

UPPER MISSISSIPPI RIVER BASIN

05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN

(National Water-Quality Assessment Station)

LOCATION.--Lat 45° 51'41", long 94° 21'33", in lot 2, sec. 20, T. 39 N., R. 32 W., Morrison County, Hydrologic Unit 07010104, at plant of Minnesota Power Co., 4 mi northwest of Royalton, 4.5 mi downstream from Swan River, and at mile 956 upstream from Ohio River.

DRAINAGE AREA.--11,600 mi², approximately.

PERIOD OF RECORD.--March 1924 to current year.

REMARKS.--Records fair. Discharge determined based on nearby gaging stations, furnished record from Minnesota Power Co., and observed flow. Flow partly regulated by power plants and Winnibigoshish, Leech, Pokegama, Sandy, and Gull Lakes and by Pine River Reservoir (see stations 05201000, 05206000, 05210500, 05218500, 05230500, 05246500).

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

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP							
1	2830	7850	8200	6100	5350	5500	10500	16700	7450
9950	8800	4960							
2	2930	7900	7900	5900	5450	5400	15000	16300	7250
11000	8800	4830							
3	2940	8150	7600	6100	5500	5400	18900	15600	6900
11100	9100	4630							
4	2830	8700	8400	6000	5550	5300	24200	14800	6650
11700	8400	4430							
5	2860	8950	8100	5750	5550	5150	27200	14700	6350
12300	8000	4420							
6	2860	8850	8350	5350	5600	5150	31800	14400	6000
12900	7850	4460							
7	2840	8650	8350	5200	5550	5250	36600	13900	5900
13000	7550	4390							
8	2870	9000	8050	5100	5500	5350	38200	12200	5550
13000	6950	4260							
9	2950	8950	8000	4990	5500	5350	38100	11800	5350
12700	6900	4380							
10	2890	8800	8100	4850	5450	5400	37300	12600	5450

12600	6750	4200							
11	2810	8400	8150	4790	5500	5450	36300	12000	5300
12100	6500	4250							
12	2590	7800	8150	4770	5500	5500	34300	11800	4990
11900	6200	4300							
13	2720	7150	7950	4820	5450	5450	32100	11500	4800
12100	6000	4220							
14	2470	6100	7700	4970	5450	5350	30000	11300	4490
11800	5850	4210							
15	2830	5500	7300	4990	5450	5350	28600	10800	4590
12200	5650	4220							
16	2670	5850	7400	5050	5400	5400	27200	10700	4490
12600	5550	4380							
17	3460	7200	7100	5250	5450	5450	26100	10200	4480
12300	5400	4430							
18	3640	7000	6900	5350	5450	5450	25000	10200	4510
11900	5100	4260							
19	3800	7300	6650	5400	5450	5450	24500	9950	4400
11200	5350	4510							
20	4760	7700	6750	5450	5450	5550	23700	9400	4310
10600	5800	4480							
21	5050	7600	6750	5550	5450	5550	23100	8850	4130
10400	5350	4510							
22	5250	8050	6850	5550	5450	5500	21600	8850	4340
10100	5100	4800							
23	5700	7850	6750	5600	5500	5500	21000	8450	4200
9700	5450	4890							
24	5700	7550	6700	5550	5500	5500	20300	8800	4580
9250	5550	4550							
25	5850	7700	6600	5500	5550	5550	19700	9250	4930
9650	5400	4520							
26	6000	7450	6450	5450	5550	5600	19300	9200	5350
9400	5300	4720							
27	6100	7800	6350	5500	5450	5800	18800	8850	5900
9650	5400	4390							
28	6000	7700	6250	5450	5450	6150	18300	8650	6750
10500	5450	4630							
29	6500	7950	6200	5450	---	6850	17900	8950	7400
10100	5350	4580							
30	7100	8250	6150	5400	---	8400	17400	8550	8600
9750	5100	4390							
31	7450	---	6050	5300	---	8950	---	8100	---
9350	5000	---							
TOTAL	127250	233700	226200	166480	153450	177000	763000	347350	165390
346800	194950	134200							
MEAN	4105	7790	7297	5370	5480	5710	25430	11200	5513
11190	6289	4473							
MAX	7450	9000	8400	6100	5600	8950	38200	16700	8600
13000	9100	4960							
MIN	2470	5500	6050	4770	5350	5150	10500	8100	4130

9250	5000	4200							
AC-FT	252400	463500	448700	330200	304400	351100	1513000	689000	328100
687900	386700	266200							
CFSM	.35	.67	.63	.46	.47	.49	2.19	.97	.48
.96	.54	.39							
IN.	.41	.75	.73	.53	.49	.57	2.45	1.11	.53
1.11	.63	.43							

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1924 - 1997, BY WATER YEAR (WY)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
JUL	AUG	SEP							
MEAN	4113	3901	3058	2711	2598	3801	9226	8624	6388
4845	3677	3546							
MAX	12930	14640	7297	5713	5480	12290	25430	24600	18160
15250	15230	12940							
(WY)	1966	1972	1997	1966	1997	1966	1997	1950	1965
1993	1953	1986							
MIN	632	618	627	534	758	968	1924	1663	1071
648	449	535							
(WY)	1937	1937	1935	1935	1937	1940	1931	1977	1988
1988	1934	1934							

(National Water-Quality Assessment Station)

PERIOD OF RECORD.--Water years 1963-66, 1975 to current year, NASQAN discontinued.

PERIOD OF DAILY RECORD:

WATER TEMPERATURES.-- May 1996 to current year.

INSTRUMENTATION.-- Water-temperature monitor since May 1996.

REMARKS.-- Samples collected and sensor located at Co. Rd. 26 bridge 3.2 mi west of Royaltown. Records represent water temperature at sensor within 0.5 oC; Temperature at the sensor was compared with the average for the river by temperature cross section on Oct. 1, Nov. 19, Dec. 4, Apr. 21, May 6, June 5 and 10, July 2 and 18, Aug. 21, and Sept. 10. Variation was within 0.5 °C.

EXTREMES FOR PERIOD OF DAILY RECORD:

WATER TEMPERATURES.-- Maximum, 27.0 °C, June 30, 1996; minimum, 0.0 °C, on many days during winter.

EXTREMES FOR CURRENT YEAR:

WATER TEMPERATURES.-- Maximum 26.5 °C, July 18; minimum, 0.0 °C, on many days during

12.5	11.5	12.0							
7	---	---	---	---	---	---	---	---	---
13.0	12.0	12.5							
8	---	---	---	---	---	---	---	---	---
12.0	11.5	12.0							
9	---	---	---	---	---	---	---	---	---
12.5	11.0	11.5							
10	---	---	---	---	---	---	---	---	---
13.0	11.0	12.0							
11	---	---	---	---	---	---	---	---	---
12.5	11.5	12.5							
12	---	---	---	---	---	---	---	---	---
11.5	10.5	11.0							
13	---	---	---	---	---	---	---	---	---
11.5	10.5	11.0							
14	---	---	---	---	---	---	---	---	---
10.5	9.5	10.0							
15	---	---	---	---	---	---	---	---	---
10.5	9.5	10.0							
16	---	---	---	---	---	---	---	---	---
11.5	9.5	10.5							
17	---	---	---	---	---	---	---	---	---
13.0	10.5	11.5							
18	---	---	---	---	---	---	---	---	---
13.0	12.0	12.5							
19	---	---	---	---	---	---	---	---	---
13.0	12.5	12.5							
20	---	---	---	---	---	---	---	---	---
13.0	11.5	12.5							
21	---	---	---	---	---	---	---	---	---
14.5	11.5	13.0							
22	---	---	---	---	---	---	9.5	9.0	9.0
14.0	13.0	13.5							
23	---	---	---	---	---	---	10.0	9.5	9.5
13.5	13.0	13.5							
24	---	---	---	---	---	---	10.0	9.5	9.5
13.5	13.0	13.0							
25	---	---	---	---	---	---	10.5	10.0	10.5
14.0	12.5	13.0							
26	---	---	---	---	---	---	11.0	10.5	10.5
14.5	13.0	13.5							
27	---	---	---	---	---	---	11.0	10.5	11.0
15.0	13.5	14.0							
28	---	---	---	---	---	---	11.5	11.0	11.5
14.5	14.0	14.5							
29	---	---	---	---	---	---	12.5	11.5	12.0
14.5	14.0	14.5							
30	---	---	---	---	---	---	12.0	11.0	11.5
16.0	14.0	15.0							
31	---	---	---	---	---	---	---	---	---
17.5	15.0	16.0							

MONTH	---	---	---	---	---	---	---	---	---
17.5	9.5	12.4							

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
MAX	MIN	MEAN							
SEPTEMBER			JULY			AUGUST			
		JUNE							
1	19.0	17.0	18.0	25.0	23.5	24.5	25.0	23.5	24.0
23.0	21.5	22.0							
2	19.5	18.0	18.5	24.5	22.5	23.5	25.5	23.0	24.0
23.5	21.5	22.0							
3	20.0	18.5	19.0	22.5	21.0	22.0	26.0	24.0	25.0
22.5	20.5	21.5							
4	20.5	19.0	19.5	21.5	20.5	21.0	26.0	24.5	25.0
22.0	20.5	21.0							
5	21.0	19.5	20.0	22.0	20.5	21.0	25.5	24.5	25.0
22.0	20.0	21.0							
6	21.5	20.0	20.5	21.0	20.0	20.5	25.5	24.0	24.5
21.5	20.0	20.5							
7	22.0	20.5	21.0	20.5	19.5	20.0	25.5	23.5	24.5
21.5	20.0	20.5							
8	22.5	20.5	21.5	19.5	18.5	19.0	26.0	24.0	24.5
22.0	20.5	21.0							
9	23.0	21.0	22.0	19.5	18.5	19.0	24.5	23.5	24.0
21.5	20.0	20.5							
10	23.5	21.0	22.0	20.5	18.5	19.5	24.0	22.5	23.0
22.0	19.5	20.5							
11	24.5	21.5	22.5	21.0	19.5	20.5	23.5	21.5	22.0
22.0	20.0	20.5							
12	24.0	22.0	23.0	22.5	20.5	21.5	23.0	21.5	22.0
21.0	19.5	20.0							
13	24.5	22.5	23.0	23.0	21.5	22.0	23.5	21.5	22.0
20.5	19.5	20.0							
14	24.5	22.0	23.0	24.0	22.0	23.0	21.5	20.5	21.0
20.5	19.0	20.0							
15	24.5	22.5	23.0	24.5	22.5	23.5	21.5	20.5	21.0
20.0	19.5	19.5							
16	24.0	22.0	23.0	25.5	23.5	24.5	21.5	20.0	20.5
20.0	19.5	19.5							
17	23.0	21.5	22.0	26.0	24.5	25.5	20.0	19.5	19.5
20.5	19.0	19.5							
18	21.5	21.0	21.5	26.5	25.5	26.0	20.5	19.0	20.0
21.0	19.0	19.5							
19	22.5	20.5	21.5	25.5	24.5	25.0	19.5	19.0	19.0
20.0	18.5	19.0							
20	23.0	20.5	21.5	24.5	24.0	24.0	20.5	19.0	19.5
19.5	18.0	18.5							

21	23.5	21.0	22.0	25.0	24.0	24.5	20.5	18.5	19.0	
19.0	17.0	17.5								
22	24.0	22.0	22.5	24.0	23.0	24.0	20.5	18.5	19.5	
17.0	16.5	17.0								
23	25.0	22.0	23.5	23.0	22.5	22.5	21.5	19.0	20.0	
18.0	16.0	16.5								
24	25.0	23.5	23.5	23.0	22.0	22.5	22.0	20.0	21.0	
17.5	15.5	16.0								
25	25.0	23.5	24.0	24.0	22.5	23.0	22.0	20.5	21.0	
18.0	16.0	16.5								
26	25.0	23.5	24.0	25.5	23.5	24.0	23.0	21.0	22.0	
18.0	16.0	16.5								
27	25.5	23.5	24.0	25.5	24.5	25.0	23.5	21.5	22.0	
18.5	16.5	17.0								
28	24.5	24.0	24.0	25.5	24.0	25.0	24.0	21.5	22.5	
17.5	16.5	17.0								
29	24.5	23.0	24.0	25.5	24.0	24.5	22.5	22.0	22.5	
16.5	16.0	16.0								
30	24.5	22.5	23.5	25.5	24.0	24.5	23.5	22.0	22.5	
17.0	15.0	15.5								
31	---	---	---	24.5	24.0	24.5	23.5	21.0	22.0	---
---	---	---								
MONTH	25.5	17.0	22.0	26.5	18.5	22.9	26.0	18.5	22.1	
23.5	15.0	19.1								

WATER-QUALITY DATA, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

OXYGEN, METRIC SOLVED (PER- CENT DATE SATUR- ATION) (00301) OCT 01... NOV 19... DEC 04... JAN 14... FEB	DIS- CHARGE,, DIS- INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE LAB (US/CM) (00095)	SPE- CIFIC CON- DUCT- ANCE LAB (US/CM) (90095)	PH CIFIC WHOLE FIELD (STAND- ARD UNITS) (00400)	PH WATER WHOLE LAB (STAND- ARD UNITS) (00403)	BARO- WATER TEMPER- ATURE WATER (DEG C) HG) (00010)	SURE (MM OF (00025)	OXYGEN, DIS- SOLVED (MG/L) (00300)		
01...	1010	--	315	323	8.1	8.0	13.0	731	9.9	98
19...	1100	6700	256	276	7.7	7.9	0.5	749	13.3	93
04...	0955	--	274	287	7.5	7.6	0.0	--	10.4	74
14...	1100	--	203	298	7.2	7.5	0.0	746	9.9	69

04...	1100	--	197	314	7.3	7.6	0.0	751	8.7	61
MAR										
03...	1100	--	318	340	7.2	7.6	0.0	735	9.4	67
APR										
07...	1217	32700	191	199	7.6	7.6	0.0	740	10	70
21...	1145	--	192	199	7.7	7.7	8.5	732	11.4	101
MAY										
06...	1310	13800	212	215	8.0	7.9	12.5	739	10.5	101
JUN										
05...	1145	--	281	277	8.1	8.2	20.5	735	8.9	102
10...	1120	--	293	290	8.3	8.1	22.5	743	8.9	106
JUL										
02...	1230	--	277	275	7.9	8.0	24.0	725	7.6	95
18...	1148	11300	257	250	7.8	7.9	26.0	733	7.4	95
AUG										
21...	1120	--	305	306	8.2	8.2	19.0	741	9.7	109
SEP										
10...	1055	--	313	304	8.2	8.3	20.5	740	8.3	95
NITRO-			ALKA-		BICAR-	CAR-	NITRO-	NITRO-	NITRO-	NITRO-
GEN,	HARD-		LINITY	ALKA-	BONATE	BONATE	GEN,	GEN,	GEN,AM-	GEN,AM-
NO2+NO3	NESS		WAT DIS	LINITY	WATER	WATER	AMMONIA	NITRITE	MONIA +	MONIA +
DIS-	TOTAL		TOT IT	LAB	DIS IT	DIS IT	DIS-	DIS-	ORGANIC	ORGANIC
SOLVED	(MG/L		FIELD	(MG/L	FIELD	FIELD	SOLVED	SOLVED	DIS.	TOTAL
DATE	AS		MG/L AS	AS	MG/L AS	MG/L AS	(MG/L	(MG/L	(MG/L	(MG/L
(MG/L	CACO3)		CACO3	CACO3)	HCO3	CO3	AS N)	AS N)	AS N)	AS N)
N)	(00900)		(39086)	(90410)	(00453)	(00452)	(00608)	(00613)	(00623)	(00625)
(00631)										
OCT										
01...	150		146	153	178	0	<0.015	<0.010	0.40	0.40
0.110										
NOV										
19...	130		108	129	132	0	0.040	<0.010	0.60	0.80
0.200										
DEC										
04...	140		127	137	155	0	0.100	<0.010	0.60	0.70
0.160										
JAN										
14...	140		142	147	173	0	0.080	0.010	0.50	0.60
0.190										
FEB										
04...	160		144	154	176	0	0.060	0.040	0.50	0.60
0.290										
MAR										
03...	170		165	168	201	0	0.080	<0.010	0.50	0.50
0.310										
APR										
07...	90		74	90	90	0	0.190	0.010	0.70	1.0

0.350										
21...	95	85	93	104	0	0.100	<0.010	0.50	0.60	
0.100										
MAY										
06...	110	97	104	118	0	<0.015	<0.010	0.46	0.56	
0.067										
JUN										
05...	140	136	137	166	0	<0.015	<0.010	0.30	0.60	
<0.050										
10...	150	144	143	176	0	<0.015	<0.010	0.41	0.58	
0.115										
JUL										
02...	130	126	132	154	0	<0.015	0.011	0.67	0.82	
0.167										
18...	130	104	122	127	0	<0.015	<0.010	0.87	0.91	
0.129										
AUG										
21...	150	128	149	156	0	<0.015	0.012	0.57	0.55	
0.146										
SEP										
10...	150	145	155	177	0	<0.015	<0.010	0.34	0.54	
0.068										

WATER-QUALITY DATA, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

POTAS-	PHOS-	PHORUS	PHOS-	PHORUS	PHOS-	PHORUS	CARBON,	CARBON,	MAGNE-	SODIUM
SIUM,	PHOS-	PHORUS	ORTH,	ORGANIC	SUS-	CALCIUM	SIUM,	SODIUM,	AD-	
DIS-	PHORUS	DIS-	DIS-	DIS-	PENDE	DIS-	DIS-	DIS-	SORP-	
SOLVED	TOTAL	SOLVED	SOLVED	SOLVED	TOTAL	SOLVED	SOLVED	SOLVED	TION	
DATE	(MG/L	(MG/L	(MG/L	(MG/L	(MG/L	(MG/L	(MG/L	(MG/L	RATIO	
(MG/L	AS P)	AS P)	AS P)	AS C)	AS C)	AS CA)	AS MG)	AS NA)		AS
K)	(00665)	(00666)	(00671)	(00681)	(00689)	(00915)	(00925)	(00930)	(00931)	
(00935)										
OCT										
01...	<0.010	<0.010	<0.010	7.9	0.40	38	14	6.7	0.2	1.7
NOV										
19...	0.040	0.020	0.020	11	0.40	34	11	5.1	0.2	1.9
DEC										
04...	0.020	<0.010	0.020	10	0.50	35	12	5.1	0.2	1.6
JAN										
14...	0.020	<0.010	<0.010	7.7	0.30	38	12	5.1	0.2	1.6
FEB										
04...	0.060	<0.010	<0.010	8.1	0.30	41	14	5.7	0.2	1.6
MAR										
03...	0.040	<0.010	<0.010	7.6	0.50	44	14	6.0	0.2	1.6
APR										
07...	0.160	0.020	0.030	9.1	--	24	7.2	3.3	0.2	2.4
21...	0.040	0.020	0.010	11	0.20	26	7.4	3.0	0.1	1.8

MAY											
06...	0.012	<0.010	<0.010	11	0.30	29	8.4	3.7	0.2	1.6	
JUN											
05...	0.010	<0.010	<0.010	9.3	0.60	35	12	4.8	0.2	1.4	
10...	<0.010	<0.010	<0.010	8.7	1.0	37	13	5.2	0.2	1.5	
JUL											
02...	0.045	0.013	0.019	12	0.80	35	12	5.0	0.2	1.4	
18...	0.029	0.022	0.021	14	1.2	34	10	4.1	0.2	1.1	
AUG											
21...	0.029	0.025	0.011	9.0	0.30	39	13	5.3	0.2	1.2	
SEP											
10...	0.012	<0.010	<0.010	7.7	0.30	38	14	5.8	0.2	1.5	
								SOLIDS,	SOLIDS,		
SED.											
SUSP.	CHLO-		FLUO-	SILICA,		MANGA-	RESIDUE	SUM OF			
SIEVE	RIDE,	SULFATE	RIDE,	DIS-	IRON,	NESE,	AT 180	CONSTI-	SEDI-		
DIAM.	DIS-	DIS-	DIS-	SOLVED	DIS-	DIS-	DEG. C	TUENTS,	MENT,		
FINER	SOLVED	SOLVED	SOLVED	(MG/L	SOLVED	SOLVED	DIS-	DIS-	SUS-	%	
DATE	(MG/L	(MG/L	(MG/L	AS	(UG/L	(UG/L	SOLVED	SOLVED	PENDED		
THAN	AS CL)	AS SO4)	AS F)	SIO2)	AS FE)	AS MN)	(MG/L)	(MG/L)	(MG/L)		
.062 MM	(00940)	(00945)	(00950)	(00955)	(01046)	(01056)	(70300)	(70301)	(80154)		
(70331)											
OCT											
01...	6.4	9.4	0.10	8.9	17	3.0	188	173	14	70	
NOV											
19...	5.1	6.9	0.10	10	95	33	172	140	16	85	
DEC											
04...	4.7	5.8	0.10	11	150	25	173	153	10	82	
JAN											
14...	3.9	5.7	<0.10	11	200	32	181	164	11	93	
FEB											
04...	4.1	6.2	0.10	12	200	30	189	173	15	94	
MAR											
03...	5.1	6.6	0.10	13	150	47	200	191	4	94	
APR											
07...	4.1	4.6	<0.10	8.1	280	92	131	101	70	95	
21...	3.3	4.9	<0.10	9.1	210	22	128	108	16	84	
MAY											
06...	3.5	4.0	<0.10	6.7	190	24	145	115	8	98	
JUN											
05...	4.2	4.9	0.12	5.8	43	3.0	174	149	6	91	
10...	4.7	5.5	0.10	6.8	20	2.9	170	161	9	96	
JUL											
02...	4.2	5.0	0.12	9.1	66	16	187	148	21	100	
18...	2.9	3.4	0.11	11	170	9.2	171	129	17	97	
AUG											
21...	4.3	5.8	0.11	12	39	6.7	200	158	5	92	
SEP											
10...	4.7	5.0	<0.10	11	14	1.2	192	168	7	83	

