400	140 180 170 210 PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671) 0.260 1.20 0.200	26 39 42 46 PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670) 0.49 2.2 0.40	0.20 0.30 0.30 0.30 ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	5.5 1.6 1.2 0.30 ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	687 676 807 BARIUM, DIS- SOLVED (UG/L AS BA) (01005)
25 JUN 15 JUL 19 SEP 06 DATE NOV 15 FEB 28 APR 05 25 JUN	27 37 34 40 SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301) 725 1210 607 488	92 130 140 160 SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303) 1.03 1.71 0.86 0.69	47 49 56 55 SOLIDS, DIS- SOLVED (TONS PER DAY) (70302) 0.25 0.34 2.22 0.16	3 4 4 4 NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631) <0.100 <0.100 <0.100	11 17 13 16 NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610) 0.040 4.80 0.230 0.020	241 342 330 366 PHOS-PHOROUS TOTAL (MG/L AS P) (00665) 0.490 2.20 0.400 0.410	140 180 170 210 PHOS-PHOROUS ORTHO, DIS-SOLVED (MG/L AS P) (00671) 0.260 1.20 0.220	26 39 42 46 PHOS-PHOROUS ORGANIC TOTAL (MG/L AS P) (00670) 0.49 2.2 0.40 0.41	0.20 0.30 0.30 0.30 ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	5.5 1.6 1.2 0.30 ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	687 676 807 BARIUM, DIS- SOLVED (UG/L AS BA) (01005)

05116000 SOURIS RIVER NEAR FOXHOLM, ND--CONTINUED

DATE	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)
NOV										
15	330									
FEB 28 APR	400	<1	1	<1	<1	75	<5	85	3400	<0.1
05	240									
25	200									
JUN 15 JUL	310									
19 SEP	310	<1	1	2	1	8	<1	50	6	<0.1
06	310									
DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)
FEB 28	<1	5	1	<1	<1	640	<1	<10	4	<0.010
JUL 19	2	4	2	<1	<1	260	2	10	4	<0.010

05116150 DES LACS RIVER NEAR KENMARE, ND

LOCATION.--Lat 48°35'23", long 101°59'49", in NE1/4NE1/4NE1/4 sec.23, T.159 N., R.88 W., Ward County, Hydrologic Unit 09010001, on right bank 500 ft upstream from crossing on U.S. Highway 52, 150 ft downstream from U.S. Fish & Wildlife Service Dam No. 8, 6.5 mi southeast of Kenmare.

DRAINAGE AREA .-- 687 mi², approximately, of which 354 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

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

GAGE .-- Water-stage recorder. Datum of gage is 1,777 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Mar. 8-28 and 30 to Apr. 1. Records fair. Flow slightly regulated by small upstream reservoirs.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 31 ft³/s, July 12, 1989, gage height, 3.85 ft; no flow much of the time each year.

EXTREMES FOR CURRENT PERIOD. -- Maximum discharge, 31 ft³/s, July 12, gage height, 3.85 ft; no flow for several months.

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

		54	John Maria Li	00010 1111	1	MEAN VALUE		,1000	. 10 55.1			
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	e12	12	9.5	15	1.8	.10
2	.00	.00	.00	.00	.00	.00	15	12	8.8	14	1.7	.10
3	.00	.00	.00	.00	.00	.00	11	11	8.4	12	1.5	.51
4	.00	.00	.00	.00	.00	.00	6.2	12	8.3	11	1.4	.19
5	.00	.00	.00	.00	.00	.00	4.9	12	8.1	11	1.3	.14
,	.00	.00	.00	.00	.00	.00	4.9	12	0.1	- 11	1.5	. 14
6	.00	.00	.00	.00	.00	.00	4.4	12	8.0	9.8	1.2	.14
7	.00	.00	.00	.00	.00	.00	4.2	12	7.9	8.7	1.2	.11
8	.00	.00	.00	.00	.00	e.10	3.1	12	7.7	7.6	1.1	.10
9	.00	.00	.00	.00	.00	e.20	2.3	12	7.6	6.8	.97	.10
10	.00	.00	.00	.00	.00	e.30	1.8	12	7.2	6.0	.58	.10
11	.00	.00	.00	.00	.00	e.40	1.4	12	7.2	6.2	.30	.10
12				.00		e.40	1.2	11	7.6	26	.21	.10
	.00	.00	.00		.00					16		.10
13	.00	.00	.00	.00	.00	e.30	1.5	12	7.2		.18	
14	.00	.00	.00	.00	.00	e.20	2.6	12	6.4	12	.17	.10
15	.00	.00	.00	.00	.00	e.10	5.6	11	6.2	8.9	.14	.10
16	.00	.00	.00	.00	.00	e.05	6.7	12	6.1	7.0	.12	.10
17	.00	.00	.00	.00	.00	e.02	6.5	12	6.3	6.5	.10	.10
18	.00	.00	.00	.00	.00	e.00	6.9	13	4.8	7.2	.10	.10
19	.00	.00	.00	.00	.00	e.00	6.9	12	3.6	5.9	.10	.10
20					.00			12	9.1	4.9	.10	.10
20	.00	.00	.00	.00	.00	e.00	7.3	12	9.1	4.7	.10	. 10
21	.00	.00	.00	.00	.00	e.00	7.4	12	16	4.2	.10	.10
22	.00	.00	.00	.00	.00	e.00	7.7	11	15	3.8	.10	.10
23	.00	.00	.00	.00	.00	e.00	8.2	11	15	3.6	.10	.10
24	.00	.00	.00	.00	.00	e.00	8.8	13	14	3.3	.10	.09
25	.00	.00	.00	.00	.00	e.20	8.9	12	13	3.1	.10	.09
26	.00	.00	.00	.00	.00	e1.0	9.8	12	13	2.8	.10	.09
27	.00	.00	.00	.00	.00	e.90	10	11	12	2.6	.10	.09
28	.00	.00	.00	.00	.00	e10	11	11	12	2.5	.10	.09
20								10	16	2.4	.10	.09
29 30	.00	.00	.00	.00		25	12					
30	.00	.00	.00	.00		e8.0	12	10	15	2.2	.10	.09
31	.00		.00	.00		e6.5		9.6		2.0	.10	
TOTAL	0.00	0.00	0.00	0.00	0.00	53.67	207.3	360.6	287.0	235.0	15.37	3.52
MEAN	.00	.00	.00	.00	.00	1.73	6.91	11.6	9.57	7.58	.50	.12
MAX	.00	.00	.00	.00	.00	25	15	13	16	26	1.8	.51
MIN	.00	.00	.00	.00	.00	.00	1.2	9.6	3.6	2.0	.10	.09
AC-FT	.00	.00	.00	.0	.00	106	411	715	569	466	30	7.0
AC-FI	.0	.0	.0	.0	.0	100	411	(1)	209	400	,,,	1.0

CAL YR 1988 TOTAL 5.03 MEAN .014 MAX .14 MIN .00 AC-FT 10 WTR YR 1989 TOTAL 1162.46 MEAN 3.18 MAX 26 MIN .00 AC-FT 2310

e - Estimated

05116150 DES LACS RIVER NEAR KENMARE, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	CIFIC CON- DUCT- ANCE (US/CM)	PH (STAND- ARD UNITS) (00400)	AIR (DEG C)	ATURE WATER (DEG C	(MG/L AS CACO3	CALCIUM DIS- SOLVEM (MG/L S) AS CA	DIS- D SOLVEI (MG/L) AS MG	DIS- D SOLVED (MG/L) AS NA)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)
MAR 29	1800	23	132	7.40	-1.5	5 0.	5 4	14 11	4.0	4.5	15	0.3
APR 04 26 JUL	1700 1115	6.0	202 580			4. 5 12.				: ::	Ξ	=
20 SEP	1310	4.8	945		33.0	25.	0 -		- 4			
06	1830	0.14	1340	7.86	21.5	16.	5 52	20 110	59	100	29	2
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE, FET-LAE (MG/L AS HCO3) (95440)	BONATE, FET-LAB (MG/L AS CO3)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVEI (MG/L AS CO2)	SULFAT DIS- SOLVE (MG/L) AS SO4	DIS- D SOLVE (MG/L) AS CL	RIDE, DIS- SOLVEI (MG/L AS F)	AS SIO2)	AT 180 DEG. C DIS- SOLVED (MG/L)	SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 29 SEP	8.8	48	0	40	3.0	15	2.4	0.10	0 12	80	82	0.11
06	14	370	0	310	8.2	430	17	0.20	12	954	928	1.30
	\$	SOLVED (TONS PER DAY)	DIS- SOLVED (UG/L AS AS)	DIS- SOLVED (UG/L AS B)	DIS- SOLVED (UG/L AS FE)	DIS- SOLVED (UG/L AS PB)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	DENUM, DIS- SOLVED (UG/L AS MO)	NIUM, DIS- SOLVED (UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) 01080)
MAR		4.88	<1	40	190	<1	6	30	0.2	1	3	90
SEP		0.36	3	120	30	<1	80	620	0.1	4	<10	680
	4.4.4				,-		-	0_0	•••	7		

05116500 DES LACS RIVER AT FOXHOLM, ND

LOCATION.--Lat 48°22'14", long 101°34'11", in NW1/4NE1/4NW1/4 sec 2, T.156 N., R.85 W., Ward County, Hydrologic Unit 09010002, on left bank 200 ft upstream from county highway bridge in Foxholm, and at mile 22.0.

DRAINAGE AREA .-- 939 mi2, of which about 400 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1904 to July 1906, October 1945 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS .-- WSP 1728: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,632.98 ft above National Geodetic Vertical Datum of 1929.

June 14 to Oct. 23, 1955, nonrecording gage at site 200 ft downstream from present gage at same datum.

See WSP 1728 or 1913 for history of changes prior to June 14, 1955.

REMARKS.--Estimated daily discharges: Mar. 11 to Apr. 2, Apr, 4,5, June 11-16, July 16-19, Sept. 10-13, and 19-30. Records good except those for periods of estimated daily discharge, which are fair.

AVERAGE DISCHARGE.--46 years (water years 1905-06, 1946-89), 28.9 ft³/s, 20,910 acre-ft/yr; median of yearly mean discharges, 16 ft³/s, 11,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,260 ft3/s, Apr. 19, 1979, gage height, 21.23 ft, from high-water mark; no flow at times in some years.

EXTREMES FOR CURRENT YEAR. -- Maximum discharge, 240 ft³/s, Mar. 29, gage height, 8.32 ft; no flow for many days.

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

MEAN VALUES DAY JUL. AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN 1.6 .00 .06 .18 .07 .07 .01 e120 16 11 4.4 2 .00 .08 .18 .07 .07 .05 e186 16 13 20 4.0 1.3 12 3 .00 .10 .18 .07 .06 .08 163 16 29 3.8 1.3 -00 .18 .07 .05 .10 e130 16 11 23 e3.4 1.9 .13 5 .00 .17 .19 .07 .04 .12 e94 16 11 17 e3.2 17 6 9.9 14 33 .00 .23 .23 .07 .03 .13 70 16 e2.8 .00 .31 .31 .07 .02 .14 56 17 9.4 12 e2.6 20 8 .00 .39 .34 .07 .01 .18 33 18 9.0 10 e2.2 12 9 .00 .41 .28 .07 .00 .19 31 18 8.4 9.3 2.6 9.5 10 .00 .34 .21 .07 .00 .21 23 18 8.2 2.1 e7.0 .00 .27 .15 .07 .01 e5.0 27 17 7.4 2.0 e5.0 12 .00 .22 .11 .07 .01 19 17 e7.0 9.0 2.0 e4.0 e14 13 .00 .19 .10 .07 .01 e9.0 24 16 e6.5 12 2.1 e3.0 .00 .17 .07 16 e6.0 40 2.3 2.8 .00 15 .00 .16 .13 .07 .00 24 16 e6.7 63 2.5 2.4 e3.0 16 .00 .16 .13 .07 .00 e1.3 24 16 e6.7 e51 2.5 2.2 17 .00 .16 .12 .07 .00 e.30 23 16 5.9 e35 2.2 2.0 18 .02 .16 .11 .07 .01 e.25 23 16 5.9 e 22 2.0 1.8 19 .03 .16 .10 .07 .01 e.20 21 16 5.6 e16 2.0 e1.7 20 .05 .15 .10 .07 .01 e.10 19 16 5.1 13 2.0 e1.6 4.7 21 .05 .15 .09 .07 .00 e.08 18 15 11 2.2 e1.5 22 .05 .15 .09 .07 .00 e.06 18 15 4.4 9.3 2.4 e1.4 23 .05 .15 .09 .07 .00 e.06 19 15 4.2 8.6 2.3 e1.3 24 .05 .17 .09 .07 .00 e.10 19 15 8.2 2.0 e1.2 25 .05 .19 .09 .07 .01 e.20 19 4.0 7.6 1.9 e1.1 17 6.9 26 .05 .21 .08 .07 .01 e10 19 4.6 1.9 e1.1 27 .05 .23 .08 .07 .01 e40 19 17 9.0 6.1 1.8 e1.0 28 .05 .22 .08 .07 .00 e80 17 16 9.8 5.6 2.0 e1.0 29 .05 .19 .08 .07 e 200 15 15 11 5.4 2.0 e.90 30 .05 .18 .08 .07 e150 15 14 11 5.4 2.1 e.90 31 .05 .07 .07 e110 14 4.9 2.1 142.50 0.65 4.36 632.86 500.9 75.4 TOTAL 5.86 2.17 0.44 1312 499 233.9 .20 MEAN .021 .14 .070 .016 20.4 43.7 16.1 7.80 16.2 2.43 4.75 MAX .05 .41 .34 .07 .07 200 186 18 13 63 4.4 33 1.8 90 MIN .00 .06 .07 .07 .00 .01 15 14 4.0 4.9 2600 AC-FT 1.3 12 8.6 4.3 .9 1260 990 464 994 150 283

CAL YR 1988 TOTAL 249.31 MEAN .68 MAX 4.1 MIN .00 AC-FT 495 WTR YR 1989 TOTAL 3410.04 MEAN 9.34 MAX 200 MIN .00 AC-FT 6760

e - Estimated

05116500 DES LACS RIVER AT FOXHOLM, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1950-51, 1969-70, 1972 to current year.

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- ATTRE WATTER (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (O0080)	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)
NOV											
15 JAN	1130	0.23	2000	8.73	-4.5	3.0	60			510	66
O4 FEB	1015	0.07	3190	7.78	0.0	0.5	30	0	0	1100	180
28	1245	0.01	2590		-16.0	0.0					
MAR 29	1510	240	243		1.0	0.0					
APR 05	1345	106	310	7.83	10.0	0.5	120	10.4	72	84	21
25 JUN	1145	18	1120	8.21	15.0	11.0	60	7.9	71	290	62
15 JUL	1210	5.8	1210	8.07	22.0	18.0	50	8.4	88	320	65
19	1545	14	580	7.65	31.5	25.0	110	3.3	39	170	40
SEP 06	1400	33	470	8.21	20.0	17.0	120	5.4	56	99	24
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY 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)
NOV					22	2.22	1200	2.5	20.22	2.2	
15 JAN	83	300	56	6	11	523	590	39	0.30	5.5	1460
O4 APR	160	380	42	5	16	855	1100	50	0.40	21	2520
05 25	7.7 33	26 140	38 50	1 4	6.9 9.9	80 249	67 330	3.1 14	0.10	8.0	201 771
JUN 15	38							18			828
JUL		150	49	4	15	294	330		0.20	8.7	
19 SEP	16	54	40	2	10	180	110	7.1	0.20	21	371
06	9.6	56	52	3	8.5	120	100	5.2	0.20	7.1	299
DATE	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOS- PHOROUS TOTAL (MG/L AS P) (00665)	PHOS- PHOROUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)
NOV											
15 JAN	1410	1.99	0.91	<0.100	0.030	0.890	0.540	0.89			
04	2420	3.43	0.48	<0.100	1.50	0.880	0.790	0.88			
APR 05 25	191 750	0.27	57.5 37.9	0.380	0.180	0.300	0.130 0.100	0.30	560	2	30
JUN 15	801	1.13	12.9		0.030	0.240		0.24			
JUL 19	368	0.50	14.1	<0.100	0.570	0.500	0.300	0.50	30	7	44
SEP 06	284	0.41	26.6	0.310	0.280	0.500	0.100	0.50			
4-33		277.00	-	17 15 10 2.1		4 (7 7		111111111111111111111111111111111111111			

05116500 DES LACS RIVER AT FOXHOLM, ND--CONTINUED

CHRO- BORON, CADMIUM MIUM, COBALT, COPPER, IRON, LEAD, DIS- DIS- DIS- DIS- DIS- DIS- DIS- DIS-	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)
NOV			
15 170			
JAN			
04 210			
APR 05 20 <1 2 1 3 260 <5	11	40	<0.1
25 90		40	10.1
JUN			
JUL 19 80 <1 1 <1 2 57 4		700	
19 80 <1 1 <1 2 57 4	20	300	<0.1
06 60			
MOLYB- NICKEL, SELE- SILVER, STRON- VANA- DENUM, TOTAL NICKEL, NIUM, TOTAL TIUM, DIUM, DIS- RECOV- DIS- DIS- RECOV- DIS- SOLVED ERABLE SOLVED SOLVED ERABLE SOLVED (UG/L	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (O1090)	CYANIDE TOTAL (MG/L AS CN) (00720)
APR 05 <1 13 8 <1 1 94 3	70	4	<0.010
JUL		- 7	
19 2 11 5 <1 <1 200 2	10	6	<0.010

05117500 SOURIS (MOUSE) RIVER ABOVE MINOT. ND

- LOCATION.--Lat 48°14'45", long 101°22'15", in NW1/4NW1/4SE1/4 sec.17, T.155 N., R.83 W., Ward County, Hydrologic Unit 09010001, on right bank 180 ft downstream from county highway bridge, 3.5 mi west of Minot, 7 mi downstream from Des Lacs River, and at mile 388.5.
- DRAINAGE AREA. -- 10,600 mi2, approximately, of which about 6,700 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

- PERIOD OF RECORD. -- May 1903 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as Mouse River at Minot, 1903-24, Souris River at Minot, 1927-28, 1929-34, and Souris River near Minot, 1928-29.
- REVISED RECORDS.--WSP 1308: 1905, 1909-14, 1918, 1924-25, 1927. WSP 1338: 1903-4, 1906, 1917, 1928, 1929(M). WSP 2113: Drainage area.
- GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,545.75 ft above National Geodetic Vertical Datum of 1929. May 5, 1903, to Sept. 30, 1928; Oct. 1, 1929, to Sept. 30, 1934; nonrecording gages at mile 377.6 in Minot, at datum 12.5 ft lower, Oct. 1, 1928, to Sept. 30, 1929, nonrecording gages at Saugstad bridge at mile 366.8, 5 mi southeast of Minot and at datum 19.2 ft lower than present datum. Records equivalent except those for periods of extreme low flow, as some industrial and sanitary waste enters river between the sites.
- REMARKS.--Estimated daily discharges: Jan. 1 to Apr. 2. Records good except those for period of estimated daily discharges, which are poor. Flow almost completely regulated by Lake Darling (station 05115500), 41 mi upstream and several smaller reservoirs; combined capacity, about 248,000 acre-ft. Some small diversions for irrigation and municipal supply.
- AVERAGE DISCHARGE.--86 years, 162 ft³/s, 117,400 acre-ft/yr; median of yearly mean discharges, 85 ft³/s, 61,600 acre-ft/yr.
- EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,000 ft³/s, Apr. 20, 1904, gage height, 21.9 ft at site in Minot, from rating curve extended above 8,100 ft³/s; no flow at times in some years. Maximum stage at present site, about 23 ft in April 1904.
- EXTREMES OUTSIDE PERIOD OF RECORD. -- Maximum stage in Minot at least 3 ft higher than 1904 peak, in 1881, according to Apr. 20, 1904 issue of Minot Daily Optic. This peak probably occurred in 1882.
- EXTREMES FOR CURRENT YEAR.--Maximum discharge, 333 ft3/s, Apr. 3, gage height, 5.97 ft; no flow, Oct. 6 to Nov. 2 and Aug. 2-12.

		DISCHA	RGE, CUBI	C FEET PE		, WATER YEAR MEAN VALUES	OCTOBER	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.65	.00	1.1	e.40	e.30	e.50	e200	21	7.0	7.1	.75	.39
2	.56	.00	1.1	e.40	e.30	e.40	e220	22	7.1	5.4	.00	.24
7	.29	.09	1.2	e.40	e.30	e.30	318	19	9.0	4.8	.00	1.7
3												
	.11	•52	1.2	e.40	e.30	e.20	241	18	17	16	.00	1.4
5	.00	.73	1.2	e.50	e.30	e.20	184	16	15	20	.00	1.1
6	.00	.79	1.2	e.50	e.20	e.20	123	14	14	12	.00	.95
7	.00	1.0	1.1	e.40	e.30	e.20	97	12	17	5.9	.00	.29
8	.00	1.1	.91	e.40	e.20	e.30	71	15	17	3.8	.00	.22
9	.00	1.2	.72	e.40	e.20	e.50	57	16	15	3.5	.00	2.5
10	.00	1.3	.84	e.40	e.20			15	13	3.3	.00	3.7
10	•00	1.5	.04	e.40	e.20	e10	45	15	15	2.5	.00	5.1
11	.00	1.2	.67	e.40	e.20	e60	35	14	14	3.0	.00	4.0
12	.00	.76	.82	e.40	e.20	e39	33	14	17	3.4	.00	3.5
13	.00	.54	1.2	e.40	e.20		27	14	22	5.6	8.7	3.0
			1.2			e23						
14	.00	.47	1.5	e.40	e.20	e10	26	14	20	6.4	15	2.7
15	.00	.83	1.1	e.40	e.20	e9.0	27	10	18	19	6.8	2.4
16	.00	.68	1.0	e.40	e.10	e5.0	28	11	16	71	3.2	2.2
17	.00	.63	.84	e.40	e.10	e3.5	27	12	13	59	2.2	1.8
18	.00	.63	.94	e.30	e.10	e3.0	25	12	9.1	39	1.6	1.3
19	.00	.63	.97	e.30	e.10	e2.8	22	10	5.5	22	1.2	1.4
20	.00	.63		e.30	e.10		21	10		7.0	.48	1.4
20	.00	.05	•94	e.50	e.10	e2.6	21	10	4.4	7.0	.40	1.4
21	.00	.70	1.0	e.30	e.10	e2.4	19	8.1	3.6	4.3	.23	1.5
22	.00	.72	.84	e.30	e.10	e2.2	18	7.8	3.6	3.3	.59	1.6
23	.00	.71	.95	e.30	e.10	e2.1	19	7.8	3.0	2.8	.79	1.7
24	.00	.84	.90	e.30	e.10	e2.0	20	11	2.8	2.5	•59	1.6
25	.00	.84	.74	e.30	e.20	e3.0	20	13	3.1	2.2	.51	1.3
26	.00	.81	.72	e.30	- 50	-9.0	27	13	3.0	2.1	.42	1.2
					e.50	e8.0	23					
27	.00	.84	.84	e.30	e.60	e24	23	11	2.6	1.8	.75	1.4
28	.00	.73	.98	e.30	e.50	e60	20	8.7	2.2	1.7	1.2	1.7
29	.00	.89	.87	e.30		e180	18	9.2	2.8	1.5	.91	1.2
30	.00	.96	.89	e.30		e220	15	10	5.4	1.4	.74	.77
31	.00		.78	e.30		e240		8.5		1.3	.63	
TOTAL	1.61	21.77	30.06	11.20	6.30	914.40	2022	397.1	302.2	342.1	47.29	50.16
MEAN	.052	.73	.97	.36	.22	29.5	67.4	12.8	10.1	11.0	1.53	1.67
MAX	.65	1.3	1.5	.50	.60	240	318	22	22	71	15	4.0
MIN	.00	.00	.67	.30	.10	.20	15	7.8	2.2	1.3	.00	.22
AC-FT	3.2	43	60	22	12	1810	4010	788	599	679	94	99

CAL YR 1988 TOTAL 2456.37 MEAN 6.71 MAX 82 MIN .00 AC-FT 4870 WTR YR 1989 TOTAL 4146.19 MEAN 11.4 MAX 318 MIN .00 AC-FT 8220

O5117500 SOURIS RIVER ABOVE MINOT, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECONI	CIFIC CON- DUCT- ANCE (US/CM)	PH (STAND- ARD UNITS) (00400)	TEMPER ATURE AIR (DEG C	ATURE WATER) (DEG C	(MG/I	CALCI L DIS- L SOLV (MG/ 3) AS C	DIS- ED SOLVEI L (MG/L A) AS MG	DIS- D SOLVED (MG/L) AS NA)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)
JAN 04	. 0900	0.40	1760		0.	5 1.	_					
FEB	0900	0.40	1700		0.	, ,,					-	
28 MAR	1000	0.50	2360		-16.	0 0.	.0				-	
13		28	610		-3.							
29 APR		186	320	7.69	2.			00 22	11	22	30	1
05	0955	190	248		5.					-		
24 JUN	1950	21	775		9.	5 13.	5			-		
15 JUL	1005	18	990		18.	5 17.	5				-	
19 SEP		24	1260		25.	0 23.	.5					-
06	1120	1.1	1160	8.99	17.	5 17.	5 2	60 38	40	170	56	5
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BONATE, FET-LAN (MG/L AS HCO3)	BONATE, FET-LAB (MG/L AS CO3)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBO DIOXID DIS- SOLVE (MG/L AS CO2 (00405	E SULFAT DIS- D SOLVE (MG/L) AS SO4	DIS- D SOLV (MG/	, RIDE DIS ED SOLV L (MG/ L) AS F	DIS- SOLVE ED (MG/L L AS) SIO2)	, RESIDUE AT 180 D DEG. C DIS- SOLVED (MG/L)	SUM OF CONSTI-	IDS, SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR			_									
29 SEP	9.0	93	0	76	3.	0 70	6.	9 0.	10 7.5	196	195	0.27
06	21	390	33	370	0.	6 180	56	0.	30 0.30	0 781	763	1.06
		SOLVED (TONS PER DAY)	DIS- SOLVED (UG/L AS AS)	DIS- SOLVED (UG/L AS B)	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)	DENUM, DIS- SOLVED (UG/L AS MO)	NIUM, DIS- SOLVED (UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) 01080)
	· · ·	98.4	<1	50	200	<1	10	120	0.2	1	2	150
SEP 06	· · ·	2.24	10	180	30	<1	60	10	0.1	1	<10	340

05120000 SOURIS (MOUSE) RIVER NEAR VERENDRYE, ND

LOCATION.--Lat 48°09'35", long 100°43'45", in NW1/4SW1/4 sec.17, T.154 N., R.78 W., McHenry County, Hydrologic Unit 09010003, on left bank 2.7 mi north of Verendrye, 19 mi upstream from mouth of Wintering River and at mile 302.0.

DRAINAGE AREA.--11,300 mi², approximately, of which about 6,900 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- February to June 1933 (gage heights only), April 1937 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS .-- WSP 2113: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,464.87 ft above National Geodetic Vertical Datum of 1929. February to June 1933, at site 4 mi upstream at datum 1.65 ft higher. April 1, 1937, to Mar. 3, 1938, non-recording gage at present site, at datum 1.97 ft higher.

REMARKS.--Estimated daily discharges: Dec. 10 to Apr. 9. Records good except those for periods of estimated daily discharge, which are fair. Flow regulated by reservoirs on Souris and Des Lacs Rivers, the largest of which is Lake Darling (station 05115500), 128 mi upstream, combined capacity about 248,000 acre-ft. Some small diversions for irrigation and municipal supply.

AVERAGE DISCHARGE.--52 years, 203 ft³/s, 147,100 acre-ft/yr; median of yearly mean discharges, 108 ft³/s, 78,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,900 ft³/s, Apr. 19, 1976, gage height, 17.84 ft; minimum daily flows of 0.3 ft³/s or less occurred in Aug., Sept. 1937, Oct. 1939 and Feb. 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 410 ft³/s, Apr. 3, gage height, 8.30 ft, backwater from ice; maximum gage height, 9.11 ft, backwater from ice, Mar. 14; minimum daily discharge, 1.9 ft³/s, Sept. 17.

		DISCHA	RGE, CUBI	C FEET PE		, WATER YEAR MEAN VALUES	OCTOBER	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.6	5.1	22	e5.5	e3.4	e3.6	e350	57	12	19	20	7.6
2	5.9	5.5	21	e5.5	e3.4	e3.6	e380	50	12	61	15	5.7
3	4.8	6.1	18	e5.4	e3.2	e3.6	e400	47	10	41	12	8.7
3	4.0	6.8	15	e5.0	e3.2	e3.6	e380		8.4	28	9.9	9.1
	3.9	10	13					45				7.0
5	5.9	10	15	e5.0	e3.0	e3.6	e360	43	7.5	20	8.9	7.0
6	6.0	14	10	e4.8	e2.8	e3.6	e300	36	6.9	14	7.9	5.6 5.6
7	7.1	12	9.5	e4.6	e2.8	e3.6	e260	27	6.3	10	6.7	5.6
8	7.6	8.7	8.8	e4.4	e2.6	e3.6	e240	23	5.9	7.8	5.8	5.5
9	11	7.7	7.5	e4.0	e2.8	e3.8	e200	23	5.3	6.2	5.0	5.5 4.6
10	8.3	7.3	e7.1	e3.6	e2.6	e5.0	167	23	4.9	5.1	4.5	4.1
				13.500								
11	5.9	7.0	e7.0	e3.8	e2.6	e10	149	23	5.4	5.1	4.2	4.0
12	14	6.6	e7.0	e4.0	e2.6	e150	119	20	15	5.0	4.0	3.4
13	25	6.3	e7.2	e4.2	e2.6	e280	105	18	26	4.4	5.8	3.1
14	25	6.3	e7.3	e4.4	e2.6	e320	83	17	27	3.9	6.6	2.7
15	27	6.6	e7.0	e4.6	e2.4	e300	70	17	26	3.3	6.3	2.4
						222			22	2.0	0.00	
16	28	6.3	e6.5	e4.6	e2.6	e250	63	16	25	3.1	5.9	1.9
17	26	5.8	e6.0	e4.6	e2.6	e180	55	18	22	3.3	5.7	1.9
18	25	5.6	e5.5	e4.6	e2.8	e140	49	17	17	3.7	5.1	2.0
19	25	5.6	e5.8	e4.6	e2.8	e110	45	16	12	4.2	5.5	4.1
20	25	5.7	e5.5	e4.6	e3.0	e90	42	14	9.3	4.3	5.6	8.8
21	24	6.1	e5.5	e4.6	e3.2	e70	42	11	8.9	4.1	5.5	11
22	23	6.1	e5.2	e4.6	e3.4	e60	40	11	7.8	9.2	5.5	9.3
23	19	7.3	e5.5	e4.2	e3.4	e55	39	11	6.9	14	18	8.6
24	14	24	e5.5	e4.0	e3.4	e50	38	11	6.4	13	21	8.0
25	11	30	e5.2	e3.8			36	11	5.9	15	19	7.7
25		50	67.2	e).0	e3.4	e45	90	11	5.9	15	19	1.1
26	9.1	27	e5.5	e3.6	e3.6	e60	35	11	5.5	22	25	6.9
27	6.9	26	e5.5	e3.4	e3.8	e70	35	11	5.4	24	28	6.6
28	5.3	24	e5.5	e3.4	e3.8	e85	55	10	5.3	27	18	6.3
29	4.5	22	e5.5	e3.4		e150	74	10	6.4	27	12	5.6
30	4.7	21	e5.5	e3.4		e200	70	11	6.4	28	11	4.2
31	5.0		e5.5	e3.4		e300		12		26	9.4	
	440 6		056 6	6		7010 6		-	700 0		700.0	400 4
TOTAL	418.6	338.5	256.6	133.6	84.4	3012.6	4281	670	328.8	461.7	322.8	172.4
MEAN	13.5	11.3	8.28	4.31	3.01	97.2	143	21.6	11.0	14.9	10.4	5.75
MAX	28	30	22	5.5	3.8	320	400	57	27	61	28	11
MIN	3.9	5.1	5.2	3.4	2.4	3.6	35	10	4.9	3.1	4.0	1.9
AC-FT	830	671	509	265	167	5980	8490	1330	652	916	640	342

CAL YR 1988 TOTAL 5981.4 MEAN 16.3 MAX 81 MIN 2.0 AC-FT 11860 WTR YR 1989 TOTAL 10481.0 MEAN 28.7 MAX 400 MIN 1.9 AC-FT 20790

05120000 SOURIS RIVER NEAR VERENDRYE, ND--CONTINUED

WATER-QUALITY RECORD

PERIOD OF RECORD. -- Water years 1950-51, 1957 to current year.

		DIS-	-QUADIII	DAIR, WAI	DIC IDAIC O	OTOBBIL 19	00 10 011	15.155.	OXYGEN,		
DATE	TIME	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)	COLOR (PLAT- INUM- COBALT UNITS) (OOO80)	OXYGEN, DIS- SOLVED (MG/L) (00300)	DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
NOV											20
14 JAN	1730	6.7	1720	8.10	-2.5	2.0	28			430	88
03 FEB	1445	5.4	2530	7.54	-5.5	0.0	23	2.1	14	590	120
27 APR	1610	3.7	1730	7.43	-11.0	0.0	17			550	130
03	1730 1605	399 38	520 860	7.76 8.77	8.5 12.0	0.5 14.5	80 45	9.3	65 107	150 240	32 54
JUN 07	1145	6.3	1360	7.90	13.0	17.5	30	6.6	69	360	77
JUL 18	1720	3.7	1000	8.26	31.5	24.5	50	7.0	83	240	56
SEP 05	1815	5.4	1660	8.49	28.5	18.5	18	8.2	88	370	78
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY 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)
NOV 14	51	240	54	5	12	423	390	100	0.60	11	1210
JAN											
O3 FEB	70	380	58	7	18	594	610	150	0.70	24	1740
27 APR	55	190	42	4	9.6	487	430	51	0.30	27	1190
03 24 JUN	16 25	48 110	40 49	3	9.2 8.8	115 225	120 210	11 17	0.10	8.3 1.3	334 573
07 JUL	41	170	50	4	11	395	270	56	0.40	16	900
18 SEP	25	130	53	4	9.1	282	240	15	0.30	14	682
05	43	240	57	6	15	447	360	86	0.50	3.2	1120
DATE	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOS- PHOROUS TOTAL (MG/L AS P) (00665)	PHOS- PHOROUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)
NOV											
14 JAN	1150	1.65	22.0	<0.100	0.080	0.400	0.200	0.40	-		
03 FEB	1730	2.37	25.4	0.150	1.20	0.940	0.550	0.94	-		
27 APR	1190	1.62	11.9	0.130	1.00	0.390	0.160	0.39	<10	3	56
03	317 562	0.45 0.78	360 58.9	0.570 <0.100	0.370	0.400	0.190 0.110	0.40	30	2	38
JUN 07	882	1.22	15.2	<0.100	0.020	1.70	1.30	1.7			
JUL 18	663	0.93	6.89	<0.100	0.050	2.00	1.10	2.0	20	17	34
SEP 05	1100	1.52	16.4	<0.100	0.020	1.40	1.10	1.4			

RED RIVER OF THE NORTH BASIN
05120000 SOURIS RIVER NEAR VERENDRYE, ND--CONTINUED

DATE	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)
NOV										
14 JAN	340									
03	470									F. 2.2
FEB 27 APR	280	<1	<1	<1	1	17	<5	86	760	<0.1
03	50	<1	1	<1	3	240	<5	21	170	<0.1
24 JUN	130								3-2	
07 JUL	260						-			
18 SEP	200	<1	1	<1	2	14	5	47	52	<0.1
05	290									
DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)
FEB 27	2	2	1	<1	<1	660	<1	<10	7	<0.010
APR 03	<1	9	8	<1	<1	160	3	30	10	<0.010
JUL 18	1	4	2	<1	<1	340	1	10	5	<0.010

05120500 WINTERING RIVER NEAR KARLSRUHE, ND

LOCATION.--Lat 48°10'14", long 100°32'20", on line between secs.10 and 11, T.154 N., R.77 W., McHenry County, Hydrologic Unit 09010003, on left bank 30 ft upstream from county highway bridge, 4 mi upstream from mouth, and 7 mi northeast of Karlsruhe.

DRAINAGE AREA .-- 705 mi2, of which about 420 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--March 1937 to current year. Monthly discharge only for some periods, published in WSP 1308. REVISED RECORDS.--WSP 1728: Drainage area.

GAGE .-- Water-stage recorder. Altitude of gage is 1,480 ft, from river-profile map.

REMARKS.--Estimated daily discharges: Nov. 14, Nov. 28 to Apr. 12. Records fair except those for periods of estimated daily discharge, which are poor. Some regulation by Fish and Wildlife Service dams on Cottonwood and Wintering Lakes; controlled capacity, about 850 acre-ft.

AVERAGE DISCHARGE.--52 years, 12.9 ft³/s, 9,350 acre-ft/yr; median of yearly mean discharges, 11 ft³/s, 8,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,000 ft3/s, Apr. 7, 1949, by velocity-area studies; maximum gage height, 12.0 ft, Apr. 7, 1949, channel choked by packed snow; no flow at times in many years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 120 ft³/s, Mar. 31, gage height, 7.59 ft, backwater from ice; no flow, Jan. 5 to Mar. 9, Mar. 19-25, July 23-27, and Aug. 9-29.

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

DAY	OCT	NOA	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.70	1.5	e1.6	e.10	e.00	e.00	e85	8.8	3.0	1.2	.04	.10
2	.72	1.7	e1.5	e.10	e.00	e.00	e70	8.2	2.8	.69	.01	.07
1 2 3 4 5	.57	1.8	e1.5	e.10	e.00	e.00	e60	7.7	2.6	.61	.01	.40
2												.40
4	-44	2.0	e1.5	e.05	e.00	e.00	e50	7.3	2.6	.43	.00	•39
	.42	2.4	e1.5	e.05	e.00	e.00	e45	7.1	2.1	.26	.00	.30
6 7 8	.44	2.5	e1.5	e.00	e.00	e.00	e40	6.5	1.6	.13	.01	.25
7	.50	2.4	e1.5	e.00	e.00	e.00	e38	5.9	1.2	.27	.02	.19
8	.47	2.3	e1.5	e.00	e.00	e.00	e36	5.5	1.4	.36	.01	.18
9	.49	2.3	e1.5	e.00	e.00	e.00	e44	5.7	1.0	.13	.00	.18
10	.66	2.1	e1.5	e.00	e.00	e.01	e40	6.0	.92	.06	.00	.18
11	.84	1.9	e1.4	e.00	e.00	e.01	e38	5.9	1.2	.39	.00	-53
12	.84	2.2	e1.3	e.00	e.00	e.02	e36	4.9	1.6	.51	.00	•53 •56
13	.75	2.1	e1.2	e.00	e.00	e.04	34	4.0	3.1	.25	.00	.43
14	.88	e2.0	e1.1	e.00	e.00	e.05		3.4	3.2	.18	.00	.35
							30					.25
15	.91	1.9	e1.0	e.00	e.00	e.04	26	4.2	3.3	.06	.00	.25
16	.96	1.9	e.90	e.00	e.00	e.03	22	3.7	3.0	.07	.00	.18
17	1.0	2.0	e.80	e.00	e.00	e.02	18	4.4	2.2	.11	.00	.10
18	.97	1.9	e.70	e.00	e.00	e.02	17	5.1	1.8	.20	.00	.06
19	.99	1.9	e.60	e.00	e.00	e.00	16	5.3	.89	.17	.00	.08
20	1.1	2.0	e.50	e.00	e.00	e.00	15	4.6	.49	.21	.00	.05
21	1.2	1.9	e.40	e.00	e.00	e.00	16	3.7	.45	.11	.00	.06
22	1.2	2.0	e.30	e.00	e.00	e.00	15	2.7	.49	.03	.00	.08
23	1.2	2.1	e.20	e.00	e.00	e.00	14	1.9	.36	.00	.00	.15
24	1.2	2.3	e.10	e.00	e.00	e.00	14	2.5	.29	.00	.00	.19
25	1.2	2.3	e.10	e.00	e.00	e.00	13	3.4	.40	.00	.00	.14
26	1.3	2.3	e.10	e.00	e.00	e.10	13	3.1	.41	.00	.00	.12
27	1.4	2.2	e.10	e.00	e.00	e.20	13	3.2	. 43	.00	.00	.11
28	1.3	e2.0	e.10	e.00	e.00	e.50	11	2.8	.35	.16	.00	.12
29	1.2	e1.9	e.10	e.00		e5.0	10	2.7	1.1	.39	.00	.08
30	1.4	e1.8	e.10	e.00		e30	9.3	3.7	1.0	.18	.03	.08
31	1.5		e.10	e.00		e100		3.4		.08	.05	
					0.00	476 0:	000 7		45 00	7 04	0.40	F 00
TOTAL	28.75	61.6	26.30	0.40	0.00	136.04	888.3	147.3	45.28	7.24	0.18	5.96
MEAN	.93	2.05	.85	.013	.00	4.39	29.6	4.75	1.51	.23	.006	.20
MAX	1.5	2.5	1.6	.10	.00	100	85	8.8	3.3	1.2	.05	.56
MIN	.42	1.5	.10	.00	.00	.00	9.3	1.9	.29	.00	.00	.05
AC-FT	57	122	52	.8	.0	270	1760	292	90	14	.4	12
1000				1 27 7 1				2.5				

CAL YR 1988 TOTAL 970.54 MEAN 2.65 MAX 61 MIN .00 AC-FT 1930 WTR YR 1989 TOTAL 1347.35 MEAN 3.69 MAX 100 MIN .00 AC-FT 2670

e - Estimated

05120500 WINTERING RIVER NEAR KARLSRUHE, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1954-56, 1972 to current year.

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) (OOO2O)	TEMPER- ATURE WATER (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (OOO80)	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)
NOV											
14 APR	1430	1.7	800	8.13	-2.0	0.5	24			330	79
10	1500	39	478	7.86	4.5	0.5	100	10.0	69	140	34
24	1355	14	680	8.02	_ 14.0	14.5	90	8.4	82	220	52
JUN 06	1750	1.4	680	8.29	27.0	23.0	30	10.5	124	270	57
JUL											
18 SEP	1440	0.22	530	8.18	28.5	24.0	30	11.2	131	200	34
05	1600	0.35	555	8.48	26.5	21.5	25	8.7	98	220	42
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY 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)
NOV											
14	33	47	23	1	4.6	337	97	12	0.20	16	512
APR 10	14	47	40	2	7.3	140	100	7.1	0.10	13	326
24	23	69	39	2	7.9	238	120	9.4	0.20	13	454
JUN 06	31	54	30	1	3.5	305	64	8.1	0.20	3.4	419
JUL					705				0.20		
18 SEP	27	46	33	1	3.1	271	20	7.4	0.20	9.2	317
05	27	41	29	1	3.5	271	24	6.4	0.20	13	332
DATE	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOS- PHOROUS TOTAL (MG/L AS P) (00665)	PHOS- PHOROUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)
NOV											
14	491	0.70	2.32	<0.100	0.020	0.030	0.010	0.03			
APR 10	308	0.44	34.8	<0.100	0.060	0.220	0.110	0.22	80	2	75
24	438	0.62	16.8	<0.100	0.050	0.140	0.070	0.14			
JUN 06	404	0.57	1.58	<0.100	0.060	0.050	0.030	0.05			
JUL	740			(0.400	0.070	0.440	0.000	0.44	<10	7	110
18 SEP	310	0.43	0.19	<0.100	0.030	0.140	0.090	0.14	110	3	110
05	320	0.45	0.31	<0.100	<0.010	0.050	0.040	0.05			

05120500 WINTERING RIVER NEAR KARLSRUHE, ND--CONTINUED

DATE	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)
NOV										
14	100									
APR										2000
10	150	<1	<1	1	1	350	<5	14	120	<0.1
24 JUN	200									
06	160									
JUL										
18 SEP	110	<1	<1	<1	2	37	<1	20	6	<0.1
05	120							-		
DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)
APR 10	<1	4	3	<1	<1	100	4	20	<3	<0.010
JUL 18	<1	1	2	<1	<1	110	<1	<10	9	<0.010

05122000 SOURIS (MOUSE) RIVER NEAR BANTRY. ND

LOCATION.--Lat 48°30'20", long 100°26'04", in SE1/4NW1/4SE1/4 sec.14, T.158 N., R.76 W., McHenry County, Hydrologic Unit 09010003, on left bank 200 ft upstream from Nelson bridge, 8 mi east of Bantry, 18 mi upstream from Willow Creek, and at mile 228.0.

DRAINAGE AREA. -- 12,300 mi² approximately, of which about 7,600 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- March 1937 to current year. Monthly discharge only for some periods, published in WSP 1308. REVISED RECORDS. -- WSP 2113: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,427.56 ft above National Geodetic Vertical Datum of 1929. Prior to Mar. 16, 1938, nonrecording gage at same site at datum 0.17 ft lower.

REMARKS.--Estimated daily discharges: Nov. 15 to Apr. 15. Records fair except those below 5 ft³/s, which are poor. Flow regulated by reservoirs on Souris, Des Lacs, and Wintering Rivers, total capacity, about 249,000 acre-ft. Diversions for irrigation of about 7,600 acres at Eaton Dam about 42 mi above station and other other small diversions for irrigation and municipal supply.

AVERAGE DISCHARGE.--52 years, 222 ft3/s, 160,800 acre-ft/yr; median of yearly mean discharges, 130 ft3/s, 94,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,330 ft³/s, Apr. 23, 1976, gage height, 14.59 ft; no flow at times each year 1937-40, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 350 ft³/s, May 19, gage height, 6.19 ft; maximum gage height, 6.27 ft, Mar. 21, backwater from ice; minimum daily discharge, 0.41 ft³/s, Sept. 2.

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

						MEAN VALUE	S					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	34 31 29 27 26	10 8.9 6.6 6.0 6.2	e8.0 e10 e13 e16 e20	e4.0 e4.5 e5.0 e5.5 e5.6	e7.0 e7.0 e7.0 e6.8 e6.6	e5.6 e5.6 e5.6 e5.6	e28 e30 e35 e50 e55	54 55 54 50 43	131 118 103 93 86	22 21 19 19 18	4.8 4.5 4.2 4.0 4.5	1.1 .41 1.7 3.1 3.6
6 7 8 9	24 22 20 18 15	5.1 4.9 4.6 4.0 3.6	e25 e30 e28 e26 e24	e5.5 e5.4 e5.2 e5.0	e6.4 e6.2 e6.0 e5.8 e5.6	e5.8 e6.0 e6.2 e6.8 e7.2	e50 e46 e44 e48 e50	34 32 32 29 32	75 65 54 45 40	17 16 16 17 20	5.8 7.0 7.4 7.7 8.0	5.4 7.1 7.9 8.1 8.4
11 12 13 14 15	13 13 13 17 20	3.2 3.4 2.8 2.1 e2.0	e22 e23 e24 e25 e23	e4.8 e4.6 e4.5 e4.5	e5.4 e5.4 e5.2 e5.2	e7.4 e7.4 e7.6 e7.8 e7.8	e70 e20 e30 e05 e90	98 138 104 80 55	36 34 30 25 22	24 27 27 27 26	8.0 7.8 7.2 6.5 5.8	10 11 11 10 9.2
16 17 18 19 20	20 18 15 14 16	e1.7 e1.6 e1.5 e1.4 e1.3	e21 e18 e17 e16 e14	e4.5 e4.5 e4.5 e4.5	e5.2 e5.2 e5.2 e5.4	e7.6 e8.0 e8.5 e30 e70	80 60 51 48 48	39 83 272 345 335	23 22 21 21 21 22	24 22 22 22 22 20	5.5 4.8 4.2 3.7 2.7	7.9 7.1 6.6 6.9
21 22 23 24 25	18 21 22 22 22	e1.3 e1.2 e1.3 e1.4 e1.6	e12 e10 e9.0 e8.0 e7.0	e4.6 e4.8 e4.8 e5.0 e5.2	e5.4 e5.4 e5.4 e5.4	e100 e80 e60 e45 e40	53 65 73 76 75	301 266 230 198 194	24 25 25 26 26	16 13 11 9.6 8.5	2.0 1.3 .90 .59	6.3 4.6 4.8 4.3 3.4
26 27 28 29 30 31	22 24 23 25 22 17	e1.8 e3.0 e3.5 e4.0 e6.0	e6.0 e5.0 e4.0 e3.0 e4.0	e5.4 e5.8 e6.0 e6.4 e6.6 e6.8	e5.4 e5.4 e5.4	e35 e34 e32 e30 e28 e26	76 74 69 62 56	182 169 163 157 152 143	25 23 21 26 24	7.5 6.1 5.8 5.0 4.7	3.7 3.3 2.9 2.8 2.9	3.5 3.1 3.4 3.6
TOTAL MEAN MAX MIN AC-FT	643 20.7 34 13 1280	106.0 3.53 10 1.2 210	475.0 15.3 30 3.0 942	158.0 5.10 6.8 4.0 313	160.6 5.74 7.0 5.2 319	732.1 23.6 100 5.6 1450	1917 63.9 130 28 3800	4119 133 345 29 8170	1311 43.7 131 21 2600	519.0 16.7 27 4.7 1030	137.49 4.44 8.0 .59 273	173.51 5.78 11 .41 344

CAL YR 1988 TOTAL 8513.1 MEAN 23.3 MAX 160 MIN 1.2 AC-FT 16890 WTR YR 1989 TOTAL 10451.70 MEAN 28.6 MAX 345 MIN .41 AC-FT 20730

05122000 SOURIS RIVER NEAR BANTRY, ND--CONTINUED

WATER-QUALITY RECORDS

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

CUBIC CON- PH TEMPER- TEMPER- TOTAL DIS- D	
14 1215 106 430 8.10 10.0 1.0 130 30 14 28 1400 68 12.5	DIUM, IS- LVED MG/L S NA) D930)
28 1400 68	40
12 1400 11	
SODIUM SIUM, BONATE, BONATE, LINITY DIOXIDE SULFATE RIDE, RAD- DIS- FET-LAB FET-LAB LAB DIS- DIS-	30
14 38 2 7.8 150 0 120 1.9 81 14 SEP 12 49 3 11 380 24 350 0.8 180 38 SOLIDS, SOLIDS, SILICA, RESIDUE SUM OF SOLIDS, DIS- AT 180 CONSTI- DIS- DIS- ARSENIC BORON, IRON, LEAD, SOLVED DEG. C TUENTS, SOLVED SOLVED DIS- DIS- DIS- (MG/L DIS- DIS- (TONS (TONS SOLVED SOLVED SOLVED AS SOLVED SOLVED PER PER (UG/L (UG/L (UG/L))	LUO- IDE, DIS- DLVED MG/L S F) 0950)
SEP 12 49 3 11 380 24 350 0.8 180 38 SOLIDS, SOLIDS, SILICA, RESIDUE SUM OF SOLIDS, DIS- AT 180 CONSTI- DIS- DIS- ARSENIC BORON, IRON, LEAD, SOLVED DEG. C TUENTS, SOLVED SOLVED DIS- DIS- DIS- (MG/L DIS- DIS- (TONS (TONS SOLVED SOLVED SOLVED SOLVED AS SOLVED SOLVED PER PER (UG/L (UG/L (UG/L))	0.10
SOLIDS, SOLIDS, SILICA, RESIDUE SUM OF SOLIDS, DIS- AT 180 CONSTI- DIS- DIS- ARSENIC BORON, IRON, LEAD, SOLVED DEG. C TUENTS, SOLVED SOLVED DIS- DIS- DIS- (MG/L DIS- DIS- (TONS (TONS SOLVED SOLVED SOLVED SOLVED AS SOLVED SOLVED PER PER (UG/L (UG/L (UG/L))	0.10
SILICA, RESIDUE SUM OF SOLIDS, SOLIDS, DIS- AT 180 CONSTI- DIS- DIS- ARSENIC BORON, IRON, LEAD, SOLVED DEG. C TUENTS, SOLVED SOLVED DIS- DIS- DIS- (MG/L DIS- DIS- (TONS (TONS SOLVED SOLVED SOLVED AS SOLVED SOLVED PER PER (UG/L (UG/L (UG/L))	0.30
SIO2) (MG/L) (MG/L) AC-FT) DAY) AS AS B) AS FE) AS PB) DATE (00955) (70300) (70301) (70303) (70302) (01000) (01020) (01046) (01049) APR	
14 6.2 282 269 0.38 80.7 1 70 100 <1	
SEP 12 0.60 682 687 0.93 20.1 7 170 40 <1	
MANGA- MOLYB- SELE- STRON- MENT, SUSP.	
APR 14 15 40 0.4 1 <10 160 20 5.7 94 28 5 .9 98	
SEP 12 50 10 0.1 2 2 320 2 .06 100	

RED RIVER OF THE NORTH BASIN
O5122000 SOURIS RIVER NEAR BANTRY, ND--CONTINUED

		DIS- CHARGE, IN	SEDI-	SEDI- MENT, DIS-
DATE	TEMPER- ATURE WATER (DEG C) (00010)	CUBIC FEET PER SECOND (00060)	MENT, SUS- PENDED (MG/L) (80154)	CHARGE, SUS- PENDED (T/DAY) (80155)
			3000.00	43720555
APR 03 04 05 06 07 08 09 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	1.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	350 550 550 550 550 560 570 570 570 570 570 570 570 570 570 57	16 17 15 18 14 15 18 19 21 22 23 30 32 22 30 25 10 11 10 8 11	12222112367655544801391030588 1222211123676555444335543222111
30. MAY 01. 02. 03. 04. 05. 06. 07. 08. 09. 10. 11. 11. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27.	11.5 12.5 13.5 13.0 10.5 10.0 17.0 17.0 17.0 17.0 18.0 17.5 18.0 17.5 17.5 18.0 17.5 16.0	54 55 54 55 54 50 43 32 29 32 98 138 104 80 55 345 345 335 272 345 335 272 345 336 230 198 198 198 198 198 198 198 198 198 198	11 7 7 18 13 8 10 10 10 12 26 19 12 10 16 17 24 25 21 14 7 9 14 10 15 13	1.6 1.0 2.4 1.5 7.3 0.8 6 0.7 8 0.7 1.9 7.1 4.2 5.7 5.7 5.7 5.7 5.7 5.7 5.7 5.7 5.7 5.7

05123400 WILLOW CREEK NEAR WILLOW CITY, ND

LOCATION.--Lat 48°35'20", long 100°26'30", in NE1/4NW1/4 sec.23, T.159 N., R.76 W., McHenry County, Hydrologic Unit 09010004, on left bank 50 ft downstream from bridge on county road, 1.5 mi upstream from Snake Creek, and 7 mi west of Willow City.

DRAINAGE AREA. -- 1,160 mi2, approximately, of which about 430 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Altitude of gage is 1,430 ft, from topographic map. Prior to Oct. 5, 1956, non-recording gage at site 50 ft upstream at same datum.

REMARKS.--Estimated daily discharges: Apr. 3-6 and May 2 to June 13. Records good except those for periods of estimated discharge, which are poor.

AVERAGE DISCHARGE.--33 years, 41.0 ft³/s, 29,700 acre-ft/yr; median of yearly mean discharges, 20 ft³/s, 14,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 5,900 ft3/s, Apr. 12, 1969, gage height, 16.76 ft; no flow at times each year.

EXTREMES FOR CURRENT YEAR .-- Peak discharges above base of 50 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 7	0815	*1.260	*13.85	No other p	eak greater t	than base discharge	

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

No flow for several months.

					MI	EAN VALU	ES					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	.00	16	e.40	.00	.00	.00
	.00	.00	.00	.00	.00	.00	.00	e15	e.30	.00	.00	.00
3	.00	.00	.00	.00	.00	.00	e5.0	e14	e.20	.00	.00	.00
1	.00	.00	.00	.00	.00	.00	e10	e13	e.10	.00	.00	.00
2 3 4 5	.00	.00	.00			.00	e50	e12	e.05	.00	.00	.00
5	.00	.00	.00	.00	.00	.00	e50	e12	e.05	.00	.00	.00
6	.00	.00	.00	.00	.00	.00	e500	e11	e.00	.00	.00	.00
7	.00	.00	.00	.00	.00	.00	1230	e10	e.00	.00	.00	.00
8	.00	.00	.00	.00	.00	.00	1040	e9.0	e.00	.00	.00	.00
9	.00	.00	.00	.00	.00	.00	821	e8.0	e.00	.00	.00	.00
10	.00	.00	.00	.00	.00	.00	686	e7.0	e.00	.00	.00	.00
11	.00	.00	.00	.00	.00	.00	608	e6.0	e.00	.00	.00	.00
12	.00	.00	.00	.00	.00	.00	526	e5.0	e.00	.00	.00	.00
13	.00	.00	.00	.00	.00	.00	438	e4.0	e.00	.00	.00	.00
14	.00	.00	.00	.00	.00	.00	306	e3.0	.00	.00	.00	.00
								e2.0	.00	.00	.00	.00
15	.00	.00	.00	.00	.00	.00	186	e2.0	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	137	e1.0	.00	.00	.00	.00
17	.00	.00	.00	.00	.00	.00	103	e1.5	.00	.00	.00	.00
18	.00	.00	.00	.00	.00	.00	84	e2.0	.00	.00	.00	.00
19	.00	.00	.00	.00	.00	.00	70	e2.5	.00	.00	.00	.00
20	.00	.00	.00	.00	.00	.00	59	e2.5	.00	.00	.00	.00
21	.00	.00	.00	.00	.00	.00	49	e2.0	.00	.00	.00	.00
22	.00	.00	.00	.00	.00	.00	42	e1.5	.00	.00	.00	.00
23	.00	.00	.00	.00	.00	.00	36	e1.0	.00	.00	.00	.00
23	.00	.00	.00	.00	.00	.00	35	e1.0	.00	.00	.00	.00
24									.00	.00	.00	.00
25	.00	.00	.00	.00	.00	.00	31	e1.5	.00	.00	.00	.00
26	.00	.00	.00	.00	.00	.00	27	e1.0	.00	.00	.00	.00
27	.00	.00	.00	.00	.00	.00	23	e.90	.00	.00	.00	.00
28	.00	.00	.00	.00	.00	.00	21	e.80	.00	.00	.00	.00
29	.00	.00	.00	.00		.00	19	e.70	.00	.00	.00	.00
30	.00	.00	.00	.00		.00	18	e.60	.00	.00	.00	.00
30 31	.00		.00	.00		.00		e.50		.00	.00	
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00	7160.00	156.00	1.05	0.00	0.00	0.00
MEAN	.00	.00	.00	.00	.00	.00	239	5.03	.035	.00	.00	.00
MAX	.00	.00	.00	.00	.00	.00	1230	16	.40	.00	.00	.00
MIN	.00	.00	.00	.00	.00	.00	.00	.50	.00	.00	.00	.00
	.00	.00	.00	.00	.00	.00	14200	309	2.1	.0	.0	.00
AC-FT	.0	.0	.0	.0	.0	.0	14200	309	2.1	.0	••	••

CAL YR 1988 TOTAL 55.99 MEAN .15 MAX 8.0 MIN .00 AC-FT 111 WTR YR 1989 TOTAL 7317.05 MEAN 20.0 MAX 1230 MIN .00 AC-FT 14510

e - Estimated

05123400 WILLOW CREEK NEAR WILLOW CITY, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1960-62, 1964-65, 1972 to current year.

DATE	TIME	DIS CHARG INST CUBI FEE PER SECO (0006	E, SPE- C CON- T DUCT ANCE OND (US/O	IC PH I- (STAN E ARI CM) UNITS	ND- ATUR D AIR S) (DEG	RE ATUI R WATI C) (DEG	RE INUI ER COBA C) UNI	AT- OXYGI M- DIS ALT SOLV TS) (MG)	S- CEN VED SATU /L) ATIC	S- HARI /ED NESS R- TOTA /MT (MG/ JR- AS DN) CACO	G CALCI AL DIS- 'L SOLV (MG/	DIS- VED SOLVED 'L (MG/L CA) AS MG)
APR 12 28	1400 0950	502 21		310 7. 000 8.	.33 10	0.0	5.0		0.1	78 79	94 21 520 63	10 39
DAT			SODIUM		POTAS-	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO-		SOLIDS, RESIDUE AT 180	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)
APR 12 28		21 96	30 39	1 2	9.0 11	83 206	58 270	5.2 37	0.10	13 24	202 689	189 664
DATI		SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	PHOS- PHOROUS TOTAL (MG/L AS P) (00665)	PHOS- PHOROUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BARIUM, DIS- SOLVED (UG/L. AS BA) (01005)	BORON, DIS- SOLVED (UG/L AS B) (O1020)
APR 12 28		0.27	274 39.4	0.310	0.080	0.240 0.210	0.160 0.130	0.24	110	2	30	50 130
DATE		CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)
APR 12		<1	2	1	2	140	<5	17	13	0.1	1	2
DATE		NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (O1145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	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)
APR 12 28		_4	<1 	<1 	88	5	10	7	<0.010	37 5	50 0.26	92 98

O5123400 WILLOW CREEK NEAR WILLOW CITY, ND--CONTINUED WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TEMPER- ATURE WATER (DEG C) (00010)	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)
APR				
03 04 05 06 07 08 10 11 13 14 15 17 18 20 21 22 23 24 25 26 27 28 29	1.0 0.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	5.0 100 500 1230 1230 1040 821 686 608 526 438 306 137 103 84 70 59 49 42 36 35 31 27 23 21 18	9 14 30 26 26 26 26 22 18 20 21 15 10 22 11 15 18 20 21 11 11 11 11	0.12 0.38 586 758 86 758 86 758 86 75 4.8 1.6 1.7 1.7 1.7 1.0 0.55
01 02 03 04 05 07 08 09 11 12 13 14 15 16 19 20	11.5 13.0 14.0 10.0 9.5 13.0 16.5 16.0 17.5 19.0 18.0 18.0 17.0	16 15 14 13 12 11 10 9.0 76.0 5.0 4.0 1.5 2.5	11 16 14 17 17 9 10 7 11 10 14 11 16 16 19 27 27 23 21	0.69 0.67 0.64 0.60 0.29 0.30 0.24 0.15 0.16 0.19 0.13 0.09 0.011 0.09 0.11

05123500 STONE CREEK NEAR KRAMER, ND

LOCATION.--Lat 48°40'42", long 100°42'40", in NW1/4NW1/4 sec.23, T.160 N., R.78 W., Bottineau County, Hydrologic Unit 09010003, on left bank 60 ft upstream from bridge on State Highway 14, 1.0 mi south of Kramer.

DRAINAGE AREA .-- 168 mi2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- March 1986 to current year (seasonal record only).

GAGE.--Water-stage recorder. Datum of gage is 1,425 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to September 16, 1986, nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Apr. 1-5, 9, 23, 30, May 7, 14, 21, and 28-30. Records fair except periods of estimated daily discharge, which are poor.

EXTREMES FOR PERIOD OF RECORD.--Maximum observed discharge, 636 ft3/s, Apr. 6, 1989, gage height, 5.89 ft. No flow most of the time each year.

EXTREMES FOR CURRENT YEAR.--Maximum observed discharge, 636 ft³/s, Apr. 6, gage height, 5.89 ft; no flow for several months.

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

MEAN VALUES AUG SEP DAY OCT NOV DEC TAN. FER MAR APR MAY JUN JUL .00 .00 .00 e.20 1.4 .06 32 .00 .00 2 .00 e1.0 1.4 .31 15 3 .00 1.5 .54 6.3 .00 .00 e50 .84 .49 .00 .00 .00 e300 5 .00 e550 .67 .44 .00 .00 6 .00 620 1.4 .40 .89 .00 .00 405 .40 .65 .00 .00 .00 e1.4 8 230 .34 .47 .00 .00 .00 1.4 9 1.2 .23 .00 .00 .00 e170 10 .00 97 .12 .40 .00 .00 .00 .78 -00 11 .00 58 .16 .34 .52 .35 .00 12 .00 .27 .00 -00 13 .00 28 .20 .00 .00 14 .00 22 e.90 .20 1.2 .00 .00 15 .00 16 1.2 .26 1.4 .00 17 .00 .00 16 .00 2.0 .20 1.3 .00 .00 7.3 1.2 17 .00 2.2 .13 .00 .00 2.6 .06 .97 18 .00 .00 .00 .00 .78 19 .00 5.4 2.8 -00 .00 .00 20 .00 4.7 2.0 .64 .00 .00 4.9 e1.8 .00 .46 21 .00 .00 .00 1.5 .28 .00 .00 22 3.8 e3.3 .97 .00 .00 .16 .00 23 .00 .97 .00 .00 24 2.8 .12 .00 .00 25 -00 2.6 .90 .00 .04 .00 .62 .00 .00 .00 .00 26 .00 2.6 .62 .00 .00 .00 .00 27 .00 1.9 28 .00 1.8 e.60 .00 .00 .00 .00 29 .00 1.6 e.40 55 .00 .00 .00 30 .00 e1.5 e.30 .00 .00 .00 .00 .16 .00 .00 0.00 TOTAL 0.00 2655.40 36.49 113.81 70.48 0.00 88.5 1.18 3.79 2.27 .00 .00 MEAN .00 .00 620 2.8 55 32 .00 .00 MAX .00 .16 .00 .00 .00 MIN .0 5270 72 226 140 .0 .0

e - Estimated

05123500 STONE CREEK NEAR KRAMER, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- April 1989 to July 1989.

				WATER	R-QUALITY	DATA, WAS	TER YEAR	OCTOBER 1	988 TO SE	PTEMBER 1	989		
DAT	TE	TIME	DIS CHARG INST CUBI FEE PER SECO (0006	E, SPE- C CIFI C CON- T DUCT ANCE ND (US/O	C PH C- (STA E AR CM) UNIT	ND- ATUR D AIR S) (DEG	RE ATUI R WATI C) (DEG	RE INUI ER COB. C) UNI	AT- OXYG M- DI ALT SOL IS) (MG	S- CEI VED SATI /L) ATI	S- HARI VED NESS R- TOTA (MG, UR- AS ON) CACC	S CALCI AL DIS- /L SOLV (MG/ 03) AS (DIS- VED SOLVED /L (MG/L CA) AS MG)
APR 12	2	1230	33	2	255 7	.10	8.0	4.5	100 1	0.2	77	88 22	8.1
	9	1140	1.	2 6						8.5		230 52	25
	3	1540	0.	18 7				5.0		9.9		290 60	35
JUL 25	5	1730	0.	05 6	510 7	.38 33	3.5 2	7.0		6.3	78	240 49	28
	DATI	S	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	DIS- SOLVED (MG/L AS K)	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)
I	APR 12		12	21	0.6	9.2	87	30	2.7	0.10	17	175	160
N	MAY 09		39	25	1	20	215	110	8.3	0.20	22	440	407
3	JUN 13		35	19	0.9		310	75	5.3	0.20	8.9	467	429
3	JUL 25		38	24	1	17	257	66	6.3	0.20	36	418	408
		S	SOLIDS, DIS- SOLVED (TONS PER AC-FT)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA	PHOS- PHOROUS TOTAL (MG/L AS P)	PHOS- PHOROUS ORTHO, DIS- SOLVED (MG/L AS P)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P)		ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, DIS- SOLVED (UG/L AS BA)	BORON, DIS- SOLVED (UG/L AS B)
	DATE	E (70303)	(70302)	(00631)	(00610)	(00665)	(00671)	(00670)	(01106)	(01000)	(01005)	(01020)
	APR 12 MAY		0.24	15.6	1.20	0.140	0.360	0.260	0.36	100	5	31	50
J	09		0.60	1.44	<0.100	0.030	0.760	0.580	0.76				130
J	13		0.64	0.23	<0.100								150
	25		0.57	0.06	<0.100	0.020	1.10	1.00	1.1	<10	6	56	10000
	DATE		ADMIUM 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)	DIS-	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (O1060)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)
A	12		<1	1	<1	2	180	/5	13	8	0.3	1	<1
J	JUL 25		<1	<1	<1	2	53	<5 <1	48	59	0.3	<1	3
	27				``	-))		40	,,,		SEDI-	SED.
	DATE		DIS- SOLVED (UG/L AS NI) 01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
A	APR												3.2
M	12		3	<1	<1	84	10	<10	6	<0.010	36	3.2	96
J	09								18.55		4	0.01	90
J	13							-	-		2	0.00	100
	25			<1	<1	250	3	<10	<3	<0.010	2	0.00	100

RED RIVER OF THE NORTH BASIN

05123500 STONE CREEK NEAR KRAMER, ND--CONTINUED

DATE	TEMPER- ATURE WATER (DEG C) (OOO10)	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	
APR 03 05 06 07 08 09 11 12 13 14 15 16 17 18 20 21 22 23 24 25 26 27 28 26 27 28 29 30 MAY 01 02 03	1.0 00.0 2.5 0.0 1.5 0 7.0 0.0 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0	500 300 550 620 405 230 170 97 58 22 16 17 13 75 4.7 98 3.3 2.6 6.6 98 1.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	19 28 53 72 61 39 31 30 28 22 24 22 23 23 21 19 11	2.6 239 105 79 38 222 10 4.8 2.3 1.7 0.99 0.42 0.30 0.24 0.16 0.01 0.00 0.04	
01 02 03 04 05 06 07 08 09 11 12 13 14 16 17 18 19 20 21 22 23 24 25 26 27	6.5 8.55 11.0 6.5 12.0 12.5 13.0 14.0 15.0 15.0 14.0 14.0 14.0	1.4 1.5 0.67 1.4 1.4 1.2 1.1 0.78 0.52 2.0 2.2 2.8 2.0 2.2 2.8 2.9 0.90 0.62	939368664444544344334689173	0.03 0.05 0.04 0.03 0.05 0.02 0.02 0.01 0.01 0.01 0.01 0.01 0.02 0.02	

05123510 DEEP RIVER NEAR UPHAM, ND

LOCATION.--Lat 48°35'03", long 100°51'44", in SW1/4NW1/4 sec.22, T.159 N., R.79 W., McHenry County, Hydrologic Unit 09010005, 60 ft downstream from county highway bridge, 0.8 mi downstream from Little Deep River, and 6.3 mi west of Upham.

DRAINAGE AREA .-- 975 mi2, of which about 605 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- September 1957 to September 1980, March 1985 to current year (seasonal records only since 1985).

GAGE .-- Water-stage recorder. Elevation of gage is 1,430 ft, from topographic map.

REMARKS .-- Estimated daily discharges: Apr. 1-5. Records fair.

AVERAGE DISCHARGE.--23 years (water years 1958-80), 20.4 ft³/s, 14,780 acre-ft/yr; median of yearly mean discharges, 0.90 ft³/s, 650 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 6,760 ft³/s, Apr. 12, 1969, gage height, 18.18 ft; no flow at times each year.

EXTREMES OUTSIDE PERIOD OF RECORD. -- Flood in April 1951 reached a stage of about 16 ft, discharge, 2,700 ft3/s, from information by local residents.

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

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 967 ft³/s, Apr. 6, gage height, 13.06 ft; no flow for several months.

MEAN VALUES DAY OCT APR JUN JUL AUG SEP NOV DEC FEB MAR MAY JAN. 12 .03 .00 .00 .00 .00 e.20 .00 9.0 7.3 6.3 2 e10 .03 .00 .00 .00 3 .03 .00 .00 .00 e30 .00 e60 .02 .00 .00 .00 45 .00 e200 5.4 .02 .00 .00 .00 6 .00 739 4.5 .01 .00 .00 .00 .00 716 3.9 .01 .00 .00 .00 8 .00 563 3.6 .00 .00 .00 .00 .00 432 3.0 .00 .00 .00 .00 10 .00 327 2.4 .00 .00 .00 .00 .00 11 .00 250 1.8 .00 .00 .00 12 .00 195 1.2 .00 .00 .00 .00 .00 13 .00 159 1.0 .00 .00 .00 .00 123 .80 -00 .00 .00 -00 15 .00 100 .61 .00 .00 .00 .00 .00 .00 85 .45 .00 -00 16 .00 .00 .00 71 .00 .00 17 .00 .39 .00 .00 .33 -00 .00 18 .00 -00 .00 .00 .00 19 .00 57 .15 .00 .00 .00 52 .00 20 .00 .09 .00 .00 .00 .00 .00 48 21 .00 .06 .00 .00 .00 .00 43 22 .05 .00 .00 .00 .00 .00 23 32 .05 .00 .00 .00 .00 .00 24 .06 .00 .00 .00 .00 .00 25 .00 24 .07 .00 .00 .00 .00 26 .00 21 .08 .00 .00 .00 .00 27 28 .00 18 .07 .00 .00 .00 .00 29 .00 16 .05 .00 .00 .00 .00 30 .00 .04 .00 .00 .00 .00 31 .00 .04 .00 .00 ---0.00 0.15 0.00 0.00 TOTAL 0.00 4511.20 65.06 MEAN .00 150 2.10 .005 .00 .00 .00 MAX .00 739 12 .03 .00 .00 .00 .00 .00 MIN .00 .20 .04 .00 .00 AC-FT .0 8950 129 .3 .0 .0 .0

e - Estimated

05123510 DEEP RIVER NEAR UPHAM, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1972-80, 1985 to current year.

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (OOO95)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (OOO2O)	TEMPER- ATURE WATER (DEG C) (OOO10)	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)
APR		200				2.2			24	.35
13	1515 1200	702 160	233 280	7.52 7.35	11.0	6.0	10.0	80	89 110	19 26
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	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)
APR 07 13	10 12	6.5 8.5	12 13	0.3	9.1 9.9	80 100	0	66 83	3.8 7.2	32 42
DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON, DIS- SOLVED (UG/L AS B) (01020)	IRON, DIS- SOLVED (UG/L AS FE) (01046)
APR 07 13	9.0 9.1	0.0	6.6 10	133 195	132 168	0.18 0.27	252 84.2	<1 1	40 30	110 60
DATE	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	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)
APR 07 13	<1 1	8 10	50 20	0.1	1 1	3 1	100 130	10	4.4	 68

05123750 CUT BANK CREEK AT UPHAM, ND

LOCATION.--Lat 48°4'29", long 100°44'39", in SE1/4SE1/4SW1/4 sec.21, T.159 N., R.78 W., McHenry County, Hydrologic Unit 09010005, on left bank 50 ft downstream from county highway bridge, and 0.5 mi southwest of Upham.

DRAINAGE AREA. -- 722 mi², of which about 450 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- October 1974 to September 1980. March 1986 to current year (seasonal records only since 1986).

GAGE.--Water-stage recorder. Datum of gage is 1,422.77 ft above National Geodetic Vertical Datum of 1929. From March to September 1986 nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Apr. 1-5, 9, 12, 23, 30, May 7, 14, 21, and 28-30. Records fair.

AVERAGE DISCHARGE. -- 6 years (1975-80), 13.7 ft3/s, 9,930 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 820 ${\rm ft}^3/{\rm s}$, Apr. 1, 1976, gage height, 7.24 ft from high water mark; no flow for several months each year.

EXTREMES FOR CURRENT YEAR.—Maximum discharge, 10 ft^3/s , Apr. 5, gage height, 3.32 ft observed, backwater from ice; no flow for several months.

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	1.8	.27	.00	.00	.00
2									12.			
2						.00	e.00	1.7	.27	.00	.00	.00
3						.00	e1.0	1.7	.27	.00	.00	.00
4						.00	e6.0	1.7	.20	.00	.00	.00
1 2 3 4 5						.00	e9.0	1.3	.18	.00	.00	.00
						.00	49.0					
6 7 8 9	3.0					.00	8.9	1.3	.10	.00	.00	.00
7						.00	6.0	e1.3	.08	.00	.00	.00
8						.00	4.2	1.3	.00	.00	.00	.00
0						.00		1.02				
9						.00	e4.1	1.3	.00	.00	.00	.00
10						.00	4.0	1.2	.00	.00	.00	.00
11						.00	4.0	1.1	.00	.00	.00	.00
12						.00	-7.0					.00
12						.00	e3.8	•99	.00	.00	.00	.00
13						.00	3.6	.81	.00	.00	.00	.00
14						.00	3.0	e.70	.00	.00	.00	.00
12 13 14 15						.00	2.4	.62	.00	.00	.00	.00
											15.5	
16						.00	1.9	.62	.00	.00	.00	.00
17						.00	1.3	.75	.00	.00	.00	.00
18						.00	1.1	.62 .75 .75 .67	.00	.00	.00	.00
10						.00	.85	67	.00	.00	.00	.00
19 20						.00	.09	.60	.00	.00		.00
20						.00	.78	.02	.00	.00	.00	.00
21						.00	.85	e.55	.00	.00	.00	.00
22						.00	1.1	.50	.00	.00	.00	.00
27						.00		. 50	.00			.00
45						.00	e1.4	.47 .50	.00	.00	.00	.00
24						.00	1.7	.50	.00	.00	.00	.00
22 23 24 25						.00	1.8	.50	.00	.00	.00	.00
26						00	2.0	47	.00	.00	.00	00
20						.00	2.0	.47 .47 e.40				.00
27						.00	2.0	• 47	.00	.00	.00	.00
28						.00	1.9	e.40	.00	.00	.00	.00
29						.00	1.8	e.35	.00	.00	.00	.00
30						.00	e1.8	e.35	.00	.00	.00	.00
26 27 28 29 30 31						.00		.30		.00	.00	
51						.00		.50		.00	.00	
TOTAL						0.00	82.18	26.60	1.79	0.00	0.00	0.00
MEAN						.00	2.74	.86	.060	.00	.00	.00
MAX						.00	9.0	1.7	.29	.00	.00	.00
									.29			
MIN						.00	.00	.30	.00	.00	.00	.00
AC-FT						.0	163	53	3.6	.0	.0	.0

e - Estimated

05123750 CUT BANK CREEK AT UPHAM, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1974-80, 1986 to current year.

DATE	TIM	DI CHAR INS CUB FE PE SEC (OOO	GE, S T. C IC C ET I R A	SPE- CIFIC CON- DUCT- ANCE JS/CM)	PH (STAND- ARD UNITS) (00400)	AIR (DEG C	ATURE WATER C) (DEG (E (MG/ R AS C) CACO	CALC L DIS- L SOL (MG 3) AS	VED /L CA)	MAGNE- SIUM DIS- SOLVE (MG/L AS MG (00925	DIS- D SOLVE (MG/I	D L SODI	NT RATIO
APR 06 13			·9 ·7	215 410	7.10				60 31		19	19	-	19 0.7
08 JUN	185	5 1	.3	763	-	- 21.	.0 13.	.0			-	-		
07	150	0 0	.12	925	7.40	13.	.0 13.	.0 4	10 73		56	46	9	19 1
DATE	POTAL SIU DIS- SOLV (MG/1 AS K	M, BONA FET- ED (MG L AS) HCO	TE, BO LAB FE /L (CAR- DNATE, ET-LAB (MG/L AS CO3) 95445)	ALKA- LINITY LAB (MG/L AS CACO3)		DE SULFATE DIS- ED SOLVE (MG/I	DIS- ED SOLV (MG/1	RID DI ED SOL L (MG L) AS	E, S- VED /L F)	SILICA DIS- SOLVEI (MG/L AS SIO2)	AT 180 DEG. DIS- SOLVI	UE SUM OF CONSTRUCT OF TUENTS - DIS- ED SOLVEL) (MG/I	F SOLIDS, I- DIS- S, SOLVED - (TONS ED PER L) AC-FT)
APR 13 JUN	14	120		0	96	15	94	8.	4 0	.10	8.2	2	92 2	52 0.40
07	18	330		0	270	21	230	12	0	.20	0.0	6	21 60	0.84
	DATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	ARSEN DIS SOLV (UG/ AS A	S- VED S L AS)	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)	SOI (UC	IS- LVED G/L HG)	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)
		2.90		2	40	30	<1	13	10		0.3	2	<10	160
JUN 07	• • •	0.20		3	80	170	<1	50	1200		0.2	1	<10	370

05123760 DEEP RIVER BELOW CUT BANK CREEK NEAR UPHAM, ND

LOCATION.--Lat 48°36'14", long 100°47'41", in SW1/4SW1/4SW1/4 sec.7, T.159 N., R.78 W., McHenry County, Hydrologic Unit 09010005, at bridge 0.5 mi below Cut Bank Creek, and about 3.5 mi northwest of Upham at bridge on county highway.

DRAINAGE AREA.--1,722 \min^2 , of which about 1,070 \min^2 is probably noncontributing.

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1975 to September 1980, March 1986 to current year.

REMARKS.--Discharge computed from records at stations 05123510 Deep River near Upham and 05123750 Cut Bank Creek at Upham.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

Part			"ALDI	-QUADITI	DAIA, WAL	ER IBAR C	CIOBER 15	00 10 551	IEMBER 15	,09		
MAY	DATE	TIME	CIFIC CON- DUCT- ANCE (US/CM)	(STAND- ARD UNITS)	ATURE AIR (DEG C)	ATURE WATER (DEG C)	(PLAT- INUM- COBALT UNITS)	DIS- SOLVED (MG/L)	DIS- SOLVED (PER- CENT SATUR- ATION)	NESS TOTAL (MG/L AS CACO3)	DIS- SOLVED (MG/L AS CA)	SIUM, DIS- SOLVED (MG/L AS MG)
MAY O9 O5 O5 O5 O5 O5 O5 O5		1400	280	7 30	13.0	5.5	70	10.8	95	110	26	12
13 1640 670 8.19 17.0 14.5 50 8.9 86 290 58 35 35 35 35 35 35 35	MAY								117			
SOLIUH, SOLIUH SOLIUH SULPH	JUN											
SOLIUM, DIAP SOLIUM, DIAP SOLIUM, LINITY SULFATE SULFATE DIAP DIAP	12	1640	670	8.19	17.0	14.5	50	8.9	86	290		
13 8.2 12 0.3 9.6 84 43 8.5 0.10 9.4 184 169	DATE	DIS- SOLVED (MG/L AS NA)	PERCENT	AD- SORP- TION RATIO	SIUM, DIS- SOLVED (MG/L AS K)	LINITY LAB (MG/L AS CACO3)	DIS- SOLVED (MG/L AS SO4)	RIDE, DIS- SOLVED (MG/L AS CL)	RIDE, DIS- SOLVED (MG/L AS F)	DIS- SOLVED (MG/L AS SIO2)	RESIDUÉ AT 180 DEG. C DIS- SOLVED (MG/L)	SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)
Ogn. 25	13	8.2	12	0.3	96	84	43	8.5	0.10	9.4	184	169
13 28	09	23	16	0.7	13	160	110	18	0.10	13	381	351
SOLIDS, SOLIDS DIS- DI		28	16	0.7	17	209	120	19	0.10	7.4	409	410
13	DATE	DIS- SOLVED (TONS PER AC-FT)	DIS- SOLVED (TONS PER DAY)	GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	GEN, AMMONIA TOTAL (MG/L AS N)	PHOROUS TOTAL (MG/L AS P)	PHOROUS ORTHO, DIS- SOLVED (MG/L AS P)	PHOROUS ORGANIC TOTAL (MG/L AS P)	INUM, DIS- SOLVED (UG/L AS AL)	DIS- SOLVED (UG/L AS AS)	DIS- SOLVED (UG/L AS BA)	DIS- SOLVED (UG/L AS B)
Og 0.52 0.0 <0.100 0.020 0.150 0.060 0.15 60	13	0.25	0.0	0.170	0.080	0.200	0.120	0.20	50	2	36	40
13	09	0.52	0.0	<0.100	0.020	0.150	0.060	0.15				60
CADMIUM MIUM, COBALT, COPPER, DIS- DIS-	13	0.56	0.0	<0.100								100
13 <1 2 2 1 82 <5 8 15 <0.1 <1 <1 <1	DATE	DIS- SOLVED (UG/L AS CD)	MIUM, DIS- SOLVED (UG/L AS CR)	DIS- SOLVED (UG/L AS CO)	DIS- SOLVED (UG/L AS CU)	DIS- SOLVED (UG/L AS FE)	DIS- SOLVED (UG/L AS PB)	DIS- SOLVED (UG/L AS LI)	NESE, DIS- SOLVED (UG/L AS MN)	DIS- SOLVED (UG/L AS HG)	DENUM, DIS- SOLVED (UG/L AS MO)	TOTAL RECOV- ERABLE (UG/L AS NI)
NICKEL, NIUM, TOTAL TIUM, DIUM, TOTAL ZINC, DIS- CYANIDE MENT, SUSP. DIS- CYANIDE MENT, CHARGE, DIAM. SOLVED SOLVED SOLVED SOLVED SOLVED ERABLE SOLVED SOLVED ERABLE SOLVED TOTAL SUS- SUS- FINER (UG/L (U		<1	2	2	1	82	<5	8	15	<0.1	<1	<1
13 1 <1 <1 76 3 10 6 <0.010 11 0.0 66 MAY 09 3 0.0 100 JUN	DATE	DIS- SOLVED (UG/L AS NI)	NIUM, DIS- SOLVED (UG/L AS SE)	TOTAL RECOV- ERABLE (UG/L AS AG)	TIUM, DIS- SOLVED (UG/L AS SR)	DIUM, DIS- SOLVED (UG/L AS V)	TOTAL RECOV- ERABLE (UG/L AS ZN)	DIS- SOLVED (UG/L AS ZN)	TOTAL (MG/L AS CN)	MENT, SUS- PENDED (MG/L)	MENT, DIS- CHARGE, SUS- PENDED (T/DAY)	SUSP. SIEVE DIAM. % FINER THAN .062 MM
09 3 0.0 100 JUN	13	1	<1	<1	76	3	10	6	<0.010	11	0.0	66
JUN										3	0.0	100
	JUN								_			

RED RIVER OF THE NORTH BASIN

O5123760 DEEP RIVER BELOW CUT BANK CREEK NEAR UPHAM, ND WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TEMPER- ATURE WATER (DEG C) (00010)	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)
APR 03 04 05 06 07 08 09 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	0.5 1.0 0.0 0.0 0.0 1.0 6.5 6.0 7.5 5.5 5.5 5.5 9.0 11.0 12.0 12.0 13.0 9.0	31 66 209 748 722 567 436 331 254 199 163 126 102 87 72 62 58 34 34 38 34 36 26 23 20 18	24 18 19 32 455 200 279 154 152 100 250 113 28 250 124 60 47 45 59 124 50 50 50 50 50 50 50 50 50 50 50 50 50	2.02 11 65 80 105 105 105 105 105 105 105 10
MAY 01 02 03 04 05 06 07 08 10 11 12 13 14 15 16 17 18 20 21 22 24 25 24 27	9.0 10.0 11.0 9.5 12.5 14.0 15.0 15.5 18.0 18.0 17.0 16.0 16.0 16.0 14.0 13.5	14 11 8.9 7.8 65.9 4.9 5.2 4.9 5.2 2.8 5.2 1.0 0.7 6.5 5.5 0.5 5.5 0.5 5.5 0.5 5.5 0.5 0.5 0	21 19 48 14 31 48 35 10 18 17 11 10 20 36 36 38 31 33 29 21 20	0.79 0.56 1.2 0.29 0.57 0.81 0.67 0.12 0.17 0.13 0.09 0.04 0.05 0.06 0.05 0.05 0.05 0.05 0.05 0.05

05123900 BOUNDARY CREEK NEAR LANDA. ND

LOCATION.--Lat 48°48'46", long 100°51'46" at east line sec.35, T.162 N., R.79 W., Bottineau County, Hydrologic Unit 09010002, on right bank 80 ft downstream from bridge on county road, 5 mi upstream from mouth, and 6 mi southeast of Landa.

DRAINAGE AREA. -- 230 mi2, of which about 60 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- September 1957 to September 1981, March 1985 to September 1985 (seasonal records only since 1985).

REVISED RECORDS .-- WSP 1728: Drainage area.

GAGE .-- Water-stage recorder. Datum of gage is 1,420.03 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Mar. 31 to Apr. 3, Apr. 25 to May 31, and June 30 to Aug. 21. Records poor.

AVERAGE DISCHARGE.--24 years (1958-1981, 1985), 12.3 ft^3/s , 8,910 acre-ft/yr; median of yearly mean discharges, 5.5 ft^3/s , 4,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,580 ft³/s, Apr. 9, 1969, gage height, 12.70 ft; maximum gage height, 12.90 ft, Apr. 1, 1976, backwater from ice and snow; no flow for several months each year.

EXTREMES FOR CURRENT YEAR. -- Maximum discharge, about 800 ft3/s, Apr. 3, gage height, 11.52 ft, backwater from ice; no flow for several months.

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	e250	e.65	.00	e347	e.75	.00
2						.00	e500	e.60	.00	e241	e.70	.00
2 3 4 5						.00	e750	e.55	.00	e143	e.70	.00
2											e.65	.00
4						.00	715	e.50	.00	e97		
5						.00	675	e.45	.00	e72	e.65	.00
6 7 8 9						.00	425	e.40	.00	e49	e.60	.00
7						.00	219	e.38	.00	e34	e.60	.00
8						.00	118	e.36	.00	e22	e.55	.00
9						.00	105	e.34	.00	e17	e.55	.00
10						.00	102	e.32	.00	e15	e.50	.00
11						.00	82	e.28	.00	e12	e.45	.00
12						.00	69	e.24	.00	e9.0	e.40	.00
13						.00	81	e.20	.00	e7.5	e.35	.00
14						.00		e.14	.00	e5.5	e.30	.00
							107					
15						.00	80	e.05	.00	e4.0	e.25	.00
16						.00	56	e.06	.00	e3.5	e.20	.00
17						.00	30	e.28	.00	e3.0	e.15	.00
18						.00	21	e.30	.00	e2.6	e.10	.00
19						.00	18	e.29	.00	e2.2	e.06	.00
20						.00	20	e.20	.00	e2.0	e.03	.00
21						.00	10 6.5	e.08	.00	e1.8	e.00	.00
22						.00	6 5	e.00	.00	e1.6	.00	.00
21 22 23							3.7	e.00	.00	e1.4	.00	.00
25						.00						.00
24 25						.00	2.3	e.00	.00	e1.3	.00	
25						.00	e1.5	e.00	00	e1.2	.00	.00
26						.00	e1.0	e.00	.00	e1.1	.00	.00
27						.00	e.90	e.00	.00	e1.0	.00	.00
28						.00	e.80	e.00	.00	e.95	.00	.00
29						.00	e.75	e.00	.00	e.90	.00	.00
30						.00	e.70	e.00	e177	e.85	.00	.00
29 30 31						e150		e.00		e.80	.00	
									455 00	4404 00	0.54	0.00
TOTAL						150.00	4451.15	6.67	177.00	1101.20	8.54	0.00
MEAN						4.84	148	.22	5.90	35.5	.28	.00
MAX						150	750	.65	177	347	-75	.00
MIN						.00	.70	.00	.00	.80	.00	.00
AC-FT						298	8830	13	351	2180	17	.0

e - Estimated

05123900 BOUNDARY CREEK NEAR LANDA, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- April 1989 to May 1989.

DATE	TIME	DIS CHARG INST CUBI FEE PER SECO (0006	E, SPE- C CON- T DUCT ANCE ND (US/O	C PH C (STAN C ARE	ND- ATUR D AIR B) (DEG	RE ATUR R WATE C) (DEG	RE INUM ER COBA C) UNIT	AT- OXYGE M- DIS ALT SOLV TS) (MG/	S- CEN /ED SATI /L) ATI	S- HARD VED NESS R- TOTA NT (MG/ JR- AS DN) CACC	CALCIAL DIS- L SOLV (MG/	DIS- VED SOLVED (L (MG/L CA) AS MG)
APR 06 12 MAY	1600 0900	365 70		200			2.0	70 11	1.0	80	100 25	9.6
09	1015	0.	32 7	732 7	.91 19	9.5 13	5.0	70 7	7.5	70 2	260 58	28
DATE	S	(MG/L AS NA)	SODIUM	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)
APR			-			-2	1220	2.2			20.4	400
12		19	27	0.8	9.0	92	52	3.3	0.10	16	204	192
09		55	30	2	13	192	180	9.3	0.10	28	512	487
DATE		DIS- SOLVED (TONS PER AC-FT)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	GEN, AMMONIA TOTAL (MG/L AS N)	PHOS- PHOROUS TOTAL (MG/L AS P) (00665)	SOLVED (MG/L AS P)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	DIS-	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	BORON, DIS- SOLVED (UG/L AS B) (01020)
APR												
12 MAY		0.28	38.8	0.510	0.070	0.270	0.190	0.27	120	4	32	50
09		0.70	0.44	<0.100	0.020	0.200	0.110	0.20				90
DATE		ADMIUM DIS- SOLVED (UG/L AS CD) 01025)	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)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	DIS- SOLVED (UG/L AS MN)	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)
APR 12		<1	<1	1	2	170	<5	14	9	0.2	1	3
DATE	N	ICKEL, DIS- SOLVED (UG/L AS NI) 01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)		ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CYANIDE TOTAL (MG/L AS CN) (00720)	SEDI- MENT, SUS- PENDED (MG/L)	SEDI- MENT, DIS-	SED. SUSP. SIEVE DIAM. # FINER THAN .062 MM (70331)
APR 12		4	<1	<1	81	8	10	5	<0.010	36	6.9	100
MAY 09										5	0.00	83
03			-					100			0.00	

RED RIVER OF THE NORTH BASIN

05123900 BOUNDARY CREEK NEAR LANDA, ND--CONTINUED

DATE	TEMPER- ATURE WATER (DEG C) (00010)	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	
APR 03 04 05 06 07 09 10 11 12 13 14 15 16 17 18 20 21 22 24 25 24 25 26 27 28 29	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	750 715 675 425 219 118 105 102 82 69 81 107 80 21 18 20 10 6.5 3.7 2.3 1.5 0.90 0.80 0.75 0.70	83 81 57 61 41 47 45 40 51 53 60 61 44 57 92 63 61 11 11 11 11 11 11 11 11 11 11 11 11	168 156 104 70 36 13 12 13 10 7.5 8.7 15 11 8.5 5.2 2.4 1.0 0.51 0.14 0.04 0.04 0.03 0.03	
MAY 01 02 03 04 05 07 08 11 12 13 14 15 16 17 18 19 20	7.0 9.0 12.0 10.0 7.0 6.0 12.5 11.0 12.5 11.5 13.0 14.5 13.0	0.65 0.60 0.55 0.50 0.40 0.38 0.34 0.32 0.24 0.20 0.14 0.05 0.06 0.28 0.29 0.20	1992466537755555100343557	0.03 0.05 0.05 0.06 0.08 0.03 0.01 0.00 0.00 0.00 0.00 0.00 0.00	

O5124000 SOURIS (MOUSE) RIVER NEAR WESTHOPE, ND (International gaging station) (National stream quality accounting network station and radiochemical program station)

LOCATION.--Lat 48°59'47", long 100°57'29", in SW1/4SE1/4 sec.30, T.164 N., R.79 W., Bottineau County, Hydrologic Unit 09010003, on left bank 1,200 ft upstream from second crossing of international boundary, 1 mi downstream from Fish and Wildlife Service Dam 357, 7 mi northeast of Westhope, 11 mi downstream from Boundary Creek, and at mile 154.5.

DRAINAGE AREA .-- 16,900 mi2, approximately, of which about 10,300 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- July to October 1929, April 1930 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS. -- WSP 1338: 1932. WSP 2113: Drainage area.

GAGE.--Water-stage recorder and control. Datum of gage is 1,402.45 ft above National Geodetic Vertical Datum of 1929. Prior to Mar. 28, 1938, nonrecording gage at site 6.3 mi upstream at datum 2.52 ft higher.

REMARKS.--Estimated daily discharges: Mar. 27 to Apr. 13 and June 4-19. Records good. Flow regulated by dams on Souris River and tributaries, combined capacity, about 321,000 acre-ft. Diversion at Eaton Dam for irrigation of about 7,600 acres and other small diversions for irrigation and municipal supply upstream from station.

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

AVERAGE DISCHARGE.--58 years (water years 1931-89), 254 ft³/s, 184,000 acre-ft/yr; median of yearly mean discharges, 142 ft³/s, 103,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,600 ft³/s, Apr. 26, 1976, gage height, 19.16 ft; maximum daily reverse flow, 35 ft³/s, Apr. 8, 1943, caused by backwater from downstream tributary inflow; no flow at times in some years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,450 ft³/s, Apr. 7, gage height, 9.82 ft, ice backwater; no flow, Nov. 29 to Mar. 26.

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

		DISCHA	MGE, CODI	C PEET PE	N SECOND,	EAN VALU	JES	K 1900 10	SEF TEMBER	1 1 90 9		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	21 22 21 26 26	5.6 9.4 7.7 12	.00 .00 .00	.00 .00 .00	.00 .00 .00	.00 .00 .00	e3.0 e30 e200 e500 e850	63 63 75 88 85	20 19 20 e20 e20	30 31 31 32 31	25 25 25 25 25 24	23 23 23 22 21
6 7 8 9	25 24 24 23 21	18 16 6.6 2.3	.00 .00 .00	.00 .00 .00	.00 .00 .00	.00 .00 .00	e1200 e1300 e1200 e1100 e980	91 91 90 97 124	e20 e20 e20 e20 e20	32 35 42 43 45	24 23 23 24 23	21 21 20 21 21
11 12 13 14 15	25 29 27 23 22	.52 .51 .55 .43	.00 .00 .00	.00 .00 .00	.00 .00 .00	.00 .00 .00	e900 e825 e790 774 589	128 96 58 56 56	e20 e20 e20 e21 e21	48 48 48 47 47	23 23 23 23 23	21 23 23 23 23
16 17 18 19 20	19 21 21 23 22	.24 .17 .13 .10	.00 .00 .00	.00 .00 .00	.00 .00 .00	.00 .00 .00	520 504 484 469 342	57 57 57 56 52	e21 e21 e21 e21 25	47 50 54 58 57	23 22 22 21 21	23 22 21 22 22
21 22 23 24 25	20 20 16 27 21	.06 .06 .05 .04	.00 .00 .00	.00 .00 .00	.00 .00 .00	.00 .00 .00	219 223 206 130 59	47 47 48 40 19	30 30 30 30 30	49 29 27 27 26	22 22 22 22 22 21	23 23 27 25 25
26 27 28 29 30 31	21 15 8.3 7.4 4.2 3.7	.04 .02 .01 .00	.00 .00 .00	.00 .00 .00 .00	.00 .00 .00	.00 e.10 e.40 e.60 e1.5 e2.5	61 60 60 59 62	17 17 17 18 19 21	30 30 30 31 30	26 26 27 27 26 26	21 22 23 23 23 23 22	25 25 25 26 26
TOTAL MEAN MAX MIN AC-FT	628.6 20.3 29 3.7 1250	94.74 3.16 18 .00 188	0.00 .00 .00	0.00 .00 .00	0.00 .00 .00	5.10 .16 2.5 .00	14699.0 490 1300 3.0 29160	1850 59•7 128 17 3670	711 23.7 31 19 1410	1172 37.8 58 26 2320	708 22.8 25 21 1400	689 23.0 27 20 1370

CAL YR 1988 TOTAL 5706.24 MEAN 15.6 MAX 41 MIN .00 AC-FT 11320 WTR YR 1989 TOTAL 20557.44 MEAN 56.3 MAX 1300 MIN .00 AC-FT 40780

O5124000 SOURIS RIVER NEAR WESTHOPE, ND--CONTINUED (National stream quality accounting network station and radiochemical program station)

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1954-64, 1966 to current year.

		DIS-	CDE	DAIA, WAI	EK TEAK C	OTOBER 19	00 10 551	IBMDBK 13	.′	OXYGEN,	COLI-
DATE	TIME	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)	COLOR (PLAT- INUM- COBALT UNITS) (OOO80)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)
OCT											
NOV 04	1700	24	1360	8.40	7.0	7.5			6.4	52	
16 APR	1000	0.25	1260	8.10	-9.0	2.0	45	69	2.5	18	20
06	1040 1615	1190 888	262 290		2.0 6.0	3.0 3.0					
27 JUN	1200	59	460	8.33	4.5	8.0	55	4.1	9.2	77	K10
08	0835 0840	20 21	725 705		10.5	14.0					=
JUL			705	-	12.5	13.5	7		-		
12 21 SEP	1840 1115	48 58	740	8.54	26.5	25.0	50	5.1	1.5	18	К18
07	1230	20	945		20.5	16.5					
DATE	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	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)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	BICAR- BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR- BONATE WATER WH IT FIELD MG/L AS CO3 (00447)
OCT 04									458	510	24
NOV 16	280	330	56	47	160	50	4	11	400	488	0
APR 27	100	180	-41	18	23	21	0.8	11	124	146	2
JUL 21	170	210	37	29	70	40	2	11	180	190	14
DATE	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)
NOV 16	230	50	0.30	11	816	805	1.11	0.55		<0.010	<0.100
APR 27	96	9.5	0.10	7.7	307	281	0.42	48.6		0.020	<0.100
JUL 21	160	20	0.20	14	514	452	0.70	80.1	0.130	0.230	0.360
DATE	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)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	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)
NOV	7 40	1 50	7.6	0 500	0.000	0.040	0.50	/10	7	110	(O F
16 APR 27	3.40 0.030	1.50	7.6 1.4	0.520	0.080	0.040	0.52	<10	3	110 59	<0.5
JUL 21	0.390	0.410	2.2	0.500	0.450	0.420	0.50	10	8	56	<0.5
							10-13-17				

O5124000 SOURIS RIVER NEAR WESTHOPE, ND--CONTINUED (National stream quality accounting network station and radiochemical program station)

DATE	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM DIS- SOLVED (UG/L AS CD) (O1025)	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) (O1130)	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)
NOV 16	200	<1	<1	<3	1	13	<5	66	310	<0.1	<10
APR 27	80	<1	<1	<3	. 3	35	<5	15	4	<0.1	<10
JUL 21	150	<1	2	<3	1	15	<1	39	28	<0.1	<10
DATE	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI) (01067)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG) (01077)	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)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN) (01092)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	GROSS ALPHA, DIS- SOLVED (UG/L AS U-NAT) (80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)
NOV 16	14	5	<1	<1	<1.0	280	<6	20	7	5.8	1.0
APR 27	5	3	<1	<1	<1.0	150	<6	20	6	4.9	<0.4
JUL 21		5	<1		<1.0	210	<6		<3	0.8	<0.4
DAT	GRO BET DI SOL (PCI AS CS-1 E (035	SS GRO A, BET S- SUS VED TOT /L (PCI AS 37) CS-1	SS GRO A, BET P. DI AL SOL /L (PC AS 37) YT-	SS GRO A, BET S- SUS VED TOT I/L (PO SR/ AS 90) YT-	OSS RAI FA, 22 BP. DI FAL SOLV CI/L RAI SR/ MET -90) (PCI	DIUM 26, URAN IS- NATU VED, DI OON SOI CHOD (UC	NIUM URAL US- CYAN LVED TOT E/L (MG U) AS	SED IDE MEN AL SUS /L PEN CN) (MG	SED MEN I- DI T, CHAR - SU DED PEN /L) (T/D	I- SE T, SU S- SIE GE, DI S- % FI DED TH AY) .062	D. SP. VE AM. NER AN
NOV 16	2	3	2.4 1	6	2.3	0.10 1	1.8 <0.	010	163 0	.11	100
APR 27	1			7			0.94 <0.		45.0	.1	95
JUN 14								-		.4	97
JUL 21	20	0 <	0.4 1	6	(0.4	0.11 1	1.9 <0.	010	7		100
SEP 07	_	_		-				_	16		100
DATE	TIME	DEPTH TO TOP OF SAMPLE INTER- VAL (FT) (72015)	SAMPLE LOC- ATION, CROSS SECTION (FT FM L BANK) (00009)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	CLOUD COVER (PER- CENT) (00032)	WIND SPEED (MILES PER HOUR) (00035)	WIND DIREC- TION (DEG. FROM TRUE NORTH) (00036)
APR 27	1200	0.50	5.00	460	8.33	8.0	9.2	77	95	15	40
27 27	1203 1207	0.50	10.0	461 460	8.33 8.33	8.0	9.2	==		=	=
27	1210 1214	1.0	20.0	460 460	8.33 8.33	8.0	9.2	==	==	=	
27	1217 1220	1.0	30.0 35.0	460 460	8.33	8.0	9.2		==		==
27	1223 1227	0.50	40.0 45.0	460 460	8.33	8.0	9.2	=	==		=
27 JUL	1230	0.50	50.0	460	8.33	8.0	9.2				
21	1115 1116	0.50	1.00	740 740	8.54 8.54	25.0 25.0	1.5	18	5	10	170
21	1117 1118	0.50	10.0	740 740	8.53	25.0 25.0	1.5	=	=	=	=
21	1119 1120	0.50	22.0	740 740	8.54	25.0 25.0	1.5		==		==
21	1121 1122	0.50	34.0 40.0	740 740	8.54 8.54	25.0 25.0	1.5				
21	1123	0.50	46.0	740	8.54	25.0				==	
21	1125	0.50	52.0 55.0	740	8.54	25.0	=	==			

O5124000 SOURIS RIVER NEAR WESTHOPE, ND--CONTINUED (National stream quality accounting network station and radiochemical program station)

DATE	TEMPER- ATURE WATER (DEG C) (OOO10)	DIS- CHARGE, IN CUBIC FEET PER SECOND (00060)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	
APR 03 04 05 06 07 08 10 11 12 14 15 16 17 18 20 21 22 23 24 25 26 27 28 29 MAY	0.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	200 500 850 1200 1300 1100 980 900 825 790 774 589 520 504 484 469 342 219 223 206 130 59 61 60 60 59 62	35 50 33 50 26 23 25 44 50 57 58 44 29 28 27 24 49 27 48 35 98 10	19 85 115 107 105 84 68 56 61 98 132 104 91 46 34 30 27 17 16 13 7.9 5.7	
01 02 03 04 06 06 09 11 12 13 14 15 17 18 20 21 22 23 24 25 26 27	4.5 7.0 11.0 10.0 6.0 9.5 12.0 13.0 11.0 14.5 14.0 15.0 16.5 14.0 16.0 16.0	63 63 75 88 91 91 90 97 124 128 96 58 56 57 57 57 57 57 48 40 17	10 6 5 6 12 9 6 4 5 1 12 12 3 17 23 6 2 3 5 3 4 4 3 3 3 3 3 3 1 28	1.7 1.0 1.4 2.9 2.5 1.7 8.1 9.8 9.6 5.0 8.9 9.7 9.7 9.8 4.9 4.3 1.4 4.3 1.4 4.3 1.4 4.3 1.4 4.3 1.4 4.3 1.4 4.4 4.4 4.4 4.4 4.4 4.4 4.4 4.4 4.4	

06185500 MISSOURI RIVER NEAR CULBERTSON, MT

LOCATION.--Lat 48°07'30", long 104°28'20", in SE1/4NW1/2 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 mi2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- July 1941 to December 1951. April 1958 to current year.

REVISED RECORDS .-- WSP 1729: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,883.4 ft above National Geodetic Vertical Datum of 1929 (U.S. Army Corps of Engineers bench mark). July 1 to Nov. 6, 1941, water-stage recorder at site 400 ft upstream at datum 0.11 ft. Nov. 7, 1941, to Aug. 17, 1950, water-stage recorder at site 580 ft downstream at present datum. Aug. 18, 1950, to Dec. 31, 1951, nonrecording gage on bridge at present datum. Apr. 1, 1958, to Nov. 1, 1967, water-stage recorder at site 580 ft downstream at present datum.

REMARKS.--Estimated daily discharges: 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. Water-quality records for the current year are also available. These records, which have been published in U.S. Geological Survey Report MT-89-1, can also be accessed through the U.S. Geological Survey's WATSTORE data system.

AVERAGE DISCHARGE.--40 years (1943-51, 1959-89, after operational level at Fort Peck Lake was reached), 10,660 ft³/s, 7,723,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 78,200 ft³/s, Mar. 26, 1943, gage height, 14.80 ft, from rating curve extended above 30,000 ft³/s; maximum gage height observed, 19.66 ft, Apr. 14, 1979, backwater from ice jam; minimum daily discharge, 575 ft³/s, Nov. 22, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 14,100 ft³/s, Apr. 6, gage height, 7.12 ft; maximum gage height, 12.11 ft, backwater from ice; minimum daily discharge, 4,730 ft³/s, Oct. 12.

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

DAY OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP			5100	initial, oo	DIO IDDI	I BK DBOOK	MEAN VAL		DER 1900	10 551 1515	J. 1909		
2 e4800 5220 10300 e11500 e11500 e11500 e13500 6770 3920 9420 9310 9960 3 e4800 6790 10400 e11500 e11500 e13500 6850 3200 9230 9270 9710 4 e4800 6720 10900 e11500 e13000 e11500 e13500 6790 9230 9310 9500 9520 5 e4800 6750 11000 e11500 e12000 e11500 e13500 6790 9230 9310 9500 9520 6 e4800 6750 11000 e11500 e12000 e11500 e13500 6790 9340 9290 9460 9170 6 e4800 6590 10900 e11500 e12000 e13500 6200 9180 9350 9250 9110 7 4840 6370 10400 e12000 e13500 e11500 12700 6030 9150 9350 9350 9190 8 4840 6640 10800 e12000 e13500 e11500 12200 5940 9470 9350 9350 9190 10 4790 6710 12600 e11500 e13000 e11500 10200 5950 9540 9260 9440 9580 11 4760 6790 13000 e12500 e13000 e11500 9570 6310 9650 9720 9290 9600 11 4760 6790 13000 e12500 e13000 e11500 9700 9700 9200 8970 9270 11 4760 6790 13000 e12500 e13000 e11000 9020 7580 9720 9340 9340 9360 11 4750 8030 11200 e11000 e13500 e11000 8110 8340 9700 9200 8970 9270 13 4750 8030 11200 e11000 e13500 e11000 7460 8860 9300 8860 9100 9180 14 4810 9110 111100 e11000 e13500 e11000 7080 7640 8840 8770 9170 9180 15 4850 9550 11000 e11000 e13500 e11000 7080 7640 8840 8770 9170 9180 16 4920 9400 11100 e11000 e13500 e11000 6670 7670 8910 8930 8860 9200 16 4920 9400 11100 e11500 e13000 e11500 6670 7670 8910 8930 8860 9200 16 4920 9400 11100 e11500 e13000 e11500 6670 7670 8910 8930 8860 9200 16 4920 9400 11100 e11500 e13000 e11500 6670 7670 8910 8930 8860 9200 16 4920 9400 11100 e11500 e13500 e12000 6680 7690 9200 8730 9200 8470 20 4860 10100 11400 e11500 e13500 e12000 6680 7690 9200 8730 9900 9200 8470 20 4860 10100 11500 e12500 e12500 e13000 e1500 6670 8600 9300 8600 9300 8600 9300 8600 9300 8600 9300 9300 9300 9300 9300 9300 9300 9	DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
3	1	e4800	5140	10200	e11500	e11500	e11500	e11500	6840	9160	9520	9170	9000
3	2	e4800	5220	10300	e11500	e12000	e11500	e12500	6770	9320	9420	9310	9560
## e4800 6750 10900 e11500 e12000 e11500 e13500 6790 9230 9310 9500 9520 ## e4800 6750 11000 e11500 e12000 e11500 e13500 6500 9340 9290 9460 9170 ## e4800 6590 10900 e11500 e12000 e13500 e13500 6500 9340 9290 9460 9170 ## e4800 6590 10900 e11500 e12000 e13500 e11500 12700 6030 9150 9360 9350 9190 ## e4800 6570 10400 e12000 e13500 e11500 12700 6030 9150 9360 9350 9190 ## e4800 6640 11600 e12000 e13500 e11500 12700 6030 9150 9360 9350 9190 ## e4800 6640 11600 e12000 e13500 e11500 10200 5940 9470 9350 9140 9380 ## e4800 6640 11600 e12000 e12500 e11500 10200 5950 9540 9260 9440 9680 ## e4800 6710 12600 e11500 e13000 e11500 9570 6310 9650 9720 9290 9600 ## e4800 6710 12600 e12000 e12500 e11000 9570 6310 9650 9720 9290 9600 ## e4800 6790 13000 e12500 e12500 e11000 8110 8340 9700 9200 8970 9270 ## e4800 9300 11100 e13000 e13500 e11000 7460 8060 9300 8860 9100 9180 ## e4800 9550 11000 e13500 e11500 6670 7670 8910 8930 8880 9200 ## e4800 9560 12500 e12500 e13000 e11500 6520 7650 9200 8770 8910 9130 9420 ## e4800 9560 12500 e12500 e13000 e12500 6520 7650 9200 8730 8930 9250 ## e4800 9560 12500 e12500 e13000 e12500 6520 7650 9200 8730 8930 9250 ## e4800 9560 12500 e12500 e13000 e12500 6680 7640 8840 8770 9170 9180 ## e4800 9560 12500 e12500 e13000 e12500 6520 7650 9200 8730 8930 9250 ## e4800 9560 12500 e12500 e13000 e12500 6680 7630 9270 8340 9130 9420 ## e4800 9560 12500 e12500 e13000 e12500 6640 7670 9140 8800 9220 8700 ## e4800 9560 12500 e12500 e13000 e12500 6640 7670 9140 8800 9220 8700 ## e4800 9500 9300 13000 e12500 e12500 6640 7710 9010 8760 9650 8660 ## e15000 e12500 e12500 e12500 6680 8430 9270 8840 9300 9300 ## e15000 e12500 e12500 e12500 6680 8430 9200 8840 9300 9300 9300 ## e45000 9400 e11500 e12500 e12500 6680 8430 9200 8860 9300 9300 9300 ## e45000 9400 e11500 e12500 e12500 6680 8430 9200 8860 9300 9300 9300 ## e450000 9400 e11500 e12500 e12500 6680 8430 9200 8860 9300 9300 9300 ## e45000000000000000000000000000000000000		e4800	5990	10400									9710
5 e4800 6750 11000 e11500 e12000 e13500 e500 9340 9290 9460 9170 6 e4800 6590 10900 e11500 e13500 e11500 e2500 9180 9350 9250 9170 7 4840 66370 10400 e12000 e13500 e11500 12700 6030 9150 9350 9350 9990 9990 9900 9350 9350 9140 9360 9440 9350 9140 9360 9440 9550 9740 9350 9140 9680 9600 9740 9600 9440 9680 9600 9720 9340 9340 9340 9410 9600 9720 9340 9340 9340 9410 9400 9400 11000 e11500 e11000 9100 9750 9340 9340 9340 9340 9340 9340 9340 9340 9340 9340 9340 9340 9340<													
7 4840 6370 10400 e12000 e13500 e11500 12700 6030 9150 9350 9350 9190 8 4840 6640 11600 e12000 e13000 e11500 10200 5950 9540 9260 9440 9680 10 4790 6710 12600 e13000 e11500 9570 6310 9650 9720 9290 9600 11 4760 6790 13000 e12500 e11000 9020 7580 9720 9340 9340 9410 12 4730 6920 12900 e12000 e12500 e11000 7800 9720 9340 9340 9410 12 4750 8030 11200 e13000 e11000 7460 8840 8770 9770 920 8970 9270 134 4850 9550 11000 e11500 6670 7670 8910 8930 8930 9250													
8	6	e4800	6590	10900	e11500	e12000	e11500	13700	6220	9180	9350	9250	9110
8	7	4840	6370	10400	e12000	e13500	e11500	12700	6030	9150	9360	9350	9190
9 4820 6640 11600 e12000 e12500 e11500 9570 6310 9560 9260 9440 9680 100 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 15 4850 9550 11000 e11000 e13500 e11000 7460 8060 9300 8860 9100 9180 15 4850 9550 11000 e11000 e13500 e11000 7600 8060 9300 8860 9100 9180 15 4850 9550 11000 e11000 e13500 e11000 7600 8070 9270 8910 8930 8880 9200 16 4920 9400 11100 e11500 e13000 e11500 6670 7670 8910 8930 8880 9200 177 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 15000 e12500 e13000 e12500 6520 7650 9120 8580 9590 9030 19 4860 9930 15000 e12500 e13000 e12000 6340 7670 9140 8800 9220 8470 20 4860 10100 11400 e11500 e13500 e12000 6540 7700 9140 8800 9220 8470 1400 1400 e11500 e12500 e12000 66740 7910 8950 8920 9500 8390 120 4860 10100 11400 e11500 e12500 e12000 6680 8430 9240 8870 9100 8170 24 5050 9420 11700 e11500 e12500 e12000 6680 8430 9240 8870 9100 8170 24 5050 9420 e10000 e12500 e12000 6680 8430 9240 8870 9100 8170 24 5050 9420 e10000 e12500 e12000 6680 8430 9240 8870 9100 8170 24 5050 9920 e12000 e12000 e12000 6680 8430 9240 8870 9100 8170 24 5050 9920 e12000 e12000 e12000 6980 8490 9040 8930 9900 9900 8140 8060 5090 9960 e11500 e12000 e11500 e12000 6980 8490 9040 8930 9900 9900 8140 8060 5090 9960 e11000 e12500 e11000 e12500 7410 8860 9310 8850 9410 8060 29 5100 9800 e11000 e12500 e12000 6980 8490 9040 8930 9900 8140 8060 5090 9960 e11000 e12000 e11000 e11500 e12000 6980 8490 9040 8930 9900 9700 8870 8870 9070 8870 9070 8870 9070 90		4840	6640	10800	e12000						9350	9140	9380
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 e13500 e11000 7080 7640 8840 8770 9170 9180 15 4850 9550 11000 e11000 e13500 e11000 7080 7640 8840 8770 9170 9180 16 4920 9400 11100 e11500 e13500 e11000 6570 7670 8910 8930 8880 9200 16 4920 9400 11100 e12000 e13000 e11500 6560 7650 9200 8730 8930 9250 17 4950 9250 11900 e12500 e13000 e11500 6560 7650 9200 8730 8930 9250 18 4900 9560 12500 e12500 e13000 e12500 6520 7650 9200 8730 8930 9250 19 4860 9930 13000 e12500 e13500 e12500 6520 7650 9120 8580 9590 9030 20 4860 10100 11400 e11500 e13500 e12000 6740 7910 8950 8920 9500 8390 21 4930 10100 11500 e11500 e13500 e12000 6740 7910 8950 8920 9500 8390 21 4930 10100 11500 e11500 e12500 e12000 6680 8430 9240 8350 22 4920 9720 11500 e12000 e12500 e12000 6680 8430 9240 8870 9100 8170 24 5050 9420 e10000 e12500 e12500 e12000 6670 8680 9170 8980 9360 8070 25 5120 9840 e11500 e12500 e12500 e12000 6670 8680 9170 8980 9360 8070 26 5140 9920 e10500 e12500 e12500 e12000 6670 8860 9170 8980 9360 8070 26 5140 9920 e10500 e12000 e12500 e12000 6870 8880 930 9900 7900 26 5140 9920 e10500 e12000 e12500 e12000 6870 8880 9310 8850 9410 8060 8930 9900 7900 26 5140 9920 e10500 e12000 e12500 e12000 6980 8490 9040 8930 9900 7900 26 5140 9920 e10500 e12000 e11500 e12000 6980 8490 9040 8930 9900 7900 27 5150 9920 e10500 e12000 e11500 e12000 6980 8490 9040 8930 9900 7900 28 5150 9840 e11500 e12500 e11500 e12000 6980 8490 9040 8930 9900 7900 26 5140 9920 e10500 e12000 e11500 e12000 6980 8490 9040 8930 9900 7900 27 5150 9820 e11500 e12500 e11500 e12000 6990 8600 9410 8960 9590 8180 30 5090 9960 e11500 e12500 11500 8743 7570 9261 9049 9317 8874 MAX 5150 10100 13000 12500 13500 13500 13500 13500 8340 8840 9900 9700 9700			6640	11600	e12000							9440	9680
12													
13 4750 8030 11200 e11000 e13500 e11000 7460 8060 9300 8860 9100 9180 114 4810 9110 11100 e11000 e13500 e11500 6670 7670 8910 8930 8880 9200 15 4850 9550 11000 e13500 e11500 6670 7670 8910 8930 8880 9200 16 4920 9400 11100 e12000 e13500 e11500 6560 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 11500 e12000 e12000 6740 7910 8950 8920 9500 8390 11500 e12000 e12000 e12000 6540 7700 9150 8840 9240 8350 11500 e12000 e12500 e12000 6680 8430 9240 8870 9100 8170 11500 e12000 e12500 e12000 6680 8430 9240 8870 9100 8170 11500 e12500 e12500 e12000 6680 8430 9240 8870 9100 8170 11500 e12500 e12500 e12000 6980 8490 9040 8930 9900 7900 11500 e12500 e12500 e12000 6980 8490 9040 8930 9900 7900 11500 e12500 e12500 e12000 6980 8490 9040 8930 9900 7900 11500 e12500 e12500 e12500 e12000 6980 8490 9040 8930 9900 7900 11500 e12500	11	4760	6790	13000	e12500	e13000	e11000	9020	7580	9720	9340	9340	9410
14 4810 9110 11100 e11000 e13500 e11500 6670 7680 7640 8840 8770 9170 9180 15 4850 9550 11000 e11000 e13500 e11500 6670 7670 8910 8930 8880 9200 16 4920 9400 11100 e12500 e13000 e11500 6520 7650 9200 8730 8930 9250 17 4950 9250 11990 e12500 e13000 e11500 6560 7650 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 1900 11500 e12500 e12000 6680 8430 9240 8870 9150 8350 24 4920 9720 11500 e12000 e12500 e12000 6680 8430 9240 8870 9100 8170 25 5120 9840 e11500 e12500 e12000 6980 8490 9040 8930 9900 7900 126 5140 9920 e12500 e12500 e12000 6980 8490 9040 8930 9900 7900 126 5140 9920 e12000 e12000 e12000 612000 6980 8490 9040 8930 9900 7900 126 5140 9920 e12000 e12000 e12000 e12000 612000 6980 8490 9040 8930 9900 7900 126 5140 9920 e12000 e12000 e12000 e12000 6120	12	4730	6920	12900	e12000	e12500	e11000	8110	8340	9700	9200	8970	
15	13	4750	8030	11200	e11000	e13500	e11000	7460	8060	9300	8860	9100	9180
15	14	4810	9110	11100	e11000	e13000	e11000	7080	7640	8840	8770	9170	9180
17 4950 9250 11900 e12000 e13000 e1500 6560 7650 9270 8340 9130 9420 18 4900 9560 12500 e12500 e13000 e12500 6520 7650 9120 8580 9590 9030 19 4860 9930 13000 e12500 e13000 e12000 6740 7910 8950 8920 9500 8390 11400 e11500 e11500 e12000 e12000 6740 7910 8950 8920 9500 8390 11400 e11500 e12500 e12000 6740 7910 8950 8920 9500 8390 11500 e12000 e12500 e12000 6740 7910 8950 8920 9500 8390 11500 e12000 e12500 e12000 6540 7700 9150 8840 9240 8350 11500 e12000 e12500 e12000 6680 8450 9240 8870 9100 8170 11500 e12000 e12500 e12000 6880 9170 8980 9360 8070 11500 e12500 e11500 e12000 6980 8490 9040 8930 9900 7900 11500 e12000 e12500 e12000 6980 8490 9040 8930 9900 7900 11500 e12000 e12500 e11500 e12000 6980 8490 9040 8930 9900 7900 11500 e12000 e12500 e11500 e12000 6980 8490 9040 8930 9900 8900 8900 8900 8900 8900 890		4850	9550	11000	e11000						8930	8880	9200
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 e13000 e12000 6740 7910 8950 8920 9500 8390 21 4930 10100 11500 e11500 e12000 6630 7710 9010 8760 9650 8660 22 4920 9720 11500 e12000 e12000 6540 7700 9150 8840 9240 8350 24 5050 9420 e10000 e12500 e12000 6870 8680 9170 8980 9360 8070 25 5120 9840 e11500 e12500 e12000 6870 8660 9270 8820 9520 <td>16</td> <td>4920</td> <td>9400</td> <td>11100</td> <td>e11500</td> <td>e13000</td> <td>e11000</td> <td>6520</td> <td></td> <td></td> <td>8730</td> <td></td> <td></td>	16	4920	9400	11100	e11500	e13000	e11000	6520			8730		
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	17	4950	9250	11900	e12000	e13000	e11500	6560	7630	9270	8340	9130	
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 e11500 e12000 7040 8660 9270 8820 9520 7940 27 5150 9920 e12000 e12000 e11500 e12000 7410 8860 9310 8850 9410 8060 28 5120 9910 e11500 e12000 e11500 e12000 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 8340 8880 7900	18	4900	9560	12500	e12500	e13000	e12500	6520	7650	9120	8580	9590	9030
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 e12500 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 e11500 e12500 7040 8660 9270 8820 9520 7940 27 5150 9920 e12000 e11500 e12500 e11500 e12000 7410 8860 9310 8850 9410 8060 28 5120 9910 e11500 e12000 e11500 e12000 7410 8860 9310 8850 9410 8060 29 5100 9890 e11000 e12000 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 E10500 F1500 F1	19	4860	9930	13000	e12500	e13000	e12000	6340	7670	9140	8800	9220	8470
22 4920 9720 11500 e12000 e12000 6540 7700 9150 8840 9240 8350 23 4930 9420 11700 e11500 e12000 e12000 6880 8430 9240 8870 9100 8170 24 5050 9420 e10000 e12500 e12000 6870 8680 9170 8980 9360 8070 25 5120 9840 e11500 e12500 e12000 6980 8490 9040 8930 9360 8070 26 5140 9920 e10500 e11000 e12500 7040 8660 9270 8820 9520 7940 27 5150 9920 e12000 e11500 e12000 7410 8860 9310 8850 9410 8060 28 5120 9910 e11500 e12000 e11500 7250 8380 9060 9060 9400 8140	20	4860	10100	11400	e11500	e13500	e12000	6740	7910	8950	8920	9500	8390
23 4930 9420 11700 e11500 e12000 e12000 6870 8430 9240 8870 9100 8170 24 5050 9420 e10000 e12500 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 e11500 e12000 7040 8660 9270 8820 9520 7940 27 5150 9920 e12000 e12000 e11500 e12000 7410 8860 9310 8850 9410 8060 28 5120 9910 e11500 e12000 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 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 8400 4907 8317 11370 11810 12500 11520 8743 7570 9261 9049 9317 8874 840 8310 8470 5140 10000 11000 11000 10500 6340 5940 8840 8340 8340 8360 9900													
24 5050 9420 e10000 e12000 e12000 6870 8680 9170 8980 9360 8070 25 5120 9840 e11500 e12500 e12000 6980 8490 9040 8930 9360 8070 26 5140 9920 e10500 e12000 e11000 e12500 7040 8660 9270 8820 9520 7940 27 5150 9920 e12000 e11500 e12000 7410 8860 9310 8850 9410 8060 28 5120 9910 e11500 e12000 e11500 7250 8380 9060 9400 8140 29 5100 9890 e11000 e12000 e10500 6990 8600 9410 8960 9590 8180 30 5090 9960 e11500 e12500 e10500 7020 8450 9790 8980 9580 8040													
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 e11500 e12000 7410 8860 9310 8850 9410 8060 28 5120 9910 e11500 e12000 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 11500 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	23	4930	9420	11700	e11500	e12000	e12000				8870		
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 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 10500 13500 8860 9790 9720 9900 9710 MIN 4730 5140 10000 11000 10500 6340 5940 8840 8340 8880 7900	24	5050	9420	e10000	e12000	e12500	e12000	6870	8680	9170	8980	9360	8070
27 5150 9920 e12000 e12000 e12000 7410 8860 9310 8850 9410 8060 28 5120 9910 e11500 e12000 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 <	25	5120	9840	e11500	e12500	e11500	e12000	6980	8490	9040	8930	9900	7900
28 5120 9910 e11500 e12000 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 10500 6340 5940 8840 8340 8880 7900													
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 10500 6340 5940 8840 8340 8880 7900													
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						e11000							
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	29	5100	9890	e11000	e12000		e10500	6990	8600	9410	8960	9590	8180
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 10500 6340 5940 8840 8340 8880 7900	30	5090	9960	e11500	e12000		e10500	7020	8450	9790	8980	9580	8040
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 10500 6340 5940 8840 8340 8880 7900	31	5100		e11500	e12500		e10500		8720		9180	9070	
MAX 5150 10100 13000 12500 13500 12500 13700 8860 9790 9720 9900 9710 MIN 4730 5140 10000 11000 10500 6340 5940 8840 8340 8880 7900													
MAX 5150 10100 13000 12500 13500 12500 13700 8860 9790 9720 9900 9710 MIN 4730 5140 10000 11000 10500 6340 5940 8840 8340 8880 7900	MEAN	4907	8317	11370	11810	12500	11520	8743	7570	9261	9049	9317	
MIN 4730 5140 10000 11000 10000 10500 6340 5940 8840 8340 8880 7900	XAM	5150	10100	13000	12500	13500	12500	13700	8860	9790	9720	9900	9710
			5140	10000	11000						8340	8880	7900
				699000	726000							572900	

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

06185600 MISSOURI RIVER STAGE GAGE NO. 4 NEAR NOHLY, MT

LOCATION.--Lat 48°02'10", long 104°09'40", in NE1/4 sec.1, T.26 N., R.58 E., Richland County, Hydrologic Unit 10060005, on right bank 4.5 mi northwest of Nohly, and at mile 1,595.7.

DRAINAGE AREA. -- 93,000 mi², approximately.

GAGE-HEIGHT RECORDS

PERIOD OF RECORD. -- March 1959 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,860.00 ft above National Geodetic Vertical Datum of 1929. Prior to Apr. 18, 1962 at datum 60.00 ft lower.

REMARKS .-- Stage regulated by Fort Peck Reservoir.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 21.20 ft, Mar. 23, 1960, present datum; minimum daily recorded, 6.87 ft, Apr. 18, 1963.

GAGE	HEIGHT,	FEET,	WATER	YEAR	OCTOBER	1988	TO	SEPTEMBER	1989
			1	MEAN '	VALUES				

					ME	EAN VALUE	S					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.57							10.47	11.56	11.88	11.67	11.49
2	9.55							10.39	11.65	11.82	11.76	11.68
3	9.53							10.44	11.68	11.72	11.71	11.90
4	9.53							10.44	11.62	11.74	11.81	11.78
5	9.54							10.31	11.69	11.75	11.86	11.74
6	9.53							10.12	11.69	11.75	11.75	11.54
7	9.57							10.01	11.59	11.79	11.73	11.66
8	9.59							9.93	11.72	11.83	11.69	11.63
9	9.60							9.89	11.83	11.69	11.72	11.82
10	9.57							9.97	11.83	11.97	11.80	11.84
11	9.52							10.43	11.93	11.87	11.71	11.78
12	9.50							11.07	11.93	11.79	11.66	11.71
13	9.52						11.16	11.14	11.84	11.71	11.61	11.69
14	9.54						10.98	10.85	11.63	11.49	11.64	11.62
15	9.57						10.68	10.84	11.53	11.67	11.59	11.68
16	9.59						10.59	10.83	11.67	11.58	11.46	11.61
17	9.66						10.51	10.82	11.74	11.47	11.58	11.77
18	9.59						10.53	10.79	11.70	11.41	11.76	11.64
19	9.55						10.39	10.82	11.67	11.55	11.75	11.49
20	9.57						10.50	10.92	11.65	11.62	11.68	11.28
21	9.58						10.50	10.91	11.60	11.62	11.90	11.46
22	9.68						10.43	10.81	11.69	11.56	11.73	11.42
23	9.61						10.42	11.03	11.69	11.62	11.62	11.24
24	9.66						10.57	11.36	11.77	11.62	11.63	11.29
25	9.70						10.57	11.30	11.62	11.67	11.90	11.14
26	9.72						10.57	11.26	11.71	11.57	11.88	11.16
27	9.79						10.67	11.47	11.75	11.56	11.71	11.20
28	9.72						10.69	11.27	11.69	11.60	11.74	11.26
29	9.68						10.55	11.32	11.66	11.67	11.77	11.27
30	9.70						10.51	11.31	11.94	11.59	11.80	11.28
31	9.70							11.32		11.66	11.70	
MEAN	9.60							10.77	11.71	11.67	11.72	11.54
MAX	9.79							11.47	11.94	11.97	11.90	11.90
MIN	9.50							9.89	11.53	11.41	11.46	11.14

06185650 MISSOURI RIVER STAGE GAGE NO. 5 AT NOHLY, MT

LOCATION.--Lat 48°00'10", long 104°05'30", in SE1/4 sec.16, T.26 N., R.59 E., Richland County, Hydrologic Unit 10060005, at downstream side of bridge, O.2 mi northwest of Nohly, and at mile 1,587.7.

DRAINAGE AREA. -- 93,000 mi2, approximately.

GAGE-HEIGHT RECORDS

PERIOD OF RECORD. -- April 1959 to current year (seasonal).

GAGE. -- Water-stage recorder. Datum of gage is 1,800.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS .-- Stage regulated by Fort Peck Reservoir.

EXTREMES FOR PERIOD OF RECORD. -- Maximum daily gage height recorded, 77.22 ft, Mar. 15, 1972; minimum daily recorded, 59.12 ft, Nov. 22, 1964.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES

					ME	AN VALUE	10					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	62.44							64.26	64.92	64.96	64.68	64.55
2	62.42							64.25	65.02	64.89	64.73	64.75
3	62.40							64.17	65.12	64.82	64.68	64.82
4	62.39							64.03		64.82	64.74	64.75
5	62.40							63.94		64.83	64.81	64.66
,	02.40							03.94		04.05	04.01	54.55
6	62.39							63.79		64.82	64.75	64.57
7	62.40							63.67		64.86	64.71	64.64
8	62.42							63.60		64.87	64.68	64.67
9	62.43							63.55		64.76	64.68	64.80
10	62.40							63.61		64.94	64.75	64.80
	CO 76							67.00		64.91	64.66	64.74
11	62.36							63.88			64.65	64.67
12	62.33							64.44		64.82		64.66
13	62.33						64.17	64.82		64.75	64.58	
14	62.34						64.06	64.84		64.58	64.61	64.59
15	62.36						63.84	65.23		64.71	64.59	64.62
16	62.37						63.75	65.37		64.67	64.49	64.57
17	62.46						63.71	65.05		64.58	64.57	64.68
18	62.42						63.72	64.70		64.51	64.73	64.59
19	62.38						63.64	64.50		64.61	64.65	64.48
20	62.38						63.68	64.55		64.67	64.69	64.28
20	02.70						07.00	04.55		04.01		
21	62.39						63.73	64.60		64.67	64.81	64.41
22	62.44							64.51		64.60	64.65	64.40
23	62.42							64.69	65.51	64.66	64.58	64.26
24	62.44							64.86	65.68	64.64	64.64	64.28
25	62.49							64.76	65.36	64.68	64.84	64.15
26	62.50							64.76	65.07	64.60	64.77	64.16
27	62.55						64.02	64.97	65.00	64.60	64.72	64.17
28	62.50						64.22	65.08	64.89	64.62	64.73	64.21
							64.14	64.98	64.82	64.68	64.78	64.21
29	62.45									64.61	64.78	64.22
30	62.45						64.16	64.96	64.99			
31	62.44							64.82		64.65	64.64	
MEAN	62.42							64.49		64.72	64.69	64.51
MAX	62.55							65.37		64.96	64.84	64.82
MIN	62.33							63.55		64.51	64.49	64.15
11714	50.00							-2.22				

06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT

LOCATION.--Lat 47°40'42", long 104°09'22", in SW1/4NE1/4SW11/4 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 mi2. Area at site 4.5 mi upstream, 68,812 mi2.

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 differnt 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. Water-quality records for the current year are also available. These records, which have been published in U.S. Geological Survey Report MT-89-1, can also be accessed through the U.S. Geological Survey's WATSTORE data system.

AVERAGE DISCHARGE.--77 years, 12,830 ft3/s, 9,295,000 acre-ft/yr.

DICCUARCE CURIC DEED DED CECOUR WARE USED OF

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge observed, 159,000 ft³/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 ft³/s, May 17, 1961, gage height, 2.73 ft, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 37,600 ft³/s, June 20, gage height, 11.80 ft; maximum gage height osberved., 14.20 ft, Mar. 29; mininum daily discharge, 800 ft³/s, Jan. 2, result of freezeup.

		DISCH	ARGE, CUB	IC FEET PER		MEAN VALUE		R 1988 T	SEPTEMBER	1989		
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		117100	308000 2	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		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 5	15300	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

YELLOWSTONE RIVER BASIN

06329590 YELLOWSTONE RIVER STAGE GAGE NO. 1 NEAR FAIRVIEW, MT

LOCATION.--Lat 47°48'34", long 104°02'36", sec. 18, T.150 N., R.104 W., McKenzie County, Hydrologic Unit 10100004, on left bank 3 mi south of Fairview, and at mile 15.2.

DRAINAGE AREA. -- 70,000 mi2, approximately.

GAGE-HEIGHT RECORDS

PERIOD OF RECORD .-- March 1959 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,860.00 ft above National Geodetic Vertical Datum of 1929. Prior to Feb. 19, 1962, at datum 60.00 ft lower.

REVISED RECORDS .-- WDR ND-82: 1980-81.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 23.78 ft, Mar. 21, 1960, present datum; minimum daily recorded, 7.92 ft, Aug. 17, 1988, present datum.

GAGE	HEIGHT,	FEET,	WATER	YEAR	OCTOBER	1988	TO	SEPTEMBER	1989
			1	MEAN Y	VALUES				

						MIN VALUE						
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1									13.82	13.24		10.71
2									14.07	13.43		10.38
3									14.31	13.54		10.19
4									14.01	13.60		10.11
5									13.90	13.60		10.04
6									14.26	13.34		9.99
7									14.83	13.11		9.97
8									14.45	12.96		9.90
9									14.46	12.77		9.84
10									15.40	12.57		9.82
11									16.31	12.30		9.78
12								14.93	16.74	12.12		9.87
13	9.43							15.59	16.80	12.09		9.97
14	9.42			7.75				16.25	17.04	12.17		10.09
15												10.19
15	9.39								16.76	12.72		10.19
16	0 44								46 00	40 56		10.20
	9.41								16.08	12.56		
17	9.41								15.96		9.83	10.19
18	9.45							==	16.02		9.81	10.13
19	9.52							14.93	16.47	12.52	9.78	10.10
20	9.57							14.93	17.71	12.27	9.73	10.03
21	9.64							14.90	17.44	11.96	9.67	10.00
22	9.66							14.90	16.45	11.57	9.59	10.00
23	9.76							15.14	16.40		9.58	10.00
24	9.69							14.64	16.54		9.72	9.97
25	9.66							14.23	15.50		9.91	10.05
26	9.63							14.47	14.66		9.82	10.02
27	9.59							14.97	14.20		9.74	10.06
28	9.62							15.32	13.83		10.04	10.09
29	9.62							14.77	13.57		10.35	10.07
30	9.59							14.77	13.35		10.28	10.00
31	9.60							14.01			10.49	
MEAN									15.38			10.06
MAX									17.71			10.71
MIN									13.35			9.78
LITIA									10.00		1777	2.10

YELLOWSTONE RIVER BASIN

06329610 YELLOWSTONE RIVER STAGE GAGE NO. 2 NEAR CARTWRIGHT, ND

LOCATION.--Lat 47°51'50", long 103°58'06", on south line sec.26, T.151 N., R.104 W., McKenzie County, Hydrologic Unit 10100004, on bridge on State Highway 23, 2 mi west of Cartwright, and at mile 8.6.

DRAINAGE AREA. -- 70,000 mi2, approximately.

GAGE-HEIGHT RECORDS

PERIOD OF RECORD. -- April 1959 to current year (seasonal).

GAGE .-- Water-stage recorder. Datum of gage is 1,800.00 ft above National Geodetic Vertical Datum of 1929.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 87.08 ft, Mar. 23, 1978; minimum daily recorded, 58.58 ft, July 26, 1974.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	64.50							69.05	68.31	67.88	65.32	65.20
2	64.49							68.79	68.49	68.04	65.32	64.92
3	64.44							68.18	68.75	68.15	65.18	64.76
4	64.38							67.69	68.50	68.24	64.88	64.66
5	64.39							67.27	68.37	68.26	64.81	64.62
6	64.41							67.02	68.65	67.99	64.79	64.55
7	64.42							67.03	69.13	67.77	64.72	64.53
8	64.44							67.05	68.86	67.65	64.61	64.46
9	64.44							66.96	68.75	67.43	64.51	64.40
10	64.46							66.89	69.58	67.20	64.41	64.36
10	04.40							00.09	09.50	07.20	04.41	04.50
11	64.46							67.64	70.51	66.97	64.33	64.34
12	64.39							69.07	71.01	66.77	64.33	64.39
13	64.40							69.71	71.10	66.70	64.30	64.52
14	64.39							70.25	71.34	66.76	64.33	64.62
15	64.37							71.03	71.18	67.24	64.29	64.73.
16	64.32							70.88	70.50	67.26	64.37	64.74
17	64.31							70.15	70.37	67.21	64.41	64.76
18	64.33							69.60	70.45	67.49	64.42	64.74
19	64.36							69.38	70.78	67.16	64.36	64.69
20	64.44							69.39	72.13	66.91	64.32	64.65
21	64.47							69.39	72.03	66.61	64.29	64.63
22	64.53							69.35	70.96	66.22	64.24	64.60
23	64.55							69.61	70.81	65.97	64.25	64.61
24	64.49							69.15	71.00	65.84	64.33	64.60
	64.49							68.71	70.06	65.68	64.46	64.58
25	04.44							00.71	70.00	05.00	04.40	04.70
26	64.42							68.88	69.26	65.65	64.40	64.59
27	64.36						67.31	69.37	68.83	65.65	64.31	64.65
28	64.36						67.96	69.68	68.48	65.61	64.49	64.66
29	64.36						68.24	69.17	68.23	65.53	64.80	64.64
30	64.39						68.49	69.18	68.03	65.43	64.76	64.60
31	64.42							68.49		65.34	64.83	
MEAN	64.42							68.84	69.81	66.86	64.55	64.63
MAX	64.55							71.03	72.13	68.26	65.32	65.20
MIN	64.31							66.89	68.03	65.34	64.24	64.34
.1114	04.51		72.2	7.7				00.07	,			

YELLOWSTONE RIVER BASIN

06329620 YELLOWSTONE RIVER STAGE GAGE NO. 3 NEAR BUFORD, ND

LOCATION.--Lat 47°55'14", long 103°57'56", in SW1/4 sec.2, T.151 N., R.104 W., McKenzie County, Hydrologic Unit 10100004, on left bank 4 mi south of Buford, and 6.5 mi southeast of Nohly.

DRAINAGE AREA. -- 70,000 mi2, approximately.

GAGE-HEIGHT RECORDS

PERIOD OF RECORD. -- April 1959 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,850.00 ft above National Geodetic Vertical Datum of 1929.
Prior to Apr. 19, 1962, at datum 50.00 ft lower. Prior to Apr. 23, 1987, gage was located 1 mi downstream.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 29.55 ft, Mar. 15, 1972; minimum daily recorded, 6.18 ft, Aug. 24, 1961, present datum.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES

							77					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.81							15.41	14.64			11.05
2	9.79							15.47	14.72			10.61
3	9.73							14.97	15.04			10.46
4	9.69							14.25	14.89			10.31
5	9.62							13.67	14.69			10.22
6	9.61							13.29	14.90			10.14
7	9.60							13.09	15.33			10.10
8	9.61							13.03	15.35			10.03
9	9.60							12.88	15.10			9.94
10	9.59							12.63	15.83			9.88
11	9.64							13.33	16.88			9.84
12	9.49							15.07	17.37			9.89
13	9.45							16.17	17.41			10.05
14	9.45							16.84	17.51			10.14
15	9.42							17.50	17.50			10.14
15	9.42							17.50	17.50			10.01
16	9.40							17.46	16.93			10.35
17	9.39							16.74	16.68	13.31	9.77	10.34
18	9.39							15.96	16.73	13.67	9.82	10.30
19	9.42							15.63	16.95	13.41	9.77	10.21
20	9.51							15.63	18.27	13.11	9.68	10.09
21 .	9.62							15.61	18.52	12.82	9.64	10.05
22	9.63							15.52	17.48	12.46	9.53	10.04
23	9.73							15.76	17.20	12.22	9.46	9.97
24	9.66							15.47	17.43		9.55	9.97
25	9.58							15.00	16.52		9.89	10.03
26	9.55							15.07	15.66		9.88	10.01
27	9.52							15.51	15.15		9.70	10.04
28	9.61						14.52	15.81	14.76		9.94	10.09
29	9.54						14.65	15.60	14.45		10.48	10.06
30	9.47						14.93	15.53			10.39	
31	9.48							14.89			10.49	
MEAN	9.57							15.12				
MAX	9.81							17.50				
MIN	9.39			5.75				12.63				
MIM	9.09							12.00				

06329640 MISSOURI RIVER STAGE GAGE NO. 5A AT BUFORD, ND

LOCATION.--Lat 47°59'06", long 103°59'05", in SE1/4 sec.15, T.152 N., R.104 W., Williams County, Hydrologic Unit 10110101, on left bank 1.5 mi southwest of Buford, and at mile 1,580.7.

DRAINAGE AREA. -- 164,000 mi², approximately.

GAGE-HEIGHT RECORDS

PERIOD OF RECORD. -- April 1960 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,850.00 ft above National Geodetic Vertical Datum of 1929. Prior to Mar. 8, 1962, at datum 50.00 ft lower.

REMARKS. -- Stage regulated by upstream reservoirs.

EXTREMES FOR PERIOD OF RECORD. -- Maximum daily gage height recorded, 19.37 ft, Mar. 23, 1978; minimum daily recorded, 2.63 ft, Aug. 15, 16, 1966.

GAGE	HEIGHT,	FEET,	WATER	YEAR	OCTOBER	1988	TO	SEPTEMBER	1989
			N	MEAN Y	VALUES				

							-					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.86							11.41				
2	5.84							11.51				
3	5.82							10.92				
4	5.78							10.06				
5	5.74							9.43				
6	5.72							8.97				
7	5.72							8.73				
8	5.75							8.69				
9	5.73							8.60				
10	5.72							8.47				
11	5.76							9.13				
12	5.64							11.08				
13	5.60							12.26				
14	5.60							12.72				7.40
15	5.59							13.59				7.57
16	5.61							13.80				
17	5.65							13.16				
18	5.63							12.39				
19	5.65							11.94		9.82		
20	5.70							11.92		9.52		
21	5.76											
22	5.85								14.09			
23	5.93								13.67			
24	5.90											
25	5.90											
26	5.88											
27	5.86						9.59					
28	5.87						10.30					
29	5.84						10.45					
30	5.82						10.79					
31	5.80											
WEAN	5.76									1000		
MEAN												
MAX	5.93											
MIN	5.59											

06329650 MISSOURI RIVER STAGE GAGE NO. 6 NEAR BUFORD, ND

LOCATION.--Lat 47°57'18", long 103°54'36", in SE1/4 sec.30, T.152 N., R.103 W., Williams County, Hydrologic Unit 10110101, on right bank 5 mi southeast of Buford, and at mile 1,576.0.

DRAINAGE AREA. -- 164,000 mi², approximately.

GAGE-HEIGHT RECORDS

PERIOD OF RECORD .-- December 1959 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,840.00 ft above National Geodetic Vertical Datum of 1929. Prior to Apr. 17, 1962, at datum 40.00 ft lower.

REMARKS .-- Stage regulated by upstream reservoirs.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 24.18 ft, June 10, 1986; minimum daily recorded, 8.23 ft, Aug. 15, 22, 1963.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES

							-					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12.81							18.61	18.45	18.10	15.28	15.05
2	12.80							18.77	18.54	18.09	15.28	14.89
3	12.78							18.22	18.86	18.15	15.25	14.92
4	12.74							17.34	18.76	18.20	15.12	14.82
5	12.71							16.59	18.52	18.23	15.08	14.73
6	12.69							16.08	18.62	18.07	14.97	14.54
7	12.68							15.86	19.03	17.87	14.90	14.54
8	12.71							15.83	19.15	17.72	14.88	14.53
9	12.70					-		15.73	. 18.89	17.52	14.81	14.54
10	12.69							15.59	19.38	17.38	14.78	14.60
10	12.09							17.79	19.00	17.50	14.10	14.00
11	12.73							16.12	20.38	17.23	14.63	14.56
12	12.62							18.02	21.05	16.95	14.51	14.51
13	12.58							19.37	21.29	16.78	14.38	14.57
14	12.58							19.89	21.44	16.67	14.38	14.60
15	12.57							20.80	21.44	16.99	14.32	14.71
16	12.59							21.05	20.90	17.40	14.22	14.72
17	12.64							20.45	20.54	17.05	14.27	14.76
18	12.62							19.53	20.54	17.32	14.36	14.76
.19	12.63							19.04	20.61	17.16	14.41	14.63
20	12.68							19.00	21.59	16.90	14.28	14.42
21	12.73							19.02	22.14	16.67	14.35	14.42
22	12.82							18.90	21.46	16.28	14.28	14.46
23	12.90							19.12	20.97	16.02	14.12	14.36
24	12.90							19.16	21.19	15.85	14.11	14.32
								18.72	20.65	15.70	14.38	14.31
25	12.89							10.72	20.05	15.70	14.50	14.51
26	12.86							18.67	19.75	15.58	14.50	14.28
27	12.85							19.07	19.20	15.57	14.32	14.29
28	12.86							19.52	18.80	15.53	14.39	14.33
29	12.81						17.68	19.39	18.45	15.56	14.75	14.31
30	12.80						17.99	19.24	18.27	15.42	14.80	14.29
31	12.79							18.75		15.31	14.82	
MEAN	12.73							18.43	19.96	16.88	14.61	14.56
MAX	12.90							21.05	22.14	18.23	15.28	15.05
MIN	12.57							15.59	18.27	15.31	14.11	14.28
LILIT	12.01											

06329660 MISSOURI RIVER STAGE GAGE NO. 7 NEAR TRENTON, ND

LOCATION.--Lat 47°59'21", long 103°47'57", in NE1/4 sec.13, T.152 N., R.103 W., McKenzie County, Hydrologic Unit 10110101, on right bank 5 mi south of Trenton, and at mile 1,566.7.

DRAINAGE AREA. -- 164,000 mi2, approximately.

GAGE-HEIGHT RECORDS

PERIOD OF RECORD. -- March 1959 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,840.00 ft above National Geodetic Vertical Datum of 1929. Prior to Aug. 7, 1962, at site 0.8 mi upstream. Prior to May 29, 1963, at datum 40.00 ft lower.

REMARKS .-- Stage regulated by upstream reservoirs.

EXTREMES FOR PERIOD OF RECORD. -- Maximum daily gage height recorded, 21.56 ft, July 10, 1975; minimum daily recorded, 4.34 ft, Aug. 19, 22, 1963.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

					111	AN TABOBO						
DAY	OCT	NOA	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.24								14.95	14.38	11.69	11.48
2	9.20								14.94	14.37	11.71	11.34
3	9.18								15.21	14.43	11.68	11.38
4	9.12								15.19	14.48	11.54	11.27
5	9.11								14.97	14.52	11.50	11.17
6	9.08								15.01	14.39	11.39	11.00
7	9.08								15.34	14.18	11.31	10.97
8	9.11								15.53	14.04	11.29	10.97
9	9.12								15.29	13.87	11.21	10.97
10	9.10								15.62	13.71	11.18	11.03
11	9.13								16.53	13.59	11.03	10.99
12	9.03							14.20	17.20	13.31	10.91	10.95
13	8.99							15.53	17.51	13.15	10.77	11.01
14	8.99							16.12	17.70	13.05	10.77	11.03
15	9.01							16.98	17.74	13.28	10.72	11.13
16	8.98							17.37	17.32	13.71	10.63	11.15
17	9.04							16.93	16.93	13.44	10.70	11.17
18	9.03							16.08	16.86	13.67	10.80	11.19
19	9.03							15.56	16.87	13.56	10.87	11.05
20	9.09							15.45	17.64	13.30	10.74	10.84
21	9.11							15.45	18.29	13.07	10.80	10.82
22	9.27							15.33	17.88	12.69	10.75	10.87
23	9.29							15.48	17.34	12.41	10.58	10.76
24	9.28							15.58	17.44	12.25	10.55	10.74
25	9.27							15.21	17.08	12.13	10.80	10.71
26	9.25							15.09	16.23	11.99	10.97	10.67
27	9.27							15.40	15.58	12.00	10.79	10.69
28	9.24							15.83	15.14	11.96	10.85	10.73
29	9.19							15.83	14.77	12.00	11.17	10.73
30	9.19							15.68	14.54	11.85	11.26	10.70
31	9.16							15.33		11.73	11.28	
MEAN	9.13								16.29	13.24	11.04	10.98
MAX	9.29								18.29	14.52	11.71	11.48
MIN	8.98								14.54	11.73	10.55	10.67

06330000 MISSOURI RIVER NEAR WILLISTON, ND

LOCATION.--Lat 48°06'45", long 103°43'04", in SE1/4 sec.31, T.154 N., R.101 W., Williams County, Hydrologic Unit 10110101, at city waterplant on left bank, 5 mi southwest of Williston, 29.3 mi downstream from Yellowstone River. and at mile 1.552.7.

DRAINAGE AREA .-- 164.500 mi2, approximately.

GAGE-HEIGHT RECORDS

PERIOD OF RECORD. -- April 1966 to current year. Operated as a stage-discharge station October 1897 to July 1965.

GAGE.--Water-stage recorder. Datum of gage is 1,830.20 ft above National Geodetic Vertical Datum of 1929. See WSP 1917 for history of changes prior to April 1966.

REMARKS .-- Stage regulated by upstream reservoirs and backwater from Lake Sakakawea.

EXTREMES FOR PERIOD OF RECORD. -- Maximum daily gage height recorded, 26.46 ft, Mar. 26, 1978; minimum daily recorded, 7.80 ft, Nov. 2, 1966.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES AUG SEP DAY OCT NOV DEC JAN FER MAR APR MAY JUN JUL 14.69 13.17 13.14 16.50 16.36 18-62 18-63 21.79 17.30 17.61 17.13 14.90 21.35 14.90 14.73 2 13.15 16.61 16.84 18.62 18.64 17.55 17.46 17.00 14.64 3 13.13 16.75 17.22 18.64 18.63 20.95 17.62 17.54 16.93 14.85 13.17 17.64 14.58 13.11 17.45 18.56 18.58 20.38 17.06 16.91 14.79 13.34 17.62 16.49 17.48 16.99 14.76 14.52 5 13.09 13.57 16.77 18.32 18.53 13.71 13.64 6 13.05 16.43 17.78 18.11 18.41 16.02 17.38 17.10 14.74 14.38 ------17.51 16.93 14.66 14.30 13.04 16.83 18.00 18.03 18.31 15.73 13.61 15.49 ---15.61 17.81 16.77 14.63 14.31 8 13.05 18.23 18.04 18.20 15.54 16.60 14.59 14.31 13.05 18.46 18.09 18.19 17.75 9 10 15.48 17.79 16.48 14.52 14.35 13.04 13.71 18.64 18.61 18.20 18.34 18.28 16.43 14.44 14.34 11 13.10 13.74 18.44 18.58 18.31 18.82 16.42 13.75 15.25 18.80 16.20 14.36 14.29 12 13.10 18.58 18.39 18.42 19.78 14.29 13.00 13.75 18.26 18.52 20.51 15.15 19.15 16.05 14.24 13 19.22 14.01 19.37 18.64 20.97 15.07 18.01 19.29 15.97 14.22 14.33 14 12.99 18.20 14.36 15 19.28 18.15 18.82 21.22 14.89 18.54 19.33 16.08 14.20 12.95 14.34 14.40 19.15 16.39 14.19 16 12.98 14.54 18.88 18.18 19.02 21.28 14.70 18.94 14.41 17 13.01 14.69 18.62 18.34 18.98 21.07 14.60 18.88 18.85 16.37 14.16 14.16 14.44 18 13.00 18.54 18.52 18.89 20.87 14.58 18.48 18.74 16.42 16.40 14.36 13.03 14.27 19 18.52 18.68 18.73 20.69 14.58 18.04 18.74 14.24 14.23 16.21 20 13.03 18.58 18.77 18.68 20.46 14.58 17.85 19.00 18.70 19.50 16.02 14.23 21 13.10 18.82 18.82 20.19 14.81 17.83 15.75 15.51 17.80 19.52 14.21 14.17 22 13.09 ___ 18.68 18.81 18.89 19.89 14.86 14.55 14.86 14.08 14.16 23 13.20 18.62 18.81 18.83 19.71 14.88 17.87 19.02 15.36 14.03 14.02 24 13.24 14.82 18.34 18.83 18.75 19.72 14.05 15.05 17.75 18.98 15.25 14.14 25 13.22 15.68 17.96 18.85 18.72 19.94 14.03 26 16.15 17.56 18.88 18.68 20.30 15.41 17.60 18.57 15.15 14.31 13.21 15.94 16.43 16.74 17.69 13.97 16.13 18.87 18.68 20.74 18.21 15.17 14.29 27 13.08 17.09 14.21 17.97 17.86 15.15 14.00 16.66 18.77 18.66 21.16 28 13.19 17.55 15.12 14.45 14.01 29 16.31 18.65 21.64 18.17 13.18 15.61 ---18.63 22.02 16.94 18.07 17.30 15.04 14.59 13.97 16.08 ---13.15 31 14.96 14.61 22.02 17.97 13.12 15.99 18.63 ---17.39 18.37 16.12 14.42 14.29 MEAN 13.09 17.65 18.30 18.58 19.92 ---18.88 19.02 18.94 19.52 17.13 14.90 14.73 13.24 19.37 22.02 ---MAX 17.30 14.96 14.03 13.97 12.95 15.49 16.36 18.03 18.19 15.48 MTN

06330110 MISSOURI RIVER STAGE GAGE NO. 9 AT WILLISTON, ND

LOCATION.--Lat 48°08'13", long 103°36'16", in NE1/4NE1/4 sec.25, T.154 N., R.101 W., Williams County, Hydrologic Unit 10110101, on left bank levee at southeast edge of Williston 0.5 mi upstream from Little Muddy Creek, and at mile 1,546.2.

DRAINAGE AREA .-- 164,500 mi2, approximately.

GAGE-HEIGHT RECORDS

PERIOD OF RECORD. -- April 1959 to current year (seasonal).

GAGE.--Water-stage recorder. Datum of gage is 1,820.00 ft above National Geodetic Vertical Datum of 1929. Prior to May 13, 1969, at site 900 ft downstream. At datum 20.00 ft lower prior to Apr. 7, 1962.

REMARKS .-- Stage regulated by upstream reservoirs and backwater from Lake Sakakawea.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 34.22 ft, July 25, 28, 1975; minimum daily recorded, 5.44 ft, Aug. 20, 1961, present datum.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

MEAN VALUES DAY OCT NOV JUN JUL AUG SEP DEC JAN FEB MAR APR MAY 21.42 23.08 25.21 25.38 28.06 24.55 24.12 22.56 22.35 21.54 23.42 21.42 21.47 23.36 23.48 25.19 25.38 27.30 24.35 24.40 23.92 22.54 22.47 21.43 21.47 23.51 23.78 25.19 25.38 26.66 24.39 24.40 23.95 22.50 22.38 21.45 23.61 24.07 25.18 25.39 27.33 24.01 24.47 24.03 22.44 22.33 5 21.48 21.46 23.72 24.36 25.05 25.36 25.83 23.59 24.41 23.95 22.41 22.25 22.16 6 21.46 21.44 23.91 24.56 24.89 25.32 24.82 23.30 24.33 23.98 22.41 23.93 22.37 7 21.44 21.62 24.70 24.80 25.24 24.11 23.06 24.33 24.00 22.12 22.34 22.09 8 21.43 21.54 24.82 24.77 25.16 23.56 22.95 24.59 23.83 22.08 22.96 23.64 22.35 q 21.40 21.54 23.42 24.98 24.78 25.15 23.15 24.70 23.62 22.33 22.11 10 21.41 21.62 24.00 25.10 24.86 25.27 22.91 23.32 24.74 21.63 25.16 24.96 25.72 22.75 23.17 24.91 23.60 22.25 22.11 11 21.47 24.66 23.42 23.36 25.13 25.38 22.19 22.11 23.55 24.33 24.71 12 21.48 21.65 24.70 25.07 25.05 26.49 22.69 22.56 22.09 13 21.44 21.59 24.70 24.96 25.13 26.86 25.59 23.28 22.04 22.13 14 21.54 21.72 25.00 24.91 25.20 27.08 22.48 25.70 23.27 22.08 22.15 15 21.55 21.99 25.38 24.87 25.30 27.35 22.44 25.08 25.43 25.62 23.58 22.18 16 21.56 22.13 25.56 24.85 25-45 27.53 22.26 25.48 25.28 24.92 25.05 27.55 27.45 27.32 27.18 21.61 25.50 25.48 25.39 22.24 25.45 25.23 22.19 25.35 23.54 22.09 22.20 17 21.60 22.12 22.25 25.25 23.47 22.00 22.18 18 22.18 25.18 25.19 25.26 22.25 23.52 22.06 22.19 19 21.54 24.92 25.29 25.32 20 21.49 21.82 25.15 25.32 22.23 22.08 22.11 21 21.45 21.70 25.14 25.30 25.37 27.05 25.62 23.39 22.08 22.01 25.20 25.32 25.46 26.87 22.53 24.67 25.73 23.20 22.07 21.99 22 21.26 21.83 23 22.03 25.23 25.32 25.49 26.70 22.39 24.69 25.53 22.97 22.00 22.08 21.39 22.08 25.23 25.32 25.47 26.59 22.43 24.73 25.38 22.88 21.94 21.94 21.41 25 22.50 25.10 25.35 25.44 26.66 22.52 24.65 25.35 22.73 21.98 21.93 25.11 22.63 22.08 21.96 26 21.35 22.49 24.90 25.39 25.40 27.08 22.83 24.56 21.92 27 21.31 22.88 24.65 25.43 25.39 27.57 23.08 24.57 24.89 22.73 22.11 22.82 22.04 21.92 28 21.53 23.07 24.37 25.37 25.39 27.72 23.43 24.69 24.69 29 21.45 23.00 24.07 25.29 27.90 23.72 24.89 24.41 22.67 22.19 21.93 22.62 22.37 30 21.45 22.86 23.81 25.24 28.22 23.87 24.86 24.30 21.93 31 21.51 23.56 25.24 28.33 24.79 22.60 22.35 24.98 23.38 22.21 22.11 21.95 24.47 24.91 25.22 26.59 23.58 24.34 MEAN 21.46 24.12 25.73 24.30 22.56 22.47 25.45 MAX 21.61 23.07 25.56 25.43 25.50 28.33 28.06 21.94 21.92 25.15 22.23 MTN 21.26 21.42 23.08 23.42 24.77

WTR YR 1989 MEAN 23.76 MAX 28.33 MIN 21.26

LITTLE MUDDY RIVER BASIN

06331000 LITTLE MUDDY RIVER BELOW COW CREEK NEAR WILLISTON, ND

LOCATION.--Lat 48°17'04", long 103°34'21", in NE1/4NW1/4 sec.5, T.155 N., R.100 W., Williams County, Hydrologic Unit 10110102, on left bank 37 ft downstream from centerline of highway, 1 mi downstream from Cow Creek, 4 mi upstream from Camp Creek, 10 mi northeast of Williston, and 13 mi upstream from mouth.

DRAINAGE AREA .-- 875 mi2, approximately, of which about 100 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- May 1954 to current year (seasonal records only since 1984).

GAGE .-- Water-stage recorder. Datum of gage is 1,863.18 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Mar. 1-26. Records good except those for the period of estimated daily discharge, which are poor. Some small diversions for irrigation. Some regulation by Lake Zahl, Fish and Wildlife Service reservoir 22 mi upstream and Blacktail Dam about 15 mi upstream.

AVERAGE DISCHARGE.--29 years (water years 1955-1983), 38.8 ft^3/s , 28,110 acre-ft/yr; median of yearly mean discharges, 31 ft^3/s , 22,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,180 ft³/s, Apr. 18, 1979, gage height, 12.77 ft; maximum gage height, 13.57 ft, Mar. 27, 1960; minimum discharge, 0.20 ft³/s, Nov. 27, 1960, Feb. 5, 1963, and June 4, 1968.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,000 $\rm ft^3/s$, Mar. 11, gage height, 10.92 ft, backwater from ice; minimum daily discharge, 2.2 $\rm ft^3/s$, Aug. 24-27, but may have been less during period of nonoperation.

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

NOV DEC JAN FEB MAR APR MAY JUN JUI

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5						e5.5 e5.2 e5.0 e4.8	194 138 114 91 73	16 16 15 14 13	9.9 9.9 9.5 9.0 8.4	4.9 5.0 5.2 5.1 4.6	3.8 3.1 2.6 2.4 2.4	3.7 3.9 6.7 6.1 5.9
6 7 8 9						e4.7 e4.5 e4.3 e5.5 e63	62 59 52 44 38	12 12 12 12 12	8.0 7.6 7.4 6.9 6.5	4.2 3.8 3.5 3.1 3.1	2.6 3.2 3.3 3.3 2.7	5.0 4.3 3.9 3.8 4.0
11 12 13 14 15						e2250 e1400 e950 e1100 e612	33 31 28 26 25	10 10 11 11	9.1 10 8.7 8.1 8.1	3.6 4.6 4.3 4.1 3.8	2.5 2.4 2.4 2.4 2.6	4.3 4.1 3.9 3.8 3.8
16 17 18 19 20						e450 e200 e120 e90 e60	24 22 21 20 20	10 11 10 9.4 8.7	7.6 7.2 6.4 5.7 5.0	3.6 4.2 5.5 27 24	2.7 2.5 2.4 2.4 2.8	3.7 3.4 3.5 3.5
21 22 23 24 25						e45 e36 e38 e50 e270	24 23 20 25 21	8.7 8.7 8.4 11	4.5 4.6 6.3 6.2	16 12 11 9.5 8.0	3.3 3.3 2.6 2.2 2.2	3.3 3.2 3.0 3.2 3.2
26 27 28 29 30 31						e1550 1110 679 819 335 222	22 22 20 19 17	11 11 11 10 11	6.0 5.6 5.4 5.4	6.2 5.4 4.9 4.5 4.5	2.2 2.8 3.4 3.6	3.3 3.2 3.2 3.2 3.3
TOTAL MEAN MAX MIN AC-FT						12494.0 403 2250 4.3 24780	1328 44.3 194 17 2630	346.9 11.2 16 8.4 688	212.7 7.09 10 4.5 422	213.5 6.89 27 3.1 423	85.6 2.76 3.8 2.2	116.8 3.89 6.7 3.0

e - Estimated

LITTLE MUDDY RIVER BASIN

O6331000 LITTLE MUDDY RIVER BELOW COW CREEK NEAR WILLISTON, ND--CONTINUED WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	CIFIC CON- DUCT- ANCE (US/CM)		AIR (DEG C	ATURE WATER) (DEG C	(MG/I AS CACO	CALCI DIS- SOLV (MG/	DIS- ED SOLVE L (MG/L A) AS MG	DIS- DIS- DIS- MG/L AS NA	SODIUM) PERCENT	RATIO
	TIME	(00001	, (00095)	(00400)	(00020)	(00010	(00900) (0091	5) (00925	(00950	(00932)	(00951)
OCT 11	1145	4.2	2350		16.5	9.	5 .	-				
02	1230	35	1000	7.85	0.5	0.	5 2	50 47	28	140	55	4
28 APR	1450	671	890		6.5	5 1.	0 .	-				
05			850		,			-	-		-	
10 JUN	1150	11	2300		22.0	14.	5 .			•		
23 AUG	0815	4.5	2210)	17.0	18.	5	-	-			
17	0725	2.5	2120	8.37	23.0	19.	5 40	00 53	64	390	67	9
DATE	POTAS SIUM DIS- SOLVE (MG/L AS K) (00935	FET-LA (MG/L AS HCO3)	BONATE, B FET-LAE (MG/L AS CO3)	LAB (MG/L AS CACO3)		SULFAT DIS- D SOLVE (MG/L) AS SO4	DIS- D SOLVE (MG/I	RIDE DIS ED SOLV (MG/ L) AS F	DIS- SOLVE ED (MG/L L AS SI02)	AT 180 DEG. DIS- SOLVE (MG/L	E SUM OF CONSTI- C TUENTS, DIS- D SOLVED) (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)
MAR 23	. 12	350	0	280	7.8	3 250	6.4		20 13	70	2 669	0.95
AUG												
17	. 13	740	17	630	5.0	580	10	0.	50 13	152	0 1520	2.07
	DATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	DIS- SOLVED (UG/L AS B)	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												
AUG	5	66.5	1	160	350	<1	30	190	0.2	2	<10	430
17	···	10.3	4	410	50	<1	80	<10	0.1	4	<10	770

06332515 BEAR DEN CREEK NEAR MANDAREE, ND (Hydrologic bench-mark station) (National stream quality accounting network station and radiochemical program station)

LOCATION.--Lat 47°47'14", long 102°46'05", in NW1/4 sec.30, T.150 N., R.94 W., McKenzie County, Hydrologic Unit 10110101, on right bank 0.5 mi upstream from county highway culvert, and 5.5 mi northwest of Mandaree.

DRAINAGE AREA .-- 74 mi2.

WATER-DISCHARGE RECORDS

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

GAGE .-- Water-stage recorder. Datum of gage is 1,947.58 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Oct. 17 to Mar. 29, Apr. 5, May 5 to June 15, and July 18 to Aug. 1. Records poor.

AVERAGE DISCHARGE.--23 years, 7.49 ft³/s, 5,430 acre-ft/yr; median of yearly mean discharges, 7.7 ft³/s, 5,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,840 ft³/s, Mar. 13, 1972, gage height, 9.02 ft; maximum gage height, 10.03 ft, Apr. 6, 1969; no flow at times most years.

EXTREMES FOR CURRENT YEAR. -- Peak discharges greater than base discharge of 100 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 10	2015	*375	a*6.33	Mar. 26	1630	106	a5.13

a - Backwater from ice No flow for many days.

MEAN VALUES	
DAY OCT NOV DEC JAN FEB MAR	APR MAY JUN JUL AUG SEP
1 .15 e.26 e.14 e.00 e.00 e.00 8.	.0 .76 e.40 1.6 e.06 .18
	.1 .59 e.60 .64 .06 .15
	.5 .73 e.42 .30 .04 .23
5 .16 e.26 e.14 e.00 e.00 e.00 e4.	.7 e.52 e.24 .17 .05 .12
6 .20 e.25 e.12 e.00 e.00 e.00 2	.2 e.45 e.20 .12 .06 .10
	.7 e.36 e.17 .03 .06 .10
	.7 e.30 e.15 .03 .06 .10
	.6 e.27 e.14 .02 .05 .09
	.2 e.24 e.16 .03 .04 .10
11 .18 e.21 e.03 e.00 e.00 e70 1.	.0 e.22 e.18 .32 .04 .13
	.63 e.20 e.20 4.2 .06 .15
	.61 e.18 e.18 1.6 .07 .15
15 .21 e.20 e.03 e.00 e.00 e8.0	.49 e.18 e.14 .66 .07 .13
16 .22 e.18 e.03 e.00 e.00 e3.5	.43 e.17 .12 .33 .12 .13
17 e.30 e.17 e.02 e.00 e.00 e1.2	.36 e.16 .14 5.2 .73 .11
	.38 e.14 .14 e42 .21 .11
	.38 e.14 .15 e15 .16 .11
	.32 e.12 .09 e5.0 .11 .12
25 3124 3111 3151 3150 3150 3150	
21 e.22 e.16 e.01 e.00 e.00 e1.2	.30 e.12 .09 e1.0 .11 .12
	.35 e.14 .12 e.40 .11 .11
	.40 e.20 .18 e.30 .09 .12
	.50 e.50 .29 e.25 .06 .16
	.40 e5.0 .20 e.28 .05 .14
2) 6.22 6.10 6.00 6.00 6.00	.40 63.0 120 0.20 103 114
26 e.23 e.15 e.00 e.00 e.00 e75 3.	.7 e1.5 .14 e.22 .05 .14
27 e.24 e.12 e.00 e.00 e.00 e60 14	
	.2 e.30 1.0 e.22 .64 .15
	.9 e8.0 19 e.16 .28 .17
30 e.22 e.12 e.00 e.00 10 1.	.0 e2.0 5.2 e.12 .29 .20
	e.70 e.08 .20
TOTAL 6 10 5 00 4 30 0 00 000 561 40 75	.35 25.65 30.68 103.62 4.27 4.04
	.51 .83 1.02 3.34 .14 .13
	14 8.0 19 42 .73 .23
	.30 .12 .09 .02 .04 .09
AC-FT 13 12 2.8 .0 .0 1120	149 51 61 206 8.5 8.0

CAL YR 1988 TOTAL 99.18 MEAN .27 MAX 6.1 MIN .00 AC-FT 197 WTR YR 1989 TOTAL 821.43 MEAN 2.25 MAX 100 MIN .00 AC-FT 1630

e - Estimated

BEAR DEN CREEK BASIN

O6332515 BEAR DEN CREEK NEAR MANDAREE, ND--CONTINUED (Hydrologic bench-mark station)

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1968 to current year.

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)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD- NESS TOTAL (MG/L AS CACO3) (00900)
NOA	75350											
22 MAR	1050	0.16	3150	8.33	-5.0	0.5	14	12.9	99			220
10	1120	48	480	7.92	12.0	0.5	120	13.0	99			59
29 MAY	1050	29	535	7.83	2.0	1.0			-		-	-
09	1035	0.27	2720	8.48	17.0	16.0	46	9.3	102			260
14	0910	0.18	2800	8.90	16.0	14.0	28	9.7	102	250	50	140
JUL 12	1010	22	880	-	25.0	20.0						
AUG 01	0900	0.06	2040	8.57	31.0	24.0		7.7	100			
22	0945	0.12	2340	8.76	24.5	20.0	27	9.6	116	250	50	150
DATE	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	BICAR- BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR- BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	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												
22 MAR	40	30	750	88	22	5.5	997	1070	72	850	2.6	0.40
10	14	5.9	73	69	4	9.8				130	2.6	0.10
09 JUN	50	32	570	82	16	7.4	552	625	24	820	2.9	0.40
14	16	25	630	90	23	5.9	736	703	96	770	1.7	0.40
AUG 01							543	609	26			
22	22	22	500	87	18	8.2	662	720	43	590	2.7	0.40
DATE	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (OO631)	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) (OO625)	PHOS- PHOROUS TOTAL (MG/L AS P) (00665)
NOV 22	17	2320	2290	3.16	1.00		0.030	<0.100	0.060	<0.010	0.80	0.030
MAR 10	5.8	312	303	0.42	40.3	0.680	0.050	0.730	0.420	0.330	2.6	0.510
MAY	9.7	1900	1820				3.76					0.060
09				2.58	1.39	-	<0.010	<0.100	0.070	0.030	1.2	
14 AUG	1.6	1930	1890	2.62	0.94		<0.010	<0.100	0.040	0.010	0.70	0.040
22	2.0	1580	1540	2.15	0.51		<0.010	<0.100	0.030	0.020	0.90	0.080

O6332515 BEAR DEN CREEK NEAR MANDAREE, ND--CONTINUED (Hydrologic bench-mark station)

DATE	PHOS- PHOROUS DIS- SOLVEI (MG/L AS P) (00666)	DIS- SOLVE (MG/L AS P)	US PHOSO, PHORO ORGAN D TOTA (MG/	OUS INUM IIC DIS IL SOLV 'L (UG) O) AS	M, ARSEN S- DIS VED SOLV L (UG/	ED SOLVE L (UG/	DIS- ED SOLV (L (UG/ BA) AS E	TED SOLV L (UG, BE) AS	S- DIS- VED SOLV /L (UG,	A, COBAL DIS- JED SOLVE L (UG/ CR) AS C	DIS- D SOLV L (UG/ CO) AS (DIS- VED SOLVED 'L (UG/L CU) AS FE)
NOV 22	0.010	0.0	10 0.	.03	10	2 <1	100 <10		<1	<1	<1	2 40
MAR 10	0.280			.51							<3	3 270
YAM					50	2		0.5	<1	<1	()	3 270
09	0.020			.06								-
14 AUG	0.010		10 0.	04	70	2	100 <10)	<1	<1	1	6 60
22	0.010	0.0	10 0.	.08	30	2 <1	100 <10)	<1	<1	1	1 30
. 0.	ATE (LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (O1130)	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) (O1090)
NOV 22.		<5	90	70	<0.1	2	2	<1	2.0	450	5	<10
MAR 10.		<5	6	57	0.3	<10	6	<1	<1.0	100	<6	24
JUN 14		1										
AUG			90	<10	<0.1	2	4	<1	<1.0	290	5	<10
22.		<1	80	<10	<0.1	1	4	<1	<1.0	310	6	<10
DA		GROSS ALPHA, DIS- SOLVED (UG/L AS U-NAT) 80030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DIS- SOLVED (PCI/L AS CS-137) (03515)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137) (03516)	GROSS BETA, DIS- SOLVED (PCI/L AS SR/ YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/ YT-90) (80060)	RADIUM 226, DIS- SOLVED, RADON METHOD (PCI/L) (09511)	URANIUM NATURAL DIS- SOLVED (UG/L AS U) (22703)	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										20	0.07	0.4
MAR										80	0.03	94
MAR										292	38	99
29. MAY		0.9	12	13	19	9.5	18	0.06	0.41			
JUN										175	.1	99
AUG	• •				-					82	.04	100
01				=						114 158	.02	98 99
DA	ATE	TIME	DEPTH TO TOP OF SAMPLE INTER- VAL (FT) (72015)	SAMPLE LOC- ATION, CROSS SECTION (FT FM L BANK) (00009)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (OOO95)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	CLOUD COVER (PER- CENT) (00032)	WIND SPEED (MILES PER HOUR) (00035)	WIND DIREC- TION (DEG. FROM TRUE NORTH) (00036)
NOV		4050	0.0	0.60	7450		2.5	40.0	20	400	40	400
22		1050 1051	0.0	0.60	3150 3150	8.33	0.5	12.9	99 99	100	10	100
22		1053 1055	0.38	1.00	3150 3150	8.32 8.32	0.5	12.9 12.9	99 99	==	==	
22		1057 1059	0.30	1.40	3150 3150	8.32	0.5	12.9 12.9	99 99			
JUN 14		0916	0.38	0.80	2800	8.90	14.0	9.7	100			
14		0918 0920	0.41	1.00	2800 2800	8.90 8.90	14.0	9.7 9.7	100 100	=	=	
14		0922 0924	0.38	1.40	2800 2800	8.90 8.90	14.0	9.7	100 100	=	==	
AUG 22.		0945	0.0	0.40	2340	8.76	20.0	9.6	116	0	10	130
22 22 22 22		0947 0949 0951 0953	0.41 0.39 0.34 0.32	0.60 0.80 1.00 1.20	2340 2340 2340 2340	8.76 8.76 8.76 8.76	20.0 20.0 20.0 20.0	9.6 9.6 9.6	116 116 116 116	=	Ξ	=======================================

06335500 LITTLE MISSOURI RIVER AT MARMARTH, ND

LOCATION.--Lat 46°17'44", long 103°55'06", in SW1/4 sec.30, T.133 N., R.105 W., Slope County, Hydrologic Unit 10110203, on left bank 90 ft downstream from bridge on U.S. Highway 12 in Marmarth, and 1.5 mi downstream from Little Beaver Creek.

DRAINAGE AREA .-- 4.640 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- March 1938 to current year.

REVISED RECORDS (WATER YEARS).--WSP 896: 1938-39. WSP 1086: 1943-44. WSP 1279: 1943(M), 1945-46, 1948. WSP 1439: 1950 (calendar year figures).

GAGE.--Water-stage recorder. Datum of gage is 2,686.32 ft above National Geodetic Vertical Datum of 1929. Prior to June 23, 1950, various nonrecording gages on former highway bridge at present site and datum. June 23, 1950, to Sept. 2, 1957, nonrecording gage at site 90 ft upstream at present datum.

REMARKS.--Estimated daily discharges: Nov. 13 to Mar. 29. Records fair except for period of estimated discharge, which are poor. Small diversions for irrigation upstream from station.

AVERAGE DISCHARGE.--51 years, 319 ft³/s, 231,100 acre-ft/yr; median of yearly mean discharges, 260 ft³/s, 188,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 45,000 ft³/s, Mar. 23, 1947, gage height, 21.7 ft; maximum gage height, 23.4 ft, Mar. 31, 1952, backwater from ice; no flow for part of most years.

EXTREMES OUTSIDE PERIOD OF RECORD. -- According to local residents, the greatest known flood prior to 1953 occurred in June 1907 (stage unknown). Other major floods occurred in March 1913, May 1929, and March 1920 and reached stages of about 21.5 ft, 20.2 ft, and 19.7 ft, respectively. These stages are not comparable to stages during period of record, owing to construction of levees.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 3,000 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
May 6	0145	2,360	5.60			2	

No flow, Feb. 3 to Mar. 8.

		DISCH	ARGE, CUBIC	FEET PER	SECOND	, WATER YEAR MEAN VALUES	OCTOBER	1988 TO	SEPTEMBER	1989	*	
DAY	OCT	NOA	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.11	13	e5.0	e.70	e.20	e.00	543	1550	79	23	42	3.6
2	.41	16	e5.5	e.50	e.10	e.00	469	1170	73	20	34	2.0
3	.41	15	e5.5	e.40	e.00	e.00	329	1590	66	15	35	1.3
3	1.3	14	e5.0	e.30	e.00	e.00	249	1740	60	11	26	1.3
5	2.3	13	e5.5	e.25	e.00	e.00	226	2050	56	7.9	21	2.4
6	1.8	14	e6.0	e.30	e.00	e.00	195	2310	52	6.2	20	1.7
7	1.9	13	e5.5	e.30	e.00	e.00	147	1800	48	5.7	16	1.5
8	2.4	11	e5.0	e.25	e.00	e.00	127	1170	44	3.4	14	1.2
9	2.2	11	e4.5	e.25	e.00	e10	109	704	40	2.6	14	1.1
10	3.3	13	e4.0	e.20	e.00	e600	129	553	38	5.6	14	1.9
11	5.9	11	e4.5	e.25	e.00	e650	145	422	39	5.2	13	3.4
12	6.4	11	e4.0	e.25	e.00	e600	112	321	35	5.6	12	3.9
13	6.1	e10	e4.5	e.25	e.00	e300	93	266	29	6.2	9.3	2.9
14	5.4	e10	e4.5	e.30	e.00	e100	81	224	33	9.4	7.1	4.1
15	6.8	e9.0	e4.5	e.25	e.00	e75	74	185	30	84	6.9	4.2
16	7.8	e8.0	e4.0	e.25	e.00	e70	65	176	33	140	5.5	3.3
17	8.3	e7.0	e3.5	e.30	e.00	e70	62	170	33	207	22	2.8
18	8.8	e7.5	e3.0	e.30	e.00	e75	61	555	27	248	8.3	2.2
19	9.4	e7.5	e3.5	e.30	e.00	e80	56	462	23	672	5.9	2.0
20	10	e7.0	e4.0	e.35	e.00	e75	50	388	20	727	9.5	2.1
21	12	e7.0	e3.5	e.30	e.00	e70	42	302	24	536	14	2.3
22	11	e7.5	e3.0	e.35	e.00	e65	43	234	27	313	10	1.8
23	10	e8.0	e3.0	e.35	e.00	e70	42	212	38	220	7.4	2.1
24	12	e8.5	e2.5	e.30	e.00	e100	37	184	53	153	4.9	6.9
25	11	e7.5	e2.0	e.25	e.00	e150	35	146	85	117	3.1	6.7
26	11	e7.0	e2.0	e.20	e.00	e500	114	125	91	91	2.3	6.2
27	7.2	e6.5	e1.5	e.25	e.00	e400	439	109	63	78	4.5	5.6
28	7.2	e6.0	e1.0	e.25	e.00	e300	554	97	44	70	13	5.8
29	9.6	e5.5	e1.0	e.25		e350	589	90	35	62	6.9	5.5
30	12	e5.0	e1.0	e.25		266	898	84	30	56	3.6	4.5
31	12		e.80	e.30		349		30		49	2.9	
TOTAL	206.03	289.5	112.80	9.30	0.30	5325.00	6115	19469		3949.8	408.1	96.3
MEAN	6.65	9.65	3.64	.30	.011	172	204	628	44.9	127	13.2	3.21
MAX	12	16	6.0	.70	.20	650	898	2310	91	727	42	6.9
MIN	.11	5.0	.80	.20	.00	.00	35	80	20	2.6	2.3	1.1
AC-FT	409	574	224	18	.6	10560	12130	38620	2670	7830	809	191

CAL YR 1988 TOTAL 6547.59 MEAN 17.9 MAX 318 MIN .00 AC-FT 12990 WTR YR 1989 TOTAL 37329.13 MEAN 102 MAX 2310 MIN .00 AC-FT 74040

06335500 LITTLE MISSOURI RIVER AT MARMARTH, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1950-51, 1970 to current year.

		DIG	74.		20.0		C. Yanganian T.					
DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (OOO61)	CIFIC CON- DUCT- ANCE (US/CM)	PH (STAND- ARD UNITS) (OO400)	TEMPER- ATURE AIR (DEG C) (OOO2O)	ATURE WATER (DEG C	(MG/L AS CACO3	CALCIUM DIS- SOLVED (MG/L AS CA)	DIS- SOLVE (MG/L AS MG	DIS- D SOLVED (MG/L) AS NA)	SODIUM PERCENT (00932)	RATIO
OCT												
05 NOV	1130	2.4	3920		13.0	9.	0 -	-	-			
18 JAN	1155	7.5	3110		-5.0	0.	5 -		-			
05 MAR	1315	0.26	3850		1.0	0.	5 -					
12	1145 1400	597 328	491 825	7.80	3.0 4.0			9 16	7.0		68	4
MAY 04	1245	1650	558		11.0	11.	0 -					
30	1605	83	1160		9.0				-		-	
28 JUL	1105	45	1180		28.0	24.	5 -					
27 AUG	1055	77	945	-	29.0	23.	0 -					
30	1220	3.4	1310	8.40	25.0	23.	5 7	2 18	6.5	260	87	14
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE, FET-LAB (MG/L AS HC03) (95440)	BONATE, FET-LAB (MG/L AS CO3)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (00405)	SULFAT DIS- SOLVE (MG/L AS SO4	DIS- D SOLVE (MG/L) AS CL	RIDE, DIS- SOLVED (MG/L AS F)	AS SIO2)	AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLVED (TONS
MAR 12	5.1	88	0	72	2.2	160	6.3	0.20	8.0	348	320	0.47
AUG 30	9.6	310	0	260	2.0	390	7.8	0.40	8.9	863	857	1.17
	SC	DLIDS, DIS- A SOLVED (TONS PER DAY)	RSENIC DIS- SOLVED (UG/L AS AS)	BORON, DIS- SOLVED S (UG/L AS B)	IRON, DIS- SOLVED (UG/L AS FE)		LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, M DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) 01080)
MAR 12. AUG	5	561	<1	100	60	2	40	40	0.3	1	3	150
30.		7.92	1	220	20	<1	40	<10	0.1	3	<10	250

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 mi2, revised.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- October 1977 to current year (seasonal records only since 1984).

REVISED RECORDS .-- 1977: Drainage area.

GAGE .-- Water-stage recorder. Elevation of gage is 2,370 ft, from topographic map.

REMARKS .-- Estimated daily discharges: Mar. 1-9 and 15-21. Records fair.

AVERAGE DISCHARGE.--6 years (water years 1978-83), 33.3 ft3/s, 24,130 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,720 ft³/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 ft3/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 FEB APR MAY JUN JUL AUG SEP JAN MAR .00 e.00 6.1 .00 23 .00 e.00 64 27 62 .00 .00 .00 e.00 60 48 43 8.4 .00 45 .00 e.00 55 87 32 6.5 .00 .00 .00 e.00 80 4.9 .00 6 e.00 .00 .00 .00 62 19 3.8 78 .00 e1.0 37 45 16 3.1 .00 .00 34 30 2.8 .00 e50 14 .00 .00 29 9 .00 e140 12 2.4 .00 .00 10 772 28 25 9.7 2.7 .00 .00 .00 26 23 9.7 3.7 .00 .00 807 25 23 21 .00 .00 21 3.6 12 .00 499 9.3 7.9 19 3.1 13 .00 333 .00 .00 3.0 14 .00 185 18 .00 .00 15 .00 e70 19 17 6.3 3.1 5.4 5.3 5.2 .00 18 15 2.9 .00 16 .00 e60 15 13 11 2.2 .00 .00 17 .00 18 e50 1.9 .00 .00 .00 17 18 e45 16 4.8 1.8 .00 .00 .00 e50 19 .00 15 10 4.7 1.5 .00 .00 20 e45 9.5 .00 .00 21 .00 e50 14 5.3 1.1 5.9 .00 52 52 47 13 9.2 .83 .00 .00 22 23 24 25 8.5 .59 .00 .00 .00 12 .00 .00 .00 45 12 7.5 6.8 .00 .00 26 .00 45 12 8.3 6.8 .11 .00 .00 8.4 27 .00 45 17 6.7 .04 .00 .00 28 .00 58 21 6.3 .0 .00 .00 .00 29 142 22 11 .00 .00 30 20 352 7.0 .00 .00 .00 .00 115 31 209 -00 ---1258.7 81.80 0.00 0.00 835 470.2 0.00 3933.00 TOTAL .00 .00 2.64 15.7 MEAN .00 127 27.8 40.6 108 .00 .00 352 MAX 11 .00 807 85 .00 .00 .00 MIN .00 .00 12 933 1660 2500 162 .0 .0 .0 7800 AC-FT

e - Estimated

06336600 BEAVER CREEK NEAR TROTTERS, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	CIFIC CON- DUCT- ANCE (US/CM	PH (STAN ARD) UNITS	ID- AT	MPER- TURE AIR CG C)	TEMPER- ATURE WATER (DEG C) (OOO10)	HARD- NESS TOTAL (MG/L AS CACO3	CALC DIS SOL (MC	CIUM S- LVED S F/L (1 CA) A	AGNE- SIUM, DIS- OLVED MG/L S MG) 0925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)
MAR 09 27	1150 1255	59 44	36 122		05	5.5	0.5 1.0	10			11	25	30 	1
APR 10	1210	29	175	0		6.5	4.0	-	-					
MAY 15	1200	17	194	0		26.0	18.0	-	_					
JUN 21	1000	4.9	210	0		26.5	20.0		-					
JUL 25	0910	0.29	242	0 8.	70	28.0	22.5	45	0 34	r 1	88	400	65	8
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE, FET-LAE (MG/L AS HCO3) (95440)	BONATE FET-LA (MG/L AS CO3)	B LAB (MG/ AS CACO	Y DIO L SO (M	ARBON DXIDE DIS- DLVED MG/L CO2)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVE (MG/L AS CL (00940	D SOL (MC	DE, D SS- SC LVED (1 F) S	LICA, IS- OLVED MG/L AS IO2) 0955)	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 JUL	17	140	0	114		2.0	71	4.9	c	0.10	9.6	274	230	0.37
25	13	280	23	270		0.9	1000	11	C	.20	0.70	1760	1730	2.39
DATE	SOL (TO PE DA	S- ARS VED D NS SO R (U	IS- LVED S G/L (AS) A	DIS- OLVED · UG/L S B)	IRON, DIS- SOLVED (UG/L AS FE) 01046)	LEA DI SOL (UG AS (O10	S- DI VED SOI /L (UC PB) AS	HIUM N S- VED S H/L (LI) A	ANGA- ESE, DIS- OLVED UG/L S MN) 1056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOL'DENI	UM, NIU S- DI VED SOL /L (UG MO) AS	M, TI S- DI VED SOL /L (UG SE) AS	SR)
MAR 09 JUL		.8	1	90	170		1	6	80	0.1				140
25	1	.38	1	840	50		1	70	10	0.1		2	1	570

06337000 LITTLE MISSOURI RIVER NEAR WATFORD CITY, ND

LOCATION.--Lat 47°35'25", long 103°15'05", in NW1/4SE1/4SE1/4 sec.35, T.148 N., R.99 W., McKenzie County, Hydrologic Unit 10110205, at bridge on U.S. Highway 85, 17 mi upstream from Cherry Creek, and 17.5 mi south of Watford City.

DRAINAGE AREA .-- 8,310 mi2 approximately.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS (WATER YEARS) .-- WSP 926: 1935. WSP 1270: 1943.

GAGE.--Water-stage recorder and supplemental nonrecording gage. Datum of gage is 1,929.03 ft above National Geodetic Vertical Datum of 1929. Oct. 2, 1959, to June 17, 1963, water-stage recorder at present site and datum. June 18, 1963, to Nov. 28, 1964, at site 700 ft upstream at present datum. See WSP 1729 or 1917 for history of changes prior to Oct. 2, 1959. Datum of gage is 1,929.03 ft above National

REMARKS .-- Estimated daily discharges: Oct. 27 to Apr. 6. Records fair except for period of estimated discharge, which are poor.

AVERAGE DISCHARGE. -- 55 years, 566 ft3/s, 410,100 acre-ft/yr; median of yearly mean discharges, 460 ft3/s, 333.000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD .-- Maximum discharge, 110,000 ft3/s, Mar. 25, 1947, gage height, 24.0 ft from floodmark, site then in use; no flow at times in most years.

EXTREMES FOR CURRENT YEAR. -- Peak discharges greater than base discharge of 8,000 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage Height (ft)	Date	Time	Discharge (ft3/s)	Gage Height (ft)
Mar. 11		*5,000	*ab7.44				

No flow for many days.

a - Backwater from iceb - Observed

		DISCHARGE	, CUBIC	FEET PER		MEAN VAL		ER 1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.8	e.52	e.00 ·	e.00	e.00	e.00	e510	887	476	384	100	30
2	1.6	e.55	e.00	e.00	e.00	e.00	e490	1050	393	204	83	22
3	1.6		e.00	e.00	e.00	e.00		897	317	136	71	166
2 3 4	1.4		e.00	e.00	e.00	e.00		1450	261	104	59	257
5	1.1		e.00	e.00	e.00	e.00		1290	228	82	53	112
6	.98	e.85	e.00	e.00	e.00	e.00		1020	194	66	47	155
7	.98		e.00	e.00	e.00	e.00	650	1610	171	58	43	132
8	1.3		e.00	e.00	e.00	e.00		1680	155	51	39	85 62
9	1.1		e.00	e.00	e.00	e10	441	2140	141	42	33	62
10	.98		e.00	e.00	e.00	e150	383	2170	127	42	29	50
11	.86	e.60	e.00	e.00	e.00	e4450	350	1700	119	46	27	40
12	.86		e.00	e.00		e2150	315	1240	113	37	24	33
13	.75		e.00	e.00		e1700	293	852	109	43	22	30
14	.64		e.00	e.00		e1000	280	639	105	41	32	26
15	.64		e.00	e.00	e.00	e500	256	547	98	36	44	22
16	.65	e.32	e.00	e.00	e.00	e700	253	455	92	32	25	19
17	.60		e.00	e.00	e.00	e500	250	392	83	43	81	16
	-55		e.00	e.00	e.00	e420	238	343	76	54	119	14
18			e.00	e.00	e.00	e300	227	295	69	33	60	12
19	-55						219	267	62	48	37	11
20	.60	e.00	e.00	e.00	e.00	e200	219	201	02	40		
21	-55	e.00	e.00	e.00	e.00	e250	208	254	59	49	23	9.6
22	• 55		e.00	e.00	e.00	e300	205	240	57	37	15	9.2
23	.75		e.00	e.00	e.00	e450	190	309	56	40	12	9.7
24	.65		e.00	e.00	e.00	e700	202	523	63	222	7.9	7.7
25	.65		e.00	e.00	e.00	e850	195	386	54	315	5.2	6.3
26	.65	e.00	e.00	e.00	e.00	e750	213	346	47	262	4.1	6.9
27	e.60		e.00	e.00		e1250	775	312	47	237	14	5.7
28	e.55		e.00	e.00		e1500	1070	295	61	202	77	4.7
29	e.45		e.00	e.00		e920	749	423	359	166	149	4.4
	e.40		e.00	e.00		e600	622	552	782	139	93	3.8
30 31	e.45		e.00	e.00		e520		710		117	46	
) (diam'r.
TOTAL	25.79		0.00	0.00		20170.00		25274	4974	3368	1474.2	1362.0
MEAN	.83	.33	.00	.00	.00	651		815	166	109	47.6	45.4
MAX	1.8	.85	.00	.00	.00	4450		2170	782	384	149	257
MIN	.40	.00	.00	.00	.00	.00		240	47	32	4.1	3.8
AC-FT	51	20	.0	.0	.0	40010		50130	9870	6680	2920	2700
CAL VR	1988 T	оты, 12097.8	3 MEAN	33.1 M	AX 367	MIN .O	O AC-FT	24000				

WTR YR 1989 TOTAL 70781.95 MEAN 194 MAX 4450 MIN .00 AC-FT 140400

06337000 LITTLE MISSOURI RIVER NEAR WATFORD CITY, ND--CONTINUED (National stream-quality accounting network station)

WATER-QUALITY RECORDS

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

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)	TEMPERATURE WATER (DEG C	BID- ITY) (NTU	DIS- SOLVI	CENT ED SATUR L) ATION	FORM, D FECAL O.7. UM-ME - (COLS.)	TOCOC FECA KF AG F (COLS PER L) 100 M	CI HARD- L, NESS AR TOTAL (MG/L AS (L) CACO3)
APR 11	0950	340	1240	8.17	4.5	4.0	0 1300	12	.0 9	۹ .	_	200
MAY						16.						
11 JUN_	1200	1740	780	-	25.0							
15 JUL	1030	96	1930	8.55	22.0	17.		9	.0 10	3 150	50 5	50 320
31 AUG	1010	126	1150		27.0	23.	5			•	-	
23	0950	12	1900	8.54	29.0	22.	0 54	9	.4 11	8 65	50 2	50 300
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 PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM DIS- SOLVEI (MG/L AS K)	, WAT WI TOT I' D FIELD MG/L CACO	H BONATH H WATER FIELD AS MG/L HC03	E BONATE R WATER D FIELD AS MG/L A CO3	S (MG/I AS SO	DIS- ED SOLV (MG/	, RIDE, DIS- ED SOLVED L (MG/L L) AS F)
APR 11	40	23	200	68	6	6.2	1	51 18	34	0 440	5.	4 0.20
JUN 15	69	36	330	68	8	10	25	90 3	17 1	8 730	7.	7 0.40
AUG 23	73	29	310	68	8	13	2	51 26	57 1	9 750	. 8.	6 0.40
DATE	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITROGEN, NITRAT DIS- SOLVE (MG/L AS N) (00618	GEN E NITRI DIS D SOLV (MG/I AS N	GEN PE NO2+NO DIS- ED SOLVE L (MG/I) AS N	NITRO GEN, AMMONI TOTAL (MG/L AS N)	AMMONI A DIS- SOLVE (MG/I AS N)	GEN,A IA MONIA ORGAN TOTA (MG/ AS N	M- + PHOS- IC PHOROUS L TOTAL L (MG/L) AS P)
APR 11	6.0	824	815	1.12	756	0.71	0 0.0	10 0.73	20 0.08	0.09	00 0.	70 0.220
JUN 15	9.7	1390	1370	1.89	360	_	- <0.0	10 <0.10	0 0.46	0.02	20 0.	60 0.030
AUG 23	9.5	1360	1350	1.85	44.4	0.36	0.0	10 0.3	70 0.05	0.02	20 0.	80 0.090
DATE	PHOS- PHOROUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHOROUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	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	DIS- SOLVI (UG/I	CADMIC DIS- ED SOLVI L (UG/1	DIS- ED SOLVE (UG/L) AS CR	(UG/L	DIS- SOLV (UG/	DIS- ED SOLVED L (UG/L U) AS FE)
APR 11	0.020	<0.010	0.22	60	<1	3	6 (0	.5	(1 <	1 <	3	4 38
JUN 15	0.010	0.020	0.03	10	1	5	7 <0	.5	(1 <	1	1	5 9
AUG 23	<0.010	<0.010	0.09	20	1	7			<1 <	1 4	3	4 3
	L S (DIS- SOLVED S UG/L US PB)	ITHIUM N DIS- SOLVED S (UG/L (AS LI) A	ANGA- JESE, ME DIS- SOLVED S UG/L (S MN) A	RCURY DIS- SOLVED UG/L S HG)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (O1145)	SILVER, DIS- SOLVED (UG/L AS AG)	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)
APR 11.		<5	35	10	<0.1	<10	3	2	1.0	410	<6	23
JUN 15.		<1	65	5	<0.1	5	3	1	<1.0	710	4	6
AUG								1		740	<6	16
23.	••	<1	50	3	<0.1	<10	5	1	<1.0	740	10	10

06337000 LITTLE MISSOURI RIVER NEAR WATFORD CITY, ND--CONTINUED (National stream-quality accounting network station)

INTER- SECTION DUCT- (STAND- ATURE DIS- VAL (FT FM ANCE ARD WATER SOLVED (FT) L BANK) (US/CM) UNITS) (DEG C) (MG/L) DATE TIME (72015) (00009) (00095) (00400) (00010) (00300)	(PER- CENT SATUR- ATION) (00301)	CLOUD COVER (PER- CENT) (00032)	WIND SPEED (MILES PER HOUR) (00035)	TION (DEG. FROM TRUE NORTH) (00036)
APR 11 0050 0.0 0.0 1240 8.17 4.0 12.0	00	05	5.0	200
11 0950 0.0 0.0 1240 8.17 4.0 12.0 11 0952 2.0 10.0 8.20 4.0 12.0	99	95	5.0	200
11 0954 1.1 18.0 8.19 4.0 12.1	99			
11 0958 0.78 15.0 8.20 4.0 12.0	98			
11 1000 0.70 30.0 8.20 4.0 12.0	98			
11 1002 1.3 45.0 8.20 4.0 12.0	98			
11 1004 1.5 60.0 4.0 12.0	98			
11 1006 1.3 75.0 8.17 4.0 12.0	98			
11 1008 1.0 90.0 8.17 4.0 12.0	98			
11 1010 0.50 105 8.17 4.0 12.0 11 1012 2.3 120 4.0 12.0	98 98		-	
11 1015 1.7 10.0 8.17 4.0 12.1	99			
11 1017 2.5 20.0 8.17 4.0				
11 1019 2.5 30.0 8.17 4.0 12.0	98			
JUN				
15 1030 0.0 0.0 1930 8.55 17.5 9.0	103	15	<10	125
15 1032 1.2 4.00 1930 8.55 17.5 9.0	101			
15 1034 1.6 8.00 1930 8.55 17.5 9.0	101			
15 1036 1.9 12.0 1930 8.55 17.5 9.0 15 1038 2.1 16.0 1930 8.55 17.5 9.0	101 101	=		-
15 1038 2.1 16.0 1930 8.55 17.5 9.0 15 1040 2.1 20.0 1930 8.55 17.5 9.0	101			
15 1042 2.0 24.0 1930 8.55 17.5 9.0	101			
15 1044 2.0 28.0 1930 8.55 17.5 9.0	101			
15 1046 1.9 32.0 1930 8.55 17.5 9.0	101			
15 1048 1.8 36.0 1930 8.55 17.5 9.0	101			
15 1050 2.0 40.0 1930 8.55 17.5 9.0	101			
15 1052 2.1 44.0 1930 8.55 17.5 9.0	101			-
15 1054 2.3 48.0 1930 8.55 17.5 9.0 15 1056 1.9 52.0 1930 8.55 17.5 9.0	101 101	==		==
15 1056 1.9 52.0 1930 8.55 17.5 9.0 15 1058 1.4 56.0 1930 8.55 17.5 9.0	101			
AUG	101			
23 0950 0.0 4.00 1900 8.54 22.0 9.4	118	15	15	130
23 0952 0.28 7.00 1910 8.56 22.0 9.4	112			
23 0954 0.41 10.0 1910 8.56 22.0 9.4	112			
23 0956 0.49 13.0 1900 8.54 22.0 9.4	112		,	
23 0958 0.50 16.0 1900 8.54 22.0 9.5	112			
23 1000 0.60 19.0 1900 8.54 22.0 9.5 23 1002 0.61 22.0 1900 8.54 22.0 9.5	112 112	=		
23 1004 0.62 25.0 8.54 22.0 9.5	112			
23 1006 0.67 28.0 1900 8.54 22.0 9.5	112			
23 1008 0.70 31.0 1900 8.54 22.0 9.5	112			
23 1010 0.70 34.0 1900 8.55 22.0 9.4	112			
23 1012 0.72 37.0 1910 8.55 22.0 9.4	112			
SEDI- SED. MENT, SUSP. SEDI- DIS- SIEVE MENT, CHARGE, DIAM. SUS- SUS- FINER PENDED PENDED THAN (MG/L) (T/DAY) .062 MM DATE (80154) (80155) (70331)				
APR 11 2,550 2,340 99				
JUN				
15 826 214 100 AUG				
23 274 8.9 100				

06338000 LAKE SAKAKAWEA NEAR RIVERDALE, ND

LOCATION.--Lat 47°30'10", long 101°25'50", in S½ sec.31, T.147 N., R.84 W., Mercer County, Hydrologic Unit 10110101, in control structure of Garrison Dam, 2.5 mi west of Riverdale, 14 mi upstream from Knife River, and at mile 1,389.9.

DRAINAGE AREA .-- 181,400 mi2, approximately.

MONTHEND-ELEVATION AND CONTENTS RECORDS

PERIOD OF RECORD. --October 1953 to current year. Prior to October 1966, published as Garrison Reservoir near Riverdale.

REVISED RECORDS .-- WSP 1559: 1957(M).

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

REMARKS.--Reservoir is formed by earth-fill dam; storage began in November 1953. Maximum capacity, 24,200,000 acre-ft below elevation 1,854.0 ft, top of 29-ft gates. Normal maximum, 22,700,000 acre-ft below elevation 1,850.0 ft, of which about 4,300,000 acre-ft is designated for flood control. Elevation of crest of spillway, 1,825.0 ft, surmounted by radial gates. Inactive storage, 5,000,000 acre-ft below elevation 1,775.0 ft. Dead storage, zero at elevation 1,672.0 ft. Snake Creek arm of the reservoir has connecting gate to main reservoir, with sill at elevation, 1,810 ft. Figures herein represent total contents.

COOPERATION. -- Elevations and contents are furnished by the U.S. Army Corps of Engineers. Elevations are observed elevations at midnight on the last day of each month. Contents are computed based on reservoir inflow, reservoir outflow, evaporation, and rainfall; and are adjusted for wind effect.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 24,368,000 acre-ft, July 25, 1975, elevation, 1,854.6 ft; minimum since first reaching normal maximum level in July of 1969, 13,365,000 acre-ft, Feb. 28, 1989, elevation, 1,820.1 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 15,136,000 acre-ft, July 3, elevation, 1,826.8 ft; minimum, 13,365,000 acre-ft, Feb. 28, elevation, 1,820.1 ft.

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

	Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.	30	1825.9	14,885,000	
Oct.	31	1825.0	14,643,000	-242,000
Nov.	30	1824.7	14,561,000	-82,000
Dec.	31	1823.2	14,157,000	-404,000
CAL	YR 1988	-	<u> -</u>	-3,991,000
Jan.	31	1821.8	13,816,000	-341,000
Feb.	28	1820.1	13,365,000	-451,000
Mar.	31	1822.0	13,857,000	+492,000
Apr.	30	1823.6	14,280,000	+423,000
May	31	1824.8	14,589,000	+309,000
June	30	1826.7	15,119,000	+530,000
July	31	1825.9	14,890,000	-229,000
Aug.	31	1823.4	14,218,000	-672,000
Sept.	30	1823.0	14,100,000	-118,000
WTR	YR 1989	-	-	-785,000

06338490 MISSOURI RIVER AT GARRISON DAM, ND (National stream-quality accounting network station)

LOCATION.--Lat 47°30'08", long 101°25'50", in S sec.31, T.147 N., R.84 W., Mercer County, Hydrologic Unit 10130101, downstream from dam at National Fish Hatchery's supply line from penstocks 4 and 5, in control structure of Garrison Dam, 2.5 mi west of Riverdale, 14 mi upstream from Knife River, and at mile 1,389.9.

DRAINAGE AREA. -- 181,400 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- October 1969 to current year.

GAGE .-- Flow meter and gate readings.

REMARKS.--Records good. Many diversions above station. Flow regulated by Lake Sakakawea (station 06338000).

Prior to October 1969 records were obtained at a site 9.1 mi downstream. Discharges at the downstream site were generally about 7 percent greater than those furnished by the U.S. Army Corps of Engineers for the present site.

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

AVERAGE DISCHARGE.--20 years, 23,570 ft3/s, 17,080,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. -- Maximum daily discharge, 65,200 ft3/s, July 25, 1975; minimum daily, 6,000 ft3/s, Sept. 29, 1974.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 24,500 ft³/s, Feb. 3; minimum daily, 10,000 ft³/s, Oct. 23 and 30.

		DISCHARG	E, CUBIC	FEET PER	SECOND, MEAN	WATER YEAR	OCTOBER	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOA	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10100	10400	18000	16400	23200	15900	15000	15500	22500	22400	22700	18000
2	10600	10500	17700	16000	24200	16100	16000	18000	22400	22300	22600	17500
3	10300	11000	18200	16300	24500	15100	14900	17900	22400	22500	22700	17300
4	10800	10400	18000	16500	23900	15800	14700	17900	22500	22400	22600	15900
5	11100	10600	17800	16300	23600	15600	15700	19200	22700	22400	22500	14800
6	14800	10500	17400	16000	23800	15400	14800	18800	22600	22000	22500	15100
7	15000	10200	18000	15800	23600	15300	14800	18800	22400	22500	22400	14400
8	10600 10700	10900	17600 15800	16300	23700	15400	13600	19800	22600	22400	22400	13800
9 10	10200	10500	16400	18300 18200	23900	15400	14500	19600	22400	22400	22200	15100
10	10200	10500	16400	18200	24300	15000	13700	19800	22200	22500	22600	14500
11	10400	10500	17300	18400	24000	15900	15000	19900	22400	22200	22400	14400
12	10900	10800	16900	18400	23900	15600	13900	19700	22500	22500	22500	14600
13	10800	10100	17900	18700	23300	16200	14000	20100	22400	22500	22100	14400
14	10800	10500	18200	18400	23900	18000	14100	19100	22300	22100	21900	14500
15	10500	10700	19100	18400	23000	16800	14000	19800	22300	22600	22500	12500
16	10800	10600	18700	19000	24100	17600	15700	22200	22300	22700	22500	11800
17	10700	10600	18600	19400	23000	17300	18100	21800	22400	22600	21600	11900
18	10400	11000	19000	19500	23900	16900	18000	22000	22400	22300	21700	10300
19	10100	11600	20300	19900	22900	17400	17800	22000	22400	22300	21700	10100
20	10100	11000	20300	19400	23300	17500	16900	22400	22200	22700	21700	10700
21	10100	10900	19900	20700	21900	17600	17100	22400	22500	22300	21700	10900
22	10600	11100	19800	20800	21900	17800	16400	22400	22500	22500	21700	10600
23	10000	10400	21000	20900	22400	16400	16100	22500	22500	22300	21900	10900
24	10200	11100	19900	21900	21200	17700	17200	22500	22300	22300	21900	10700
25	10300	10400	18600	22400	19700	16400	17800	22300	22300	22400	21600	10700
26	10300	10200	17500	21800	17500	15000	17000	22600	22300	22500	21200	10400
27	10500	10400	18000	21800	15700	14800	17100	22300	22500	22500	21400	10400
28	10500	12900	18300	21200	15700	15200	16500	22700	22100	22500	21000	10300
29	10400	16500	17800	21400		15400	16600	22700	22400	22300	21100	10600
30 31	10000	17200	18200	21300		15000	16800	22400	22500	22500	19200	11200
37	10500		18200	22200		15300		22600		22500	18100	
TOTAL	333100	334600	568400	592000	630000	500800	473800	641700	672200	694900	676600	388300
MEAN	10750	11150	18340	19100	22500	16150	15790	20700	22410	22420	21830	12940
MAX	15000	17200	21000	22400	24500	18000	18100	22700	22700	22700	22700	18000
MIN	10000	10100	15800	15800	15700	14800	13600	15500	22100	22000	18100	10100
AC-FT	660700	663700	1127000	1174000	1250000	993300	939800	1273000	1333000	1378000	1342000	770200

CAL YR 1988 TOTAL 6519200 MEAN 17810 MAX 27500 MIN 10000 AC-FT 12930000 WTR YR 1989 TOTAL 6506400 MEAN 17830 MAX 24500 MIN 10000 AC-FT 12910000

06338490 MISSOURI RIVER AT GARRISON DAM, ND--CONTINUED (National stream-quality accounting network station)

LOCATION .-- Samples collected at National Fish Hatchery's supply line from penstocks 4 and 5, in control structure of Garrison Dam.

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORD. --SPECIFIC CONDUCTANCE: October 1971 to current year. WATER TEMPERATURES: October 1971 to current year.

EXTREMES FOR PERIOD OF DAILY RECORD .--

SPECIFIC CONDUCTANCE: Maximum observed, 870 microsiemens, May 4, 18, 19, July 4, 1980; minimum observed, 500 microsiemens, Mar. 20, 1986.
WATER TEMPERATURES: Maximum observed, 24.4°C, Aug. 13, 1988; minimum observed, 0.0°C on many days during winter months in most years.

EXTREMES FOR CURRENT YEAR .--

SPECIFIC CONDUCTANCE: Maximum observed, 945 microsiemens, Dec. 27; minimum observed, 670 microsiemens, Nov. 4.

WATER TEMPERATURES: Maximum observed, 22.0°C, Aug. 4; minimum observed, 12.0°C, Feb. 3.

DATE	TIME	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)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD- NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
OCT 12	0845	750	8.42	10.0	14.5	1.8	8.6	84	К1	K1	250	59
NOV 16	0905	760	8.40	-2.0	7.5	1.4	9.9	83	К2	к6	250	56
MAR 01	0920	730	8.18	-20.0		0.30	10.8	81	K2	K13	250	59
APR					4.0	0.50						
26 JUN	0910	730	8.07	7.5	5.0	0.80	10.3	80	<1	<1	250	57
30	0930	745	8.08	26.0	13.0	0.60	9.1	86	<1	<1	250	57
06	0905	715	8.05	15.0	15.5	1.9	6.7	67	<1	<1	230	55
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	BICAR- BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR- BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)
OCT		22			2 2 4	124		_				
12 NOV	25	71	38	2	3.7	176	200	7	210	12	0.50	6.6
16	26	71	38	2	4.0	179	199	10	210	11	0.50	6.6
MAR 01	25	72	38	2	4.2	196	239	0	210	12	0.60	6.9
APR 26	25	69	38	2	3.9	186	227	0	200	11	0.50	6.7
JUN 30	25	67	37	2	4.3	156	190	0	190	12	0.60	6.8
SEP 06	23	65	37	2	4.2	159	194	0	200	11	0.60	6.7

06338490 MISSOURI RIVER AT GARRISON DAM, ND--CONTINUED (National stream-quality accounting network station)

NOT 12	DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, 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)
Note												
MAR	NOV	492	495	0.67	0.0	<0.010	<0.100	0.020	0.010	0.30	0.010	0.010
Oct Oct		488	492	0.66	0.0	<0.010	<0.100	<0.010	<0.010	0.30	0.010	<0.010
25 JAB 2485	01	499	506	0.68	0.0	0.010	<0.100	0.070	0.030	0.20	0.010	<0.010
SEP	26	482	485	0.66	0.0	<0.010	<0.100	0.030	0.030	0.30	0.010	<0.010
PHOSPHORUS	30	476	457	0.65	0.0	<0.010	0.110	0.020	0.020	0.40	0.020	<0.010
PHOROUS PHOROUS SULVED ORGANIC ORGAN		467	462	0.64	0.0	<0.010	0.150	<0.010	0.010	0.20	<0.010	<0.010
12	DATE	PHOROUS ORTHO, DIS- SOLVED (MG/L AS P)	PHOROUS ORGANIC TOTAL (MG/L AS P)	INUM, DIS- SOLVED (UG/L AS AL)	DIS- SOLVED (UG/L AS AS)	DIS- SOLVED (UG/L AS BA)	LIUM, DIS- SOLVED (UG/L AS BE)	DIS- SOLVED (UG/L AS CD)	MIUM, DIS- SOLVED (UG/L AS CR)	DIS- SOLVED (UG/L AS CO)	DIS- SOLVED (UG/L AS CU)	DIS- SOLVED (UG/L AS FE)
NOV 16		40.040	0.04			-						
MAR 01	NOA				2	54	(0.5	(1	. (1	()	4	9
APR 26	MAR	<0.010										
JUN 30		<0.010	0.01	<10	2	59	<0.5	2	<1	<3	6	7
SEP O6 <		<0.010	0.01	<10	1	58	<0.5	<1	<1	<3	2	5
06 <	30	<0.010	0.02									
LEAD, DIS- DIS- DIS- DIS- DIS- DIS- DIS- DIS-	06	<0.010		<10	2	54	<0.5	<1	<1	<3	3	4
12	DATE	DIS- SOLVED (UG/L AS PB)	DIS- SOLVED (UG/L AS LI)	NESE, DIS- SOLVED (UG/L AS MN)	DIS- SOLVED (UG/L AS HG)	DENUM, DIS- SOLVED (UG/L AS MO)	DIS- SOLVED (UG/L AS NI)	NIUM, DIS- SOLVED (UG/L AS SE)	DIS- SOLVED (UG/L AS AG)	TIUM, DIS- SOLVED (UG/L AS SR)	DIUM, DIS- SOLVED (UG/L AS V)	DIS- SOLVED (UG/L AS ZN)
MAR 01 <5 52 3 <0.1 10 2 1 1.0 600 <6 51 APR 26 <5 53 4 <0.1 <10 <1 <1 <1.0 590 <6 32 SEP	OCT										1-3/6	
APR 26 <5 53 4 <0.1 <10 <1 <1 <1.0 590 <6 32 SEP	MAR	<5	51	2	0.1	<10	1	1	1.0	590	<6	6
26 <5 53 4 <0.1 <10 <1 <1.0 590 <6 32		<5	52	3	<0.1	10	2	1	1.0	600	<6	51
06 <1 51 2 <0.1 <10 2 1 <1.0 560 <6 25	26	<5	53	4	<0.1	<10	<1	<1	<1.0	590	<6	32
	06	<1	51	2	<0.1	<10	2	-1	<1.0	560	<6	25

06338490 MISSOURI RIVER AT GARRISON DAM, ND--CONTINUED (National stream-quality accounting network station)

SPECIFIC CONDUCTANCE, MICROSIEMENS/CM AT 25 DEGREES CENTIGRADE, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989, ONCE DATLY DAY OCT NOV DEC TAN. FEB SEP MAR APR MAY TIIN JUL. AUG 745 770 780 745 765 750 760 745 730 740 735 730 735 720 690 700 705 765 765 2 770 765 710 755 760 680 710 740 735 775 3 770 750 785 750 720 700 710 670 755 775 760 730 735 715 690 700 720 5 780 760 765 745 750 755 740 740 710 700 720 705 6 770 750 745 710 695 705 750 770 755 760 750 730 710 745 750 750 750 775 780 760 760 750 740 710 730 710 A 780 780 765 760 745 720 710 700 710 700 760 735 745 760 750 765 755 740 730 700 710 720 10 765 745 775 765 765 730 770 750 745 700 705 710 11 770 740 760 735 710 790 760 760 770 740 720 715 715 740 745 12 770 750 775 760 760 760 720 710 700 720 13 750 760 805 765 765 730 735 700 700 705 720 14 740 755 750 780 760 770 750 715 720 720 722 720 15 755 750 760 760 760 780 720 705 705 740 730 725 16 745 745 760 770 765 780 700 705 750 725 730 745 745 765 760 17 760 750 780 750 765 725 715 720 705 740 710 18 730 780 745 750 705 730 725 725 720 750 750 755 19 760 765 745 745 740 715 720 735 720 725 20 760 760 770 750 760 730 715 725 730 680 730 21 760 755 755 760 750 750 730 730 710 745 765 22 765 730 750 750 750 745 780 790 715 745 750 735 720 760 735 720 23 705 750 750 720 720 750 735 700 24 730 780 800 750 770 700 720 745 735 710 700 25 760 760 770 780 770 775 700 715 750 730 700 710 770 765 760 26 750 755 790 755 760 700 720 760 700 720 740 750 765 760 27 945 755 755 760 755 690 715 800 750 755 735 710 700 715 28 790 780 725 29 760 770 790 760 710 720 740 700 720 ---775 720 760 780 770 770 740 710 720 ---755 705 700 715 31 755 755 755 750 710 720 730 MEAN 759 753 767 769 757 762 731 727 728 715 717 715 MAX 780 780 945 805 785 770 740 780 800 760 745 765 MIN 730 670 745 690 745 745 745 690 700 700 680 680 WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989, ONCE DAILY DAY OCT NOV DEC JAN FEB JUN JUL AUG SEP MAR APR MAY 19.3 18.8 17.8 18.6 19.0 15.2 16.7 16.3 20.6 20.5 19.4 18.6 14.3 16.3 21.3 2 17.5 18.5 16.3 14.7 19.2 18.8 20.6 18.7 3 16.8 17.9 17.2 12.0 19.9 19.8 18.4 20.2 19.2 16.1 19.6 17.5 15.5 12.8 15.3 20.7 19.8 18.5 20.3 22.0 19.2 5 18.9 15.5 19.0 17.3 15.6 13.5 15.4 20.0 19.6 21.0 21.9 19.4 6 15.8 16.7 16.3 18.9 18.1 15.7 14.5 15.7 17.5 19.8 18.4 21.2 20.7 20.7 18.9 17.4 15.4 15.3 16.1 17.3 19.8 19.7 14.4 19.7 19.9 8 15.4 18.5 18.0 18.3 14.7 17.7 17.5 20.6 21.0 20.1 19.5 9 17.0 14.2 18.4 19.1 15.1 17.3 18.6 20.0 18.3 21.8 20.3 18.8 17.7 10 18.1 18.5 15.0 17.5 18.5 19.8 19.0 21.0 20.8 18.1 17.9 17.6 17.3 11 18.2 18.4 14.7 15.2 20.3 17.0 18.5 19.6 20.5 21.7 20.9 19.6 21.4 12 18.8 18.8 14.5 15.0 15.5 15.3 17.2 17.4 18.9 20.9 17.0 17.1 17.2 13 18.6 19.5 21.4 20.1 20.8 19.5 17.8 20.5 14 16.2 18.3 15.8 19.0 19.8 18.9 18.7 17.8 18.3 15 18.4 17.8 15.2 15.0 18.0 19.3 21.1 18.1 20.3 19.1 17.7 16 17.9 17.4 16.3 17.2 19.3 19.4 18.3 20.4 19.3 18.9 17 17.5 16.7 17.4 16.5 13.8 16.9 19.4 19.5 19.1 20.9 20.5 18.7 18 16.5 16.2 18.0 17.2 14.5 18.0 18.3 20.1 18.5 20.1 20.8 19.7 19 16.2 16.2 17.5 17.2 14.1 18.3 17.6 19.5 19.1 20.3 20.4 18.9 20 16.7 17.1 18.3 17.4 18.6 20.6 18.2 19.4 19.0 18.3 20.4 21 16.1 17.1 18.0 17.5 18.4 19.9 19.3 19.0 19.7 18.2 19.5 22 15.8 17.4 18.0 18.0 14.3 18.1 18.5 18.2 20.6 19.4 18.6 23 15.2 17.7 17.9 17.6 15.6 17.8 18.6 19.0 20.8 20.3 17.2 24 14.9 18.0 16.5 17.5 17.2 19.0 20.6 18.4 19.1 21.0 20.9 17.8 25 14.8 17.9 16.0 17.1 17.2 19.0 20.0 18.7 19.2 20.7 21.4 18.4 26 18.1 17.9 15.3 17.0 16.5 18.9 18.1 20.9 17.6 20.2 19.6 21.0 18.4 27 18.0 16.1 19.7 21.2 20.0 20.0 19.3 18.8 18.1 15.0 17.9 19.5 16.8 18.0 19.2 20.8 19.1 28 15.8 19.3 19.3 19.1 17.2 16.9 20.2 20.4 18.7 29 19.0 19.3 19.6 18.5 19.5 15.2 18.9 18.0 20.6 20.2 30 18.8 ---19.1 19.4 31 18.5 15.3 18.7 20.2 20.3 20.3 14.9 17.2 MEAN 16.9 17.9 17.3 16.3 17.7 19.2 19.5 18.9 20.4 20.5 18.6 19.5 18.5 19.6 18.8 20.2 21.1 21.8 22.0 MAX 21.4 20.6 20.7

MIN

14.8

16.2

13.7

12.0

14.9

18.0

18.1

14.4

17.3

19.1

17.0

06339010 MISSOURI RIVER ABOVE STANTON, ND

LOCATION.--Lat 47°21'45", long 101°21'25", SE1/4NE1/4SE1/4 sec.22, T.145 N., R.84 W., McLean County, Hydrologic Unit 10130101, on left bank 9 mi south of Riverdale, and at mile 1,379.

DRAINAGE AREA .-- 181,400 mi2, approximately.

GAGE-HEIGHT RECORDS

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

GAGE .-- Water-stage recorder. Datum of gage is 1600.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS. -- Stage regulated completely by releases from Garrison Dam (station 06338490) 13 mi upstream.

EXTREMES FOR PERIOD OF RECORD. -- Maximum daily gage height recorded, 72.24 ft, Jan. 29, 1977; minimum daily recorded, 64.21 ft, May 7, 1987 and Nov. 12, 1988.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES

					M	EAN VALUE	5					
DAY	OCT	NOA	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	64.29 64.43 64.38 64.54 64.59	64.49 64.39 64.57 64.26 64.39	65.94 65.97 65.92 65.93 66.03	66.52 67.37 67.78 67.52 67.03	67.39 67.33 68.27 68.85 69.01	67.34 67.25 67.21 67.00 66.95	65.52 65.54 65.41 65.34 65.34	65.46 66.08 66.04 66.03 66.20	66.95 66.90 66.85 66.95 66.92	66.90 66.88 66.94 66.92 66.94	67.14 67.18 67.17 67.18 67.16	66.25 66.05 66.14 65.79 65.67
6 7 8 9	65.08 65.43 64.76 64.24 64.40	64.35 64.42 64.42 64.49 64.41	65.78 65.99 65.87 65.66 65.65	67.26 67.77 68.02 68.68 68.74	68.18 67.34 67.63 67.70 67.13	66.89 67.43 66.57 66.24 65.91	65.42 65.04 65.23 65.07 65.23	66.11 66.22 66.26 66.46 66.42	66.95 66.92 66.89 66.91 66.92	66.88 66.91 66.96 66.90 66.95	67.19 67.18 67.18 67.24 67.18	65.51 65.53 65.42 65.38 65.63
11 12 13 14 15	64.39 64.48 64.50 64.50 64.48	64.34 64.21 64.49 64.42 64.43	65.75 65.84 65.81 66.02 66.13	69.55 68.15 68.32 66.90 66.77	66.82 67.62 66.75 66.72 66.94	65.72 65.84 65.69 65.90 65.98	65.16 65.31 65.09 65.20 65.07	66.52 66.45 66.42 66.43 66.35	66.94 66.91 66.85 66.90 66.92	66.95 66.92 66.91 66.90 66.83	67.29 67.24 67.23 67.23 67.20	65.29 65.47 65.41 65.50 65.13
16 17 18 19 20	64.40 64.48 64.42 64.44 64.42	64.40 64.37 64.45 64.53 64.50	66.15 66.14 66.13 66.33 66.35	67.19 68.16 67.22 66.89 67.18	67.13 67.18 67.18 67.04 66.96	65.97 66.01 65.88 65.80 65.97	65.45 65.75 65.74 65.82 65.66	66.86 66.86 66.88 66.97	66.92 66.92 66.92 66.94 66.98	66.97 66.96 66.94 66.92 66.90	67.29 67.17 67.15 67.08 67.10	64.74 64.93 64.69 64.39 64.55
21 22 23 24 25	64.32 64.43 64.27 64.36 64.32	64.47 64.52 64.36 64.50 64.43	66.43 66.37 66.15 66.32 66.20	67.85 67.27 66.80 67.10 67.15	66.69 66.74 67.84 68.22 66.92	65.92 65.98 65.88 65.86	65.75 65.66 65.70 65.47 65.84	66.93 66.96 66.96 66.97 66.94	66.84 66.93 66.93 66.90	66.98 66.98 66.96 66.99 67.01	67.12 67.05 66.98 67.17 67.09	64.50 64.55 64.56 64.63 64.56
26 27 28 29 30 31	64.32 64.39 64.42 64.35 64.28 64.38	64.37 64.29 64.80 65.48 65.85	65.95 66.19 66.41 66.50 66.39 66.60	67.66 67.71 67.50 67.29 67.31 66.65	66.55 66.50 66.46	65.53 65.53 65.42 65.52 65.36 65.33	65.71 65.78 65.65 65.65 65.66	66.91 66.96 66.86 66.93 66.92	66.88 66.91 66.96 66.87 66.92	67.00 67.04 67.05 67.06 67.04 67.11	66.73 66.88 66.86 66.77 66.48 66.30	64.62 64.52 64.51 64.58 64.57
MEAN MAX MIN	64.47 65.43 64.24	64.51 65.85 64.21	66.69 66.60 65.65	67.53 69.55 66.52	67.32 69.01 66.46	66.11 67.43 65.33	65.48 65.84 65.04	66.59 66.97 65.46	66.91 66.98 66.84	66.95 67.11 66.83	67.07 67.29 66.30	65.10 66.25 64.39

KNIFE RIVER BASIN 219

06339100 KNIFE RIVER AT MANNING. ND

LOCATION.--Lat 47°14'10", long 102°46'10", in SE1/4NW1/4 sec.6, T.143 N., R.95 W., Dunn County, Hydrologic Unit 10130201, on left bank 50 ft downstream from bridge on State Highway 22, and 0.4 mi north of Manning.

DRAINAGE AREA.--205 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- July 1967 to current year.

GAGE .-- Water-stage recorder. Datum of gage is 2,156.55 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 14 to Mar. 25. Records fair except those for period of estimated daily discharge, which are poor.

AVERAGE DISCHARGE.--22 years, 21.2 ft³/s, 15,360 acre-ft/yr; median of yearly mean discharges, 22 ft³/s, 15,900 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 2,940 ft³/s, June 15, 1970, gage height, 16.20 ft; no flow at times.

EXTREMES FOR CURRENT YEAR. -- Peak discharges greater than base discharge of 300 ft3/s and maximum (*):

Date	Time	Discharge (ft3/s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 12	1515	380	8.83	Apr. 28	0345	445	9.36
Mar. 27	0415	322	8.33	June 29	1545	*665	*11.01

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

No flow for many days.

		DIOONA	,	0 1001 10	iii obooiii	MEAN VALUE	S	1,000 1		,,,,		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.07	e.65	e.70	e.74	e.66	42	31	3.3	52	.05	.00
2	.00	.10	e.70	e.70	e.72	e.66	34	21	3.1	34	.03	.00
3	.00	.20	e.74	e.70	e.70	e.66	34	14	2.8	21	.03	.00
3	.00	.26	e.77	e.70	e.68	e.64	36	11	2.0	9.4	.03	.00
5	.00	.32	e.74	e.70	e.68	e.64	53	7.7	2.0	4.6	.03	.00
6	.00	.26	e.70	e.70	e.66	e.64	38	5.6	1.8	2.6	.02	.00
7	.00	.32	e.65	e.68	e.66	e.66	30	6.5	1.3	1.9	.02	.00
7 8	.00	.64	e.58	e.68	e.66	e1.0	26	8.0	1.1	1.4	.03	.00
9	.00	.84	e.50	e.66	e.66	e6.0	21	11	.86	.96	.02	.00
10	.00	.91	e.42	e.66	e.68	e45	18	12	.61	.81	.01	.00
11	.00	1.1	e.40	e.64	e.68	e95	15	8.1	.61	.87	.01	.00
12	.00	1.0	e.45	e.64	e.68	e338	11	4.2	.74	.62	.00	.00
13	.00	.91	e.52	e.62	e.68	e237	9.0	5.2	.86	.58	.00	.00
14	.00	e.82	e.66	e.62	e.68	e130	7.6	1.9	.85	.64	.00	.00
15	.00	e.75	e.62	e.64	e.68	e100	6.4	1.8	.65	.62	.00	.00
16	.00	e.70	e.65	e.64	e.66	e70	5.4	1.9	.54	.54	.00	.00
17	.01	e.62	e.70	e.66	e.66	e48	4.9	1.8	.84	.39	.00	.00
18	.01	e.58	e.74	e.68	e.66	e34	4.6	1.5	.70	.50	.00	.00
19	.01	e.53	e.75	e.70	e.64	e25	4.4	1.4	.54	.50	.00	.13
20	.01	e.56	e.75	e.70	e.64	e17	3.9	1.1	.38	.51	.00	.00
21	.01	e.60	e.74	e.70	e.64	e12	3.7	.92	.26	.34	.00	.03
22	.01	e.65	e.72	e.72	e.66	e13	3.0	.89	.29	.27	.00	.00
23	.01	e.70	e.72	e.72	e.68	e18	2.7	.99	.24	.52	.00	.00
24	.02	e.74	e.70	e.70	e.70	e27	2.6	1.9	.26	.41	.00	.00
25	.04	e.80	e.70	e.70	e.70	e97	2.6	1.4	.28	.28	.00	.00
26	.08	e.75	e.68	e.68	e.70	245	4.1	1.4	.31	.21	.00	.00
27	.10	e.70	e.68	e.68	e.68	289	103	1.6	.20	.14	.00	.00
28	.07	e.65	e.68	e.68	e.68	295	309	1.5	.26	.08	.00	.00
29	.05	e.60	e.70	e.70		160	78	2.8	351	.07	.00	.00
30	.05	e.60	e.70	e.72		91	44	3.2	150	.08	.00	.01
31	.06		e.70	e.74		60		2.8		.06	.00	
TOTAL	0.54	18.28	20.41	21.16	18.94	2457.56	956.9	176.10	528.68	136.90	0.28	0.17
MEAN	.017	.61	.66	.68	.68	79.3	31.9	5.68	17.6	4.42	.009	.006
MAX	.10	1.1	.77	.74	.74	338	309	31	351	52	.05	.13
MIN	.00	.07	.40	.62	.64	.64	2.6	.89	.20	.06	.00	.00
AC-FT	1.1	36	40	42	38	4870	1900	349	1050	272	.6	.3
MC-FI	1.1	50	40	42	70	4010	1,500	243	.0,0	-1-	•	

CAL YR 1988 TOTAL 572.36 MEAN 1.56 MAX 35 MIN .00 AC-FT 1140 WTR YR 1989 TOTAL 4335.92 MEAN 11.9 MAX 351 MIN .00 AC-FT 8600

e - Estimated

KNIFE RIVER BASIN

06339100 KNIFE RIVER AT MANNING, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (OOO61)	CIFIC CON- DUCT- ANCE (US/CM)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (OOO2O)	TEMPER ATURE WATER (DEG C	(MG/L AS) CACO3	CALCIUM DIS- SOLVED (MG/L AS CA)	DIS- SOLVEI (MG/L AS MG)	DIS- DIS- O SOLVED (MG/L AS NA)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)
NOV	4475	0.55										
21 JAN	1435	0.57	4200		5.0	1.	0 -					
03 FEB	1100	0.69	4050		-8.0	0.	5 -		-	-		
22 MAR	1205	0.66	3390		-6.5	0.	0 -		-	-		-
12	1235 1135	352 12	340 630	7.62	2.0 -1.0			2 10	4.0	. 44	64	3
APR 03	1230	34	720		4.5	1.	0 -		_			
21 MAY	0830	3.8	1420	==	8.5	11.			-	-		-
22 JUN	1350	0.95	1320		24.0	19.	0 -		-			
27	0900	0.16	1900	8.35	18.0	21.	0 23	0 43	29	380	78	11
AUG 09	0830	0.03	1420		20.0	16.	0 -					
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE, FET-LAE (MG/L AS HCO3) (95440)	BONATE, FET-LAB (MG/L AS CO3)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (OO405)	SULFAT DIS-	DIS- D SOLVE (MG/L) AS CL	RIDE, DIS- DIS- MG/L AS F)	AS SIO2)	AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR	2.6	20	•							070		0.74
12 JUN	9.6	89	0	73	3.4		5.0			230	210	0.31
27	9.9	620	9	520	4.4	510	12	0.60	0.80	1320	1310	1.80
	5	SOLVED (TONS PER DAY)	DIS- SOLVED S (UG/L AS AS)	DIS- SOLVED S (UG/L (AS B)	DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB) 01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	DIS- SOLVED (UG/L AS MN)	DIS- SOLVED (UG/L AS HG) 71890)	DENUM, DIS- SOLVED (UG/L AS MO)	NIUM, DIS- SOLVED (UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) 01080)
MAR 12. JUN		219	<1	80	140	1	5	60	0.1	- 1	<10	90
27.	• •	0.57	<1	470	70	<1	40	40	0.1	3	1	620

06339500 KNIFE RIVER NEAR GOLDEN VALLEY, ND

LOCATION.--Lat 47°09'40", long 102°03'39", in SE1/4 sec.34, T.143 N., R.90 W., Mercer County, Hydrologic Unit 10130201, on left bank 6 ft downstream from highway bridge, 4.5 mi downstream from Elm Creek, and 9 mi south of Golden Valley.

DRAINAGE AREA .-- 1,230 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1903 to November 1906, April 1907 to November 1915, April 1916 to October 1919, and October 1921 to September 1924 (published as "at Broncho" or "near Broncho"), and April 1943 to current year. Monthly discharge only for some periods published in WSP 1309.

REVISED RECORDS (WATER YEARS).--WSP 1006:0 Drainage area. WSP 1279: 1904. 1914-19(M). 1922-24(M), 1944.

GAGE.--Water-stage recorder. Datum of gage is 1,847.13 ft above National Geodetic Vertical Datum of 1929. See WSP 1729 or 1917 for history of changes prior to May 1, 1946.

REMARKS .-- Estimated daily discharges: Nov. 15 to Mar. 27. Records fair.

AVERAGE DISCHARGE.--63 years (1904-06, 1908-15, 1917-19, 1922-24, 1944-89), 95.1 ft^3/s , 68,900 acre-ft/yr; median of yearly mean discharges, 86 ft^3/s , 62,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,200 ft³/s, May 9, 1970, gage height, 25.84 ft; maximum gage height, 26.7 ft, Mar. 26, 27, 1943, from floodmark; no flow at times in some years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 26, 27, 1943 reached a stage of 26.7 ft, from floodmark, 11,500 ft 3 /s. The 1943 flood was the highest since 1903 according to information from local residents.

EXTREMES FOR CURRENT YEAR. -- Peak discharges greater than base discharge of 1,500 ft3/s and maximum (*):

Date	Time	Discharge (ft3/s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 15	1500	*630	*a8.35				

DISCHARGE. CUBIC FEET PER SECOND. WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

Minimum daily discharge, 0.77 ft^3/s , Aug. 10. a - Backwater from ice

			,		. 5200112	MEAN VALUES	3	,,,,,,		1878		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	1.9 1.7 1.9 1.8 1.9	4.6 4.8 4.9 4.9 5.9	e6.0 e5.7 e5.3 e5.0 e5.3	e4.4 e4.3 e4.5 e4.7 e4.9	e3.8 e3.5 e3.2 e3.0 e2.8	e2.0 e1.9 e1.9 e1.8 e1.7	246 169 154 139 109	255 148 96 67 49	199 129 80 53 49	5.0 38 110 56 34	1.6 1.5 1.3 1.2	9.0 6.8 5.9 4.8 3.1
6 7 8 9	2.2 2.7 2.7 2.7 2.3	5.6 5.1 6.0 5.0 4.8	e5.4 e5.3 e4.9 e3.9	e4.9 e4.6 e4.4 e4.2 e4.0	e2.6 e2.4 e2.3 e2.2 e2.1	e1.7 e1.9 e2.5 e3.5 e6.0	108 103 111 99 79	39 33 28 26 21	34 25 20 17 13	21 15 12 8.1 6.8	.92 .84 .84 .80	2.3 1.8 2.0 2.8 3.5
11 12 13 14 15	2.1 2.3 2.8 2.3 2.7	5.1 6.9 8.4 6.6 e5.8	e3.7 e4.5 e5.6 e5.3 e4.9	e3.8 e3.8 e3.7 e3.6 e3.5	e2.1 e2.2 e2.2 e2.1 e2.1	e124 e235 e201 e250 e558	68 60 54 50 44	18 15 14 13	11 11 9.9 9.2 8.3	6.3 6.1 5.9 6.1 5.7	.85 1.4 1.3 1.2	3.0 2.4 2.0 1.6 1.1
16 17 18 19 20	2.7 3.3 4.0 3.7 4.1	e5.1 e4.4 e4.4 e4.5 e4.6	e4.5 e4.4 e4.6 e4.8 e5.0	e3.5 e3.6 e3.8 e4.1 e4.1	e2.0 e2.0 e1.9 e1.9	e420 e250 e160 e120 e60	37 31 28 25 25	12 14 12 11 9•9	8.3 8.1 8.1 7.5 6.7	5.2 5.9 7.6 6.6	1.0 1.0 1.0 .95	1.1 1.1 1.1 1.1
21 22 23 24 25	4.0 4.0 2.9 2.7 3.0	e4.7 e4.7 e5.0 e5.4	e5.2 e5.0 e4.8 e4.5 e4.0	e4.0 e4.2 e4.4 e4.4	e1.9 e2.0 e2.0 e2.1 e2.2	e40 e52 e45 e52 e60	23 22 19 19 17	9.1 8.5 8.4 9.9	5.6 5.5 5.8 5.8	5.2 3.8 3.2 2.8 2.4	.92 .96 1.0 1.0 3.7	1.0 1.1 1.1 1.1
26 27 28 29 30 31	3.3 3.5 3.6 3.6 3.9 4.5	e5.0 e4.2 e4.8 e5.2 e5.6	e3.8 e4.0 e4.0 e4.2 e4.4 e4.5	e4.1 e4.0 e4.1 e4.2 e4.2 e4.0	e2.1 e2.1 e2.0	e106 e180 313 536 458 385	19 139 317 333 396	11 10 10 31 66 258	5.3 5.4 5.6 5.6	2.4 2.4 2.5 2.2 1.9	6.0 4.7 10 15 16	1.1 1.1 1.1 1.1 1.2
TOTAL MEAN MAX MIN AC-FT	90.8 2.93 4.5 1.7 180	156.5 5.22 8.4 4.2 310	146.0 4.71 6.0 3.5 290	128.2 4.14 4.9 3.5 254	64.7 2.31 3.8 1.9 128	4629.9 149 558 1.7 9180	3043 101 396 17 6040	1327.8 42.8 258 8.4 2630	762.3 25.4 199 5.2 1510	397.1 12.8 110 1.8 788	94.77 3.06 16 .77 188	68.6 2.29 9.0 1.0 136

CAL YR 1988 TOTAL 4712.11 MEAN 12.9 MAX 190 MIN .15 AC-FT 9350 WTR YR 1989 TOTAL 10909.67 MEAN 29.9 MAX 558 MIN .77 AC-FT 21640

KNIFE RIVER BASIN

06339500 KNIFE RIVER NEAR GOLDEN VALLEY, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1950, 1964-65, 1972 to current year.

*		DIS CHARG INST CUBI FEE PER	E, SPE- CIFIC C CON- T DUCT- ANCE	PH (STAND- ARD	AIR	ATURE	(MG/	CALCI L DIS- L SOLV (MG/	DIS- ED SOLVE L (MG/L	, SODIUM, DIS- D SOLVED (MG/L	SODIUM	SODIUM AD- SORP- TION RATIO
DATE	TIME	SEC0 (0006			(DEG C) (00020)						PERCENT (00932)	(00931)
OCT												
10	0930	2.	2 300	00	12.0	10.	.0					(7-
21 JAN	1200	4.	7 340	00	- 4.0	1.	0	-		-	-	1 /
06 FEB	1230	4.	9 415	io	-10.0	0.	.0					
23 MAR	1115	5 4.	8 475	io	- 0.0	0.	0	-	- ,		-	
13 APR	1125	185	103	7.92	2 -1.0	0.	5 1	20 22	16	180	74	7
06 20	1145		107 165		.7.			= 100	= :	: :	= =	- =
23 JUN	0935	8.	0 195		- 21.0	18.	5			- 11		
26 AUG	1035	5 5.	4 186	io	- 18.5	20.	0				-	
14	1025	5 1.	2 178	8.4	1 19.0	21.	0 2	30 39	31	340	75	10
DATE	POTAS SIUM DIS- SOLVE (MG/I AS K)	M, BONAT FET-L ED (MG/ AS HC03	E, BONATE AB FET-LA L (MG/L AS) CO3)	AB LAB (MG/L AS CACO3)		DIS- DIS- DIS- DIS- DIS- DIS- DIS- DIS-	DIS- D SOLV (MG/	, RIDE DIS ED SOLV (MG/L) AS F	, DIS- - SOLVE ED (MG/L L AS) SIO2)	AT 180 D DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 13	12	230	0	180	4.3	320	6.	0 0.	20 14	709	682	0.96
AUG 14	13	520	12	450	3.2		6.			1230	1230	1.67
	ATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON, DIS- SOLVED (UG/L AS B)	IRON, DIS- SOLVED (UG/L AS FE)		LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (O1056)	MERCURY DIS- SOLVED (UG/L AS HG)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO)	SELE- NIUM, DIS- SOLVED S (UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) D1080)
MAR 13. AUG		354	<1	160	260	<1	20	100	0.1	1	<10	310
14.	••	4.15	1	300	30	1	40	20	0.1	4	<10	680

06339560 BRUSH CREEK NEAR BEULAH, ND

LOCATION.--Lat 47°10'43", long 101°47'05", in NW1/4SW1/4NW1/4 sec.25, T.143 N., R.88 W., Mercer County, Hydrologic Unit 10130201, on right bank 60 ft upstream from bridge on State Highway 49, and 6 mi south of Beulah.

DRAINAGE AREA .-- 23.92 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- October 1974 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,948 ft above National Geodetic Vertical Datum of 1929, from State Highway Department levels.

REMARKS.--Estimated daily discharges: Oct. 28 to Apr. 3. Records fair except those for period of estimated daily discharge, which are poor.

AVERAGE DISCHARGE.--15 years, 1.74 ft3/s, 1,260 acre-ft/yr; median of yearly mean discharges, 1.6 ft3/s, 1,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 940 ft³/s, Mar. 29, 1982, gage height, 8.40 ft, backwater from ice; maximum gage height, 9.26 ft, Mar. 21, 1978; no flow at times.

EXTREMES FOR CURRENT YEAR. -- Peak discharges greater than base discharge of 50 ft3/s and maximum (*).

Date	Time	Discharge (ft ³ /s)	Gage Height (ft)	Da te	Time	Discharge (ft ³ /s)	Gage Height (ft)
Mar. 10	1615	73.0	*a7.00	May 16	1745	*376	6.82

No flow Jan. 10 to Mar. 7. a - Backwater from ice

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES DAY OCT NOV DEC TIIN. JIII. AUG SEP JAN FEB MAR APR MAY .06 e.13 e.01 e.00 .20 .10 .11 e.24 e.00 e4.0 .06 .09 .10 2 e.22 e.15 e.01 e.00 e.00 e3.0 1.5 1.1 .19 .06 .90 .10 .12 e.24 e.16 e.01 e.00 e.00 e3.0 1.4 .17 -06 .09 .11 4 e.25 e.15 e.01 e.00 e.00 2.3 -74 .16 .10 .11 5 -07 e.23 e.15 e.01 e.00 e.00 2.3 1.1 -66 .14 6 .07 .15 .10 .10 P-24 e-16 e-01 e.00 e.00 2.4 1.1 -59 .08 e.01 e.00 .52 .16 .10 .10 7 e.23 e.15 e.00 2.7 1.1 e.20 8 .09 e.01 e.01 1.0 .47 .16 .11 .11 e.14 e.00 .09 e.02 .45 .16 .10 .11 9 e.20 e.12 e.01 e-00 1.9 -99 1.5 10 .09 e35 .94 .16 .11 .12 e.18 e.10 e.00 e.00 .41 .78 .40 .20 .12 .12 .10 e.20 e.08 e.00 e.00 e15 1.6 e.00 e6.0 .20 .14 .13 12 .10 e.20 e.09 e.00 1.6 .68 .42 .13 13 .11 e.18 e.08 e.00 e.00 e5.0 1.7 .63 .44 .19 .62 .40 .11 .13 .11 e.18 e.08 e.00 e.00 e4.0 1.6 .11 .14 15 .13 e.15 e.06 e.00 e.00 e3.0 1.5 .64 .39 16 e.16 e.06 e.00 e.00 e2.0 58 .34 .18 .11 -14 1.3 17 .21 e.16 e.07 e.00 e.00 e1.5 21 .35 .19 .10 .14 18 .19 e.15 e.06 e.00 e.00 e1.3 3.2 .39 .23 .10 .13 19 .16 e.16 e.06 e.00 e.00 e1.2 1.3 1.5 .36 .19 .12 .13 .15 20 .18 e.16 e.06 e.00 e.00 1.0 28 .17 -11 .16 e.16 e.06 e.00 -29 .15 .12 .15 21 e.00 e1.1 1.4 .90 .77 .33 .13 .11 .15 22 .20 e.17 e.05 e.00 e.00 e1.2 1.3 e.00 .10 .15 23 .18 e.17 e.05 e.00 e1.3 1.3 .38 .14 .10 24 .19 e.15 e.05 e.00 e.00 e1.4 1.2 -82 e.00 .35 .13 .15 .16 25 -18 e.14 e.04 e.00 e1.5 1.2 .20 e.03 e.00 .83 .31 .12 .10 .18 26 e.14 e.00 e1.7 2.6 .32 .12 .18 27 .24 e.02 e.00 e.00 16 .76 .16 e.14 e1.9 e.21 .65 .28 .16 .16 .20 28 e.14 e.02 e.00 e.00 e2.3 6.1 e.20 e.00 2.0 .26 .15 .13 e.02 e2.8 3.1 29 e.14 ---2.1 e.21 e.02 e.00 ---3.7 .23 .11 .20 30 e.13 e5.0 31 .10 e.25 e.02 e.00 e3.5 TOTAL 4.38 2.49 0.09 0.00 98.83 114.38 14.14 5.02 3.49 4.18 5.41 76.2 .47 .080 .003 .00 2.54 3.69 .16 .11 .14 MEAN .14 .18 3.19 .16 1.4 .25 .25 .01 .00 35 16 58 .23 .16 .21 MAX .06 .13 .02 .00 .00 .00 1.2 .62 .23 .11 .09 .10 MIN 8.3 6.9 8.7 4.9 196 151 227 28 10 .0

CAL YR 1988 TOTAL 126.51 MEAN .35 MAX 5.0 MIN .00 AC-FT 251 WTR YR 1989 TOTAL 328.61 MEAN .90 MAX 58 MIN .00 AC-FT 652

e - Estimated

KNIFE RIVER BASIN

06339560 BRUSH CREEK NEAR BEULAH, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1975 to current year.

					,			0010					-				
	DATE	TIME	DIS- CHARGE INST: CUBIC FEED PER SECON	E, SPE- CIFI CON- DUCT ANCE ND (US/C	C PH - (STAN ARI M) UNITS	ND- ATUI D AII S) (DEG	RE AT R WA C) (DE	PER- URE TER G C) O1O)	OXYGE DIS SOLV (MG/	N, (PE - CE ED SAT L) ATI	S- VED R- NT UR- ON)	HARD- NESS TOTAL (MG/L AS CACO3	(MG) AS	VED SO	AGNE- SIUM DIS- DLVEI MG/L S MG D925	DIS- DIS- DIS- MG/	ED /L NA)
	11	1438	0.1	11 20	80 8.	.08 1	5.0	10.0	9	.3	83	510	0 87		70	320	
	17	1049	0.1	16 25	00	:	2.0	0.0							-		
	04	0957	0.0	01		:	2.5	0.0			_	_			_		
	10 29	1131 1017	28 2.8		80 10 7.		3.5 3.5	0.5		.6	61	250	- 48		32	130	
I	O3	1356	2.8				7.0	1.0				_		-	_		
	26 JUN	1305	2.3					11.5		-		-			-	•	
A	22 AUG	1325	0.3					22.0	8	.1	94	510	95		57	230	
2	01 SEP	1440	0.1					27.0				-	10.75	-6			
	05	1335	0.1	11 18	40 8.			19.0	11	.2	123	420	79		54	280	
	DATE	PE	SODIUM ERCENT 00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	BICAR- BONATE WATER WH IT FIELD MG/L A HCO3 (00450	BO W W F S MG	CAR- NATE ATER H IT IELD /L AS CO3 O447)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	SOL (MC	E, VED (/L CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA DIS- SOLVI (MG/I AS SIO2 (0095)	A, F	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	
	OCT 11		57	6	8.9		_	_		600	8	3.2	0.30	15		1460	
	MAR 29			4		260	31	7	0	330						687	
	JUN 22			5		458	55		0	620						1360	
	SEP 05			6		564	68		0	520	9	.8				1280	
	DATE	SU CO TU	DLIDS, IM OF DNSTI- JENTS, DIS- GOLVED MG/L) (0301)	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, NITRAT DIS- SOLVE (MG/L AS N) (00618	E NI	ITRO- GEN, TRITE DIS- OLVED MG/L S N) O613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NIT GE AMMO	PRO- CON, MONIA CONTACTOR (AL N)	NITRO- JEN, AM- MONIA + DRGANIC TOTAL (MG/L AS N) (00625)		1- + IC F	PHOS- PHOROUS TOTAL (MG/L AS P)	
	OCT 11		1470	1.99	0.43					<0.100	0	080	0.70	0.5	50	0.110	
	MAR 29					<1	0.10	0	0.020	0.120	٠.				_		
	JUN 22					9	_		0.010	<0.100							
	SEP 05		1270	1.74	0.38	26	_		0.010	<0.100					_		
	DATE	PH S (PHOS- IOROUS DIS- SOLVED MG/L S P)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	BORON, DIS- SOLVED (UG/L AS B) (01020)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE) (01045)	IRON, DIS- SOLVE (UG/L AS FE (01046	M. NI TO RI CI	ANGA- ESE, OTAL ECOV- RABLE UG/L S MN) 1055)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	CARE ORGA DIS SOLV (MG AS (006	ON, C NIC ED /L C)	CARBON, DRGANIC SUS- PENDED TOTAL (MG/L AS C) (00689)	SEDI- MENT, SUS- PENDE (MG/I	D (SEDI- MENT, DIS- CHARGE, SUS- PENDED T/DAY) 80155)	
	OCT 11		0.090	0 11	750	550	-		110	440		4	0.7		-	0.00	
	MAR 29			0.11	350	550 560	3		140	110	8	.6	0.3		5	0.02	
	JUN 22					430			0							-	
	SEP 05				-		1:										
	٠,		3.0	200			1,	,						-			

06340000 SPRING CREEK AT ZAP, ND

LOCATION.--Lat 47°17'10", long 101°55'31", in SW1/4 sec.14, T.144 N., R.89 W., Mercer County, Hydrologic Unit 10130201, on right bank 250 ft downstream from Burlington Northern Railway bridge in Zap, and 9 mi upstream from mouth.

DRAINAGE AREA .-- 549 mi2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- March to September 1924, October 1945 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,819.39 ft above National Geodetic Vertical Datum of 1929.

Mar. 4 to Sept. 30, 1924, nonrecording gage at site 250 ft upstream at different datum. Oct. 1, 1945, to Sept. 30, 1947, nonrecording gage 250 ft upstream at datum 1.12 ft higher.

REMARKS.--Estimated daily discharges: Feb. 1 to Apr. 3. Records good except those for period of estimated daily discharge, which are fair. Flow slightly regulated by Lake Ilo, 56 mi upstream, capacity 7,130 acre-ft.

AVERAGE DISCHARGE.--44 years, 42.8 ft³/s, 31,010 acre-ft/yr; median of yearly mean discharges, 40 ft³/s, 29,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,130 ft³/s, Apr. 7, 1952, gage height, 20.03 ft; maximum gage height, 20.70 ft, Mar. 15, 1972; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known occurred in about 1902, from ice jam. Floods of February 1913 and March 1943 reached a stage of about 20 ft and 19.5 ft, respectively, from information by local residents.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 1,000 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Da te	Time	Discharge (ft ³ /s)	Gage Height (ft)
Mar. 30	1115	*233	a*6.30	No other	peaks greater	than base discharge.	

Minimum daily discharge, 0.40 ft $^3/s$, Feb. 4 and Mar. 5. a - Backwater from ice

		DISCHARG	E, CUBIC	FEET PER	SECOND	, WATER YEAR MEAN VALUES	OCTOBER	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	6.3 5.5 4.6 5.8 6.2	7.9 7.9 7.9 8.3 8.2	7.3 7.4 7.5 7.4 7.4	5.6 5.5 5.6 5.6	e2.0 e1.0 e.50 e.40 e.45	e.55 e.55 e.50 e.45 e.40	e150 e130 e125 111 106	81 71 60 54 45	15 16 15 13	6.3 6.0 9.8 49	4.9 5.0 4.9 4.5	8.6 8.2 8.6 9.8 8.9
6 7 8 9 10	6.2 6.6 6.6 6.9 7.0	7.9 8.6 8.4 8.4	7.6 7.0 6.7 5.9 5.7	5.6 5.7 5.3 5.0	e.50 e.70 e.60 e.60 e.70	e.45 e.50 e1.0 e10 e70	95 83 71 72 64	38 34 31 27 23	10 8.8 8.5 8.1 7.4	34 28 23 20 17	4.5 4.7 4.8 4.8 4.4	9.6 9.5 9.0 8.1 7.0
11 12 13 14 15	7.1 7.3 7.4 7.3 7.5	8.1 8.3 8.4 7.6 8.4	5.7 6.2 6.8 7.2 6.9	4.9 4.8 4.7 4.8 4.8	e.80 e.90 e1.0 e.80 e.70	e90 e50 e40 e15 e15	57 51 47 43 40	20 17 15 15 16	7.7 7.9 7.9 8.1 8.2	19 18 18 23 15	4.4 4.8 5.2 5.5 5.1	6.7 6.6 6.6 6.2
16 17 18 19 20	7.8 9.0 7.5 7.2 7.5	7.2 7.7 7.3 7.3 8.0	6.4 6.0 6.1 6.4 6.5	4.9 5.0 4.9 5.1 5.3	e.60 e.50 e.55 e.60 e.70	e12 e10 e9.5 e9.0 e8.5	37 34 32 30 29	17 21 15 13	7.6 7.4 7.6 7.7 7.1	13 12 14 27 23	5.0 4.9 4.7 4.5 4.6	5.2 5.0 4.9 4.7 4.8
21 22 23 24 25	7.2 7.5 7.1 7.4 7.6	7.9 7.3 7.7 8.0 8.0	6.4 6.5 6.5 5.7 4.8	5.7 6.1 6.2 6.1 6.2	e.75 e.80 e.75 e.70 e.65	e9.0 e10 e15 e30 e40	25 25 23 21 20	11 11 10 13 13	6.5 6.4 6.5 7.4 7.4	13 11 11 9.6 8.5	4.7 4.7 4.8 4.7 7.4	5.0 5.3 5.3 5.3
26 27 28 29 30 31	7.5 7.6 7.5 7.4 7.4 8.0	7.9 6.4 6.4 6.8 7.2	4.3 4.7 4.8 5.1 5.3 5.5	6.6 6.8 6.6 6.7 6.6	e.60 e.60 e.60	e60 e100 e80 e190 e180 e160	22 54 54 65 65	12 12 11 17 19	7.4 6.4 6.1 6.4 6.5	7.3 6.6 6.1 6.5 6.2 5.7	9.5 8.1 14 11 8.9 8.8	5.3 5.5 5.6 5.4 5.4
TOTAL MEAN MAX MIN AC-FT	219.5 7.08 9.0 4.6 435	233.5 7.78 8.6 6.4 463	193.7 6.25 7.6 4.3 384	174.4 5.63 6.8 4.7 346	20.05 .72 2.0 .40 40	1217.40 39.3 190 .40 2410	1781 59.4 150 20 3530	768 24.8 81 10 1520	257.0 8.57 16 6.1 510	509.6 16.4 49 5.7 1010	182.7 5.89 14 4.4 362	198.1 6.60 9.8 4.7 393

CAL YR 1988 TOTAL 3700.51 MEAN 10.1 MAX 85 MIN .80 AC-FT 7340 WTR YR 1989 TOTAL 5754.95 MEAN 15.8 MAX 190 MIN .40 AC-FT 11410

KNIFE RIVER BASIN

06340000 SPRING CREEK AT ZAP, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1969-70, 1974 to current year.

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (OOO61)	CIFIC CON- DUCT- ANCE (US/CM)	PH (STAND- ARD UNITS) (OO400)	TEMPER- ATURE AIR (DEG C) (OOO2O)	TEMPER ATURE WATER (DEG C	(MG/L AS CACO3	CALCIU DIS- SOLVE (MG/L) AS CA	DIS- D SOLVEI (MG/L) AS MG	DIS- DIS- DIS- DIS- DIS- DIS- DIS- DIS-	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)
13 NOV	0857	7.4	2010		11.0	8.	.0 -					
17 JAN	0908	7.8	2100		-5.0	0.	.0 -					
04 MAR	0906	5.5	2360		1.0	0.	.0 -	- 1				
02	0928 1258	0.55	1890 2350		-10.0 14.0				-	-	- ::	
29 APR	1246	194	810		5.0			10 39	27	110	52	3
04 26 JUN	1205 1120	118 21	750 1360		9.0 8.5			:		=	Ξ	=
22 AUG	1131	6.4	1840		21.5	18.	.5 -	-	-	-	-	-
02 SEP	0953	4.5	1200	8.44	32.0	25.	.0 26	60 44	36	180	59	5
06	1420	10	1700		21.0	19.	.0 -			-		
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE, FET-LAB (MG/L AS HCO3) (95440)	BONATE, FET-LAB (MG/L AS CO3)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (OO405)		DIS- ED SOLVE (MG/L AS CL	RIDE, DIS- ED SOLVE (MG/L AS F)	DIS- SOLVEI D (MG/L AS SIO2)	AT 180 DEG. C DIS- SOLVED (MG/L)	CONSTI- TUENTS, DIS-	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 29	9.3	190	0	160	8.4	270	5.8	3 0.2	0 5.0	560	561	0.76
AUG 02	9.0	380	14	330	2.2		6.1					
D.	S	OLIDS, DIS- A SOLVED (TONS PER DAY)	RSENIC DIS- SOLVED (UG/L AS AS)	BORON, DIS- SOLVED (UG/L AS B)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB) 01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA-	MERCURY DIS- SOLVED (UG/L AS HG)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) 01080)
MAR 29. AUG		293	<1	170	110	<1	30	80	0.2	1	<10	740
02.	••	9.84	2	350	30	<1	50	40	0.1	1	1	970

06340500 KNIFE RIVER AT HAZEN, ND (National stream-quality accounting network station)

LOCATION.--Lat 47°17'07", long 101°37'18", in SW1/4SE1/4SE1/4 sec.18, T.144 N., R.86 W., Mercer County, Hydrologic Unit 10130201, on left bank at downstream side of highway bridge, 0.5 mi south of Hazen, and 3 mi upstream from Antelope Creek.

DRAINAGE AREA .-- 2,240 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. --October to November 1928, March 1929 to September 1933, August 1937 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS. -- WSP 1146: 1943. WSP 1279: 1930-31, 1932-33(M). WSP 1917: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,712.35 ft above National Geodetic Vertical Datum of 1929. Prior to Sept. 25, 1947, nonrecording gages at same site and datum.

REMARKS.--Estimated daily discharges: Nov. 4 to Apr. 3. Records good except those for period of estimated discharge, which are fair. Slight regulation by Lake Ilo 81 mi upstream, capacity 7,130 acre-ft.

AVERAGE DISCHARGE.--56 years (1930-33, 1938-89), 177 ft^3/s , 128,200 acre-ft/yr; median of yearly mean discharges, 154 ft^3/s , 112,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 35,300 ft³/s, June 24, 1966, gage height, 27.01 ft; no flow at times in 1933, 1959, 1962.

EXTREMES OUTSIDE PERIOD OF RECORD. -- According to local residents, the floods of 1943 and 1950 were not exceeded during the period 1884 to 1942.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 1,500 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 11	1100	*1000	a*11.90				

Minimum daily discharge, 5.0 ft³/s, Feb. 4. a - Backwater from ice

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES OCT JUL AUG SEP DAY NOV DEC JAN FEB MAR APR MAY JUN 16 21 16 e27 e17 e12 e500 490 323 e13 260 12 41 18 17 e8.0 e400 340 14 2 e27 e13 e11 226 181 11 35 17 P27 11 e16 e6.0 e10 e346 27 9.0 18 293 170 129 104 4 P18 P27 P17 e5.0 P10 5 254 132 8.1 24 16 e28 e7.0 139 99 e19 e16 P11 6 102 7.9 23 15 e19 e27 e16 e9.0 e11 228 119 86 15 83 7.9 18 e19 e27 e10 212 101 74 e13 e11 7.5 17 e16 68 17 8 e20 e26 e10 e13 197 64 55 57 16 18 e21 e26 e14 e9.0 e50 198 80 70 45 50 6.4 14 10 18 e20 e25 e9.0 e215 183 47 14 11 17 e20 e25 e10 e700 164 61 41 6.4 15 e26 e15 e11 e600 145 55 38 45 6.6 13 12 e20 50 15 13 14 e20 e26 e19 e11 e450 129 34 56 7.4 14 e22 e25 e20 e12 e350 118 46 32 56 7.4 14 12 30 50 15 17 e24 e24 e20 e12 e300 110 40 8.0 47 28 39 8.1 11 16 17 e30 e24 e19 e12 e270 106 34 37 7.7 10 17 19 e26 e25 e19 e11 e220 99 147 29 27 91 7.0 7.9 18 18 e23 e24 e19 e11 e200 83 38 7.0 82 66 25 7.4 19 17 e23 e24 e19 e10 e200 23 e170 78 48 47 7.4 6.2 20 16 P22 P23 P19 P11 23 52 6.5 21 16 e23 e23 e18 e12 e170 73 40 8.4 e22 68 36 22 40 9.4 7.9 22 15 e24 e18 e12 e150 33 31 15 e22 e13 e140 63 34 22 8.2 8.7 23 e24 e18 15 e21 e140 60 40 22 6.3 9.0 24 e24 e17 e14 16 57 23 28 9.6 10 25 e20 e16 e170 39 e23 e15 e19 e15 e230 58 39 22 26 10 26 15 e24 e17 15 e19 e14 137 35 20 22 17 10 27 e23 e17 e260 19 16 e290 31 17 24 10 28 e24 e18 e17 e14 309 31 e17 427 40 17 21 9.8 29 18 e25 e18 e400 18 e17 e17 e800 412 63 16 18 9.5 30 e26 39 31 e18 e15 e700 114 16 15 ---2977 1827 1392 364.0 459.5 TOTAL 511 656 730 520 305.0 7265 5597 11.7 15.3 44.9 16.5 21.9 23.5 16.8 10.9 234 187 96.0 60.9 MEAN 39 43 21 30 28 20 15 800 500 490 323 132 MAX 6.3 6.2 16 11 MIN 14 17 12 5.0 10 57 31 16 3620 2760 722 911 AC-FT 1010 1030 14410 5900 1300 1450 605 11100

CAL YR 1988 TOTAL 15000.5 MEAN 41.0 MAX 400 MIN 8.4 AC-FT 29750 WTR YR 1989 TOTAL 22603.5 MEAN 61.9 MAX 800 MIN 5.0 AC-FT 44830

KNIFE RIVER BASIN

O6340500 KNIFE RIVER AT HAZEN--CONTINUED (National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1950, 51, 1969 to current year.

		WALL	-QUALITI	DAIA, WAI	ER IEAR	CIOBER	1,500	IO SEF.	I BROOK 19	0,		
DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (OOO95)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPE ATUR WATE (DEG (OOO1	E R C) (TUR- BID- ITY NTU)	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												
11 NOV	1315	17	1780	8.29	13.0	9	.5		8.6	76		
15	1145	24	1940	8.31	-2.5	C	.5	7.2	12.7	89	K50	120
JAN 04	1243	17	2370		3.0	0	.0					
FEB 28	1120	14	2150	7.80	-7.0	c	.0	3.6	8.1	55	470	1600
MAR 10	1439	211	1500		14.0		.5					
13	1137	442	1010		3.5		.5					
APR 03	1200	324	790		7.0	1	.0					
25 JUN	1049	53	1480	8.24	14.5			21	10.8	102	<1	K68
22 AUG	0946	22	1670		16.5	17	.5					
01	1010	14	1260	8.39	32.0	26	.0	28	7.3	92	K240	K650
SEP 05	1200	24	1540		22.0	. 20	.0					
DATE	HARD- NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODI SORF TIO RATI (0093	UM)-)- S)N (OTAS- SIUM, DIS- OLVED MG/L S K)	ALKA- LINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	BICAR- BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR- BONATE WATER WH IT FIELD MG/L AS CO3 (00447)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)
NOV 15	420	76	55	300	60	7		8.6	516	576	26	600
FEB 28	500	100	60	380	62	8	3	8.3	688	840	0	600
APR 25	290	59	35	230	62	6	,	7.4	356	434	0	440
AUG 01	270	53	32	190	60	5		9.9	366	445	1	310
	CHI RIC DIS SOI (MO	CO- FLU DE, RIC S- DI LVED SOL G/L (MO CL) AS	JO- SILI DE, DIS SS- SOL VED (MG J/L AS F) SIO	SOLI CCA, RESI S- AT 1 VED DEC S/L DI S SOLI D2) (MC	IDS, SOLIDUE SUM 180 CON: 3. C TUE: 1S- D: 1VED SOI	IDS, OF S STI- NTS, IS- LVED G/L)	OLIDS, DIS- SOLVED (TONS PER AC-FT) 70303)	SOLI DIS SOL' (TO) PE	DS, GES- NITR VED DI NS SOL R (MG Y) AS	RO- NIT N, GE ATE NITR S- DI VED SOL /L (MG N) AS	N, GE ITE NO2+ S- DI VED SOL /L (MG N) AS	RO- N, NO3 S- VED /L N)
					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					140		
NOV 15.	7	7.7	0.40 9	.3	1330	1370	1.81	86	.2	<0.	010 0.	120
FEB 28.	7	7.4	.50 19	,	1540	1590	2.09	58	.2 0.	380 0.	010 0.	390
APR 25.	6	5.9	.30 5	5.6	1010	998	1.37	145		<0.	010 <0.	100
AUG O1.		5.9	0.40 9	9.9	841	832	1.14	32	.7	<0.	010 <0.	100

KNIFE RIVER BASIN 229

06340500 KNIFE RIVER AT HAZEN--CONTINUED (National stream-quality accounting network station)

1.22	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N)	PHOS- PHOROUS TOTAL (MG/L AS P)	PHOS- PHOROUS DIS- SOLVED (MG/L AS P)	PHOS- PHOROUS ORTHO, DIS- SOLVED (MG/L AS P)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P)	ALUM- INUM, DIS- SOLVED (UG/L AS AL)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, DIS- SOLVED (UG/L AS BA)
DATE	(00610)	(00608)	(00625)	(00665)	(00666)	(00671)	(00670)	(01106)	(01000)	(01005)
NOV 15 FEB	0.050	0.080	0.70	0.020	<0.010	<0.010	0.02	<10	1	52
28 APR	0.210	0.200	0.70	0.050	0.030	0.020	0.05	<10	<1	100
25 AUG	0.040	0.040	1.0	0.040	0.010	<0.010	0.04	10	<1	57
01	<0.010	0.010	1.1	0.110	0.020	0.010	0.11	20	2	68
DATE	BERYL- LIUM, DIS- SOLVED (UG/L AS BE) (01010)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	COPPER, DIS- SOLVED (UG/L AS CU) (01040)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)
NOV 15	<0.5	3	2	<3	4	26	<5	59	99	0.1
FEB 28	<10	3	2	<1	150	40	<5	70	230	<0.1
APR 25 AUG	<0.5	<1	<1	<3	2	21	<5	36	20	<0.1
01	<0.5	<1	<1	<3	<1	7	<1	39	13	0.2
DATE	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
NOV										
15 FEB	<10	4	<1	2.0	1300	<6	11	53	3.4	57
28	1	4	<1	2.0	1600	1	60			
APR 25 AUG	<10	4	<1	<1.0	890	<6	4	62	8.9	98
	<10	3	<1	<1.0	890	<6	<3	99	3.7	98

06340700 MISSOURI RIVER NEAR STANTON, ND

LOCATION.--Lat 47°17'14", long 101°20'25", in SW1/4 sec.16, T.144 N., R.84 W., McLean County, Hydrologic Unit 10130101, on right bank 3 mi southeast of Stanton, 0.1 mi below Ft. Clark irrigation pumping station, 0.4 mi above the United Power Association power plant, and at mile 1,372.

DRAINAGE AREA .-- 182,000 mi2, approximately.

GAGE-HEIGHT RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 1,650.00 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Sept. 30, 1964, at datum 50.00 ft lower.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

REMARKS. -- Stage regulated completely by releases from Garrison Dam (station 06338490) 18 mi upstream.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 24.56 ft, Feb. 22, 1965; minimum daily recorded, 9.70 ft, Nov. 12, 1988.

			GAGE HE	IGHT, FEE		YEAR OCTO	BER 1988	TO SEPTEM	IBER 1989			
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	9.81 9.96 9.94 10.11 10.17	10.06 9.91 10.07 9.88 9.91	11.88 11.99 11.92 11.94 12.12	14.98 14.60 14.12	=======================================	13.04 13.41 13.20 13.28	11.61 11.63 11.47 11.35 11.29	11.52 12.11 11.98 11.95 12.01	13.10 13.08 12.99 13.12 13.05	13.02 12.99 13.07 13.03 13.07	13.06 13.06 13.01	=
6 7 8 9	10.67 11.19 10.52 9.71 9.97	9.92 9.95 9.97 10.05 10.01	11.73 11.97 11.89 11.74 11.58	13.60 12.73	16.43 16.20 16.24 16.22	13.51 13.47 13.34 13.38 12.98	11.44 10.94 11.16 10.92 11.15	12.11 12.24 12.28 12.53 12.45	13.08 13.07 13.02 13.05 13.05	13.00 13.03 13.08 12.99 13.07	13.04 13.00 12.99 13.06 12.95	11.22 11.11 10.95 11.37
11 12 13 14 15	9.94 10.01 10.10 10.06 10.02	9.91 9.70 10.03 10.04 9.96	11.66 11.79 11.68 12.05 12.13	14.57 14.48 14.46 14.40 14.14	16.32 16.08 16.30 15.87 15.72	12.49 12.50 12.05 12.28 12.32	10.98 11.25 10.95 11.05 10.88	12.59 12.52 12.47 12.53 12.37	13.08 13.04 12.99 13.02 13.05	13.09 13.02 13.01 13.02 12.87	13.07 13.03 13.00 13.03 12.95	10.87 11.12 11.07 11.27 10.78
16 17 18 19 20	9.92 10.07 9.94 10.00 9.93	9.85 9.93 10.08 10.12 10.14	12.15 12.20 12.19 12.43 12.52	14.57 14.19 14.28 13.99 14.21	=======================================	12.18 12.43 12.29 12.28 12.37	11.36 11.71 11.73 11.82 11.66	12.94 13.02 12.98 13.04 13.05	13.04 13.05 13.03 13.07 13.10	13.07 13.06 13.03 12.98 12.96	13.07 12.95 12.93 12.83 12.85	10.34 10.51 10.31 9.88 10.06
21 22 23 24 25	9.85 9.89 9.73 9.89 9.84	10.05 10.18 9.97 10.08 10.07	12.56 12.47 12.34 12.58 12.41	14.34 14.22 14.22 14.25 14.32	15.57 15.16 15.54 15.14 14.67	12.22 12.25 12.15 12.01 11.79	11.74 11.67 11.66 11.50 11.81	13.06 13.07 13.08 13.09 13.05	12.95 13.05 13.05 13.02 13.01	13.06 13.03 13.02 13.03 13.04	12.88 12.83 12.79 13.02	10.03 10.06 10.03 10.19 10.06
26 27 28 29 30 31	9.84 9.83 9.98 9.91 9.81 9.88	9.91 9.78 10.38 11.20 11.80	12.18 12.45 12.74 12.92 13.36 13.75	14.26 14.15 14.18 13.77 13.92 14.10	14.22 13.76 13.12	11.65 11.63 11.48 11.61 11.43 11.38	11.75 11.88 11.65 11.67 11.32	13.05 13.11 13.04 13.14 13.05 13.07	12.98 13.03 13.10 12.97 13.05	13.08	=	10.19 10.05 10.02 10.13 10.07
MEAN MAX MIN	10.02 11.19 9.71	10.10 11.80 9.70	12.24 13.75 11.58	==	=	=	11.43 11.88 10.88	12.66 13.14 11.52	13.04 13.12 12.95	=	=	Ξ

06340900 MISSOURI RIVER NEAR HENSLER, ND

LOCATION.--Lat $47^{\circ}16'45"$, long $101^{\circ}11'03"$, in SW1/4 sec.22, T.144 N., R.83 W., McLean County, Hydrologic Unit 10130101, on left bank about 7.5 mi west of Washburn, and at mile 1,362.

DRAINAGE AREA. -- 183.000 mi2, approximately.

GAGE-HEIGHT RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 1,640.00 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Sept. 30, 1964, at datum 40 ft lower.

REMARKS. -- Stage regulated by releases from Garrison Dam (station 06338490) 28 mi upstream.

EXTREMES FOR PERIOD OF RECORD. -- Maximum daily gage height recorded, 27.77 ft, Mar. 20, 1965; minimum daily recorded, 13.65 ft, June 04, 1986.

GAGE	HEIGHT,	FEET,	WATER	YEAR	OCTOBER	1988	TO	SEPTEMBER	1989
			N	MEAN Y	ALUES				

					r	DAN VALUE	U					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2	14.58	14.65	16.17				15.93	16.03 16.47	17.28 17.27	17.22 17.21	17.30 17.36	16.42 16.37
2	14.68	14.53	16.28	19.95		18.75	15.88	16.30	17.20	17.26	17.32	16.31
4	14.79	14.70	16.29	20.07			15.76	16.26	17.30	17.22	17.32	15.96
5	14.82	14.54	16.40	19.97			15.65	16.08	17.24	17.27	17.29	15.84
6	15.12	14.58	16.21	19.65	21.13	18.74	15.86	16.45	17.28	17.22	17.27	15.64
7	15.72	14.58	16.26	19.02	20.99	18.81	15.42	16.50	17.28	17.23	17.24	15.62
8	15.37	14.59	16.27			18.71	15.62	16.55	17.22	17.26	17.22 17.28	15.53 15.32
9	14.41	14.66	16.21		20.87	18.80	15.26 15.58	16.77 16.68	17.25 17.22	17.20 17.27	17.20	15.78
10	14.75	14.64	15.96		20.67	18.94	15.50	10.00	17.22	17.21		
11	14.65	14.57	15.97	20.01	20.78	18.89	15.27	16.78	17.27	17.29	17.30	15.35
12	14.65	14.36	16.16	19.93	20.65	18.95	15.64	16.75	17.24 17.20	17.24	17.27	15.52 15.44
13	14.85	14.63	15.97	19.84	20.82	18.48 18.31	15.32 15.42	16.73 16.78	17.21	17.23	17.26	15.68
14 15	14.75	14.67	16.35 16.50	19.77 19.51	20.47	18.52	15.25	16.63	17.23	17.10	17.18	15.30
15	14.09	14.50	10.50	13.51	20.50	10.72						
16	14.63	14.51	16.48	19.79		18.46	15.60	17.09	17.22	17.25	17.29	14.83
17	14.78	14.54	16.53	19.54		19.17	15.95	17.27	17.26	17.27	17.19	14.92
18	14.64	14.64	16.52	19.69		18.40	16.11	17.19	17.22	17.25 17.20	17.18 17.10	14.78
19	14.69	14.69	16.64	19.46		18.01 18.03	16.07 16.05	17.22 17.25	17.26 17.27	17.18	17.10	14.47
20	14.63	14.76	16.82	19.56		18.05	10.05	17.25	17.21	17.10	200	
21	14.56	14.61	16.86	19.67	20.37	17.75	15.99	17.27	17.19	17.27	17.14	14.57
22	14.53	14.72	16.77	19.74		17.49	16.02	17.29	17.24	17.23	17.10	14.49
23	14.49	14.63	16.58	19.76	20.36	17.30	16.08	17.29	17.25	17.25	17.08	14.41
24	14.55	14.63	17.02	19.58	20.13	16.79	15.63	17.32	17.23 17.20	17.24 17.25	17.16 17.21	14.60 14.46
25	14.53	14.75	17.02	19.65	19.94	16.49	16.15	17.25	17.20	17.25	17.21	
26	14.52	14.54	16.90	19.64	19.54	16.25	16.18	17.24	17.19	17.28	16.83	14.56
27	14.56	14.46	17.16	19.60	19.17	16.03	16.29	17.29	17.22	17.29	17.03	14.45
28	14.66	14.74	17.55	19.59	18.65	15.90	16.13	17.27	17.28 17.21	17.31 17.30	17.04 16.94	14.42
29	14.59	15.44	19.03	19.09		16.01 15.87	16.01 16.08	17.36 17.26	17.24	17.25	16.82	14.48
30 31	14.52	16.12	20.58	19.05 19.21		15.81	10.00	17.27		17.29	16.48	
		44.60		The same			45.04	46 00	47 04	17.24	17.15	15.15
MEAN	14.71	14.69	16.86				15.81 16.29	16.90 17.36	17.24	17.24	17.36	16.42
MAX	15.72	16.12 14.36	20.83 15.96				15.25	16.03	17.19	17.10	16.48	14.38
MIN	14.41	14.50	17.90				13.23	10.05	11.19	17.10	10.40	14.55

06340905 COAL LAKE COULEE NEAR HENSLER, ND

LOCATION.--Lat 47°18'09", long 101°07'52", in SW14SE14SE14 sec.12, T.144 N., R.83 W., McLean County, Hydrologic Unit 10130101, on right bank 100 ft upstream from bridge, on county road 4.5 mi west of Washburn, 3.6 mi northwest of Hensler, and 0.3 mi upstream from mouth.

DRAINAGE AREA .-- 70.5 mi2, of which 53.3 mi2 is probably noncontributing, revised.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- October 1977 to December 1988 (discontinued).

GAGE.--Water-stage recorder. Elevation of gage is 1,690 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS .-- Records good .

AVERAGE DISCHARGE.--11 years (water years 1978-1988), 2.61 ft^3/s , 1,890 acre-ft/yr; median of yearly mean discharges, 2.2 ft^3/s , 1,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.—Maximum discharge, 926 ft^3/s , Aug. 20, 1980, gage height, 8.61 ft, from rating extended above 600 ft^3/s on basis of a culvert computation of peak flow; no flow for many months each year.

EXTREMES FOR CURRENT YEAR .-- No flow for entire period.

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

1	DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
2	1	-00	-00	-00									
3 .00 .00 .00 .00 4 .00 .00 .00 5 .00 .00 .00 6 .00 .00 .00 7 .00 .00 .00 8 .00 .00 .00 9 .00 .00 .00 10 .00 .00 .00 11 .00 .00 .00 12 .00 .00 .00 13 .00 .00 .00 14 .00 .00 .00 15 .00 .00 .00 15 .00 .00 .00 16 .00 .00 .00 17 .00 .00 .00 18 .00 .00 .00 19 .00 .00 .00 19 .00 .00 .00 20 .00 .00 .00 21 .00 .00 .00 22 .00 .00 .00 23 .00 .00 .00 24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00 20 .00 .00 .00 21 .00 .00 .00 22 .00 .00 .00 23 .00 .00 .00 24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00		-00	-00										
6 .00 .00 .00 .00 7 .00 .00 .00 8 .00 .00 .00 9 .00 .00 .00 10 .00 .00 .00 11 .00 .00 .00 12 .00 .00 .00 13 .00 .00 .00 14 .00 .00 .00 15 .00 .00 .00 16 .00 .00 .00 17 .00 .00 .00 18 .00 .00 .00 19 .00 .00 .00 19 .00 .00 .00 20 .00 .00 .00 21 .00 .00 .00 22 .00 .00 .00 24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00 29 .00 .00 .00 20 .00 .00 .00 21 .00 .00 .00 22 .00 .00 .00 .00 23 .00 .00 .00 24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00	3	.00											
6 .00 .00 .00 .00 7 .00 .00 .00 8 .00 .00 .00 9 .00 .00 .00 10 .00 .00 .00 11 .00 .00 .00 12 .00 .00 .00 13 .00 .00 .00 14 .00 .00 .00 15 .00 .00 .00 16 .00 .00 .00 17 .00 .00 .00 18 .00 .00 .00 19 .00 .00 .00 19 .00 .00 .00 20 .00 .00 .00 21 .00 .00 .00 22 .00 .00 .00 24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00 29 .00 .00 .00 20 .00 .00 .00 21 .00 .00 .00 22 .00 .00 .00 .00 23 .00 .00 .00 24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00	1	.00	.00	.00									
6 .00 .00 .00 .00 7 .00 .00 .00 8 .00 .00 .00 9 .00 .00 .00 10 .00 .00 .00 11 .00 .00 .00 12 .00 .00 .00 13 .00 .00 .00 14 .00 .00 .00 15 .00 .00 .00 16 .00 .00 .00 17 .00 .00 .00 18 .00 .00 .00 19 .00 .00 .00 19 .00 .00 .00 20 .00 .00 .00 21 .00 .00 .00 22 .00 .00 .00 24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00 29 .00 .00 .00 20 .00 .00 .00 21 .00 .00 .00 22 .00 .00 .00 .00 23 .00 .00 .00 24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00	4	.00	.00	.00									
7 .00 .00 .00 .00 8 .00 .00 .00 9 .00 .00 .00 10 .00 .00 .00 11 .00 .00 .00 12 .00 .00 .00 13 .00 .00 .00 14 .00 .00 .00 15 .00 .00 .00 16 .00 .00 .00 17 .00 .00 .00 18 .00 .00 .00 19 .00 .00 .00 19 .00 .00 .00 20 .00 .00 .00 21 .00 .00 .00 22 .00 .00 .00 23 .00 .00 .00 24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00	9	.00	.00	.00									
7 .00 .00 .00 .00 8 .00 .00 .00 9 .00 .00 .00 10 .00 .00 .00 11 .00 .00 .00 12 .00 .00 .00 13 .00 .00 .00 14 .00 .00 .00 15 .00 .00 .00 16 .00 .00 .00 17 .00 .00 .00 18 .00 .00 .00 19 .00 .00 .00 19 .00 .00 .00 20 .00 .00 .00 21 .00 .00 .00 22 .00 .00 .00 23 .00 .00 .00 24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00	6	.00	.00										
11	7	.00	.00	.00									
11	8	.00	.00	.00									
11	9	.00	.00	.00									
11	10	.00											
12													
13	11	.00	.00	.00									
13	12	.00	.00	.00									
14 .00 .00 .00 .00 15 .00 .00 .00 16 .00 .00 .00 17 .00 .00 .00 18 .00 .00 .00 19 .00 .00 .00 20 .00 .00 .00 21 .00 .00 .00 22 .00 .00 .00 23 .00 .00 .00 24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00 29 .00 .00 .00	13	.00	.00	.00									
15	14	.00	.00	.00									
16	15	.00	.00	.00									
17													
18	16	.00	.00	.00									
19 .00 .00 .00 .00 20 .00 .00 .00 21 .00 .00 .00 22 .00 .00 .00 23 .00 .00 .00 24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00	17	.00	.00	.00									
20 .00 .00 .00 21 .00 .00 .00 22 .00 .00 .00 23 .00 .00 .00 24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00	18	.00	.00	.00									
21	19	.00	.00	.00									
24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00	20	.00	.00	.00									
24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00	21	-00	-00	.00									
24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00	22	.00	-00	-00									
24 .00 .00 .00 25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00	23	.00	-00	-00									
25 .00 .00 .00 26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00	21	00	.00	.00									
26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00	25	00	00	00									
26 .00 .00 .00 27 .00 .00 .00 28 .00 .00 .00 29 .00 .00 .00 30 .00 .00 .00 31 .0000		•00	•00	.00									
27	26	.00	.00	.00									
28 .00 .00 .00 29 .00 .00 .00 30 .00 .00 .00 31 .0000	27	.00	.00	.00									
29 .00 .00 .00 30 .00 .00 .00 31 .0000	28	.00											
30 .00 .00 .00 31 .0000	29	.00	.00	.00									
31 .0000	30	-00	-00										
	31	.00		.00									
TOTAL 0.00 0.00 0.00			0.00	0.00									
MEAN .00 .00 .00													
MAX .00 .00 .00	MAX	.00	.00	.00									
MIN .00 .00 .00 AC-FT .0 .0 .0	MIN	.00	.00	.00									
AC-FT .0 .0 .0	AC-FT	.0	.0	.0									

CAL YR 1988 TOTAL 174.37 MEAN .48 MAX 6.0 MIN .00 AC-FT 346

06341000 MISSOURI RIVER AT WASHBURN, ND

LOCATION.--Lat 47°17'20", long 101°02'15", in SE1/4SW1/4 sec.14, T.144 N., R.82 W., McLean County, Hydrologic Unit 10130101, on left bank near municipal water plant in Washburn, and at mile 1,355.

DRAINAGE AREA .-- 184,000 mi2, approximately.

GAGE-HEIGHT RECORDS

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

GAGE. -- Water-stage recorder. Datum of gage is 1,640.00 ft above National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1964, at datum 40 ft lower.

REMARKS. -- Stage regulated by releases from Garrison Dam (station 06338490) 35 mi upstream.

EXTREMES FOR PERIOD OF RECORD. -- Maximum daily gage height recorded, 22.76 ft, Jan. 11, 1964; minimum daily recorded, 9.73 ft, May 7, 1978.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES SEP APR JUN JUL AUG DAY OCT NOV DEC MAY JAN FEB MAR 12.75 12.79 11.90 9.92 10.01 12.80 11.62 14.73 13.96 11.52 14.14 ---12.83 11.92 12.79 12.73 2 9.96 10.02 11.76 14.52 13.16 14.18 11.95 12.76 12.80 11.83 11.73 13.03 11.79 10.01 9.88 14.80 14.20 12.83 12.76 12.80 11.55 15.38 14.05 10.10 14.21 11.74 10.12 11.79 12.78 12.76 11.39 11.47 5 15.29 10.12 9.92 11.79 15.05 14.05 6 9.98 9.98 11.94 12.81 12.74 12.75 11.17 10.36 11.75 14.63 14.22 14.82 === 11.06 11.69 15.17 14.15 11.97 12.80 12.74 12.74 11.14 14.21 11.74 ---12.01 12.75 12.78 12.72 11.04 10.83 9.98 14.95 14.23 8 9.76 10.05 11.68 14.98 14.27 12.23 12.79 12.76 10.84 9 14.98 10.04 12.18 12.68 11.28 10 10.04 11.44 14.49 14.87 14.36 10.90 11 9.98 10.00 11.43 15.03 15.12 14.33 12.27 12.81 12.79 12.78 15.06 9.98 9.79 11.65 14.97 14.58 12.25 12.77 12.74 12.76 11.04 12 13 10.18 11.40 15.34 14.68 10.73 12.22 12.73 12.73 12.72 10.95 12.73 14 10.07 10.06 11.78 15.45 15.08 14.51 10.79 12.28 12.73 12.74 11.14 15 10.01 9.95 11.88 15.02 15.22 14.54 12.14 12.76 12.62 12.66 10.90 10.38 16 9.97 9.91 11.92 15.59 15.03 14.38 10.91 12.55 12.75 12.76 12.75 12.67 10.10 9.91 12.00 16.02 14.96 14.76 11.30 12.79 12.78 10.46 17 10.32 9.97 10.05 11.98 15.98 14.98 14.60 11.55 12.67 12.75 12.77 12.66 9.95 12.59 10.01 10.10 12.07 15.57 14.82 14.54 11.45 12.72 12.78 12.70 19 9.98 12.58 20 12.26 15.58 11.50 12.73 12.79 12.69 9.96 10.20 14.92 12.77 12.61 10.15 12.75 12.74 21 9.91 10.00 12.32 15.97 14.56 14.84 11.41 12.74 12.75 12.74 12.60 10.00 12.76 22 9.84 10.10 12.22 15.82 14.60 14.80 11.48 12.77 12.58 12.76 9.97 23 9.83 10.04 12.05 15.34 14.90 14.65 11.56 12.77 12.63 10.11 24 9.87 10.00 12.59 14.99 15.04 13.86 11.14 12.83 12.74 12.73 9.98 12.73 25 9.86 10.18 12.92 15.19 15.16 13.12 11.56 12.77 12.77 12.33 10.13 12.84 12.75 12.73 26 9.88 9.94 15.66 14.58 12.25 11.60 12.81 12.72 12.75 12.51 9.98 11.66 15.56 27 9.89 9.84 12.89 14.62 ------12.79 12.80 12.54 9.96 13.76 11.57 12.74 10.00 10.05 15.51 14.17 28 11.45 12.84 12.73 12.79 12.44 10.13 9.96 10.75 15.52 ---29 14.89 ---15.61 11.55 12.79 12.75 12.74 12.37 10.12 9.91 14.47 ------30 11.49 12.77 12.00 15.40 31 9.93 14.51 10.04 10.08 15.30 14.67 12.39 12.77 12.75 12.64 10.69 MEAN 12.28 11.06 14.89 15.40 ------12.84 12.83 12.80 12.83 11.92 11.49 MAX 14.49 12.72 12.62 12.00 9.95 MIN

234 TURTLE CREEK BASIN

06341410 TURTLE CREEK ABOVE WASHBURN, ND

LOCATION.--Lat 47°23'06", long 100°54'43", in NW1/4NE1/4 sec.18, T.145 N., R.80 W., McLean County, Hydrologic Unit 10130101, on right bank 250 ft downstream from bridge on county highway, 8.5 mi northeast of Washburn, and 8.8 mi south of Turtle Lake.

DRAINAGE AREA. -- 350 mi², approximately, of which 195 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- October 1986 to current year.

GAGE .-- Water-stage recorder. Elevation of gage is 1.780 ft from topographic map.

REMARKS.--Estimated daily discharges: Oct. 1 to Sept. 30. Records poor due to beaver activity. Water from the McClusky Canal is sometimes diverted into the stream at a point upstream from the gage.

EXTREMES FOR PERIOD OF RECORD .-- Maximum discharge, 845 ft3/s, Mar. 21, 1987, gage height, 6.94 ft; no flow at times each year.

EXTREMES FOR CURRENT YEAR .-- Maximum discharge, 20 ft3/s, Mar. 26, gage height, 3.20 ft, backwater from beaver dam; no flow for 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 e.68 e3.5 e.06 e.00 e.00 e.00 e4.0 e1.5 e.10 e.00 e4.0 e9.2 e3.4 e.66 e.05 e.00 e.00 e.00 e2.7 e1.1 e.05 e.00 e4.0 e9.0 3 e3.2 e.64 e.05 e.00 e.00 e.00 e2.1 e1.0 e.03 e.00 e4.0 e8.5 e3.0 e.62 e.04 e.00 e.00 e.00 e1.2 e.80 e.02 e.00 e4.0 e8.5 5 e3.1 e.58 e.04 e.00 e.00 e.00 e1.1 e.70 e.01 e.00 e4.0 e8.0 6 e3.4 e.45 e.04 e.00 e.00 e.00 e.60 e.00 e.00 e4.0 e8.0 e1.1 7 e.00 e3.7 e.35 e.30 e.03 e.00 e.50 e.00 e.00 e4.0 e7.0 e.00 e1.4 8 e.01 e.40 e.00 e.00 e4.0 e.02 e.00 e.00 e4.1 e6.0 e1.4 9 e.22 e3.9 e.01 e.00 e.30 e.00 e.00 e3.8 e5.0 e.00 e.10 e1.2 10 e.25 e4.0 e.20 e.00 e.00 e.00 e.00 e.00 e3.5 e4.0 e.30 e1.0 11 e4.0 e.15 e.00 e.00 e.00 e1.0 e.22 e.02 e.00 e3.4 e3.0 e7.0 12 e.10 e.00 e.00 e.00 e.20 e.03 e.00 e3.2 e3.0 e3.8 e1.0 e11 e5.0 e.00 e3.2 13 e3.7 e.10 e.00 e.00 e.00 e1.0 e.17 e.01 e3.0 e7.0 e3.6 e.09 e.00 e.00 e.00 e4.6 e1.0 e.15 e.00 e.00 e3.0 e.00 e.00 15 e3.5 e-10 e.00 e.00 e.00 e4.0 e1.0 e.13 e8.0 e3.0 16 e.00 e4.0 e.10 e.00 e.00 e.00 e1.2 e.98 e.10 e.00 e7.8 e3.0 e.00 17 e3.5 e.10 e.00 e.00 e.00 e.95 e.95 e.20 e.00 e7.4 e2.8 18 e3.0 e.00 e.00 e.60 e.92 e.00 e.00 e7.5 e2.5 e.09 e.00 e.15 e.00 e.00 e.25 e.12 e.07 e.90 e.00 e2.5 19 e.00 e.00 20 e2.0 e.08 e.00 e.00 e.05 e.88 e.10 e.00 e.00 e7.4 e2.5 e.00 21 e1.5 e.08 e.00 e.00 e.00 e.10 e.85 e.09 e.00 e.00 e7.4 e2.0 22 e1.4 e.07 e.00 e.00 e.00 e.50 e.85 e.08 e.00 e.00 e7.4 e1.5 23 e1.2 e.07 e.00 e.00 e.00 e1.0 e.80 e.06 e.00 e.00 e7.4 e1.0 e.00 e.00 e.80 24 e1.1 e.07 e.00 e2.0 e.10 e.00 e.00 e7.0 e.70 25 e1.1 e.07 e.00 e.00 e.00 e7.0 e.80 e.08 e.00 e.00 e7.0 e.50 26 e1.0 e.06 e.00 e.00 e.07 00.00 P.00 e7.5 e. 30 e.00 e18 e1.3 27 e.95 e.06 e.00 e.00 e.06 e.00 e.01 e9.2 e.20 e.00 e16 e2.0 28 e.90 e.05 e.00 e.00 e13 e4.0 e.04 e.00 e.10 e9.1 e.15 e.00 29 e.85 e.05 e.00 e.00 e10 e3.0 e.10 e.00 e1.0 e9.5 e.12 ---30 e.80 e.05 e.00 e.00 e2.0 e.20 e.00 e4.0 e10 e.10 --e7.1 e.70 e.00 e.00 e4.0 e9.5 e6.0 e.15 TOTAL 80.30 6.31 0.34 0.00 0.00 115.76 43.23 9.72 0.27 9.11 192.7 108.07 2.59 .31 MEAN .21 .011 .00 .00 3.73 1.44 .009 .29 6.22 3.60 .00 4.0 10 4.0 .68 .06 .00 18 4.0 .10 9.2 MAX .80 .00 3.2 .10 MIN .70 .05 .00 .00 .00 .00 159 230 18 382 214

86

19

.5

CAL YR 1988 TOTAL 666.17 MEAN 1.82 MAX 15 MIN .00 AC-FT 1320 WTR YR 1989 TOTAL 565.81 MEAN 1.55 MAX 18 MIN .OO

.0

.0

13

AC-FT

e - Estimated

TURTLE CREEK BASIN 235

06341410 TURTLE CREEK ABOVE WASHBURN, ND--CONTINUED WATER-QUALITY RECORDS

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

OCT	310 450
13 1239 3.7 1210 8.44 21.0 8.5 10	450
NOV 17 1340 0.10 1950 8.50 -4.0 1.0 14 10.7 76	
MAR 13 1448 4.6 3701.0 0.5 28 1051 12 630 7.98 4.0 0.5 8.0 10.9 76	160
APR 04 1032 1.1 1260 6.0 1.5 19 1127 0.89 2150 8.74 15.0 8.0 4.5 10.7 91	530
JUL 31 1130 4.0 2520 8.41 26.0 23.5 6.7 2.5 30	450
AUG 28 1056 9.1 1190 7.68 19.5 16.0 3.9 4.2 43	280
SEP 14 1214 3.0 1240 21.0 13.0	
DIS- DIS- DIS- DIS- DIS- LAB DIS- DIS- SOLVED SOLVED SOLVED SOLVED SORP- SOLVED (MG/L SOLVED SOLVED (MG/L (MG/L (MG/L SODIUM TION (MG/L AS (MG/L (MG/L AS CA) AS MG) AS NA) PERCENT RATIO AS K) CACO3) AS SO4) AS CL) DATE (00915) (00925) (00930) (00932) (00931) (00935) (90410) (00945) (00940) (FLUO- RIDE, DIS- SOLVED (MG/L AS F) 00950)
OCT 13 36 53 150 51 4 8.8 325 320 16	0.50
NOV 17 48 79 300 59 6 12 607 510 20	0.40
MAR 28 20 26 87 53 3 11 164 180 6.1	0.10
APR 19 59 92 340 58 7 11 606 620 11 JUL	0.30
31 27 92 460 68 10 19 623 780 22 AUG	0.30
28 31 50 170 55 4 12 323 310 18	0.50
SOLIDS, SOLIDS, NITRO- PHOS-)
OCT 13 7.4 814 787 1.11 8.13 <0.100 0.030 350 2	2
NOV 17 7.8 1360 1340 1.85 0.37 <0.100 0.020 470 4	
MAR 28 13 453 444 0.62 15.0 0.180 0.310 210 30	0
APR 19 11 1540 1510 2.09 3.70 <0.100 0.040 540 5	0
JUL 31 23 1860 1800 2.53 20.1 <0.100 0.190 80 5	0
AUG 28 20 828 807 1.13 20.3 <0.100 0.320 430 6	5

PAINTED WOODS CREEK BASIN

06341800 PAINTED WOODS CREEK NEAR WILTON, ND

LOCATION.--Lat 47°16'30", long 100°47'30", in SW1/4SW1/4 sec.23, T.144 N., R.80 W., McLean County, Hydrologic Unit 10130101, on right bank 600 ft upstream from county highway bridge, 7 mi upstream from Yanktonai Creek, and 8 mi north of Wilton.

DRAINAGE AREA. -- 427 mi², approximately, of which about 310 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- October 1957 to September 1981, August 1982 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,760 ft, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 15-19 and Dec. 11 to Mar. 19. Records good except those for periods of estimated discharge, which are poor. Since the fall of 1982 Missouri River basin water has been diverted into the stream at a point several miles upstream.

AVERAGE DISCHARGE.--7 years (1983-89), 30.9 ft³/s, 22,390 acre-ft/yr; 24 years prior to the diversion of Missouri River water into the basin, (1958-81), 8.07 ft³/s, 5,850 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,050 ft³/s, Apr. 19, 1979, gage height, 9.64 ft; no flow for many days most years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 130 ft³/s, Mar. 11, gage height, 5.72 ft; minimum daily discharge, 0.06 ft³/s, Oct. 14-16, 23-25, and Nov. 3.

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

					N	MEAN VALUE	S					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	.51 .37 .30 .22	.20 .13 .06 .14	14 14 14 14 15	e26 e27 e27 e28 e28	e26 e22 e18 e20 e23	e24 e24 e23 e22 e20	17 18 19 13	4.2 3.6 3.3 3.1 2.9	46 42 38 36 35	34 32 33 31 28	16 22 28 29 29	39 38 39 39 37
6 7 8 9	.16 .16 .16 .13	.38 .40 .37 .29	17 16 13 12 11	e28 e26 e23 e20 e22	e25 e25 e25 e25 e26	e21 e21 e22 e23 e40	12 11 9.2 7.5 6.1	2.8 2.8 2.7 2.4 2.3	35 34 36 35 34	30 29 28 27 29	32 33 33 33 32	35 36 35 36 37
11 12 13 14 15	.13 .15 .07 .06	.39 .37 .31 .34 e.32	e10 e10 e10 e10 e9.0	e23 e25 e27 e27 e28	e27 e28 e27 e25 e23	e70 e50 e11 e9.0 e8.5	6.3 6.5 8.1 9.9 8.9	2.2 2.0 1.8 1.8	35 38 40 39 36	29 29 30 30 27	33 35 35 34 33	39 39 37 36 36
16 17 18 19 20	.06 .08 .11 .16	e.32 e.32 e.32 e.32 7.9	e10 e10 e10 e10 e10	e30 e30 e28 e28 e27	e22 e21 e21 e20 e21	e8.0 e7.5 e6.5 e5.5	8.8 6.5 5.0 4.2 4.0	1.7 1.9 1.8 1.7	35 34 35 35 35 33	28 28 30 29 27	30 32 33 42 40	36 34 32 35 34
21 22 23 24 25	.17 .18 .06 .06	18 18 16 16 15	e10 e9.5 e9.2 e9.0 e9.0	e28 e30 e29 e27 e26	e22 e23 e25 e27 e25	4.3 4.0 4.1 5.9	4.3 4.1 3.6 3.4 3.4	1.5 1.4 1.5 1.9	35 35 35 34 34	22 15 11 10 9.6	37 36 36 35 35	34 33 33 30 32
26 27 28 29 30 31	.12 .08 .31 .18 .10	14 13 14 13 13	e9.0 e28 e26 e26 e28 e28	e27 e28 e28 e28 e28 e27	e24 e24 e24	18 24 23 20 16 13	4.2 8.8 8.6 7.1 5.4	1.9 11 34 38 39 41	32 32 31 33 35	12 23 17 15 21 22	36 38 39 40 38 39	30 28 28 27 26
TOTAL MEAN MAX MIN AC-FT	4.82 .16 .51 .06 9.6	163.45 5.45 18 .06 324	430.7 13.9 28 9.0 854	834 26.9 30 20 1650	664 23.7 28 18 1320	563.9 18.2 70 4.0 1120	245.9 8.20 19 3.4 488	221.5 7.15 41 1.4 439	1067 35.6 46 31 2120	765.6 24.7 34 9.6 1520	1043 33.6 42 16 2070	1030 34.3 39 26 2040

CAL YR 1988 TOTAL 7514.53 MEAN 20.5 MAX 54 MIN .06 AC-FT 14910 WTR YR 1989 TOTAL 7033.87 MEAN 19.3 MAX 70 MIN .06 AC-FT 13950

e - Estimated

PAINTED WOODS CREEK BASIN

06341800 PAINTED WOODS CREEK NEAR WILTON, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1959-64, 1970 to current year.

DATE	E	TIME	CHAR INS CUE FE PE	ST. SIC SET SR COND	DU AN (US	FIC N- CT-	(ST UNI	H AND- RD TS)	AT A (DE	PER- PURE IR G C)	WA (DE	MPER- TURE ATER EG C)	B: I': (N'	UR- ID- IY IU) 076)	OXYG DI SOL (MG (003	EN, S- VED /L)	SOL (PE CE SAT	S- VED R- NT UR- ON)	TO:	TAL G/L
OCT 12		1548		0.17		1620		8.72		20.5		11.0		9.3						480
NOV																				
16 JAN		1455	(32		1780		8.50		-1.5		1.5		7.1	1	2.3		89		460
03 MAR		1635	27	7		1490				-2.0		0.0								
01		1443	24			1390				14.0		0.0								
13		1606 1258	11			870 600		7.69		-1.0 8.0		0.5		1.5		9.4		66		200
APR																				
19 JUN		1346	4	1.1		840		8.58		19.0		9.5		9.5	1	1.3		99		230
21 JUL		1146	36	5		1210		8.22		17.0		20.0		8.3		6.1		68		400
31		1323	23	5		1340		8.29		32.0		26.0		8.6		7.2		89		370
AUG 28		1309	38	3		1120		7.82		19.5		17.5		7.0		8.1		85		370
DATE		CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	SI SOI (MC	MG)	SOL (M		PER	DIUM CENT 932)	SO	DIUM AD- PRP- PION TIO 1931)	SC (M	OTAS- SIUM, DIS- DLVED MG/L S K) D935)	LIN: (MC AS CAC	AB G/L S	SULF DIS SOL (MG AS S	VED /L 04)	(MG	E, VED /L CL)	SOI (MC AS	UO- DE, IS- LVED G/L F) 950)
OCT																				
12		61	79	9	24	0		51		5	2	20	361		560		18		(0.30
16 MAR		60	75	5	27	0		55		6	1	11	465		600		17		(0.30
28 APR		34	27	,	7	0		42		2		9.7	150		190		5	.6	1	0.20
19		38	32	2	9	9		48		3		5.5	186		230		6	.8	(0.20
JUN 21		55	63	5	15	0		44		3	1	15	260		480		17		1	0.40
JUL 31		44	63	5	16	0		47		4	1	14	234		470		17	0	i	0.50
AUG 28		46	61		15	0		46		3	1	13	234		460		17		,	0.50
	DATE	SILI	ICA, S- LVED S/L	SOLI RESI AT 1 DEG DI SOL (MG (703	DS, DUE 80 . C S- VED /L)	SOLII SUM (CONST TUENT DIS SOLI (MG,	OF CI- CS, CS- /ED /L)	SOLI DI SOL (TO PE AC- (703	S- VED NS R FT)	SOLI	DS, S- VED NS R Y)	NIT GE NO2+	RO- N, NO3 S- VED /L N)	PHOS PHORO ORTH DIS- SOLVE (MG/L AS P) (0067	us o, D	BORO DIS SOLV (UG/ AS B	N, ED L	IRO DI SOL' (UG AS (O10	N, S- VED /L FE)	
OCT	2	-	7.3	1	170	1:	200	1	.59	0	.54	<0	100	0.0	10	1	00		<3	
NOV													100						7	
MAR	5	11			300		320		.77		.12			0.0			80			
APR	3	10)		443	4	138	0	.60	26	.8	0.	170	0.1	40	1	20		140	
	9	4	1.9		546	5	528	0	.74	6	.07	<0.	100	0.0	20	1	30		30	
2*	1	3	5.0		962	9	940	1	.31	94	.3	<0.	100	0.0	20	3	20		7	
	1	1	.6		894	9	911	1	.22	54	.8	<0.	100	<0.0	10	3	10		10	
AUG 28	в	2	2.6		918	8	391	1	.25	93	.7	<0.	100	0.0	10	3	00		9	

06342020 MISSOURI RIVER AT PRICE, ND

LOCATION.--Lat $47^{\circ}04'47''$, long $100^{\circ}55'55''$, in NW1/4 sec.34, T.142 N., R.81 W., Oliver County, Hydrologic Unit 10130101, on right bank 0.5 mi south of Price, and at mile 1,338.

DRAINAGE AREA .-- 185,000 mi2, approximately.

GAGE-HEIGHT RECORDS

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

GAGE.--Water-stage recorder. Datum of gage is 1,620.00 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Sept. 30, 1964, at datum 20 ft lower.

REMARKS.--Stage regulated by releases from Garrison Dam (station 06338490) 52 mi upstream.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 30.12 ft, Jan. 22, 1967; minimum daily recorded, 17.68 ft, Apr. 22, 1987.

GAGE	HEIGHT,	FEET,	WATER	YEAR	OCTOBER	1988	TO	SEPTEMBER	1989
			1	AFAN I	TALLIES				

							_					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	18.14 18.07 18.15 18.19 18.22	18.04 18.14 18.01 18.19 18.00	19.62 19.75 19.76 19.81 19.72	25.18 24.53 24.45 24.74 24.85	24.10 23.69 24.24 24.87 24.88	22.25 22.45 22.47 22.34 22.34	19.51 19.42 19.36 19.24 19.14	19.53 19.65 19.80 19.73 19.51	20.87 20.88 20.86 20.87 20.88	20.84 20.82 20.80 20.83 20.82	20.87 20.90 20.90 20.87 20.82	20.03 20.02 19.95 19.84 19.57
6 7 8 9 10	18.34 19.02 19.10 18.19 18.11	18.04 18.04 18.04 18.10 18.11	19.84 19.62 19.73 19.67 19.47	24.71 24.32 23.78 24.02	24.79 24.89 24.68 24.70 24.58	22.35 22.41 22.42 22.37 22.46	19.26 19.09 19.02 18.80 18.90	19.89 19.94 19.99 20.15 20.21	20.88 20.89 20.85 20.86 20.84	20.83 20.79 20.84 20.84 20.82	20.80 20.81 20.79 20.79 20.78	19.38 19.31 19.21 19.06 19.29
11 12 13 14 15	18.11 18.10 18.25 18.19 18.17	18.07 17.94 17.97 18.06 18.04	19.67 19.71 19.42 19.63 19.84	24.90 25.00 24.92 24.93 24.88	24.58 24.59 24.51 24.45 24.34	22.47 22.60 22.74 22.66 23.01	18.79 18.99 18.90 18.83 18.83	20.24 20.31 20.29 20.29 20.22	20.88 20.87 20.83 20.81 20.83	20.88 20.85 20.82 20.81 20.75	20.80 20.83 20.79 20.77 20.74	19.19 19.14 19.13 19.16 19.19
16 17 18 19 20	18.13 18.18 18.14 18.09 18.12	17.99 17.96 18.05 18.11 18.21	20.55 20.45 20.00 20.00 20.16	24.84 24.95 24.95 24.88 24.81	24.22 24.25 24.19 24.25 24.12	22.87 22.87 23.10 22.98 23.04	18.85 19.20 19.54 19.45 19.54	20.40 20.78 20.74 20.78 20.78	20.82 20.86 20.84 20.85 20.87	20.77 20.86 20.88 20.81 20.79	20.77 20.76 20.75 20.71 20.65	18.74 18.63 18.60 18.31 18.23
21 22 23 24 25	18.07 17.98 17.99 17.97	18.10 18.12 18.12 18.03 18.18	20.27 20.18 20.06 20.54 20.81	24.86 24.97 24.96 24.85 24.91	24.07 23.93 23.86 23.93 23.79	23.11 23.11 23.23 23.15 23.23	19.41 19.49 19.55 19.32 19.39	20.84 20.85 20.85 20.90 20.86	20.85 20.83 20.85 20.84 20.83	20.82 20.83 20.84 20.83 20.84	20.67 20.70 20.64 20.64 20.80	18.37 18.28 18.24 18.32 18.27
26 27 28 29 30 31	18.00 18.03 18.03 18.07 18.04 18.01	18.03 17.92 17.99 18.55 19.30	20.97 22.67 24.47 24.53 24.95 25.31	24.97 24.88 24.90 24.74 24.61 24.60	23.42 23.02 22.62	23.14 22.95 22.74 21.74 20.69 19.94	19.63 19.61 19.59 19.44 19.49	20.83 20.86 20.83 20.87 20.87	20.81 20.79 20.83 20.86 20.81	20.86 20.85 20.86 20.90 20.85 20.85	20.55 20.52 20.62 20.55 20.54 20.19	18.30 18.28 18.24 18.25 18.29
MEAN MAX MIN	18.17 19.10 17.97	18.11 19.30 17.92	20.68 25.31 19.42	=	24.20 24.89 22.62	22.56 23.23 19.94	19.25 19.63 18.79	20.41 20.90 19.51	20.85 20.89 20.79	20.83 20.90 20.75	20.72 20.90 20.19	18.89 20.03 18.23

SQUARE BUTTE CREEK BASIN

06342260 SQUARE BUTTE CREEK BELOW CENTER. ND

LOCATION.--Lat 47°03'25", long 101°11'35", in SE1/4 sec.4, T.141 N., R.83 W., Oliver County, Hydrologic Unit 10130101, on right bank at southeast corner of farmyard, and 6 mi southeast of Center.

DRAINAGE AREA .-- 146 mi2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- May 1965 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,865 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Oct. 1 to Sept. 30. Records fair. Flow regulated by Nelson Lake 1.5 miles upstream beginning Aug. 24, 1967, capacity 5,000 acre-ft. The capacity of Nelson Lake was increased to 10,000 acre-ft in Aug. 1975.

AVERAGE DISCHARGE.--24 years, 11.3 ft³/s, 8,190 acre-ft/yr; median of yearly mean discharges, 11 ft³/s, 8,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,700 ft3/s, June 24, 1966, gage height, 14.35 ft; no flow Feb. 14-26, 1966.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, about 4.0 ft³/s, Apr. 27, gage height, 2.17 ft; maximum recorded gage height, 2.33 ft, Oct. 2, backwater from beaver dams; minimum daily, 0.45 ft³/s, June 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	e1.8	e1.7	e1.5	e.95	e.90	e1.0	e1.8	e1.3	e.60	e.56	e.90	e1.1
2	e1.8	e1.7	e1.4	e.90	e.70	e1.0	e1.8	e1.2	e.80	e.55	e.90	e.75
3	e1.7	e1.7	e1.2	e1.0	e.80	e1.0	e1.8	e1.1	e.60	e.55	e.88	e1.2
4	e1.5	e1.7	e1.2	e1.0	e.80	e.95	e1.8	e1.1	e.50	e.55	e.88	e1.1
5	e1.6	e1.8	e1.2	e1.1	e.90	e.90	e1.7	e1.0	e.50	e.54	e.85	e1.1
6	e1.6	e1.8	e1.0	e1.1	e1.0	e.95	e1.8	e.90	e.48	e.54	e.85	e1.1
7	e1.6	e1.9	e1.0	e1.1	e1.0	e1.0	e1.7	e.90	e.45	e.54	e.85	e1.1
8	e1.6	e1.9	e1.0	e1.0	e1.0	e1.2	e1.8	e.85	e.48	e.52	e.84	e1.1
9	e1.6	e1.8	e.95	e.90	e1.1	e1.5	e1.7	e.80	e.48	e.52	e.80	e1.1
10	e1.5	e1.8	e.90	e.80	e1.1	e2.0	e1.6	e.80	e.48	e.50	e.80	e1.1
11	e1.5	e1.7	e.95	e1.0	e1.1	e1.8	e1.8	e.75	e.50	e.50	e.80	e1.3
12	e1.5	e1.7	e.95	e1.1	e1.2	e1.7	e1.7	e.70	e.50	e.50	e.80	e1.3
13	e1.5	e1.7	e1.0	e1.3	e1.1	e1.7	e1.4	e.70	e.60	e.50	e.80	e1.3
14	e1.5	e1.7	e1.1	e1.4	e1.0	e1.6	e1.5	e.65	e.50	e.50	e.82	e1.2
15	e1.5	e1.7	e1.2	e1.5	e.90	e1.6	e1.9	e.65	e.54	e.48	e.84	e1.2
16	e1.6	e1.7	e1.1	e1.5	e.85	e1.5	e1.8	e.60	e.50	e.48	e.80	e1.3
17	e2.2	e1.6	e1.1	e1.5	e.80	e1.5	e1.7	e.70	e.70	e.48	e.80	e1.3
18	e2.1	e1.5	e1.3	e1.5	e.80	e1.4	e1.7	e.60	e.60	e1.5	e.75	e1.3
19	e1.9	e1.5	e1.3	e1.5	e.80	e1.4	e1.6	e.60	e.56	e1.0	e1.6	e1.3
20	e1.9	e1.6	e1.2	e1.4	e.90	e1.4	e1.5	e.55	e.52	e.90	e1.2	e1.3
21	e1.9	e1.6	e1.2	e1.5	e1.0	e1.5	e1.5	e.55	e.70	e.80	e1.9	e1.3
22	e1.9	e1.7	e1.2	e1.5	e1.1	e1.6	e1.4	e.55	e.60	e.80	e1.3	e1.3
23	e1.8	e1.7	e1.1	e1.4	e1.2	e1.6	e1.4	e.50	e.58	e.75	e2.0	e1.2
24	e1.8	e1.7	e1.1	e1.3	e1.4	e1.7	e1.4	e.55	e.62	e.75	e1.6	e1.2
25	e1.8	e1.7	e1.1	e1.2	e1.3	e1.8	e1.4	e1.0	e.60	e.70	e1.2	e1.2
26	e1.8	e1.6	e1.0	e1.3	e1.3	e2.5	e2.0	e.90	e.60	e1.3	e.95	e1.2
27	e1.7	e1.5	e1.0	e1.4	e1.2	e2.1	e3.0	e.60	e.60	e1.1	e1.4	e1.2
28	e1.6	e1.5	e1.0	e1.4	e1.0	e1.9	e2.0	e.50	e.60	e1.0	e1.3	e1.2
29	e1.6	e1.6	e1.0	e1.4		e1.8	e1.4	e1.2	e.60	e.95	e.90	e1.2
30	e1.6	e1.6	e1.0	e1.3		e1.8	e1.4	e1.0	e.60	e.90	e.80	e1.2
31	e1.7		e1.0	e1.1		e1.7		e.70		e.88	e1.1	
TOTAL	52.7	50.4	34.25	38.35	28.25	47.10	51.0	24.50	16.99	22.14	32.21	35.75
MEAN	1.70	1.68	1.10	1.24	1.01	1.52	1.70	.79	.57	.71	1.04	1.19
MAX	2.2	1.9	1.5	1.5	1.4	2.5	3.0	1.3	.80	1.5	2.0	1.3
MIN	1.5	1.5	.90	.80	.70	.90	1.4	.50	.45	.48	.75	-75
AC-FT	105	100	68	76	56	93	101	49	34	44	64	71

CAL YR 1988 TOTAL 503.55 MEAN 1.38 MAX 2.5 MIN .80 AC-FT 999 WTR YR 1989 TOTAL 433.64 MEAN 1.19 MAX 3.0 MIN .45 AC-FT 860

e - Estimated

SQUARE BUTTE CREEK BASIN

Q6342260 SQUARE BUTTE CREEK BELOW CENTER, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (OO4OO)	TEMPERATURE AIR (DEG C (00020	ATURE WATER) (DEG C	(MG/I AS CACO	CALCIU L DIS- L SOLVE (MG/L 3) AS CA	DIS- D SOLVE (MG/L) AS MG	, SODIUM DIS- D SOLVED (MG/L) AS NA	SODIUM) PERCENT	RATIO
OCT 11	0924	1.5	1360		16.0	0 10.	0 .			-	-	
14	1232	1.7	1370		-3.	5 2.	5	-				
JAN 18	0957	1.5	1320		-2.0	0 1.	ο .					
FEB 27	1012	1.2	1340		-2.0	0 0.	5					V%
MAR 14 30	0835 1012	1.6			-3.0 5.0							
APR 03 17	1005 1128	1.8	1300	8.05	2.0	0 2.	0 .	30 74	- 36 .	190	 55	
JUN 07	1118	0.44	1410		18.	5 18.	0 .					
JUL 	0830	0.86	1260	7.83	25.0	0 23.	0 39	50 78	38	200	55	5 5
SEP 05	1017	1.2	1410		27.	5 17.	5 .					
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)	CARBOI DIOXIDI DIS- SOLVEI (MG/L AS CO2 (00405	E SULFAT DIS- D SOLVE (MG/L) AS SO4	DIS- D SOLVI (MG/I	RIDE, DIS- ED SOLVE (MG/L L) AS F)	DIS- SOLVE D (MG/L AS SIO2)	D DEG. (DIS-SOLVEI (MG/L)	SUM OF CONSTI- TUENTS DIS- O SOLVEI (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)
APR	7 7	400	0	400	7	740	40		0 18	024		1 26
17 JUL	7.3	490		400	7.0		12	0.4		928		
	S	OLVED TONS PER DAY)	DIS- SOLVED S (UG/L AS AS)	DIS- SOLVED S (UG/L (AS B)	IRON, DIS- SOLVED (UG/L AS FE)	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)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) 01080)
APR 17. JUL		4.28	<1	920	10	1	40	210	0.2	2	<10	960
31.		2.28	<1	1100	40	<1	40	30	0.2	2	1	930

BURNT CREEK BASIN 241

LOCATION.--Lat 46°54'54", long 100°48'48", in SW1/4NW1/4SW1/4 sec.29, T.140 N., R.80 W., Burleigh County, Hydrologic Unit 10130101, on left bank on upstream side of county highway bridge, and 7 mi northwest of Bismarck.

06342450 BURNT CREEK NEAR BISMARCK, ND

DRAINAGE AREA .-- 108 mi2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- October 1967 to current year (seasonal records only since 1982).

GAGE .-- Water-stage recorder. Altitude of gage is 1,690 ft, from topographic map.

REMARKS .-- Records good.

AVERAGE DISCHARGE.--15 years (water years 1968-82), 8.03 ft^3/s , 5,820 acre-ft/yr; median of yearly mean discharges, 4.7 ft^3/s , 3,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,000 ft³/s, Apr. 18, 1979, gage height, 16.93 ft from rating curve extended above 2,200 ft³/s on basis of culvert and flow-over-road measurement of peak flow; no flow for many days each year.

EXTREMES FOR CURRENT YEAR. -- Maximum discharge, 26 ft3/s, Mar. 27, gage height, 5.22 ft; no flow for months.

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

					M	EAN VALUE	5					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						.00	5.8	4.3	.87	.00	.00	.00
2						.00	5.9	3.3	1.1	.00	.00	.00
1 2 3 4 5						.00	5.3	2.7	.91	.00	.00	.00
4						.00	. 5.1	2.0	.56	.00	.00	.00
5						.00	4.5	1.3	.45	.00	.00	.00
6 7 8 9						.00	3.5	.75	-35	.00	.00	.00
7						.00	4.0	.52	.24	.00	.00	.00
8						.00	4.8	-43	.19	.00	.00	.00
9						.00	4.5	.37	.15	.00	.00	.00
10						.02	3.8	.31	.11	.00	.00	.00
11						1.6	2.8	.28	.09	.00	.00	.00
12						2.9	1.9	.23	.07	.00	.00	.00
13						1.5	1.5	.20	.07	.00	.00	.00
14						.91	1.0	.17	.07	.00	.00	.00
15						.50	.89	.13	.06	.00	.00	.00
16						.40	.83	.09	.05	.00	.00	.00
17						.22	.79	.10	.03	.00	.00	.00
18						.13	.69	.09	.01	.00	.00	.00
19						.08	1.0	.08	.00	.00	.00	.00
20						.04	.88	.07	.00	.00	.00	.00
21 22						.04	.60	.06	.00	.00	.00	.00
22						.06	.49	.05	.00	.00	.00	.00
23						.09	.30	.04	.00	.00	.00	.00
24 25						.40	.22	.08	.00	.00	.00	.00
25						2.1	.18	.07	.00	.00	.00	.00
26 27 28 29 30						9.9	.33	.06	.00	.00	.00	.00
27						15	2.0	.05	.00	.00	.00	.00
28						13	4.4	.04	.00	.00	.00	.00
29						10	7.2	.15	.00	.00	.00	.00
30						8.3	5.8	.41	.00	.00	.00	.00
31						7.1		.47		.00	.00	
TOTAL						74.29	81.00	18.90	5.38	0.00	0.00	0.00
MEAN						2.40	2.70	.61	.18	.00	.00	.00
MAX						15	7.2	4.3	1.1	.00	.00	.00
MIN						.00	.18	.04	.00	.00	.00	.00
AC-FT						147	161	37	11	.0	.0	.0

242

BURNT CREEK BASIN

06342450 BURNT CREEK NEAR BISMARCK, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS CHARG INST CUBI FEE PER SECO (OOO6	E, SPE- CIFIC CON- T DUCT ANCE ND (US/C	PH - (STANI ARD M) UNITS	AIR (DEG C	ATURE WATER) (DEG C	(MG/I AS CACO	CALCI DIS- SOLV (MG/) AS C	DIS- ED SOLVE L (MG/L A) AS MG	DIS- DIS- DIS- MG/L AS NA	SODIU	r RATIO
MAR												
13					0.							-
27 APR	1000	13	6	25 5.0	5.	0 0.	.0 18	30 32	24	63	4	1 2
11	0900	3.	0		4.	0 -		-		•		-
15	1025	0.	13 12	20 .	22.	0 16.	.0	-		-		
DATE	POTAS SIUM DIS- SOLVE (MG/L AS K) (00935	BONAT FET-L D (MG/ AS HCO3	E, BONAT AB FET-L L (MG/ AS) CO3	AB LAB L (MG/I AS) CACO	DIOXID DIS- SOLVE (MG/L 3) AS CO2	D SOLVE (MG/L) AS SO4	DIS- ED SOLVE (MG/I	RIDE DIS ED SOLV (MG/ L) AS F	DIS- SOLVE ED (MG/L L AS) SIO2)	AT 180 DEG. DIS- SOLVE (MG/L	E SUM OF CONSTIC TUENTS DIS- D SOLVE) (MG/L	SOLIDS, DIS- SOLVED (TONS PER) AC-FT)
MAR 27	12	190	0	160	3030	150	7.0	0.	10 7.0	44	7 39	2 0.61
	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 27	· · · ·	15.3	1	90	220	<1	40	190	0.2	1	<10	290

MISSOURI RIVER MAIN STEM

06342500 MISSOURI RIVER AT BISMARCK, ND

LOCATION.--Lat 46°48'51", long 100°49'12", in SE1/4NW1/4SE1/4 sec.31, T.139 N., R.80 W., Burleigh County, Hydrologic Unit 10130101, on left bank 40 ft upstream from Bismarck City waterplant, 2,100 ft downstream from Burlington Northern Railway bridge, 1.6 mi northwest of Bismarck Post Office, 3.5 mi upstream from Heart River, and at mile 1,314.5

DRAINAGE AREA .-- 186,400 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. --October to November 1927, April 1928 to current year. See WSP 1729 or 1917 for history of data prior to April 1928.

GAGE.--Water-stage recorder. Datum of gage is 1,618.28 ft, revised, above National Geodetic Vertical Datum of 1929. See WSP 1729 or 1917 for history of changes prior to Sept. 30, 1937.

REMARKS.--Estimated daily discharges: Dec. 25 to Apr. 3. Records good except those for period of estimated daily discharge, which are fair. Flow regulated by Lake Sakakawea (station 06338000) 75.4 mi upstream since November 1953.

AVERAGE DISCHARGE.--61 years (water years 1929-89), 22,630 ft3/s, 16,400,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 500,000 ft³/s, Apr. 6, 1952, gage height, 27.90 ft. Since completion of Garrison Dam in 1953, maximum discharge, 68,900 ft³/s, July 13, 1975, gage height, 14.24 ft; maximum gage height, 14.58 ft, Dec, 18, 1979, backwater from ice; minimum discharge, about 1,800 ft³/s, Jan. 3, 1940; minimum gage height, 1.35 ft, Sept. 4, 1934, present site and datum.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, 31.6 ft, Mar. 31, 1881, present site and datum.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, about 26,500 ft³/s, Feb. 5, gage height, 13.12 ft, backwater from ice; maximum gage height, 14.44 ft, Jan. 1, backwater from ice; minimum discharge, 8,890 ft³/s, Oct. 10, gage height 3.75 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	11100	10600	17900	e19500	e22800	e16800	e17000	18200	25100	24700	24900	20600
2	10400	11000	19000	e19500	e23800	e16800	e17000	17900	25200	24800	25000	20200
3	10700	10900	19600	e17500	e24800	e17000	e17000	19700	25100	24600	25300	20000
4	10800	10900	19700	e17100	e25900	e17200	18500	19400	24800	24800	25100	19600
5	11400	11100	19700	e17400	e26200	e16200	17600	19000	25200	24800	25100	17800
			13100		020200	0.0200	1,000	1,000	2)200	24000	2)100	17000
6	11600	10700	20000	e17700	e25600	e16900	17100	18700	25000	24900	24700	16900
7	13200	10900	19400	e17400	e25300	e16700	17600	20000	25100	24600	24800	16200
8	15600	10900	19500	e17100	e25500	e16500	15900	20300	25000	24700	24700	16000
9	13700	10900	19600	e16900	e25200	e16300	16000	20600	24700	24900	24600	15500
10	10100	11200	19200	e17400	e25400	e16500	14900	21600	24800	24700	24800	15400
						0.0000	14500	21000	24000	24100	24000	1,5400
11	10900	11100	19100	e19600	e25600	e16500	15600	21400	24800	25000	24500	16400
12	10700	10900	21000	e19500	e26000	e16000	15000	21900	25100	25000	25000	15200
13	10900	10200	19500	e19700	e25700	e17000	15900	21900	25000	24800	24900	15600
14	11400	11100	18100	e19700	e25600	e16700	15000	21700	24700	24700	24600	15400
15	11200	11200	19600	e20000	e24900	e17300	15100	21900	24600	24600	24700	15900
			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	020000	024300	017500	13100	21300	24000	24000	24700	17300
16	11000	11000	20700	e19700	e25600	e19300	14600	21500	24700	24200	24400	14500
17	10800	10700	23100	e19700	e24600	e18000	15700	23800	24900	24900	24800	13000
18	11200	10800	24800	e20300	e25800	e18800	17600	24600	25000	25300	24500	13300
19	10800	11200	21500	e20800	e24600	e18500	18300	24400	24700	25000	24600	12500
20	10900	11500	21500	e20900	e25600	e18000	18200	24600	24900	24700	24000	11400
	110000				02,000	0.0000	10200	24000	24300	24100	24000	11400
21	10700	11700	22200	e21300	e24500	e18600	18000	24800	25100	24500	24000	11800
22	10400	11200	22500	e20800	e24900	e18700	17800	24900	24700	24900	24300	11900
23	10500	11400	22100	e22100	e23400	e18800	17900	24900	24800	24800	24000	11700
24	10200	11100	22700	e22300	e23400	e19000	18000	25200	24800	24900	23800	11800
25	10400	11200	e22500	e22400	e24000	e18000	16700	25300	24800	24800	24600	12000
								25500		24000		.2000
26	10300	11400	e21300	e23400	e22700	e17500	18600	25100	24700	24900	24700	11700
27	10600	10800	e19900	e24000	e21000	e17000	19000	24900	24600	24900	22800	12000
28	10700	10400	e18700	e23300	e18700	e17000	18800	25100	24500	25000	23800	11600
29	11000	12200	e19300	e23300		e17000	18200	25000	25000	25200	23700	11500
30	10800	15000	e19600	e22700		e17000	18000	25400	24600	25100	23300	11800
31	10500		e19000	e22900		e17000		25200		24800	22300	
						7.4777				-1		
TOTAL	344500	335200	632300	625900	687100	538600	510600	698900	746000	769500	756300	439200
MEAN	11110	11170	20400	20190	24540	17370	17020	22550	24870	24820	24400	14640
MAX	15600	15000	24800	24000	26200	19300	19000	25400	25200	25300	25300	20600
MIN	10100	10200	17900	16900	18700	16000	14600	17900	24500	24200	22300	11400
AC-FT	683300	664900	1254000	1241000	1363000	1068000	1013000	1386000	1480000	1526000	1500000	871200
			1022-1032	13.3.5	7.7.7.7.7.	111111111				.,_,,,,,	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-,

CAL YR 1988 TOTAL 7340200 MEAN 20060 MAX 33000 MIN 10100 AC-FT 14560000 WTR YR 1989 TOTAL 7084100 MEAN 19410 MAX 26200 MIN 10100 AC-FT 14050000

MISSOURI RIVER MAIN STEM

06342500 MISSOURI RIVER AT BISMARCK, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIM	E	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	CIFI CON- DUCT ANCE D (US/C	C PI - (STA M) UNI	ND- RD RS)	TEMPER ATURE AIR (DEG (E A W	MPER- TURE (ATER (DEG C)	HARD- NESS TOTAL (MG/I AS CACO)	L L 3)	CALCIU DIS- SOLVE (MG/I AS CA	ED ()	MAGNE- SIUM DIS- SOLVE (MG/L AS MG (00925	, SOD DI D SOL (M		SODIU PERCEN (00932	T	SODIUM AD- SORP- TION RATIO (00931)
NOV 17	143	5	10400	7	50		-3.	.0	2.5				-	_				_	
05	122	0	16700	7	30	3.30	22.	.5	16.0	2	40	55		24	6	4	3	37	2
DATE	POTA SIU DIS SOLV (MG/ AS K	M, ED L	BICAR BONATE FET-LA (MG/L AS HCO3)	BONAT B FET-L (MG/ AS CO3	E, LIN	TY AB G/L GO3)	CARBO DIOXII DIS- SOLVE (MG/I AS CO2 (OO405	DE SU ED S L (2) AS	ULFATE DIS- SOLVED MG/L S SO4)	DIS-	, ED L L)	FLUO- RIDE, DIS- SOLVE (MG/I AS F)	ED	SILICA DIS- SOLVE (MG/L AS SIO2) (00955	, RES AT D DE SO (M	IDS, IDUE 180 G. C IS- LVED G/L) 300)	SOLIDS SUM OF CONSTI TUENTS DIS- SOLVE (MG/L	- - - - - - - - - - -	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
SEP 05	4.	5	250	0	200		2.	.0 2	200	13		0.6	50	6.5		472	49	90	0.64
	DATE	S (DLIDS, DIS- GOLVED TONS PER DAY) 70302)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON DIS- SOLVEI (UG/L AS B) (01020)	IRON, DIS- SOLVED (UG/L AS FE) 01046)	LEAD DIS SOLV (UG/ AS F	ED L B)	ITHIUM DIS- SOLVED (UG/L AS LI) 01130)	NE SC (U	ANGA- ESE, DIS- DLVED IG/L S MN)	SO (U AS	CURY IS- LVED G/L HG) 890)	MOLYB DENUM DIS- SOLVE (UG/L AS MO (01060	, ! D :	SELE- NIUM, DIS- SOLVED (UG/L AS SE) D1145)	SC (U	PRON- PIUM, DIS- DLVED JG/L S SR) 1080)
SEP 05	· · · ·	213	500	<1	140)	20		1	50		10		0.1		2	1		620

06343500 E.A. PATTERSON LAKE NEAR DICKINSON, ND

LOCATION.--Lat 46°52'11", long 102°49'37", in NE1/4NW1/4SW sec.8, T.139 N., R.96 W., Stark County, Hydrologic Unit 10130202, at left edge of spillway, and 2 mi southwest of Dickinson.

DRAINAGE AREA . -- 400 mi2, approximately.

RESERVOIR-ELEVATION AND CONTENTS RECORDS

- PERIOD OF RECORD. -- May 1950 to current year. Prior to October 1958, published as Dickinson Reservoir near Dickinson.
- GAGE.--Water-stage recorder. Datum of gage is 2,400.00 ft above National Geodetic Vertical Datum of 1929 (levels by Water and Power Resources Service); gage readings have been reduced to elevations NGVD. Prior to Jan. 4, 1961; nonrecording gage at same site and datum.
- REMARKS.--Reservoir is formed by earthfill dam; storage began May 23, 1950; dam completed Aug. 9, 1950. Total capacity is 24,600 acre-ft at maximum pool, elevation, 2,428.9 ft. Dead storage is 1,000 acre-ft below lowest point of outlet, elevation, 2,404.0 ft. Conservation storage is 9,100 acre-ft between elevation 2,404.0 ft and 2,420.0 ft, crest of spillway. The crest of the spillway was raised 3.5 ft in 1981 from 2,416.5 ft. Figures given herein represent total contents based on capacity table dated Jan. 1, 1965. The reservoir is for flood control, irrigation and municipal supply.
- COOPERATION. -- Record of elevation and contents furnished by U.S. Bureau of Reclamation. Monthend elevations interpolated from once-daily readings. Extremes are those observed.
- EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 11,590 acre-ft, June 9, 1982, elevation, 2,421.13 ft; minimum since initial filling of reservoir, 2,950 acre-ft, Mar. 16, 1962, elevation, 2,410.41 ft.
- EXTREMES FOR CURRENT YEAR.--Maximum contents recorded, 10,770 acre-ft, June 5, elevation, 2,420.48 ft; minimum, 4,500 acre-ft, Mar. 7, elevation 2,413.34 ft.

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

1	Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.	30	2.414.72	5,360	
Oct.	31	2.414.19	5.020	-340
lov.	30	2.413.94	4.860	-160
ec.	31	2,413.82	4,790	-70
CAI	YR 1988	-	\ -	-4,000
an.	31	2.413.66	4.690	-100
eb.	28	2.413.41	4.540	-150
lar.	31	2.418.76	8,790	+4,250
pr.	30	2.419.44	9,530	+740
lay	31	2,419.66	9.780	+250
une	30	2.419.78	9,920	+140
uly	31	2.418.49	8.510	-1,410
ug.	31	2.417.67	7.700	-810
ept.	30	2,416.90	7,000	-700
	R YR 1989			+1,540

06343500 E.A. PATTERSON LAKE NEAR DICKINSON, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1971, 1975, 1980 to current year.

DATE	P D (LING VERTH DIFFEET) (I	ME PR SOLEN (EPTH FEET) H	EES- C: SURE C: MM D: OF AI IG) (U:	NCE S/CM) UN	TAND- ARD IITS) (ATURE A WORLD (DEG C) (DEG C)	EMPER- (1 ATURE II ATER CO DEG C) UI	OLOR PLAT- NUM- (S OBALT D NITS)	ECCHI ISK) S (IN) (YGEN, DIS- OLVED MG/L) 0300)
OCT 11	1410	3.30	21.0	700	1600	8.80	18.0	11.5	35	36.0	8.2
JAN									-		
17 APR	1255	3.30	19.6	685	1990	8.60	4.5	2.0	30 1	10	6.8
12 JUN	1100	0.0	26.0	698	968	7.90	9.0	5.0	70	22.0	12.6
29	1235	3.30	25.0	697	1220	8.20	30.0	20.0	40	39.0	7.4
DATE	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	TOTAL (MG/L AS CACO3)	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)	SODIU	T RATIO	DIS- SOLVED (MG/L AS K)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	
OCT 11 JAN	82	290	54	37	270		7		328	550	
17	55	330	55	47	370	7	70 9	12	403	700	
APR 12 JUN	99	160	31	20	150	6	56 5	9.0	178	310	
29	90	220	44	26	200	6	55 6	10	216	420	
DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	(MG/L	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	CONSTI-	SOLIDS DIS- SOLVE (TONS PER AC-FT	DIS- D SOLVED TONS PER DAY)	NO2+NO3 DIS- SOLVED (MG/L AS N)	PHOS- PHOROUS DIS- SOLVED (MG/L AS P) (00666)	BORON, DIS- SOLVED (UG/L AS B) (01020)	
OCT	-										
11 JAN	13	0.40	7.2	1170	1130	1.5	0.0	<0.100	0.130	340	
17 APR	16	0.40	5.0	1440	1450	1.9	0.0	0.150	0.150	380	
12 JUN	8.5	0.20	4.3	650	641	0.8	0.0	0.350	0.100	180	
29	8.7	0.30	4.5	856	844	1.1	6 0.0	0.140	0.050	250	

HEART RIVER BASIN

06343500 E.A. PATTERSON LAKE NEAR DICKINSON, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	SAM- PLING DEPTH (FEET) (00003)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	CLOUD COVER (PER- CENT) (00032)	WIND SPEED (MILES PER HOUR) (00035)	WIND DIREC- TION (DEG. FROM TRUE NORTH) (00036)
OCT										
11	1405	0.0	1640	8.70	11.5	8.2	83			
11	1407	1.60	1630	8.80	11.5	8.2	83			
11	1410	3.30	1600	8.80	11.5	8.2	82	90	10	135
11	1412	6.60	1620	8.80	11.0	8.0	81			
11	1415	13.1	1650	8.80	10.5	7.5	76			
11	1417	19.7	1640	8.80	10.5	7.1	.72			
11	1420	21.0	1630	8.80	10.5	5.0	50			
JAN										
17	1250	0.0	2000	8.40	0.5	8.0	63			
17	1252	1.60	1990	8.50	1.0	7.2	57			
17	1255	3.30	1990	8.60	2.0	6.8	55	0	15	280
17	1257	6.60	1990	8.60	2.0	6.4	51			
17	1300	13.1	2000	8.60	3.0	5.4	43			
17	1302	19.7	2080	8.40	3.5	2.6	21			
APR				200			12.2	4		
12	1100	0.0	968	7.90	5.0	12.6	108	0	0	0
12	1103	1.60	960	8.20	4.0	12.4	105			
12	1105	3.30	960	8.30	4.0	11.9	99			
12	1107	6.60	944	8.20	3.5	11.6	98			
12	1110	13.1	960	8.20	3.5	11.4	97			
12	1112	19.7	1300	8.20	3.5	2.2	19			
12	1115	26.4	2200	8.00	5.0	2.0	17			
JUN	4070	0.0	4070	0.00	24 0		44			
29	1230	1.60	1230 1220	8.20	21.0	7.5	41 91			===
29	1232 1235	3.30	1220	8.20	21.0	7.5 7.4	90	0	<5.0	110
29	1237	6.60	1220	8.20	19.5	7.2	88		٠,٠٠	
29	1240	13.1	1220	8.20	19.0	6.5	79			
29	1242	19.7	1220	8.10	18.0	5.6	68			
23	1242	13.1	1220	0.10	10.0	5.0	00	-		

06344300 HEART RIVER AT DICKINSON, ND

LOCATION.--Lat 46°51'56", long 102°44'10", in SW14NW14SE14 sec.12, T.139 N., R.96 W., Stark County, Hydrologic Unit 101302202, on left bank near the southeast corner of Dickinson sewage lagoon cell No. 3, 1.9 mi southeast of Dickinson and 9.5 mi downstream from Edward Arthur Patterson Lake.

DRAINAGE AREA. -- 440 mi2, approximately.

WATER-DISCHARGE RECORDS

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

GAGE. -- Water-stage recorder and concrete control. Elevation of gage is 2,360 ft from topographic map.

REMARKS.--Estimated daily discharges: Dec. 8 to Mar. 6. Records good except those for period of estimated discharge, which are fair. Flow regulated by Edward Arthur Patterson Lake (station 06343500) 10 mi upstream.

EXTREME FOR PERIOD OF RECORD.--Maximum discharge, about 3,500 ft³/s, Mar. 3, 1986, gage height 10.56, backwater from ice; maximum gage height, 10.93 ft, Mar. 1, 1986, backwater from ice; minimum daily discharge, 0.10 ft³/s, Mar. 27, 1985.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 238 ft³/s, Apr. 27, gage height, 5.61 ft; minimum daily discharge, 0.86 ft³/s, Apr. 25.

		DISCHA	RGE, CUBIC	FEET PER	SECOND,	WATER YEAR	R OCTOBER	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.8	16	2.2	e2.1	e1.6	e1.3	2.4	2.3	91	1.2	1.8	1.8
	1.7	6.2	2.3	e2.1	e1.0	e1.3	2.4	1.9	78	1.1	1.6	1.8
3	1.6	2.9	2.3	e2.1	e1.0	e1.3	2.0	1.6	56	1.1	1.6	23
2 3 4	1.5	2.5	2.3	e2.3	e1.0	e1.3	2.1	1.7	39	1.1	1.7	3.8
5	1.5	2.4	2.3	e2.2	e1.1	e1.4	1.8	1.6	29	1.1	1.8	2.2
6	1.6	2.2	2.3	e2.2	e1.1	e1.5	1.6	1.4	20	1.0	2.0	1.9
7	1.7	2.4	2.2	e2.2	e1.2	2.0	1.8	1.5	15	1.1	2.4	1.8
8	1.7	2.5	e2.1	e2.2	e1.3	8.6	2.3	1.5	7.7	1.1	2.1	1.6
9	1.7	2.2	e2.1	e2.2	e1.3	51	1.8	1.3	4.3	1.2	2.1	1.6
10	1.7	2.2	e2.1	e2.2	e1.3	41	1.6	.87	3.0	1.2	2.3	1.7
11	1.7	2.2	e2.2	e2.2	e1.4	14	1.5	.91	3.0	1.1	1.9	1.7
12	1.6	2.2	e2.3	e2.2	e1.5	4.8	1.5	1.1	3.3	1.4	2.0	1.9
13	1.6	2.3	e2.5	e2.1	e1.4	3.1	1.5	1.0	3.2	2.9	2.3	1.9
14	1.6	2.2	e2.3	e2.1	e1.3	2.0	1.5	.92	2.7	3.2	2.2	1.9
15	1.7	2.2	e2.2	e2.2	e1.2	1.8	1.4	1.0	2.3	3.2	2.7	1.9
16	1.5	2.2	e2.1	e2.2	e1.2	1.8	1.5	1.2	2.0	2.7	2.2	1.9
17	1.6	2.2	e2.0	e2.2	e1.2	1.6	1.6	1.3	4.6	2.4	3.0	2.0
18	1.5	2.1	e2.2	e2.3	e1.2	1.7	1.6	1.4	3.1	2.6	3.0	2.2
19	1.4	2.1	e2.4	e2.3	e1.1	1.8	1.5	1.3	2.3	2.2	3.0	2.1
20	1.5	2.1	e2.2	e2.2	e1.1	1.6	1.4	1.2	2.1	2.2	3.3	2.1
21	1.5	2.2	e2.1	e2.2	e1.3	1.8	1.4	1.4	2.0	2.1	3.5	32
22	1.7	2.2	e2.1	e2.2	e1.3	2.1	1.4	1.2	2.6	1.9	3.5	4.5
23	1.9	2.2	e2.1	e2.2	e1.4	2.9	1.3	1.2	2.6	1.9	2.4	2.1
24	2.2	2.3	e2.1	e2.1	e1.4	2.8	1.1	8.9	2.2	2.3	2.0	2.0
25	2.0	2.3	e2.1	e2.0	e1.3	2.6	.86	2.8	1.9	2.4	7.2	1.8
26	2.0	2.2	e2.1	e1.9	e1.3	2.7	23	2.1	3.0	2.4	2.8	1.8
27	2.5	2.4	e2.1	e2.0	e1.3	3.7	76	1.9	2.3	1.9	15	1.8
28	2.6	2.4	e2.1	e2.1	e1.3	3.3	6.7	1.5	1.6	2.0	7.8	1.8
29	2.0	2.3	e2.1	e2.1		2.2	2.8	29	1.4	2.4	3.1	1.8
30	2.0	2.3	e2.1	e2.3		2.0	2.0	10	1.3	2.4	2.1	1.8
31	2.0		e2.1	e2.4		1.8		68		2.2	1.8	
TOTAL	54.6	86.1	67.7	67.3	35.1		151.36	155.00	392.5	59.0	96.2	112.2
MEAN	1.76	2.87	2.18	2.17	1.25	5.57	5.05	5.00	13.1	1.90	3.10	3.74
MAX	2.6	16	2.5	2.4	1.6	51	76	68	91	3.2	15	32
MIN	1.4	2.1	2.0	1.9	1.0	1.3	.86	.87	1.3	1.0	1.6	1.6
AC-FT	108	171	134	133	70	343	300	307	779	117	191	223

CAL YR 1988 TOTAL 1064.38 MEAN 2.91 MAX 41 MIN .98 AC-FT 2110 WTR YR 1989 TOTAL 1449.86 MEAN 3.97 MAX 91 MIN .86 AC-FT 2880

e - Estimated

06344300 HEART RIVER AT DICKINSON, ND--CONTINUED

249

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	C CON- C CON- C DUCT- ANCE	PH - (STAND ARD M) UNITS)	AIR (DEG	E ATUR WATE C) (DEG	E (MG CR AS C) CAC	S CALC AL DIS /L SOL (MG 03) AS	VED SOLV /L (MG, CA) AS	UM, SODIUS- S- DIS- VED SOLVE /L (MG/ MG) AS N	D L SODI	NT RATIO
OCT 12	1325	1.6	22	10 -	- 20	.0 10	.5					
NOV 21	1555	2.3	3 22	10 -	_ 2	.0 1	.5					
JAN 10	1530	2.2	2 22	70 -	14	.0 0	.5					
FEB 17	1345	1.2	2 22	70 -	17	.5 0	0.0					
MAR 09	1200	29		95 7.8				200 40	24	140		58 4
21	1455	1.9					.0					
31 MAY	1430	1.9			- 14		.0					-
09	1700	1.2	16	40 -	- 22	.0 19	.0					
22 JUL	1605	2.8	16.	30 -	- 21	.0 21	.5					
31 SEP	1420	2.3	20	90 8.4	10 38	.0 26	.0	310 56	40	360		71 9
01	1535	1.8	19	00 -	- 29	.5 22	2.0					
DATE	POTAS- SIUM DIS- SOLVEI (MG/L AS K) (00935	BONATE FET-LA D (MG/I AS HCO3)	BONATI AB FET-L (MG/I AS CO3	AB LAB L (MG/L AS) CACO3	DIOXI DIS SOLV (MG/	DE SULFA DIS- ED SOLV (MG/ 2) AS SO	DISCED SOL'L (MG)	E, RID - DI VED SOL /L (MG CL) AS	E, DIS- S- SOLV VED (MG/ /L AS F) SIO	- AT 18 VED DEG. /L DIS SOLV (2) (MG/	OUÉ SUM O CONST C TUENT DIS ED SOLV L) (MG/	F SOLIDS, I- DIS- S, SOLVED - (TONS ED PER L) AC-FT)
MAR 09	14	230	0	190	5	.8 250	51	c	.20 6.	.6 6	684 6	40 0.93
JUL 31	11	480	0	390	3	.0 620	49		.50 10	14	00 13	80 1.90
5,			J	230	,	.0 020	49				-	
D		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)	DIS-	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (O1145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
MAR 09.		54.1	<1	170	100	<1	20	200	0.1	1	<10	410
JUL 31.		8.85	4	510	50	1	50	30		5	2	730
	76	7.7.		- 1			,	,			_	

06344600 GREEN RIVER NEAR NEW HRADEC, ND

LOCATION.--Lat 47°01'40", long 103°03'10", on line between secs.13 and 14, T.141 N., R.98 W., Billings County, Hydrologic Unit 10130202, on left bank above county highway bridge, and 8 mi west of New Hradec.

DRAINAGE AREA .-- 152 mi2, approximately.

WATER-DISCHARGE RECORDS

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

GAGE. -- Water-stage recorder. Elevation of gage is 2,510 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 19-21, Dec. 20 to Jan. 10, Feb. 1-8, Feb. 17 to Mar. 21 and June 3-22. Records fair except for estimated record, which is poor.

AVERAGE DISCHARGE.--25 years, 16.8 ft^3/s , 12,170 acre-ft/yr; median of yearly mean discharge, 17 ft^3/s , 12,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,120 ft³/s May 9, 1970, gage height, 16.88 ft; maximum gage height, 17.60 ft, Mar. 22, 1978, backwater from ice; no flow for several days in some years.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 100 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 11	1330	*485	a*11.49	Apr. 27	1615	210	7.76
Mar. 28	0630	100	6.94	May 30	0245	120	6.78

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

No flow Aug. 2-14. a - Backwater from beaver dam

MEAN VALUES DAY OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP .29 .83 .80 e.70 e.50 19 3.0 .02 .23 .91 2 .28 .80 e.45 e.50 e.50 8.5 11 .64 .00 .19 .30 3 .23 .81 e.48 e.35 e.50 10 6.5 e8.2 .26 .00 .90 4 .22 .75 e.60 e.25 e.60 5.7 e6.0 .20 .00 5 .26 .83 e.60 e.20 e.80 16 e5.0 .06 .00 .24 6 .67 .76 .24 e2.0 .89 e.58 e.18 15 e3.8 .03 .00 .24 e.18 .23 .89 e.54 e5.0 11 3.6 e3.2 .02 .00 .18 .71 8 -24 .76 e.52 e.20 e10 9.1 3.2 e3.0 .01 .00 .17 9 -26 .69 e.50 .33 e20 7.1 3.0 e1.8 .01 .00 .14 10 .28 .58 -69 e.50 .42 e45 6.1 2.6 e1.3 .01 .00 .14 .28 11 .73 .56 -02 .51 .54 e400 5.4 2.4 e1.4 .00 .18 .55 12 .27 .61 .57 .93 e165 4.6 2.1 e1.5 .04 .00 .24 13 . 31 1.1 .76 e60 4.1 2.1 e1.0 .05 .00 .28 14 -29 .44 1.1 .82 .63 e45 3.5 2.0 e1.2 .11 .00 . 36 15 .47 .34 -87 .77 .48 e41 3.3 2.0 e1.0 .24 -01 .42 16 .41 .86 .49 .01 .46 -44 -85 e30 3.0 e1.0 .40 2.1 .39 .93 17 .54 .86 e.45 e23 .02 2.8 2.0 e1.1 1.0 .40 .62 .98 e.76 18 1.0 e16 .64 -06 .29 2.0 e.40 2.7 e.59 19 .64 e.39 1.0 1.0 .23 2.4 1.8 .40 .08 e.40 e13 20 .74 e.40 e.95 .93 e.45 1.7 e.36 -24 .08 .24 2.5 e11 21 .63 e.42 e.90 .84 e.50 e6.6 2.6 1.8 e.36 .18 .10 .20 22 .76 .48 e.80 .91 e.60 2.7 1.7 e.38 .14 .13 .19 8.5 23 .80 .57 e.70 .88 e.70 12 3.6 1.7 .98 .14 .16 .19 24 .72 .62 e.60 .79 e.70 23 2.3 1.0 .24 .19 4.0 .14 25 .68 e.56 .76 e.70 49 4.1 2.0 1.5 .18 .13 .20 26 .73 .67 e.53 .78 e.58 59 6.2 2.4 1.1 .11 .10 .23 27 .87 .56 e.51 .82 e.55 67 128 2.7 .64 .08 .10 .26 e.49 28 .80 .54 .80 e.52 90 85 2.6 .49 .11 .16 .35 e.48 29 .85 .64 .86 48 29 37 3.0 .09 .14 .30 e.47 30 .83 .66 .93 34 16 75 6.2 .06 .18 .33 31 .91 e.47 1.0 27 22 .04 .22 15.60 TOTAL 23.81 7.64 18.13 22.78 82.86 8.75 13.24 1313.00 433.8 224.1 1.84 .50 1.1 1.0 MEAN .60 .47 42.4 14.5 7.23 2.76 .28 .059 .25 .97 75 MAY .70 400 128 14 3.0 .22 .46 MIN .22 .38 -47 -45 .18 - 50 2.4 .36 .01 -00 .14 AC-FT 31 36 164 17 45 26 2600 860 445 17 3.6 15

CAL YR 1988 TOTAL 534.08 MEAN 1.46 MAX 32 MIN .00 AC-FT 1060 WTR YR 1989 TOTAL 2165.55 MEAN 5.93 MAX 400 MIN .00 AC-FT 4300

e Estimated

06344600 GREEN RIVER NEAR NEW HRADEC, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (OO400)	TEMPER- ATURE AIR (DEG C) (00020)	WATER (DEG (E (MG/ R AS C) CACO	CALC L DIS L SOL (MG 3) AS	IUM - VED /L CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) 00925)	SODIUM DIS- SOLVED (MG/L AS NA)	SODIUM PERCENT	RATIO
OCT 07	1725	0.24	1800		22.0	47	•						
NOV							.0				-		-
21 JAN	1325	0.42	1220		5.0	3.	.0						
10 FEB	1155	0.50	1360		-17.0	0.	.0						
16	1515	0.54	1190		-20.0	0.	.0						
10	1000	12	348		10.0	0.	.5						
15	1545	41	257	7.70	-4.0			55 12		6.0	26	46	
30	1220 1555	6.3 35	449 430	=	1.0		.5						
MAY					8.0		.0	75					-
05 JUN	1725	4.2	885		9.5		.0						-
02	1105	11	845		16.5								
22 JUL	1300	0.38	1040		22.0	20.	.0					-	
28 SEP	1525	0.11	1000	8.50	32.5	23.	.5 2	00 39		25	170	64	5
01	1210	0.24	1280		25.0	20.	.5					-	
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)	SULFAT DIS- SOLVE (MG/L AS SO4	DIS- ED SOLV (MG/	, RID DI ED SOL L (MG L) AS	E, S- VED /L F)	ILICA, DIS- SOLVED (MG/L AS SIO2) 00955)	SOLIDS, RESIDUE AT 180 DEG. (DIS- SOLVEI (MG/L) (70300)	SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)
MAR 15	9.1	66	0	54	2.1	61	5.	0 0	.10	9.2	190	161	0.26
JUL													
28	8.4	370	0	310	1.9	250	4.	5 0	. 40	7.9	714	690	0.97
	S	TONS S PER DAY)	DIS- SOLVED (UG/L AS AS)	DIS- SOLVED S (UG/L (AS B)	DIS- SOLVED (UG/L AS FE)	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)	MERC DI SOL (UG AS (718	URY I S- VED S /L (HG) A	DIS- SOLVED (UG/L AS MO)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) O1145) (STRON- TIUM, DIS- SOLVED (UG/L AS SR) O1080)
MAR 15. JUL		21.1	<1	70	370	<1	2	80	. 0	0.1	1	<10	90
28.		0.21	1	410	40	<1	20	90		0.1	5	1	330

06345500 HEART RIVER NEAR RICHARDTON, ND

LOCATION.--Lat 46°44'46", long 102°18'27", in NE1/4 sec.29, T.138 N., R.92 W., Stark County, Hydrologic Unit 10130202, on right bank 5 ft upstream from bridge on State Highway 8, 0.5 mi downstream from Plum Creek, and 9.5 mi south of Richardton.

DRAINAGE AREA .-- 1,240 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- May 1903 to September 1922, April 1943 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS (WATER YEARS) .-- WSP 1209: Drainage area. WSP 1239: 1906. 1918(M). 1947(M).

GAGE.--Water-stage recorder. Datum of gage is 2,153.67 ft above National Geodetic Vertical Datum of 1929. May 18, 1903, to Sept. 30, 1922, nonrecording gage at 3 sites in 1 mi reach below present site at different datums. Apr. 14, 1943, to July 7, 1947, nonrecording gage at present site and datum.

REMARKS.--Estimated daily discharges: Nov. 15 to Apr. 4. Records good except those for period of estimated daily discharge, which are fair. Flow is regulated by Patterson Lake Reservoir (station 06343500) 85 river miles upstream since 1950. Some diversions for irrigation and water supply at low flow.

AVERAGE DISCHARGE.--64 years (water years 1904-07, 1909-22, 1944-89), 105 ft^3/s , 76,070 acre-ft/yr; median of yearly mean discharges, 96 ft^3/s , 69,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 23,400 ft3/s, Apr. 16, 1950, gage height, 28.05 ft, from highwater mark in gage well; no flow at times in some years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of July 5, 1938, reached a stage of about 26 ft, from information by local residents, discharge, 16,000 ft³/s; flood of Mar. 25, 1943, reached a stage of 24.2 ft from floodmarks, discharge, 11,700 ft³/s.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, about 900 ft³/s, Mar. 13; maximum gage height observed, 9.33 ft, Mar. 13, backwater from ice; minimum daily discharge, 0.32 ft³/s, Aug. 9 and 10.

DISCHARGE. CUBIC FEET PER SECOND. WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

		DISCHI	inge, cobi	C FEET FE		MEAN VALUES		K 1900 I) SEPTEMBE	1909		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	4.4 4.0 3.6 3.3 2.9	9.0 8.7 9.0 13	e6.5 e6.8 e6.8 e6.8 e6.5	e3.6 e3.6 e3.7 e4.0	e3.0 e2.8 e2.5 e2.5 e2.6	e2.5 e2.5 e2.5 e2.5 e2.5	e100 e90 e80 e60 60	167 104 67 49 38	332 259 172 124 87	5.1 4.4 3.6 3.2 2.6	1.1 .90 .89 .76	9.7 7.0 8.3 5.2 4.0
6 7 8 9	3.1 3.4 3.7 3.7 4.0	10 9.1 8.8 8.7 8.7	e6.0 e5.5 e5.0 e5.0	e3.5 e3.2 e3.0 e2.7 e2.5	e2.7 e2.7 e2.7 e2.7	e4.0 e5.0 e10 e20 e140	50 49 48 48 47	31 27 25 23 20	63 45 35 30 24	2.4 9.6 8.6 5.5 4.7	•55 •46 •38 •32 •32	14 12 7.8 5.3 4.3
11 12 13 14 15	3.9 3.7 3.9 4.1 4.8	8.2 8.0 8.4 8.8 e7.0	e5.5 e5.7 e6.0 e5.5 e4.0	e2.6 e2.7 e2.8 e3.0 e3.0	e2.7 e2.7 e2.7 e2.7	e475 e550 e650 e650 e400	41 36 32 29 27	18 16 14 14 13	20 18 16 15	4.0 3.3 3.2 3.6 3.3	.50 .74 .72 .64	3.7 3.1 2.7 2.4 2.1
16 17 18 19 20	5.3 5.2 5.2 5.0 4.9	e5.0 e5.5 e5.5 e6.0 e6.5	e4.5 e5.0 e5.5 e5.0 e4.7	e3.0 e3.2 e3.3 e3.2 e3.5	e2.7 e2.7 e2.6 e2.6 e2.6	e180 e195 e185 e180 e155	26 25 23 21 20	13 15 12 10 8.5	11 12 12 11 9.0	3.1 2.5 2.2 2.0 1.8	.49 .47 1.0 1.7	2.0 2.5 2.1 2.0 1.9
21 22 23 24 25	5.2 5.9 5.6 5.9	e6.5 e7.0 e7.5 e7.5 e6.5	e4.7 e4.5 e4.5 e4.3 e4.0	e3.5 e3.5 e3.1 e2.7	e2.6 e2.6 e2.7 e2.7	e135 e65 e40 e85 e95	19 18 17 17 16	7.8 7.8 7.9 8.5 8.5	10 9.8 8.2 7.4 6.6	3.0 2.3 1.8 1.5	1.8 2.0 2.4 2.6 6.0	1.8 1.9 1.8 7.2
26 27 28 29 30 31	6.2 6.8 5.1 7.7 8.3 8.7	e6.0 e5.5 e5.0 e5.5 e6.0	e4.0 e3.8 e3.5 e3.5 e3.5	e2.7 e2.9 e2.9 e2.9 e3.3 e3.5	e2.6 e2.6 e2.5	e100 e85 e105 e190 e160 e65	20 69 179 157 225	8.5 8.8 16 16 19 492	7.1 6.9 5.9 6.4 5.7	.83 .72 .93 1.3 1.2	5.2 4.4 3.7 5.3 8.9	7.3 4.6 3.3 2.7 2.5
TOTAL MEAN MAX MIN AC-FT	152.7 4.93 8.7 2.9 303	229.9 7.66 13 5.0 456	154.9 5.00 6.8 3.5 307	97.4 3.14 4.0 2.5 193	74.5 2.66 3.0 2.5 148	4936.5 159 650 2.5 9790	1649 55.0 225 16 3270	1285.3 41.5 492 7.8 2550	1383.0 46.1 332 5.7 2740	94.58 3.05 9.6 .72 188	71.03 2.29 14 .32 141	147.2 4.91 14 1.8 292

CAL YR 1988 TOTAL 4110.03 MEAN 11.2 MAX 140 MIN .09 AC-FT 8150 WTR YR 1989 TOTAL 10276.01 MEAN 28.2 MAX 650 MIN .32 AC-FT 20380

e - Estimated

06345500 HEART RIVER NEAR RICHARDTON, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1950, 1972 to current year.

DATE	TIM	E	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	CIFIC CON- DUCT- ANCE (US/CN	PH (STAN ARD UNITS) (DEG	RE R C)	TEMPER ATURE WATER (DEG C	(MG/ AS) CACO	CAL L DI L SO (M 3) AS	CIUM S- LVED G/L CA)	MAGNE SIUM DIS- SOLVE (MG/L AS MG (00925	, SODIU DIS- D SOLVE (MG/	D L SOI	OIUM CENT 932)	SODIUM AD- SORP- TION RATIO (00931)
OCT O3 NOV	115	5	3.8	254	10	:	5.0	12.	0				-			
14 JAN	123	0	8.9	253	50	:	3.0	1.	0			-	-			
03 FEB	143	0	3.6	260	00	:	2.5	0.	5			-	-1			
13	121	5	2.7	283	50	:	3.5	0.	5			_	-			
MAR 10 27	145 141		141 77	174			7.0	0.		70 7	0	46 _	270		61	6
02 22 JUN	133 144		101 7.9	135 166			6.0 5.0	12.		=	=	:		=		Ξ
20 JUL	134	0	8.8	138	30	2	7.0	24.	0			-				
24 AUG	140	0	1.5	173	8.	30 3	1.0	24.	5 4	10 7	2	55	330		63	7
28	150	0	3.8	229	90	22	2.0	15.	0			-	-:			
DATE	POTA SIU DIS SOLV (MG/ AS K	M, ED L	BICAR- BONATE FET-LAI (MG/L AS HCO3) (95440	BONATE FET-LA (MG/I AS CO3)	Å LAB (MG/I AS CACO	Y DIOX: DIS L SOLV (MG,	IDE S S- VED /L O2)	SULFATI DIS- SOLVEI (MG/L AS SO4	DIS- D SOLV (MG/	, RI D ED SO L (M L) AS	UO- DE, IS- LVED G/L F)	SILICA DIS- SOLVE (MG/L AS SIO2) (00955	AT 18 D DEG. DIS SOLV (MG/	UÉ SUM O CONS C TUES - D: ED SOS L) (MC	OF STI- NTS, IS- LVED S/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 10	11		460	0	770		- 0	500	40			0.0	4.0	70		4 77
JUL					370		5.8	590	19		0.40	9.2			1240	1.73
24	15		440	0	360		3.5	720	22		0.50	6.7	14	50	1440	1.97
	ATE	SC (T	DLVED CONS PER DAY)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON, DIS- SOLVED (UG/L AS B) (01020)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	SOI (UC AS	IS- LVED G/L PB)	DIS- SOLVED (UG/L AS LI) (01130)	MANGA NESE, DIS- SOLVE (UG/L AS MN (01056	D S	CRCURY DIS- SOLVED UG/L S HG) (1890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVEI (UG/L AS SE) (01145)) S	STRON- TIUM, DIS- SOLVED (UG/L AS SR) 01080)
MAR 10. JUL		48	33	1	380	100		1	40	12	0	<0.1	2	<10)	1000
24.	••		5.79	2	550	60		1	50	5	0	0.1	6	2	2	1100

06345780 HEART RIVER ABOVE LAKE TSCHIDA NEAR GLEN ULLIN, ND

LOCATION.--Lat 46°39'24", Long 102°04'40" in SW14NE14NE14 sec.30, T.137 N., R.90 W., Grant County, Hydrologic Unit, 10130202, on right bank 100 ft. downstream from bridge on county road, and 16 mi south and 1 mi west of Hebron.

DRAINAGE AREA. -- 285 mi², approximately.

WATER-DISCHARGE RECORDS

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

GAGE .-- Water-stage recorder. Datum of gage is 2,090 ft from topographic map.

REMARKS.--July to September 1988: Estimated daily discharges: July 1-8, Aug. 19-30, and Sept. 11-14. Records fair.

Water Year 1989.--Estimated daily discharges: Dec. 15, 24-31, Jan. 1,2, 8-10, and Jan. 24 to Mar. 25. Records good except for estimated periods, which are fair. Flow is regulated by Patterson Lake Reservoir (station 06343500) about 90 river miles upstream from station, and some diversions for irrigation and water supply at low flow.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 600 ft³/s, Mar. 14, 1989, gage height, 7.12 ft; minimum daily discharge, 0.02 ft³/s, Aug. 22-23, Sept. 4-7, 9-10, 1988; backwater from ice.

EXTREMES FOR CURRENT PERIOD.--July to September 1988: Maximum discharge, 25 ft³/s, July 9, gage height, 4.54 ft; minimum daily discharge, .02 ft³/s, Aug. 22-23, Sept. 4-7, 9 and 10.

Water Year 1989.--Maximum discharge, about 600 $\rm ft^3/s$, Mar. 14, gage height, 7.12 ft, backwater from ice; minimum daily discharge, 0.13 $\rm ft^3/s$, Aug. 6,7,10, and 17.

DISCHARGE, CUBIC FEET PER SECOND, JULY 1988 TO SEPTEMBER 1988 MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5										e2.0 e3.0 e5.0 e7.0	.09 .10 .13 .14	.06 .04 .03 .02
6 7 8 9										e8.0 e7.0 e10 23	.11 .10 .07 .05	.02 .02 .03 .02
11 12 13 14 15										14 14 11 7.4 6.4	.04 .05 .05 .08	e.04 e.06 e.10 e.12 .14
16 17 18 19 20										4.8 3.9 3.2 2.3 3.0	.09 .08 .05 e.03 e.03	.20 .29 .36 .81
21 22 23 24 25										2.7 1.7 1.5 .91	e.03 e.02 e.02 e.03 e.03	1.7 1.8 1.8 2.1 4.7
26 27 28 29 30 31										.70 .46 .28 .20 .15	e.03 e.04 e.04 e.04 e.05	5.3 4.8 5.0 5.3 5.0
TOTAL MEAN MAX MIN AC-FT										171.59 5.54 23 .11 340	1.93 .062 .14 .02 3.8	41.50 1.38 5.3 .02 82

e - Estimated

06345780 HEART RIVER ABOVE LAKE TSCHIDA NEAR GLEN ULLIN, ND--CONTINUED

WATER-DISCHARGE RECORDS

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 4 5	5.7 4.6 4.1 3.6 3.4	8.0 8.9 9.2 9.2	11 11 12 13 12	e5.2 e5.0 5.1 5.4 e5.4	e4.0 e3.5 e3.0 e2.7 e3.0	e3.0 e2.9 e2.9 e2.8 e3.0	178 126 97 78 66	212 137 94 70 53	313 226 179 128 99	6.4 6.0 5.8 4.5 3.6	.26 .21 .22 .20 .15	7.7 12 11 9.4 8.8
6 7 8 9	3.5 3.6 3.2 3.1 3.1	17 15 13 12 11	13 11 11 8.3 8.3	e5.0 e4.5 e4.0 e3.5 e3.5	e3.2 e3.3 e3.3 e3.3	e3.3 e3.5 e5.0 e10 e115	57 51 50 48 48	44 38 33 29 26	78 61 47 38 32	2.6 2.3 2.3 4.3 7.3	.13 .13 .14 .14	6.4 4.8 12 10 8.1
11 12 13 14 15	3.3 3.5 3.7 3.9 3.8	11 11 11 11 8.8	8.4 9.6 11 12 e7.2	e3.5 e3.5 3.7 e3.7 e3.8	e3.4 e3.6 e3.7 e4.0 e4.0	e300 e350 e320 e400 e250	47 43 39 34 32	23 20 20 18 16	28 23 20 19 18	6.2 7.9 5.2 4.5 3.6	.21 .34 .27 .20 .18	6.9 5.7 4.8 4.0 3.7
16 17 18 19 20	3.7 3.7 3.9 4.0 4.1	8.1 11 9.6 12 12	11 10 11 11 11	e4.2 e4.5 e4.5 e4.3 e4.8	e3.9 e3.5 e3.3 e3.0 e3.5	e150 e100 e100 e90 e80	30 29 28 27 25	21 141 32 21 17	17 16 15 14 13	2.6 3.6 4.1 3.0 3.0	.16 .13 .14 .23	2.9 2.7 2.2 1.8 2.6
21 22 23 24 25	4.2 4.3 4.3 4.2 4.3	11 11 11 11 11	10 10 9.6 e9.0 e8.0	e4.8 e4.5 e4.0 e4.0	e3.5 e3.2 e3.4 e3.5 e3.5	e75 e70 e70 e70 e72	23 23 22 21 20	16 14 12 13 11	12 12 13 12 11	2.1 1.1 1.2 .69 .51	.24 .26 .19 .14	3.0 3.1 2.6 2.6 2.5
26 27 28 29 30 31	4.7 4.7 4.3 6.6 5.6	12 8.2 10 9.9 10	e6.1 e6.0 e5.8 e5.7 e5.6 e5.5	e4.0 e4.2 e4.3 e4.5 e5.0	e3.5 e3.4 e3.0	98 110 107 130 165 160	23 112 159 207 157	11 11 11 15 23 56	9.7 8.5 8.0 8.0 7.1	.68 1.1 .57 .43 .41	.36 .26 .35 4.4 4.3	3.0 11 7.6 5.8 4.6
TOTAL MEAN MAX MIN AC-FT	128.7 4.15 6.6 3.1 255	324.9 10.8 17 8.0 644	294.1 9.49 13 5.5 583	135.5 4.37 5.4 3.5 269	95.5 3.41 4.0 2.7 189	3418.4 110 400 2.8 6780	1900 63.3 207 20 3770	1258 40.6 212 11 2500	1485.3 49.5 313 7.1 2950	97.94 3.16 7.9 .35 194	26.85 .87 12 .13 53	173.3 5.78 12 1.8 344

WTR YR 1989 TOTAL 9338.49 MEAN 25.6 MAX 400 MIN .13 AC-FT 18520

e - Estimated

06345780 HEART RIVER ABOVE LAKE TSCHIDA NEAR GLEN ULLIN, ND--CONTINUED

WATER-QUALITY DATA

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

DATE	TIM	Œ	DIS- CHARGE INST. CUBIC FEET PER SECONI (00061	CIFIC CON- DUCT- ANCE US/CN	PH (STAN ARD UNITS	D- ATUR AIF) (DEG	E C)	TEMPER- ATURE WATER (DEG C	(MG/I AS) CACO	CA D S (3) A	LCIUM DIS- OLVED MG/L S CA)	DIS-	DIS- DIS- D SOLVE (MG/	D L SOI A) PERC		SODIUM AD- SORP- TION RATIO (00931)
OCT																
03 26 NOV	173 141		3.9 4.9	249 228		12	.0	12.		=	==			=	==	=
14	161	5	10	216	50	3	5.0	1.0	0			-	-			
O1	151	0	11	263	50	12	2.0	1.0	0 .							
04 FEB	101	5.	5.4	276	50	7	.5	0.	5				-			-
13	162	5	3.8	301	10	3	5.0	0.	5	-			-			
MAR 10 27	173		146 105	93			0.0	0.		00	39	24	120	_	55	4
MAY 01	140	5	213	157												
25 JUN	121		12	169			.0	28.		-			-	==		==
20 JUL	163	0	13	112	20	25	0.0	26.	ο .	-			-			
24	164	.0	0.6	7 170	00 8.	50 33	5.0	24.	0 3	10	53	42	320		68	8
28	174	.0	0.3	6 209	90	20	0.0	21.	0	-		, h-	-			
DATE	POTA SIU DIS SOLV (MG/ AS K	M, ED L	BICAR- BONATE FET-LA (MG/L AS HCO3) (95440	BONATE B FET-LA (MG/I AS CO3)	AB LAB (MG/ AS CACO	Y DIOXI DIS L SOLV (MG/	DE S - ED L (2)	SULFAT DIS- SOLVEI (MG/L AS SO4 (00945	DIS- D SOLVI (MG/I	ED S L (L) A	CLUO- CIDE, DIS- SOLVED MG/L AS F)	AS SIO2)	AT 18 DEG. DIS SOLV	O CONS C TUEN - DI ED SOI L) (MO	OF STI-	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 10	13		270	0	220	1	.7	260	12		0.20	6.6	6	49	608	0.88
JUL 24	13		500	0	410	2	2.5	570	14		0.60	7.4	13	00 1	270	1.77
	DATE	S()	DLVED TONS PER DAY)	ARSENIC DIS- SOLVED (UG/L AS AS)	BORON, DIS- SOLVED (UG/L AS B)	IRON, DIS- SOLVED (UG/L AS FE)	LEA DI SOI (UC AS	IS- LVED G/L PB)	LITHIUM DIS- SOLVED (UG/L AS LI)	MANG NESE DIS SOLV (UG/ AS M	ED L	ERCURY DIS- SOLVED (UG/L AS HG)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO)	SELE- NIUM, DIS- SOLVEI (UG/L AS SE)		STRON- TIUM, DIS- SOLVED UG/L US/SR)
MAR	MIE	(/(0302)	(01000)	(01020)	(01046)	(010	049)	(01130)	(0105	0) (71890)	(01060)	(01145)	,,,	1080)
10. JUL	•••	25	56	<1	180	120		<1	20		70	0.4	1	<10		450
24.			2.35	<1	640	50		1	50		10	0.1	6	2	2	860

257

06346000 LAKE TSCHIDA NEAR GLEN ULLIN, ND

LOCATION.--Lat 46°35'43", long 101°48'34", in SW1/4NE1/4 sec.13, T.136 N., R.89 W., Grant County, Hydrologic Unit 10130202, 10 mi upstream from Heart Butte Creek, and 14 mi north of Elgin.

DRAINAGE AREA .-- 1,710 mi2, approximately.

RESERVOIR-ELEVATION AND CONTENTS RECORDS

- PERIOD OF RECORD. -- August 1949 to current year. Prior to October 1957, published as Heart Butte Reservoir near Glen Ullin.
- GAGE. -- Nonrecording gage. Datum of gage is at National Geodetic Vertical Datum of 1929, levels by Water and Power Resources Service.
- REMARKS.--Reservoir is formed by earthfill dam; storage began Sept. 29, 1949; dam completed Dec. 9, 1949. Total capacity is 430,000 acre-ft at maximum pool, elevation 2,118.2 ft. Dead storage is 6,750 acre-ft below lowest point of outlet, elevation 2,030.0 ft. Active conservation storage is 69,030 acre-ft between elevation 2,030.0 ft and 2,064.5 ft, crest of spillway. Figures given herein represent total contents. Controlled releases are through 4 by 5 ft slide gate. The spillway is uncontrolled "glory hole" type and discharges through a conduit 14 ft in diameter. The reservoir is for flood control, irrigation, and incidental water supply.
- COOPERATION. -- Record of elevations and contents furnished by U.S. Bureau of Reclamation. Monthend elevations interpolated from once-daily readings. Extremes are those observed.
- EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 174,000 acre-ft, Apr. 9, 1952, elevation, 2,086.23 ft; minimum since first reaching spillway level, 40,840 acre-ft, Mar. 6, 1962, elevation, 2,052.5 ft.
- EXTREMES FOR CURRENT YEAR.--Maximum contents, 66,750 acre-ft, June 8 and 9, elevation, 2,061.76 ft; minimum, 46,880 acre-ft, Nov. 1, elevation, 2,055.00 ft.

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

I	Da te	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.	30	2,055.14	47.260	
Oct.	31	2.055.01	46,910	-350
Nov.	30	2.055.10	47,160	+250
Dec.	31	2,055.23	47,510	+350
CAL	YR 1988		-	-11,140
Jan.	31	2.055.27	47.610	+100
Feb.	28	2,055.23	47,510	-100
Mar.	31	2.058.37	56,340	+8,830
Apr.	30		62,310	+5,970
May	31	2.061.01	64,360	+2,050
June	30	2.061.37	65,510	+1,150
July	31	2.058.06	55.420	-10,090
Aug.	31	2,055.48	48,180	-7,240
Sept.	30		46,970	-1,210
WTR	YR 1989		_	-290

06346000 LAKE TSCHIDA NEAR GLEN ULLIN, ND--CONTINUED

WATER-QUALITY DATA

PERIOD OF RECORD. -- Water years 1971, 1980 to current year.

DATE		PLING DEPTH D (FEET) (ESER- S VOIR EPTH FEET) I	RES- COURE COURT C	UCT- (S NCE S/CM) UN	PH STAND- ARD IITS)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER- ATURE WATER (DEG C) (OOO10)	(P IN CC UN	DLOR PLAT- NUM- (: DBALT NITS)	PAR- ENCY SECCHI DISK) (IN)	OXYGEN, DIS- SOLVED (MG/L) (00300)
OCT 24	1300	0.0	40.0	751	1280	8.90	12.0	9.0		15	55.0	10.5
JAN 25	1215		40.9	758	1370	8.40	-13.0	1.5		10	44.0	9.7
MAY						0.40					4. 1.2.00	
23 AUG	1010	3.30	14.6	748	1250	8.40	23.0	15.0		20	203	10.2
02	1145	0.0	39.6	746	1310	8.30	33.0	23.5		25	40.0	8.1
DATE	OXYGEN DIS- SOLVE (PER- CENT SATUR ATION (00301	HARD- D NESS TOTAL (MG/L - AS) CACO3)		MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	(MG/L AS NA)	SOD1	SOF IUM TI	DIUM S D- D D- SO ON (M	OTAS- SIUM, DIS- DLVED GG/L K) D935)	ALKA- LINITY LAB (MG/L AS CACO3 (90410		VED /L 04)
OCT 24 JAN	9			41	180		55		0	260	440	
25 MAY	7	0 320	59	43	190		55	5 1	1	291	470	
23 AUG	10	4 290	53	38	170		55	4	9.6	253	410	
02	9	8 300	57	38	180		56	5 1	1	259	440	
DATE	CHLO- RIDE, DIS- SOLVE (MG/L AS CL	(MG/L) AS F)	AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	CONSTI- TUENTS.	SOLID SOLV (TON PER AC-F	S- DI VED SOL IS (TO R PE TT) DA	DS, GS- NO2 VED D NS SO R (M	TRO- EN, +NO3 IS- LVED G/L N) 631)	PHOS- PHOROUS DIS- SOLVEI (MG/L AS P) (00666	DIS SOLV (UG, AS I	S- VED /L B)
OCT 24 JAN	10	0.30	0.29	886	893	1.	.20 C	.0 <0	.100	0.06	o :	280
25	10	0.30	1.4	982	960	1.	34 0	.0 0	.110	0.030) 2	280
MAY 23 AUG	9.1	0.30	2.3	862	845	1.	.17	.0 0	.210	0.020		260
02	9.4	0.30	2.6	899	894	1.	22 0	.0 <0	.100	0.090)	

HEART RIVER BASIN

06346000 LAKE TSCHIDA NEAR GLEN ULLIN, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

259

		SAM- PLING DEPTH	SPE- CIFIC CON- DUCT- ANCE	PH (STAND- ARD	TEMPER- ATURE WATER	OXYGEN, DIS- SOLVED	OXYGEN, DIS- SOLVED (PER- CENT SATUR-	CLOUD COVER (PER-	WIND SPEED (MILES PER	WIND DIREC- TION (DEG. FROM TRUE
DATE	TIME	(FEET) (00003)	(US/CM) (00095)	UNITS) (00400)	(DEG C) (00010)	(MG/L) (00300)	ATION) (00301)	CENT) (00032)	HOUR) (00035)	NORTH) (00036)
OCT										
24	1300	0.0	1280	8.90	9.0	10.5	93	95	13	315
24	1302	1.60	1290	8.90	9.0	10.4	91			
24	1304	3.30	1290	8.90	9.0	10.4	91			
24	1306	6.60	1290	9.00	9.0	10.4	91			
24	1308	13.2	1290	9.00	9.0	10.4	91			
24	1310	19.8	1290	9.00	9.0	10.3	90			
24	1312	26.4	1290	9.00	9.0	10.3	90			
24	1314	33.0	1280	9.00	9.0	10.3	90			
24	1316	39.6	1290	9.00	9.0	10.3	90			
24	1318	40.0	1290	9.00	9.0	10.3	90			
JAN		1	50	,,,,,	,		,,,			
25	1145	0.0	1370	8.40	1.0	12.2	86	0	0	
25	1149	1.60	1370	8.40	1.5	12.1	86			
25	1152	3.30	1370	8.40	1.5	12.0	86			
25	1156	2.00	1370	8.40	2.0	12.0	87			
25	1159	4.00	1370	8.40	2.0	11.9	86			
25	1202	6.00	1370	8.40	2.5	11.9	88			
25	1206	8.00	1400	8.30	3.0	8.6	64			
25	1209	10.0	1450	8.30	3.0	10.3	77			
25	1212	12.0	1520	8.30	3.0	10.3	77			
25	1220	13.5	1520	8.20	3.5	9.7	73			
MAY										
23	1006	0.0	1250	8.40	16.0	10.2	105			
23	1008	1.60	1250	8.40	. 15.5	10.2	105			
23	1010	3.30	1250	8.40	15.0	10.2	104	0	<5.0	0
23	1012	6.60	1250	8.40	15.0	10.1	102			
23	1014	13.2	1250	8.30	14.5	9.8	98			
23	1016	19.8	1240	8.30	14.0	9.7	96			
23	1018	26.4	1240	8.30	14.0	9.6	95			
23	1020	33.0	1240	8.30	13.5	9.5	93			
23	1022	39.6	1240	8.30	13.5	9.1	89			
23	1024	46.2	1240	8.20	13.5	7.6	74			
AUG			10000			1000	4 3 4			
02	1145	0.0	1310	8.30	23.5	8.1	98	50	4.0	240
02	1147	1.60	1310	8.20	23.5	8.1	98			
02	1149	3.30	1310	8.20	23.5	8.1	98			
02	1151	6.60	1310	8.20	23.0	8.1	96			
02	1153	13.2	1310	8.20	23.0	7.7	92			
02	1155	19.8	1310	8.20	23.0	7.5	89			
7 F F F F F F F F F F F F F F F F F F F		10.00			-2.0		9,			

06348000 HEART RIVER NEAR LARK, ND

LOCATION.--Lat 46°36'37", long 101°22'54", in NW1/4NW1/4SW1/4 sec.9, T.136 N., R.85 W., Grant County, Hydrologic Unit 10130203, on right bank 20 ft downstream from county highway bridge, 0.6 mi downstream from Big Muddy Creek, and 10 mi north of Lark.

DRAINAGE AREA .-- 2,750 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- June 1946 to current year (seasonal records only since Oct. 1982).

GAGE.--Water-stage recorder. Datum of gage is 1,802.83 ft above National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Nov. 16, 1948, nonrecording gage at same site and datum.

REMARKS.--Estimated daily discharges: Mar. 1-27 and Sept. 3-30. Records good except those for periods of estimated discharge, which are poor. Flow regulated by Lake Tschida (06346000) 45 mi upstream since 1949.

AVERAGE DISCHARGE.--35 years, (1947-82) 225 ft³/s, 163,000 acre-ft/yr; median of yearly mean discharges, 172 ft³/s, 124,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 29,200 ft³/s, Apr. 17, 1950, gage height, 20.70 ft, from rating curve extended above 11,000 ft³/s on basis of contracted-opening measurement of peak flow; no flow Jan. 16 to Mar. 4, 1950, Jan. 17-26, 1962.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 610 ft³/s, Mar. 28, gage height, 4.44 ft³/s; maximum observed gage height, 6.87 ft, Mar. 11, ice jam; minimum daily during period Mar. 1 to Sept. 30, 3.8 ft³/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						e3.8	202	155	60	8.0	61	38
						e3.8	137	124	59	18	55	40
2 3 4 5						e5.0	113	124	40	85	55 55	e45
2						e3.9	113	90	71	115	13	e35
4						e3.9	97 71	70	31	115	43 27	e 30
2						e4.0	71	56	25	118	21	e30
6 7 8 9 10						e4.2	68 66 63 59 56	46	24	106	38 67	e25
7						e5.0	66	40	18	57	67	e20
8						e9.0	63	40 35 32 26	16	57 50 46	70	e15
9						e16	59	32	16	46	77 75	e12
10						e250	56	26	13	44	75	e10
11						e500	48 45	22 19	14	42 45 112	76	e15
12 13						e280	45	19	19 37	45	80	e18
13						e220	44	18	37	112	83	e15
14						e170	41	16	37	100	90	e13
14 15						e150	41	15	37 36	99	90 92	e12
16						e130 e120	39	21	38	117	70	e11
17						e120	39 38	19	40	115	62	e11
18						e110	37	19	35	116	67	e10
19						e100	34	21	35	101	132	e20
20						e90	37 34 32	21 20	35 35 32	93	105	e19
21						e75	29	18	32	97	61	e18
22						e65	29 30	19	32	99	48	e17
23	4					e60	30	20	33	96	37	e16
24						e80	30	24	32	90	29	e15
21 22 23 24 25						e80 e100	30 28	24 23	32 33 32 31	99 96 90 85	29 36	e15
26						e150	27	32 26	28	82	45	e15
27						e200	58	26	28	81	43	e15
28						350	121	23	25	81	48	e15
20						444	156	32	20	83	51	e15
30						375	196	10	12	72	44	e15
26 27 28 29 30 31						307		40 63		72 61	38	
TOTAL						4379.6	2036	1184	898	2514.0	1905	570
MEAN						141	67.9	38.2	29.9	81.1	61.5	19.0
MAX						500	202	155	60	118	132	45
MIN						3.8	27	15	12	8.0	27	45 10
AC-FT						8690	4040	2350	1780	4990	3780	1130
AC-FT						9090	4040	2550	1700	4770	2100	1150

e - Estimated

06348000 HEART RIVER NEAR LARK, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	CIFIC CON- DUCT- ANCE (US/CM)	PH (STAND- ARD UNITS) (00400)	TEMPER ATURE AIR (DEG C	WATER () (DEG C	(MG/ AS C) CACO	CALCI L DIS- L SOLV (MG/ 3) AS C	DIS- ED SOLVE L (MG/I A) AS MO	M, SODIUM DIS- ED SOLVED (MG/L G) AS NA	SODIU	T RATIO
OCT												
06 MAR	1500	9.5	1610		16.	0 -	-			-	-	
09	1350	16	1650		8.							
27 APR	1600	155	640		8.	5 0.	5			-	•	-
10 MAY	1430	53	985	8.40	5.	0 6.	5 2	20 42	27	130		56 4
01 JUN		157	1410		11.			-	-	-	-	
02 JUL		60	1100		18.	5 16.	0					
19 SEP	0950	104	1410		24.	0 22.	0	-		-	•	
08	1255	15	1450	8.30	19.	5 17.	5 3	20 56	43	210	5	58 5
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BONATE, FET-LAB (MG/L AS HCO3)	BONATE, FET-LAB (MG/L AS CO3)	LAB (MG/L AS CACO3)	CARBO DIOXID DIS- SOLVE (MG/L AS CO2 (OO405	DIS- DIS- DIS- MG/L AS SO4	DIS- D SOLV (MG/	, RIDE DIS ED SOLV L (MG/ L) AS F	, DIS- - SOLVI ED (MG/I L AS) SIO2	AT 180 ED DEG. DIS- SOLVE (MG/L	E SUM OF CONSTICT TUENTS DIS- D SOLVE) (MG/I	SOLIDS, DIS- SOLVED (TONS D PER AC-FT)
APR												
10 SEP	7.0	300	0	240	1.	9 260	5.0	0.	30 4.4	4 63	5 62	0.86
08	11	400	11	350	3.	2 440	12	0.	50 4.2	2 99	8 99	9 1.36
		SOLVED (TONS PER DAY)	DIS- SOLVED (UG/L AS AS)	DIS- SOLVED (UG/L AS B)	IRON, DIS- SOLVED (UG/L AS FE) 01046)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
APR 10 SEP		90.9	<1	140	90	<1	29	40	0.3	1	<10	490
		41.2	<1	350	80	<1	50	30	0.3	3	<10	820

06348300 HEART RIVER AT STARK BRIDGE NEAR JUDSON, ND

LOCATION.--Lat 46°42'11", long 101°12'37", in SE1/4SW1/4SW1/4 sec.6, T.137 N., R.83 W., Morton County, Hydrologic Unit 10130203, on right bank 50 ft upstream from county bridge, 9.5 mi southeast of Judson.

DRAINAGE AREA .-- 2,930 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- March 1986 to September 1988 (maximum discharges only), October 1988 to September 1989.

GAGE. -- Water-stage recorder. Datum of gage is 1,720 ft National Geodetic Vertical Datum, from topographic map.

REMARKS.--Estimated daily discharges: Nov. 2 to Mar. 30, Apr. 9, 10, and July 1-4. Records fair except those for period Nov. 2 to Apr. 10, which are poor. Flow regulated by Lake Tschida (06346000) since 1949.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,500 ft³/s, Mar. 23, 1987, gage height, 16.70 ft; minimum daily, 1.5 ft³/s, July 3-4, 1989.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, about 300 ft³/s, Mar. 12, gage height, 6.25 ft observed, backwater from ice; minimum daily, 1.5 ft³/s, July 3 and 4.

		DISCHAR	RGE, CUBIC	FEET PER	SECOND,	WATER YEAR	OCTOBER	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	17 18 18 18 18	21 e20 e19 e18 e17	e12 e13 e13 e14 e15	e11 e11 e10 e10 e9.8	e17 e14 e10 e8.0 e7.0	e5.4 e5.2 e5.0 e4.8 e4.7	177 122 119 102 97	194 152 119 94 75	46 46 44 34 28	e1.8 e1.5 e1.5 e13 61	47 42 41 38 32	46 42 47 47 39
6 7 8 9	19 20 19 18 18	e17 e17 e17 e16 e15	e14 e11 e10 e9.5 e9.0	e9.4 e9.0 e8.6 e8.2 e8.0	e7.0 e6.8 e6.6 e6.2 e6.0	e4.6 e4.5 e4.5 e7.0 e20	81 75 76 e74 e72	65 58 52 49 43	21 20 20 14 13	68 64 39 20 19	20 16 55 59 66	29 27 27 24 18
11 12 13 14 15	17 17 17 19 18	e15 e15 e15 e15 e14	e10 e15 e17 e16 e15	e9.0 e10 e11 e10	e6.5 e7.0 e6.5 e5.8 e5.5	e50 e280 e200 e170 e150	70 62 58 56 53	36 33 32 31 29	9.8 8.8 9.7 24 30	15 17 11 56 69	59 61 57 64 77	28 29 32 33 33
16 17 18 19 20	18 19 18 19 20	e13 e13 e12 e11 e10	e17 e19 e19 e19 e18	e12 e14 e15 e14 e14	e5.4 e5.4 e5.6 e5.8	e140 e120 e100 e90 e80	50 51 49 47 45	26 30 30 22 20	21 31 33 25 25	68 80 87 77 62	79 62 50 51 98	28 28 25 22 22
21 22 23 24 25	20 19 19 19 20	e10 e10 e11 e12 e13	e17 e16 e15 e14 e13	e15 e14 e13 e12 e12	e6.0 e6.2 e6.4 e6.8 e7.0	e75 e70 e60 e65 e60	42 40 38 37 37	16 12 11 16 25	31 30 26 29 28	54 55 54 54 52	90 63 37 27 20	27 22 20 20 18
26 27 28 29 30 31	20 20 25 29 25 21	e12 e12 e11 e11	e13 e12 e12 e12 e11 e11	e12 e13 e15 e17 e20 e19	e6.5 e6.0 e5.5	e75 e80 e100 e130 e160 228	45 60 88 147 198	20 21 16 13 29 33	27 22 16 8.7 6.3	54 51 57 62 62 59	16 25 58 50 43 52	18 19 19 18 16
TOTAL MEAN MAX MIN	602 19.4 29 17	423 14.1 21 10	431.5 13.9 19 9.0	376.0 12.1 20 8.0	197.9 7.07 17 5.4	2548.7 82.2 280 4.5	2268 75.6 198 37	1402 45.2 194 11	727.3 24.2 46 6.3	1444.8 46.6 87 1.5	1555 50.2 98 16	823 27.4 47 16

WTR YR 1989 TOTAL 12799.2 MEAN 35.1 MAX 280 MIN 1.5

e - Estimated

06348300 HEART RIVER AT STARK BRIDGE NEAR JUDSON, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- April 1988 to current year.

DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	CIFIC CON- DUCT- ANCE DUS/CM		TEMPER- ATURE AIR (DEG C) (00020)	ATURE WATER (DEG ((MG/1 R AS C) CACO	CALCI L DIS- L SOLV (MG/ 3) AS C	DIS- ED SOLVE L (MG/L A) AS MG	DIS- DIS- CD SOLVED (MG/L AS NA)	SODIUM PERCENT	RATIO
06	0950	18	1600)	14.0	6.	.0					
NOV 16	1225	13	1710		0.5	6.	.5 .					
20 JAN	1020	18	1720		-0.5	o.	.5					4
31 MAR	1015	19	-		-9.5	0.	.0 .					
14	1150	166	650		-3.0	0.	0		50.			1000
30 APR	0940	95	645		1.0			-				
11	1105	71	1020	8.50	4.0	4.	.0 2	30 47	28	150	57	4
01 JUN	0950	201	1350		7.5	7.	.0 .	-				
07 JUL	1150	22			20.0	17.	5 .	-				
19 SEP	1205	82	1450		30.0	24.	.0	-				-
08	1455	29	1530	8.40	19.0	19.	5 3	10 54	43	230	61	6
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BONATE FET-LA (MG/L AS HCO3)	BONATE, B FET-LAB (MG/L AS CO3)	LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (OO405)	SULFAT DIS- SOLVE (MG/L AS SO4	DIS- D SOLVE (MG/I	DIS- DIS- ED SOLVE (MG/I	DIS- SOLVE ED (MG/L AS SIO2)	AT 180 D DEG. 0 DIS- SOLVED (MG/L)	CONSTI- TUENTS, DIS-	SOLVED (TONS
APR												
11 SEP	7.0	330	0	270	1.7	280	6.5	0.	30 4.7	706	689	0.96
08	11	420	0	350	2.7	460	13	0.	50 5.2	1040	1030	1.41
		OLIDS, DIS- SOLVED (TONS PER DAY) 70302)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000) (DIS- SOLVED (UG/L AS B)	DIS- SOLVED (UG/L AS FE)	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)	DENUM, DIS- SOLVED (UG/L AS MO)	NIUM, DIS- SOLVED (UG/L AS SE)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) 01080)
APR 11. SEP		135	<1	190	30	<1	34	10	0.3	1	<10	530
08.	••	81.4	<1	390	20	<1	50	<10	0.1	3	<10	800

O6349000 HEART RIVER NEAR MANDAN, ND (National stream-quality accounting network station)

LOCATION.--Lat 46°50'02", long 100°58'27", in NW1/4NE1/4 sec.25, T.139 N., R.82 W., Morton County, Hydrologic Unit 10130203, on left bank near downstream wingwall of bridge on county highway, 3 mi west of Mandan, and 4 mi downstream from Sweetbriar Creek.

DRAINAGE AREA .-- 3.310 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- April to September 1924, March 1928 to June 1933, August 1937 to current year. Published as "at Sunny" 1924, 1928-33.

REVISED RECORDS .-- WSP 926: 1938. WSP 1209: Drainage area. WSP 1239: 1924, 1928-29, 1948.

GAGE.--Water-stage recorder. Datum of gage is 1,638.70 ft above National Geodetic Vertical Datum of 1929, and 1,623.03 ft above Burlington Northern Railway datum. See WSP 1729 or 1917 for history of changes prior to June 30, 1958.

REMARKS.--Estimated daily discharges: Nov. 17 to Mar. 31 and Sept. 18-30. Records fair except those for period of estimated daily discharges, which are poor. Flow regulated by Lake Tschida (station 06346000) 105 mi upstream since 1949. Some diversions above station.

AVERAGE DISCHARGE.--56 years (water years 1929-32, 1938-89), 264 ft³/s, 191,300 acre-ft/yr; median of yearly mean discharges, 199 ft³/s, 144,000 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 30,500 ft³/s, Apr. 19, 1950, gage height, 23.64 ft; maximum gage height, 25.75 ft, Apr. 4, 1952, ice jam; no flow for many days in some years.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,010 ft^3/s , Apr. 1, gage height, 4.80 ft; maximum gage height, 5.88 ft, Mar. 31, ice jam; minimum daily discharge, 0.14 ft^3/s , July 5.

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

MEAN VALUES DAY OCT NOV DEC JAN FEB APR MAY TIIN. TIII. AIIG SEP MAR 20 e15 e12 e9.1 e4.5 821 212 2.2 35 22 2 20 24 e16 50 47 e12 499 211 e9.0 e4.5 1.1 3 19 20 e17 177 63 16 42 e12 1.5 e8.5 e4.0 19 18 e18 169 e8.0 151 59 .95 14 41 e11 e4.0 5 13 20 48 18 e19 e3.5 156 124 44 e11 e6.5 6 20 18 e20 110 13 14 42 e11 e5.5 e3.0 144 9.7 21 26 19 e20 e5.0 e3.0 70 30 e11 128 95 8 22 82 76 23 19 e21 e2.8 21 e11 e4.5 121 20 Q 18 e21 68 22 56 22 e11 e4.5 e2.6 111 10 21 22 18 e21 58 20 23 e10 e4.0 e4.0 104 11 19 19 16 7.1 21 e20 e10 e4.0 e10 94 52 34 33 29 12 18 91 3.3 18 e19 e10 e20 44 14 14 e4.5 13 82 40 12 18 e18 e10 e5.0 e250 38 25 14 19 18 e18 e10 e5.0 e200 73 12 2.3 15 19 72 38 .93 34 24 e17 e10 e5.0 e150 16 19 11 e17 e10 e5.0 73 33 26 32 44 23 17 20 e10 e17 e10 e5.0 e130 68 34 31 47 56 22 18 19 e9.5 e17 e10 e5.0 e100 66 31 28 64 49 e20 19 19 e9.0 30 68 53 39 e18 e16 e10 e5.0 e90 64 44 20 20 e10 e16 e85 60 27 37 60 e19 e5.0 60 21 20 e11 e15 e10 e80 56 21 45 e21 79 22 18 e12 e15 e10 e90 54 18 37 34 e22 e5.0 23 18 e13 e15 e5.0 e100 52 16 41 24 e23 e9.5 17 e14 e15 e9.0 e5.0 e110 47 19 39 29 31 e20 35 20 25 17 e15 e15 e9.0 e5.0 46 16 29 e18 e130 26 59 75 35 28 e16 18 e16 e15 e9.0 e5.0 e160 17 11 30 23 27 19 e17 e14 e9.5 e4.5 e200 22 9.2 e17 e15 26 10 28 18 e14 e10 e4.5 e250 92 18 24 e17 31 87 30 29 14 e13 e14 e10 e300 105 15 28 e15 48 e14 e420 30 18 e14 e10 ---165 8.3 35 e14 31 20 e13 e9.5 e700 52 28 44 ---914.3 TOTAL 588 471.5 522 317.5 152.1 3750.9 3984 1972 858 - 62 954.3 749 30.8 MEAN 19.0 15.7 16.8 10.2 5.43 121 133 63.6 30.5 27.7 25.0 63 79 1.7 MAX 22 24 21 12 9.1 700 821 212 47 8.3 MIN 14 9.0 9.0 4.0 2.6 46 16 .14 14 3910 1810 1890 AC-FT 1170 935 1040 630 302 7440 7900 1700 1490

CAL YR 1988 TOTAL 16835.57 MEAN 46.0 MAX 950 MIN .34 AC-FT 33390 WTR YR 1989 TOTAL 15234.22 MEAN 41.7 MAX 821 MIN .14 AC-FT 30220

e - Estimated

06349000 HEART RIVER NEAR MANDAN, ND--CONTINUED (National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1946-50, 1971-76, 1978 to current year.

		WAI	EK-QUALI	II DATA	, WATE	R IEAR C	CTOB	ER 198	8 10 5	PTEMI	DER 19	09		
DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	CIFI CON- DUCT ANCE D (US/C	F - (ST A M) UNI	AND- ARD ITS)	TEMPER- ATURE AIR (DEG C) (00020)	WA'	PER- URE TER G C)	TUR- BID- ITY (NTU) (OOO76)	SO (N	GEN, DIS- DLVED MG/L) D300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	COLI- FORM, FECAL O.7 UM-MF (COLS., 100 ML (31625	TOCOCCI FECAL, KF AGAR (COLS. PER) 100 ML)
OCT 05	0950	18	16	50	8.60	4.5		4.0	2.0		13.1	99	4.	4 30
NOV					0.00				2.0		15.1			
15 DEC	1000	12		-					5.00				-	
21 FEB	1140	15	20	00	8.10	3.0		0.0	3.6		12.5	87	30	0 11
O1	1200	9.1	20	80	8.20	-22.0		0.0	3.5		6.5	44	K	3 360
09	1055	2.6	22			2.5		0.0	-				-	
15 30	1135 1345	150 417		60 60	==	-0.5 1.5		0.0	-			==		
APR 12	0955	86	10	40	8.50	11.0		5.0	5.1		12.9	101	1	1 56
MAY 02	1345	205	14	10		14.5		13.0					-	
05 JUN	0945	118		-									-	
08 JUL	0950	22	17	40	8.50	14.0		15.0	7.5		10.3	102	100	0 370
17 SEP	1420	47	15	50		24.5		24.5	-				-	
06	1125	42	14	50	8.40	21.5		19.5	7.0		9.7	106	2	2 170
DATE	HARD- NESS TOTAL (MG/L AS CACO3) (00900)	CALCIU DIS- SOLVE (MG/L AS CA (00915	DIS- D SOLV (MG/	M, SOD DI ED SOL (M G) AS		SODIUM PERCENT (00932)	SOI T RA	DIUM AD- RP- ION TIO 931)	POTAS- SIUM, DIS- SOLVEI (MG/L AS K) (00935)	TO:	KA- NITY F WH F IT IELD /L AS ACO3 0419)	BICAR- BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR- BONATE WATER WH IT FIELD MG/L AS CO3 (OO447	AS SO4)
OCT 05	320	47	48	28	30	65		7	7.5		444	493	2.	4 490
DEC 21	490	91	63	34	10	60		7	9.1		628	766		0 580
FEB 01	470	84	64	35	50	61		7	9.3		666	813		0 640
APR 12	220	44	27	15	50	59		5	6.3		280	317	1:	2 280
JUN 08	300	46	46	30		67		8	9.4		442	476	3	
SEP	280	45	40	22		62		6					38	
06	CHL RID DIS	0- F E, R	LUO- S	ILICA, DIS- SOLVED	SOLID	S, SOLI UE SUM O CONS	OF TI-	SOLID DIS SOLV	- [LIDS, DIS- DLVED	329 NIT GE NITR DI	N, GE ATE NITE	TRO- NI EN, C	ITRO- GEN, 2+NO3
DATE	SOL (MG AS	VED S /L (CL) A	OLVED MG/L S F)	(MG/L AS SIO2) DO955)	DIS- SOLVI (MG/I	ED SOL	S- VED	(TON PER AC-F	S (1 T) [ONS PER DAY)	SOL (MG AS (OO6	VED SOL /L (MC N) AS	VED SO I/L (I N) AS	DLVED MG/L S N) D631)
OCT 05	17		0.40	5.2	11.	40 1	160	1.	55 5	6.3		<0.	010 <	0.100
DEC 21	16		0.50	9.5	14	50 1	480	1.	97	9.5	0.	240 0.	010	0.250
FEB 01	17		0.50	12	15		570	2.		37.1				0.380
APR 12	8	.2	0.30	4.4	6	97	685	0.				<0.	010 <	0.100
JUN 08	14		0.50	6.1	12	20 1	190	1.	66 7	2.1		<0.	010 <	0.100
SEP 06	12		0.40	3.5	9:	59	988	1.	30 10	8		<0.	010 <	0.100

06349000 HEART RIVER NEAR MANDAN, ND--CONTINUED (National stream-quality accounting network station)

	DATE	AMMO TO: (MO	TRO- EN, ONIA TAL G/L N) 510)	NITRO- GEN, AMMONIA DIS- SOLVEI (MG/L AS N) (00608)	GEN, A MONIA ORGAN TOTA (MG/ AS N	M- + PH IC PHO L TO L (N	HOS- DROUS DTAL MG/L S P) D665)	PHOR	S- VED /L P)	PHOS PHORO ORTH DIS- SOLVE (MG/L AS P) (0067	US O,	PHOS- PHOROU ORGANI TOTAL (MG/L AS P) (00670	S IN C D SO (U	UM- IUM, DIS- DLVED G/L AL) 106)	ARSENI DIS- SOLVE (UG/L AS AS	DIS D SOLV (UC	ED F/L BA)	
oc	O5	0	.030	0.040	0.	20 (0.010	0.	010	<0.0	10	0.0	1	<10		1	45	
	21		.110	0.120			0.010		010	<0.0						-		
FE	O1		.240	0.230			0.010		010	<0.0		0.0	1	<10		1 4	(100	
AP	R 12		.030	0.030			0.030		020	<0.0		0.0		20		1	39	
JU	N 08		.090	0.010			0.030		030	<0.0		0.0						
SE	06		.040	0.010														
	00		RYL-	0.010			0.020	νο.	010	<0.0	10	0.0	2	<10		1	54	
	DATE	LIU DIS SOI (UC AS	JM,	CADMIUM DIS- SOLVEI (UG/L AS CD) (01025)	DIS- SOLV (UG/ AS C	COE DI ED SOL L (U R) AS	SALT, IS- LVED IG/L IG CO)	COPP DIS SOL (UG AS (O10	VED /L CU)	IRON DIS SOLV (UG/ AS F (0104	ED L E)	LEAD, DIS- SOLVE (UG/L AS PB (01049	D SO (U	HIUM IS- LVED G/L LI) 130)	MANGA NESE, DIS- SOLVE (UG/L AS MN (01056	MERC D SOI (UC	S- VED HG)	
oc	T 05		<0.5	<		<1	<3		1		<3	,	5	69		4		
FE	B 01		10	<		2	<1		3		40	<		90		60	0.1	
AP	R 12		(0.5	<		<1	<3	-3	3		25		5	33		9	0.2	
SE	P 06		(0.5	<1		1	<3		2		10		1	47		4	0.3	
				,			1)				10			41	SEDI-		D.	
7	DATE	DEN DI SOI (UC AS	LYB- NUM, IS- LVED G/L MO) D60)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	DIS SOLV (UG/ AS S	SIL ED SC L (U	VER, DIS- DLVED JG/L G AG)	DI SOL (UG	SR)	VANA DIUM DIS SOLV (UG/ AS V (0108	ED L	ZINC, DIS- SOLVE (UG/L AS ZN (01090	D SU PE) (M	DI- NT, S- NDED G/L) 154)	MENT, DIS- CHARGE SUS- PENDE (T/DAY (80155	SIE SIE % FI D TH	ISP. EVE IAM. INER IAN IAN	
oc	T 05		10			<1	1.0		740		<6	<	7	16	0.7	7	85	
FE			3	2		<1									0.7			
AP	R						<1.0		100		<1	1		129	3.2		31	
MA			<10	<1		<1	<1.0		480		<6		9	37	8.6		94	
SE				-		-						-		138	44		99	
	06		<10	3		<1	<1.0		690		<6	1		34	3.9		98	
DA	TE	TIME	0	TOP I F A PLE C ER- SE L (F		SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	(ST A UNI	PH PAND- RD TS) 400)	WA'	URE TER G C)	OXYG DI SOL (MG (003	EN, S- VED /L)	XYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	CL CO (P		WIND SPEED (MILES PER HOUR) 00035)	(DI FI TI NOI	ND REC- ION EG. ROM RUE RTH) 036)
OCT 05		0950	0	.50	14.0	1650		8.60		4.0	1	3.1	99		0	10		180
05		0952	0	.50	24.0	1650 1650)	8.60		4.0	1	3.1 3.1						
05 APR		0956	0	.50	44.0	1650)	8.60		4.0	1	3.1						
12		0957		.50 .50	10.0	1040		8.50		5.5		2.7	102		=	==		
12		1001	0	.50 .50	30.0	1040)	8.50		5.5	1.	2.9	102					==
12		1005	0	.50	50.0	1040)	8.50		5.0	1	2.9	100					
12	:	1007 1009		.50 .50	60.0 70.0	1040		8.50 8.50		5.0		2.9 2.9	100 100			=		
SEP 06		1125		.50	10.0	1450		8.40		19.5		9.7	106		25			300
06	:	1127		.50	20.0	1450)	8.40		19.0		9.6	103 103		=			
06		1131	0	.50	40.0	1450)	8.40	-	19.0		9.6	103					
06	•	1132	0	.50	50.0	1450	,	8.40		19.0		9.6	103					

22.22

22.59

19.53

MISSOURI RIVER MAIN STEM

06349070 MISSOURI RIVER BELOW MANDAN. ND

LOCATION.--Lat 46°44'32", long 100°49'54", at midsection of west half sec.30, T.138 N., R.80 W., Morton County, Hydrologic Unit 10130102, on right bank 1 mi south of Fort Lincoln State Park, 6 mi southeast of Mandan, and at mile 1,309.

DRAINAGE AREA .-- 189,800 mi2, approximately.

MAX

MTN

19.64

19.59

21.59

GAGE-HEIGHT RECORDS

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

GAGE .-- Water-stage recorder. Datum of gage is 1,600.00 ft above National Geodetic Vertical Datum of 1929 (U.S. Army Corps of Engineers bench mark).

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

REMARKS. -- Stage regulated by Garrison Dam (station 06338490) 80.9 mi upstream.

EXTREMES FOR PERIOD OF RECORD .-- Maximum daily gage height recorded, 29.71 ft, Mar. 17, 1972; minimum daily recorded, 17.40 ft, Apr. 1, 1968.

MEAN VALUES SEP JUN JUL AUG DAY OCT NOV DEC JAN FEB MAR APR MAY 22.89 22.70 22.71 21.87 19.94 19.73 21.59 27.60 27.04 24.46 24.32 21.63 19.77 24.24 22.90 22.72 22.72 21.76 19.82 21.86 27.51 26.42 24.24 21.58 22.87 22.69 22.76 21.72 19.83 19.85 22.01 27.05 26.15 24.46 22.97 21.93 22.81 22.71 22.71 21.63 19.85 19.81 22.01 26.93 26.86 24.38 21.74 21.89 5 19.97 19.91 22.04 27.16 27.33 24.25 21.41 21.82 22.87 22.72 22.72 21.34 6 20.01 19.75 22.08 27.31 27.26 24.25 21.33 21.68 22.83 22.73 22.66 21.13 21.99 22.84 22.70 22.65 20.93 20.37 19.80 21.99 27.16 27.26 24.30 21.46 21.04 26.65 22.06 22.83 22.71 22.64 20.86 19.82 21.97 27.21 24.40 21.10 20.74 19.82 26.12 27.09 24.36 21.13 22.09 22.77 22.73 22.62 20.74 22.04 10 19.71 19.89 22.03 26.47 27.03 20.86 22.28 22.79 22.71 22.66 20.61 24.44 22.75 22-60 20.94 11 19.85 22.06 27.17 21.06 22.25 22.78 19.87 26.90 22.34 20.60 22.69 12 19.78 19.82 22.35 27.35 26.92 24.69 20.90 22.82 22.77 22.68 20.69 22.72 13 19.81 19.59 22.12 27.42 26.84 24.98 21.13 22.79 20.67 22.70 22.62 14 19.99 19.85 21.65 27.39 26.86 25.03 20.95 22.31 22.74 20.82 22.63 15 19.92 19.89 21.95 27.41 26.70 25.06 20.97 22.34 22.72 22.69 22.59 22.57 20.54 16 26.63 20.88 22.24 22.75 19.87 19.82 22.19 27.35 25.29 22.73 22.65 20.03 17 19.82 19.76 22.60 27.44 26.50 25.02 21.09 22.66 22.76 22.80 20.07 19.93 22.82 18 19.76 23.28 27.47 26.52 25.20 21.51 22.88 22.81 22.76 22.76 22.61 19.90 25.21 19 19.87 22.57 27.53 26.44 21.70 22.76 22.69 22.51 19.58 20 19.84 19.93 22.40 27.43 26.49 25.12 21.65 22.84 19.62 19.80 26.35 21.63 22.88 22.79 22.67 22.50 21 20.02 22.53 27.42 25.20 22.75 22.73 22.56 22.59 22.90 19.70 22 19.69 19.87 27.49 26.26 25.20 21.57 22.52 22.49 22.91 19.58 23 19.70 19.92 27.56 26.02 25.28 21.60 22.93 19.58 22.71 27.58 25.42 21.61 22.75 22.73 22.47 24 19.64 19.85 26.13 22.75 22.71 27.49 26.05 21.34 22.93 22.56 19.69 25 19.69 19.85 24.29 25.35 19.94 19.57 26 19.67 26.71 27.56 25.85 25.35 21.72 22.93 22.70 22.71 22.62 22.29 19.65 25.79 27.58 25.45 25.24 21.86 22.88 22.73 22.73 27 19.68 19.75 22.93 22.69 22.75 22.42 19.57 19.75 25.82 27.49 25.00 25.04 21.81 28 19.68 27.51 22.91 22.76 22.77 22.44 19.53 20.15 26.35 26.71 24.82 21.67 29 19.82 ---22.71 22.74 22.35 19.60 19.77 20.84 27.30 24.74 21.59 30 22.69 22.22 22.93 31 27.19 24.52 22.78 22.72 22.58 20.42 19.87 23.10 27.29 26.56 24.84 21.63 22.45 MEAN 19.90 27.33 22.76 21.87 21.04 27.19 27.60 25.42 24.32 22.97 22.90 22.82 20.84

24.24

20.86

21.58

25.00

26.12

464245100092000 LONG LAKE POOL 3 NEAR MOFFIT, ND

LOCATION.--Lat $46^{\circ}42'45"$, long $100^{\circ}09'20"$, in NE1/4SW1/4 sec.4, T.137 N., R.75 W., Burleigh County, Hydrologic Unit 10130103, near center of pool, and 7 mi northeast of Moffit.

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- March 1988 to January 1989 (discontinued).

						,		.01000	,00 10	00. 10		-,		
DATE	TIME	SAM- PLIN DEPT (FEE (OOOO	G VO TH DEF T) (FE	OF SU SER- D DIR PTH A CET) N	LEV. LAND RFACE ATUM (FT. BOVE GVD) 2000)	BAROMETR PRESSUR (MM OF HG)	IC SPE- CIFI CON- DUCT ANCE (US/O	C PH LA C- (STA C AR CM) UNIT	B T ND- D S) (EMPER- ATURE AIR DEG C)	ATUR WATE (DEG	E (SECO R DISK C) (IN	R- CY OXYG CHI DI () SOL () (MG	S- CENT VED SATUR
JAN 26	1130	3.	30	4.0 1	711	7	63 85	500 8	.80	-6.5	0	.0 4.	.00	0.3
DATE	CLOUD COVER (PER- CENT) (OOO32)	WIND SPEE (MIL PER HOUR (0003	D (DE ES FF TF	REC- FOON FOON OR OM URUE (CRITH) 10	OLI- ORM, ECAL, .7 M-MF OLS./ O ML) 1625)	STREITOCOC FECAL KF AG (COLS PER 100 MI (3167)	CI HARD L, NESS AR TOTA (MG/ AS L) CACO	CALC L DIS L SOL (MG	IUM - VED /L CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) 00925)	SODIU DIS- SOLVE (MG/ AS N	D L SODI A) PERCE	SOR SOR SUM TI	ON (MG/I
JAN 26	5	10	k.	230	<14	K	20 5	510 21		110	2000		87 3	9 110
DA	L W T	ALKA- INITY AT WH OT IT FIELD G/L AS CACO3 00419)	BICAR- BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	C03	E R SI T I D S AS	JLFATE DIS- SOLVED (MG/L S SO4) DO945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	AS SIO	CA, R - A VED /L	OLIDS, ESIDUE T 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)	DIS- SOLVED (TONS PER DAY)
JAN 26		2260	2220) 2	64 2	700	160	0.40	28		6550	6470	8.91	0.0
DA	A D P	ESIDUE OTAL T 105 EG. C, SUS- ENDED (MG/L) OO530)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	GEN NITRI DIS SOLV (MG/ AS N	FE NO	NITRO- GEN, D2+NO3 DIS- SOLVED (MG/L AS N) DO631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	MONI	AM- A + NIC P /L N)	PHOS- HOROUS TOTAL (MG/L AS P) 00665)	PHOS- PHOROUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	
JAN 26		212	0.220	0.0	50	0.280	0.610	6.9	5	.4	2.20	1.80	1.80	0.40

06349215 LONG LAKE CREEK ABOVE LONG LAKE NEAR MOFFIT, ND

LOCATION.--Lat 46°37'59", long 100°14'29", in NE1/4NE1/4NW1/4 sec.4, T.136 N., R.76 W., Emmons County, Hydrologic Unit 10130103, on left bank 2.5 mi upstream from Long Lake 4.5 mi southeast of Moffit.

DRAINAGE AREA .-- 250 mi² approximately.

WATER-DISCHARGE RECORDS

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

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

GAGE.--Water-stage recorder. Elevation of gage is 1,720 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS .-- Estimated daily discharges: Oct. 1 to Mar. 9. Records poor.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 402 ft^3/s , May 11, gage height, 5.60 ft; minimum daily, 0.15 ft^3/s , Dec. 10.

			,		0200	MEAN VALUE	ES	1,000 10	00. 10.100	,,,,,		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e.40	e.30	e.40	e.30	e.50	e.50	68	21	5.3	.41	.24	46
2	e.40	e.35	e.40	e.30	e.55	e.45	50	18	5.7	. 36	.25	32
3	e.40	e.35	e.40	e.40	e.40	e.45	39	17	5.2	.36	.25	22
2 3 4	e.40	e.35	e.30	e.40	e.30	e.45	27	24	4.6	.39	.25	13
5	e.40	e.30	e.40	e.40	e.35	e.40	26	20	4.1	.41	.20	8.4
	40	e. 00	e.40	e.40	e.55	e.40	20	20	4.1	• 4 1	.20	0.4
6	e.40	e.30	e.40	e.40	e.45	e.50	23	13	3.5	.40	.20	6.3
7	e.40	e.30	e.40	e.40	e.60	e.50	20	13	5.0	. 39	.18	4.6
8	e.35	e.20	e.40	e.35	e.55	e.60	16	14	3.2	.42	.17	3.3
9	e.35	e.20	e.20	e.25	e.65	e.60	17	12	2.3	.44	.18	2.7
10	e.35	e.20	e.15	e.35	e.65	45	15	8.4	1.6	.40	.21	2.0
11	e.35	e.35	e.20	e.40	e.76	350	15	4.5	1.8	. 43	.15	2.0
12	e.35	e.40	e.40	e.40	e.65	359	14	5.7	5.9	.42	.23	2.0
13	e.30	e.40	e.40	e.40	e.55	265	15	7.9	4.3	.34	.27	1.8
14	e.30	e.40	e.45	e.40	e.55	180	14	7.8	1.7	.30	.25	1.7
15	e.30	e.45	e.30	e.40	e.55	105	11	6.7	1.2	.28	.28	1.5
16	e.30	e.45	e.40	e.40	e.50	60	13	4.9	•79	.28	.23	1.3
17	e.30	e.40	e.40	e.40	e.50	48	10	6.0	1.5	.34	.27	1.2
18	e.30	e.40	e.40	e.40	e.45	32	11	5.8	.81	.44	.33	1.1
19	e.30	e.40	e.40	e.40								1.2
					e.40	16	9.9	8.7	•57	.33	•49	
20	e.30	e.40	e.40	e.45	e.40	9.4	10	6.2	.89	.28	.36	1.1
21	e.30	e.40	e.40	e.45	e.50	7.2	7.8	4.5	.83	.25	.37	1.1
22	e.30	e.40	e.40	e.45	e.45	5.7	6.5	5.3	.48	.18	.40	1.1
23	e.30	e.40	e.40	e.45	e.45	5.4	9.3	4.7	.44	.16	. 45	.96
24	e.30	e.40	e.40	e.75	e.55	50	11	12	.34	.19	.43	.88
25	e.30	e.40	e.40	e.40	e.55	159	11	9.7	.33	.28	.42	.82
26	e.30	e.40	e.40	e.40	e.50	128	12	6.0	.37	.25	.46	.77
27	e.30	e.40	e.30	e.45	e.50	91	15	3.1	.31	.18	.87	.73
28	e.30	e.30	e.30	e.45	e.50	157	15	5.0	.35	.23	72	.71
29	e.30	e.30	e.30								81	
30	e.30			e.45		158	18	6.3	.37	.30		.78
		e.30	e.30	e.55		117	23	5.8	.41	.27	55	.82
31	e.30		e.30	e.65		79		5.1		.27	62	
TOTAL	10.25	10.60	11.10	13.05	14.31	2431.15	552.5	292.1	64.19	9.98	278.39	163.87
MEAN	.33	.35	.36	.42	.51	78.4	18.4	9.42	2.14	.32	8.98	5.46
MAX	.40	. 45	. 45	.75	.76	359	68	24	5.9	.44	81	46
MIN	.30	.20	.15	.25	.30	.40	6.5	3.1	.31	.16	.15	.71
AC-FT	20	21	22	26	28	4820	1100	579	127	20	552	325
						70-0		213				2-2

WTR YR 1989 TOTAL 3851.49 MEAN 10.6 MAX 359 MIN .15 AC-FT 7640

e - Estimated

06349215 LONG LAKE CREEK ABOVE LONG LAKE, ND--CONTINUED

WATER-QUALITY DATA

PERIOD OF RECORD. -- April 1988 to current year.

		WILDIT-WOAL	TIT DATA,	WAIDN IL	SAR OCTOBE	SK 1900 IC	SEFTEMBE	M 1909		
DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (OOO95)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER- ATURE WATER (DEG C) (OOO10)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
NOV										
07 JAN	1330	0.33	785		10.0	4.5				
23	1250	1.5	1570		4.0	0.0				
MAR 10	1730	81	790		12.5	0.5				0.22
27 APR	1330	162	245	7.72	4.0	0.0	10.7	74	K30	7300
20	1310	9.8	830		22.5	12.5				
DATE	HARD- NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	BICAR- BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR- BONATE WATER WH IT FIELD MG/L AS CO3 (OO447)
MAR										
27	62	14	6.6	23	41	1	8.9	70	85	0
DATE	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	RESIDUE TOTAL AT 105 DEG. C, SUS- PENDED (MG/L) (00530)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)
MAR										
27	48	2.0	0.10	7.6	160	155	0.22	70.0	17	0.320
D	GE NITE DI	S- DI LVED SOL L/L (MG N) AS	N, GE NO3 AMMO S- DI VED SOL /L (MG N) AS	N, GEN, NIA MONI S- ORGA VED TOT /L (MG N) AS	A + MONI NIC ORGA AL DIS /L (MG N) AS	AM- A + PHO NIC PHOR TOT /L (MG N) AS	OUS DI AL SOL /L (MG P) AS	OUS PHOR S- ORT VED TOT /L (MG P) AS	US, PHOR HO, ORGAL TOT (MGP) AS	OUS NIC AL /L P)
MAR 27.	0	030 0.	350 0.	270 2	.1 1	.5 0.	340 0.	220 0.	200 0	.14
21.	0.	0.	JJ0 0.	210 2	• 1	., 0.	J40 0.	220 0.	200 0	• 14

271

464010100121800 LONG LAKE POOL 2 NEAR MOFFIT, ND

LOCATION.--Lat 46°40'10", long 100°12'18", in NW1/4SW1/4 sec.19, T.137 N., R.75 W., Burleigh County, Hydrologic Unit 10130103, near center of pool, and about 4 mi east of Moffit.

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- March 1988 to January 1989 (discontinued).

DATE	TIME	SAM- PLIN DEPT (FEE (OOOO	G VOI TH DEPT T) (FEE	IR (FT	AND METRACE PRESIDE SURTACE (MM/E OF O) HG)	CIC SPE- CIFI E CON- I DUCT ANCE (US/C	C PH - (STAN ARI M) UNITS	ND- ATUR D AIF B) (DEG	RE ATUR WATE C) (DEG	E (SECC R DISK C) (IN	Y OXYGEN HI DIS-) SOLVI) (MG/I	CENT ED SATUR-
JAN 26	1315	3.	30 2	2.7 171	5 7	65 73	00 8.	.82 -3	5.0 0	.0 5.	00 3	.0 21
DATE	CLOUD COVER (PER- CENT) (00032)	WIND SPEE (MIL PER HOUR (OOO3	D (DEC ES FRO TRU) NORT	EC- FORI DN FEC G. 0.7 DM UM-I JE (COLS TH) 100 I	M, TOCOC AL, FECA KF AG MF (COLS S./ PER ML) 100 M	CCI HARD LL, NESS AR TOTA L (MG/ L AS LL) CACO	CALCI L DIS- L SOLV (MG)	PED SOLV	JM, SODIU S- DIS- VED SOLVE 'L (MG/ MG) AS N	D L SODI A) PERCE	NT RATIO	DIS- SOLVED (MG/L D AS K)
JAN 26	5	5 13		230	<14 2	290 6	90 30	150	1500		80 25	95
D.	V 2	ALKA- LINITY WAT WH FOT IT FIELD MG/L AS CACO3 (00419)	BICAR- BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR- BONATE WATER WH IT FIELD MG/L AS CO3 (OO447)	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)
JAN 26.		1980	2070	168	2200	120	0.80	30	5620	5300	7.64	0.0
D	D A C	RESIDUE TOTAL AT 105 DEG. C, SUS- PENDED (MG/L) (00530)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	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 ORGANIC TOTAL (MG/L AS P) (00670)
JAN 26.		125	0.250	0.030	0.280	0.230	6.1	4.4	2.00	1.60	1.90	0.10

464052100160700 LONG LAKE POOL 1 NEAR MOFFIT, ND

LOCATION.--Lat 46°40'52", long 100°16'07", in SW1/4NW1/4SW1/4 sec.15, T.137 N., R.76 W., Burleigh County, Hydrologic Unit 10130103, near center of pool, and 1.5 mi east of Moffit.

WATER-QUALITY RECORDS

PERIOD OF RECORD .-- March 1988 to May 1989 (discontinued).

DATE	TIME	SAM- PLING DEPTH (FEET) (00003)	RESE VOI DEPT (FEE (7202	ME PR ER- S IR (EH ET) H	RO- TRIC ESS- SURE MM OF IG)	DUC ANG (US)	FIC N- CT-	UNI	RD	AT A (DE	PER- URE IR G C) O2O)	WA (DE	PER- URE TER G C) O1O)	(SE DI	ANS- PAR- ENCY ECCHI ESK) IN)	SO:	GEN, IS- LVED G/L) 300)	OXYGEN DIS- SOLVI (PER- CEN' SATUI ATION (0030	ED TR-N)
OCT 25	1330				768	3	3320		9.15		8.0		2.5		1.50		11.4	8	84
MAY 08	1030	0.0	5	5.0	762		1220		8.86		14.0		11.0		6.00		9.2	8	84
	(MG/L)	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	STRE TOCOO FECA KF AG (COLS PER 100 M	CCI HA AL, NE GAR TO G. (N R AL) CA	TAL IG/L	DIS SOI (MC	CIUM S- LVED G/L CA) 915)	SO (M AS	GNE- IUM, IS- LVED G/L MG) 925)	SOL (M AS	IUM, S- VED G/L NA) 930)	PER	DIUM CENT 932)	SO	DDIUM AD- PRP- PION TIO 0931)	SOI (M	TAS- IUM, IS- LVED G/L K) 935)	ALKA- LINITY WAT WH TOT IT FIELD MG/L CACOTO (00419	Y H T D AS
OCT		**200	4.4	100	770	4.		-			•		70		46	7	_	0	10
25 MAY		K200		100	330	17		6		66			79		16	3			12
08	4.2	K20		30	150	19	9	2	5	21			73		8	1	3	3.	16
DATE	BICAR BONAT WATE WH I FIEL MG/L HC03 (0045	E BONA R WAT T WH D FIE AS MG/L CO	TE ER S IT LD AS 3 A	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO RIDE DIS- SOLV (MG/ AS 0	ED L	FLUC RIDI SOL' (MG AS (009)	E, S- VED /L F)	DIS	VED /L	AT 1	DUE BO C S- VED /L)	SOLII SUM (CONST TUENT DIS SOLI (MG,	OF TI- TS, S- VED /L)	SOLII SOLI (TOI PEI AC-1 (7030	VED NS R FT)	SOLII DIS SOLV (TON PER DAY (7030	E- VED NS R	
OCT 25		64	122	900	43		0	.50	15		2	320	25	280	3	.16	0.	0	
MAY 08		37	24	310	13			.20		.9		817		781		.11		.0	
DATE	RESID TOTAL AT 10 DEG. SUS- PENDE (MG/	UE NIT GE 5 NITR C, DI SOL D (MG L) AS	RO- N, ITE N S- VED /L N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITR GEN AMMON DIS SOLV (MG/ AS N	ED L	NITH GEN.	RO- AM- NIC AL /L	NIT GEN, MONI	RO- AM- A + NIC	PHORPHORE (MG AS (006)	S- OUS AL /L	PHOS	S- OUS S- VED /L	PHOR	S- US, HO, AL /L	PHOS	S- DUS NIC AL /L	
OCT				40 400			_							200		20	•	00	
25 MAY	620		010	<0.100	0.0			.3		.0	1.			390	1.0			.20	
08	16	νο.	010	<0.100	0.0	050	7	.6	,	.0		420	0.2	210	0.2	280		.14	
DATE	TIM	SAM PLI DEP (FE	NG TH ET) (SPE- CIFIC CON- DUCT- ANCE US/CM)	PH (STAN ARD UNITS (OO40	3)	TEMPI ATUI WATI (DEG (OOO	RE ER C)	SOL	S- VED	OXYG DI SOL (PE CE SAT ATI	S- VED R- NT UR- ON)	CLOU COVE (PER CENT	ER R-	WINI SPEI (MII PEI HOUI (OOO)	ED LES R	WIND DIRE TIC (DEC FRC TRU NORT (0003	EC- ON G. OM JE TH)	
MAY	103	0 0	0	1220		86	4-	1 0		9.2		84		40	12	,		60	
08	103 103	3 1	.00	1220 1220	8.	86	1	1.0		9.2		84			12				
08 08 08	103 103 104	5 2 8 3	.00	1220 1220 1220	8.	86 86 86	1	1.0		9.2 9.2 9.2		=		==		=		=	

273

06349275 LONG LAKE CREEK BELOW LONG LAKE NEAR MOFFIT, ND

LOCATION.--Lat 47°41'30", long 100°17'10", in NW1/4NW1/4NW1/4 sec.16, T.137 N., R.76 W., Burleigh County, Hydrologic Unit 10130103, on right bank at road crossing of the outflow of Long Lake, 1.0 mi north of Moffit.

DRAINAGE AREA. -- 380 mi² contributing, approximately.

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder. Elevation of gage is 1,715 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Records fair. Some regulation by several U.S. Fish and Wildlife Service control structures on the Long Lake National Wildlife Refuge.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 12 ft³/s, May 11, gage height, 1.81 ft; no flow most of the time.

DISCHARGE. CUBIC FEET PER SECOND. WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

		DISCHA	RGE, COBI	C FEEL FE		EAN VALU	ES OCTOBE	ik 1966 10	SEFTEMBE	1909		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	. 45	5.7	1.8	.00	.00	.00
2	.00	.00	.00	.00	.00	.00	.95	6.2	1.8	.00	.00	.00
2	.00	.00	.00	.00	.00	.00	1.5	6.7	1.7	.00	.00	.00
4	.00	.00	.00	.00	.00	.00	2.0	5.5	1.7	.00	.00	.00
5	.00	.00	.00	.00	.00	.00	2.5	5.7	1.5	.00	.00	.00
6	.00	.00	.00	.00	.00	.00	3.4	6.2	1.7	.00	.00	.00
7	.00	.00	.00	.00	.00	.00	4.3	6.1	1.1	.00	.00	.00
8	.00	.00	.00	.00	.00	.00	4.6	6.3	1.3	.00	.00	.00
9	.00	.00	.00	.00	.00	.00	5.1	6.6	1.3	.00	.00	.00
10	.00	.00	.00	.00	.00	.00	5.4	7.6	1.4	.00	.00	.00
11	.00	.00	.00	.00	.00	.00	5.8	8.5	.98	.00	.00	.00
12	.00	.00	.00	.00	.00	.00	6.0	5.0	.35	.00	.00	.00
13	.00	.00	.00	.00	.00	.00	5.7	3.5	.25	.00	.00	.00
14	.00	.00	.00	.00	.00	.00	6.5	3.7	.51	.00	.00	.00
15	.00	.00	.00	.00	.00	.00	6.1	4.1	.52	.00	.00	.00
16	.00	.00	.00	.00	.00	.00	5.3	5.0	.68	.00	.00	.00
17	.00	.00	.00	.00	.00	.00	6.0	3.1	.24	.00	.00	.00
18	.00	.00	.00	.00	.00	.00	5.5	3.4	.22	.00	.00	.00
19	.00	.00	.00	.00	.00	.00	5.4	2.4	.33	.00	.00	.00
20	.00	.00	.00	.00	.00	.00	4.6	2.2	.19	.00	.00	.00
21	.00	.00	.00	.00	.00	.00	5.4	2.8	.01	.00	.00	.00
22	.00	.00	.00	.00	.00	.00	5.5	2.8	.00	.00	.00	.00
23	.00	.00	.00	.00	.00	.00	4.7	3.2	.00	.00	.00	.00
24	.00	.00	.00	.00	.00	.00	4.8	2.6	.00	.00	.00	.00
25	.00	.00	.00	.00	.00	.00	5.0	1.8	.00	.00	.00	.00
26	.00	.00	.00	.00	.00	.00	5.6	2.1	.00	.00	.00	.00
27	.00	.00	.00	.00	.00	.00	5.2	2.9	.00	.00	.00	.00
28	.00	.00	.00	.00	.00	.00	4.9	2.1	.00	.00	.00	.00
29	.00	.00	.00	.00		.00	5.0	2.2	.00	.00	.00	.00
30	.00	.00	.00	.00		.01	5.4	1.7	.00	.00	.00	.00
30 31	.00		.00	.00		.16		1.8		.00	.00	
TOTAL	0.00	0.00	0.00	0.00	0.00	0.17	138.60	129.5	19.58	0.00	0.00	0.00
MEAN	.00	.00	.00	.00	.00	.005	4.62	4.18	.65	.00	.00	.00
MAX	.00	.00	.00	.00	.00	.16	6.5	8.5	1.8	.00	.00	.00
								1.7	.00	.00	.00	.00
MIN	.00	.00	.00	.00	.00	.00	.45				.00	.00
AC-FT	.0	.0	.0	.0	.0	.3	275	257	39	.0	.0	.0

WTR YR 1989 TOTAL 287.85 MEAN .79 MAX 8.5 MIN .00 AC-FT 571

06349275 LONG LAKE CREEK BELOW LONG LAKE, ND--CONTINUED

WATER-QUALITY DATA

PERIOD OF RECORD .-- April 1989.

	DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (OOO95)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER- ATURE WATER (DEG C) (OOO10)	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)
A	15	1145	6.6	1310	8.70	10.0	4.5	12.5	98	20	2100
	DATE	HARD- NESS TOTAL (MG/L AS CACO3) (00900)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY WAT WH TOT IT FIELD MG/L AS CACO3 (00419)	BICAR- BONATE WATER WH IT FIELD MG/L AS HCO3 (00450)	CAR- BONATE WATER WH IT FIELD MG/L AS CO3 (OO447)
I	15	150	19	26	230	75	8	12	319	368	11
	DATE	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	RESIDUE TOTAL AT 105 DEG. C, SUS- PENDED (MG/L) (00530)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)
I	15	330	14	0.20	7.9	862	832	1.17	15.3	72	0.240
	DAT	NIT GE NITR DI SOL (MG AS	RO- NIT N, GE LITE NO2+ S- DI VED SOL /L (MG N) AS	RO- NIT N, GE NO3 AMMO S- DI VED SOL /L (MG N) AS	RO- NIT N, GEN, NIA MONI S- ORGA VED TOT /L (MG N) AS	RO- NIT AM- GEN, A + MONI NIC ORGA AL DIS /L (MG N) AS	RO- AM- A + PHO NIC PHOF L TOT /L (MG N) AS	PHOROUS DI CAL SOL	S- PHO OUS PHOR S- ORT VED TOT /L (MG P) AS	S- PHO US, PHOR HO, ORGA AL TOT /L (MG P) AS	OS- OUS NIC PAL /L P)
	APR 15	0.0	20 0.2	60 0.1	30 2.	3 1.	3 0.6	500 0.3	60 0.3	90 0.	21

06349500 APPLE CREEK NEAR MENOKEN. ND

LOCATION.--Lat 46°47'40", long 100°39'25", in NW1/4NE1/4 sec.9, T.138 N., R.79 W., Burleigh County, Hydrologic Unit 10130103, on left bank 75 ft downstream from bridge on county highway, 4 mi upstream from Hay Creek, 6.3 mi west of Menoken, and 6.4 mi east of Bismarck.

DRAINAGE AREA .-- 1,680 mi2, approximately, of which about 500 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- March to June 1905, October 1945 to current year. Published as "near Bismarck" 1905.

REVISED RECORDS .-- WSP 1209: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,638.61 ft above National Geodetic Vertical Datum of 1929. See WSP 1729 or 1917 for history of changes prior to Sept. 30, 1953.

REMARKS.--Estimated daily discharges: Nov. 21 to Mar. 7. Records good except those for period of estimated daily discharge, which are poor.

AVERAGE DISCHARGE.--44 years, 33.7 ft³/s, 24,420 acre-ft/yr; median of yearly mean discharges, 20 ft³/s, 14,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,750 ft³/s, Apr. 18, 1950, gage height, 17.07 ft; maximum gage height, 17.46 ft, Apr. 19, 1979; no flow at times in some years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Da te	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 31	0650	*97	*6.38				

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

Minimum daily discharge, 0.01 ft3/s, July 9.

						MEAN VALUE	S					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	.31 .37 .38 .39	.10 .10 .10 .11	e.05 e.04 e.06 e.04 e.04	e.35 e.40 e.50 e.70	e.35 e.25 e.15 e.15 e.16	e.13 e.14 e.15 e.16 e.17	50 42 40 36 32	6.7 5.6 5.3 5.1 4.9	3.6 3.4 6.5 6.1 5.4	.02 .03 .02 .02 .02	.60 .54 .50 .50	.04 .04 .04 .04
6 7 8 9	.17 .14 .12 .13	.16 .16 .14 .15	e.05 e.09 e.14 e.12 e.14	e.60 e.55 e.50 e.50	e.17 e.18 e.20 e.22 e.24	e.18 e.19 .20 .27 1.6	29 28 24 21 21	4.7 4.4 4.7 4.8 4.9	3.7 .75 .48 .36 .27	.02 .02 .02 .01 .02	•55 •55 •55 •40 •07	.03 .03 .03 .03
11 12 13 14 15	.17 .05 .05 .05	.17 .18 .16 .16	e.12 e.12 e.14 e.20 e.18	e.52 e.54 e.55 e.56 e.57	e.26 e.29 e.34 e.30 e.20	5.0 6.3 11 15 7.5	20 19 17 16 15	4.7 4.3 3.5 3.1 2.7	.20 .17 .14 .13	.03 .03 .02 .02	.04 .04 .04 .03	.05 .04 .04 .04
16 17 18 19 20	.07 .08 .07 .05	.19 .18 .18 .17	e.14 e.12 e.20 e.50 e.45	e.58 e.59 e.61 e.74 e.84	e.15 e.15 e.17 e.19 e.21	5.3 3.9 2.7 2.2 1.7	14 13 12 11 9.8	2.4 2.4 2.9 2.8 2.1	.08 .07 .08 .06	.02 .02 .04 .03	.03 .03 .03 .04	.03 .03 .03 .04
21 22 23 24 25	.07 .07 .08 .09	e.16 e.12 e.10 e.09 e.09	e.40 e.36 e.32 e.28 e.26	e.72 e.62 e.62 e.59 e.53	e.22 e.21 e.19 e.16 e.15	1.6 1.6 2.4 4.6 6.5	9.0 8.8 8.3 7.9 6.3	1.5 1.2 .93 1.0	.05 .07 .07 .08	.03 .02 .02 .03	.05 .05 .03 .03	.07 .06 .04 .04
26 27 28 29 30 31	.08 .09 .09 .08 .08	e.08 e.08 e.05 e.05 e.04	e.25 e.25 e.25 e.26 e.28 e.30	e.50 e.47 e.49 e.50 e.47 e.45	e.14 e.13 e.13	10 19 21 16 54 79	7.2 9.6 8.8 8.6 7.6	1.2 1.2 1.1 1.5 3.0 3.8	.07 .07 .05 .03	.08 .12 .35 .69 .69	.03 .04 .06 .05 .04	.05 .04 .04 .04
TOTAL MEAN MAX MIN AC-FT	4.23 .14 .39 .05 8.4	3.91 .13 .19 .04 7.8	6.15 .20 .50 .04	17.40 .56 .84 .35	5.66 .20 .35 .13	279.49 9.02 79 .13 554	551.9 18.4 50 6.3 1090	99.53 3.21 6.7 .93 197	32.24 1.07 6.5 .03 64	3.19 .10 .69 .01 6.3	5.59 .18 .60 .03	1.20 .040 .07 .03 2.4

CAL YR 1988 TOTAL 1373.80 MEAN 3.75 MAX 86 MIN .02 AC-FT 2720 WTR YR 1989 TOTAL 1010.49 MEAN 2.77 MAX 79 MIN .01 AC-FT 2000

06349500 APPLE CREEK NEAR MENOKEN, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1974 to current year.

DATE	TIM	DIS CHARG INST CUBI FEE PER SECO (0006	E, SPE- CIFIC C CON- T DUCT- ANCE ND (US/CM	PH (STAND- ARD UNITS)	AIR (DEG C	ATURE WATER) (DEG (E (MG/ R AS C) CACO	L DIS- L SOL' (MG,	VED SOLV	JM, SODI S- DIS- VED SOLVI /L (MG MG) AS	ED /L SOD: NA) PERC	ENT	SODIUM AD- SORP- TION RATIO (00931)
OCT 05 11	1540 1535							=	=	Ξ	=	=	i i
21	1400	0.0	09 115	0	1.	0 1.	.5						
JAN O5 FEB	1350	0.	37 167	0	-3.	0 0.	.0						
23 MAR	1150	0.	11 94	0	-5.	0 0.	.0						
13 27	1515 1330		170 74		0.			 30 47	27	160		59	5
15	1431	2.	9 102	0	23.	0 20.	.5						
JUN 28 AUG	1030	0.0	06 -		32.	0 20.	.0						
14	0900	0.0	01 147	0 7.86	15.	0 20.	.0 2	30 42	31	340		75	10
DATE	POTAS SIUM DIS- SOLVE (MG/I AS K)	BONATI FET-L D (MG/I AS HCO3	E, BONATE AB FET-LA (MG/L AS) CO3)	B LAB (MG/L AS CACO3)		DIS- D SOLVE (MG/I) AS SOA	DIS- ED SOLV (MG/	, RIDI DIS ED SOLV L (MG,	E, DIS- S- SOLV VED (MG/ /L AS F) SIO2	AT 10 /ED DEG /L DI: SOL' 2) (MG	DUE SUM (BO CONS' C TUEN' S- DIS VED SOL' /L) (MG/	OF TI- TS, S- VED /L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
MAR 27	7.9	490	0	400	1240	150	28	0.	30 16		713	580	0.97
AUG 14	11	750	19	640	16	230	59		60 10			130	1.50
	DATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON, DIS- SOLVED (UG/L AS B)	IRON, DIS- SOLVED (UG/L AS FE)	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)	S	TRON- TIUM, DIS- OLVED UG/L S SR) 1080)
MAR 27	•••	38.9	1	640	190	1	70	660	0.2	1	<10		390
14.		0.03	4	1300	40	<1	110	20	0.1	3	1		450

MISSOURI RIVER MAIN STEM

06349700 MISSOURI RIVER NEAR SCHMIDT, ND

LOCATION.--Lat 46°39'22", long 100°44'18", in SW1/4NE1/4 sec.26, T.137 N., R.80 W., Morton County, Hydrologic Unit 10130102, on right bank 2 mi southeast of abandoned townsite of Schmidt, 13 mi southeast of Mandan, and at mile 1,298.

DRAINAGE AREA. -- 191,700 mi2, approximately.

GAGE-HEIGHT RECORDS

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

GAGE. -- Water-stage recorder. Datum of gage is 1,600.00 ft National Geodetic Vertical Datum of 1929.

REMARKS.--Stage regulated by releases from Garrison Dam (station 06338490) 91.1 mi upstream, and backwater from Lake Oahe.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height recorded, 23.56 ft, Dec. 9, 1976; minimum daily recorded, 7.92 ft, May 30, 1967.

GAGE HEIGHT, FEET, 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 4 5	==	11.81 11.88 11.97 11.87 12.05	13.52 14.01 14.26 14.35 14.40	19.76 19.49 19.55	19.84	17.11 17.27	17.83 18.30 18.36 16.09 14.31	14.17 14.16 14.40 14.51 14.46	15.78 15.75 15.74 15.69 15.74	15.62 15.65 15.63 15.63	15.57 15.59 15.64 15.62 15.63	14.66 14.48 14.45 14.34 14.06
6 7 8 9 10	12.16 12.38 13.15 13.17	11.88 11.90 11.92 11.91 11.98	14.38 14.41 14.28 14.38 14.38	19.76 19.76 	20.08 20.11 20.03 20.05 20.00	17.12 17.14 17.18 17.16 17.16	13.98 14.09 13.76 13.67 13.36	14.22 14.55 14.65 14.69 14.86	15.73 15.74 15.77 15.70 15.66	15.64 15.64 15.62 15.66 15.64	15.59 15.55 15.54 15.53 15.55	13.77 13.51 13.44 13.31 13.10
11 12 13 14 15	12.10 12.03	12.01 11.93 11.73 11.88 11.98	14.19 14.37 14.62 14.03 14.14	19.56 19.88 20.05 20.06	19.90 19.84 19.79 19.77	17.27 17.30 17.50 17.65 17.61	13.50 13.34 13.55 13.41 13.34	14.88 14.93 15.03 15.00 15.04	15.67 15.75 15.77 15.73 15.67	15.66 15.70 15.65 15.62 15.62	15.49 15.55 15.58 15.51 15.52	13.54 13.23 13.25 13.20 13.32
16 17 18 19 20	11.99 11.97 12.04 11.99 11.95	11.93 11.88 11.83 11.92 12.00	14.51 14.98 16.09 16.43 16.00	20.06 20.03 20.09 20.08 20.06	19.57	17.88 17.69 17.78 17.90 17.78	13.29 13.41 13.82 14.16 14.13	14.93 15.24 15.63 15.61 15.64	15.68 15.70 15.75 15.71 15.70	15.51 15.60 15.74 15.71 15.60	15.46 15.47 15.44 15.46 15.36	13.12 12.47 12.47 12.33 11.92
21 22 23 24 25	11.95 11.84 11.80 11.80	12.11 12.02 12.03 11.98 11.93	15.79 15.74 15.90 16.60	19.99 19.99 20.06 20.12 20.08	19.37 19.26 19.12 19.05 19.04	17.84 17.88 17.91 18.10 18.11	14.14 14.02 14.08 14.13 13.84	15.69 15.73 15.74 15.77	15.73 15.73 15.71 15.71 15.71	15.55 15.60 15.59 15.61 15.60	15.32 15.39 15.34 15.24 15.31	11.91 12.05 11.90 11.88 12.03
26 27 28 29 30 31	11.77 11.74 11.87 11.91 11.92 11.82	12.06 11.90 11.81 12.08 12.76	19.07 18.69 18.68 19.08 19.47	20.09 20.14 20.08 20.07 19.95 19.75	18.88 18.53	18.18 18.15 18.01 17.87 17.80 17.72	14.13 14.43 14.37 14.24 14.13	15.78 15.71 15.75 15.77 15.85 15.83	15.67 15.67 15.62 15.67 15.67	15.60 15.62 15.64 15.69 15.67 15.58	15.45 15.13 15.21 15.25 15.16 15.07	11.90 11.96 11.87 11.81 11.87
MEAN MAX MIN	==	11.96 12.76 11.73	==	==	==	==	14.37 18.36 13.29	15.16 15.85 14.16	15.71 15.78 15.62	15.63 15.74 15.51	15.44 15.64 15.07	12.90 14.66 11.81

06350000 CANNONBALL RIVER AT REGENT, ND

LOCATION.--Lat 46°25'36", long 102°33'05", in NE14NE14 sec.13, T.134 N., R.95 W., Hettinger County, Hydrologic Unit 10130204, on right bank 400 ft from bridge on county highway, and 0.3 mi north of Regent.

DRAINAGE AREA .-- 580 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- September 1950 to current year.

GAGE. -- Water-stage recorder. Datum of gage is 2,422.90 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated discharges: Dec. 12 to Mar. 22. Records fair except those for period of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--39 years, 46.2 ft³/s, 33,470 acre-ft/yr; median of yearly mean discharges, 31 ft³/s, 22,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 10,000 ft3/s, Mar. 27, 1978, gage height, 20.55 ft; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since 1914, 26.1 ft, Apr. 16, 1950, from floodmarks, discharge, 20,300 ft³/s, on basis of slope-area measurement at site 4 mi downstream.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 400 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Da te	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 27	0700	*449	*5.69				

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

Minimum daily discharge, no flow, Aug. 15.

			1000		1	MEAN VALU	ES					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	2.3 2.4 2.3 2.3 2.2	3.3 3.5 3.6 3.5 3.5	3.2 3.3 3.4 3.4 3.3	e2.0 e2.0 e2.0 e2.0	e2.5 e2.4 e2.4 e2.4	e2.5 e2.3 e2.2 e2.2	26 25 22 19 21	190 176 138 97 76	6.1 5.8 5.8 5.0 4.6	1.6 1.2 .73 .37	.32 .31 .27 .22 .18	1.9 2.8 3.8 3.0 3.2
6 7 8 9	2.2 2.3 2.4 2.6 2.5	3.2 3.2 3.3 3.2 3.4	3.2 3.2 2.9 2.6 2.5	e2.0 e2.0 e2.0 e2.0	e2.4 e2.4 e2.4 e2.4	e2.2 e2.5 e15 e30 e75	24 20 19 17 16	57 44 35 30 25	4.4 4.1 3.8 3.5 3.5	.35 .21 .28 .12 .19	.16 .16 .19 .16	8.8 7.4 4.9 3.2 2.3
11 12 13 14 15	2.5 2.4 2.5 2.5 2.6	3.5 3.5 3.6 3.7 3.5	2.5 e2.5 e2.5 e2.5 e2.5	e2.0 e2.0 e2.0 e2.0	e2.4 e2.4 e2.4 e2.4	e90 e130 e165 e170 e65	15 13 13 13	20 18 16 14 13	3.7 3.6 3.2 3.1 2.8	.28 .46 .42 1.1	.11 .14 .04 .01	2.3 2.1 1.9 1.7
16 17 18 19 20	3.0 3.2 2.9 2.9 3.0	3.4 3.1 3.1 3.2 3.2	e2.3 e2.3 e2.3 e2.3 e2.3	e2.1 e2.1 e2.3 e2.3	e2.4 e2.4 e2.4 e2.4	e55 e40 e45 e40 e30	12 12 12 11 11	12 12 11 10 8.1	2.9 5.5 4.8 4.3 3.4	1.6 1.6 1.4 1.7	.74 1.0 .94 1.8 2.0	1.4 1.3 1.2 1.2
21 22 23 24 25	2.8 2.9 2.9 2.9	3.2 3.2 3.2 3.2 3.1	e2.2 e2.2 e2.2 e2.2 e2.2	e2.3 e2.3 e2.3 e2.2 e2.1	e2.4 e2.4 e2.5 e2.6	e25 e20 16 18 23	10 10 7.8 7.8 7.8	7.3 6.7 6.6 8.1 7.4	3.3 3.6 3.9 4.0	.78 .37 .02 .77	2.0 1.7 1.2 1.0 8.4	1.5 1.6 1.6 1.6
26 27 28 29 30 31	2.9 3.1 2.7 2.8 2.9 3.1	3.3 2.9 2.5 2.5 2.8	e2.1 e2.1 e2.1 e2.1 e2.0 e2.0	e2.1 e2.3 e2.3 e2.3 e2.4 e2.5	e2.5 e2.5 e2.5	28 34 24 23 19	11 241 164 207 192	7.1 6.1 5.5 5.6 6.5 6.7	3.5 3.0 2.9 2.5 2.3	1.3 1.1 .85 .40 .20	7.2 3.7 3.0 2.3 1.9	1.5 1.4 1.5 1.4 1.5
TOTAL MEAN MAX MIN AC-FT	82.9 2.67 3.2 2.2 164	97.4 3.25 3.7 2.5 193	78.4 2.53 3.4 2.0 156	66.0 2.13 2.5 2.0 131	67.9 2.42 2.6 2.4 135	1213.1 39.1 170 2.2 2410	1191.4 39.7 241 7.8 2360	1075.7 34.7 190 5.5 2130	116.9 3.90 6.1 2.3 232	24.24 .78 1.7 .02 48	43.10 1.39 8.4 .00 85	72.3 2.41 8.8 1.2 143

CAL YR 1988 TOTAL 1792.8 MEAN 4.90 MAX 40 MIN 1.0 AC-FT 3560 WTR YR 1989 TOTAL 4129.34 MEAN 11.3 MAX 241 MIN .00 AC-FT 8190

e - Estimated

06350000 CANNONBALL RIVER AT REGENT, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1964-66, 1971 to current year.

DATE	TIME	DIS- CHARGE INST CUBIC FEED PER SECON (0006	SPE- CIFIC CON- DUCT- ANCE ND (US/CM	PH (STAND- ARD UNITS)	AIR (DEG (WATER () (DEG	E (MG/ R AS C) CACO	CALCI L DIS- L SOLV (MG/ 3) AS C	DIS- ED SOLVE L (MG/L A) AS MG	, SODIUM, DIS- D SOLVED (MG/L) AS NA)	SODIUM PERCENT (00932)	RATIO
OCT 04	1100	2.2	179	00 -	- 5.	.0 9	.0				-	
NOV 15	1045	3.6	177	0	5.	.0 1	.0	_				
JAN 04	1540	2.0	207	0 -	- 3.	.0 0	.5				-	
FEB 14 MAR	1310	2.4	211	0 -	6.	.0 0	.0				-	
11 16 28	1125 1700 1035	90 54 26	69 79 94	8	9.	5 0	.5	60 32 	20	81	49	
MAY 02	1825	178	206					_				
JUN 01	1450	6.0						_			_	
21 JUL	1430	3.4									-	
25 AUG	1015	1.2						10 71	57	310	6	7
09 29	1050 1125	2.3			- 30. - 22.			=	=======================================		-	
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR BONATE FET-LA (MG/I AS HCO3)	E, BONATE AB FET-LA (MG/L AS (CO3)	B LAB (MG/L AS CACO3		DE SULFATORIO DIS- ED SOLVI (MG/I	DIS- ED SOLV L (MG/ 4) AS C	, RIDE DIS ED SOLV L (MG/ L) AS F	, DIS- - SOLVE ED (MG/L L AS) SIO2)	AT 180 D DEG. C DIS- SOLVED (MG/L)	CONSTI- TUENTS, DIS-	SOLIDS, DIS- SOLVED (TONS PER AC-FT)
MAR 11	14	170	0	140	4.	4 200	6.	9 0.	20 4.8	459	446	0.62
JUL 25	9.5	470	6	390	3.	7 670	12	٠.	50 5.0	1380	1380	1.88
		OLIDS, 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)	DIS- SOLVED (UG/L AS MO)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) O1145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
MAR 11. JUL		111	<1	210	140	<1	20	120	0.1	1	<10	470
25.	• •	4.62	2	740	50	1	50	70	0.1	3	2	1300

06351680 WHITE BUTTE FORK CEDAR CREEK NEAR SCRANTON, ND

LOCATION.--Lat 46°19'20", long 102°59'45", in NW1/4 sec.21, T.133 N., R.98 W., Slope County, Hydrologic Unit 10130205, on left bank 1,200 ft downstream from county highway bridge, and 13 mi northeast of Scranton.

DRAINAGE AREA .-- 42.9 mi2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- March 1965 to current year (seasonal records only since 1984).

GAGE. -- Water-stage recorder. Elevation of gage is 2,825 ft above National Geodetic Vertical Datum from topographic map.

REMARKS.--Estimated daily discharges: Feb. 1 to Mar. 26. Records good except those for period of estimated daily discharges, which are poor.

AVERAGE DISCHARGE.--18 years (water years 1966-83), 4.45 ft^3/s , 3,220 acre-ft/yr; median of yearly mean discharges, 4.5 ft^3/s , 3,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 645 ft^3/s , May 8, 1970, gage height, 7.20 ft; maximum gage height, 7.76 ft, May 8, 1967; no flow for many days each year.

EXTREMES FOR CURRENT YEAR. -- Maximum discharge, 116 ft3/s, Apr. 28, gage height, 4.64 ft; no flow for 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	.48	38	.02	.00	.00	.00
					e.00	e.00		36	.02	.00	.00	.00
2 3 4 5					e.00	e.00	.33 .29	17	.01	.00	.00	.00
1					e.00	e.00	• 29	7.4	.00	.00	.00	00
4							.27					00
5					e.00	e.00	.27	4.4	.00	.00	.00	.00
6 7 8					e.00	e.00	.19	2.8	.00	.00	.00	.00
7					e.00	e.00	.17	2.2	.00	.00	.00	.00
8					e.00	e.00 e.50	.75	1.7	.00	.00	.00	.00
10					e.00	e.50	.70	1.4	.00	.00	.00	.00
10					e.00	e1.0	.66	.91	.00	.00	.00	.00
11					e.00	e3.0	.97	.83	.00	.00	.00	.00
12					e.00	e5.0	2.0	.67	.00	.00	.00	.00
13					e.00	e10	2.9	.56	.00	.00	.00	.00
14					e.00	e3.5	4.2	-51	.00	.00	.00	.00
14 15					e.00	e3.0	5.4	.51 .51	.00	-00	.00	.00
16					e.00	e9.0	6.8	.49	.00	.00	.00	.00
17					e.00	e2.0	6.6	.41	.00	.00	.00	.00
18					e.00	e2.0	7.3	.31	.00	.00	.00	.00
19					e.00	e2.0	8.7	.23	.00	.00	.00	.00
20					e.00	e1.0	12	.23	.00	.00	.00	.00
21 22					e.00	e.80	13 13 13	.15	.00	.00	.00	.00
22		7			e.00	e1.0	13	.10	.00	.00	.00	.00
23					e.00	e2.0	13	.07	.00	.00	.00	.00
24					e.00	e2.0	13	.14	.00	.00	.00	.00
24 25					e.00	e1.5	13 12	.13	.00	.00	.00	.00
26					e.00	e3.0	18	.19	.00	.00	.00	.00
27					e.00	2.0	26	.14	.00	.00	.00	.00
27 28 29					e.00	1.1	64	.08	.00	.00	.00	.00
20						.97	47	.03	.00	.00	.00	.00
30						.34	30	.02	.00	.00	.00	.00
30 31							90	.04		.00	.00	
21						.43		.04		.00	.00	
TOTAL					0.00	57.14	309.98	117.59	0.05	0.00	0.00	0.00
MEAN					.00	1.84	10.3	3.79	.002	.00	.00	.00
MAX					.00	10	64	38	.02	.00	.00	.00
MIN					.00	.00	.17	.02	.00	.00	.00	.00
AC-FT					.0	113	615	233	.1	.0	.0	.0

e - Estimated

281

CANNONBALL RIVER BASIN

06351680 WHITE BUTTE FORK CEDAR CREEK NEAR SCRANTON, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIM	CHAIN CU	IS- RGE, ST. BIC EET ER COND D61)	SPE- CIFIC CON- DUCT- ANCE (US/CN	PH (STAN ARD 1) UNITS) (DEC	RE R C)	TEMPERATURE WATER (DEG (00010	E R C)	HARD- NESS TOTAL (MG/L AS CACO3	CALC: DIS- SOL' (MG,	VED /L CA)	MAGNE SIUM DIS- SOLVE (MG/L AS MG	DISD SOLV (MG)	ED /L NA)	SODIU PERCEN (00932	T	SODIUM AD- SORP- TION RATIO (00931)
MAR 13 23 30	1610 1530 1130		0 1.8 0.21	93 133 140	50	70 - 	1.0 8.5 8.0	0	.5		0 56 	==		96 - -	=	-	2	3
03	1600 1630		4	163 250			1.0	11 14						-	==		-	
DATE	POTAS SIUN DIS- SOLVI (MG/I AS K	H, BON.	CAR- ATE, -LAB G/L S 03) 440)	CAR- BONATE FET-LA (MG/L AS CO3)	AB LAB (MG/ AS CACO	Y DIOX DI L SOL (MO 3) AS (S- VED /L (O2)	SULFA: DIS- SOLVI (MG/I AS SO(ED L 4)	CHLO- RIDE, DIS- SOLVE (MG/L AS CL	RIDI DIS D SOLV (MG,	E, S- VED /L F)	SILICA DIS- SOLVE (MG/I AS SIO2)	AT 1 D DEG DI SOL (MG	DUÉ 80 . C S- VED /L)	SOLIDS SUM OF CONSTI TUENTS DIS- SOLVE (MG/L (70301	S	SOLIDS, DIS- SOLVED (TONS PER AC-FT)
MAR 13	14	91		0	74		2.9	390		8.5	. 0	.10	6.5		694	64	.8	0.94
	DATE	SOLIDS DIS- SOLVEI (TONS PER DAY) (70302	AR O S (A	RSENIC DIS- SOLVED (UG/L AS AS) D1000)	BORON, DIS- SOLVED (UG/L AS B) (01020)	IRON, DIS- SOLVED (UG/L AS FE) (01046)		LEAD, DIS- SOLVED (UG/L AS PB) 01049)	SC (U	HIUM DIS- DLVED G/L LI)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	S (RCURY DIS- OLVED UG/L S HG) 1890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (Q1060)	N S (SELE- NIUM, DIS- SOLVED (UG/L AS SE) D1145)	DI SOL (UG	SR)
MAR 13.		18.7		1	200	130)	<1		20	470		0.1	1		<10		690

06352000 CEDAR CREEK NEAR HAYNES, ND

LOCATION.--Lat 46°09'15", long 102°28'25", in W1/2 sec.20, T.131 N., R.94 W., Adams County, Hydrologic Unit 10130205, on left bank 30 ft downstream from bridge on State Highway 8, and 12.5 mi north of Haynes.

DRAINAGE AREA . -- 553 mi2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- October 1950 to current year.

GAGE.--Water-stage recorder. Datum of gage is 2,472.90 ft above National Geodetic Vertical Datum of 1929, North Dakota Highway Department benchmark. Prior to May 20, 1951, nonrecording gage on former bridge 400 ft upstream at same datum.

REMARKS.--Estimated daily discharges: Nov. 27 to Apr. 12. Records good except those for periods of estimated discharges, which are poor.

AVERAGE DISCHARGE.--39 years, 35.9 ft³/s, 26,010 acre-ft/yr; median of yearly mean discharges, 30 ft³/s, 21,700 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,870 ft³/s, Apr. 7, 1952, gage height, 21.25 ft; maximum gage height, 22.05 ft, Mar. 28, 1978, backwater from ice and snow; no flow at times in some years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 17, 1950 reached a stage of about 23 ft, discharge, 26,900 ft³/s, by slope-area measurement at site 9 mi upstream.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 400 ft3/s and maximum (*):

Date	Time	Discharge (ft3/s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr. 27	2045	591	10.25	No other pe	eaks greater t	than base discharge	e.

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

Minimum daily discharge, 0.24 ft3/s, Aug. 6.

					1	MEAN VALUE	SS					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	1.0 1.0 1.0 1.0	1.0 1.0 1.1 1.1	e1.3 e1.3 e1.2 e1.2	e1.4 e1.4 e1.4 e1.4	e.80 e.80 e.80 e.80	e.75 e.75 e.75 e.75 e.70	e15 e12 e10 e10 e9.0	221 218 179 151 124	8.7 6.6 5.1 4.0	1.3 1.0 .95 .84 .73	.30 .26 .29 .29 .28	1.4 1.3 1.1 .89
6 7 8 9	1.0 1.0 1.0 1.0	1.0 1.2 1.2 1.1 1.1	e1.2 e1.4 e1.3 e1.2 e1.3	e1.4 e1.2 e1.2 e1.2 e1.1	e.80 e.80 e.80 e.80	e.70 e.70 e.70 e10 e30	e8.0 e7.0 e7.0 e6.5 e6.0	96 71 51 37 29	3.5 3.3 3.0 2.7 2.4	.73 .76 .70 .64	.24 .27 .30 .30	.82 .72 .72 .69 .82
11 12 13 14 15	.95 .87 .87 .87	1.1 1.1 1.2 1.1 1.6	e1.4 e1.5 e1.6 e1.7	e1.1 e1.1 e1.1 e1.1	e.80 e.80 e.80 e.80	e55 e65 e50 e45 e35	e5.5 e5.0 5.0 5.0	23 19 16 14 12	2.3 2.1 1.9 1.8 1.8	.83 1.0 1.3 2.0 2.0	.40 .45 .46 .69	1.0 1.1 1.1 1.1 .93
16 17 18 19 20	.83 1.0 1.0 1.0	1.6 1.1 1.1 1.1	e1.4 e1.3 e1.4 e1.5 e1.4	e1.1 e1.1 e1.1 e1.1	e.80 e.80 e.80 e.80	e15 e13 e10 e8.0 e5.0	4.4 4.7 4.3 4.1 3.9	11 10 11 14	1.7 2.1 2.1 1.9 1.7	2.0 1.8 1.5 1.3	.76 .68 .57 .63	.87 .82 .76 .76
21 22 23 24 25	1.1 1.1 .98 1.1 .83	1.1 1.1 1.1 1.1	e1.4 e1.4 e1.4 e1.4	e1.1 e1.0 e1.0 e1.0	e.80 e.80 e.80 e.80	e3.0 e4.0 e7.5 e15 e30	3.5 3.1 2.5 2.5 2.4	7.9 6.4 5.3 6.9	1.6 1.7 1.8 1.9 2.2	.92 .70 .58 .57	.62 .55 .51 .79 4.6	1.5 1.4 1.3 1.2 1.0
26 27 28 29 30 31	.76 1.0 1.7 1.0 .92	1.2 e1.2 e1.2 e1.2 e1.3	e1.4 e1.4 e1.4 e1.4 e1.4	e1.0 e1.0 e1.0 e1.0 e.90 e.90	e.80 e.75 e.75	e40 e50 e35 e30 e25 e20	6.8 246 400 287 191	14 10 8.0 6.2 5.8	2.3 1.9 1.6 1.4	.46 .49 .41 .45 .36	7.7 4.0 2.3 1.9 1.9	.94 .87 .87 .87
TOTAL MEAN MAX MIN AC-FT	30.76 .99 1.7 .76 61	34.5 1.15 1.6 1.0 68	42.9 1.38 1.7 1.2 85	35.10 1.13 1.4 .90 70	22.30 .80 .80 .75 44	606.30 19.6 65 .70 1200	1281.6 42.7 400 2.4 2540	1411.5 45.5 221 5.3 2800	88.4 2.95 12 1.3 175	28.92 .93 2.0 .32 57	35.57 1.15 7.7 .24 71	29.78 .99 1.5 .69 59

CAL YR 1988 TOTAL 1260.62 MEAN 3.44 MAX 23 MIN .18 AC-FT 2500 WTR YR 1989 TOTAL 3647.63 MEAN 9.99 MAX 400 MIN .24 AC-FT 7240

06352000 CEDAR CREEK NEAR HAYNES, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	, SPE- CIFIC CON- DUCT- ANCE D (US/CM		TEMPER ATURE AIR (DEG C	ATUR WATE) (DEG	E (MG/ R AS C) CACO	S CALC AL DIS 'L SOI (MC 03) AS	CIUM S S- I LVED SC S/L (M CA) AS	AGNE- SIUM, DIS- DLVED MG/L S MG) 0925)	SODIUM DIS- SOLVED (MG/I AS NA	SODI	NT RATIO
OCT	4540	1.0	407		40		-						
NOV NOV	1510	1.0			10.		• 5	-		7.7			
15 JAN	1355	1.6	164	0	-5.	5 0	•5					-	
04 FEB	1720	1.4	215	0	1.	0 0	.5				6		
14	1615	0.8	2 249	0	-4.	0 0	.0					-	- 4
MAR 11	1540	69	57	4 8.00	3.	5 0	.5	140 28	3 1	18	61		15 2
22	1545	4.7	121	0	7.	0 0	.5					-	
28	1345	. 35	86	8	18.	0 1	.0				-	•	
03	1200	180	209	0	12.	0 11	.0					_	
23	1650	5.1	222		28.		.0					-	
JUN 21 JUL	1650	1.6	175	0	13.	5 18	.0				- 4	-	
26	1045	0.4	3 157	8.30	29.	0 24	.0	80 45	5 6	55	300		52 7
29	1530	1.9	188	0	24.	0 22	.0					-	
DATE	POTAS- SIUM DIS- SOLVEI (MG/L AS K) (00935	FET-LA (MG/L AS HCO3)	BONATE B FET-LAM (MG/L AS CO3)	B LAB (MG/L AS CACO3)	CARBO DIOXID DIS- SOLVE (MG/L AS CO2 (00405	E SULFA DIS- D SOLV (MG/	DIS- ED SOLV L (MG/ 4) AS (PED SOIL (MCCL) AS	DE, DI IS- SC LVED (M I/L A F) SI	JICA, IS- DLVED MG/L AS (02) (955)	SOLIDS RESIDU AT 180 DEG. DIS- SOLVE (MG/I	C TUENTS DISCO SOLVE	SOLIDS, DIS- SOLVED (TONS D PER AC-FT)
MAR													
11 JUL	12	160	0	130	2.	5 160	5.	0 0	.20	6.6	36	59 36	0.50
26	13	440	7	370	3.	5 650	10	(.50	2.3	133	132	20 1.81
		SOLVED (TONS PER DAY)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	DIS- SOLVED (UG/L AS B)	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- SOLVEI (UG/L AS MN) (01056)	MERCUR DIS- SOLVE (UG/L AS HO	RY I	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) D1060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
MAR 11.		69.0	<1	150	170	<1	10	110	0.	.1	1	1	330
JUL 26.		1.54	1	630	50	1	70	40	0.	1	3	2	950

06353000 CEDAR CREEK NEAR RALEIGH. ND

LOCATION.--Lat 46°05'30", long 101°20'00", in NE1/4SE1/4 sec.8, T.130 N., R.85 W., Grant County, Hydrologic Unit 10130205, on left bank at upstream side of bridge on N.D. Highway 31, 6 mi upstream from mouth, and 19 mi south of Raleigh.

DRAINAGE AREA. -- 1,750 mi2, approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- April to September 1939, March 1962 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,881.23 ft above National Geodetic Vertical Datum of 1929. Prior to June 6, 1962, nonrecording gage at same site and datum, and June 6, 1962, to Sept. 7, 1972, at site 1 mi upstream at datum 9.58 ft higher.

REMARKS.--Estimated daily discharges: Nov. 14 to Mar. 28. Records good except those for period of estimated daily discharge, which are poor.

AVERAGE DISCHARGE.--27 years (water years 1963-89), 99.2 ft³/s, 71,870 acre-ft/yr; median of yearly mean discharges, 79 ft³/s, 57,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 13,400 ft3/s, Mar. 28, 1978, gage height, 13.70 ft; no flow at times in most years.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since 1950, about 18 ft, Apr. 18, 1950; discharge 45,000 ft³/s, on basis of slope-area measurement 5 mi upstream.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 700 ft3/s and maximum (*):

Date	Time	Discharge (ft3/s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 25	1300	*900	a*5.95	No other	r peak greater	than base discha	arge.

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

No flow for several days.
a - Backwater from ice

		5250	,		5500.15	MEAN VALUES		.,,				
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	e.04	e.04	e.06	e.05	159	328	14	16	.00	1.3
2	.00	.00	e.05	e.04	e.06	e.04	121	448	13	14	.00	.51
3	.00	.00	e.06	e.04	e.05	e.04	110	385	12	13	.00	.12
4	.00	.00	e.07	e.04	e.05	e.04	81	321	13	11	.00	.05
5	.00	.00	e.07	e.03	e.05	e.04	72	306	14	7.6	.00	.03
,	.00	.00	e.07	e.05	e.05	e.04	12	500	14	7.0	.00	.00
6	.00	.00	e.07	e.03	e.05	e.04	66	274	13	4.9	.00	.02
7	.00	.00	e.06	e.03	e.05	e.04	64	231	11	3.4	.00	.02
8	.00	.00	e.06	e.03	e.05	e.10	56	198	9.4	2.4	.00	.01
9	.00	.00	e.06	e.03	e.05	e.26	47	168	8.2	1.9	.00	.00
10	.00	.00	e.05	e.03	e.05	e1.0	41	140	7.1	1.3	.00	.00
11	.00	.00	e.06	e.03	e.04	e20	36	114	8.3	.89	.00	.01
12	.00	.00	e.07	e.03	e.04	e18	33	94	7.7	.51	.00	.03
									6.4			.04
13	.00	.00	e.08	e.03	e.04	e15	30	78		.25	.00	
14	.00	e.02	e.08	e.03	e.04	e13	27	65	6.4	.12	.00	.04
15	.00	e.03	e.07	e.03	e.04	e12	25	55	5.9	.08	.00	.03
16	.00	e.03	e.06	e.04	e.04	e11	23	46	5.9	.03	.00	.02
17	.00	e.03	e.05	e.04	e.03	e10	23	40	8.2	.02	.00	.01
18	.00	e.02	e.05	e.04	e.03	e9.5	21	35	9.4	.02	.00	.00
19	.00	e.02	e.05	e.04	e.03	e9.0	20	30	11	.01	.00	.00
20	.00	e.02	e.06	e.04	e.03	e8.5	18	26	10	.00	.00	.00
20	.00	e.02	e.00	e.04	e.05	60.5	10	20	10	.00	.00	.00
21	.00	e.02	e.06	e.04	e.03	e8.0	17	24	12	.00	.00	.00
22	.00	e.02	e.05	e.04	e.03	e7.5	16	22	13	.00	.00	.00
23	.00	e.02	e.05	e.04	e.03	e10	15	20	13	.00	.00	.00
24	.00	e.02	e.04	e.04	e.04	e200	14	18	15	.00	.00	.00
25	.00	e.02	e.04	e.05	e.05	e800	14	16	16	.00	.00	.00
26	.00	e.02	e.04	e.05	e.05	e500	18	15	16	.00	.00	.00
20	.00	e.02	e.04			e225	23	15	15	.00	.00	.00
27				e.05	e.05					.00	24	.00
28	.00	e.02	e.04	e.05	e.05	e250	323	15	17		17	
29	.00	e.02	e.04	e.06		329	500	18	17	.00		.00
30	.00	e.03	e.04	e.06		277	256	16	16	.00	7.7	.00
31	.00		e.04	e.06		171		15		.00	2.9	
TOTAL	0.00	0.38	1.70	1.23	1.21	2905.15	2269	3576	343.9	77.43	51.60	2.24
MEAN	.00	.013	.055	.040	.043	93.7	75.6	115	11.5	2.50	1.66	.075
MAX	.00	.03	.08	.06	.06	800	500	448	17	16	24	1.3
MIN	.00	.00	.04	.03	.03	.04	14	15	5.9	.00	.00	.00
									682	154	102	4.4
AC-FT	.0	.8	3.4	2.4	2.4	5760	4500	7090	002	154	102	4.4

CAL YR 1988 TOTAL 4991.49 MEAN 13.6 MAX 314 MIN .00 AC-FT 9900 WTR YR 1989 TOTAL 9229.84 MEAN 25.3 MAX 800 MIN .00 AC-FT 18310

WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

06353000 CEDAR CREEK NEAR RALEIGH, ND--CONTINUED

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)
NOV												
15 DEC	1300	0.03	1570		-1.5	2.0						
20 JAN	1250	0.06	2050		-0.5	1.5						
31 MAR	1300	0.06	1660		-7.5	0.0						
09	1610	0.26	1230		6.5	0.5	122					
14	1505	13	1160		-2.0	0.0						
27 APR	1400	225	435	-	4.0	1.0	-		77			
10 MAY	1055	42	985	8.50	3.0	3.0	230	40	31	130	54	4
01 JUN	1630	478	550		13.5	8.0						
01 JUL	1055	14	2130		19.0	12.5						
18	0930	0.02	2760		21.0	22.5						
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)
APR												
10	9.5	200	0	170	1.0	350	5.5	0.20	5.4	703	673	0.96
DAT	SOL (TO PE DA	IS- ARSI LVED DONS SOI DR (UCLY) AS	IS- DO LVED SOI G/L (UC AS) AS	LVED SOL	IS- DI LVED SOL I/L (UG FE) AS	S- DI VED SOL /L (UG PB) AS	IUM NES S- DI VED SOL /L (UG LI) AS	S- DI VED SOL (UG MN) AS	URY DEN S- DI VED SOL /L (UG HG) AS	VED SOL L/L (UG MO) AS	M, TI S- DI VED SOL /L (UG SE) AS	SR)
APR												
10	79	9.7	<1	190	130	<1	35	20	0.3	1	<10	570

Date

CANNONBALL RIVER BASTN

06354000 CANNONBALL RIVER AT BREIEN, ND (National stream-quality accounting network station)

LOCATION.--Lat 46°22'33", long 100°56'03", in sec.36, T.134 N., R.82 W., Morton County, Hydrologic Unit 10130206, on left bank at downstream side of bridge on State Highway 6, 1,100 ft downstream from Dogtooth Creek, and 0.6 mi southeast of Breien.

DRAINAGE AREA .-- 4,100 mi2, approximately.

Time

WATER-DISCHARGE RECORDS

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

Discharge (ft3/s)

REVISED RECORDS.--WSP 786: 1934. WSP 1146: 1943. WSP 1279: 1936-37(M). 1947(M). WSP 1509: 1955(M).

GAGE.--Water-stage recorder. Datum of gage is 1,673.54 ft above National Geodetic Vertical Datum of 1929. From June 12, 1973, to July 1, 1985, at site 450 ft downstream. Prior to June 12, 1973, at site 50 ft upstream at datum 3.00 ft higher. June 13, 1973, to April 8, 1980, at datum 2.00 ft higher.

REMARKS.--Estimated daily discharges: Nov. 12, 16, 18, 19, 25 to Apr. 13. Records fair except those for periods of estimated daily discharge, which are poor. Some storage in several small lakes above station.

AVERAGE DISCHARGE.--55 years, 251 ft3/s, 181,800 acre-ft/yr; median of yearly mean discharges, 190 ft3/s, 138,000 acre-ft/yr.

Date

Time

Gage height

(ft)

Discharge (ft3/s)

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 94,800 ft³/s, Apr. 19, 1950, gage height, 22.30 ft, from floodmarks, from rating curve extended above 16,000 ft³/s on basis of slope area and contracted-opening measurements of peak flow, site and datum then in use; no flow at times in some years.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 1,000 ft3/s and maximum (*):

Gage height

(ft)

Mar.	27		a1,200		unknow	n Apr	. 29	0845		1,080		5.68
а	- About											
		DISCHA	RGE, CUBIC	FEET PER		, WATER YEAR MEAN VALUES	OCTOBER	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1 2 3 4 5	.75 .75 .70 .52	2.9 3.0 3.3 2.8 2.9	e9.5 e9.5 e10 e10 e10	e7.0 e7.0 e7.0 e7.0	e5.0 e4.5 e4.0 e3.5 e3.0	e2.2 e2.2 e2.0 e1.8 e1.6	e300 e270 e250 e220 e200	702 771 712 566 489	51 46 46 47 38	6.1 4.4 3.8 4.0 3.3	.16 .08 .00 .00	21 14 9.3 6.0 4.4
6 7 8 9 10	.59 .70 .82 .89	3.1 7.6 11 12 11	e10 e9.0 e8.5 e8.0 e7.0	e7.0 e6.5 e6.0 e5.5 e4.0	e3.0 e2.8 e2.6 e2.6 e2.6	e1.8 e3.0 e6.0 e12 e22	e190 e180 e170 e160 e150	433 396 346 301 260	39 37 34 33 30	2.3 2.8 2.7 1.5	.00 .00 .00	2.9 1.8 1.4 1.1
11 12 13 14 15	.89 .96 .82 .89	10 e10 11 10	e7.5 e8.0 e9.0 e8.5 e8.0	e4.5 e4.5 e5.0 e5.0	e2.4 e2.4 e2.4 e2.4	e30 e35 e32 e28 e24	e140 e130 e115 99	224 196 174 152 134	25 23 22 24 22	.88 .72 .58 .46	.00 .00 .00	1.5 1.8 1.5 1.2
16 17 18 19 20	.76 .89 .89 1.1 1.6	e9.0 10 e10 e10	e8.0 e8.5 e9.0 e9.0	e5.5 e5.5 e6.0 e6.0	e2.2 e2.2 e2.2 e2.2	e22 e20 e18 e16 e14	83 78 75 77 67	122 108 97 84 77	21 20 20 19 18	.30 1.1 21 15 5.1	.00 .00 .02 .14	.81 .71 .48 .42
21 22 23 24 25	1.7 1.3 1.2 1.2	12 12 14 14 e14	e9.0 e9.0 e9.0 e8.5 e8.0	e6.0 e6.0 e6.0 e6.0	e2.2 e2.2 e2.2 e2.2	e25 e40 e150 e200 e900	60 53 46 40 37	70 62 57 95 80	16 17 19 21 19	2.3 1.1 .48 .30 .29	.31 .27 .20 .18 .16	.82 .77 .86 .76 .66
26 27 28 29 30 31	1.8 2.0 2.7 2.1 2.4 2.5	e12 e8.0 e7.5 e7.5 e8.5	e7.5 e7.5 e7.0 e7.0 e7.0	e5.5 e5.0 e4.5 e5.0 e5.2 e5.5	e2.2 e2.2 e2.3	e1000 e1050 e950 e800 e550 e400	62 112 227 948 593	70 61 53 48 51 56	17 15 14 11 8.4	.26 .21 .86 .71 .30	.12 131 547 188 79 37	•59 •53 •47 •39 •39
TOTAL MEAN MAX MIN AC-FT	1.20 2.7 .52	270.1 9.00 14 2.8 536	262.5 8.47 10 7.0 521	177.7 5.73 7.0 4.0 352	74.3 2.65 5.0 2.2 147	6358.6 205 1050 1.6 12610	5222 174 948 37 10360	7047 227 771 48 13980	772.4 25.7 51 8.4 1530	84.54 2.73 21 .18 168	983.90 31.7 547 .00 1950	78.93 2.63 21 .39 157

TOTAL 21174.91 MEAN 57.9 MAX 900 MIN .21 AC-FT 42000 TOTAL 21369.07 MEAN 58.5 MAX 1050 MIN .00 AC-FT 42390 CAL YR 1988 WTR YR 1989

06354000 CANNONBALL RIVER AT BREIEN, ND--CONTINUED (National stream-quality accounting network station)

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1946-50, 1970-72, 1974 to current year.

DATE		TIME	PE	GE, T. IC ET R	SPE CIF CON DUC AND (US/	TIC T- E (CM)	UNI	AND- RD	AT A (DE	PER- URE IR G C)	AT WA (DE	PER- URE TER G C)	B I (N	UR- ID- TY TU) 076)	SOL	S- VED	SOL (PE CE SAT	S- VED CR- CNT CUR- CON)	FOI FEG O. UM- (COI 100	MF LS./	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT 26		1100	1	.8	2	2400		8.60		3.5		2.5	1	1	1	2.7		94		55	330
JAN 30		1105		.3						14.5				1.8						К3	90
FEB 28		1430		.3	-	200				4.0		0.0									
MAR 10		1615	21			600				20.0		0.5			,						
27 APR		1100	1010			395				2.0		0.5									
13 27		1000 1115	111 119			140 180		8.60		15.5		8.5	3	9	1	2.2		105		40	230
30 JUL		1105	54		2	2040				9.0		10.5									
18		1210	4	.5	1	730				24.0		24.5									
SEP 07		0940	2	. 4	1	170		8.70				17.0	2	9		9.5		98		93	380
DATE		HARD- NESS TOTAL (MG/L AS CACO3) 00900)	(MG	VED /L CA)	SI SOL (MC	MG)	DI SOL (M		PER	DIUM CENT 932)	SO T RA	DIUM AD- RP- ION TIO 931)	SO (M AS	TAS- IUM, IS- LVED G/L K) 935)	ALK LINI WAT TOT FIE MG/L CAC (OO4	WH IT LD AS	BICA BONA WAT WH FIE MG/L HCC (004	TE ER IT LD AS	BONA WA' WH FII MG/I	AR- ATE FER IT ELD L AS 03 447)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)
OCT 26		320	41		52	,	48	2		76		12	1	1		604		659		38	750
JAN 30		500	79		73		44			65		9		9.7		640		781		0	830
APR 13		250	46		32		15			56		4		8.0		240		146		72	360
SEP 07		140	28		16		21			76		8		8.0		288		288		31	290
0,		140			,,,			SOLI	ng	SOLI	ng	Ü		0.0		NITE	20-	NIT	PO-	NIT	
0	ATE	CHL RID DIS SOL (MG AS (009	E, VED /L CL)	FLUO RIDE DIS SOLV (MG/ AS F	ED L	SILI DIS- SOL (MG AS SIO (009	VED /L	RESI AT 1 DEG DI	DUÉ 80 . C S- VED /L)	SUM CONS TUEN	OF TI- TS, S- VED /L)	SOLI DI SOL (TO PE AC- (703	S- VED NS R FT)	SOLI DI SOL (TO PE DA (703	S- VED NS R Y)	GEN NITRA DIS SOLV (MG, AS I	N, ATE S- VED /L N)	GE NITR DI SOL (MG AS (006	N, ITE S- VED /L N)	MO2+ DI3 SOL (MG AS (N, NO3 S- VED /L N)
OCT																					
26. JAN	••	29		0.			.6	1	720	1	730	2	.34	8	.36			<0.		<0.	
30. APR	••	23		0.	50	11		1	790	1	840	2	.43	25	.5	0.	130		010		140
13. SEP	• •	7	.3	0.	30	3	.9		781		752		.06	234				<0.		<0.	
07.	• •	12		0.	50	8	.8		755		744	1	.03	4	.85			<0.	010	<0.	100
2	ATE	NIT GE AMMO TOT (MG AS (006	N, NIA AL /L N)	NITR GEN AMMON DIS SOLV (MG/ AS N (0060	IA ED L	NITTOTAL	AM- A + NIC AL /L	PHOR PHOR TOT (MG AS (006	OUS AL /L P)	PHOR PHOR DI SOL (MG AS (006	OUS S- VED /L P)	PHOR PHOR ORT DIS SOLV (MG/ AS P (006	OUS HO, ED L	PHOROGA ORGA TOT (MG AS (006	OUS NIC AL /L P)	ALUM INUM DIS SOLV (UG) AS /	M, S- VED /L AL)	ARSE DI SOL (UG AS (O10	S- VED /L AS)	BARIU DIS- SOLVI (UG, AS 1	ED /L BA)
OCT 26.		<0.	010	<0.0	10	0	.50	0.	020	0.	010	<0.	010	0	.02		20		1	<	100
JAN 30.		0.	190	0.1	90	0	.80	0.	020	<0.	010	<0.	010	0	.02		(10		<1	<	100
APR 13.		0.	040	0.0	30	1	.2	0.	050	0.	020	<0.	010	0	.05		70		<1		37
SEP 07.		0.	050	0.0	40	1	.2	0.	100	0.	020	<0.	010	0	.10		60		3		53

06354000 CANNONBALL RIVER AT BREIEN, ND--CONTINUED (National stream-quality accounting network station)

DATE	BERYL LIUM, DIS- SOLVE (UG/L AS BE	CADM DI D SOL (UG	IUM MI S- DI VED SO /L (U CD) AS	IRO- UM, IS- LVED IG/L IG CR)	COBALT DIS- SOLVED (UG/L AS CO	DIS SOI (UC	PER, S- LVED G/L CU)		S- VED /L FE)		S- VED /L PB)	LITHIUM DIS- SOLVED (UG/L AS LI)	NES DI SOL (UG AS	S- VED S /L (MN) A	RCURY DIS- OLVED UG/L S HG) 1890)
OCT 26	<10		1	<1	<	1	3		<10		<5	100		40	0.3
JAN 30	<10		1	<1	<	1	3		40		<5	110	i.	60	0.1
APR 13	<0.	5	<1	1	<	3	5		54		<5	37		9	0.2
SEP 07	<0.										3			6	
07	ζ0.	2	<1	1	<	,	8		84		9	44			0.2
DATE	MOLYE DENUM DIS- SOLVE (UG/L AS MO	DIS D SOL (UG	EL, NI - D VED SO /L (U NI) AS	UM, DIS- DLVED G/L SE) 145)	SILVER DIS- SOLVEI (UG/L AS AG)	DI SOI (UC	RON- IUM, IS- LVED G/L SR) O80)	VAN DIU DI SOL (UG AS (O10	M, S- VED /L V)	ZIN DI SOL (UG AS	S- VED /L ZN)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	PEN (T/D	T, S- S GE, S- % DED AY) .0	SED. SUSP. IEVE DIAM. FINER THAN 62 MM 0331)
OCT 26		6	3	<1	<1.0		550		3		<10	98	0	.48	98
JAN 30		5	5	<1	<1.0		1100		<1		<10	68	0	.97	35
APR 13	<1	0	1	<1	2.0		590		<6		5	182	54		99
SEP 07	<1	0	9	1	<1.0)	350		<6		8	45		.3	98
DATE		DEPTH TO TOP OF SAMPLE INTER- VAL (FT) 72015)	SAMPLE LOC- ATION, CROSS SECTION (FT FM L BANK) (00009)	SPI COI DUC ANG (US)	E- FIC N- CT- (S CE /CM) UN	PH STAND- ARD NITS)	TEM AT WA	PER- URE TER G C) O1O)	OXY D SO:	GEN, IS- LVED G/L) 300)	OXYGE DIS SOLV (PER CEN SATU ATIO	EN, S- VED R- CONT CONT	LOUD OVER PER- ENT) 0032)	WIND SPEED (MILE PER HOUR) (00035	WIND DIREC- TION (DEG. S FROM TRUE NORTH)
JAN 30 30 30 30	1107 1109 1111 1113 1115	1.5 1.5 1.5 1.5	3.00 5.00 7.00 9.00		2400 2400 2400 2400 2400	8.00 8.00 8.00 8.00		0.0 0.0 0.0 0.0		9.6 9.6 9.6 9.6		66 66 66 66	 	10 - -	
APR 13 13 13 13 13	1002 1004 1006 1008 1010 1012	0.50 0.50 0.50 0.50 0.50	10.0 20.0 30.0 40.0 50.0 60.0		1160 1170 1140 1140 1140 1150	8.50 8.50 8.50 8.50 8.50		9.5 9.0 8.5 8.5 8.5		11.8 11.9 12.2 12.3 12.4 12.2	1 1	104 104 105 106 107	- 	20	
O7 07 07	0940 0942 0944	0.50 0.50 0.50	3.00 7.00 10.0		1170 1170 1170	8.70 8.60 8.60		17.0 17.0 17.0		9.5 9.5 9.5		98 98 98	Ξ	=	==

06354500 BEAVER CREEK AT LINTON, ND

LOCATION.--Lat 46°15'27", long 100°13'58", on line between secs.17 and 18, T.132 N., R.76 W., Emmons County, Hydrologic Unit 10130104, on left bank 60 ft downstream from bridge on U.S. Highway 83, 0.7 mi south of railway station in Linton, and 1 mi upstream from Spring Creek.

DRAINAGE AREA .-- 717 mi2, of which about 100 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- August 1949 to September 1989.

REVISED RECORDS. -- WSP 1209: Drainage area. WSP 1239: 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 1,690.55 ft above National Geodetic Vertical Datum of 1929. Prior to June 18, 1958, nonrecording gage at site 60 ft upstream at same datum. Station was moved to a location downstream from Linton on October 5, 1989.

REMARKS.--Estimated daily discharges: Mar. 10-26. Records fair except those for period of estimated daily discharge, which are poor.

AVERAGE DISCHARGE.--40 years, 41.0 ft^3/s , 29,700 acre-ft/yr; median of yearly mean discharges, 28 ft^3/s , 20,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 9,800 ft³/s, Apr. 8, 1952, gage height, 17.50 ft; maximum gage height, 18.22 ft, Mar. 23, 1987; no flow at times in some years.

EXTREMES FOR CURRENT YEAR .-- Peak discharges greater than base discharge of 200 ft3/s and maximum (*):

Date	Time	Discharge (ft3/s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 14	0900	500 855	ice jam	Aug. 28	0345	*4450	*16.64

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

No flow Oct. 1 to Mar. 9, July 25-27, Aug. 1-17 and 19-26. a - ice backwater

		5250	,		0200.12	MEAN VALUES		,,,,,	02. 13.13.			
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	142	27	5.6	.25	.00	128
2	.00	.00	.00	.00	.00	.00	105	30	5.6	.24	.00	97
	.00	.00	.00	.00	.00	.00	95	32	4.9	.27	.00	81
3	.00	.00	.00	.00	.00	.00 .	80	33	4.4	.23	.00	65
5	.00	.00	.00	.00	.00	.00	71	32	4.0	.23	.00	51
6	.00	.00	.00	.00	.00	.00	64	28	3.7	.22	.00	39
7	.00	.00	.00	.00	.00	.00	60	26	3.5	.21	.00	31
8	.00	.00	.00	.00	.00	.00	53	25	3.2	.20	.00	24
9	.00	.00	.00	.00	.00	.00	48	23	3.0	.20	.00	17
10	.00	.00	.00	.00	.00	e.10	43	21	2.5	.18	.00	13
11	.00	.00	.00	.00	.00	e5.0	41	19	2.0	.15	.00	13
12	.00	.00	.00	.00	.00	e 150	37	18	2.1	.13	.00	12
13	.00	.00	.00	.00	.00	e 250	34	15	2.4	.10	.00	11
14	.00	.00	.00	.00	.00	e400	30	13	2.2	.07	.00	8.9
15	.00	.00	.00	.00	.00	e300	31	12	1.8	.05	.00	7.8
16	.00	.00	.00	.00	.00	e180	37	11	1.3	.31	.00	7.1
17	.00	.00	.00	.00	.00	e100	41	11	1.0	.35	.00	6.9
18	.00	.00	.00	.00	.00	e80	43	12	.89	.30	.01	6.4
19	.00	.00	.00	.00	.00	e65	44	11	.88	.24	.00	5.8
20	.00	.00	.00	.00	.00	e50	45	9.7	.78	.18	.00	5.2
21	.00	.00	.00	.00	.00	e45	45	9.1	.70	.13	.00	4.4
22	.00	.00	.00	.00	.00	e35	44	8.4	.62	.09	.00	3.4
23	.00	.00	.00	.00	.00	e30	42	7.9	.50	.05	.00	3.4
24	.00	.00	.00	.00	.00	e50	39	8.0	.48	.01	.00	3.8
25	.00	.00	.00	.00	.00	e 250	36	7.2	.40	.00	.00	3.5
26	.00	.00	.00	.00	.00	e450	33	6.7	.43	.00	.00	3.3
27	.00	.00	.00	.00	.00	724	29	6.4	.38	.00	22	3.1
28	.00	.00	.00	.00	.00	740	28	5.9	.39	.02	1570	2.8
29	.00	.00	.00	.00		440	28	5.3	.40	.09	615	2.6
30	.00	.00	.00	.00		286	27	5.0	.29	.05	366	2.5
31	.00		.00	.00		204		5.2		.01	199	
TOTAL	0.00	0.00	0.00	0.00	0.00	4834.10	1495	483.8	60.34	4.56	2772.01	662.9
MEAN	.00	.00	.00	.00	.00	156	49.8	15.6	2.01	.15	89.4	22.1
MAX	.00	.00	.00	.00	.00	740	142	33	5.6	.35	1570	128
MIN	.00	.00	.00	.00	.00	.00	27	5.0	.29	.00	.00	2.5
AC-FT	.0	.0	.0	.0	.0	9590	2970	960	120	9.0	5500	1310
AC-FI	.0	••	••	•0	.0	3,30	2310	300	120	5.0),00	1515

CAL YR 1988 TOTAL 1309.85 MEAN 3.58 MAX 36 MIN .00 AC-FT 2600 WTR YR 1989 TOTAL 10312.71 MEAN 28.3 MAX 1570 MIN .00 AC-FT 20460

BEAVER CREEK BASIN

06354500 BEAVER CREEK AT LINTON, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	CIFIC CON- DUCT- ANCE (US/CM)	PH (STAND- ARD UNITS) (00400)	AIR (DEG C)	ATURE WATER (DEG C)	(MG/L AS CACO3)		DIS- D SOLVED (MG/L) AS MG)	SODIUM DIS- SOLVED (MG/L AS NA	SODIUM PERCENT	RATIO
MAR	15.0											
13 29 APR	1645 1020	278 458	372 210						6.5	16	31	0.9
14 28 JUN	1015 0945	29 27	620 900		7.0						=	==
08 JUL	1435	3.3	660		18.5	20.5	·	-				
17	1000	0.30			24.0	22.0		-		-		
28 SEP	1235	1170			22.0	9.5	·	-	-	-	-	
12	1015	12	690		6.5	11.5	210	49	21	58	36	2
DATE	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BONATE, FET-LAE (MG/L AS HCO3)	BONATE, B FET-LAB (MG/L AS CO3)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)		DIS- DIS- O SOLVED (MG/L AS SO4)	DIS- SOLVEI (MG/L AS CL)	(MG/L) AS F)	AS SIO2)	AT 180 DEG. (DIS- SOLVEI (MG/L	SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLVED (TONS
MAR 29	9.6	76	0	62		76	4.5	0.4		440	3 132	0.20
SEP					2.4		1.5	0.1		148		
12	14	280	0	230		120	6.3	0.2	0 20	443	428	. 0.60
	DATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	ARSENIC DIS- SOLVED (UG/L AS AS) (O1000)	BORON, DIS- SOLVED (UG/L AS B) (O1020)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LEAD, DIS- SOLVED (UG/L AS PB) (O1049)	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) (O1145)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)
MAR				2.5		/						
SEP	9 2	183	1	50	210 70	<1	15 70	140	0.3	1 2	<10 <10	120
1.	٠٠٠٠	14.2)	180	70	<1	70	100	0.1	2	(10	330

GRAND RIVER BASIN

06354988 BOWMAN-HALEY LAKE NEAR HALEY, ND

LOCATION.--Lat 45°59'06", long 103°14'43", in NE1/4 sec.24, T.129 N., R.101 W., Bowman County, Hydrologic Unit 10130301, at dam on North Fork Grand River, and 6 mi west of Haley.

DRAINAGE AREA. -- 446 mi2, approximately.

RESERVOIR-ELEVATION AND CONTENTS RECORDS

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

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

REMARKS.--Reservoir is formed by a rolled earth-fill dam; storage began Aug. 22, 1966; dam completed April 1967.
Total capacity is 93,000 acre-ft at maximum pool, elevation, 2,777.0 ft. Dead storage is 4,280 acre-ft below lowest point of outlet, elevation, 2,740.0 ft. Normal operating storage is 20,100 acre-ft at elevation 2,755.0 ft, crest of spillway. Figures given herein represent total contents. Controlled releases are through a 30-inch or 8-inch gate valve. The spillway is uncontrolled "glory hole" type and discharges through a conduit 9 ft in diameter. The reservoir is for flood control, water supply, and recreation.

COOPERATION. -- Records of elevations and contents furnished by U.S. Army Corps of Engineers. Elevations affected by wind.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 37,540 acre-ft, Mar. 28, 1978, elevation, 2,762.66 ft; minimum since first reaching spillway level, 12,660 acre-ft, Sept. 16-20, 1982, elevation, 2,749.93 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 17,785 acre-ft, May 15, elevation, 2,754.22 ft; minimum, 12,810 acre-ft, Mar. 9, elevation, 2,750.87 ft.

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

1	Da te	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.	30	2,751.34	13,540	
Oct.	31	2.751.04	13,140	-400
Nov.	30	2.750.92	12,980	-160
Dec.	31	2,750.85	12,900	-80
CAL	YR 1988	-	-	-3,500
Jan.	31	2.750.90	12,960	+60
eb.	28	2,750.90	12,960	0
Mar.	31	2,751.73	14,060	+1,100
Apr.	30	2,753.23	16,210	+2,150
lay	31	2,753.90	17,260	+1,050
June	30	2.753.65	16,870	-390
July	31	2,753.10	16,010	-860
lug.	31	2,752.39	14,980	-1,030
Sept.	30	*2,751.91	14,300	-680
WTR	YR 1989	_		+760

^{* -} Estimated

GRAND RIVER BASIN

06355000 NORTH FORK GRAND RIVER AT HALEY, ND

LOCATION.--Lat 45°57'39", long 103°07'09", at southwest corner of sec.30, T.129 N., R.99 W., Bowman County, Hydrologic Unit 10130301, on left bank 10 ft downstream from county highway bridge, 300 ft south of post office at Haley, and 1 mi north of South Dakota state line.

DRAINAGE AREA .-- 509 mi2.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- May 1908 to September 1917, October 1945 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS (WATER YEARS) .-- WSP 1239: 1908-10, 1913-15(M), 1917(M).

GAGE.--Water-stage recorder. Datum of gage is 2,658.60 ft above National Geodetic Vertical Datum of 1929. Oct. 23, 1945 to June 18, 1951, nonrecording gage on downstream side of bridge near left abutment at present datum. See WSP 1729 or 1917 for history of changes prior to Oct. 23, 1945.

REMARKS.--Estimated daily discharges: Oct. 6 to Nov. 10, Dec. 3 to Mar. 31, July 13, 29 to Aug. 4, Aug. 25-30, Sept. 1, and 15-26. Records fair except those for periods of estimated daily discharge and beaver activity period of Sept. 19-30, which are poor. Flow regulated since August 1966 by Bowman-Haley Lake (station 06354988) 8 mi upstream.

AVERAGE DISCHARGE.--53 years (water years 1908-17, 1946-89), 26.3 ft³/s, 19,050 acre-ft/yr; median of yearly mean discharges, 20 ft³/s, 14,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 14,100 ft³/s, Apr. 7, 1952, gage height, 17.03 ft, from rating curve extended above 4,500 ft³/s on basis of discharge measurement at gage height, 15.09 ft, half of which was indirect measurement of flow over roadway outside of main channel; maximum gage height, 17.10 ft, Apr. 15, 1950; no flow at times.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 14 ft³/s, Apr. 28, gage height, 4.89 ft; maximum gage height, 5.72 ft, Mar. 9, backwater from ice; no flow for 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 2 3 4 5	.29 .38 .45 .54 .61	e1.8 e1.8 e1.6 e1.6	.99 1.0 e1.0 e1.1	e.42 e.45 e.60 e.75 e.85	e.40 e.35 e.30 e.27 e.25	e.33 e.31 e.29 e.29 e.30	2.8 2.2 1.9 1.5	3.5 2.8 2.5 2.3 2.0	3.0 2.7 3.0 4.4 4.4	3.0 2.7 2.7 2.3 1.5	e.15 e.05 e.03 e.01	e3.4 3.1 2.5 2.7 2.7
6 7 8 9 10	e.80 e.94 e1.0 e1.1 e1.1	e1.8 e1.8 e1.8 e2.0	e1.1 e1.1 e1.1 e1.1 e1.1	e.87 e.80 e.70 e.60 e.50	e.23 e.21 e.20 e.20 e.20	e.32 e.35 e.40 e5.5 e5.0	1.4 1.4 1.2 .98	1.7 1.6 1.6 1.5	4.3 4.6 5.0 5.5 3.2	•57 •43 •45 •26 •50	.00 .00 .00	1.8 1.1 .85 1.0 1.4
11 12 13 14 15	e1.3 e1.1 e1.3 e1.5 e1.0	2.0 2.0 1.8 1.7	e1.0 e1.1 e1.1 e1.1 e.95	e.40 e.30 e.25 e.25 e.25	e.21 e.23 e.25 e.30 e.40	e5.5 e4.5 e3.0 e2.0	.96 .93 .84 .71 .58	.99 .95 .95 .99	2.2 1.8 1.5 1.7	.68 .76 e1.0 5.7 7.2	.00 .00 .00	1.7 1.6 1.4 1.2 e1.2
16 17 18 19 20	e1.0 e1.5 e1.8 e2.0 e2.0	.92 1.1 7.0 2.6 1.8	e.95 e1.1 e1.3 e1.5 e1.5	e.27 e.30 e.35 e.45 e.55	e.40 e.40 e.38 e.36 e.35	e2.0 e2.0 e1.5 e1.5	.56 .60 .57 .60	1.1 1.1 .92 9.7 7.7	1.7 1.8 1.5 1.2	7.8 8.6 8.5 8.6 8.7	.00 .00 .00	e1.0 e1.0 e1.1 e1.1
21 22 23 24 25	e1.8 e1.6 e2.0 e1.8 e1.8	.75 .40 .91 .95	e1.3 e1.6 e1.5 e1.1 e1.0	e.60 e.55 e.50 e.45 e.40	e.36 e.38 e.40 e.45 e.55	e2.0 e2.0 e2.0 e4.0 e5.5	.53 .39 .29 .44 .63	6.7 5.1 4.8 4.6 4.7	.68 .88 .71 .82	6.7 3.5 1.9 1.5	.00 .00 .00 .00 e.76	e1.1 e1.1 e1.1 e1.1
26 27 28 29 30 31	e1.8 e1.6 e1.6 e1.8 e1.8	.89 .22 .78 .96 .95	e.95 e.60 e.30 e.33 e.35 e.38	e.45 e.45 e.45 e.50 e.60	e.45 e.40 e.35	e7.5 e8.5 e6.6 e5.0 e4.0 e3.5	1.5 7.9 12 8.0 5.0	5.3 5.9 3.6 3.2 3.2	1.1 1.2 2.0 2.8 3.2	.55 .43 .24 e.24 e.39 e.39	e3.2 e3.4 e4.0 e4.6 e4.0	e1.1 1.1 1.3 1.5
TOTAL MEAN MAX MIN AC-FT	41.11 1.33 2.0 .29 82	47.54 1.58 7.0 .22 94	31.60 1.02 1.6 .30 63	15.31 .49 .87 .25 30	9.23 .33 .55 .20 18	89.19 2.88 8.5 .29 177	59.45 1.98 12 .29 118	96.70 3.12 9.7 .92 192	70.54 2.35 5.5 .68 140	88.78 2.86 8.7 .24 176	24.10 .78 4.6 .00 48	44.55 1.48 3.4 .85 88

CAL YR 1988 TOTAL 324.15 MEAN .89 MAX 7.0 MIN .00 AC-FT 643 WTR YR 1989 TOTAL 618.10 MEAN 1.69 MAX 12 MIN .00 AC-FT 1230

e - Estimated

GRAND RIVER BASIN

06355000 NORTH FORK GRAND RIVER AT HALEY, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1951, 1972 to current year.

DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	CIFIC CON- DUCT- ANCE D (US/CM		AIR (DEG C)	ATURE WATER (DEG ((MG/L R AS C) CACO3	CALCIU DIS- SOLVE (MG/L AS CA	DIS- D SOLVE (MG/L) AS MG	, SODIUM, DIS- D SOLVED (MG/L) AS NA)	SODIUM PERCENT	RATIO
OCT O6	1330	0.8	0 2940	·	17.0	10.	.5 -					
17 FEB	1630	1.2	3010		-4.0	1.	.0 -	-	-		5 1 2	-
15 MAR	1545	0.4	0 2690	·	-3.0	0.	.0 -					
12 28	1545 1715	4.5 6.6	1670 1400					10 44	- 31	300	. 72	
05	1350	2.2	2400		8.5	12.	.5 -	-				
31 JUN	1150	3.1	2150			- 33		-				-
27 JUL	1610	1.2	2490)	29.0	26.	.0 -		-			
28	1025	0.2	8 2950	8.30	23.5	24.	.0 36	50 55	53	630	79	15
31	1155	4.1	3200		21.5	20.	.0 -					
DATE	POTAS- SIUM, DIS- SOLVEI (MG/L AS K)	BONATE FET-LA (MG/L AS HCO3)	, BONATE B FET-LAI (MG/L AS CO3)	LAB (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2) (OO405)	SULFAT DIS- SOLVE (MG/I AS SO4	DIS- ED SOLVE (MG/L	RIDE, DIS- ED SOLVE (MG/L) AS F)	AS SIO2)	AT 180 DEG. 0 DIS- SOLVEI (MG/L)	SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)
MAR 12	11	330	0	270	3.3	620	9.0	0.4	0 6.2	1170	1180	1.59
JUL 28	12	600	10	510	4.8	1200	14	0.8	0 2.9	2280	2290	3.10
1		SOLVED (TONS PER DAY)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	DIS- SOLVED (UG/L AS B)	DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145) (STRON- TIUM, DIS- SOLVED (UG/L AS SR) 01080)
MAR 12. JUL		14.2	<1	720	80	1	30	70	0.1	1	<10	710
28.	• • •	1.72	1	1600	30	1	70	50	0.1	4	<10	990

MISSOURI RIVER MAIN STEM

06439980 LAKE OAHE NEAR PIERRE, SD

LOCATION.--Lat 44°27'30", long 100°23'29", in NE1/4 sec.1, T.111 N., R.80 W., 5th principal meridian, Hughes County, Hydrologic Unit 10130105, in Pier A of Control Tower No. 1 of powerhouse intake structure of dam on Missouri River, 6.0 mi northwest of Pierre, 7.1 mi upstream from Bad River, and at mile 1,072.3.

DRAINAGE AREA .-- 243,500 mi2, approximately.

RESERVOIR-ELEVATION AND CONTENTS RECORDS

PERIOD OF RECORD. -- August 1958 to current year (monthend contents only). Prior to October 1967, published as Oahe Reservoir near Pierre.

GAGE.--Water-stage recorder. Datum of gage is National Geodetic Vertical Datum of 1929. Prior to Jan. 14, 1958, nonrecording gages at various locations upstream from outlet works, Jan. 14, 1959, to Sept. 30, 1962, recorder in Tower No. 1 of outlet works, all at same datum.

REMARKS.--Reservoir is formed by an earthfill dam; storage began in August 1958. Maximum capacity, 23,338,000 acre-ft below elevation 1,620.0 ft (top of spillway gates). Normal maximum, 22,240,000 acre-ft below 1,617.0 ft, of which about 2,390,000 acre-ft is designated for flood control. Inactive storage, 5,451,000 acre-ft below elevation 1,540.0 ft. Dead storage, 1,970 acre-ft below elevation 1,425.0 ft (invert of lowest outlet tunnel). Figures given herein represent elevations at powerhouse intake structure and total contents adjusted for wind effect.

The spillway consists of a gated chute with flat crest at elevation 1,596.5 ft, 8 gates, 50 by 23.5 ft each; design capacity, 300,000 ft³/s. The outlet works consist of 7 turbines with a generating capacity of 85,000 kilowatts each. Water is used for flood control, navigation, power, and incidental uses.

COOPERATION .-- Records of elevation and contents provided by U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 22,764,000 acre-ft, May 14, 1986, affected by wind; minimum since initial filling, 12,619,000 acre-ft, Sept. 30, 1989.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 15,161,000 acre-ft, Apr. 9; minimum contents, 12,619,000 acre-ft, Sept. 30.

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

							Da	te	9							Elevation (feet)	Contents (acre-feet)	Change in content (acre-feet)
Sept.	30															1,592.78	14,920,000	
Oct.	31															1,590.31	14,276,000	-644.000
lov.	30															1,588.55	13,905,000	-371,000
ec.																1,589.09	13,988,000	+83,000
CAI	YR	19	88													-	-	-4,116,000
Jan.	31															1,589.52	14,072,000	+84,000
eb.	29															1,591.20	14,523,000	+451,000
ar.	31						 									1,593.17	15,021,000	+498,000
pr.	30															1,592.53	14,857,000	-164,000
ay	31															1,590.85	14,433,000	-424,000
une	30						 									1,589.28	14,065,000	-368,000
uly	31						 									1,587.53	13,613,000	-452,000
ug.	31						 									1,584.72	12,912,000	-701,000
Sept.	30			•	•							•				1,583.20	12,619,000	-293,000
WT	R YR	19	89															-2,301,000

NOTE .-- Lake frozen over Feb. 5 to Apr. 7.

06467600 JAMES RIVER NEAR MANFRED, ND

LOCATION.--Lat 47°38'40", long 99°49'40", near midpoint of north line sec.15, T.148 N., R.72 W., Wells County, Hydrologic Unit 10160001, on right upstream wingwall of bridge on county highway, and 5 mi southwest of Manfred.

DRAINAGE AREA .-- 253 mi2, of which about 197 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- October 1954 to August 1957 (annual maximum only), September 1957 to current year (seasonal records only from 1982 to 1985).

GAGE. -- Water-stage recorder. Datum of gage is 1,605.73 ft above National Geodetic Vertical Datum of 1929. Prior to Sept. 16, 1957, crest-stage gage only on downstream side of bridge at same datum.

REMARKS. -- Estimated daily discharges: Mar. 10 to Apr. 5. Records fair except those for period of estimated daily discharge, which are poor.

AVERAGE DISCHARGE.--29 years (water years 1958-82, 1986 to current year), 4.07 ft^3/s , 2,950 acre-ft/yr; median of yearly mean discharges, 3.6 ft^3/s , 2,600 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, about 2,000 ft3/s, Apr. 18 or 19, 1979, gage height, 9.2 ft, from highwater mark, backwater from snow; no flow for long periods each year.

EXTREMES FOR CURRENT YEAR .-- Peaks greater than a base of 30 ft3/s and maximum (*):

Date	Time	Discharge (ft3/s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 29	0930	*20	ab*2 00				

DIGGUARGE GURLS BEER DER GEGOND WAREN VELD GOMODER 1000 DO GERMENDER 1000

No flow for several months.

a - observed b - ice jam

		DISCHARG	E, CUBIC	FEET PER		MATER Y	EAR OCTOBER ES	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	e10	.79	1.1	.00	.00	.00
2	.00	.00	.00	.00	.00	.00	e9.0	.74	3.5	.00	.00	.00
3	.00	.00	.00	.00	.00	.00	e7.8	.65	5.9	.00	.00	.00
4	.00	.00	.00	.00	.00	.00	e4.2	.69	7.2	.00	.00	.00
2 3 4 5	.00	.00	.00	.00	.00	.00	e2.7	.69	2.0	.00	.00	.00
6	.00	.00	.00	.00	.00	.00	2.5	.60	.46	.00	.00	.00
7	.00	.00	.00	.00	.00	.00	1.7	.60	.25	.00	.00	.00
8	.00	.00	.00	.00	.00	.00	1.1	.60	.14	.00	.00	.00
9	.00	.00	.00	.00	.00	.00	.69	.60	.03	.00	.00	.00
10	.00	.00	.00	.00	.00	e.10	•49	.49	.00	.00	.00	.00
11	.00	.00	.00	.00	.00	e.20	.37	.34	.00	.00	.00	.00
12	.00	.00	.00	.00	.00	e1.0	.34	.30	.00	.00	.00	.00
13	.00	.00	.00	.00	.00	e.50	.22	.25	.00	.00	.00	.00
14	.00	.00	.00	.00	.00	e.20	.20	.23	.00	.00	.00	.00
15	.00	.00	.00	.00	.00	e.10	.30	.20	.00	.00	.00	.00
16	.00	.00	.00	.00	.00	e.05	.37	.13	.00	.00	.00	.00
17	.00	.00	.00	.00	.00	e.03	.40	.10	.00	.00	.00	.00
18	.00	.00	.00	.00	.00	e.00	.40	.03	.00	.00	.00	.00
19	.00	.00	.00	.00	.00	e.00	.40	.00	.00	.00	.00	.00
20	.00	.00	.00	.00	.00	e.00	.46	.00	.00	.00	.00	.00
21	.00	.00	.00	.00	.00	e.00	.56	.00	.00	.00	.00	.00
22	.00	.00	.00	.00	.00	e.00	.65	.00	.00	.00	.00	.00
23	.00	.00	.00	.00	.00	e.00	.65	.00	.00	.00	.00	.00
24	.00	.00	.00	.00	.00	e.10	.74	.00	.00	.00	.00	.00
24 25	.00	.00	.00	.00	.00	e.20	.79	.00	.00	.00	.00	.00
26	.00	.00	.00	.00	.00	e8.0	.84	.00	.00	.00	.00	.00
27	.00	.00	.00	.00	.00	e7.0	1.0	.00	.00	.00	.00	.00
28	.00	.00	.00	.00	.00	e5.0	.96	.00	.00	.00	.00	.00
29	.00	.00	.00	.00		e20	.90	.00	.00	.00	.00	.00
30	.00	.00	.00	.00		e15	.84	.00	.00	.00	.00	.00
31	.00		.00	.00		e13		.00		.00	.00	
TOTAL	0.00	0.00	0.00	0.00	0.00	70.48	51.57	8.03	20.58	0.00	0.00	0.00
MEAN	.00	.00	.00	.00	.00	2.27	1.72	.26	.69	.00	.00	.00
MAX	.00	.00	.00	.00	.00	20	10	.79	7.2	.00	.00	.00
					.00	.00	.20	.00	.00	.00	.00	.00
MIN	.00	.00	.00	.00			102	16	41	.00	.00	.00
AC-FT	.0	.0	.0	.0	.0	140	102	10	41	.0	.0	.0

TOTAL 404.92 MEAN 1.11 MAX 60 MIN .00 AC-FT 803 TOTAL 150.66 MEAN .41 MAX 20 MIN .00 AC-FT 299 WTR YR 1989

e - Estimated

06467600 JAMES RIVER NEAR MANFRED, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1959-60, 1962-64, 1972 to current year.

		W	ATER-QUA	TTTY D	DATA, WAT	ER Y	EAR O	CTOE	ER 19	88 T	O SEP	TEMB	ER 19	89					
DATE	TIME	DI CHAR INS CUB FE PE SEC (OOO	GE, SF ST. CI SIC CO SET DU SR AN	PE- IFIC DN- JCT- ICE S/CM)	PH (STAND- ARD UNITS) (00400)	ATO A: (DEC	PER- URE IR G C) 020)	WA (DE	PER- URE TER G C) O1O)	I (N	UR- ID- TY TU) 076)	SO (M	GEN, IS- LVED G/L) 300)	SO: (P) C: SA' AT	GEN, IS- LVED ER- ENT TUR- ION) 301)	HAF NES TOT (MC AS CAC	SAL J/L SO3)	CALCI DIS- SOLV (MG/ AS C	ED L
MAR 27	1138	6	.5	350	7.25		2.0		0.5		4.9		8.3		58		110	26	
APR 06	1451	2	6	520			6.5		6.0										
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODI DIS SOLV (MG AS	ED /L SC NA) PER	DIUM RCENT 1932)	SODIUM AD- SORP- TION RATIO (00931)	SOI SOI (MC AS	TAS- IUM, IS- LVED G/L K) 935)	LIN (M A CA	KA- ITY AB G/L S CO3) 410)	DI SO (M	FATE S- LVED G/L SO4) 945)	RI DI SO (M AS	LO- DE, S- LVED G/L CL) 940)	RES AT DEC D SOI (MC	IDS, IDUE 180 G. C IS- LVED G/L) 300)	SOL	OF STI- ITS, IS- VED	SOLID DIS SOLV (TON PER AC-F (7030	ED S
MAR	12																		No.
27	12	32		35	1	1		101			2		5.5		255		232	0.	
DATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	AT 1 DEG. SUS- PEND (MG	C, E C, E ED (M	TRO- SEN, PRATE DIS- DLVED IG/L S N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	NITE DI SOI (MC	TRO- EN, RITE IS- LVED G/L N)	NO2 TO (M	TRO- EN, +NO3 TAL G/L N) 630)	NO2 D SO (M AS	TRO- EN, +NO3 IS- LVED G/L N) 631)	MI G AMM TO (M AS	TRO- EN, ONIA TAL G/L N)	AMMO D: SOI (MO	TRO- EN, ONIA IS- LVED G/L N) 608)		AM- A + NIC CAL (/L N)	NITR GEN, A MONIA ORGAN DIS. (MG/ AS N (0062	M- ic L
MAR					-														
27	4.51		7 0	.190	0.040	0.	.030	0	.200	0	.220	0	.190	0	.170	. 1	.9	1.	1
DA:	PHO TO (M AS	ROUS TAL G/L P)	PHOS- PHOROUS DIS- SOLVED (MG/L AS P) (00666)	PHOSU PHORU ORTH TOTA (MG/ AS P	S, ORT O, DIS L SOLV L (MG/	OUS HO, ED L	PHOR PHOR ORGA TOT (MG AS (006	OUS NIC AL /L P)	ARSE TOT (UG AS (010	AL /L AS)	ARSEI DIS SOL' (UG AS (O100	VED /L AS)	DI	S- VED /L B)	(UG AS	AL OV- BLE /L CD)	CADM DI SOL (UG AS (O10	S- VED /L CD)	
MAR 27		.480	0.430	0.3	52 0.	360	. 0	.13		2		3		110		1		<1	
DA: MAR 27	DI SO (U AS TE (O1	BON, ANIC TAL G/L C)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE) (01045) 590 CYANIDE TOTAL (MG/L AS CN) (00720)	IRON DIS SOLV (UG/AS F (0104 CYANI DIS-SOLV (MG/AS C) (0072	DI SOLL (UG E) AS 6) (010 CHLO. PHY DE PLA TO ED CHRO. N) (UG	S-VED /L PB) 49) <5 R-A TO- NK- MO ROM /L)	MAN NES TOT REC ERA (UG AS (O10 CHLO PHY PLA CHRO CHRO (UG (709	GA- E, AL OV- BLE /L MN) 55) 30 R-B- NN MO ROM /L)	MANN NES DI SOL (UG AS (O10) PLANN TOO BIOM ASH (MG/	E, S- VED /L MN) 56) 22 K- N ASS WT L)	MERCI DII SOL' (UG AS I (718)	S-VED /L HG) 90) 0.1	SELINIUM TOTA (UG, AS : (O114 SED: MENT SUS. PENI (MG, (801)	(1, AL /L (5E) (47) (1, C) (1, C) (1, C)	SELINIUI DI SOLI (UG AS (O11. SED MEN' DI CHARCE SUI PEN (T/D (801.	M, S- VED /L SE) 45) <1 I-, S- GE, DED AY)	SIE	S-VED /L ZN) 90) 10 D. SP. VE AM. NER AM	
MAR 27	. 1	4	<0.010	<0.	01 0.	500	<0.	200	5	.2	1100			17	0	.30		97	

06468170 JAMES RIVER NEAR GRACE CITY, ND

LOCATION.--Lat 47°33'29", long 98°51'45", in NW1/4NW1/4NW1/4 sec.17, T.147 N., R.64 W., Foster County, Hydrologic Unit 10160001, on left bank on upstream side of county highway bridge and 2.5 mi northwest of Grace City.

DRAINAGE AREA. -- 1,060 mi², approximately, of which about 650 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- June 1968 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,457.60 ft, above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 7 to Apr. 16. Records fair except those for period Mar. 26 to Apr. 16, which are poor.

AVERAGE DISCHARGE.--21 years, 30.0 ft^3/s , 21,740 acre-ft/yr; median of yearly mean discharges, 19 ft^3/s , 13,800 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,100 ft³/s, Apr. 13, 1969, gage height, 12.00 ft; no flow at times most years.

EXTREMES FOR CURRENT YEAR. -- Peak discharges greater than base discharge of 200 ft3/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 30	1345	*100	a*7.54				

No flow for many days. a - Backwater from ice

		DISCHA	RGE, CUBI	C FEET PE	R SECOND	, WATER YE MEAN VALUE	AR OCTOBER	1988 TO	SEPTEMBER	1989		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.05	.06	e.02	e.00	e.00	e.00	e10	1.6	•39	.24	.12	.67
2	.00	.06	e.02	e.00	e.00	e.00	e12	1.3	.37	.19	.13	.78
3	.00	.01	e.02	e.00	e.00	e.00	e15	1.2	.30	.21	.30	.91
3	.00	.01	e.02	e.00	e.00	e.00	e8.0	1.3	.24	.18	.29	.85
	.02	.09	e.02	e.00	e.00	e.00	e6.0	1.1	.24	.13	.23	.87
5	.02	.09	e.02	e.00	e.00	e.00	60.0	1.1	• 24	. 15	•2)	.01
6	.08	.00	e.02	e.00	e.00	e.00	e6.6	•99	.24	.06	.14	.87
7	.06	e.00	e.01	e.00	e.00	e.00	e30	1.0	.19	.06	.13	.71
8	.09	e.00	e.00	e.00	e.00	e.00	e25	•99	.12	.05	.13	.57
9	.10	e.00	e.00	e.00	e.00	e.00	e22	.90	.12	.00	.14	.46
10	.00	e.00	e.00	e.00	e.00	e.00	e20	.90	.12	.00	.12	.43
44	0.4	- 00	- 00	- 00	- 00			.90	.26	00	.12	.47
11	.04	e.00	e.00	e.00	e.00	e.00	e16			.00		
12	.08	e.02	e.00	e.00	e.00	e.00	e15	.85	-54	.06	.06	.46
13	.10	e.05	e.00	e.00	e.00	e.00	e13	.67	.54	.01	.05	.48
14	.18	e.00	e.00	e.00	e.00	e.00	e12	.66	.65	.00	.00	.48
15	.16	e.05	e.00	e.00	e.00	e.00	e11	.60	.72	.00	.00	.48
16	.06	e.06	e.00	e.00	e.00	e.00	e10	.55	.72	.00	.00	.43
17	.04	e.06	e.00	e.00	e.00	e.00	8.0	.53	.71	.00	.00	.44
18	.00	e.06	e.00	e.00	e.00	e.00	7.1	.52	.63	.00	.25	.43
19	.00	e.06	e.00	e.00	e.00	e.00	6.7	.49	.63	.00	.50	.31
20	.04	e.06	e.00	e.00	e.00	e.00	6.6	.47	.56	.00	.36	.30
20	.04	0.00	0.00	0.00	6.00	e.00	0.0	• 41	.,0			
21	.06	e.06	e.00	e.00	e.00	e.00	6.0	.42	.52	.00	.54	.30
22	.04	e.06	e.00	e.00	e.00	e.00	6.2	.42	.48	.00	.54	.25
23	.03	e.06	e.00	e.00	e.00	e.00	4.7	.42	.47	.00	.50	.18
24	.00	e.06	e.00	e.00	e.00	e.00	3.8	.48	.42	.00	.41	.20
25	.02	e.06	e.00	e.00	e.00	e.00	3.4	.37	.42	.00	.30	.20
00	00	e.06	- 00	- 00	- 00	e.00	7 7	.36	.36	.00	.23	.14
26	.00		e.00	e.00	e.00		3.3					.18
27	.04	e.05	e.00	e.00	e.00	e.05	3.0	.39	.25	.00	.18	
28	.00	e.04	e.00	e.00	e.00	e.13	2.6	.39	.24	.14	.28	.17
29	.05	e.03	e.00	e.00		e5.0	2.1	.40	.24	.38	.24	.12
30	.06	e.03	e.00	e.00		e80	2.0	.42	.24	.26	.18	.14
31	.06		e.00	e.00		e30		•39		.22	.62	
TOTAL	1.46	1.16	0.13	0.00	0.00	115.18	297.1	21.98	11.93	2.19	7.09	13.28
MEAN	.047	.039	.004	.00	.00	3.72	9.90	.71	.40	.071	.23	.44
MAX	.18	.09	.02	.00	.00	80	30	1.6	.72	.38	.62	.91
MIN	.00	.00	.00	.00	.00	.00	2.0	.36	.12	.00	.00	.12
AC-FT	2.9	2.3	.3	.00	.00	228	589	44	24	4.3	14	26
AC-FT	2.9	2.5	• 5	.0	.0	220	709	44	24	4.0	14	20

CAL YR 1988 TOTAL 1745.76 MEAN 4.77 MAX 120 MIN .00 AC-FT 3460 WTR YR 1989 TOTAL 471.50 MEAN 1.29 MAX 80 MIN .00 AC-FT 935

e - Estimated

06468170 JAMES RIVER NEAR GRACE CITY, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	TIME	DIS CHARG INST CUBI FEE PER SECO (0006	E, S C C T D ND (U	SPE- SIFIC SON- DUCT- NCE S/CM)	PH (STAND- ARD UNITS) (00400)	ATU	PER- JRE IR	TEM AI WA (DE	PER- URE TER G C)	I E I	CUR- BID- CTY ITU) 0076)	SO (M	GEN, IS- LVED G/L) 300)	SO (P	GEN, DIS- LVED ER- ENT TUR- TON)	TO (M A CA	RD- SS TAL G/L S CO3)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
APR 11	0930	16		450	7.45		0.0		0.5		1.0		9.2		63		140	31
MAY 17	1100	0.	40	1400	8.13		16.5		17.0		3.8		4.3		45		270	49
AUG 23	1400	0.	40	1650	8.80		28.0		23.0		2.1						160	25
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIU DIS- SOLVE (MG/ AS N	D L S A) PE	ODIUM RCENT 0932)	SODIUM AD- SORP- TION RATIO (00931)	SI	K)	LIN (M A CA	KA- ITY AB G/L S CO3)	DI SO (M	FATE S- LVED G/L SO4)	RI DI SO (M	LO- DE, S- LVED G/L CL)	RES AT DE D SO (M	IDS, IDUE 180 G. C IS- LVED G/L) 300)	SUM CON TUE D SO (M	IDS, OF STI- NTS, IS- LVED G/L) 301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
APR 11	16	34		33	1	7	7.9	109		10	0		9.8		275		267	0.37
MAY 17	36	210		61	6	14	1	395		27	0	7.	3		912		890	1.24
AUG 23	23	290		78	10	16	5	339		35	0	11	0		1030		1020	1.40
DATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	RESID TOTAL AT 10 DEG. SUS- PENDE (MG/ (0053	5 NI C, SD ()	ITRO- GEN, TRATE DIS- OLVED MG/L S N) 0618)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	NITE DI	S- VED /L N)	NO2 TO (M	TRO- EN, +NO3 TAL G/L N) 630)	NO2 D SO (M AS	TRO- EN, +NO3 IS- LVED G/L N) 631)	AMMO TO: (MO AS	TRO- EN, ONIA TAL G/L N)	AMM D SO (M AS	TRO- EN, ONIA IS- LVED G/L N) 608)	GEN MON ORG TO (MO	IRO- , AM- IA + ANIC IAL G/L N)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)
APR						,		,		,				,		,,,,	,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
11 MAY	12.0	17		0.360	0.030		030		.400		.390		540		.530		2.2	1.5
17 AUG 23	0.98	11			<0.010		010		.100		.100		.030		.020		1.9	1.1
23	1.11	3			<0.010		010	ζ0	.100	ζ0	.100	0	.040	0	.040		2.5	2.5
DAT	PHOR PHOR TOT (MG AS	S- P OUS AL /L P)	PHOS- HOROUS DIS- SOLVED (MG/L AS P) 00666)	ORT	US, ORTHO, DIS	HO, HO, ED (L	PHOR PHOR ORGA TOT (MG AS (006	OUS NIC AL /L P)	ARSE TOT (UG AS	AL /L AS)	ARSEI SOLI (UG, AS (0100	ED L AS)	BORG DI SOL' (UG AS (O10	VED /L B)	TOTA RECO ERAI (UG, AS (AL OV- BLE /L CD)	CADMI DIS SOLV (UG) AS (S- /ED /L CD)
APR 11	0.	240	0.180	0.	168 0.	155	0	.07		2		2		40		<1		<1
MAY 17		130	0.070			033		.08		4		4		310	,	<1		<1
AUG 23		120	0.030			027		.09		3		4		300		<1		<1
DAT	(UG AS	ER, VED /L CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE) 01045)	IRO DI SOL (UG AS	S- DI VED SOI /L (UC FE) AS	S- VED /L PB)	MANG NES TOT REC ERA (UG AS	E, AL OV- BLE /L MN)	MANO NESI DI SOL' (UG AS	E, S- VED /L MN)	MERCI DIS SOLV (UG, AS I	ED L G)	SELI NIUI TOTA (UG, AS (E- M, AL /L SE)	SELE NIUM DIS SOLV (UG) AS S	E- M, S- /ED /L SE)	ZINC DIS SOLV (UG/ AS Z	S- VED 'L ZN)
APR 11		<1	80		49	<5		130		100	(0.5		<1		<1		5
MAY 17		3	440		24	<1		370		210		0.1		<1		<1		14
AUG 23		2	200		40	<1		110		41		.9		<1		<1		6

299

JAMES RIVER BASIN 06468170 JAMES RIVER NEAR GRACE CITY, ND--CONTINUED WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS- SOLVED (MG/L AS CN) (00723)	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)	PLANK- TON BIOMASS ASH WT (MG/L) (81353)	PLANK- TON BIOMASS DRY WT (MG/L) (81354)	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)
APR 11	8.4	<0.010	<0.01	F 70	0.000	0.7	1200	2	0.09	100
MAY	0.4	10.010	(0.01	5.70	0.900	8.3	1200	2	0.09	100
17 AUG	16	<0.010	<0.01	7.40	0.300	4.5	1200	12	.01	93
23	25	<0.010	<0.01					10	.01	86

06468190 JUANITA LAKE TRIBUTARY NEAR GRACE CITY, ND

LOCATION.--Lat 47°32'54", long 98°45'31", in SW1/4NE1/4SE1/4 sec.13, T.147 N., R.64 W., Foster County, Hydrologic Unit 10160001, on left bank 1,000 ft upstream from Lake Juanita, 2 mi east of Grace City.

DRAINAGE AREA .-- 94 mi2, approximately, of which about 54 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- March 1986 to September 1989 (discontinued). Seasonal records only.

GAGE.--Water-stage recorder. Datum of gage is 1,460.00 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS.--Estimated daily discharges: Mar. 31 to Apr. 3 and Apr. 11 to May 20. Records poor.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 204 ft³/s, Apr. 2, 1987, gage height, 20.85 ft; no flow for several months each year.

EXTREMES FOR CURRENT PERIOD. -- Maximum discharge, 19 ft3/s, Apr. 4, gage height, 19.10 ft; no flow for several months.

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

MEAN VALUES DAY OCT JUN .TIII. AUG SEP NOV DEC JAN FEB MAR APR MAY .00 .00 e.50 e.02 .00 .00 .00 .00 2 e1.0 e.02 .00 .00 .00 .00 e7.0 e.02 .00 .00 .00 .00 .00 4 .00 .00 e.02 .00 .00 .00 5 .00 .00 .00 .00 .00 11 e.02 678 .00 e.02 .00 .00 .00 .00 11 7.5 4.3 2.3 .00 e.02 .00 .00 .00 .00 .00 .00 .00 .00 e.02 .00 .00 .00 .00 .00 9 e.02 .00 .00 .00 .00 10 .00 .00 1.9 e.02 .00 e.01 .00 .00 .00 11 12 13 14 15 .00 e1.5 e.80 .00 .00 .00 .00 e.01 .00 e.01 .00 .00 .00 .00 .00 e.60 e.01 .00 .00 e.50 e.40 .00 .00 .00 e.01 .00 .00 .00 .00 .00 16 .00 .00 .00 .00 .00 e.30 e.01 17 e.25 e.15 e.01 .00 .00 .00 .00 .00 e.01 .00 .00 .00 .00 .00 .00 .00 .00 .00 19 .00 e.10 e.01 20 .00 e.08 e.01 .00 .00 .00 .00 21 22 23 .00 e.04 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 .00 e.03 .00 .00 .00 .00 .00 .00 e.03 24 .00 e.03 .00 .00 .00 .00 .00 25 .00 .00 .00 .00 .00 .00 e.03 e.03 .00 .00 .00 .00 26 .00 .00 27 .00 e.03 .00 .00 .00 .00 .00 28 .00 e.03 .00 .00 .00 .00 .00 .00 29 .00 e.03 .00 .00 .00 .00 30 .00 e.02 .00 .00 .00 .00 .00 31 e.10 .00 .00 .00 ---0.00 0.30 0.00 0.00 0.00 TOTAL 0.10 67.48 MEAN .003 2.25 .010 .00 .00 .00 .00 .00 MAX .10 16 .02 .00 .00 .00 .00 .00 .00 MIN .00 .02 .00 .00 AC-FT .2 134 .6 .0 .0 .0 .0

e - Estimated

06468190 JUANITA LAKE TRIBUTARY NEAR GRACE CITY, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- March 1986 to April 1989 (discontinued).

			W	ATER.	-QUAL	TTY	DATA,	WATE	ER YE	AR O	CTOBE	R 19	88 TO	SEP.	EMBE	R 198	39					
DATE		TIME	CHAR INS CUB FE PE	T. IC ET R OND	SPE CIF CON DUC ANC (US/	IC T- E CM)	AR	ND-	AI (DEG	RE R C)	TEMP ATU WAT (DEG (OOO	RE ER C)		U)	OXYG DI SOL (MG (OO3	S- VED /L)	SOL (PE CE SAT	S- VED R- INT IUR- ION)	HAR NES TOT (MG AS CAC	S AL /L 03)	CALC: DIS- SOL' (MG, AS (VED /L CA)
10 05 19		1600 1530 0930	1 7 0	.5		580 520 770		•45	1	5.0 0.0 5.0		4.0 2.0 5.5		.50		2.0		90		240	59	=
DATE		MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SOLV (MG	ED /L NA)	SOD PERC (009	IUM ENT	SOR TI RAT	IO	SI SOL (MG AS	UM, S- VED /L K)	LINI LA (MG	TY B /L	DIS SOL (MG	VED /L 04)	DIS	E, VED /L CL)	AT 1 DEG DI	DUE 80 . C S- VED	SOLI SUM CONS TUEN DI SOL (MG (703	OF TI- TS, S- VED /L)	SOLII SOLV (TON PER AC-II (7030	S- VED NS R FT)
APR 10		22	25			18		0.7		5	112		160		12			306		351	0	54
	DATE	SOL D SO (T P	IDS, IS- LVED ONS ER AY) 302)	RESI TOTA AT DEG SUS PENI	105 . C, S- DED G/L)	NIT TO (MC AS	TRO- EN, RITE	NITE DI SOI (MC AS	TRO- EN, RITE IS- LVED	NI G NO2 TO (M AS	TRO- EN, +NO3 TAL G/L N) 630)	NO2 D SO (M	TRO- EN, +NO3 IS- LVED	NIT GE AMMO TOT (MO	RO- N, NIA	NIT GE AMMO DI SOI (MO AS	PRO- EN, ONIA IS- LVED E/L N)	(MC	TRO-	MONIORGA ORGA DIS (MC	PRO- AM- IA + ANIC S. I/L N)	.54
APR																						
10			1.24		12	0	.010	<0.	.010	<0	.100	<0	.100	0.	080	0.	.090		1.8		1.3	
	DATE	PHO TO (M AS	OS- ROUS TAL G/L P) 665)	PHOP PHOP SOI (MC AS (OO6	ROUS IS- LVED G/L P)	PHONO OR' TO' (MC	OS- RUS, IHO, IAL G/L P) 507)	PHOF ORT DIS SOLV (MG/ AS F	ROUS THO, S- /ED /L	PHO	ANIC TAL G/L P)	TO' (UC	ENIC TAL G/L AS)	SOL (UC	S- VED /L AS)	SOI (UC AS	S- VED	TOT REC ERA (UC AS	COV- ABLE S/L CD)	SOI (UC	S- VED /L CD)	
APR 10		0	.220	0.	180	0	.161	0.	.151		0.06		1		1		40		1		<1	
	DATE	COP DI SO (U	PER, S- LVED G/L CU) 040)	IRO TOT REC ERA	ON, FAL COV- ABLE FE)	IRO D: SOI (UC AS	ON, IS- LVED G/L FE) 046)	LEA DI SOL (UC	AD, IS- LVED	MAI NE TO RE ER. (UC	NGA- SE, TAL COV- ABLE G/L MN) 055)	NES SOI (UC AS	NGA- SE, IS- LVED G/L MN) 056)	SOL (UC	URY S- VED /L HG)	SEL NIU TOT	E- IM, PAL S/L SE)	(UC	E- IM, IS- VED	ZIN DI SOL (UC	IC, S- VED E/L ZN)	
APR 10			2		110		72		<5		60		35		0.4		<1		<1		6	
	DATE	ORG TO (M AS	BON, ANIC TAL G/L C) 680)	CYAN TOT (MC AS (OO7	NIDE TAL S/L CN)	SOI (MC AS	NIDE	CHLC PHY PLA TO CHRC FLUC	OR-A YTO- ANK- ON OMO OROM	PH' PL. TCHRO	OR-B YTO- ANK- ON	ASH (MG	NK- ON MASS WT	PLAN TO BIOM DRY (MG/ (813	K- N ASS WT L)		OI- IT, S- IDED	CHAR	OI- IT, IS- IGE, IS- IDED OAY)	SIE DI % FI	D. ISP. EVE AM. NER IAN	
APR 10		1	4	<0.	.010	<(0.01	2.	.10	0	.400		4.2	1200			5	(.01		68	

06468250 JAMES RIVER ABOVE ARROWWOOD LAKE NEAR KENSAL, ND

LOCATION.--Lat $47^{\circ}23'59"$, long $98^{\circ}47'50"$, in SW1/4SW1/4SW1/4 sec.2, T.145 N., R.64 W., Foster County, Hydrologic Unit 10160003, on left bank 20 ft upstream from bridge.

DRAINAGE AREA. -- 1,200 mi², approximately, of which about 750 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- Water year 1986 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,440.00 ft above National Geodetic Vertical Datum of 1929, from topographc map.

REMARKS.--Estimated daily discharges: Mar. 27 to Apr. 6 and Sept. 8-30. Records good except those for periods of estimated discharge, which are fair.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft3/s, Mar. 28, 1987, gage height 11.48 ft, backwater from ice; no flow at times most years.

EXTREMES FOR CURRENT PERIOD .-- Peak discharges greater than base of 200 ft3/s and maximum (*):

Date	Time	Discharge (ft3/s)	Gage Height (ft)	Date	Time	Discharge (ft ³ /s)	Gage Height (ft)
Apr. 9	0500	*97	*3.09				

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

No flow for several months.

DAY OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP 1				Acres Control		1	MEAN VALUE	S					
2	DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
\$\frac{5}{4}\$													
5 .00 .00 .00 .00 .00 .00 .00 e28 6.9 2.8 .00 .00 4.9 6 .00 .00 .00 .00 .00 .00 .00 .00 .00 .	2												
5 .00 .00 .00 .00 .00 .00 .00 e28 6.9 2.8 .00 .00 4.9 6 .00 .00 .00 .00 .00 .00 .00 .00 .00 .	3								4.9				
6 .00 .00 .00 .00 .00 .00 .00 .00 .00 .0	4									3.3			5.8
7	5	.00	.00	.00	.00	.00	.00	e28	6.9	2.8	.00	.00	4.9
8 .00 .00 .00 .00 .00 .00 .00 .55 .5.8 2.3 .00 .00 e3.6													
9 .00 .00 .00 .00 .00 .00 .00 .00 .50 .50	7	.00	.00					30			.00		
10 .00 .00 .00 .00 .00 .00 .00 .00 .34 4.8 2.0 .00 .00 e2.8 11 .00 .00 .00 .00 .00 .00 .00 .00 .00 .	8	.00	.00	.00	.00	.00	.00						
11	9	.00	.00	.00	.00	.00	.00	59					e3.2
12	10	.00	.00	.00	.00	.00	.00	34	4.8	2.0	.00	.00	e2.8
15	11	.00	.00	.00	.00	.00	.00	30	3.9				
15	12	.00	.00	.00	.00	.00	.00	27		3.9			
15 .00 .00 .00 .00 .00 .00 .00 .24 2.5 3.5 .00 .00 e.80 16 .00 .00 .00 .00 .00 .00 .00 .00 .24 2.3 2.9 .00 .00 e.80 17 .00 .00 .00 .00 .00 .00 .00 .00 .00 .0	13	.00	.00	.00	.00	.00	.00	27		3.9			
15 .00 .00 .00 .00 .00 .00 .00 .00 .24		.00	.00						3.1				
17	15	.00	.00	.00	.00	.00	.00	24	2.5	3.5	.00	.00	e.80
17	16	.00	.00	.00	.00	.00	.00	24	2.3	2.9			
19	17	.00	.00	.00	.00	.00	.00		2.7				
20 .00 .00 .00 .00 .00 .00 .00 .14 2.1 1.9 .00 .00 e.20 21 .00 .00 .00 .00 .00 .00 .00 .13 1.8 1.9 .00 .00 e.10 22 .00 .00 .00 .00 .00 .00 .00 11 1.4 1.8 .00 .00 e.08 23 .00 .00 .00 .00 .00 .00 .00 .00 9.6 1.6 1.6 .00 .00 e.06 24 .00 .00 .00 .00 .00 .00 .00 9.0 2.3 1.5 .00 .00 e.06 25 .00 .00 .00 .00 .00 .00 .00 9.4 3.0 1.4 .00 .00 e.02 26 .00 .00 .00 .00 .00 .00 9.5 2.9 1.2 .00 .00 e.02 27 .00 .00 .00 .00 .00 .00 e.00 9.5 2.0 1.91 .00 .00 e.00 28 .00 .00 .00 .00 .00 e.00 9.5 2.0 1.8 .67 .00 .00 e.00 29 .00 .00 .00 .00 .00 e.00 9.5 1.8 .67 .00 .00 e.00 29 .00 .00 .00 .00 .00 e.00 e.05 9.5 1.8 .67 .00 .00 e.00 30 .00 .00 .00 .00 .00 .00 e.00 9.5 2.0 .30 .30 .00 .00 e.00 31 .0000 .00 .00 .00 .00 e1.0 8.8 2.1 4.8 .00 .00 .00 e.00 31 .0000 .00 .00 .00 .00 .00 .36 21.5 3.66 2.33 .005 .39 2.14 MAX .00 .00 .00 .00 .00 .00 .00 .00 .00 .0	18	.00	.00		.00			19	2.5				
20 .00 .00 .00 .00 .00 .00 .00 .14 2.1 1.9 .00 .00 e.20 21 .00 .00 .00 .00 .00 .00 .00 .13 1.8 1.9 .00 .00 e.10 22 .00 .00 .00 .00 .00 .00 .00 11 1.4 1.8 .00 .00 e.08 23 .00 .00 .00 .00 .00 .00 .00 .00 9.6 1.6 1.6 .00 .00 e.06 24 .00 .00 .00 .00 .00 .00 .00 9.0 2.3 1.5 .00 .00 e.04 25 .00 .00 .00 .00 .00 .00 .00 9.4 3.0 1.4 .00 .00 e.02 26 .00 .00 .00 .00 .00 .00 .00 9.5 2.9 1.2 .00 .00 e.02 27 .00 .00 .00 .00 .00 .00 9.5 2.0 1.4 .00 .00 e.00 28 .00 .00 .00 .00 .00 e.00 9.5 2.0 91 .00 .00 e.00 29 .00 .00 .00 .00 .00 e.00 9.5 1.8 .67 .00 .00 e.00 29 .00 .00 .00 .00 .00 e.00 9.5 1.8 .67 .00 .00 e.00 29 .00 .00 .00 .00 .00 .00 e.00 9.5 1.8 .67 .00 .00 e.00 30 .00 .00 .00 .00 .00 .00 .00 e.00 9.5 1.8 .67 .00 .00 e.00 31 .00 e10 7.2 3.0 .30 .30 .00 .00 e.00 31 .0000 .00 .00 .00 .00 .36 21.5 3.66 2.33 .005 .39 2.14 MAX .00 .00 .00 .00 .00 .00 .00 .00 .00 .0	19	.00	.00	.00	.00	.00	.00	16					
22	20	.00	.00	.00	.00	.00	.00	14	2.1	1.9	.00	.00	e.20
25 .00 .00 .00 .00 .00 .00 .00 .00 9.6 1.6 1.6 .00 .00 e.06 24 .00 .00 .00 .00 .00 .00 9.0 2.3 1.5 .00 .00 .00 e.04 25 .00 .00 .00 .00 .00 .00 .00 9.4 3.0 1.4 .00 .00 e.02 26 .00 .00 .00 .00 .00 .00 .00 .00 9.5 2.9 1.2 .00 .00 .00 e.02 27 .00 .00 .00 .00 .00 .00 e.00 9.5 2.0 91 .00 .00 .00 e.00 28 .00 .00 .00 .00 .00 e.00 9.5 2.0 91 .00 .00 .00 e.00 29 .00 .00 .00 .00 e.05 9.5 1.8 .67 .00 .00 e.00 29 .00 .00 .00 .00 .00 e.05 9.5 1.8 .67 .00 .00 e.00 30 .00 .00 .00 .00 .00 .00 .00 .00 .	21	.00	.00	.00	.00	.00		13					
24	22	.00	.00	.00	.00	.00							
25 .00 .00 .00 .00 .00 .00 .00 9.4 3.0 1.4 .00 .00 e.02 26 .00 .00 .00 .00 .00 .00 .00 9.5 2.9 1.2 .00 .00 e.01 27 .00 .00 .00 .00 .00 e.00 9.5 2.0 .91 .00 .00 e.00 28 .00 .00 .00 .00 .00 e.05 9.5 1.8 .67 .00 .00 e.00 29 .00 .00 .00 .00 .00 e.10 8.8 2.1 .48 .00 .00 e.00 30 .00 .00 .00 .00 .00 e1.0 7.2 3.0 .30 .00 .00 e.00 31 .0000 .00 e1.0 7.2 3.0 .30 .00 .00 e.00 TOTAL 0.00 0.00 0.00 0.00 11.15 646.5 113.5 69.76 0.15 12.00 64.11 MEAN .00 .00 .00 .00 .00 .00 .36 21.5 3.66 2.33 .005 .39 2.14 MAX .00 .00 .00 .00 .00 .00 .00 .00 5.0 1.4 .30 .00 .00	23	.00											
26 .00 .00 .00 .00 .00 .00 9.5 2.9 1.2 .00 .00 e.01 27 .00 .00 .00 .00 e.00 9.5 2.0 .91 .00 .00 e.00 28 .00 .00 .00 .00 .00 e.05 9.5 1.8 .67 .00 .00 e.00 29 .00 .00 .00 .00 .00 e.10 8.8 2.1 .48 .00 .00 .00 e.00 30 .00 .00 .00 .00 e1.0 7.2 3.0 .30 .00 .00 .00 e.00 31 .00 00 .00 .00 e10 3.900 12 TOTAL 0.00 0.00 0.00 0.00 0.00 11.15 646.5 113.5 69.76 0.15 12.00 64.11 MEAN .00 .00 .00 .00 .00 .00 .00 .00 .00 .0		.00							2.3				
27	25	.00	.00	.00	.00	.00	.00	9.4	3.0	1.4	.00	.00	e.02
27	26	.00	.00	.00	.00	.00		9.5			.00		
29 .00 .00 .00 .00 .00 e.10 8.8 2.1 .48 .00 .00 e.00 30 .00 .00 .00 e1.0 7.2 3.0 .30 .00 .00 .00 e.00 31 .00 00 .00 e1.0 3.900 12 TOTAL 0.00 0.00 0.00 0.00 0.00 11.15 646.5 113.5 69.76 0.15 12.00 64.11 MEAN .00 .00 .00 .00 .00 .00 .36 21.5 3.66 2.33 .005 .39 2.14 MAX .00 .00 .00 .00 .00 .00 .00 .00 .00 .0	27	.00	.00	.00		.00							
30 .00 .00 .00 .00 .00 e1.0 7.2 3.0 .30 .00 .00 e.00 31 .0000 .00 e10 3.900 12 TOTAL 0.00 0.00 0.00 0.00 0.00 11.15 646.5 113.5 69.76 0.15 12.00 64.11 MEAN .00 .00 .00 .00 .00 .36 21.5 3.66 2.33 .005 .39 2.14 MAX .00 .00 .00 .00 .00 10 59 7.0 4.3 .13 12 10 MIN .00 .00 .00 .00 .00 .00 .00 5.0 1.4 .30 .00 .00 .00 .00						.00							
30	29	.00											
31 .0000 .00 e10 3.900 12 TOTAL 0.00 0.00 0.00 0.00 0.00 11.15 646.5 113.5 69.76 0.15 12.00 64.11 MEAN .00 .00 .00 .00 .00 .36 21.5 3.66 2.33 .005 .39 2.14 MAX .00 .00 .00 .00 .00 10 59 7.0 4.3 .13 12 10 MIN .00 .00 .00 .00 .00 .00 5.0 1.4 .30 .00 .00	30	.00	.00					7.2		.30			
MEAN .00 .00 .00 .00 .00 .36 21.5 3.66 2.33 .005 .39 2.14 MAX .00 .00 .00 .00 .00 10 59 7.0 4.3 .13 12 10 MIN .00 .00 .00 .00 .00 .00 .00 5.0 1.4 .30 .00 .00 .00	31	.00		.00	.00		e10		3.9		.00	12	
MEAN .00 .00 .00 .00 .00 .36 21.5 3.66 2.33 .005 .39 2.14 MAX .00 .00 .00 .00 .00 10 59 7.0 4.3 .13 12 10 MIN .00 .00 .00 .00 .00 .00 .00 5.0 1.4 .30 .00 .00 .00	TOTAL	0.00	0.00	0.00	0.00	0.00	11.15		113.5				64.11
MAX .00 .00 .00 .00 .00 10 59 7.0 4.3 .13 12 10 MIN .00 .00 .00 .00 .00 .00 5.0 1.4 .30 .00 .00 .00					.00	.00		21.5	3.66				
MIN .00 .00 .00 .00 .00 .00 5.0 1.4 .30 .00 .00 .00										4.3	.13		
							.00		1.4	.30	.00	.00	
no.11	AC-FT	.0	.0	.0	.0	.0	22	1280	225	138	.3	24	127

CAL YR 1988 TOTAL 2463.93 MEAN 6.73 MAX 150 MIN .00 AC-FT 4890 WTR YR 1989 TOTAL 917.17 MEAN 2.51 MAX 59 MIN .00 AC-FT 1820

e - Estimated

06468250 JAMES RIVER ABOVE ARROWWOOD LAKE NEAR KENSAL, ND--CONTINUED WATER-QUALITY RECORDS

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

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)	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)
MAR 29	1125	0.08	225									
06 11 19 MAY	1255 1300 1210	30 29 16	950 620 550	7.50	5.0 3.0 12.0	0.5 0.5 6.0	2.2	9.8	67 	160	32	20
16	1400	2.3	845	8.18	26.5	20.5	3.5	7.7	85	270	52	34
23	0900	0.0	950	8.25	20.0	18.5		7.5	79			
DATE	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	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)	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)	RESIDUE TOTAL AT 105 DEG. C, SUS- PENDED (MG/L) (00530)
APR 11	70	47	2	7.4	179	110	21	395	371	0.54	31.4	17
MAY 16	84											6
10		39	2	11	288	140	22	540	516	0.73	3.32	0
DATE	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (OO625)	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)
APR										0.050		0.004
MAY	0.250	0.040	0.030	0.300	0.280	1.10	1.00	2.8	2.0	0.270	0.200	0.201
16		<0.010	<0.010	<0.100	<0.100	0.030	0.030	1.6	0.90	0.140	0.070	0.065
DATE	PHOS- PHOROUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	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, DIS- SOLVED (UG/L AS PB) (01049)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN) (01055)
APR 11	0.181	0.07	2	2	90	<1	1	<1	230	65	<5	200
MAY 16	0.040	0.07	4	4	190	<1	<1	<1	200	10	<1	410
DATE	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MERCURY DIS- SOLVED (UG/L AS HG) (71890)	SELE- NIUM, TOTAL (UG/L AS SE) (01147)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS- SOLVED (MG/L AS CN) (00723)	ALA- CHLOR TOTAL RECOVER (UG/L) (77825)	ALDRIN, DIS- SOLVED (UG/L) (39331)	ALDRIN, TOTAL (UG/L) (39330)	ALDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39333)
APR	400	0.0		**	,	44	40.040	10.01				
11 MAY	170	0.2	<1	<1	6	11	<0.010	<0.01			CO 040	T
16	85	<0.1	<1	<1	<3	14	<0.010	<0.01	<0.10	<0.01	<0.010	
23									<0.10	<0.01	<0.010	<0.1

06468250 JAMES RIVER ABOVE ARROWWOOD LAKE NEAR KENSAL, ND--CONTINUED

MAY 16 CO.10 CO.10 CO.1 CO.1 CO.1 CO.10 CO.01 C	DATE	AME- TRYNE TOTAL (82184)	ATRA ZINE TOTA (UG/ (3963	L SOLV	E, CHLO S- DANI VED TOTA 'L) (UG/1	E, TOM I AL TER L) (UG/I	E, AL OT- CYAN- MA- AZINE IAL TOTAL KG) (UG/L	SOL'	D, S- DDD VED TOTA /L) (UG/	L TERI	T- DDE A- DIS AL SOLV G) (UG/	- DD ED TOT L) (UG	AL TERIAL (UG/KG)
### AUG	MAY 16	<0.10	<0.	10 <0									
DDT. TOTAL DT. D	AUG												
MAY 16	DATE	DIS- SOLVED (UG/L)	DDT TOTA (UG/	DDT TOTA IN BO TOM N L TERI L) (UG/K	AL DI- DT- AZING MA- DI: CAL SOL' G) (UG)	ON, DI-	DI- AZINO TOTA IN BO ON, TOM M AL TERI /L) (UG/K	DN, DICAL BOT.I DT- TOTAL IA- RECOVER DRY V	MBA MAT DI- AL ELDR V. DIS WT. SOLV KG) (UG/	IN DI- ELDR ED TOTA	DI- ELDRI TOTA IN BO IN TOM M L TERI L) (UG/K	N, L T- ENDO- A- SULF. AL DISSG G) (UG/1	ENDO- AN SULFAN, DLV TOTAL L) (UG/L)
AUG 23		()3)11)	(2921	0) (393)	31 (395)	(2) (395	(0) (3957	1) (569)	01) (0900	(1)	0) (5956	5) (825)	04) (09000)
Section Co.01 Co	16	<0.01	<0.0	10	<0	.01 <0	.01		<0.	01 (0.0	10	<0	.01 <0.010
SULFAN, TOTAL TOTA		<0.01	<0.0	10 0	0.8 <0	.01 <0	.01 <0	.1 <	1.0 <0.	01 (0.0	10 <0	.1 <0	.01 <0.010
16 0.01	DATE	SULFAN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DIS SOLV (UG/	ED TOTALL) (UG/	TOTAL IN BOOK IN, TOM IN TERMS (L) (UG/I	AL OT- MA- ETHIC IAL DISSO KG) (UG/1	OLV TOTA L) (UG/	TOTAL IN BOOK TOM IN TOM IN TERMS	AL HEPT OT- CHLO MA- DIS IAL SOLV KG) (UG/	R, HEPT CHLO ED TOTA L) (UG/	CHLO TOTA A- IN BO R, TOM M L TERI L) (UG/K	R, HEP'L CHL	OR HEPTA- IDE CHLOR - EPOXIDE ED TOTAL /L) (UG/L)
AUG			<0.	01 <0.0	010	<0	.01 <0.	01	<0.	01 <0.0	10	<0	.01 <0.010
HEPTA- CHLOR FORTAL CHLOR FORT		<0.1	<0.	01 <0.0	010 <0	0.1 <0	.01 <0.	01 <	0.1 <0.	01 <0.0	10 <0	.1 <0	.01 <0.010
AUG 23	D	E T	CHLOR POXIDE OT. IN BOTTOM MATL. UG/KG)	DIS- SOLVED (UG/L)	TOTAL (UG/L)	TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	THION, DIS- SOLVED (UG/L)	THION, TOTAL (UG/L)	THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	MYL TOTAL (UG/L)	OXY- CHLOR DISSOLV (UG/L)	OXY- CHLOR, TOTAL (UG/L)	OXY- CHLOR, TOT. IN BOTTOM MATL. (UG/KG)
AUG 23													
METHYL PARA METHYL PARA METHYL PARA METHYL TRI TRI TRI TOT. IN METHYL TOT. IN MATHYL TOT. IN METHYL TOT. IN ME	AUG						<0.01						-
METHYL PARA	23.	••	<0.1	<0.01	<0.010	<0.1	<0.01	<0.01	<0.1	<0.5	<0.01	<0.01	<0.1
16	D		PARA- THION, DIS- SOLVED (UG/L)	PARA- THION, TOTAL (UG/L)	PARA- THION, TOT. IN BOTTOM MATL. (UG/KG)	TRI- THION DISSOLV (UG/L)	TRI- THION, TOTAL (UG/L)	TRI- THION, TOT. IN BOTTOM MATL. (UG/KG)	CHLOR WATER WHOLE TOT.REC (UG/L)	BUZIN WATER WHOLE TOT.REC (UG/L)	DIS- SOLVED (UG/L)	TOTAL (UG/L)	TOTAL IN BOT- TOM MA- TERIAL (UG/KG)
AUG 23			20.01	40 O1		40.04	40.01		(0.1	40.1	ZO 01	ZO 01	
NAPH- THA- THA- LENES, PARA- POLY- CHLOR. DIS- TOTAL T	AUG												
THA- LENES, PARA- POLY- CHLOR. DIS- TOTAL	۷,۰			10.01	10.1		10.01	10.1	10.1		10.01	10.01	10.1
16 <0.10 <0.01 <0.1 <0.1 <0.10 <0.10 <0.1 AUG	D	(THA- LENES, POLY- CHLOR. TOTAL UG/L)	THION, DIS- SOLVED (UG/L)	THION, TOTAL (UG/L)	THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DIS- SOLVED (UG/L)	TOTAL (UG/L)	TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	DISSOLV (UG/L)	TOTAL IN BOT- TOM MA- TERIAL (UG/KG)	THANE DISSOLV (UG/L)	THANE TOTAL (UG/L)
AUG			<0.10	<0.01	50-01		<0.1	<0.1	2	<0.10		<0.10	<0.1
	AUG												

305

06468250 JAMES RIVER ABOVE ARROWWOOD LAKE NEAR KENSAL, ND--CONTINUED

DATE	PER- THANE IN BOT- TOM MA- TERIAL (UG/KG) (81886)	PHORATE TOTAL (UG/L) (39023)	PI- CLORAM BOT.MAT TOTAL RECOV. DRY WT. (UG/KG) (38930)	PROME- TONE TOTAL (UG/L) (39056)	PROME- TRYNE TOTAL (UG/L) (39057)	PRO- PAZINE TOTAL (UG/L) (39024)	PROPHAM TOTAL (UG/L) (39052)	SEVIN, TOTAL (UG/L) (39750)	SILVEX, TOTAL (UG/L) (39760)	SILVEX, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39761)	SIMA- ZINE TOTAL (UG/L) (39055)
MAY 16		<0.01		<0.1	<0.1	<0.10	<5.0	<5.0	<0.01		<0.10
AUG 23	<1.00	<0.01	<1.0	<0.1	<0.1	<0.10	<0.5	<0.50	<0.01	<1.0	<0.10
DATE	SIME- TRYNE TOTAL (UG/L) (39054)	TOX- APHENE, DIS- SOLVED (UG/L) (39401)	TOX- APHENE, TOTAL (UG/L) (39400)	TOXA- PHENE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39403)	TRI- FLURA- LIN, TOTAL RECOVER (UG/L) (39030)	TRI- THION, DIS- SOLVED (UG/L) (82342)	TRI- THION, TOTAL (UG/L) (39786)	TRI- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39787)	2,4-D, TOTAL (UG/L) (39730)	2,4-D, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39731)	2,4-DP TOTAL (UG/L) (82183)
MAY		44.4	-						40.04		40.04
16 AUG	<0.1	<1.0	<1		<0.10	<0.01	<0.01		<0.01		<0.01
23	<0.1	<1.0	<1	<10	<0.10	<0.01	<0.01	<0.1	0.03	<1.0	<0.01
DATE	2,4-DP, IN BOTTOM MAT. (UG/KG) (34609)	2,4,5-T TOTAL (UG/L) (39740)	2,4,5-T TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39741)	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)	PLANK- TON BIOMASS ASH WT (MG/L) (81353)	PLANK- TON BIOMASS DRY WT (MG/L) (81354)	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)	SED. SUSP. SIEVE DIAM. % FINER THAN .125 MM (70332)
APR				2			200		20.12	26	
11 MAY				6.10	1.00	5.2	1200	6	0.46	98	1
16 AUG		<0.01		6.50	0.800	6.2	1200	22	.14		
23	<1.0	<0.01	<1.0								-
DATE	1-NAPH- THOL (UG/L) (LC1351a)	3-HYD XYCAR BOFUR (UG/	BO- A AN C L) (U	CARB	ALDICARB SULFONE (UG/L) (LC1344ª)	ALDICARB SULFOXIDE (UG/L) (LC1343ª)	(UG/L)	(UG/	AN FO	NOFOS G/L) 1336ª)	OXAMYL (UG/L) (LC1335ª)
MAY 16 AUG	<5.0	<5.	0 <	5.0	<5.0	<5.0	<5.0	<5.	0 <	0.01	<5.0
23	<0.5	<0.	5	0.5	<0.5	<0.5	<0.5	<0.	5	0.01	<0.5

06468300 KELLY CREEK BELOW NICCUM RESERVOIR NEAR BORDULAC, ND

LOCATION.--Lat 47°24'01", long 98°49'43", in SW1/4SW1/4SE1/4 sec.4, T.145 N., R.64 W., Foster County, Hydrologic Unit 10160001, on right bank 300 ft upstream from culvert on county road 6.5 mi east of Bordulac.

DRAINAGE AREA.--188 \min^2 , approximately, of which about 77 \min^2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. -- October 1985 to September 1989 (discontinued).

GAGE.--Water-stage recorder. Elevation of gage is 1,460.00 ft above National Geodetic Vertical Datum of 1929, from topographic map.

REMARKS .-- Estimated daily discharges: Mar. 27-28. Records fair. Slight amount of regulation by Niccum Reservoir.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 350 ft3/s, Apr. 1, 1987, gage height, 4.52 ft, backwater from ice; no flow at times most years.

MEAN VALUES

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 20 ft³/s, Aug. 31, gage height, 1.96 ft; no flow for several months.

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

DAY OCT NOV DEC JUN JUL AUG SEP JAN FEB MAR APR MAY .00 8.6 .49 .16 .00 .00 19 2 .00 9.3 .50 .12 .00 .00 13 3 .00 8.4 .42 .11 .00 .00 .00 5.4 .08 .00 .00 9.0 1.4 5 .00 1.4 .06 .00 .00 6 5.0 3.3 3.2 .00 7.9 .61 .04 .00 .00 .00 6.0 .60 .04 .00 .00 8 .00 3.8 .68 .01 .00 .00 10 3.3 .00 3.0 .62 .00 .00 .00 .00 2.6 .44 .00 .00 .00 11 .00 2.3 .28 .00 .00 .00 4.5 4.6 .33 12 .00 2.1 .03 .00 .00 13 .00 2.0 .02 .00 .00 14 .00 .37 .01 .00 .00 3.3 15 .00 1.5 .34 .00 .00 .00 2.5 .00 16 1.6 .00 .00 2.1 .00 .19 17 .00 .91 .15 .00 .00 .00 1.3 18 .00 .81 .16 .00 .00 .00 .85 .00 .00 19 .00 .69 .17 .00 .00 .00 20 .00 .93 .14 .00 .00 .00 .00 .00 .00 21 .00 .68 .09 .00 .00 22 .00 .47 .08 .00 .00 23 .00 .08 .00 .00 .00 24 .00 .00 .00 .00 .12 1.1 25 .00 .00 .19 .00 .85 .00 .11 26 .74 .77 .00 .00 .00 .11 .00 .10 27 .00 .00 .00 .09 e.10 .06 28 .06 .00 .00 .00 .09 e5.0 17 .00 .00 .00 .08 29 -08 .49 12 .10 .00 .00 .07 .00 .44 31 8.1 .00 10 .15 ------TOTAL 42.20 83.70 10.69 0.68 0.00 10.00 101.63 1.36 .32 MEAN 2.79 1.4 .023 .00 3.39 MAX 9.3 .16 .00 19 MIN .00 .06 .00 .00 .00 .00 AC-FT 166 21 1.3 .0 20 202

e - Estimated

06468300 KELLY CREEK BELOW NICCUM RESERVOIR NEAR BORDULAC, ND--CONTINUED WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1986 to May 1989 (discontinued).

DATE	TIME	DISCHARGED INSTITUTE CUBIC FEET PER SECON (0006)	E, SP CI C CO DU AN ND (US	PE- FIC ON- ICT- ICE 5/CM)	PH (STAND ARD UNITS) (00400	- A	MPER- TURE AIR EG C) 0020)	AT WA (DE	PER- URE TER G C) O10)	I (N	UR- ID- TY TU) 076)	OXYGEN DIS- SOLVE (MG/I	I, (ED S	YGEN, DIS- SOLVED PER- CENT SATUR- ATION)	HARD NESS TOTA (MG/ AS CACO	L L 3)	ALCIUM DIS- SOLVED (MG/L AS CA)
APR 06 11 19 MAY	1110 1100 1100	7.° 2.° 0.°	3	480 560 660	7.5	5	3.0 2.0 12.0		1.0 2.0 4.5		3.4	8	.8	62 	2	00	40
16	1115	0.2	26	650	8.0	4	26.0		17.0		4.0	8.	.0	82	2	40	43
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM DIS- SOLVEM (MG/I AS NA	SO A) PER	DIUM CENT	SODIU AD- SORP- TION RATIO (00931	M S (OTAS- SIUM, DIS- OLVED MG/L S K) 0935)	LIN L (M A CA	AB G/L	DI SO (M	FATE S- LVED G/L SO4) 945)	CHLO- RIDE, DIS- SOLVE (MG/I AS CI	RE AT D	DLIDS, SIDUE 180 DEG. C DIS- SOLVED MG/L)	SOLID SUM O CONST TUENT DIS SOLV (MG/	F S I- S, ED L)	OLIDS, DIS- SOLVED (TONS PER AC-FT) 70303)
APR																	
11 MAY	25	38		28	1		9.8	178		10	0	9.9)	358	3	34	0.49
16	32	51		30	1		11	215		12	0	11		417	3	97	0.57
DATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	RESIDUTOTAL AT 105 DEG. (SUS- PENDEI (MG/I (00530	G NIT	TRO- EN, RATE DIS- DLVED IG/L N)	NITRO GEN, NITRIT TOTAL (MG/L AS N) (00615	E SI	ITRO- GEN, TRITE DIS- OLVED MG/L S N) 0613)	NO2 TO (M AS	TRQ- EN, +NO3 TAL G/L N) 630)	NO2 D SO (M	TRO- EN, +NO3 IS- LVED G/L N) 631)	NITRO GEN, AMMONI TOTAL (MG/I AS N)	AM A S	GEN, MONIA DIS- GOLVED MG/L S N)	NITRO GEN, AI MONIA ORGAN TOTAL (MG/I AS N	M- G + M IC O L	NITRO- EN, AM- ONIA + RGANIC DIS. (MG/L AS N) 00623)
APR	300-120			215.		, ,,,		, , ,						20200			
11	2.25	11	0	.630	0.05	0	0.050	0	.700	0	.680	0.51	0	0.490	2.	5	1.7
MAY 16	0.29	16			<0.01	0 <	0.010	<0	.100	<0	.100	0.02	20	0.020	1.	0	1.0
DAT	PHOR PHOR TOT (MG AS	S- PHOUS AL S /L (P)	PHOS- HOROUS DIS- SOLVED MG/L AS P)	PHO PHOR ORT TOT (MG AS (705	S- PH US, O HO, D AL SO /L (M P) AS	HOS- OROUS RTHO, IS- LVED G/L P) 0671)		OUS NIC AL /L P)	ARSE TOT (UG AS (O10	AL /L AS)	ARSEI DIS SOLV (UG, AS	S- /ED S /L (AS) /	BORON, DIS- SOLVED UG/L LS B)	REC ERA (UG AS	AL C. OV- BLE : /L CD)	ADMIU DIS- SOLVE (UG/L AS CD	D)
APR																	
11 MAY	0.	240	0.170	0.	182	0.149	0	.06		2		2	60	1	1	<	1
16	0.	090	0.020	0.	015	0.001	0	.07		2		2	100		<1	<	1
DAT	COPP DIS SOL (UG AS	ER, T - F VED F /L (CU)	RON, COTAL RECOV- CRABLE UG/L US FE)	IRO DI SOL (UG AS	S- VED S /L (FE) A	EAD, DIS- OLVED UG/L S PB) 1049)	NES TOT REC	AL OV- BLE /L MN)	MANNES DI SOL (UG AS (010)	E, S- VED /L MN)	MERCU DIS SOLV (UG, AS I	S- N /ED T /L (HG) A	ELE- IIUM, OTAL UG/L S SE)	SEL NIU DI SOL (UG AS (O11	M, S- VED : /L SE)	ZINC, DIS- SOLVE (UG/L AS ZN D1090)
APR		/1	340		110	/=		530		440	,		/1		11		4
11 MAY		<1	340		110	<5		530		440		0.3	<1		<1		4
16		2	190		11	<1		220		22	<(0.1	<1		<1		3

308

JAMES RIVER BASIN

06468300 KELLY CREEK BELOW NICCUM RESERVOIR NEAR BORDULAC, ND--CONTINUED

DATE	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS- SOLVED (MG/L AS CN) (00723)	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)	PLANK- TON BIOMASS ASH WT (MG/L) (81353)	PLANK- TON BIOMASS DRY WT (MG/L) (81354)	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)
APR 11	15	<0.010	<0.01	14.0	2.90	4.4	1100	7	0.04	89
MAY 16	14	<0.010	<0.01	14.0	1.30	16	1100	9	.01	90

309

06468360 ARROWWOOD LAKE OPEN-WATER SITE

LOCATION.--Lat 47°16'46", long 98°50'05", in SW1/4NE1/4 sec.19, T.144 N., R.64 W., Stutsman County, Hydrologic Unit 10160001, in open-water area near center of lake about 1.5 mi northeast of Arrowwood National Wildlife Refuge headquarters, and about 5 mi southwest of Kensal.

WATER-QUALITY RECORDS

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

INSTRUMENTATION .-- Water-quality monitor since November 1987.

REMARKS.--Records of daily air and water temperature, specific conductance, dissolved oxygen, pH, relative humidity, solar radiation, and wind speed and direction are available in files at the District office. These daily records will be published in a separate report.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	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)	OXYGEN, DIS- SOLVED (MG/L) (00300)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)
JAN								
11	1145	1435	2320	6.90	-15.0	0.5	0.7	<0.010
MAY	1145	1400	2,20	0.90	-15.0	0.5	0.1	10.010
15	1300	1435	753	8.70	24.0	19.5	10.8	<0.010
31	1420	1435	790	8.40	16.5	14.0	9.2	0.060
JUN	1,420	1422	150	0.40	,		,,-	
22	1130	1435	880	8.20	19.5	20.0	8.6	0.170
JUL	11.							
06	1130	1435	950	8.40		24.5	7.6	0.100
18	1130	1435	955	8.70		21.5	8.3	0.030
AUG								
08	0830	1435	1030	8.70	16.0	19.0	9.4	<0.010
08	1022	1435	1050	8.50	23.5	19.5	10.7	<0.010
08	1221	1435	1030	8.51	26.0	20.5	11.8	<0.010
08	1312	1435	1040	8.52	26.5	22.5	11.9	<0.010
08	1410	1435	1030	8.58	27.0	24.0	13.2	<0.010
08	1520	1435	1030	8.61	27.0	24.5	13.8	0.010
08	1610	1435	1010	8.60	28.0	24.5	13.5	<0.010
08	1710	1435	1030	8.64	28.0	24.5	14.7	0.010
08	1810	1435	1050	8.57	29.5	25.0	14.5	<0.010 0.010
08	1900	1435	1060	8.58	30.0	25.5	14.8	<0.010
08	2000	1435	1030	8.49	31.0	25.5 25.0	15.5 15.2	<0.010
08	2100	1435	1050	8.45	24.0	24.5	14.7	<0.010
08	2200 2300	1435 1435	1030 1030	8.58 8.52	19.5	24.0	14.4	<0.010
08	0001	1435	1050	8.58	18.5	24.0	14.2	0.010
09	0210	1435	1050	8.54	15.0	23.0	12.8	<0.010
09	0405	1435	1050	8.53	13.5	22.5	12.6	0.010
09	0500	1435	1040	8.57	13.0	22.5	12.1	<0.010
09	0600	1435	1050	8.62	12.5	22.0	11.2	<0.010
09	0703	1435	1060	8.56	14.0	21.5	11.3	<0.010
09	0800	1435	1040	8.58	18.0	21.5	11.3	<0.010
09	0900	1435	1050	8.57	23.5	21.5	11.4	<0.010
09	1000	1435	1030	8.65	25.5	22.5	12.2	0.010
09	1100	1435	1030	8.64	26.5	23.0	11.9	<0.010
0.345/216/37		1122			2000	0.3		

JAMES RIVER BASIN

06468360 ARROWWOOD LAKE OPEN-WATER SITE--CONTINUED

DATE	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	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)	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)
JAN							
11	<0.100	3.00	6.1	1.40	1.20		
MAY							
15	<0.100	0.030	2.6	0.090	0.030	31.0	1.40
31	0.300	0.680	2.5	0.200	0.150	0.800	<0.200
JUN	1 00	0 220	4 6	0 770	0.750	7 60	0.600
22 JUL	1.00	0.220	1.5	0.370	0.350	3.60	0.600
06	0.800	0.060	1.8	0.580	0.520	13.0	1.10
18	0.400	0.100	4.0	0.660	0.620	12.0	0.400
AUG						17.1	21.122
08	<0.100	0.040	3.3	0.870	0.690	65.0	1.80
08	<0.100	0.030	3.6	0.920	0.690	50.0	1.40
08	<0.100	0.030	3.0	0.840	0.680	50.0	1.80
08	<0.100	0.030	3.1	0.900	0.680	58.0	1.90
08	<0.100	0.030	3.1	0.890	0.670	49.0	1.90
08	<0.100	0.040	3.5	0.880	0.680	48.0	1.90
08	<0.100	0.040	3.2	0.860	0.680	43.0	1.90
08	<0.100	0.040	3.5	0.830	0.680	46.0	1.90
08	<0.100	0.040	3.0	0.840	0.680	49.0	1.80
08	<0.100	0.040	3.3	0.830	0.670	25.0	0.700
08	<0.100	0.030	3.3	0.840	0.670	69.0	2.30
08	<0.100	0.050	3.1	0.840	0.670	46.0	1.40
08	<0.100	0.040	3.0	0.870	0.670	38.0	1.40
09	<0.100		6.3	0.880	0.660	42.0	1.90
09	<0.100	0.040	2.7	0.810	0.650	35.0	1.40
09	<0.100	0.040	4.6	0.850	0.660	76.0	2.70
09	<0.100	0.030	2.9	0.840	0.640	65.0	2.30
09	<0.100	0.040	3.2	0.830	0.640	37.0	0.900
09	<0.100	0.040	2.7	0.770	0.650	56.0	1.40
09	<0.100	0.040	3.3	0.830	0.660	40.0	1.40
09	<0.100	0.040	2.8	0.810	0.650	54.0	0.900
09	<0.100	0.040	3.6	0.840	0.650	50.0	<0.900
09	<0.100	0.050	2.8	0.820	0.650		

06468380 ARROWWOOD LAKE OUTFLOW SITE

LOCATION.--Lat 47°15'55", long 98°50'52", in SE1/4NE1/4 sec.25, T.144 N., R.65 W., Stutsman County, Hydrologic Unit 10160001, in downstream end of the lake, about 0.2 mi east of Arrowwood National Wildlife Refuge headquarters, and about 6 mi southwest of Kensal.

WATER-QUALITY RECORDS

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

INSTRUMENTATION .-- Water-quality monitor since November 1987.

REMARKS.--Records of daily air and water temperature, specific conductance, dissolved oxygen, pH, relative humidity, solar radiation, and wind speed and direction are available in files at the District office. These daily records will be published in a separate report.

DATE	TIME	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	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)	OXYGEN, DIS- SOLVED (MG/L) (00300)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)
MAY								
15 31	1150 1130	1435 1435	750 790	8.70 8.10	24.5 14.0	20.0	11.2 9.7	<0.010 0.050
JUN 22	0945	1435	880	7.90	17.5	21.5	8.6	0.200
JUL 06	1000	1435	850	9.20	21.5	24.0	10.4	<0.010
18 AUG	1045	1435	880	9.30	23.0	21.0	11.6	<0.010
08	0801	1435	1030	8.40	16.5	19.0	6.5	<0.010
08	1002	1435	1030	8.40	22.5	19.5	7.4	<0.010
08	1206	1435	1030	8.40	25.5	21.0	9.6	<0.010
08	1300	1435	1030	8.43	26.5	21.0	11.4	<0.010
08	1355	1435	1050	8.45	27.0	22.5	12.8	<0.010
08	1502	1435	1060	8.60	28.0	23.5	13.2	0.010
08	1600	1435	1040	8.70	29.5	25.5	11.5	<0.010
08	1700	1435	1010	8.80	29.5	24.5	12.8	<0.010
08	1757	1435	1030	8.76	30.5	25.5	12.2	0.010
08	1858	1435	1020	8.78	30.5	26.0	13.1	<0.010
08	1957	1435	1040	8.83	28.5	26.0	13.4	0.010
08	2058	1435	1060	8.76	21.5	26.0	13.6	<0.010
08	2158	1435	1030	8.81	18.0	25.0	12.2	<0.010
08	2258	1435	1030	8.81	15.5	24.0	10.6	<0.010
09	0001	1435	1040	8.79	15.5	23.5	10.0	10 010
09	0200	1435	1030	8.75	13.5	22.5	9.2	<0.010
09	0400	1435	1020	8.70	12.0	22.0	7.7	<0.010
09	0500	1435	1030	8.71	11.0	21.5	7.0	<0.010
09	0600	1435	1010	8.73	10.5	21.0	6.4	<0.010
09	0700	1435	1040	8.68	13.0	20.5	6.2	<0.010
09	0800	1435	1050	8.68	17.0	20.5	6.1	<0.010
09	0900	1435	1030	8.73	20.0	20.5	5.9	<0.010
09	1000	1435	1030	8.69	25.0	21.0	7.1 7.5	<0.010
09	1100	1435	1040	8.74	27.5	21.5	1.5	10.010

JAMES RIVER BASIN

06468380 ARROWWOOD LAKE OUTFLOW SITE--CONTINUED

DATE	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N) (OO625)	PHOS- PHOROUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)
MAY							
15 31 JUN	<0.100 0.200	0.030 0.720	1.5 2.6	0.080	0.030 0.150	20.0 1.50	0.800
22	0.600	0.490	2.2	0.370	0.320	2.00	0.400
JUL 06	<0.010	0.060	2.0	0.420	0.380	1.30	<0.020
18	<0.010	0.050	2.2	0.520	0.430	0.900	<0.020
08	<0.100	0.030	3.1	0.930	0.760	65.0	2.10
08	<0.100	0.040	2.8	0.890	0.750	45.0	1.60
08	<0.100	0.040	2.7	0.830	0.740	43.0	1.40
08	<0.100	0.030	2.4	0.860	0.690	39.0	1.20
08	<0.100	0.030	3.0	0.840	0.660	45.0	1.60
08	<0.100	0.040	3.0	0.860	0.690	34.0	1.20
08	<0.100	0.030	2.8	0.830	0.670	38.0	1.20
08	<0.100	0.030	2.3	0.820	0.680	32.0	1.20
08	<0.100	0.030	3.3	0.850	0.680	29.0	1.20
08	<0.100	0.040	2.3	0.810	0.680	29.0 31.0	0.900
08	<0.100	0.040	2.4	0.800	0.690	32.0	0.900
08	<0.100	0.040	2.5	0.870		38.0	0.900
08	<0.100	0.070	3.2	0.970	0.710	32.0	1.60
09		0.010	J	0.510	\		1.60
09	<0.100	0.020	2.4	0.880	0.740	33.0	1.20
09	<0.100	0.030	2.5	0.880	0.750	28.0	1.40
09	<0.100	0.030	2.9	0.870	0.770	26.0	<0.800
09	<0.100	0.020	2.4	0.960	0.790	41.0	1.40
09	<0.100	0.030	2.7	0.990	0.800	31.0	1.20
09	<0.100	0.030	2.8	0.950	0.800	35.0	1.20
09	<0.100	0.030	2.6	0.960	0.780	37.0	1.40
09	<0.100	0.020	2.7	0.940	0.780	37.0	1.20
09	<0.100	0.030	2.3	0.940	0.760	38.0	1.00

06468460 JIM LAKE NEAR PINGREE, ND

LOCATION.--Lat. 47°10'23", long 98°48'2", in NE1/45W1/4 sec.28, T.143 N., R.64 W., Stutsman County, Hydrologic Unit 10160001, near center of lake about 1 mi upstream from spillway, and about 5.5 mi east of Pingree.

INSTRUMENTATION .-- Water-quality monitor since May 1989.

WATER-QUALITY RECORDS

PERIOD OF RECORD .-- January 1989 to August 1989.

REMARKS.--Records of daily air and water temperature, specific conductance, dissolved oxygen, pH, relative humidity, solar radiation, and wind speed and direction are available in files at the District office. These daily records will be published in a separate report.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (OO4OO)	TEMPER- ATURE AIR (DEG C) (00020)	TEMPER- ATURE WATER (DEG C) (OOO10)	OXYGEN, DIS- SOLVED (MG/L) (OO3OO)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)
JAN							
11	1345	1420	7.50	-5.0	1.5	0.9	<0.010
24	1015	1560	7.70	-15.0	1.0	0.2	<0.010
FEB		.,,,,,	1	.5.0			
07	0850	1850	7.60	-12.0	1.5	0.4	0.010
MAY							
15	1550	716	8.50		20.0	8.8	0.030
31	1750	810	8.50		15.0	9.5	0.010
JUN	0000	1000		1500-00	477.75	2.3	2 020
22	1320	890	7.60	21.0	21.0	5.3	0.070
JUL	4.00						
06	1400	950	7.90		26.5	5.5	0.040
18 AUG	1330	975	8.10		23.0	7.0	0.020
08	0922	1060	8.50	20.5	19.0	9.6	<0.010
08	1106	1070	8.40	24.5	19.0	9.0	<0.010
08	1222	1060	8.40	25.0	19.5	11.6	<0.010
08	1300	1040	8.40	25.5	19.5	12.7	<0.010
08	1400	1050	8.40	26.0	20.0	15.2	<0.010
08	1500	1050	8.50	27.0	25.5	13.1	<0.010
08	1600	1050	8.40	27.0	25.0	13.5	<0.010
08	1700	1050	8.40	28.0	25.0	13.7	<0.010
08	1800	1050	8.70	29.0	25.0	13.1	<0.010
08	1917	1060	8.10	30.0	24.5	8.2	<0.010
08	2000	1070	8.30	28.5	25.0	11.9	<0.010
08	2100	1080	8.70	22.0	25.0	13.0	<0.010
08	2205	1060	8.80	25.5	24.0	13.3	<0.010
08	2300	1070	8.80	16.0	23.0	13.3	<0.010
09	0001	1080	8.80	15.0	23.0	13.3	<0.010
09	0200	1070	8.80	13.5	21.0	12.4	<0.010
09	0500	1070 1070	8.80	11.0	20.0	11.2	<0.010
09	0600	1070	9.00	10.0	20.0	10.5	<0.010
09	0705	1070	9.00	12.0	20.0	10.0	<0.010
09	0802	1070	9.00	14.5	20.0	8.8	<0.010
09	0900	1070	9.00	19.5	20.0	8.9	<0.010
09	1001	1080	8.50	23.5	20.5	10.0	<0.010
09	1105	1080	8.60	26.5	22.0	10.4	<0.010
2.500		1,5.4.4	1011			4,7,1	45,557

JAMES RIVER BASIN

06468460 JIM LAKE NEAR PINGREE, ND--CONTINUED

DATE	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	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)	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)
JAN							
11 24 FEB	<0.100 <0.100	0.690 0.890	4.3 5.3	0.260 0.320	0.180 0.180	=	Ξ
07	<0.100	0.990	5.4	0.600	0.440		
MAY 15 31	<0.100 <0.100	0.040 0.280	1.9	0.120 0.210	0.040 0.150	6.70 0.900	0.600
JUN 22	0.200	1.70	3.3	0.190	0.170	0.800	0.600
JUL 06 18	0.200 0.200	1.20 0.230	3.1 2.5	0.520 0.690	0.470 0.600	5.40 4.60	0.400
08 08 08 08 08 08 08 08 08 09 09 09 09 09	<pre><0.100 <0.100 <0.1</pre>	0.060 0.060 0.030 0.040 0.030 0.050 0.030 0.030 0.030 0.030 0.030 0.030 0.030 0.030 0.030	2.80 3.99 3.87 4.71 7.1 5.6 5.4 5.4 5.8 7.2 5.2 5.2 5.2 5.2 5.2 5.2 5.2 5.2 5.2 5	0.890 0.900 0.870 0.880 0.910 0.880 0.860 0.870 0.850 0.850 0.860 0.860 0.860 0.860 0.860	0.740 0.750 0.750 0.750 0.750 0.750 0.720 0.730 0.740 0.730 0.740 0.730 0.730 0.730 0.730 0.730 0.730 0.750	50.0 60.0 52.0 44.0 52.0 33.0 44.0 33.0 36.0 27.0 31.0 28.0 36.0 37.0 45.0 31.0 31.0 33.0 34.0 34.0 34.0 38.0 38.0	4.70 5.10 5.80 4.30 5.10 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.50 3.40 3.40 3.50 3.40 3.50 3.40 3.50
09	<0.100 <0.100	0.040	2.8	0.890	0.730	34.0 28.0	2.60 3.40

315

06469000 JAMESTOWN RESERVOIR NEAR JAMESTOWN. ND

LOCATION.--Lat 46°55'50", long 98°42'23", in SE1/4NW1/4 sec.24, T.140 N., R.64 W., Stutsman County, Hydrologic Unit 10160001, on left bank in control house below Jamestown Dam on James River, 1.7 mi north of Jamestown Post Office, and 3.3 mi upstream from Pipestem Creek.

DRAINAGE AREA. -- 1,760 mi², approximately, of which about 1,010 mi² is probably noncontributing.

RESERVOIR-ELEVATION AND CONTENTS RECORDS

PERIOD OF RECORD .-- November 1953 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft above National Geodetic Vertical Datum of 1929; gage readings have been reduced to elevations NGVD. June 22, 1959, to June 3, 1971 at site 0.2 mi upstream at same datum. Prior to June 22, 1959, nonrecording gages at different locations.

REMARKS.--Reservoir is formed by earth-fill dam, completed Oct. 1, 1953. Closure made May 7, 1953, and filling of dead storage started. Gates initially closed Feb. 8, 1954. Usable capacity, 229,470 acre-ft between elevations 1,400 ft, sill of outlet and 1,454 ft, crest of spillway. Dead storage below elevation 1,400 ft, 820 acre-ft. Maximum design pool, 389,000 acre-ft, elevation, 1,464.6 ft. Figures given herein represent total contents based on capacity table dated Oct. 1, 1965. Reservoir is used for flood control and municipal supply. Elevations are adjusted for wind effect.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 103,100 acre-ft, May 1, 1969, elevation, 1,443.60 ft; minimum since initial filling of reservoir, 18,220 acre-ft, Mar. 4, 5, 1965, elevation, 1,423.66 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 26,050 acre-ft, Apr. 24, elevation, 1,428.36 ft; minimum, 23,400 acre-ft, Sept. 29, elevation, 1,426.91 ft.

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

	Da te	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.	30	1,428.12	25,590	
Oct.	31	1,427.77	24,940	-650
Nov.	30	1,427.68	24,780	-160
Dec.	31	1,427.67	24,760	-20
CA	L YR 1988	-	-	-4,650
Jan.	31	1,427.65	24,730	-30
Feb.	28	1,427.56	24,560	-170
Mar.	31	1,428.20	25,740	+1,180
Apr.	30	1,428.21	25,760	+20
May	31	1.428.10	25,550	-210
June	30	1.427.68	24,780	-770
	31	1.427.21	23,930	-850
July	31	1,427.10	23,730	-200
July Aug.			07 540	-190
		1,426.99	23,540	-150

JAMES RIVER BASIN

06469000 JAMESTOWN RESERVOIR NEAR JAMESTOWN, ND--CONTINUED

WATER-QUALITY RECORDS

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

DATE	PI DI (1	LING EPTH D FEET) (MESER- STORY VOIR EPTH FEET)	RES- C: SURE CO (MM DI OF AI HG) (U:	NCE S/CM) UN	TAND- ARD ITS) (ATURE AIR (DEG C) (1	EMPER- ATURE : WATER (DEG C)	COLOR (PLAT- INUM- (COBALT UNITS)	TRANS- PAR- ENCY SECCHI DISK) (IN) 00077)	OXYGEN, DIS- SOLVED (MG/L) (00300)
OCT 26	1028		29.2	760	690	8.80	-1.0	7.0	14	36.0	11.5
JAN 23	1400			780	720	7.70	-6.0	2.0	14	362	10.4
MAY 22	1030	3.30	33.0	766	690	8.20	16.5	15.0	20	36.0	10.1
AUG O1	1215	0.0	33.0	772	700	8.20	32.5	24.5	37	29.0	8.1
DATE	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)	SODIU	IT RATIO	DIS- SOLVEI (MG/L AS K)	, LINITY LAB D (MG/L AS CACO3	SULFA DIS- SOLV (MG,	VED /L 04)
OCT 26 JAN	95	250	47	31	55	3	32 2	10	257	97	
23 MAY	74	270	52	33	60	3	31 2	16	287	110	
22 AUG	100	240	48	30	54	3	31 2	12	253	100	
01	96	240	48	29	56	3	52 2	16	251	110	
DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS DIS- SOLVE (TONS PER AC-FT	DIS- ED SOLVE TONS PER DAY)	NO2+NO2 D DIS- SOLVE (MG/L AS N)	PHOS- 3 PHOROU DIS- D SOLVE (MG/L AS P)	S BORG DIS D SOLV (UG,	S- VED /L B)
OCT 26	12	0.20	9.4	475	446	0.6		0.120	0 0.14		130
JAN 23	13	0.20		435 482	416						120
MAY 22	12	0.20		447	417						120
AUG											

JAMES RIVER BASIN

06469000 JAMESTOWN RESERVOIR NEAR JAMESTOWN, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	TIME	SAM- PLING DEPTH (FEET) (00003)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	CLOUD COVER (PER- CENT) (00032)	WIND SPEED (MILES PER HOUR) (00035)	WIND DIREC- TION (DEG. FROM TRUE NORTH) (00036)
OCT										
26	1030	0.0	690	8.70	7.0	11.7		99	<5.0	150
26	1032	1.60	680	8.80	7.0	11.6				
26	1034	3.30	690	8.80	7.0	11.5				
26	1036	6.60	690	8.80	7.0	11.5				
26	1038	13.2	690	8.80	7.0	11.5				
26	1040	19.8	690	8.80	7.0	11.4				
26	1042	26.4	690	8.80	7.0	11.4				
MAY										
22	1026	0.0	689	8.20	15.0	10.2	101			
22	1028	1.60	689	8.20	15.0	10.1	100			
22	1030	3.30	690	8.20	15.0	10.1	100	100	10	0
22	1032	6.60	690	8.30	15.0	10.0	99			
22	1034	13.2	689	8.40	15.0	10.0	99			
22	1036	19.8	688	8.30	15.0	10.0	99			
22	1038	26.4	688	8.40	15.0	9.9	98			
22	1040	33.0	687	8.30	15.0	10.0	99			
AUG										
01	1215	0.0	700	8.20	24.5	8.1	96	0	10	180
01	1217	1.60	698	8.20	24.5	8.1				
01	1219	3.30	698	8.20	24.5	8.1				
01	1221	6.60	698	8.20	24.5	8.0				
01	1223	13.2	701	8.10	24.0	7.3				
01	1225	19.8	701	8.10	24.0	6.6				
01	1227	26.4	703	7.90	23.5	3.3				
01	1229	33.0	704	7.80	23.0	2.0				

06469400 PIPESTEM CREEK NEAR PINGREE, ND

LOCATION.--Lat 47°10'03", long 98°58'07", in NE1/4NW1/4 sec.31, T.143 N., R.65 W., Stutsman County, Hydrologic Unit 10160002, on right bank on downstream side of State Highway 36 bridge, and 3 mi west of Pingree.

DRAINAGE AREA .-- 700 mi2, of which about 440 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- October 1973 to current year.

GAGE .-- Water-stage recorder. Datum of gage is 1,500.63 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Mar. 10 to Apr. 18. Records fair except for period of estimated discharge, which are poor.

AVERAGE DISCHARGE.--16 years, 24.8 ft^3/s , 17,970 acre-ft/yr; median of yearly mean discharges, 17 ft^3/s , 12,300 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,520 ft3/s, Apr. 20, 1979, gage height, 11.60 ft, backwater from ice; no flow at times.

EXTREMES FOR CURRENT YEAR. -- Peak discharges greater than base discharge of 100 ft3/s and maximum (*):

Date	Time	Discharge (ft3/s)	Gage Height (ft)	Date	Time	Discharge (ft ³ /s)	Gage Height (ft)
Sept. 9	0215	*99	*5.95				

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

No flow for several months.

		DIDONANGE	, 00010	I DDI I DIK		MEAN VALUE	S	1,000 10	ODI IDIIDDII	1505		
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	.00	e8.0	3.1	1.8	.18	.00	.25
2	.00	.00	.00	.00	.00	.00	e9.0	2.8	1.7	.15	.00	.19
2 3 4	.00	.00	.00	.00	.00	.00	e15	2.8	1.7	.11	.00	.26
4	.00	.00	.00	.00	.00	.00	e40	3.8	1.5	.09	.00	.38
5	.00	.00	.00	.00	.00	.00	e30	3.4	1.3	.06	.00	.41
6	.00	.00	.00	.00	.00	.00	e26	2.3	1.2	.04	.00	.25
7	.00	.00	.00	.00	.00	.00	e25	1.9	•95	.02	.00	16
7	.00	.00	.00	.00	.00	.00	e28	1.9	.91	.02	.00	88
0												
9	.00	.00	.00	.00	.00	.00	e30	1.8	.81	.03	.00	98
10	.00	.00	.00	.00	.00	e.10	e26	1.7	.73	.01	.00	84
11	.00	.00	.00	.00	.00	e5.0	e23	1.4	.73	.00	.00	78
12	.00	.00	.00	.00	.00	e3.0	e21	1.3	.82	.00	.00	65
13	.00	.00	.00	.00	.00	e1.0	e19	1.4	.84	.00	.00	56
14	.00	.00	.00	.00	.00	e.50	e16	1.3	.78	.00	.00	51
15	.00	.00	.00	.00	.00	e.30	e14	1.3	.65	.00	.00	45
16	.00	.00	.00	.00	.00	e.25	e13	1.1	.58	.00	.00	41
17	.00	.00	.00	.00	.00	e.20	e12	.93	.50	.01	.00	35
18	.00	.00	.00	.00	.00	e.15	e11	1.1	.50	.06	.07	31
19	.00	.00	.00	.00	.00	e.12	7.2	1.2	.50	.07	5.3	30
								1.2		.06	1.1	27
20	.00	.00	.00	.00	.00	e.10	6.9	1.3	-47	.00	1.1	21
21	.00	.00	.00	.00	.00	e.20	5.6	1.1	.45	.02	.37	26
22	.00	.00	.00	.00	.00	e.50	4.4	1.2	.43	.00	.25	23
23	.00	.00	.00	.00	.00	e1.0	4.2	1.4	.37	.00	.19	16
24	.00	.00	.00	.00	.00	e2.0	4.8	2.0	.33	.00	.16	16
25	.00	.00	.00	.00	.00	e5.0	4.6	1.7	.33	.00	.13	17
26	.00	.00	.00	.00	.00	e10	3.9	1.4	.32	.00	.13	13
27	.00	.00	.00	.00	.00	e25	3.8	1.3	.26	.00	.13	13
28	.00	.00	.00	.00	.00	e15	3.8	1.2	.23	.00	.34	13
28 29	.00	.00	.00	.00		e11	3.6	1.7	.21	.01	.39	11
30	.00	.00	.00	.00		e10	3.3	1.9	.20	.03	.33	10
30 31	.00		.00	.00		e9.0	3.5	1.9		.02	.31	
TOTAL	0.00	0.00	0.00	0.00	0.00	99.42	422.1	54.63	22.10	0.99	9.20	904.74
TOTAL												
MEAN	.00	.00	.00	.00	.00	3.21	14.1	1.76	.74	.032	.30	30.2
MAX	.00	.00	.00	.00	.00	25	40	3.8	1.8	.18	5.3	98
MIN	.00	.00	.00	.00	.00	.00	3.3	.93	.20	.00	.00	.19
AC-FT	.0	.0	.0	.0	.0	197	837	108	44	2.0	18	1790

CAL YR 1988 TOTAL 3719.03 MEAN 10.2 MAX 220 MIN .00 AC-FT 7380 WTR YR 1989 TOTAL 1513.18 MEAN 4.15 MAX 98 MIN .00 AC-FT 3000

e - Estimated

06469400 PIPESTEM CREEK NEAR PINGREE, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1974 to current year.

DATE	TIME	SPE- CIFI CON- DUCT ANCE (US/O	C (S	PH STAND- ARD HITS) 00400)	AIF (DEG	RE (C) (TEMPE ATUR WATE DEG 0001	R- TO: E (MC R A: C) CAC	CAL G/L G(3)	CALCI DIS- SOLV (MG/ AS C	ED L	MAGN SIU DIS SOLV (MG/ AS M	M, ED L	SODIU DIS- SOLVE (MG/ AS N	D L SC A) PEF	DIUN CENT	r RATI) – ON	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)
APR 05 AUG	1330	4	40	7.20		5.0	1	.0	160	34		17		27		26	5 1		11
22	1000	5	90	7.20	22	2.0	18	.0	170	35		21		44		33	3 1		14
DATE	I	BICAR-BONATE, FET-LAB (MG/L AS HCO3) (95440)	CAR- BONAT FET-I (MG/ AS CO3	E, L AB L	ALKA- INITY LAB (MG/L AS CACO3) 90410)	DIOX	S- VED /L (O2)	SULFATI DIS- SOLVEI (MG/L AS SO4 (00945)		CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	RI SO (M	UO- DE, DIS- DLVED G/L F)	D: SC (N	LICA, IS- DLVED MG/L AS (02)	SOLIDS RESIDU AT 180 DEG. DIS- SOLVE (MG/I	E S C T	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SO (T P	IDS, IS- LVED ONS ER -FT) 303)
APR 05		110	0		94	1	11	110		6.0		0.10		7.3	30	2	269		0.41
22	19	190	0	1	60	1	19	130		9.3		0.20		17	37	7	366		0.51
DATE		SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	ARSEN DIS SOLV (UG/ AS /	ED L S)	BORON, DIS- SOLVED (UG/L AS B) 01020)	SOL (UG	S- VED /L FE)	LEAD, DIS- SOLVEI (UG/L AS PB (01049)		ITHIUM DIS- SOLVED (UG/L AS LI) 01130)	NE SO (U AS	NGA- SE, IS- LVED G/L MN) 056)	SC (I	RCURY DIS- DLVED JG/L B HG)	MOLYE DENUM DIS- SOLVE (UG/L AS MO	, D	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SO (U AS	RON- IUM, IS- LVED G/L SR) 080)
APR 05 AUG		0.0		1	40		70	<		18		200		0.4		1	<10		170
22		0.0		2	120		90	<		40		210		1.9		2	<10		220

06470000 JAMES RIVER AT JAMESTOWN, ND

LOCATION.--Lat 46°53'22", long 98°40'58", in NW1/4NE1/4 sec.6, T.139 N., R.63 W., Stutsman County, Hydrologic Unit 10160003, on left bank 200 ft upstream from Interstate 94 bridge at southeast corner of Jamestown, and 3 mi downstream from Pipestem Creek.

DRAINAGE AREA. -- 2,820 mi², approximately, of which about 1,650 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1928 to September 1933, March to May 1935, August 1937 to September 1939, April 1943 to current year. Monthly discharge only for some periods, published in WSP 1309.

REVISED RECORDS .-- WSP 1239: 1938(M). WSP 1917: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,373.27 ft above National Geodetic Vertical Datum of 1929.
Oct. 1, 1949 to Sept. 30, 1965, at former bridge 0.5 mi upstream at datum 2.00 ft higher. See WSP 1729 or 1917 for history of changes prior to Oct. 1, 1949.

REMARKS.--Estimated daily discharges: Dec. 16-18, 23 to Jan. 2, 6 to Mar. 30, and Sept. 11-30. Records good except those for periods of Mar. 8-30 and Sept. 11-30, which are poor. Flow regulated by Arrowwood, Jim, and Pipestem Lakes, and Jamestown Reservoir, combined capacity, 393,000 acre-ft. Regulation by Jamestown Reservoir (station 06469000) 6 mi since 1953 and by Pipestem Lake, capacity 147,000 acre-ft, since 1973.

AVERAGE DISCHARGE.--55 years (water years 1929-33, 1938-39, 1944-89), 64.9 ft³/s, 47,020 acre-ft/yr; median of yearly mean discharges, 36 ft³/s, 26,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,390 ft³/s, May 13, 1950, gage height, 15.82 ft, site and datum then in use; no flow at times in 1933.

EXTREMES FOR CURRENT YEAR. -- Maximum discharge, 130 ft3/s, Mar. 29, gage height, 4.45 ft, backwater from ice; minimum daily, 0.06 ft3/s, Aug. 16.

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

DAY OCT NOV DEC JAN FER APR MAY JUN JUL AUG SEP MAR 4.9 .80 2.2 2.8 2.5 1.4 1.8 A1.4 e1.5 e1.9 25 .42 2 .79 2.2 13 2.0 1.8 e1.8 e1.0 e1.7 3 1.2 2.0 35 .42 2.2 e.90 19 1.8 1.8 2.2 e1.3 1.7 2.3 1.6 35 .42 11 1.8 2.0 e.80 e1.2 21 5.1 5 3.4 25 3.0 1.8 1.9 1.7 e.80 e1.2 1.3 16 6 1.6 2.9 2.0 e.75 29 2.0 1.3 e1.4 e1.4 25 1.2 5.3 3.8 1.6 3.0 2.0 .14 e1.2 e.74 e1.5 1.4 2.8 e.72 e10 11 1.3 1.1 5.1 3.0 8 1.8 1.8 e1.1 2.0 e.70 1.3 3.0 2.6 1.7 e1.0 e30 5.8 1.3 10 3.9 2.0 2.1 1.6 e.80 e65 e1.8 2.7 e90 .80 1.6 2.7 .14 11 2.5 1.6 e1.0 2.9 .70 2.0 2.0 .14 e1.5 12 2.7 1.6 e1.0 e.90 e40 3.6 2.7 2.7 3.4 .70 1.9 1.8 .87 e1.2 13 1.5 e1.1 e.80 e20 1.5 .68 e1.0 14 2.8 2.7 1.9 e1.1 e.72 e11 3.2 2.4 e.70 15 2.9 2.6 1.5 e1.1 e10 .56 e.80 .06 e.70 16 2.9 3.0 e1.5 e.68 2.9 .42 2.5 .98 2.9 2.3 5.7 3.4 e1.4 e1.3 e.68 e9.0 2.9 1.0 .24 e.50 7.9 18 2.9 2.7 e1.8 e1.5 e.70 e8.5 2.8 1.2 e.40 e1.9 e.70 e8.0 1.1 2.2 2.1 5.6 e.30 19 1.9 e.25 2.9 2.7 2.0 e.72 e8.0 2.7 2.0 1.9 2.6 e8.0 1.6 e.23 21 2.9 2.7 1.8 e.80 2.7 1.2 5.2 5.4 2.5 4.9 e.22 22 2.4 2.6 1.8 e1.9 e1.0 e12 2.2 2.1 1.3 2.7 e.20 23 2.0 2.4 e1.8 e1.8 e1.5 e20 2.0 1.8 1.0 2.1 .93 2.4 2.4 e1.8 e1.8 e2.0 e35 2.0 19 2.7 e.19 e2.5 4.9 e.18 25 2.6 2.4 e45 2.0 2.5 .84 1.1 e1.7 e1.8 .84 15 e.18 26 2.2 e1.6 e1.8 290 3.7 2.9 2.1 2.3 P2.4 10 2.9 1.6 .74 e.17 27 2.2 2.1 e1.4 e1.9 e2.3 e80 2.1 .69 39 e70 2.3 1.5 e.17 28 2.2 1.9 e1.3 e2.0 e2.3 1.4 1.3 8.1 6.9 1.4 e.16 29 2.0 1.8 e1.3 e2.0 e100 3.4 ---.60 3.8 1.3 4.4 e.16 ---980 30 2.0 1.8 e1.3 e2.0 4.4 .56 7.6 25 3.4 31 2.1 e1.3 e2.0 122.30 76.01 225.1 80.58 61.1 190.48 TOTAL 69.19 76.0 52.0 48.9 31.11 894.2 2.60 2.04 6.14 3.95 2.53 MEAN 2.23 2.53 1.68 1.58 1.11 28.8 7.50 29 2.5 5.2 35 MAX 3.4 3.4 2.0 2.2 100 19 1.1 .56 .06 .79 2.0 .42 .16 MTN 1.8 1.3 1.0 .68 1.2 160 121 243 151 AC-FT 137 151 103 97 62 1770

CAL YR 1988 TOTAL 8720.99 MEAN 23.8 MAX 213 MIN .02 AC-FT 17300 WTR YR 1989 TOTAL 1926.97 MEAN 5.28 MAX 100 MIN .06 AC-FT 3820

e - Estimated

321

06470000 JAMES RIVER AT JAMESTOWN, ND--CONTINUED WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1950-51, 1958 to current year.

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)	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)
OCT 03	1100	1.1	1100	7.40	5.0	8.0	5.3	9.2	76	390	91
NOV 21	1200	2.7	1140	7.45	-3.0	2.0	4.8	11.8	84	380	85
JAN 03	1130	2.3	1280	7.40	-5.0	0.5	3.7	7.9	54	470	120
FEB 27	1100	2.3	1200	7.30	-7.0	0.5	3.6	8.0	56	400	100
MAR 14	1020	11	450		-8.0	0.5					
29 APR	0935	58	300		5.0	0.5					
06 MAY	1600	30	710	7.70	8.0	4.0		13.3	99	260	59
15 JUL	1545	0.58	825	8.01	26.5	22.0	3.5	5.3	60	290	70
10 AUG	1000	2.0	1050	7.45	25.0	19.0	8.4	4.5	48	350	79
15	1000	0.15	1080	7.60	18.0	14.5	3.8	7.7	74	360	88
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	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 03	39	97	34	2	11	337	220	35	721	697	0.98
NOV 21	40	110	38	3	11	331	190	53	707	688	0.96
JAN 03	41	110	33	2	8.2	419	220	40	813	792	1.11
FEB 27	36	110	37	2	7.9	403	200	42	773	742	1.05
APR 06	28	50	28	1	11	181	160	14	455	434	0.62
MAY 15	29	64	31	2	8.7	232	170	23	517	505	0.70
JUL 10	36	86	34	2	13	291	230	31	693	651	0.94
AUG 15	33	100	37	2	8.6	364	170	25	591	645	0.80
	SOLIDS, DIS- SOLVED (TONS PER DAY)	RESIDUE TOTAL AT 105 DEG. C, SUS- PENDED (MG/L)	NITRO- GEN, NITRATE DIS-	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE DIS-	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA DIS-	NITRO- GEN, AM-	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N)
DATE	(70302)	(00530)	(00618)	(00615)	(00613)	(00630)	(00631)	(00610)	(00608)	(00625)	(00623)
OCT 03	2.14	29			<0.010		0.110		0.260		0.70
NOV 21	5.19	6			0.020		<0.100		0.040		0.70
JAN 03	5.07	8			<0.010		<0.100		0.440		0.90
FEB 27	4.82	<1	0.290		0.010		0.300		0.490		0.80
APR 06	36.6		0.340	0.050	0.040	0.400	0.380	0.320	0.300	1.1	1.3
MAY 15	0.81	13		<0.010	<0.010	<0.100	<0.100	0.040	0.160	1.1	0.30
JUL 10	3.74	16			0.010		<0.100		0.180		0.70
AUG 15	0.24	9		<0.010	<0.010	<0.100	<0.100	0.170	0.180	0.80	0.60

06470000 JAMES RIVER AT JAMESTOWN, ND--CONTINUED

				, """	DAIN OUTUE		02. 12			
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)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)
OCT 03		0.030		0.010			3	420		<1
NOV 21		0.020		0.003			1	340		<1
JAN 03		0.020		0.015			3	370		<1
FEB 27		0.030		0.014			3	370		<1
APR 06	0.120	0.060	0.065	0.037	0.05	1	1	120	<1	<1
MAY 15	0.060	0.030	0.027	0.012	0.03	2	2	230	<1	<1
JUL 10		0.050		0.012	0.05	_	5	330		<1
AUG					0.00		5	460		<1
15	0.120	0.030	0.042	0.084	0.08	8	5	460	<1	(1
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, 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 DIS- SOLVED (UG/L AS HG) (71890)	SELE- NIUM, TOTAL (UG/L AS SE) (01147)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)
OCT 03	1		18	/E		840	0.8		<1	5
NOV				<5						
21 JAN	2	-	8	<5	-	28	0.3	-	<1	5
O3 FEB	2		190	<5		850	0.3		<1	. 5
27 APR	1		210	<5		1500	0.3		<1	8
O6	1	620	24	<5	840	760	0.2	<1	<1	<3
15 JUL	3	470	7	<1	530	240	<0.1	<1	<1	. 4
AUG	<1		21	<1		940	0.9		<1	7
15	1	880	18	1	850	770	1.5	<1	<1	10
DATE	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS- SOLVED (MG/L AS CN) (00723)	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)	PLANK- TON BIOMASS ASH WT (MG/L) (81353)	PLANK- TON BIOMASS DRY WT (MG/L) (81354)	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										
03 NOV			-					82	0.24	66
21 JAN			<0.01					104	0.76	26
03 FEB			<0.01					94	0.59	29
27			<0.01					78	0.49	33
APR 06	8.8	<0.010	<0.01	5.50	0.600	6.7	1200	23	1.9	98
MAY 15	8.1	<0.010	<0.01	5.90	0.600	14	1100	15	.02	92
JUL 10			<0.01					42	.23	95
AUG 15	5.6	<0.010	<0.01	4.40	0.400	9.8	1100	20	.01	91

06470500 JAMES RIVER AT LA MOURE. ND

LOCATION.--Lat 46°21'20", long 98°18'15", in NE1/4NE1/4 sec.11, T.133 N., R.61 W., LaMoure County, Hydrologic Unit 10160003, on left bank 80 ft downstream from bridge on State Highway 13, 0.5 mi west of LaMoure, and 12 mi upstream from Cottonwood Creek.

DRAINAGE AREA. -- 4,390 mi², approximately, of which about 2,600 mi² is probably noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April to July 1903 (gage-height record only), April 1950 to current year. Gage-height records for 1902-11 are contained in reports of the National Oceanic and Atmospheric Administration.

REVISED RECORDS. -- WSP 1917: Drainage area.

GAGE.--Water-stage recorder and rubble-masonry control. Datum of gage is 1,290.00 ft above National Geodetic Vertical Datum of 1929. See WSP 1729 or 1917 for history of changes prior to Apr. 19, 1950.

REMARKS.-Estimated daily discharges: Nov. 24 to Apr. 4. Records good except those for period Nov. 24 to Mar. 10, which are fair and those for period Mar. 11 to Apr. 4, which are poor. Flow regulated by Arrowwood, Jim, and Pipestem Lakes and Jamestown Reservoir, combined capacity, 393,000 acre-ft. Regulation by Jamestown Reservoir (station 06469000) 85 mi upstream since 1953 and by Pipestem Lake, capacity 147,000 acre-ft, since 1973.

AVERAGE DISCHARGE.--39 years (water years 1951-89), 100 ft^3/s , 72,450 acre-ft/yr; median of yearly mean discharges, 71 ft^3/s , 51,400 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD. -- Maximum discharge, 6,800 ft3/s, Apr. 14, 1969, gage height, 16.17 ft; no flow at times.

EXTREMES OUTSIDE PERIOD OF RECORD.--Prior to flood of Apr. 14, 1969, a long-time resident said that the flood of May 16, 1950, was the highest since 1881, with stage in either 1942 or 1943 being almost as high owing to large ice jam.

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

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 900 ft^3/s , Mar. 30, gage height, 9.78 ft, backwater from ice; minimum daily, 0.0 ft^3/s , Aug. 9 and 10.

						MEAN VALUE	S					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	YAM	JUN	JUL	AUG	SEP
1 2 3 4 5	14 6.7 11 2.1 3.0	9.9 8.7 12 12 18	e7.4 e7.4 e7.5 e7.8 e8.0	e6.6 e6.6 e6.6 e6.4	e7.1 e7.0 e6.9 e6.8 e6.7	e7.6 e7.4 e7.4 e7.2 e7.0	e780 e750 e500 e350 261	34 33 30 48 44	27 29 23 19 20	11 8.3 10 7.4 8.0	5.4 3.0 6.6 7.5 8.0	40 32 32 29 17
6 7 8 9 10	4.8 6.2 6.5 7.9 9.4	3.2 8.7 7.8 16 8.3	e7.8 e7.4 e7.0 e6.5 e6.2	e6.4 e6.2 e6.2 e6.0 e5.8	e6.6 e6.5 e6.4 e6.6 e6.8	e7.0 e7.0 e7.0 e7.0 e10	201 175 114 100 93	14 22 40 25 21	16 27 13 9.1 9.8	13 7.3 28 48 55	1.2 .61 .23 .00	43 46 45 41 29
11 12 13 14 15	2.6 2.5 5.0 8.0	6.0 12 15 6.7 20	e6.0 e6.0 e6.0 e6.4	e5.8 e5.8 e6.0 e6.0	e7.5 e8.0 e7.8 e7.8	e40 e100 e300 e600 e500	91 91 78 64 43	16 26 28 22 18	13 32 13 11 12	39 26 17 21 28	.22 .66 2.1 3.8 2.0	39 24 20 21 16
16 17 18 19 20	12 12 13 8.5 14	3.9 8.0 8.9 8.1	e6.4 e6.8 e6.8 e7.0	e6.0 e6.2 e6.4 e6.4	e7.6 e7.4 e7.4 e7.6	e250 e150 e100 e80 e70	63 36 43 33 32	14 19 21 25 19	15 26 23 17 21	22 29 39 37 27	.97 .32 2.3 16	19 7.9 11 15 13
21 22 23 24 25	14 15 22 6.2 14	8.1 8.3 e8.1 e8.0	e7.0 e7.0 e7.0 e7.0	e6.4 e6.4 e6.0 e6.0	e7.8 e8.0 e8.2 e8.2	e60 e50 e40 e50 e70	25 17 46 41 33	13 20 17 27 23	29 20 21 21 23	20 15 15 12 9.9	9.3 7.9 4.5 2.6 5.1	18 22 1.3 4.6
26 27 28 29 30 31	7.0 34 2.0 5.2 9.1	e8.0 e8.0 e7.8 e7.6 e7.4	e6.8 e6.6 e6.6 e6.6	e6.0 e6.2 e6.4 e6.8 e7.0 e7.2	e8.0 e7.7 e7.6	e150 e300 e550 e700 e880 e750	37 41 31 39 37	18 8.3 27 32 30 24	24 19 15 23 17	12 9.5 6.9 13 14 8.5	10 6.5 14 12 14 38	5.0 6.5 14 4.0 2.4
TOTAL MEAN MAX MIN AC-FT	299.7 9.67 34 2.0 594	286.6 9.55 20 3.2 568	211.8 6.83 8.0 6.0 420	194.6 6.28 7.2 5.8 386	207.4 7.41 8.4 6.4 411	5864.6 189 880 7.0 11630	4245 141 780 17 8420	758.3 24.5 48 8.3 1500	587.9 19.6 32 9.1 1170	616.8 19.9 55 6.9 1220	196.81 6.35 38 .00 390	628.7 21.0 46 1.3 1250

CAL YR 1988 TOTAL 12425.1 MEAN 33.9 MAX 230 MIN 2.0 AC-FT 24650 WTR YR 1989 TOTAL 14098.21 MEAN 38.6 MAX 880 MIN .00 AC-FT 27960

06470500 JAMES RIVER AT LAMOURE, ND--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD .-- Water years 1957 to current year.

PERIOD OF DAILY RECORDS.-SPECIFIC CONDUCTANCE: October 1976 to current year.
WATER TEMPERATURE: June 1953 to September 1975, October 1976 to current year.

INSTRUMENTATION .-- Temperature recorder from June 1953 to September 1978. Water-quality monitor since October 1982.

EXTREMES FOR PERIOD OF DAILY RECORD.-SPECIFIC CONDUCTANCE: Maximum, 1,880 microsiemens, Jan. 31, 1979; minimum, 183 microsiemens, Mar. 30, 1989.
WATER TEMPERATURE: Maximum, 33.0°C, July 12, 13, 1957; July 23, 1977; minimum, 0.0°C on many days during winte months.

EXTREMES FOR CURRENT YEAR.-SPECIFIC CONDUCTANCE: Maximum, 1,830 microsiemens, Jan. 14,15; minimum, 183 microsiemens, Mar. 30.
WATER TEMPERATURE: Maximum, 29.2°C, July 3; minimum, 0.0°C on many days during winter months.

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)	COLOR (PLAT- INUM- COBALT UNITS) (OOO80)	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)
OCT 04	1230	2.9	930	8.30	0.0	8.0	20	9.8	10.8	88	310
NOV							20				
21 JAN	1400	8.4	1120	8.24	0.0	0.5		4.4	15.8	108	420
03 FEB	1430	6.6	1800	7.68	-5.0	1.5	12	2.5	15.0	105	610
27 MAR	1515	7.7	1480	7.40	-7.0	0.5	3	0.50			530
28	1440	550	200		8.0	0.5					
31	0840	720	220		0.0	0.5					
APR 05	0930	270	300	7.20	2.0	0.5	110	31	10.8	73	100
18	1120	56	630		5.0	5.5					
MAY 15	1230	14	1020	7.83	18.0	18.0	100	35	6.3	66	340
JUL 10	1230	60	1120	8.15	26.0	24.5	32	43	7.1	84	360
AUG	1230	00	1120	0.15	20.0	24.5	22				
15	1200	2.9	1080	8.40	20.0	21.0	30	17	8.2	91	280
DATE	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L AS CACO3) (90410)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)
OCT 04	68	35	86	37	2	3.7	297	140	39	0.20	565
NOV 21	100	41	100	34	2	9.3	359	230	34		751
JAN 03	140	64	180	38	3	15	532	370	94	0.40	1200
FEB 27	130	49	140	36	3	10	476	250	71	0.30	942
APR 05	25	9.8	15	22	0.7	10	86	47	8.4	0.10	189
MAY 15	76	37	85	34	2	11	293	190	42	0.20	622
JUL 10	81	38	98	36	2	14	350	190	47	0.20	801
AUG 15	60	31	130	49	3	13	302	170	65	0.50	638

O6470500 JAMES RIVER AT LAMOURE, ND--CONTINUED
WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

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)	RESIDUE TOTAL AT 105 DEG. C, SUS- PENDED (MG/L) (00530)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (OO630)	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)
OCT 04	550	0.77	4.42	22	1440	44	<0.010		<0.100		0.030
NOV 21					-	-	0.020		<0.100		0.230
JAN	731	1.02	17.0	4						-	
FEB	1180	1.63	21.4	11			<0.010		<0.100		0.090
27 APR	939	1.28	19.6	<1	0.100		0.010		0.110		0.730
05 MAY	172	0.26	138	43	0.840	0.060	0.030	0.800	0.870	0.480	0.420
15 JUL	619	0.85	22.8	88		0.010	<0.010	<0.100	<0.100	0.050	0.030
10 AUG	681	1.09	130	147			<0.010		<0.100		0.270
15	651	0.87	5.08	24		<0.010	<0.010	<0.100	<0.100	0.030	0.020
DATE	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N) (OO625)	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)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)
OCT 04		0.70	- 22	0.030	22	0.010		- 22	2	270	
NOV 21		0.80	2.5	0.020			80	425	2	370	
JAN					-	0.009					-
O3 FEB		1.1	-	0.030	-	0.018			1	550	-
27 APR		1.0		0.010		0.021			<1	430	
05 MAY	1.6	1.5	0.340	0.260	0.250	0.226	0.09	2	2	50	1
15 JUL	0.90	0.70	0.270	0.030	0.032	0.011	0.24	3	2	280	<1
10 AUG		0.80		0.420		0.361			14	390	
15	1.8	0.80	0.300	0.100	0.126	0.004	0.17	5	, 4	500	<1
DATE	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	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, 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 DIS- SOLVED (UG/L AS HG) (71890)	SELE- NIUM, TOTAL (UG/L AS SE) (01147)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)
OCT 04	<1	1		5	<5	122	100	0.5	22	<1	6
NOV 21	<1									<1	6
JAN		2	-	40	<5		470	0.5	77		
FEB	<1	3		13	<5		270	0.2	1.50	<1	10
27 APR	<1	1		10	<5		1100	0.6		<1	6
05 MAY	<1	3	2300	260	<5	270	160	0.1	<1	1	8
15 JUL	<1	<1	2800	7	<1	2000	1400	0.2		<1	5
10 AUG	<1	1		8	<1		920	0.8		<1	9
15	<1	1	860	9	<1	850	180	0.9	<1	<1	5

326

JAMES RIVER BASIN

06470500 JAMES RIVER AT LAMOURE, ND--CONTINUED

DATE	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS- SOLVED (MG/L AS CN) (00723)	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)	PLANK- TON BIOMASS ASH WT (MG/L) (81353)	PLANK- TON BIOMASS DRY WT (MG/L) (81354)	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								44	0.34	71
NOV 21	- 22	- 44	<0.01					79	1.8	13
JAN 03			<0.01					82	1.5	10
FEB 27			<0.01	- 12				173	3.6	23
APR	44	10 010	40.04	0.50	40.000	0.0	4000	60	44	99
05 MAY	11	<0.010	<0.01	2.50	<0.200	9.8	1200	60	44	99
15	10	<0.010	<0.01	40.0	3.00	17	1200	163	6.2	97
JUL										
AUG			<0.01					96	16	98
15	13	0.010	<0.01	26.0	1.80	6.1	1200	22	.17	95

06470500 JAMES RIVER AT LAMOURE, ND--CONTINUED

SPECI	FIC COND	UCTANCE,	MICROS	IEMENS/CM	AT 25	DEGREES C	CENTIGRADE,	WATER YEAR	OCTOBER	1988 TO	SEPTEMBER	1989
DAY	MAX	MIN	MEAN	MAX	MI	N MEAN	MAX MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEM	BER		DECEMBER			JANUARY	
1 2 3 4 5	930 960 970 970 980	860 870 870 880 900	891 906 933 948 965	1180 1140 1140 1140 1160	1070 1080 1100 1090 1130	0 1110 0 1120 0 1130	1250 1270 1290	1230	1220 1240 1260 1280 1300	1750 1740 1740 1750 1770	1710 1710 1720 1730 1740	1730 1720 1730 1740 1760
6 7 8 9	990 990 990 990 990	970 950 930 910 920	985 978 982 948 960	1160 1160 1150 1160 1150	1140 1080 1100 1110 1080	1140 1140 1140	1350 1420 1500	1310 1330 1350 1400 1480	1320 1340 1370 1450 1500	1810 1820 1820 1820 1810	1760 1800 1810 1800 1790	1780 1810 1810 1810 1800
11 12 13 14 15	990 1010 1010 1010 980	940 950 960 940 920	978 985 988 974 963	1200 1190 1150 1160 1130	1100 1110 1070 1070 1060	1150 1120 1100	1560 1560 1590	1520 1550 1550 1560 1560	1540 1550 1560 1570 1570	1810 1800 1810 1830 1830	1790 1790 1800 1810 1800	1800 1800 1800 1820 1820
16 17 18 19 20	980 980 980 980 970	910 910 910 910 910	953 962 939 943 964	1100 1170 1200 1210 1200	1040 1090 1110 1140 1120	1130 1160 1190	1640 1670 1750	1590 1620 1640 1670 1750	1610 1630 1650 1700 1760	1820 1790 1760 1740 1730	1780 1750 1730 1710 1670	1790 1770 1750 1720 1690
21 22 23 24 25	970 1000 1030 1030 990	910 910 970 960 960	952 940 1000 978 974	1190 1180 1190 1180 1160	1130 1130 1160 1160 1140	1150 1170 1170	1810 1810 1820	1770 1790 1790 1810 1770	1790 1800 1800 1810 1780	1670 1650 1620 1610 1600	1630 1610 1600 1570 1550	1650 1630 1610 1590 1570
26 27 28 29 30 31	1010 1040 1060 1160 1180 1180	980 990 1020 1060 1070 1080	998 1010 1030 1100 1110 1130	1150 1170 1180 1220 1230	1130 1140 1150 1190 1210	1150 1170 1200 1220	1800 1770 1770 1760	1760 1760 1750 1740 1730 1740	1780 1790 1760 1750 1750	1560 1540 1520 1510 1500 1490	1540 1520 1500 1500 1470 1470	1550 1530 1520 1500 1490 1480
MONTH	1180	860	980	1230	1040	1150	1820	1220	1580	1830	1470	1700
SPECIF	FIC COND	UCTANCE,	MICROSI	EMENS/CM	AT 25 D	EGREES C	ENTIGRADE,	WATER YEAR	OCTOBER	1988 TO	SEPTEMBER	1989
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH	I		APRIL			MAY	
1 2 3 4 5	1480 1460											
	1450 1450 1450	1450 1430 1430 1430 1440	1470 1440 1440 1440 1440	1450 1440 1430 1420 1420	1430 1420 1410 1400 1400	1430 1420 1410	219 225 243	191 196 202 218 243	196 199 213 233 249	800 810 820 830 860	730 730 720 780 760	760 775 795 808 822
6 7 8 9	1450	1430 1430 1430	1440 1440 1440	1440 1430 1420	1420 1410 1400	1430 1420 1410 1410 1410 1410 1410 1420 142	219 225 243 258 284 310 336 361	196 202 218	199 213 233	810 820 830	730 730 720 780	775 795 808
8 9	1450 1450 1480 1480 1490 1510	1430 1430 1430 1440 1450 1450 1480 1490	1440 1440 1440 1440 1460 1470 1480 1500	1440 1430 1420 1420 1420 1420 1420 1420	1420 1410 1400 1400 1400 1410 1410 1410	1430 1410 1410 1410 1410 1410 1420 1420 142	219 225 243 258 284 310 336 361	196 202 218 243 250 274 300 326	199 213 233 249 266 290 318 344	810 820 830 860 870 890 900 920	730 730 720 780 760 780 800 830 840	775 795 808 822 828 852 869 883
8 9 10 11 12 13	1450 1450 1480 1480 1490 1510 1530 1560 1530 1530 1530	1430 1430 1430 1440 1450 1450 1480 1490 1500 1520 1530 1520 1510	1440 1440 1440 1440 1460 1470 1480 1500 1510 1530 1530 1530 1530	1440 1430 1420 1420 1420 1420 1420 1420 1420 142	1420 1410 1400 1400 1410 1410 1410 1380 1260 1070 613 455	1430 1420 1410 1410 1410 1410 1420 1420 142	219 225 243 258 284 310 336 361 386 447 463 476	196 202 218 243 250 274 300 326 362 377 376 414 425	199 213 233 249 266 290 318 344 371 395 413 441 451	810 820 830 860 870 890 920 940 950 970 970 980	730 730 720 780 760 780 800 830 840 850 830 830 830 870 910 980 990	775 795 808 822 828 852 869 883 898 910 924 938 931
8 9 10 11 12 13 14 15 16 17 18 19	1450 1450 1480 1480 1490 1510 1530 1530 1530 1530 1530 15490 1470 1470 1460 1450	1430 1430 1430 1440 1450 1450 1480 1500 1520 1520 1520 1510 1480 1460 1440 1430 1420	1440 1440 1440 1440 1460 1470 1480 1500 1510 1530 1530 1530 1530 1540 1450 1450 1450 1450	1440 1430 1420 1420 1420 1420 1420 1420 1420 1270 1270 1090 632 454 373 317 301 306	1420 1400 1400 1400 1410 1410 1380 1260 1070 347 319 292 274 273	1430 1420 1410 1410 1410 1410 1420 1420 142	219 225 243 258 284 310 336 361 386 433 447 463 476 515	196 202 218 243 250 274 300 326 362 377 376 414 425 433 496 532 590	199 2133 233 249 266 290 318 344 371 395 413 441 451 477 529 579 614 637	810 820 830 860 870 890 900 920 940 950 970 970 980 990	730 730 730 720 780 760 780 800 830 840 850 830 830 830 870 910 980 990 1010	775 795 808 822 828 852 869 883 898 910 924 938 931 945 973 987 1000 1020
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	1450 1450 1480 1480 1510 1510 1530 1530 1530 1530 1530 1540 1470 1460 1450 1450 1450 1460 1460	1430 1430 1430 1440 1450 1450 1450 1450 1520 1530 1520 1510 1480 1440 1430 1420 1420 1420 1420	1440 1440 1440 1440 1460 1470 1480 1500 1510 1530 1530 1530 1530 1520 1450 1440 1450 1450 1450	1440 1430 1420 1420 1420 1420 1420 1420 1420 142	1420 1400 1400 1400 1410 1410 1410 1380 1260 613 455 347 319 292 273 303 328 345 352 360 343 292 225 191 184	1430 1420 1410 1410 1410 1410 1420 1420 142	219 225 243 258 284 310 336 361 386 433 447 463 476 515 571 650 670 660 650 670 690 710 720 750 760 770 780	196 202 218 243 250 274 300 326 362 377 3776 414 425 433 496 532 588 590 610 580 600 640 660 660 680 680 680	199 2133 2249 266 290 318 344 371 395 441 451 477 529 579 637 637 637 627 627 627 627 627 627 627 627 627 62	810 820 830 860 870 890 900 920 940 950 970 970 980 990 1010 1020 1030 1020 1020 1020 1020 1010 101	730 730 730 780 760 780 800 830 830 830 830 830 830 830 830 8	775 795 795 808 822 852 869 883 893 910 924 938 931 945 973 980 1020 1020 1020 1020 1020 1020 1020 10
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 29 20 20 20 20 20 20 20 20 20 20 20 20 20	1450 1450 1480 1480 1510 1510 1530 1530 1530 1530 1530 153	1430 1430 1430 1440 1450 1450 1480 1500 1520 1520 1520 1510 1480 1440 1440 1420 1420 1420 1440 1450 1460 1450 1460 1450	1440 1440 1440 1440 1460 1470 1480 1500 1510 1530 1530 1530 1530 1450 1450 1450 1450 1450 1460 1460	1440 1430 1420 1420 1420 1420 1420 1420 1420 1370 1270 1090 632 454 373 317 301 306 331 355 374 490 397	1420 1410 1400 1410 1410 1410 1260 1070 613 455 347 319 292 274 273 303 328 345 352 360 343 292 225 191	1430 1420 1410 1410 1410 1410 1420 1420 142	219 225 243 258 284 310 336 361 386 433 447 463 476 515 650 670 660 650 670 690 710 720 750 760 770	196 202 218 243 250 274 300 326 362 377 376 414 425 433 496 532 588 590 610 590 600 640 660 660 660 660 660 660 660 66	199 2133 233 249 266 290 318 344 371 395 413 447 529 579 614 637 635 617 627 624 660 676 676 693 718 730 732	810 820 830 860 870 890 990 940 950 970 970 980 990 1010 1020 1030 1020 1020 1020 1020 102	730 730 730 720 780 760 780 800 830 840 850 830 830 830 830 870 910 980 990 1010 1010 1010 980 980 970 960 970 990 990	775 795 808 822 828 852 869 883 898 910 924 938 931 945 973 987 1000 1020 1020 1020 1020 1020 1020 102

JAMES RIVER BASIN

06470500 JAMES RIVER AT LAMOURE, ND--CONTINUED

SPECIE	FIC CON	DUCTANCE	E. MICROSTE		AT 25 DEGE			WATER YEAR	COTOBER	1988 TO	SEPTEMBER	1989
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE		MAX	JULY	MEAN	MAX		PIEAN	MAX		
4	4000							AUGUST			SEPTEMBER	2
1 2	1000	990 980	992 985	1070 1080	1030 1030	1050 1060				1000 970	950 930	978 949
3	1000	950	988	1100	1050	1070				960	890	940
4				1100	1060	1080				950	920	930
5				1120	1100	1100				950	880	921
6										940	890	923
7 8										950	890	922
9										930 960	870 910	908 942
10										960	900	946
11										930	830	906
12										860	790	835
13 14										830	760	798
15										780 790	750 740	769 767
16												
17							1110 1110	1050 1060	1080 1090	840 870	760 810	804 841
18							1120	1030	1100	910	810	869
19							1130	1060	1100	920	850	885
20							1150	1080	1110	920	860	899
21							1190	1090	1140	930	890	914
22 23							1210	1150	1180	950	890	916
24							1210 1210	1170 1170	1190 1190	940 950	910 900	934 926
25							1190	1150	1170	960	890	917
26							1160	1070	1120	950	900	926
27							1110	1060	1100	950	930	940
28 29							1060	1010	1040	950	870	919
30	1070	1020	1050				1030 1030	990 1000	1020 1020	940 960	880 910	912 929
31							1030	970	1010			
MONTH										1000	740	899
		WATED T	PMDED ATTIDE	DECREE	e ceretie	WAMED	VEAD OCTO	DED 1000 F	O CEDMENT	PP 4000		
2111								BER 1988 1				
DAY	MAX	WATER T	EMPERATURE MEAN	MAX	S CELSIUS,	WATER	YEAR OCTO	DBER 1988 1	CO SEPTEME MEAN	BER 1989	MIN	MEAN
DAY	MAX		MEAN								MIN JANUARY	MEAN
DAY	12.9	MIN	MEAN CR 11.6		MIN	MEAN	MAX	MIN DECEMBER	MEAN	MAX		
1 2	12.9 12.6	MIN OCTOBE 10.5 10.2	MEAN CR 11.6 11.4	MAX 4.2 4.1	MIN NOVEMBER 3.6 3.4	MEAN 3.9 3.8	1.7 1.4	MIN DECEMBER 1.3 1.3	MEAN 1.5 1.4	MAX 1.3 1.5	JANUARY 1.0 1.3	1.1
1 2 3	12.9 12.6 11.7	MIN OCTOBE 10.5 10.2 9.3	MEAN 11.6 11.4 10.6	MAX 4.2 4.1 4.0	MIN NOVEMBER 3.6 3.4 3.1	MEAN 3.9 3.8 3.6	1.7 1.4 1.6	MIN DECEMBER 1.3 1.3 1.3	1.5 1.4 1.4	1.3 1.5 1.5	JANUARY 1.0 1.3 1.4	1.1 1.4 1.5
1 2	12.9 12.6	MIN OCTOBE 10.5 10.2	MEAN CR 11.6 11.4	MAX 4.2 4.1	MIN NOVEMBER 3.6 3.4	MEAN 3.9 3.8	1.7 1.4	MIN DECEMBER 1.3 1.3	MEAN 1.5 1.4	MAX 1.3 1.5	JANUARY 1.0 1.3	1.1
1 2 3 4 5	12.9 12.6 11.7 9.4 8.8	MIN OCTOBE 10.5 10.2 9.3 7.5 7.3	MEAN 11.6 11.4 10.6 8.5 8.2	4.2 4.1 4.0 4.5 4.2	MIN NOVEMBER 3.6 3.4 3.1 3.7 2.4	MEAN 3.9 3.8 3.6 4.1 3.4	1.7 1.4 1.6 1.8 1.9	MIN DECEMBER 1.3 1.3 1.3 1.5 1.6	1.5 1.4 1.4 1.7	1.3 1.5 1.5 1.5	JANUARY 1.0 1.3 1.4 1.2	1.1 1.4 1.5 1.3 1.2
1 2 3 4 5	12.9 12.6 11.7 9.4 8.8	MIN OCTOBE 10.5 10.2 9.3 7.5 7.3	MEAN 11.6 11.4 10.6 8.5 8.2 8.1	4.2 4.1 4.0 4.5 4.2	MIN NOVEMBER 3.6 3.4 3.1 3.7 2.4	MEAN 3.9 3.8 3.6 4.1 3.4 2.3	1.7 1.4 1.6 1.8 1.9	MIN DECEMBER 1.3 1.3 1.5 1.6	1.5 1.4 1.4 1.7 1.8	1.3 1.5 1.5 1.4 1.3	JANUARY 1.0 1.3 1.4 1.2 .7	1.1 1.4 1.5 1.3 1.2
1 2 3 4 5 6 7 8	12.9 12.6 11.7 9.4 8.8 8.9 10.4 10.8	MIN OCTOBE 10.5 10.2 9.3 7.5 7.3 7.0 7.7 8.8	MEAN 11.6 11.4 10.6 8.5 8.2	MAX 4.2 4.1 4.0 4.5 4.2 2.7	MIN NOVEMBER 3.6 3.4 3.1 3.7 2.4	MEAN 3.9 3.8 3.6 4.1 3.4 2.3 3.1 3.2	1.7 1.4 1.6 1.8 1.9 2.1 2.2	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9	1.5 1.4 1.4 1.7	1.3 1.5 1.5 1.5	JANUARY 1.0 1.3 1.4 1.2	1.1 1.4 1.5 1.3 1.2
1 2 3 4 5 6 7 8 9	12.9 12.6 11.7 9.4 8.8 8.9 10.4 10.8 12.0	MIN OCTOBE 10.5 10.2 9.3 7.5 7.3 7.0 7.7 8.8	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.0 9.7 10.9	MAX 4.2 4.1 4.0 4.5 4.2 2.7 4.0 3.7	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.2 2.6 2.9	MEAN 3.9 3.86 4.1 3.1 2.3 3.6	1.7 1.4 1.6 1.8 1.9 2.1 2.2 2.1	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9	1.5 1.4 1.4 1.7 1.8 1.9 2.1 1.7	1.3 1.5 1.5 1.4 1.3	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0	1.1 1.4 1.5 1.3 1.2
1 2 3 4 5 6 7 8	12.9 12.6 11.7 9.4 8.8 8.9 10.4 10.8	MIN OCTOBE 10.5 10.2 9.3 7.5 7.3	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.0	MAX 4.2 4.1 4.0 4.5 4.2 2.7 4.0 3.7	MIN NOVEMBER 3.6 3.4 3.1 3.7 2.4 1.7 2.2	MEAN 3.9 3.8 3.6 4.1 3.4 2.3 3.1 3.2	1.7 1.4 1.6 1.8 1.9 2.1 2.2	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7	1.5 1.4 1.4 1.7 1.8 1.9 2.1	1.3 1.5 1.5 1.4 1.3	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0	1.1 1.4 1.5 1.3 1.2
1 2 3 4 5 6 7 8 9 10	12.9 12.6 11.7 9.4 8.8 8.9 10.8 12.0 11.1	MIN OCTOBE 10.5 10.2 9.3 7.5 7.3 7.0 7.7 8.8 9.9 9.6	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.0 9.7 10.9 10.4	MAX 4.2 4.1 4.0 4.5 4.2 2.7 4.07 4.2 2.7	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4	MEAN 3.86 4.1 3.4 2.31 3.69 1.6	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 2.1 1.1	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7	1.5 1.4 1.4 1.7 1.8 1.9 2.1 1.7 1.0	1.3 1.5 1.5 1.4 1.3	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0	1.1 1.4 1.5 1.3 1.2 .3 .0 .0
1 2 3 4 5 6 7 8 9 10 11 12	12.9 12.6 11.7 9.4 8.8 8.9 10.4 12.0 11.1 9.9	MIN OCTOBE 10.5 10.2 9.3 7.5 7.3 7.0 7.7 8.8 9.9 9.6	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.0 9.7 10.9 10.4 9.3 9.2	MAX 4.2 4.1 4.0 4.5 4.2 2.7 4.0 3.7 4.0 7 4.0	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4	MEAN 3.98 3.64 4.1 3.4 2.31 3.26 1.9 1.60	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 2.1 1.1 .9	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7	MEAN 1.5 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .6 .6	1.3 1.5 1.5 1.4 1.3 .6	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0 .0 .0 .0	1.1 1.4 1.5 1.3 1.2
1 2 3 4 5 6 7 8 9 10 11 12 13	12.9 12.6 11.7 9.4 8.8 8.9 10.4 10.8 12.0 11.1 9.9 10.2	MIN OCTOBE 10.5 10.2 9.3 7.5 7.3 7.0 7.7 8.8 9.9 9.6 8.7 8.4	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.0 9.7 10.9 10.4 9.3 9.3	MAX 4.2 4.1 4.0 4.5 4.2 2.7 4.0 3.7 4.2 2.7	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4 1.4 1.3 2.0	MEAN 3.9 3.8 3.6 4.1 3.4 2.3 3.6 1.0 2.6	1.7 1.4 1.6 1.8 1.9 2.1 2.2 2.1 1.1	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7	MEAN 1.5 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .6 .6	1.3 1.5 1.5 1.4 1.3 .6 .0	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0 .0 .0 .0	1.1 1.4 1.5 1.3 1.2 .0 .0
1 2 3 4 5 6 7 8 9 10 11 12	12.9 12.6 11.7 9.4 8.8 8.9 10.4 12.0 11.1 9.9	MIN OCTOBE 10.5 10.2 9.3 7.5 7.3 7.0 7.7 8.8 9.9 9.6	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.0 9.7 10.9 10.4 9.3 9.2	MAX 4.2 4.1 4.0 4.5 4.2 2.7 4.0 3.7 4.0 7 4.0	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4	MEAN 3.98 3.64 4.1 3.4 2.31 3.26 1.9 1.60	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 2.1 1.1 .9	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7	MEAN 1.5 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .6 .6	1.3 1.5 1.5 1.4 1.3 .6	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0 .0 .0 .0	1.1 1.4 1.5 1.3 1.2
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	12.9 12.6 11.7 9.8 8.9 10.4 10.8 12.0 11.1 9.9 10.2 11.6 12.3	MIN OCTOBE 10.5 10.2 9.3 7.5 7.3 7.0 7.7 8.8 9.6 8.7 8.4 8.3 9.1 10.8	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.0 9.7 10.9 10.4 9.3 10.3 11.5	MAX 4.2 4.1 4.0 4.5 4.2 2.7 4.0 3.7 4.2 2.7 1.89 2.4 1.6	MIN NOVEMBER 3.6 3.4 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4 1.4 1.3 2.0 1.6	MEAN 3.9 3.6 4.1 3.4 2.3 3.6 1.9 1.60 2.60 2.8	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 2.1 1.1 .9 .8 .7 .7 1.0 1.8	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7 .5 .6 .6 1.0	1.5 1.4 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .6 .7 .8	1.3 1.5 1.5 1.4 1.3 .6 .0	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0 .0 .0 .0 .0 .0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0
1 2 3 4 5 6 7 8 9 10 11 12 3 14 15 16	12.9 12.6 11.7 9.8 8.8 10.8 12.0 11.1 9.9 10.2 11.6 12.3	MIN OCTOBE 10.5 10.2 9.3 7.5 7.7 7.7 8.8 9.9 9.6 8.7 8.4 9.1 10.8	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.7 10.9 10.4 9.3 9.2 9.3 11.5	MAX 4.2 4.1 4.0 4.5 4.2 2.7 4.7 4.2 2.7 1.8 2.9 3.4 1.6 .1	MIN NOVEMBER 3.6 3.4 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4 1.3 2.0 1.6 .0	MEAN 3.983.6 4.1 2.31.2 3.6 1.9 1.60.6 2.08 .0	MAX 1.7 1.4 1.6 1.8 1.9 2.1 1.1 .9 .8 .7 1.0 1.8 2.1	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7 .5 .6 1.0	1.5 1.4 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .6 .7 .8	1.3 1.5 1.5 1.4 1.3 .6 .0 .0	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0 .0 .0 .0 .0 .0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0
1 2 3 4 5 6 7 8 9 10 11 12 3 14 15 16 17 18	12.9 12.6 11.7 9.8 8.9 10.4 10.0 11.1 9.9 10.2 11.6 12.3 11.4 19.2	MIN OCTOBE 10.5 10.5 10.5 7.5 7.5 7.0 7.7 8.8 9.9 8.7 8.4 8.3 9.1 10.8 10.1 9.3	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.0 9.7 10.9 10.4 9.3 10.5 10.9 8.8	MAX 4.2 4.1 4.0 4.5 4.2 2.7 4.0 3.7 4.2 2.7 1.89 2.4 1.6	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4 1.3 2.0 1.6 .0	MEAN 3.9 3.6 4.1 3.4 2.3 3.6 1.9 1.60 2.60 2.8	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 2.1 1.1 .9 .8 .7 .7 1.0 1.8 2.1 1.8	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7 .5 .6 1.0 1.8	MEAN 1.5 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .6 .7 .8 1.4 1.9 1.7	1.3 1.5 1.5 1.4 1.3 .6 .0	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0 .0 .0 .0 .0 .0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0 .0
1 2 3 4 5 6 7 8 9 10 11 12 3 14 15 16 17 8 19	12.96 11.7 9.8 8.9 10.8 12.0 11.1 9.9 10.2 11.6 12.3 11.4 11.0 9.9	MIN OCTOBE 10.52 9.35 7.57 7.07 8.8 9.6 8.7 8.4 8.9 10.8 10.1 9.4 6.8	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.0 9.7 10.4 9.3 10.5 10.9 10.5 8.8 7.4	MAX 4.2 4.10 4.52 2.7 4.7 2.7 4.2 7 1.8 9.9 4.1 1.3 0.1	MIN NOVEMBER 3.6 3.4 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4 1.4 1.3 2.0 1.6 .0 .0	MEAN 3.98.664.1 3.4 2.31.2.6.9 1.60.60.60 1.00.1	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 2.1 1.1 .9 .8 .7 .7 1.0 1.8 2.1 1.8	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7 .5 .66 1.0 1.8 1.5 1.4 1.5	MEAN 1.5 1.4 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .6 .6 .7 .8 1.4 1.9 1.7 1.7	1.3 1.5 1.5 1.4 1.3 .6 .0 .0	JANUARY 1.0 1.3 1.4 1.2 -7 -0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0 .0
1 2 3 4 5 6 7 8 9 10 11 12 3 14 15 16 17 18	12.9 12.6 11.7 9.8 8.9 10.4 10.0 11.1 9.9 10.2 11.6 12.3 11.4 11.0 9.9 8.5	MIN OCTOBE 10.52 9.35 7.57 7.07 8.88 9.99 8.4 8.31 10.8 10.1 9.4 8.1 6.8 6.7	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.0 9.7 10.9 10.4 9.3 10.5 10.9 8.8	MAX 4.2 4.10 4.52 2.7 4.07 4.2 7 4.2 7 1.8 9 3.4 1.3 0	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4 1.3 2.0 1.6 .0	MEAN 3.98.66 4.1 3.4 2.31.2 3.69 1.606.0 2.60 2.08 .01	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 2.1 1.1 .9 .8 .7 1.0 1.8	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7 .5 .6 1.0 1.8	MEAN 1.5 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .6 .7 .8 1.4 1.9 1.7	1.3 1.5 1.5 1.4 1.3 .6 .0 .0	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0 .0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	12.9 12.6 11.7 9.8 8.9 10.4 10.0 11.1 9.9 10.2 11.6 12.3 11.4 11.0 9.9 8.5	MIN OCTOBE 10.52 7.53 7.07 8.89 9.6 8.7 8.3 9.1 10.1 8.3 9.1 10.1 8.4 6.7 6.5	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.0 9.7 10.4 9.3 9.3 10.5 10.9 10.8 8.4 7.5	MAX 4.2 4.1 4.0 4.5 4.2 2.7 4.0 3.7 2.7 1.89 2.4 1.6 1.30 .1 .1	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4 1.4 1.3 2.0 1.6 .0 .0 .0 .0	MEAN 3.9864.1 3.4 2.31.2 3.12 3.10 2.66 2.08 .01 .00 .1	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 2.1 1.1 .9 .8 .7 1.0 1.8 2.1 1.8 1.9 1.5	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7 .5 .6 1.0 1.8 1.5 1.4 1.5 .9	MEAN 1.5 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .6 .6 .7 .8 1.4	1.3 1.5 1.5 1.4 1.3 .6 .0 .0	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0 .0 .0
1 2 3 4 5 6 7 8 9 10 11 12 3 14 15 16 17 18 19 20 21 22	12.96 11.7 9.8 8.9 10.8 12.0 11.1 9.9 10.2 11.6 12.3 11.4 11.0 9.2 7.9 8.5	MIN OCTOBE 10.52 9.35 7.57 7.07 8.89 9.6 8.7 8.43 9.11 10.8 10.1 48.8 6.7 6.51	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.7 10.9 10.4 9.3 2.3 11.5 10.9 8.8 7.5 7.4 6.7	MAX 4.2 4.10 4.52 2.7 4.07 4.2.7 1.89 3.44 1.6 1.30 1.1 1.1	MIN NOVEMBER 3.6 3.4 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4 1.3 2.0 1.6 .0 .0 .0 .0	MEAN 3.886 4.14 2.31.23.69 1.60.60 2.20.88 .01.10	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 1.1 1.1 .9 .8 .7 1.0 1.8 1.8 1.9 1.5	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7 .5 .6 1.0 1.8 1.5 1.4 1.5 .9 .6 .0	MEAN 1.5 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .66 .7 .8 1.4 1.9 1.7 1.7 1.7 1.7	1.3 1.5 1.5 1.4 1.3 .6 .0 .0 .0	JANUARY 1.0 1.3 1.4 1.2 -7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0 .0 .0 .0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 3	12.96 11.7 9.8 8.9 10.8 12.0 11.1 9.9 10.2 11.3 11.4 9.9 7.9 5.9	MIN OCTOBE 10.52 9.53 7.07 8.99 8.74 8.99 10.8 10.4 8.11 6.67 6.51 6.51	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.7 10.9 10.4 9.2 9.3 11.5 10.9 10.8 8.8 7.4 7.5 7.4 4.4	MAX 4.2 4.10 4.52 2.7 4.07 4.2.7 1.89 3.44 1.6 1.30 1.1 1.1	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4 1.3 2.0 1.6 .0 .0 .0 .0 .0	MEAN 3.866 4.14 2.31.269 1.606.220 8 0.10 1.00 1.12 2.22	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 2.1 1.1 .9 .8 .7 1.8 1.8 1.8 1.9 1.5 .9 6.0	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7 .5 .66 1.0 1.8 1.5 1.4 1.5 .9 .6 .0 .0	MEAN 1.5 1.4 1.7 1.8 1.9 2.17 1.0 8 .6 .7 1.7 1.7 1.7 1.7 1.7 1.7	1.3 1.5 1.5 1.4 1.3 .6 .0 .0 .0	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0 .0 .0 .0 .0
1 2 3 4 5 6 7 8 9 10 11 12 3 14 15 16 17 18 19 20 21 22	12.96 11.7 9.8 8.9 10.8 12.0 11.1 9.9 10.2 11.6 12.3 11.4 11.0 9.2 7.9 8.5	MIN OCTOBE 10.52 9.35 7.57 7.07 8.89 9.6 8.7 8.43 9.11 10.8 10.1 48.8 6.7 6.51	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.7 10.9 10.4 9.3 2.3 11.5 10.9 8.8 7.5 7.4 6.7	MAX 4.2 4.1 4.0 4.5 4.2 2.7 4.0 3.7 2.7 1.89 2.4 1.6 1.30 .1 .1	MIN NOVEMBER 3.6 3.4 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4 1.3 2.0 1.6 .0 .0 .0 .0	MEAN 3.886 4.14 2.31.23.69 1.60.60 2.20.88 .01.10	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 1.1 1.1 .9 .8 .7 1.0 1.8 1.8 1.9 1.5	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7 .5 .6 1.0 1.8 1.5 1.4 1.5 .9 .6 .0	MEAN 1.5 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .66 .7 .8 1.4 1.9 1.7 1.7 1.7 1.7	1.3 1.5 1.5 1.4 1.3 .6 .0 .0 .0	JANUARY 1.0 1.3 1.4 1.2 -7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0 .0 .0 .0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	12.96 11.7 9.8 8.9 10.8 12.0 11.1 9.9 10.2 7.9 7.3 5.9 5.1 4.2	MIN OCTOBE 10.52 9.53 7.07 8.99 8.74 8.31 10.8 10.4 10.5	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.7 10.9 10.4 9.3 9.2 9.3 11.5 10.3 8.8 7.5 7.4 4.4 3.9 3.4	MAX 4.2 4.10 4.52 2.7 4.07 4.2 7 4.2 7 1.8 9 3.4 2.1 6 1.3 0.1 1.1 1.2 3.7 1.3	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4 1.3 2.0 1.6 .0 .0 .0 .0 .0 .1 .1 .3 .7	MEAN 3.86 4.14 2.31.23.69 1.60.60 1.00 1.10 1.20 1.00 1.10 1.10 1.10 1.1	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 1.1 .9 .8 .7 .0 1.8 2.1 1.8 1.9 1.5 .9 .6 .0 .0	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7 .5 .6 1.0 1.8 1.5 1.4 1.5 1.4 1.5 1.4 1.5 1.4 1.5 1.4 1.5 1.4 1.5 1.4 1.5	MEAN 1.5 1.4 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .66 .7 .8 1.4 1.9 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7	MAX 1.3 1.5 1.5 1.4 1.3 .6 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0 .0 .0 .0 .0 .0
1 2 3 4 5 6 7 8 9 10 11 12 3 14 15 16 17 18 19 20 21 22 3 4	12.66 11.798.8 8.94.80 10.10.10 90.02.63 11.02.95 77.55.12 3.30	MIN OCTOBE 10.52 7.53 7.07 8.99 8.7 8.4 8.11 10.4 6.8 6.7 6.51 3.4	MEAN 11.6 11.4 10.6 8.5 8.2 8.1 9.0 7 10.4 9.2 9.3 11.5 10.9 8.7 4 7 6 7 4 3 9	MAX 4.104.52 4.074.77 4.074.27 1.23.73 1.102.373 1.24	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.2 2.6 2.9 1.4 1.3 2.0 1.6 .0 .0 .0 .0 .0	MEAN 3.3.6.9 4.4 3.1.2.6.9 1.0 1.0 1.2 1.0 1.2 1.0 1.0 1.0	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 2.1 1.1 .9 .8 .7 1.0 8 2.1 1.8 1.9 1.5 .9 .6 .0	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7 .5 .6 1.0 1.8 1.5 .9 .6 .0 .0	MEAN 1.5 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .6 .6 .7 .8 1.4 1.9 1.7 1.7 1.7 1.7 1.7 1.7 1.0	1.3 1.5 1.5 1.4 1.3 .6 .0 .0 .0	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0 .0 .0 .0 .0 .0 .0
1 2 3 4 5 6 7 8 9 10 11 23 14 5 16 7 18 9 20 21 22 3 24 5 26 27 28	12.66 11.7 98.8 8.94 10.8 11.1 9.02.65 11.6 9.03.6 7.55.12 3.30	MIN OCTOBE 10.52 9.53 7.53 7.07 8.99 9.6 8.74 8.91 10.8 10.1 66.7 66.1 3.4 3.2 2.7 7.0	MEAN 11.6 11.4 10.6 8.5 2 8.1 9.7 10.9 10.4 9.3 2.3 3.1 11.5 10.3 8.8 7.5 7.4 7.5 7.4 7.5 7.4 7.5 7.4 7.5 7.4 7.5	MAX 4.2 4.10 4.52 2.7 4.7 4.7 2.7 1.8 9.4 4.1 1.2 3.7 1.1 2.3 7 1.1 2.4 2.1	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.26 2.9 1.4 1.3 2.0 1.6 0 0 0 0 0 1 1.1 3.7 1.4 2.1 1.6	MEAN 3.86 3.12 3.12 3.12 3.12 3.13 3.69 1.00 1.00 1.01 1.02 1.00 1.01 1.02 1.00 1.01 1.02 1.00 1.02 1.00	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2.1 1.1 .9 .8 .7 .00 1.8 2.18 1.95 .96 .00 .00 .00	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7 .5 .6 1.0 1.8 1.5 1.4 1.5 .9 .6 0.0 .0 .0	MEAN 1.5 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .66 .7 .8 1.4 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7	1.3 1.5 1.5 1.4 1.3 .0 .0 .0 .0 .0 .0 .0	JANUARY 1.0 1.3 1.4 1.2 -7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0 .0 .0 .0 .0 .0 .0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 32 44 25 26 27 28 29	12.96 11.7 9.8 8.9 10.8 11.1 9.0 11.3 11.0 2.9 5 7.7 5.5 1.2 3.3 1.7	MIN OCTOBE 10.52357.53 7.0789.96 8.743.110.8 10.448.1866.7 565.143.12 2.770.8	MEAN 11.6 11.4 10.6 8.52 8.1 9.7 10.9 10.4 9.2 9.3 11.5 10.9 10.8 7.4 7.5 7.4 4.9 3.4 1.2	MAX 4.2 4.10 4.52 2.7 4.07 4.2 7 4.2 7 1.8 9 2.1 1.1 2.3 7 1.2 2.7 1.2 2.7	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.6 2.9 1.4 1.3 2.0 1.6 .0 .0 .0 .0 .1 .3 .7 1.4 2.1 1.5	MEAN 3.866 4.14 2.31.269 1.606.08 0.10 1.22.50 1.73.06 1.73.06	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 2.1 1.1 .9 .8 .7 1.8 2.1 1.8 1.9 1.5 .9 6.0 .0 .0 .0 .0	MIN DECEMBER 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7 .5 .66 1.0 1.8 1.5 1.4 1.5 9 .6 0 .0 0 .0 0 .0	MEAN 1.5 1.4 1.7 1.8 1.9 1.7 1.0 8 66 67 1.4 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7	1.3 1.5 1.5 1.4 1.3 .6 .0 .0 .0 .0 .0 .0	JANUARY 1.0 1.3 1.4 1.2 .7 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0
1 2 3 4 5 6 7 8 9 10 11 23 14 5 16 7 18 9 20 21 22 3 24 5 26 27 28	12.66 11.7 98.8 8.94 10.8 11.1 9.02.65 11.6 9.03.6 7.55.12 3.30	MIN OCTOBE 10.52 9.53 7.53 7.07 8.99 9.6 8.74 8.91 10.8 10.1 66.7 66.1 3.4 3.2 2.7 7.0	MEAN 11.6 11.4 10.6 8.5 2 8.1 9.7 10.9 10.4 9.3 2.3 3.1 11.5 10.3 8.8 7.5 7.4 7.5 7.4 7.5 7.4 7.5 7.4 7.5 7.4 7.5	MAX 4.2 4.10 4.52 2.7 4.7 4.7 2.7 1.8 9.4 4.1 1.2 3.7 1.1 2.3 7 1.1 2.4 2.1	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.26 2.9 1.4 1.3 2.0 1.6 0 0 0 0 0 1 1.1 3.7 1.4 2.1 1.6	MEAN 3.86 3.12 3.12 3.12 3.12 3.13 3.69 1.00 1.00 1.01 1.02 1.00 1.01 1.02 1.00 1.01 1.02 1.00 1.02 1.00	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2.1 1.1 .9 .8 .7 .00 1.8 2.18 1.95 .96 .00 .00 .00	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 .8 .7 .5 .6 1.0 1.8 1.5 1.4 1.5 .9 .6 0.0 .0 .0	MEAN 1.5 1.4 1.7 1.8 1.9 2.1 1.7 1.0 .8 .66 .7 .8 1.4 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7	1.3 1.5 1.5 1.4 1.3 .0 .0 .0 .0 .0 .0 .0	JANUARY 1.0 1.3 1.4 1.2 -7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0 .0 .0 .0 .0 .0 .0
1 2 3 4 5 6 7 8 9 10 11 12 3 14 15 16 17 18 19 20 21 22 3 24 25 26 27 28 9 30	12.66 11.74 8.8 9.44 10.263 11.19 90.263 11.19 77.55 1.2 33.10.72	MIN OCTOBE 10.5237.53 7.789.99.6 8.448.110.8 10.446.8 10.446.7 6.51.4 2.2 7.70.8 1.6	MEAN 11.6 11.6 11.6 11.6 11.6 11.6 11.6 11	MAX 4.10 4.52 2.70 7.27 1.89 4.10 1.11 1.23 7.7 1.14 2.7 1.7	MIN NOVEMBER 3.6 3.1 3.7 2.4 1.7 2.6 2.9 1.4 1.3 2.6 0.0 0.0 0.0 0.0 0.1 1.3 7 1.4 2.1 1.5 1.5	MEAN 3.8661.4 3.31.269 1.001.0 1.22.50 1.73.061.6	MAX 1.7 1.4 1.6 1.8 1.9 2.1 2.2 2.1 1.1 .9 .8 .7 1.8 2.1 1.8 1.9 1.5 .9 6.0 .0 .0 .0 .0	MIN DECEMBER 1.3 1.3 1.5 1.6 1.8 1.9 1.1 8 1.7 1.5 1.6 1.8 1.9 1.1 1.5 1.6 1.0 1.8 1.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	MEAN 1.5 1.4 1.7 1.8 1.9 2.1 1.7 1.8 6.6 7 8.8 1.4 1.97 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.	1.3 1.5 1.5 1.4 1.3 .6 .0 .0 .0 .0 .0 .0	JANUARY 1.0 1.3 1.4 1.2 -7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0	1.1 1.4 1.5 1.3 1.2 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0

06470500 JAMES RIVER AT LAMOURE, ND--CONTINUED

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

		WATER ID	MI BILATORE,	DEGILEED	CELSTOS,	MATEN	IDAN OCIOL	1500	10 001 1011	DDI. 1505		
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUAR	Y		MARCH			APRIL			MAY	
1 2 3 4 5	.0	.0	.0	.0	.0	.0	.0	.0	.0	10.4 12.9 12.7 14.2 11.8	6.4 7.9 9.8 11.8 7.2	7.9 10.0 11.1 12.7 9.3
6 7 8 9 10	.0	.00.00	.0	.00	.0 .0 .0	.0	.0	.0	.0 .0 .0	9.6 12.1 12.5 14.2 16.3	5.0 8.2 11.4 11.0 12.6	7.2 10.1 12.0 12.4 14.4
11 12 13 14 15	.0	.0	.0	.0	.0	.0	.0 .2 .3 .6 3.5	.0	.0 .0 .1 .2 1.4	15.8 16.1 18.7 21.1 20.2	14.0 13.6 14.1 16.1 17.6	15.1 14.8 15.8 18.3 19.1
16 17 18 19 20	.0	.0	.0	.0	.0	.0	7.1 7.3 9.3 10.9 12.7	3.7 4.1 5.0 7.0 8.9	6.0 5.7 7.1 8.7 10.5	19.8 19.1 20.0 19.0 18.7	18.1 17.5 17.9 16.8 15.0	18.9 18.3 18.8 18.2 16.8
21 22 23 24 25	.0	.0	.0	.0	.0	.0	12.5 15.9 16.8 16.6 15.1	9.9 11.8 14.3 14.7 12.3	11.3 13.7 15.3 15.6 13.6	19.1 19.7 21.9 20.2 16.3	15.3 17.7 17.9 16.5 14.3	17.2 18.6 19.6 18.4 15.5
26 27 28 29 30 31	.0	.0 .0 	.0 .0 .0	.0	.0	.0	13.7 11.0 8.6 7.4 7.4	11.2 8.7 7.1 5.9 6.2	12.2 9.5 7.6 6.8 6.8	15.1 16.6 17.8 17.0 13.7	12.3 13.1 14.3 13.8 12.5 11.8	13.7 14.8 16.0 14.8 13.1 13.5
MONTH	.0	.0	.0	.0	.0	.0	16.8	.0	5.1	21.9	5.0	14.7
		WATER TE	MPERATURE,	DEGREES	CELSIUS,	WATER						
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
5	1,202	JUNE	100		JULY		14.14	AUGUST			SEPTEMBE	
1 2 3 4 5	17.5 19.0 19.4 20.3 21.1	13.2 16.4 16.2 17.0 17.9	15.2 17.5 17.9 18.5 19.5	26.2 27.6 29.2 27.6 27.1	23.4 24.3 24.3 25.6 24.6	25.0 25.8 26.6 26.7 26.0	26.2 26.5 26.7 26.8 24.4	23.8 23.9 24.4 24.5 20.4	25.0 25.2 25.6 25.6 22.5	20.2 19.7 21.1 20.4 20.6	17.4 18.4 18.1 18.6 17.8	18.8 19.1 19.2 19.6 19.2
6 7 8 9	22.7 21.8 17.8 17.3 20.1	19.0 17.4 14.9 15.6 16.1	20.7 20.0 16.5 16.5 17.9	26.7 25.5 26.1 26.2 26.9	24.6 23.9 22.4 24.0 23.3	25.6 24.7 23.9 25.0 24.8	20.3 22.0 25.6 23.6 22.6	18.6 18.3 19.7 21.3 20.5	19.6 20.0 22.2 22.5 21.6	21.4 21.4 19.7 18.2 16.1	19.4 18.5 18.4 16.3	20.2 19.8 19.1 17.1 14.9
11 12 13 14 15	20.0 19.4 16.0 17.3 16.5	18.2 16.2 14.3 12.9 15.2	19.2 18.2 14.9 14.9	26.3 26.2 25.6 24.1 24.2	22.2 23.6 23.4 22.6 21.6	23.9 24.9 24.5 23.3 23.0	23.2 25.1 22.8 22.0 23.9	20.9 21.4 20.7 20.1 18.8	22.0 22.4 21.7 20.8 21.1	13.9 13.5 13.4 14.6 15.9	11.5 10.6 10.9 11.5 13.1	12.6 11.9 12.3 13.1 14.5
16 17 18 19 20	20.6 19.5 21.9 23.3 24.4	16.2 18.7 17.5 18.8 20.8	18.1 19.1 19.5 21.1 22.1	24.8 23.9 23.5 25.9 25.0	22.0 21.2 20.3 21.8 23.3	23.7 22.5 21.7 23.8 23.9	22.4 22.3 22.6 23.2 23.3	20.1 20.2 19.6 20.8 20.6	21.5 21.3 21.1 21.9 21.8	17.8 18.8 19.5 20.5 19.0	14.6 15.7 17.1 17.5 17.4	16.0 17.3 18.3 18.8 18.0
21 22 23 24 25	22.9 20.6 22.4 21.7 22.2	18.6 17.4 19.0 20.2 19.7	20.2 18.5 20.6 21.0 20.8	25.3 26.3 26.2 26.0 25.6	23.1 23.6 23.6 23.8 23.4	24.2 24.9 24.9 24.9 24.6	23.3 22.3 23.8 24.4 23.1	20.4 20.7 20.7 21.9 21.4	21.5 21.4 22.2 23.1 22.2	17.4 13.8 11.1 11.5 12.1	14.0 10.8 9.3 8.5 10.1	15.6 12.3 10.3 9.9 11.1
26 27 28 29	23.1 25.4 24.0	20.0 19.9 20.7	21.4 21.8 22.5	28.5 27.0 24.9 25.5	23.8 24.2 22.6 22.1	25.2 25.7 23.5 23.0	22.9 21.6 22.5 21.4	21.0 20.3 19.3 18.3	21.9 21.0 20.6	12.0 13.5 15.9 15.5 16.3	9.8 10.2 13.1 13.7	11.0 11.8 14.3 14.7
30 31	27.9	22.3	24.8	26.3	22.8	24.5	20.3	18.8	19.9 19.7 18.9	16.3	13.6	15.0

06470800 BEAR CREEK NEAR OAKES, ND

LOCATION.--Lat 46°13'31", long 98°04'17", in NE1/4NE1/4 sec.28, T.132 N., R.59 W., Dickey County, Hydrologic Unit 10160003, on right bank 80 ft downstream from bridge on ND Highway 13, 6 mi north, and 1 mi east of Oakes.

DRAINAGE AREA .-- 357 mi2, of which about 255 mi2 is noncontributing, revised.

WATER-DISCHARGE RECORDS

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

GAGE .-- Water-stage recorder. Datum of gage is 1,291.30 ft above National Geodetic Vertical Datum of 1929.

REMARKS .-- Estimated daily discharges: Nov. 21 to Apr. 10, June 28 to July 7, 10, and Sept. 20-30. Records fair.

AVERAGE DISCHARGE.--13 years, 8.76 ft³/s, 6,350 acre-ft/yr; median of yearly mean discharges, 7.6 ft³/s, 5,500 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,170 ft3/s, Apr. 15, 1979, gage height, 11.47 ft; no flow for long periods each year.

EXTREMES OUTSIDE PERIOD OF RECORD. -- Flood of July 1, 1975, reached a stage of 15.00 ft present datum, from floodmark, discharge 4,590 ft³/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 50 ft3/s and maximum (*):

Date	Time	Discharge (ft3/s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 29	2215	*500	*a10.01	July 8	2200	74	6.96

No flow for several months. a - Backwater from ice

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 .00 .00 e.01 e.00 e.00 e.00 e300 3.4 e.14 .40 .35 2 .00 .00 e.01 e.00 e.00 e.00 e250 2.9 .54 e.14 .26 3 .00 .00 e.01 e.00 e.00 e.00 e200 2.5 .50 e.13 .21 45 .00 .00 e.01 e.00 e.00 e.00 e185 2.3 .45 e.12 .19 .29 -00 .00 e.01 e.00 e.00 e.00 e200 2.0 .42 e.12 .26 e.11 6 .00 .00 e.00 e.00 e.00 e.00 e130 .39 .12 .25 .00 .00 e.00 e.00 e.00 e.00 e80 .36 e.10 .10 .22 e.00 8 .00 .00 e.00 e.00 e.00 e52 1.7 .30 31 08 .21 9 .00 .00 e.00 e.00 e.00 e.00 e46 1.5 .23 17 .07 .18 10 .00 .00 e.00 e.00 e.00 e.00 .22 e10 .06 .15 .17 .00 -00 5.6 05 11 e.00 e.00 e.00 e.00 38 1.2 .22 33 30 12 .00 .00 e.00 e.00 e.00 e.00 1.1 .29 3.0 .05 .16 .00 13 .00 e.00 e.00 e.00 e.00 1.1 .26 1.8 .04 .15 14 .00 .00 e.00 e.00 e.00 e.00 27 1.0 .30 1.2 .04 .14 15 .00 .01 e.00 e.00 e.00 e.00 22 .89 .25 .93 .04 .13 .12 16 .01 .79 .71 -04 .00 e.00 e.00 e.00 e.00 18 .21 .23 .73 17 .00 .01 e.00 e.00 e.00 e.00 14 .04 .11 2.2 .03 .00 e.00 .10 18 .01 e.00 e.00 e.00 12 -80 4.3 .00 .24 .05 .09 19 .02 e.00 e.00 e.00 e.00 9.3 -80 .76 .20 .06 e.15 20 .00 .03 e.00 e.00 e.00 e.00 8.0 4.1 e.00 6.9 .68 .23 2.8 .06 e.15 21 .00 e.18 e.00 e.00 e.00 e.00 .68 .25 .06 .00 e.03 e.00 e.00 e.00 6.0 1.9 22 e.14 e.00 e.10 .65 .24 .05 e.03 e.00 e.00 5.6 e.14 23 .00 1.4 e.00 .67 .22 .06 e.03 e.00 e1.0 1.1 e.13 .00 e.00 24 .62 .20 .91 .05 e.02 e.00 e.00 e.12 25 -00 e.00 e5.0 4.4 .00 e.02 e.00 e.00 e.00 e20 .58 .19 .74 .18 e.12 26 4.1 3.9 e.00 e.00 .50 .16 .61 .25 .00 e.00 e100 e.11 27 e.02 e.02 e.00 .48 e.16 .51 .40 .00 e.00 e.00 e300 e.11 28 3.9 e.00 e.00 .51 e.16 .55 .42 e.10 .00 e450 29 e.02 --e.00 .54 e.15 .49 .42 e.10 .00 e.01 e.00 --e400 30 31 e.00 .56 .41 .42 .00 e.00 --e350 5.16 TOTAL 0.00 0.47 0.05 0.00 0.00 1626.10 1743.6 36.77 8.39 124.85 4.40 .00 .016 .002 .00 .00 52.5 58.1 1.19 .28 4.03 .14 .17 MEAN 450 .00 .18 .01 .00 .00 300 3.4 .57 47 .42 .40 MAX .15 MIN .00 .00 .00 .00 .00 .00 3.7 .48 .10 .03 .09 AC-FT .0 .9 .1 .0 .0 3230 73 248 8.7 10

CAL YR 1988 TOTAL 228.59 MEAN .62 MAX 20 MIN .00 AC-FT 453 WTR YR 1989 TOTAL 3549.79 MEAN 9.73 MAX 450 MIN .00 AC-FT 7040

e - Estimated

WATER-QUALITY RECORDS

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

WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

06470800 BEAR CREEK NEAR OAKES, ND--CONTINUED

DATE	TIME	DIS- CHARGE INST. CUBIC FEET PER SECON (00061	, SI CC DI AI D (US	PE- IFIC DN- JCT- VCE B/CM)	(ST A UNI	H AND- RD TS)	AT (DE	MPER- TURE AIR EG C)	WA (DE	MPER- TURE ATER EG C)	SC (M	GEN, DIS- DLVED G/L) 0300)	SO (P C SA AT	GEN, IS- LVED ER- ENT TUR- ION)	TO (M	TAL G/L	(MC	
MAR																		
28 31 APR	1200 1130	293 361		330 200		6.50		1.0		0.5		==				62	15	5
03 08 18 MAY	1410 1210 0945	201 52 12		230 380 540		=		5.0 -5.0 2.0		1.0 0.5 5.5		Ξ		==		==		=
15 JUL	1430	0.9	3	1020		12		21.0		20.0								
10 AUG	1430	5.9		370				27.0		23.5								
15	1500	0.0	4	700		7.35		25.0		21.0		5.4		60		250	53	3
DATE	MAG SI DI SOL (MG AS (009	UM, SO S- D VED SO /L (MG) A	DIUM, IS- LVED MG/L S NA) 0930)	SOD: PERCE (009)	ENT	SOR	ON	SI	K)	BIC BONA FET- (MG AS HCO (954	TE, LAB /L 3)	CAR- BONA' FET- (MG, A) CO. (954	TE, LAB /L S 3)	ALK LINI LA (MG AS CAC (904	TY B /L 03)	CAR DIOX DI SOL (MG AS C	IDE S- VED /L O2)	
MAR 31 AUG	6	.0	13		28		0.7	8	.3	61		0		50		3	1	
15	29		50		29		1	15		330		0		270		2	3	
DATE	SULF DIS SOL (MG AS S	ATE R - D VED S /L (O4) A	HLO- IDE, IS- OLVED MG/L S CL) 0940)	FLUC RIDE DIS SOLV (MG, AS 1	E, S- VED /L F)	SILI DIS SOL (MG AS SIO	VED /L	SOLI RESI AT 1 DEG DI SOL (MG (703	DUE 80 . C S- VED /L)	SOLI SUM CONS TUEN DI SOL (MG (703	OF TI- TS, S- VED /L)	SOLII SOLI (TOI PEI AC-1 (7030	S- VED NS R FT)	SOLI DI SOL (TO PE DA (703	S- VED NS R	ARSE DI SOL (UG AS (O10	S- VED /L AS)	
MAR 31	30		6.8	0.	.10	9	.8		141		119	0	.19	137			1	
AUG 15	68		27	0.	.20	22			469		427	0	.64	0	.05		4	
DATE	BOR DI SOL (UG AS	S- VED S /L (B) A	RON, DIS- OLVED UG/L S FE) 1046)	LEAD SOLV (UG, AS I	S- VED /L PB)	SOL (UG	S- VED /L LI)	(UG	E, S- VED /L MN)	MERC DI SOL (UG AS (718	S- VED /L HG)	MOLI DENI DII SOLI (UG, AS I	UM, S- VED /L MO)	SEL NIU DI SOL (UG AS	M, S- VED /L SE)	STR TI DI SOL (UG AS (O10	UM, S- VED /L SR)	
MAR 31		40	140		<1		3		90		0.4		1		<10		100	
AUG 15		180	20		<1		40		290		1.5		<1		1		330	

06470830 JAMES RIVER AT OAKES, ND

LOCATION.--Lat 46°08'14", long 98°08'09", in NW1/4NE1/4NE1/4 sec.30, T.131 N., R.59 W., Dickey County Hydrologic Unit 10160003, on left bank 10 ft downstream from bridge 1.0 mi west of Oakes.

DRAINAGE AREA.--5,320 mi², of which about 3,300 mi² is probably noncontributing.

GAGE-HEIGHT RECORDS

PERIOD OF RECORD .-- October 1982 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,200.00 ft above National Vertical Datum of 1929. Flow regulated by Jamestown Reservoir (station 06469000).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily gage height, 95.20 ft, Dec. 20, 1984; minimum, 88.11 ft, Sept. 4, 1988.

EXTREMES FOR CURRENT YEAR .-- Maximum gage height, 94.15 ft, Apr. 1; minimum, 88.62 ft, Nov. 16.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES

						IDAN VALUE	10					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1		89.36	89.52	89.60		90.05	94.07	90.21	89.58	89.64	89.60	89.33
2		89.46	89.54	89.60		90.06	93.95	90.29	89.54	89.59	89.88	89.47
3		89.37	89.55	89.60		90.10	93.86		89.51	89.41		
4		89.35		(90.39			89.71	89.46
5	89.18		89.55			90.14	93.76	90.20	89.61	89.45	89.52	89.49
5	09.10	88.90	89.56			90.15	93.62	89.78	89.66	89.65	89.36	89.71
6	89.21	89.10	89.58			90.16	93.41	89.93	89.66	89.25	89.24	89.65
7	89.29	89.34	89.59			90.16	93.03	90.20	89.43	89.22	89.36	89.54
8	89.16	89.40	89.59			90.19	92.51	89.84	89.22	89.22	89.39	89.55
9	89.14	89.28	89.59			90.20	92.12	90.04	89.44	89.11	89.26	89.57
10	88.96	89.22	89.59			90.22	91.93	90.14	89.48	89.11		89.67
						90.22	31.33	30.14	07.40	0,111		03.01
11	89.11	89.44	89.59			90.29	91.57	90.28	89.51	89.15		89.69
12	89.21	89.47	89.59			90.45	91.28	90.09	89.34	89.25		89.65
13	89.29	89.49	89.58			90.66	91.07	89.87	89.27	89.22		89.79
14	89.19	89.36	89.59			90.98	90.77	89.78	89.09	89.27		89.81
15	89.16	89.24	89.59			91.29	90.88	89.81	89.42	89.31		89.83
15.5		03.24	03.33			31.23	90.00	09.01	09.42	09.51		09.00
16	89.15	88.80	89.59			91.95	90.51	89.87	89.50	89.39	89.10	89.74
17	89.04	89.19	89.57			92.32	90.35	89.88	89.46	89.42	89.20	89.93
18	89.17	89.31	89.56			92.45	90.35	89.79	89.48	89.34	89.46	90.20
19	89.26	89.34	89.56			92.44	90.21	89.72	89.57	89.45	89.30	89.68
20	89.38	89.35	89.56			92.33	90.06	89.77	89.77	89.55	89.21	89.65
	03.30	09.33	09.00			92.00	90.00	09.11	09.11	09.77	09.21	09.00
21	89.21	89.38	89.56			92.23	90.04	89.75	89.39	89.56	89.24	89.49
22	89.40	89.39	89.55			92.06	90.24	89.69	89.44	89.60	89.09	89.33
23	89.10	89.41	89.57			91.93	90.02	89.63	89.47	89.58	89.05	89.57
24	89.24	89.43	89.57			91.92	89.99	89.46	89.48	89.59	89.14	89.85
25	89.20	89.44	89.57			92.11	89.83	89.76	89.49	89.63	89.18	89.47
		03.44	09.51			92.11	09.00	09.70	09.49	09.07	09.10	03.41
26	89.32	89.46	89.59			92.49	89.95	89.40	89.55	89.54	89.08	89.59
27	89.14	89.47	89.62			93.23	89.53	89.68	89.50	89.34	89.12	89.87
28	89.09	89.48	89.62			93.49	89.72	89.69	89.53	89.40	89.28	89.55
29	89.28	89.50	89.62			93.67	90.05	89.00	89.54	89.54	89.32	89.60
30	89.30	89.51	89.61			93.86	90.11	89.19	89.49	89.48	89.24	89.86
31	89.32		89.60			93.95		89.39		89.57	89.18	
,	07.72		07.00	775		22.27		09.79		09.71	09.10	
MEAN		89.34	89.58			91.53	91.29	89.82	89.48	89.41		89.65
MAX		89.51	89.62			93.95	94.07	90.39	89.77	89.65		90.20
MIN		88.80	89.52			90.05	89.53	89.00	89.09	89.11		89.33

06470830 JAMES RIVER AT OAKES, ND--CONTINUED

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORDS.--SPECIFIC CONDUCTANCE: Water years 1982 to current year. WATER TEMPERATURE: Water years 1982 to current year.

INSTRUMENTATION. -- Water quality monitor since October 1982.

EXTREMES FOR PERIOD OF DAILY RECORD.-SPECIFIC CONDUCTANCE: Maximum, 2,670 microsiemens, Feb. 26,27, 1989; minimum recorded, 290 microsiemens,
Apr. 1, 1984.
WATER TEMPERATURE: Maximum, 31.7°C, Aug. 15, 1988; minimum, 0.0°C on many days during the winter months.

EXTREMES FOR CURRENT YEAR.-SPECIFIC CONDUCTANCE: Maximum, 2,670 microsiemens, Feb. 26,27; minimum, 350 microsiemens,

Apr. 2-4.
WATER TEMPERATURE: Maximum, 29.3°, July 2; minimum, 0.0°C, on many days during winter months.

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)	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)
FEB 28	0800		2630	7.60	-15.0	0.0	2.0			870	190
APR 04	1630	1140	250	7.00	8.0	2.0	25	12.5	88	86	21
MAY 15	1530		970	8.15	28.0	21.5	27	11.9	133	330	73
JUL 10	1600		1240	8.30	30.0	27.0	35	11.0	136	340	73
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY 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)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)
FEB 28	95	280	41	4	12	712	540	150	0.40	1790	1700
APR 04	8.2	13	22	0.6	9.7	77	37	7.3	0.10	155	147
MAY 15	36	79	33	2	12	268	190	40	0.20	612	591
JUL 10	38	130	45	3	11	350	200	68	0.30	817	732
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)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)
FEB											
28 APR	2.43	0.0	4		-	<0.010		<0.100		0.070	
04 MAY	0.21	477	54	0.560	0.050	0.040	0.600	0.600	0.450	0.430	1.6
15 JUL	0.83	0.0	62		0.020	<0.010	<0.100	<0.100	0.050	0.020	0.80
10	1.11	0.0	124			<0.010		<0.100		0.020	

JAMES RIVER BASIN

06470830 JAMES RIVER AT OAKES, ND--CONTINUED

	DATE	NITRO- GEN, AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS PHORO TOTA (MG, AS I	S- PHO DUS I AL SO /L (N P) AS	DROUS POIS- DLVED MG/L G P)	PHOS- HORUS, DRTHO, TOTAL (MG/L AS P) 70507)	PHO OR DI SOL (MG AS	S- VED	PHO ORG TO (M AS	TAL G/L P)	TO (U	ENIC TAL G/L AS)		S- VED (/L AS)	BORO DIS SOLV (UG/ AS B	N, TO - RI ED EI L (I	OMIUM OTAL ECOV- RABLE JG/L S CD)	SOI (UC	S- LVED S/L CD)
FEB 28	з	0.60		(.050		0	.047						2	7	80			<10
APR		1.6	0 3		280	0.270		.244		0.08		2		2		50	2		<1
MAY		0.80										2		3		60	<1		<1
JUL			0.2		.030	0.004	- 33	.010		0.20		2							
10	o	0.70		(140		0	.107						9	4	80			<1
	DAT	COPP DIS SOL (UG AS	VED /L CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE) (01045)	IRON, DIS- SOLVE (UG/L AS FE (01046	SOL (UG) AS	VED /L PB)	MANG NESE TOTA RECO ERAB (UG/ AS M	L OV- SLE 'L	MANG NESE DIS SOLV (UG/ AS M	ED L	MERCUI DIS SOLV (UG/ AS H	ED L G)	SELE- NIUM, TOTAL (UG/L AS SE		SELE- NIUM, DIS- SOLVED (UG/L AS SE) 01145)	SOI (UC AS	NC, IS- LVED G/L ZN)	
	FEB 28 APR		1		30		<5				40		.6		-	<1		20	
	04 MAY		4	2000	200)	<5	1	70		67	33		<	1	<1		<3	
	15 JUL		<2	1700		5	<1	7	20	2	70	0	.2		-	<1		11	
	10		1			7	1			8	00	0	.6	-	-	<1		4	
	DATI	CARB ORGA TOT (MG AS	NIC (AL /L C)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDI DIS- SOLVEI (MG/L AS CN (00723	TO CHRO FLUO (UG	TO- NK- N MO ROM	CHLOR PHYT PLAN TON CHROM FLUOR (UG/ (7095	K- K- IO IOM	PLANK TON BIOMA ASH W .(MG/L	SS T	PLANK TON BIOMA DRY W (MG/L (8135	SS T	SEDI- MENT, SUS- PENDE (MG/L	C CD ()	SEDI- MENT, DIS- HARGE, SUS- PENDED T/DAY) BO155)	SII DI % FI	ED. JSP. EVE IAM. INER HAN 2 MM 531)	
	FEB 28				<0.0	1								20	9	0.0		46	
	04 MAY	11		<0.010	<0.0	6.	70	0.2	200	7.	2	1200		6	1	189		93	
	15	9	.4	<0.010	<0.0	33.	0	3.0	00	10		1200		14	5	0.0		100	
	JUL 10				<0.0	1								17	1	0.0		97	

06470830 JAMES RIVER AT OAKES, ND--CONTINUED

SPECI	FIC CON	DUCTANCE,	MICROS	SIEMENS/CM	AT 25 D	EGREES CE	ENTIGRADE,	WATER YEAR	OCTOBER	1988 TO	SEPTEMBER	1989
DAY	MAX	MIN	MEAN	MAX			MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMB	ER		DECEMBER			JANUARY	
1 2 3 4 5	960 960 970 1000 990	940 940 950 960 980	950 950 960 980 990	1070 1080 1080 1070 1060	1050 1070 1060 1050 1040	1070 1070 1060	1530 1550 1580 1600 1600	1480 1520 1560 1580 1590	1500 1540 1570 1590 1600	2330 2300 2300 2320 2350	2300 2290 2280 2300 2320	2310 2300 2290 2310 2330
6 7 8 9 10	1010 1020 1010 1000 1010	980 1010 980 980 990	1000 1010 1000 990 1000	1050 1070 1090 1080 1050	1040 1050 1060 1050	1060	1610 1590 1600 1610 1640	1590 1580 1580 1590 1600	1600 1590 1590 1600 1620	2370 2390 2410 2410 2420	2340 2370 2390 2400 2400	2350 2380 2400 2400 2410
11 12 13 14 15	1030 1040 1050 1060 1040	1000 1010 1020 1030 1030	1020 1030 1040 1040 1030	1070 1090 1080 1060 1070	1050 1060 1060 1050 1050	1060 1070 1070 1060 1060	1690 1710 1720 1740 1770	1640 1680 1700 1720 1730	1660 1690 1710 1730 1750	2440 2460 2460 2460 2450	2420 2440 2450 2440 2430	2430 2450 2460 2450 2440
16 17 18 19 20	1030 1040 1040 1050 1050	1010 1020 1010 1010 1030	1020 1030 1030 1030 1040	1110 1160 1190 1210 1230	1060 1110 1160 1190 1210	1090 1140 1170 1200 1220	1790 1810 1830 1860 1870	1770 1790 1800 1830 1860	1770 1800 1820 1850 1860	2440 2420 2400 2380 2370	2420 2400 2380 2360 2350	2430 2410 2390 2370 2360
21 22 23 24 25	1040 1060 1040 1040 1040	1020 1030 1010 1020 1020	1030 1040 1020 1030 1030	1250 1270 1290 1300 1310	1230 1240 1270 1290 1290	1240 1260 1280 1290 1300	1900 1930 1940 1970 2010	1880 1910 1920 1940 1960	1890 1920 1930 1950 1990	2360 2340 2340 2330 2320	2340 2330 2330 2310 2310	2350 2340 2330 2320 2320
26 27 28 29 30 31	1050 1050 1070 1090 1110 1100	1020 1010 1020 1060 1090 1050	1040 1030 1040 1080 1100 1080	1340 1380 1400 1440 1480	1310 1340 1370 1390 1440	1320 1360 1380 1420 1460	2080 2140 2200 2270 2310 2320	2010 2070 2140 2200 2270 2310	2040 2100 2170 2240 2290 2310	2320 2310 2290 2290 2280 2270	2300 2290 2280 2270 2270 2260	2310 2290 2290 2280 2270 2270
												277 275
MONTH	1110	940	1020	1480	1040	1170	2320	1480	1820	2460	2260	2360
							1.5	1480 WATER YEAR				
		DUCTANCE,	MICROS:		AT 25 DE		1.5					
SPECIE	FIC CONI	MIN FEBRUARY	MICROS:	IEMENS/CM MAX	AT 25 DE MIN MARCH	EGREES CE MEAN	NTIGRADE,	WATER YEAR MIN APRIL	OCTOBER MEAN	1988 TO MAX	SEPTEMBER	1989
SPECIE DAY	FIC CONI	DUCTANCE,	MICROS:	IEMENS/CM	AT 25 DE	EGREES CE	NTIGRADE,	WATER YEAR	OCTOBER	1988 TO	SEPTEMBER MIN	1989
SPECIAL DAY	MAX 2260 2250 2240	MIN FEBRUARY 2250 2230 2230 2230 2230	MEAN 2250 2240 2240 2240	IEMENS/CM MAX	MIN MARCH 2590 2560 2540	MEAN 2590 2570 2550 2520	MAX 370 360 360	MIN APRIL 360 350 350 350 350 360 360	OCTOBER MEAN 360 360 360 360	1988 TO MAX 810 820 830 830	SEPTEMBER MIN MAY 800 800 800 820	1989 MEAN 810 810 810 820
SPECIE DAY 1 2 3 4 5 6 7 8 9	MAX 2260 2250 2240 2250 2270 2290 2310 2330 2370	MIN FEBRUARY 2250 2230 2230 2230 2250 2260 2260 2310 2320	MEAN 2250 2240 2240 2240 2260 2270 2300 2320 2340	2600 2580 2560 2550 2500 2470 2470 2430 2400	MIN MARCH 2590 2560 2540 2500 2470 2440 2420 2400 2380	2590 2570 2570 2550 2480 2450 2440 2410 2390	MAX 370 360 360 370 370 380 390 400 540	MIN APRIL 360 350 350 350 360 360 370 380 400	OCTOBER MEAN 360 360 360 360 360 360 360 370 380 390 480	1988 TO MAX 810 820 830 830 830 840 850 870 900	SEPTEMBER MIN MAY 800 800 800 820 820 820 820 820 840 850 850 860	1989 MEAN 810 810 820 820 830 840 860 880
SPECIAL DAY 1 2 3 4 5 5 6 7 8 9 10 11 12 13 14	MAX 2260 2250 2240 2250 2270 2290 2310 2330 2370 2380 2400 2420 2440 2440	MIN FEBRUARY 2250 2230 2230 2230 2250 2260 2280 2310 2320 2360 2380 2400 2420 2430	MEAN 2250 2240 2240 2240 2260 2270 2300 2320 2340 2370 2390 2410 2430 2440	2600 2580 2560 2550 2550 2470 2470 2430 2400 2380 2350 2250 2120 1800	MIN MARCH 2590 2560 2540 2540 2440 2420 2440 24380 2340 2250 2120 1800 1510	2590 2570 2570 2550 2480 2440 2410 2390 2370 2310 2200 1970 1650	MAX 370 360 360 370 370 380 390 400 540 520 480 480 480 510 530	MIN APRIL 360 350 350 350 350 360 360 360 370 380 400 480 470 470 470 480 500	OCTOBER MEAN 360 360 360 360 360 360 370 380 390 480 500 470 470 490 510	1988 TO MAX 810 820 830 830 830 840 850 870 900 910 930 940 950	MIN MAY 800 800 800 820 820 820 820 830 850 860 880 890 900 910	810 810 810 820 820 830 840 860 880 890 900 910 920 930
SPECIA DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	MAX 2260 2250 2240 2250 2270 2290 2310 2330 2370 2380 2400 2440 2440 2450 2460 2480 2480 2480 2490 2520	MIN FEBRUARY 2250 2230 2230 2250 2250 2260 2280 2310 2320 2360 2380 2400 2420 2430 2430 2440 2450 2440 2450 2470 2480	MEAN 2250 2240 2240 2240 2260 2270 2300 2320 2340 2370 2390 2410 2430 2440 2450 2470 2470 2470	2600 2580 2560 2550 2500 2500 2470 2450 2430 2430 2400 2380 2350 2120 1800 1500	MIN MARCH 2590 2560 2560 2540 2500 2470 2440 2420 2400 2380 2340 2250 2120 1800 1510 1250 1000 790 630 530	2590 2570 2520 2520 2480 2410 2410 2370 2370 2310 2200 1970 1650 1380	MAX 370 360 360 370 370 380 390 400 540 520 480 480 510 530 550 680 620 630 660	MIN APRIL 360 350 350 350 350 360 360 370 380 400 480 470 480 500 520 550 600 590 620	OCTOBER MEAN 360 360 360 360 360 370 380 390 480 500 470 470 490 510 540 580 610 610 640	810 820 830 830 830 850 870 900 910 930 940 950 950 960 960	MIN MAY 800 800 800 820 820 820 820 840 850 860 890 910 910 930 940 940 950	810 810 810 820 820 840 860 890 910 920 930 940 950 950 950
SPECIAL DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 3 24	MAX 2260 2250 2240 2250 2270 2290 2310 2330 2370 2380 2400 2440 2450 2460 2440 2450 2460 2480 2490 2520 2560 2600 2630 2650	PUCTANCE, MIN FEBRUARY 2250 2230 2230 2230 2250 2260 2280 2310 2320 2360 2380 2400 2420 2430 2430 2450 2470 2480 2210 2250 2260 2470 2480 2510 2560 2600 2610 2620	MEAN 2250 2240 2240 2240 2240 2260 2320 2320 2370 2390 2410 2430 2440 2440 2450 2470 2480 2500 2540 2580 2580 2610 2620 2630	2600 2580 2560 2550 2500 2500 2470 2450 2430 2400 2380 2350 2120 1800 1500 1000 780 630 540 500 510 520	MIN MARCH 2590 2560 2540 2500 2470 2440 2420 2420 2430 2340 2250 1800 1510 1000 790 630 530 500 490 500 510	2590 2570 2570 2520 2480 2450 2440 2410 2370 2370 2310 2200 1970 1650 1380 1150 890 700 580 510	MAX 370 360 360 370 370 380 390 400 540 520 480 480 510 530 660 660 660 670 690 710 730	MIN APRIL 360 350 350 350 360 370 380 400 480 470 480 500 520 550 600 620 640 640 660 680 700	OCTOBER MEAN 360 360 360 360 360 370 380 390 480 500 470 470 490 510 540 610 640 650 660 670 700 710	1988 TO MAX 810 820 830 830 830 840 850 970 900 910 930 940 950 960 960 960 960 980 1000 980	MIN MAY 800 800 800 820 820 820 820 820 820 830 850 860 880 890 910 910 910 930 940 950 950 950 960 960 970 970 980 990 1000 1010	810 810 810 820 820 820 830 840 860 990 910 920 930 940 950 950 950 950 970 970 970 980

MONTH

15.0

.0

7.2

5.6

.0

1.7

			0	6470830	JAMES RIV	ER AT	DAKES, ND-	CONTINUED				
SPECIF	IC CON	DUCTANCE,	MICROSIE	MENS/CM A	r 25 DEGR	EES CE	NTIGRADE,	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 2 3 4 5	1060 1060 1070 1080 1100	1030 1040 1040 1050 1060	1040 1050 1050 1060 1080	1190 1200 1200 1220 1210	1120 1160 1170 1180 1190	1150 1180 1180 1200 1200	1040 1050 1090 1050 1010	990 1010 1040 1010 1000	1010 1030 1060 1030 1010	1070 1040 1030 1010 1010	1040 1020 1000 990 980	1050 1030 1020 1000 990
6 7 8 9	1110 1090 1080 1090 1100	1070 1070 1060 1060 1070	1090 1080 1070 1070 1090	1200 1190 1200 1190 1190	1170 1150 1160 1160 1150	1180 1170 1180 1180 1170	1030 1070 1080 1100 1100	1000 1020 1040 1050 1070	1020 1040 1060 1080 1090	1000 990 990 1000 1000	960 960 970 980 990	980 970 980 990 990
11 12 13 14 15	1090 1080 1080 1090 1100	1080 1060 1060 1060 1070	1080 1080 1070 1070 1080	1160 1160 1140 1110 1080	1130 1120 1110 1080 1030	1140 1140 1130 1100 1050	===	=	Ξ	1000 1000 1000	990 990 990 	990 1000 990
16 17 18 19 20	1100 1090 1110 1130 1120	1070 1080 1070 1080 1090	1090 1090 1090 1100	1050 1040 1100 1140 1160	1000 1000 1000 1090 1120	1030 1020 1040 1110 1130	1160 1150 1130 1120 1120	1120 1120 1090 1090 1080	1140 1130 1110 1110	=	=	===
21 22 23 24 25	1110 1080 1080 1080 1100	1080 1060 1060 1060 1060	1090 1070 1070 1070 1080	1160 1130 1090 1060 1080	1120 1090 1040 1010 1020	1140 1120 1070 1030 1050	1110 1120 1140 1130 1120	1080 1080 1090 1080 1090	1090 1100 1120 1100 1100	===	=	=======================================
26 27 28 29 30 31	1110 1130 1150 1170 1150	1080 1090 1110 1130 1130	1090 1100 1130 1150 1140	1060 1040 1060 1000 990 1010	1020 1000 1010 980 950 970	1050 1020 1030 990 970 990	1140 1120 1100 1090 1070 1060	1090 1080 1080 1060 1060 1050	1110 1100 1090 1070 1060 1050	=======================================		=======================================
MONTH	1170	1030	1080	1220	950	1100						
		WATER TEN	MPERATURE	, DEGREES	CELSIUS,	WATER	YEAR OCTO	BER 1988 T	O SEPTEM	BER 1989		
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
							PIAA					
1		OCTOBER		1	NOVEMBER	· · · · · · · · · · · · · · · · · · ·	PIAX	DECEMBER			JANUARY	
2 3 4 5	15.0 14.7 12.0 9.7 10.2	9.7 8.7 6.4 3.0 4.9	12.2 11.6 9.8 6.3 7.5	4.5 4.9 4.8 5.6 4.5	2.2 2.4 2.5 4.1 1.1	3.2 3.6 3.8 4.8 2.9	.9 .9 .9 .7	.4 .4 .3 .3 .3	.7 .7 .6 .5	.1 .1 .1 .2	JANUARY .0 .0 .0 .0 .0	.0 .1 .1 .1
4	14.7 12.0 9.7	9.7 8.7 6.4 3.0	11.6 9.8 6.3	4.5 4.9 4.8 5.6	2.2 2.4 2.5 4.1	3.2 3.6 3.8 4.8	.9	.4 .4 .3	•7 •7 •6	.1 .1 .2	.0	.1 .1
4 5 6 7 8	14.7 12.0 9.7 10.2	9.7 8.7 6.4 3.0 4.9	11.6 9.8 6.3 7.5 8.2 9.4 10.3 11.6	4.5 4.9 4.8 5.6 4.5	2.2 2.4 2.5 4.1 1.1 .4 1.6 1.6	3.2 3.6 3.8 4.8 2.9	•9 •9 •7 •7	.4 .4 .3 .3 .2	.7 .7 .6 .5 .5	.1 .2 .2	.0	.1 .1 .1
4 5 6 7 8 9 10 11 12 13 14	14.7 12.0 9.7 10.2 11.0 12.5 13.3 14.2 12.5	9.7 8.7 6.4 3.0 4.9 5.3 6.6 7.6 9.1	11.6 9.8 6.3 7.5 8.2 4 10.0 8.7 9.5 11.2	4.5 4.8 5.6 4.5 3.6 4.5 5.0 1.8	2.2 2.4 2.5 4.1 1.1 .4 1.6 2.1	3.56.889 1.52.93.9	.9 .9 .9 .7 .7	.4 .4 .3 .3 .2 .2 .2 .0 .0 .0	.7 .7 .6 .5 .4 .3 .3 .2	.1 .1 .2 .2 .3 .2 .1 .1	.0 .0 .0 .0 .0 .0 .0 .0 .0 .0	.1 .1 .1 .1 .1 .0 .0 .0 .1
4 5 6 7 8 9 10 11 12 13 14 15 16 17	14.7 12.0 9.7 10.2 11.0 12.5 13.3 14.2 12.5 11.5 11.5 12.0 14.2 13.2	9.7 8.7 6.4 9.7 5.6 6.6 7.1 8.7 6.9 8.3 10.7	11.6 9.8 6.5 7.5 8.2 9.4 10.3 11.6 10.0 8.7 9.5 11.2	4.5 4.8 4.8 5.6 4.5 5.6 4.8 5.0 1.1 5.9 1.0	2.2 2.4 2.5 4.1 1.1 1.6 1.6 2.1 .2	3.68.89 9.29.39 1.32.3.9 1.21.4	.9 .9 .9 .7 .7 .6 .9 .7 .7 .6 .9 .9 .9 .9	.4 .4 .3 .3 .2 .2 .0 .0 .0	.77.655 .453332 .24.763	.1 .1 .2 .2 .3 .2 .1 .1 .1	.0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0 .0	.1 .1 .1 .1 .0 .0 .0 .0 .0 .0 .0

.9

.0

06470830 JAMES RIVER AT OAKES, ND--CONTINUED

		WATER TEM	PERATURE,	DEGREES	CELSIUS,	WATER	YEAR OCTOBER	1988	TO SEPTEM	BER 1989		
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH		A	PRIL			MAY	
1 2 3 4 5	.0 .1 .1	.0	.0 .1 .1	.0	.0000	.0	2.4 2.0 1.5 2.7 3.3	.2 1.2 .6 .0 1.0	1.6 1.1 1.3 2.2	10.8 13.0 13.8 15.2 11.4	6.2 7.8 9.9 11.8 5.1	8.4 10.3 11.9 13.3 8.4
6 7 8 9	.0	•0	.0	.0	.0	.00000	2.9 2.6 1.3 .4 1.7	1.8 1.4 .0	2.4 2.3 .7 .2 .8	10.7 12.6 13.5 15.4 18.1	2.8 7.6 11.6 10.9 12.8	6.1 10.1 12.5 13.0 15.3
11 12 13 14 15	.0 .0 .1 .1	.0	.0 .0 .1	.0	.0	.0000	2.9 5.4 6.6 7.8 9.3	1.1 2.1 4.2 4.9 6.0	2.0 3.6 5.4 6.4 7.6	16.2 16.6 18.7 20.4 22.2	14.2 13.6 13.4 16.2 17.3	15.4 15.1 16.0 18.2 19.5
16 17 18 19 20	.1 .1 .1	.0	.1	.0	.0	.0	9.1 7.4 9.7 12.1 14.6	6.0 4.2 4.9 7.5 10.2	8.5 5.9 7.1 9.6 12.1	21.0 18.8 20.1 18.7 18.3	18.5 17.2 17.2 15.9 13.0	19.9 18.1 18.4 17.6 15.9
21 22 23 24 25	.0	.0	.0	.0	.0	.00000	16.5 16.7 18.0	11.0 12.7 14.0 14.7 12.2	12.7 14.5 15.3 15.9 14.0	20.4 20.3 22.7 20.4 15.5	14.5 17.3 17.3 15.8 12.6	17.3 19.0 20.0 18.3 14.2
26 27 28 29 30 31	.0	.0 .0 	.0	.0 .0 .2 .1	.00.00	.0		11.2 7.9 6.6 5.5 6.1	12.5 9.5 7.2 6.8 7.2	15.7 18.4 19.8 16.5 13.1	10.2 11.8 13.6 12.7 11.2	12.9 14.9 16.4 14.1 12.1 13.1
	4	0	0	1.1	.0	.0	18.0	.0	6.6	22.7	2.8	14.7
MONTH	.1	.0	.0	1.1	.0		10.0	••	0.0	,		
MONTH	.,,						YEAR OCTOBER					
DAY	MAX										MIN	MEAN
		WATER TEM	PERATURE,	DEGREES	CELSIUS,	WATER	YEAR OCTOBER	1988	TO SEPTEM	BER 1989		MEAN ER
	MAX	WATER TEM	PERATURE,	DEGREES	CELSIUS,	WATER	YEAR OCTOBER MAX A	1988 MIN	TO SEPTEM	BER 1989	MIN	MEAN
DAY 1 - 2 3 4	MAX 20.2 20.4 21.3 21.3	MIN JUNE 12.6 15.8 14.9 15.9	MEAN 15.5 18.2 18.2 18.2	DEGREES MAX 28.3 29.3 28.8 29.2	MIN JULY 24.0 23.3 24.4	WATER MEAN 26.4 26.1 25.9 26.8	MAX 28.4 27.8 28.9 27.1 24.4 21.5	MIN .UGUST 24.1 23.7 23.7 23.8	TO SEPTEM MEAN 26.3 25.7 26.1 25.4	MAX 22.1 20.5 21.5 21.2	MIN SEPTEMBE 15.8 18.0 17.9 17.9	MEAN ER 18.7 19.5 19.4 19.7
DAY 1 2 3 4 5 6 7 8 9	MAX 20.2 20.4 21.3 21.3 22.0 24.5 22.4 18.6	MIN JUNE 12.6 15.8 14.9 15.9 17.6 17.9 15.1 12.6 13.7	MEAN 15.5 18.2 18.2 18.2 19.8 21.0 19.4 15.5 15.7	DEGREES MAX 28.3 29.3 28.8 29.2 28.2 27.6 26.1 28.8 27.7	MIN JULY 24.0 23.3 24.4 23.8 23.9 22.3 21.3 23.8	WATER MEAN 26.4 26.1 25.9 26.8 26.1 25.6 24.3 24.5 25.7	MAX 28.4 27.8 28.9 27.1 24.4 21.5 23.9 25.4 26.1	MIN .UGUST 24.1 23.7 23.8 18.5 15.8 16.6 18.1 20.2	TO SEPTEM MEAN 26.3 25.7 26.1 25.4 21.8 18.6 19.9 20.8 23.1	MAX 22.1 20.5 21.5 21.5 21.6 22.1 20.2 17.7	MIN SEPTEMBE 15.8 18.0 17.9 17.9 17.1 19.3 17.9 17.0 14.5	MEAN 18.7 19.5 19.4 19.7 19.4 20.5 19.8 18.5 16.2
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14	MAX 20.2 20.4 21.3 21.3 22.0 24.5 22.4 18.6 22.3 20.6 18.7 15.6	MIN JUNE 12.6 15.8 14.9 15.9 17.6 17.9 15.1 12.6 13.7 16.2 18.4 14.8 14.8 11.3	MEAN 15.5 18.2 18.2 18.2 19.8 21.0 19.4 15.5 15.7 19.1 19.4 17.5 13.8 15.6	DEGREES MAX 28.3 29.3 28.8 29.2 28.2 27.6 26.1 28.8 27.7 28.4 25.3 26.9 25.3	MIN JULY 24.0 23.3 24.4 23.8 23.9 22.3 21.3 23.8 21.2 21.0 22.0 22.0 22.3	WATER MEAN 26.4 26.1 25.9 26.8 26.1 25.6 24.5 25.7 24.4 23.0 24.9 24.8 23.7	MAX 28.4 27.8 28.9 27.1 24.4 21.5 23.9 25.4 26.1 25.2	1988 MIN .UGUST 24.1 23.7 23.7 23.8 18.5 15.8 16.6 18.1 20.2 21.3	MEAN 26.3 25.7 26.1 25.4 21.8 18.6 19.9 20.8 23.1 23.2	MAX 22.1 20.5 21.5 21.5 21.5 22.6 22.1 20.2 17.7 15.3 12.8 13.1 13.9	MIN SEPTEMBE 15.8 18.0 17.9 17.1 19.3 17.9 17.0 14.5 12.9 10.5 9.6 10.0	MEAN 18.7 19.5 19.4 19.7 19.4 20.5 16.2 13.8 11.7 11.2
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	MAX 20.2 20.4 21.3 22.0 24.5 22.4 18.6 22.3 20.6 18.7 15.6 20.3 22.1 23.1 20.1 23.4	MIN JUNE 12.6 15.9 17.6 17.9 15.1 12.6 13.7 16.2 18.4 11.3 15.1 17.6 18.3 19.7	MEAN 15.5 18.2 18.2 18.2 19.8 21.0 19.4 15.5 15.7 19.1 19.4 17.5 13.8 15.6 17.7 20.3 19.0 19.7 22.9	DEGREES MAX 28.3 29.3 28.8 29.2 28.2 27.6 26.1 28.8 27.7 28.4 25.3 26.9 25.3 26.5 26.8 24.0 25.2 27.0	MIN JULY 24.0 24.0 23.3 24.4 23.8 23.9 22.3 21.3 23.8 21.2 21.0 22.0 22.2 22.3 20.7	WATER MEAN 26.4 26.1 25.9 26.8 26.1 25.6 24.3 24.5 24.4 23.0 24.9 24.8 23.7 23.4 24.4 22.0 22.1 23.9	MAX 28.4 27.8 28.9 27.1 24.4 21.5 23.9 25.4 26.1 25.2 25.5 25.0 24.1 24.8	MIN	MEAN 26.3 25.7 26.1 25.4 21.8 18.6 19.9 20.8 23.1 23.2 22.3 22.1 21.4 22.2	MAX 22.1 20.5 21.5 21.2 21.5 22.6 22.1 20.2 17.7 15.3 12.8 13.1 13.9	MIN SEPTEMBE 15.8 18.0 17.9 17.9 17.1 19.3 17.9 17.0 14.5 12.9 10.5 9.6 10.0	MEAN 2R 18.7 19.5 19.4 19.7 19.4 20.5 19.8 18.5 16.2 13.8 11.7 11.2
DAY 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	MAX 20.2 20.4 21.3 21.3 22.0 24.5 22.4 18.6 22.3 20.6 18.7 15.6 22.3 20.1 23.1 23.1 23.1 24.6 22.6 19.7 23.7	MIN JUNE 12.6 15.9 17.6 17.9 15.1 12.6 13.7 16.2 18.4 11.3 15.1 17.6 18.3 15.1 17.6 18.7 20.5	MEAN 15.5 18.2 18.2 18.2 19.8 21.0 19.4 15.5 15.7 19.1 19.4 17.5 13.8 15.6 17.7 20.3 19.7 22.9 22.4 19.4 17.8 21.0 21.2	DEGREES MAX 28.3 29.3 28.8 29.2 28.2 27.6 26.1 28.8 27.7 28.4 25.3 26.9 25.3 26.5 26.8 24.0 27.4 27.4 27.4 27.0 26.9 27.2	MIN JULY 24.0 24.0 23.3 24.4 23.8 23.9 22.3 21.3 23.8 21.2 21.0 22.0 22.2 22.3 20.7 21.9 20.9 22.7 23.4 23.5 22.9 23.3	WATER MEAN 26.4 25.9 26.8 26.1 25.6 24.3 24.5 25.7 24.4 23.0 24.9 24.9 24.8 23.7 23.4 22.1 23.9 25.0 25.1 25.2 24.9	MAX 28.4 27.8 28.9 27.1 24.4 21.5 23.9 25.4 26.1 25.2 25.5 25.0 24.1 24.8 24.2 24.8 26.7 28.1 26.9	MIN	MEAN 26.3 25.7 26.1 25.4 21.8 18.6 19.9 20.8 23.1 23.2 22.3 22.1 21.4 22.2 21.3 21.7 22.8 224.4	MAX 22.1 20.5 21.5 21.2 21.5 22.6 22.1 13.1 13.9	MIN SEPTEMBE 15.8 18.0 17.9 17.9 17.1 19.3 17.9 17.0 14.5 12.9 10.5 9.6 10.0	MEAN 18.7 19.5 19.4 19.7 19.4 20.5 18.8 11.7 11.2 12.1

MONTH 29.1 11.3 19.5 29.3 19.5 24.8

06470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND

LOCATION.--Lat 45°56'52", long 98°10'29", in SE1/4NE1/4 sec.34, T.129 N., R.60 W., Dickey County, Hydrologic Unit 10160003, on left bank, 10 ft upstream from dam, 4.5 mi southwest of Ludden and .8 mi upstream from North Dakota-South Dakota state line.

DRAINAGE AREA. -- 5,480 mi2, of which about 3,300 mi2 are noncontributing.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD .-- October 1981 to current year.

GAGE.--Water-stage recorder and concrete dam control. Datum of gage is 1,280.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Estimated daily discharges: Nov. 22 to Mar. 12, 16 to Apr. 12, and July 20-26. Records fair except those for periods Nov. 22 to Mar. 12 and July 20-26, which are poor. Flow regulated by upstream reservoirs, Jamestown Reservoir (station 06469000), Pipestem Lake, capacity 147,000 acre-ft, and Lake LaMoure.

AVERAGE DISCHARGE. -- 8 years, 148 ft3/s, 107,200 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, about 2,300 ft3/s, Mar. 28, 1987, gage height, 13.76 ft, no flow at times during some years.

EXTREMES FOR CURRENT YEAR. -- Maximum discharge, about 1,400 ft3/s, Apr. 3, gage height, 12.47 ft; no flow for many days.

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

MEAN VALUES DAY OCT NOV DEC JAN FEB APR JUN JUL AUG SEP MAY .00 .00 e.78 e.50 e780 .00 .01 e1.0 1.5 1.5 1.5 2 .00 .00 e5.0 e4.6 e.78 e.50 e1000 19 .07 .00 .00 e.76 e.49 e1350 23 7.1 3 5.1 .00 e4.5 e6.0 .01 .00 .03 4 .00 4.4 e8.0 e6.7 e.76 e1300 58 .00 .00 .07 e.48 5 .00 89 e9.0 e6.0 e.74 e1280 239 .00 .00 -01 6 .00 8.6 .17 e9.0 e.74 e1250 53 2.5 .03 .00 .14 -00 .00 e7.0 e3.5 e.74 e.46 e1150 1.2 50 -00 .00 8 .00 e1050 4.2 .00 e6.0 e3.4 e.72 e.46 3.3 38 -00 .00 1.6 .03 q -00 3.7 e5.6 e3.3 e.72 e.45 e1000 1.9 -00 13 10 2.7 6.5 e5.2 e.72 e.44 e800 1.5 .00 .00 .00 3.3 11 -00 00 e5.0 e3.2 e.70 e700 11 00 00 .00 9.7 .00 12 .00 e5.0 e3.2 e.60 e5.0 e600 33 25 .03 .00 16 3.9 .00 13 .01 e5.0 e3.2 e.60 11 567 80 26 .07 -00 14 .00 2.0 e5.4 e3.2 e.60 21 537 80 23 .00 -00 -68 15 .00 2.4 .00 44 e5.0 e3.2 e.60 25 307 36 -00 .00 339 213 16 .00 117 e4.8 e3.1 e.60 e35 13 .00 .00 .00 13 17 .82 .71 e.60 2.5 .00 .00 5.4 e4.8 e3.1 e50 .46 18 .07 .00 e5.6 e.60 190 8.0 .00 19 .00 .00 e90 .00 .00 e6.0 e.50 173 .00 4.9 .00 2.8 19 e100 29 e3.0 20 .00 .00 e5.8 e.50 118 24 .00 e.00 .00 21 e3.0 e170 21 .00 .00 e5.2 e.50 8.5 23 6.6 e.00 .00 94 e2.5 e240 e5.0 e1.5 e.50 123 22 .00 e.00 e280 5.1 38 .01 e.00 .00 10 3.1 .07 .00 23 e.00 e1.5 e.50 e310 41 e.00 1.2 e4.8 e1.5 e.50 5.1 24 e.00 e4.7 46 .02 e.00 .00 e330 25 2.5 e4.6 e.50 7.5 e.00 .00 e.00 e1.5 e350 2.3 2.0 26 .00 e.00 e.50 6.6 20 e.00 .00 .02 e4.5 e1.4 e370 .30 27 32 e.00 e.50 57 .81 10 .00 e4.5 e1.4 e400 .00 4.2 .00 28 e.00 e4.5 e1.3 e.50 e450 71 6.8 .26 .00 2.3 29 .00 e.00 e1.0 e500 2.2 66 .04 1.0 .00 .01 e4.4 30 .00 e.10 e4.4 e.90 e550 2.1 34 .09 2.0 .23 .00 .00 31 .07 e.80 e700 8.0 2.8 TOTAL 57.60 276.02 163.6 92.00 17.36 4992.16 14872.2 964.16 228.93 39.47 3.04 321.37 1.27 MEAN 1.86 9.20 5.28 2.97 .62 161 496 31.1 7.63 .098 10.7 .78 MAX 32 117 9.0 6.7 700 1350 239 50 19 2.8 123 MIN .00 .00 1.0 -80 .50 .44 2.1 .46 .00 .00 .00 .00 AC-FT 114 547 325 182 9900 29500 1910 454 78 6.0 637

CAL YR 1988 TOTAL 9471.30 MEAN 25.9 MAX 244 MIN .00 AC-FT 18790 WTR YR 1989 TOTAL 22027.91 MEAN 60.4 MAX 1350 MIN .00 AC-FT 43690

e - Estimated

06470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED

WATER-QUALITY RECORDS

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

PERIOD OF DAILY RECORDS .--

SPECIFIC CONDUCTANCE: October 1982 to current year.

PH: June 1983 to current year.

WATER TEMPERATURE: October 1982 to current year. DISSOLVED OXYGEN: October 1982 to current year.

INSTRUMENTATION .-- Water quality monitor since October 1982.

REMARKS.--Unpublished records for dissolved oxygen and pH are available in files at the District office for water years 1983 through 1987. No flow for many days (see table of daily mean discharges for this station).

EXTREMES FOR PERIOD OF DAILY RECORD .--

SPECIFIC CONDUCTANCE: Maximum recorded, 2,770 microsiemens, Mar. 18, 1989; minimum recorded, 217 microsiemens, July 13, 1983.

PH: Maximum recorded, 9.7 units, Oct. 10, 1984; minimum recorded, 6.0 units, Nov. 20, 1984.
WATER TEMPERATURE: Maximum, 31.2°C, Aug. 3, 1989; minimum, O.0°C, several days during winter months each year.

DISSOLVED OXYGEN: Maximum recorded, greater than 20 mg/L on many days; minimum recorded, 0.5 mg/L, June 5, 1988.

EXTREMES FOR CURRENT YEAR . --

SPECIFIC CONDUCTANCE: Maximum recorded, 2.770 microsiemens, Mar. 18; minimum recorded, 380 microsiemens,

Apr. 14,15.

PH: Maximum recorded, 9.6 units, June 9, July 1; minimum recorded, 6.8 units, May 28,29, June 3. WATER TEMPERATURE: Maximum, 31.2°C, Aug. 3; minimum, 0.0°C, several days during winter months.

DISSOLVED OXYGEN: Maximum recorded, greater than 20 mg/L on many days; minimum recorded, 2.0 mg/L, Aug. 19.

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) (OOO2O)	TEMPER- ATURE WATER (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (OO3O1)	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												
03 JAN	1400	9.2	1240	8.60	5.0	11.0	41	12.0	106	330	60	44
04	1000 0930	6.7	1750 2220	7.30 8.20	-5.0 2.0	1.0	4.6	2.5 14.7	17 105	500	98	63
FEB 28	1100	0.50	2500	7.40	-10.0	1.0	5.7			850	160	110
27 APR	1515	396	400		2.0	0.5					44	
04	1030	1310	250	7.20	3.0	0.5	14	11.4	77	87	21	8.5
O8	1350	1070	260		-2.0	0.5						-
16 AUG	0900	20	690	8.40	16.0	19.0	12	8.5	91	230	48	26
16	1000		980	8.70	19.0	19.5		9.2	99			
DATE	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	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)	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)
OCT 03	150	49	4	5.1	278	280	73	0.20	839	780	1.14	20.8
JAN												
O4	170	41	3	18	343	460	87	0.20	1780	1100	2.42	32.3
28 APR	250	38	4	23	650	620	130	0.40	1790	1700	2.43	2.42
04	14	24	0.7	9.2	79	36	8.1	0.10	156	148	0.21	552
MAY 16	57	35	2	1.3	204	120	27	0.20	418	402	0.57	22.3

06470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED

DATE	RESIDUE TOTAL AT 105 DEG. C, SUS- PENDED (MG/L) (00530)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO- GEN, NITRITE TOTAL (MG/L AS N) (00615)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	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 03	59			0.020		<0.100		0.080		1.7		0.170
JAN 04	12			<0.010		<0.100		0.440		1.7		0.200
FEB 28	10			0.010		<0.100		2.70		3.6		1.50
APR 04	23	0.550	0.050	0.040	0.600	0.590	0.480	0.450	1.6	1.5	0.330	0.270
MAY 16	27		<0.010	<0.010	<0.100	<0.100	0.030	<0.010	1.2	0.80	0.280	0.100
10	-1	PHOS-	10.010	10.010	10.100	VO. 100	0.090	0.010	1.2	0.00	0.280	0.100
DATE	PHOS- PHORUS, ORTHO, TOTAL (MG/L AS P) (70507)	PHOROUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	PHOS- PHOROUS ORGANIC TOTAL (MG/L AS P) (00670)	ARSENIC TOTAL (UG/L AS AS) (01002)	ARSENIC DIS- SOLVED (UG/L AS AS) (01000)	BORON, DIS- SOLVED (UG/L AS B) (01020)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD) (01027)	CADMIUM DIS- SOLVED (UG/L AS CD) (01025)	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, DIS- SOLVED (UG/L AS PB) (01049)
OCT 03		0.155			7	350		<1	1	-	14	<5
JAN 04		0.166			4	340		<1	3		9	<5
FEB 28		0.169			4	470		<10	<1		310	<5
APR 04	0.259	0.226	0.07	2	2	50	1	<1	1	1200	170	<5
MAY 16	0.004	0.080	0.28	3	3	200	<1	<1	<3	560	6	<1
10		0.080	0.20	,	,	200	×1	×1	()	700		
	MANGA- NESE, TOTAL	MANGA-	MERCURY	SELE-	SELE-	ZINC,	CARBON,		CYANIDE	ALA-		
DATE	RECOV- ERABLE (UG/L AS MN) (01055)	NESE, DIS- SOLVED (UG/L AS MN) (01056)	DIS- SOLVED (UG/L AS HG) (71890)	NIUM, TOTAL (UG/L AS SE) (01147)	NIUM, DIS- SOLVED (UG/L AS SE) (01145)	DIS- SOLVED (UG/L AS ZN) (01090)	ORGANIC TOTAL (MG/L AS C) (00680)	TOTAL (MG/L AS CN) (00720)	SOLVED (MG/L AS CN) (00723)	CHLOR TOTAL RECOVER (UG/L) (77825)	ALDRIN, DIS- SOLVED (UG/L) (39331)	ALDRIN, TOTAL (UG/L) (39330)
OCT	RECOV- ERABLE (UG/L AS MN)	DIS- SOLVED (UG/L AS MN) (01056)	DIS- SOLVED (UG/L AS HG) (71890)	NIUM, TOTAL (UG/L AS SE)	DIS- SOLVED (UG/L AS SE) (01145)	DIS- SOLVED (UG/L AS ZN) (01090)	ORGANIC TOTAL (MG/L AS C)	TOTAL (MG/L AS CN)	SOLVED (MG/L AS CN)	CHLOR TOTAL RECOVER (UG/L)	DIS- SOLVED (UG/L)	TOTAL (UG/L)
OCT O3 JAN	RECOV- ERABLE (UG/L AS MN)	DIS- SOLVED (UG/L AS MN) (01056)	DIS- SOLVED (UG/L AS HG) (71890)	NIUM, TOTAL (UG/L AS SE) (01147)	DIS- SOLVED (UG/L AS SE) (01145)	DIS- SOLVED (UG/L AS ZN) (01090)	ORGANIC TOTAL (MG/L AS C)	TOTAL (MG/L AS CN)	SOLVED (MG/L AS CN) (00723)	CHLOR TOTAL RECOVER (UG/L)	DIS- SOLVED (UG/L)	TOTAL (UG/L)
OCT 03 JAN 04 FEB	RECOV- ERABLE (UG/L) AS MN) (01055)	DIS- SOLVED (UG/L AS MN) (01056) 75	DIS- SOLVED (UG/L AS HG) (71890)	NIUM, TOTAL (UG/L AS SE)	DIS- SOLVED (UG/L (O1145)	DIS- SOLVED (UG/L AS ZN) (O1090)	ORGANIC TOTAL (MG/L AS C)	TOTAL (MG/L AS CN)	SOLVED (MG/L AS CN) (00723)	CHLOR TOTAL RECOVER (UG/L)	DIS- SOLVED (UG/L)	TOTAL (UG/L)
OCT 03 JAN 04 FEB 28	RECOV- ERABLE (UG/L AS MN) (01055)	DIS- SOLVED (UG/L AS MN) (01056) 75 1400 7800	DIS- SOLVED (UG/L AS HG) (71890)	NIUM, TOTAL (UG/L AS SE) (01147)	DIS- SOLVED (UG/L AS SE) (01145)	DIS- SOLVED (UG/L AS ZN) (01090)	ORGANIC TOTAL (Mg/L AS C) (00680)	TOTAL (MG/L AS CN) (00720)	SOLVED (MG/L AS CN) (00723)	CHLOR TOTAL RECOVER (UG/L)	DIS- SOLVED (UG/L)	TOTAL (UG/L)
OCT 03 JAN 04 FEB 28 APR 04 MAY	RECOV- ERABLE (UG/L AS MN) (01055)	DIS- SOLVED (UG/L AS MN) (01056) 75 1400 7800 98	DIS- SOLVED (UG/L AS HG) (71890) 0.7 0.2 0.5	NIUM, TOTAL (UG/L AS SE) (01147)	DIS- SOLVED (UG/L AS SE) (01145) <1 <1 <1	DIS- SOLVED (UG/L AS ZN) (01090) 55 8 10	ORGANIC TOTAL (MG/L AS C) (00680)	TOTAL (MG/L AS CN) (00720)	SOLVED (MG/L AS CN) (00723)	CHLOR TOTAL RECOVER (UG/L) (77825)	DIS- SOLVED (UG/L) (39331)	TOTAL (UG/L) (39330)
OCT 03 JAN 04 FEB 28 APR 04 MAY 16 AUG	RECOV- ERABLE (UG/L AS MN) (01055)	DIS- SOLVED (UG/L AS MN) (01056) 75 1400 7800	DIS- SOLVED (UG/L AS HG) (71890)	NIUM, TOTAL (UG/L AS SE) (01147)	DIS- SOLVED (UG/L AS SE) (01145)	DIS- SOLVED (UG/L AS ZN) (01090)	ORGANIC TOTAL (Mg/L AS C) (00680)	TOTAL (MG/L AS CN) (00720)	SOLVED (MG/L AS CN) (00723)	CHLOR TOTAL RECOVER (UG/L) (77825)	DIS- SOLVED (UG/L) (39331)	TOTAL (UG/L) (39330)
OCT O3 JAN O4 FEB 28 APR O4 MAY 16	RECOV- ERABLE (UG/L AS MN) (01055)	DIS- SOLVED (UG/L AS MN) (01056) 75 1400 7800 98	DIS- SOLVED (UG/L AS HG) (71890) 0.7 0.2 0.5	NIUM, TOTAL (UG/L AS SE) (01147)	DIS- SOLVED (UG/L AS SE) (01145) <1 <1 <1	DIS- SOLVED (UG/L AS ZN) (01090) 5 8 10 29 5	ORGANIC TOTAL (MG/L AS C) (00680)	TOTAL (MG/L AS CN) (00720)	SOLVED (MG/L AS CN) (00723)	CHLOR TOTAL RECOVER (UG/L) (77825)	DIS- SOLVED (UG/L) (39331)	TOTAL (UG/L) (39330)
OCT 03 JAN 04 FEB 28 APR 04 MAY 16 AUG	RECOV- ERABLE (UG/L AS MN) (01055)	DIS- SOLVED (UG/L AS MN) (01056) 75 1400 7800 98	DIS- SOLVED (UG/L AS HG) (71890) 0.7 0.2 0.5	NIUM, TOTAL (UG/L AS SE) (01147)	DIS- SOLVED (UG/L AS SE) (01145) <1 <1 <1	DIS- SOLVED (UG/L AS ZN) (01090) 55 8 10	ORGANIC TOTAL (MG/L AS C) (00680)	TOTAL (MG/L AS CN) (00720)	SOLVED (MG/L AS CN) (00723)	CHLOR TOTAL RECOVER (UG/L) (77825)	DIS- SOLVED (UG/L) (39331)	TOTAL (UG/L) (39330)
OCT O3 JAN O4 FEB 28 APR O4 MAY 16 AUG 16 DATE	RECOV-ERABLE (UG/L AS MN) (01055) 160 520 ALDRIN, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	DIS- SOLVED (UG/L AS MN) (01056) 75 1400 7800 98 51 AME- TRYNE TOTAL (82184)	DIS- SOLVED (UG/L AS HG) (71890) 0.7 0.2 0.5 0.4 0.2 ATRA- ZINE, TOTAL (UG/L) (39630)	NIUM, TOTAL (UG/L AS SE) (01147) CHLOR- DANE, DIS- SOLVED (UG/L) (39352)	DIS- SOLVED (UG/L AS SE) (01145) <1 <1 <1 <1 <1 CHLOR- DANE, TOTAL (UG/L) (39350)	DIS-SOLVED (UG/L AS ZN) (01090) 55 8 10 29 5-CHLOR-DANE, TOTAL IN BOT-TOM MA-TERIAL (UG/KG)	ORGANIC TOTAL (MG/L AS C) (00680)	TOTAL (MG/L AS CN) (00720)	SOLVED (MG/L AS CN) (00723) (0.01 (0.01 (0.01 DDD, TOTAL (UG/L) (39360)	CHLOR TOTAL RECOVER (UG/L) (77825)	DIS- SOLVED (UG/L) (39331) <0.01 <0.01 DDE, DIS- SOLVED (UG/L) (39366)	TOTAL (UG/L) (39330)
OCT	RECOV- ERABLE (UG/L AS MN) (01055) 160 520 ALDRIN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39333)	DIS- SOLVED (UG/L AS MN) (01056) 75 1400 7800 98 51 	DIS- SOLVED (UG/L AS HG) (71890) 0.7 0.2 0.5 0.4 0.2 ATRA- ZINE, TOTAL (UG/L)	NIUM, TOTAL (UG/L AS SE) (01147) CHLOR-DANE, DIS- SOLVED (UG/L)	DIS- SOLVED (UG/L AS SE) (01145) <1 <1 <1 <1 CHLOR- DANE, TOTAL (UG/L)	DIS- SOLVED (UG/L AS ZN) (01090) 5 8 10 29 5 CHLOR- DANE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39351)	ORGANIC TOTAL (MG/L AS C) (OO680) 9.6 11 CYAN- AZINE TOTAL (UG/L)	TOTAL (MG/L AS CN) (00720)	SOLVED (MG/L AS CN) (00723) (0.01 (0.01 (0.01 DDD, TOTAL (UG/L)	CHLOR TOTAL RECOVER (UG/L) (77825)	DIS- SOLVED (UG/L) (39331)	TOTAL (UG/L) (39330)

O6470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

			WATER	(-QUALITY	DATA, WAT	ER YEAR O	CTOBER 15	988 TO SEE	TEMBER 19	09		
DATE	DDE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39368)	DDT DIS SOLV (UG/	ED TOTA	TOM I L TERM L) (UG/I	AL DI- DT- AZING MA- DIS IAL SOLV	S- AZINO YED TOTA YL) (UG/	IN BO N, TOM N L TERM L) (UG/F	DN, DICAM AL BOT.M DT- TOTAM MA- RECOV IAL DRY W	MAT DI- AL ELDR V. DIS VT. SOLV	IN DI- - ELDR ED TOTA L) (UG/	IN TOM M L TERI L) (UG/K	EN, AL DT- ENDO- MA- SULFAN AL DISSOLV AG) (UG/L)
MAY 16		<0.	01 <0.0	010	<0.	.01 <0.	01		<0.	01 <0.0	10	<0.01
AUG 16	0.1	<0.	01 <0.0	010 <	0.1 <0.			0.1 <1	.0 <0.	01 <0.0	10 <0	0.1 <0.01
DATE	ENDO- SULFAN, TOTAL (UG/L) (39388)	ENDO SULFA TOTA IN BO TOM M TERI (UG/K (3938	N, L T- ENDRI IA- DIS AL SOLV G) (UG/	ED TOTAL	/L) (UG/K	AL DT- MA- ETHIO (AL DISSO (G) (UG/L	LV TOTA) (UG)	/L) (UG/F	AL HEPT OT- CHLO MA- DIS AL SOLV (G) (UG/	R, HEPT - CHLC ED TOTA L) (UG/	R, TOM M L TERI L) (UG/K	OR, HEPTA- CHLOR OT- EPOXIDE MA- DIS- CAL SOLVED (G) (UG/L)
MAY 16	<0.010		<0.	.01 <0.0	010	<0.	01 <0.	.01	<0.	01 <0.0	10	<0.01
AUG 16	<0.010	<0	.1 <0.	.01 <0.0	010 <0	0.1 <0.	01 <0.	.01 <0	.1 <0.	01 <0.0	10 <0	.1 <0.01
D	E	HEPTA- CHLOR POXIDE TOTAL (UG/L) 39420)	HEPTA- CHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG) (39423)	LINDANE DIS- SOLVED (UG/L) (39341)		LINDANE TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39343)	MALA- THION, DIS- SOLVED (UG/L) (39532)	MALA- THION, TOTAL (UG/L) (39530)	MALA- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39531)	METHO- MYL TOTAL (UG/L) (39051)	METH- OXY- CHLOR DISSOLV (UG/L) (82350)	METH- OXY- CHLOR, TOTAL (UG/L) (39480)
MAY 16.		<0.010		<0.01	<0.010		<0.01	<0.01		<0.5	<0.01	<0.01
AUG 16.		<0.010	<0.1	<0.01	<0.010	<0.1	<0.01	<0.01	<0.1	<0.5	<0.01	<0.01
D	T(METH- OXY- CHLOR, OT. IN BOTTOM MATL. UG/KG) 39481)	METHYL PARA- THION, DIS- SOLVED (UG/L) (39602)	METHYL PARA- THION, TOTAL (UG/L) (39600)	METHYL PARA- THION, TOT. IN BOTTOM MATL. (UG/KG) (39601)	METHYL- TRI- THION DISSOLV (UG/L) (82344)	METHYL TRI- THION, TOTAL (UG/L) (39790)	METHYL TRI- THION, TOT. IN BOTTOM MATL. (UG/KG) (39791)	METOLA- CHLOR WATER WHOLE TOT.REC (UG/L) (82612)	METRI- BUZIN WATER WHOLE TOT.REC (UG/L) (82611)	MIREX, DIS- SOLVED (UG/L) (39756)	MIREX, TOTAL (UG/L) (39755)
MAY 16.			<0.01	<0.01		<0.01	<0.01		<0.1	<0.1	<0.01	<0.01
AUG 16.		<0.3	<0.01	<0.01	<0.1	<0.01	<0.01	<0.1	<0.1	<0.1	<0.01	<0.01
D	II To	MIREX, TOTAL N BOT- OM MA- TERIAL UG/KG) 39758)	NAPH- THA- LENES, POLY- CHLOR. TOTAL (UG/L) (39250)	PARA- THION, DIS- SOLVED (UG/L) (39542)	PARA- THION, TOTAL (UG/L) (39540)	PARA- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39541)	PCB, DIS- SOLVED (UG/L) (39517)	PCB, TOTAL (UG/L) (39516)	PCB, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39519)	PCN DISSOLV (UG/L) (82360)	PCN, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39251)	PER- THANE DISSOLV (UG/L) (82348)
MAY 16.			<0.10	<0.01	<0.01		<0.1	<0.1		<0.10		<0.10
AUG 16.		<0.1	<0.10	<0.01	0.01	<0.1	<0.1	<0.1	<1	<0.10	<1.0	<0.10
D		PER- THANE TOTAL (UG/L) 39034)	PER- THANE IN BOT- TOM MA- TERIAL (UG/KG) (81886)	PHORATE TOTAL (UG/L) (39023)	PI- CLORAM BOT.MAT TOTAL RECOV. DRY WT. (UG/KG) (38930)	PROME- TONE TOTAL (UG/L) (39056)	PROME- TRYNE TOTAL (UG/L) (39057)	PRO- PAZINE TOTAL (UG/L) (39024)	PROPHAM TOTAL (UG/L) (39052)	SEVIN, TOTAL (UG/L) (39750)	SILVEX, TOTAL (UG/L) (39760)	SILVEX, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39761)
MAY 16.		<0.1				<0.1	<0.1	<0.10	<0.5	<0.50	<0.01	
AUG 16.		<0.1	<1.00	<0.10	<1.0	<0.1	<0.1	<0.10	<0.5	<0.50	<0.01	<1.0

JAMES RIVER BASIN

O6470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE MAY	THOL (UG/L) (LC1351a	BOFUR (UG/	AN L) (CARB UG/L) C1338ª)	SULFONE (UG/L) (LC1344ª)	SULFO (UG/	XIDE CA	ARBARYL (UG/L) LC636ª)	FURAN (UG/L) (LC1337ª)	FONOFO (UG/L) (LC1336	(UG/L)
,	1-NAPH-	3-HYD	RO-	ALDI-	ALDICARB	ALDIC	ADD		CARBO-		
AUG 16	<0.01	<1.0	<0.01	<1.0							
MAY 16	<0.01		<0.01		29.0	1.50	6.2	1200	23	1.2	99
APR 04					7.90	0.200	6.8	1200	28	99	94
FEB 28							1		32	0.04	89
JAN 04									25	0.46	86
OCT 03									64	1.6	99
DATE	2,4-DP, TOTAL (UG/L) (82183)	2,4-DP, IN BOTTOM MAT. (UG/KG) (34609)	2,4,5-T TOTAL (UG/L) (39740)	2,4,5-T TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39741)	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)	PLANK- TON BIOMASS ASH WT (MG/L) (81353)	PLANK- TON BIOMASS DRY WT (MG/L) (81354)	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 16	<0.10	<0.1	<1.0	<1	<10	<0.10	<0.01	<0.01	<0.1	0.02	<1.0
MAY 16	<0.10	<0.1	<1.0	<1		<0.10	<0.01	<0.01		0.06	
DATE	SIMA- ZINE TOTAL (UG/L) (39055)	SIME- TRYNE TOTAL (UG/L) (39054)	TOX- APHENE, DIS- SOLVED (UG/L) (39401)	TOX- APHENE, TOTAL (UG/L) (39400)	TOXA- PHENE, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39403)	TRI- FLURA- LIN TOTAL RECOVER (UG/L) (39030)	TRI- THION DIS- SOLVED (UG/L) (82342)	TRI- THION, TOTAL (UG/L) (39786)	TRI- THION, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39787)	2,4-D, TOTAL (UG/L) (39730)	2,4-D, TOTAL IN BOT- TOM MA- TERIAL (UG/KG) (39731)

a - Lab Code. WATSTORE parameter code unavailable.

06470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED SPECIFIC CONDUCTANCE, MICROSIEMENS/CM AT 25 DEGREES CENTIGRADE, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

0. 201		DUCTANCE,	MICROS	TEMENS/CM	AT 25 DEC	REES CE	ENTIGRADE,	WATER YEAR	OCTOBER	1988 TO	SEPTEMBER	1989
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER	3		DECEMBER			JANUARY	
1 2 3 4 5	1250 1260 1250 1240 1250	1210 1230 1190 1200 1200	1230 1250 1210 1220 1230	1340 1340 1330 1320 1310	1310 1310 1300	1330 1320 1320 1310 1300	1360 1370 1390 1390 1410	1350	1360 1360 1380 1380 1400	1700 1720 1730 1750 1750	1680 1690 1710 1740 1740	1690 1700 1720 1740 1750
6 7 8 9 10	1260 1280 1270	1220 1260 1210	1240 1270 1240	1300 1290 1280 1280 1260	1270 1260	1280 1280 1270 1260 1260	1410 1420 1430 1440 1450	1400 1410 1410 1420 1430	1400 1410 1420 1430 1430	1760 1760 1770 1790 1790	1750 1740 1750 1760 1760	1760 1750 1760 1770 1770
11 12 13 14 15	1270 1260 1310 1320 1310	1230 1220 1240 1290 1290	1250 1250 1270 1300 1300	1270 1280 1280 1270 1270		1260 1260 1260 1260 1260	1480 1490 1510 1520 1530	1450 1460 1470 1500 1500	1470 1480 1500 1510	1790 1800 1810 1820 1820	1770 1780 1790 1800 1810	1780 1790 1800 1810 1820
16 17 18 19 20	1310 1310 1260 1270 1280	1280 1230 1230 1250 1240	1290 1260 1250 1260 1260	==	=======================================	===	1560 1580 1590	1540 1560 1570	1550 1570 1580	1830 1850 1860 1870	1820 1830 1850 1860	1830 1840 1860 1860
21 22 23 24 25	1290 1300 1290 1290 1270	1280 1270 1230 1260 1240	1280 1290 1250 1270 1260	1320	1300	1310	1600 1610 1620 1630 1640	1580 1590 1610 1610 1620	1590 1600 1610 1610 1630	1880 1900 1900 1900 1920	1860 1880 1890 1880 1900	1870 1890 1890 1890 1910
26 27 28 29 30 31	1290 1280 1290 1310 1330 1340	1260 1230 1230 1280 1300 1320	1280 1250 1260 1290 1320 1330	1320 1330 1330 1350	1310 1310 1310 1330 	1310 1320 1320 1340	1640 1650 1660 1680 1690 1710	1630 1630 1630 1650 1660 1680	1630 1640 1650 1660 1670 1690	1920 1930 1940 1950 1950 1970	1900 1910 1930 1930 1940 1940	1910 1920 1930 1940 1950 1960
MONTH												
SPECI	FIC COND	UCTANCE,	MICROS:	EMENS/CM	AT 25 DEG	REES CE	NTIGRADE,	WATER YEAR	OCTOBER	1988 TO	SEPTEMBER	1989
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
DAY	MAX	MIN FEBRUARY		MAX	MIN MARCH		MAX					MEAN
1 2 3 4 5	1960 1980 2010 2020			2510 2520 2550 2580			920 850 780 670 610	MIN			MIN	MEAN
1 2 3 4	1960 1980 2010	FEBRUARY 1940 1950 1970	1950 1970 1990	2510 2520 2550	MARCH 2460 2500 2530	MEAN 2490 2510 2540	920 850 780 670	MIN APRIL 860 790 680 610	890 820 730 630	MAX	MIN MAY	
1 2 3 4 5 6 7 8 9	1960 1980 2010 2020 2050 2050 2070	FEBRUARY 1940 1950 1970 1990 2020 2040 2050	1950 1970 1970 1990 2000 2030 2040 2060	2510 2520 2550 2580 2590 2610 2640 2660	MARCH 2460 2500 2530 2520 2540 2580 2600 2630	MEAN 2490 2510 2540 2560 2570 2600 2620 2640	920 850 780 670 610 580 550 540 500	MIN APRIL 860 790 680 610 580 550 530 530 480	890 820 730 630 590 560 540 520 490	MAX	MIN MAY	
1 2 3 4 5 6 7 8 9 10 11 12 13 14	1960 1980 2010 2020 2050 2050 2070 2110 2130 2170 2200 2210	FEBRUARY 1940 1950 1970 1990 2020 2040 2050 2070 2120 2140 2170 2180	1950 1970 1990 2000 2030 2040 2060 2090 2120 2160 2180 2200	2510 2520 2550 2580 2590 2610 2640 2660 2670 2680 2690 2700 2700	MARCH 2460 2500 2530 2520 2540 2580 2600 2630 2650 2660 2680 2680 2670	MEAN 2490 2510 2540 2560 2570 2600 2620 2640 2660 2670 2680 2690 2690	920 850 780 670 610 580 550 540 500 480 470 440 440	MIN APRIL 860 790 680 610 580 550 530 500 480 470 440 430 430 380	890 820 730 630 590 560 540 520 490 480 450 440 420 390	MAX	MIN MAY	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	1960 1980 2010 2020 2050 2050 2070 2110 2130 2170 2200 2210 2240 2250 2270 2300 2320	FEBRUARY 1940 1950 1970 1990 2020 2040 2050 2070 2120 2140 2170 2180 2210 2220 2240 2270 2280	1950 1970 1990 2000 2030 2040 2060 2090 2120 2160 2180 2200 2220 2230 2250 2280 2290	2510 2520 2550 2580 2590 2610 2640 2660 2670 2700 2700 2700 2700 2770 2760	2460 2500 2500 2530 2520 2540 2580 2600 2630 2650 2680 2680 2670 2730 2720	MEAN 2490 2510 2540 2560 2570 2600 2620 2640 2660 2670 2680 2690 2750 2750	920 850 780 670 610 580 550 540 500 480 470 440 410 400 430 460 460 480	MIN APRIL 860 790 680 610 580 550 530 500 480 470 440 430 400 380 380 380 400 410 420 450	890 820 730 630 590 560 540 520 490 480 450 440 420 390 390 390 410 420 440 440 460	MAX	MIN MAY 700 720 720	 720 720 720
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 3 24	1960 1980 2010 2020 2050 2050 2070 2110 2130 2170 2200 2210 2240 2250 2270 2300 2320 2340 2370 2380 2380 2430	FEBRUARY 1940 1950 1970 1990 2020 2040 2050 2070 2120 2140 2170 2180 2210 2220 2240 2250 2270 2280 2290 2340 2350 2350 2390	1970 1970 1970 2000 2040 2040 2060 2090 2120 2160 2180 2220 2230 2250 2230 2250 2230 2250 2230 2250 2230 2250 2230 2250 2230 2250 2270 2370 2370 2370 2370 2410	2510 2520 2550 2580 2590 2610 2640 2660 2670 2700 2700 2700 2700 2700 270	MARCH 2460 2500 2520 2540 2580 2600 2630 2650 2660 2680 2670 2730 2720 2620 2380 2180 2000 1830	MEAN 2490 2510 2540 2560 2570 2620 2640 2660 2670 2680 2690 2750 2750 2670 2480 2260 2180 1890	920 850 780 670 610 580 550 540 480 470 440 410 400 430 480 520 550 580 600 600 620	MIN APRIL 860 790 680 610 580 550 530 500 480 470 440 430 400 380 380 380 400 410 420 450 480 510 550 570 600	890 820 730 630 590 560 540 520 490 480 450 440 420 390 390 390 410 420 440 460 500 530 590 610	MAX	MIN MAY	 720 720 720 730 740 750 760 760 760 780 780 780
1 2 3 4 5 6 7 8 9 10 11 23 14 5 16 17 8 19 20 21 22 34 25 26 27 28 29 30	1960 1980 2010 2020 2050 2070 2110 2130 2170 2200 2210 2240 2250 2270 2380 2380 2380 24380 2450 2470 2490 2500	FEBRUARY 1940 1950 1970 1990 2020 2040 2050 2070 2120 2140 2210 2220 2240 2270 2280 2270 2280 2290 2340 2350 2360 2390 2420 2450 2450 2450 2480	2030 2040 2040 2060 2090 2120 2160 2180 2220 2230 2250 2250 2250 2250 2270 2370 2410 2430 2470 2480 2470 2480	2510 2520 2550 2580 2590 2610 2640 2660 2670 2700 2700 2700 2700 2700 2710 2750 2150 2150 2160 1950 1780	2460 2500 2520 2520 2540 2580 2600 2630 2650 2680 2670 2720 2620 2380 2180 2000 1830 1660 1500 1190 1100	MEAN 2490 2510 2540 2560 2570 2620 2640 2660 2670 2680 2690 2690 2750 2750 2750 2750 2180 1150 1150 11060	920 850 780 670 610 580 550 540 500 480 470 440 440 430 460 480 520 550 580 610 580 560 610	MIN APRIL 860 790 680 610 580 550 530 500 480 470 440 430 380 380 400 410 420 450 480 510 550 570 600 570 550 540 ——————————————————————————————	890 820 730 630 590 560 520 490 480 450 440 420 390 390 410 420 440 460 500 560 590 610 600 560 550 560 550 560 560 560 560 56	MAX	MIN MAY	 720 720 730 740 750 750 760 760 760 780 760

06470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED

SPECIFIC CONDUCTANCE. MICROSIEMENS/CM AT 25 DECEMBER CENTUCANE WATER VEAR OCTOBER 1000 TO SERVICE ACCURATE

SPECI	FIC COND	UCTANCE,	MICROSI	EMENS/CM	AT 25	DEGREES	CENTIGRADE,	WATER YEAR	OCTOBER	1988 TO	SEPTEMBER	1989
DAY	MAX	MIN	MEAN	MAX	MI	N MEA	N MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JUL	Y		AUGUST			SEPTEMBER	
1	860	670	820	960	94	0 960				1050	1010	1030
2	860	700	840	980	94			980	990	1060	1030	1050
3	840	650	810	980	94			970	990	1070	1040	1060
4	860	660	820	1000	96							
5	870	680	840	1000	97			960	970	1080	1050	1060
	0,0	000	040	1000	97	0 990	990	950	970	1090	1050	1070
6	910	850	880	1020	98	0 998	3 1030	980	1010	1080	1060	1070
7	900	850	870	1020	98			1000	1020	1090	1060	1080
8	880	820	860	1040	99			1020	1040	1100	1080	1090
9	900	860	880	1030	1000					1090	1080	1080
10	890	840	880	1050	100			1000	1010	1090	1080	1080
				,			1000	1000	1010	1030	1000	1000
11	890	750	860				1020	990	1000	1090	1080	1080
12	880	860	870				1040	980	1010	1110	1080	1090
13	880	860	870					980	1010	1110	1090	1100
14	890	860	880					980	998	1130	1090	1110
15	910	860	880					980	990	1140	1110	1120
		7.7	-				1010	900	990	1140	1110	1120
16	910	880	900							1150	1110	1130
17	900	880	900					970	980			
18	920	880	900					960	990			
19	940	900	920					960	980			
20	940	910	930					950	980			
			,,,,				900	950	900		375	
21	940	910	920				980	950	980			
22	950	910	930				1010	950	1010			
23	950	910	930									
24	940	920	930				980	950	960			
25	940	920	930				980	950	960			
26	950	920	930				4000	000	000			
27	960	920	940					960	980			
28	960			4070			,,,	980	980			
29		920	940	1030	990			940	960			
	970	920	950	1030	990			920	940			
30	980	940	960	1020	996			940	960			
31				1040	1000	1020	1020	980	1000			
MONTH	980	650	890								122	
a punctured			-20									

PH (STANDARD UNITS), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

			· · · (DIAM	DAND UNII	D), WALER	IEAR OCI	OBER 1900	10 SEPIE	MDEK 1909			
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCT	OBER	NOV	EMBER	DEC	EMBER	JANI	UARY	FEB	RUARY	МА	RCH
							•		1 00		rin.	iton
1	8.6	8.2	7.8	7.5								
2	8.5	8.3	7.8	7.6								
3	8.7	8.2	7.8	7.4								
4	8.5	8.2	7.9	7.6								
5	8.6	8.2	8.1	7.7								
-	0.0	0.2	0.1	1.1								
6	8.4	8.3	8.1	7.7								
7			8.2	7.7								
ė			8.2	7.8								
9	8.3	8.0	8.2	7.8								
10	8.7	7.8	8.0	7.6								
10	0.7	7.0	0.0	7.0								
11	8.5	8.3	7.9	7.6								
12	8.7	8.2	7.8	7.6								
13	8.6	8.3	7.8	7.6								
14	8.5	8.3	8.0	7.6								
15	8.6	8.3	8.0	8.0								
1)	0.0	0.5	0.0	0.0								
16	8.3	8.2	8.0	7.6								
17	8.5	8.2		7.0								
18	8.5	8.0										
19												
20												
20												
21	8.0	7.9										
22	8.2	7.9										
23	8.3	7.8										
24	8.2	7.7										
25	8.2	7.7										
25	0.2	1.1										
26	7.9	7.7										
27	7.8	7.7										
28	7.8											
		7.5										
29	7.8	7.6										
30	7.8	7.7										
31	7.9	7.6										
MONTH							7454					
11011111												

> 06470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED PH (STANDARD UNITS), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

		F	H (STANDA	RD UNITS), WATER	YEAR O	CTOBER 1988	TO SEP	LEWRER 1888			
DAY	XAM	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APR	IL	MAY		JU	NE	JU	ILY	AUGUS	ST	SEP	rember
1 2 3 4 5	=======================================	=======================================	=	===	8.3 8.3 8.4 8.8	6.9 7.2 6.8 7.0 7.2	9.6 9.0 8.9 9.0 9.1	8.9 8.9 8.9 9.0	9.3 9.2 9.2 9.3	8.9 8.9 8.8 8.8	8.7 8.7 8.6 8.6 8.7	8.4 8.4 8.3 8.2 8.3
6 7 8 9	===	=======================================	===		8.8 8.3 8.3 9.6 9.2	8.1 8.2 8.0 8.1 8.1	9.1 9.2 9.4 9.3 9.3	9.0 9.2 9.2 9.2	9.2 9.4 9.3 9.4	9.0 9.0 9.0 9.1 9.1	8.5 8.4 8.6 8.6 8.6	8.3 8.2 8.2 8.5 8.5
11 12 13 14 15	===	==	=	===	8.3 8.2 8.6 8.9	8.2 8.2 8.3 8.2	=	===	9.4 9.3 9.3 9.2 9.4	9.0 8.9 8.8 8.9 8.8	8.7 8.8 8.7 8.6 8.5	8.5 8.6 8.4 8.3 8.2
16 17 18 19 20	===	===	8.5 8.4 8.4 8.4	8.1 8.2 8.2 7.7	8.7 8.6 8.6 8.5 8.4	8.3 8.4 8.4 8.4	=	=======================================	9.2 9.2 9.2 9.1 9.2	9.0 8.8 8.5 8.6 8.8	8.3 8.2 8.1 8.1 8.2	8.1 7.8 7.8 7.6 7.7
21 22 23 24 25	===	=======================================	8.0 8.5 8.1 8.0 8.0	7.4 7.2 7.3 7.6 7.6	8.5 8.4 8.5 8.9 8.7	8.4 8.4 8.6 8.6		=======================================	9.1 9.2 9.2 9.1	8.6 8.5 8.5 8.7	8.4 8.7 8.5 8.4 8.3	7.9 8.1 8.1 8.0 8.0
26 27 28 29 30 31	=======================================	==	8.0 7.9 8.0 8.0 8.8 8.4	7.1 7.2 6.8 6.8 6.9 7.1	8.8 8.8 8.8 8.9	8.6 8.7 8.8 8.8	9.2 9.2 9.1 9.1	8.8 8.9 8.9 8.9	9.0 9.0 9.0 8.9 8.7 8.7	8.7 8.8 8.6 8.6 8.5 7.6	8.3 8.1 7.8 7.7 8.0	7.9 7.7 7.6 7.6 7.7
MONTH											8.8	7.6
		WATER TEM	PERATURE,	DEGREES	CELSIUS,	WATER	YEAR OCTOBE	R 1988	TO SEPTEMBER	1989		
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER		1	NOVEMBER		D	ECEMBER	l		JANUARY	
1 2 3 4 5	14.6 13.3 12.0 9.8 11.6	11.3 10.7 8.6 6.4 6.3	12.8 12.0 10.6 8.0 8.6	6.2 5.5 5.2 5.8 5.0	2.6 2.4 2.8 4.6 2.4	4.3 4.1 4.3 5.2 3.6	2.2 2.3 2.3 2.2 2.3	1.8 1.8 1.8 1.8	2.0 2.0 2.1 2.0 1.9	2.0 1.5 1.8 1.7 1.5	1.5 1.4 1.5 1.4	1.6 1.5 1.7 1.5
6 7 8 9	11.9 12.9 11.8	7.3 9.3 9.4	9.4 11.2 10.6	3.8 5.2 4.4 5.1 2.8	1.5 2.3 2.2 2.8 1.1	2.6 3.7 3.4 3.6 1.7	2.2 2.6 2.1 2.1 2.3	1.8 2.0 1.6 1.6	2.0 2.2 1.8 1.8 2.1	1.6 1.8 1.6 1.6	1.4 1.1 1.3 1.4	1.5 1.5 1.4 1.5
11 12 13 14 15	11.7 12.3 13.0 16.4 14.7	7.8 7.2 7.1 9.6 12.3	8.9 9.4 9.8 12.6 13.2	3.0 4.0 4.4 3.1	1.5 1.6 2.1 1.5	2.5 3.0 3.0 2.0	2.3 2.2 2.4 2.6 2.6	1.8 1.7 2.0 2.0 1.8	2.1 2.0 2.0 2.3 2.4	1.7 1.6 1.7 1.6	1.4 1.5 1.5 1.4 1.0	1.6 1.5 1.6 1.5
16 17 18 19 20	12.8 11.8 9.7 8.0 8.6	10.5 9.3 7.5 5.8 6.0	11.7 10.4 8.6 7.0 7.1	1.2 1.6 1.9	.7 1.1 1.4	1.0 1.3 1.7	2.4 2.6 2.6	1.9 2.0 2.3	2.1 2.3 2.4	1.8 1.9 2.2 1.8	1.3 1.6 1.1 1.4	1.5 1.8 1.6 1.6
21 22 23 24 25	9.3 7.9 6.4 5.7 4.5	6.7 4.3 3.2 1.8 2.3	8.0 6.3 4.4 3.7 3.5	1.8	1.5 1.1	1.6	2.6 2.7 2.5 2.6 2.4	2.2 2.1 2.0 2.0 2.0	2.3 2.5 2.2 2.3 2.3	2.1 2.2 2.1 2.1 2.2	1.6 1.8 1.9 1.8 2.0	1.8 1.9 2.0 1.9 2.1
26 27 28 29 30 31	5.2 4.8 3.1 4.4 5.5	2.7 .6 2.0 2.8 3.2	3.7 2.9 2.6 3.5 4.1	1.7 2.1 2.0 2.0	1.1 1.6 1.8 1.8	1.4 1.9 1.9 1.8	2.0 2.0 2.1 2.0 2.1 2.0	1.5 1.8 1.9 1.9	1.8 1.9 2.0 2.0 2.0	2.2 2.2 2.2 2.4 2.5 2.4	2.0 1.9 1.9 2.0 2.2 1.8	2.0 2.0 2.0 2.1 2.3 2.1

MONTH

O6470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN FEBRUARY	MEAN	MAX	MIN	MEAN	MAX	MIN APRIL	MEAN	MAX	MIN	MEAN
1 2 3 4 5	2.2 2.1 2.0 1.8	1.7 1.9 1.7 1.6	2.0 2.0 1.9 1.7	1.4 1.4 1.3 1.1	1.1 1.2 1.0 .9	1.3 1.3 1.2 1.0	1.0 .6 .4 .7	.3 .2 .1 .0	.6 .4 .2 .3	=	=	=======================================
6 7 8 9	1.8 1.7 1.8	1.4 1.3 1.4 1.4	1.6 1.5 1.5 1.6	1.2 1.2 1.2 1.2 1.6	1.0 1.0 .8 .8 1.0	1.0 1.1 1.1 1.0 1.2	.5 .4 .8 .8	.1 .0 .0	.3 .2 .4 .4	=	=	===
11 12 13 14 15	1.8 1.6 1.6 1.7	1.5 1.2 1.3 1.4 1.4	1.6 1.4 1.4 1.5	1.6 1.8 1.6	1.3 1.5 1.4 1.0	1.5 1.6 1.6 1.4	1.2 3.0 2.8 4.6 7.2	.2 .4 1.2 .8 3.0	.6 1.4 1.8 2.5 4.8	=	=	
16 17 18 19 20	1.5 1.4 1.3 1.1	1.4 1.3 .8 .8	1.4 1.4 1.1 1.0	.4 .5 .5	.1 .2 .3	.3	7.8 7.2 9.3 12.4 13.6	6.0 4.6 5.5 7.4 10.0	7.0 6.1 7.3 9.6 11.6	19.5 20.0 19.3 18.1	17.8 17.9 15.8 14.6	18.6 18.9 18.0 16.5
21 22 23 24 25	1.1 1.0 1.1 1.3	.8 .7 1.0	1.0 .9 1.0 1.0	.3 .4 .5	.1 .1 .2 .1	.2 .2 .3	14.2 16.2 16.3 17.7 16.5	10.8 12.2 14.0 14.8 13.8	12.6 14.0 15.1 16.0 15.0	19.8 20.2 22.6 21.1 17.2	15.6 16.2 17.6 17.0 14.3	17.6 18.9 20.1 19.3 15.7
26 27 28 29 30 31	1.4 1.3 1.4	1.1 1.1 1.2	1.2 1.2 1.2	.4 .4 .5 .6 .4	.0 .2 .1 .2 .2	.2 .3 .4 .3	15.0 11.9 	11.9 9.6 	13.2 10.5 	14.6 17.2 19.7 17.8 14.2 14.7	10.3 11.4 12.7 12.2 11.0	13.2 14.8 16.1 15.2 13.2
MONTH												
		WATER TEM	PERATURE,	DEGREES	CELSIUS,	WATER	YEAR OCTO	BER 1988	TO SEPTE	MBER 1989		
DAY	MAY											
	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	MAX	MIN JUNE		MAX	JULY		MAX	MIN AUGUST	MEAN		SEPTEMBE	R
1 2 3 4 5	17.7 18.8 19.8 21.6 20.3		14.7 16.6 17.5 18.1 18.0	28.5 29.5 30.0 29.0 28.3		27.2 26.9 26.4 27.0 26.8	28.5 31.2 27.5 25.5		MEAN 26.4 27.5 26.3 23.3			
2 3 4	17.7 18.8 19.8 21.6	JUNE 10.3 12.2 13.2 13.8	14.7 16.6 17.5 18.1	28.5 29.5 30.0 29.0	JULY 25.6 25.2 24.4 25.0	27.2 26.9 26.4 27.0	28.5 31.2 27.5	AUGUST 24.3 24.9 25.4	26.4 27.5 26.3	22.0 22.2 21.8 21.9	17.0 18.6 18.7 18.8	19.3 20.3 19.9 20.4
2 3 4 5 6 7 8 9 9	17.7 18.8 19.8 21.6 20.3 25.0 20.5 17.9 23.0	JUNE 10.3 12.2 13.2 13.8 17.8 17.8 17.5 15.1	14.7 16.6 17.5 18.1 18.0 20.6 19.2 16.5 18.5	28.5 29.5 30.0 29.0 28.3 27.4 26.6 30.4 28.0	JULY 25.6 25.2 24.4 25.0 24.9 25.1 23.7 22.4 24.9	27.2 26.9 26.4 27.0 26.8 26.3 25.3 25.9 25.9	28.5 31.2 27.5 25.5 21.7 22.2 28.0 27.4	AUGUST 24.3 24.9 25.4 20.8 18.4 18.6 19.2 10.8	26.4 27.5 26.3 23.3 20.2 19.9 22.7 24.4	22.0 22.2 21.8 21.9 22.8 22.3 21.8 20.4 18.6	17.0 18.6 18.7 18.8 18.0 19.8 18.9 18.6 15.7	19.3 20.3 19.9 20.4 20.4 20.9 20.3 19.4 16.8
2 3 4 5 6 7 8 9 10 11 12 13 14	17.7 18.8 19.8 21.6 20.3 25.0 20.5 17.9 23.0 22.3 21.3 20.0 16.5 17.4	JUNE 10.3 12.2 13.2 13.8 13.8 17.8 17.8 17.5 14.1 17.8	14.7 16.6 17.5 18.1 18.0 20.6 19.2 16.5 18.5 20.0 20.1 18.4 15.1	28.5 29.5 30.0 29.0 28.3 27.4 26.6 30.4 28.0 28.9	JULY 25.6 25.2 24.4 25.0 24.9 25.1 23.7 22.4 24.9 23.0	27.2 26.9 26.4 27.0 26.8 25.3 25.9 25.9 25.6	28.5 31.2 27.5 25.5 21.7 22.2 28.0 27.4 25.2 25.6 29.4 27.8 24.4	AUGUST 24.3 24.9 25.4 20.8 18.4 18.6 19.2 10.8 21.8 21.2 22.6 22.8 20.8	26.4 27.5 26.3 23.3 20.2 19.9 22.7 24.4 23.1 23.5 25.0 24.8 21.9	22.0 22.2 21.8 21.9 22.8 22.3 21.8 20.4 18.6 15.7 14.1 13.5 17.5	17.0 18.6 18.7 18.8 18.0 19.8 18.9 18.6 15.7 14.1 11.8 10.5 11.2	19.3 20.3 19.9 20.4 20.4 20.9 20.3 19.4 16.8 14.7
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 19	17.7 18.8 19.6 20.3 25.0 20.5 17.9 23.3 20.0 16.5 17.4 23.3 22.8 21.4 22.8 21.4	JUNE 10.3 12.2 13.8 13.8 17.8 17.8 17.1 15.1 17.8 17.2 16.2 13.0 15.5	14.7 16.6 17.5 18.1 18.0 20.6 19.2 16.5 18.5 20.0 20.1 18.4 15.1 15.0 17.2 21.3 19.5 19.5 19.8 22.8	28.5 29.5 30.0 29.0 28.3 27.4 26.6 30.4 28.0 28.9	JULY 25.6 25.2 24.4 25.0 24.9 25.1 23.7 22.4 24.9 23.0	27.2 26.9 26.4 27.0 26.8 25.3 25.3 25.9 25.6	28.5 31.2 27.5 25.5 21.7 22.2 28.0 27.4 25.2 25.6 29.4 27.8 24.4 24.4	AUGUST 24.3 24.9 25.4 20.8 18.4 18.6 19.2 10.8 21.8 21.8 21.8 22.6 22.8 20.8 18.8 16.6 20.6 20.0 21.5	26.4 27.5 26.3 23.3 20.2 19.9 22.7 24.4 23.1 23.5 25.0 24.8 21.9 20.9 22.6 22.6 22.7	22.0 22.2 21.8 21.9 22.8 20.4 18.6 15.7 14.1 13.5 17.5 18.8 17.5 18.8 22.4 21.2 22.2	17.0 18.6 18.7 18.8 18.0 19.8 18.9 18.6 15.7 14.1 11.8 10.5 11.2 11.3 13.0 14.8 16.8 17.9	19.3 20.3 19.9 20.4 20.4 20.3 19.4 16.8 14.7 12.7 13.8 15.5 16.8 19.6 19.7
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	17.7 18.8 19.6 20.3 25.0 20.5 17.9 22.3 21.3 20.0 16.5 17.4 23.3 22.8 21.8 26.2 24.9 23.0 22.4 23.0	JUNE 10.3 12.2 13.8 17.8 17.8 17.5 15.1 17.8 17.5 14.2 13.0 15.5 19.4 18.5 17.9 21.4 18.5 17.9 19.5	14.7 16.6 17.5 18.1 18.0 20.6 19.2 16.5 20.0 20.1 18.4 15.1 15.0 21.3 19.8 22.9 20.4 18.9 20.1	28.5 29.5 30.0 29.0 28.3 27.4 26.6 30.4 28.9	JULY 25.6 25.2 24.4 25.0 24.9 25.1 23.7 22.4 24.9 23.0	27.2 26.9 26.4 27.0 26.8 25.3 25.9 25.9 25.6	28.5 31.2 27.5 25.5 21.7 22.2 28.0 27.4 25.2 25.6 29.4 27.8 24.4 24.4 24.4 25.3 24.4 24.1 24.2 25.3	AUGUST 24.3 24.9 25.4 20.8 18.4 18.6 19.2 10.8 21.8 21.2 22.6 22.8 20.8 18.8 16.6 20.0 21.5 20.8 21.2 21.2 21.2	26.4 27.5 26.3 23.3 20.2 19.9 22.7 24.4 23.1 23.5 25.0 24.8 21.9 20.9 22.6 22.7 22.6 22.7 24.4	22.0 22.2 21.8 21.9 22.8 21.8 20.4 18.6 15.7 14.1 15.8 17.5 18.8 17.5 18.8 22.2 20.0 17.8 21.2 21.2 21.2	SEPTEMBE 17.0 18.6 18.7 18.8 18.0 19.8 18.9 18.6 15.7 14.1 11.8 10.5 11.2 11.3 13.0 14.8 16.9 17.9 17.9 17.8	19.3 20.3 19.9 20.4 20.4 20.3 19.48 14.7 12.7 13.8 15.5 16.8 19.6 19.7 18.5 15.8 12.5 11.6

O6470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED OXYGEN DISSOLVED (Mg/L), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

		OX	YGEN DISS	OLVED (MG	/L), WAT	ER YEAR	OCTOBER 19	88 TO SE	PTEMBER	1989		
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER	3		JANUARY	
1	9.2											
2	5.1	3.5 3.5	4.6 3.7	11.1	3.8 5.4	5.3 8.3						
3	13.4	3.5 3.6	7.8 3.8	11.9 13.2	5.0	6.8						
5	5.2	3.6	3.8	15.2	3.8 12.9	8.1 14.2						
6	5.4	3.5	3.8	14.8	5.1	10.0						
7				14.1	4.3	7.6						
8	9.6	3.6	4.6	10.8 14.8	3.9 4.9	7.0 9.1						
10	13.0	3.6	7.2	15.1	6.4	12.1						
11	5.3	3.6	3.7	17.4	6.3	11.1						
12	10.7	3.6	6.0	14.3	5.3	8.7						
13 14	9.3	3.6 3.5	6.0 3.7	14.2 15.4	7.5 9.6	10.7						
15	4.7	3.5	3.6	16.2	13.5	14.9						
16	3.9	3.5	3.6	16.6	8.5	13.8						
17	11.2	3.6	6.2									
18 19	11.9	3.6 3.7	5.1 3.8	12.9	8.4 7.6	9.1 8.4						
20	8.2	3.7	5.1	10.0	7.5	8.2						
21	6.6	3.6	4.3	10.5	8.2	8.7						
22	11.5	3.7	7.0									
23 24	14.7	5.2 3.8	11.2 6.3									
25	14.4	3.8	8.1									
26	11.3	3.8	5.1									
27	15.7	3.8	12.6									
28 29	15.7 8.4	5.7 3.9	10.5 5.4									
30	10.4	3.8	6.1									
31	13.0	3.9	7.2									
MONTH												
		OX	YGEN DISS	OLVED (MG	/L). WAT	ER YEAR	OCTOBER 19	88 TO SE	EPTEMBER	1989		
DAY	MAY						OCTOBER 19				MTN	MEAN
DAY	MAX	MIN	MEAN	SOLVED (MG MAX	MIN	ER YEAR (OCTOBER 19	MIN	MEAN	1989 MAX	MIN	MEAN
DAY	MAX		MEAN								MIN MAY	MEAN
1		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	
1 . 2		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	
1 2 3 4		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	
1 2 3	==	MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	===
1 2 3 4 5	=	MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	=======================================
1 2 3 4 5		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	=======================================
1 2 3 4 5		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	=======================================
1 2 3 4 5 6 7 8		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	
1 2 3 4 5 6 7 8 9		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	
1 2 3 4 5 6 7 8 9 10 11 12		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	
1 2 3 4 5 6 7 8 9 10 11 12 13		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	
1 2 3 4 5 6 7 8 9 10 11 12		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	
1 2 3 4 5 6 7 8 9 0 11 12 3 14		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	
1 2 3 4 5 6 7 8 9 0 11 2 3 1 4 5 1 6 1 7 1 7 1 6 1 7		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY 6.1	
1 2 3 4 5 6 7 8 9 10 11 23 14 5 16 7 18		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	
1 2 3 4 5 6 7 8 9 0 11 2 3 1 4 5 1 6 1 7 1 7 1 6 1 7		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL	MEAN	MAX	MAY	 8.3
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL 9.1 10.4 15.1 8.8	MEAN	MAX 10.7 10.3 10.0 10.2	MAY 6.1 7.8 5.9 7.7 7.8	 8.3 9.0 8.1 9.0
1 2 3 4 5 6 7 8 9 10 11 23 14 5 16 17 18 9 20 21 22		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX >20.0 >20.0 >20.0 >20.0	MIN APRIL	MEAN	MAX 10.7 10.0 10.2 10.7 16.3	MAY 6.1 7.8 5.9 7.7 7.8	8.3 9.0 9.2 8.8
1 2 3 4 5 6 7 8 9 9 10 11 2 3 14 5 16 7 18 9 20 1 22 3		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL 9.1 10.4 15.1 8.8	MEAN	MAX 10.7 10.3 10.0 10.2	MAY 6.1 7.8 5.9 7.7 7.8	 8.3 9.0 8.1 9.0
1 2 3 4 5 6 7 8 9 10 11 21 3 14 5 16 17 8 9 20 21 22		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL 9.1 10.4 15.1 8.8 9.2 7.4	MEAN 14.7 18.3 >20.0 >20.0 >20.0 >20.0	MAX 10.7 10.3 10.0 10.2 10.7 16.3 11.2	MAY	8.3 9.0 8.1 9.2 8.8 9.1
1 2 3 4 5 6 7 8 9 10 11 2 3 14 5 16 17 8 9 20 1 2 2 3 2 4 5 2 6		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL 9.1 10.4 15.1 8.8 9.2 7.4 8.3 7.4 6.9	MEAN 14.7 18.3 >20.0 >20.0 >20.0 >20.0 >20.0 >20.0 >20.0 >20.0	MAX 10.7 10.3 10.0 10.2 10.7 16.3 11.2 12.7 16.5	MAY	8.3 9.0 8.1 9.0 9.2 8.8 9.1 10.1
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 32 42 5 26 27		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL 9.1 10.4 15.1 8.8 9.2 7.4 8.3 7.4 6.9 9.2	MEAN 14.7 18.3 >20.0 >20.0 >20.0 >20.0 >20.0 >20.0 >20.0 >20.0	MAX 10.7 10.3 10.0 10.2 10.7 16.5 15.3 19.9	MAY 6.1 7.8 5.9 7.7 7.8 7.5 6.8 8 9.0	 8.3 9.0 8.1 9.0 9.2 8.8 9.1 10.1 10.6
1 2 3 4 5 6 7 8 9 0 11 21 3 4 5 16 7 8 9 0 11 21 3 4 5 22 3 4 5 26 7 8 9 0 12 23 4 5 26 7 28		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL 9.1 10.4 15.1 8.8 9.2 7.4 8.3 7.4 6.9	MEAN 14.7 18.3 >20.0 >20.0 >20.0 >20.0 >20.0 >20.0 >20.0 >20.0	MAX 10.7 10.3 10.0 10.2 10.7 16.3 11.2 12.7 16.5	MAY	8.3 9.0 8.1 9.0 9.2 8.8 9.1 10.1 10.6
1 2 3 4 5 6 7 8 9 10 11 2 3 4 5 16 7 8 9 10 11 2 13 4 5 16 7 8 9 20 21 22 3 4 2 5 2 6 2 7 8 9 3 0		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL 9.1 10.4 15.1 8.8 9.2 7.4 8.3 7.4 6.9 9.2	MEAN 14.7 18.3 >20.0 >20.0 >20.0 >20.0 >20.0 >20.0 >20.0 >20.0	MAX 10.7 10.3 10.0 10.2 10.7 16.5 15.3 19.9 18.3 19.9 18.4 14.4	MAY	8.3 9.0 8.1 9.0 9.2 8.8 9.1 10.1 10.6 13.8 13.4 13.6 13.2
1 2 3 4 5 6 7 8 9 0 11 12 3 14 5 16 7 18 9 0 11 22 3 24 5 26 7 8 29		MIN FEBRUAR	MEAN Y	MAX	MIN MARCH	MEAN	MAX	MIN APRIL 9.1 10.4 15.1 8.8 9.2 7.4 8.3 7.4 6.9 9.2	MEAN 14.7 18.3 >20.0 >20.0 >20.0 >20.0 >20.0 >20.0 >20.0	MAX 10.7 10.3 10.0 10.2 10.7 16.3 11.2 12.7 16.5	MAY	8.3 9.0 8.1 9.0 9.2 8.8 9.1 10.1 10.6

> Actual value is known to be greater than the value shown

348

JAMES RIVER BASIN

O6470875 JAMES RIVER AT DAKOTA LAKE DAM NEAR LUDDEN, ND--CONTINUED

OXYGEN DISSOLVED (Mg/L), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBE	R
1 2 3 4 5	17.6 16.2 17.6 >20.0 19.8	12.0 10.4 12.5 12.8 10.1	14.6 13.6 15.1 15.8 13.6	===	===	===	12.3 15.7 11.5 10.5	6.8 6.2 4.6 5.0	9.4 10.3 7.3 8.2	11.0 12.4 9.4 11.6 11.8	7.5 7.9 7.2 7.3 5.8	9.7 10.1 8.8 9.0 9.1
6 7 8 9	>20.0 17.7 20.0 >20.0 16.8	12.0 8.5 13.4 11.6 8.6	15.5 13.4 15.8 15.5 12.6	===	===		11.0 14.0 14.7 >20.0 11.9	6.8 6.9 8.4 8.8 7.6	9.1 9.0 10.9 11.9 9.3	11.0 11.7 11.5 11.0	4.4 7.4 8.5 9.0 9.5	7.9 9.3 9.5 10.2 10.8
11 12 13 14 15	14.1 >20.0 >20.0	4.4 5.5 13.5	9.3 13.0 17.4	==	===	=======================================	12.7 12.8 12.7 9.2 9.2	5.0 4.7 4.8 5.1 5.2	9.1 7.6 7.6 7.1 7.0	12.4 12.2 12.6 11.5 11.0	9.8 9.9 8.4 7.4 7.3	11.3 11.2 10.8 9.9 9.4
16 17 18 19 20	==	==	==	==	===	==	11.9 11.4 11.6 9.4 9.7	6.6 3.4 2.7 2.0 7.6	8.4 8.5 6.6 6.3 9.0	11.4 9.7 8.6 10.9 9.7	7.2 3.3 2.7 3.9 8.4	9.1 7.9 5.5 8.0 9.0
21 22 23 24 25	==	===	===	===	===	===	9.9 9.8 11.4 10.3	7.7 7.1 5.2 2.9	9.0 8.7 8.9 6.3	9.9 12.3 11.7 10.0 11.6	7.2 9.5 6.3 4.7 4.7	9.1 10.1 9.4 8.1 9.8
26 27 28 29 30 31	=======================================	=======================================		19.0 12.6 13.0 11.5 14.7	7.6 6.7 5.4 8.5 6.1	9.7 9.2 9.1 10.3 9.9	11.2 13.3 11.3 11.9 11.7	7.7 8.7 7.3 7.2 9.1 9.3	8.7 9.6 8.9 9.4 9.9 9.8	12.4 9.9 11.8 12.5 9.9	8.0 3.5 3.1 7.2 5.1	10.4 7.9 8.0 8.9 7.5
MONTH									-)	12.6	2.7	9.2

> Actual value is known to be greater than the value shown

06470878 JAMES RIVER AT ND-SD STATE LINE

LOCATION.--Lat 45°56'10", long 98°10'26", in SE1/4SE1/4 sec. 34, T.129 N., R.60 W., Dickey County, Hydrologic Unit 10160003, at bridge on North Dakota-South Dakota state line road 6.5 mi south, and 1 mi west from Ludden.

DRAINAGE AREA. -- 5,480 mi², approximately, revised, of which about 3,300 mi² is probably noncontributing. GAGE HEIGHT RECORDS

PERIOD OF RECORD. -- October 1981 to current year (gage heights only).

GAGE .-- Water-stage recorder. Datum of gage is 1,200 ft above National Geodetic Vertical Datum of 1929.

EXTREMES FOR PERIOD OF RECORD .-- Maximum observed, 93.60 ft, Mar. 28, 1987; minimum observed, 86.45 ft, Oct. 3, 1988.

EXTREMES FOR CURRENT YEAR .-- Maximum observed, 92.20 ft, Apr. 4; minimum observed, 86.45 ft, Oct. 3.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MEAN VALUES

					PIE	MIN VALUE	10					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1								88.75	88.56	88.20	87.78	
2								88.78	88.48	88.17	88.01	
3								88.85	88.45	88.05	87.89	
4								88.63	88.48	88.10	87.75	
5								88.70	88.49	88.27	87.63	
6								88.71	88.47	87.93	87.49	
7								88.90	88.36	87.89	87.47	
8								88.61	88.31	87.89	87.51	
9								88.74	88.42	87.77	87.54	
10								88.82	88.46	87.70	87.57	
11								89.03	88.48	87.76	87.58	
12								88.86	88.36	87.81	87.56	
13								88.68	88.32	87.76	87.52	
14								88.66	88.27	87.75	87.49	
15								88.71	88.40	87.76	87.44	
16								88.82	88.44	87.77	87.43	
17								88.84	88.39	87.84	87.49	
18								88.75	88.37	87.82	87.80	
19								88.68	88.39	87.72	87.76	87.61
20								88.72	88.54	87.72	87.54	87.48
21								88.70	88.20	87.73	87.46	87.57
22								88.66	88.28	87.73	87.45	87.60
23								88.62	88.28	87.73	87.43	87.60
24								88.56	88.27	87.75	87.49	87.75
25								88.76	88.26	87.80	87.61	87.59
26								88.52	88.26	87.74	87.51	87.46
27								88.73	88.23	87.58	87.42	87.60
28								88.74	88.25	87.51	87.53	87.60
29							88.67	88.35	88.23	87.66	87.45	87.44
30							88.68	88.37	88.13	87.64	87.42	87.49
31								88.48		87.65		
MEAN								88.70	88.36	87.81		
MAX								89.03	88.56	88.27		
MIN								88.35	88.13	87.51		

350

JAMES RIVER BASIN

06470980 JAMES RIVER NEAR HECLA, SD

LOCATION.--Lat 45°53'34", long 98°10'13", in SW1/4SE1/4SE1/4 sec. 16, T.128 N., R.61 W., Brown County, SD, Hydrologic Unit 10160003, on left bank 30 ft upstream from bridge on county road 1.0 mi northwest of Hecla, South Dakota and 3.0 mi downstream from the North Dakota - South Dakota border.

DRAINAGE AREA. -- 5,520 mi² approximately, of which about 3,300 mi² is probably noncontributing.

GAGE HEIGHT RECORDS

PERIOD OF RECORD. -- February 1982 to current year.

GAGE. -- Water-stage recorder. Datum of gage is 1200.00 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Records of stream velocity and discharge are also collected at this location. These records which have been used to supplement the discharge record for station 06740875, James River at Dakota Lake Dam near Ludden, ND are available in the files of the District office.

EXTREMES FOR PERIOD OF RECORD. -- Maximum gage height, 92.72 ft, Apr. 1, 1987; minimum, 86.15 ft, Sept. 18, 1988.

EXTREMES FOR CURRENT YEAR .-- Maximum gage height, 91.55, Apr. 7; minimum, 86.50 ft, Oct. 10.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989
MEAN VALUES

					M	EAN VALUE	S					
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	86.85	86.67	86.90	87.28				88.65	88.44	88.04	87.63	87.14
2	86.73	86.83	86.91	87.28				88.66	88.40	88.04	87.74	87.21
3	86.71	86.73	86.92	87.28		87.51	91.01	88.70	88.37	87.94	87.69	87.27
4	86.63	86.66	86.92	87.28		87.53	91.35	88.61	88.38	87.94	87.60	87.22
5	86.78	86.78	86.93	87.28		87.54	91.48	88.71	88.39	88.02	87.53	87.23
6	86.82	86.78	86.94	87.29		87.55	91.51	88.65	88.35	87.87	87.38	87.32
7	86.89	86.79	86.95	87.34		87.55	91.52	88.73	88.34	87.78	87.44	87.16
8	86.80	86.83	86.96	87.35		87.55	91.47	88.55	88.28	87.77	87.46	87.12
9	86.75	86.76	86.96	87.34		87.56	91.24	88.59	88.32	87.72	87.45	87.11
10	86.66	86.69	86.98	87.34		87.57	90.90	88.63	88.32	87.65	87.46	87.12
11	86.63	86.82	86.99	87.38		87.58	90.64	88.74	88.33	87.67	87.45	87.19
12	86.72	86.93	87.01	87.39		87.61	90.38	88.67	88.34	87.73	87.42	87.14
13	86.88	86.91	87.01	87.40		87.65	90.14	88.56	88.29	87.68	87.39	87.19
14	86.79	86.73	87.03	87.40		87.76	90.00	88.56	88.24	87.68	87.30	87.23
15	86.72	86.75	87.02	87.41		87.88	89.71	88.58	88.29	87.66	87.33	87.20
16	86.69	86.85	87.03	87.40		88.05	89.66	88.63	88.29	87.67	87.34	87.16
17	86.63	86.91	87.03	87.40		88.33	89.49	88.66	88.28	87.69	87.39	87.15
18	86.66	86.88	87.04	87.39		88.87	89.31	88.61	88.26	87.69	87.56	87.48 87.23
19	86.69	86.89	87.04	87.40		89.39	89.17	88.58	88.24	87.64	87.55	87.06
20	86.85	86.89	87.05	87.40			89.00	88.61	88.32	87.65	87.31	
21	86.68	86.89	87.05	87.40			88.77	88.57	88.18	87.63	87.33	87.28
22	86.76	86.89	87.06	87.40			88.81	88.55	88.18	87.63	87.32	87.47
23	86.72	86.88	87.08	87.41			88.67	88.51	88.18	87.60	87.31	87.40
24	86.60	86.89	87.08	87.42			88.58	88.50	88.16	87.61	87.36	87.57
25	86.60	86.89	87.08	87.42			88.36	88.66	88.16	87.62	87.42	87.29
26	86.63	86.89	87.14	87.42			88.41	88.47	88.17	87.57	87.26	87.20
27	86.81	86.90	87.22	87.43			88.23	88.54	88.13	87.43	87.22	87.43
28	86.65	86.89	87.25	87.44			88.41	88.58	88.10	87.40	87.32	87.25
29	86.68	86.89	87.27	87.44			88.61	88.32	88.11	87.57	87.26	87.08
30	86.69	86.89	87.27	87.45			88.60	88.34	88.03	87.56	87.20	87.33
31	86.71		87.27	87.46				88.40		87.57	87.14	
MEAN	86.72	86.83	87.04	87.38				88.58	88.26	87.70	87.41	87.24
MAX	86.89	86.93	87.27	87.46				88.74	88.44	88.04	87.74	87.57
MIN	86.60	86.66	86.90	87.28				88.32	88.03	87.40	87.14	87.06

06470980 JAMES RIVER NEAR HECLA, SD--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD. -- Water years 1985 to current year.

DATE	TIME	CHAR INS CUE FE PE	ST. BIC EET ER COND (SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND ARD UNITS) (00400	- A7	MPER- TURE AIR EG C)	TEME ATU WAT (DEC	RE CER C)	TUR- BID- ITY (NTU) (00076)	OXYG DI SOL (MG (003	EN, S- /ED /L)	DXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)	HARD- NESS TOTAL (MG/L AS CACO3 (00900	CA I	ALCIUM DIS- SOLVED (MG/L AS CA)
JAN 04	1230			1800	7.2	0	-2.0		0.5	3.2		2.3	16	53	io -	100
FEB 28	1330		22	2800	7.4		-10.0		0.0	6.8		4.0	27	100	0 .	190
APR 04	1230	1340)	260	7.0		5.0		0.5	16		2.0	81		8	21
MAY 16		1540								11		9.5	103	24		52
10	1300			730	8.3	U	25.0	-	20.0	34						72
DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODI DIS SOLV (MC AS (OOS	S- /ED G/L NA) F	SODIUM PERCENT (00932)	SODIU AD- SORP- TION RATIO (00931	M 2 I SC (N)	OTAS- SIUM, DIS- DLVED MG/L S K) D935)	AS	TY B J/L S(03)	SULFATE DIS- SOLVED (MG/L AS SO4)	DIS- SOL' (MG AS	O- I E, / VED /L CL)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS SUM OF CONSTI TUENTS DIS- SOLVE (MG/I (70301	, so	OLIDS, DIS- SOLVED (TONS PER AC-FT) 70303)
JAN		0.00		3/2				22.					40.00			1.60
O4 FEB	68	190		43	4		18	351		480	93		1240	116		1.69
28 APR	130	290)	38	4	2	26	709		720	150		2020	194	.0	2.75
04 MAY	8.6	16	5	26	0.	8	9.1	81		37	8	.7	156	15	3	0.21
16	27	58	3	33	2	1	13	215		130	26		464	43	5	0.63
DATE	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	RESI TOTA AT DEG. SUS PENI (MC	AL 105 N . C, S- DED G/L)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO GEN, NITRIT TOTAL (MG/L AS N) (00615	E I SO	ITRO- GEN, TRITE DIS- DLVED MG/L S N) D613)	NIT GE NO2+ TOT (MC AS (OO6	NO3 CAL S/L N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NIT GE AMMO TOT (MG AS	N, NIA AL /L N)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO GEN, AM MONIA ORGANI TOTAL (MG/L AS N) (00625	I- GI + MC C OI	NITRO- EN, AM- ONIA + RGANIC DIS. (MG/L AS N) 00623)
JAN 04	0.0		5		-	- <0	0.010			<0.100			0.470		_	2.4
FEB 28	0.0		3		_	- (0.010			<0.100			2.10		_	4.0
APR 04	564	4	14	0.550	0.05	0 (0.040	0.	600	0.590	0.	460	0.450	1.9		1.3
MAY 16	0.0		<1		0.02	0 <0	0.010	<0.	100	<0.100	0.	030	0.010	1.0		0.90
D.17	PHOP TOT (MC	ROUS PAL P)	PHOS- PHOROU DIS- SOLVE (MG/I AS P)	JS PHOR ORT ED TOT (MG) AS	S- PH US, O HO, D AL SO /L (M P) AS	HOS- OROUS RTHO, IS- LVED G/L P)	PHO PHOR ORGA TOT (MG AS	NIC AL AL P)	ARSE TOT (UG AS	NIC I AL SO /L (U AS) AS	SENIC DIS- DLVED JG/L S AS)	BORON DIS- SOLVI (UG/I AS B	- REC ED ERA L (UG) AS	AL CA COV- BLE S /L (CD) A	DMIUM DIS- SOLVEI UG/L S CD	D)
JAN	E (006	107)	(00666	5) (705	07) (0	0671)	(006	(0)	(010	02) (0	1000)	(01020	0) (010	121) (0	1025	
04 FEB			0.13	30		0.099					2	3	50	77	<	1
28 APR			0.43	30		0.174					3	5	30		<10)
O4	0.	350	0.26	50 0.	256	0.232	0	.09		2	2		60	1	<	1
16	0.	190	0.09	50 0.	104	0.035	0	.09		3	3	2	10	<1	<	1

06470980 JAMES RIVER NEAR HECLA, SD--CONTINUED

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, 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 DIS- SOLVED (UG/L AS HG) (71890)	SELE- NIUM, TOTAL (UG/L AS SE) (01147)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	ZINC, DIS- SOLVED (UG/L AS ZN) (01090)
JAN 04	3		15	<5		1400	0.4	222	<1	11
FEB)		15	(5		1400	0.4			
28 APR	<1		60	<5		8500	0.3	-	<1	30
04	6	1500	120	<5	220	87	0.4	<1	<1	22
MAY 16	<3	330	5	<1	450	64	0.2		<1	7
				G!!! OD 4	GUIL OD D				CERT	CED
DATE	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CYANIDE TOTAL (MG/L AS CN) (00720)	CYANIDE DIS- SOLVED (MG/L AS CN) (00723)	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)	PLANK- TON BIOMASS ASH WT (MG/L) (81353)	PLANK- TON BIOMASS DRY WT (MG/L) (81354)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
JAN	ORGANIĆ TOTAL (MG/L AS C)	TOTAL (MG/L AS CN)	DIS- SOLVED (MG/L AS CN) (00723)	PHYTO- PLANK- TON CHROMO FLUOROM (UG/L)	PHYTO- PLANK- TON CHROMO FLUOROM (UG/L)	TON BIOMASS ASH WT (MG/L)	TON BIOMASS DRY WT (MG/L)	MENT, SUS- PENDED (MG/L) (80154)	MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
JAN 04	ORGANIĆ TOTAL (MG/L AS C)	TOTAL (MG/L AS CN)	DIS- SOLVED (MG/L AS CN)	PHYTO- PLANK- TON CHROMO FLUOROM (UG/L)	PHYTO- PLANK- TON CHROMO FLUOROM (UG/L)	TON BIOMASS ASH WT (MG/L)	TON BIOMASS DRY WT (MG/L)	MENT, SUS- PENDED (MG/L)	MENT, DIS- CHARGE, SUS- PENDED (T/DAY)	SUSP. SIEVE DIAM. % FINER THAN .062 MM
JAN	ORGANIĆ TOTAL (MG/L AS C)	TOTAL (MG/L AS CN)	DIS- SOLVED (MG/L AS CN) (00723)	PHYTO- PLANK- TON CHROMO FLUOROM (UG/L)	PHYTO- PLANK- TON CHROMO FLUOROM (UG/L)	TON BIOMASS ASH WT (MG/L)	TON BIOMASS DRY WT (MG/L)	MENT, SUS- PENDED (MG/L) (80154)	MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
JAN 04 FEB 28	ORGANIĆ TOTAL (MG/L AS C)	TOTAL (MG/L AS CN)	DIS- SOLVED (MG/L AS CN) (00723)	PHYTO- PLANK- TON CHROMO FLUOROM (UG/L)	PHYTO- PLANK- TON CHROMO FLUOROM (UG/L)	TON BIOMASS ASH WT (MG/L)	TON BIOMASS DRY WT (MG/L)	MENT, SUS- PENDED (MG/L) (80154)	MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	SUSP. SIEVE DIAM. % FINER THAN. .062 MM (70331)

353

06471200 MAPLE RIVER AT NORTH DAKOTA-SOUTH DAKOTA STATE LINE

LOCATION.--Lat 45°56'20", long 98°27'08", in SWUSEU sec.33, T.129 N., R.62 W., Dickey County, ND, Hydrologic Unit 10160004, on left bank 0.4 mi upstream from State line, 7.8 mi northeast of Frederick, SD, and 15.7 mi upstream from mouth.

DRAINAGE AREA .-- 716 mi2, of which about 332 mi2 is probably noncontributing.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS. -- WDR SD-86-1: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 1,365 ft above National Geodetic Vertical Datum of 1929, from topographic map. Prior to June 14, 1962, nonrecording gage at site 0.4 mi downstream at datum 0.94 ft lower.

REMARKS.--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.--33 years, 20.2 ft3/s, 14,630 acre-ft/yr; median of yearly mean discharges, 14 ft3/s, 10,100 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,930 ft^3/s , Apr. 11, 1969; maximum gage height, 16.05 ft, Apr. 11, 1969, backwater from ice; no flow for long periods in each year.

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

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar. 29	1545	*900	a*9.00	Apr. 1	0700	530	7.27

a Backwater from ice No flow for many days.

		DISCHARGE,	IN	CUBIC	FEET	PER		ND, WATER MEAN VALUE		OCTOR	BER 1988 TO) SEPTEMBER	1989		
DAY	OCT	NOV	DEC	:	JAN		FEB	MAR		APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00)	.00		.00	.00		517	10	.89	.00	.00	.00
2	.00	.00	.00		.00		.00	.00		365	9.6	.89	.00	.00	.00
2	.00	.00	.00		.00		.00	.00		248	8.6	.77	.00	.00	.00
4	.00	.00	.00		.00		.00	.00		177	9.0	.70	.00	.00	.00
5	.00	.00	.00		.00					136	8.8	.63	.00	.00	.00
5	.00	.00	.00	,	.00		.00	.00		150	0.0	.0)	.00	•00	.00
6	.00	.00	.00		.00		.00	.00		104	7.3	•55	.00	.00	.00
7	.00	.00	.00)	.00		.00	.00		85	6.8	.46	.00	.00	.00
8	.00	.00	.00)	.00		.00	.00		73	6.7	.41	.00	.00	.00
9	.00	.00	.00)	.00		.00	.00		67	5.9	.30	.00	.00	.00
10	.00	.00	.00		.00		.00	.00		48	5.0	.21	.00	.00	.00
11	.00	.00	.00	,	.00		.00	.00		40	4.0	.16	.00	.00	.00
12	.00	.00	.00		.00		.00	.00		35	4.0	.22	.00	.00	.00
13	.00	.00	.00		.00		.00	.00		32	3.9	.17	.00	.00	.00
14	.00		.00		.00					29		.16	.00	.00	.00
		.00					.00	.00			3.6			.00	.00
15	.00	.00	.00	,	.00		.00	.00		24	3.0	.11	.00	.00	.00
16	.00	.00	.00		.00		.00	e20		23	2.4	.07	.00	.00	.00
17	.00	.00	.00)	.00		.00	e120		20	2.0	.04	.00	.00	.00
18	.00	.00	.00)	.00		.00	e90		18	2.0	.06	.00	.00	.00
19	.00	.00	.00)	.00		.00	e70		16	1.9	.03	.00	.00	.00
20	.00	.00	.00		.00		.00	e50		15	1.7	.00	.00	.00	.00
21	.00	.00	.00)	.00		.00	e40		14	1.5	.00	.00	.00	.00
22	.00	.00	.00		.00		.00	e30		12	1.5	.00	.00	.00	.00
23	.00	.00	.00		.00		.00	e25		12	1.5	.00	.00	.00	.00
24	.00	.00	.00		.00		.00	e40		11	1.4	.00	.00	.00	.00
25	.00	.00	.00		.00		.00	e75		11	1.1	.00	.00	.00	.00
25	.00	.00	.00	,	.00		.00	ers		-11	1.1	.00	.00	.00	.00
26	.00	.00	.00		.00		.00	e150		11	.91	.00	.00	.00	.00
27	.00	.00	.00		.00		.00	e300		11	.62	.00	.00	.00	.00
28	.00	.00	.00		.00		.00	e550		11	.65	.00	.00	.00	.00
29	.00	.00	.00)	.00			e800		11	.97	.00	.00	.00	.00
30	.00	.00	.00)	.00			e600		11	1.2	.00	.00	.00	.00
31	.00		.00)	.00			475			1.0		.00	.00	
TOTAL	0.00	0.00	0.00)	0.00		0.00	3435.00	2	187	118.55	6.83	0.00	0.00	0.00
MEAN	.00	.00	.00		.00		.00	111		2.9	3.82	.23	.00	.00	.00
MAX	.00	.00	.00		.00		.00	800		517	10	.89	.00	.00	.00
MIN	.00	.00	.00		.00		.00	.00		11	.62	.00	.00	.00	.00
PILN	.00	.00	.00		.00		.00	.00		11	.02	.00	.00	•00	.00

As the number of streams on which streamflow information is likely to be desired far exceeds the number of stream-gaging stations feasible to operate at one time, the Geological Survey collects limited streamflow data at sites other than stream-gaging stations. When limited streamflow data are collected on a systematic basis over a period of years for use in hydrologic analyses, the site at which the data are collected is called a partial-record station. Data collected at these partial-record stations are usable in low-flow or floodflow analyses, depending on the type of data collected. In addition, discharge measurements are made at other sites not included in the partial-record program. These measurements are generally made in times of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Records collected at partial-record stations are presented in a table of annual maximum stage and discharge at crest-stage stations. Discharge measurements made at miscellaneous sites for both low flow and high flow are given in a second table.

Crest-stage partial-record stations

The following table contains annual maximum discharge for crest-stage stations. A crest-stage gage is a device which will register the peak stage occurring between inspections of the gage. A stage-discharge relation for each gage is developed from discharge measurements made by indirect measurements of peak flow or by current meter. The date of the maximum discharge is not always certain, but it is usually determined by comparison with nearby continuous-record stations, weather records, or local inquiry. Only the maximum discharge for each water year is given. Information on some lower floods may have been obtained, but is not published herein. The years given in the period of record represent water years for which the annual maximum has been determined.

Station No.	Station Name	Location	Drainage area (mi ²)	Period of record	Date	ANNUAL Gage height (ft)	Dis- charge (ft ³ /s)
		RED RIVER OF THE NO	RTH BASIN	1			
	Red River at Grand Forks,	Lat 47°56'34", long 97°03'10", in SW1/4 NE1/4 sec.33, T.152 N., R.50 W., Grand Forks County, Hydrologic Unit 09020301, on left bank 2.3 mi downstream from Red Lake River. (Previous site of Red River at Grand Forks).	30,100	1882 - 1983 1987 - 89	4-12-89	43.98	38,000
05083000	Turtle River at Manvel, ND	Lat 48°04'43", long 97°11'03", in SE1/4 sec.10, T.153 N., R.51 Grand Forks County, Hydrologic Unit 09020307, on left bank 10 downstream from bridge on State Highway No. 33, 0.3 mi west of Manvel, and 10 mi upstream from mouth.	W.,	#1945-70, 1972-73, 1980-89	4-18-89	b14.95	a900
05083500	Red River of the North at Oslo, MN	Lat 48°11'40", long 97°08'30", in SW1/4SW1/4 sec.36, T.155 N., R.51 W., Walsh County, Hydrologic Unit 09020306, on bridge crossing the Red River 0.5 mi west of Oslo, MN.	31,200	#1936-37, #1941-43, #1945-60, 1985-89	4-14-89	36.72	33,500
05102490	Red River of the North at Pembina, ND	Lat 48°58'17", long 97°14'16", in NE1/4 sec.4, T.163 N., R.51 W Pembina County, Hydrologic Unit 09020311, on bridge crossing the Red River 0.2 mi north of Pembina.		1985-89	4-08-86° 4-09-87° 4-08-88° 4-23-89	784.05 767.16	d34,300 d37,000 d15,700 d38,400
		SOURIS RIVER	BASIN				
05119410	Bonnes Coulee at Velva, ND	Lat 48°03'30", long 100°57'00", in NE14SW14 sec. 21, T.153 N., R.80 W., McHenry County, at culvert on U.S. Highway 52, 0.5 mi west of Velva.	53.0	1962, 1965, 1971-73, 1976-77, 1987-88	6-29-89	1.76	^a 70

^{# -} Operated as a continuous-record gaging station

a - Estimate

b - Backwater from ice

c - Elevation of peak stage corrected. No change in previously published maximum discharge.

d - Discharge determined using record from station 2 mi downstream

DISCHARGE MEASUREMENTS AT PARTIAL RECORD AND MISCELLANEOUS SITES

Station No.	Station Name	ximum discharge at crest-stage part Location	Drainage area (mi ²)	Period of record	Da te	ANNUAL Gage height (ft)	MAXIMUM Dis- charge (ft ³ /s)
		KNIFE RIVER	BASIN				
06339490	Elm Creek near Golden Valley, ND	Lat 47°06'25", long 102°03'05", in SE14 NW14 sec. 23, T.142 N., R.90 W., Mercer County, Hydrologic Unit 10130201, at bridge on county road, 13.5 mi south of Golden Valley.	82.0	#1967-81 1982-89	3-12-89	4.03	20
06340200	West Branch Otter Creek near Beulah, ND	Lat 47°08'05", long 101°39'35", in NW1/4 NW1/4 SW1/4 sec.12, T.142 N., R.87 W., Oliver County, Hydrologic Unit 10130201, on right bank 10 mi northeast of Beulah.	26.5	#1965-83, 1984-89	3-10-89	ab4.96	88
		HEART RIVER	BASIN				
06343000	Heart River near South Heart, ND	Lat 46°51'56", long 102°56'53", in NE1/4 SE1/4 SW1/4 sec.8, T.139 N R.97 W., Stark County, Hydrologic Unit 10130202, on left bank 1.7 mi downstream from North Creek, 2 mi east of South Heart and 5.5 mi upstream from Edward Arthur Patterson Lake.	311	#1965-84, 1985-89	3-11-89	b10.29	825

 ^{# -} Operated as a continuous-record gaging station
 a - Estimate
 b - Backwater from ice

Miscellaneous discharge measurement sites

Measurements of streamflow at points other than gaging stations are given in the following table.

	22231318	e measurements made at miscellaneous si		Measured	Measu	rements
Stream	Tributary to	Location	Drainage area (mi ²)	previously (water years)	Date	Discharge (ft ³ /s)
		RED RIVER OF THE NORTH BA	SIN			
Red River ^a	Red River of the North	Lat 46°53'28", long 96°46'14", in SW1/4 SE1/4 SW1/4 sec.32, T.140 N., R.48 W., Cass County, Hydrologic Unit 09020104, downstream of 12th Ave. N. Bridge, in Fargo.			08-29-89	142
Red River ^a	Red River of the North	Lat 46°54'38", long 96°45'47", in SE1/4 NW1/4 SE1/4 sec.29, T.140 N., R.48 W., Cass County, Hydrologic Unit 09020104, in Fargo.		-	08-29-89	150
Red River ^a	Red River of the North	Lat 46°56'02", long 96°47'28", in SW1/4 SE1/4 SW1/4 sec.18, T.140 N., R.48 W., Cass County, Hydrologic Unit 09020104, 75 ft downstream of County Road 20 bridge, in north Fargo.		No.	08-29-89	146
Red River Tributary ^a	Red River of the North	Lat 46°56'21", long 96°45'12", in NE1/4 NW1/4 SE1/4 sec.12, T.140 N., R.49 W., Cass County, Hydrologic Unit 09020104, 11/2 mi north of Fargo.			08-29-89 08-30-89	19.5 9.17
Red River ^a	Red River of the North	Lat 46°58'16", long 96°49'23", in NW1/4 SE1/4 NE1/4 sec.2, T.140 N., R.49 W., Cass County, Hydrologic Unit 09020104, 21/2 m1 north of Fargo.			08-30-89	162
Mauvais Coulee Tributary near Cando, ND ^a		Lat 48°27'28", long 99°14'50", in NE1/4 NW1/4 sec.1, T.157 N., R.67 W., Towner County, Hydrologic Unit 09020201, 2 mi south and 1.5 mi west of Cando.		_	04-17-89	14.6
Sheyenne Riverb	Red River of the North	Lat 46°37'48", long 97°56'22", in NW1/4 NW1/4 NE1/4 sec.2, T.136 N., R.58 W., Ransom County, Hydrologic Unit 09020204, on Hwy. 46 bridge.	 %		05-31-89 06-14-89 06-29-89 07-27-89 08-29-89 09-27-89	50.4 21.1 27.2 20.7 28.2 15.7
Sheyenne River ^b	Red River of the North	Lat 46°22'02", long 97°33'47", in NW1/4 NW1/4 NE1/4 sec.2, T.133 N., R.55 W., Ransom County, Hydrologic Unit 09020204, 150 ft upstream from bridge on county road, 7.4 mi southeast of Lisbon at river mi 148.		1963 ^a , 1983-88	06-01-89 06-29-89 07-27-89 08-08-89 08-30-89 09-28-89	42.4 24.8 28.5 31.5
Sheyenne Riverb	Red River of the North	Lat 46°30'54", long 97°29'23", in SE1/4 SE1/4 SE1/4 sec.8, T.135 N., R.54 W., Ransom County, Hydrologic Unit 09020204, 30 ft upstream from county highway bridge, 5 mi south of Sheldon at river mi 114.		1963 ^a , 1983-88	06-01-89 06-28-89 07-26-89 08-08-89 08-30-89 09-28-89	55.6 37.3 23.6 20.8 37.9 23.8
Sheyenne River ^b	Red River of the North	Lat 46°31'01", long 97°20'33", in NW1/4 SW1/4 SW1/4 sec.10, T.135 N., R.53 W., Ransom County, Hydrologic Unit 09020204, on bridge 7 mi east and 5 mi south of Sheldon.	-	1983-88	06-01-89 06-28-89 07-26-89 08-08-89 08-30-89 09-27-89	77.0 41.0 21.3 20.1 47.0 33.0
Sheyenne River ^a	Red River of the North	Lat 47°01'50", long 96°50'12", in NE1/4 SE1/4 NE1/4 sec.14, T.141 N., R.49 W., Cass County, Hydrologic Unit 09020205, 4 mi east of Argusville.			08-30-89	55.7

a - Data collected by U.S. Geological Survey.
 b - Current year measurements furnished by and previous measurement data available from North Dakota State Water Commission unless otherwise noted.

		surements made at miscellaneous sites du	70.00	Measured		rements
Stream	Tributary to	Location	Drainage area (mi ²)	previously (water years)	Date	Discharge (ft3/s)
		DED DIVER OF MUS NOOTH DA	771			
Red River ^a	Red River of the North	RED RIVER OF THE NORTH BAS Lat 47°05'34", long 96°48'58", in SE1/4 SE1/4 SE1/4 sec.24, T.142 N., R.49 W., Cass County, Hydrologic Unit 09020104, at Cass County 34 Bridge, 1 mi north and 1 mi west of Georgetown, MN.			08-30-89	237
		WHITE EARTH RIVER BASIN	1			
White Earth River at White Earth, ND 06332000 ^b	White Earth River	Lat 48°22'35", long 102°46'00", in SE1/4 SW1/4 sec.36, T.157 N., R.94 W., Mountrail County, Hydrologic Unit 10110101, 0.2 mi east of White Earth	780	1954-81 ^{#a}	05-17-89	2.78
		LITTLE MISSOURI RIVER BAS	SIN			
Little Beaver Creek near Marmarth, ND 06335000 ^D	Little Missouri River	Lat 46°16'29", long 103°58'33", in NW1/4 SE1/4 NE1/4 sec. 7, T.132 N., R.106 W., Bowman County, Hydrologic Unit 10110201, 50 feet downstream of concrete ford, 3 mi southwest of Marmarth.	587	1938-79 ^{#a} , 1986-88	04-24-89 05-16-89 06-21-89 07-18-89	6.68 12.4 1.62 2.77
Little Missouri River ^b	Missouri River	Lat 46°35'33", long 103°30'53", in SE1/4 SW1/4 NE1/4 sec.17, T.136 N., R.102 W., Slope County, Hydrologic Unit 10110203, ten mi west and 8 mi north of Amidon.		1985-88	10-11-88 04-24-89 05-16-89 06-21-89 07-18-89 08-23-89 09-27-89	0.19 56.6 291 15.9 152 0.52
Little Missouri River at Medora, ND 06336000 ^b	Missouri River	Lat 46°55'10", long 103°31'40", in NE1/4 NW1/4 NE1/4 sec. 27, T.140 N., R.102 W., Billings County, Hydrologic Unit 10110203, on bridge on county highway in Medora.	6,190	1903-08#a, 1921-24#a, 1928-34#a, 1945-75#a, 1976a, 1985-88	10-11-88 04-03-89 04-25-89 05-16-89 06-20-89 07-18-89 08-23-89 09-27-89	0.91 641 63.5 326 25.9 6.90 2.04
Little Missouri ^b	Missouri River	Lat 47°19'57", long 103°39'05", in NE1/4 SE1/4 SE1/4 sec.34, T.145 N., R.102 W., McKenzie County, Hydrologic Unit 10110205, 13 mi east of Trotters.		1985-88	10-12-88 04-25-89 05-17-89 06-20-89 07-19-89 08-23-89 09-27-89	0.67 91.6 368 32.9 23.2 4.06
		MISSOURI RIVER BASIN				
Missouri River ^a	Missouri River Mainstem	Lat 47°29'42", long 101°25'49", in NE14 SE14 NW14 sec.6, T.146 N., R.84 W., McLean County, Hydrologic Unit 10130101, at left bank of Garrison Dam tailrace and 2.5 mi west of Riverdale, at river mi 1390.	181,400	1988	05-02-89	17,500
		KNIFE RIVER BASIN				
Knife River near Stanton, ND ^a	Missouri River	Lat 47°21'29", long 101°23'49", in SW1/4 SW1/4 SW1/4 sec.21, T.145 N., R.84 W., Mercer County, Hydrologic Unit 10130201, on county bridge 2.5 mi north of Stanton.		1988	05-01-89 05-02-89	437 418
		MISSOURI RIVER BASIN				
Missouri River near Stanton, ND 06340700ª	Missouri River Mainstem	Lat 47°17'14", long 101°20'25", in SW1/4 sec.16, T.144 N., R.84 W., McLean County, Hydrologic Unit 10130101, on right bank 3 mi southeast of Stanton and at river mi 1372	182,000	1988	05-03-89	18,300

a - Data collected by U.S. Geological Survey.
 b - Current year measurements furnished by and previous measurement data available from North Dakota State Water Commission unless otherwise noted.
 # - Operated as a continuous-record gaging station.

		rements made at miscellaneous sites dur	Drainage	Measured previously		rements	
Stream	Tributary to	Location	area (mi ²)	(water years)	Date	Discharge (ft ³ /s)	
•		MISSOURI RIVER BASIN					
lissouri River at Washburn, ND 06340700ª	Missouri River Mainstem	Lat 47°17'20", long 101°02'15", in SE1/4 SW1/4 sec.14, T.144 N., R.82 W., McLean County, Hydrologic Unit 10130101, on alternate Highway 200 bridge at Washburn and at river mi 1355.	184,000	1987-88	05-03-89	19,300	
		HEART RIVER BASIN					
reen River ^b	Heart River	Lat 46°58'06", long 102°44'54", in SE1/4 NE1/4 SE1/4 sec.2, T.140 N., R.95 W., Stark County, Hydrologic Unit 10130202, 4 mi north and 2 mi east of Dickinson.			04-07-89 04-25-89 05-09-89 06-06-89 07-11-89 07-27-89 08-10-89 08-25-89 09-26-89	30.2 6.53 9.80 14.4 3.54 2.49 0.33 0.46 1.20	
reen River near Gladstone, ND 06345000 ^b	Heart River	Lat 46°53'31", long 102°37'01", in SE14 SW14 SW14 sec.36, T.140 N., R.95 W., Stark County, Hydrologic Unit 10130202, 7 mi east of Dickinson.	356	1945-76 ^a , 1988	04-07-89 04-25-89 05-09-89 06-06-89 06-20-89 07-11-89 07-27-89 09-26-89	34.6 8.90 16.7 24.9 1.71 3.59 0.36	
		MISSOURI RIVER BASIN					
issouri River ^a	Missouri River Mainstem	Lat 46°58'44", long 100°56'08", in NE1/4 SW1/4 NW1/4 sec.5, T.140 N., R.81 W., Morton County, Hydrologic Unit 10130101.		1988	05-04-89	18,900	
		APPLE CREEK BASIN					
Long Lake Creek ^b	Apple Creek	Lat 46°33'37", long 100°07'09", in SW1/4 SE1/4 SW1/4 sec.28, T.136 N., R.75 W., Emmons County, Hydrologic Unit 10130103, 1/2 mi south and 11/4 mi west of Braddock.			09-25-89	0.90	
ong Lake Creek ^b	Apple Creek	Lat 46°35'52", long 100°11'26", in SE1/4 SW1/4 NW1/4 sec.13, T.136 N., R.76 W., Emmons County, Hydrologic Unit 10130103, 5 mi west and 1.5 mi north of Braddock.	444		09-25-89	0.71	
		CANNONBALL RIVER BASIN					
Cannonball River below Bentley, ND 06351000b	Missouri River	Lat 46°21'30", long 102°02'30", in SW1/4 SW1/4 sec.6, T.133 N., R.90 W., Grant County, Hydrologic Unit 10130204, 2 mi northeast of Bentley.	1,140	1951-81 ^{#a} , 1988	04-25-89 05-09-89 06-06-89 07-11-89 09-26-89	18.1 69.0 12.5 2.40 2.64	
Cannonball River ^b	Missouri River	Lat 46°07'35", long 101°19'57", in SW1/4 SW1/4 NW1/4 sec.33, T.131 N., R.85 W., Grant County, Hydrologic Unit 10130204, 16 mi south of Raleigh.			04-25-89 05-09-89 06-06-89 07-11-89	24.9 121 16.6 0.85	
Cedar River near Pretty Rock, ND 06352500b	Cannonball River	Lat 46°01'55", long 101°49'55", in SW1/4 SW1/4 SW1/4 sec.33, T.130 N., R.89 W., Grant County, Hydrologic Unit 10130205, 7 mi north of Keldron, SD.	1,340	1943-76 ^{#a} 1988	04-13-89 04-25-89 05-09-89 06-06-89	20.9 10.3 128 12.7	

 ^{# -} Operated as a continuous-record gaging station.
 a - Data collected by U.S. Geological Survey.
 b - Current year measurements furnished by and previous measurement data available from North Dakota State Water Commission unless otherwise noted.

DISCHARGE MEASUREMENTS AT PARTIAL RECORD AND MISCELLANEOUS SITES

		asurements made at miscellaneous sites dur		Measured	Meas	urements
Stream	Tributary to	Location	Drainage area (mi ²)	previously (water years)	Da te	Discharge (ft ³ /s)
		JAMES RIVER BASIN				
James River ^a	Missouri River	Lat 46°40'28", long 98°35'15", in SE1/4 SE1/4 SE1/4 sec.23, T.137 N., R.63 W., Stutsman County, Hydrologic Unit 10160003, on bridge 1 mi south of Montpelier.		1988	10-11-88 11-10-88 04-26-89 05-18-89 05-31-89 06-28-89 07-25-89 08-29-89	6.56 28.4 10.9 15.6 12.9 5.52 36.8
James River ^a	Missouri River	Lat 46°32'38", long 98°28'26", in NE1/4 NE1/4 NE1/4 sec.4, T.135 N., R.62 W., LaMoure County, Hydrologic Unit 10160003, on bridge 1/2 mi northwest of Dickey.		1988	10-11-88 11-10-88 04-26-89 05-18-89 05-31-89 06-28-89 07-25-89 08-07-89 08-29-89	8.94 40.7 15.8 26.3 17.2 8.15 4.17 36.7
James River ^a	Missouri River	Lat 46°27'13", long 98°22'06", in SW1/4 NW1/4 NW1/4 sec.4, T.134 N., R.61 W., LaMoure County, Hydrologic Unit 10160003, on bridge 1 mi north of Grand Rapids.		1988	04-26-89 05-18-89 05-31-89 06-28-89 07-25-89 08-07-89 08-29-89	19.2 27.3 15.4 10.1 5.15 14.1
Maple River ^a	Elm River	Lat 46°15'24", long 98°34'25", in NW1/4 NW1/4 NE1/4 sec.16, T.132 N., R.63 W., Dickey County, Hydrologic Unit 10160004, 6 mi north and 1/2 mi east of Monango.		1984-88	04-10-89 04-21-89	
Maple River ^a	Elm River	Lat 46°08'22", long 98°23'41", in SE1/4 SW1/4 SW1/4 sec.24, T.131 N., R.62 W., Dickey County, Hydrologic Unit 10160004, 11/2 mi south and 11/2 mi east of Fullerton.		1984-88	04-10-89 04-21-89 04-27-89	7.24

a - Current year measurements furnished by and previous measurement data available from North Dakota State Water Commission unless otherwise noted.

Water-quality partial-record stations are particular sites where chemical-quality, biological and/or sediment data are collected systematically over a period of years for use in hydrologic analyses. These data are collected usually less than quarterly. Samples collected at sites other than gaging stations and partial-record stations to give better areal coverage in a river basin are referred to as miscellaneous sites.

WATER-OHALITY	DATA	WATER	YEAR	OCTOBER	1988	TO	SEPTEMBER	1989

			WAIER-QUA	LIII DAIA	, WATER I	EAR OCTOB	EK 1900 I	O SEFTEMB	ER 1909			
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) (OOO20)	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
					RED RIVER	OF THE N	ORTH BASI	N				
		050	083000 т	URTLE RIV	ER AT MAN	VEL, ND (LAT 48 04	43N LONG	097 11 0)3W)		
APR 18	1440	861	116	7.80	8.5	2.0	280	68	26	130	49	4
		050835	OO RED R	IVER OF T	HE NORTH	AT OSLO.	MN (LAT 4	8 11 35N	LONG 097	08 25W)		
APR 13	1620	33500	28	7.70	2.0	4.0	120	28	11	11	16	0.5
					KNIF	E RIVER B	BASIN					
		0633	9490 ELM	CREEK NR	GOLDEN V	ALLEY, NO	(LAT 47	06 25N LC	NG 102 03	05W)		
MAR 13	1215	10	56	7.89	0.0	0.5	79	15	10	76	64	4
		06340200	WEST BR	ANCH OTTE	B CREEK N	R BEIII.AH	ND (LAT	47 08 05N	LONG 101	39 35W)		
MAR 10	1011	5.0	28		13.0	1.0					- 4	
APR 25	1343	0.04		8.04	17.0	13.5	450	90	55	260	55	5
						T RIVER E				1		
		06343					(LAT 46 5					
MAR 15	1200	47	59	7.70	-3.0	0.5	95	20	11	82	62	4
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)	RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, DIS- SOLVED (TONS PER AC-FT) (70303)
					RED RIVER	OF THE N	ORTH BASI	N				
		05083	000 TURT	LE RIVER	AT MANVEL	, N. DAK.	(LAT 48	04 43N LC	NG 097 11	03W)		
APR 18	11	120	0	100	3.1	210	180	0.20	14	732	700	1.0
		050835	OO RED R	IVER OF T	HE NORTH	AT OSLO,	MN (LAT 4	8 11 35N	LONG 097	08 25W)		
APR 13	6.8	120										0.25
					KNIF	E RIVER E	BASIN					
		0633	9490 ELM	CREEK NF	GOLDEN V	ALLEY, NO	(LAT 47	06 25N LC	NG 102 03	05W)		
MAR 13	12	89	0	73	1.8	180	6.3	0.10	33	397	377	0.54
		0634020	O WEST B	RANCH OTT	ER CREEK	NR BEULAH	H, ND (LAT	47 08 05	N LONG 10	01 39 35W)		
APR 25	9.2	430					7.3					1.82
				75.0								
					HEAR	T RIVER I	BASIN					
		0634	3000 HEA	RT RIVER	NR SOUTH	HEART, NE	(LAT 46	51 56N LC	NG 102 56	5 53W)		
MAR 15	9.5	100	0	84	3.2	200	8.3	0.10	7.5	426	389	0.58

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

WATER-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 SOLIDS, MANGA-MOLYB-SELE-STRON-NESE, DIS-ARSENIC BORON, LITHIUM MERCURY NIUM, IRON, LEAD. DENUM. TIUM. SOLVED DIS-DIS-DIS-DIS-DIS-DIS-DIS-DIS-DIS-DIS-(TONS SOLVED (UG/L AS FE) PER (UG/L (UG/L AS LI) (UG/L (UG/L (UG/L (UG/L (UG/L (UG/L (UG/L DAY) AS PB) AS AS) AS B) AS MN) AS HG) AS MO) AS SE) AS SR) DATE (70302)(01000) (01020) (01046) (01049) (01056) (71890) (01060) (01145) (01080) (01130) RED RIVER OF THE NORTH BASIN 05083000 TURTLE RIVER AT MANVEL, ND (LAT 48 04 43N LONG 097 11 03W) APR 18.. 1700 180 1 60 230 780 0.1 05083500 RED RIVER OF THE NORTH AT OSLO, MN (LAT 48 11 35N LONG 097 08 25W) APR 13.. 16600 2 30 120 3 10 50 140 KNIFE RIVER BASIN 06339490 ELM CREEK NR GOLDEN VALLEY, ND (LAT 47 06 25N LONG 102 03 05W) MAR 13.. 10.8 <1 120 260 9 80 <10 1 06340200 WEST BRANCH OTTER CREEK NR BEULAH, ND (LAT 47 08 05N LONG 101 39 35W) APR 25.. 0.14 <1 160 190 1200 HEART RIVER BASIN 06343000 HEART RIVER NR SOUTH HEART, ND (LAT 46 51 56N LONG 102 56 53W) MAR 15.. 54.3 1 110 100 <1 7 80 0.2 1 <10 180

STATION RECORDS, GROUND WATER

GROUND-WATER LEVELS

BENSON COUNTY

480228098482501. Local number, 153-063-30CBC. LOCATION.--Lat 48°02'28", long 098°48'25", Hydrologic Unit 09020201.

Owner: North Dakota State Water Commission.

AQUIFER. -- Spiritwood.

WELL CHARACTERISTICS. -- Drilled observation well, diameter 1.25 in, depth 200 ft, cased to 137 ft, plastic pipe, No. 18 slot screen set 137 to 143 ft below land-surface datum.

INSTRUMENTATION .-- Measured quarterly using a steel tape.

DATUM .-- Altitude of land-surface datum is 1.445 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD.--June 1970 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.32 ft below land-surface datum, June 15, 1987; lowest measured, 22.30 ft below land-surface datum, Mar. 3, 1971.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

	WATER		WATER			
DATE	LEVEL	DATE	LEVEL	DATE	LEVEL	
NOV 17	15.79	FEB 21	16.19	AUG 2	16.87	

BENSON COUNTY

480958099154801. Local number, 154-067-15BBB.
LOCATION.--Lat 48°09'58", long 099°15'48", Hydrologic Unit 09020201.
Owner: North Dakota State Water Commission.

AQUIFER . -- Spiritwood.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 1.25 in, depth 180 ft, cased to 147 ft, plastic pipe, No. 18 slot screen set 147 to 153 ft below land-surface datum.
INSTRUMENTATION. -- Measured quarterly using a steel tape.

DATUM. -- Altitude of land-surface datum is 1,475 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD. -- June 1970 to current year.

EXTREMES FOR PERIOD OF RECORD. -- Highest water level measured, 30.19 ft below land-surface datum, May 26, 1983; lowest measured, 33.80 ft below land-surface datum, Mar. 15, 1978.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

	WATER		WATER		WATER
DATE	LEVEL	DATE	LEVEL	DATE	LEVEL
NOV 18	31.80	FEB 23	32.86	SEPT 27	33.28

BENSON COUNTY

481041099442701. Local number, 154-071-11AAD1. LOCATION.--Lat 48°10'41", long 099°44'27", Hydrologic Unit 09020202. Owner: North Dakota State Water Commission.

AQUIFER .-- Fox Hills Sandstone.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 1.25 in, depth 100 ft, cased to 42 ft, plastic pipe, No. 12 slot screen set 42 to 45 ft below land-surface datum.

INSTRUMENTATION. -- Measured quarterly using a steel tape.

DATUM. -- Altitude of land-surface datum is 1,590 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD. -- August 1968 to current year. EXTREMES FOR PERIOD OF RECORD. -- Highest water level measured, 5.41 ft below land-surface datum, July 12, 1982; lowest measured, 9.27 ft below land-surface datum, June 8, 1988.

	WATER		WATER		WATER
DATE	LEVEL	DATE	LEVEL	DATE	LEVEL
NOV 18	8.77	FEB 22	8.88	SEPT 26	8.59

363 GROUND-WATER LEVELS

BOWMAN COUNTY

461534103491701. Local number, 132-105-16BDB.
LOCATION.--Lat 46°15'34", long 103°49'17", Hydrologic Unit 10110203.
Owner: North Dakota State Water Commission.

AQUIFER .-- Hell Creek-Fox Hills Sandstone.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 2 in, depth 475 ft, cased to 441 ft, steel pipe, No. 12 slot screen set 441 to 459 ft below land-surface datum.

INSTRUMENTATION. -- Measured annually, during late November or early December, using a steel tape.

DATUM. -- Altitude of land-surface datum is 3,010 ft. Measuring point: Top of casing 3.40 ft above land-surface

datum.

PERIOD OF RECORD .-- September 1971 to current year.

EXTREMES FOR PERIOD OF RECORD. -- Highest water level measured, 270.15 ft below land-surface datum, Feb. 25, 1973; lowest measured, 272.34 ft below land-surface datum, Nov. 18, 1988.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

WATER DATE LEVEL NOV 18 272.34

BURLEIGH COUNTY

464943100305801. Local number, 139-078-27CBB.
LOCATION.--Lat 46°49'43", long 100°30'58", Hydrologic Unit 10130103.
Owner: North Dakota State Water Commission.

AQUIFER . -- McKenzie.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 1.25 in, depth 255 ft, cased to 200 ft, plastic pipe,

slotted 200 to 220 ft below land-surface datum, gravel packed.

INSTRUMENTATION.--Measured on a six-week schedule, except during the winter, using a steel tape.

DATUM.--Altitude of land-surface datum is 1,713. Measuring point: Top of casing 1.90 ft above land-surface

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

EXTREMES FOR PERIOD OF RECORD .-- Highest water level measured, 21.73 ft below land-surface datum, June 5, 1987; lowest measured, 32.44 ft below land-surface datum, Aug. 26, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM. WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 29 NOV 16 DEC 2	24.99 24.69 24.65	MAR 31 APR 29 JUNE 1	24.08 23.88 23.81	JULY 1 JULY 22	26.55 27.72	AUG 30 SEPT 30	26.72 27.48

DIVIDE COUNTY

485649103155701. Local number, 163-097-15BCC.
LOCATION.--Lat 48°56'49", long 103°15'57", Hydrologic Unit 09010001.
Owner: North Dakota State Water Commission.

AQUIFER. -- Yellowstone.

WELL CHARACTERISTICS.--Drilled observation well, diameter 2 in, depth 575 ft, cased to 546 ft, steel pipe, No. 12

slot screen set 546 to 558 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 1,915 ft. Measuring point: Top of casing 1.50 ft above land-surface datum.

PERIOD OF RECORD.--January 1973 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 10.31 ft below land-surface datum, June 5, 1979; lowest measured, 14.78 ft below land-surface datum, Aug. 15, 1989.

WATER			WATER		WATER	WATER	
DATE	LEVEL	DATE	LEVEL	DATE	LEVEL	DATE	LEVEL
NOV 15	14.46	FEB 14	14.38	MAY 16	14.37	AUG 15	14.78

DUNN COUNTY

471323102290101. Local number, 143-093-09BCB.
LOCATION.--Lat 47°13'23", long 102°29'01", Hydrologic Unit 10130201.
Owner: North Dakota State Water Commission.

AQUIFER .-- Sentinel Butte.

WELL CHARACTERISTICS. -- Drilled observation well, diameter 2 in, depth 965 ft, cased to 378 ft, steel pipe, No. 12 slot screen set 378 to 396 ft below land-surface datum.

INSTRUMENTATION . -- Measured quarterly using a steel tape.

DATUM .-- Altitude of land-surface datum is 2,133 ft. Measuring point: Top of casing 2.10 ft above land-surface datum.

PERIOD OF RECORD. -- February 1974 to current year.

EXTREMES FOR PERIOD OF RECORD .-- Highest water level measured, 92.12 ft below land-surface datum, June 7, 1984; lowest measured, 93.79 ft below land-surface datum, June 22, 1981.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	93.31	FEB 17	93.59	MAY 12	93.12	AUG 9	93.36

EDDY COUNTY

473720098592401. Local number, 148-065-19DAA.
LOCATION.--Lat 47°37'20", long 098°59'24", Hydrologic Unit 10160001.
Owner: North Dakota State Water Commission.

AQUIFER .-- New Rockford.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 1.25 in, depth 242 ft, cased to 220 ft, plastic pipe, slotted from 210 to 220 ft below land-surface datum.

INSTRUMENTATION .-- Measured on a six-week schedule, except during the winter, using a steel tape.

DATUM. -- Altitude of land-surface datum is 1,526 ft. Measuring point: Top of casing 1.90 ft above land-surface datum.

PERIOD OF RECORD. -- September 1964 to current year. EXTREMES FOR PERIOD OF RECORD. -- Highest water level measured, 43.40 ft below land-surface datum, Sept. 6, 1983; lowest measured, 50.49 ft below land-surface datum, Sept. 6, 1978.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5 DEC 20	48.05 46.90	MAR 2 JUNE 26	46.29 46.01	AUG 24	47.95	SEPT 26	47.71

EMMONS COUNTY

463632100171901. Local number, 136-076-07CBC. LOCATION.--Lat 46°36'32", long 100°17'19", Hydrologic Unit 10130103. Owner: North Dakota State Water Commission.

AQUIFER . -- Long Lake .

WELL CHARACTERISTICS .-- Drilled observation well, diameter 1.25 in, depth 150 ft, cased to 117 ft, plastic pipe, No. 12 slot screen set at 117 to 123 ft below land-surface datum.

INSTRUMENTATION. -- Measured quarterly using a steel tape.

DATUM. -- Altitude of land-surface datum is 1,735 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

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

EXTREMES FOR PERIOD OF RECORD. -- Highest water level measured, +0.87 ft above land-surface datum, Apr. 17, 1987; lowest measured, 8.32 ft below land-surface datum, Sept. 1, 1977.

CORRECTION. -- Highest water level measured, +0.87 ft above land-surface datum, Apr. 17, 1987, was previously published as below-land surface datum (see EXTREMES FOR PERIOD OF RECORD).

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 23 APR 19	5.93 4.65	JUNE 8	4.76	AUG 15	7.58	SEPT 26	6.93

GRAND FORKS COUNTY

474957097343501. Local number, 150-054-04CCD.
LOCATION.--Lat 47°49'57", long 097°34'35", Hydrologic Unit 09020307.
Owner: North Dakota State Water Commission.

AQUIFER .-- Elk Valley.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 1.25 in, depth 126 ft, cased to 40 ft, plastic pipe, No. 12 slot screen set 40 to 43 ft below land-surface datum.

INSTRUMENTATION. -- Measured quarterly using a steel tape.

DATUM. -- Altitude of land-surface datum is 1,127 ft. Measuring point: Top of casing 1.80 ft above land-surface datum.

PERIOD OF RECORD.--September 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.97 ft below land-surface datum, July 23, 1987; lowest measured, 7.96 ft below land-surface datum, Mar. 7, 1977.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 27	6.56	JAN 25	6.92	JUNE 7	5.08	SEPT 6	7.10

GRIGGS COUNTY

471612098113101. Local number, 144-059-20CCC. LOCATION.--Lat 47°16'12", long 098°11'31", Hydrologic Unit 09020203. Owner: North Dakota State Water Commission.

AQUIFER . -- Spiritwood.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 1.25 in, depth 240 ft, cased to 158 ft, plastic pipe, No. 25 slot screen set 158 to 161 ft below land-surface datum.

INSTRUMENTATION. -- Measured quarterly using a steel tape.

COOPERATION. -- Record provided by the North Dakota State Water Commission since 1975.

DATUM. -- Altitude of land-surface datum is 1,430 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD .-- September 1971 to current year.

EXTREMES FOR PERIOD OF RECORD .-- Highest water level measured, 45.84 ft below land-surface datum, Apr. 5, 1977; lowest measured, 90.80 ft below land-surface datum, Aug. 11, 1988.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 9 NOV 29	53.48 51.91	APR 27	48.15	JULY 11	63.79	JULY 18	69.26

GRIGGS COUNTY

473425098232901. Local number, 147-061-01CCC. LOCATION.--Lat 47°34'25", long 098°23'29", Hydrologic Unit 09020203. Owner: North Dakota State Water Commission.

AQUIFER. -- Spiritwood.

WELL CHARACTERISTICS. -- Drilled observation well, diameter 1.25 in, depth 340 ft, cased to 237 ft, plastic pipe, No. 25 slot screen set 237 to 240 ft below land-surface datum.

INSTRUMENTATION. -- Measured monthly except during the winter, using a steel tape.

COOPERATION. -- Record provided by the North Dakota State Water Commission since 1977.

DATUM. -- Altitude of land-surface datum is 1,525 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD.--September 1971 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 26.17 ft below land-surface datum, Apr. 29, 1987; lowest measured, 96.10 ft below land-surface datum, Aug. 12, 1975.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 9 NOV 29	30.64 29.50	APR 27	28.16	JULY 11	76.39	JULY 19	69.94

GRIGGS COUNTY

473600098065901. Local number, 148-059-36AAB.
LOCATION.--Lat 47°36'00", long 098°06'59", Hydrologic Unit 09020203.
Owner: North Dakota State Water Commission.

AQUIFER . -- McVille.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 1.25 in, depth 180 ft, cased to 137 ft, plastic pipe, No. 12 slot screen set 137 to 143 ft below land-surface datum.

INSTRUMENTATION. -- Measured quarterly using a steel tape.

COOPERATION. -- Record provided by the North Dakota State Water Commission since 1984.

DATUM .-- Altitude of land-surface datum is 1,320 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD .-- October 1971 to December 1982, April 1985 to present.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, +0.77 ft above land-surface datum, Sept. 11, 1986; lowest measured, 12.09 ft below land-surface datum, Aug. 9, 1978.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM. WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 29	6.39	APR 27	6.62	JULY 11	8.06	JULY 21	8.17

HETTINGER COUNTY

463153102521001. Local number, 135-097-04DCA. LOCATION.--Lat 46°31'53", long 102°52'10", Hydrologic Unit 10130204. Owner: North Dakota State Water Commission.

AQUIFER .-- Fox Hills Sandstone.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 4 in, depth 1,790 ft, cased to 1,320 ft, steel pipe, open hole.

INSTRUMENTATION. -- Measured quarterly using a steel tape. Water-level recorder prior to May 1974.

DATUM. -- Altitude of land-surface datum is 2,567 ft. Measuring point: Top of casing 0.70 ft above land-surface datum.

PERIOD OF RECORD. -- September 1968 to current year.

EXTREMES FOR PERIOD OF RECORD. -- Highest water level measured, 142.02 ft below land-surface datum, Dec. 19, 1968; lowest measured, 145.91 ft below land-surface datum, Sept. 19, 1968 (first measurement on well may be as much as 1.5 ft low due to slow recovery of well).

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 23	144.03	MAR 13	144.08	JUNE 1	144.22	SEPT 5	144.24

KIDDER COUNTY

470638099324301. Local number, 142-070-16DDD.
LOCATION.--Lat 47°06'38", long 099°32'43", Hydrologic Unit 10130103.
Owner: North Dakota State Water Commission.

AQUIFER .-- Long Lake.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 1.25 in, depth 84 ft, cased to 70 ft, plastic pipe, No. 18 slot screen set 70 to 73 ft below land-surface datum.

INSTRUMENTATION. -- Measured monthly, except during the winter, using a steel tape.

COOPERATION. -- Record provided by the North Dakota State Water Commission since 1979.

DATUM. -- Altitude of land-surface datum is 1,810 ft. Measuring point: Top of casing 1.90 ft above land-surface

PERIOD OF RECORD .-- November 1965 to current year.

EXTREMES FOR PERIOD OF RECORD. -- Highest water level measured, 19.94 ft below land-surface datum, Dec. 4, 1976; lowest measured, 26.03 ft below land-surface datum, Aug. 27, 1982.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 29 DEC 20	21.32	APR 14 MAY 15	21.21	JUNE 16 JULY 18	21.12	AUG 18 SEPT 19	22.47

367 GROUND-WATER LEVELS

MC LEAN COUNTY

473752101055301. Local number, 148-082-23BBB.
LOCATION.--Lat 47°37'52", long 101°05'53", Hydrologic Unit 10130101.
Owner: North Dakota State Water Commission.

AQUIFER .-- Lake Nettie.

WELL CHARACTERISTICS. -- Drilled observation well, diameter 1.25 in, depth 300 ft, cased to 198 ft, plastic pipe, No. 24 slot screen set 198 to 204 ft below land-surface datum.

INSTRUMENTATION. -- Measured monthly, except during the winter, using a steel tape.

COOPERATION. -- Record provided by the North Dakota State Water Commission since December 1984.

DATUM. -- Altitude of land-surface datum is 1,880 ft. Measuring point: Top of casing 2.30 ft above land-surface datum.

PERIOD OF RECORD .-- December 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.21 ft below land-surface datum, July 31, 1987, and June 27, 1984; lowest measured, 42.30 ft below land-surface datum, Dec. 2, 1970.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM. WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 1 NOV 29 JAN 6	39.10 39.20 39.25	MAY 3 JUNE 5	39.20 39.16	JULY 6 JULY 14	39.40 39.08	AUG 1 AUG 29	39.54 39.67

OLIVER COUNTY

470642101162701. Local number, 142-084-24BBA.
LOCATION.--Lat 47°06'42", long 101°16'27", Hydrologic Unit 10130101.
Owner: North Dakota State Water Commission.
AQUIFER.--Fox Hills Sandstone.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 4 in, depth 1,295 ft, cased to 966 ft, steel pipe, open ended.

INSTRUMENTATION .-- Measured quarterly using a steel tape.

DATUM. -- Altitude of land-surface datum is 2,006 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD.--January 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 197.04 ft below land-surface datum, Dec. 8, 1972; lowest measured, 201.85 ft below land-surface datum, Aug. 6, 1987.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER
NOV 21	198.87	SEPT 14	199.40
NOV 21	198.87	SEPT 14	199.40

PEMBINA COUNTY

485239097501702. Local number, 162-056-01CCC2. LOCATION.--Lat 48°52'39", long 097°50'17", Hydrologic Unit 09020313. Owner: North Dakota State Water Commission.

AQUIFER . -- Icelandic.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 40 ft, cased to 37 ft, plastic pipe,
No. 12 slot screen set 37 to 40 ft below land-surface datum.

INSTRUMENTATION. -- Measured quarterly using a steel tape.

DATUM. -- Altitude of land-surface datum is 988 ft. Measuring point: Top of casing 1.80 ft above land-surface datum.

PERIOD OF RECORD .-- October 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.-Highest water level measured, 4.65 ft below land-surface datum, May 21, 1970; lowest measured, 9.47 ft below land-surface datum, Oct. 14, 1988 and Aug. 22, 1989.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 14	9.47	JAN 24	8.85	JUNE 2	8.03	AUG 22	9.47

PIERCE COUNTY

475323100092101. Local number, 151-074-20AAA.
LOCATION.--Lat 47°53'23", long 100°09'21", Hydrologic Unit 09020202.
Owner: North Dakota State Water Commission.

AQUIFER . -- New Rockford.

WELL CHARACTERISTICS. -- Drilled observation well, diameter 1.25 in, depth 320 ft, cased to 256 ft, plastic pipe, No. 18 slot screen set 256 to 259 ft below land-surface datum.

INSTRUMENTATION. -- Measured quarterly using a steel tape.

DATUM. -- Altitude of land-surface datum is 1,605 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD .-- November 1968 to current year.

EXTREMES FOR PERIOD OF RECORD. --Highest water level measured, 28.08 ft below land-surface datum, Nov. 29, 1976; lowest measured, 35.18 ft below land-surface datum, August 24, 1989.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 14 NOV 22	33.96 33.90	MAY 23	33.65	JULY 11	34.20	AUG 24	35.18

RICHLAND COUNTY

462633097163402. Local number, 134-052-06CCD2.
LOCATION.--Lat 46°26'33", long 097°16'34", Hydrologic Unit 09020204.
Owner: North Dakota State Water Commission.

AQUIFER .-- Sheyenne Delta.

WELL CHARACTERISTICS. -- Drilled observation well, diameter 4 in, depth 40 ft, cased to 30 ft, plastic pipe, slotted 30 to 40 ft below land-surface datum.

INSTRUMENTATION .-- Water level recorder October 1965 to current year. Prior to February 1972 only 5-day low and EOM water levels are available.

DATUM.--Altitude of land-surface datum is 1,067 ft. Measuring point: Top of casing 0.65 ft above land-surface datum.

REMARKS. -- Key well reported in monthly Water Resources Review.

PERIOD OF RECORD. -- September 1963 to current year.

EXTREMES FOR PERIOD OF RECORD. -- Highest recorded water level, 0.78 ft below land-surface datum, May 13, 1972; lowest recorded, 9.12 ft below land-surface datum, Mar. 8-11, 1989.

DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET), WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989 MAXIMUM VALUES (DAILY-LOW WATER-LEVEL)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	8.73	8.80	8.81	9.00	8.98	9.11	6.81	6.18	6.56	7.07	7.85	8.28
10	8.75	8.81	8.82	9.01	9.03	9.12	5.85	6.29	6.77	7.29	8.01	8.34
15	8.75	8.79	8.89	9.01	9.05	9.01	5.79	6.49	6.84	7.46	8.10	8.37
20	8.77	8.78	8.95	9.02	9.05	9.02	5.77	6.29	6.99	7.36	8.21	8.42
25	8.80	8.77	8.97	9.00	9.08	8.88	5.89	6.29	6.83	7.61	8.27	8.30
EOM	8.80	8.80	8.98	8.99	9.08	7.90	6.02	6.34	6.70	7.70	8.25	8.34
MAX	8.81	8.81	8.98	9.02	9.08	9.12	7.77	6.53	7.02	7.70	8.32	8.42
WATER	YEAR 1989		HIGH	EST WATER	LEVEL 5.0	67 APR 15			LOWEST	WATER LEVEL	9.12 MAR	8-11

STARK COUNTY

465755102410701. Local number, 140-095-08AAA.
LOCATION.--Lat 46°57'55", long 102°41'07", Hydrologic Unit 10130204.
Owner: North Dakota State Water Commission.

AQUIFER . -- Sentinel Butte.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 4 in, depth 160 ft, cased to 80 ft, plastic pipe, open ended.

INSTRUMENTATION . -- Measured monthly using a steel tape.

DATUM .-- Altitude of land-surface datum is 2,419 ft. Measuring point: Top of casing 1.70 ft above land-surface da tum.

REMARKS.--Key well reported in monthly Water Resources Review. PERIOD OF RECORD.--December 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 15.61 ft below land-surface datum, June 19, 1970; lowest measured, 20.41 ft below land-surface datum, Mar. 21, 1969. During well construction a measurement of 27.23 ft below land-surface datum was made (Dec. 10, 1968), but was not considered to be the result of natural conditions.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24 NOV 21	19.67 19.69	JAN 21 FEB 21	19.78 19.85	APR 21 MAY 22	18.98 18.75	JULY 24 AUG 21	18.86 19.33
DEC 20	19.75	MAR 21	19.30	JUNE 23	18.39	SEPT 22	19.60

369

STEELE COUNTY

GROUND-WATER LEVELS

471601097371001. Local number, 144-055-26BBB.
LOCATION.--Lat 47°16'01", long 097°37'10", Hydrologic Unit 09020109.
Owner: North Dakota State Water Commission.

AQUIFER. -- Galesburg.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 1.25 in, depth 300 ft, cased to 53 ft, plastic pipe, slotted 53 to 68 ft below land-surface datum.

INSTRUMENTATION. -- Measured monthly, except during the winter, using a steel tape.

COOPERATION. -- Record provided by the North Dakota State Water Commission since 1982.

DATUM. -- Altitude of land-surface datum is 1,160 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

PERIOD OF RECORD. -- June 1970 to current year.

EXTREMES FOR PERIOD OF RECORD. -- Highest water level measured, 16.20 ft below land-surface datum, Apr. 23, 1984; lowest measured, 25.32 ft below land-surface datum, Aug. 5, 1989.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 2	22.90	APR 16	21.90	JUNE 18	21.61	AUG 5	25.32
NOV 1	22.63	MAY 12	21.42	JULY 8	23.56	SEPT 2	24.20
DEC 9	22.23				0.00		

STUTSMAN COUNTY

463846098274101. Local number, 137-062-26DDD.
LOCATION.--Lat 46°38'46", long 098°27'41", Hydrologic Unit 10160003.
Owner: North Dakota State Water Commission.

AQUIFER . -- Spiritwood.

WELL CHARACTERISTICS. -- Drilled observation well, diameter 1.25 in, depth 240 ft, cased to 157 ft, plastic pipe, No. 12 slot screen set 157 to 163 ft below land-surface datum.

INSTRUMENTATION. -- Measured monthly, except during the winter, using a steel tape.

COOPERATION. -- Record provided by the North Dakota State Water Commission since 1982.

DATUM. -- Altitude of land-surface datum is 1,455 ft. Measuring point: Top of casing 1.80 ft above land-surface datum.

PERIOD OF RECORD. -- September 1970 to current year.

EXTREMES FOR PERIOD OF RECORD. -- Highest water level measured, 15.20 ft below land-surface datum, Sept. 6, 1979; lowest measured, 20.67 ft below land-surface datum, May 28, 1973.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 18	16.74	APR 20	17.15	JUNE 22	16.83	AUG 16	16.85
DEC 11	16.85	MAY 18	16.82	JULY 19	16.96	SEPT 14	16.71

TRAILL COUNTY

473228097051501. Local number, 147-051-22BBB.
LOCATION.--Lat 47°32'28", long 097°05'15", Hydrologic Unit 09020301.
Owner: North Dakota State Water Commission.

AQUIFER . -- Hillsboro.

AQUIFER.--Hillsboro.
WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 103 ft, cased to 97 ft, plastic pipe,
No. 18 slot screen set 97 to 100 ft below land-surface datum.
INSTRUMENTATION.--Measured quarterly using a steel tape.
DATUM.--Altitude of land-surface datum is 925 ft. Measuring point: Top of casing 2.40 ft above land-surface

datum.

PERIOD OF RECORD. -- August 1965 to current year.

EXTREMES FOR PERIOD OF RECORD. -- Highest water level measured, +1.90 ft above land-surface datum, July 4, 1979; lowest measured, 7.27 ft below land-surface datum, Aug. 17, 1965.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL			
DEC 9 MAR 6	1.60	JUNE 2	0.50	AUG 9	3.67	AUG 25	3.40	

WALSH COUNTY

481657097473601. Local number, 156-056-36CCC1. LOCATION.--Lat 48°16'57", long 097°47'36", Hydrologic Unit 09020308. Owner: North Dakota State Water Commission.

AQUIFER . -- Fordville.

WELL CHARACTERISTICS.--Drilled observation well, diameter 1.25 in, depth 280 ft, cased to 27 ft, plastic pipe,
No. 18 slot screen set 27 to 30 ft below land-surface datum.

INSTRUMENTATION.--Measured quarterly using a steel tape.

DATUM.--Altitude of land-surface datum is 1,145 ft. Measuring point: Top of casing 1.85 ft above land-surface

datum.

PERIOD OF RECORD.--May 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 4.98 ft below land-surface datum, June 3, 1987; lowest measured, 6.98 ft below land-surface datum, Mar. 11, 1985.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM. WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL			
OCT 27 DEC 6	6.06 6.07	JAN 25	5.94	MAY 9	5.96	SEPT 7	6.38	

WALSH COUNTY

482408097443201. Local number, 157-055-21DBC.
LOCATION.--Lat 48°24'08", long 097°44'32", Hydrologic Unit 09020301.
Owner: North Dakota State Water Commission.

AQUIFER .-- Dakota Formation.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 4 in, depth 496 ft, cased to 491 ft, steel pipe, screen set 491 to 496 ft below land-surface datum.

INSTRUMENTATION. -- Measured quarterly using a steel tape.

DATUM. -- Altitude of land-surface datum is 975 ft. Measuring point: Top of casing at land-surface datum.

PERIOD OF RECORD. -- May 1968 to current year.

EXTREMES FOR PERIOD OF RECORD. -- Highest water level measured, 88.84 ft below land-surface datum, Mar. 9, 1982; lowest measured, 92.75 ft below land-surface datum, Sept. 17, 1974.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	
OCT 27 DEC 6	91.29 91.50	JAN 25	91.49	MAY 9	91.35	AUG 23	91.60	

WALSH COUNTY

482449098095801. Local number, 157-058-18DDD.
LOCATION.--Lat 48°24'49", long 098°09'58", Hydrologic Unit 09020308.
Owner: North Dakota State Water Commission.

AQUIFER .-- Pierre Shale.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 4 in, depth 140 ft, cased to 80 ft, plastic pipe, slotted screen set 80 to 100 ft below land-surface datum.

INSTRUMENTATION. -- Measured quarterly using a steel tape.

DATUM. -- Altitude of land-surface datum is 1,580 ft. Measuring point: Top of casing 1.00 ft above land-surface datum.

PERIOD OF RECORD .-- June 1968 to current year.

EXTREMES FOR PERIOD OF RECORD. -- Highest water level measured, +0.89 ft above land-surface datum, Dec. 5, 1972; lowest measured, 9.15 ft below land-surface datum, Mar. 14, 1977.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 27 DEC 6	7.27	JAN 23	7.49	JUNE 7	6.29	AUG 23	7.90

371

WARD COUNTY

GROUND-WATER LEVELS

480912101090301. Local number, 154-082-24ABA. LOCATION.--Lat 48°09'12", long 101°09'03", Hydrologic Unit 09010001. Owner: North Dakota State Water Commission.

AQUIFER .-- Lower Souris.

WELL CHARACTERISTICS. -- Drilled observation well, diameter 1.25 in, depth 115 ft, cased to 10 ft, plastic pipe, slotted screen set 10 to 40 ft below land-surface datum.

INSTRUMENTATION. -- Measured quarterly using a steel tape.

DATUM. -- Altitude of land-surface datum is 1,850 ft. Measuring point: Top of casing 1.70 ft above land-surface

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 10.84 ft below land-surface datum, June 17, 1965; lowest measured, 16.79 ft below land-surface datum, Sept. 24, 1989.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE NOV 21	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21 DEC 11	16.06 16.13	MAR 25	15.44	JUNE 24	15.79	SEPT 24	16.79

WELLS COUNTY

474419099371201. Local number, 149-070-09DAA1. LOCATION.--Lat 47°44'19", long 099°37'12", Hydrologic Unit 10160001. Owner: North Dakota State Water Commission.

AQUIFER .-- New Rockford.

WELL CHARACTERISTICS. -- Drilled observation well, diameter 1.25 in, depth 283 ft, cased to 177 ft, plastic pipe, slotted 177 to 197 ft below land-surface datum.

INSTRUMENTATION. -- Measured quarterly using a steel tape.

DATUM. -- Altitude of land-surface datum is 1,610 ft. Measuring point: Top of casing 1.80 ft above land-surface datum.

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 64.02 ft below land-surface datum, Dec. 10, 1986; lowest measured, 66.65 ft below land-surface datum, Mar. 15, 1967.

WATER LEVEL, IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 13	64.32	NOV 22	64.30	MAY 23	64.10	AUG 24	64.20

WILLIAMS COUNTY

483048103373101. Local number, 158-100-17ADA.
LOCATION.--Lat 48°30'48", long 103°37'31", Hydrologic Unit 10110102.
Owner: North Dakota State Water Commission.

AQUIFER .-- Little Muddy.

WELL CHARACTERISTICS .-- Drilled observation well, diameter 1.25 in, depth 52 ft, cased to 35 ft, plastic pipe, slotted 35 to 43 ft below land-surface datum.

INSTRUMENTATION. -- Measured quarterly using a steel tape.

DATUM. -- Altitude of land-surface datum is 1,987 ft. Measuring point: Top of casing 2.00 ft above land-surface datum.

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 18.02 ft below land-surface datum, June 5, 1979; lowest measured, 23.99 ft below land-surface datum, Aug. 9, 1988.

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 15	21.22	FEB 15	20.90	MAY 17	21.45	AUG 10	23.38

QUALITY OF GROUND WATER

STATION NUMBER	LOCAL IDENTIFIER	GEO- LOGIC UNIT	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH (STAND- ARD UNITS) (00400)	TEMPER- ATURE AIR (DEG C) (00020)
		ВО	WMAN COUNTY						
460705103005301 460645103021801 460705103025601 4606451030333302 460705103041101	130-099-01BBB 130-099-03ADD 130-099-03BAA 130-099-04ADD2 130-099-04BAA	125TRVL 125TRVL 125TRVL 125TRVL 125TRVL	09-18-89 09-15-89 09-15-89 09-26-89 09-27-89	1355 0935 1235 1600 1440	27.86 4.08 20.62 17.52	60.00 64.00 70.00 50.00 47.00	2360 7010 6480 7500 4380	8.70 8.20 8.50 7.00 7.10	22.0 28.0 29.5 21.0 32.5
461355103055701 460902103043601 461355103043303	131-099-19DDD 131-099-21CCB1 131-099-21CCC3	125TRVL 125TRVL 125TRVL 125TGRVL 125HRMN	09-27-89 09-27-89 09-25-89 09-21-89 09-21-89	1441 1441 1350 1050 1550	12.70 25.74 57.74 77.49	47.00 47.00 74.00 80.00 152.00	4380 4380 2800 1850 1710	7.10 7.10 8.40 8.00 8.80	32.5 32.5 19.0 13.0 20.0
460856103024401 460856103020701 460856103020702 460804103010101 460843103032001	131-099-22DCC1 131-099-23CCC1 131-099-23CCC2 131-099-26DDC1 131-099-27BBC1	125HRMN 125TRVL 125TRVL 125TRVL 125TGRVL	09-22-89 09-20-89 09-20-89 09-26-89 09-07-89	1305 1510 1155 1145 1310	45.29 77.56 75.08 45.49 53.16	76.00 170.00 100.00 76.00 86.00	3920 1380 2600 1400 4520	7.30 8.80 8.50 8.40 7.80	11.0 17.5 12.0 16.0 22.0
460843103032003 460823103030301 460816103032701 460816103032702 460830103044504	131-099-27BBC3 131-099-27CAB 131-099-27CBC1 131-099-27CBC2 131-099-29ADD4		09-06-89 09-08-89 08-24-89 08-25-89 09-14-89	1800 1320 1645 1450 1410	59.54 19.72 48.98 48.94 58.79	160.00 38.00 80.00 60.00 80.00	1640 4290 2740 2800 1900	8.80 7.20 7.70 7.50 8.30	19.0 19.0 36.0 36.0 27.0
460849103053201 460834103055501 460823103053201 460804103052301 460810103051301	131-099-29BAB 131-099-29BCC 131-099-29CAB 131-099-29CDD 131-099-29DCB	125TRVL 125TGRVL 125TRVL 125HRMN 125TRVL	09-12-89 09-13-89 09-12-89 09-13-89 09-14-89	1735 1550 1505 1050 0950	19.55 13.26 9.00 14.49 15.06	33.00 53.00 30.00 32.00 22.00	5390 1750 5810 10500 5720	7.90 9.30 7.40 8.00 8.00	15.0 22.0 17.0 17.0 20.0
460751103044501 460718103045501 460747103032902 460747103032903 460757103021601	131-099-32AAD 131-099-32DDB 131-099-33ADA2 131-099-33ADA3 131-099-34AAA	125TGRVL 125TRVL	09-12-89 09-27-89 09-19-89 09-19-89 09-08-89	1015 1045 1130 1450 1000	12.62 12.06 6.51 6.52 21.94	23.00 65.00 38.00 76.00 41.00	7500 2900 2660 2580 8900	8.00 8.60 8.90 10.90	13.0 29.0 20.0 22.5 16.0
460744103014801	131-099-35BDB1	125TRVL	09-19-89	1755	38.00	78.00	1370	8.80	20.0

QUALITY OF GROUND WATER

STATION NUMBER	DATE	TEMPER- ATURE WATER (DEG C) (00010)	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 PERCENT (00932)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVEL (MG/L AS K) (00935)
				BOW	MAN COUNT	Y					
460705103005301 460645103021801 460705103025601 460645103033302 460705103041101	09-18-89 09-15-89 09-15-89 09-26-89 09-27-89	9.0 13.5 8.5 8.5 10.5	4.6 4.5 4.9 5.5 5.4	45 49 48 53 54	69 220 140 1900 730	12 22 16 200 130	9.5 40 24 350 98	500 1600 1600 1400 830	94 94 96 61 71	27 48 60 14 14	4.7 13 11 14 16
461355103055701 460902103043601 461355103043303	09-27-89 09-27-89 09-25-89 09-21-89 09-21-89	10.5 10.5 9.0 8.5 9.0	5.4 5.4 3.5 2.7	54 54 34 26	700 73 1000 20	130 13 220 5•4	90 9.9 110 1.6	800 620 65 410	71 94 12 97	14 32 0.9 41	13 7.0 9.5 2.3
460856103024401 460856103020701 460856103020702 460804103010101 460843103032001	09-22-89 09-20-89 09-20-89 09-26-89 09-07-89	8.5 9.0 8.5 9.0 8.5	3.8 2.3 2.8	36 22 27	1600 26 62 14 370	300 5.6 12 3.3 62	210 2.8 7.7 1.5 52	490 330 570 310 1000	40 96 95 97 85	5 29 32 37 23	15 1.8 4.9 2.4 6.1
460843103032003 460823103030301 460816103032701 460816103032702 460830103044504	09-06-89 09-08-89 08-24-89 08-25-89 09-14-89	8.0 8.0 10.0 10.0 8.5	10.6 3.9 	100 37 	14 2300 300 320 140	3.1 400 52 56 28	1.5 310 41 44 18	390 370 510 500 390	98 26 78 77 84	47 3 13 12 14	2.3 11 8.9 8.6
460849103053201 460834103055501 460823103053201 460804103052301 460810103051301	09-12-89 09-13-89 09-12-89 09-13-89 09-14-89	8.5 8.0 12.0 8.5 9.5	5.2 4.1 3.0 4.7	50 39 31 46	2600 18 1300 2400 1900	430 5.0 250 340 330	360 1.4 160 380 270	590 400 1100 2300 860	33 98 65 67 49	5 42 14 21 9	12 2.9 22 14 39
460751103044501	09-12-89	9.5	5.3	52	3800	470	640	930	35	7	18
460849103053201 460834103055501 460823103053201 460804103052301 460810103051301	09-12-89 09-13-89 09-12-89 09-13-89 09-14-89	8.5 8.0 12.0 8.5 9.5	5.2 4.1 3.0 4.7	50 39 31 46	2600 18 1300 2400 1900	430 5.0 250 340 330	360 1.4 160 380 270	590 400 1100 2300 860	33 98 65 67 49	5 42 14 21 9	12 2.9 22 14 39
460751103044501 460718103045501 460747103032902 460747103032903 460757103021601	09-12-89 09-27-89 09-19-89 09-19-89 09-08-89	9.5 11.0 9.0 9.0 8.5	5.3 5.0 4.4	52 49 43	3800 560 120 28 340	470 94 23 6.3 25	640 78 14 2.9 67	930 500 570 630 1500	35 66 91 98 90	7 9 24 54 36	18 13 6.0 3.1 30
460744103014801	09-19-89	9.5	6.0	59	24	6.1	2.2	330	96	30	2.0

QUALITY OF GROUND WATER

STATION NUMBER	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 IT FIELD MG/L AS CACO3 (OO419)	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)
				BOW	MAN COUNT	Y					
460705103005301 460645103021801 460705103025601 460645103033302 460705103041101	09-18-89 09-15-89 09-15-89 09-26-89 09-27-89	598 571 387 330	34 0 8 0	547 468 330 270	720 3600 3400 4900 2100	10 15 12 2.1 9.0	0.10	7.5 11 10 3.8 13	1600 5620 5070 7270 3460	1590 5580 5270 7040 3450	2.18 7.64 6.90 9.89 4.71
461355103055701 460902103043601 461355103043303	09-27-89 09-27-89 09-25-89 09-21-89 09-21-89	595 403 757	19 0 24	520 330 660	2200 950 870 480	2.9 5.2 17 30	0.10	14 8.0 10	3400 1890 1540 1230	3500 1920 1500 1340	4.62 2.57 2.09 1.67
460856103024401 460856103020701 460856103020702 460804103010101 460843103032001	09-22-89 09-20-89 09-20-89 09-26-89 09-07-89	759 561 533 820	29 14 6 0	670 484 447 672	2100 340 920 280 1900	37 33 5.8 6.0	0.40	6.4 9.5 7.5 8.0	3660 1070 1830 870 3510	3460 1130 1820 880 3450	4.98 1.46 2.49 1.18 4.77
460843103032003 460823103030301 460816103032701 460816103032702 460830103044504	09-06-89 09-08-89 08-24-89 08-25-89 09-14-89	737 864 561 586 647	48 0 0 0	684 708 460 480 530	190 2400 980 990 560	13 14 5.6 5.5 5.1	=======================================	9.5 13 <0.50 17 9.0	1060 4180 1920 1920 1310	1020 3950 1870 1900 1340	1.44 5.68 2.61 2.61 1.78
460849103053201 460834103055501 460823103053201 460804103052301 460810103051301	09-12-89 09-13-89 09-12-89 09-13-89 09-14-89	305 616 1400 853 935	0 69 0 0	250 621 1150 699 766	3700 330 2700 6600 3300	24 6.8 14 11 4.7	=	11 10 21 10 35	5280 1140 4960 10700 5100	5280 1130 4960 10100 5300	7.18 1.55 6.75 1.32 6.94
460751103044501 460718103045501 460747103032902 460747103032903 460757103021601	09-12-89 09-27-89 09-19-89 09-19-89 09-08-89	1340 528 680 669 24	0 0 19 31 62	1100 432 589 600 84	4900 1300 870 800 3800	6.7 1.6 5.0 8.7	=	24 10 7.4 8.0 1.0	8410 2190 1850 1740 5420	7650 2260 1850 1820 5510	11.4 2.98 2.52 2.37 7.37
460744103014801	09-19-89	690	28	612	390	33		9.0	1100	1140	1.50

STATION NUMBER	DATE	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (OO631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHOROUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	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)
				BOW	MAN COUNT	Y					
460705103005301 460645103021801 460705103025601 460645103033302 460705103041101	09-18-89 09-15-89 09-15-89 09-26-89 09-27-89	0.100 0.180 0.050 <0.010	<0.100 0.350 <0.100 <0.100	0.410 0.490 0.440 1.30	0.100 0.040 0.040 <0.010	2 2 <1 <1 <1	 3500	680 20 20 1000 840	 1	230	60 160 60 3000 470
461355103055701 460902103043601 461355103043303	09-27-89 09-27-89 09-25-89 09-21-89 09-21-89	0.030 <0.010 0.390	<0.100 <0.100 0.310	0.300 0.090 0.660	0.180 <0.010 0.840	<1 1 1 2	3600 	1800 40 49 460	<1 <1 	230	500 80 240 44
460856103024401 460856103020701 460856103020702 460804103010101 460843103032001	09-22-89 09-20-89 09-20-89 09-26-89 09-07-89	0.420 0.030 0.040 <0.010	0.140 <0.100 <0.100 <0.100	0.620 0.330 0.210 0.670	0.740 0.190 0.240 0.070	2 1 1 <1 5	530 	100 560 70 55 80	1 	100	340 51 20 17 150
460843103032003 460823103030301 460816103032701 460816103032702 460830103044504	09-06-89 09-08-89 08-24-89 08-25-89 09-14-89	0.080 <0.010 0.010 0.010 <0.010	<0.100 <0.100 <0.100 <0.100 <0.100	0.310 1.60 0.350 0.250 0.530	0.600 <0.010 0.050 0.050 0.020	4 2 <1 <1 <1	=	240 240 30 40	=======================================	=======================================	18 3800 50 70 33
460849103053201 460834103055501 460823103053201 460804103052301 460810103051301	09-12-89 09-13-89 09-12-89 09-13-89 09-14-89	<0.010 0.050 <0.010 0.020 <0.010	0.610 <0.100 <0.100 <0.100 <0.100	0.640 0.410 1.20 0.940 0.890	<0.010 0.240 <0.010 0.020 <0.010	<1 <1 5 <1 2	=======================================	20 65 220 220 310	=	=======================================	120 10 530 610 550
460751103044501 460718103045501 460747103032902 460747103032903 460757103021601	09-12-89 09-27-89 09-19-89 09-19-89 09-08-89	0.050 <0.010 <0.010 0.050 0.030	1.10 <0.100 <0.100 <0.100 0.120	0.670 1.10 0.090 0.460 0.090	<0.010 0.010 0.120 0.300 0.010	<1 <1 1 1 <1	=	70 80 100 80 10	=	=	2800 190 40 30 <10
460744103014801	09-19-89	0.400	0.220	0.660	0.750	3		330	44:		66

QUALITY OF GROUND WATER

STATION NUMBER	DATE	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)	CARBON, ORGANIC TOTAL (MG/L AS C) (00680)	CARBON, INOR- GANIC, TOTAL (MG/L AS C) (00685)	C-13 / C-12 STABLE ISOTOPE RATIO PER MIL (82081)	H-2 / H-1 STABLE ISOTOPE RATIO PER MIL (82082)	O-18 / O-16 STABLE ISOTOPE RATIO PER MIL (82085)	S-34 / S-32 STABLE ISOTOPE RATIO PER MIL (82086a
				BOW	MAN COUNT	.Y					
460705103005301	09-18-89			<1		39	100	-12.90			
460645103021801	09-15-89			<1		8.9	91	-11.70			-16.17
460705103025601	09-15-89			<1		14	62	-13.40			-16.43
460645103033302				<1		3.8	67	-14.10			-19.96
460705103041101	09-27-89	<0.1	<1	<10	3900						1 0 7
	09-27-89										
	09-27-89	0.1	<1	<1	3300						
461355103055701				<1		36	100	-10.30			
460902103043601	09-21-89			<1		2.2	66	-9.80			-13.09
461355103043303	09-21-89			<1		96	110	-10.70	-		
460856103024401		<0.1	28	<10	4300						
460856103020701	09-20-89			<1		160	120	-8.30			
460856103020702				<1		13	93	-10.50			-5.22
460804103010101				<1		10	88	-10.10		==	
460843103032001	09-07-89			<1		9.3	150	-14.40	-129.5	-16.85	
460843103032003	09-06-89			<1		90	150	-8.50	-137.0	-17.60	
460823103030301				<1		8.0	130	-15.50			-17.10
460816103032701				<1		14	100	-11.00	-130.0	-17.05	
460816103032702				<1		15	110	-12.10	-129.5	-16.95	
460830103044504				<1		6.3	100	-10.70	-		-11.10
460849103053201	09-12-89			6		6.8	52	-10.70			-18.10
460834103055501				<1		18	110	-9.40			
460823103053201	09-12-89			<1		49	160	-15.80			-15.45
460804103052301				<1		140	130	-13.80			
460810103051301	09-14-89			<1		31	140	-16.10			-14.17
460751103044501	09-12-89			<1		64	160	-11.80			-20.96
460718103045501	09-27-89			<1		16	87	-13.50			-16.03
460747103032902	09-19-89			<1		5.5	110	-12.40			-11.03
460747103032903	09-19-89			<1		16	110	-10.80			
460757103021601	09-08-89			<1		9.4	3.9	-15.00		-	-20.23
460744103014801	09-19-89			<1		150	110	-9.40			-

a - Some analytical results were not available at time of publication. These results will be available, upon request, at a later date.

RED RIVER OF THE NORTH BASIN

484714097442301 ICELANDIC STATE PARK, ND (National Trends Network precipitation-quality station)

LOCATION.--Lat 48°47'14", long 97°44'23", in SW1/4NW1/4SW1/4 sec. 10, T.161 N., R.55 W., Pembina County, Hydrologic Unit 09020313, at Icelandic State Park 5.6 mi west of Cavalier.

PERIOD OF RECORD. -- October 1983 to current year (weekly composite).

INSTRUMENTATION. -- The composite sample collector is an Aerochem Metrics 1/model 301 wet/dry precipitation collector mounted on ground surface. Precipitation quantity is determined by a Belfort 1/model 5-780 recording rain gage equipped with an event recorder and an Alter-type wind screen. The recording rain gage is installed 20 ft east of the sample collector with gage mouth and collector bucket elevations of 50.75 in above land surface. A nonrecording National Weather Service rain gage is installed 28 ft south of the composite sample collector as a quality check on weekly composite precipitation volume.

REMARKS.--Data presented are provisional analyses by the Central Analytical Laboratory of the Illinois State Water Survey and have not completed quality-assurance review by the National Atmospheric Deposition Program. Unless noted starting and ending time for composite period is 9:00 a.m.

COOPERATION. -- Onsite observers are provided by the North Dakota State Parks and Recreation Department.

PRECIPITATION-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

PERIOD OF COLLECTION	PRECIP- ITATION TOTAL INCHES/ WEEK (00046)	COL- LECTOR EFFI- CIENCY WET DEPOS. PERCENT (82284)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	SPE- CIFIC CON- DUCT- ANCE LAB (US/CM) (90095)	PH (STAND- ARD UNITS) (00400)	PH LAB (STAND- ARD UNITS) (00403)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
09/27 to 10/04 10/04 to 10/11 10/11 to 10/18 10/18 to 10/25	0.03 0.0 0.10 0.09	433 100	8.6 18.0 19.7	a1.8	5.36 4.80 6.21	a5.70	0.408 a<.009 .608 1.421
10/25 to 11/01 11/01 to 11/08 11/08 to 11/15 11/15 to 11/22	0.03 b0.0 0.70 b0.0	100 >700 76 >400	10.0	23.6 21.0 5.0	4.68	6.65 6.69 6.18	.955 1.012 .154 .055
11/22 to 11/29 11/29 to 12/06 12/06 to 12/13 12/13 to 12/20	0.0	>100 >100 >900	3.9	a10.4 a13.5	5.46	a6.51 6.12 a6.56	a.134 a<.384 .126
12/20 to 12/27 12/27 to 01/03 01/03 to 01/10 01/10 to 01/17	0.40 0.30 0.58 0.30	40 63 9.0 67	6.1 9.1 5.5 5.6	Ξ	5.33 4.77 4.90 5.01	Ξ	.071 .039 .161 .042
01/17 to 01/24 01/24 to 01/31 01/31 to 02/07 02/07 to 02/14	0.10 0.12 0.0 0.0	20 92 	13.5	a _{7.7}	4.35	a6.17 	a.106 .078
02/14 to 02/21 02/21 to 02/28 02/28 to 03/07 03/07 to 03/14	0.0 0.07 0.0 0.13	14 100 62	20.4	a7.5	4.46	a5.84	a.240 .259
03/14 to 03/21 03/21 to 03/28 03/28 to 04/04 04/04 to 04/11 04/11 to 04/18	0.0 0.36 bo.0	47 == >200	5.7 4.7 13.7	a _{29.3}	5.24 4.79 4.76	a7.09	.125 .019 .121 a1.152

 $[\]frac{1}{2}$ The use of brand names in this report is for identification purposes only and does not imply endorsement by the U.S. Geological Survey.

a Data are laboratory determinations by the Central Analytical Laboratory of the Illinois State Water Survey. To provide for an adequate sample, 50 milliliters of dilution water was added.

b Trace of water collected in field sampler.

RED RIVER OF THE NORTH BASIN

484714097442301 ICELANDIC STATE PARK, ND (National Trends Network precipitation-quality station)

PRECIPITATION-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

PERIOD OF COLLECTION	PRECIP- ITATION TOTAL INCHES/ WEEK (00046)	COL- LECTOR EFFI- CIENCY WET DEPOS. PERCENT (82284)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	SPE- CIFIC CON- DUCT- ANCE LAB (US/CM) (90095)	PH (STAND- ARD UNITS) (00400)	PH LAB (STAND- ARD UNITS) (00403)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
04/18 to 04/25 04/25 to 05/02		·400	19.1		5.73		0.532
05/02 to 05/09	0.0	>100 89	17.7		5.85		1.227
05/09 to 05/16	0.0		17.7	a4.3	J.05	a5.39	a.261
05/16 to 05/23			12.1		5.86		.317
05/23 to 05/30			13.0		5.74		.647
05/30 to 06/06				a29.1		a6.76	a2.414
06/06 to 06/13	2.05	95	4.9		5.50		.311
06/13 to 06/20	0.10	120	5.1		5.41		.288
06/20 to 06/27	0.12	125	11.1		5.78		.976
06/27 to 07/04	0.82	107	8.4			6.04	.238
07/04 to 07/11	0.55	104	13.7		5.39		.565
07/11 to 07/18	0.0			a2.2		a5.98	a.020
07/18 to 07/25	0.0			a2.3		a5.77	a.041
07/25 to 08/01	0.10	100	18.6		5.53		.863
08/01 to 08/08	0.05	60		32.4		6.56	2.327
08/08 to 08/15	0.15	120	33.0		5.90		2.189
08/15 to 08/22	1.64	92	7.5		5.72		.241
08/22 to 08/29	0.35	109	7.3		4.92		.116
08/29 to 09/05	0.36	89		9.9	5.83	**	.309
09/05 to 09/12	0.47	94	6.8		5.43		.220
09/12 to 09/19	0.0			a1.6		a5.77	a.017
09/19 to 09/26	p0.0	>100		a23.9		a7.01	a1.085

a Data are laboratory determinations by the Central Analytical Laboratory of the Illinois State Water Survey. To provide for an adequate sample, 50 milliliters of dilution water was added.

b Trace of water collected in field sampler.

RED RIVER OF THE NORTH BASIN

484714097442301 ICELANDIC STATE PARK, ND (National Trends Network precipitation-quality station)

PRECIPITATION-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

			,	J 00102	,,,,,			
PERIOD OF COLLECTION	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHOROUS DIS- SOLVED (MG/L AS P) (00666)
09/27 to 10/04 10/04 to 10/11 10/11 to 10/18 10/18 to 10/25	0.083 a<.003 .097 .349	0.215 a.120 .240 1.19	0.071 a<.003 .063 .153	1.13 a<0.03 2.91 3.2	0.17 a0.04 0.14 0.15	0.240 a<0.010 0.390 0.230	0.260 a<0.020 0.640 0.260	0.030 a<0.007 <0.007 <0.007
10/25 to 11/01 11/01 to 11/08 11/08 to 11/15 11/15 to 11/22	.226 .255 .014 .008	.472 1.16 .025 .083	.122 .929 .006 <.003	3.27 1.45 0.60 0.19	0.20 1.69 0.07 0.09	0.590 0.280 0.340 0.110	1.40 0.360 0.140 0.360	0.037 0.023 <0.007 <0.007
11/22 to 11/29	a.024	a.162	a.020	ao.77	a0.20	a<0.030	a<0.060	a<0.027
11/29 to 12/06 12/06 to 12/13 12/13 to 12/20	a<.128 .027	a<.128 .043	a<.128 .017	a<1.28 0.27	a<1.28 0.10	a<0.290 0.080	a<0.660 <0.020	a<0.284 <0.007
12/20 to 12/27 12/27 to 01/03 01/03 to 01/10 01/10 to 01/17	.014 .009 .028 .007	.030 .028 .055 .024	.006 .005 .019 .009	0.35 0.23 0.31 0.23	0.07 0.06 0.08 0.04	0.240 0.290 0.190 0.160	0.020 0.020 <0.020 0.040	<0.007 <0.007 0.007 <0.007
01/17 to 01/24 01/24 to 01/31 01/31 to 02/07 02/07 to 02/14	a.021 .018	a.118 .056	a.009 <.003	a0.50 0.35 	a0.12 0.12 		a<0.050 0.040	a<0.020 <0.007
02/14 to 02/21 02/21 to 02/28 02/28 to 03/07 03/07 to 03/14	a.053	a.285	a<.013 .007	a _{0.49}	a<0.13 0.11	a<0.030 0.370	a<0.070 0.300	a<0.030 <0.007
03/14 to 03/21 03/21 to 03/28 03/28 to 04/04 04/04 to 04/11 04/11 to 04/18	.013 .003 .024 a.355	.132 .026 .124 a.684	.008 <.003 .008 a.038	0.29 0.31 1.44 a3.1		0.190 0.070 0.380 a0.570	0.160 0.100 0.500 a0.590	<0.007 <0.007 <0.007 <0.007 a<0.007
04/18 to 04/25 04/25 to 05/02	0.094	0.148	0.044	2.5	0.10	0.570	1.33	<0.007
05/02 to 05/09 05/09 to 05/16	.275 a.037	.189 a.037	.088 a.013	1.81 a0.11	0.10 a0.07	0.380 a0.040	0.800 a0.070	<0.007 a0.010
05/16 to 05/23 05/23 to 05/30 05/30 to 06/06 06/06 to 06/13	.061 .136 a.587 .070	.101 .100 a .783 .017	.029 .104 a .104 .024	1.53 1.32 a2.54 0.55	0.08 0.11 a0.62 0.04	0.420 0.430 a0.970 0.140	0.880 0.770 a0.230 0.260	<0.007 <0.007 a<0.022 <0.007
06/13 to 06/20 06/20 to 06/27 06/27 to 07/04 07/04 to 07/11	.036 .315 .049 .109	.103 .066 .025 .088	.033 .056 .025 .084	0.58 1.05 0.91 2.28	0.10 0.15 0.07 0.12	0.150 0.430 0.310 0.450	0.330	0.020 0.023 <0.007 <0.007
07/11 to 07/18 07/18 to 07/25 07/25 to 08/01 08/01 to 08/08	a.008 a.008 .226 .501	a.017 a.020 .092 .559	a.067 a.007 .133 .203	a _{0.08} a _{0.03} 2.34 2.72	a0.06 a0.06 0.22 0.38	a0.020 a0.020 0.710 1.36	a0.020 a<0.020 1.09 0.990	a<0.007 a<0.007 0.010 0.166
08/08 to 08/15 08/15 to 08/22 08/22 to 08/29 08/29 to 09/05	.496 .053 .023	.043 .028 .040 .078	.255 .038 .053 .055	2.21 0.77 0.78 0.85	0.18 0.05 0.08 0.11	1.05 0.200 0.230 0.400	1.71 0.400 0.290 0.570	<0.007 <0.007 <0.007 <0.007
09/05 to 09/12 09/12 to 09/19 09/19 to 09/26	.063 a.005 a.229	.041 a.017 a.667	.022 a.006 a.069	0.85 a0.03 a2.16	0.04 a0.04 a0.42	0.140 a0.010 a0.560	0.170 a0.020 a0.700	<0.007 a<0.007 a<0.046

a Data are laboratory determinations by the Central Analytical Laboratory of the Illinois State Water Survey. To provide for an adequate sample, 50 milliliters of dilution water was added.

470732099140204 WOODWORTH, ND (National Trends Network precipitation-quality station)

LOCATION.--Lat 47°14'32", long 99°14'02", in SE1/4SW1/4SW1/4 sec.12, T.142 N., R.68 W., Stutsman County, Hydrologic Unit 10160002, at U.S. Fish and Wildlife Service Northern Prairie Wildlife Research Center, Woodworth Experiment Station, 2.8 mi east and 1 mi south of Woodworth.

PERIOD OF RECORD. -- November 1983 to current year (weekly composite).

INSTRUMENTATION. -- The composite sample collector is an Aerochem Metrics 1/model 301 wet/dry precipitation collector mounted on ground surface. Precipitation quantity is determined by a Belfort 1/model 5-780 recording rain gage equipped with an event recorder and an Alter-type wind screen. The recording rain gage is installed 17 ft east of the sample collector with gage mouth and collector bucket elevations of 50.75 in above land surface. A Belfort 1/model 5-780 rain gage with Omnidata pod recorder is installed 30 ft east of the recording rain gage as a quality check on weekly composite precipitation volume.

REMARKS.--The station is located 300 ft west of an event sample-collection station which was operated by the North Dakota State Health Department (station discontinued 1987). Continuously recording meteorological instrumentation for air temperature, wind speed, and wind direction were installed 9.8 ft above land surface at the event station. Data presented are provisional analyses by the Central Analytical Laboratory of the Illinois State Water Survey and have not completed quality-assurance review by the National Atmospheric Deposition Program. Unless noted starting and ending time for composite periods is 9:00 a.m.

COOPERATION .-- Onsite observers are provided by the U.S. Fish and Wildlife Service.

PRECIPITATION-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

PERIOD OF COLLECTION	PRECIP- ITATION TOTAL INCHES/ WEEK (00046)	COL- LECTOR EFFI- CIENCY WET DEPOS. PERCENT (82284)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	SPE- CIFIC CON- DUCT- ANCE LAB (US/CM) (90095)	PH (STAND- ARD UNITS) (00400)	PH LAB (STAND- ARD UNITS) (00403)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
09/27 TO 10/04 10/04 TO 10/11 10/11 to 10/18 10/18 to 10/25	0.06 0.0 0.05 b0.0	100 100 100	10.2	a2.2	5.32 5.16	a5.95	0.452 a.020 .448
10/25 to 11/01 11/01 to 11/08 11/08 to 11/15 11/15 to 11/22	0.0 0.34 0.20 b0.0	88 50 100	19.7	30.4	5.39 5.64	6.18	.357 .086 1.664
11/22 to 11/29 11/29 to 12/06 12/06 to 12/13 12/13 to 12/20	0.0	100	=	a1.7 a8.9 a1.4 31.4	Ξ	a5.74 a6.12 a5.84 6.76	a.054 a.194 a.013 1.908
12/20 to 12/27 12/27 to 01/03 01/03 to 01/10 01/10 to 01/17	0.0 0.49 b0.0	6.0	Ξ	12.8 18.0 20.0	Ξ	6.45 7.07 6.39	1.989
01/17 to 01/24 01/24 to 01/31 01/31 to 02/07 02/07 to 02/14	0.0 0.0 0.0	Ξ	Ξ	a2.0 a1.8 	Ξ	a6.28 a6.10 a5.98	a.010 a.032 a.046
02/14 to 02/21 02/21 to 02/28 02/28 to 03/07 03/07 to 03/14	0.0 0.0 0.0 0.07	>14	Ξ	a1.8 a2.8 a1.9 a39.9	Ξ	a5.95 a6.22 a6.14 a7.27	a.010 a.116 a.023 a<.355
03/14 to 03/21 03/21 to 03/28 03/28 to 04/04 04/04 to 04/11 04/11 to 04/18	0.0 0.12 0.37 0.15 0.15	258 78 47 67	16.2 8.4 15.9 7.7	a2.9	5.52 5.75 5.63 5.75	a6.62 	a .687 .401 .082 .308 .291

^{1/} The use of brand names in this report is for identification purposes only and does not imply endorsement by the U.S. Geological Survey.

a Data are laboratory determinations by the Central Analytical Laboratory of the Illinois State Water Survey. To provide for an adequate sample, 50 milliliters of dilution water was added.

b Trace of water collected in field sampler.

JAMES RIVER BASIN

470732099140204 WOODWORTH, ND (National Trends Network precipitation-quality station)

PRECIPITATION-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

PERIOD OF COLLECTION	PRECIP- ITATION TOTAL INCHES/ WEEK (00046)	COL- LECTOR EFFI- CIENCY WET DEPOS. PERCENT (82284)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	SPE- CIFIC CON- DUCT- ANCE LAB (US/CM) (90095)	PH (STAND- ARD UNITS) (00400)	PH LAB (STAND- ARD UNITS) (00403)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
04/18 to 04/25 04/25 to 05/02 05/02 to 05/09 05/09 to 05/16	0.02 0.54 0.90 0.0	50 104 97	12.4	a35.4 a1.5	5.34 6.10	a7.34 a5.88	a1.231 .320 .351 a.020
05/16 to 05/23 05/23 to 05/30 05/30 to 06/06 06/06 to 06/13	0.75 0.20 1.11	108 140 104	9.3 10.7 5.6 7.1	=======================================	6.07 5.97 5.74 5.33	=======================================	•359 •429 •208 •050
06/13 to 06/20 06/20 to 06/27 06/27 to 07/04 07/04 to 07/11	0.03 0.40 0.0 0.05	167 85 100 180	12.0	11.1	5.79 4.69	6.68	.220 .552
07/11 to 07/18 07/18 to 07/25 07/25 to 08/01 08/01 to 08/08	0.75 0.0 0.90 0.25	108 98 92	11.8 11.7 13.1	a _{1.6}	4.72 5.75 5.00	a5.81	.049 a<.009 .397 .408
08/08 to 08/15 08/15 to 08/22 08/22 to 08/29 08/29 to 09/05	0.35 0.77 1.15	103 127 99	9.1 35.8 9.8 8.2	=	5.35 6.68 4.90 5.67	=======================================	.282 .165 .087 .257
09/05 to 09/12 09/12 to 09/19 09/19 to 09/26	0.85 0.0 0.25	98 88	5.1	a _{1.8}	5.27 4.23	a ₅ .93	.075 a.017 .182

a Data are laboratory determinations by the Central Analytical Laboratory of the Illinois State Water Survey. To provide for an adequate sample, 50 milliliters of dilution water was added.

b Trace of water collected in field sampler.

JAMES RIVER BASIN

470732099140204 WOODWORTH, ND (National Trends Network precipitation-quality station)

PRECIPITATION-QUALITY DATA, WATER YEAR OCTOBER 1988 TO SEPTEMBER 1989

PRECIFI	IAIION-QUA	DIII DAIA	, WALLER I	DAIL OCTOB	LIK 1700 I			
PERIOD OF COLLECTION	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N) (00618)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	PHOS- PHOROUS DIS- SOLVED (MG/L AS P) (00666)
09/27 to 10/04 10/04 to 10/11 10/11 to 10/18 10/18 to 10/25	0.088 a.009 .104	0.232 a.039 .490	0.060 a.024 .043	1.39 a0.07 1.87	0.18 a0.06 0.16	0.420 a<0.010 0.400	0.290 a<0.020 0.400	0.037 a0.027 0.030
10/25 to 11/01 11/01 to 11/08 11/08 to 11/15 11/15 to 11/22	.062 .018 .412	.092 .141 .0644	.054 .007 .138	2.11 0.55 3.38	0.09 0.06 0.26	0.860 0.220 2.05	1.34 0.070 1.01	<0.007 0.023 <0.007
11/22 to 11/29 11/29 to 12/06 12/06 to 12/13 12/13 to 12/20	a.011 a<.026 a<.003 .398	a .025 a .344 a .033 .351	a.004 a<.026 a<.003 .323	a<0.03 a0.44 a<0.03 4.95	a0.05 a0.44 a0.04 0.30	a0.010 a<0.060 a0.010 1.03	a<0.020 a<0.140 a0.030 0.090	a0.010 a<0.059 a0.017 <0.007
12/20 to 12/27 12/27 to 01/03 01/03 to 01/10 01/10 to 01/17	.117	.075	.062	1.40	0.10	0.540	<0.020	<0.007 <0.007
01/17 to 01/24 01/24 to 01/31 01/31 to 02/07 02/07 to 02/14	a<.003 a.006 a.007	a.021 a.032 a.023	a<.003 a<.003 a.006	a<0.03 a0.03 a0.05	a0.05 a0.04 a<0.03	a(0.010 a0.010 a0.010	a<0.020 a<0.020 a<0.020	a<0.007 a<0.007 a<0.007
02/14 to 02/21 02/21 to 02/28 02/28 to 03/07 03/07 to 03/14	a<.003 a.028 a<.003 a<.118	a.032 a.041 a.050 a.197	a<.003 a.007 a.005 a<.118	a0.04 a0.09 a<0.03 a<1.18	a0.08 a0.05 a0.11 a<1.18	a0.010 a0.030 a0.020 a<0.270	a0.110 a0.190 a0.040 a<0.610	a<0.007 a0.120 a<0.007 a<0.263
03/14 to 03/21 03/21 to 03/28 03/28 to 04/04 04/04 to 04/11 04/11 to 04/18	a.140 .062 .015 .088 .064	a.120 .078 .026 .072 .236	a.068 .032 .005 .021 .014	a0.87 2.04 0.92 2.79 0.78	a0.15 0.11 0.04 0.13 0.08	a0.600 0.670 0.250 1.85 0.500	a0.810 1.23 0.680 1.07 0.400	a<0.007 <0.007 <0.007 <0.007 <0.007
04/18 to 04/25 04/25 to 05/02 05/02 to 05/09 05/09 to 05/16	a0.187 .061 .067 a.005	a0.458 .070 .046 a<.003	a.092 .034 .041 a<.003	a2.58 1.26 1.24 a<0.03	a0.31 0.09 0.08 a<0.03	a3.69 0.990 0.360 a0.010	a1.06 0.550 0.710 a0.030	a<0.023 <0.007 <0.007 a0.010
05/16 to 05/23 05/23 to 05/30 05/30 to 06/06 06/06 to 06/13	.051 .063 .039 .011	.081 .132 .108 .023	.035 .059 .019 .020	1.13 1.34 0.74 0.56	0.09 0.11 0.13 0.04	0.340 0.370 0.160 0.160	0.580 0.640 0.300 0.320	<0.007 <0.007 <0.007 <0.007
06/13 to 06/20 06/20 to 06/27 06/27 to 07/04 07/04 to 07/11	.054 .099 	.328 .121 	.082 .065	1.10 1.55 2.53	0.15 0.14 0.25	0.220 0.500 0.710	0.210 0.680 	
07/11 to 07/18 07/18 to 07/25 07/25 to 08/01 08/01 to 08/08	.011 a<.003 .079 .069	.014 a .014 .046 .050	a .025 a .004 .047 .051	0.81 a<0.03 1.47 1.88	0.08 a0.04 0.11 0.09	0.280 a0.010 0.470 0.370	0.410 a0.040 0.770 0.430	<0.007 a0.010 <0.007 0.020
08/08 to 08/15 08/15 to 08/22 08/22 to 08/29 08/29 to 09/05	.073 .037 .017 .030	.078 .027 .045 .040	.039 .047 .016 .025	0.75 0.80 0.73 1.00	0.09 0.06 0.09 0.08	0.220 0.170 0.250 0.280	0.470 0.300 0.330 0.470	<0.007 <0.007 <0.007 <0.007
09/05 to 09/12 09/12 to 09/19 09/19 to 09/26	a.003 .034	.030 a.057 .029	.010 a<.003 .014	0.55 a<0.03 1.08	0.08 a0.11 0.10	0.060 a0.020 0.270	0.190 a<0.020 0.260	<0.007 a0.040 <0.007

a Data are laboratory determinations by the Central Analytical Laboratory of the Illinois State Water Survey. To provide for an adequate sample, 50 milliliters of dilution water was added.

	2.
Access to WATSTORE 34	Page Coal Lake Coulee near Hensler 23:
그 어느 하는데 있다고 있는데 생각하면 이 모든데 들어도 되었다면 하면 하는데 하는데 되었다. 그 사람이 그 나를 하는데	
Acre-foot (AC-FT, acre-ft), definition of 34	
Analyses of samples collected at miscellaneous	
surface-water quality sites360-361	
Analyses of samples collected at water-quality	
partial-record stations and	Concentration, suspended-sediment, definition of
miscellaneous sites372-376	Contents definition of 35
Apple Creek near Menoken275-276	Contents, definition of 35
Apple Creek basin, gaging-station records for268-276	Control, definition of 35
Apple Creek basin, miscellaneous sites 358	Cooperation
Aquifer, definition of 34	Crest-stage gage, definition of 35
Arrowwood Lake open-water site309-310	Cubic foot per second per square mile (CFSM),
Arrowwood Lake outflow site311-312	definition of 35
Artesian, definition of 34	Cubic foot per second, definition of 35
	Cubic foot per second-day, definition of 2
Bacteria, definition of 34	Cut Bank Creek at Upham1/8-1/
Fecal coliform, definition of 34	Cypress Creek near Sarles122-12
Fecal streptococcal, definition of 35	
Baldhill Creek near Dazey 77-78	Deep River below Cut Bank Creek near Upham180-18
Bear Creek near Oakes330-331	Deen River near Upham
Bear Den Creek near Mandaree203-205	Definition of terms 34-38
Bear Den Creek basin, gaging station	Des Lacs River at Foxholm
records for203-205	Des Lacs River near Kenmare
Beaver Creek (tributary to Goose River)	Devils Lake near Devils Lake 7
near Finley102-103	Discharge definition of 2
Beaver Creek (tributary to Little Missouri	instantaneous, definition of 2
River) near Trotters208-209	mean, definition of 35
Beaver Creek (tributary to Missouri River)	suspended-sediment, definition of 2
at Linton289-290	Dissolved, definition of 35
Beaver Creek basin, gaging-station records for289-290	Dissolved-solids concentration,
Bed material, definition of 35	definition of 35
Benson County, ground-water levels for 362	Divide County, ground-water levels for 36
Big Coulee near Churchs Ferry 69-70	Downstream order system
Biochemical oxygen demand (BOD),	Drainage area, definition of
definition of 35	Drainage basin, definition of
Bonnes Coulee near Velva 354	Dry Lake near Penn
Boundary Creek near Landa182-184	Dunn County, ground-water levels for 36
Bowman County, ground-water levels for 363	buill Country, ground-water levels for
Bowman County, miscellaneous ground-water	E. A. Patterson Lake near Dickinson245-247
quality sites372-376	East Branch Short Creek Reservoir near
Bowman-Haley Lake near Haley 291	Columbus 140
Brush Creek near Beulah223-224	Eddy County, ground-water levels for 36
Burleigh County, ground-water levels for 363	Edmore Coulee near Edmore
Burnt Creek near Bismarck241-242	Edmore Coulee Tributary near Webster 62-62
	Elm Creek near Golden Valley355,360-36
Burnt Creek basin, gaging-station records for241-242	Emmons County, ground-water levels for 36
Company 11 Private of Profes	
Cannonball River, at Breien286-288	Explanation of records 15-3
at Regent278-279	7 1 110 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
Cannonball River basin, gaging-station	Fecal coliform bacteria, definition of 35
records for278-288	
Cannonball River basin, miscellaneous sites 358	Forest River, at Minto111-11
Cedar Creek, near Haynes282-283	near Fordville109-110
near Raleigh284-285	7/
White Butte Fork, near Scranton280-281	Gage height (G.H.), definition of
Cells/volume, definition of 35	Gaging station, definition of
Cfs, definition of 35	Goose River at Hillsboro104-10
Channel A near Penn 71-73	Grand Forks County, ground-water levels for 36
Chemical oxygen demand (COD),	Grand River, North Fork, at Haley292-29
definition of 35	Grand River basin, gaging-station
Climate5	records for291-29
Coal Lake Coulee basin, gaging station	Green River near New Hradec250-25
neconds for	Chicae County ground-water records for

p	age	Pag
Ground-water level data, by counties:	480	James River, near Hecla, SD350-35
	362	near Manfred295-29
Dateman County	363	James River basin, gaging-station
D	363	records for295-35
Dinii da Garanta	363	miscellaneous measurement sites 35
Dumm Country	364	Jamestown Reservoir near Jamestown315-31
	364	Jim Lake near Pingree313-31
D C	364	Juanita Lake Tributary near Grace City300-30
A	365	dualities bake illibutery hear drace crty
Griggs County365-	366	Kolly Crook below Nicoum Poscovcin
Uatting and Control	366	Kelly Creek below Niccum Reservoir near Bordulac306-30
V1111 0- 1	366	Kidder County, ground-water records for 366
Mat and Count	367	Knife River, at Hazen227-229
014	367	at Manning219-220
Dambing Count	367	near Golden Valley221-222
Diaman Carata	368	
Diebi de Company	368	Knife River basin, gaging-station records in219-229
C+)- C+	368	
041- 01	369	crest-stage partial record stations for 35
C+	369	miscellaneous discharge measurements 35
m	369	water-quality partial-records stations
17-1-1 6	370	and miscellaneous sites360-36
Wand Carrate	371	Lake Ashtabula at Baldhill Dam 79
W-11- C	371	
	371	Lake Darling near Foxholm
Ground-water chemical analyses by counties:	, ,	Lake Oahe near Pierre, SD 29
Bowman County372-	376	Lake Sakakawea near Riverdale 21
Ground-water level records362-		Lake Tschida near Glen Ullin257-259
	,,,	Lakes and Reservoirs:
Hardness, definition of	36	Arrowwood Lake open-water site309-310
Heart River, above Lake Tschida near Glen Ullin-254-2	256	Arrowwood Lake outflow site311-312
at Dickinson248-2	249	Ashtabula, Lake, at Baldhill Dam 79
at Stark Bridge near Judson262-2		Bowman-Haley Lake, near Haley 29
near Lark260-2	261	Darling, Lake, near Foxholm 150
near Mandan264-2	266	Darling, Lake, near Grano148-149
near Richardton252-2	253	
near South Heart355,360-	361	Devils Lake, near Devils Lake
Heart River basin, gaging-stations	, , ,	E. A. Patterson Lake near Dickinson245-247
records for245-2	266	
crest-stage partial-record stations for355.		East Branch Short Creek Reservoir near Columbus
-111	358	Homme Reservoir near Park River 11
water-quality partial records stations	,,,,	Jamestown Reservoir near Jamestown315-317
and miscellaneous sites360-3	361	Jim Lake near Pingree313-314
	366	Morrison Lake near Webster
Hidden Island Coulee near Hansboro120-1		Oahe, Lake, near Pierre, SD 294
Hanne Branch Bra	113	Sakakawea, Lake, near Riverdale 21
Hydrologic bench-mark network, definition of	15	Tschida, Lake, near Glen Ullin257-259
Hydrologic conditions (see summary of	.,	Latitude-longitude system
hydrologic conditions)5-	-14	Little Coulee near Brinsmade 68
Hydrologic unit, definition of	36	Little Missouri River, at Marmarth206-207
	,,	near Watford City210-212
Icelandic State Park, NTN		Little Missouri River basin, gaging-station
precipitation quality377-3	570	records for206-212
Instantaneous discharge, definition of	35	Little Missouri River basin, miscellaneous
Introduction	1	sites
	•	Little Muddy River below Cow Creek near
James River, above Arrowwood Lake near Kensal302-3	505	Williston201-202
at Dakota Lake Dam near Ludden338-3		Little Muddy River basin, gaging-station
at Jamestown320-3		records for201-202
at LaMoure323-3	129	
at Manth Dalata Carth Division Co.	149	
at Oakes332-3	37	Long Creek, at western crossing of international boundary, Sask 137
		international boundary, bask.

INDEX 385

	Page	D	age
Long Lake Creek above Long Lake26		National trends network (NTN), definition of	15
Long Lake Creek below Long Lake27	73-274		
Long Lake Pool 3 near Moffit	268	precipitation-quality data377-	
Long Lake Pool 2 near Moffit	271	Normal, definition of	36
Long Lake Pool 1 near Moffit	272	North Fork Grand River at Haley292-	290
bong bake roof I hear Motific	212	Olders Greater annual mater levels for	767
Man showing location of gaging stations	2	Oliver County, ground-water levels for	367
Map showing location of, gaging stations water-quality stations	3	D / + 1 U - 1 O - 1 Wilh	277
ground-water observation wells	-	Painted Woods Creek near Wilton236-	251
	4	Painted Woods Creek basin, gaging-station	277
Maple River (James River basin) at North	767	records for236-	
Dakota-South Dakota State line	353	Parameter code, definition of	36
Maple River (tributary to Sheyenne River),	95-96	Park River, at Grafton116-	111
near Enderlinnear Hope	93-94	South Branch, below Homme Dam114-	115
Manuais Coules near Conde	122 22	Partial-record station, definition of	36
Mauvais Coulee, near Cando	58-59	Particle size, definition of	36
Tributary No. 3 near Cando	56-57	classification, definition of	36
McLean County, ground-water	767		367
levels for	367	Pembina County, precipitation chemical	770
Mean discharge, definition of	35	quality377-	2/9
Micrograms per gram (UG/G, Ng/g),	76	Pembina River, at Neche129-	150
definition of	36	at Walhalla127-	
Micrograms per liter (UG/L, µg/L),	70		126
definition of	36	Percent composition, definition of	36
Middle Branch Forest River near Whitman	108	Pesticides, definition of	36
Milligrams per liter (MG/L, mg/L),	70	pH, definition of	36
definition of	36	Picocurie (PC, pCi), definition of	37
Miscellaneous sites, discharge	750		368
measurements at35		Pipestem Creek near Pingree318-	519
Missouri River, above Stanton	218		
at Bismarck2		Radiochemical program, definition of	15
at Garrison Dam2		Records of ground-water levels:	11
at Price	238	Availability of data 28	-29
at Washburn	233		-28
below Mandan	267	Data presentation	28
near Culbertson, MT	189	Records of ground-water quality:	= :
near Hensler	231	Data collection and computation	34
near Schmidt	277	Data presentation	34
near Stanton	230	Records of stage and water discharge:	
near Williston	199	Accuracy of the records	19
Missouri River basin, miscellaneous			,18
discharge measurements35	7-358	Data presentation 18-	-19
Missouri River main stem, gaging-stations		Identifying estimated daily discharge	19
records for189-191, 196-200, 213-218, 230			-20
233, 238, 243-244, 267, 277	7, 294	Records of surface-water quality:	
Missouri River stage gage No. 4		Arrangement of records	20
near Nohly, MT	190	Classification of records	20
Missouri River stage gage No. 5	44.	Data presentation	26
at Nohly, MT	191	Laboratory measurements	26
Missouri River stage gage No. 5A at Buford	196	On-site measurements and sample	
Missouri River stage gage No. 6 near Buford	197	collection	20
Missouri River stage gage No. 7	1222	Remark codes	27
near Trenton	198	Sediment	26
Missouri River stage gage No. 9	. 222	Water temperatures	26
at Williston	200	Red River of the North, at Drayton118-	119
Morrison Lake near Webster	64	at Emerson. Man133-	136
Mouse River (see Souris River)	1712	at Fargo 50-	-51
Mowbray Creek near Mowbray, Man	125	at Grand Forks106-107,	554
		at Halstad, MN 99-	101
National Geodetic Vertical Datum of 1929 (NGVD),	4-	at Hickson 44-	-45
definition of	36	at Oslo, MN354,360-	561
National stream-quality accounting network		at Wahpeton 42-	
(NASQAN), definition of	15	near Pembina	354

Red River of the North basin, gaging-station	Stutsman County, ground-water levels for 369
records for 42-188	precipitation chemical quality380-382
Red River of the North basin, crest-stage	Summary of hydrologic conditions:
partial-records stations for 354	Climate
miscellaneous discharge measurements356-357	Chemical quality of streamflow 1
water-quality partial-records stations	Ground-water levels1
and miscellaneous sites360-361	Streamflow 8,10
Reservoirs (see lakes and reservoirs)	Surface area, definition of 3
	Suspended, definition of 3
Return period, definition of	Suspended, recoverable, definition of 3
Richland County, ground-water levels for 368	
Runoff in inches (IN, in), definition of 37	
Rush River at Amenia 97-98	Suspended-sediment concentration, definition of
CAR (Cadium adamenta matta)	
SAR (Sodium-adsorption ratio),	
definition of 37	
Sediment, definition of	Suspended, total, definition of 38
bedload, definition of 37	
suspended sediment, definition of 37	Techniques of water-resources
suspended-sediment concentration,	investigations, TWRI 39-40
definition of 37	Terms, definition of 34-30
suspended-sediment discharge, definition of 37	Thermograph, definition of 35
suspended-sediment load, definition of 37	Time-weighted average, definition of 39
Sheyenne River, above Harvey 52-53	Tongue River at Akra131-13
at Lisbon 84-85	Tons per acre-foot, definition of 3
at Valley City 82-83	Tons per day, definition of 3
at West Fargo 91-92	Total. definition of 3
below Baldhill Dam 80-81	Total discharge 3
near Cooperstown 75-76	Total, recoverable, definition of 3
near Horace 89-90	Traill County, ground-water levels for 355
near Kindred 86-88	Turtle Creek above Washburn234-23
near Warwick 54-55	Turtle Creek basin, gaging stations
Short Creek below international boundary	records for234-239
near Roche Percee, Sask 141	Turtle River at Manvel354,360-36
Snowflake Creek near Snowflake, Man 124	
Sodium-adsorption ratio (SAR), definition of 37	Walsh County, ground-water levels for 370
Solute, definition of 37	Ward County, ground-water levels for 37
Souris (Mouse) River, above Minot159-160	Water year, definition of 3
near Bantry167-169	WDR, definition of 3
near Foxholm151-153	Weighted average, definition of 3
near Sherwood142-147	Wells County, ground-water levels for 37
near Verendrye161-163	West Branch Otter Creek near Beulah355,360-36
near Westhope185-188	White Butte Fork Cedar Creek near
Souris (Mouse) River basin, gaging stations	Scranton280-28
records for	White Earth River basin, miscellaneous sites 35
Souris River, crest-stage partial-record	Wild Rice River, near Abercrombie 48-4
	Wild Rice River, near Abercrombie 48-49 near Rutland
stations in 354 South Branch Park River below	Williams County, ground-water levels for 37
Homme Dam114-115	
	Willow Creek near Willow City170-17
Special networks and programs	Wintering River near Karlsruhe164-16
Specific conductance, definition of	Woodworth, NTN precipitation quality380-383
Spring Creek (Knife River basin) at Zap 225-226	WRD (see WDR)
Square Butte Creek below Center239-240	WSP, definition of 39
Square Butte Creek basin, gaging-station	
records for239-240	Yellowstone River near Sidney, MT 193
Stage, definition of 37	Yellowstone River stage gage No. 1 near
Stage-discharge relation, definition of 37	Fairview, MT 19
Stark County, ground-water levels for 368	Yellowstone River stage gage No. 2 near
Starkweather Coulee near Webster 65-66	Cartwright 19
Station identification numbers 15	Vellowstone River stage gage No. 3 near
Steele County, ground-water levels for 369	Buford 19
Stone Creek near Kramer173-175	Vellowstone River basin, gaging-station
Streamflow, definition of 37	records for192-19

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).

Length	Multiply inch-pound units	Ву	To obtain SI units
Seet (ft)		Length	
feet (ft)	inches (in)		
Area			
acres 4.047x10³ square meters (m²) square miles (mi²) square kilometers (mi²) square miles (mi²) square kilometers (mi			
A.047x10 ³ square meters (m ²)	miles (mi)	1.609x10°	kilometers (km)
4.047x10 ⁻¹ square hectometers (hm ²) square kilometers (km ²)		Area	
4.047x10 ⁻¹ square hectometers (hm ²) square kilometers (km ²)	acres	4.047x10 ³	square meters (m ²)
Square miles (mi²) 2.590x10° square kilometers (km²)			
Square miles (mi²) 2.590x10° square kilometers (km²)			
gallons (gal) 3.785x10° cubic decimeters (dm³) 3.785x10°³ cubic meters (m³) 3.785x10°³ cubic meters (m³) 3.785x10°³ cubic meters (m³) 3.785x10°³ cubic hectometers (hm³) cubic feet (ft³) 2.832x10°¹ cubic decimeters (dm³) 2.832x10°² cubic meters (m³) cubic meters (m³) 2.447x10°³ cubic meters (m³) acre-feet (acre-ft) 1.233x10°³ cubic meters (m³) 1.233x10°³ cubic meters (m³) 1.233x10°δ cubic decimeters per second (dm³/s) 2.832x10°δ cubic meters per second (dm³/s) 1.233x10°δ cubic meters per second (dm³/s) 1.233x10°δ cubic decimeters per second (dm³/s) 1.233x10°δ cubic decimeters per second (dm³/s) 1.233x10°δ cubic decimeters per second (dm³/s) 1.233x10°δ cubic meters per second (dm³/s) 1.233x10°δ cubic decimeters per second (dm³/s) 1.233x10°δ cubic meters per second (dm³/s)	square miles (mi ²)		square kilometers (km²)
3.785x10° cubic decimeters (dm³) cubic meters (m³) cubic meters (dm³) cubic meters (dm³) cubic meters (m³) cubic decimeters (m³) cubic decimeters (m³) cubic meters (m³) cubic decimeters (m³) cubic decimeters (m³) cubic meters (m³) cubic meters (m³) cubic meters (m³) cubic decimeters (m³) cubic meters (m³) cubic		Volume	
3.785x10° cubic decimeters (dm³) cubic meters (m³) cubic meters (dm³) cubic meters (dm³) cubic meters (m³) cubic decimeters (m³) cubic decimeters (m³) cubic meters (m³) cubic decimeters (m³) cubic decimeters (m³) cubic meters (m³) cubic meters (m³) cubic meters (m³) cubic decimeters (m³) cubic meters (m³) cubic	gallons (gal)	3.785x10°	liters (L)
Million gallons			cubic decimeters (dm ³)
million gallons 3.785x10³ 3.785x10⁻³ 3.785x10⁻² 2.832x10⁻² 2.832x10⁻² 2.832x10⁻³ 2.447x10⁻³ 2.447x			cubic meters (m ³)
cubic feet (ft³) 2.832x10¹ cubic decimeters (dm³) 2.832x10² cubic meters (m³) cubic decimeters (m³) cubic decimeters (m³) cubic decimeters (m³) cubic decimeters per second (dm³/s) cubic meters per second (dm³/s) cubic meters per second (dm³/s) cubic decimeters per second (dm³/s) cubic decimeters per second (dm³/s) cubic decimeters per second (dm³/s) cubic meters per second (dm³/s)	million gallons		cubic meters (m ³)
cubic feet (ft³) 2.832x10¹ 2.832x10² cubic meters (m³) cubic decimeters (m³) cubic decimeters (m³) cubic decimeters (m³) cubic decimeters per second (dm³/s) cubic meters per second (dm³/s) cubic meters per second (dm³/s) cubic decimeters per second (dm³/s) cubic decimeters per second (dm³/s) cubic meters per second (m³/s)			
Cfs-days 2.832x10 ⁻² cubic meters (m ³) cubic meters (m ³) cubic meters (m ³) cubic meters (hm ³) cubic hectometers (hm ³) 1.233x10 ⁻³ cubic hectometers (hm ³) 1.233x10 ⁻⁶ cubic hectometers (hm ³) cubic hectometers (hm ³) 1.233x10 ⁻⁶ cubic kilometers (km ³) cubic decimeters (km ³) Flow 2.832x10 ⁻¹ cubic decimeters per second (dm ³ /s) cubic meters per second (m ³ /s) cubic meters per second (m ³ /s) cubic decimeters per second (dm ³ /s) cubic decimeters per second (dm ³ /s) cubic decimeters per second (m ³ /s) cubic meters per second (m ³ /s) cubic meters per second (dm ³ /s) cubic decimeters per second (dm ³ /s) cubic decimeters per second (dm ³ /s) cubic meters per second (dm ³ /s) cubic meters per second (dm ³ /s) cubic meters per second (m ³ /s) cubic meters per se	cubic feet (ft ³)		
cfs-days 2.447x10³ cubic meters (m³) 2.447x10⁻³ cubic hectometers (hm³) 1.233x10⁻³ cubic hectometers (hm³) 1.233x10⁻⁵ cubic hectometers (hm³) 1.233x10⁻⁶ cubic kilometers (km³) Flow cubic feet per second (ft³/s) 2.832x10¹ cubic decimeters per second (dm³/s) 2.832x10² cubic meters per second (m³/s) 2.832x10² cubic meters per second (m³/s) 2.832x10⁻² cubic meters per second (dm³/s) 3.309x10⁻² cubic decimeters per second (dm³/s) 6.309x10⁻² cubic decimeters per second (dm³/s) 6.309x10⁻² cubic meters per second (dm³/s)		2.832x10 ⁻²	cubic meters (m ³)
acre-feet (acre-ft) 2.447x10 ⁻³ cubic hectometers (hm ³) 1.233x10 ⁻³ cubic hectometers (hm ³) 1.233x10 ⁻³ cubic hectometers (hm ³) 1.233x10 ⁻⁶ cubic kilometers (km ³) Flow cubic feet per second (ft ³ /s) 2.832x10 ⁻¹ cubic decimeters per second (dm ³ /s) 2.832x10 ⁻² cubic meters per second (m ³ /s) 2.832x10 ⁻² cubic meters per second (L/s) 6.309x10 ⁻² cubic decimeters per second (dm ³ /s) 6.309x10 ⁻³ cubic decimeters per second (dm ³ /s) 6.309x10 ⁻⁵ cubic meters per second (dm ³ /s) 6.309x10 ⁻⁵ cubic meters per second (dm ³ /s) 6.309x10 ⁻⁵ cubic decimeters per second (dm ³ /s) 6.309x10 ⁻⁵ cubic meters per second (dm ³ /s) 6.309x10 ⁻⁵ cubic meters per second (dm ³ /s) 6.309x10 ⁻⁵ cubic meters per second (dm ³ /s) 6.309x10 ⁻⁵ cubic meters per second (dm ³ /s) 6.309x10 ⁻⁵ cubic meters per second (dm ³ /s) 6.309x10 ⁻⁵ cubic meters per second (dm ³ /s) 6.309x10 ⁻⁵ cubic meters per second (dm ³ /s) 6.309x10 ⁻⁵ cubic meters per second (dm ³ /s) 6.309x10 ⁻⁵ cubic meters per second (dm ³ /s) 6.309x10 ⁻⁵ cubic meters per second (dm ³ /s) 6.309x10 ⁻⁵ cubic meters per second (dm ³ /s)	cfs-days	2.447x10 ³	cubic meters (m ³)
acre-feet (acre-ft) 1.233x10³ 1.233x10⁻³ 1.233x10⁻⁵ 2.832x10⁻¹ 2.832x10¹ 2.832x10¹ 2.832x10² 2.			cubic hectometers (hm ³)
cubic feet per second (ft³/s) Flow cubic feet per second (ft³/s) 2.832x10¹ 2.832x10¹ 2.832x10² cubic decimeters per second (dm³/s) 2.832x10² cubic meters per second (m³/s) 6.309x10² cubic decimeters per second (dm³/s) ilters per second (L/s) cubic decimeters per second (dm³/s) cubic decimeters per second (dm³/s) cubic decimeters per second (dm³/s) cubic meters per second (dm³/s) cubic decimeters per second (dm³/s) cubic meters per second (dm³/s) cubic meters per second (dm³/s)	acre-feet (acre-ft)		
cubic feet per second (ft³/s) 2.832x10¹ 2.832x10¹ 2.832x10² cubic decimeters per second (dm³/s) 2.832x10² cubic meters per second (m³/s) gallons per minute (gal/min) 6.309x10² 6.309x10² cubic decimeters per second (dm³/s) cubic decimeters per second (dm³/s) cubic decimeters per second (dm³/s) cubic meters per second (dm³/s) cubic meters per second (dm³/s) cubic decimeters per second (dm³/s) cubic meters per second (m³/s)		1.233x10 ⁻³	
cubic feet per second (ft 3 /s) 2.832x10 1 2.832x10 1 2.832x10 2 cubic decimeters per second (dm 3 /s) 2.832x10 2 cubic meters per second (3 /s) gallons per minute (gal/min) 6.309x10 2 6.309x10 2 cubic decimeters per second (dm 3 /s) cubic decimeters per second (dm 3 /s) cubic meters per second (dm 3 /s) cubic meters per second (dm 3 /s) cubic decimeters per second (dm 3 /s) cubic decimeters per second (dm 3 /s) cubic decimeters per second (dm 3 /s) cubic meters per second (m 3 /s) cubic meters per second (m 3 /s)		1.233x10 ⁻⁶	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		Flow	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	cubic feet per second (ft ³ /s)	2.832x101	liters per second (L/s)
gallons per minute (gal/min) $ \begin{array}{cccccccccccccccccccccccccccccccccc$			cubic decimeters per second (dm ³ /s)
gallons per minute (gal/min) 6.309x 10^2 liters per second (L/s) cubic decimeters per second (dm³/s) 6.309x 10^5 cubic meters per second (m³/s) cubic decimeters per second (dm³/s) 4.381x 10^1 cubic decimeters per second (dm³/s) cubic meters per second (m³/s)			cubic meters per second (m ³ /s)
6.309x10 ⁻² cubic decimeters per second (dm ³ /s) cubic meters per second (m ³ /s) cubic decimeters per second (m ³ /s) cubic decimeters per second (dm ³ /s) cubic decimeters per second (dm ³ /s) cubic meters per second (m ³ /s)	gallons per minute (gal/min)		liters per second (L/s)
million gallons per day 6.309x10 ⁻⁵ 4.381x10 ⁻¹ cubic meters per second (m ³ /s) cubic decimeters per second (dm ³ /s) cubic meters per second (m ³ /s)			
million gallons per day 4.381x10 ¹ cubic decimeters per second (dm ³ /s) 4.381x10 ² cubic meters per second (m ³ /s)			cubic meters per second (m ³ /s)
4.381x10 ⁻² cubic meters per second (m ³ /s)	million gallons per day		cubic decimeters per second (dm ³ /s)
Mass			cubic meters per second (m³/s)
		Mass	
tons (short) 9.072x10 ⁻¹ megagrams (Mg) or metric tons	tons (short)	9.072x10 ⁻¹	megagrams (Mg) or metric tons



U.S.MAIL

U.S. DEPARTMENT OF THE INTERIOR Geological Survey 821 E. Interstate Avenue Bismarck, ND 58501

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE \$300
SPECIAL 4TH CLASS BOOK RATE