



Water Resources Data Michigan Water Year 1996



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MI-96-1
Prepared in cooperation with the State of Michigan
and with other agencies

CALENDAR FOR WATER YEAR 1996

1995

OCTOBER							NOVEMBER							DECEMBER						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
1	2	3	4	5	6	7				1	2	3	4						1	2
8	9	10	11	12	13	14	5	6	7	8	9	10	11	3	4	5	6	7	8	9
15	16	17	18	19	20	21	11	12	13	14	15	16	17	10	11	12	13	14	15	16
22	23	24	25	26	27	28	19	20	21	22	23	24	25	17	18	19	20	21	22	23
29	30	31					26	27	28	29	30			24	25	26	27	28	29	30
														31						

1996

JANUARY							FEBRUARY							MARCH						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
	1	2	3	4	5	6					1	2	3						1	2
7	8	9	10	11	12	13	4	5	6	7	8	9	10	3	4	5	6	7	8	9
14	15	16	17	18	19	20	11	12	13	14	15	16	17	10	11	12	13	14	15	16
21	22	23	24	25	26	27	18	19	20	21	22	23	24	17	18	19	20	21	22	23
28	29	30	31				25	26	27	28	29			24	25	26	27	28	29	30
														31						
APRIL							MAY							JUNE						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
	1	2	3	4	5	6				1	2	3	4							1
7	8	9	10	11	12	13	5	6	7	8	9	10	11	2	3	4	5	6	7	8
14	15	16	17	18	19	20	12	13	14	15	16	17	18	9	10	11	12	13	14	15
21	22	23	24	25	26	27	19	20	21	22	23	24	25	16	17	18	19	20	21	22
28	29	30					26	27	28	29	30	31		23	24	25	26	27	28	29
														30						
JULY							AUGUST							SEPTEMBER						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
	1	2	3	4	5	6					1	2	3	1	2	3	4	5	6	7
7	8	9	10	11	12	13	4	5	6	7	8	9	10	8	9	10	11	12	13	14
14	15	16	17	18	19	20	11	12	13	14	15	16	17	15	16	17	18	19	20	21
	2	22	23	24	25	26	18	19	20	21	22	23	24	22	23	24	25	26	27	28
28	29	30	31				25	26	27	28	29	30	31	29	30					



Water Resources Data Michigan Water Year 1996

by S.P. Blumer, T.E. Behrendt, J.M. Ellis, R.J. Minnerick,
R.L. LeuVoy, and C.R. Whited



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MI-96-1
Prepared in cooperation with the State of Michigan
and with other agencies

U.S. DEPARTMENT OF THE INTERIOR

BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY

GORDON P. EATON, Director

For information on the water program in Michigan write to
District Chief, Water Resources Division
U.S. Geological Survey
6520 Mercantile Way, Suite 5
Lansing, Michigan 48911-5991

1997

PREFACE

This volume of the annual hydrologic data report of Michigan is one of a series of annual reports that document hydrologic data gathered from the U.S. Geological Survey's surface- and ground-water data-collection networks in each state, Puerto Rico, and the Trust Territories. These records of streamflow, ground-water levels, and 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 Geological Survey policy and established guidelines, the following individuals contributed significantly to the collection, processing, and tabulation of the data:

S.M. Baltusis	G.C. Huffman	H.A. Madill	M.F. Soper
S.J. Becker	D.A. James	J.J. Marks	J.D. Wallace
T.A. DeWitt	P.J. Klimek	R.G. Nettleton	J.S. Walters
S.B. Horton	J.C. Knudsen	C.E. Oberst	T.L. Weaver
D.L. Hubbell	G. Lansky	J.L. Rodriguez	D.G. Wydra

This report was prepared in cooperation with the State of Michigan and with other agencies under the general supervision of C. Barton, District Chief, Michigan, and W.J. Carswell, Regional Hydrologist, Northeastern Region.

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13. ABSTRACT (Maximum 200 words) Water resources data for the 1996 water year for Michigan consists of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and ground water levels. This report contains discharge records for 144 streamflow-gaging stations; stage only records for 1 stream-gaging stations and 19 lake-gaging stations; stage and contents for 4 lakes and reservoirs; water-quality records for 15 streamflow-gaging stations and 1 lake-gaging station; water-level records for 35 ground-water wells. Also included are 29 crest-stage partial-record stations and 2 low-flow partial-record stations. Additional water data were collected at various sites not involved in the systematic data-collection program. Miscellaneous data were collected at 28 measuring sites and 3 water-quality sampling sites. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State, local, and Federal agencies in Michigan.				
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SURFACE-WATER STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED IN THIS VOLUME

Letters after station name designate type of data collected: (d) discharge, (b) biological, (c) chemical, (e) elevation, gage heights, or contents, (m) microbiological, (o) dissolved oxygen, (p) pesticide, (r) radio-chemical, (s) sediment, (t) water temperature.

	Station number	Page
ST. LAWRENCE RIVER BASIN		
STREAMS TRIBUTARY TO LAKE SUPERIOR		
Washington Creek at Windigo (d,c,m,r,s)	04001000	30
Clark Lake near Watersmeet (e)	461420089195001	33
Bond Falls Reservoir:		
Bond Falls Canal near Paulding (d)	04033500	34
Bond Falls Reservoir near Paulding (e)	04034000	35
Middle Branch Ontonagon River near Trout Creek (d)	04034500	36
Middle Branch Ontonagon River near Rockland (d)	04035500	37
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West Branch Ontonagon River near Bergland (d)	04036000	39
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Cisco Lake near Watersmeet (e)	04037400	40
Cisco Branch Ontonagon River at Cisco Lake Outlet (d)	04037500	41
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Portage River (Portage Lake):		
Sturgeon River near Sidnaw (d)	04040500	43
Sturgeon River near Alston (d)	04041500	44
Trap Rock River near Lake Linden (d)	04043050	45
Dead River:		
McClure Storage Basin Release near Marquette (d)	04043800	46
Sand River Wildlife Flooding at Sand River (e)	04044609	47
Au Train River at Forest Lake (d)	04044724	48
Grand Sable Lake near Grand Marais (e)	463910086014201	49
Muskallonge Lake near Deer Park (e)	04044796	50
Tahquamenon River near Paradise (d)	04045500	51
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Black River near Garnet (d)	04046000	52
Manistique River near Manistique (d)	04056500	53
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Middle Branch Escanaba River at Humboldt (d)	04057800	55
Greenwood Reservoir near Greenwood (e)	04057811	57
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Pigeon River near Scott, IN (d)	04099750	84
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Wanadoga Creek near Battle Creek (d)	04104945	94
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Augusta Creek near Augusta (d)	04105700	97
Kalamazoo River at Comstock (d)	04106000	98
Portage Creek at Portage (d)	04106180	99
Portage Creek near Kalamazoo (d)	04106300	100
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East Branch Pine River near Tustin (d)	04124500	162
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Au Sable River:		
South Branch Au Sable River:		
Lake St. Helen near St. Helen (e)	442409084274001	175
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South Branch Tobacco River near Beaverton (d)	04152238	202
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Belle River:		
North Branch Belle River at Imlay City (d)	04160570	215
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Stony Lake near Washington (e)	04161790	221
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Plum Brook at Utica (d)	04163400	226
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East Branch Coon Creek at Armada (d)	04164300	229
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DISCONTINUED SURFACE-WATER-DISCHARGE OR STAGE-ONLY STATIONS

The following continuous-record surface-water discharge or stage-only stations (gaging stations) in Michigan have been discontinued. Daily streamflow or stage records were collected and published for the period of record, expressed in water years, shown for each station. Those stations with an asterisk (*) after the station number have had previous or subsequent operation as a crest-stage partial-record station. Information regarding these stations may be obtained from the District Office at the address given on the back side of the title page of this report.

[Letters after station name designate type of data collected: (d) discharge, (e) elevation (stage only). Letter (a) before drainage area means approximately.]

Station name	Station number	Drainage area (mi ²)	Period of record
STREAMS TRIBUTARY TO LAKE SUPERIOR			
Montreal River at Ironwood, MI (d)	04028000	63.0	1918-22, 1924-26, 1949-54
Montreal River near Saxon, WI (d)	04030000	262	1938-70
Black River at Ramsay, MI (d)	04030500	a82	1924-25
Black River near Bessemer, MI (d)	04031000	200	1955-82
Presque Isle River at Marenisco, MI (d)	04031500	171	1945-82
Presque Isle River near Tula, MI (d)	04032000*	261	1945-73
Iron River near White Pine, MI (d)	04032500	98.1	1952-57
Middle Branch Ontonagon River near Paulding, MI (d)	04033000	164	1942-95
East Branch Ontonagon River near Mass, MI (d)	04035000	272	1942-79
Cisco Branch Ontonagon River near Watersmeet, MI (d)	04038000	62.2	1942-44
South Branch Ontonagon River at Ewen, MI (d)	04039500*	348	1942-71
Perch River near Sidnaw, MI (d)	04041000*	63.1	1913-15
Sturgeon River near Baraga, MI (d)	04042000	379	1927-31, 1943-47
Otter River near Elo, MI (d)	04042500*	162	1942-72
Sturgeon River near Arnheim, MI (d)	04043000	705	1942-74
Dead River near Negaunee, MI (d)	04043500	138	1902-03
Dead River at Forestville, MI (d)	04044000	158	1899-1902
Carp River near Negaunee, MI (d)	04044400	51.4	1961-87
Carp River near Marquette, MI (d)	04044500	a86	1902-04
Big Creek near Harvey, MI (d)	04044563	17.0	1979-81
Cedar Creek near Harvey, MI (d)	04044573	9.04	1979-81
Cherry Creek near Harvey, MI (d)	04044583	4.53	1965-70, 1979-81
Silver Creek at Harvey, MI (d)	04044595	8.58	1979-81
Tahquamenon River at Newberry, MI (d)	04045000	a200	1934-36
STREAMS TRIBUTARY TO LAKE MICHIGAN			
South Manistique Lake Outlet at Curtis, MI (d)	04046500	a44	1942-44
North Manistique Lake Outlet at Helmer, MI (d)	04047000	a15	1942-44
Manistique Lake near Curtis, MI (e)	04047200	118	1942-91
Manistique River near Germfask, MI (d)	04047500	a120	1942-50
Fox River at Seney, MI (d)	04048000	107	1942-44
East Branch Fox River near Germfask, MI (d)	04048500	104	1942-44
Holland Creek near Seney, MI (d)	04049000	a13	1938-42
Manistique River at Germfask, MI (d)	04049500*	341	1938-70
Goose Pen Outlet at Germfask, MI (d)	04050000	--	1939-41
Grays Creek near Germfask, MI (d)	04050500	a36	1938-40
Pine Creek near Germfask, MI (d)	04051000	a11	1938-40
Sand Creek near Germfask, MI (d)	04051500	a6	1938-40
Driggs River near Seney, MI (d)	04052000	a70	1938-42
Walsh Creek near Seney, MI (d)	04052500	a12	1938-42
Driggs River near Germfask, MI (d)	04053000	114	1938-41
Marsh Creek near Shingleton, MI (d)	04053500	a20	1938-42
Marsh Creek near Germfask, MI (d)	04054000	--	1938-41
Duck Creek near Blaney, MI (d)	04054500	a92	1938-54
Manistique River near Blaney, MI (d)	04055000*	704	1938-70
Creighton River near Shingleton, MI (d)	04055500	a35	1938-42

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

Station name	Station number	Drainage area (mi ²)	Period of record
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued			
West Branch Manistique River near Manistique, MI (d)	04056000	322	1938-56
Indian Lake near Manistique, MI (e)	04057000	302	1938-95
Indian River near Manistique, MI (d)	04057000*	302	1938-71, 1992-93
Manistique River above Manistique, MI (d)	04057004	a1,445	1994-96
Sturgeon River near St. Jacques, MI (d)	04057500	167	1950-52
Middle Branch Escanaba River near Greenwood, MI (d)	04057820*	73.3	1973-82
Black River near Republic, MI (d)	04057900*	34.4	1961-68
Middle Branch Escanaba River near Ishpeming, MI (d)	04058000	128	1954-75
Green Creek near Princeton, MI (d)	04058130	13.8	1977-82
Warner Creek near Palmer, MI (d)	04058300*	14.2	1961-68, 1972-78
Goose Lake Outlet near Sands Station, MI (d)	04058400*	37.5	1966-82
East Branch Escanaba River at Gwinn, MI (d)	04058500	124	1955-80
Tenmile Creek at Perronville, MI (d)	04059400*	38.4	1971-77
Iron River near Iron River, MI (d)	04060000	a65	1901-04
Iron River at Caspian, MI (d)	04060500	92.1	1948-80
Peshekee River near Michigamme, MI (d)	04062100	66.5	1961-68, 1993-95
Peshekee River near Champion, MI (d)	04062200*	133	1961-78
Lake Michigamme near Champion, MI (e)	04062228	193	1942-91
Michigamme River near Michigamme, MI (d)	04062230	194	1969-82
Michigamme River near Champion, MI (d)	04062270	231	1964-69
Michigamme River at Republic, MI (d)	04062300*	240	1961-75
Michigamme River near Witch Lake, MI (d)	04062400	316	1964-80
Menominee River near Iron Mountain, MI (d)	04065000	2,430	1898-99, 1903-14
West Branch Sturgeon River near Randville, MI (d)	04065300	56.1	1958-81
East Branch Sturgeon River below Skunk Creek near Felch, MI (d)	04065393	61.8	1974-84
East Branch Sturgeon River at Hardwood, MI (d)	04065397	90.8	1978-83
Sturgeon River near Foster City, MI (d)	04065500	237	1955-80
Pine Creek near Iron Mountain, MI (d)	04065600	16.8	1972-81
Menominee River below Koss, MI (d)	04067000	3,720	1907-09, 1913-81
Galien River near New Troy, MI (d)	04095500	a47	1945-47
East Branch Galien River near New Troy, MI (d)	04096000	19.2	1945-47
Beebe Creek near Hillsdale, MI (d)	04096272*	42.4	1974-78
Sand Creek at Litchfield, MI (d)	04096312*	20.6	1974-77
Soap Creek near Litchfield, MI (d)	04096325	10.9	1975-77
St. Joseph River at Clarendon, MI (d)	04096340*	144	1974-77
Sauk (East Branch Coldwater) River at Coldwater, MI (d)	04096500	--	1938-62
Coldwater River near Hodunk, MI (d)	04096600	293	1963-89
St. Joseph River at Mendon, MI (d)	04097000	918	1903-05
Little Portage Creek near Fulton, MI (d)	04097060*	27.0	1965-67
Portage River near Vicksburg, MI (d)	04097170*	68.2	1946-51, 1965-80
Gourdneck Canal near Schoolcraft, MI (d)	04097195	--	1966-73, 1983-92
Gourdneck Creek near Schoolcraft, MI (d)	04097200	7.29	1964-73
Fawn River near White Pigeon, MI (d)	04098500*	192	1903-04, 1958-75
St. Joseph River at Berrien Springs, MI (d)	04102000*	4,081	1901-07, 1909-32, 1951-56
Paw Paw River near Paw Paw, MI (d)	04102320	195	1980-82

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

Station name	Station number	Drainage area (mi ²)	Period of record
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued			
Paw Paw River near Hartford, MI (d)	04102420	311	1980-82
St. Joseph River at St. Joseph, MI (d)	04102533	4,670	1994-96
South Branch Kalamazoo River near Albion, MI (d)	04102850	146	1972-76
Reed's Springs near Albion, MI (d)	04103000	--	1905-06
Kalamazoo River at Marshall, MI (d)	04103500	449	1949-82
Battle Creek at Charlotte, MI (d)	04104000	a67	1948-54
Battle Creek at Bellevue, MI (d)	04104500	178	1948-53
Gull Creek near Galesburg, MI (d)	04105800*	38.1	1965-73
Portage Creek near Portage, MI (d)	04106190	18.6	1965-67
Portage Creek at Kalamazoo, MI (d)	04106500	46.8	1948-58, 1975-86
Gun River at dam near Shelbyville, MI (d)	04107000	a30	1946-47
Gun River near Martin, MI (d)	04107500	a35	1946-47
Kalamazoo River near Allegan, MI (d)	04108000	a1,470	1903-08
Kalamazoo River near Fennville, MI (d)	04108500	a 1,600	1929-36, 1938-93
Kalamazoo River at New Richmond, MI (d)	04108660	a1,980	1994-96
Portage River below Little Portage Lake near Munith, MI (d)	04109500	a55	1944-56
Orchard Creek at Munith, MI (d)	04110000	a49	1944-56
Portage River near Munith, MI (d)	04110500	118	1944-46
Red Cedar River near Williamston, MI (d)	04111379	163	1975-89
Mud Lake Drain at Lansing, MI (d)	04112904	4.28	1975-76
Carrier Creek near Lansing, MI (d)	04113097	12.1	1975-80
Sebewa Creek near Sunfield, MI (d)	04113500	24.1	1954-56
Fish Creek near Carson City, MI (d)	04115500	145	1936-38
Flat River at Smyrna, MI (d)	04116500*	528	1951-86
Thornapple River near Caledonia, MI (d)	04118000*	773	1931-38, 1952-82, 1984-94
Grand River at Eastmanville, MI (d)	04119300	a5,230	1976-77
Crockery Creek at Slocums Grove, MI (d)	04120000	--	1903
Grand River at Grand Haven, MI (d)	04120250	5,518	1994-96
Higgins Lake Outlet (head of Muskegon River) near Roscommon, MI (d)	04120500	49.2	1942-50
Muskegon River near Merritt, MI (d)	04121000*	355	1947-74
Muskegon River at Newaygo, MI (d)	04122000	a2,350	1908 1909-20, 1931-93
Muskegon River at Muskegon, MI (d)	04122150	2,680	1994-96
Big Sable River near Freesoil, MI (d)	04123000*	115	1942-74
Manistee River near Grayling, MI (d)	04123500*	123	1943-74
Pine River near Le Roy, MI (d)	04125000*	128	1952-63
Pine River near Hoxeyville, MI (d)	04125500	251	1952-82
Manistee River near Manistee, MI (d)	04126000	1,677	1952-93
Little Manistee River near Freesoil, MI (d)	04126200*	178	1957-75
Little Manistee River near Stronach, MI (d)	04126500	a196	1931
Boardman River near Mayfield, MI (d)	04127000	182	1952-89
Boardman River at Traverse City, MI (d)	04127500	--	1903-04
Intermediate River at Bellaire, MI (d)	04127565	146	1991
Elk Lake near Elk Rapids, MI (e)	445256085240001	a410	1952-95
STREAMS TRIBUTARY TO LAKE HURON			
Indian River at Indian River, MI (d)	04128500	598	1942-82
Pigeon River at Afton, MI (d)	04129500	139	1942-81
Cheboygan River near Cheboygan, MI (d)	04130000	889	1943-82
Mullett Lake near Cheboygan, MI (e)	04130000	889	1943-91
Rainy River near Onaway, MI (d)	04131000	75.7	1942-52

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

Station name	Station number	Drainage area (mi ²)	Period of record
STREAMS TRIBUTARY TO LAKE HURON--Continued			
Rainy River near Ocqueoc, MI (d)	04131500*	87.9	1953-79
Black River near Cheboygan, MI (d)	04132000*	558	1943-74
Cheboygan Pond at Cheboygan, MI (e)	04132052	a1,500	1943-91
Thunder Bay River near Hillman, MI (d)	04132500*	232	1945-73
Upper South Branch Thunder Bay River near Lachine, MI (d)	04133000	171	1945-54
Thunder Bay River near Bolton, MI (d)	04133500	588	1945-80
North Branch Thunder Bay River near Bolton, MI (d)	04134000	184	1945-80
Lower South Branch Thunder Bay River near Hubbard Lake, MI (d)	04134500	146	1945-54
Thunder Bay River near Alpena, MI (d)	04135000	1,238	1901-09 1980-93
Au Sable River at Grayling, MI (d)	04135500*	110	1943-93
East Branch Au Sable River at Grayling, MI (d)	04135600	76.0	1958-84
Au Sable River near Red Oak, MI (d)	04136000	a1,000	1909-16, 1931
Au Sable River at Bamfield, MI (d)	04137000	a1,420	1902-14
East Branch Au Gres River at McIvor, MI (d)	04138000*	a84	1951-74
Au Gres River near National City, MI (d)	04138500	154	1951-81
Houghton Creek near Lupton, MI (d)	04139000*	29.7	1950-73
Rifle River at "The Ranch" near Lupton, MI (d)	04139500	56.8	1950-71
Prior Creek near Selkirk, MI (d)	04140000*	21.4	1950-73
Rifle River at Selkirk, MI (d)	04140500*	117	1950-82
South Branch Shepards Creek near Selkirk, MI (d)	04141000*	1.15	1952-78
West Branch Rifle River near Selkirk, MI (d)	04141500*	a52	1952-63
Rifle River at Omer, MI (d)	04143000	364	1902-04
North Branch Kawkawlin River near Kawkawlin, MI (d)	04143500	101	1951-82
Shiawassee River at Linden, MI (d)	04143900	83.7	1968-94
Shiawassee River at Byron, MI (d)	04144000	365	1948-83
Shiawassee River near Fergus, MI (d)	04145000	637	1940-84, 1989-94
Bad River near Brant, MI (d)	04145500*	a89	1949-59
Flint River at Columbiaville, MI (d)	04146500	470	1932-33, 1948-52
Holloway Reservoir near Otisville, MI (e)	04147000	526	1954-91
Butternut Creek near Genesee, MI (d)	04147990	34.7	1970-84
Flint River at Genesee, MI (d)	04148000	a593	1931-52
Gilkey Creek near Flint, MI (d)	04148160	6.43	1970-84
Swartz Creek near Holly, MI (d)	04148200*	12.1	1956-75
Swartz Creek at Flint, MI (d)	04148300*	115	1970-84
Thread Creek near Flint, MI (d)	04148440*	54.4	1970-84
Brent Run near Montrose, MI (d)	04148720	20.8	1970-84
Flint River near Fosters, MI (d)	04149000	1,188	1940-84, 1988-92
Flint River near Alicia, MI (e)	04149500	--	1949-84
South Branch Cass River near Cass City, MI (d)	04150000	238	1949-80
Cass River at Wahjamega, MI (d)	04150800	645	1969-94
Cass River at Vassar, MI (d)	04151000*	710	1910-28, 1949-70
Tobacco River at Beaverton, MI (d)	04152500	487	1948-82
Kinney Creek near Clare, MI (d)	04153000	a9	1935-36
Salt River near North Bradley, MI (d)	04153500	138	1934-71
Chippewa River near Midland, MI (d)	04154500*	597	1948-73
Tittabawassee River at Freeland, MI (d)	04156500	a2,530	1903-10, 1912-36
State Drain near Sebawaing, MI (d)	04157500	67.3	1940-54
Columbia Drain near Sebawaing, MI (d)	04158000	33.9	1940-54, 1988-90
Pigeon River near Owendale, MI (d)	04158500	53.2	1953-82
Pigeon River near Pigeon, MI (d)	04159000	93.3	1947-52
Pigeon River near Caseville, MI (d)	04159010	125	1987-93

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

Station name	Station number	Drainage area (mi ²)	Period of record
STREAMS TRIBUTARY TO ST. CLAIR RIVER			
Silver Creek near Jeddo, MI (d)	04159488	20.6	1978-82
Mill Creek near Abbottsford, MI (d)	04160000*	185	1947-64
Black River near Port Huron, MI (d)	04160050	684	1931, 1933-44
Clinton River at Auburn Heights, MI (d)	04161000*	123	1935-40, 1957-82
Galloway Creek near Auburn Heights, MI (d)	04161100	17.9	1960-91
Paint Creek near Lake Orion, MI (d)	04161500*	38.5	1955-75 1989-91
Clinton River at Sterling Heights, MI (d)	04161820	309	1979-83
Red Run near Warren, MI (d)	04162010	--	1980-88
Bear Creek at Warren, MI (d)	04162500	17.3	1954-57
Big Beaver Creek near Warren, MI (d)	04162900	--	1959-88
Big Beaver Creek at Warren, MI (d)	04163000	25.2	1954-58
Plum Brook near Utica, MI (d)	04163500	22.9	1954-66
Red Run near Cady, MI (e)	04163900	--	1980-82
North Branch Clinton River at Almont, MI (d)	04164010*	9.56	1963-68
North Branch Clinton River near Romeo, MI (d)	04164050*	49.7	1965-69
North Branch Clinton River near Meade, MI (d)	04164150*	89.6	1968-72
Coon Creek near Armada, MI (d)	04164200*	10.0	1966-70
Tupper Brook at Ray Center, MI (d)	04164250*	8.62	1960-64
Highbank Creek near Armada, MI (d)	04164350*	14.9	1965-70
East Branch Coon Creek near New Haven, MI (d)	04164360*	36.1	1968-72
Deer Creek near Meade, MI (d)	04164400*	12.7	1960-65
McBride Drain near Macomb, MI (d)	04164450*	5.79	1960-64
Middle Branch Clinton River near Macomb, MI (d)	04164600*	22.2	1965-69
Middle Branch Clinton River at Macomb, MI (d)	04164800*	41.0	1963-68, 1970-82
Middle Branch Clinton River near Mount Clemens, MI (d)	04165000	a51	1947-49
Gloede Ditch near Waldenburg, MI (d)	04165200*	16.0	1959-64
Clinton River By-Pass below weir at Mount Clemens, MI (e)	04165556	--	1980-83
Clinton River By-Pass at mouth at Mount Clemens, MI (e)	04165557	--	1980-83
STREAMS TRIBUTARY TO DETROIT RIVER			
Lower River Rouge at Dearborn, MI (d)	04168500	91.9	1931-33
STREAMS TRIBUTARY TO LAKE ERIE			
Hayes Creek at Commerce, MI (d)	04169000	a8	1946-51
Huron River at Commerce, MI (d)	04169500*	57.3	1946-75
Davis Creek near Whitmore Lake, MI (d)	04171000	65.8	1953-54
Ore Creek near Brighton, MI (d)	04171500	a31	1951-68
Portage River near Pinckney, MI (d)	04172500*	79.1	1945-71
Huron River near Dexter, MI (d)	04173000*	522	1904, 1946-72, 1976-77
Huron River at Dexter, MI (e)	04174000	--	1904-16
Huron River at Ypsilanti, MI (d)	04174800	807	1974-84, 1990-94
Stony Creek at Oakville, MI (d)	04175340	68.0	1970-81
Huron River at Flat Rock, MI (d)	04175500	851	1904-11
Huron River at Flat Rock, MI (e)	04175500	851	1912-22
River Raisin near Tecumseh, MI (d)	04175700	267	1956-80
South Branch River Raisin at Adrian, MI (d)	04175957	164	1992-95
Saline River near Saline, MI (d)	04176400*	94.6	1966-77

DISCONTINUED SURFACE-WATER-QUALITY STATIONS

The following continuous-record surface-water-quality stations in Michigan have been discontinued. Daily records of temperature, specific conductance, or sediment were collected and published for the record shown for each station. Information regarding these stations may be obtained from the District office at the address given on the back side of the title page of this report.

[Type of record: Temp. (temperature), S.C. (specific conductance), Sed. (sediment). Letter (a) before drainage area means approximately.]

Station name	Station number	Drainage area (mi ²)	Type of record	Period of record
STREAMS TRIBUTARY TO LAKE SUPERIOR				
Black River near Bessemer, MI	04031000	200	Temp.	1955-71
Ontonagon River near Rockland, MI	04040000	1,340	Temp., S.C.	1975-81
Sturgeon River near Chassell, MI	04043004	723	Temp., S.C.	1978-81
Trap Rock River near Lake Linden, MI	04043050	28.0	Temp.	1972-83
Salmon Trout River near Big Bay, MI	04043250	37.8	Temp.	1971-73
Tahquamenon River near Paradise, MI	04045500	790	Temp., S.C.	1975-81
STREAMS TRIBUTARY TO ST. MARYS RIVER				
St. Marys River above Sault Ste. Marie, MI	04045580	a80,900	Temp., S.C.	1974-81
STREAMS TRIBUTARY TO LAKE MICHIGAN				
Black River near Garnet, MI	04046000	a28	Temp.	1952-75 1977-78
Manistique River above Manistique, MI	04057004	a1,445	Temp., S.C.	1976-81
Manistique River at Manistique, MI	04057005	a1,450	Temp., S.C.	1975
Middle Branch Escanaba River at Humboldt, MI	04057800	46.0	Temp.	1973-78
Greenwood Afterbay near Greenwood, MI	04057812	67.4	Temp.	1973-86
Greenwood Diverson near Greenwood, MI	04057813	--	Temp.	1973-82
Greenwood Release near Greenwood, MI	04057814	67.4	Temp.	1973-82
Middle Branch Escanaba River near Greenwood, MI	04057820	73.3	Temp.	1973-78
Black River near Republic, MI	04057900	34.4	Sed.	1962-63, 1965,
Middle Branch Escanaba River near Ishpeming, MI	04058000	128	Temp. Temp.	1962-68 1962-75, 1977-82
Green Creek near Palmer, MI	04058120	8.42	Temp., Sed.	1965,
Green Creek near Princeton, MI	04058130	13.8	Temp.	1979-80
Schweitzer Creek near Palmer, MI	04058200	23.6	Temp.	1977-81
Goose Lake Outlet near Sands Station, MI	04058400	37.5	Temp.	1962-71
East Branch Escanaba River at Gwinn, MI	04058500	124	Temp. Sed.	1977-81 1955-64 1962-63
Escanaba River at Cornell	04059000	870	Temp., S.C.	1975-81
Ford River near Hyde, MI	04059500	450	Temp. S.C.	1956-81 1975-81
Paint River near Alpha, MI	04062000	631	Temp.	1953-54, 1956-57
Peshekee River near Champion, MI	04062200	133	Temp.	1962, 1964-78
Michigamme River near Witch Lake, MI	04062400	316	Temp., Sed.	1965-69
East Branch Sturgeon River at Hardwood, MI	04065397	90.8	Temp.	1978-83
Sturgeon River near Foster City, MI	04065500	237	Temp.	1957-80
Pine Creek near Iron Mountain, MI	04065600	16.8	Temp.	1972-81
Beebe Creek near Hillsdale, MI	04096272	42.4	Sed.	1975,
Sand Creek at Litchfield, MI	04096312	20.6	Temp., Sed. Temp., Sed. Sed.	1976-77 1975-76, 1977

DISCONTINUED SURFACE-WATER-QUALITY STATIONS--Continued

Station name	Station number	Drainage area (mi ²)	Type of record	Period of record
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued				
Soap Creek near Litchfield, MI	04096325	10.9	Temp., Sed.	1975-76, Sed. 1977
St. Joseph River at Clarendon, MI	04096340	144	Temp., Sed.	1975-76, Sed. 1977
St. Joseph River at Niles, MI	04101500	3,666	Temp., S.C.	1979-84
Paw Paw River near Paw Paw, MI	04102320	195	Temp., Sed.	1981-82
Paw Paw River near Hartford, MI	04102420	311	Sed.	1981-82
Black River near Bangor, MI	04102700	83.6	Temp., Sed.	1981-82
Kalamazoo River at Comstock, MI	04106000	a1,010	Temp.	1969-75
Portage Creek near Kalamazoo, MI	04106300	22.4	Temp., S.C.	1968-71
West Fork Portage Creek at Kalamazoo, MI	04106400	18.7	Temp., S.C.	1971, Temp. 1972-73
Portage Creek at Kalamazoo, MI	04106500	46.8	S.C.	1968, Temp., S.C. 1972-75, Temp. 1976-86
Kalamazoo River near Cooper Center, MI	04106770	1,248	Temp.	1968, 1970, Temp., S.C. 1969, 1971-75
Kalamazoo River at Saugatuck, MI	04108690	a2,020	S.C.	1974, Temp., S.C. 1975-81
Grand River near Eaton Rapids, MI	04111000	661	Temp.	1964-74, 1976-77
Grand River at Lansing, MI	04113000	a1,230	Temp.	1964, 1967-68, 1970-73
Grand River at Portland, MI	04114000	1,385	Temp.	1964-68
Grand River at Eastmanville, MI	04119300	a5,230	Temp., S.C.	1979-83
Muskegon River at Ewart, MI	04121500	a1,450	Temp.	1957-83
Little Muskegon River near Morley, MI	04121900	138	Temp.	1967-83
Muskegon River near Bridgeton, MI	04122030	a2,420	Temp., S.C.	1975-81
Pere Marquette River near Scottville, MI	04122500	681	Temp.	1968-83
Manistee River near Grayling, MI	04123500	123	Temp.	1957-77
East Branch Pine River near Tustin, MI	04124500	60	Temp.	1952-63
Pine River near LeRoy, MI	04125000	128	Temp.	1953-63
Pine River near Luther, MI	04125200		Sed.	1967-70
Silver Creek near Luther, MI	04125210		Sed.	1969-70
Poplar Creek near Hoxeyville, MI	04125350		Sed.	1969-70
Pine River near Dublin, MI	04125450		Sed.	1968-70
Pine River near Hoxeyville, MI	04125500	251	Temp.	1952-63
Pine River near Wellston, MI	04125510		Sed.	1967-70
Little Manistee River near Freesoil, MI	04126200	178	Temp.	1957-77
Manistee River at Manistee	04126520	1,928	Temp., S.C.	1975-81
Boardman River near Mayfield, MI	04127000	182	Temp.	1962-77
Jordan River near East Jordan, MI	04127800	67.9	Temp.	1967-83
STREAMS TRIBUTARY TO LAKE HURON				
Sturgeon River near Wolverine, MI	04128000	198	Temp.	1959-83
Pigeon River near Vanderbilt, MI	04129000	62.6	Temp.	1951-66
Cheboygan River at Cheboygan, MI	04132052	a1,500	Temp., S.C.	1975-81
Thunder Bay River near Alpena, MI	04135000	1,238	Temp., S.C.	1980-85
Thunder Bay River at Alpena, MI	04135020	a1,240	Temp., S.C.	1979

DISCONTINUED SURFACE-WATER-QUALITY STATIONS--Continued

Station name	Station number	Drainage area (mi ²)	Type of record	Period of record
STREAMS TRIBUTARY TO LAKE HURON--Continued				
Au Sable River at Grayling, MI	04135500	110	Temp.	1953-80
South Branch Au Sable River near Luzerne, MI	04135700	401	Temp.	1967-83
Au Sable River at Mio, MI	04136500	a1,100	Temp.	1952-66
Au Sable River near Au Sable, MI	04137500	a1,540	Temp., S.C.	1978-81
East Branch Au Gres River at McIvor, MI	04138000	a84	Temp.	1952-66
Au Gres River near National City, MI	04138500	154	Temp.	1952-59
Houghton Creek near Lupton, MI	04139000	29.7	Temp.	1950-68
Rifle River near Lupton, MI	04139500	56.8	Temp.	1950-71
Prior Creek near Selkirk, MI	04140000	21.4	Temp.	1951-68
Rifle River at Selkirk, MI	04140500	117	Temp.	1951-76
West Branch Rifle River near Selkirk, MI	04141500	a52	Temp.	1952-61
Rifle River near Sterling, MI	04142000	a320	Sed.	1966, 1970-72, 1975-81
Shiawassee River at Byron, MI	04144000	365	Temp., S.C.	1962-81
Shiawassee River at Owosso, MI	04144500	538	Sed.	1966-72
Cass River at Frankenmuth, MI	04151500	841	Sed.	1966-72
Pigeon River near Caseville	04159010	125	Temp., S.C.	1978-81
STREAMS TRIBUTARY TO ST. CLAIR RIVER				
St. Clair River at Port Huron, MI	04159130	a222,400	Temp., S.C.	1978-81
Black River at Fargo, MI	04159500	480	Sed. Temp.	1966, 1979-82
STREAMS TRIBUTARY TO LAKE ST. CLAIR				
Clinton River near Drayton Plains, MI	04160900	79.2	Temp.	1962-74
Clinton River near Fraser, MI	04164000	444	Sed.	1966
Clinton River at Mount Clemens, MI	04165500	734	Temp., S.C.	1975-81
STREAMS TRIBUTARY TO DETROIT RIVER				
Detroit River at Detroit, MI	04165700	a228,800	Temp., S.C.	1974-81
STREAMS TRIBUTARY TO LAKE ERIE				
River Raisin near Monroe, MI	04176500	1,042	Temp., Sed. Temp., S.C.	1966-72 1978-81

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INTRODUCTION

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

This report includes records on both surface and ground water in the State. Specifically, it contains: (1) Discharge records for 144 streamflow-gaging stations, 29 crest-stage partial-record stations, 2 low-flow partial-record stations, and 28 miscellaneous sites; (2) stage only records for 1 stream-gaging stations and 19 lake-gaging stations; (3) stage and content records for 4 lakes and reservoirs; (4) water-quality records for 15 streamflow-gaging stations, 1 lake-gaging station, and 3 miscellaneous sites; and (5) water-level records for 35 ground-water wells. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State, local, and Federal agencies in Michigan.

This series of annual reports for Michigan 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 Michigan 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, Part 4." For the 1961 through 1970 water years, the data were published in two 5-year reports. Data on chemical quality, temperature, and suspended sediment for the 1941 through 1970 water years were published annually under the title "Quality of Surface Waters of the United States," and water levels for the 1935 through 1974 water years were published under the title "Ground-Water Levels in the United States." The above mentioned Water-Supply Papers 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 Section, Federal Center, Box 25425, Denver, CO 80225.

Publications similar to this report are published annually by the Geological Survey for all states. These official Survey reports have an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and the volume number. For example, this volume is identified as "U.S. Geological Survey Water-Data Report MI-96-1." 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 telephone (517) 887-8903.

COOPERATION

The U.S. Geological Survey and agencies of the State of Michigan have had cooperative agreements for the collection of water-resource records since 1930. Organizations that assisted in collecting the data in this report through cooperative agreement with the Survey are:

Michigan Department of Environmental Quality, Russell Harding, Director, through Land and Water Management Division, Lawrence N. Witte, Chief.

Michigan Department of Natural Resources, K. L. Cool, Director.

Michigan Department of Transportation, Robert A. Welke, Director.

Assistance with funds or services was given by the U.S. Army Corps of Engineers in collecting records for 7 gaging stations published in this report. Assistance was also furnished by the National Weather Service, National Oceanic Atmospheric Administration, and U.S. Department of Commerce.

The following organizations aided in collecting records:

Macomb County Board of Supervisors; Oakland County Drain Commission; Delta Township (Eaton County); Huron County; Kalamazoo County; Otsego County; Wayne County; Huron-Clinton Metropolitan Authority; Ann Arbor, Battle Creek, Cadillac, Clare, Coldwater, Flint, Imlay City, Kalamazoo, Lansing, Norway, Portage, Sturgis, and Ypsilanti; American Aggregates Co.; Consumers Power Co.; Cleveland Cliffs Iron Co.; Dow Chemical Co.; French Paper Co.; Mead Corporation; Indiana Michigan Power Co.; STS Hydropower, Ltd; Swift-Eckrich, Inc.; Upper Peninsula Power Co.; White's Bridge Hydro Co.; Wisconsin-Electric Power Co.; and Wolverine Power Supply Cooperative, Inc.

Organizations that supplied data are acknowledged in the station descriptions.

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SUMMARY OF HYDROLOGIC CONDITIONS

Surface Water

In the Upper Peninsula, streamflow at Sturgeon River near Sidnaw (fig. 1) began the year slightly above normal and remained so during October and November. During December, streamflow returned to the normal range and stayed in the normal range throughout the winter and into early spring. However, due to near record amounts of snowfall received during the winter, a high potential for flooding existed in all of the Upper Peninsula. As a result of these conditions, many gages in the Upper Peninsula recorded instantaneous peak discharges in the range of 10 to 20 year recurrence intervals. At one gaging station, Washington Creek at Windigo, the maximum instantaneous discharge of 657 ft³/s (cubic feet per second) represents a new peak for the period of record. The frequency of recurrence for a discharge of this magnitude is 25 to 50 years. In addition to instantaneous peaks, monthly mean discharges for May were excessive. At the Sturgeon River near Sidnaw station, the monthly mean of 1,146 ft³/s was the second highest recorded for the period of record and was almost three times the long term monthly mean of 443 ft³/s. Monthly mean discharges for the remainder of the year, except for September, were slightly above normal. The 1996 annual mean discharge of 292 ft³/s was only slightly above the 1961-1990 yearly mean discharge of 218 ft³/s.

In the Lower Peninsula, streamflow at Muskegon River at Evart began the year in the normal range and remained close to the long term monthly medians through April. Late spring and early summer precipitation caused streamflow for the months of May, June and July to exceed the long term values, with the mean discharge for June being the most excessive. By September, streamflow returned to the normal range. Streamflow at Red Cedar River at East Lansing was similar to Muskegon River at Evart. Streamflow remained near the normal range through February but became slightly deficient for March and April. During May and June the monthly means were excessive before returning to normal in August and September. As a result of this widely scattered and often locally heavy precipitation, two long-term gaging stations in the Lower Peninsula established new instantaneous peak discharges for the period of record. Flint River near Otisville had a peak discharge of 7,470 ft³/s on June 24 which exceeded the old peak of 6,150 ft³/s. At Plum Brook at Utica a peak discharge of 1,290 ft³/s, recorded on June 18, exceeded the previous peak of 1,160 ft³/s. Frequency of recurrence for both new peak discharges is 50 to 100 years. Additional peak discharges for the period of record were established at two crest-stage partial-record stations. Pine River near Rattle Run and North Branch Flint River near Columbiaville had period of record peaks occurring in June as a result of locally heavy precipitation.

Water levels of Lake Superior, Lakes Michigan-Huron and Lake Erie remained above the long-term average at the end of the 1996 water year continuing the trend begun in late spring when they rose from near normal levels. Water levels for Lake St. Clair were also above average at the end of the year. No new record high or low water levels on any of the Great Lakes were experienced during the year. Water levels for Lake Superior ended the year about 0.5 ft above average, water levels for Lakes Michigan-Huron ended the year about 0.8 ft above average, and water levels for Lake St. Clair and Lake Erie ended the year approximately 1.0 ft above the long-term average.

Water Quality

Surface-water-quality data were collected at 1 Hydrologic Bench-Mark Network station and at 15 other sampling stations during the 1996 water year. Concentrations of dissolved solids and suspended sediments, analyzed from samples collected at the Hydrologic Bench-Mark Network station, fall within the range of concentrations in previous samples.

Ground Water

Glacial deposits cover most of the State. The outwash sand and gravel in these deposits form the most productive aquifers in the State. Lacustrine sand also is very productive. Poorly sorted, relatively impermeable mixtures of clay, silt, sand, and gravel, that form some till deposits tend to be poor aquifers; clay deposits generally yield little or no water. In most areas of the State, glacial deposits are less than 200 ft thick. In some areas in the northern part of the Lower Peninsula, however, the deposits are greater than 800 ft thick. Sandstone, limestone, and dolomite are the principal bedrock aquifers. Where near enough to land surface to be recharged by precipitation, they yield freshwater. Where deeply buried, however, these rocks commonly yield brackish or salty water.

Annual recharge to aquifers in Michigan ranges from 3 to 18 in. (inches) and is derived from precipitation, which averages 31 in. annually.

Ground-water levels were measured at 35 wells during the 1996 water year. This statewide network of ground-water wells (fig. 10) is designed to provide statewide areal coverage and to define ground-water conditions in the important aquifers in the State.

Ground-water levels for the 1996 water year generally followed seasonal patterns. Ground-water levels at four wells in the southwestern Lower Peninsula (Kalamazoo County) established new lows for the period of record. Three of these wells also set new lows last year. Two of these wells have been monitored for only nine years. The other two wells have been monitored for 14 and 27 years. In the southcentral Lower Peninsula (Eaton County) one well reached a new record high water level. The Eaton County well has been monitored for 42 years. It is important to note that all of the above mentioned wells have historically been affected by pumpage.

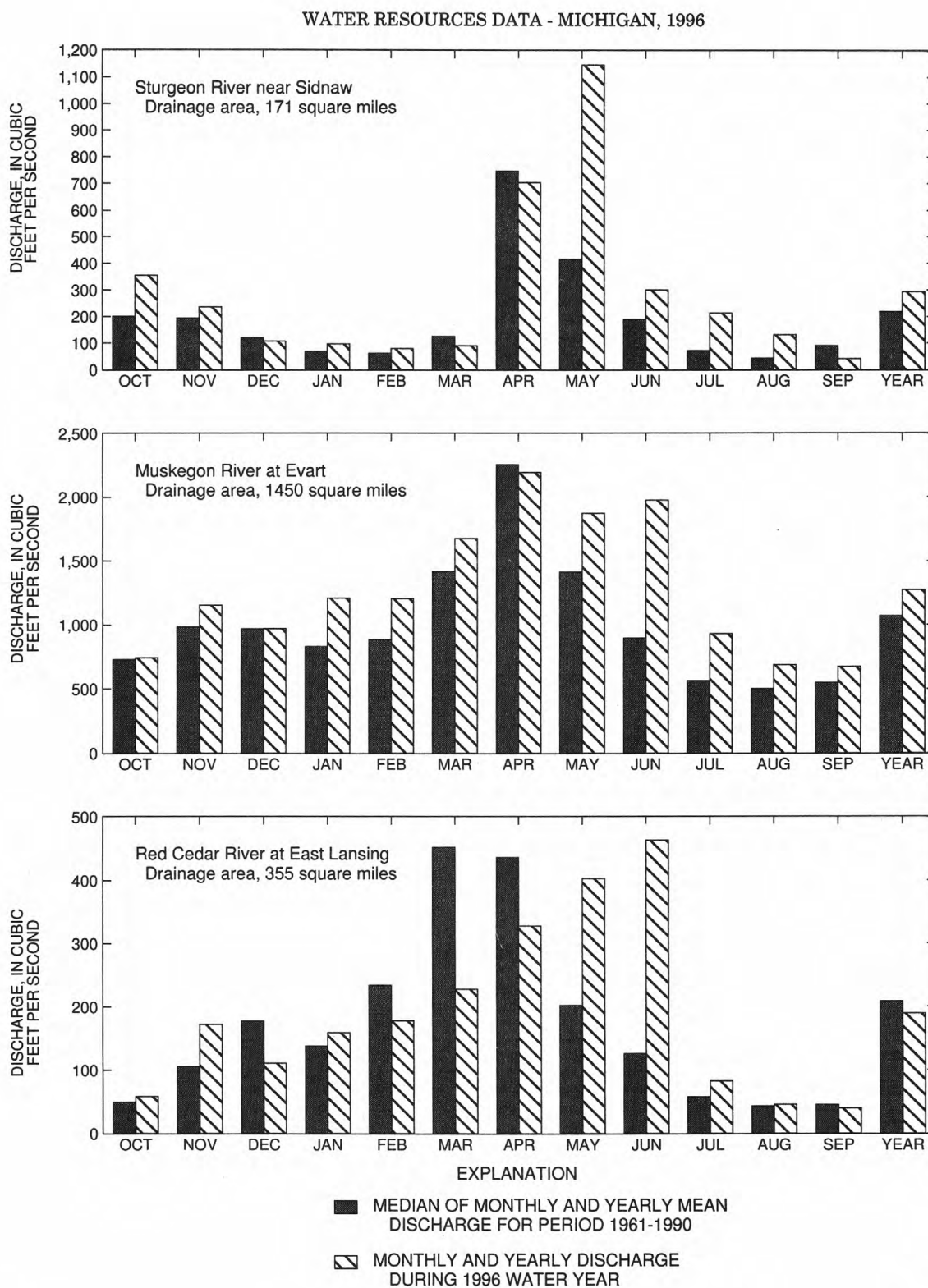


Figure 1.--Discharge during 1996 water year compared with median discharge for period 1961-90 for three representative stations.

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The principal aquifers in Michigan are glacial outwash deposits and sandstone, limestone, and dolomite bedrock. The following table lists the aquifers and some of their characteristics.

Aquifer name and description	Well characteristics		Remarks
	Depth, in feet	Yield, in gallons per minute	
	Common range	Common range	
Glacial aquifers:			
Outwash: Mostly sand and gravel.	25-200	1-1,000	Water generally hard; iron concentrations common; deep wells may produce salty water in places.
Lacustrine sand: Mostly sand, some gravel.	25-100	80-500	Used for domestic supply in Saginaw Bay and Detroit areas; is salty in places at depth
Till: Intermixed clay, silt, sand, gravel and boulders; abundant sand and gravel lenses in some areas.	25-200	5-200	Primary source of domestic supply in western Upper Peninsula.
Bedrock aquifers:			
Saginaw Formation: Sandstone, siltstone, some shale, limestone, and coal	25-300	100-300	One of Michigan's most important bedrock aquifers; water generally hard; salty in places at depth.
Marshall Formation: Sandstone and siltstone.	25-200	100-500	Another of Michigan's important bedrock aquifers; salty in places and at depth.
Silurian-Devonian rocks: Limestone and dolomite; some shale and sandstone.	25-150	10-300	Important aquifer in parts of eastern Upper Peninsula; water commonly hard.
Cambrian-Ordovician rocks: Sandstone, limestone, and dolomite.	25-150	10-100	Important aquifer in eastern Upper Peninsula; water commonly very hard; salty in places and at depth.
Precambrian sandstone: Sandstone interbedded with siltstone.	25-400	5-50	Important aquifer in western Upper Peninsula; salty in places.

Natural chemical characteristics of ground water in Michigan are determined primarily by the geologic environment through which the water flows. Natural ground water generally is suitable for human consumption and most other uses. Water from glacial deposits, at places, contains elevated concentrations of iron [2.5 to 5.0 mg/L (milligrams per liter)]; water from carbonate rocks is likely to be very hard (400 to 900 mg/L as calcium carbonate); and water from the Saginaw Formation in the Saginaw Bay-Thumb area commonly is highly mineralized (2,000 to 80,000 mg/L of dissolved solids). Throughout the State, salty water underlies and is in contact with freshwater at depths ranging from about 100 ft to about 900 ft. Average dissolved-solids concentration of water from bedrock (535 mg/L) is about twice as great as the average concentration from glacial deposits (241 mg/L) (Cummings, 1980).

REFERENCES CITED

Cummings, T.R., 1980, Chemical and physical characteristics of natural ground waters in Michigan--A preliminary report: U.S. Geological Survey Open-File Report 80-953, 34 p.

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SPECIAL NETWORKS AND PROGRAMS

Hydrologic Benchmark Network is a network of 50 sites in small drainage basins around the country whose purpose is to provide consistent data on the hydrology, including water quality, and related factors in representative undeveloped watersheds nationwide, and to provide analyses on a continuing basis to compare and contrast conditions observed in basins more obviously affected by human activities.

National Stream-Quality Accounting Network (NASQAN) monitors the water quality of large rivers within four of the Nation's largest river basins--the Mississippi, Columbia, Colorado, and Rio Grande. The network consists of 39 stations. Samples are collected with sufficient frequency that the flux of a wide range of constituents can be estimated. The objective of NASQAN is to characterize the water quality of these large rivers by measuring concentration and mass transport of a wide range of dissolved and suspended constituents, including nutrients, major ions, dissolved and sediment-bound heavy metals, common pesticides, and inorganic and organic forms of carbon. This information will be used (1) to describe the long-term trends and changes in concentration and transport of these constituents; (2) to test findings of the National Water-Quality Assessment Program (NAWQA); (3) to characterize processes unique to large-river systems such as storage and re-mobilization of sediments and associated contaminants; and (4) to refine existing estimates of off-continent transport of water, sediment, and chemicals for assessing human effects on the world's oceans and for determining global cycles of carbon, nutrients, and other chemicals.

The National Atmospheric Deposition Program/National Trends Network (NADP/NTN) provides continuous measurement and assessment of the chemical climate of precipitation throughout the United States. As the lead federal agency, the USGS works together with over 100 organizations to accomplish the following objectives; (1) Provide a long-term, spatial and temporal record of atmospheric deposition generated from a network of 191 precipitation chemistry monitoring sites. (2) Provide the mechanism to evaluate the effectiveness of the significant reduction in SO₂ emissions that began in 1995 as implementation of the Clean Air Act Amendments (CAAA) occurred. (3) Provide the scientific basis and nationwide evaluation mechanism for implementation of the Phase II CAAA emission reductions for SO₂ and NO_x scheduled to begin in 2000.

Data from the network, as well as information about individual sites, are available through the world wide web at:

<http://nadp.nrel.colostate.edu/NADP>

The National Water-Quality Assessment (NAWQA) Program of the U.S. Geological Survey is a long-term program with goals to describe the status and trends of water-quality conditions for a large, representative part of the Nation's ground- and surface-water resources; provide an improved understanding of the primary natural and human factors affecting these observed conditions and trends; and provide information that supports development and evaluation of management, regulatory, and monitoring decisions by other agencies.

Assessment activities are being conducted in 53 study units (major watersheds and aquifer systems) that represent a wide range of environmental settings nationwide and that account for a large percentage of the Nation's water use. A wide array of chemical constituents will be measured in ground water, surface water, streambed sediments, and fish tissues. The coordinated application of comparative hydrologic studies at a wide range of spatial and temporal scales will provide information for decision making by water-resources managers and a foundation for aggregation and comparison of findings to address water-quality issues of regional and national interest.

Communication and coordination between USGS personnel and other local, State, and federal interests are critical components of the NAWQA Program. Each study unit has a local liaison committee consisting of representatives from key federal, State, and local water resources agencies, Indian nations, and universities in the study unit. Liaison committees typically meet semiannually to discuss their information needs, monitoring plans and progress, desired information products, and opportunities to collaborate efforts among the agencies.

Additional information about the NAWQA Program is available through the world wide web at:

http://www.rvares.er.usgs.gov/nawqa/nawqa_home.html

EXPLANATION OF THE RECORDS

The surface-water and ground-water records published in this report are for the 1996 water year that began October 1, 1995, and ended September 30, 1996. 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 water, and ground-water level data. The locations of the stations and wells where the data were collected are shown in figures 4-10. The following sections of the introductory text are presented to provide users with a more detailed explanation of how the hydrologic data published in this report were collected, analyzed, computed, and arranged for presentation.

Station Identification Numbers

Each data station, whether streamsite or well, in this report is assigned a unique identification number. This number is unique in that it applies specifically to a given station and to no other. The number usually is assigned when a station is first established and is retained for that station indefinitely. The 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 all surface-water stations except some lakes and the "latitude-longitude" system is used for wells and lakes.

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Downstream Order System

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

The station-identification number is assigned according to downstream order. In assigning station numbers, no distinction is made between partial-record stations and other stations; therefore, the station number for a partial-record station indicates downstream-order position in a list made up of both types of stations. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete eight-digit number for each station, such as 04037500, which appears just to the left of the station name, includes the two-digit Part number "04" plus the six-digit downstream-order number "037500." The Part number designates the major river basin; for example, Part "04" is the St. Lawrence River basin.

Latitude-Longitude System

The identification numbers for wells 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 figure 2.)

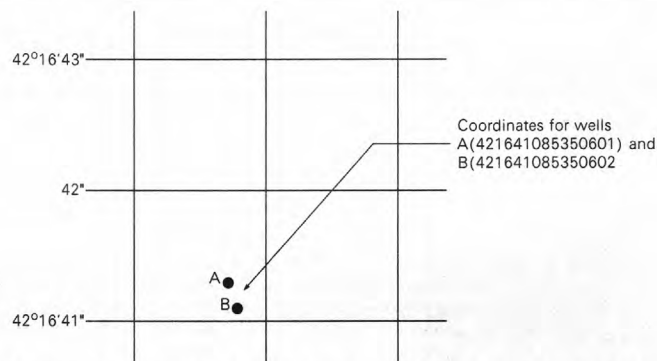


Figure 2.--System for numbering wells (latitude and longitude).

Local Well Numbering System

The local well number indicates the location of wells within the rectangular subdivision of land with reference to the Michigan meridian and base line. The first two segments of the well number designate township and range, the third segment of the number designates the section and the letters A through D designate successively smaller subdivisions of the section as shown in figure 3. Thus, a well designated as 32N 6E 16CCCB would be located to the nearest 2.5 acres and would be within the shaded area in section 16. In the event that two or more wells are located in the same 2.5 acre tract, a sequential number designation follows the letter designations--for example, 16CCCB1, 16CCCB2, 16CCCB3, etc.

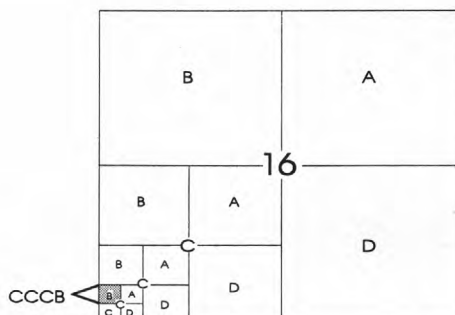


Figure 3.--Local well numbering system in Michigan.

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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 anytime, 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-month 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, but they are presented separately in this report. Location of all complete-record water-discharge stations for which data are given in this report are shown in figures 4 and 5.

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

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

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

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

At some gaging stations, acoustic velocity meter (AVM) systems are used to compute discharge. The AVM system measures the stream's velocity at one or more paths in the cross section. Coefficients are developed to relate this path velocity to the mean velocity in the cross section. Because the AVM sensors are fixed in position, the adjustment coefficients generally vary with stage. Cross-sectional area curves are developed to relate stage, recorded as noted above, to cross section area. Discharge is computed by multiplying path velocity by the appropriate stage related coefficient and area.

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.

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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 for various reasons fails to operate properly. 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 continuous-record surface-water discharge station (gaging station) consist of four parts, the manuscript or station description; the data table of daily mean values of discharge for the current water year with summary data; a tabular statistical summary of monthly mean flow data for a designated period, by water year; and a summary statistics table that includes statistical data of annual, daily, and instantaneous flows as well as data pertaining to annual runoff, 7-day low-flow minimums, and flow duration.

Station manuscripts

The manuscript provides, under various headings, descriptive information, such as station location; period of record; historical extremes outside the period of record; record accuracy; and other remarks pertinent to station operation and regulation. The following information, as appropriate, is provided with each continuous record of discharge or lake content. Comments to follow clarify information presented under the various headings of the station description.

LOCATION.--Information on locations is obtained from the most accurate maps available. The location of the gaging station with respect to the cultural and physical features in the vicinity and with respect to the reference place mentioned in the station name is given. River mileages, given for only a few stations, were determined by methods given in "River Mileage Measurement," Bulletin 14, Revision of October 1968, prepared by the Water Resources Council or were provided by the U.S. Army Corps of Engineers.

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

PERIOD OF RECORD.--This indicates the period for which records have been published 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 flow at it can reasonably be considered equivalent to flow at the present station.

REVISED RECORDS.--Because of new information, published records 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 sea level (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 are flagged in the daily-discharge table. (See next section, "Identifying Estimated Daily Discharge".) The REMARKS paragraph is used to present information relative to the accuracy of the records, to special methods of computation, and to conditions that affect natural flow at the station. In addition, information may be presented pertaining to average discharge data for the period of record; to extremes data for the period of record and the current year; and, possibly, to other pertinent items. For reservoir stations, information is given on the dam forming the reservoir, the capacity, outlet works and spillway, and purpose and use of the reservoir.

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

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

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

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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 District Office (address 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 for a discontinued station were obtained by computer retrieval, the data would be current and there would be no need to check because any published revision of data is always accompanied by revision of the corresponding data in computer storage.

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

Headings for AVERAGE DISCHARGE, EXTREMES FOR PERIOD OF RECORD, AND EXTREMES FOR CURRENT YEAR are presented in the tabular summaries following the discharge table or in the REMARKS paragraph, as appropriate.

Data table of daily mean values

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

Statistics of monthly mean data

A tabular summary of the mean (line headed "MEAN"), maximum (line headed "MAX"), and minimum (line headed "MIN") of monthly mean flows for each month for a designated period is provided below the mean values table. The water years of the first occurrence of the maximum and minimum monthly flows are provided immediately below those figures. The designated period will be expressed as "FOR WATER YEARS ____ - ____, BY WATER YEAR (WY)," and will list the first and last water years of the range of years selected from the PERIOD OF RECORD paragraph in the station manuscript. It will consist of all of the station record within the specified water years, inclusive, including complete months of record for partial water years, if any, and may coincide with the period of record for the station. The water years for which the statistics are computed will be consecutive, unless a break in the station record is indicated in the manuscript.

Summary statistics

A table titled "SUMMARY STATISTICS" follows the statistics of monthly mean data tabulation. This table consists of four columns, with the first column containing the line headings of the statistics being reported. The table provides a statistical summary of yearly, daily, and instantaneous flows, not only for the current water year but also for the previous calendar year and for a designated period, as appropriate. The designated period selected, "WATER YEARS ____ - ____, " will consist of all of the station record within the specified water years, inclusive, including complete months of record for partial water years, if any, and may coincide with the period of record for the station. The water years for which the statistics are computed will be consecutive, unless a break in the station record is indicated in the manuscript. All of the calculations for the statistical characteristics designated ANNUAL (See line headings below.), except for the "ANNUAL 7-DAY MINIMUM" statistic, are calculated for the designated period using complete water years. The other statistical characteristics may be calculated using partial water years.

The date or water year, as appropriate, of the first occurrence of each statistic reporting extreme values of discharge is provided adjacent to the statistic. Repeated occurrences may be noted with footnotes or in the REMARKS paragraph of the manuscript. Because the designated period may not be the same as the station period of record published in the manuscript, occasionally the dates of occurrence listed for the daily and instantaneous extremes in the designate-period column may not be within the selected water years listed in the heading. When this occurs, it will be noted in the REMARKS paragraph or in footnotes. Selected streamflow duration curve statistics and runoff data are also given. Runoff data may be omitted if there is extensive regulation or diversion of flow in the drainage basin.

The following summary statistics data, as appropriate, are provided with each continuous record of discharge. Comments to follow clarify information presented under the various line headings of the summary statistics table.

ANNUAL TOTAL.--The sum of the daily mean values of discharge for the year. At some stations the annual total discharge is adjusted for reservoir storage or diversion. The adjusted figures are identified by a symbol and corresponding footnotes.

ANNUAL MEAN.--The arithmetic mean of the individual daily mean discharges for the year noted or for the designated period. At some stations the yearly mean discharge is adjusted for reservoir storage or diversion. The adjusted figures are identified by a symbol and corresponding footnotes.

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HIGHEST ANNUAL MEAN.--The maximum annual mean discharge occurring for the designated period.

LOWEST ANNUAL MEAN.--The minimum annual mean discharge occurring for the designated period.

HIGHEST DAILY MEAN.--The maximum daily mean discharge for the year or for the designated period.

LOWEST DAILY MEAN.--The minimum daily mean discharge for the year or for the designated period.

ANNUAL 7-DAY MINIMUM.--The lowest mean discharge for 7 consecutive days for a calendar year or a water year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (April 1-March 31). The data shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day 10-year low-flow statistic.)

INSTANTANEOUS PEAK FLOW.--The maximum instantaneous discharge occurring for the water year or for the designated period. Note that secondary instantaneous peak discharges above a selected base discharge are stored in District computer files for stations meeting certain criteria. Those discharge values may be obtained by writing to the District Office. (See address on back of title page of this report.)

INSTANTANEOUS PEAK STAGE.--The maximum instantaneous stage occurring for the water year or for the designated period. If the dates of occurrence for the instantaneous peak flow and instantaneous peak stage differ, the REMARKS paragraph in the manuscript or a footnote may be used to provide further information.

INSTANTANEOUS LOW FLOW.--The minimum instantaneous discharge occurring for the water year or for the designated period.

ANNUAL RUNOFF.--Indicates the total quantity of water in runoff for a drainage area for the year. Data reports may use any of the following units of measurement in presenting annual runoff data:

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

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming the runoff is distributed uniformly in time and area.

Inches (INCHES) indicates the depth to which the drainage area would be covered if all of the runoff for a given time period were uniformly distributed on it.

10 PERCENT EXCEEDS.--The discharge that has been exceeded 10 percent of the time for the designated period.

50 PERCENT EXCEEDS.--The discharge that has been exceeded 50 percent of the time for the designated period.

90 PERCENT EXCEEDS.--The discharge that has been exceeded 90 percent of the time for the designated period.

Data collected at partial-record stations follow the information for continuous-record sites. Data for partial-record discharge stations are presented in two tables. The first is a table of annual maximum stage and discharge at crest-stage partial-record stations, and the second is a table of discharge measurements at low-flow partial-record stations. The tables of partial-record stations are followed by a listing of discharge measurements made at sites other than continuous-record or partial-record stations. These measurements are generally made in times of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Identifying Estimated Daily Discharge

Estimated daily-discharge values published in the water-discharge tables of annual State data reports are identified by flagging individual daily values with the letter symbol "e" and printing a table footnote, "e Estimated".

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 ft³/s; to the nearest tenth between 1.0 and 10 ft³/s; to whole numbers between 10 and 1,000 ft³/s; and to 3 significant figures for more than 1,000 ft³/s. The number of significant figures used is based solely on the magnitude of the discharge value.

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

Other Records Available

Information used in the preparation of the records in this publication, such as discharge-measurement notes, gage-height records, temperature measurements, and rating tables are on file in the Michigan District Office. Also, most of the daily mean discharges are in computer-readable form and have been analyzed statistically. Information on the availability of the unpublished information or on the results of statistical analyses of the published records may be obtained from the Michigan District Office.

Records of Surface-Water Quality

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

Classification of Records

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

A careful distinction needs to be made between "continuing records", as used in this report, and "continuous recordings," which refers to a continuous graph or a series of discrete values punched at short intervals on a paper tape. Some records of water quality, such as temperature and specific conductance, may be obtained through continuous recordings; however, because of costs, most data are obtained only monthly or less frequently. Locations of stations for which records on the quality of surface water appear in this report are shown in figures 6 and 7.

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 on site measurements and for collecting, treating, and shipping samples are given in publications on "Techniques of Water-Resources Investigations," Book 1, Chap. D2; Book 3, Chap. C2; Book 5, Chap. A1, A3, and A4. All of these references are listed under "PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS", which appears at the end of the introductory text. Also, detailed information on collecting, treating, and shipping samples may be obtained from the Geological Survey 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. Many samples obtained for the National Stream Quality Accounting Network (see definitions) are obtained from at least several verticals. Whether samples are obtained from the centroid of flow or from several verticals depends on flow conditions and other factors which must be evaluated by the collector.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis.

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

Water Temperature

Water temperatures are measured at all the water-quality stations. In addition, water temperatures are taken at time of discharge measurements for water-discharge stations. 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 and/or maximum and minimum temperatures for each day are published. Water temperatures measured at the time of water-discharge measurements are on file in the Michigan District Office.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section.

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

Laboratory Measurements

Sediment samples were analyzed in the Geological Survey laboratory in Lemoyne, Pennsylvania. All other samples were analyzed in the Geological Survey laboratories in Arvada, Colorado. Methods used in analyzing sediment samples and computing sediment records are given in TWRI, Book 5, Chap. C1. Methods used by the Geological Survey laboratories 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.

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 and water temperature 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 is given only if a water-quality monitor or temperature recorder is or was in operation at a station.

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

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

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

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

Remark Codes

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

<u>PRINTED OUTPUT</u>	<u>REMARK</u>
E	Estimated value.
>	Actual value is known to be greater than the value shown.
<	Actual value is known to be less than the value shown.
K	Results based on colony count outside the acceptance range (non-ideal colony count).
L	Biological organism count less than 0.5 percent (organism may be observed rather than counted).
D	Biological organism count equal to or greater than 15 percent (dominant).
&	Biological organism estimated as dominant.

Dissolved Trace-Element Concentrations

NOTE: Traditionally, dissolved trace-element concentrations have been reported at the microgram per liter ($\mu\text{g/L}$) level. Recent evidence, mostly from large rivers, indicates that actual dissolved-phase concentrations for a number of trace elements are within the range of 10's to 100's of nanograms per liter (ng/L). Data above the $\mu\text{g/L}$ level should be viewed with caution. Such data may actually represent elevated environmental concentrations from natural or human causes; however, these data could reflect contamination introduced during sampling, processing, or analysis. To confidently produce dissolved trace-element data with insignificant contamination, the U.S. Geological Survey began using new trace-element protocols at some stations in water year 1994.

Change in National Trends Network Procedures

NOTE: Sample handling procedures at all National Trends Network stations were changed substantially on January 11, 1994, in order to reduce contamination from the sample shipping container. The data for samples before and after that date are different and not directly comparable. A tabular summary of the differences based on a special intercomparison study, is available from the NADP/NTN Coordination Office, Colorado State University, Fort Collins, Colorado, 80523 (Telephone: 303-491-5643).

Records of Ground-Water Levels

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

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.

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

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 three parts, the station description, the data table of water levels observed during the current water year, and a graph of the water levels for the current water year or other selected period. 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 of the well description.

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

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

REMARKS.--This entry describes factors that may influence the water level in a well or the measurement of the water level. It should identify wells that 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 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 level are listed. For wells equipped with recorders, only abbreviated tables are published; generally, only water-level lows are listed for every fifth day and at the end of the month (EOM). The highest and lowest water levels of the water year and their dates of occurrence are shown on a line below the abbreviated table. Because all values are not published for wells with recorders, the extremes may be values that are not listed in the table. Missing records are indicated by dashes in place of the water level. A hydrograph for a selected period of record follows each water-level table.

ACCESS TO WATSTORE DATA

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

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

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

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

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

DEFINITION OF TERMS

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

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

Adenosine triphosphate (ATP) is an organic, phosphate-rich, compound important in the transfer of energy in organisms. Its central role in living cells makes it an excellent indicator of the presence of living material in water. A measure of ATP therefore provides a sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter of the original water sample.

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

Algal growth potential (AGP) is the maximum algal dry weight biomass that can be produced in a natural water sample under standardized laboratory conditions. The growth potential is the algal biomass present at stationary phase and is expressed as milligrams dry weight of algae produced per liter of sample.

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

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

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, 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.

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. They are characterized as aerobic or facultative anaerobic, gram-negative, nonspore-forming, rod-shaped bacteria which ferment lactose with gas formation within 48 hours at 35°C. In the laboratory these bacteria are defined as all the organisms that produce colonies with a golden-green metallic sheen within 24 hours when incubated at 35°C plus or minus 1.0°C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

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

Fecal streptococcal bacteria are bacteria found also in the intestine of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as Gram-positive, cocci bacteria which are capable of growth in brain-heart infusion broth. In the laboratory they are defined as all the organisms which produce red or pink colonies within 48 hours at 35°C plus or minus 1.0°C on KF-streptococcus medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

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

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

Biomass is the amount of living matter present at any given time, expressed as the mass per unit area or volume of habitat.

Ash mass is the mass or amount of residue present after the residue from the dry mass determination has been ashed in a muffle furnace at a temperature of 500°C for 1 hour. The ash mass values of zooplankton and phytoplankton are expressed in grams per cubic meter (g/m^3), and periphyton and benthic organisms in grams per square meter (g/m^2).

Dry mass refers to the mass of residue present after drying in an oven at 105°C for zooplankton and periphyton, until the mass remains unchanged. This mass represents the total organic matter, ash and sediment, in the sample. Dry-mass values are expressed in the same units as ash mass.

Organic mass or volatile mass of the living substance is the difference between the dry mass and ash mass and represents the actual mass of the living matter. The organic mass is expressed in the same units as for ash mass and dry mass.

Wet mass is the mass of living matter plus contained water.

Bottom material: See Bed material.

Cells/volume refers to the number of cells 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.

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

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

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

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

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

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming that the runoff is distributed uniformly in time and area.

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

Cubic foot per second-day [$\text{ft}^3/\text{s}/\text{d}$] is the volume of water represented by a flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, approximately 1.9835 acre-feet, about 646,000 gallons, or 2,445 cubic meters.

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.

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Annual 7-Day minimum is the lowest mean discharge for 7 consecutive days for a calendar year or a water year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (April 1-March 31). The date shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day 10-year low-flow statistic.)

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

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

Dissolved refers to that material in a representative water sample which passes through a 0.45 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.

Dissolved-solids concentration of water is determined either analytically by the "residue-on-evaporation" method, or mathematically by totaling the concentrations of individual constituents reported in a comprehensive chemical analysis. During the analytical determination of dissolved solids, the bicarbonate (generally a major dissolved component of water) is converted to carbonate. Therefore, in the mathematical calculation of dissolved-solids concentration, the bicarbonate value, in milligrams per liter, is multiplied by 0.492 to reflect the change.

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

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

Gage height (G.H.) is the water-surface elevation referred to some arbitrary gage datum. Gage height is often used interchangeably with the more general term "stage," although gage height is more appropriate when used with a reading on a gage.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is computed as the sum of equivalents of polyvalent cations and is expressed as the equivalent concentration of calcium carbonate (CaCO_3).

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

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

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

Metamorphic stage refers to the stage of development that an organism exhibits during its transformation from an immature form to an adult form. This developmental process exists for most insects, and the degree of difference from the immature stage to the adult form varies from relatively slight to pronounced, with many intermediates. Examples of metamorphic stages of insects are egg-larva-adult or egg-nymph-adult.

Methylene blue active substances (MBAS) are apparent detergents. The determination depends on the formation of a blue color when methylene blue dye reacts with synthetic anionic detergent compounds.

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.

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

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

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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.

Organism is any living entity.

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meter (m^2), acre, or hectare. Periphyton, benthic organisms, and macrophytes are expressed in these terms.

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

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

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

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

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

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

<u>Classification</u>	<u>Size (mm)</u>	<u>Method of analysis</u>
Clay.....	0.00024 - 0.004	Sedimentation
Silt.....	.004 - .062	Sedimentation
Sand.....	.062 - 2.0	Sedimentation or sieve
Gravel.....	2.0 - 64.0	Sieve

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

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

Periphyton is the assemblage of microorganisms attached to and living upon submerged solid surfaces. While primarily consisting of algae, they also include bacteria, fungi, protozoa, rotifers, and other small organisms.

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

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

Plankton is the community of suspended, floating, or weakly swimming organisms that live in the open water of lakes and rivers.

Phytoplankton is the plant part of the plankton. They are usually microscopic and their movement is subject to the water currents. Phytoplankton growth is dependent upon solar radiation and nutrient substances. Because they are able to incorporate as well as release materials to the surrounding water, the phytoplankton have a profound effect upon the quality of the water. They are the primary food producers in the aquatic environment and are commonly known as algae.

Blue-green algae are a group of phytoplankton organisms having a blue pigment, in addition to the green pigment called chlorophyll. Blue-green algae often cause nuisance conditions in water.

Diatoms are the unicellular or colonial algae having a siliceous shell. Their concentrations are expressed as number of cells per milliliter (cells/mL) of sample.

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Green algae have chlorophyll pigments similar in color to those of higher green plants. Some forms produce algae mats or floating "moss" in lakes. Their concentrations are expressed as number of cells per milliliter (cells/mL) of sample.

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column and are often large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers.

Polychlorinated biphenyls (PCBs) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Primary productivity is a measure of the rate at which new organic matter is formed and accumulated through photosynthetic and chemosynthetic activity of producer organisms (chiefly, green plants). The rate of primary production is estimated by measuring the amount of oxygen released (oxygen method) or the amount of carbon assimilated (carbon method) by the plants.

Milligrams of carbon per area or volume per unit time $[mg (C/m^2) / \text{time}]$ for periphyton and macrophytes and $[mg (C/m^3) / \text{time}]$ for phytoplankton are units for expressing primary productivity. They define the amount of carbon dioxide consumed as measured by radioactive carbon (carbon 14). The carbon 14 method is of greater sensitivity than the oxygen light and dark bottle method and is preferred for use in unenriched waters. Unit time may be either the hour or day, depending on the incubation period.

Milligrams of oxygen per area or volume per unit time $[mg (O_2/m^2) / \text{time}]$ for periphyton and macrophytes and $[mg (O_2/m^3) / \text{time}]$ for phytoplankton are the units for expressing primary productivity. They define production and respiration rates as estimated from changes in the measured dissolved-oxygen concentration. The oxygen light and dark bottle method is preferred if the rate of primary production is sufficient for accurate measurements to be made within 24 hours. Unit time may be either the hour or day, depending on the incubation period.

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

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

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

Sea level in this report refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)--a geodetic datum derived from a general adjustment of the first-order nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

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

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

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

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

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

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

Suspended-sediment discharge (tons/day) is the rate at which dry 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 (ft³/s) x 0.0027.

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

Total-sediment discharge (tons/day) is the sum of the suspended-sediment discharge and the bed-load discharge. It is the total quantity of sediment, as measured by dry mass or volume, that passes a section during a given time.

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

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

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

Solute is any substance that is dissolved in water.

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

Stage-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.

Substrate is the physical surface upon which an organism lives.

Artificial substrate is a device which is purposely placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is taken. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multiplate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection.

Natural substrate refers to any naturally occurring emersed or submersed solid surface, such as a rock or tree, upon which an organism lives.

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

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

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

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

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

Suspended, total is the total amount of a given constituent in the part of a representative water-suspended sediment sample that is retained on a 0.45 um membrane filter. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to determine when the results should be reported as "suspended, total."

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

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Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchical scheme beginning with Kingdom and ending with Species at the base. The higher the classification level, the fewer features the organisms have in common. For example, the taxonomy of a particular mayfly, Hexagenia limbata, is the following:

Kingdom	Animal
Phylum	Arthropoda
Class	Insecta
Order.....	Ephemeroptera
Family.....	Ephemeridae
<u>Genus</u>	<u>Hexagenia</u>
<u>Species</u>	<u>Hexagenia limbata</u>

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

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the stream each day for the year.

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

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

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

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

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

Water year in 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, 1996, is called the "1996 water year."

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

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

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

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS

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

The reports listed below are for sale by the U.S. Geological Survey, Branch of Information Services, Box 25286, Federal Center, Denver, Colorado 80225 (authorized agent of the Superintendent of Documents, Government Printing Office). Prepayment is required. Remittance should be sent by check or money order payable to the U.S. Geological Survey. Prices are not included because they are subject to change. Current prices can be obtained by writing to the above address. When ordering or inquiring about prices for any of these publications, please give the title, book number, chapter number, and "U.S. Geological Survey Techniques of Water-Resources Investigations."

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

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS--Continued

- 3-A9. *Measurement of time of travel in streams by dye tracing*, by F. A. Kilpatrick and J. F. Wilson, Jr.: USGS--TWRI Book 3, Chapter A9. 1989. 27 pages.
- 3-A10. *Discharge ratings at gaging stations*, by E. J. Kennedy: USGS--TWRI Book 3, Chapter A10. 1984. 59 pages.
- 3-A11. *Measurement of discharge by the moving-boat method*, by G. F. Smoot and C. E. Novak: USGS--TWRI Book 3, Chapter A11. 1969. 22 pages.
- 3-A12. *Fluorometric procedures for dye tracing*, Revised, by J. F. Wilson, Jr., E. D. Cobb, and F. A. Kilpatrick: USGS--TWRI Book 3, Chapter A12. 1986. 34 pages.
- 3-A13. *Computation of continuous records of streamflow*, by E. J. Kennedy: USGS--TWRI Book 3, Chapter A13. 1983. 53 pages.
- 3-A14. *Use of flumes in measuring discharge*, by F. A. Kilpatrick and V. R. Schneider: USGS--TWRI Book 3, Chapter A14. 1983. 46 pages.
- 3-A15. *Computation of water-surface profiles in open channels*, by Jacob Davidian: USGS--TWRI Book 3, Chapter A15. 1984. 48 pages.
- 3-A16. *Measurement of discharge using tracers*, by F. A. Kilpatrick and E. D. Cobb: USGS--TWRI Book 3, Chapter A16. 1985. 52 pages.
- 3-A17. *Acoustic velocity meter systems*, by Antonius Laenen: USGS--TWRI Book 3, Chapter A17. 1985. 38 pages.
- 3-A18. *Determination of stream reaeration coefficients by use of tracers*, by F. A. Kilpatrick, R. E. Rathbun, Nobuhiro Yotsukura, G. W. Parker, and L. L. DeLong: USGS--TWRI Book 3, Chapter A18. 1989. 52 pages.
- 3-A19. *Levels at streamflow gaging stations*, by E.J. Kennedy: USGS--TWRI Book 3, Chapter A19. 1990. 31 pages.
- 3-A20. *Simulation of soluble waste transport and buildup in surface waters using tracers*, by F. A. Kilpatrick: USGS--TWRI Book 3, Chapter A20. 1993. 38 pages.
- 3-A21. *Stream-gaging cableways*, by C. Russell Wagner: USGS--TWRI Book 3, Chapter A21. 1995. 56 pages.
- 3-B1. *Aquifer-test design, observation, and data analysis*, by R. W. Stallman: USGS--TWRI Book 3, Chapter B1. 1971. 26 pages.
- 3-B2. *Introduction to ground-water hydraulics, a programmed text for self-instruction*, by G. D. Bennett: USGS--TWRI Book 3, Chapter B2. 1976. 172 pages.
- 3-B3. *Type curves for selected problems of flow to wells in confined aquifers*, by J. E. Reed: USGS--TWRI Book 3, Chapter B3. 1980. 106 pages.
- 3-B4. *Regression modeling of ground-water flow*, by R. L. Cooley and R. L. Naff: USGS--TWRI Book 3, Chapter B4. 1990. 232 pages.
- 3-B4. *Supplement 1. Regression modeling of ground-water flow - Modifications to the computer code for nonlinear regression solution of steady-state ground-water flow problems*, by R. L. Cooley: USGS--TWRI Book 3, Chapter B4. 1993. 8 pages.
- 3-B5. *Definition of boundary and initial conditions in the analysis of saturated ground-water flow systems--An introduction*, by O. L. Franke, T. E. Reilly, and G. D. Bennett: USGS--TWRI Book 3, Chapter B5. 1987. 15 pages.
- 3-B6. *The principle of superposition and its application in ground-water hydraulics*, by T. E. Reilly, O. L. Franke, and G. D. Bennett: USGS--TWRI Book 3, Chapter B6. 1987. 28 pages.

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS--Continued

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- 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.
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- 4-B1. *Low-flow investigations*, by H. C. Riggs: USGS--TWRI Book 4, Chapter B1. 1972. 18 pages.
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- 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.
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PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS--Continued

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- 6-A6. *A coupled surface-water and ground-water flow model (MODBRANCH) for simulation of stream-aquifer interaction*, by Eric D. Swain and Eliezer J. Wexler. 1995. 125 pages.
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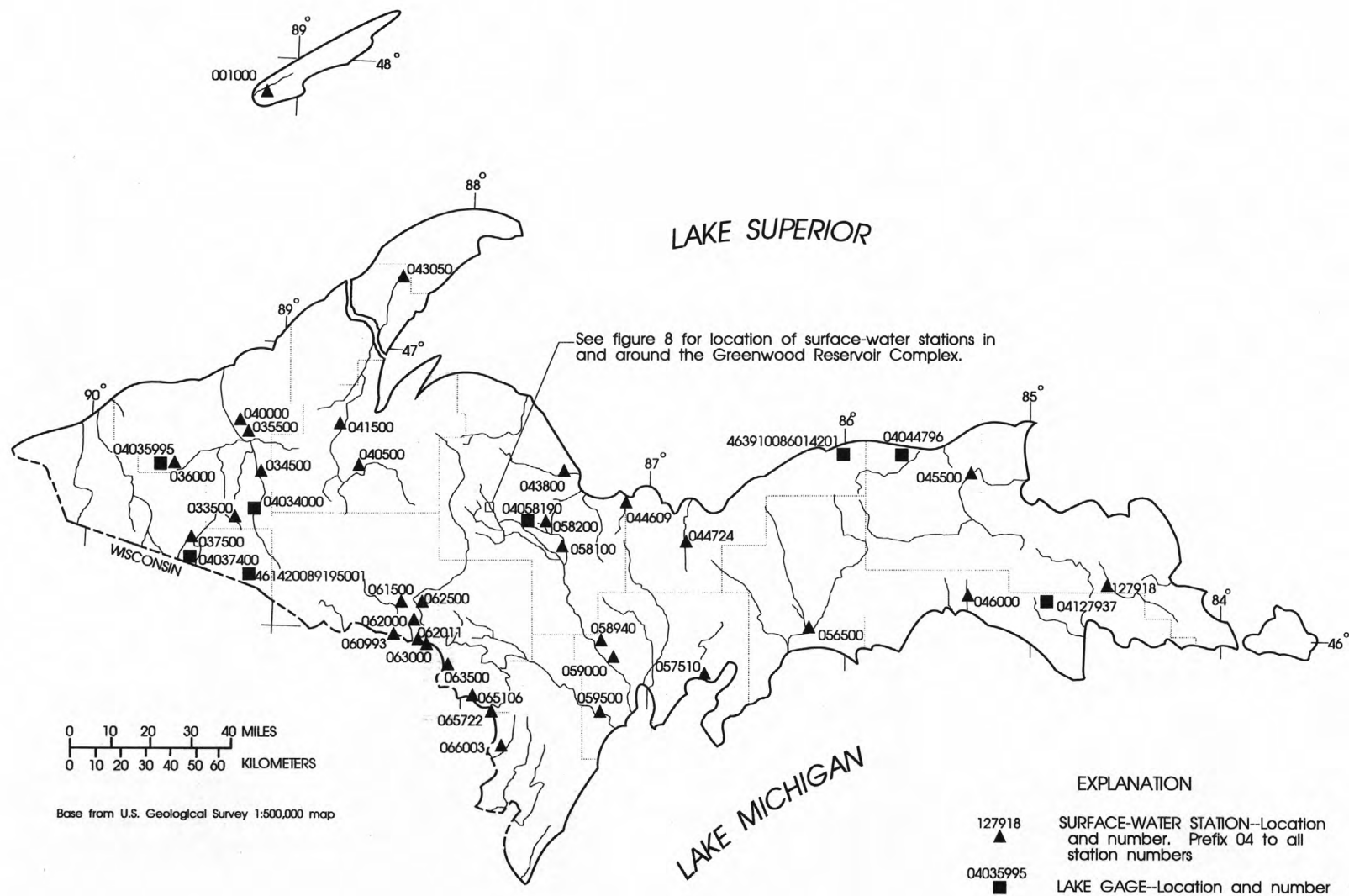


Figure 4.--Identification number and location of active surface-water gaging stations in the Upper Peninsula of Michigan.

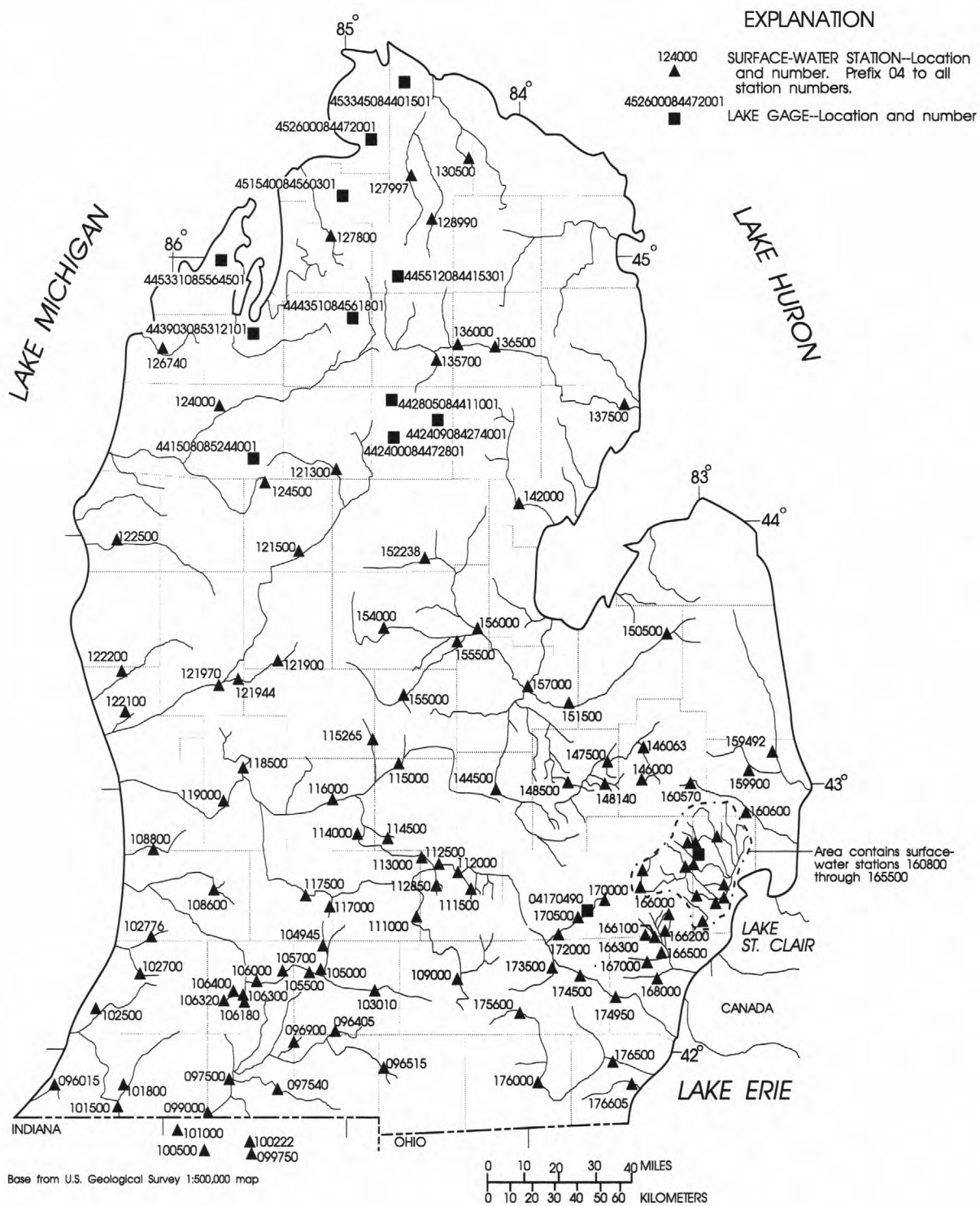


Figure 5.--Identification number and location of active surface-water gaging stations in the Lower Peninsula of Michigan.

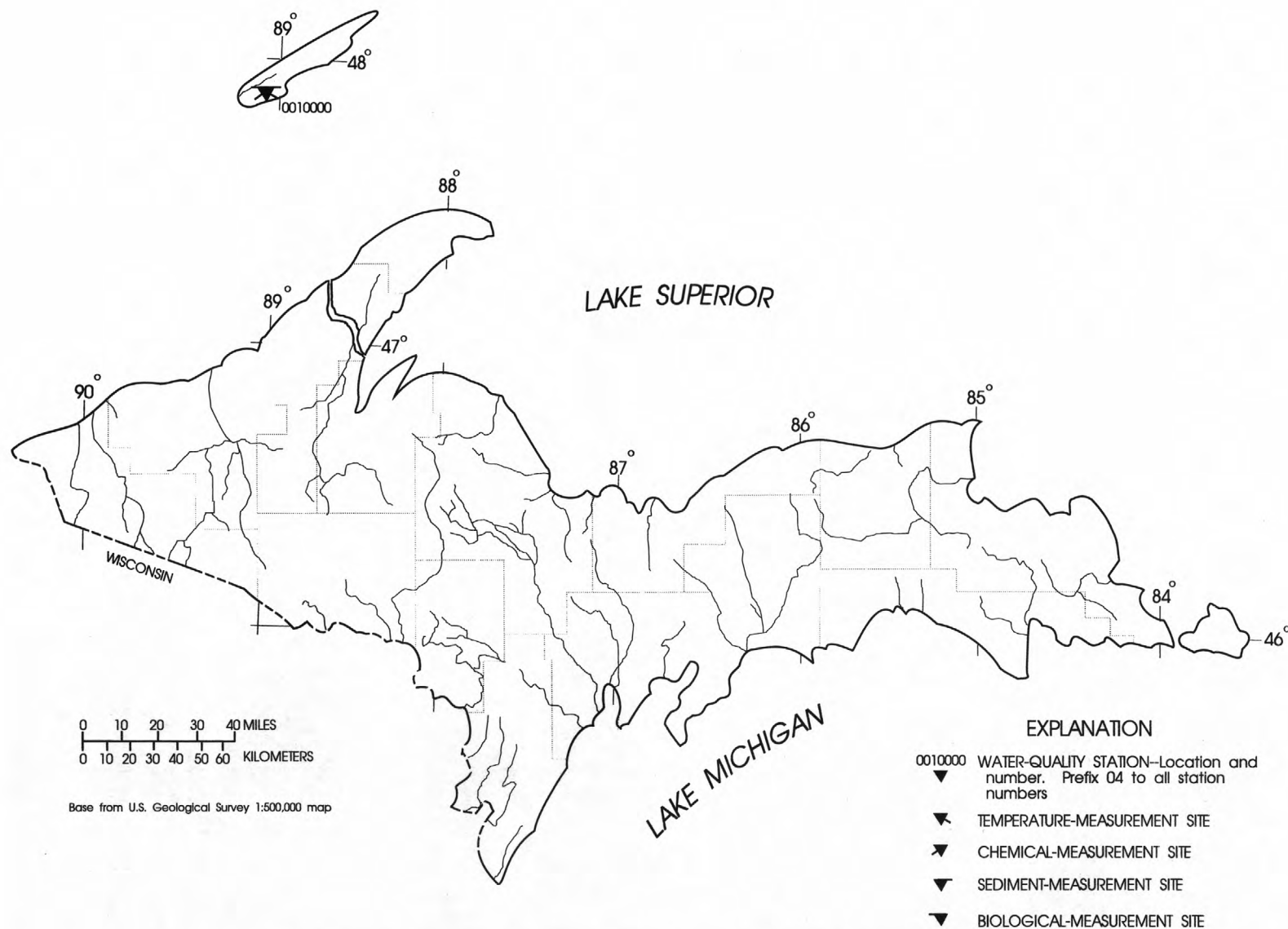


Figure 6.--Identification number and location of active surface-water-quality stations in the Upper Peninsula of Michigan.

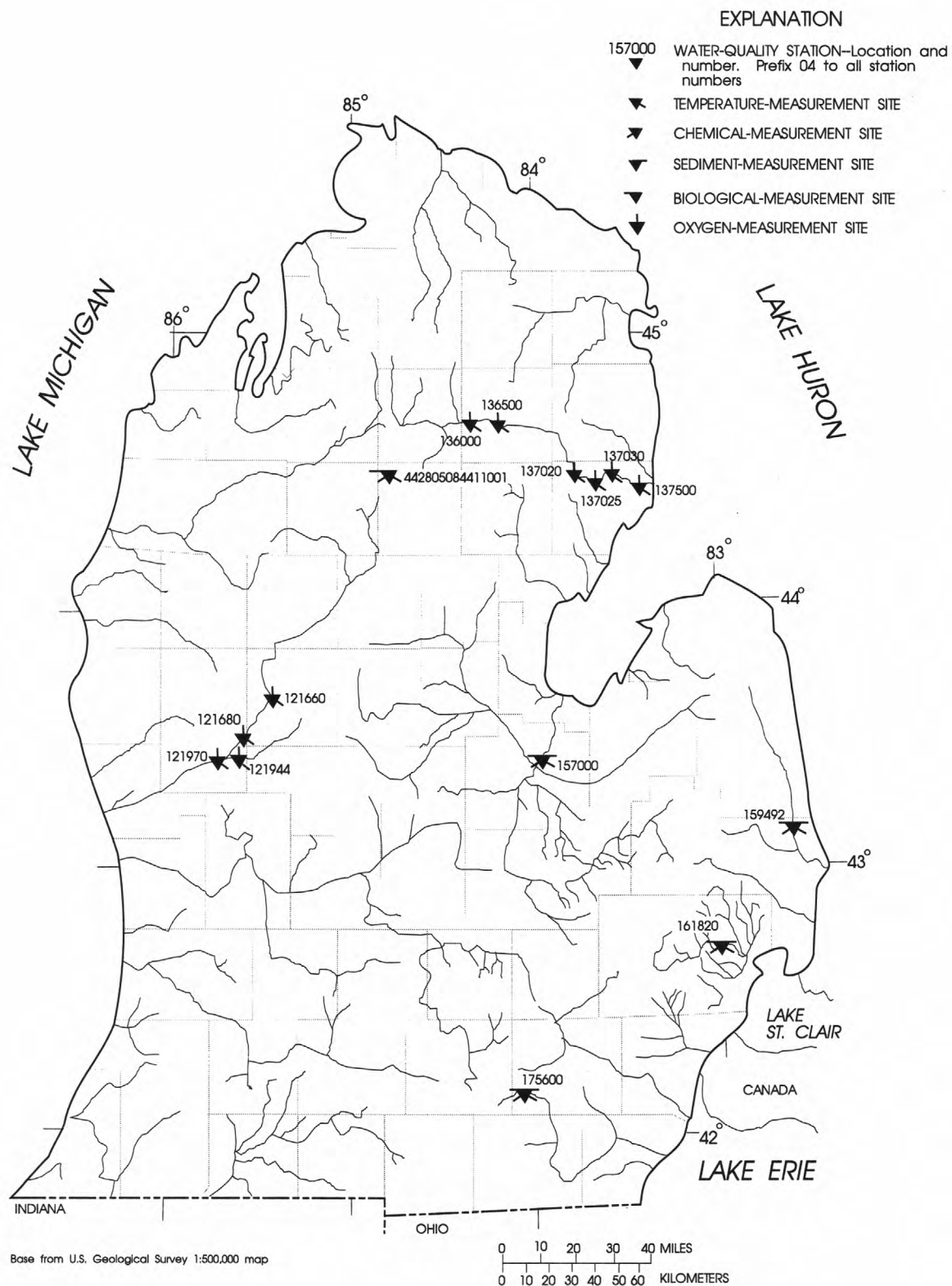


Figure 7.-- Identification number and location of active surface-water-quality stations in the Lower Peninsula of Michigan.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04001000 WASHINGTON CREEK AT WINDIGO, MI
(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'23", long 89°08'42", in NW1/4 sec.28, T.64 N., R.38 W., Keweenaw County, Isle Royale National Park, Hydrologic Unit 04020300, on left bank 0.8 mi northeast of Windigo, and 35 mi southwest of Rock Harbor.

DRAINAGE AREA.--13.2 mi².

WATER-DISCHARGE RECORDS

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

GAGE.--Water-stage recorder, crest-stage gage, and concrete control. Elevation of gage is 605 ft above sea level, from topographic map.

REMARKS.--Water-discharge records good except for estimated daily discharges during winter months, which are fair, and estimated daily discharges for July 1-31, which are poor.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.9	13	e3.5	e3.2	e2.5	e2.5	e3.4	55	16	e33	9.6	2.4
2	11	23	e3.5	e3.2	e2.4	e2.5	e3.4	51	25	e28	7.1	2.4
3	9.1	25	e3.6	e3.2	e2.4	e2.4	e3.3	55	33	e22	5.6	4.7
4	7.8	19	e3.6	e3.2	e2.3	e2.4	e3.3	69	35	e14	4.7	3.5
5	6.4	16	e3.6	e3.1	e2.3	e2.4	3.3	85	28	e12	4.4	2.9
6	5.7	16	e3.6	e3.0	e2.3	e2.3	3.3	100	26	e35	4.7	2.5
7	5.2	16	e3.6	e3.0	e2.3	e2.3	3.3	125	24	e80	5.0	2.3
8	4.6	12	e3.5	e3.0	e2.4	e2.2	3.3	139	20	e60	5.2	7.9
9	4.1	9.8	e3.5	e2.9	e2.4	e2.1	e3.3	189	16	e45	4.4	9.0
10	3.9	9.6	e3.5	e2.8	e2.3	e2.1	e3.5	199	14	e30	3.8	5.8
11	3.7	8.3	e3.5	e2.6	e2.3	e2.2	e5.0	163	12	e20	3.3	4.9
12	3.3	7.9	3.5	e2.6	e2.3	e2.2	e10	130	10	e24	3.2	7.9
13	3.0	7.5	3.4	e2.5	e2.3	e2.5	e3.5	120	9.3	e32	2.9	5.4
14	2.9	6.8	3.4	e2.6	e2.2	e4.0	e25	130	7.6	e31	27	4.4
15	2.7	6.3	3.4	e2.7	e2.2	e9.0	e20	143	6.4	e27	20	3.6
16	2.5	6.0	3.4	e2.7	e2.2	e14	e20	133	5.8	e25	14	3.4
17	2.4	5.7	3.4	e2.7	e2.1	e20	e22	154	5.6	e20	9.9	3.2
18	2.3	5.7	3.4	e2.7	e2.1	e15	e30	439	4.7	e18	7.4	2.9
19	2.8	5.6	3.4	e2.8	e2.0	e9.0	e60	233	4.1	e16	6.0	2.5
20	3.6	5.9	3.4	e3.0	e2.1	e4.0	e80	146	3.6	e14	5.2	2.3
21	7.5	5.6	3.4	e2.9	e2.1	e3.7	97	98	3.3	e12	4.4	2.2
22	13	5.0	3.4	e2.8	e2.0	e3.7	120	78	3.2	e10	9.0	2.2
23	12	4.2	3.4	e2.7	e2.1	e3.6	97	62	3.1	e9.0	7.9	2.2
24	45	3.6	3.4	e2.7	e2.3	e3.6	86	51	2.9	e8.0	5.2	2.4
25	40	e3.6	3.4	e2.7	e2.6	e3.6	85	42	2.7	e7.0	4.5	2.5
26	29	e3.6	3.4	e2.7	e2.6	e3.6	72	36	2.5	e6.0	4.1	2.5
27	25	e3.6	3.4	e2.7	e2.5	e3.4	64	31	2.4	e5.0	3.6	3.3
28	22	e3.6	3.4	e2.7	e2.5	e3.4	57	27	3.2	e5.0	3.3	2.9
29	18	e3.5	3.4	e2.7	e2.5	e3.4	63	23	57	e5.2	3.2	1.9
30	17	e3.5	3.4	e2.5	---	e3.3	59	20	40	e9.0	2.9	1.3
31	14	---	3.4	e2.5	---	e3.3	---	17	---	e14	2.5	---
TOTAL	337.4	264.9	107.1	87.1	66.6	143.7	1140.4	3343	426.4	676.2	204.0	191.9
MEAN	10.9	8.83	3.45	2.81	2.30	4.64	38.0	108	14.2	21.8	6.58	6.40
MAX	45	25	3.6	3.2	2.6	20	120	439	57	80	27	33
MIN	2.3	3.5	3.4	2.5	2.0	2.1	3.3	17	2.4	5.0	2.5	2.2
CFSM	.82	.67	.26	.21	.17	.35	2.88	8.17	1.08	1.65	.50	.48
IN.	.95	.75	.30	.25	.19	.40	3.21	9.42	1.20	1.91	.57	.54

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 1996, BY WATER YEAR (WY)

	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEAN	12.0	14.5	7.20	4.24	3.69	12.4	68.3	41.0	13.7	6.99	4.37	7.63																				
MAX	33.8	47.2	18.3	18.1	13.0	58.7	154	108	34.2	21.8	14.0	55.1																				
(WY)	1986	1992	1966	1966	1966	1967	1967	1996	1968	1996	1966	1977																				
MIN	.76	.88	.63	.60	.61	1.10	20.3	5.13	2.87	1.04	.71	.57																				
(WY)	1977	1977	1977	1977	1977	1965	1987	1977	1988	1988	1976	1976																				

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1965 - 1996

ANNUAL TOTAL	3684.25	6988.7	16.3
ANNUAL MEAN	10.1	19.1	33.1
HIGHEST ANNUAL MEAN			8.42
LOWEST ANNUAL MEAN			1990
HIGHEST DAILY MEAN	173	May 14	439
LOWEST DAILY MEAN	.50	Aug 22	(e)2.0
ANNUAL SEVEN-DAY MINIMUM	.55	Aug 18	2.1
INSTANTANEOUS PEAK FLOW			(b)657
INSTANTANEOUS PEAK STAGE			8.17
INSTANTANEOUS LOW FLOW			May 18
ANNUAL RUNOFF (CFSM)	.76	1.45	.43
ANNUAL RUNOFF (INCHES)	10.38	19.70	1.24
10 PERCENT EXCEEDS	29	55	16.80
50 PERCENT EXCEEDS	3.4	4.1	38
90 PERCENT EXCEEDS	.87	2.4	5.8
			1.4

(a) Feb. 19, 22.

(b) From rating curve extended above 280 ft³/s.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04001000 WASHINGTON CREEK AT WINDIGO, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1965 to January 1996 (discontinued).

PERIOD OF DAILY RECORD.--

. WATER TEMPERATURE: October 1964 to September 30, 1991.

INSTRUMENTATION.--Water-temperature recorder from Oct. 20, 1964 to Sept. 30, 1991.

REMARKS.--Samples were collected at or near gage.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE (water years 1966-72, 1974-91): Maximum, 24.5°C, July 8, 1987; minimum, 0.0°C on many days during winter.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	TUR-BID-ITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, (PER-UM-MF (COLS./100 ML) (31625)
OCT 25...	1330	40	93	7.4	3.5	2.5	12.7	99	K430
JAN 30...	1415	2.9	150	7.4	0.0	1.1	--	--	54
DATE	STREP-TOCOCOI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	HARD-NESS TOTAL (MG/L AS CaCO3) (00900)	HARD-NESS NONCARB DISSOLV FLD. AS CaCO3 (MG/L) (00904)	CALCIUM DIS-SOLVED (MG/L AS Ca) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS Mg) (00925)	SODIUM, DIS-SOLVED (MG/L AS Na) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	BICAR-BONATE WATER DIS IT FIELD (MG/L AS HCO3) (00453)	ALKA-LINITY WAT DIS TOT IT FIELD (MG/L AS CaCO3) (39086)
OCT 25...	230	45	16	12	3.7	2.1	0.70	36	29
JAN 30...	43	49	--	13	4.1	2.9	0.30	--	--
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, 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)
OCT 25...	7.6	1.6	0.20	10	88	0.12	9.50	<0.010	0.150
JAN 30...	3.7	3.6	0.10	10	101	0.14	0.79	<0.010	0.120
DATE	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	ALUM-INUM, DIS-SOLVED (UG/L AS AL) (01106)	BARIUM, DIS-SOLVED (UG/L AS BA) (01005)	COBALT, DIS-SOLVED (UG/L AS CO) (01035)	IRON, DIS-SOLVED (UG/L AS FE) (01046)
OCT 25...	<0.015	0.60	0.030	0.010	<0.010	40	6	<3	250
JAN 30...	0.020	0.30	<0.010	<0.010	<0.010	30	4	<3	250

STREAMS TRIBUTARY TO LAKE SUPERIOR

04001000 WASHINGTON CREEK AT WINDIGO, MI--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DATE	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	MOLYB- DENUM, DIS- SOLVED (UG/L AS MO) (01060)	NICKEL, DIS- SOLVED (UG/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (UG/L AS SE) (01145)	SILVER, DIS- SOLVED (UG/L AS AG) (01075)	STRON- TIUM, DIS- SOLVED (UG/L AS SR) (01080)	VANA- DIUM, DIS- SOLVED (UG/L AS V) (01085)	RADIUM 226, DIS- SOLVED, RADON METHOD (PCI/L) (09511)
OCT 25...	<4	20	10	<1	<1	<1.0	23	<6	<0.02
JAN 30...	<4	13	<10	<1	<1	<1.0	26	<6	--
DATE	URANIUM NATURAL DIS- SOLVED (UG/L AS U) (22703)	URANIUM NATURAL 2 SIGMA WATER, DISS, (UG/L) (75990)	RA-226 2 SIGMA WATER, DISS, (PCI/L) (76001)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDE (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)			
OCT 25...	0.01	0.001	0.007	14	1.5	60			
JAN 30...	--	--	--	5	0.04	45			

STREAMS TRIBUTARY TO LAKE SUPERIOR

461420089195001 CLARK LAKE NEAR WATERSMEET, MI

LOCATION.--Lat 46°14'20", long 89°19'50", in NW1/4 SE1/4 sec.5, T.44 N., R.40 W., Gogebic County, Hydrologic Unit 04020102, at U.S. Forest Service Public Access Site, 7.8 mi southwest of Watersmeet.

PERIOD OF RECORD.--September 1992 to current year.

GAGE.--Nonrecording gage. Elevation of gage is 1,712 ft above sea level, from topographic map.

REMARKS.--Staff gage read by observer.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 4.00 ft, May 22, 1996; minimum observed, 1.60 ft, Apr. 7, 1994.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 4.00 ft, May 22; minimum observed, 1.86 ft, Oct. 19.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	---	3.92	---	---	3.60
2	---	---	---	---	---	---	---	---	---	3.88	3.86	---
3	---	---	---	---	---	---	---	---	---	3.86	---	---
4	---	---	---	---	---	---	---	---	3.96	3.84	3.86	---
5	---	---	2.11	---	---	---	---	---	---	3.82	---	---
6	---	2.10	---	---	---	---	---	---	3.98	---	---	3.60
7	1.94	---	---	---	---	---	---	---	---	3.80	3.90	---
8	1.95	---	---	---	---	---	---	---	3.96	3.80	---	---
9	---	---	---	---	---	---	---	---	---	---	---	3.56
10	---	2.10	---	---	---	---	---	---	---	3.78	---	---
11	---	---	---	---	---	---	---	---	3.94	---	---	---
12	---	---	---	---	---	---	---	---	---	---	3.80	3.50
13	1.92	---	---	---	---	---	---	---	3.92	3.90	---	---
14	---	---	---	---	---	2.27	---	---	3.88	---	---	---
15	---	---	---	---	---	---	---	---	---	---	3.79	---
16	1.92	---	---	---	---	---	---	---	3.86	3.88	3.78	---
17	---	---	---	---	---	---	---	---	3.86	---	3.78	3.38
18	---	---	---	---	---	---	---	---	---	3.95	3.78	3.38
19	1.86	---	---	---	---	---	---	---	---	---	---	---
20	---	---	---	---	---	---	---	---	3.80	3.92	---	3.36
21	---	---	---	---	---	---	---	3.98	3.80	---	3.74	---
22	---	---	---	---	---	---	---	4.00	---	3.88	3.76	3.36
23	1.96	---	---	---	---	---	---	---	3.80	---	3.75	---
24	---	---	---	---	---	---	---	---	---	3.88	3.73	3.34
25	2.06	---	---	---	---	---	---	---	---	3.82	3.70	3.34
26	2.06	---	---	---	---	---	---	---	---	---	3.68	---
27	---	---	---	---	---	---	---	3.98	3.84	3.82	3.66	---
28	---	---	---	---	---	---	---	---	---	3.87	3.66	---
29	2.06	---	---	---	---	---	---	---	3.82	3.90	---	---
30	---	---	---	---	---	---	---	---	3.80	---	3.64	3.30
31	---	---	---	---	---	---	---	3.96	---	3.88	---	---

STREAMS TRIBUTARY TO LAKE SUPERIOR

04033500 BOND FALLS CANAL NEAR PAULDING, MI

LOCATION.--Lat 46°23'57", long 89°08'47", in SW1/4 NE1/4 sec.11, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 40 ft upstream from intake to pipeline No. 2, 0.8 mi downstream from Bond Falls Reservoir on Middle Branch Ontonagon River, and 1.6 mi east of Paulding.

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,441.59 ft above sea level. Prior to Oct. 1, 1968, nonrecording gage at same site and at datum 3.00 ft higher.

REMARKS.--Records good except for estimated daily discharges and daily discharges below 5.0 ft³/s, which are poor. Canal diverts water from Bond Falls Reservoir (station 04034000) to South Branch Ontonagon River; water is used for power production at Victoria Dam near Rockland. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	109	8.8	132	209	136	100	6.3	11	3.3	319	160	292
2	59	9.2	133	229	192	e98	54	11	3.5	319	267	290
3	6.2	9.3	133	264	e200	e98	106	11	92	319	332	291
4	6.0	9.4	133	263	e200	e98	106	11	226	319	332	294
5	6.7	9.4	133	262	e200	e98	106	11	228	319	324	292
6	7.2	9.4	133	262	e200	e98	105	11	106	317	219	291
7	6.9	9.5	133	259	e200	e98	103	11	14.4	317	122	290
8	6.8	9.8	167	257	e200	e98	103	11	70	317	122	289
9	6.8	9.8	140	257	e200	e98	103	11	259	315	200	296
10	6.8	9.8	12	254	e200	98	55	30	259	315	297	310
11	6.7	9.9	11	252	e200	103	7.4	66	258	314	297	308
12	6.8	10	11	251	e200	104	7.5	66	258	312	300	304
13	6.8	10	11	254	e200	106	7.1	43	258	176	302	303
14	6.8	67	80	251	e200	109	6.8	12	258	12.5	301	300
15	6.8	132	163	e250	e200	109	6.8	12	258	12.0	301	299
16	6.8	132	163	e250	e200	109	6.8	12	258	11.1	299	297
17	6.8	134	163	e250	e200	110	6.9	33	291	11.1	299	293
18	6.9	134	163	e250	e200	61	7.3	65	321	12.0	298	169
19	7.2	134	163	e250	124	6.8	8.5	65	321	12.0	297	9.4
20	7.3	133	162	e250	e100	6.4	8.7	33	321	11.1	301	8.8
21	8.0	134	162	247	e100	6.4	8.6	4.7	321	11.1	305	108
22	7.4	134	185	245	e100	6.4	9.1	4.3	319	60	305	196
23	7.7	134	217	241	e100	6.4	8.9	4.1	317	140	303	290
24	8.1	134	217	198	e100	6.6	9.3	4.0	317	220	302	300
25	7.6	133	217	150	e100	6.9	9.8	3.8	317	300	301	303
26	7.8	134	216	145	100	6.4	9.9	3.6	317	300	300	301
27	8.0	134	215	162	e100	6.4	9.8	3.5	317	299	299	301
28	8.1	133	213	190	e100	6.4	10	3.4	319	299	297	299
29	8.0	132	211	181	e100	6.4	10	3.3	319	297	295	297
30	8.1	133	211	163	---	6.4	11	3.3	319	225	295	295
31	8.2	---	210	107	---	6.4	---	3.3	---	116	293	---
TOTAL	377.3	2325.3	4613	7053	4652	1877.3	1017.5	577.3	7245.2	6326.9	8665	7916.2
MEAN	12.2	77.5	149	228	160	60.6	33.9	18.6	242	204	280	264
MAX	109	134	217	264	200	110	106	66	321	319	332	310
MIN	6.0	8.8	11	107	100	6.4	6.3	3.3	3.3	11	122	8.8

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1996, BY WATER YEAR (WY)

MEAN	104	99.4	144	189	209	139	31.2	115	167	171	164	137
MAX	257	253	292	303	305	287	194	310	312	284	320	275
(WY)	1959	1972	1972	1986	1969	1984	1973	1986	1966	1993	1947	1944
MIN	.00	6.24	10.2	55.2	88.7	2.21	.33	.92	3.37	14.5	2.98	1.37
(WY)	1965	1944	1948	1990	1991	1959	1962	1962	1943	1949	1966	1959

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1942 - 1996
ANNUAL TOTAL	46433.3	52646.0	
ANNUAL MEAN	127	144	139
HIGHEST ANNUAL MEAN			206
LOWEST ANNUAL MEAN			55.9
HIGHEST DAILY MEAN	323	332	368
LOWEST DAILY MEAN	.70	3.3	May 5 1960
ANNUAL SEVEN-DAY MINIMUM	1.9	3.4	(c)
10 PERCENT EXCEEDS	298	302	(d)
50 PERCENT EXCEEDS	111	133	297
90 PERCENT EXCEEDS	7.5	6.8	137
			4.9

(a) Aug. 3, 4.

(b) May 29 to June 1.

(c) No flow for several days in 1963-70, 1973-75, 1982, 1987, 1991, 1994.

(d) No flow in 1963-65, 1967, 1975, 1987, 1991.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04034000 BOND FALLS RESERVOIR NEAR PAULDING, MI

LOCATION.--Lat 46°24'29", long 89°07'42", in SW1/4 sec.1, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, at Bond Falls Dam on Middle Branch Ontonagon River, 2.5 mi east of Paulding.

DRAINAGE AREA.--190 mi².

PERIOD OF RECORD.--June 1942 to current year. Prior to October 1950, monthend contents only published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,335.59 ft above sea level.

REMARKS.--Reservoir is formed by earthfill and concrete dam with one taintor gate; dam completed in 1937. Capacity of reservoir, 41,300 acre-ft between gage heights of 120 ft (maximum drawdown) and 141 ft (full pond). Dead storage unknown. Water diverted to South Branch Ontonagon River through Bond Falls Canal (station 04033500); water used for power production at Victoria Dam near Rockland.

COOPERATION.--Gage-height record provided by Upper Peninsula Power Co. and converted to acre-feet by U.S. Geological Survey.

EXTREMES FOR PERIOD OF RECORD (SINCE 1947).--Maximum contents observed, 42,980 acre-ft, July 3, 1953, gage height, 141.7 ft, of which 1,680 acre-ft was uncontrolled storage; no usable storage at times; minimum gage height observed, 116.0 ft, Mar. 21, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum contents observed, 37,980 acre-ft, May 22, June 6, gage height, 139.6 ft; minimum observed, 13,420 acre-ft, Sept. 30, gage height, 127.8 ft.

MONTHEND GAGE HEIGHT AND CONTENTS AT 1030, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)	(equivalent in ft ³ /s)
Sept. 30	128.8	15,320	--	--
Oct. 31	135.3	28,260	+12,940	+210.4
Nov. 30	137.5	33,150	+4,890	+82.2
Dec. 31	136.3	30,460	-2,690	-43.7
CAL YR 1995			+660	+0.9
Jan. 31	131.9	21,300	-9,160	-149.0
Feb. 29	129.3	16,270	-5,030	-87.4
Mar. 31	130.7	18,930	+2,660	+43.3
Apr. 30	138.6	35,680	+16,750	+281.5
May 31	139.3	37,290	+1,610	+26.2
June 30	137.4	32,920	-4,370	-73.4
July 31	137.3	32,690	-230	-3.7
Aug. 31	133.0	23,500	-9,190	-149.5
Sept. 30	127.8	13,420	-10,080	-169.4
WTR YR 1996			-1,900	-2.6

STREAMS TRIBUTARY TO LAKE SUPERIOR

04034500 MIDDLE BRANCH ONTONAGON RIVER NEAR TROUT CREEK, MI

LOCATION.--Lat 46°28'40", long 89°05'25", in SW1/4 sec.8, T.47 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.1 mi upstream from State Highway 28, 3.8 mi west of village of Trout Creek, and 7.5 mi downstream from Bond Falls Reservoir.

DRAINAGE AREA.--203 mi².

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,132.03 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Nov. 4, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good except for June 10 to Sept. 10, which are fair. Flow regulated by Bond Falls Reservoir (station 04034000) 7.5 mi upstream. Diversion to South Branch Ontonagon River 8.5 mi upstream by Bond Falls Canal (station 04033500). Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	53	52	e48	48	e44	43	44	1460	263	54	55	e47
2	46	59	49	47	e44	e43	43	1360	277	62	54	e44
3	46	56	49	e47	e44	e43	43	1050	202	56	54	e44
4	45	53	49	47	e44	e43	43	712	64	54	53	e44
5	45	51	48	48	e44	43	44	721	61	54	56	e44
6	53	53	e47	49	e44	e43	44	939	179	54	56	e44
7	60	53	e46	49	e43	e43	43	994	372	56	57	e44
8	49	52	e45	49	e43	e43	43	1050	322	55	54	e44
9	47	52	e45	48	43	43	43	867	59	54	54	e44
10	46	51	e45	47	44	42	45	801	57	53	54	e44
11	46	51	e45	47	43	43	51	939	57	54	54	44
12	45	49	e46	46	43	43	55	927	56	58	54	44
13	45	49	e47	46	43	46	51	847	55	56	54	44
14	46	51	e47	45	44	46	49	653	54	54	54	44
15	49	50	49	42	43	45	49	535	54	54	55	44
16	47	50	49	e43	e43	44	48	502	54	53	54	44
17	46	50	49	e44	e43	43	50	439	55	52	53	44
18	45	49	49	e45	e43	43	63	426	55	58	53	43
19	46	49	49	e46	e43	43	89	587	56	59	53	44
20	47	50	49	e47	43	43	101	710	55	55	54	45
21	58	50	49	e47	44	43	116	1040	55	53	53	45
22	57	48	49	e47	43	44	134	1130	55	54	56	46
23	61	49	49	46	42	44	109	1190	56	53	53	45
24	88	48	49	e46	43	43	108	918	57	54	52	46
25	61	e48	48	e46	42	42	227	621	55	53	52	44
26	53	e48	47	e45	42	e43	626	567	57	53	52	45
27	52	48	e47	e45	42	e44	1210	462	74	53	52	47
28	51	47	47	45	41	e45	1370	282	59	60	51	45
29	51	47	48	e45	e43	45	1470	209	57	57	e51	45
30	51	e48	50	e45	---	44	1470	51	55	56	e51	44
31	49	---	50	e45	---	43	---	111	---	56	e50	---
TOTAL	1584	1510	1484	1432	1250	1348	7881	23100	2987	1707	1658	1335
MEAN	51.1	50.3	47.9	46.2	43.1	43.5	263	745	99.6	55.1	53.5	44.5
MAX	88	59	50	49	44	46	1470	1460	372	62	57	47
MIN	45	47	45	42	41	42	43	51	54	52	50	43

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1996, BY WATER YEAR (WY)

	MEAN	55.2	56.4	48.4	46.9	46.4	50.6	85.1	119	98.4	70.8	57.9	53.6
	MAX	221	239	102	84.7	76.7	118	297	745	461	253	105	216
	(WY)	1943	1943	1943	1943	1943	1943	1943	1996	1943	1953	1952	1942
	MIN	43.5	33.1	32.0	31.7	31.0	32.4	36.5	38.8	50.7	50.2	42.6	43.2
	(WY)	1944	1949	1949	1949	1949	1949	1949	1949	1992	1989	1944	1967

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1942 - 1996

ANNUAL TOTAL	20753	47276	
ANNUAL MEAN	56.9	129	
HIGHEST ANNUAL MEAN			65.3
LOWEST ANNUAL MEAN			187
HIGHEST DAILY MEAN	467	May 31	1550
LOWEST DAILY MEAN	39	Feb 21	30
ANNUAL SEVEN-DAY MINIMUM	39	Feb 21	31
INSTANTANEOUS PEAK FLOW			1750
INSTANTANEOUS PEAK STAGE		4.74	5.05
INSTANTANEOUS LOW FLOW			14
10 PERCENT EXCEEDS	57	267	66
50 PERCENT EXCEEDS	49	49	50
90 PERCENT EXCEEDS	40	43	44

(a) Sometime during period Jan. 23 to Feb. 13, 1947, result of ice jam upstream.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04035995 LAKE GOGEBIC NEAR BERGLAND, MI

LOCATION.--Lat 46°35'19", long 89°32'52", in SW1/4 NW1/4 sec.3, T.48 N., R.42 W., Ontonagon County, Hydrologic Unit 04020102, at upstream side of dam on lake outlet, 1.0 mi southeast of Bergland, and 4.3 mi east of Merriweather.

DRAINAGE AREA.--162 mi².

PERIOD OF RECORD.--July 1958 to September 1959 (no winter record), February 1969 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,292.70 ft above sea level. July 1958 to September 1959, nonrecording gage at mouth of Merriweather Creek at different datum. February 1969 to September 1988, at datum 1.00 ft higher.

REMARKS.--Lake Gogebic is used as a storage reservoir (capacity 35,200 acre-ft) by Upper Peninsula Power Co. for power production at Victoria Dam near Rockland. Lake level is controlled at the outlet by a concrete and steel dam with removable flash boards. Major inlets to Lake Gogebic are Slate River, Trout Brook, and Merriweather Creek. Streamflow records are currently collected at the outlet, West Branch Ontonagon River (station 04036000). Surface area of lake is 14,780 acres.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 4.44 ft, present datum, May 9, 1996; minimum daily, 0.68 ft, present datum, Apr. 5, 6, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 4.44 ft, May 9; minimum daily, 1.27 ft, Mar. 20, 21, Apr. 9.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.94	2.79	2.41	1.92	---	---	1.35	4.37	2.94	2.88	2.88	2.78
2	2.95	2.88	2.39	1.91	---	---	1.33	4.32	2.90	2.93	2.90	2.79
3	2.97	2.86	2.39	1.89	---	---	1.31	4.28	2.90	2.94	2.91	2.78
4	2.95	2.88	2.37	1.88	---	---	1.28	4.28	2.95	2.95	2.92	2.82
5	2.90	2.80	2.37	1.86	---	---	1.34	4.32	2.97	2.97	2.96	2.81
6	2.91	2.81	---	1.84	1.81	---	1.33	4.32	2.96	2.95	2.94	2.81
7	3.02	2.74	2.33	1.84	1.72	---	1.31	4.34	2.94	2.98	2.94	2.80
8	3.02	2.71	2.30	1.82	1.70	---	1.30	4.38	2.95	2.95	2.90	2.77
9	2.99	2.78	2.34	1.81	1.69	---	1.27	4.41	2.93	2.92	2.85	2.77
10	2.98	2.73	2.35	1.80	1.70	1.47	1.29	4.42	2.91	2.92	2.87	2.77
11	2.98	2.69	2.35	1.79	1.71	1.37	1.29	4.40	2.91	2.93	2.89	2.77
12	2.99	2.70	2.35	1.78	1.70	1.33	1.36	4.35	2.90	2.97	2.86	2.67
13	2.94	2.67	2.31	1.77	1.69	1.32	1.43	4.27	2.86	3.01	2.84	2.67
14	2.89	2.66	2.29	1.75	1.69	1.31	1.47	4.18	2.84	3.01	2.84	2.67
15	2.86	2.64	2.27	1.74	1.67	1.30	1.51	4.09	2.83	2.98	2.81	2.67
16	2.82	2.62	2.23	1.73	1.67	1.30	1.55	4.01	2.82	2.98	2.82	2.66
17	2.87	2.60	2.21	1.73	1.67	1.31	1.57	3.93	2.79	2.95	2.82	2.65
18	2.74	2.59	2.18	1.79	1.66	1.31	1.59	3.89	2.78	2.93	2.81	2.65
19	2.74	2.57	2.15	1.84	1.65	1.29	1.78	3.85	2.78	2.87	2.83	2.65
20	2.67	2.56	2.14	1.84	1.63	1.27	2.03	3.87	2.79	2.89	2.87	2.66
21	2.72	2.56	2.12	1.85	1.61	1.27	2.28	3.85	2.78	2.88	2.87	2.66
22	2.81	2.54	2.11	1.84	1.58	1.29	2.60	3.78	2.77	2.89	2.90	2.68
23	2.74	2.54	2.09	1.83	1.58	1.29	2.87	3.69	2.76	2.86	2.89	2.70
24	2.89	2.51	2.07	1.81	1.58	1.30	3.15	3.59	2.76	2.83	2.93	2.70
25	2.98	2.50	2.06	1.81	1.54	1.33	3.62	3.51	2.75	2.82	2.86	2.71
26	2.97	2.49	2.04	1.81	1.53	1.32	3.90	3.42	2.83	2.79	2.81	2.70
27	2.94	2.47	2.02	1.82	1.53	1.32	4.09	3.31	2.88	2.78	2.82	2.80
28	2.92	2.46	2.01	1.82	1.53	1.32	4.19	3.23	2.90	2.83	2.81	2.82
29	2.92	2.42	1.99	1.84	1.53	1.30	4.28	3.14	2.94	2.86	2.79	2.80
30	2.88	2.43	1.96	1.82	---	1.32	4.34	3.07	2.93	2.86	2.78	2.77
31	2.84	---	1.94	1.82	---	1.33	---	3.00	---	2.86	2.79	---
MEAN	2.89	2.64	---	1.82	---	---	2.13	3.93	2.86	2.91	2.86	2.73
MAX	3.02	2.88	---	1.92	---	---	4.34	4.42	2.97	3.01	2.96	2.82
MIN	2.67	2.42	---	1.73	---	---	1.27	3.00	2.75	2.78	2.78	2.65

STREAMS TRIBUTARY TO LAKE SUPERIOR

04036000 WEST BRANCH ONTONAGON RIVER NEAR BERGLAND, MI

LOCATION.--Lat 46°35'15", long 89°32'30", in SW1/4 NE1/4 sec.3, T.48 N., R.42 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.4 mi downstream from dam at outlet of Lake Gogebic, and 1.5 mi east of Bergland.

DRAINAGE AREA.--162 mi².

PERIOD OF RECORD.--July 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,290.81 ft above sea level. Prior to Nov. 5, 1942, nonrecording gage 0.4 mi upstream at different datum.

REMARKS.--Records good except for daily discharges below 5.0 ft³/s and estimated daily discharges, which are fair. Flow regulated by Lake Gogebic (station 04035995). Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	67	501	224	188	e150	206	171	1170	618	31	e35	16
2	66	512	218	185	e148	204	169	1150	609	33	e35	15
3	131	504	215	182	e145	199	167	1130	393	33	e35	14
4	167	513	210	178	e140	194	170	1130	208	35	e35	15
5	158	393	217	176	e140	191	169	1140	208	35	e40	15
6	160	474	305	175	e138	187	167	1150	204	e33	e54	15
7	210	443	207	173	e138	183	165	1150	197	e98	e210	15
8	317	368	193	166	138	179	163	1170	196	e90	e174	15
9	364	335	198	162	136	175	162	1180	190	e85	e30	14
10	361	319	127	160	136	172	161	1180	184	e105	e30	13
11	361	305	121	158	139	170	162	1180	185	e120	e30	13
12	359	306	165	157	139	167	173	1150	179	e120	e29	11
13	341	298	212	153	137	165	186	1120	167	e230	e30	9.4
14	323	293	272	149	136	165	194	1090	124	e315	e30	8.6
15	309	287	268	147	135	164	202	1050	73	e315	32	8.5
16	298	282	259	147	134	164	209	1020	63	e310	32	8.3
17	315	275	251	145	132	164	212	986	61	e310	32	8.1
18	272	270	244	165	130	165	221	971	61	e275	32	8.2
19	266	265	238	186	129	162	258	959	61	e282	33	7.7
20	248	263	235	174	127	161	325	970	60	e150	34	6.7
21	263	261	233	171	125	166	396	961	58	e168	33	5.8
22	296	255	228	169	176	162	501	935	57	e154	33	5.7
23	272	251	224	167	217	159	606	898	56	e147	32	6.0
24	375	247	221	164	219	160	707	865	55	e95	34	5.6
25	550	244	217	161	211	177	845	836	55	50	30	5.1
26	600	241	213	158	205	183	983	800	54	58	28	5.0
27	591	236	209	e155	213	177	1050	763	48	58	28	5.1
28	585	234	206	e155	214	176	1090	729	44	60	28	5.1
29	584	228	201	e155	211	173	1130	697	39	60	26	5.0
30	571	226	196	e150	---	174	1160	671	34	60	23	4.2
31	554	---	191	e150	---	175	---	647	---	49	20	---
TOTAL	10334	9629	6718	5081	4538	5419	12274	30848	4541	3964	1307	289.1
MEAN	333	321	217	164	156	175	409	995	151	128	42.2	9.64
MAX	600	513	305	188	219	206	1160	1180	618	315	210	16
MIN	66	226	121	145	125	159	161	647	34	31	20	4.2

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1996, BY WATER YEAR (WY)

	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
MEAN	133	156	172	169	156	146	328	299	218	137	82.9	82.9													
MAX	698	489	346	360	257	327	742	995	550	578	550	408													
(WY)	1986	1989	1968	1966	1969	1973	1943	1996	1954	1952	1972	1980													
MIN	.65	3.68	18.5	23.3	35.8	55.8	10.7	3.09	21.5	7.09	1.25	.88													
(WY)	1990	1990	1949	1949	1949	1949	1949	1987	1986	1988	1963	1963													

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1942 - 1996

ANNUAL TOTAL	64610.5	94942.1	173
ANNUAL MEAN	177	259	288
HIGHEST ANNUAL MEAN			70.1
LOWEST ANNUAL MEAN			1952
HIGHEST DAILY MEAN	600	1180	1380
LOWEST DAILY MEAN	1.4	4.2	.38
ANNUAL SEVEN-DAY MINIMUM	1.8	5.0	.39
INSTANTANEOUS PEAK FLOW		1190	1400
INSTANTANEOUS PEAK STAGE		5.51	5.98
ANNUAL RUNOFF (CFSM)	1.09	1.60	1.07
ANNUAL RUNOFF (INCHES)	14.84	21.80	14.47
10 PERCENT EXCEEDS	351	679	366
50 PERCENT EXCEEDS	167	174	128
90 PERCENT EXCEEDS	3.8	29	8.3

(a) Nov. 16, 17, 1989.

(e) Estimated.

LOCATION.--Lat 46°15'10", long 89°27'07", in NE1/4 sec.32, T.45 N., R.41 W., Gogebic County, Hydrologic Unit 04020102, on right bank at outlet, 100 ft upstream from dam. 13 mi west of Watersmeet.

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,679.53 ft above sea level (levels by Michigan Department of Natural Resources). July 15, 1942, to Oct. 28, 1969, nonrecording gage, and Oct. 28, 1969, to Oct. 23, 1989, water-stage recorder at site 90 ft downstream at same datum.

REMARKS.--Cisco Lake (capacity 15,600 acre-ft) is the downstream lake in a chain of lakes used as storage reservoirs by Upper Peninsula Power Company for power production at Victoria Dam near Rockland. Lake level is controlled at the outlet by a concrete dam with two bays and removable flash boards. The major inlet to Cisco Lake is the combined outlet from Lindsley Lake and Thousand Island Lake. Streamflow records are currently collected at the outlet, Cisco Branch Ontonagon River (station 04037500). The lake level is maintained at an elevation of approximately 1,683.5 ft, above sea level, during winter months and 1,684.0 ft, above sea level, during summer months. Surface area of lake is 506 acres.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 4.69 ft, July 19, 1942; minimum, 1.72 ft, Mar. 20-22, 1948.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 4.20 ft, July 29; minimum, 3.40 ft, Apr. 18.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.15	3.88	3.51	3.49	3.46	3.46	3.43	4.11	3.97	3.94	4.03	3.98
2	4.13	3.91	3.50	3.48	3.46	3.46	3.43	4.10	4.00	4.03	4.03	4.00
3	4.09	3.89	3.49	3.46	3.46	3.46	3.43	4.09	4.04	4.02	4.03	3.99
4	4.02	3.87	3.48	3.46	3.46	3.46	3.47	4.08	4.04	4.00	4.03	4.10
5	3.99	3.86	3.49	3.46	3.46	3.48	3.48	4.08	4.02	3.98	4.04	4.08
6	4.04	3.83	3.48	3.47	3.47	3.50	3.50	4.09	4.01	3.96	4.04	4.05
7	4.13	3.76	3.47	3.47	3.49	3.51	3.51	4.09	3.97	3.95	4.02	4.01
8	4.11	3.76	3.47	3.48	3.49	3.52	3.52	4.10	3.96	3.96	3.98	3.96
9	4.08	3.74	3.48	3.50	3.50	3.51	3.51	4.11	3.95	3.95	3.98	3.93
10	4.05	3.69	3.47	3.51	3.51	3.50	3.50	4.11	3.94	3.96	4.01	3.96
11	4.01	3.64	3.47	3.51	3.52	3.49	3.49	4.11	3.97	3.98	4.02	3.96
12	4.00	3.61	3.49	3.51	3.51	3.47	3.51	4.10	3.97	4.08	4.02	3.95
13	4.00	3.58	3.51	3.49	3.48	3.48	3.52	4.08	3.97	4.15	4.06	3.94
14	3.98	3.60	3.56	3.49	3.46	3.48	3.49	4.06	3.98	4.10	4.01	3.94
15	3.98	3.59	3.54	3.49	3.45	3.48	3.47	4.04	3.99	4.05	3.98	3.96
16	3.99	3.57	3.52	3.49	3.45	3.48	3.44	4.00	4.01	4.00	3.97	3.97
17	4.01	3.55	3.49	3.48	3.45	3.48	3.42	3.99	4.02	3.97	3.98	3.97
18	3.98	3.54	3.45	3.57	3.46	3.47	3.42	3.95	4.01	3.98	3.99	3.98
19	4.00	3.52	3.44	3.64	3.46	3.47	3.48	4.09	3.99	4.02	4.00	3.99
20	3.96	3.50	3.45	3.63	3.45	3.46	3.52	4.15	3.97	4.01	3.99	4.01
21	3.99	3.51	3.46	3.60	3.44	3.46	3.57	4.15	3.97	3.98	4.01	4.02
22	3.99	3.52	3.47	3.57	3.45	3.46	3.64	4.13	3.95	3.95	4.03	4.04
23	3.98	3.52	3.49	3.54	3.47	3.45	3.69	4.11	3.97	3.96	4.03	4.04
24	4.02	3.52	3.50	3.52	3.49	3.47	3.74	4.07	3.96	3.97	4.02	4.02
25	4.03	3.52	3.52	3.50	3.48	3.58	3.84	4.02	3.97	3.98	4.00	4.03
26	3.98	3.54	3.54	3.47	3.47	3.57	3.92	3.98	4.02	3.99	3.98	4.03
27	3.93	3.54	3.55	3.48	3.50	3.54	3.98	3.94	4.09	4.01	3.97	4.02
28	3.87	3.53	3.54	3.47	3.51	3.51	4.01	3.89	4.06	4.15	3.97	3.97
29	3.84	3.51	3.53	3.46	3.48	3.48	4.03	3.90	4.03	4.18	3.96	3.93
30	3.81	3.52	3.51	3.45	---	3.46	4.08	3.92	3.97	4.11	3.96	3.92
31	3.84	---	3.50	3.46	---	3.44	---	3.95	---	4.06	3.97	---
MEAN	4.00	3.64	3.50	3.50	3.47	3.49	3.60	4.05	3.99	4.01	4.00	3.99
MAX	4.15	3.91	3.56	3.64	3.52	3.58	4.08	4.15	4.09	4.18	4.06	4.10
MIN	3.81	3.50	3.44	3.45	3.44	3.44	3.42					

STREAMS TRIBUTARY TO LAKE SUPERIOR

04037500 CISCO BRANCH ONTONAGON RIVER AT CISCO LAKE OUTLET, MI

LOCATION.--Lat 46°15'12", long 89°27'05", in NE1/4 sec.32, T.45 N., R.41 W., Gogebic County, Hydrologic Unit 04020102, on left bank 80 ft downstream from Cisco Lake Dam, 2.5 mi upstream from Langford Creek, 5.0 mi upstream from U.S. Highway 2, and 13 mi west of Watersmeet.

DRAINAGE AREA.--50.7 mi².

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

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,672.69 ft above sea level. Prior to Oct. 1, 1968, nonrecording gage at same site and at datum 4.00 ft higher.

REMARKS.--Records good except for estimated daily discharges, which are fair and daily discharges below 3.0 ft³/s, which are poor. Flow regulated by Cisco Lake (station 04037400). Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	155	38	54	52	e34	50	55	188	1.2	57	121	1.1
2	126	59	53	51	e34	31	39	187	1.5	31	74	.77
3	174	84	52	51	e34	31	23	185	23	68	73	.75
4	167	105	46	31	e34	16	6.5	184	86	66	72	59
5	84	104	38	17	e20	3.9	6.7	184	124	65	103	101
6	35	101	37	17	e4.0	3.8	6.8	184	123	64	126	98
7	71	96	37	17	e4.0	3.9	7.2	183	93	63	125	95
8	128	95	37	18	4.2	18	24	184	70	63	77	91
9	126	115	38	19	11	e33	38	184	69	42	23	44
10	123	129	38	19	18	e33	61	185	40	9.3	4.1	3.0
11	119	124	21	26	19	e33	78	185	7.1	1.4	3.6	1.6
12	72	121	5.1	34	48	e33	96	182	1.1	43	15	1.2
13	35	68	5.7	34	71	e33	116	180	.84	141	48	1.0
14	34	12	31	34	69	e33	118	178	.74	177	123	1.0
15	35	64	56	34	47	e33	116	175	.66	173	119	.94
16	35	81	63	34	30	e33	113	171	.61	167	65	.90
17	35	80	72	34	30	e33	111	168	14	142	16	.90
18	34	78	70	e34	31	e33	110	163	35	103	16	.90
19	35	77	51	e34	31	e33	116	183	46	107	16	.90
20	33	54	32	59	30	e33	122	194	44	107	15	.90
21	74	34	16	80	29	e33	127	193	45	104	15	.92
22	115	35	4.7	79	17	e33	134	189	44	66	31	1.1
23	114	34	5.0	77	3.6	e33	139	185	44	22	44	31
24	119	35	5.3	76	17	e33	145	180	26	3.7	44	49
25	141	35	5.6	75	31	38	160	174	14	3.3	43	49
26	158	36	6.0	74	30	58	173	169	15	3.2	42	75
27	152	45	20	75	32	78	177	164	72	3.2	41	94
28	147	54	36	74	52	76	178	85	129	5.8	34	90
29	143	54	46	74	71	74	181	3.5	125	77	21	87
30	77	54	53	52	---	72	186	2.7	120	180	14	63
31	18	---	53	e34	---	72	---	1.6	---	175	1.7	---
TOTAL	2914	2101	1087.4	1419	885.8	1153.6	2963.2	4973.8	1414.75	2332.9	1565.4	1043.88
MEAN	94.0	70.0	35.1	45.8	30.5	37.2	98.8	160	47.2	75.3	50.5	34.8
MAX	174	129	72	80	71	78	186	194	129	180	126	101
MIN	18	12	4.7	17	3.6	3.8	6.5	1.6	.61	1.4	1.7	.75

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1996, BY WATER YEAR (WY)

MEAN	69.7	67.5	48.6	38.9	34.9	43.5	60.5	47.3	46.1	32.6	26.3	38.5
MAX	151	116	84.1	62.6	81.0	92.1	111	160	123	113	99.7	104
(WY)	1986	1968	1961	1983	1945	1973	1985	1996	1953	1953	1978	1977
MIN	13.1	14.5	23.5	23.1	20.6	24.1	2.02	.17	.11	.25	.15	.23
(WY)	1958	1945	1990	1959	1950	1956	1948	1977	1977	1977	1970	1976

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1945 - 1996

ANNUAL TOTAL	14885.93	23854.73	
ANNUAL MEAN	40.8	65.2	
HIGHEST ANNUAL MEAN			46.2
LOWEST ANNUAL MEAN			65.9
HIGHEST DAILY MEAN	174	194	25.2
LOWEST DAILY MEAN	.37	.61	288
ANNUAL SEVEN-DAY MINIMUM	.38	.91	.08
INSTANTANEOUS PEAK FLOW			.09
INSTANTANEOUS PEAK STAGE			Jul 28 1988
ANNUAL RUNOFF (CFSM)	.80	5.67	(c)6.10
ANNUAL RUNOFF (INCHES)	10.92	1.29	.91
10 PERCENT EXCEEDS	104	167	12.38
50 PERCENT EXCEEDS	34	46	103
90 PERCENT EXCEEDS	.62	3.9	37
			1.0

(a) May 1-4, 1951.

(b) July 21, Aug. 2, 3, 1988.

(c) Present datum.

(e) Estimated.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04040500 STURGEON RIVER NEAR SIDNAW, MI

LOCATION.--Lat 46°35'03", long 88°34'33", in NE1/4 SE1/4 sec.5, T.48 N., R.34 W., Baraga County, Hydrologic Unit 04020104, on right bank 30 ft downstream from highway bridge, 3.0 mi downstream from Rock River, 3.5 mi northwest of Covington, 6.5 mi upstream from Perch River, 8.5 mi northeast of Sidnaw, and at mile 71.

DRAINAGE AREA.--171 mi².

PERIOD OF RECORD.--October 1912 to September 1915, April 1943 to current year.

REVISED RECORDS.--WSP 1507: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,214.40 ft above sea level. October 1912 to September 1915, nonrecording gage at site 200 ft upstream at different datum. Apr. 2, 1943, to Oct. 1, 1946, nonrecording gage at present site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	146	349	e120	e98	e82	e76	e98	1100	190	141	229	51
2	232	517	e120	e96	e82	e76	e95	974	397	150	185	46
3	277	525	e120	e95	e82	e76	e95	998	691	160	150	42
4	296	479	e120	e95	e82	e76	e95	1060	840	132	128	41
5	280	418	e120	e95	e82	e76	e92	1150	733	106	134	40
6	246	392	e115	e95	e82	e76	e92	1130	785	90	272	39
7	340	368	e110	e94	e82	e76	e94	1380	707	198	284	36
8	375	314	e110	e94	e82	e76	e96	1640	604	158	273	33
9	343	296	e110	e92	e82	e76	e98	1830	485	141	213	32
10	301	285	e110	e92	e82	e76	e105	2040	373	114	169	31
11	260	253	e110	e90	e82	e76	e130	1920	308	95	143	33
12	223	231	e110	e90	e82	e80	e200	1550	268	99	122	39
13	192	227	e110	e90	e80	e85	e320	1290	259	148	106	40
14	175	195	e110	e90	e80	e90	e310	1150	212	230	96	45
15	215	174	e105	e90	e80	e95	e300	1130	172	262	98	51
16	240	171	e105	e92	e80	e100	e280	1190	155	215	102	55
17	220	158	e105	e94	e80	e100	318	1270	153	164	95	54
18	189	157	e105	e95	e80	e100	451	1310	141	236	87	51
19	166	153	e100	e98	e78	e100	852	1680	136	646	78	47
20	176	152	e100	e105	e78	e100	1130	2330	139	644	80	46
21	259	145	e100	e110	e78	e100	1220	1920	130	510	74	42
22	363	145	e100	e117	e78	e100	1620	1300	128	336	110	36
23	424	138	e100	e115	e78	e100	1700	945	121	230	151	34
24	866	130	e100	e110	e78	e100	1710	728	141	185	146	33
25	853	129	e100	e105	e76	e100	1970	586	141	170	113	35
26	804	e125	e100	e100	e76	e100	1870	466	123	153	90	38
27	681	e120	e100	e98	e76	e105	1520	383	111	133	77	41
28	574	e113	e100	e95	e76	e105	1450	326	105	127	70	43
29	479	e115	e98	e90	e76	e105	1500	283	106	191	64	46
30	426	e120	e98	e85	---	e105	1320	242	148	216	58	45
31	377	---	e98	e82	---	e100	---	218	---	239	54	---
TOTAL	10998	7094	3309	2987	2312	2806	21131	35519	9002	6619	4051	1245
MEAN	355	236	107	96.4	79.7	90.5	704	1146	300	214	131	41.5
MAX	866	525	120	117	82	105	1970	2330	840	646	284	55
MIN	146	113	98	82	76	76	92	218	105	90	54	31
CFSM	2.07	1.38	.62	.56	.47	.53	4.12	6.70	1.75	1.25	.76	.24
IN.	2.39	1.54	.72	.65	.50	.61	4.60	7.73	1.96	1.44	.88	.27

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 1996, BY WATER YEAR (WY)

MEAN	183	196	117	70.9	62.3	158	758	467	214	129	82.3	126
MAX	547	599	242	162	191	744	1321	1147	579	503	319	586
(WY)	1986	1989	1983	1969	1984	1973	1960	1965	1944	1968	1978	1968
MIN	11.5	17.3	16.0	15.5	15.4	39.8	266	111	24.4	8.00	7.86	4.63
(WY)	1977	1977	1977	1977	1977	1956	1946	1977	1988	1988	1976	1976

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1913 - 1996

ANNUAL TOTAL	70677						107073					
ANNUAL MEAN	194						293			213		
HIGHEST ANNUAL MEAN										311		1968
LOWEST ANNUAL MEAN										104		1948
HIGHEST DAILY MEAN	866						2330	May 20	4450			Apr 21 1985
LOWEST DAILY MEAN	23						31	Sep 10	2.7			Sep 13 1976
ANNUAL SEVEN-DAY MINIMUM	32						35	Sep 6	3.2			Aug 28 1976
INSTANTANEOUS PEAK FLOW							2430	May 20	4630			Apr 24 1960
INSTANTANEOUS PEAK STAGE							8.84	May 20	11.63			Apr 24 1960
INSTANTANEOUS LOW FLOW							30	Sep 10	2.7			Sep 13 1976
ANNUAL RUNOFF (CFSM)	1.13						1.71		1.24			
ANNUAL RUNOFF (INCHES)	15.38						23.29		16.90			
10 PERCENT EXCEEDS	526						852		520			
50 PERCENT EXCEEDS	100						116		100			
90 PERCENT EXCEEDS	42						76		31			

(e) Estimated.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04041500 STURGEON RIVER NEAR ALSTON, MI

LOCATION.--Lat 46°43'35", long 88°39'43", in SE1/4 sec.15, T.50 N., R.35 W., Baraga County, Hydrologic Unit 04020104, on right bank in powerhouse of Upper Peninsula Power Co. at Prickett Dam, 4.0 mi upstream from Clear Creek, 5.0 mi southeast of Alston, and at mile 45.

DRAINAGE AREA.--346 mi².

PERIOD OF RECORD.--February 1932 to June 1941, October 1942 to current year.

GAGE.--Water-stage recorder. Datum of gage is 709.64 ft above sea level. Prior to Jan. 5, 1948, nonrecording gage, and Jan. 5, 1948, to Sept. 30, 1963, water-stage recorder at same site at datum 39.34 ft lower.

REMARKS.--Records good. Flow regulated by powerplant at station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	686	259	225	217	319	270	1950	481	292	434	173
2	64	650	267	236	208	444	264	1580	546	293	455	173
3	111	960	283	226	291	412	254	1390	830	293	444	174
4	308	1130	297	205	342	358	255	1910	1080	292	441	174
5	319	858	289	205	288	327	255	2040	1290	291	264	157
6	325	690	235	205	220	327	255	1800	1370	294	363	142
7	325	645	203	205	202	337	254	2170	1430	291	587	143
8	448	644	203	197	202	361	228	2140	1230	292	581	143
9	596	541	205	188	203	378	218	2660	933	292	431	143
10	608	488	231	188	202	384	252	2850	754	291	317	142
11	512	530	272	189	202	389	284	3030	662	292	316	132
12	405	562	268	187	196	277	543	2650	654	267	315	123
13	405	522	244	192	189	174	647	2040	600	245	314	123
14	406	404	243	192	188	186	645	1620	421	246	313	123
15	406	312	243	207	189	201	644	1780	301	467	313	123
16	406	312	229	213	190	259	642	1780	302	665	273	134
17	412	314	219	213	198	443	399	1600	302	489	235	145
18	424	313	219	214	201	420	643	1790	258	306	234	167
19	424	313	224	215	201	303	1190	2220	238	622	210	171
20	422	311	222	214	210	272	2340	3420	293	889	189	181
21	423	312	222	212	211	244	2300	3120	293	891	189	183
22	450	285	223	214	211	244	2750	2550	292	886	189	183
23	571	258	220	267	210	243	2900	1440	293	755	189	176
24	1360	259	219	312	209	243	2840	1100	301	609	189	166
25	1770	259	220	313	210	244	3240	1000	299	413	192	167
26	1400	259	232	302	202	217	3240	960	291	276	210	167
27	1020	260	233	243	198	198	2630	792	289	266	225	167
28	1020	260	211	243	225	232	2200	679	288	267	223	169
29	829	260	204	228	228	256	2320	652	290	415	204	169
30	626	259	204	219	---	257	2450	525	292	565	177	178
31	653	---	216	228	---	256	---	546	---	507	173	---
TOTAL	17496	13856	7259	6897	6243	9205	37352	55784	16903	13259	9189	4711
MEAN	564	462	234	222	215	297	1245	1799	563	428	296	157
MAX	1770	1130	297	313	342	444	3240	3420	1430	891	587	183
MIN	48	258	203	187	188	174	218	525	238	245	173	123
CFSM	1.63	1.33	.68	.64	.62	.86	3.60	5.20	1.63	1.24	.86	.45
IN.	1.88	1.49	.78	.74	.67	.99	4.02	6.00	1.82	1.43	.99	.51

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1932 - 1996, BY WATER YEAR (WY)

MEAN	349	385	269	211	200	366	1157	807	441	306	229	275
MAX	973	1001	433	380	412	1255	2093	1799	973	894	595	1056
(WY)	1986	1989	1988	1969	1984	1973	1960	1996	1944	1968	1978	1968
MIN	99.4	120	101	111	133	164	420	265	138	94.2	100	70.9
(WY)	1949	1949	1977	1977	1964	1940	1987	1988	1988	1988	1976	1976

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1932 - 1996

ANNUAL TOTAL	141898		198154			
ANNUAL MEAN	389		541		418	
HIGHEST ANNUAL MEAN					582	1960
LOWEST ANNUAL MEAN					247	1948
HIGHEST DAILY MEAN	1770	Oct 25	3420	May 20	6820	Apr 25 1960
LOWEST DAILY MEAN	30	Sep 19	48	Oct 1	(a)1.0	(b)
ANNUAL SEVEN-DAY MINIMUM	46	Sep 24	129	Sep 10	1.1	Aug 14 1960
INSTANTANEOUS PEAK FLOW			3850	May 19	7360	Apr 24 1960
INSTANTANEOUS PEAK STAGE			9.00	May 19	(c)13.75	Apr 24 1960
ANNUAL RUNOFF (CFSM)	1.12		1.56		1.21	
ANNUAL RUNOFF (INCHES)	15.26		21.30		16.42	
10 PERCENT EXCEEDS	830		1390		845	
50 PERCENT EXCEEDS	248		290		266	
90 PERCENT EXCEEDS	150		185		138	

(a) Approximately; result of draining of pond for dam repair.

(b) Aug. 14-19, 1960.

(c) Present datum.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI

LOCATION.--Lat 47°13'43", long 88°23'07", in SE1/4 SE1/4 sec.20, T.56 N., R.32 W., Houghton County, Hydrologic Unit 04020103, on right bank 20 ft upstream from bridge on county highway, 2.0 mi northeast of Lake Linden, and 3.0 mi upstream from mouth.

DRAINAGE AREA.--28.0 mi².

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 621.7 ft above sea level.

REMARKS.--Records excellent except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	60	50	24	24	e19	e18	e23	146	35	77	21	12
2	76	118	24	23	e19	e18	22	124	118	61	19	12
3	61	133	24	23	e19	e18	21	143	134	45	17	15
4	61	88	24	24	e19	e18	21	202	109	34	17	14
5	44	65	24	23	e19	e18	21	243	80	29	19	14
6	33	63	23	22	e19	e18	22	244	93	63	46	13
7	38	66	e23	22	e19	e18	22	353	108	88	53	13
8	39	52	e23	22	e19	e18	22	352	70	62	43	13
9	30	42	e23	22	e19	e18	22	436	54	50	27	13
10	26	41	23	21	e19	e18	28	547	45	38	22	14
11	24	38	e24	21	e18	e18	53	344	38	31	20	14
12	23	34	e24	21	e18	e18	69	287	35	43	18	16
13	21	e33	e25	22	e18	e20	67	283	32	54	17	16
14	24	33	e25	21	e18	e27	56	301	29	51	21	15
15	48	29	e25	22	e18	e32	62	301	27	46	26	15
16	36	29	e25	22	e18	e40	60	259	26	37	29	15
17	28	28	25	22	e18	e35	80	296	26	30	26	14
18	25	27	25	19	e18	32	128	382	25	27	22	14
19	29	27	25	e20	e18	30	250	456	24	28	19	13
20	50	29	25	e22	e18	29	351	297	23	25	19	13
21	128	30	25	e22	e18	e33	359	154	23	23	18	13
22	107	e26	25	e22	e18	e31	489	111	25	22	18	13
23	77	25	25	e22	e18	e29	449	90	23	20	19	13
24	260	24	25	e21	e18	25	396	73	27	20	17	13
25	197	e24	25	e21	e18	20	385	64	25	19	16	12
26	101	24	25	e21	e18	e21	270	58	23	19	15	13
27	73	24	24	e21	e18	e27	179	53	22	18	14	37
28	60	24	24	e20	e18	23	179	47	22	18	14	35
29	54	23	24	e20	e18	23	243	43	399	19	13	25
30	64	e23	24	e20	---	23	193	40	220	19	13	21
31	51	---	24	e20	---	23	---	38	---	23	13	---
TOTAL	1948	1272	753	668	532	739	4542	6767	1940	1139	671	473
MEAN	62.8	42.4	24.3	21.5	18.3	23.8	151	218	64.7	36.7	21.6	15.8
MAX	260	133	25	24	19	40	489	547	399	88	53	37
MIN	21	23	23	19	18	18	21	38	22	18	13	12
CFSM	2.24	1.51	.87	.77	.66	.85	5.41	7.80	2.31	1.31	.77	.56
IN.	2.59	1.69	1.00	.89	.71	.98	6.03	8.99	2.58	1.51	.89	.63

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1996, BY WATER YEAR (WY)

MEAN	33.3	40.6	26.7	20.8	20.1	42.0	179	80.6	38.3	22.1	18.0	23.2
MAX	94.6	134	43.9	33.2	42.8	112	283	223	117	63.5	70.2	92.5
(WY)	1986	1989	1988	1969	1984	1973	1976	1972	1968	1968	1988	1968
MIN	8.71	9.66	9.28	9.03	9.00	16.1	70.3	22.0	11.7	11.4	9.78	9.57
(WY)	1977	1977	1977	1977	1977	1972	1987	1977	1977	1967	1970	1976

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1967 - 1996

ANNUAL TOTAL	14141.6	21444	45.3
ANNUAL MEAN	38.7	58.6	62.6
HIGHEST ANNUAL MEAN			31.5
LOWEST ANNUAL MEAN			1979
HIGHEST DAILY MEAN	338	May 14	547
LOWEST DAILY MEAN	8.3	Aug 23	12
ANNUAL SEVEN-DAY MINIMUM	8.9	Aug 18	13
INSTANTANEOUS PEAK FLOW			691
INSTANTANEOUS PEAK STAGE			8.83
INSTANTANEOUS LOW FLOW			Jun 29
ANNUAL RUNOFF (CFSM)	1.38	2.09	(b)1.7
ANNUAL RUNOFF (INCHES)	18.79	28.49	1.62
10 PERCENT EXCEEDS	98	137	21.97
50 PERCENT EXCEEDS	23	24	91
90 PERCENT EXCEEDS	12	17	22
			13

(a) Sept. 1, 2, 25.

(b) Result of ice jam upstream.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04043800 McCLURE STORAGE BASIN RELEASE NEAR MARQUETTE, MI

LOCATION.--Lat 46°34'19", long 87°28'35", in SW1/4 NE1/4 sec.7, T.48 N., R.25 W., Marquette County, Hydrologic Unit 04020105, on left bank in power house of Upper Peninsula Power Co., 600 ft upstream from Reany Creek, 2.5 mi downstream from McClure Dam, and 4.3 mi northwest of Marquette.

PERIOD OF RECORD.--April 1990 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 785 ft above sea level, from topographic map.

REMARKS.--Records good except for daily discharges below 1.0 ft³/s, which are poor. Flow completely regulated by powerplant at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	64	196	182	167	292	334	180	355	341	335	151	181
2	64	210	183	168	293	334	180	352	355	338	146	180
3	65	218	187	168	313	335	180	352	355	336	147	180
4	64	219	190	169	328	335	178	352	354	338	146	180
5	65	212	188	167	283	336	173	352	352	335	148	180
6	65	203	189	168	225	336	172	353	353	335	149	180
7	72	193	188	168	187	337	171	358	353	335	169	180
8	75	190	189	167	173	334	169	360	352	337	181	181
9	78	188	187	166	188	335	159	362	351	337	176	182
10	89	188	189	166	183	335	164	e365	349	336	173	182
11	87	189	185	169	184	333	167	361	350	336	171	182
12	84	189	183	168	185	335	169	357	349	336	171	174
13	85	193	182	166	185	338	166	357	349	337	172	185
14	100	193	184	166	256	340	167	362	349	337	160	187
15	118	192	183	169	274	342	166	e368	352	239	184	188
16	121	192	185	149	255	340	220	e368	353	166	177	187
17	126	192	184	152	324	339	315	e368	353	148	170	186
18	125	193	171	167	326	338	341	e368	356	131	169	181
19	121	193	178	173	325	338	352	e368	353	152	169	178
20	131	191	188	175	327	341	353	e370	341	168	168	179
21	140	191	187	175	328	339	358	e368	341	168	213	178
22	170	194	180	174	328	339	363	361	342	176	169	178
23	188	193	171	174	328	339	357	348	344	147	177	178
24	242	193	171	174	327	340	354	342	343	184	176	176
25	217	193	170	175	331	341	353	340	341	166	176	176
26	182	193	170	181	336	257	346	339	339	155	177	176
27	185	192	169	161	336	183	345	340	338	156	174	176
28	192	195	170	162	336	180	339	340	335	156	165	175
29	196	186	162	243	335	179	341	341	336	159	182	176
30	195	181	173	293	---	180	315	343	334	157	182	177
31	194	---	170	292	---	180	---	341	---	157	182	---
TOTAL	3900	5845	5588	5532	8091	9592	7613	11011	10413	7493	5270	5399
MEAN	126	195	180	178	279	309	254	355	347	242	170	180
MAX	242	219	190	293	336	342	363	370	356	338	213	188
MIN	64	181	162	149	173	179	159	339	334	131	146	174

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1990 - 1996, BY WATER YEAR (WY)

	1990	1991	1992	1993	1994	1995	1996
MEAN	129	189	199	160	174	201	261
MAX	213	295	304	190	279	339	323
(WY)	1991	1991	1992	1992	1996	1996	1991
MIN	83.3	126	139	124	110	178	195
(WY)	1992	1995	1995	1995	1995	1995	1994

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1990 - 1996

ANNUAL TOTAL	55115.47	85747	181
ANNUAL MEAN	151	234	234
HIGHEST ANNUAL MEAN			141
LOWEST ANNUAL MEAN			1996
HIGHEST DAILY MEAN	258	May 11	May 20 1996
LOWEST DAILY MEAN	.01	Jul 27	(a) (b)
ANNUAL SEVEN-DAY MINIMUM	6.2	Jul 10	Aug 18 1990
10 PERCENT EXCEEDS	214	352	341
50 PERCENT EXCEEDS	170	188	172
90 PERCENT EXCEEDS	64	157	64

(a) Oct. 1, 2, 4.

(b) June 13-18, 1992, Aug. 23-25, 1994.

(c) Estimated.

LOCATION.--Lat 46°29'14", long 87°07'30", in SW1/4 NE1/4 sec.12, T.47 N., R.23 W., Marquette County, Hydrologic Unit 04020201, on right bank at dam at Sand River, 1.2 mi upstream from mouth.

DRAINAGE AREA.--28.6 mi². Area of Sand River Wildlife Flooding is 0.6 mi².

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

GAGE.--Water-stage recorder. Datum of gage is 600.0 ft above sea level (Michigan Department of Natural Resources bench mark).

REMARKS.--Pond level regulated by concrete dam with two 20-foot stop-log bays and a 20-foot radial gate. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 11.84 ft, Nov. 6, 1988; minimum, 4.78 ft, Feb. 10, 11, 1994.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 10.04 ft, Oct. 23, 31; minimum, 5.02 ft, Jan. 8, 14-16.

[illegible]

STREAMS TRIBUTARY TO LAKE SUPERIOR

04044724 AU TRAIN RIVER AT FOREST LAKE, MI

LOCATION.--Lat 46°20'27", long 86°51'00", in SE1/4 NE1/4 sec.31, T.46N., R.20W., Alger County, Hydrologic Unit 04020201, on left bank 800 ft downstream from Upper Peninsula Power Co. powerhouse, 0.6 mi downstream from Au Train Dam, and 0.6 mi northwest of Forest Lake.

DRAINAGE AREA.--81 mi², approximately.

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

GAGE.--Water-stage recorder. Elevation of gage is 650 ft above sea level, from topographic map.

REMARKS.--Records good. Flow regulated by powerplant 800 ft upstream and by Au Train Basin, capacity 12,342 acre-ft, 0.6 mi upstream.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	42	127	113	65	113	133	69	558	156	59	88	79
2	42	127	110	65	113	132	68	517	159	59	89	78
3	43	126	107	65	113	133	68	486	159	59	88	78
4	43	127	108	65	112	133	68	482	159	60	85	78
5	43	127	108	65	116	132	68	505	170	60	85	78
6	43	136	107	65	121	132	68	521	179	61	84	78
7	44	141	107	65	126	132	68	542	187	61	84	78
8	43	141	107	64	104	132	68	592	198	61	82	78
9	43	141	107	65	106	131	68	622	194	62	81	78
10	47	141	107	65	134	131	69	653	181	60	80	78
11	50	141	107	65	134	131	68	670	172	59	81	78
12	50	140	107	65	134	131	69	624	161	61	78	78
13	50	140	83	65	134	131	68	568	154	63	78	77
14	50	140	65	65	128	131	68	530	147	61	80	78
15	52	140	65	65	134	123	68	502	144	61	79	78
16	54	139	65	65	134	116	68	466	143	62	78	78
17	56	139	65	64	134	115	68	475	133	62	78	78
18	55	138	65	66	134	115	69	448	120	63	78	114
19	42	138	70	65	134	88	70	417	103	64	77	139
20	60	137	73	65	134	69	104	418	83	73	76	138
21	70	137	68	65	134	68	134	407	70	89	76	137
22	75	136	65	68	134	69	135	365	62	102	78	137
23	76	136	65	71	133	69	135	309	62	105	81	136
24	94	135	65	71	134	68	135	273	62	104	81	136
25	114	134	65	68	133	69	141	244	62	95	80	136
26	118	134	65	65	133	69	150	215	62	90	80	136
27	122	122	65	65	133	68	224	193	61	91	80	136
28	126	113	65	68	133	69	392	174	60	85	80	136
29	126	113	65	88	133	69	489	164	60	84	80	136
30	126	113	65	113	---	69	558	161	60	85	79	135
31	126	---	65	113	---	69	---	158	---	85	79	---
TOTAL	2125	3999	2564	2154	3692	3227	3895	13259	3723	2246	2503	3078
MEAN	68.5	133	82.7	69.5	127	104	130	428	124	72.5	80.7	103
MAX	126	141	113	113	134	133	558	670	198	105	89	139
MIN	42	113	65	64	104	68	68	158	60	59	76	77
CFSM	.85	1.65	1.02	.86	1.57	1.29	1.60	5.28	1.53	.89	1.00	1.27
IN.	.98	1.84	1.18	.99	1.70	1.48	1.79	6.09	1.71	1.03	1.15	1.41

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1994 - 1996, BY WATER YEAR (WY)

	1994	1995	1996	1994	1995	1996	1994	1995	1996	1994	1995	1996
MEAN	72.5	98.2	76.4	68.1	85.6	96.4	116	193	77.3	57.1	65.3	73.0
MAX	114	136	82.7	71.5	127	104	134	428	124	72.5	80.7	103
(WY)	1994	1994	1996	1994	1996	1996	1995	1996	1996	1996	1996	1996
MIN	35.0	25.4	70.8	63.3	57.7	84.4	82.6	55.4	51.3	43.2	45.5	53.0
(WY)	1995	1995	1995	1995	1995	1995	1994	1994	1994	1995	1994	1995

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1994 - 1996

ANNUAL TOTAL	28655	46465	89.9
ANNUAL MEAN	78.5	127	127
HIGHEST ANNUAL MEAN			127
LOWEST ANNUAL MEAN			65.8
HIGHEST DAILY MEAN	147	Apr 29	670
LOWEST DAILY MEAN	29	Jul 6	42
ANNUAL SEVEN-DAY MINIMUM	29	Jul 6	43
INSTANTANEOUS PEAK FLOW			686
INSTANTANEOUS PEAK STAGE			6.08
ANNUAL RUNOFF (CFSM)	.97		1.57
ANNUAL RUNOFF (INCHES)	13.16		21.34
10 PERCENT EXCEEDS	135		175
50 PERCENT EXCEEDS	66		88
90 PERCENT EXCEEDS	42		61

(a) Oct. 1, 2, 19.

(b) On several days in October and November, 1994.

[illegible]

STREAMS TRIBUTARY TO LAKE SUPERIOR

04044796 MUSKALLONGE LAKE NEAR DEER PARK, MI

LOCATION.--Lat 46°40'34", long 85°37'35", in SE1/4 NW1/4 sec.1, T.49 N., R.11 W., Luce County, Hydrologic Unit 04020201, at Muskallonge Lake State Park, 0.5 mi west of Deer Park.

DRAINAGE AREA.--11 mi², approximately.

PERIOD OF RECORD.--October 1958 to September 1964, May 1971 to September 1982, October 1992 to current year.

GAGE.--Nonrecording gage. Datum of gage is 612.98 ft above sea level.

REMARKS.--Staff gage read by observer. The inlet to Muskallonge Lake is Trout Creek. There is no continuous outlet, however during periods of high lake level, water flows through an intermittent stream channel to Cranberry Lake. Surface area of lake is 786 acres.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 22.32 ft, May 23, 1979, Feb. 16, 1994; minimum observed, 18.65 ft, Aug. 4, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 21.94 ft, May 20, 22; minimum observed, 21.14 ft, Oct. 10.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	---	---	21.70	---	---
2	---	---	---	---	---	---	21.24	---	---	---	21.62	---
3	---	21.40	---	---	---	---	---	---	---	---	21.62	---
4	---	---	---	---	---	---	---	---	21.74	21.68	21.60	21.32
5	---	---	---	---	---	---	---	---	---	21.66	21.58	21.32
6	---	---	---	---	---	---	---	21.84	---	21.68	21.62	21.32
7	---	21.44	---	---	---	---	---	---	21.72	21.70	---	21.32
8	---	---	---	---	---	---	---	---	---	21.72	---	---
9	---	21.46	---	---	---	---	---	---	---	---	21.58	21.28
10	21.14	---	---	---	---	---	---	21.84	21.72	---	21.56	21.28
11	---	---	---	21.19	---	---	---	---	---	21.68	21.54	21.28
12	---	---	---	---	---	---	---	---	---	21.68	21.52	21.30
13	21.16	21.42	---	---	21.37	---	---	21.86	---	21.68	---	---
14	---	---	---	---	---	---	---	---	21.70	21.68	---	---
15	---	---	---	---	---	---	---	---	---	21.70	---	21.40
16	---	---	---	---	---	---	---	21.88	---	---	21.50	21.40
17	21.20	---	---	---	---	---	---	---	21.66	---	21.50	21.40
18	---	---	---	---	---	---	---	---	---	21.66	21.50	21.40
19	---	---	---	---	---	---	---	---	21.65	21.66	21.50	21.40
20	21.20	---	---	---	---	---	---	21.94	21.64	21.66	21.48	21.40
21	---	---	---	---	---	---	---	---	---	21.64	---	---
22	---	---	---	---	---	---	---	21.94	---	21.62	---	---
23	21.28	---	---	---	---	---	---	---	---	---	21.44	21.42
24	---	---	---	---	---	---	---	---	21.62	---	21.44	21.44
25	---	---	---	---	---	---	---	---	---	21.58	21.44	21.48
26	---	---	---	---	---	---	---	---	---	21.56	21.42	21.48
27	21.30	---	---	---	---	---	---	---	21.60	21.56	21.40	---
28	---	---	---	---	---	---	---	21.76	---	21.54	---	---
29	---	---	---	---	---	---	---	---	---	21.60	---	---
30	21.35	---	---	---	---	---	---	---	---	21.64	21.38	21.42
31	---	---	---	---	---	---	---	21.76	---	---	21.36	---

STREAMS TRIBUTARY TO LAKE SUPERIOR

04045500 TAHQUAMENON RIVER NEAR PARADISE, MI

LOCATION.--Lat 46°34'30", long 85°16'10", in NE1/4 sec.11, T.48 N., R.8 W., Luce County, Hydrologic Unit 04020202, on left bank 0.7 mi upstream from Tahquamenon (Big) Falls, 11.5 mi west of Paradise, and 19 mi northeast of Newberry.

DRAINAGE AREA.--790 mi².

PERIOD OF RECORD.--August 1953 to current year. Prior to October 1989, published as "near Tahquamenon Paradise".

GAGE.--Water-stage recorder. Datum of gage is 698.03 ft above sea level.

REMARKS.--Records good. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	457	2210	593	e490	1100	575	811	5020	533	895	1570	312
2	451	2320	585	e490	1070	573	815	4890	504	920	1600	295
3	461	2360	578	e490	1030	568	812	4800	565	917	1580	281
4	510	2350	566	482	987	562	802	4730	601	895	1490	263
5	566	2300	567	474	939	554	787	4670	620	829	1380	255
6	614	2240	569	467	898	547	776	4560	612	736	1340	247
7	757	2140	567	463	853	542	764	4470	641	690	1490	238
8	900	2040	550	455	800	536	747	4340	665	683	1710	229
9	963	1940	535	448	754	522	727	4190	667	754	1710	224
10	1040	1820	e535	440	710	507	751	4050	634	836	1690	221
11	1070	1670	e530	437	670	492	856	3880	588	876	1640	215
12	1070	1540	e520	433	636	479	1070	3710	552	860	1530	219
13	1040	1430	e520	429	619	484	1230	3560	512	881	1390	268
14	994	1340	e520	426	605	522	1320	3370	472	912	1250	346
15	1020	1230	e520	426	595	560	1450	3170	432	922	1120	477
16	1090	1130	e515	429	584	585	1540	2950	397	934	982	616
17	1170	1040	e515	429	569	600	1670	2750	376	909	862	698
18	1160	959	e515	494	564	610	1850	2550	367	841	739	725
19	1170	897	e515	736	555	612	2190	2380	371	792	626	714
20	1280	858	e515	903	540	617	2560	2220	502	776	548	672
21	1550	830	e500	971	529	629	3040	2070	592	726	508	620
22	1700	792	e500	1050	524	634	3690	1930	586	660	496	622
23	1800	745	e500	1100	519	630	4180	1770	586	638	528	668
24	1910	704	e500	1120	533	626	4560	1630	547	672	537	820
25	1970	692	e500	1160	548	654	4800	1490	514	764	500	1080
26	1970	692	e500	1170	560	707	5000	1310	482	799	465	1180
27	1950	684	e500	1190	571	743	5100	1180	430	797	438	1370
28	2110	664	e500	1180	577	764	5070	1020	400	753	405	1570
29	2220	646	e490	1170	577	778	5040	871	506	940	373	1700
30	2260	620	e490	1140	---	795	5010	738	790	1270	350	1820
31	2260	---	e490	1120	---	807	---	627	---	1470	329	---
TOTAL	39503	40883	16300	22212	20016	18814	69018	90896	16044	26347	31176	18965
MEAN	1274	1363	526	717	690	607	2301	2932	535	850	1006	632
MAX	2260	2360	593	1190	1100	807	5100	5020	790	1470	1710	1820
MIN	451	620	490	426	519	479	727	627	367	638	329	215
CFSM	1.61	1.73	.67	.91	.87	.77	2.91	3.71	.68	1.08	1.27	.80
IN.	1.86	1.93	.77	1.05	.94	.89	3.25	4.28	.76	1.24	1.47	.89

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 1996, BY WATER YEAR (WY)

	MEAN	862	1032	783	497	466	721	2733	1704	694	510	438	628
MAX	1768	2284	1756	983	809	1710	4575	4511	1736	1051	1126	1623	
(WY)	1979	1989	1967	1983	1984	1973	1976	1960	1974	1956	1973	1970	
MIN	256	420	339	303	279	335	1537	511	243	209	217	249	
(WY)	1964	1977	1977	1963	1963	1956	1987	1986	1988	1963	1991	1955	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1953 - 1996

ANNUAL TOTAL	295374		410174									
ANNUAL MEAN	809		1121									
HIGHEST ANNUAL MEAN										922		
LOWEST ANNUAL MEAN										1294		1971
HIGHEST DAILY MEAN	2520	May 1	5100	Apr 27	6820	May 10 1960				616		1963
LOWEST DAILY MEAN	213	Jun 26	215	Sep 11	165	Jul 8 1988				172		1970
ANNUAL SEVEN-DAY MINIMUM	224	Aug 23	228	Sep 6	172	Jul 6 1988				6990		May 10 1960
INSTANTANEOUS PEAK FLOW			5120	Apr 27	6990	May 10 1960				10.26		May 10 1960
INSTANTANEOUS PEAK STAGE			9.10	Apr 27						157		(a)
INSTANTANEOUS LOW FLOW										1.17		
ANNUAL RUNOFF (CFSM)	1.02		1.42							15.86		
ANNUAL RUNOFF (INCHES)	13.91		19.31									
10 PERCENT EXCEEDS	2010		2250							1920		
50 PERCENT EXCEEDS	493		737							582		
90 PERCENT EXCEEDS	288		454							303		

(a) July 26, 1955, July 8, 1988.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04046000 BLACK RIVER NEAR GARNET, MI

LOCATION.--Lat 46°07'05", long 85°21'55", in SE1/4 sec.13, T.43 N., R.9 W., Mackinac County, Hydrologic Unit 04060107, on right bank 20 ft upstream from footbridge, 15 ft downstream from Peters Creek, 3.5 mi upstream from mouth, and 3.7 mi southwest of Garnet.

DRAINAGE AREA.--28 mi², approximately.

PERIOD OF RECORD.--September 1951 to September 1978, October 1978 to September 1994 (operated as a crest-stage partial-record station), October 1994 to current year.

REVISED RECORDS.--WSP 1707: 1959.

GAGE.--Water-stage recorder. Datum of gage is 629.7 ft above sea level. Oct. 1, 1978 to Sept. 30, 1994, nonrecording gage at same site and datum.

REMARKS.--Records fair.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.3	40	15	e10	e12	13	20	151	19	16	41	11
2	8.3	76	15	e10	e10	12	20	128	25	17	37	11
3	9.2	67	15	e10	e9.0	e12	19	125	29	18	33	11
4	16	56	15	e10	e8.0	e12	18	123	27	16	31	11
5	13	47	15	e10	e8.4	11	18	118	26	15	29	11
6	15	43	15	e10	e8.6	11	18	107	24	15	26	11
7	25	40	15	e10	e9.0	e11	18	103	24	14	36	10
8	24	37	e14	e10	e9.2	10	17	98	26	14	32	10
9	21	34	e13	e10	9.3	9.7	17	94	24	16	30	10
10	19	34	e12	e11	11	8.3	22	90	22	16	27	10
11	18	35	e11	10	13	8.5	31	82	21	15	25	10
12	16	31	e10	9.9	13	10	47	73	19	16	22	11
13	14	28	e9.5	9.7	e13	11	45	65	18	25	20	16
14	15	25	e9.5	9.7	13	12	44	60	17	25	23	15
15	20	25	e9.5	9.5	e13	e12	46	56	16	25	23	21
16	21	22	e9.5	9.7	13	12	45	52	16	25	20	28
17	18	21	e9.5	9.8	13	12	46	50	16	21	19	26
18	16	21	e9.6	21	13	12	62	47	15	20	18	23
19	14	19	e10	36	13	12	101	47	16	29	17	20
20	44	21	e10	50	13	12	130	48	18	22	21	18
21	53	22	e10	41	13	e12	171	43	17	19	18	17
22	51	20	e10	35	13	12	230	39	20	17	19	23
23	45	19	e10	e31	12	12	202	37	18	16	19	24
24	51	20	e10	e28	13	12	182	34	17	20	16	31
25	49	18	e10	e25	14	20	186	32	16	27	16	35
26	43	18	e10	e23	13	e20	215	29	15	22	15	31
27	49	17	e10	e20	13	e20	169	27	15	19	14	64
28	72	16	e10	e18	13	20	144	25	14	19	13	59
29	59	15	e10	e16	14	19	139	23	16	46	13	51
30	51	15	e10	e14	---	19	146	21	17	56	12	42
31	44	---	e10	e13	---	21	---	20	---	49	12	---
TOTAL	921.8	901	352.1	540.3	342.5	410.5	2568	2047	583	690	697	671
MEAN	29.7	30.0	11.4	17.4	11.8	13.2	85.6	66.0	19.4	22.3	22.5	22.4
MAX	72	76	15	50	14	21	230	151	29	56	41	64
MIN	8.3	15	9.5	9.5	8.0	8.3	17	20	14	14	12	10
CFSM	1.06	1.07	.41	.62	.42	.47	3.06	2.36	.69	.79	.80	.80
IN.	1.22	1.20	.47	.72	.46	.55	3.41	2.72	.77	.92	.93	.89

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1996, BY WATER YEAR (WY)

	MEAN	24.1	31.3	24.6	15.7	13.2	21.6	90.9	48.6	25.2	18.5	14.6	20.1
MAX	68.0	69.9	60.0	26.0	24.7	61.7	168	141	75.3	38.6	38.7	65.5	65.5
(WY)	1960	1978	1971	1967	1966	1953	1971	1960	1974	1952	1973	1970	1970
MIN	6.06	7.12	7.75	7.09	7.09	7.43	46.0	19.4	12.0	7.65	6.57	6.44	6.44
(WY)	1964	1977	1977	1977	1995	1956	1961	1955	1964	1955	1995	1955	1955

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1952 - 1996

ANNUAL TOTAL	7035.8	10724.2	29.0
ANNUAL MEAN	19.3	29.3	49.9
HIGHEST ANNUAL MEAN			15.6
LOWEST ANNUAL MEAN			752
HIGHEST DAILY MEAN	87	Apr 28	230
LOWEST DAILY MEAN	5.2	Sep 1	8.0
ANNUAL SEVEN-DAY MINIMUM	5.4	Aug 28	8.8
INSTANTANEOUS PEAK FLOW			243
INSTANTANEOUS PEAK STAGE			5.44
INSTANTANEOUS LOW FLOW			(b)6.4
ANNUAL RUNOFF (CFSM)	.69		1.05
ANNUAL RUNOFF (INCHES)	9.35		14.25
10 PERCENT EXCEEDS	45		58
50 PERCENT EXCEEDS	10		17
90 PERCENT EXCEEDS	6.8		8.7

(a) From rating curve extended above 400 ft³/s.

(b) Result of freezeup.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04056500 MANISTIQUE RIVER NEAR MANISTIQUE, MI

LOCATION.--Lat 46°01'50", long 86°09'40", in SE1/4 sec.15, T.42 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, on left bank 1.0 mi downstream from West Branch, 6.0 mi northeast of Manistique, and at mile 19.5.

DRAINAGE AREA.--1,100 mi², approximately.

PERIOD OF RECORD.--March 1938 to current year.

REVISED RECORDS.--WSP 1387: 1940-42(M), 1943, 1945. WSP 1627, 1727: 1938, 1939.

GAGE.--Water-stage recorder. Datum of gage is 608.46 ft above sea level. Prior to July 15, 1939, non-recording gage at site 1,600 ft upstream at different datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Since July 1948, slight regulation by dam on outlet of Manistique Lake.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	639	2290	e1180	e1000	e1100	e1000	e1420	8120	1610	1210	2970	886
2	631	2350	e1150	e1000	e1100	e1000	e1420	7750	1670	1300	3200	854
3	648	2480	e1150	e1000	e1100	e1000	e1420	7230	1910	1290	3210	828
4	751	2570	e1100	e1000	e1100	e1000	e1420	6730	2010	1250	3000	810
5	895	2610	e1100	e1000	e1100	e1000	e1420	6320	2010	1190	2610	785
6	1030	2580	e1100	e1000	e1080	e1000	e1420	5990	1980	1130	2270	766
7	1190	2510	e1100	e1000	e1050	e1000	e1420	5750	1970	1090	2140	750
8	1350	2420	e1100	e1000	e1050	e1000	e1420	5480	1970	1100	2130	735
9	1420	2290	e1100	e980	e1050	e1000	e1420	5170	1940	1210	2130	720
10	1450	2230	e1100	e980	e1040	e1000	e1420	4970	1890	1270	2120	705
11	1430	2190	e1100	e980	e1020	e1000	e1420	4790	1780	1210	1990	705
12	1360	2130	e1080	e980	e1010	e1000	e1420	4650	1660	1150	1800	702
13	1270	1900	e1080	e980	e1000	e1000	e1500	4530	1580	1080	1620	701
14	1220	e1850	e1060	e980	e1000	e1000	e1600	4340	1510	1090	1500	714
15	1260	e1820	e1060	e980	e1000	e1000	e1800	4120	1430	1110	1470	737
16	1420	e1800	e1050	e980	e1000	e1020	e2100	3910	1370	1150	1530	756
17	1550	e1800	e1050	e980	e1000	e1020	e2400	3720	1320	1170	1530	769
18	1590	e1700	e1050	e1000	e1000	e1050	2760	3550	1300	1110	1460	766
19	1550	e1650	e1050	e1100	e1000	e1080	3250	3440	1280	1190	1370	746
20	1570	e1540	e1050	e1200	e1000	e1100	4110	3360	1260	1210	1300	717
21	1800	e1500	e1020	e1400	e1000	e1100	5890	3300	1260	1170	1230	698
22	2030	e1500	e1020	e1500	e1000	e1100	8860	3180	1310	1110	1190	690
23	2130	e1450	e1020	e1500	e1000	e1100	10800	3030	1310	1040	1230	694
24	2200	e1400	e1000	e1480	e1000	e1150	10700	2850	1280	1040	1250	722
25	2240	e1350	e1000	e1450	e1000	e1200	10700	2660	1240	1160	1230	775
26	2200	e1300	e1000	e1400	e1000	e1250	11200	2480	1200	1190	1180	827
27	2130	e1280	e1000	e1300	e1000	e1310	11100	2260	1160	1140	1110	889
28	2170	e1250	e1000	e1250	e1000	e1400	9870	2080	1120	1070	1060	959
29	2280	e1220	e1000	e1200	e1000	e1410	8920	1930	1100	1220	1010	1000
30	2320	e1200	e1000	e1180	---	e1420	8440	1800	1130	1820	966	994
31	2320	---	e1000	e1120	---	e1420	---	1700	---	2480	922	---
TOTAL	48044	56160	32870	34900	29800	34130	133040	131170	45560	37950	53728	23400
MEAN	1550	1872	1060	1126	1028	1101	4435	4231	1519	1224	1733	780
MAX	2320	2610	1180	1500	1100	1420	11200	8120	2010	2480	3210	1000
MIN	631	1200	1000	980	1000	1000	1420	1700	1100	1040	922	690
CFSM	1.41	1.70	.96	1.02	.93	1.00	4.03	3.85	1.38	1.11	1.58	.71
IN.	1.62	1.90	1.11	1.18	1.01	1.15	4.50	4.44	1.54	1.28	1.82	.79

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 1996, BY WATER YEAR (WY)

	MEAN	1150	1525	1262	951	853	1306	4014	2368	1316	900	701	817
MAX	2720	3777	2569	1777	1516	3358	6401	6963	4531	1783	1733	2657	
(WY)	1979	1989	1966	1966	1966	1946	1976	1960	1943	1993	1996	1978	
MIN	386	606	480	469	480	547	1962	907	602	402	384	350	
(WY)	1949	1977	1977	1977	1963	1963	1946	1987	1988	1955	1963	1948	

SUMMARY STATISTICS FOR 1995 CALENDAR YEAR FOR 1996 WATER YEAR WATER YEARS 1938 - 1996

	ANNUAL TOTAL	430247	660752	1429	1960
ANNUAL MEAN	1179	1805	2229	806	1948
HIGHEST ANNUAL MEAN					
LOWEST ANNUAL MEAN					
HIGHEST DAILY MEAN	3080	Apr 23	11200	Apr 26	May 11 1960
LOWEST DAILY MEAN	437	Sep 4	631	Oct 2	Oct 4 1948
ANNUAL SEVEN-DAY MINIMUM	453	Aug 30	712	Sep 8	Sep 30 1948
INSTANTANEOUS PEAK FLOW			11400	Apr 26	May 11 1960
INSTANTANEOUS PEAK STAGE			12.00	Apr 26	May 11 1960
INSTANTANEOUS LOW FLOW			631	(a)	Oct 4 1948
ANNUAL RUNOFF (CFSM)	1.07	1.64			
ANNUAL RUNOFF (INCHES)	14.55	22.35			
10 PERCENT EXCEEDS	2410	3070			
50 PERCENT EXCEEDS	879	1220			
90 PERCENT EXCEEDS	580	980			

(a) Oct. 1, 2, 3.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057510 STURGEON RIVER NEAR NAHMA JUNCTION, MI

LOCATION.--Lat 45°56'35", long 86°42'20", in SW1/4 SE1/4 sec.17, T.41 N., R.19 W., Delta County, Hydrologic Unit 04030112, Hiawatha National Forest, on left bank 30 ft upstream from bridge on Forest Service Road 2231, 500 ft downstream from Mormon Creek, 0.1 mi east of Federal Forest Highway 13, and 3.2 mi north of Nahma Junction.

DRAINAGE AREA.--183 mi².

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 610.99 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	85	221	e96	e84	e105	e94	e110	1170	159	226	444	91
2	89	415	e96	e84	e105	e94	e110	1060	319	185	380	88
3	93	429	e95	e82	e105	e94	e110	996	429	173	328	85
4	142	356	e94	e82	e105	e94	e110	1000	335	152	285	83
5	142	300	e94	e82	e105	e94	e110	985	288	136	255	81
6	144	263	e92	e82	e105	e92	e110	937	270	125	257	78
7	274	241	e90	e82	e105	e90	e110	894	291	128	252	75
8	282	221	e90	e82	e100	e90	e110	867	273	137	244	74
9	247	213	e90	e82	e100	e90	e110	831	245	156	227	73
10	225	214	e90	e82	e100	e90	e120	817	220	139	204	73
11	200	200	e90	e82	e100	e92	e150	801	213	129	186	77
12	180	204	e90	e82	e100	e100	e250	741	203	136	169	92
13	165	e180	e90	e82	e100	e120	e350	670	192	173	156	91
14	169	e160	e90	e82	e100	e130	e320	619	181	170	161	89
15	184	e150	e90	e80	e98	e125	e300	578	166	180	226	97
16	197	e135	e88	e80	e98	e120	e280	538	155	170	222	94
17	193	e130	e88	e85	e98	e120	e400	501	155	163	190	93
18	183	e125	e88	e95	e98	e120	474	472	151	167	169	90
19	175	e125	e88	e110	e98	e120	749	455	151	387	157	83
20	220	e125	e88	e115	e96	e115	988	459	146	346	152	77
21	425	e125	e86	e120	e96	e115	1100	413	139	278	144	75
22	414	e125	e86	e115	e96	e115	1310	372	160	251	153	76
23	346	e120	e86	e110	e96	e115	1350	342	148	221	156	77
24	345	e120	e86	e110	e96	e115	1400	314	139	208	141	99
25	329	e110	e86	e110	e96	e115	1600	286	133	298	131	124
26	286	e105	e86	e110	e94	e110	1850	231	125	281	129	113
27	258	e100	e86	e105	e94	e110	1580	217	122	218	123	164
28	286	e100	e86	e105	e94	e110	1420	203	118	209	112	183
29	273	e96	e85	e105	e94	e110	1300	192	140	542	105	159
30	247	e96	e85	e105	---	e110	1210	175	361	629	98	145
31	229	---	e85	e105	---	e110	---	169	---	540	93	---
TOTAL	7027	5504	2760	2917	2877	3319	19491	18305	6127	7253	6049	2899
MEAN	227	183	89.0	94.1	99.2	107	650	590	204	234	195	96.6
MAX	425	429	96	120	105	130	1850	1170	429	629	444	183
MIN	85	96	85	80	94	90	110	169	118	125	93	73
CFSM	1.24	1.00	.49	.51	.54	.59	3.55	3.23	1.12	1.28	1.07	.53
IN.	1.43	1.12	.56	.59	.58	.67	3.96	3.72	1.25	1.47	1.23	.59

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1996, BY WATER YEAR (WY)

MEAN	179	227	169	107	96.1	173	549	296	184	122	112	130
MAX	337	532	369	182	181	378	847	590	411	254	330	354
(WY)	1983	1978	1971	1969	1984	1973	1979	1996	1979	1968	1978	1978
MIN	55.5	64.4	49.8	50.0	54.2	72.6	271	91.6	50.3	45.7	48.1	40.7
(WY)	1977	1977	1977	1977	1977	1994	1987	1987	1988	1988	1976	1976

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1967 - 1996

ANNUAL TOTAL	53024	84528	195
ANNUAL MEAN	145	231	289
HIGHEST ANNUAL MEAN			1978
LOWEST ANNUAL MEAN			121
HIGHEST DAILY MEAN	568	1850	2030
LOWEST DAILY MEAN	40	73	33
ANNUAL SEVEN-DAY MINIMUM	42	76	35
INSTANTANEOUS PEAK FLOW		1900	2120
INSTANTANEOUS PEAK STAGE		11.11	11.50
INSTANTANEOUS LOW FLOW		73	32
ANNUAL RUNOFF (CFSM)	.79	1.26	1.07
ANNUAL RUNOFF (INCHES)	10.78	17.18	14.50
10 PERCENT EXCEEDS	298	447	398
50 PERCENT EXCEEDS	105	128	129
90 PERCENT EXCEEDS	54	86	66

(a) Sept. 9, 10.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057800 MIDDLE BRANCH ESCANABA RIVER AT HUMBOLDT, MI

LOCATION.--Lat 46°29'57", long 87°53'11", in SW1/4 sec.1, T.47 N., R.29 W., Marquette County, Hydrologic Unit 04030110, on left bank 15 ft upstream from county road FX, 1.5 mi downstream from Halfway Creek, and 0.3 mi north of Humboldt.

DRAINAGE AREA.--46.0 mi².

PERIOD OF RECORD.--June 1959 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. V-notch sharp-crested weir since Oct. 3, 1960. Datum of gage is 1,521.20 ft above sea level (Cleveland-Cliffs Iron Co. bench mark). Prior to Sept. 1, 1960, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. From July 1960 to June 1972, some diversion 100 ft upstream by industry for iron ore processing; figures of runoff adjusted. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	80	e34	e24	e28	e25	e30	306	77	41	58	20
2	21	138	e34	e24	e27	e25	e30	275	175	46	e50	20
3	28	154	e34	e23	e27	e25	e30	270	283	44	e40	19
4	45	127	e34	e23	e27	e25	e29	267	286	38	e38	20
5	38	112	e34	e23	e26	e25	e28	281	255	34	e45	18
6	35	91	e33	e23	e26	e25	e28	279	220	32	49	17
7	68	86	e32	e23	e26	e25	e28	313	228	40	56	16
8	83	82	e32	e23	e26	e25	e28	357	194	41	64	15
9	66	81	e32	e23	e26	e25	e28	382	151	39	53	16
10	57	73	e31	e23	e26	e25	e29	449	123	33	45	15
11	48	67	e30	e23	e26	e25	e32	447	107	31	39	17
12	41	64	e30	e23	e26	e26	e38	369	96	36	34	21
13	33	58	e30	e23	e26	e28	e43	329	85	47	29	23
14	32	50	e30	e23	e26	e29	e48	313	73	43	59	24
15	41	47	e30	e23	e26	e30	e55	342	64	39	61	28
16	41	47	e29	e23	e26	e30	63	385	63	36	49	28
17	34	45	e29	e24	e26	e29	70	431	63	33	42	26
18	30	44	e28	e24	e26	e28	89	428	60	60	37	22
19	29	43	e28	e25	e26	e28	148	639	58	248	32	19
20	34	42	e28	e26	e26	e28	222	1000	59	242	36	17
21	51	43	e27	e32	e26	e28	269	502	53	122	28	16
22	73	43	e27	e32	e25	e28	358	343	59	80	65	16
23	75	41	e27	e31	e25	e28	430	277	54	64	85	15
24	124	40	e26	e30	e25	e28	461	230	68	56	58	17
25	151	e38	e26	e30	e25	e28	457	190	58	53	45	18
26	122	e37	e26	e29	e25	e28	447	160	51	47	43	17
27	99	e35	e26	e29	e25	e28	402	137	48	41	38	26
28	108	e35	e25	e28	e25	e28	369	118	44	39	31	27
29	103	e35	e25	e28	e25	e28	361	104	46	79	26	25
30	94	e35	e25	e28	---	e28	336	92	47	78	23	23
31	83	---	e24	e28	---	e29	---	84	---	65	21	---
TOTAL	1908	1913	906	794	751	840	4986	10099	3248	1927	1379	601
MEAN	61.5	63.8	29.2	25.6	25.9	27.1	166	326	108	62.2	44.5	20.0
MAX	151	154	34	32	28	30	461	1000	286	248	85	28
MIN	21	35	24	23	25	25	28	84	44	31	21	15
CFSM	1.34	1.39	.64	.56	.56	.59	3.61	7.08	2.35	1.35	.97	.44
IN.	1.54	1.55	.73	.64	.61	.68	4.03	8.17	2.63	1.56	1.12	.49

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 1996, BY WATER YEAR (WY)

	MEAN	56.3	59.6	38.7	24.2	21.0	39.0	199	128	61.3	32.3	26.6	37.8
MAX	191	197	77.5	41.5	55.9	149	423	326	153	89.9	76.5	184	
(WY)	1986	1989	1992	1966	1984	1973	1985	1972	1989	1968	1978	1978	
MIN	5.87	5.97	5.57	5.30	6.00	11.5	74.9	35.4	13.3	7.57	5.80	4.91	
(WY)	1977	1977	1977	1977	1977	1964	1987	1977	1988	1988	1976	1976	

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1959 - 1996
ANNUAL TOTAL	18232	29352	
ANNUAL MEAN	50.0	80.2	60.1
HIGHEST ANNUAL MEAN			95.3
LOWEST ANNUAL MEAN			33.8
HIGHEST DAILY MEAN	222	1000	1830
LOWEST DAILY MEAN	12	15	4.2
ANNUAL SEVEN-DAY MINIMUM	13	16	4.5
INSTANTANEOUS PEAK FLOW		1190	1930
INSTANTANEOUS PEAK STAGE		7.58	9.21
INSTANTANEOUS LOW FLOW		12	4.0
ANNUAL RUNOFF (CFSM)	1.09	1.74	1.31
ANNUAL RUNOFF (INCHES)	14.74	23.74	17.76
10 PERCENT EXCEEDS	125	250	130
50 PERCENT EXCEEDS	31	34	32
90 PERCENT EXCEEDS	15	23	12

(e) Estimated.

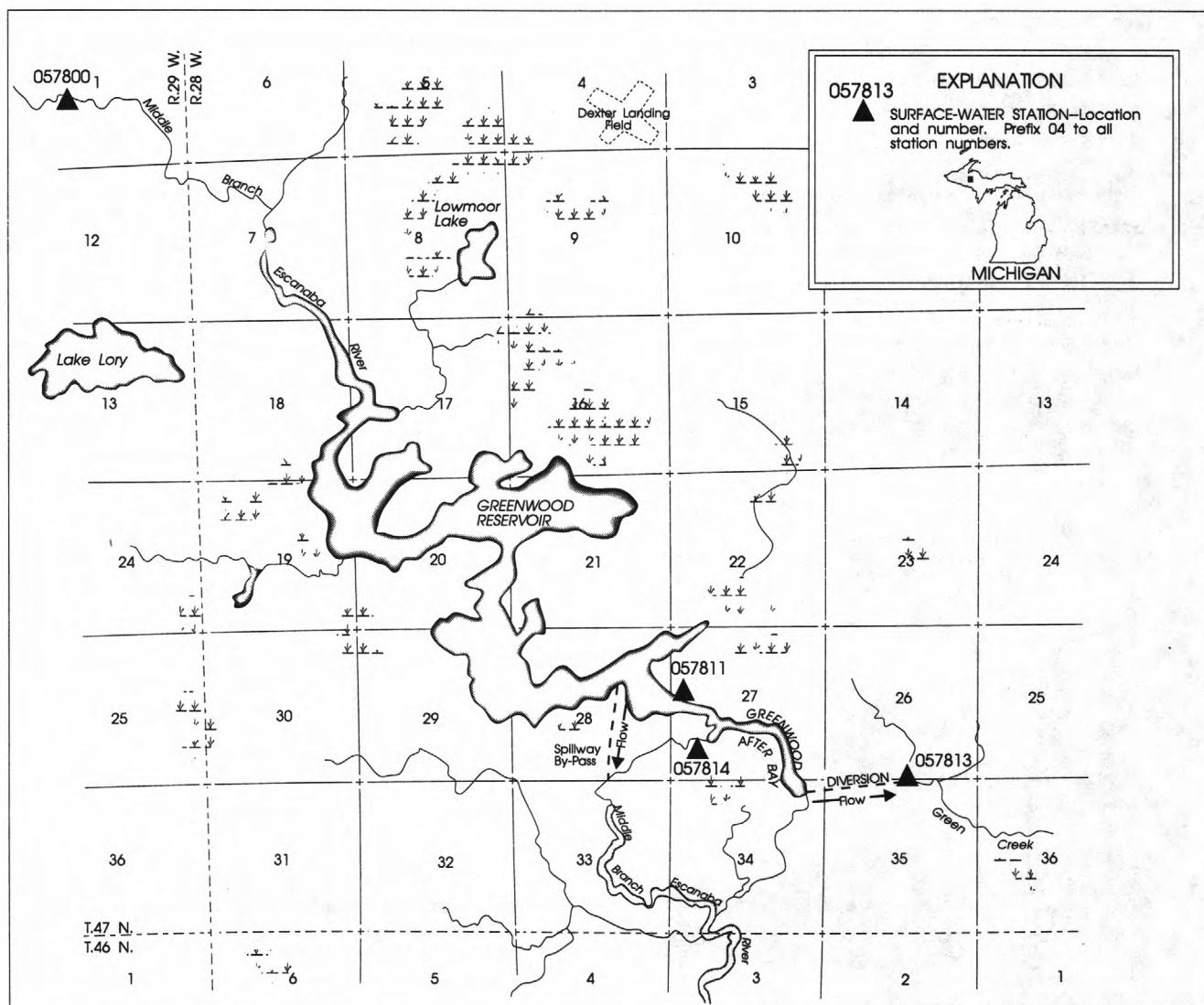


Figure 8.--Identification number and location of active surface-water gaging stations in and around the Greenwood Reservoir Complex.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057811 GREENWOOD RESERVOIR NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW1/4 SW1/4 sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, at downstream side of dam on Middle Branch Escanaba River, 3.7 mi southwest of Greenwood.

DRAINAGE AREA.--67.4 mi².

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

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft above sea level (levels by Cleveland-Cliffs Iron Co.); gage readings have been converted to sea level elevations. Prior to Feb. 20, 1973, nonrecording gage at same site and datum.

REMARKS.--The reservoir is formed by an earth/rockfill main dam and several earthfill dikes surrounding the storage area. Storage began Dec. 22, 1972. The fixed-crest concrete spillway was completed in September 1973. Capacity of reservoir, 23,300 acre-ft at spillway elevation 1,515 ft. Above elevation 1,515 ft, water flows over concrete spillway into Middle Branch Escanaba River about 2,000 ft downstream from Greenwood Release (station 04057814). The main dam is equipped with an outlet structure with 4 valves to control flow to afterbay (conservation pool) which has a capacity of 420 acre-ft at elevation 1,480 ft. Two outlet systems from the afterbay provide for diversion and release flow. Diverted flow to Green Creek gaged at Greenwood Diversion (station 04057813); released flow to Middle Branch Escanaba River gaged at Greenwood Release (station 04057814). Reservoir impounds water for diversion to Schweitzer Reservoir (station 04058190), for use in iron ore processing.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 26,520 acre-ft, Apr. 21, 22, 23, 1985, elevation, 1,517.3 ft; minimum since first filling, 3,240 acre-ft, Mar. 12, 1977, elevation, 1,491.1 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 25,386 acre-ft, May 20, elevation, 1,516.49 ft; minimum, 19,728 acre-ft, Oct. 3, 6, elevation, 1,512.19 ft.

MONTHEND ELEVATION, IN FEET ABOVE SEA LEVEL, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

Date	Elevation (feet)	Contents (acre-feet)	Change in contents	
			(acre- feet)	(equivalent in ft ³ /s)
Sept. 30	1,512.32	19,884	--	--
Oct. 31	1,513.92	21,896	+2,012	+32.7
Nov. 30	1,515.00	23,300	+1,404	+23.6
Dec. 31	1,514.68	22,884	-416	-6.8
CAL YR 1995			+3000	+4.1
Jan. 31	1,514.45	22,585	-299	-4.9
Feb. 29	1,513.72	21,636	-949	-16.5
Mar. 31	1,512.78	20,436	-1,200	-19.5
Apr. 30	1,515.87	24,518	+4,082	+68.6
May 31	1,515.36	23,804	-714	-11.6
June 30	1,515.29	23,706	-98	-1.6
July 31	1,515.2	23,580	-126	-2.0
Aug. 31	1,514.94	23,222	-358	-5.8
Sept. 30	1,513.53	21,389	-1,833	-30.8
WTR YR 1996			+1,505	+2.1

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'04", long 87°46'10", in NW1/4 NE1/4 sec.35, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at downstream end of pipeline, 200 ft upstream from Green Creek, 0.7 mi downstream from Greenwood Afterbay, and 3.6 mi south of Greenwood.

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

GAGE.--Water-stage recorder and concrete flume. Datum of gage is 1,454.57 ft above sea level (Cleveland-Cliffs Iron Co. bench mark). Prior to Aug. 22, 1973, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. Flow completely regulated. A pipeline, 0.7 mi long, diverts water from Greenwood Reservoir (station 04057811) into Green Creek, tributary to Schweitzer Reservoir (station 04058190). Water is used for iron ore processing, some returned to Middle Branch Escanaba River 27 mi downstream via another Green Creek, some returned 31 mi downstream via Goose Lake Outlet and East Branch Escanaba River.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	26	e5.0	24	22	19	16	25	.04	6.8	10	13	25
2	26	e5.0	24	22	19	15	25	.04	6.8	10	13	25
3	26	e5.0	24	22	19	15	20	.04	6.8	11	13	25
4	26	e5.0	24	22	19	15	16	.04	6.8	12	13	25
5	23	e5.0	24	22	19	16	16	.04	6.2	12	13	25
6	20	e5.0	24	23	19	21	16	.04	5.8	12	13	25
7	20	e5.0	24	23	19	21	15	.04	5.9	12	13	25
8	20	e5.0	24	23	19	21	15	.04	5.9	12	13	25
9	18	e5.0	24	23	19	22	15	.04	5.9	14	13	25
10	14	e5.0	24	23	19	22	12	.03	5.9	15	13	26
11	14	e5.0	24	23	19	22	11	.03	5.9	15	13	26
12	14	e5.0	24	21	19	22	6.8	.03	5.8	15	13	26
13	e14	e11	24	19	19	23	4.9	.03	5.8	15	13	25
14	e14	e11	25	19	19	24	4.9	.03	5.8	15	13	25
15	e14	e11	25	19	19	24	4.9	.03	5.8	14	13	25
16	e14	e11	25	19	19	24	1.7	.03	5.8	14	13	25
17	e14	e11	25	19	19	24	.09	.03	5.8	14	13	25
18	e14	e11	24	19	19	24	.09	.03	7.8	14	13	25
19	e14	e11	23	19	19	24	.09	.03	9.6	13	13	25
20	e14	e14	23	19	18	24	.07	.02	9.6	12	13	25
21	e14	e16	23	19	15	24	.06	.02	9.7	12	13	25
22	e10	22	23	19	15	24	.06	.02	9.9	12	13	25
23	e7.0	24	22	19	15	25	.04	.03	10	13	13	25
24	e7.0	24	22	19	16	25	.04	.03	10	13	13	25
25	e7.0	24	22	19	16	25	.04	.03	10	13	13	25
26	e7.0	24	22	19	16	25	.04	.03	10	13	14	25
27	e7.0	24	22	19	16	25	.04	.03	10	13	14	25
28	e7.0	24	22	19	16	25	.04	.04	10	13	16	25
29	e6.0	24	22	19	16	25	.04	4.4	10	13	22	25
30	e5.0	24	22	19	---	25	.04	7.1	10	13	25	25
31	e5.0	---	22	19	---	25	---	6.9	---	13	25	---
TOTAL	441	381	726	630	520	692	209.98	19.31	230.1	402	441	753
MEAN	14.2	12.7	23.4	20.3	17.9	22.3	7.00	.62	7.67	13.0	14.2	25.1
MAX	26	24	25	23	19	25	25	7.1	10	15	25	26
MIN	5.0	5.0	22	19	15	15	.04	.02	5.8	10	13	25

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1973 - 1996, BY WATER YEAR (WY)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEAN	14.2	11.8	13.9	18.0	17.9	13.9	7.26	9.30	12.7	17.5	17.1	16.7												
MAX	26.5	26.4	25.5	26.0	26.0	25.8	17.2	22.7	26.0	26.1	28.5	28.1												
(WY)	1995	1995	1995	1994	1995	1982	1980	1980	1977	1988	1994	1994												
MIN	.046	.37	.19	.19	.28	.31	.11	.22	.28	1.63	1.20	.39												
(WY)	1978	1974	1974	1974	1974	1974	1977	1973	1974	1982	1977	1977												

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1973 - 1996

ANNUAL TOTAL	7313.0	5445.39	14.3
ANNUAL MEAN	20.0	14.9	22.4
HIGHEST ANNUAL MEAN			4.06
LOWEST ANNUAL MEAN			30
HIGHEST DAILY MEAN	27	26	(a)
LOWEST DAILY MEAN	2.6	.02	(c)
ANNUAL SEVEN-DAY MINIMUM	3.3	.03	May 16
10 PERCENT EXCEEDS	26	25	(d).01
50 PERCENT EXCEEDS	24	15	.02
90 PERCENT EXCEEDS	9.2	.05	Apr 11 1987

(a) Oct. 1-4, Sept. 10-12.

(b) June 25-28, 1977, Nov. 9, 1979.

(c) May 20-22.

(d) Minimum daily discharge since diversion began Jan. 7, 1973. No flow Dec. 27, 1972 to Jan. 6, 1973.

(e) Estimated.

(f) Apr. 16, 17, 1987.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'22", long 87°47'52", in NW1/4 SW1/4 sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at outlet of Greenwood Afterbay releasing to Middle Branch Escanaba River, 2.6 mi upstream from Bell Creek, and 3.8 mi southwest of Greenwood.

DRAINAGE AREA.--67.4 mi².

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

GAGE.--Water-stage recorder and concrete flume. Datum of gage is 1,473.77 ft above sea level (Cleveland-Cliffs Iron Co. bench mark). Prior to Nov. 7, 1973, nonrecording gage at same site and different datum.

REMARKS.--Records fair. Since December 1972, flow from Greenwood Reservoir (station 04057811) below spillway elevation 1,515 ft is completely regulated by the afterbay release structure into the Middle Branch Escanaba River. Since January 1973, water diverted immediately upstream from station via Greenwood Diversion (station 04057813) to Green Creek for iron ore processing and some returned to Middle Branch Escanaba River 27 mi downstream via another Green Creek. Since October 1979, some of the diversion returned 31 mi downstream via Goose Lake Outlet and East Branch Escanaba River. Overflow from reservoir spillway bypasses and returns to the Middle Branch Escanaba River 0.5 mi downstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	22	23	22	24	e35	22	27	23	24	27	24
2	21	22	24	21	24	e34	22	26	23	24	25	24
3	21	22	24	21	24	e34	22	26	22	23	24	24
4	22	22	24	22	24	e33	22	26	22	23	24	25
5	22	22	24	22	24	e32	22	26	22	23	24	25
6	21	22	24	23	24	e32	23	26	21	23	24	25
7	22	21	24	23	24	e32	26	26	21	23	24	25
8	22	21	24	23	24	e32	25	26	21	23	24	25
9	22	21	24	23	24	e32	24	26	21	22	24	25
10	22	21	24	24	24	e32	24	26	21	22	25	25
11	22	21	24	24	24	e32	24	26	21	21	26	25
12	22	21	24	24	24	e32	25	26	21	20	25	25
13	22	21	24	24	24	e29	26	26	21	20	25	25
14	22	21	24	24	24	24	26	26	21	20	25	25
15	22	21	24	24	24	23	27	26	21	20	25	25
16	22	20	24	24	24	22	27	26	20	19	25	25
17	22	20	24	24	24	22	27	26	20	19	24	25
18	22	19	24	24	24	22	27	26	20	19	24	25
19	22	19	23	25	24	22	27	27	21	19	24	25
20	22	19	23	24	24	22	27	26	21	20	24	25
21	22	22	23	24	e36	23	27	26	22	21	24	25
22	22	23	23	24	e36	24	27	25	22	22	24	25
23	22	23	22	24	e36	25	27	26	22	23	24	25
24	22	23	22	24	e36	24	27	27	23	23	24	25
25	21	23	22	24	e36	23	27	27	23	24	24	25
26	21	23	22	24	e36	23	27	27	24	24	24	25
27	21	23	22	24	e36	23	27	27	24	25	23	25
28	21	23	22	24	e36	23	27	27	25	25	23	25
29	21	23	22	24	e36	23	27	27	24	26	23	25
30	21	23	22	24	---	23	27	25	24	26	23	25
31	22	---	22	24	---	22	---	24	---	27	24	---
TOTAL	673	647	721	729	804	834	765	810	657	693	752	747
MEAN	21.7	21.6	23.3	23.5	27.7	26.9	25.5	26.1	21.9	22.4	24.3	24.9
MAX	22	23	24	25	36	35	27	27	25	27	27	25
MIN	21	19	22	21	24	22	22	24	20	19	23	24

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1973 - 1996, BY WATER YEAR (WY)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEAN	30.6	30.0	26.2	25.4	26.2	28.8	28.8	27.2	27.1	26.4	25.6	25.8												
MAX	141	122	35.6	32.6	35.9	56.3	44.9	40.3	42.2	42.2	29.1	30.2												
(WY)	1973	1973	1974	1974	1986	1989	1989	1976	1975	1974	1982	1984												
MIN	21.7	21.6	23.3	18.9	22.0	23.2	22.0	21.7	20.3	21.8	22.0	22.0												
(WY)	1996	1996	1996	1973	1973	1987	1995	1995	1973	1995	1995	1995												

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1973 - 1996

ANNUAL TOTAL	8279	8832	
ANNUAL MEAN	22.7	24.1	27.4
HIGHEST ANNUAL MEAN			44.8
LOWEST ANNUAL MEAN			23.3
HIGHEST DAILY MEAN	26	Apr 1	(a)36
LOWEST DAILY MEAN	19	Nov 18	(c)19
ANNUAL SEVEN-DAY MINIMUM	20	Nov 14	(b)290
10 PERCENT EXCEEDS	25		(d)6.4
50 PERCENT EXCEEDS	22		11
90 PERCENT EXCEEDS	21		26
			24

(a) Feb. 21-29.

(b) Prior to regulation; since regulation began, 63 ft³/s, July 10, 11, 1974.

(c) Nov. 18-20, July 16-19.

(d) Release structure closed for trash rack cleaning and flume inspection.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04058100 MIDDLE BRANCH ESCANABA RIVER NEAR PRINCETON, MI

LOCATION.--Lat 46°19'02", long 87°30'07", in NW1/4 sec.12, T.45 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on right bank 400 ft downstream from powerplant, 0.3 mi upstream from Green Creek, and 2.2 mi northwest of Princeton.

DRAINAGE AREA.--210 mi².

PERIOD OF RECORD.--July 1961 to September 1982, October 1989 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,102.68 ft above sea level.

REMARKS.--Records good. Flow regulated by powerplant 400 ft upstream from station. Since December 1972, additional regulation 27 mi upstream by Greenwood Release (station 04057814). Since January 1973, some flow diverted to Green Creek via Greenwood Diversion (station 04057813) 27 mi upstream by industry for iron ore processing and some returned 0.3 mi downstream via another Green Creek. Since October 1979, some of the diversion returned 5.0 mi downstream via Goose Lake Outlet and East Branch Escanaba River. From 1973 to 1991 annual mean discharge and runoff figures adjusted for diversion and change in contents in Greenwood Reservoir (station 04057811). Several measurements of water temperature were made during the year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 22, 1985, reached a stage of 11.84 ft, from floodmark, discharge, 4,200 ft³/s, from rating curve extended above 2,400 ft³/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	99	154	118	108	127	124	123	1340	314	208	222	112
2	101	180	118	105	e120	124	118	1170	376	196	190	112
3	111	271	118	106	e120	124	115	1030	491	173	190	111
4	122	298	118	106	e120	111	111	962	666	163	190	110
5	123	256	118	103	e120	110	112	952	774	157	170	111
6	167	213	118	99	e120	108	111	960	805	149	171	110
7	187	213	115	99	e120	110	111	984	773	149	251	110
8	180	201	110	99	e120	113	111	1030	711	135	306	110
9	176	160	110	99	117	114	110	1110	630	128	238	102
10	174	151	110	99	116	113	114	1210	539	133	162	92
11	173	181	110	100	118	112	126	1300	482	138	177	93
12	155	188	111	99	118	117	161	1350	410	139	200	137
13	130	174	111	98	118	122	194	1270	369	139	199	158
14	114	161	110	98	116	130	192	1120	355	139	191	137
15	114	161	110	99	142	136	182	1010	345	152	200	136
16	114	161	111	98	113	127	168	878	329	126	201	123
17	126	161	110	97	111	116	181	944	210	209	185	110
18	133	160	110	99	110	116	208	1010	150	163	183	110
19	126	157	120	101	110	110	320	1120	225	282	163	103
20	120	142	123	119	126	121	369	1300	245	457	143	96
21	154	127	114	130	123	123	422	1690	191	510	136	96
22	190	128	114	119	108	115	562	1720	176	474	135	96
23	197	128	114	e115	108	107	667	1340	230	366	135	96
24	197	124	114	e115	116	107	919	946	283	302	136	96
25	199	117	114	e115	125	117	1240	770	269	281	136	96
26	209	118	114	114	124	132	1590	637	267	243	136	96
27	227	118	114	118	124	123	1550	544	221	208	134	96
28	230	118	114	131	124	108	1450	473	209	208	132	96
29	200	118	114	150	125	116	1450	424	208	208	123	96
30	163	118	113	136	---	126	1460	397	208	232	112	104
31	154	---	112	138	---	126	---	317	---	259	112	---
TOTAL	4865	4957	3530	3412	3459	3658	14547	31308	11461	6826	5359	3251
MEAN	157	165	114	110	119	118	485	1010	382	220	173	108
MAX	230	298	123	150	142	136	1590	1720	805	510	306	158
MIN	99	117	110	97	108	107	110	317	150	126	112	92

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 1996, BY WATER YEAR (WY)

MEAN	176	182	140	107	99.0	146	518	452	248	156	123	154
MAX	376	349	235	196	162	348	917	1056	518	318	216	566
(WY)	1973	1973	1992	1969	1969	1973	1976	1972	1968	1968	1978	1978
MIN	54.4	70.0	79.4	61.0	56.1	71.0	179	111	101	63.5	53.0	60.4
(WY)	1964	1977	1977	1964	1963	1964	1990	1977	1977	1965	1963	1963

SUMMARY STATISTICS

	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1961 - 1996
ANNUAL TOTAL	53503	96633	
ANNUAL MEAN	147	264	209
HIGHEST ANNUAL MEAN			296
LOWEST ANNUAL MEAN			122
HIGHEST DAILY MEAN	451	May 31	2550
LOWEST DAILY MEAN	27	Sep 26	4.1
ANNUAL SEVEN-DAY MINIMUM	65	Sep 23	28
INSTANTANEOUS PEAK FLOW			(a)2580
INSTANTANEOUS PEAK STAGE			8.37
INSTANTANEOUS LOW FLOW			2.2
10 PERCENT EXCEEDS	251		409
50 PERCENT EXCEEDS	114		130
90 PERCENT EXCEEDS	89		77

(a) Gage height 7.85 ft.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04058190 SCHWEITZER RESERVOIR NEAR PALMER, MI

LOCATION.--Lat 46°25'00", long 87°38'48", in SE1/4 NW1/4 sec.2, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on left bank 120 ft upstream from dam on Schweitzer Creek, 3.0 mi southwest of Palmer.

DRAINAGE AREA.--23.1 mi².

PERIOD OF RECORD.--January 1963 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,300.00 ft above sea level (Cleveland-Cliffs Iron Co. reference mark); gage readings have been converted to sea level elevations. Prior to Oct. 25, 1967, nonrecording gage at same site and datum.

REMARKS.--Reservoir is formed by an earthfill dam with fixed crest concrete spillway completed in 1963. Capacity of reservoir, 5,300 acre-ft at spillway elevation, 1,338.00 ft. The dam includes a discharge pipe equipped with valve to control release flow to Schweitzer Creek (station 04058200). An average of 29 ft³/s was diverted from reservoir for iron ore processing (furnished by Cleveland Cliffs Iron Co.), some returned to Middle Branch Escanaba River basin via Green Creek and some returned to the East Branch Escanaba River basin via Goose Lake Outlet. Since January 1973, controlled diversion from Greenwood Reservoir (station 04057811) via Greenwood Diversion (station 04057813) into Schweitzer Reservoir. Controlled inflow averaged 14.9 ft³/s for the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents recorded, 5,900 acre-ft, May 31, 1970, Apr. 20, 1985, elevation, 1,339.5 ft; minimum recorded since first filling, 2,920 acre-ft, Apr. 10, 1974, elevation, 1,329.7 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 5,620 acre-ft, April 22, 23, elevation, 1,338.80 ft; minimum, 4,608 acre-ft, September 9, 10, elevation, 1,335.86 ft.

MONTHEND ELEVATION, IN FEET ABOVE SEA LEVEL, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

Date	Elevation (feet)	Contents (acre-feet)	Change in contents	
			(acre- feet)	(equivalent in ft ³ /s)
Sept. 30	1,337.38	5,090	--	--
Oct. 31	1,337.94	5,279	+189	+3.1
Nov. 30	1,337.70	5,195	-84	-1.4
Dec. 31	1,338.06	5,324	+129	+2.1
CAL YR 1995			+1,034	+1.4
Jan. 31	1,337.99	5,296	-28	-0.5
Feb. 29	1,337.56	5,146	-150	-2.6
Mar. 31	1,336.79	4,887	-259	-4.2
Apr. 30	1,338.39	5,456	+569	+9.6
May 31	1,337.85	5,247	-209	-3.4
June 30	1,337.82	5,237	-10	-0.2
July 31	1,338.04	5,316	+79	+1.3
Aug. 31	1,336.69	4,857	-459	-7.5
Sept. 30	1,336.20	4,710	-147	-2.5
WTR YR 1996			-380	-0.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04058200 SCHWEITZER CREEK NEAR PALMER, MI

LOCATION.--Lat 46°24'40", long 87°37'27", in SW1/4 sec.1, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on right bank 10 ft upstream from highway bridge, 1.0 mi downstream from Schweitzer Reservoir, and 2.5 mi southwest of Palmer.

DRAINAGE AREA.--23.6 mi².

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

GAGE.--Water-stage recorder. Concrete control since Oct. 1, 1963. Datum of gage is 1,268.28 ft above sea level (Cleveland-Cliffs Iron Co. bench mark). Prior to Aug. 21, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Since August 1962, flow completely regulated by Schweitzer Reservoir (station 04058190) 1.0 mi upstream. Prior to June 1994, some diversion from headwaters of basin for municipal supply and the effluent discharged to the Carp River basin. An average of 29 ft³/s was diverted from Schweitzer Reservoir by industry for iron ore processing (furnished by Cleveland Cliffs Iron Co.), some returned to the Middle Branch Escanaba River via Green Creek and some returned via Goose Lake Outlet and East Branch Escanaba River. Diversion into Schweitzer Reservoir from Greenwood Reservoir (station 04057811) via Greenwood Diversion (station 04057813). Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.4	5.7	4.4	6.7	8.3	4.1	4.5	88	5.0	4.7	8.8	4.3
2	4.3	26	4.4	5.4	6.6	4.2	4.4	67	15	5.0	5.6	4.4
3	4.6	45	4.4	5.2	5.8	e4.1	4.4	66	59	4.7	4.7	4.5
4	4.5	32	4.4	9.1	5.8	e4.0	4.4	74	80	4.9	4.6	4.5
5	4.3	17	4.4	e13	5.8	4.0	4.4	85	57	4.6	5.0	4.4
6	4.5	12	4.7	e11	5.5	3.9	4.4	78	49	4.6	4.8	4.3
7	4.9	10	8.6	e10	5.5	e3.9	4.4	84	54	5.2	5.5	4.3
8	4.9	e6.0	10	e8.5	5.3	e3.9	4.4	95	41	4.8	5.7	4.2
9	10	e5.2	e7.7	7.8	5.1	3.9	4.7	96	27	4.7	5.3	4.3
10	12	4.8	e9.4	7.4	5.3	4.0	5.3	121	21	4.6	4.7	4.4
11	7.9	e4.6	e10	8.6	5.8	4.1	5.7	110	18	4.7	4.6	4.6
12	5.2	4.4	e9.9	9.3	5.8	4.4	5.9	73	15	5.1	4.6	4.7
13	4.6	4.4	e9.0	8.6	5.9	4.7	5.3	55	13	4.9	4.6	4.5
14	4.7	4.4	13	7.2	6.5	4.4	5.1	48	7.5	4.8	6.2	4.8
15	4.8	4.4	14	5.0	6.9	4.3	5.2	50	5.1	4.7	4.9	4.3
16	4.4	4.4	13	4.7	7.0	4.3	5.2	50	5.1	4.6	4.8	4.2
17	4.2	4.4	12	4.8	7.1	4.3	5.9	49	4.9	4.6	4.6	4.2
18	4.2	4.4	11	7.3	e6.6	4.4	6.7	57	4.9	7.8	4.6	4.5
19	4.5	4.3	10	11	6.2	4.4	9.1	86	5.1	21	4.6	4.1
20	4.5	4.4	11	37	6.6	4.3	53	152	4.9	41	4.5	4.0
21	4.9	4.4	11	22	6.2	4.3	156	94	5.1	27	4.6	3.9
22	4.6	4.3	10	15	4.7	4.4	203	55	5.0	18	5.4	3.9
23	6.0	4.4	9.3	13	4.6	4.5	221	38	5.1	10	4.4	5.5
24	14	4.3	10	10	4.6	4.6	201	26	5.2	6.1	4.5	3.7
25	15	4.4	10	8.3	4.4	4.6	231	20	5.1	5.2	4.5	3.8
26	12	4.4	9.3	e8.0	4.4	4.4	230	14	4.9	4.9	4.4	4.9
27	10	4.4	9.1	12	4.4	4.6	172	8.9	4.7	4.5	4.5	3.8
28	11	4.4	8.1	12	4.3	4.4	138	6.2	4.7	5.0	4.4	4.1
29	7.6	4.4	8.0	12	e4.2	4.5	136	5.4	5.0	6.9	4.5	4.1
30	7.2	4.4	8.4	12	---	4.4	124	5.2	4.8	13	4.4	5.5
31	5.3	---	8.6	9.9	---	4.5	---	5.4	---	13	4.4	---
TOTAL	205.0	251.6	277.1	321.8	165.2	132.8	1964.4	1862.1	541.1	264.6	152.7	130.7
MEAN	6.61	8.39	8.94	10.4	5.70	4.28	65.5	60.1	18.0	8.54	4.93	4.36
MAX	15	45	14	37	8.3	4.7	231	152	80	41	8.8	5.5
MIN	4.2	4.3	4.4	4.7	4.2	3.9	4.4	5.2	4.7	4.5	4.4	3.7

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 1996, BY WATER YEAR (WY)

MEAN	11.1	12.2	7.94	5.75	5.15	7.39	47.9	28.9	15.3	8.49	7.15	9.28
MAX	41.8	41.3	24.0	13.5	9.98	35.3	115	98.1	55.8	24.2	28.9	56.5
(WY)	1986	1989	1966	1966	1961	1966	1985	1972	1968	1979	1973	1978
MIN	3.48	3.59	3.59	2.15	1.92	2.40	1.45	1.69	4.11	3.96	3.46	3.62
(WY)	1964	1964	1990	1963	1963	1963	1963	1963	1977	1990	1963	1963

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1961 - 1996

ANNUAL TOTAL	2217.3	6269.1	
ANNUAL MEAN	6.07	17.1	13.9
HIGHEST ANNUAL MEAN			26.4
LOWEST ANNUAL MEAN			4.64
HIGHEST DAILY MEAN	50	231	699
LOWEST DAILY MEAN	3.4	3.7	1.0
ANNUAL SEVEN-DAY MINIMUM	3.5	3.9	1.0
INSTANTANEOUS PEAK FLOW		251	860
INSTANTANEOUS PEAK STAGE		4.82	6.50
INSTANTANEOUS LOW FLOW			.40
10 PERCENT EXCEEDS	10	49	30
50 PERCENT EXCEEDS	4.4	5.1	5.6
90 PERCENT EXCEEDS	3.7	4.3	4.0

(a) Apr. 9-18, May 5, 6, 1963.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04058940 ESCANABA RIVER NEAR ST. NICHOLAS, MI

LOCATION.--Lat 45°58'45", long 87°16'13", in SW1/4 NE1/4 sec.2, T.41 N., R.24 W., Delta County, Hydrologic Unit 04030110, on right bank 600 ft downstream from Boney Falls Dam, 2.1 mi west of St. Nicholas, and 23 mi upstream from mouth.

DRAINAGE AREA.--Not determined.

PERIOD OF RECORD.--December 1987 to current year (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 854.03 ft above sea level.

REMARKS.--Diurnal fluctuation caused by hydroelectric plant 600 ft upstream. Some regulation by Schweitzer Reservoir (station 04058190) about 40 mi upstream and Greenwood Reservoir (station 04057811) about 50 mi upstream. Gage-height telemeter at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 7.09 ft, Apr. 29, 1996, result of unusual regulation; minimum daily, 1.89 ft, Sept. 2, 1991.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 7.09 ft, Apr. 29, result of unusual regulation; minimum daily, 2.06 ft, Dec. 7.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.15	2.71	2.25	2.19	2.27	2.21	2.42	4.90	2.73	2.57	2.70	2.13
2	2.22	3.02	2.20	2.18	2.24	2.22	2.46	4.67	3.10	2.60	2.61	2.16
3	2.30	3.29	2.28	2.17	2.23	2.23	2.40	4.62	3.51	2.70	2.51	2.10
4	2.37	3.35	2.26	2.17	2.22	2.23	2.38	4.57	3.86	2.58	2.45	2.12
5	2.45	3.18	2.25	2.16	2.20	2.19	2.37	4.61	3.94	2.50	2.44	2.21
6	2.46	3.00	2.11	2.16	2.22	2.19	2.39	4.59	3.97	2.45	2.64	2.15
7	2.82	2.90	2.06	2.14	2.22	2.17	2.38	4.62	4.02	2.44	2.81	2.12
8	2.92	2.80	2.18	2.13	2.20	2.18	2.39	4.67	3.94	2.47	2.98	2.11
9	2.91	2.66	2.17	2.13	2.18	2.18	2.39	4.71	3.76	2.46	2.86	2.08
10	2.87	2.64	2.13	2.13	2.17	2.18	2.42	4.76	3.54	2.43	2.61	2.11
11	2.74	2.57	2.15	2.14	2.17	2.18	2.56	4.81	3.38	2.37	2.52	2.17
12	---	2.44	2.16	2.13	2.16	2.18	2.75	4.73	3.26	2.40	2.48	2.32
13	---	2.48	2.17	2.13	2.17	2.24	2.82	4.59	3.19	2.50	2.47	2.52
14	2.52	2.42	2.18	2.13	2.22	2.32	2.82	4.31	3.06	2.55	2.49	2.44
15	2.49	2.46	2.21	2.13	2.23	2.36	2.91	4.24	2.94	2.52	2.69	2.45
16	2.46	2.42	2.20	2.13	2.23	2.38	2.90	4.10	2.83	2.48	2.66	2.41
17	2.43	2.32	2.20	2.12	2.19	2.38	2.97	4.09	2.80	2.38	2.54	2.33
18	2.47	2.43	2.21	2.15	2.18	2.37	3.21	4.14	2.53	2.56	2.47	2.24
19	2.47	2.37	2.20	2.16	2.18	2.39	3.71	4.20	2.61	3.03	2.42	2.25
20	2.65	2.39	2.20	2.20	2.19	2.46	---	4.35	2.77	3.32	2.36	2.19
21	2.83	2.32	2.20	2.30	2.18	2.49	---	4.47	2.71	3.29	2.33	2.17
22	3.04	2.21	2.20	2.31	2.21	2.41	---	4.51	2.61	3.10	2.37	2.17
23	3.04	2.20	2.19	2.30	2.22	2.36	---	4.24	2.66	2.87	2.49	2.17
24	3.05	2.13	2.19	2.31	2.20	2.36	---	4.00	2.71	2.76	2.42	---
25	3.05	2.22	2.23	2.31	2.27	2.37	---	3.71	2.76	2.66	2.33	---
26	2.98	2.22	2.20	2.29	2.24	2.38	---	3.55	2.72	2.63	2.32	---
27	2.92	2.24	2.19	2.26	2.23	2.40	6.06	3.34	2.64	2.53	2.26	---
28	2.93	2.21	2.20	2.25	2.21	2.39	5.90	3.19	2.58	2.49	2.26	---
29	2.90	2.15	2.19	2.26	2.21	2.38	5.93	3.06	2.56	2.68	2.22	---
30	2.81	2.20	2.19	2.27	---	2.39	5.48	2.97	2.72	2.77	2.19	---
31	2.73	---	2.19	2.26	---	2.44	---	2.89	---	2.75	2.18	---
MEAN	---	2.53	2.19	2.20	2.21	2.31	---	4.20	3.08	2.64	2.49	---
MAX	---	3.35	2.28	2.31	2.27	2.49	---	4.90	4.02	3.32	2.98	---
MIN	---	2.13	2.06	2.12	2.16	2.17	---	2.89	2.53	2.37	2.18	---

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04059500 FORD RIVER NEAR HYDE, MI

LOCATION.--Lat 45°45'20", long 87°12'05", in SW1/4 sec.19, T.39 N., R.23 W., Delta County, Hydrologic Unit 04030109, on right bank 40 ft downstream from bridge on County Road 533, 1.4 mi downstream from Tenmile Creek, and 1.5 mi north of Hyde.

DRAINAGE AREA.--450 mi².

PERIOD OF RECORD.--October 1954 to current year.

GAGE.--Water-stage recorder. Datum of gage is 681.77 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	162	497	e140	e120	e165	e140	e150	3130	350	273	383	89
2	161	874	e140	e120	e165	e140	e150	2730	610	288	351	86
3	176	1000	e140	e120	e165	e140	e150	2450	837	295	310	82
4	205	942	e140	e120	e165	e140	e150	2290	1130	328	271	80
5	235	862	e140	e120	e165	e140	e150	2160	1260	336	e250	77
6	275	796	e135	e120	e165	e140	e150	2140	1330	295	e300	75
7	458	729	e130	e120	e165	e140	e150	2100	1400	286	e400	73
8	587	611	e130	e120	e165	e140	e150	2080	1320	288	e450	72
9	609	384	e130	e120	e160	e140	e155	2050	1190	326	408	77
10	625	445	e130	e120	e160	e140	e170	2050	1080	340	385	86
11	600	433	e125	e120	e160	e145	e600	2000	973	336	341	106
12	548	316	e125	e120	e160	e150	e800	1880	865	309	283	151
13	461	298	e120	e120	e160	e160	e780	1720	808	374	243	165
14	397	299	e120	e120	e160	e170	e760	1570	710	432	224	175
15	356	312	e120	e120	e155	e180	e740	1420	597	452	231	168
16	319	280	e120	e120	e150	e180	e700	1300	516	491	228	155
17	284	232	e120	e125	e150	e170	e680	1270	449	432	206	144
18	256	222	e120	e135	e150	e160	e650	1240	414	361	185	131
19	240	226	e120	e150	e150	e160	e2000	1220	405	598	167	118
20	280	228	e120	e180	e150	e155	3810	1210	403	743	157	108
21	481	221	e120	e190	e150	e150	4070	1160	373	696	141	102
22	653	191	e120	e190	e150	e150	4860	1080	384	647	140	100
23	701	206	e120	e180	e150	e150	4760	1020	372	580	139	97
24	803	180	e120	e180	e150	e150	4660	928	358	459	139	94
25	828	e170	e120	e175	e145	e150	4750	810	353	368	166	91
26	792	e160	e120	e170	e145	e150	5470	694	330	332	157	95
27	768	e150	e120	e170	e145	e150	4790	589	314	288	134	119
28	771	e150	e120	e170	e140	e150	4120	512	285	260	119	118
29	695	e145	e120	e170	e140	e150	3640	444	262	344	110	121
30	605	e145	e120	e170	---	e150	3360	383	263	367	101	125
31	522	---	e120	e165	---	e150	---	362	---	384	95	---
TOTAL	14853	11704	3885	4440	4500	4680	57525	45992	19941	12308	7214	3280
MEAN	479	390	125	143	155	151	1917	1484	665	397	233	109
MAX	828	1000	140	190	165	180	5470	3130	1400	743	450	175
MIN	161	145	120	120	140	140	150	362	262	260	95	72
CFSM	1.06	.87	.28	.32	.34	.34	4.26	3.30	1.48	.88	.52	.24
IN.	1.23	.97	.32	.37	.37	.39	4.76	3.80	1.65	1.02	.60	.27

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1955 - 1996, BY WATER YEAR (WY)

MEAN	310	394	211	118	102	252	1304	816		210	165	256
MAX	819	1246	589	346	493	1078	2353	2483	1006	793	713	1013
(WY)	1960	1986	1966	1966	1984	1973	1979	1960	1966	1968	1978	1978
MIN	39.9	42.5	27.7	26.5	29.6	48.5	345	204	52.4	34.7	38.8	26.2
(WY)	1977	1977	1977	1977	1977	1964	1990	1986	1988	1988	1970	1976

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1955 - 1996

ANNUAL TOTAL	102875		190322									
ANNUAL MEAN	282		520									
HIGHEST ANNUAL MEAN												1960
LOWEST ANNUAL MEAN												1963
HIGHEST DAILY MEAN	1400											1960
LOWEST DAILY MEAN	36											1976
ANNUAL SEVEN-DAY MINIMUM	36											1976
INSTANTANEOUS PEAK FLOW												1960
INSTANTANEOUS PEAK STAGE												1960
INSTANTANEOUS LOW FLOW												(a)
ANNUAL RUNOFF (CFSM)	.63											
ANNUAL RUNOFF (INCHES)	8.50											
10 PERCENT EXCEEDS	715											
50 PERCENT EXCEEDS	170											
90 PERCENT EXCEEDS	38											

(a) Aug. 30, 1976, July 7, 8, 1988.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04060993 BRULE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'39", long 88°18'57", in NW1/4 SE1/4 sec.9, T.41 N., R.32 W., Michigan Meridian, Iron County, Hydrologic Unit 04030106, on left bank 30 ft upstream from bridge on U.S. Highway 2, 4.0 mi upstream from Paint River, 4.0 mi northwest of Florence, WI, and 8.0 mi upstream from confluence with Michigamme River.

DRAINAGE AREA.--366 mi², approximately.

PERIOD OF RECORD.--January 1914 to February 1916, June 1944 to current year.

REVISED RECORDS.--WSP 1387: 1914-16. WDR MI-92-1: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 1,240 ft above sea level, from topographic map. Prior to Aug. 29, 1944, nonrecording gage, and Aug. 29, 1944 to Apr. 4, 1994, water-stage recorder at site 3.0 mi downstream at different datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Discharge includes some mine pumpage prior to August 1977. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	335	464	e310	e290	e280	e250	e320	1540	388	393	353	254
2	371	727	e310	e290	e280	e250	e320	1300	546	431	333	257
3	375	779	e310	e290	e280	e250	e310	1190	665	423	309	261
4	385	668	e310	e290	e280	e250	e300	1170	603	368	294	258
5	338	547	e310	e290	e280	e250	e300	1160	516	341	309	289
6	378	513	e310	e290	e270	e250	e300	1190	581	320	456	274
7	801	485	e300	e290	e270	e250	e300	1140	690	348	496	256
8	848	441	e300	e290	e270	e250	e300	1090	601	385	523	247
9	681	410	e300	e290	e270	e250	e300	1080	513	389	420	254
10	535	431	e300	e290	e270	e250	e330	1070	467	348	349	251
11	432	395	e300	e290	e270	e260	e380	1040	474	326	335	259
12	385	402	e300	e290	e270	e270	e460	928	466	425	319	260
13	346	343	e300	e290	e260	e280	449	820	476	752	320	260
14	324	352	e300	e290	e260	e300	442	749	443	546	328	255
15	315	352	e300	e290	e260	e310	453	704	390	446	335	255
16	304	340	e300	e290	e260	e310	424	681	371	411	324	254
17	290	e330	e300	e290	e260	e310	427	673	376	380	320	251
18	276	e320	e300	e290	e260	e300	540	660	402	441	301	249
19	279	e310	e300	e290	e260	e300	928	717	417	704	291	248
20	288	e300	e300	e290	e260	e300	1560	911	403	592	305	246
21	344	e300	e300	e290	e260	e300	1980	838	383	466	295	247
22	401	e300	e300	e290	e260	e300	2390	707	424	394	348	305
23	434	e300	e300	e290	e260	e300	2700	649	402	364	393	342
24	742	e300	e300	e290	e260	e300	2670	586	413	361	340	323
25	918	e310	e300	e280	e260	e300	2770	546	394	362	309	301
26	831	e310	e290	e280	e250	e290	3060	508	381	343	299	285
27	669	e310	e290	e280	e250	e290	3000	503	502	320	290	308
28	577	e310	e290	e280	e250	e300	2510	460	619	322	276	321
29	519	e310	e290	e280	e250	e310	2020	426	517	380	267	306
30	480	e310	e290	e280	---	e320	1750	411	463	377	263	293
31	478	---	e290	e280	---	e320	---	399	---	367	256	---
TOTAL	14679	11969	9300	8920	7670	8770	33993	25846	14286	12825	10356	8169
MEAN	474	399	300	288	264	283	1133	834	476	414	334	272
MAX	918	779	310	290	280	320	3060	1540	690	752	523	342
MIN	276	300	290	280	250	250	300	399	371	320	256	246
CFSM	1.29	1.09	.82	.79	.72	.77	3.10	2.28	1.30	1.13	.91	.74
IN.	1.49	1.22	.95	.91	.78	.89	3.46	2.63	1.45	1.30	1.05	.83

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1914 - 1996, BY WATER YEAR (WY)

	MEAN	328	338	277	251	244	320	650	505	397	336	291	314
MAX	612	600	424	369	406	833	1235	1104	712	983	604	582	
(WY)	1986	1916	1986	1986	1984	1973	1967	1965	1981	1953	1972	1959	
MIN	179	202	175	156	163	178	235	251	194	185	186	182	
(WY)	1949	1990	1990	1995	1995	1965	1990	1988	1988	1989	1948	1948	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1914 - 1996

ANNUAL TOTAL	112493						166783						
ANNUAL MEAN	308						456						
HIGHEST ANNUAL MEAN										353			
LOWEST ANNUAL MEAN										512			1973
HIGHEST DAILY MEAN										221			1990
LOWEST DAILY MEAN	918						3060		Apr 26	4420			Jul 2 1953
ANNUAL SEVEN-DAY MINIMUM	139						246		Sep 20	130			Dec 2 1963
INSTANTANEOUS PEAK FLOW	140						250		Feb 26	140			Jan 2 1995
INSTANTANEOUS LOW FLOW							3140		Apr 26	4700			Jul 2 1953
ANNUAL RUNOFF (CFSM)							7.45		Apr 26	(a)7.45			Apr 26 1996
ANNUAL RUNOFF (INCHES)							241		Sep 8	(b)118			Dec 2 1963
10 PERCENT EXCEEDS	.84						1.25			.96			
50 PERCENT EXCEEDS	11.43						16.95			13.10			
90 PERCENT EXCEEDS	488						720			556			
	290						310			290			
	160						260			205			

(a) Present site and datum; peak stage at previous site and datum, 8.60 ft, Dec. 20, 1983, backwater from ice.

(b) Discharge measurement.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04061500 PAINT RIVER AT CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'21", long 88°20'05", in SE1/4 sec.20, T.43 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 150 ft downstream from municipal powerplant at Crystal Falls, 14.5 mi upstream from mouth.

DRAINAGE AREA.--597 mi².

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

REVISED RECORDS.--WSP 1174: 1947-48(m). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,306.1 ft above sea level (Wisconsin Electric Power Co. bench mark).

REMARKS.--Records fair. Diurnal fluctuation caused by powerplant immediately upstream; since storage capacity is small, daily flows are not affected appreciably. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	483	920	455	403	e350	e360	440	3490	699	567	562	323
2	649	1210	469	401	e350	e360	429	2910	946	635	526	309
3	733	1420	473	399	e350	e350	427	2660	1220	733	482	319
4	769	1350	466	378	e350	e350	412	2770	1190	632	457	304
5	737	1180	451	380	e350	e350	407	2990	1130	558	389	338
6	712	1120	423	387	e350	e350	417	3040	1200	520	488	332
7	1060	1000	385	378	e350	e350	422	2950	1470	530	579	301
8	1360	884	414	371	e350	e350	415	3090	1400	571	612	303
9	1170	627	408	372	e350	e350	413	3240	1210	555	552	295
10	975	846	409	376	e350	e350	435	3350	1080	562	495	306
11	841	703	429	384	e350	e350	503	3400	1040	516	445	304
12	784	615	420	378	e350	e360	692	3040	1020	568	409	341
13	706	567	413	390	e350	e380	742	2630	914	515	383	351
14	589	577	423	387	e350	e410	757	2270	831	912	347	301
15	562	589	427	386	e350	e440	765	2020	e710	993	325	311
16	574	591	442	371	e350	e450	764	1890	e700	839	323	306
17	566	519	446	372	e350	e450	e810	1780	e660	715	314	315
18	537	548	442	382	e350	e440	e1800	1750	e620	679	300	313
19	497	529	439	378	e350	e440	e1800	2070	e570	787	280	304
20	499	528	435	e380	e350	e430	e2500	3690	561	932	334	284
21	560	505	429	e370	e360	e420	e3100	4080	548	975	390	306
22	666	452	428	e370	e360	e410	e4700	3320	576	1040	409	334
23	771	454	427	e370	e360	e400	5030	2550	564	776	504	369
24	1440	429	427	e360	e360	e400	5450	2030	595	689	510	353
25	1990	452	421	e360	e360	e400	6200	1600	594	655	458	341
26	1830	461	419	e360	e360	389	6960	1310	565	617	408	342
27	1600	477	408	e360	e360	394	6030	1090	619	416	287	372
28	1390	461	404	e360	e360	441	4900	980	717	365	367	389
29	1240	441	404	e360	e360	463	4390	901	703	419	341	378
30	1160	444	403	e360	---	471	4100	831	627	504	332	365
31	958	---	406	e360	---	450	---	774	---	552	324	---
TOTAL	28408	20899	13245	11643	10240	12308	65710	74496	25279	20927	12932	9809
MEAN	916	697	427	376	353	397	2190	2403	843	675	417	327
MAX	1990	1420	473	403	360	471	6960	4080	1470	1040	612	389
MIN	483	429	385	360	350	350	407	774	548	365	280	284
CFSM	1.53	1.17	.72	.63	.59	.67	3.67	4.03	1.41	1.13	.70	.55
IN.	1.77	1.30	.83	.73	.64	.77	4.09	4.64	1.58	1.30	.81	.61

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 1996, BY WATER YEAR (WY)

	MEAN	522	537	385	317	303	463	1555	1043	679	477	369	442
MAX	1516	1201	603	487	616	1818	2732	2549	1414	1657	811	1211	
(WY)	1986	1986	1984	1983	1984	1973	1967	1965	1983	1953	1972	1959	
MIN	172	230	222	208	202	210	521	371	220	185	181	163	
(WY)	1949	1977	1977	1964	1964	1964	1990	1988	1988	1988	1976	1948	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1944 - 1996

ANNUAL TOTAL	203119	305896	
ANNUAL MEAN	556	836	591
HIGHEST ANNUAL MEAN			882
LOWEST ANNUAL MEAN			344
HIGHEST DAILY MEAN	1990	6960	10500
LOWEST DAILY MEAN	220	280	81
ANNUAL SEVEN-DAY MINIMUM	250	305	145
INSTANTANEOUS PEAK FLOW		7300	10900
INSTANTANEOUS PEAK STAGE		7.89	9.82
INSTANTANEOUS LOW FLOW			7.7
ANNUAL RUNOFF (CFSM)	.93	1.40	.99
ANNUAL RUNOFF (INCHES)	12.66	19.06	13.45
10 PERCENT EXCEEDS	1020	1790	1120
50 PERCENT EXCEEDS	442	453	390
90 PERCENT EXCEEDS	270	350	239

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04062000 PAINT RIVER NEAR ALPHA, MI

LOCATION.--Lat 46°00'40", long 88°15'30", in NW1/4 NW1/4 sec.25, T.42 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 0.6 mi downstream from Lower Paint Dam, 5.5 mi upstream from Brule River, and 6.0 mi southeast of Alpha.

DRAINAGE AREA.--631 mi².

PERIOD OF RECORD.--June 1952 to current year.

REVISED RECORDS.--WSP 1727: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 1,260 ft above sea level, from topographic map.

REMARKS.--Records good. Flow completely regulated by powerplant and Lower Paint Dam, 0.6 mi upstream. Records not adjusted for diversion to Michigamme River by Paint River Diversion Canal. Several measurements of water temperature were made during the year.

REVISIONS.--The maximum discharge for the water year 1985 has been revised to 5,390 ft³/s, April 22, 1985, gage height, 9.25 ft.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	99	93	e95	e91	e88	e84	e90	2710	92	89	96	101
2	96	94	e95	e91	e88	e84	e92	2810	92	91	97	101
3	98	94	e95	e91	e88	e84	e92	2770	514	89	98	100
4	96	94	e95	e91	e88	e84	e92	2770	938	89	98	98
5	96	94	e95	e91	e88	e84	e92	2800	928	89	99	98
6	97	94	e96	e90	e87	e84	e92	3300	942	89	101	98
7	99	92	e96	e90	e87	e84	e92	3660	940	92	102	98
8	96	92	e95	e90	e86	e84	e92	3590	926	92	101	98
9	94	e92	e94	e90	e86	e84	e94	3550	914	92	104	98
10	96	93	e94	e90	e86	e84	e94	3540	517	92	101	98
11	93	e93	e94	e90	e86	e84	e94	3340	222	92	101	98
12	92	e96	e94	e90	e86	e84	e94	3130	304	95	101	96
13	94	e94	e94	e90	e86	e84	e94	2750	88	97	101	96
14	90	e92	e94	e90	e86	e84	e94	1810	87	94	101	96
15	89	94	e94	e90	e86	e86	e94	1130	87	94	101	96
16	89	93	e94	e89	e86	e88	e94	744	87	99	101	96
17	89	e92	e94	e89	e86	e90	e96	337	87	94	101	95
18	89	e92	e93	e88	e86	e90	e98	95	87	96	101	119
19	92	93	e93	e88	e86	e90	99	521	87	99	101	140
20	92	92	e93	e88	e86	e90	529	1750	87	96	101	138
21	94	e92	e93	e88	e86	e90	1790	2370	88	96	101	137
22	94	e92	e93	e88	e86	e90	2580	2030	88	96	101	136
23	94	e92	e92	e88	e86	e90	3010	1600	87	96	102	146
24	96	e92	e92	e88	e86	e90	3110	1540	87	96	101	131
25	95	e92	e92	e88	e86	e90	4090	1500	87	96	101	94
26	94	e92	e92	e88	e84	e90	5110	1500	87	96	101	94
27	96	e93	e92	e88	e84	e90	5130	1140	89	96	101	94
28	94	e94	e92	e88	e84	e90	3780	472	89	96	101	94
29	94	e94	e92	e88	e84	e90	2790	93	90	96	101	94
30	94	e94	e92	e88	---	e90	2530	92	89	95	101	94
31	93	---	e92	e88	---	e90	---	92	---	93	101	---
TOTAL	2914	2790	2901	2765	2498	2700	36228	59536	8907	2912	3119	3172
MEAN	94.0	93.0	93.6	89.2	86.1	87.1	1208	1921	297	93.9	101	106
MAX	99	96	96	91	88	90	5130	3660	942	99	104	146
MIN	89	92	92	88	84	84	90	92	87	89	96	94

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1996, BY WATER YEAR (WY)

	128	119	92.6	89.8	92.5	103	456	390	208	142	102	115
MEAN	128	119	92.6	89.8	92.5	103	456	390	208	142	102	115
MAX	554	383	145	102	225	487	1389	1921	937	969	215	305
(WY)	1986	1989	1983	1965	1984	1973	1954	1996	1983	1953	1978	1980
MIN	85.0	82.0	84.5	71.4	85.1	84.0	81.4	83.5	85.4	86.9	87.0	66.8
(WY)	1971	1992	1993	1955	1991	1956	1990	1992	1975	1983	1958	1962

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1952 - 1996

ANNUAL TOTAL	37251	130442	169
ANNUAL MEAN	102	356	356
HIGHEST ANNUAL MEAN			1996
LOWEST ANNUAL MEAN			1990
HIGHEST DAILY MEAN	733	5130	7380
LOWEST DAILY MEAN	81	(e)84	62
ANNUAL SEVEN-DAY MINIMUM	83	84	65
INSTANTANEOUS PEAK FLOW		5800	8050
INSTANTANEOUS PEAK STAGE		9.42	10.50
10 PERCENT EXCEEDS	98	931	118
50 PERCENT EXCEEDS	92	94	91
90 PERCENT EXCEEDS	83	86	86

(a) Feb. 26 to Mar. 14.
(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04062011 BRULE RIVER NEAR COMMONWEALTH, WI

LOCATION.--Lat 45°56'51", long 88°12'55", in NW1/4 sec. 14, T.40 N., R.18 E., Wisconsin Meridian, Florence County, Hydrologic Unit 04030106, on right bank 900 ft downstream from Brule Island Dam, 1.5 mi upstream from confluence with Michigamme River, and 2.8 mi north of Commonwealth, WI.

DRAINAGE AREA.--1,020 mi².

PERIOD OF RECORD.--October 1989 to current year.

REVISED RECORDS.--WDR MI-91-1: 1990(M).

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 1,130 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by powerplant 900 ft upstream and by Lower Paint Dam 8.2 mi upstream. Records not adjusted for diversion to Michigamme River by Paint River Diversion Canal.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	434	534	380	381	393	e340	e360	4160	512	e560	473	378
2	450	834	401	377	404	e350	e360	4080	721	e560	453	380
3	490	909	409	367	379	e350	e360	3900	1220	e550	431	392
4	471	735	410	356	360	e350	e360	3900	1540	e520	433	377
5	395	563	385	361	349	e350	e360	3890	e1500	e450	431	394
6	476	604	328	367	353	e360	e380	4520	e1400	e440	588	391
7	914	552	266	358	354	e380	e380	4840	e1100	e460	646	388
8	990	551	314	338	354	342	e380	4720	e800	e500	693	357
9	827	370	373	355	344	351	e380	4670	e700	e510	571	368
10	611	478	353	359	361	342	e400	4650	e660	e460	482	368
11	543	510	363	356	358	344	e480	4400	e640	e470	470	376
12	495	366	367	355	356	353	e690	4000	e640	527	452	370
13	414	392	364	367	351	366	e530	3530	e620	961	452	369
14	378	404	374	376	353	404	e490	2580	e600	678	458	366
15	433	388	364	355	349	462	e585	1840	e540	988	469	365
16	394	449	378	336	341	410	e540	1510	e530	1020	454	363
17	401	401	392	349	337	401	553	1100	e520	906	440	362
18	360	379	388	385	345	390	744	786	e540	948	434	355
19	364	421	393	403	340	403	1220	1210	e560	1080	427	418
20	400	416	406	405	338	392	2110	2660	e550	851	437	394
21	446	421	380	384	345	369	3400	3210	e540	637	422	397
22	487	357	384	393	337	390	4620	2750	e540	532	460	462
23	515	330	385	415	338	383	5660	2170	e540	491	517	428
24	911	330	384	383	350	406	5850	2090	e540	478	479	376
25	1070	298	390	377	353	410	6800	2040	e540	479	431	320
26	913	373	388	374	366	306	7750	1940	e520	470	415	324
27	772	382	373	378	348	e310	7730	1660	e680	445	401	316
28	557	389	354	371	340	e350	6260	1050	e800	450	404	311
29	608	343	366	372	336	e380	4720	527	e700	498	396	273
30	552	346	370	379	---	e380	4200	561	e620	500	388	235
31	524	---	379	378	---	e390	---	518	---	487	398	---
TOTAL	17595	13825	11561	11510	10232	11514	68652	85462	21913	18906	14405	10973
MEAN	568	461	373	371	353	371	2288	2757	730	610	465	366
MAX	1070	909	410	415	404	462	7750	4840	1540	1080	693	462
MIN	360	298	266	336	336	306	360	518	512	440	388	235

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1990 - 1996, BY WATER YEAR (WY)

MEAN	433	398	340	316	317	408	930	921	490	428	352	361
MAX	712	571	416	371	353	506	2288	2757	730	610	465	395
(WY)	1991	1993	1992	1996	1996	1991	1996	1996	1996	1996	1996	1993
MIN	276	307	270	259	270	359	322	430	334	272	296	314
(WY)	1990	1990	1990	1991	1991	1994	1990	1990	1992	1990	1990	1991

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1990 - 1996

ANNUAL TOTAL	158536	296548	
ANNUAL MEAN	434	810	475
HIGHEST ANNUAL MEAN			810
LOWEST ANNUAL MEAN			325
HIGHEST DAILY MEAN	1480	May 17	7750
LOWEST DAILY MEAN	228	Jan 10	235
ANNUAL SEVEN-DAY MINIMUM	266	Jan 1	308
INSTANTANEOUS PEAK FLOW			8480
INSTANTANEOUS PEAK STAGE		13.91	Apr 25
10 PERCENT EXCEEDS	617		1500
50 PERCENT EXCEEDS	384		410
90 PERCENT EXCEEDS	290		349
			269

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04062500 MICHIGAMME RIVER NEAR CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'50", long 88°12'57", in NW1/4 sec.20, T.43 N., R.31 W., Iron County, Hydrologic Unit 04030107, on right bank 400 ft upstream from highway bridge, 5.0 mi downstream from Michigamme Reservoir, 6.0 mi east of Crystal Falls, and 15 mi upstream from confluence with Brule River.

DRAINAGE AREA.--656 mi².

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

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 1,300 ft above sea level, from topographic map.

REMARKS.--Records good. Flow regulated by powerplant and by Michigamme Reservoir, capacity, 119,950 acre-ft, 5 mi upstream.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	507	1190	733	903	1120	976	496	2220	1490	573	806	707
2	518	745	733	902	1150	862	501	2260	1420	761	804	707
3	426	243	732	893	1170	766	532	2290	1750	752	801	705
4	238	594	729	898	1160	641	515	2330	2600	746	800	705
5	244	764	736	911	1150	569	461	2360	1910	742	820	703
6	236	907	730	930	1150	568	420	2560	2570	738	817	709
7	232	1030	817	966	1150	569	456	2500	2960	742	846	702
8	181	1120	940	992	1150	571	481	2300	2590	832	842	700
9	136	1160	944	991	1140	569	472	2350	2160	1010	820	654
10	186	872	941	989	1140	566	479	2370	1850	1010	807	573
11	257	779	934	987	1130	561	552	2340	1510	947	804	570
12	385	744	936	985	1130	562	365	2380	1510	975	801	569
13	198	733	936	985	1120	565	217	2400	1520	839	851	526
14	203	739	909	984	1120	566	463	2020	1410	824	925	450
15	201	738	875	982	1110	565	653	1520	1010	610	928	449
16	317	737	724	1030	1110	562	721	1480	587	571	920	297
17	530	738	722	1080	1100	563	898	1230	1050	515	919	235
18	526	738	835	1070	1090	565	1030	1220	1060	557	923	230
19	529	737	924	981	1090	600	1120	1260	1060	784	917	228
20	531	737	924	979	1080	624	1270	1900	1060	816	911	228
21	548	736	886	921	1100	614	1340	4150	1090	1070	909	231
22	554	736	863	885	1110	622	1450	4700	1130	1160	922	233
23	561	735	862	883	1100	537	1480	4660	1050	1160	916	358
24	344	735	862	882	1090	493	1480	4190	1030	1190	913	353
25	195	735	859	881	1080	505	1370	3580	977	1150	909	239
26	184	736	857	880	1070	507	1420	3240	946	1010	907	531
27	179	734	856	810	1070	505	1500	2860	942	795	904	704
28	173	733	854	733	1060	503	2530	2000	868	801	932	703
29	191	733	852	870	1050	501	2270	1570	608	815	911	700
30	524	735	851	1010	---	504	2160	1560	244	811	784	698
31	961	---	880	1080	---	504	---	1550	---	809	709	---
TOTAL	10995	23393	26236	29273	32290	18185	29102	75350	41962	26075	26778	15397
MEAN	355	780	846	944	1113	587	970	2431	1399	841	864	513
MAX	961	1190	944	1080	1170	976	2530	4700	2960	1160	932	709
MIN	136	243	722	733	1050	493	217	1220	244	515	709	228

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 1996, BY WATER YEAR (WY)

	MEAN	510	568	800	869	816	530	653	1096	825	677	601	522
MAX	1220	1432	1427	1274	1252	819	1662	2865	1650	1461	1035	1325	
(WY)	1952	1989	1989	1983	1983	1971	1973	1960	1983	1953	1987	1968	
MIN	151	88.3	238	390	350	160	142	130	257	261	292	157	
(WY)	1970	1949	1949	1977	1948	1977	1987	1987	1987	1959	1977	1975	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1944 - 1996

ANNUAL TOTAL	218926		355036										
ANNUAL MEAN	600		970										
HIGHEST ANNUAL MEAN										706			
LOWEST ANNUAL MEAN										1049		1960	
HIGHEST DAILY MEAN	2340									382		1977	
LOWEST DAILY MEAN	136									6940		Apr 27 1960	
ANNUAL SEVEN-DAY MINIMUM	180									71		Nov 26 1950	
INSTANTANEOUS PEAK FLOW										83		Mar 21 1968	
INSTANTANEOUS PEAK STAGE										7260		Apr 28 1960	
10 PERCENT EXCEEDS	1010									10.73		Apr 28 1960	
50 PERCENT EXCEEDS	568									1180			
90 PERCENT EXCEEDS	219									653			
										166			

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04063000 MENOMINEE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'04", long 88°11'13", in NE1/4 sec.16, T.41 N., R.31 W., Michigan Meridian, Iron County, Hydrologic Unit 04030108, on left bank 0.5 mi downstream from confluence of Brule and Michigamme Rivers, 3.5 mi northeast of Florence, WI, and at mile 117.

DRAINAGE AREA.--1,760 mi².

PERIOD OF RECORD.--January 1914 to September 1996 (discontinued). Published as "at Twin Falls near Iron Mountain, MI", January 1914 to June 1950.

REVISED RECORDS.--WSP 1707: 1953(M). WDR MI-92-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,119.23 ft above sea level (levels by Owen Ayres Associates). Prior to July 1950, headwater and tailwater gages and generation data entered hourly in daily log sheets by company employees at the Twin Falls Powerplant of Wisconsin Electric Power Co., 10.4 mi downstream.

REMARKS.--Records good except for estimated daily discharges, which are fair. Prior to July 1950, discharge determined from powerplant records computed on basis of load-discharge rating of hydroelectric units and rating for tailwater gage during periods of spill; ratings developed by U.S. Geological Survey. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre-ft, by Peavy Pond, capacity, 33,860 acre-ft, on Michigamme River, and by many smaller reservoirs upstream from station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1040	2570	1180	1530	e1600	1880	1360	8060	2590	1900	1610	1190
2	1630	2140	1500	1640	e1600	1920	1250	7550	2680	2070	1770	1430
3	1790	2460	1460	1640	e1600	1860	1210	6510	3680	2140	1650	1260
4	1600	2330	1710	1660	e1600	1870	1110	6520	5180	2120	1490	1230
5	1400	2360	1430	1680	e1600	e1850	1460	6510	3660	1840	1660	1320
6	1510	2570	1460	1720	e1600	e1800	1190	7110	4570	1790	1640	1240
7	1720	2490	1550	1630	e1600	1790	1270	7450	5920	1680	2160	1540
8	2450	2470	1440	1760	e1600	e1800	1430	7360	5210	1730	2730	1280
9	2360	2370	2110	1670	e1600	e1800	1130	7310	4010	1940	2320	1160
10	2360	1870	1650	1690	e1600	e1850	1370	7320	3470	2070	1820	1310
11	2090	1890	1690	1690	e1600	1900	1380	7040	2930	2070	2050	1330
12	1620	1730	1650	1630	e1600	2100	1790	6660	2840	2100	1670	1560
13	1550	1500	1600	1630	e1600	2070	1690	6140	2690	2520	1610	1120
14	1500	1820	1590	1620	e1600	1930	1860	5170	2560	2870	1600	1170
15	1360	1600	1530	1710	e1600	1810	2030	4330	1660	2730	1760	1290
16	1590	1690	1660	1660	e1600	1800	1990	3900	1830	1760	1760	1260
17	1550	1810	1630	1630	e1600	1600	2150	3490	2310	1870	1790	1570
18	1420	1660	1580	1550	e1600	1740	2780	3150	2280	1780	1660	1270
19	1600	1480	1580	1800	e1600	1710	3760	3520	2190	2370	1600	1410
20	1460	1740	1560	1600	e1600	1710	4680	5760	2330	2570	1550	1210
21	1470	1580	1660	1490	e1650	1860	6140	9510	2140	2690	1580	907
22	896	1650	1610	1650	e1700	1840	7350	10400	2300	2730	1610	728
23	1330	1460	1490	1620	e1700	1510	8980	8380	1960	2340	1710	745
24	2230	1480	1660	e1600	e1750	1220	8750	7440	2210	2310	1630	683
25	3010	1230	1630	e1600	1780	1540	9960	5930	2040	2350	1710	825
26	2660	1430	1550	e1600	1850	1910	11200	5140	2200	1980	1730	811
27	2490	1680	1590	e1600	1820	1770	11300	4640	2130	1820	1530	844
28	2400	1600	1720	e1600	1790	1530	10100	3410	1970	1820	1440	779
29	2690	1660	1600	e1600	1860	1680	8340	2870	1790	1670	1440	703
30	2660	1370	1580	e1600	---	1460	7730	3070	1820	2080	1420	870
31	2680	---	1640	e1600	---	1400	---	2900	---	1940	1360	---
TOTAL	58116	55690	49290	50700	47900	54510	126740	184550	85150	65650	53060	34045
MEAN	1875	1856	1590	1635	1652	1758	4225	5953	2838	2118	1712	1135
MAX	3010	2570	2110	1800	1860	2100	11300	10400	5920	2870	2730	1570
MIN	896	1230	1180	1490	1600	1220	1110	2870	1660	1670	1360	683

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1914 - 1996, BY WATER YEAR (WY)

	MEAN	1479	1606	1455	1391	1362	1584	3180	3068	2144	1597	1298	1404
MAX	3537	3465	2640	2253	2514	3544	8159	6319	5035	4253	2359	3149	
(WY)	1986	1986	1984	1983	1984	1973	1916	1960	1916	1953	1972	1968	
MIN	726	725	765	691	647	692	735	595	799	721	545	718	
(WY)	1949	1964	1925	1924	1926	1914	1990	1987	1988	1925	1925	1925	

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1914 - 1996
ANNUAL TOTAL	583501	865401	
ANNUAL MEAN	1599	2364	1797
HIGHEST ANNUAL MEAN			3069
LOWEST ANNUAL MEAN			922
HIGHEST DAILY MEAN	5100	May 17	11300
LOWEST DAILY MEAN	743	Apr 12	683
ANNUAL SEVEN-DAY MINIMUM	948	Apr 11	770
INSTANTANEOUS PEAK FLOW			11700
INSTANTANEOUS PEAK STAGE			10.46
INSTANTANEOUS LOW FLOW			261
10 PERCENT EXCEEDS	2370		4590
50 PERCENT EXCEEDS	1480		1710
90 PERCENT EXCEEDS	1090		1330
			843

(a) Since July 1950.

(b) Aug. 21, 1962, Sept. 26, 1975.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04063500 MENOMINEE RIVER AT TWIN FALLS NEAR IRON MOUNTAIN, MI

LOCATION.--Lat 45°52'17", long 88°04'12", in NE1/4 SE1/4 sec. 12, T.40 N., R.31 W., Michigan Meridian, Dickinson County, Hydrologic Unit 04030108, on left bank 150 ft downstream from Wisconsin Electric Power Company powerhouse at Twin Falls Dam, 3.6 mi north of Iron Mountain, and at mile 106.6.

DRAINAGE AREA.--1,800 mi².

PERIOD OF RECORD.--January 1914 to current year. Published as "near Florence, WI" October 1957 to September 1989.

REVISED RECORDS.--WDR MI-91-1: 1990(M). WDR MI-92-1: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 1,062 ft above sea level (levels by Wisconsin Electric Power Co.). Prior to September 1957, headwater and tailwater gages and generation data entered hourly in daily log sheets by company employees. Oct. 1957 to Sept. 1989, water-stage recorder at site 10.4 mi upstream at different datum. Nov. 1989 to July 1993, water-stage recorder at site 150 ft upstream at same datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Prior to September 1957, discharge determined from powerplant records computed on basis of load-discharge rating of hydroelectric units and rating for tailwater gage during periods of spill; ratings developed by U.S. Geological Survey. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre ft, by Peavy Pond, capacity, 33,860 acre-ft, on Michigamme River, and by many smaller reservoirs upstream from station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1150	2730	1330	1680	e1700	1930	1450	7980	2540	2080	1960	1380
2	1620	2440	1620	1700	e1700	1930	1220	7700	2850	2200	1850	1400
3	1920	2480	1540	1720	e1700	1930	1230	6410	3720	2310	1790	1400
4	1790	2470	1690	1760	e1700	1910	1250	6520	5260	2090	1660	1370
5	1430	2560	1640	1730	e1700	1920	1360	6650	3810	1910	1700	1420
6	1610	2650	1610	1780	e1700	1940	1230	7170	4500	1940	1890	1360
7	1920	2670	1470	1790	e1700	1930	1270	7490	6130	1750	2480	1680
8	2490	2600	1790	1760	e1700	1890	1400	7460	5470	1910	2720	1460
9	2480	2450	2070	1750	e1700	1880	1250	7350	4050	2120	2540	1230
10	2520	1970	1710	1770	e1700	1990	1420	7440	3670	2130	2080	1390
11	2290	2060	1790	1760	e1700	2050	1420	7110	3140	2190	2170	1520
12	1740	1840	1660	1740	e1700	2140	1980	6860	2960	2230	1840	1580
13	1710	1700	1820	1740	e1700	2100	1850	6230	2910	2740	1680	1270
14	1590	1860	1700	1710	e1700	1990	1910	5300	2540	3050	1740	1320
15	1470	1780	1610	1780	e1700	1960	2110	4320	1830	2710	1900	1370
16	1650	1840	1720	1760	e1700	1830	2000	3940	2070	1870	2060	1460
17	1640	1950	1770	1750	e1700	1760	2270	3680	2280	e2060	1810	1560
18	1590	1790	1660	1750	e1700	1730	2740	3240	2400	2020	1780	1430
19	1680	1560	1630	1820	e1700	1710	3820	3440	2310	2460	1740	1560
20	1670	1720	1680	1690	e1700	1800	4930	5700	2420	2790	1750	1360
21	1680	1840	1670	1700	e1800	1880	6210	9330	2290	2830	1760	928
22	1110	1700	1730	1730	1810	1830	7570	10400	2430	2790	1720	897
23	1350	1600	1670	1700	1810	1630	8990	8160	2080	2460	1820	880
24	2330	1600	1710	1760	1840	1280	8790	7630	2320	2530	1820	736
25	3180	1280	1690	1710	1840	1580	9570	5900	2220	2570	1820	860
26	2790	1580	1710	1710	1900	1870	9850	5200	2320	2150	1870	926
27	2600	1740	1700	1760	1870	1880	10900	4690	2160	1930	1780	1050
28	2630	1690	1750	e1700	1860	1750	10200	3450	2130	1940	1620	725
29	2800	1750	1640	e1700	1880	1670	8340	2980	1980	1910	1550	773
30	2730	1500	1670	e1700	---	1560	7890	3150	1780	2120	1450	887
31	2810	---	1780	e1700	---	1490	---	2970	---	2120	1390	---
TOTAL	61970	59400	52230	53810	50610	56740	126420	185850	88570	69910	57740	37182
MEAN	1999	1980	1685	1736	1745	1830	4214	5995	2952	2255	1863	1239
MAX	3180	2730	2070	1820	1900	2140	10900	10400	6130	3050	2720	1680
MIN	1110	1280	1330	1680	1700	1280	1220	2970	1780	1750	1390	725

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1914 - 1996, BY WATER YEAR (WY)

	MEAN	1488	1618	1465	1401	1370	1597	3196	3080	2160	1611	1312	1416
MAX	3537	3465	2640	2253	2514	3544	8159	6319	5035	4309	2359	3149	
(WY)	1986	1986	1984	1983	1984	1973	1916	1960	1916	1953	1972	1968	
MIN	726	725	765	691	647	692	707	595	799	721	545	718	
(WY)	1949	1964	1925	1924	1926	1914	1990	1987	1988	1925	1925	1925	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1914 - 1996

ANNUAL TOTAL	610644						900432						
ANNUAL MEAN	1673						2460				1810		
HIGHEST ANNUAL MEAN											3069		1916
LOWEST ANNUAL MEAN											922		1925
HIGHEST DAILY MEAN	5160					May 17	10900		Apr 27	18100		Apr 26	1960
LOWEST DAILY MEAN	743					Apr 12	725		Sep 28	57		Sep 26	1975
ANNUAL SEVEN-DAY MINIMUM	1000					Apr 11	850		Sep 23	277		Oct 18	1975
INSTANTANEOUS PEAK FLOW							11600		Apr 27	19500		Apr 26	1960
INSTANTANEOUS PEAK STAGE							12.54		Apr 27	(a)12.54		Apr 27	1996
INSTANTANEOUS LOW FLOW							442		Oct 4	(a)399		Aug 30	1992
10 PERCENT EXCEEDS	2500						4560			3060			
50 PERCENT EXCEEDS	1580						1810			1480			
90 PERCENT EXCEEDS	1090						1410			852			

(a) Since October 1989.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04065106 MENOMINEE RIVER AT NIAGARA, WI

LOCATION.--Lat 45°46'04", long 87°58'50", in NE 1/4 NE 1/4 sec.15, T.38 N., R.20 E., Marinette County, Hydrologic Unit 04030108, on right bank 0.7 mi downstream from Little Quinnesec Falls Dam, at Niagara, WI.

DRAINAGE AREA.--2,470 mi².

PERIOD OF RECORD.--October 1992 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 880 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre-ft, by Peavy Pond, capacity, 33,860 acre-ft, on Michigamme River, and by smaller reservoirs upstream of gage. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1620	3590	e1700	e2000	e2100	e2100	1750	10900	3120	2710	2450	1620
2	1890	3660	1830	e2000	e2100	e2100	1650	10300	3460	2890	2380	1600
3	2260	3650	1890	e1900	e2100	e2200	1610	8960	4340	2910	2180	1710
4	2350	3620	2010	e1900	e2200	e2100	1620	8690	6730	2640	2030	1650
5	2060	3600	2060	e1800	e2200	e2100	1670	8820	5080	2490	2060	1570
6	2230	3520	e2000	e1900	e2200	e2000	1710	9180	5050	2350	2280	1720
7	3310	3640	e1800	e2000	e2100	e2100	1680	9700	7370	2250	3030	1720
8	3700	3430	e1800	e2000	e2100	e2100	1700	9540	6840	2270	3680	1690
9	4050	2900	e1900	e1900	e2200	e1900	1700	9390	5190	2570	3370	1730
10	3710	2620	e2000	e1900	e2200	e2000	1750	9320	4710	2490	2640	1490
11	3340	2610	e2000	e1900	e2200	e2100	2010	9280	3940	2510	2640	1830
12	2570	2150	e1900	e2000	e2100	e2200	2680	8800	3690	2650	2500	1810
13	2520	2090	e1900	e2000	e2200	e2200	2720	8120	3780	3210	2080	1610
14	2250	2320	e1900	e1900	e2200	e2200	2670	6980	3340	3870	2230	1520
15	2130	2220	e2000	e1900	e2300	e2200	2910	6030	2410	3590	2320	1660
16	2060	2190	e2100	e2000	e2200	e2100	2660	5280	2620	2550	2400	1680
17	2200	2380	e2000	e2000	e2100	e2000	3250	5210	3000	2510	2240	1800
18	2100	2160	e2000	e2100	e2100	e2000	3570	4480	3030	2490	2100	1690
19	2080	1980	e2000	e2100	e2100	e2000	5780	4590	3030	3290	2120	1820
20	2100	2070	e1900	e2000	e2200	e2100	8570	6560	3220	3780	2070	1420
21	2270	2190	e2000	e1900	e2100	e2200	9640	10200	3170	3760	2100	1220
22	1950	1990	e2000	e1900	e2200	e2100	11400	11600	3030	3510	2090	1210
23	2030	1890	e1900	e2000	e2100	2040	13300	9220	2750	3030	2090	1250
24	3290	1910	e1900	e2000	e2100	1660	13000	8830	3020	3080	2250	1190
25	4440	1620	e2000	e2000	e2100	2070	13900	7070	2970	3120	2130	1200
26	4080	1890	e2000	e2100	e2100	2300	15700	6030	2950	2640	2170	1230
27	3750	2050	e1900	e2000	e2000	2190	16000	5670	2800	2470	2190	1620
28	3800	e2100	e1900	e2100	e2000	2130	14800	4320	2940	2280	1940	1210
29	3670	e1800	e1900	e2200	e2000	2120	12300	3760	2880	2550	1880	1180
30	3710	e1700	e1900	e2300	---	1940	11300	3750	2580	2700	1690	1170
31	3580	---	e1900	e2100	---	1930	---	3610	---	2590	1650	---
TOTAL	87100	75540	59990	61800	61900	64480	185000	234190	113040	87750	70980	45820
MEAN	2810	2518	1935	1994	2134	2080	6167	7555	3768	2831	2290	1527
MAX	4440	3660	2100	2300	2300	2300	16000	11600	7370	3870	3680	1830
MIN	1620	1620	1700	1800	2000	1660	1610	3610	2410	2250	1650	1170

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1993 - 1996, BY WATER YEAR (WY)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
MEAN	1961	1983	1941	1829	1875	1949	3376	4376	2994	2259	1777	1839
MAX	2810	2531	2458	2258	2134	2176	6167	7555	4184	2831	2290	2225
(WY)	1996	1993	1993	1993	1996	1995	1996	1996	1993	1996	1996	1994
MIN	1632	1283	1542	1369	1391	1764	1953	2074	1899	1718	1368	1527
(WY)	1993	1995	1995	1995	1995	1994	1994	1994	1994	1995	1993	1996

SUMMARY STATISTICS FOR 1995 CALENDAR YEAR FOR 1996 WATER YEAR WATER YEARS 1993 - 1996

	1995 CALENDAR YEAR	1996 WATER YEAR	WATER YEARS 1993 - 1996
ANNUAL TOTAL	776920	1147590	
ANNUAL MEAN	2129	3135	
HIGHEST ANNUAL MEAN			2348
LOWEST ANNUAL MEAN			3135
HIGHEST DAILY MEAN	6740	16000	1894
LOWEST DAILY MEAN	1110	1170	1894
ANNUAL SEVEN-DAY MINIMUM	1290	1250	1030
INSTANTANEOUS PEAK FLOW		16100	1110
INSTANTANEOUS PEAK STAGE		15.11	16100
10 PERCENT EXCEEDS	3500	5850	15.11
50 PERCENT EXCEEDS	1900	2190	3670
90 PERCENT EXCEEDS	1360	1710	1980

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04065722 MENOMINEE RIVER NEAR VULCAN, MI

LOCATION.--Lat 45°44'12", long 87°51'48", sec.34, T.39 N., R.29 W., Michigan Meridian, Dickinson County, Hydrologic Unit 04030108, on left bank 0.35 mi downstream from Sturgeon Falls Dam, 3.0 mi south of Vulcan, and at mile 78.7.

DRAINAGE AREA.--2,900 mi².

PERIOD OF RECORD.--December 1987 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 820 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre-ft, by Peavy Pond, capacity, 33,860 acre-ft, on Michigamme River, and by smaller reservoirs upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1860	4180	1910	2300	e2600	2470	2200	13700	3530	3110	2970	1750
2	2070	4340	2130	2290	e2500	2420	2040	12800	3970	3470	2780	1830
3	2580	4400	2190	2360	e2500	e2400	1990	11100	5180	3380	2550	1890
4	2650	4620	2290	2360	e2500	e2400	1980	10400	7590	3190	2270	1880
5	2530	4490	2380	2400	e2500	e2400	2060	10500	6180	3030	2410	1690
6	2610	4320	2490	2390	e2500	2370	2050	10600	6000	2810	2660	1800
7	3550	4330	2060	e2400	e2500	2470	2010	11400	8420	2640	3310	1920
8	4600	4130	2310	e2400	e2500	2470	2040	11200	8290	2730	4230	1890
9	4760	3620	2560	2400	e2500	2280	2080	11200	6460	2920	4010	1900
10	4590	3110	2740	2360	e2500	2340	2160	10800	5640	3090	3020	1840
11	4370	3160	2910	2350	e2500	2450	2510	11100	4950	2880	3070	2010
12	3230	2580	2690	2380	2510	2680	3440	10200	4480	3130	3210	2320
13	2990	2380	2570	2360	e2500	2620	3620	9840	4610	3720	2590	2000
14	2780	2700	2590	2270	e2500	2570	3520	8530	4500	4480	2020	1850
15	2710	2650	2420	2310	e2500	2640	3940	7390	2990	4260	2610	1940
16	2410	2500	2390	2360	2470	2550	3470	6420	3180	3110	2720	1940
17	2660	2670	2380	2320	2420	2390	4280	6440	3640	2990	2600	2060
18	2470	2600	2340	e2400	e2400	2410	4770	5610	3620	2970	2310	1870
19	2440	2320	2330	e2500	e2400	2430	7410	5490	3600	3970	2350	2070
20	2480	2280	2230	e2600	e2400	2420	11200	7170	3810	4760	2230	1660
21	2780	2590	2320	e2600	2420	2590	13100	10800	3700	4630	2400	1380
22	2920	2330	2330	e2600	e2400	2520	15300	12200	3680	4340	2320	1450
23	2660	2150	2320	2610	2410	2420	17900	10600	3260	3590	2290	1420
24	4030	2180	2300	2630	2380	1990	18100	9750	3640	3610	2430	1430
25	5380	1870	2310	2630	2440	2260	18400	7990	3500	3580	2420	1350
26	5160	2210	2350	2650	2410	2690	20700	6710	3560	3130	2410	1520
27	4480	2330	2340	2590	2420	2520	21500	6390	3310	2860	2360	1840
28	4570	2400	2350	2630	2410	2510	20000	5260	3410	2690	2200	1420
29	4490	2300	2380	e2600	2430	2450	16700	4390	3360	2900	2070	1440
30	4420	2140	2350	e2600	---	2310	14300	4170	3030	3090	1860	1380
31	4190	---	2280	e2600	---	2300	---	4200	---	3060	1850	---
TOTAL	105420	89880	73540	76250	71420	75740	244770	274350	135090	104120	80530	52740
MEAN	3401	2996	2372	2460	2463	2443	8159	8850	4503	3359	2598	1758
MAX	5380	4620	2910	2650	2600	2690	21500	13700	8420	4760	4230	2320
MIN	1860	1870	1910	2270	2380	1990	1980	4170	2990	2640	1850	1350

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 1996, BY WATER YEAR (WY)

	MEAN	2047	2459	2302	2041	1952	2414	4090	3934	2998	2161	1692	1925
MAX	3401	4412	3008	2533	2463	2849	8159	8850	4832	3359	2598	2456	
(WY)	1996	1989	1989	1993	1996	1991	1996	1996	1993	1996	1996	1994	
MIN	1081	1382	1555	1489	1442	2028	1356	1720	1062	1100	1256	1223	
(WY)	1990	1990	1990	1995	1995	1994	1990	1988	1988	1988	1989	1989	

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR			FOR 1996 WATER YEAR			WATER YEARS 1988 - 1996		
ANNUAL TOTAL	893920			1383850			2568		
ANNUAL MEAN	2449			3781			3781		
HIGHEST ANNUAL MEAN							1864		
LOWEST ANNUAL MEAN							1990		
HIGHEST DAILY MEAN	7200			May 17			21500		
LOWEST DAILY MEAN	1250			Feb 26			846		
ANNUAL SEVEN-DAY MINIMUM	1270			Feb 25			932		
INSTANTANEOUS PEAK FLOW							22000		
INSTANTANEOUS PEAK STAGE							17.39		
INSTANTANEOUS LOW FLOW							822		
10 PERCENT EXCEEDS	4090			6850			4120		
50 PERCENT EXCEEDS	2230			2590			2090		
90 PERCENT EXCEEDS	1470			2020			1320		

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04066003 MENOMINEE RIVER BELOW PEMENE CREEK NEAR PEMBINE, WI

LOCATION.--Lat 45°34'46", long 87°47'13", in NE 1/4, sec.29, T. 37 N., R.28 W., Michigan Meridian, Menominee County, MI, Hydrologic Unit 04030108, on left bank 40 ft downstream from County Trunk Z bridge, 0.9 mi downstream from Pemene Creek, 3.9 mi west of Nathan, MI, 10.6 mi southeast of Pembine, and at mile 64.3.

DRAINAGE AREA.--3,140 mi².

PERIOD OF RECORD.--October 1949 to current year. Published as "near Pembine" (04066000) prior to August 1982. Monthly discharges for some periods published in WSP 1307.

GAGE.--Water-stage recorder. Elevation of gage is 740 ft above sea level, from topographic map. October 1949 to Oct. 27, 1972, water-stage recorder at site 1.0 mi upstream at elevation 745, from river-profile map, and Oct. 28, 1972, to August 1982, water-stage recorder at site 1.5 mi upstream at elevation 770, from river-profile map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by powerplants and by Michigamme Reservoir, capacity, 119,950 acre-ft, and Peavy Pond, capacity, 33,860 acre-ft, on the Michigamme River, and by many smaller reservoirs upstream from station. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1790	4330	e2400	e2400	e2800	e2600	e2400	14800	3740	3030	3240	1840
2	1960	4650	e2400	e2400	e2700	e2600	e2300	13900	4010	3360	2950	1900
3	2610	4770	e2500	e2500	e2700	e2600	e2200	12500	5280	3550	2820	1900
4	2620	4890	e2600	e2500	e2600	e2700	e2200	11200	7160	3540	2420	1990
5	2600	4820	e2500	e2500	e2600	e2600	2300	11300	6990	3180	2470	1870
6	2560	4580	e2100	e2600	e2600	e2600	2290	11400	5680	2960	2730	1850
7	3580	4490	e2000	e2600	e2800	e2500	2240	12300	8500	2840	3170	2070
8	4640	4320	e2000	e2600	e2900	e2500	2180	12100	8920	2730	4330	1980
9	4810	3850	e2100	e2500	e2900	e2500	2260	12000	7150	2990	4190	1910
10	4870	3200	e2200	e2500	e2900	e2400	2340	11600	5740	3340	3300	2010
11	4520	3300	e2000	e2500	e2800	e2500	2810	11900	5380	2920	3130	1950
12	3560	2880	e2100	e2500	e2700	e2600	3730	10900	4580	3170	3180	2410
13	2970	2530	e2300	e2500	e2700	e2600	4070	10600	4810	3720	3100	2110
14	3030	2770	e2400	e2400	e2700	e2700	3960	9310	4840	4610	1890	2000
15	2800	2840	e2400	e2400	e2800	e2800	4250	7920	3440	4760	2780	1970
16	2500	2510	e2200	e2400	e2700	e2700	3970	6850	3300	3690	2700	1970
17	2560	2740	e2300	e2400	e2600	e2600	4630	6840	3720	3200	2710	2130
18	2570	2740	e2300	e2500	e2700	e2600	5240	6140	3940	3180	2450	1890
19	2490	2380	e2400	e2600	e2600	e2600	e7000	5650	4010	3730	2480	2220
20	2580	2380	e2400	e2800	e2700	e2600	e12000	6810	4100	4920	2360	1840
21	2990	2690	e2400	e2800	e2600	e2800	15200	10700	4020	4850	2410	1600
22	3490	2520	e2400	e2700	e2600	e2700	17000	12300	3940	4550	2390	1630
23	2770	e2300	e2400	e2700	e2600	e2600	19100	11800	3570	3780	2370	1610
24	4040	e2000	e2400	e2800	e2500	e2400	19400	9900	3780	3740	2450	1610
25	5560	e2200	e2400	e2800	e2600	e2600	19200	8680	3660	3800	2540	1560
26	5560	e2200	e2400	e2800	e2600	e2900	21400	6870	3680	3450	2570	1570
27	4790	e2100	e2500	e2700	e2600	e2700	22200	6700	3630	3130	2530	1890
28	4710	e2200	e2500	e2700	e2600	e2700	21200	5520	3360	2930	2390	1830
29	4640	e2300	e2500	e2800	e2600	e2600	18200	4550	3470	3090	2150	1620
30	4510	e2500	e2500	e2800	---	e2500	15500	4270	3380	3330	2010	1610
31	4330	---	e2400	e2800	---	e2500	---	4190	---	3360	1890	---
TOTAL	109010	93980	72400	80500	77800	80900	262770	291500	141780	109430	84100	56340
MEAN	3516	3133	2335	2597	2683	2610	8759	9403	4726	3530	2713	1878
MAX	5560	4890	2600	2800	2900	2900	22200	14800	8920	4920	4330	2410
MIN	1790	2000	2000	2400	2500	2400	2180	4190	3300	2730	1890	1560

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1950 - 1996, BY WATER YEAR (WY)

	MEAN	2519	2663	2325	2130	2083	2605	5601	4886	3433	2551	2113	2346
MAX	5659	5766	3939	3035	3810	7461	10000	12100	6118	6523	3505	5335	
(WY)	1986	1986	1986	1986	1984	1973	1967	1960	1953	1953	1952	1968	
MIN	1028	1043	1167	1080	1201	1461	1432	1341	1152	1201	1003	1009	
(WY)	1977	1977	1977	1977	1964	1964	1990	1987	1988	1988	1977	1976	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1950 - 1996

ANNUAL TOTAL	947810	1460510	
ANNUAL MEAN	2597	3990	
HIGHEST ANNUAL MEAN			2938
LOWEST ANNUAL MEAN			4318
HIGHEST DAILY MEAN	7560	May 17	26700
LOWEST DAILY MEAN	1300	Jun 23	1560
ANNUAL SEVEN-DAY MINIMUM	1440	Jun 23	1630
INSTANTANEOUS PEAK FLOW			22400
INSTANTANEOUS PEAK STAGE			15.85
10 PERCENT EXCEEDS	4300		6990
50 PERCENT EXCEEDS			2700
90 PERCENT EXCEEDS	1700		2100
			1460
			2938
			4318
			1778
			26700
		Apr 27	840
		Sep 25	914
		Sep 20	(a)26900
		Apr 27	(b)18.94
			4980
			2310
			1460

(a) Gage height, 13.90 ft, site and datum then in use.

(b) Backwater from ice.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04096015 GALIEN RIVER NEAR SAWYER, MI

LOCATION.--Lat 41°52'25", long 86°34'30", in SE1/4 sec.12, T.7 S., R.20 W., Berrien County, Hydrologic Unit 04050001, on right bank 10 ft downstream from bridge on Minnich Road, 1.3 mi southeast of Sawyer.

DRAINAGE AREA.--80.7 mi².

PERIOD OF RECORD.--July 1995 to September 1996.

GAGE.--Water-stage recorder. Elevation of gage is 610 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1994 TO SEPTEMBER 1995
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	---	---	42	30	25
2	---	---	---	---	---	---	---	---	---	37	29	25
3	---	---	---	---	---	---	---	---	---	35	115	24
4	---	---	---	---	---	---	---	---	---	36	131	24
5	---	---	---	---	---	---	---	---	---	42	160	23
6	---	---	---	---	---	---	---	---	---	37	91	23
7	---	---	---	---	---	---	---	---	---	34	63	25
8	---	---	---	---	---	---	---	---	---	36	52	30
9	---	---	---	---	---	---	---	---	---	33	50	28
10	---	---	---	---	---	---	---	---	---	32	54	26
11	---	---	---	---	---	---	---	---	---	30	47	25
12	---	---	---	---	---	---	---	---	---	29	42	24
13	---	---	---	---	---	---	---	---	---	28	38	24
14	---	---	---	---	---	---	---	---	---	27	35	23
15	---	---	---	---	---	---	---	---	---	28	53	23
16	---	---	---	---	---	---	---	---	---	169	82	23
17	---	---	---	---	---	---	---	---	---	91	61	22
18	---	---	---	---	---	---	---	---	---	55	51	22
19	---	---	---	---	---	---	---	---	---	46	46	22
20	---	---	---	---	---	---	---	---	---	39	40	23
21	---	---	---	---	---	---	---	---	---	42	37	24
22	---	---	---	---	---	---	---	---	---	49	34	27
23	---	---	---	---	---	---	---	---	---	100	32	25
24	---	---	---	---	---	---	---	---	---	71	30	24
25	---	---	---	---	---	---	---	---	---	73	30	24
26	---	---	---	---	---	---	---	---	---	50	28	23
27	---	---	---	---	---	---	---	---	---	42	27	23
28	---	---	---	---	---	---	---	---	---	40	27	23
29	---	---	---	---	---	---	---	---	---	36	28	26
30	---	---	---	---	---	---	---	---	---	33	27	23
31	---	---	---	---	---	---	---	---	---	31	26	---
TOTAL	---	---	---	---	---	---	---	---	---	1473	1596	726
MEAN	---	---	---	---	---	---	---	---	---	47.5	51.5	24.2
MAX	---	---	---	---	---	---	---	---	---	169	160	30
MIN	---	---	---	---	---	---	---	---	---	27	26	22
CFSM	---	---	---	---	---	---	---	---	---	.59	.64	.30
IN.	---	---	---	---	---	---	---	---	---	.68	.74	.33

STREAMS TRIBUTARY TO LAKE MICHIGAN

04096015 GALIEN RIVER NEAR SAWYER, MI--Continued

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	53	65	e42	e42	111	49	99	170	55	112	31
2	22	138	62	e41	e40	95	49	85	267	52	87	30
3	24	135	61	e40	e39	78	53	77	223	49	75	29
4	26	78	58	e39	e38	e70	48	75	163	47	69	29
5	25	60	58	e38	e36	e65	45	70	138	45	59	28
6	26	52	56	e37	e35	e62	44	67	205	44	53	28
7	28	49	53	e36	e45	e60	42	65	248	42	50	28
8	28	45	50	e35	e80	e58	41	62	171	41	92	28
9	29	42	47	e34	e110	e58	41	107	143	39	77	29
10	27	61	e49	e34	e90	e59	40	2640	575	38	58	29
11	27	637	e46	e33	e80	e60	39	1890	493	37	52	28
12	26	636	e45	e33	e70	87	45	921	322	36	49	32
13	25	282	e44	e33	e62	108	62	556	206	35	46	34
14	25	187	e60	e34	e58	110	51	392	164	35	44	38
15	26	159	e85	e35	e55	105	62	332	132	35	43	41
16	27	136	78	e36	e52	88	87	535	112	34	42	37
17	26	119	69	e60	e50	78	79	1230	104	33	40	34
18	26	120	64	256	e47	73	65	707	703	465	39	32
19	27	127	62	312	e50	68	95	426	553	851	38	31
20	35	108	58	184	e56	63	431	301	263	338	37	30
21	67	96	56	e140	70	58	293	481	187	190	36	30
22	58	87	e51	e80	69	55	333	334	149	142	35	34
23	40	82	e50	e72	71	54	379	236	120	110	68	32
24	32	75	e48	e66	72	54	201	219	106	90	45	32
25	30	72	e47	e60	64	57	144	239	96	154	40	32
26	29	69	e47	e56	65	52	128	189	85	96	37	33
27	53	69	e46	e52	225	49	106	182	77	76	35	54
28	68	69	e46	e50	370	50	92	201	69	68	34	54
29	63	67	e45	e47	161	50	103	585	63	202	33	46
30	48	65	e44	e45	---	48	116	391	58	263	32	41
31	49	---	e43	e43	---	48	---	221	---	184	31	---
TOTAL	1064	3975	1693	2103	2302	2131	3363	13915	6395	3926	1588	1014
MEAN	34.3	132	54.6	67.8	79.4	68.7	112	449	213	127	51.2	33.8
MAX	68	637	85	312	370	111	431	2640	703	851	112	54
MIN	22	42	43	33	35	48	39	62	58	33	31	28
CFSM	.43	1.64	.68	.84	.98	.85	1.39	5.56	2.64	1.57	.63	.42
IN.	.49	1.83	.78	.97	1.06	.98	1.55	6.41	2.95	1.81	.73	.47

SUMMARY STATISTICS

FOR 1996 WATER YEAR

WATER YEARS 1995 - 1996

ANNUAL TOTAL	43469			
ANNUAL MEAN	119			
HIGHEST DAILY MEAN	2640	May 10	2640	May 10 1996
LOWEST DAILY MEAN	22	(a)	22	(b)
ANNUAL SEVEN-DAY MINIMUM	25	Oct 1	23	Sep 14 1995
INSTANTANEOUS PEAK FLOW	3440	May 10	3440	May 10 1996
INSTANTANEOUS PEAK STAGE	14.13	May 10	14.13	May 10 1996
ANNUAL RUNOFF (CFSM)	1.47		1.47	
ANNUAL RUNOFF (INCHES)	20.04		20.00	
10 PERCENT EXCEEDS	250		202	
50 PERCENT EXCEEDS	58		51	
90 PERCENT EXCEEDS	32		27	

(a) Oct. 1, 2.

(b) Sept. 17-19, Oct. 1, 2, 1995.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04096405 ST. JOSEPH RIVER AT BURLINGTON, MI

LOCATION.--Lat 42°06'11", long 85°04'48", in SE1/4 SE1/4 sec.23, T.4 S., R.7 W., Calhoun County, Hydrologic Unit 04050001, on right bank 10 ft downstream from bridge on Elevenmile Road in Burlington, 4.1 mi upstream from Burnett Creek, 6.7 mi downstream from Tekonsha Creek, and at mile 161.

DRAINAGE AREA.--206 mi².

PERIOD OF RECORD.--October 1962 to current year. Published as "near Burlington" prior to October 1991.

GAGE.--Water-stage recorder. Elevation of gage is 905 ft above sea level, from topographic map. October 1962 to September 1990 water-stage recorder and October 1990 to September 1991 nonrecording gage at site 2.7 mi upstream at different datum (station 04096400).

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	81	188	e98	e145	250	183	351	198	185	66	38
2	27	93	182	e97	e145	e240	174	325	197	163	69	37
3	29	104	176	e96	e145	e230	169	310	189	151	64	36
4	34	117	169	e95	e140	e215	164	301	187	140	56	34
5	39	120	163	e94	e135	e205	153	293	188	132	52	33
6	56	112	157	e92	e125	e195	143	286	203	125	51	31
7	59	106	145	e90	e125	e185	140	274	215	117	44	30
8	63	100	153	e89	e135	e180	138	262	214	109	52	30
9	58	97	121	e89	e145	e175	136	256	244	102	54	33
10	55	108	e130	e90	e155	e176	134	300	293	95	52	33
11	52	169	e135	e91	e160	178	132	352	292	89	46	39
12	49	217	e140	e92	e160	174	139	356	295	84	44	39
13	44	230	e145	e92	e150	175	171	373	307	81	42	38
14	41	229	e150	e93	e140	182	188	421	294	81	39	40
15	40	217	159	e96	e130	193	201	521	275	84	40	42
16	40	202	157	e105	e128	196	217	616	251	82	38	44
17	39	191	e155	e120	e126	193	218	618	244	75	34	44
18	38	182	150	e140	e124	187	213	566	293	75	30	41
19	37	175	141	e165	e122	180	210	500	299	77	42	39
20	45	173	e135	e170	e120	174	243	441	293	72	50	37
21	56	178	e130	e175	e120	170	258	433	304	69	58	39
22	61	177	e128	e180	e120	169	304	402	325	67	63	50
23	63	173	125	e180	e135	165	390	366	347	66	85	53
24	58	166	124	e180	155	163	375	339	379	61	78	52
25	54	159	119	e180	161	167	368	316	395	62	63	50
26	50	161	e115	e178	170	177	375	292	378	62	56	49
27	66	167	e110	e175	217	186	376	272	335	58	51	55
28	77	185	e105	e170	274	193	369	255	278	55	47	55
29	88	189	e100	e160	271	200	364	239	238	57	45	63
30	86	189	e100	e145	---	196	365	224	209	65	42	66
31	83	---	e99	e140	---	190	---	211	---	70	39	---
TOTAL	1615	4767	4306	3957	4378	5859	7010	11071	8159	2811	1592	1270
MEAN	52.1	159	139	128	151	189	234	357	272	90.7	51.4	42.3
MAX	88	230	188	180	274	250	390	618	395	185	85	66
MIN	27	81	99	89	120	163	132	211	187	55	30	30
CFSM	.25	.77	.67	.62	.73	.92	1.13	1.73	1.32	.44	.25	.21
IN.	.29	.86	.78	.71	.79	1.06	1.27	2.00	1.47	.51	.29	.23

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1963 - 1996, BY WATER YEAR (WY)

	MEAN	102	140	181	182	201	307	226	190	115	86.4	84.0
MAX	357	378	308	508	428	668	567	426	640	308	270	237
(WY)	1987	1993	1983	1993	1968	1982	1982	1983	1989	1968	1981	1981
MIN	16.4	26.3	26.7	34.6	36.0	74.0	140	96.4	48.9	23.8	16.2	14.5
(WY)	1964	1965	1964	1977	1963	1964	1964	1971	1964	1988	1964	1963

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1963 - 1996

ANNUAL TOTAL	45309	56795	177
ANNUAL MEAN	124	155	270
HIGHEST ANNUAL MEAN			1993
LOWEST ANNUAL MEAN			1964
HIGHEST DAILY MEAN	300	618	1330
LOWEST DAILY MEAN	27	27	8.0
ANNUAL SEVEN-DAY MINIMUM	31	32	9.4
INSTANTANEOUS PEAK FLOW		630	(a)1390
INSTANTANEOUS PEAK STAGE		5.72	(b)6.21
INSTANTANEOUS LOW FLOW			8.0
ANNUAL RUNOFF (CFSM)	.60	.75	.86
ANNUAL RUNOFF (INCHES)	8.18	10.26	11.65
10 PERCENT EXCEEDS	201	300	348
50 PERCENT EXCEEDS	129	140	144
90 PERCENT EXCEEDS	43	42	45

(a) Gage height 5.82 ft, site and datum then in use.

(b) Present site and datum.

(c) Aug. 9, 10, 11, 1964.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04096515 SOUTH BRANCH HOG CREEK NEAR ALLEN, MI

LOCATION.--Lat 41°56'55", long 84°49'40", in NE1/4 SE1/4 sec.13, T.6 S., R.5 W., Branch County, Hydrologic Unit 04050001, on left bank 12 ft downstream from bridge on U.S. Highway 12, 1.0 mi downstream from Little Hog Creek, and 3.1 mi west of Allen.

DRAINAGE AREA.--48.7 mi².

PERIOD OF RECORD.--October 1969 to current year. Prior to October 1987, published as Hog Creek near Allen.

GAGE.--Water-stage recorder. Elevation of gage is 1,010 ft above sea level, from topographic map. Prior to May 23, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges and those for October and November, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.0	25	45	e24	e35	95	54	95	44	63	23	6.3
2	3.0	34	42	e24	e35	73	50	94	45	55	20	6.1
3	4.5	44	40	e23	e34	e60	47	90	53	48	18	6.0
4	8.5	50	37	e23	e33	e50	46	85	56	42	16	5.9
5	9.4	50	35	e23	e32	e45	43	78	51	38	15	5.6
6	19	44	e33	e22	e31	e43	39	72	51	34	14	5.3
7	17	36	e31	e22	e31	e40	37	66	62	31	13	5.4
8	15	30	e30	e22	e32	e37	35	62	63	29	13	5.6
9	13	24	e30	e22	e35	e35	33	69	69	28	12	6.7
10	12	21	e31	e22	e38	e32	32	164	88	26	12	6.8
11	12	43	e31	e23	e39	30	31	248	95	24	11	6.3
12	9.6	58	e32	e23	e38	32	35	248	93	23	10	7.3
13	9.7	64	33	e24	e36	36	63	210	95	21	9.9	6.9
14	8.5	62	41	e24	e34	40	77	173	93	21	9.4	6.4
15	9.9	57	50	e25	e32	45	82	147	86	22	9.2	7.2
16	9.8	52	51	e27	e31	45	85	132	77	22	8.8	6.6
17	9.2	47	45	e30	e31	42	83	121	72	21	8.5	6.3
18	8.9	45	42	e60	e31	41	78	118	122	21	8.1	5.6
19	8.6	44	38	e58	e30	41	74	122	341	21	8.4	5.1
20	13	45	e35	e56	e30	43	82	116	456	19	9.7	4.7
21	16	48	e33	e52	e30	47	95	116	402	18	13	5.0
22	17	49	e32	e50	30	49	110	111	316	17	11	8.6
23	17	48	e31	e48	30	47	132	101	243	17	11	9.1
24	17	45	e30	e45	35	52	141	91	195	16	10	8.0
25	16	41	e29	e44	36	71	129	84	159	16	9.1	7.1
26	14	40	e28	e43	39	80	118	76	130	15	8.6	7.5
27	21	41	e27	e41	70	78	106	70	109	14	8.1	11
28	31	50	e26	e39	105	71	95	66	94	14	7.6	16
29	29	49	e25	e38	107	66	88	61	82	15	7.2	13
30	24	45	e25	e36	---	62	92	55	72	18	6.7	11
31	24	---	e24	e35	---	58	---	49	---	19	6.4	---
TOTAL	429.6	1331	1062	1048	1150	1586	2212	3390	3914	788	347.7	218.4
MEAN	13.9	44.4	34.3	33.8	39.7	51.2	73.7	109	130	25.4	11.2	7.28
MAX	31	64	51	60	107	95	141	248	456	63	23	16
MIN	3.0	21	24	22	30	30	31	49	44	14	6.4	4.7
CFSM	.28	.91	.70	.69	.81	1.05	1.51	2.25	2.68	.52	.23	.15
IN.	.33	1.02	.81	.80	.88	1.21	1.69	2.59	2.99	.60	.27	.17

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1970 - 1996, BY WATER YEAR (WY)

	MEAN	21.5	34.1	44.3	45.5	51.4	86.5	81.2	54.2	48.5	22.4	17.2	16.3
MAX	75.0	110	80.2	159	112	220	163	114	159	62.4	67.9	60.3	
(WY)	1987	1993	1991	1993	1976	1982	1978	1983	1989	1981	1981	1981	
MIN	5.97	6.20	8.77	7.11	13.5	47.3	34.3	20.1	4.18	1.55	1.86	3.08	
(WY)	1972	1972	1977	1977	1972	1983	1971	1971	1988	1988	1988	1991	

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1970 - 1996
ANNUAL TOTAL	11947.7	17476.7	
ANNUAL MEAN	32.7	47.8	43.5
HIGHEST ANNUAL MEAN			67.4
LOWEST ANNUAL MEAN			23.8
HIGHEST DAILY MEAN	97	Mar 8	629
LOWEST DAILY MEAN	3.0	Oct 1	.58
ANNUAL SEVEN-DAY MINIMUM	3.7	Sep 26	.84
INSTANTANEOUS PEAK FLOW		465	(b)664
INSTANTANEOUS PEAK STAGE		5.50	6.20
INSTANTANEOUS LOW FLOW			.48
ANNUAL RUNOFF (CFSM)	.67	.98	.89
ANNUAL RUNOFF (INCHES)	9.13	13.35	12.14
10 PERCENT EXCEEDS	64	95	93
50 PERCENT EXCEEDS	29	35	30
90 PERCENT EXCEEDS	8.2	8.5	7.0

(a) Oct. 1, 2.

(b) Gage height 6.0 ft, from floodmark.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04096900 NOTTAWA CREEK NEAR ATHENS, MI

LOCATION.--Lat 42°03'20", long 85°18'30", in NW1/4 sec.12, T.5 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on Shorts Road, 4.2 mi southwest of Athens, and 5.0 mi downstream from Pine Creek.

DRAINAGE AREA.--162 mi².

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 850 ft above sea level, from topographic map.

REMARKS.--Records fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	77	125	184	e91	e115	275	115	213	117	147	78	65
2	74	145	175	e88	e110	229	114	205	123	140	77	63
3	75	164	167	e86	e105	206	114	186	132	136	74	63
4	78	168	160	e84	e105	181	112	170	130	129	71	62
5	80	156	153	e81	e110	161	111	159	125	125	67	59
6	83	141	147	e79	e115	151	108	152	140	122	61	58
7	88	131	135	e77	123	e145	104	147	184	120	61	56
8	92	125	129	e75	137	e145	95	143	192	116	62	54
9	93	121	e125	e74	154	e140	94	144	194	111	62	53
10	89	126	108	e74	159	e130	96	180	238	107	60	49
11	84	218	133	e75	162	121	97	248	267	104	57	49
12	80	329	144	e76	149	128	102	268	259	101	57	50
13	78	383	147	e77	133	147	131	247	239	98	55	50
14	76	369	148	e79	122	162	153	211	201	95	54	50
15	77	330	153	e82	114	173	151	189	174	97	65	52
16	77	287	160	e88	107	175	165	186	157	94	74	51
17	74	245	157	102	105	165	175	188	162	88	75	50
18	72	214	145	155	e104	154	164	179	264	86	73	47
19	73	200	135	235	103	149	151	167	340	86	75	45
20	81	196	e125	274	103	142	161	154	339	84	86	44
21	99	200	121	267	116	134	210	161	311	81	96	50
22	114	199	117	250	129	130	251	179	275	79	98	62
23	116	192	115	192	129	124	311	172	244	75	113	65
24	108	181	114	178	140	121	333	158	222	72	108	64
25	98	168	114	e165	149	125	305	152	211	72	103	56
26	90	159	111	e150	159	129	265	145	194	73	97	53
27	104	158	e105	e140	214	118	231	141	182	69	88	62
28	128	176	e100	e135	289	117	200	140	170	66	81	70
29	139	199	e98	e130	302	117	184	136	160	69	76	68
30	132	194	e96	e125	---	116	194	128	154	76	72	60
31	126	---	e94	e120	---	115	---	121	---	78	68	---
TOTAL	2855	5999	4115	3904	4062	4625	4997	5369	6100	2996	2344	1680
MEAN	92.1	200	133	126	140	149	167	173	203	96.6	75.6	56.0
MAX	139	383	184	274	302	275	333	268	340	147	113	70
MIN	72	121	94	74	103	115	94	121	117	66	54	44
CFSM	.57	1.23	.82	.78	.86	.92	1.03	1.07	1.26	.60	.47	.35
IN.	.66	1.38	.94	.90	.93	1.06	1.15	1.23	1.40	.69	.54	.39

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1996, BY WATER YEAR (WY)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEAN	101	135	158	153	169	246	240	179	164	110	92.0	84.1																		
MAX	344	290	273	366	302	475	385	332	625	279	239	163																		
(WY)	1987	1989	1991	1993	1985	1982	1985	1983	1989	1986	1995	1980																		
MIN	41.9	43.9	56.7	49.3	71.3	135	119	91.1	55.9	41.7	37.5	35.0																		
(WY)	1967	1972	1977	1977	1977	1970	1971	1971	1977	1977	1977	1976																		

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1967 - 1996
ANNUAL TOTAL	55826	49046	
ANNUAL MEAN	153	134	152
HIGHEST ANNUAL MEAN			211
LOWEST ANNUAL MEAN			80.0
HIGHEST DAILY MEAN	589	Aug 20	2170
LOWEST DAILY MEAN	65	Jul 14	21
ANNUAL SEVEN-DAY MINIMUM	71	Jul 10	23
INSTANTANEOUS PEAK FLOW			2190
INSTANTANEOUS PEAK STAGE			7.85
INSTANTANEOUS LOW FLOW			21
ANNUAL RUNOFF (CFSM)	.94	.83	.94
ANNUAL RUNOFF (INCHES)	12.82	11.26	12.78
10 PERCENT EXCEEDS	225	214	279
50 PERCENT EXCEEDS	135	124	122
90 PERCENT EXCEEDS	86	65	59

(a) July 28, 29, 30, Aug. 4, 6, 1977, Aug. 4, 1988.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04097500 ST. JOSEPH RIVER AT THREE RIVERS, MI

LOCATION.--Lat 41°56'25", long 85°37'58", in SW1/4 SE1/4 sec.18, T.6 S., R.11 W., St. Joseph County, Hydrologic Unit 04050001, on right bank in Scidmore Park at Three Rivers, 250 ft downstream from Rocky River, and at mile 112.

DRAINAGE AREA.--1,350 mi².

PERIOD OF RECORD.--May 1953 to September 1983, October 1992 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 781.34 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. Flow regulated by powerplant upstream from station. Several measurements of water temperature were made during the year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1918, 8,260 ft³/s, Apr. 27, 1950.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	381	820	1440	1130	1160	1790	1110	1860	1460	1560	488	567
2	492	860	1440	902	1060	1790	1140	2060	1460	1450	705	214
3	492	875	1410	772	1070	1690	1090	2010	1330	1350	456	518
4	499	798	1330	800	1060	1600	1060	1960	1200	1260	461	406
5	514	1010	1290	834	1000	1600	914	1870	1210	1200	473	403
6	608	917	1280	782	1020	1470	934	1650	1370	1070	537	406
7	401	938	1210	764	863	1450	1050	1640	1430	777	470	415
8	473	908	1210	788	964	1400	929	1620	1470	804	484	427
9	657	908	1180	777	1100	1320	884	1570	1570	947	399	419
10	483	908	992	765	1150	1280	885	1840	1790	755	386	390
11	488	1300	674	772	1120	1240	864	2140	2080	557	220	266
12	505	1570	918	808	1150	1230	913	2310	2160	727	463	481
13	515	1950	954	798	1050	1270	1190	2520	2150	579	405	573
14	512	2000	1180	769	1130	1290	1140	2690	2120	627	304	297
15	510	2020	1300	791	871	1360	1160	2770	2030	660	325	293
16	498	1980	1290	807	991	1380	1260	2640	1790	523	402	609
17	473	1810	1270	920	788	1350	1360	2710	1770	732	226	429
18	547	1680	1190	1070	983	1300	1380	2580	2410	651	369	446
19	491	1660	1220	1220	878	1300	1390	2490	2620	701	468	451
20	691	1480	1190	1270	888	1240	1460	2410	2610	458	466	358
21	555	1550	1030	1320	929	1220	1570	2360	2510	443	414	543
22	545	1560	1060	1270	940	1190	1860	2250	2570	445	499	486
23	641	1540	970	1460	958	1190	2130	2190	2460	440	721	447
24	679	1460	1000	1440	996	1180	2550	2210	2430	425	487	529
25	709	1450	1090	1310	1080	1150	2780	2040	2530	455	562	594
26	615	1460	962	1360	1170	1160	2660	1940	2490	444	770	550
27	843	1390	919	1330	1300	1150	2550	1880	2070	432	567	728
28	765	1350	858	1200	1470	1140	2430	1670	1960	380	397	477
29	772	1440	1020	1220	1750	1140	2340	1600	1880	588	500	529
30	793	1430	813	1050	---	1130	2200	1610	1680	561	572	633
31	873	---	873	965	---	1110	---	1530	---	563	266	---
TOTAL	18020	41022	34563	31464	30889	41110	45183	64620	58610	22564	14262	13884
MEAN	581	1367	1115	1015	1065	1326	1506	2085	1954	728	460	463
MAX	873	2020	1440	1460	1750	1790	2780	2770	2620	1560	770	728
MIN	381	798	674	764	788	1110	864	1530	1200	380	220	214
CFSM	.43	1.01	.83	.75	.79	.98	1.12	1.54	1.45	.54	.34	.34
IN.	.50	1.13	.95	.87	.85	1.13	1.25	1.78	1.62	.62	.39	.38

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 1996, BY WATER YEAR (WY)

	MEAN	731	928	1119	1180	1290	1942	2025	1607	1171	802	650	619
MAX	1865	2582	2053	3493	2716	3969	3320	2870	2587	1780	1639	1628	
(WY)	1994	1993	1983	1993	1968	1982	1982	1983	1980	1978	1981	1980	
MIN	218	293	288	328	328	488	793	650	286	243	187	199	
(WY)	1964	1965	1964	1963	1963	1964	1964	1964	1964	1964	1964	1964	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1953 - 1996

ANNUAL TOTAL	399466	416191	
ANNUAL MEAN	1094	1137	1176
HIGHEST ANNUAL MEAN			1850
LOWEST ANNUAL MEAN			365
HIGHEST DAILY MEAN	2030	Mar 13	2780
LOWEST DAILY MEAN	381	Oct 1	214
ANNUAL SEVEN-DAY MINIMUM	484	Oct 1	335
INSTANTANEOUS PEAK FLOW			3270
INSTANTANEOUS PEAK STAGE			6.64
INSTANTANEOUS LOW FLOW			204
ANNUAL RUNOFF (CFSM)	.81		.84
ANNUAL RUNOFF (INCHES)	11.01		11.47
10 PERCENT EXCEEDS	1630		2060
50 PERCENT EXCEEDS	1130		1060
90 PERCENT EXCEEDS	544		450

STREAMS TRIBUTARY TO LAKE MICHIGAN

04097540 PRAIRIE RIVER NEAR NOTTAWA, MI

LOCATION.--Lat 41°53'18", long 85°24'34", in NW1/4 SW1/4 sec.6, T.7 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on left bank 10 ft upstream from bridge on State Highway 66, 3.0 mi upstream from unnamed tributary, and 3.0 mi southeast of Nottawa.

DRAINAGE AREA.--106 mi².

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

GAGE.--Water-stage recorder. Elevation of gage is 850 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Since 1987, some diversion by pumping for sprinkler irrigation. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47	63	111	e70	e82	146	94	163	117	147	73	32
2	46	71	109	e68	e78	133	90	160	119	139	71	30
3	49	78	107	e66	e76	121	86	156	119	137	67	30
4	51	83	105	e65	e74	111	85	156	117	126	63	31
5	52	84	103	e65	e74	112	84	147	115	117	59	30
6	54	82	101	e64	e74	115	83	140	118	109	55	29
7	55	79	98	e64	e75	112	82	133	125	103	51	31
8	54	76	96	e63	76	107	84	128	131	95	47	32
9	52	72	e93	e62	82	101	81	138	134	92	45	33
10	50	73	e90	e61	91	98	78	198	152	88	42	33
11	48	116	88	e60	91	95	77	242	181	83	42	34
12	46	152	92	e60	89	95	83	284	199	78	41	40
13	45	163	92	e60	85	97	111	267	193	74	39	43
14	45	157	96	e61	81	99	123	234	181	71	38	45
15	45	148	100	e62	79	100	126	213	165	71	38	47
16	45	139	101	e64	76	100	128	200	150	72	38	47
17	44	133	99	e68	74	98	128	192	144	72	37	46
18	43	129	97	e84	e73	95	124	189	174	72	36	46
19	42	126	95	e95	72	93	119	192	240	71	41	46
20	47	124	93	e100	72	93	127	186	370	69	46	44
21	51	124	91	e101	73	93	147	186	471	68	52	48
22	51	125	89	e103	73	92	175	177	453	66	57	56
23	50	122	88	104	74	92	201	169	373	64	58	56
24	49	120	87	106	75	92	225	161	317	61	55	53
25	47	117	86	104	76	93	223	155	271	58	52	51
26	45	114	e84	100	78	94	205	147	234	57	48	52
27	53	114	e80	98	98	93	188	142	209	54	45	58
28	59	116	e78	93	133	92	172	145	186	52	41	58
29	60	114	e75	92	155	91	165	136	170	56	38	56
30	59	112	e74	e86	---	90	163	128	158	67	36	54
31	61	---	e72	e84	---	92	---	122	---	73	33	---
TOTAL	1545	3326	2870	2433	2409	3135	3857	5386	6086	2562	1484	1291
MEAN	49.8	111	92.6	78.5	83.1	101	129	174	203	82.6	47.9	43.0
MAX	61	163	111	106	155	146	225	284	471	147	73	58
MIN	42	63	72	60	72	90	77	122	115	52	33	29
CFSM	.47	1.05	.87	.74	.78	.95	1.21	1.64	1.91	.78	.45	.41
IN.	.54	1.17	1.01	.85	.85	1.10	1.35	1.89	2.14	.90	.52	.45

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1963 - 1996, BY WATER YEAR (WY)

	MEAN	63.1	83.7	107	106	112	151	156	120	99.4	65.2	53.3	52.7
MAX	150	222	177	258	218	336	259	226	254	144	148	120	120
(WY)	1987	1993	1983	1993	1968	1982	1978	1983	1989	1986	1981	1980	1980
MIN	17.2	22.9	25.2	29.7	29.1	47.2	75.6	58.7	32.9	13.3	15.8	14.1	14.1
(WY)	1965	1965	1964	1963	1963	1964	1964	1963	1964	1988	1964	1964	1964

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1963 - 1996

ANNUAL TOTAL	31556	36384	97.4	1993
ANNUAL MEAN	86.5	99.4	153	1964
HIGHEST ANNUAL MEAN			33.5	1964
LOWEST ANNUAL MEAN			782	Feb 26 1985
HIGHEST DAILY MEAN	175	Mar 10	5.7	Aug 5 1988
LOWEST DAILY MEAN	32	Aug 2	7.9	Jul 31 1988
ANNUAL SEVEN-DAY MINIMUM	36	Jul 19	797	Feb 26 1985
INSTANTANEOUS PEAK FLOW			5.39	Feb 26 1985
INSTANTANEOUS PEAK STAGE			28	(a)
INSTANTANEOUS LOW FLOW			.94	
ANNUAL RUNOFF (CFSM)	.82		12.77	
ANNUAL RUNOFF (INCHES)	11.07		174	
10 PERCENT EXCEEDS	132		84	
50 PERCENT EXCEEDS	84		45	
90 PERCENT EXCEEDS	47			

(a) Aug. 4, 5, 1988.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04099000 ST. JOSEPH RIVER AT MOTTVILLE, MI

LOCATION.--Lat 41°48'03", long 85°45'22", in SW1/4 sec.6, T.8 S., R.12 W., St. Joseph County, Hydrologic Unit 04050001, on right bank 575 ft upstream from bridge on U.S. Highway 12 in Mottville, 0.4 mi downstream from Indiana Michigan Power Co. hydroelectric plant, 4 mi upstream from Pigeon River, and at mile 96.

DRAINAGE AREA.--1,866 mi².

PERIOD OF RECORD.--October 1923 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1930, 1932, 1938, 1940-42, 1945. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.3 ft above sea level (Indiana Michigan Power Co. bench mark). Prior to Oct. 1, 1951, at site 0.4 mi upstream at datum 4.2 ft higher.

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by powerplants upstream from station. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	703	1280	1890	1470	1480	2320	1450	2570	2100	2320	886	820
2	729	1380	1810	1310	1310	2340	1510	2710	2160	2210	1090	448
3	828	1330	1810	1070	1470	2250	1490	2660	1950	2040	853	768
4	784	1230	1730	1080	e1400	2110	1440	2610	1860	1880	819	645
5	817	1520	1650	1160	e1350	2170	1290	2510	1800	1790	810	620
6	901	1310	1640	1130	e1300	2050	1300	2340	2050	1690	882	641
7	723	1490	1550	1120	e1200	1920	1400	2170	2120	1400	768	681
8	743	1420	1530	1090	e1350	1860	1330	2220	2150	1220	770	641
9	943	1340	1450	1130	e1500	1800	1190	2140	2260	1450	645	708
10	780	1370	1310	1100	e1550	1740	1250	2540	2570	1020	672	685
11	809	1960	785	1110	e1500	1670	1220	2900	2740	904	461	504
12	802	2040	1300	1120	e1450	1700	1310	3060	2930	1000	681	757
13	813	2380	1310	1120	e1400	1730	1580	3240	2900	965	654	785
14	799	2570	1550	1110	e1500	1750	1540	3440	2900	976	581	638
15	835	2490	1720	1150	e1250	1820	1580	3610	2820	1010	550	525
16	829	2630	1710	1140	e1300	1880	1680	3630	2640	830	618	895
17	776	2480	1690	1300	e1100	1810	1770	3640	2470	1110	497	698
18	843	2270	1580	1490	e1300	1760	1800	3550	3060	1100	586	738
19	832	2230	1640	1670	e1250	1760	1870	3370	3450	1110	715	729
20	1120	2040	1500	1610	e1300	1660	1910	3330	3510	845	671	530
21	957	2070	1430	1690	1320	1600	2010	3290	3410	813	766	801
22	950	2060	1390	1740	1340	1580	2370	3180	3450	815	693	776
23	1050	2060	1380	1850	1340	1570	2710	2990	3470	785	1090	768
24	1010	1900	1340	2010	1390	1560	2970	3070	3420	762	888	805
25	1120	1880	1460	1740	1450	1530	3440	2940	3650	799	900	862
26	993	1930	1350	1790	1550	1540	3380	2770	3520	763	1120	868
27	1290	1940	1240	1770	1810	1520	3260	2730	3250	724	914	1010
28	1200	1800	1210	1730	1980	1520	3170	2590	2770	737	730	919
29	1220	1910	1320	1610	2230	1530	3080	2370	2710	848	822	878
30	1180	1820	1190	1510	---	1520	2980	2360	2520	1110	847	975
31	1320	---	1220	1110	---	1520	---	2290	---	977	532	---
TOTAL	28699	56130	45685	43030	41670	55090	59280	88820	82610	36003	23511	22118
MEAN	926	1871	1474	1388	1437	1777	1976	2865	2754	1161	758	737
MAX	1320	2630	1890	2010	2230	2340	3440	3640	3650	2320	1120	1010
MIN	703	1230	785	1070	1100	1520	1190	2140	1800	724	461	448
CFSM	.50	1.00	.79	.74	.77	.95	1.06	1.54	1.48	.62	.41	.40
IN.	.57	1.12	.91	.86	.83	1.10	1.18	1.77	1.65	.72	.47	.44

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1924 - 1996, BY WATER YEAR (WY)

	MEAN	1104	1342	1569	1729	1850	2547	2676	2127	1679	1171	953	949
MAX	3290	3378	4065	4589	3451	5335	7646	5009	5004	2953	2413	2286	
(WY)	1987	1993	1928	1993	1968	1982	1950	1943	1989	1937	1981	1980	
MIN	372	483	507	531	505	751	904	786	509	407	335	357	
(WY)	1964	1965	1964	1963	1963	1964	1931	1931	1964	1988	1964	1964	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1924 - 1996

ANNUAL TOTAL	554002		582646										
ANNUAL MEAN	1518		1592								(a)1642		
HIGHEST ANNUAL MEAN											2856		1950
LOWEST ANNUAL MEAN											580		1964
HIGHEST DAILY MEAN	2630						3650		Jun 25	10700		Jun 4	1989
LOWEST DAILY MEAN	703						448		Sep 2	39		Oct 19	1963
ANNUAL SEVEN-DAY MINIMUM	784						577		Aug 11	278		Aug 1	1964
INSTANTANEOUS PEAK FLOW							4190		Jun 24	(b)11400		Jun 4	1989
INSTANTANEOUS PEAK STAGE							5.90		Jun 24	(c)10.76		Apr 27	1950
ANNUAL RUNOFF (CFSM)	.81						.85			.88			
ANNUAL RUNOFF (INCHES)	11.04						11.62			11.96			
10 PERCENT EXCEEDS	2120						2780			3000			
50 PERCENT EXCEEDS	1530						1450			1390			
90 PERCENT EXCEEDS	878						753			632			

(a) Does not include water year 1924.

(b) Gage height 10.41 ft.

(c) Present datum.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04099750 PIGEON RIVER NEAR SCOTT, IN

LOCATION.--Lat 41°44'56", long 85°34'35", in SE1/4 NW1/4 sec.14, T.38 N., R.8 E., Lagrange County, Hydrologic Unit 04050001, on right bank 20 ft downstream from bridge on County Road 750 North, 1,200 ft downstream from Page Ditch, 0.7 mi south of Indiana-Michigan State line, and 1.2 mi northwest of Scott, IN.

DRAINAGE AREA.--361 mi², of which 53.9 mi² does not contribute directly to surface runoff.

PERIOD OF RECORD.--June 1968 to current year.

REVISED RECORDS.--WSP 2111: Drainage area. WDR IN-92-1: 1991.

GAGE.--Water-stage recorder. Datum of gage is 815.00 ft above sea level.

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

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	136	188	284	200	e380	402	291	644	718	697	289	251
2	128	220	275	196	e370	432	283	579	693	623	289	211
3	125	311	269	e190	e365	414	277	543	672	551	282	218
4	139	313	251	e185	e358	435	276	525	592	482	269	213
5	146	345	252	e180	e343	398	267	483	565	445	254	199
6	158	391	252	e178	e340	385	259	479	575	417	232	190
7	162	409	243	e175	504	382	254	445	608	392	218	192
8	162	412	e230	e172	487	377	247	429	570	366	221	191
9	159	398	e228	e170	497	333	241	435	567	325	216	190
10	153	369	e226	e168	455	307	236	811	756	315	206	184
11	149	456	e221	e167	421	284	218	1250	864	302	199	189
12	146	514	e219	e166	395	267	230	1180	817	289	192	200
13	145	477	e215	e166	375	262	247	974	787	281	174	191
14	142	450	413	e165	e350	255	242	899	800	293	167	188
15	141	442	370	200	e320	275	248	880	773	302	189	188
16	142	437	324	216	e290	270	269	876	732	299	189	187
17	139	422	282	214	e260	262	272	1030	686	284	181	183
18	136	407	260	273	e230	257	264	1370	873	302	178	175
19	135	394	236	367	e210	256	270	1410	1560	318	183	170
20	142	379	e215	426	263	262	349	1410	1670	296	209	168
21	170	351	e210	444	211	268	385	1490	1460	276	438	183
22	165	349	e202	414	207	265	471	1520	1410	267	623	219
23	160	343	e200	391	206	262	673	1510	1380	252	481	203
24	157	335	e200	399	207	262	716	1470	1360	249	479	189
25	149	325	e199	388	209	272	722	1400	1310	278	482	185
26	147	318	e198	366	213	275	732	1290	1230	262	460	188
27	170	312	e198	362	286	279	745	1180	1120	234	421	203
28	199	327	e198	401	367	311	717	1080	1000	227	372	204
29	191	261	e198	410	380	311	710	988	877	270	325	197
30	195	279	e198	396	---	308	690	895	762	345	273	189
31	186	---	e197	e390	---	300	---	792	---	321	262	---
TOTAL	4774	10934	7463	8535	9499	9628	11801	30267	27787	10560	8953	5838
MEAN	154	364	241	275	328	311	393	976	926	341	289	195
MAX	199	514	413	444	504	435	745	1520	1670	697	623	251
MIN	125	188	197	165	206	255	218	429	565	227	167	168
CFSM	.43	1.01	.67	.76	.91	.86	1.09	2.70	2.57	.94	.80	.54
IN.	.49	1.13	.77	.88	.98	.99	1.22	3.12	2.86	1.09	.92	.60

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1968 - 1996, BY WATER YEAR (WY)

	MEAN	224	306	372	393	425	591	596	461	389	267	216	203
MAX	575	684	719	1169	836	1389	1089	976	1103	654	516	538	
(WY)	1987	1993	1983	1993	1969	1982	1978	1996	1981	1981	1981	1981	1981
MIN	96.3	96.7	157	173	143	311	324	233	132	104	92.5	85.8	
(WY)	1972	1972	1972	1977	1972	1996	1971	1971	1988	1988	1988	1971	

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR			FOR 1996 WATER YEAR			WATER YEARS 1968 - 1996		
ANNUAL TOTAL	104137			146039					
ANNUAL MEAN	285			399			368		
HIGHEST ANNUAL MEAN							545		
LOWEST ANNUAL MEAN							207		
HIGHEST DAILY MEAN	698			Apr 14			1670		
LOWEST DAILY MEAN	125			Oct 3			42		
ANNUAL SEVEN-DAY MINIMUM	136			Sep 28			140		
INSTANTANEOUS PEAK FLOW							1780		
INSTANTANEOUS PEAK STAGE							6.91		
ANNUAL RUNOFF (CFSM)	.79						1.11		
ANNUAL RUNOFF (INCHES)	10.73						15.05		
10 PERCENT EXCEEDS	450						794		
50 PERCENT EXCEEDS	261						282		
90 PERCENT EXCEEDS	156						171		

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04100222 NORTH BRANCH ELKHART RIVER AT COSPERVILLE, IN

LOCATION.--Lat 41°28'54", long 85°28'32", in NE1/4 NW1/4 sec.22, T.35 N., R.9 E., Noble County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on County Road 900 North at Cosperville, IN, 1,300 ft downstream from Boyd Ditch, 1.7 mi upstream from Hustin Ditch, and 3.1 mi downstream from Waldron Lake.

DRAINAGE AREA.--142 mi².

PERIOD OF RECORD.--October 1971 to current year.

GAGE.--Water-stage recorder. Datum of gage is 880.12 ft above sea level (levels by Indiana Department of Natural Resources).

REMARKS.--Records good except for estimated daily discharges, which are poor. Flow regulated at times by dam at Waldron Lake.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	49	84	e41	e122	152	113	326	332	321	74	72
2	12	85	83	e39	e118	147	110	311	318	276	72	66
3	18	140	79	e36	e110	139	107	293	299	247	68	59
4	25	157	77	e36	e103	139	106	275	278	226	64	53
5	25	151	73	e38	e99	139	103	260	259	207	60	48
6	30	138	69	e39	e92	141	100	246	244	190	56	44
7	28	126	67	e40	e86	138	96	230	245	175	52	44
8	26	116	e64	e43	95	134	93	217	238	163	49	46
9	24	113	e61	e46	102	125	90	213	241	151	45	43
10	21	108	e59	e47	104	120	86	242	359	141	41	39
11	19	131	e57	e47	104	114	84	266	403	130	39	36
12	18	158	e55	e48	102	110	81	268	413	119	37	35
13	17	163	e54	e48	99	108	80	264	410	109	34	31
14	15	158	61	e46	e92	106	80	258	423	101	32	26
15	13	150	59	e45	e88	106	80	265	411	96	41	25
16	14	142	60	45	e86	105	79	294	391	93	42	25
17	14	138	59	62	e83	102	81	412	374	89	42	23
18	20	132	59	90	e80	99	80	477	466	95	41	20
19	76	129	58	126	e78	98	84	499	535	99	40	18
20	64	126	55	159	e76	104	140	504	568	98	44	17
21	56	122	e53	144	e76	103	179	509	575	96	98	22
22	47	120	e52	143	e75	101	252	501	568	92	113	34
23	41	116	e50	142	e74	102	318	488	556	86	114	34
24	36	111	e48	152	75	105	345	473	545	82	114	31
25	33	106	e47	156	77	111	358	452	525	80	111	27
26	32	103	e45	155	80	117	366	429	500	76	107	27
27	38	99	e44	156	111	120	364	421	470	72	101	30
28	41	95	e43	165	142	118	356	421	439	64	94	31
29	42	94	e42	147	152	116	350	409	407	44	87	29
30	42	90	e41	148	---	116	338	390	371	61	81	28
31	45	---	e41	e130	---	114	---	363	---	71	76	---
TOTAL	946	3666	1799	2759	2781	3649	5099	10976	12163	3950	2069	1063
MEAN	30.5	122	58.0	89.0	95.9	118	170	354	405	127	66.7	35.4
MAX	76	163	84	165	152	152	366	509	575	321	114	72
MIN	12	49	41	36	74	98	79	213	238	44	32	17
CFSM	.21	.86	.41	.63	.68	.83	1.20	2.49	2.86	.90	.47	.25
IN.	.25	.96	.47	.72	.73	.96	1.34	2.88	3.19	1.03	.54	.28

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1972 - 1996, BY WATER YEAR (WY)

	MEAN	84.2	122	145	157	152	254	244	174	148	87.4	60.8	64.2
MAX	272	314	341	542	272	553	530	354	405	211	130	161	
(WY)	1987	1973	1986	1993	1990	1985	1985	1996	1996	1981	1981	1972	
MIN	17.8	17.8	46.5	42.2	43.2	118	133	67.2	18.1	16.4	18.3	13.9	
(WY)	1975	1972	1972	1977	1972	1996	1987	1988	1988	1988	1978	1994	

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1972 - 1996
ANNUAL TOTAL	40033	50920	141
ANNUAL MEAN	110	139	222
HIGHEST ANNUAL MEAN			85.7
LOWEST ANNUAL MEAN			1993
HIGHEST DAILY MEAN	320	Apr 14	575
LOWEST DAILY MEAN	12	Oct 2	12
ANNUAL SEVEN-DAY MINIMUM	16	Sep 26	16
INSTANTANEOUS PEAK FLOW			576
INSTANTANEOUS PEAK STAGE			6.61
ANNUAL RUNOFF (CFSM)	.77		.98
ANNUAL RUNOFF (INCHES)	10.49		13.34
10 PERCENT EXCEEDS	200		363
50 PERCENT EXCEEDS	101		97
90 PERCENT EXCEEDS	32		33

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04100500 ELKHART RIVER AT GOSHEN, IN

LOCATION.--Lat 41°35'36", long 85°50'55", in NE1/4 NE1/4 sec.8, T.36 N., R.6 E., Elkhart County, Hydrologic Unit 04050001, on right bank 20 ft downstream from River Avenue bridge at Goshen, IN, 0.4 mi upstream from Rock Run, and at mile 16.1.

DRAINAGE AREA.--594 mi².

PERIOD OF RECORD.--April 1931 to current year.

REVISED RECORDS.--WSP 1337: 1939(M). WSP 1557: 1954. WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 769.43 ft above sea level. Prior to Nov. 20, 1931, nonrecording gage at same site and datum.

REMARKS.--Records fair except for estimated daily discharges, which are poor. Occasional low-flow regulation at Goshen Dam, 3.4 mi upstream.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	119	236	318	e205	e380	551	392	1090	1170	924	476	284
2	117	287	308	e200	e355	e480	390	1010	1130	874	452	268
3	127	472	298	e195	e340	e440	382	944	1090	837	428	252
4	145	518	291	e189	e320	428	375	895	1040	797	406	239
5	142	487	338	e187	e315	506	366	853	996	751	384	231
6	147	469	307	e183	e310	534	361	834	1010	704	355	228
7	149	449	e270	e181	323	441	354	793	1080	656	329	236
8	153	424	e250	e181	364	404	347	767	1070	612	316	269
9	149	400	e230	e181	480	374	336	763	1030	567	299	258
10	144	387	e215	e181	462	419	329	1680	3260	528	274	243
11	140	546	e210	e180	e430	418	316	2150	3090	485	266	235
12	133	755	e210	e180	420	388	289	1610	e2290	456	260	238
13	129	632	e220	e180	377	382	282	1220	e1870	426	246	231
14	123	567	239	e180	378	373	281	1080	e1630	395	236	223
15	120	537	252	e181	362	372	299	1090	e1500	394	263	224
16	118	519	261	e190	340	375	334	1230	e1350	416	259	219
17	127	493	265	222	317	365	323	2060	e1300	403	249	214
18	95	471	266	404	e300	361	313	2540	e2400	563	242	209
19	110	457	230	618	310	356	321	2280	e2100	1050	259	194
20	161	446	201	465	325	374	521	1960	e1900	1110	299	183
21	203	430	e200	e460	322	379	809	1730	e1730	865	509	224
22	187	409	e198	e500	314	367	905	1600	e1600	715	541	270
23	175	392	e197	561	309	358	1550	1520	e1470	630	435	249
24	159	376	e193	605	307	361	1680	1450	e1400	575	427	236
25	152	367	e191	563	308	376	1290	1390	e1350	544	406	219
26	150	360	e191	566	315	383	1190	1320	1340	507	391	221
27	193	357	e190	554	405	383	1150	1280	1250	470	379	262
28	211	347	e190	497	793	393	1110	1380	1140	447	366	267
29	201	332	e190	e470	665	404	1120	1430	1060	481	348	245
30	196	326	e190	e440	---	400	1160	1440	982	473	326	227
31	218	---	e192	e400	---	394	---	1280	---	502	306	---
TOTAL	4693	13248	7301	10299	10946	12539	18875	42669	45628	19157	10732	7098
MEAN	151	442	236	332	377	404	629	1376	1521	618	346	237
MAX	218	755	338	618	793	551	1680	2540	3260	1110	541	284
MIN	95	236	190	180	300	356	281	763	982	394	236	183
CFSM	.25	.74	.40	.56	.64	.68	1.06	2.32	2.56	1.04	.58	.40
IN.	.29	.83	.46	.64	.69	.79	1.18	2.67	2.86	1.20	.67	.44

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1932 - 1996, BY WATER YEAR (WY)

	MEAN	315	395	498	589	687	934	940	711	508	359	269	251
MAX	1652	1132	1276	2058	1657	2497	2424	2354	1521	1079	712	784	
(WY)	1955	1973	1983	1993	1959	1982	1950	1943	1996	1951	1958	1958	
MIN	75.9	95.9	122	122	108	301	363	222	101	94.0	73.0	58.5	
(WY)	1965	1965	1964	1963	1963	1964	1946	1958	1934	1934	1941	1941	

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR			FOR 1996 WATER YEAR			WATER YEARS 1932 - 1996		
ANNUAL TOTAL	175366			203185			537		
ANNUAL MEAN	480			555			1005		
HIGHEST ANNUAL MEAN							197		
LOWEST ANNUAL MEAN							1964		
HIGHEST DAILY MEAN	1800			3260			6010		
LOWEST DAILY MEAN	95			95			7.0		
ANNUAL SEVEN-DAY MINIMUM	117			117			50		
INSTANTANEOUS PEAK FLOW				4290			6360		
INSTANTANEOUS PEAK STAGE				9.24			11.94		
ANNUAL RUNOFF (CFSM)	.81			.93			.90		
ANNUAL RUNOFF (INCHES)	10.98			12.72			12.29		
10 PERCENT EXCEEDS	904			1280			1100		
50 PERCENT EXCEEDS	415			376			388		
90 PERCENT EXCEEDS	159			187			155		

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04101000 ST. JOSEPH RIVER AT ELKHART, IN

LOCATION.--Lat 41°41'30", long 85°58'30", in SW1/4 NE1/4 sec.5, T.37 N., R.5 E., Elkhart County, Hydrologic Unit 04050001, on left bank 200 ft downstream from Elkhart River, 200 ft upstream from Main Street bridge in Elkhart, IN, 2,000 ft downstream from Christiana Creek, 0.5 mi downstream from Elkhart Hydroelectric Plant, and at mile 76.5.

DRAINAGE AREA.--3,370 mi².

PERIOD OF RECORD.--August 1947 to current year. Gage heights at site 0.8 mi downstream at different datum from September 1924 to March 1926 are available from the Indiana District Office.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 700.00 ft above sea level.

REMARKS.--Records good. Flow regulated by Elkhart Hydroelectric Plant.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1380	2180	3060	2470	2320	3820	2610	5220	4920	4820	2450	1670
2	1230	2430	2960	2350	2720	3810	2690	5030	4870	4490	2340	1660
3	1520	2470	2950	1880	2730	3730	2640	4890	4520	4160	2320	1500
4	1480	2600	2810	1830	2910	3420	2600	4750	4500	3890	2110	1690
5	1500	2770	2770	1960	2790	3710	2500	4520	4080	3590	2040	1580
6	1480	2590	2790	1960	2630	3590	2350	4300	4520	3440	2010	1500
7	1550	2700	2610	1910	2650	3240	2530	4030	4700	3110	1880	1590
8	1430	2750	2570	1820	2680	3170	2410	4020	4660	2670	1880	1690
9	1500	2640	2200	1850	3020	3150	2240	4080	4740	2940	1750	1700
10	1630	2610	1740	2060	3140	2910	2360	7080	7860	2640	1730	1600
11	1480	3770	1810	1940	2910	2890	2260	8620	9930	2260	1510	1490
12	1480	3920	2000	1970	2860	2710	2310	7350	8290	2120	1560	1660
13	1470	4070	2390	2130	2750	2750	2740	6880	7260	2360	1710	1600
14	1480	4210	2680	2080	2750	3000	2650	6590	6750	2210	1470	1640
15	1520	4150	3190	2090	2630	3070	2670	6650	6330	2230	1550	1550
16	1490	4130	3180	2020	2360	3070	2910	7070	5960	2290	1620	1620
17	1460	4060	2890	2240	2330	2980	2900	8410	5490	2240	1500	1720
18	1430	3830	2790	2690	2230	3020	2970	8730	7160	2650	1470	1540
19	1450	3660	2690	3170	2400	2950	3030	8100	9080	3100	1610	1590
20	1770	3480	2460	2810	2340	2820	3320	7730	8570	3130	1750	1420
21	1850	3460	2520	3080	2370	2830	3750	7510	8020	2620	1970	1810
22	1750	3410	2340	3300	2380	2700	4740	7150	7550	2380	2290	1940
23	1700	3360	2450	3240	2370	2720	5830	6920	7320	2220	2500	1810
24	1780	3220	2260	3670	2420	2700	6010	6850	7140	2150	2510	1710
25	1840	3120	2470	3250	2440	2620	6100	6680	7240	2110	2260	1720
26	1720	3150	2370	3240	2630	2730	6060	6330	6900	2060	2400	1810
27	1980	3140	2110	3120	3150	2670	5790	6150	6670	2010	2280	2180
28	2230	3100	2190	2820	3750	2740	5720	6100	5930	2060	2180	2140
29	2050	3050	2130	2990	3840	2730	5670	5810	5610	2430	1930	1920
30	1880	2930	2180	2690	---	2700	5620	5710	5270	2770	1930	1880
31	2220	---	2120	2270	---	2720	---	5350	---	2560	1780	---
TOTAL	50730	96960	77680	76900	78500	93670	107980	194610	191840	85710	60290	50930
MEAN	1636	3232	2506	2481	2707	3022	3599	6278	6395	2765	1945	1698
MAX	2230	4210	3190	3670	3840	3820	6100	8730	9930	4820	2510	2180
MIN	1230	2180	1740	1820	2230	2620	2240	4020	4080	2010	1470	1420
CFSM	.49	.96	.74	.74	.80	.90	1.07	1.86	1.90	.82	.58	.50
IN.	.56	1.07	.86	.85	.87	1.03	1.19	2.15	2.12	.95	.67	.56

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1948 - 1996, BY WATER YEAR (WY)

	MEAN	2202	2649	3218	3580	3827	5087	5208	4124	3268	2393	1962	1881
MAX	5752	5883	5795	9270	7039	10760	12690	7725	7535	4409	4180	3855	
(WY)	1987	1993	1991	1993	1968	1982	1950	1956	1989	1968	1981	1981	
MIN	791	856	958	1127	1120	1679	2633	1911	1280	898	737	721	
(WY)	1964	1965	1964	1964	1963	1964	1958	1958	1988	1988	1964	1964	

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1948 - 1996
ANNUAL TOTAL	1029110	1165800	
ANNUAL MEAN	2819	3185	
HIGHEST ANNUAL MEAN			5264
LOWEST ANNUAL MEAN			1283
HIGHEST DAILY MEAN	5470	9930	18500
LOWEST DAILY MEAN	1230	1230	336
ANNUAL SEVEN-DAY MINIMUM	1440	1450	561
INSTANTANEOUS PEAK FLOW		10600	18800
INSTANTANEOUS PEAK STAGE		23.79	27.91
ANNUAL RUNOFF (CFSM)	.84	.95	.97
ANNUAL RUNOFF (INCHES)	11.36	12.87	13.22
10 PERCENT EXCEEDS	4200	6070	5820
50 PERCENT EXCEEDS	2770	2660	2790
90 PERCENT EXCEEDS	1650	1620	1380

STREAMS TRIBUTARY TO LAKE MICHIGAN

04101500 ST. JOSEPH RIVER AT NILES, MI

LOCATION.--Lat 41°49'45", long 86°15'35", in SW1/4 sec.26, T.7 S., R.17 W., Berrien County, Hydrologic Unit 04050001, on right bank 100 ft upstream from Main Street Bridge in Niles, 0.6 mi downstream from dam at French Paper Co., 1.3 mi upstream from Dowagiac River, and at mile 44.

DRAINAGE AREA.--3,666 mi².

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1933-36, 1940-43, 1945-46(M). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 633.02 ft above sea level. Prior to Oct. 1, 1968, at datum 2.00 ft higher. Oct. 1, 1930, to Feb. 11, 1931, nonrecording gage on Main Street Bridge, and Feb. 12 to June 30, 1931, nonrecording gage 50 ft upstream from present site (gage heights referred to sea level datum). Oct. 1, 1943, to Apr. 12, 1970, auxiliary gage was headwater gage at hydroelectric plant at Buchanan Dam, 8 mi downstream from base gage at different datum. Since Apr. 13, 1970, auxiliary water-stage recorder at sewage-treatment plant, 1.1 mi downstream from base gage at same datum.

REMARKS.--Records good. Flow regulated by powerplants upstream from station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1600	2580	3340	2650	2480	4530	3200	6180	6060	5750	3230	1830
2	1450	2810	3260	2910	3240	4370	3020	5590	5740	5330	2950	2110
3	1840	2840	3250	2380	e3300	4210	3170	5690	5650	4990	2940	1720
4	1940	2910	3390	2230	e3400	4080	3070	5400	5320	4610	2640	2090
5	1860	2900	3090	2300	e3300	4360	3010	5280	4940	4360	2580	1900
6	1850	3080	3060	2320	e3100	4230	2780	5020	5200	4280	2480	1760
7	1820	3060	2990	2280	e3150	3680	2870	4770	5730	3960	2460	1830
8	1830	3110	3050	2340	3210	3780	2840	4540	5470	3220	2330	2130
9	1530	2970	2730	2250	3410	3480	2750	5010	5650	3580	2130	1990
10	2010	2990	1910	2350	3380	3610	2780	9250	12500	3340	2010	2030
11	1840	4600	2310	2460	3490	3470	2620	12200	13500	2680	2080	1910
12	1810	4940	2030	2200	3250	3280	2770	9590	10700	2630	1790	1910
13	1700	4790	2800	2510	3380	3160	3040	8420	8920	2830	2110	1880
14	1490	4740	2830	2480	2970	3490	3120	7860	8120	2590	1920	2060
15	1840	4610	3630	2430	3170	3440	3050	7770	7680	2800	2020	1910
16	1650	4580	3630	2450	2730	3640	3380	8500	7180	2840	2060	1820
17	1930	4670	3320	2760	2870	3550	3510	11400	6740	2730	1920	2080
18	1740	4220	3270	3120	2410	3400	3330	11300	8770	3990	1670	1970
19	1790	4100	3060	3630	2980	3480	3530	9840	11300	4470	1960	1880
20	1880	4050	2940	3310	2740	3490	3870	9010	10200	4260	2150	1920
21	2350	3730	2980	3650	2710	3270	4380	9020	9400	3460	2170	1960
22	2020	3930	2720	3580	2800	3090	5660	8560	8860	3010	2680	2460
23	1980	3710	2850	3820	2920	3230	7410	8230	8420	2910	2980	2160
24	2030	3660	2610	4280	2850	3130	7120	7870	8420	2740	3090	2190
25	2120	3460	2690	4020	2890	2980	7000	7890	8110	2690	2520	2100
26	2070	3490	2800	3800	2920	3190	6920	7410	8180	2710	2820	2240
27	2330	3650	2580	3780	3690	3140	6630	7280	7790	2420	2810	2700
28	2700	3500	2560	3200	4750	3100	6400	7270	7110	2430	2570	2780
29	2280	3270	2340	3380	4510	3140	6620	7500	6690	3260	2210	2280
30	2460	3480	2640	3010	---	3330	6350	6790	6190	3830	2400	2200
31	2550	---	2580	2830	---	3030	---	6360	---	3600	2390	---
TOTAL	60290	110430	89240	90710	92000	109360	126200	236800	234540	108300	74070	61800
MEAN	1945	3681	2879	2926	3172	3528	4207	7639	7818	3494	2389	2060
MAX	2700	4940	3630	4280	4750	4530	7410	12200	13500	13500	3230	2780
MIN	1450	2580	1910	2200	2410	2980	2620	4540	4940	2420	1670	1720
CFSM	.53	1.00	.79	.80	.87	.96	1.15	2.08	2.13	.95	.65	.56
IN.	.61	1.12	.91	.92	.93	1.11	1.28	2.40	2.38	1.10	.75	.63

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1996, BY WATER YEAR (WY)

	MEAN	2341	2745	3164	3562	3887	5219	5440	4412	3488	2543	2112	2037
MAX	6217	6564	6689	9810	7371	11560	13590	10760	8176	4989	4497	4103	
(WY)	1987	1993	1991	1993	1968	1982	1950	1943	1989	1981	1981	1981	
MIN	1056	932	1131	1239	1196	1857	2164	1579	1254	1033	828	885	
(WY)	1964	1965	1964	1964	1964	1964	1931	1931	1934	1934	1941	1941	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1931 - 1996

ANNUAL TOTAL	1203830						1393740						
ANNUAL MEAN	3298						3808				3409		
HIGHEST ANNUAL MEAN											5718		1950
LOWEST ANNUAL MEAN											1464		1964
HIGHEST DAILY MEAN	6780					Apr 12	13500		Jun 11	19800		Mar 21	1982
LOWEST DAILY MEAN	1450					Oct 2	1450		Oct 2	420		Aug 30	1931
ANNUAL SEVEN-DAY MINIMUM	1670					Sep 26	1730		Oct 13	728		Aug 26	1941
INSTANTANEOUS PEAK FLOW							15600		Jun 10	20200		Apr 5	1950
INSTANTANEOUS PEAK STAGE							13.01		Jun 10	(a)15.10		Apr 5	1950
ANNUAL RUNOFF (CFSM)	.90						1.04			.93			
ANNUAL RUNOFF (INCHES)	12.22						14.14			12.63			
10 PERCENT EXCEEDS	4890						7270			6120			
50 PERCENT EXCEEDS	3250						3090			2820			
90 PERCENT EXCEEDS	1940						1950			1480			

(a) Present datum.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04101800 DOWAGIAC RIVER AT SUMNERVILLE, MI

LOCATION.--Lat 41°54'48", long 86°12'47", in SE1/4 sec.30, T.6 S., R.16 W., Cass County, Hydrologic Unit 04050001, on right bank 30 ft upstream from bridge on Indian Lake Road, 0.3 mi west of Sumnerville.

DRAINAGE AREA.--255 mi².

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

GAGE.--Water-stage recorder. Datum of gage is 692.62 ft above sea level.

REMARKS.--Records good. Flow regulated by millpond and lake-level control dam upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	184	295	316	254	253	342	262	369	285	250	206	105
2	184	330	305	253	264	325	258	340	363	244	196	107
3	196	347	301	238	249	287	260	318	356	238	189	112
4	218	313	293	232	236	290	256	308	324	230	178	117
5	213	291	289	238	234	326	249	300	314	225	170	118
6	206	277	277	234	242	338	245	295	361	220	167	118
7	210	271	267	226	256	304	242	289	390	212	159	117
8	211	263	259	203	321	292	239	288	367	208	158	123
9	211	258	246	233	360	286	239	315	353	205	151	155
10	208	281	228	230	350	278	238	691	829	201	137	154
11	204	722	251	230	357	282	237	711	761	194	130	150
12	198	756	256	232	322	305	259	550	652	187	132	156
13	194	598	260	232	303	356	336	452	503	187	127	155
14	189	493	291	232	294	364	296	395	446	183	123	156
15	195	436	324	231	285	348	315	393	394	187	124	178
16	199	398	314	229	272	323	353	406	356	184	122	174
17	196	379	298	260	265	308	324	498	360	177	119	169
18	194	369	285	470	249	297	305	525	657	213	116	165
19	192	380	277	594	260	288	324	428	586	226	115	162
20	223	375	264	449	266	277	586	366	482	209	117	159
21	319	362	260	376	280	267	497	555	424	200	112	174
22	313	356	256	338	279	262	583	492	387	201	114	204
23	286	345	256	337	280	258	616	421	352	191	154	193
24	259	328	256	372	279	260	489	418	350	184	138	189
25	243	318	258	346	275	276	428	419	340	185	131	184
26	232	315	261	327	288	269	420	377	314	179	128	190
27	277	319	255	373	380	259	384	368	300	171	128	267
28	315	349	254	327	438	269	358	371	285	172	121	277
29	317	342	245	328	384	266	379	358	271	225	115	256
30	298	322	248	295	---	257	395	327	259	228	111	238
31	299	---	252	286	---	254	---	300	---	215	105	---
TOTAL	7183	11188	8402	9205	8521	9113	10372	12643	12421	6331	4293	5022
MEAN	232	373	271	297	294	294	346	408	414	204	138	167
MAX	319	756	324	594	438	364	616	711	829	250	206	277
MIN	184	258	228	203	234	254	237	288	259	171	105	105
CFSM	.91	1.46	1.06	1.16	1.15	1.15	1.36	1.80	1.62	.80	.54	.66
IN.	1.05	1.63	1.23	1.34	1.24	1.33	1.51	1.84	1.81	.92	.63	.73

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 1996, BY WATER YEAR (WY)

	MEAN	260	311	334	314	332	409	405	334	272	221	196	211
MAX	530	490	513	548	508	629	552	490	414	333	326	401	
(WY)	1987	1991	1992	1993	1985	1985	1993	1981	1996	1978	1992	1993	
MIN	132	179	179	166	177	251	297	205	142	133	101	112	
(WY)	1964	1965	1964	1963	1963	1964	1971	1964	1964	1988	1964	1964	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1961 - 1996

ANNUAL TOTAL	112842												
ANNUAL MEAN	309												
HIGHEST ANNUAL MEAN													1993
LOWEST ANNUAL MEAN													1964
HIGHEST DAILY MEAN	756				Nov 12		829		Jun 10	1550		Feb 25	1985
LOWEST DAILY MEAN	149				Aug 28		105		(a)	87		Sep 8	1964
ANNUAL SEVEN-DAY MINIMUM	157				Aug 27		110		Aug 29	89		Aug 3	1964
INSTANTANEOUS PEAK FLOW							937		Jun 10	1590		Feb 24	1985
INSTANTANEOUS PEAK STAGE							6.93		Jun 10	9.26		Feb 24	1985
INSTANTANEOUS LOW FLOW							103		(b)	86		Sep 10	1964
ANNUAL RUNOFF (CFSM)	1.21						1.12			1.17			
ANNUAL RUNOFF (INCHES)	16.46						15.27			15.96			
10 PERCENT EXCEEDS	428						418			458			
50 PERCENT EXCEEDS	299						267			278			
90 PERCENT EXCEEDS	195						156			164			

(a) Aug. 31, Sept. 1.

(b) Sept. 1, 2.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04102500 PAW PAW RIVER AT RIVERSIDE, MI

LOCATION.--Lat 42°11'10", long 86°22'06", in SW1/4 SE1/4 sec.23, T.3 S., R.18 W., Berrien County, Hydrologic Unit 04050001, on left bank 40 ft upstream from bridge on Coloma Road, 0.8 mi east of Riverside.

DRAINAGE AREA.--390 mi².

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 1337: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 588.80 ft above sea level. May 10, 1966, to July 11, 1967, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Diurnal fluctuation, principally during low flow, caused by paper mill upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	257	356	452	e310	e380	604	371	496	356	293	257	187
2	255	375	450	e300	e370	607	368	486	386	283	252	185
3	252	391	444	e295	e360	600	366	479	410	275	239	182
4	256	394	430	e295	e350	554	362	457	433	271	218	182
5	261	387	412	e300	e340	495	357	437	442	267	212	184
6	265	375	401	e300	e360	470	351	425	438	263	211	181
7	281	354	384	e300	e380	e450	347	411	442	256	212	180
8	277	337	363	e300	402	e430	342	402	459	248	219	178
9	268	322	343	e300	445	e420	338	422	504	244	215	192
10	266	344	318	e300	485	e410	336	529	579	240	210	191
11	264	459	345	e300	487	e410	335	679	764	238	209	200
12	262	581	360	e300	492	409	339	725	839	235	208	210
13	255	625	376	e300	474	445	359	691	759	230	206	213
14	251	591	404	e300	452	489	365	697	730	228	206	216
15	254	599	433	e300	422	513	384	722	721	226	203	229
16	256	641	443	e300	399	521	415	697	644	225	203	224
17	260	647	429	309	390	525	427	656	506	224	219	227
18	255	600	419	387	372	519	433	638	440	229	215	218
19	249	539	406	489	388	480	452	631	451	238	208	214
20	284	505	378	545	385	447	511	609	469	250	205	216
21	335	487	356	521	403	423	594	602	488	247	216	211
22	364	472	342	488	412	400	631	639	510	236	198	220
23	382	464	331	497	425	386	667	612	509	225	197	232
24	377	457	323	504	433	378	711	583	472	218	204	256
25	358	452	319	474	430	378	724	565	431	221	205	258
26	329	445	321	448	435	370	713	519	389	218	207	238
27	311	437	318	441	479	356	683	477	366	224	199	267
28	324	442	316	438	576	359	628	449	349	229	195	282
29	336	456	297	420	619	365	559	435	332	222	194	320
30	345	455	e310	406	---	369	516	422	313	230	194	328
31	352	---	e320	e395	---	370	---	408	---	245	189	---
TOTAL	9041	13989	11543	11562	12345	13952	13984	17000	14931	7478	6525	6621
MEAN	292	466	372	373	426	450	466	548	498	241	210	221
MAX	382	647	452	545	619	607	724	725	839	293	257	328
MIN	249	322	297	295	340	356	335	402	313	218	189	178
CFSM	.75	1.20	.95	.96	1.09	1.15	1.20	1.41	1.28	.62	.54	.57
IN.	.86	1.33	1.10	1.10	1.18	1.33	1.33	1.62	1.42	.71	.62	.63

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1996, BY WATER YEAR (WY)

	MEAN	383	449	513	507	534	679	649	509	399	320	285	303
MAX	1217	826	906	1038	842	1234	961	799	686	581	557	569	
(WY)	1987	1989	1991	1952	1981	1979	1985	1974	1969	1982	1980	1975	
MIN	178	223	232	226	256	390	361	287	200	180	163	158	
(WY)	1964	1954	1959	1959	1963	1957	1958	1958	1964	1963	1964	1963	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1952 - 1996

ANNUAL TOTAL	162545												
ANNUAL MEAN	445												
HIGHEST ANNUAL MEAN													1991
LOWEST ANNUAL MEAN													1964
HIGHEST DAILY MEAN	934												
LOWEST DAILY MEAN	244												
ANNUAL SEVEN-DAY MINIMUM	251												
INSTANTANEOUS PEAK FLOW													
INSTANTANEOUS PEAK STAGE													
ANNUAL RUNOFF (CFSM)	1.14												
ANNUAL RUNOFF (INCHES)	15.50												
10 PERCENT EXCEEDS	689												
50 PERCENT EXCEEDS	420												
90 PERCENT EXCEEDS	265												

(a) Gage height 7.81 ft.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04102700 SOUTH BRANCH BLACK RIVER NEAR BANGOR, MI

LOCATION.--Lat 42°21'15", long 86°11'15", in NW1/4 sec.28, T.1 S., R.16 W., Van Buren County, Hydrologic Unit 04050002, on left bank 50 ft upstream from bridge on 66th Street, 4.9 mi northwest of Bangor.

DRAINAGE AREA.--83.6 mi².

PERIOD OF RECORD.--June 1966 to current year. Prior to October 1981, published as Black River near Bangor.

REVISED RECORDS.--WDR MI-81-1: 1973-75(M), 1979(M).

GAGE.--Water-stage recorder. Elevation of gage is 610 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are poor. Occasional regulation caused by mills upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	33	53	110	e56	e59	134	60	88	63	57	39	25
2	32	72	104	e55	e57	120	61	78	75	55	37	25
3	41	76	95	e54	e54	109	61	72	81	52	37	25
4	43	67	89	e53	e52	e100	59	69	73	50	35	24
5	41	60	84	e51	e49	e90	57	66	69	48	34	25
6	40	56	80	e49	e47	e85	56	64	75	46	33	24
7	41	54	75	e47	e46	e80	54	61	98	45	33	25
8	40	53	70	e46	e75	e77	53	60	102	43	36	25
9	38	51	e68	e45	e150	e75	52	60	98	43	35	28
10	37	58	e66	e45	e120	e75	52	159	156	41	33	28
11	36	199	e65	e46	e110	e76	51	265	221	40	32	28
12	35	226	e64	e47	e100	83	51	212	218	39	32	28
13	35	186	e75	e50	e90	111	57	156	167	38	32	31
14	35	148	87	e53	e82	121	60	121	121	38	32	30
15	36	128	116	e56	e75	118	61	120	97	39	38	32
16	37	114	115	e60	e70	107	77	157	82	38	37	31
17	36	105	97	e66	e66	95	76	144	94	37	35	29
18	35	101	87	218	e65	88	69	126	482	39	34	29
19	35	107	81	307	e66	83	77	108	421	40	36	29
20	41	118	75	228	75	77	149	97	247	39	32	29
21	85	123	71	236	85	72	175	202	203	37	29	29
22	93	120	68	184	88	67	157	188	185	37	28	30
23	70	110	67	e115	86	65	165	147	156	35	29	28
24	57	99	67	e100	87	63	135	126	127	36	29	30
25	52	91	e65	e95	85	64	113	110	108	37	28	30
26	49	86	e64	e88	89	63	107	96	92	37	28	33
27	52	88	e62	e82	148	60	97	87	81	36	26	44
28	57	143	e61	e76	211	60	85	89	72	36	26	38
29	56	142	e60	e70	168	61	80	82	66	41	26	36
30	53	119	e60	e65	---	60	90	72	61	42	26	40
31	52	---	e58	e62	---	58	---	67	---	40	25	---
TOTAL	1423	3153	2406	2805	2555	2597	2497	3549	4191	1281	992	888
MEAN	45.9	105	77.6	90.5	88.1	83.8	83.2	114	140	41.3	32.0	29.6
MAX	93	226	116	307	211	134	175	265	482	57	39	44
MIN	32	51	58	45	46	58	51	60	61	35	25	24
CFSM	.55	1.26	.93	1.08	1.05	1.00	1.00	1.37	1.67	.49	.38	.35
IN.	.63	1.40	1.07	1.25	1.14	1.16	1.11	1.58	1.86	.57	.44	.40

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1996, BY WATER YEAR (WY)

	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEAN	69.7	98.7	134	123	137	188	168	105	84.3	60.5	46.0	59.9																			
MAX	362	282	272	244	263	389	327	182	248	181	141	329																			
(WY)	1987	1991	1983	1973	1976	1979	1975	1975	1980	1986	1980	1986																			
MIN	33.8	46.7	44.5	42.8	74.4	83.8	68.9	44.4	31.7	28.4	27.9	29.6																			
(WY)	1975	1972	1977	1977	1987	1996	1971	1971	1971	1988	1988	1996																			

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1966 - 1996

ANNUAL TOTAL	33678	28337	
ANNUAL MEAN	92.3	77.4	
HIGHEST ANNUAL MEAN			106
LOWEST ANNUAL MEAN			133
HIGHEST DAILY MEAN	508	Jan 15	1740
LOWEST DAILY MEAN	30	Aug 26	21
ANNUAL SEVEN-DAY MINIMUM	31	Aug 26	24
INSTANTANEOUS PEAK FLOW			579
INSTANTANEOUS PEAK STAGE			9.05
INSTANTANEOUS LOW FLOW			13.63
ANNUAL RUNOFF (CFSM)	1.10		20
ANNUAL RUNOFF (INCHES)	14.99		1.27
10 PERCENT EXCEEDS	172	143	17.25
50 PERCENT EXCEEDS	74	63	206
90 PERCENT EXCEEDS	34	32	75
			34

(a) Sept. 4, 6.

(b) From rating curve extended above 1,200 ft³/s.

(c) Sept. 28, 1966, Aug. 18, 19, 1984.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04102776 MIDDLE BRANCH BLACK RIVER NEAR SOUTH HAVEN, MI

LOCATION.--Lat 42°25'57", long 86°12'25", in NE1/4 NE1/4 sec.32, T.1 N., R.16 W., Allegan County, Hydrologic Unit 04050002, on left bank 10 ft downstream from bridge on 68th Street, 4.0 mi northeast of South Haven.

DRAINAGE AREA.--83.0 mi².

PERIOD OF RECORD.--October 1994 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 590 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	63	122	e67	e70	126	57	95	68	72	41	24
2	29	76	118	e65	e66	116	57	88	87	68	38	24
3	30	86	110	e63	e63	95	57	83	97	66	37	25
4	31	77	103	e61	e61	e90	57	79	83	62	35	24
5	31	72	98	e59	e60	e85	56	76	79	59	35	24
6	32	68	94	e57	e58	e80	54	74	86	55	32	24
7	35	65	88	e56	e56	e77	52	72	103	53	31	24
8	36	63	83	e55	e115	e75	51	70	93	52	32	24
9	34	60	e78	e54	172	e73	50	70	91	49	31	27
10	33	65	e75	e54	151	e72	50	125	155	48	29	27
11	32	154	e73	e54	134	e74	49	230	183	45	30	26
12	31	210	e72	e55	121	76	49	180	139	45	31	26
13	30	176	e80	e57	e100	90	58	153	123	45	28	26
14	31	161	101	e60	e90	96	59	133	105	44	29	26
15	31	152	126	e65	e85	98	63	127	90	44	35	30
16	31	136	126	e70	e78	94	78	141	80	43	34	30
17	31	124	100	96	e75	89	72	128	101	42	32	29
18	30	118	95	155	e72	83	66	118	285	45	30	28
19	30	117	91	196	e75	78	73	105	499	46	30	27
20	38	122	84	154	e81	73	116	102	391	41	31	26
21	73	127	83	181	89	68	127	201	357	40	31	26
22	116	124	80	221	89	65	124	238	282	39	28	29
23	98	117	79	e125	89	62	144	166	204	36	30	31
24	80	111	78	e110	91	61	128	152	150	34	31	30
25	73	104	78	e105	89	63	118	130	131	36	28	30
26	66	100	e77	e100	97	62	116	110	113	36	28	30
27	66	100	e74	e95	131	56	104	97	102	35	27	44
28	74	131	e72	e90	166	60	95	91	92	35	27	45
29	71	132	e70	e85	136	59	91	84	84	41	27	40
30	65	122	e69	e80	---	58	99	77	76	44	27	37
31	63	---	e68	e75	---	57	---	72	---	44	25	---
TOTAL	1479	3333	2745	2820	2760	2411	2370	3667	4529	1444	960	863
MEAN	47.7	111	88.5	91.0	95.2	77.8	79.0	118	151	46.6	31.0	28.8
MAX	116	210	126	221	172	126	144	238	499	72	41	45
MIN	28	60	68	54	56	56	49	70	68	34	25	24
CFSM	.57	1.34	1.07	1.10	1.15	.94	.95	1.43	1.82	.56	.37	.35
IN.	.66	1.49	1.23	1.26	1.24	1.08	1.06	1.64	2.03	.65	.43	.39

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1995 - 1996, BY WATER YEAR (WY)

	MEAN	47.1	133	103	127	102	109	120	120	106	44.2	33.7	29.2
MAX	47.7	155	117	163	108	141	160	122	151	46.6	36.4	29.6	
(WY)	1996	1995	1995	1995	1995	1995	1995	1995	1996	1996	1995	1995	
MIN	46.5	111	88.5	91.0	95.2	77.8	79.0	118	61.7	41.9	31.0	28.8	
(WY)	1995	1996	1996	1996	1996	1996	1996	1996	1995	1995	1996	1996	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1995 - 1996

ANNUAL TOTAL	33773		29381	
ANNUAL MEAN	92.5		80.3	
HIGHEST ANNUAL MEAN				89.4
LOWEST ANNUAL MEAN				98.5
HIGHEST DAILY MEAN	406	Jan 15	499	Jun 19
LOWEST DAILY MEAN	25	Sep 16	24	(a)
ANNUAL SEVEN-DAY MINIMUM	27	Sep 1	24	Sep 1
INSTANTANEOUS PEAK FLOW			542	Jun 19
INSTANTANEOUS PEAK STAGE			7.79	Jun 19
ANNUAL RUNOFF (CFSM)	1.11		.97	
ANNUAL RUNOFF (INCHES)	15.14		13.17	
10 PERCENT EXCEEDS	158		132	
50 PERCENT EXCEEDS	84		72	
90 PERCENT EXCEEDS	31		30	

(a) Sept. 1, 2, 4-8, 1996.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04103010 KALAMAZOO RIVER NEAR MARENGO, MI

LOCATION.--Lat 42°15'42", long 84°51'21", in SW1/4 SE1/4 sec.26, T.2 S., R.5 W., Calhoun County, Hydrologic Unit 04050003, on right bank at upstream side of bridge on B Drive North, 0.8 mi south of Marengo, and 5.0 mi west of Albion.

DRAINAGE AREA.--267 mi².

PERIOD OF RECORD.--October 1986 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 910 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Some diversion by pumping for irrigation. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	121	183	213	e130	e152	e250	192	304	173	153	126	101
2	122	208	204	e129	e150	e210	189	291	180	150	127	100
3	134	235	198	e125	e147	e170	186	289	179	146	127	98
4	141	244	189	e120	e145	e155	183	250	181	144	122	99
5	147	232	187	e115	e142	e150	184	238	180	141	119	100
6	177	210	180	e112	e145	e145	180	229	214	138	116	100
7	173	194	161	e110	e155	e140	183	221	216	135	112	101
8	165	181	e150	e110	e160	e140	177	217	213	131	122	102
9	159	173	e145	e110	e175	e140	173	219	244	129	117	104
10	151	172	e145	e110	e180	e145	171	276	272	128	116	105
11	144	280	e145	e110	184	e150	169	325	268	126	113	106
12	138	337	e145	e112	170	e170	171	338	251	124	112	109
13	133	349	e150	e114	e165	188	209	323	231	122	107	110
14	132	314	e160	e116	e155	194	243	293	215	126	105	112
15	133	272	e175	e120	e140	200	250	274	202	132	104	117
16	132	243	199	e140	e140	200	247	265	188	126	104	115
17	130	228	184	e175	e140	197	246	256	189	122	101	114
18	127	221	184	222	e145	193	231	248	247	122	97	114
19	127	212	172	315	e150	189	226	234	277	121	110	109
20	150	209	158	285	e155	192	294	222	274	118	117	106
21	163	213	e155	256	e160	194	296	249	262	116	128	106
22	159	218	e150	220	e165	193	351	248	240	115	127	123
23	151	219	e145	197	170	191	394	238	216	115	143	120
24	151	205	e140	e190	174	193	389	225	211	128	136	121
25	142	192	e137	e180	178	216	349	210	199	129	128	119
26	140	184	e136	e175	195	235	308	200	191	125	121	120
27	172	187	e135	e168	263	231	275	197	183	124	116	134
28	200	222	e133	e160	315	215	252	197	175	122	113	132
29	209	230	e130	e158	306	203	251	191	167	122	109	137
30	201	225	e130	155	---	198	288	184	159	126	106	139
31	186	---	e130	e154	---	194	---	180	---	123	104	---
TOTAL	4710	6792	4965	4893	5021	5781	7257	7611	6397	3979	3605	3373
MEAN	152	226	160	158	173	186	242	246	213	128	116	112
MAX	209	349	213	315	315	250	394	338	277	153	143	139
MIN	121	172	130	110	140	140	169	180	159	115	97	98
CFSM	.57	.85	.60	.59	.65	.70	.91	.92	.80	.48	.44	.42
IN.	.66	.95	.69	.68	.70	.81	1.01	1.06	.89	.55	.50	.47

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1996, BY WATER YEAR (WY)

	MEAN	229	266	247	268	250	303	317	250	245	185	176	181
MAX	349	383	356	466	340	445	468	386	530	274	226	272	
(WY)	1987	1989	1991	1993	1991	1990	1993	1990	1989	1993	1989	1993	
MIN	152	167	160	158	173	186	225	177	126	111	116	112	
(WY)	1996	1988	1996	1996	1996	1996	1987	1987	1988	1988	1996	1996	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1987 - 1996

ANNUAL TOTAL	70228	64384	243	
ANNUAL MEAN	192	176	332	1993
HIGHEST ANNUAL MEAN			176	1996
LOWEST ANNUAL MEAN			1140	Jun 3 1989
HIGHEST DAILY MEAN	409	Mar 8	95	Jul 9 1988
LOWEST DAILY MEAN	108	Sep 16	98	Jul 4 1988
ANNUAL SEVEN-DAY MINIMUM	118	Sep 14	1160	Jun 3 1989
INSTANTANEOUS PEAK FLOW			(a)402	Jun 3 1989
INSTANTANEOUS PEAK STAGE			(b)8.06	Jun 3 1989
INSTANTANEOUS LOW FLOW			95	Aug 19 1987
ANNUAL RUNOFF (CFSM)	.72	.66	.91	
ANNUAL RUNOFF (INCHES)	9.78	8.97	12.36	
10 PERCENT EXCEEDS	265	253	368	
50 PERCENT EXCEEDS	185	166	221	
90 PERCENT EXCEEDS	130	113	138	

(a) Gage height 7.60 ft.

(b) Backwater from ice.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04104945 WANADOGA CREEK NEAR BATTLE CREEK, MI

LOCATION.--Lat 42°23'47", long 85°07'54", in NW1/4 SE1/4 sec.9, T.1 S., R.7 W., Calhoun County, Hydrologic Unit 04050003, on right bank 30 ft upstream from bridge on State Highway 66, 5.0 mi north of Battle Creek.

DRAINAGE AREA.--48.3 mi².

PERIOD OF RECORD.--October 1994 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 830 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e13	21	50	e18	23	109	33	55	25	17	13	9.7
2	e13	31	46	e18	21	87	32	54	29	15	13	9.3
3	e13	37	42	e17	20	65	30	54	34	16	12	9.4
4	e14	30	38	17	18	e61	31	51	32	15	12	9.3
5	e14	20	35	14	18	45	30	44	28	14	11	9.3
6	e15	16	31	14	18	37	29	39	30	13	10	9.3
7	e16	17	30	13	19	36	26	35	37	13	10	9.6
8	e17	18	24	13	25	31	25	32	34	12	10	9.7
9	e17	15	22	e13	33	26	24	34	36	12	10	10
10	e16	20	23	e13	42	24	24	55	44	11	10	11
11	e16	64	23	e13	54	24	24	78	42	11	9.9	11
12	e15	80	23	e13	49	28	25	92	34	10	10	10
13	e15	85	24	e14	42	40	37	97	30	10	9.8	11
14	e14	87	28	e14	29	51	47	87	28	10	9.7	11
15	e14	79	34	e15	24	55	54	74	26	12	10	12
16	15	67	38	16	e21	54	61	67	23	12	10	12
17	15	56	34	24	e19	51	61	57	28	11	10	11
18	15	47	33	53	18	46	61	49	72	12	9.9	10
19	15	41	28	77	18	41	58	43	99	12	13	10
20	21	41	25	89	19	40	61	38	104	11	14	10
21	35	46	24	95	28	35	62	50	103	11	13	11
22	36	47	22	83	29	32	70	58	91	11	12	16
23	31	45	e21	65	27	31	80	64	71	11	15	17
24	23	39	e21	56	31	30	85	60	55	9.9	13	15
25	19	32	e20	46	35	33	85	49	42	9.5	12	14
26	17	30	e19	45	40	36	77	39	32	9.6	11	13
27	29	32	e19	39	58	31	66	34	27	9.8	11	20
28	44	49	e19	36	77	33	58	34	24	12	11	22
29	43	53	e18	e34	94	33	52	32	22	14	11	21
30	33	52	18	31	---	32	53	29	19	15	10	18
31	26	---	e18	27	---	32	---	26	---	14	10	---
TOTAL	639	1297	850	1035	949	1309	1461	1610	1301	375.8	346.3	371.6
MEAN	20.6	43.2	27.4	33.4	32.7	42.2	48.7	51.9	43.4	12.1	11.2	12.4
MAX	44	87	50	95	94	109	85	97	104	17	15	22
MIN	13	15	18	13	18	24	24	26	19	9.5	9.7	9.3
CFSM	.43	.90	.57	.69	.68	.87	1.01	1.08	.90	.25	.23	.26
IN.	.49	1.00	.65	.80	.73	1.01	1.13	1.24	1.00	.29	.27	.29

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1995 - 1996, BY WATER YEAR (WY)

	MEAN	27.8	56.1	43.7	43.7	34.0	50.2	51.7	52.0	34.4	15.6	17.8	14.2
MAX	35.0	69.0	60.0	54.0	35.3	58.2	54.8	52.0	43.4	19.1	24.4	15.9	
(WY)	1995	1995	1995	1995	1995	1995	1995	1995	1996	1995	1995	1995	
MIN	20.6	43.2	27.4	33.4	32.7	42.2	48.7	51.9	25.4	12.1	11.2	12.4	
(WY)	1996	1996	1996	1996	1996	1996	1996	1996	1995	1996	1996	1996	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1995 - 1996

ANNUAL TOTAL	13097		11544.7									
ANNUAL MEAN	35.9		31.5									
HIGHEST ANNUAL MEAN										36.8		
LOWEST ANNUAL MEAN										42.0		1995
HIGHEST DAILY MEAN	111					109		Mar 1	119	31.5		1996
LOWEST DAILY MEAN	13				Mar 14	9.3		(a)	9.3			
ANNUAL SEVEN-DAY MINIMUM	14				Jul 19	9.4		Sep 1	9.4			Sep 1 1996
INSTANTANEOUS PEAK FLOW					Sep 29	118		Mar 1	121			Nov 8 1994
INSTANTANEOUS PEAK STAGE						5.75		Mar 1	5.83			Nov 8 1994
ANNUAL RUNOFF (CFSM)	.74					.65			.76			
ANNUAL RUNOFF (INCHES)	10.09					8.89			10.34			
10 PERCENT EXCEEDS	67					61			69			
50 PERCENT EXCEEDS	32					25			32			
90 PERCENT EXCEEDS	15					11			13			

(a) Sept. 2, 4-6, 1996.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04105000 BATTLE CREEK AT BATTLE CREEK, MI

LOCATION.--Lat 42°19'55", long 85°09'15", in NW1/4 sec.5, T.2 S., R.7 W., Calhoun County, Hydrologic Unit 04050003, on right bank 350 ft upstream from bridge on Emmett Street in Battle Creek, 3.0 mi upstream from mouth.

DRAINAGE AREA.--241 mi².

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to July 1933, January 1934 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1944. WSP 1507: 1956.

GAGE.--Water-stage recorder. Datum of gage is 823.24 ft above sea level (levels by Michigan Department of Natural Resources). Prior to May 14, 1951, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Occasional slight regulation prior to November 1943. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	67	125	222	110	e130	e380	160	257	126	125	61	45
2	64	129	221	111	e110	e520	160	258	129	114	60	46
3	64	135	211	103	e105	e460	156	269	133	106	59	46
4	67	138	200	101	e98	e360	152	277	126	99	57	46
5	73	135	188	93	e90	318	150	265	132	93	50	47
6	76	128	171	91	e88	238	145	247	131	84	52	47
7	78	123	152	91	e92	184	148	223	139	76	50	46
8	81	119	117	87	e100	176	141	208	142	72	45	43
9	84	116	126	84	e125	159	138	199	153	70	50	49
10	76	121	118	84	e180	145	135	233	171	68	64	53
11	76	179	123	84	e230	147	132	289	182	66	64	56
12	76	245	122	84	e260	168	134	333	183	63	61	53
13	79	293	122	88	e240	198	144	387	161	63	50	50
14	67	355	130	92	e210	223	166	399	139	57	50	50
15	72	386	152	94	e150	250	201	371	132	62	47	51
16	73	362	168	94	e110	257	227	329	125	63	49	52
17	72	319	166	105	e100	249	229	288	132	67	50	53
18	73	277	180	158	e92	235	226	260	226	65	47	51
19	74	239	167	232	e88	222	231	239	319	63	51	52
20	75	218	135	e340	e90	208	237	218	396	63	55	50
21	89	209	140	e420	e110	192	247	236	560	61	54	54
22	112	208	122	e480	e140	180	272	247	628	61	55	64
23	113	208	120	e440	e140	172	312	251	551	57	59	64
24	99	206	120	e350	e130	154	341	280	463	61	61	67
25	97	196	120	e290	e155	159	367	282	397	59	58	65
26	98	182	115	e240	e170	163	379	256	341	56	53	59
27	102	174	111	e220	e200	149	349	220	287	53	57	70
28	123	194	110	e200	e260	163	308	192	238	53	50	79
29	135	201	107	e190	e320	159	278	171	196	58	48	77
30	135	213	108	e170	---	158	262	148	155	63	47	71
31	129	---	108	e150	---	158	---	129	---	61	47	---
TOTAL	2699	6133	4472	5476	4313	6904	6527	7961	7193	2182	1661	1656
MEAN	87.1	204	144	177	149	223	218	257	240	70.4	53.6	55.2
MAX	135	386	222	480	320	520	379	399	628	125	64	79
MIN	64	116	107	84	88	145	132	129	125	53	45	43
CFSM	.36	.85	.60	.73	.62	.92	.90	1.07	.99	.29	.22	.23
IN.	.42	.95	.69	.85	.67	1.07	1.01	1.23	1.11	.34	.26	.26

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1996, BY WATER YEAR (WY)

	MEAN	125	164	196	208	239	413	394	262	191	109	88.4	97.6
MAX	673	474	468	591	593	936	1162	825	678	281	313	276	
(WY)	1987	1993	1991	1952	1943	1948	1947	1943	1943	1968	1994	1950	
MIN	32.4	46.1	46.8	57.5	61.5	87.6	93.7	69.6	49.2	34.3	27.8	30.6	
(WY)	1964	1964	1964	1964	1963	1931	1931	1931	1964	1936	1936	1963	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1931 - 1996

ANNUAL TOTAL	71653	57177	
ANNUAL MEAN	196	156	(a)211
HIGHEST ANNUAL MEAN			394
LOWEST ANNUAL MEAN			64.1
HIGHEST DAILY MEAN	886	Mar 16	628
LOWEST DAILY MEAN	62	Sep 16	43
ANNUAL SEVEN-DAY MINIMUM	65	Sep 11	46
INSTANTANEOUS PEAK FLOW			640
INSTANTANEOUS PEAK STAGE			1.74
INSTANTANEOUS LOW FLOW			41
ANNUAL RUNOFF (CFSM)	.81		.65
ANNUAL RUNOFF (INCHES)	11.06		8.83
10 PERCENT EXCEEDS	354		289
50 PERCENT EXCEEDS	166		130
90 PERCENT EXCEEDS	75		53
			60

- (a) Does not include water year 1931.
(b) From floodmark.
(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04105500 KALAMAZOO RIVER NEAR BATTLE CREEK, MI

LOCATION.--Lat 42°19'26", long 85°11'51", in SW1/4 sec.1, T.2 S., R.8 W., Calhoun County, Hydrologic Unit 04050003, on left bank 20 ft upstream from bridge on Kendall Street in Battle Creek.

DRAINAGE AREA.--824 mi².

PERIOD OF RECORD.--July 1937 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1938-39. WSP 1387: 1938, 1945-46, 1948.

GAGE.--Water-stage recorder. Elevation of gage is 815 ft above sea level, from topographic map. Prior to Oct. 1, 1957, water-stage recorder at site 4.7 mi downstream at different datum. Oct. 1, 1957 to June 15, 1959, nonrecording gage at bridge 1,800 ft upstream at different datum. June 16, 1959 to Oct. 13, 1960, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Diurnal fluctuation below 1,500 ft³/s caused by powerplants upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	351	579	717	467	e410	981	672	964	538	558	366	e285
2	320	634	709	456	e400	e900	676	918	583	485	436	e280
3	390	632	680	391	e400	e800	671	891	562	462	388	e275
4	387	647	648	363	e395	e700	662	847	549	448	379	e275
5	400	624	629	369	e395	e660	638	831	567	428	373	e270
6	433	600	586	402	395	e640	625	777	634	425	324	e265
7	459	572	524	403	398	e620	635	745	729	417	390	e260
8	452	537	501	404	482	e610	629	703	688	410	346	e270
9	455	528	425	383	509	605	605	704	770	404	388	e290
10	421	584	427	401	547	595	597	899	921	389	380	e300
11	406	957	446	389	606	593	595	1030	898	375	377	e290
12	403	1100	494	401	590	613	556	1070	826	370	370	e280
13	408	1100	519	420	526	675	552	1130	776	367	346	e290
14	378	1090	577	434	531	721	615	1100	709	358	344	e295
15	398	1080	634	430	515	796	738	1050	673	407	359	e300
16	390	995	641	413	457	830	791	982	636	392	337	e300
17	394	886	587	493	444	797	777	928	685	389	335	e300
18	381	828	585	723	470	778	761	866	994	388	285	e290
19	380	769	560	972	449	772	754	815	1160	379	368	e280
20	421	736	489	879	486	741	939	780	1210	374	414	e300
21	502	739	487	957	495	711	1020	884	1350	365	e415	e340
22	523	739	489	930	511	691	1120	849	1420	369	e400	e370
23	504	722	470	890	529	678	1240	844	1300	354	e390	e350
24	461	704	478	853	530	661	1260	840	1270	395	e370	e330
25	453	656	470	773	577	674	1250	818	1080	407	e350	e320
26	445	623	447	725	648	714	1200	784	958	381	e340	e310
27	512	642	455	691	934	725	1060	729	883	384	e330	e360
28	579	735	439	619	1090	708	955	692	800	366	e320	386
29	608	742	427	612	1070	700	918	635	736	391	e310	361
30	592	729	437	461	---	660	924	606	657	424	e300	355
31	585	---	471	438	---	666	---	561	---	419	e290	---
TOTAL	13791	22509	16448	17542	15789	22015	24435	26272	25562	12480	11120	9177
MEAN	445	750	531	566	544	710	814	847	852	403	359	306
MAX	608	1100	717	972	1090	981	1260	1130	1420	558	436	386
MIN	320	528	425	363	395	593	552	561	538	354	285	260
CFSM	.54	.91	.64	.69	.66	.86	.99	1.03	1.03	.49	.44	.37
IN.	.62	1.02	.74	.79	.71	.99	1.10	1.19	1.15	.56	.50	.41

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1937 - 1996, BY WATER YEAR (WY)

	MEAN	494	591	655	674	761	1119	1102	843	680	487	422	430
MAX	1446	1284	1248	1557	1500	2183	2834	1998	1703	1000	899	855	
(WY)	1987	1993	1991	1993	1976	1948	1947	1943	1943	1943	1994	1975	
MIN	173	204	215	229	218	317	441	336	238	186	189	167	
(WY)	1964	1965	1964	1964	1964	1964	1946	1958	1964	1964	1964	1963	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

* WATER YEARS 1937 - 1996

ANNUAL TOTAL	243489	217140	687	
ANNUAL MEAN	667	593	1081	1943
HIGHEST ANNUAL MEAN			250	1964
LOWEST ANNUAL MEAN			7130	Apr 7 1947
HIGHEST DAILY MEAN	1750	Mar 15	86	Aug 5 1964
LOWEST DAILY MEAN	320	Oct 2	106	Aug 4 1964
ANNUAL SEVEN-DAY MINIMUM	363	Sep 13	(a)7290	Apr 7 1947
INSTANTANEOUS PEAK FLOW			(c)7.95	Feb 26 1985
INSTANTANEOUS PEAK STAGE			50	Sep 22 1939
INSTANTANEOUS LOW FLOW			.83	
ANNUAL RUNOFF (CFSM)	.81	.72	11.33	
ANNUAL RUNOFF (INCHES)	10.99	9.80		
10 PERCENT EXCEEDS	971	935	1220	
50 PERCENT EXCEEDS	624	554	550	
90 PERCENT EXCEEDS	407	345	294	

(a) June 18, 24.

(b) Gage height 9.13 ft, site and datum then in use.

(c) Present site and datum.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04105700 AUGUSTA CREEK NEAR AUGUSTA, MI

LOCATION.--Lat 42°21'12", long 85°21'14", in SW1/4 sec.27, T.1 S., R.9 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 15 ft downstream from bridge on EF Road, 1.3 mi north of Augusta.

DRAINAGE AREA.--38.9 mi².

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

GAGE.--Water-stage recorder. Elevation of gage is 815 ft above sea level, from topographic map. Prior to June 15, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	42	50	e27	e31	55	38	51	29	28	29	22
2	24	49	48	e27	e30	49	38	46	35	28	29	22
3	30	48	46	e26	e28	41	37	46	39	28	28	22
4	31	44	45	e24	e27	41	37	45	37	26	27	22
5	29	41	43	e23	e26	44	36	42	34	26	26	21
6	31	38	39	e23	e26	41	36	40	37	25	25	21
7	32	40	35	e23	e30	36	35	39	35	25	24	21
8	31	40	35	e22	e31	35	35	38	34	24	30	21
9	30	38	35	e22	e28	35	34	42	40	24	32	22
10	30	43	36	e22	e39	30	34	62	57	24	27	22
11	29	87	36	e22	41	33	33	67	59	23	25	21
12	28	96	35	e22	36	35	35	59	51	23	24	22
13	28	89	36	e22	32	42	47	49	44	23	24	23
14	28	75	43	e23	e28	45	44	44	41	23	23	23
15	30	63	50	e24	e25	46	48	46	38	24	28	24
16	30	55	48	28	e22	44	55	48	34	23	28	24
17	29	52	42	37	e21	42	50	46	41	23	26	24
18	28	51	40	62	21	42	45	43	83	25	25	23
19	28	50	38	71	21	40	47	40	102	25	29	22
20	36	51	34	57	29	39	56	38	95	23	35	22
21	49	55	e32	50	40	37	56	55	77	22	33	26
22	47	55	e31	43	39	36	67	50	64	22	30	34
23	42	51	e30	43	38	35	72	45	53	21	32	32
24	38	47	e30	50	41	36	64	42	49	22	31	30
25	35	43	e29	43	41	38	56	39	45	22	28	28
26	34	43	e29	41	48	38	53	37	41	21	26	29
27	42	47	e28	42	72	35	49	36	38	21	26	43
28	50	61	e28	39	82	37	45	36	35	22	25	43
29	47	58	e27	39	68	37	47	34	33	33	25	39
30	43	53	e27	34	---	36	51	32	30	31	24	35
31	42	---	e27	33	---	36	---	31	---	29	23	---
TOTAL	1056	1605	1132	1064	1048	1216	1380	1368	1430	759	847	783
MEAN	34.1	53.5	36.5	34.3	36.1	39.2	46.0	44.1	47.7	24.5	27.3	26.1
MAX	50	96	50	71	82	55	72	67	102	33	35	43
MIN	24	38	27	22	21	30	33	31	29	21	23	21
CFSM	.88	1.38	.94	.88	.93	1.01	1.18	1.13	1.23	.63	.70	.67
IN.	1.01	1.53	1.08	1.02	1.00	1.16	1.32	1.31	1.37	.73	.81	.75

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 1996, BY WATER YEAR (WY)

	MEAN	40.9	46.9	48.4	43.8	45.9	57.2	59.6	47.8	43.4	36.0	34.3	36.8
MAX	85.2	67.3	65.3	66.3	66.3	81.3	86.9	81.8	73.2	51.4	53.8	70.7	
(WY)	1987	1986	1992	1993	1976	1985	1975	1975	1978	1986	1980	1986	
MIN	18.9	23.4	31.9	26.9	30.1	39.2	41.2	30.0	23.9	17.4	17.9	18.0	
(WY)	1965	1965	1965	1971	1970	1996	1971	1965	1988	1965	1984	1966	

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1965 - 1996
ANNUAL TOTAL	15397	13688	
ANNUAL MEAN	42.2	37.4	45.1
HIGHEST ANNUAL MEAN			57.5
LOWEST ANNUAL MEAN			30.3
HIGHEST DAILY MEAN	110	102	454
LOWEST DAILY MEAN	24	21	14
ANNUAL SEVEN-DAY MINIMUM	28	21	14
INSTANTANEOUS PEAK FLOW		106	560
INSTANTANEOUS PEAK STAGE		1.94	3.41
INSTANTANEOUS LOW FLOW			(b)8.9
ANNUAL RUNOFF (CFSM)	1.08	.96	1.16
ANNUAL RUNOFF (INCHES)	14.72	13.09	15.74
10 PERCENT EXCEEDS	58	53	67
50 PERCENT EXCEEDS	40	35	42
90 PERCENT EXCEEDS	29	23	27

(a) Feb. 17-19, July 23, 26, 27, Sept. 5-8, 11.

(b) Result of freezeup.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04106000 KALAMAZOO RIVER AT COMSTOCK, MI

LOCATION.--Lat 42°17'08", long 85°30'50", in NE1/4 sec.19, T.2 S., R.10 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank at downstream side of bridge on River Street in Comstock, 0.2 mi downstream from Comstock Creek.

DRAINAGE AREA.--1,010 mi², approximately.

PERIOD OF RECORD.--April to August 1931, October 1932 to December 1979, October 1984 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 824: 1933-36. WSP 1387: 1933, 1934(M), 1935, 1936(M), 1938(M), 1940(M), 1941.

GAGE.--Water-stage recorder. Datum of gage is 756.12 ft above sea level. Prior to Oct. 1, 1987, at datum 3.00 ft higher. Prior to November 1945, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by powerplant 1.2 mi upstream from station. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	522	780	e1090	654	633	1460	770	1150	758	758	480	340
2	518	781	e1060	657	628	1540	750	1210	755	737	479	397
3	516	793	e1020	638	632	1430	723	1180	762	712	482	395
4	515	803	e980	575	632	1450	712	1150	754	689	479	331
5	511	807	e940	554	632	1370	792	950	734	598	461	395
6	514	804	e880	553	627	1070	763	972	726	550	412	347
7	513	792	e820	563	510	841	691	988	761	610	396	461
8	518	802	792	548	603	755	673	950	892	470	479	337
9	533	777	729	550	712	919	676	877	915	473	388	327
10	543	776	608	560	739	663	680	1020	1060	574	414	465
11	551	935	539	567	777	738	681	1360	1160	470	487	346
12	549	1110	585	570	792	794	680	1350	1130	470	478	384
13	e530	1540	947	581	782	738	693	1350	1020	472	411	409
14	e540	1850	867	599	774	853	715	1270	858	471	361	385
15	e550	1580	911	603	756	963	828	1310	827	469	496	474
16	e540	e1500	919	591	726	950	1100	1300	817	610	476	438
17	527	e1400	898	608	687	932	1070	1170	781	548	478	329
18	528	e1300	511	634	650	942	959	1210	1180	469	343	466
19	527	e1200	390	890	641	932	864	1020	1500	445	395	389
20	539	e1150	549	1030	648	915	1060	829	1490	471	488	266
21	569	e1150	616	1070	652	843	1240	1170	1480	470	492	412
22	611	e1120	736	1140	695	714	1380	1200	1510	397	487	504
23	641	e1090	760	1170	789	798	1530	1070	1610	404	483	588
24	643	e1030	716	1170	832	855	1490	1140	1550	482	501	473
25	644	e1000	698	1130	679	780	1480	1100	1270	484	501	478
26	631	e980	680	1070	713	748	1460	930	1120	484	496	476
27	738	e1050	653	1010	859	778	1400	957	1130	479	488	585
28	794	e1150	641	948	1090	822	1240	952	1090	473	476	560
29	786	e1130	629	900	1270	805	1170	922	910	479	399	474
30	783	e1100	625	819	---	799	1190	818	793	491	383	586
31	783	---	639	686	---	796	---	766	---	587	474	---
TOTAL	18207	32280	23428	23638	21160	28993	29460	33641	31343	16296	14063	12817
MEAN	587	1076	756	763	730	935	982	1085	1045	526	454	427
MAX	794	1850	1090	1170	1270	1540	1530	1360	1610	758	501	588
MIN	511	776	390	548	510	663	673	766	726	397	343	266
CFSM	.58	1.07	.75	.75	.72	.93	.97	1.07	1.03	.52	.45	.42
IN.	.67	1.19	.86	.87	.78	1.07	1.09	1.24	1.15	.60	.52	.47

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1996, BY WATER YEAR (WY)

	MEAN	683	800	864	914	971	1368	1350	1056	872	673	575	579
MAX	1990	1652	1674	1958	1758	2802	3018	2484	2063	1446	1217	1170	
(WY)	1987	1993	1991	1993	1976	1985	1950	1943	1989	1943	1994	1975	
MIN	268	285	347	371	370	461	617	405	302	269	235	278	
(WY)	1964	1964	1964	1964	1964	1964	1964	1931	1934	1934	1934	1963	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1931 - 1996

ANNUAL TOTAL	333672						285326						
ANNUAL MEAN	914						780						
HIGHEST ANNUAL MEAN													
LOWEST ANNUAL MEAN													
HIGHEST DAILY MEAN	1960				Mar 16		1850		Nov 14	6830		Apr 8 1947	
LOWEST DAILY MEAN	390				Dec 19		266		Sep 20	185		Aug 7 1934	
ANNUAL SEVEN-DAY MINIMUM	515				Oct 2		370		Sep 3	217		Aug 1 1934	
INSTANTANEOUS PEAK FLOW							2260		Nov 13	6910		Apr 8 1947	
INSTANTANEOUS PEAK STAGE							6.20		Nov 13	(a)10.94		Apr 8 1947	
INSTANTANEOUS LOW FLOW							238		Sep 14	119		May 29 1958	
ANNUAL RUNOFF (CFSM)	.91						.77			.88			
ANNUAL RUNOFF (INCHES)	12.29						10.51			12.01			
10 PERCENT EXCEEDS	1350						1200			1530			
50 PERCENT EXCEEDS	908						735			744			
90 PERCENT EXCEEDS	523						469			405			

(a) Present datum.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04106180 PORTAGE CREEK AT PORTAGE, MI

LOCATION.--Lat 42°12'21", long 85°35'23", in SE1/4 sec.16, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank 750 ft upstream from bridge on Westnedge Avenue in Portage.

DRAINAGE AREA.--16.5 mi².

PERIOD OF RECORD.--October 1982 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 850 ft above sea level, from topographic map.

REMARKS.--Records good. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	17	17	15	e13	16	15	18	13	13	11	10
2	10	19	16	14	e12	16	14	16	16	13	11	10
3	12	17	16	14	e12	15	14	16	15	13	11	10
4	12	16	16	13	e12	14	14	16	14	13	11	10
5	12	15	16	13	e12	16	14	15	13	13	11	10
6	13	15	16	13	12	15	14	15	16	13	11	10
7	13	15	15	13	13	15	13	15	15	13	11	11
8	13	15	15	13	16	14	13	15	14	12	11	11
9	12	15	15	13	16	14	13	17	17	12	10	12
10	12	21	15	13	15	14	13	28	25	12	10	11
11	12	42	15	13	15	14	13	23	20	12	10	11
12	12	28	15	13	14	15	16	19	20	12	10	11
13	12	21	15	13	14	16	17	17	17	12	10	11
14	12	19	18	13	14	17	15	17	15	12	15	11
15	13	18	18	13	13	17	20	21	14	13	17	12
16	12	17	17	13	13	16	19	20	13	12	13	12
17	12	17	16	15	13	15	16	19	14	12	12	11
18	12	17	16	23	13	15	15	18	23	13	12	11
19	12	17	15	24	13	15	19	17	21	13	11	11
20	16	18	15	18	13	15	23	17	18	12	12	11
21	17	18	15	16	14	15	18	23	17	12	12	15
22	15	18	15	15	14	14	30	19	16	12	12	15
23	14	17	15	15	14	14	24	18	16	11	12	13
24	14	16	15	17	15	15	20	18	17	12	12	12
25	14	16	15	15	15	15	18	17	16	12	11	12
26	14	16	15	15	18	15	18	17	15	11	11	14
27	19	18	14	16	27	14	17	16	15	11	11	19
28	19	21	14	15	22	15	16	15	15	12	11	16
29	16	18	14	15	18	15	19	14	14	13	11	15
30	15	17	14	14	---	14	19	13	14	12	10	13
31	17	---	15	e13	---	15	---	13	---	12	10	---
TOTAL	418	554	478	458	425	465	509	542	488	380	353	361
MEAN	13.5	18.5	15.4	14.8	14.7	15.0	17.0	17.5	16.3	12.3	11.4	12.0
MAX	19	42	18	24	27	17	30	28	25	13	17	19
MIN	10	15	14	13	12	14	13	13	13	11	10	10
CFSM	.82	1.12	.93	.90	.89	.91	1.03	1.06	.99	.74	.69	.73
IN.	.94	1.25	1.08	1.03	.96	1.05	1.15	1.22	1.10	.86	.80	.81

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1983 - 1996, BY WATER YEAR (WY)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEAN	18.5	20.5	19.5	18.5	18.5	20.7	21.0	19.7	17.8	16.6	16.2	16.3		
MAX	25.7	25.5	23.6	21.4	21.5	28.1	26.6	24.1	24.9	21.4	19.2	20.3		
(WY)	1992	1991	1991	1992	1985	1985	1985	1983	1989	1986	1994	1993		
MIN	13.5	16.2	15.4	14.8	14.7	15.0	17.0	16.2	13.8	12.3	11.4	12.0		
(WY)	1996	1988	1996	1996	1996	1996	1996	1994	1987	1996	1996	1996		

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1983 - 1996
ANNUAL TOTAL	6108	5431	
ANNUAL MEAN	16.7	14.8	18.6
HIGHEST ANNUAL MEAN			21.2
LOWEST ANNUAL MEAN			14.8
HIGHEST DAILY MEAN	42	42	83
LOWEST DAILY MEAN	10	10	10
ANNUAL SEVEN-DAY MINIMUM	11	10	10
INSTANTANEOUS PEAK FLOW		56	118
INSTANTANEOUS PEAK STAGE		3.11	3.87
ANNUAL RUNOFF (CFSM)	1.01	.90	1.13
ANNUAL RUNOFF (INCHES)	13.77	12.24	15.36
10 PERCENT EXCEEDS	21	18	23
50 PERCENT EXCEEDS	16	15	18
90 PERCENT EXCEEDS	13	11	14

(a) Oct. 1, 2, Aug. 9-13, Aug. 30 to Sept. 6.

(b) Sept. 15, 1988, Sept. 30 to Oct. 2, 1995, Aug. 9-13, Aug. 30 to Sept. 6, 1996.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04106300 PORTAGE CREEK NEAR KALAMAZOO, MI

LOCATION.--Lat 42°14'46", long 85°34'33", in SE1/4 sec.34, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 5 ft upstream from bridge on Lovers Lane, 3.0 mi south of Kalamazoo.

DRAINAGE AREA.--22.4 mi².

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

GAGE.--Water-stage recorder. Datum of gage is 814.88 ft above sea level.

REMARKS.--Records good. Flow includes water which is pumped from ground-water sources by industry and discharged into stream 2.0 mi upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	40	40	33	35	40	31	48	35	33	35	24
2	31	48	38	31	36	39	32	46	45	28	35	24
3	31	42	38	32	36	37	39	47	39	27	33	25
4	31	39	38	32	36	37	40	46	37	26	36	25
5	31	37	38	32	35	43	39	47	36	24	36	25
6	33	38	37	32	36	40	40	46	46	25	38	25
7	35	37	37	32	36	39	41	46	41	25	38	25
8	33	35	36	34	46	39	41	48	39	30	35	25
9	33	34	35	34	42	40	41	51	60	33	32	27
10	33	52	35	33	40	39	43	77	67	32	29	25
11	34	94	35	34	39	39	44	56	51	33	30	26
12	34	60	33	33	36	40	52	48	49	35	30	25
13	34	49	32	34	36	41	48	45	41	34	30	25
14	34	45	41	34	37	43	44	44	39	34	36	26
15	33	42	37	34	36	41	57	53	40	33	58	27
16	32	41	36	34	36	39	47	47	38	25	31	27
17	32	40	34	41	35	39	43	46	43	35	24	25
18	35	41	36	52	35	38	44	44	66	37	23	24
19	36	40	35	55	36	36	56	42	48	37	23	24
20	51	42	35	43	34	35	64	43	44	34	26	23
21	44	42	33	40	36	35	50	62	40	34	25	37
22	40	40	31	39	38	36	80	42	40	33	26	29
23	39	40	32	41	39	34	59	38	38	33	29	27
24	36	39	32	45	39	35	49	39	44	36	26	25
25	38	39	32	40	39	36	48	38	36	36	25	23
26	37	39	32	39	44	36	46	37	38	34	25	27
27	50	45	32	43	66	35	44	41	35	34	25	39
28	47	49	31	38	49	35	44	40	36	40	24	29
29	39	42	31	38	41	35	51	39	37	41	23	27
30	38	38	31	32	---	29	47	34	36	35	24	27
31	42	---	31	35	---	30	---	35	---	34	24	---
TOTAL	1126	1309	1074	1149	1129	1160	1404	1415	1284	1010	934	792
MEAN	36.3	43.6	34.6	37.1	38.9	37.4	46.8	45.6	42.8	32.6	30.1	26.4
MAX	51	94	41	55	66	43	80	77	67	41	58	39
MIN	30	34	31	31	34	29	31	34	35	24	23	23

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 1996, BY WATER YEAR (WY)

	MEAN	37.6	39.8	40.2	39.8	41.7	47.1	49.1	44.7	41.9	39.2	37.4	37.1
MAX	56.0	56.4	53.5	48.9	53.0	61.4	63.3	57.5	55.3	54.0	50.3	51.9	
(WY)	1992	1991	1992	1988	1971	1985	1991	1991	1989	1991	1980	1992	
MIN	25.3	26.5	27.1	29.3	25.7	34.6	35.5	30.4	24.7	26.1	26.8	26.4	
(WY)	1965	1972	1977	1978	1972	1978	1977	1977	1988	1977	1977	1996	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1965 - 1996

ANNUAL TOTAL	14311		13786		41.3	
ANNUAL MEAN	39.2		37.7		51.5	1991
HIGHEST ANNUAL MEAN					32.0	1977
LOWEST ANNUAL MEAN					257	May 31 1989
HIGHEST DAILY MEAN	94	Nov 11	94	Nov 11	17	Sep 23 1994
LOWEST DAILY MEAN	24	May 22	23	(a)	22	Jul 22 1977
ANNUAL SEVEN-DAY MINIMUM	31	Sep 23	24	Aug 27	22	May 30 1989
INSTANTANEOUS PEAK FLOW			122	Apr 22	(b)407	Jun 26 1978
INSTANTANEOUS PEAK STAGE			1.83	Apr 22	4.49	Jan 19 1965
INSTANTANEOUS LOW FLOW					(c)8.0	
10 PERCENT EXCEEDS	47		48		53	
50 PERCENT EXCEEDS	38		36		40	
90 PERCENT EXCEEDS	32		26		29	

(a) Aug. 18, 19, 29, Sept. 20, 25.

(b) Gage height 3.09 ft.

(c) Result of bridge construction upstream.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04106320 WEST FORK PORTAGE CREEK NEAR OSHTEMO, MI

LOCATION.--Lat 42°14'07", long 85°38'54", in SE1/4 sec.1, T.3 S., R.12 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank at upstream side of culvert on 12th Street, 2.1 mi southeast of Oshtemo.

DRAINAGE AREA.--13.0 mi².

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

GAGE.--Water-stage recorder. Datum of gage is 868.86 ft above sea level (Kalamazoo County Road Commission bench mark).

REMARKS.--Records good. At times, flow is affected by ground-water withdrawals. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.1	6.4	6.6	5.2	6.1	6.4	3.4	8.1	3.5	2.2	4.5	6.6
2	6.2	6.8	6.2	5.2	6.1	6.0	3.5	7.5	4.0	2.2	3.9	5.8
3	5.5	6.7	6.0	5.0	6.1	5.7	5.7	7.1	4.4	8.8	3.2	5.5
4	5.2	6.2	5.8	5.0	6.1	5.4	6.1	6.8	4.7	12	2.7	5.0
5	5.0	5.8	5.7	5.0	6.2	5.6	5.2	6.8	5.9	11	2.4	4.6
6	4.8	5.5	5.4	5.0	6.0	5.6	4.4	6.7	7.4	8.3	2.1	4.2
7	4.8	5.5	5.2	4.8	6.1	5.5	3.8	6.7	8.1	6.1	1.9	3.9
8	4.8	5.5	5.1	4.8	6.1	5.4	3.3	6.9	7.7	4.6	1.7	3.6
9	4.7	5.5	5.1	4.8	6.1	5.3	3.0	7.4	7.9	3.5	1.5	3.6
10	4.6	6.1	5.2	5.0	6.0	5.1	2.8	9.1	9.7	2.9	1.3	3.4
11	4.6	11	5.2	5.0	6.3	5.4	2.8	9.6	9.1	2.5	1.1	3.4
12	4.6	12	5.2	5.0	6.3	6.5	2.7	9.1	8.3	2.2	1.1	3.2
13	4.6	11	5.2	5.0	6.2	6.5	3.2	8.2	7.4	2.0	1.0	3.1
14	4.6	9.5	5.6	5.1	6.0	6.4	3.5	7.7	6.7	1.8	1.2	3.0
15	4.6	8.3	6.0	5.2	5.7	6.0	4.6	8.2	5.8	1.7	1.8	3.0
16	4.6	7.6	6.1	5.3	5.7	5.2	4.7	8.8	4.9	1.6	1.9	3.0
17	4.6	7.1	5.9	5.7	5.7	4.4	4.3	8.6	4.6	1.4	2.0	2.9
18	4.6	7.1	5.7	7.0	5.5	3.6	4.6	8.2	5.0	1.4	1.9	2.8
19	4.6	6.9	5.4	8.6	5.6	3.2	5.7	8.0	5.1	1.4	1.8	2.8
20	5.0	6.8	5.0	8.5	5.7	3.0	9.2	8.1	4.9	1.2	1.8	2.8
21	5.7	6.9	5.0	7.7	5.7	2.6	9.7	8.7	4.7	1.1	1.8	3.4
22	5.9	6.8	5.1	6.9	5.2	2.5	11	8.3	4.5	.99	1.8	4.1
23	5.7	6.5	5.2	6.6	4.9	2.5	11	8.0	4.0	.87	2.0	4.1
24	5.4	6.2	5.2	7.0	4.8	2.4	11	7.9	3.8	.78	2.0	3.9
25	5.0	6.1	5.2	6.6	4.8	2.5	9.9	8.1	3.4	.64	2.0	3.7
26	4.8	5.9	5.2	6.2	5.1	2.4	9.2	7.3	3.1	.46	2.0	3.6
27	6.4	6.1	5.1	6.5	7.3	2.4	8.2	6.3	3.0	.34	4.5	4.4
28	7.7	7.2	5.2	6.4	8.0	2.7	7.3	5.6	3.0	.56	8.3	4.4
29	7.5	7.1	5.1	6.3	7.3	3.0	7.7	4.8	2.8	2.1	9.3	4.1
30	6.9	6.8	5.2	6.2	---	3.3	8.5	4.3	2.5	3.7	8.7	3.7
31	6.7	---	5.2	6.1	---	3.4	---	3.8	---	4.6	7.6	---
TOTAL	166.8	212.9	168.3	182.7	172.7	135.9	180.0	230.7	159.9	94.94	90.8	115.6
MEAN	5.38	7.10	5.43	5.89	5.96	4.38	6.00	7.44	5.33	3.06	2.93	3.85
MAX	7.7	12	6.6	8.6	8.0	6.5	11	9.6	9.7	12	9.3	6.6
MIN	4.6	5.5	5.0	4.8	4.8	2.4	2.7	3.8	2.5	.34	1.0	2.8
CFSM	.41	.55	.42	.45	.46	.34	.46	.57	.41	.24	.23	.30
IN.	.48	.61	.48	.52	.49	.39	.52	.66	.46	.27	.26	.33

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1972 - 1996, BY WATER YEAR (WY)

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEAN	6.34	7.09	7.15	6.75	6.69	7.35	7.35	6.24	5.23	4.85	5.24	5.78													
MAX	9.74	11.0	11.8	9.79	9.63	10.4	11.2	12.5	11.4	10.7	11.8	12.6													
(WY)	1976	1986	1976	1973	1976	1973	1973	1973	1973	1973	1975	1975													
MIN	2.28	3.92	5.11	4.96	4.57	4.38	5.00	2.62	1.13	1.20	1.96	2.30													
(WY)	1993	1993	1982	1981	1995	1996	1988	1988	1988	1988	1988	1994													

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1972 - 1996

ANNUAL TOTAL	2153.2	1911.24	6.30
ANNUAL MEAN	5.90	5.22	10.0
HIGHEST ANNUAL MEAN			3.87
LOWEST ANNUAL MEAN			1975
HIGHEST DAILY MEAN	34	12	35
LOWEST DAILY MEAN	1.2	.34	.34
ANNUAL SEVEN-DAY MINIMUM	1.9	.66	.63
INSTANTANEOUS PEAK FLOW		13	36
INSTANTANEOUS PEAK STAGE		1.63	2.47
INSTANTANEOUS LOW FLOW		.20	.20
ANNUAL RUNOFF (CFSM)	.45	.40	.48
ANNUAL RUNOFF (INCHES)	6.16	5.47	6.59
10 PERCENT EXCEEDS	9.9	8.1	9.8
50 PERCENT EXCEEDS	5.2	5.2	5.9
90 PERCENT EXCEEDS	2.8	2.1	3.1

(a) Dec. 6, 1992, Oct. 28, 1994.

(b) Nov. 11, July 4.

(c) Dec. 5, 1992, Oct. 28, 1994, Apr. 16, 1995.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04106400 WEST FORK PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°14'40", long 85°36'50", in NE1/4 sec.5, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank 30 ft upstream from culvert on Oakland Drive, 2.5 mi upstream from mouth, and 3.7 mi southwest of main business district of Kalamazoo.

DRAINAGE AREA.--18.7 mi².

PERIOD OF RECORD.--September 1959 to current year.

GAGE.--Water-stage recorder and V-notch sharp-crested weir. Datum of gage is 858.09 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except for estimated daily discharges, which are fair. At times, flow is affected by ground-water withdrawals. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.4	10	9.5	6.2	e9.0	e9.8	5.1	9.8	4.8	4.0	4.1	7.0
2	7.6	11	9.0	6.1	e8.9	e9.0	5.1	8.8	5.8	3.7	4.4	6.2
3	7.9	10	8.8	e6.0	e8.9	e8.4	5.5	8.3	6.2	3.3	4.1	5.5
4	7.8	9.4	8.5	e6.0	e8.9	e8.0	6.6	8.1	5.6	6.0	3.6	5.1
5	7.1	8.8	8.1	e6.0	e8.9	e8.0	7.4	7.8	5.2	10	3.0	4.7
6	6.7	8.5	8.3	e5.8	e8.8	e8.0	6.9	7.7	6.8	10	2.5	4.4
7	6.6	8.3	7.6	e5.7	e8.8	e7.9	6.2	7.5	8.7	8.9	2.1	4.3
8	6.4	8.1	7.8	e5.7	e8.8	e7.7	5.6	7.6	9.2	7.1	2.0	4.1
9	6.2	7.8	7.6	e5.8	e8.7	e7.6	5.2	8.3	12	5.4	1.8	4.1
10	6.0	9.9	7.8	e6.0	e8.8	e7.4	4.9	12	15	4.5	1.6	3.8
11	5.9	20	8.2	e6.0	e9.0	e8.0	4.6	12	13	3.5	1.4	3.4
12	5.7	19	8.8	e6.0	e9.1	8.9	4.8	11	12	3.0	1.2	3.2
13	5.6	17	10	6.1	e8.9	9.5	5.0	10	11	2.6	1.2	3.1
14	5.7	15	12	6.7	e8.0	9.6	4.8	9.5	9.2	2.3	2.0	3.0
15	6.0	14	10	8.7	e8.0	9.3	6.8	11	8.0	2.4	4.5	3.1
16	5.9	12	9.4	8.7	e8.4	8.4	8.6	11	6.9	2.2	3.3	3.0
17	6.1	11	9.0	8.8	e8.2	7.5	7.3	10	6.9	1.9	2.3	3.0
18	6.1	11	8.6	11	e8.1	6.6	6.1	10	10	1.9	1.8	2.8
19	6.0	11	e8.0	13	e8.0	5.7	7.5	9.4	9.5	1.8	1.4	2.7
20	7.1	10	e7.4	13	e8.0	5.0	10	9.0	8.1	1.5	1.4	2.6
21	8.8	10	e6.3	13	e8.0	4.6	11	10	7.2	1.4	1.5	4.0
22	8.8	10	e6.3	12	e7.5	4.4	17	9.9	6.8	1.4	1.6	5.6
23	8.3	9.6	e6.2	9.6	e7.2	4.2	17	9.4	6.1	1.3	2.2	5.2
24	7.8	9.1	e6.1	11	e7.1	4.0	14	9.5	6.5	1.1	2.2	4.4
25	7.3	8.7	e6.0	11	e7.2	4.4	13	8.9	5.8	1.1	2.0	4.0
26	7.0	8.6	e6.0	10	e8.0	4.5	13	8.3	5.2	.99	2.0	4.1
27	8.5	9.0	6.0	e9.7	e10	4.4	11	7.8	4.6	.89	1.9	6.5
28	10	10	6.1	e9.2	e10	4.5	9.4	7.6	4.4	1.3	2.7	6.5
29	10	10	6.1	e9.1	e9.9	4.6	9.8	7.2	4.4	2.4	5.7	5.4
30	9.9	9.7	6.1	e9.0	---	4.4	10	6.0	4.3	2.3	7.6	4.6
31	10	---	6.3	e9.0	---	4.8	---	5.5	---	3.0	7.7	---
TOTAL	225.2	326.5	241.9	259.9	247.1	209.1	249.2	278.9	229.2	103.18	86.8	129.4
MEAN	7.26	10.9	7.80	8.38	8.52	6.75	8.31	9.00	7.64	3.33	2.80	4.31
MAX	10	20	12	13	10	9.8	17	12	15	10	7.7	7.0
MIN	5.6	7.8	6.0	5.7	7.1	4.0	4.6	5.5	4.3	.89	1.2	2.6
CFSM	.39	.58	.42	.45	.46	.36	.44	.48	.41	.18	.15	.23
IN.	.45	.65	.48	.52	.49	.42	.50	.55	.46	.21	.17	.26

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 1996, BY WATER YEAR (WY)

	MEAN	9.70	10.4	10.5	9.82	10.2	11.6	11.6	9.95	8.76	7.84	7.74	8.71
MAX	15.2	16.8	16.8	14.5	15.9	18.0	18.2	15.2	14.9	12.7	13.9	18.8	
(WY)	1970	1986	1992	1993	1971	1971	1975	1975	1969	1970	1975	1975	
MIN	3.39	3.54	5.04	5.16	6.25	6.75	7.32	4.18	2.36	2.35	2.49	3.17	
(WY)	1965	1965	1965	1965	1965	1996	1963	1965	1988	1964	1964	1964	

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1959 - 1996
ANNUAL TOTAL	3251.2	2586.38	
ANNUAL MEAN	8.91	7.07	9.73
HIGHEST ANNUAL MEAN			14.1
LOWEST ANNUAL MEAN			4.85
HIGHEST DAILY MEAN	39	Apr 17	40
LOWEST DAILY MEAN	2.7	Sep 2	.89
ANNUAL SEVEN-DAY MINIMUM	3.1	Aug 28	1.2
INSTANTANEOUS PEAK FLOW		21	41
INSTANTANEOUS PEAK STAGE		2.82	3.32
INSTANTANEOUS LOW FLOW		.88	.88
ANNUAL RUNOFF (CFSM)	.48	.38	.52
ANNUAL RUNOFF (INCHES)	6.47	5.15	7.07
10 PERCENT EXCEEDS	13	10	14
50 PERCENT EXCEEDS	8.0	7.2	9.4
90 PERCENT EXCEEDS	5.2	2.5	5.2

(a) Apr. 19, 1975, Dec. 7, 1992.

(b) July 26, 27, 28, 1996.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04108600 RABBIT RIVER NEAR HOPKINS, MI

LOCATION.--Lat 42°38'32", long 85°43'19", in SE1/4 sec.16, T.3 N., R.12 W., Allegan County, Hydrologic Unit 04050003, on left bank at downstream side of bridge on 18th Street, 2.5 mi northeast of Hopkins.

DRAINAGE AREA.--71.4 mi².

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 700 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	29	93	e36	e38	63	38	59	55	48	28	14
2	24	48	85	e35	e37	57	36	53	83	46	27	14
3	24	44	73	e34	e35	e52	36	50	84	47	26	13
4	26	36	66	e33	e34	e49	36	48	71	42	24	13
5	25	32	62	e32	e33	e47	37	44	65	40	22	13
6	26	30	57	e31	e32	e45	35	43	95	38	21	13
7	27	29	e50	e31	e43	e44	34	41	132	36	20	13
8	26	28	e46	e30	e70	e43	33	41	116	36	19	13
9	24	26	e44	e30	e100	e41	34	43	113	35	19	17
10	24	36	e42	e29	e80	e40	34	139	145	34	18	19
11	23	180	e40	e30	e70	e42	33	168	106	32	18	16
12	22	190	e41	e31	e60	80	37	100	134	32	19	16
13	21	132	e47	e32	e55	111	93	72	96	30	18	17
14	21	98	e60	e33	e50	e100	64	61	75	29	17	17
15	22	80	e85	e36	e45	e85	82	61	62	27	21	19
16	23	70	88	e40	e44	e75	111	63	55	26	20	19
17	21	69	70	e50	e43	e65	73	58	101	29	18	18
18	21	69	63	e150	e43	57	59	54	439	29	17	17
19	20	74	58	230	e45	53	68	48	602	26	17	17
20	24	93	47	136	e48	49	154	126	405	25	18	16
21	42	99	e44	e95	52	44	117	635	238	25	19	17
22	43	86	e42	e80	47	41	123	384	151	23	18	27
23	36	76	e41	e65	45	39	131	221	112	22	18	25
24	32	65	e40	e58	55	38	89	151	95	22	19	26
25	30	59	e40	e54	55	39	75	115	84	21	18	26
26	27	57	e39	e50	73	42	72	94	73	e21	17	25
27	31	63	e39	e47	106	38	62	82	66	e21	16	40
28	39	125	e38	e45	114	e40	55	75	61	e27	16	44
29	36	99	e37	e43	71	40	54	69	56	e35	15	37
30	31	80	e37	e42	---	38	60	63	51	34	15	31
31	29	---	e36	e40	---	37	---	59	---	31	15	---
TOTAL	843	2202	1650	1708	1623	1634	1965	3320	4021	969	593	612
MEAN	27.2	73.4	53.2	55.1	56.0	52.7	65.5	107	134	31.3	19.1	20.4
MAX	43	190	93	230	114	111	154	635	602	48	28	44
MIN	20	26	36	29	32	37	33	41	51	21	15	13
CFSM	.38	1.03	.75	.77	.78	.74	.92	1.50	1.88	.44	.27	.29
IN.	.44	1.15	.86	.89	.85	.85	1.02	1.73	2.09	.50	.31	.32

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1996, BY WATER YEAR (WY)

MEAN	41.6	60.7	73.9	65.7	74.2	109	95.4	62.9	55.3	33.5	28.8	33.9
MAX	119	171	131	146	152	227	152	124	138	99.0	86.8	123
(WY)	1987	1991	1976	1993	1976	1979	1993	1981	1986	1986	1994	1978
MIN	15.0	19.1	21.7	19.8	25.7	46.1	49.4	25.1	16.4	13.6	12.5	11.9
(WY)	1969	1972	1977	1970	1970	1969	1968	1977	1987	1987	1970	1969

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1966 - 1996

ANNUAL TOTAL	20984	21140	61.1
ANNUAL MEAN	57.5	57.8	89.3
HIGHEST ANNUAL MEAN			32.5
LOWEST ANNUAL MEAN			1993
HIGHEST DAILY MEAN	300	635	May 21
LOWEST DAILY MEAN	19	13	(a)
ANNUAL SEVEN-DAY MINIMUM	19	13	Sep 2
INSTANTANEOUS PEAK FLOW		700	May 21
INSTANTANEOUS PEAK STAGE		8.02	May 21
ANNUAL RUNOFF (CFSM)	.81	.81	(c)9.57
ANNUAL RUNOFF (INCHES)	10.93	11.01	.86
10 PERCENT EXCEEDS	97	100	11.63
50 PERCENT EXCEEDS	48	41	115
90 PERCENT EXCEEDS	23	19	43
			19

(a) Sept. 3-8.

(b) Aug. 27, 28, 1970, Sept. 18, 1971, Aug. 7, 1987.

(c) From floodmark.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04108800 MACATAWA RIVER NEAR ZEELAND, MI

LOCATION.--Lat 42°46'40", long 86°01'06", in NW1/4 sec.31, T.5 N., R.14 W., Ottawa County, Hydrologic Unit 04050002, on left bank 20 ft upstream from bridge on State Road, 0.2 mi downstream from South Branch, and 2.5 mi south of Zeeland.

DRAINAGE AREA.--65.8 mi².

PERIOD OF RECORD.--October 1960 to current year. Prior to October 1978, published as Black River near Zeeland.

GAGE.--Water-stage recorder. Datum of gage is 585.7 ft above sea level (levels by Gove Associates, Inc.).

REMARKS.--Records good except for estimated daily discharges, which are poor. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e4.2	10	304	e12	e22	e55	26	46	28	14	6.6	e1.6
2	e4.3	71	177	e11	e20	e45	23	30	45	14	6.0	e1.5
3	e5.0	48	95	e11	e18	e40	22	25	41	16	6.1	e1.4
4	e5.4	24	63	e10	e17	e37	23	22	31	12	5.6	e1.3
5	e5.5	16	55	e10	e16	e35	23	20	27	11	5.7	e1.5
6	e5.2	14	e42	e9.6	e15	e33	20	19	38	10	5.3	e1.7
7	e4.5	13	e35	e9.4	e15	e31	19	18	44	9.3	e4.9	e1.9
8	e4.2	13	e32	e9.0	e300	e29	18	18	34	9.1	e4.5	e2.2
9	e4.1	13	e29	e8.9	529	e28	17	22	56	8.3	e4.1	2.6
10	e4.1	92	e27	e8.8	405	e26	16	375	174	7.3	e3.8	2.5
11	e4.2	718	e26	e8.8	278	e25	15	309	90	7.2	e3.6	2.4
12	e4.3	558	e25	e8.8	e100	e47	22	97	166	7.0	e3.4	2.3
13	e4.4	276	e24	e10	e60	250	67	51	166	7.5	e3.2	2.2
14	e4.5	150	e35	e11	e45	420	34	38	41	7.9	e3.0	2.7
15	e5.5	99	121	e13	e40	282	119	37	31	15	e2.8	2.1
16	e6.2	76	141	17	e35	128	141	40	26	8.7	e2.6	1.9
17	e6.0	84	e90	82	e31	81	54	34	301	7.5	e2.4	1.8
18	e5.5	94	e55	661	e28	58	38	32	1280	12	e2.3	1.6
19	e5.4	130	e40	756	e27	47	55	26	1230	10	e2.7	1.6
20	e12	268	e30	e260	e26	38	132	574	487	8.0	e2.9	1.7
21	22	242	e24	e130	155	30	68	3130	185	6.8	e2.6	1.7
22	42	112	e21	e90	96	28	59	1080	111	6.5	e2.7	2.2
23	23	89	e20	e70	83	25	87	462	73	6.1	e2.8	2.4
24	10	59	e18	e55	155	25	44	241	50	5.5	e2.6	2.5
25	7.2	44	e17	e47	104	34	37	117	40	5.4	e2.4	2.3
26	6.2	46	e16	e42	154	29	64	88	31	5.3	e2.2	2.6
27	10	61	e15	e37	294	e21	38	64	26	5.1	e2.1	6.6
28	e22	164	e14	e33	225	23	28	52	22	5.6	e2.0	4.2
29	21	118	e13	e29	e75	24	27	44	18	7.6	e1.9	3.0
30	12	82	e13	e26	---	22	38	35	15	7.8	e1.8	2.3
31	9.5	---	e12	e24	---	24	---	30	---	7.5	e1.7	---
TOTAL	289.4	3784	1629	2510.3	3368	2020	1374	7176	4807	271.0	106.3	68.3
MEAN	9.34	126	52.5	81.0	116	65.2	45.8	231	160	8.74	3.43	2.28
MAX	42	718	304	756	529	420	141	3130	1280	16	6.6	6.6
MIN	4.1	10	12	8.8	15	21	15	18	15	5.1	1.7	1.3
CFSM	.14	1.92	.80	1.23	1.77	.99	.70	3.52	2.44	.13	.05	.03
IN.	.16	2.14	.92	1.42	1.90	1.14	.78	4.06	2.72	.15	.06	.04

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 1996, BY WATER YEAR (WY)

	MEAN	31.4	80.7	101	80.6	109	173	107	61.3	42.1	22.9	17.7	33.0
MAX	152	333	328	278	398	499	206	288	217	185	122	252	
(WY)	1987	1991	1983	1974	1985	1979	1993	1981	1980	1982	1994	1986	
MIN	2.56	2.98	3.99	2.89	6.71	37.6	21.2	8.89	3.10	1.94	2.03	2.09	
(WY)	1964	1977	1977	1977	1963	1981	1986	1968	1987	1965	1962	1963	

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1961 - 1996
ANNUAL TOTAL	22229.2	27403.3	
ANNUAL MEAN	60.9	74.9	71.4
HIGHEST ANNUAL MEAN			115
LOWEST ANNUAL MEAN			24.6
HIGHEST DAILY MEAN	1070	3130	4600
LOWEST DAILY MEAN	2.5	(e)1.3	1.2
ANNUAL SEVEN-DAY MINIMUM	2.7	1.5	1.2
INSTANTANEOUS PEAK FLOW		4340	7220
INSTANTANEOUS PEAK STAGE		14.33	15.81
INSTANTANEOUS LOW FLOW			.83
ANNUAL RUNOFF (CFSM)	.93	1.14	1.08
ANNUAL RUNOFF (INCHES)	12.57	15.49	14.73
10 PERCENT EXCEEDS	134	154	150
50 PERCENT EXCEEDS	25	23	20
90 PERCENT EXCEEDS	4.2	2.6	3.3

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04109000 GRAND RIVER AT JACKSON, MI

LOCATION.--Lat 42°17'05", long 84°24'30", in sec.22, T.2 S., R.1 W., Jackson County, Hydrologic Unit 04050004, on left bank on grounds of sewage-treatment plant, 1 mi north of Jackson, 2.2 mi upstream from Portage River, and at mile 216.

DRAINAGE AREA.--174 mi².

PERIOD OF RECORD.--April 1935 to current year.

REVISED RECORDS.--WSP 974: 1937(M). WSP 1387: 1936. WSP 1727: 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft above sea level (Fargo Engineering Co. bench mark). Prior to Sept. 24, 1935, nonrecording gage at same site and datum.

REMARKS.--Records good. Slight regulation by mills upstream from station. Flow includes about 20 ft³/s as sewage effluent, which originates from ground-water sources, from the City of Jackson. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	91	151	166	86	131	299	175	260	89	97	67	52
2	58	195	161	86	117	277	169	250	90	89	63	52
3	94	178	165	81	112	158	166	243	91	83	62	53
4	82	175	199	87	106	138	162	238	92	77	60	53
5	110	168	203	87	103	156	157	232	88	73	62	52
6	117	172	128	84	102	179	157	226	129	69	62	52
7	113	169	96	83	101	167	151	214	112	66	61	52
8	139	163	91	80	110	156	149	202	143	65	75	50
9	117	158	89	83	107	154	145	209	205	61	60	91
10	79	196	81	83	101	150	142	274	204	63	56	60
11	74	297	89	82	93	153	139	281	210	63	53	64
12	73	277	87	83	88	147	144	275	209	62	54	60
13	71	275	82	83	90	148	149	272	203	75	55	59
14	66	273	111	87	97	153	154	265	153	59	54	64
15	99	279	103	85	93	161	177	246	129	64	54	61
16	100	262	100	85	87	160	179	217	149	60	51	63
17	69	214	94	125	90	158	182	212	157	59	49	63
18	65	199	99	151	83	171	191	188	261	59	47	62
19	63	175	102	228	92	167	211	143	232	59	72	61
20	82	133	97	212	97	222	266	139	253	55	84	61
21	98	128	100	222	101	232	258	189	218	53	59	62
22	98	140	95	239	96	226	328	199	157	55	63	70
23	99	140	94	239	99	173	326	191	144	61	108	64
24	99	136	92	204	106	167	327	181	174	69	70	64
25	96	152	91	159	106	197	330	171	206	63	62	63
26	96	150	85	165	147	200	324	164	156	58	63	70
27	170	174	91	177	272	194	314	153	135	54	63	106
28	137	176	90	139	298	195	277	148	127	67	61	84
29	128	170	86	147	304	202	252	140	132	67	60	74
30	130	169	86	124	---	199	285	126	147	62	58	79
31	138	---	87	134	---	187	---	100	---	70	55	---
TOTAL	3051	5644	3340	4010	3529	5646	6386	6348	4795	2037	1923	1921
MEAN	98.4	188	108	129	122	182	213	205	160	65.7	62.0	64.0
MAX	170	297	203	239	304	299	330	281	261	67	108	106
MIN	58	128	81	80	83	138	139	100	88	53	47	50
CFSM	.57	1.08	.62	.74	.70	1.05	1.22	1.18	.92	.38	.36	.37
IN.	.65	1.21	.71	.86	.75	1.21	1.37	1.36	1.03	.44	.41	.41

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1935 - 1996, BY WATER YEAR (WY)

	MEAN	79.5	106	115	123	143	221	226	165	129	84.8	66.9	66.1
MAX	214	305	210	343	301	501	589	484	433	349	193	222	
(WY)	1991	1993	1993	1993	1976	1976	1950	1943	1943	1968	1995	1975	
MIN	23.4	25.5	27.7	27.2	31.5	73.2	64.3	54.7	34.3	19.5	15.1	25.2	
(WY)	1964	1964	1964	1964	1964	1964	1935	1936	1936	1936	1936	1963	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1935 - 1996

ANNUAL TOTAL	53118						48630						
ANNUAL MEAN	146						133						
HIGHEST ANNUAL MEAN										128			
LOWEST ANNUAL MEAN										216			1993
HIGHEST DAILY MEAN	426						330		Apr 25	971		Jun 3	1943
LOWEST DAILY MEAN	54						47		Aug 18	12		Aug 23	1936
ANNUAL SEVEN-DAY MINIMUM	57						52		Aug 12	14		Aug 4	1936
INSTANTANEOUS PEAK FLOW							428		Feb 27	(a)1070		Jun 25	1937
INSTANTANEOUS PEAK STAGE							11.36		Feb 27	15.44		Jun 25	1968
INSTANTANEOUS LOW FLOW							42		(b)	9.2		Aug 22	1936
ANNUAL RUNOFF (CFSM)	.84						.76			.73			
ANNUAL RUNOFF (INCHES)	11.36						10.40			9.96			
10 PERCENT EXCEEDS	257						234			258			
50 PERCENT EXCEEDS	128						111			95			
90 PERCENT EXCEEDS	68						60			39			

(a) Gage height 13.50 ft.

(b) Aug. 18, 19.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04111000 GRAND RIVER NEAR EATON RAPIDS, MI

LOCATION.--Lat 42°32'05", long 84°37'23", in NE1/4 sec.26, T.2 N., R.3 W., Eaton County, Hydrologic Unit 04050004, on right bank 400 ft upstream from bridge on Petrieville Highway, 2 mi northeast of Eaton Rapids, 2.5 mi downstream from Spring Brook, 25 mi upstream from Red Cedar River, and at mile 178.

DRAINAGE AREA.--661 mi².

PERIOD OF RECORD.--October 1950 to September 1982, October 1995 to September 1996. Gage-height records collected in this vicinity 1905-28 (flood seasons only) are contained in reports of the National Weather Service.

REVISED RECORDS.--WSP 1707: 1951 (M).

GAGE.--Water-stage recorder. Datum of gage is 852.68 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except for estimated daily discharges, which are fair. Diurnal fluctuation caused by powerplant at Smithville Dam and mills at Eaton Rapids. Several measurements of water temperature were made during the year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 4, 1950, reached a stage of 8.15 ft, discharge, 3,860 ft³/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e200	e390	596	e300	e300	925	686	1010	517	532	182	127
2	e190	e410	580	e300	e280	985	655	1030	490	490	186	126
3	e175	e430	581	e280	e260	e760	672	1010	397	462	184	127
4	e170	e450	552	e260	e250	e700	644	959	407	414	181	125
5	e210	e470	544	e240	e240	780	633	881	396	299	170	125
6	e240	e490	514	e235	e230	e660	605	841	405	274	141	119
7	e250	e500	506	e230	e220	e530	589	821	484	251	168	121
8	e260	e450	e450	e225	e250	e480	562	747	541	244	183	123
9	e270	e430	e330	e220	e350	e460	540	757	572	225	181	128
10	e250	e600	e300	e220	e430	e450	516	899	622	222	170	122
11	e230	e800	e290	e220	456	e460	505	1010	655	201	170	192
12	e210	e900	e300	e215	440	460	496	1040	649	192	138	185
13	e190	e940	e340	e215	397	536	568	1050	643	184	129	167
14	e180	e970	e380	e220	306	620	541	996	599	198	129	164
15	e190	e1000	e450	e230	e280	636	553	922	549	212	131	160
16	e180	e900	e470	e270	e320	668	601	894	515	210	135	159
17	e160	e850	486	309	e280	655	620	865	507	200	133	160
18	e170	e780	449	658	e270	621	613	856	852	203	126	155
19	e185	e750	396	1020	e260	610	626	833	1590	193	132	150
20	e200	e700	367	1050	286	606	680	786	1590	187	185	148
21	e210	e670	326	915	395	592	821	961	1450	184	213	151
22	e220	e650	302	863	468	580	954	1060	1230	181	251	165
23	e230	e630	352	891	443	592	1090	1010	1070	184	243	167
24	e240	e610	366	921	423	606	1130	906	939	155	195	177
25	e250	e600	309	819	438	622	1150	809	835	158	229	178
26	e270	e600	e275	710	519	643	1110	736	763	161	210	175
27	e300	e600	e285	e640	798	663	1050	716	704	167	157	169
28	e370	e600	e260	e560	973	687	975	674	680	165	154	168
29	e420	609	e260	e480	933	705	956	644	606	176	135	251
30	e410	602	e280	e400	---	683	982	604	552	226	132	258
31	e400	---	e290	e340	---	678	---	538	---	218	127	---
TOTAL	7430	19381	12166	14456	11495	19653	22123	26865	21789	7348	5200	4742
MEAN	240	646	392	466	396	634	737	867	726	237	168	158
MAX	420	1000	596	1050	973	985	1150	1060	1590	532	251	258
MIN	160	390	260	215	220	450	496	538	396	155	126	119
CFSM	.36	.98	.59	.71	.60	.96	1.12	1.31	1.10	.36	.25	.24
IN.	.42	1.09	.68	.81	.65	1.11	1.25	1.51	1.23	.41	.29	.27

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1951 - 1996, BY WATER YEAR (WY)

	MEAN	241	336	426	453	551	925	939	640	403	268	189	188
MAX	875	670	877	1406	1280	1932	1561	1848	1041	1234	579	800	
(WY)	1955	1952	1976	1952	1971	1974	1974	1956	1968	1968	1968	1975	
MIN	64.6	94.7	86.0	96.5	111	223	378	200	138	94.7	78.8	64.6	
(WY)	1964	1964	1964	1963	1964	1964	1964	1958	1964	1965	1963	1963	

SUMMARY STATISTICS

FOR 1996 WATER YEAR

WATER YEARS 1951 - 1996

ANNUAL TOTAL	172648		
ANNUAL MEAN	472		463
HIGHEST ANNUAL MEAN			769
LOWEST ANNUAL MEAN			147
HIGHEST DAILY MEAN	1590	Jun 19	3400
LOWEST DAILY MEAN	119	Sep 6	21
ANNUAL SEVEN-DAY MINIMUM	123	Sep 4	52
INSTANTANEOUS PEAK FLOW	1650	Jun 19	(a)3500
INSTANTANEOUS PEAK STAGE	5.05	Jun 19	8.19
INSTANTANEOUS LOW FLOW	73	Sep 10	14
ANNUAL RUNOFF (CFSM)	.71		.70
ANNUAL RUNOFF (INCHES)	9.72		9.51
10 PERCENT EXCEEDS	921		997
50 PERCENT EXCEEDS	426		315
90 PERCENT EXCEEDS	164		115

(a) Gage height 7.52 ft.

(b) Dec. 20, 1962, Oct. 14, 1966.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04111500 DEER CREEK NEAR DANSVILLE, MI

LOCATION.--Lat 42°36'30", long 84°19'15", in SE1/4 NE1/4 sec.33, T.3 N., R.1 E., Ingham County, Hydrologic Unit 04050004, on right bank 15 ft upstream from bridge on Clark Road, 3.5 mi north of Dansville, and 7.2 mi upstream from mouth.

DRAINAGE AREA.--16.3 mi².

PERIOD OF RECORD.--May 1954 to current year.

REVISED RECORDS.--WSP 1727: 1954(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 889.08 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.64	2.5	7.9	4.9	e4.6	27	11	30	5.3	3.8	1.2	.37
2	.68	4.5	7.3	4.2	e4.2	11	10	20	5.6	3.4	1.1	.35
3	.88	5.0	7.1	3.8	e3.8	10	10	17	5.2	3.1	.98	.31
4	1.2	3.8	6.6	e3.5	e3.4	8.4	9.9	15	4.8	2.6	.89	.32
5	1.1	3.1	6.3	e3.0	e3.0	8.3	8.9	13	4.7	2.4	.79	.29
6	2.2	2.9	6.2	e3.2	e3.5	6.9	8.5	12	7.1	2.2	.74	.28
7	1.9	3.0	4.5	e3.1	e4.0	e6.3	7.9	10	8.2	2.0	.70	.39
8	1.6	2.7	3.8	e3.0	16	e6.0	7.4	9.8	6.4	1.9	.75	.45
9	1.5	2.4	3.9	e3.0	22	e5.9	6.8	15	11	1.9	.64	.64
10	1.3	2.9	4.2	e3.1	19	e5.9	6.6	65	12	1.8	.63	.72
11	1.2	31	e4.0	e3.1	14	6.0	6.6	56	8.6	1.6	.63	.51
12	1.2	32	e4.1	e3.1	6.9	15	7.8	34	7.4	1.6	.64	.47
13	1.1	16	e6.0	e3.2	e4.6	22	19	24	6.8	1.5	.54	.49
14	1.1	12	10	e3.3	e4.5	18	16	19	5.5	1.4	.54	.70
15	1.2	9.3	14	e3.5	e4.4	16	15	16	4.6	1.9	.50	.73
16	1.2	8.0	10	e5.4	e4.3	13	18	15	4.1	1.6	.47	.63
17	1.1	7.2	8.0	28	e4.1	11	15	14	9.0	1.3	.48	.57
18	1.1	6.9	6.9	e50	e3.9	11	13	13	105	1.4	.38	.53
19	1.1	6.9	6.1	e52	e8.0	11	13	11	135	1.5	.48	.46
20	1.3	9.3	5.1	41	12	10	28	9.9	59	1.3	.63	.43
21	1.9	11	5.1	29	29	10	24	58	34	1.1	.80	.47
22	1.7	8.7	5.1	15	15	9.6	24	33	23	1.1	.69	.81
23	1.6	7.6	5.1	10	14	10	30	21	16	1.1	1.1	.64
24	1.5	6.5	4.9	e9.2	19	15	21	17	15	1.0	.75	.64
25	1.4	5.7	4.7	e8.5	13	22	17	13	13	.96	.58	.57
26	1.4	5.6	4.5	e7.8	13	16	17	11	9.7	.89	.50	.56
27	2.9	6.3	4.3	e7.2	61	19	14	9.7	8.1	.89	.49	.88
28	4.1	11	4.2	e6.7	52	13	12	8.9	6.8	.89	.55	.95
29	2.8	9.1	3.7	e6.2	33	14	12	7.5	5.7	1.3	.46	.84
30	2.4	7.7	4.1	e5.6	---	13	38	6.6	4.6	1.3	.42	.72
31	2.3	---	4.9	e5.0	---	12	---	5.9	---	1.3	.40	---
TOTAL	48.60	250.6	182.6	337.9	399.2	382.3	447.4	610.3	551.2	52.03	20.45	16.72
MEAN	1.57	8.35	5.89	10.9	13.8	12.3	14.9	19.7	18.4	1.68	.66	.56
MAX	4.1	32	14	52	61	27	38	65	135	3.8	1.2	.95
MIN	.64	2.4	3.7	3.0	3.0	5.9	6.6	5.9	4.1	.89	.38	.28
CFSM	.10	.51	.36	.87	.84	.76	.91	1.21	1.13	.10	.04	.03
IN.	.11	.57	.42	.77	.91	.87	1.02	1.39	1.26	.12	.05	.04

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954 - 1996, BY WATER YEAR (WY)

	MEAN	5.64	9.53	12.3	11.0	16.3	29.7	24.3	12.4	8.77	4.01	2.53	3.00
MAX	33.8	45.1	32.7	40.1	52.3	70.6	64.8	57.2	43.3	30.5	17.1	20.6	
(WY)	1960	1993	1973	1974	1985	1982	1975	1956	1968	1957	1992	1992	
MIN	.35	.65	.48	.88	1.65	3.00	5.93	2.58	1.03	.39	.19	.25	
(WY)	1964	1964	1964	1977	1963	1964	1963	1958	1988	1965	1971	1979	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1954 - 1996

ANNUAL TOTAL	3803.24	3299.30	11.6	
ANNUAL MEAN	10.4	9.01	22.8	1993
HIGHEST ANNUAL MEAN			1.86	1964
LOWEST ANNUAL MEAN			720	Apr 19 1975
HIGHEST DAILY MEAN	131	Mar 12		Sep 9 1978
LOWEST DAILY MEAN	.64	Oct 1	.28	Sep 1 1978
ANNUAL SEVEN-DAY MINIMUM	.73	Sep 10	.33	Sep 5 1978
INSTANTANEOUS PEAK FLOW			215	Jun 18 1975
INSTANTANEOUS PEAK STAGE			6.73	Jun 18 1975
INSTANTANEOUS LOW FLOW			.25	(c)
ANNUAL RUNOFF (CFSM)	.64		.55	.71
ANNUAL RUNOFF (INCHES)	8.68		7.53	9.63
10 PERCENT EXCEEDS	21		19	26
50 PERCENT EXCEEDS	6.3		5.1	4.6
90 PERCENT EXCEEDS	1.1		.64	.70

(a) From rating curve extended above 610 ft³/s.

(b) From floodmark.

(c) Sept. 5, 6.

(d) Sept. 8, 9, 12, 1978.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04112000 SLOAN CREEK NEAR WILLIAMSTON, MI

LOCATION.--Lat 42°40'33", long 84°21'50", in SE1/4 NE1/4 sec.1, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, on left bank 30 ft downstream from culvert on Meridian Road, 2.1 mi upstream from mouth, and 4.2 mi west of Williamston.

DRAINAGE AREA.--9.34 mi².

PERIOD OF RECORD.--June 1954 to current year.

GAGE.--Water-stage recorder and concrete control with V-notch sharp-crested weir. Datum of gage is 862.12 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except for estimated daily discharges, which are fair. At times, low flow is affected by pumpage for irrigation. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e.18	.52	2.6	1.0	e.12	5.0	3.2	15	2.3	2.5	.62	.16
2	e.18	.76	2.2	.95	e.99	3.8	3.0	9.2	2.3	2.3	.57	.15
3	e.20	.67	2.2	.84	e.82	3.2	3.0	7.5	2.1	2.0	.50	.15
4	e.24	.56	1.9	.69	e.66	2.5	3.0	6.4	1.9	1.7	.44	.15
5	e.24	.52	1.8	.56	e.61	2.7	2.8	5.4	1.7	1.5	.39	.14
6	e.37	.50	1.6	e.53	e.69	2.3	2.8	4.7	2.2	1.3	.35	.15
7	e.33	.57	1.4	e.53	.84	2.2	2.6	4.2	2.2	1.2	e.34	e.19
8	e.28	.52	1.2	e.55	7.0	1.9	2.4	3.8	1.9	1.2	e.41	e.20
9	e.26	.48	1.2	e.61	7.0	1.6	2.3	4.2	2.4	1.1	e.31	e.19
10	e.26	.70	1.1	e.69	6.5	1.4	2.2	25	2.6	.99	e.28	e.19
11	.25	7.1	e.99	e.66	5.1	1.8	2.1	26	2.2	.85	e.26	.16
12	.25	5.6	.95	.70	2.5	e5.6	2.9	15	2.1	.79	e.26	.16
13	.23	3.2	.95	.74	1.8	e5.8	20	e9.5	1.9	.75	e.23	.16
14	e.22	2.4	2.2	.77	1.8	e5.3	12	e7.3	1.6	.68	e.23	.21
15	e.24	2.0	3.8	.72	1.6	e4.5	10	e6.4	1.4	.91	e.22	.22
16	e.23	1.7	2.7	.68	1.4	e3.6	13	e5.8	1.3	.74	e.22	.20
17	e.22	1.5	2.1	8.2	1.3	e3.2	8.9	e5.1	5.3	.62	e.22	.18
18	e.22	1.4	2.0	16	1.2	e3.3	7.0	4.6	198	.69	e.19	e.18
19	e.22	1.4	1.8	27	1.2	e3.3	6.8	4.0	125	.68	e.20	e.17
20	e.28	2.2	1.5	8.8	4.1	e3.3	14	3.9	55	.57	e.22	e.16
21	e.37	3.1	1.4	5.0	e9.5	e2.8	10	31	34	.52	e.23	e.18
22	e.34	2.3	1.3	4.0	3.9	e2.6	11	14	24	.53	.22	e.19
23	e.32	2.0	1.3	3.7	3.6	e2.6	14	8.5	17	.56	e.28	e.18
24	e.29	1.6	1.2	e3.4	6.9	e4.5	9.9	6.8	15	.56	.21	e.19
25	e.28	1.5	1.2	3.2	5.2	e6.3	7.7	5.3	10	.42	.20	e.19
26	e.28	1.4	1.1	2.8	7.2	4.4	7.2	4.6	7.4	.41	e.20	e.20
27	e.75	1.8	1.0	e2.7	27	3.8	5.5	4.0	5.7	.43	e.21	e.33
28	.74	4.3	.95	2.7	20	3.5	4.6	3.5	4.4	.42	.21	.35
29	.54	3.0	.89	2.3	8.7	3.5	4.6	3.0	3.6	.58	.19	.30
30	.49	2.6	.91	1.9	---	3.3	24	2.6	2.9	.97	.18	.26
31	.48	---	1.0	1.5	---	3.4	---	2.4	---	.72	.17	---
TOTAL	9.78	57.90	48.44	104.42	140.31	107.0	222.5	258.7	539.4	29.19	8.76	5.84
MEAN	.32	1.93	1.56	3.37	4.84	3.45	7.42	8.35	18.0	.94	.28	.19
MAX	.75	7.1	3.8	27	27	6.3	24	31	198	2.5	.62	.35
MIN	.18	.48	.89	.53	.61	1.4	2.1	2.4	1.3	.41	.17	.14
CFSM	.03	.21	.17	.36	.52	.37	.79	.89	1.93	.10	.03	.02
IN.	.04	.23	.19	.42	.56	.43	.89	1.03	2.15	.12	.03	.02

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954 - 1996, BY WATER YEAR (WY)

	MEAN	2.82	4.37	6.00	5.18	8.00	16.6	13.1	5.91	4.67	1.97	1.16	1.40
MAX	20.9	21.9	24.9	21.4	28.4	39.9	47.2	37.6	35.3	26.5	8.15	7.19	
(WY)	1960	1993	1973	1974	1985	1982	1975	1956	1968	1957	1980	1993	
MIN	.087	.13	.11	.11	.12	.78	1.45	.94	.25	.074	.10	.086	
(WY)	1964	1964	1964	1963	1963	1964	1963	1955	1988	1988	1987	1955	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1954 - 1996

ANNUAL TOTAL	1667.76	1532.24	
ANNUAL MEAN	4.57	4.19	5.92
HIGHEST ANNUAL MEAN			10.5
LOWEST ANNUAL MEAN			.72
HIGHEST DAILY MEAN	71	198	536
LOWEST DAILY MEAN	.18	.14	.02
ANNUAL SEVEN-DAY MINIMUM	.19	.15	.03
INSTANTANEOUS PEAK FLOW		283	(b)1290
INSTANTANEOUS PEAK STAGE		4.90	9.99
INSTANTANEOUS LOW FLOW		.12	.01
ANNUAL RUNOFF (CFSM)	.49	.45	.63
ANNUAL RUNOFF (INCHES)	6.64	6.10	8.61
10 PERCENT EXCEEDS	9.9	7.8	14
50 PERCENT EXCEEDS	2.0	1.5	1.7
90 PERCENT EXCEEDS	.26	.21	.19

(a) 1973, 1993.

(b) From rating curve extended above 660 ft³/s on basis of computation of peak flow through culvert and over road embankment.

(c) Sept. 11, 1954, Jan. 18, 1957, Aug. 3, 1988.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04112500 RED CEDAR RIVER AT EAST LANSING, MI

LOCATION.--Lat 42°43'40", long 84°28'40", in SW1/4 sec.18, T.4 N., R.1 W., Ingham County, Hydrologic Unit 04050004, in left downstream bridge abutment of Farm Lane Bridge on Michigan State University Campus in East Lansing, 4.0 mi upstream from Sycamore Creek, and 5.6 mi upstream from mouth.

DRAINAGE AREA.--355 mi².

PERIOD OF RECORD.--August 1902 to December 1903, March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Red Cedar River at Agricultural College, August 1902 to December 1903 and as Cedar River at East Lansing, March 1931 to September 1965. Gage-height records collected in this vicinity 1911-19, and 1920-28 (flood seasons only), are contained in reports of the National Weather Service.

REVISÉD RECORDS.--WSP 1307: 1936(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 824.39 ft above sea level. August 1902 to December 1903 nonrecording gage at site 0.8 mi downstream at different datum. March 1931 to November 1940 water-stage recorder at site 250 ft upstream at present datum.

REMARKS.--Records good. Prior to April 1975, occasional regulation at low flow by mill at Williamston, 16 mi upstream from station. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 24, 1904, reached a stage of 13.4 ft, discharge, 8,000 ft³/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e31	80	165	83	119	352	252	517	176	143	67	33
2	29	90	161	85	98	343	235	496	174	136	66	31
3	38	102	154	82	88	185	223	443	177	136	61	29
4	41	115	149	71	89	174	217	396	177	127	56	29
5	51	109	143	73	87	197	213	348	174	110	51	30
6	64	99	135	66	81	158	204	302	196	100	47	32
7	66	95	90	63	73	125	194	264	216	92	65	33
8	63	93	97	61	82	130	183	240	228	86	73	35
9	58	95	101	61	158	138	172	239	241	83	51	41
10	55	111	89	62	222	119	164	358	252	81	45	39
11	52	237	92	62	223	116	165	632	252	77	42	40
12	49	378	90	62	185	134	178	685	226	73	41	42
13	47	394	86	63	136	225	353	595	215	70	40	38
14	44	331	106	66	116	308	466	502	220	67	39	44
15	43	272	136	69	106	285	436	431	202	74	38	45
16	44	225	162	68	96	261	433	374	167	78	35	43
17	48	190	150	94	89	227	387	322	218	76	35	41
18	53	171	132	250	90	205	327	287	934	75	34	38
19	56	160	124	524	85	198	300	261	1760	76	44	36
20	68	160	111	533	95	191	397	268	1940	74	40	34
21	73	183	100	392	176	176	465	571	1520	70	39	35
22	76	190	97	324	257	170	485	732	1060	66	42	41
23	e69	172	93	283	215	178	518	656	768	63	59	44
24	e57	152	93	246	209	182	522	552	616	60	45	49
25	51	135	93	204	243	259	481	463	523	58	43	44
26	51	129	90	174	253	400	445	378	391	55	38	47
27	74	139	83	203	355	377	396	305	283	55	35	50
28	87	180	80	172	618	364	340	261	225	56	34	47
29	96	198	85	168	529	332	298	233	191	67	35	51
30	89	184	79	148	---	299	393	206	165	91	35	52
31	81	---	80	124	---	269	---	188	---	81	36	---
TOTAL	1804	5169	3446	4936	5173	7077	9842	12505	13887	2556	1411	1193
MEAN	58.2	172	111	159	178	228	328	403	463	82.5	45.5	39.8
MAX	96	394	165	533	618	400	522	732	1940	143	73	52
MIN	29	80	79	61	73	116	164	188	165	55	34	29
CFSM	.16	.49	.31	.45	.50	.64	.92	1.14	1.30	.23	.13	.11
IN.	.19	.54	.36	.52	.54	.74	1.03	1.31	1.46	.27	.15	.13

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1902 - 1996, BY WATER YEAR (WY)

MEAN	105	146	183	209	281	502	473	284	181	90.4	60.6	74.6
MAX	571	735	494	739	1024	1162	1494	1310	627	578	366	426
(WY)	1982	1993	1995	1993	1938	1948	1947	1956	1968	1994	1992	1903
MIN	14.8	21.2	20.5	29.0	28.6	58.6	62.3	52.9	20.4	5.70	9.24	14.6
(WY)	1935	1964	1964	1940	1940	1934	1931	1931	1934	1934	1934	1939

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1902 - 1996

ANNUAL TOTAL	81025		68999			
ANNUAL MEAN	222		189		217	
HIGHEST ANNUAL MEAN					431	1993
LOWEST ANNUAL MEAN					43.3	1964
HIGHEST DAILY MEAN	1530	Mar 14	1940	Jun 20	5720	Apr 20 1975
LOWEST DAILY MEAN	29	Oct 2	29	Oct 2	3.0	Jul 31 1981
ANNUAL SEVEN-DAY MINIMUM	35	Sep 27	31	Sep 1	3.9	Jul 15 1984
INSTANTANEOUS PEAK FLOW			2020	Jun 20	5940	Apr 20 1975
INSTANTANEOUS PEAK STAGE			7.13	Jun 20	11.95	Apr 20 1975
INSTANTANEOUS LOW FLOW			27	(a)	3.0	Jul 31 1981
ANNUAL RUNOFF (CFSM)	.63		.53		.61	
ANNUAL RUNOFF (INCHES)	8.49		7.23		8.30	
10 PERCENT EXCEEDS	491		396		507	
50 PERCENT EXCEEDS	153		121		104	
90 PERCENT EXCEEDS	50		41		29	

(a) Oct. 2, 3, Sept. 3.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04112850 SYCAMORE CREEK NEAR HOLT, MI

LOCATION.--Lat 42°38'25", long 84°28'58", in SW1/4 SW1/4 sec.18, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, on left bank 15 ft downstream from bridge on Holt Road, 1.6 mi east of Holt.

DRAINAGE AREA.--80.6 mi².

PERIOD OF RECORD.--April 1975 to September 1980, May 1989 to September 1990, October 1994 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 850 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	21	47	e23	e28	96	50	139	35	35	18	9.3
2	14	30	45	e23	e26	64	44	97	36	32	16	9.5
3	17	30	42	e23	e25	48	42	78	35	31	16	9.4
4	19	26	41	e21	e24	55	44	70	33	28	15	9.3
5	15	22	40	e19	e23	46	42	62	34	26	13	8.8
6	24	20	35	e18	e22	e39	39	58	42	24	13	8.4
7	18	21	e25	e18	e20	e36	38	53	47	23	12	9.1
8	15	20	e27	e17	e25	e35	36	50	40	22	19	10
9	14	18	e28	e17	e45	e33	34	55	53	23	13	18
10	15	20	e25	e16	e60	e33	33	155	64	21	12	13
11	14	99	e26	e17	e60	e35	33	252	51	20	12	11
12	13	167	e25	e17	e37	49	39	169	45	19	12	11
13	12	111	e24	e17	e34	77	94	114	40	19	11	12
14	13	75	e31	e17	e31	71	79	91	36	18	11	13
15	14	58	e45	e18	e28	64	73	80	33	22	11	16
16	13	51	e42	e21	e26	54	89	75	29	19	10	13
17	13	48	e40	57	e25	48	76	69	41	18	10	13
18	13	45	e36	145	e24	46	65	64	270	18	9.7	12
19	13	44	e32	233	e23	46	65	57	568	19	12	11
20	16	48	e30	187	e30	43	96	52	484	17	12	10
21	24	57	e28	130	87	43	108	162	326	16	12	12
22	19	52	e27	75	66	43	100	171	220	16	12	16
23	17	46	e26	57	48	41	131	101	144	15	15	14
24	18	40	e25	61	51	47	107	82	115	14	12	14
25	18	38	e25	51	48	60	86	66	93	14	10	12
26	19	36	e24	52	50	58	82	58	72	13	9.9	12
27	29	37	e24	54	131	51	69	53	60	13	9.7	19
28	31	64	e23	51	277	49	59	50	52	12	10	15
29	24	57	e23	46	137	47	57	45	45	16	9.7	13
30	21	49	e23	34	---	46	120	43	40	26	9.6	12
31	20	---	e23	e31	---	52	---	38	---	20	9.9	---
TOTAL	540	1450	957	1566	1511	1555	2030	2709	3183	629	377.5	365.8
MEAN	17.4	48.3	30.9	50.5	52.1	50.2	67.7	87.4	106	20.3	12.2	12.2
MAX	31	167	47	233	277	96	131	252	568	35	19	19
MIN	12	18	23	16	20	33	33	38	29	12	9.6	8.4
CFSM	.22	.60	.38	.63	.65	.62	.84	1.08	1.32	.25	.15	.15
IN.	.25	.67	.44	.72	.70	.72	.94	1.25	1.47	.29	.17	.17

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 1996, BY WATER YEAR (WY)

	MEAN	20.3	42.6	51.5	49.2	62.2	139	130	63.8	49.1	20.8	24.9	27.8
MAX	54.0	121	119	114	188	222	324	99.8	135	45.2	90.1	88.0	
(WY)	1995	1995	1976	1990	1976	1976	1975	1976	1989	1976	1980	1980	
MIN	8.20	13.0	10.9	10.1	19.0	50.2	67.7	26.5	17.1	8.76	6.85	5.90	
(WY)	1980	1977	1977	1977	1979	1996	1996	1977	1978	1977	1977	1979	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1975 - 1996

ANNUAL TOTAL	20676	16873.3	53.1	
ANNUAL MEAN	56.6	46.1	76.4	1976
HIGHEST ANNUAL MEAN			26.4	1977
LOWEST ANNUAL MEAN				
HIGHEST DAILY MEAN	516	Mar 12	568	Jun 19
LOWEST DAILY MEAN	12	Sep 30	8.4	Sep 6
ANNUAL SEVEN-DAY MINIMUM	13	Oct 12	9.1	Sep 1
INSTANTANEOUS PEAK FLOW			592	Jun 19
INSTANTANEOUS PEAK STAGE			7.50	Jun 19
INSTANTANEOUS LOW FLOW			7.7	Sep 6
ANNUAL RUNOFF (CFSM)	.70		.57	
ANNUAL RUNOFF (INCHES)	9.54		7.79	
10 PERCENT EXCEEDS	107		90	124
50 PERCENT EXCEEDS	40		31	27
90 PERCENT EXCEEDS	17		12	10

(a) Sept. 29, Oct. 1, 1979.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04113000 GRAND RIVER AT LANSING, MI

LOCATION.--Lat 42°45'02", long 84°33'19", in NW1/4 sec.9, T.4 N., R.2 W., Ingham County, Hydrologic Unit 04050004, on right bank 30 ft upstream from bridge on North Grand River Avenue in Lansing, 2.0 mi downstream from Red Cedar River, and at mile 152.

DRAINAGE AREA.--1,230 mi², approximately.

PERIOD OF RECORD.--March 1901 to September 1906, October 1934 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "at North Lansing" 1901-6. Gage-height records collected in this vicinity 1907-10 (flood seasons only), 1911-19, 1920-28 (flood seasons only), and since 1931 are contained in reports of the National Weather Service.

REVISED RECORDS.--WSP 1174: 1949. WSP 1387: 1901, 1903-4, 1935, 1937, 1942.

GAGE.--Water-stage recorder. Datum of gage is 805.53 ft above sea level (levels by Michigan Department of Natural Resources). Prior to August 1906, nonrecording gage at same site at different datum. November 1934 to June 1949 water-stage recorder at site 1.8 mi downstream at datum 2.42 ft lower.

REMARKS.--Records good. Large diurnal fluctuation at low and medium flow caused by powerplants upstream from station. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	275	565	856	454	479	1420	1110	1820	716	756	290	184
2	265	576	882	471	443	1610	1030	1810	713	741	276	182
3	254	641	886	410	e440	1190	1030	1780	639	587	227	293
4	259	664	819	396	e425	1050	1010	1640	597	664	319	319
5	282	660	781	307	398	1170	1000	1490	561	543	288	148
6	406	681	776	321	379	1000	947	1330	682	448	221	162
7	342	712	648	386	358	764	923	1250	629	420	467	173
8	386	662	617	e380	409	710	832	1250	759	333	590	176
9	393	564	584	300	576	785	834	1150	894	447	226	196
10	409	773	400	373	738	686	766	1560	935	336	354	188
11	325	1350	532	257	787	756	811	2040	944	384	197	183
12	349	1540	375	375	718	871	875	2090	966	277	231	319
13	254	1630	556	292	616	989	1280	2000	835	332	235	260
14	253	1520	593	397	509	1130	1350	1780	891	291	201	286
15	307	1520	681	343	457	1160	1320	1650	781	333	172	248
16	275	1330	756	373	509	1090	1320	1480	671	370	192	202
17	191	1270	735	446	450	1050	1320	1430	1040	264	252	212
18	341	1120	713	810	444	998	1180	1280	3090	396	232	271
19	265	1100	620	1660	399	914	1210	1320	4040	232	218	237
20	318	1020	536	1790	428	969	1470	1270	4590	359	258	199
21	390	986	518	1470	640	951	1520	2140	4080	285	228	238
22	338	1060	481	1250	797	850	1770	2110	3140	237	379	282
23	308	1030	468	1210	785	841	1900	2020	2340	327	396	401
24	417	957	531	1270	815	919	1940	1820	2020	206	305	355
25	312	823	513	1270	744	1030	1910	1490	1730	335	269	387
26	356	772	470	986	920	1170	1900	1330	1420	217	310	307
27	464	818	427	1050	1290	1220	1730	1100	1250	202	301	355
28	442	958	414	e960	2030	1210	1590	1020	1120	331	190	229
29	594	976	382	e760	1890	1180	1450	966	973	267	225	264
30	624	956	428	e650	---	1160	1750	841	890	365	245	355
31	572	---	431	e570	---	1130	---	736	---	404	189	---
TOTAL	10966	29234	18409	21987	19873	31973	39078	46993	43936	11689	8483	7611
MEAN	354	974	594	709	685	1031	1303	1516	1465	377	274	254
MAX	624	1630	886	1790	2030	1610	1940	2140	4590	756	590	401
MIN	191	564	375	257	358	686	766	736	561	202	172	148
CFSM	.29	.79	.48	.58	.56	.84	1.06	1.23	1.19	.31	.22	.21
IN.	.33	.88	.56	.66	.60	.97	1.18	1.42	1.33	.35	.26	.23

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1901 - 1996, BY WATER YEAR (WY)

	MEAN	465	627	739	814	1009	1920	1785	1119	836	486	355	357
MAX	1880	2559	1666	2669	2550	7242	5113	3815	2800	2204	1178	1277	
(WY)	1987	1993	1976	1993	1976	1904	1947	1956	1905	1902	1992	1903	
MIN	88.5	138	124	150	158	348	488	330	168	98.3	61.1	93.6	
(WY)	1964	1965	1964	1963	1963	1964	1935	1958	1936	1936	1936	1963	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1901 - 1996

ANNUAL TOTAL	338745	290232	874
ANNUAL MEAN	928	793	1638
HIGHEST ANNUAL MEAN			232
LOWEST ANNUAL MEAN			1993
HIGHEST DAILY MEAN	4100	4590	22700
LOWEST DAILY MEAN	191	148	20
ANNUAL SEVEN-DAY MINIMUM	246	175	44
INSTANTANEOUS PEAK FLOW		4920	(a)24500
INSTANTANEOUS PEAK STAGE		9.71	(b)15.43
INSTANTANEOUS LOW FLOW		147	(c)
ANNUAL RUNOFF (CFSM)	.75	.64	.71
ANNUAL RUNOFF (INCHES)	10.24	8.78	9.65
10 PERCENT EXCEEDS	1750	1550	1910
50 PERCENT EXCEEDS	766	640	545
90 PERCENT EXCEEDS	300	243	182

(a) From rating curve extended above 15,000 ft³/s; gage height, 18.60 ft, datum then in use.

(b) Present site and datum.

(c) Sept. 5, 6.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04114000 GRAND RIVER AT PORTLAND, MI

LOCATION.--Lat 42°51'23", long 84°54'44", in NW1/4 sec.4, T.5 N., R.5 W., Ionia County, Hydrologic Unit 04050004, on left bank at downstream side of bridge on Kent Street, 1.0 mi south of Portland, 1.9 mi upstream from Looking Glass River, and at mile 115.

DRAINAGE AREA.--1,385 mi².

PERIOD OF RECORD.--August 1952 to March 1982, June 1988 to current year. Gage-height records collected in this vicinity 1907-28 (flood seasons only) are contained in reports of the National Weather Service.

GAGE.--Water-stage recorder. Datum of gage is 705.00 ft above sea level (levels by Michigan Department of Natural Resources). Prior to July 6, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Slight diurnal fluctuation caused by powerplants upstream from station. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	327	638	1020	e490	e640	1790	1110	1880	890	940	472	233
2	310	681	951	e510	e540	1450	1090	1920	895	860	368	203
3	354	646	973	e520	e500	1460	1040	1840	902	845	350	196
4	340	711	948	e460	e500	1110	1040	1800	790	679	286	287
5	361	716	904	e450	e480	1180	1040	1570	820	762	355	386
6	354	711	877	e350	e450	1130	1010	1460	747	623	366	186
7	504	760	e840	e370	e430	e1000	968	1280	944	547	271	184
8	427	740	e730	e430	e400	e800	926	1290	983	512	978	213
9	466	704	e680	e460	e480	e850	922	1230	1000	458	574	204
10	477	649	e640	e350	e650	e770	869	1500	1130	533	309	241
11	490	1390	e450	e420	e820	728	858	2190	1100	431	409	221
12	413	1800	e600	e300	e880	736	884	2330	1140	460	274	214
13	438	1680	e430	e420	e800	881	1310	2200	1080	358	269	326
14	330	1640	e620	e330	e700	1060	1430	2020	1010	420	298	319
15	337	1530	e660	e440	e560	1200	1390	1830	1010	352	291	351
16	403	1440	e770	e390	e520	1170	1500	1620	892	418	208	302
17	343	1310	e840	e450	e570	1110	1400	1540	950	417	224	250
18	286	1240	e820	e520	e510	1080	1310	1390	3670	357	289	239
19	397	1120	e800	e1000	e490	1040	1210	1360	6150	475	295	301
20	383	1110	e700	e1900	e450	971	1470	1360	5550	319	311	291
21	492	1070	e600	e2000	e480	1010	1570	2900	5160	403	316	242
22	500	1070	e580	e1600	e720	969	1740	2590	4080	366	274	305
23	442	1100	e540	e1400	e900	905	2060	2470	3080	277	455	341
24	393	1040	e520	e1350	e880	922	2080	2190	2530	404	468	448
25	494	976	e600	e1400	e900	989	2030	1870	2110	265	365	396
26	403	896	e570	e1400	883	1060	2030	1520	1760	373	316	448
27	475	879	e530	e1100	1140	1170	1890	1370	1430	289	354	421
28	597	1040	e480	e1200	1820	1170	1680	1160	1300	226	362	456
29	534	1050	e470	e1050	2140	1170	1540	1120	1130	406	241	304
30	659	1040	e440	e850	---	1140	1680	1050	1030	381	238	296
31	686	---	e480	e710	---	1120	---	952	---	433	288	---
TOTAL	13415	31377	21063	24620	21233	33141	41077	52802	55263	14589	10874	8804
MEAN	433	1046	679	794	732	1069	1369	1703	1842	471	351	293
MAX	686	1800	1020	2000	2140	1790	2080	2900	6150	940	978	456
MIN	286	638	430	300	400	728	858	952	747	226	208	184
CFSM	.31	.76	.49	.57	.53	.77	.99	1.23	1.33	.34	.25	.21
IN.	.36	.84	.57	.66	.57	.89	1.10	1.42	1.48	.39	.29	.24

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1996, BY WATER YEAR (WY)

MEAN	561	801	924	949	1106	2039	1970	1288	857	568	442	428
MAX	1766	2743	1975	2989	2947	4202	3936	4676	2587	2268	1297	1433
(WY)	1982	1993	1976	1993	1976	1974	1975	1956	1989	1968	1992	1975
MIN	132	174	161	184	186	382	683	373	258	155	166	133
(WY)	1964	1965	1964	1963	1963	1964	1964	1958	1988	1965	1965	1963

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1952 - 1996
ANNUAL TOTAL	373599	328258	
ANNUAL MEAN	1024	897	991
HIGHEST ANNUAL MEAN			1830
LOWEST ANNUAL MEAN			282
HIGHEST DAILY MEAN	4840	6150	12200
LOWEST DAILY MEAN	270	184	58
ANNUAL SEVEN-DAY MINIMUM	308	209	85
INSTANTANEOUS PEAK FLOW		6780	12400
INSTANTANEOUS PEAK STAGE		10.41	12.98
INSTANTANEOUS LOW FLOW		174	38
ANNUAL RUNOFF (CFSM)	.74	.65	.72
ANNUAL RUNOFF (INCHES)	10.03	8.82	9.72
10 PERCENT EXCEEDS	1860	1680	2140
50 PERCENT EXCEEDS	840	724	632
90 PERCENT EXCEEDS	391	301	232

(a) Sept. 6, 7.
(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04114500 LOOKING GLASS RIVER NEAR EAGLE, MI

LOCATION.--Lat 42°49'46", long 84°46'43" (revised), in SW1/4 sec.10, T.5 N., R.4 W., Clinton County, Hydrologic Unit 04050004, on right bank at upstream side of former bridge site on Hinman Road, 1.5 mi northeast of Eagle, and 10 mi upstream from mouth.

DRAINAGE AREA.--281 mi².

PERIOD OF RECORD.--August 1944 to September 1996 (discontinued).

REVISED RECORDS.--WSP 1387: 1946-47.

GAGE.--Water-stage recorder. Datum of gage is 747.09 ft above sea level (levels by Michigan Department of Natural Resources). Prior to June 2, 1962, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Small intermittent diversion at times into Lake Geneva when discharge is above 50 ft³/s. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	44	70	139	e69	e115	247	163	391	345	496	65	48
2	44	74	148	e68	e100	242	160	356	310	424	69	47
3	45	77	155	e67	e95	225	156	332	273	362	70	46
4	47	72	156	e65	e88	230	156	322	235	309	66	45
5	49	70	154	e63	e82	e220	154	319	207	266	62	44
6	53	70	e150	e61	e77	e200	151	316	192	225	59	43
7	61	70	e145	e59	e75	e170	150	307	234	193	58	43
8	56	68	e130	e58	e80	e150	147	295	287	164	112	45
9	56	70	e120	e57	e100	e145	144	286	262	143	140	49
10	52	77	e105	e56	e130	e140	142	360	259	131	97	50
11	51	198	e90	e56	e160	e155	138	390	258	130	80	49
12	47	228	e84	e55	e150	e170	144	340	311	116	70	49
13	44	180	e82	e55	e140	e180	306	310	277	106	63	49
14	42	167	e100	e54	e130	189	290	300	233	97	60	50
15	41	168	e120	e54	e115	192	277	301	208	90	57	54
16	41	179	e135	e55	e105	195	311	304	192	84	54	55
17	40	187	e130	e90	e97	203	321	299	297	79	59	53
18	38	192	e120	e170	e90	218	334	288	976	79	55	52
19	38	188	e110	e260	e85	226	357	268	1330	78	55	50
20	46	183	e105	e260	e83	220	402	272	850	75	59	48
21	55	178	e100	e255	e120	208	425	744	640	72	60	48
22	60	166	e95	e250	e145	194	445	600	568	70	60	58
23	54	155	e85	e240	e160	180	453	488	573	67	70	54
24	53	146	e82	e230	e155	169	437	458	634	64	67	53
25	52	138	e80	e220	e150	165	430	461	686	62	64	52
26	51	132	e77	e200	e180	158	429	481	712	60	62	56
27	58	131	e74	e190	e210	154	417	497	709	58	62	65
28	66	152	e73	e180	e220	154	401	496	682	57	57	70
29	69	150	e72	e170	e230	158	386	475	633	62	53	64
30	67	e140	e71	e150	---	162	404	439	567	63	50	57
31	69	---	e70	e130	---	164	---	394	---	64	49	---
TOTAL	1589	4076	3357	3947	3667	5783	8630	11889	13940	4346	2064	1546
MEAN	51.3	136	108	127	126	187	288	384	465	140	66.6	51.5
MAX	69	228	156	260	230	247	453	744	1330	496	140	70
MIN	38	68	70	54	75	140	138	268	192	57	49	43
CFSM	.18	.48	.39	.45	.45	.66	1.02	1.36	1.65	.50	.24	.18
IN.	.21	.54	.44	.52	.49	.77	1.14	1.57	1.85	.58	.27	.20

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 1996, BY WATER YEAR (WY)

	MEAN	93.7	129	160	172	215	436	415	254	141	86.7	56.3	72.6
MAX	614	414	445	505	673	1058	1131	910	518	405	206	532	
(WY)	1987	1991	1976	1993	1976	1985	1947	1956	1986	1994	1994	1975	
MIN	15.3	25.0	21.6	24.0	24.3	47.0	85.9	64.8	31.3	13.6	16.9	15.3	
(WY)	1964	1964	1964	1963	1963	1964	1964	1958	1964	1965	1965	1963	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1944 - 1996

ANNUAL TOTAL	65154	64834	186
ANNUAL MEAN	179	177	321
HIGHEST ANNUAL MEAN			35.7
LOWEST ANNUAL MEAN			2400
HIGHEST DAILY MEAN	811	Mar 13	1330
LOWEST DAILY MEAN	38	Oct 18	38
ANNUAL SEVEN-DAY MINIMUM	41	Oct 13	41
INSTANTANEOUS PEAK FLOW			1630
INSTANTANEOUS PEAK STAGE			5.94
INSTANTANEOUS LOW FLOW			37
ANNUAL RUNOFF (CFSM)	.64		.63
ANNUAL RUNOFF (INCHES)	8.63		8.58
10 PERCENT EXCEEDS	364		435
50 PERCENT EXCEEDS	135		100
90 PERCENT EXCEEDS	51		32

(a) From rating curve extended above 1,900 ft³/s; gage height 7.70 ft, from graph based on gage readings.

(b) From floodmark, backwater from ice.

(c) Oct. 18, 19, 20.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04115000 MAPLE RIVER AT MAPLE RAPIDS, MI

LOCATION.--Lat 43°06'35", long 84°41'35", in sec.5, T.8 N., R.3 W., Clinton County, Hydrologic Unit 04050005, on right bank at downstream side of bridge on Maple Road in Maple Rapids, 50 ft upstream from Pine Creek, and 0.8 mi upstream from Hayworth Creek. Records include flow of Pine Creek.

DRAINAGE AREA.--434 mi².

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

REVISÉD RECORDS.--WSP 1707: 1956.

GAGE.--Water-stage recorder. Datum of gage is 642.58 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Oct. 4, 1968, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in March 1904 reached a stage of 13.8 ft. from information by local resident.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	68	196	76	e150	e398	144	322	540	455	109	43
2	22	92	219	76	e130	e381	141	334	480	404	94	40
3	24	92	233	e72	e120	e356	143	345	439	367	80	37
4	26	88	246	e68	e105	e329	145	342	403	335	68	35
5	35	80	249	e64	e95	e295	146	321	370	307	58	33
6	33	73	241	e61	e85	e257	148	305	347	280	52	32
7	25	68	224	e60	e75	e218	151	287	331	253	50	31
8	26	62	209	e59	e80	e184	152	265	327	229	75	31
9	32	59	196	e59	e120	e160	149	247	335	212	88	37
10	32	59	186	e58	e230	e140	144	262	349	196	98	39
11	30	146	171	e58	313	121	139	393	359	177	79	38
12	24	259	153	e58	320	116	143	556	402	156	66	37
13	24	307	137	e57	e296	165	177	627	484	135	57	36
14	24	327	129	e57	e263	254	221	624	529	117	51	35
15	34	328	137	e57	220	314	262	590	514	104	52	39
16	78	319	150	e56	e175	357	314	540	470	93	63	41
17	62	302	153	e74	146	368	352	490	454	85	57	41
18	54	284	148	e200	e120	363	372	442	1310	80	49	38
19	77	265	142	356	105	354	379	406	2940	86	49	36
20	71	251	132	431	96	334	386	452	3170	92	129	33
21	66	251	121	451	155	306	392	2180	2890	86	139	32
22	54	247	110	436	224	279	398	3210	2370	75	115	33
23	47	237	102	407	240	253	406	3140	1870	67	115	37
24	46	222	97	376	258	232	404	2750	1520	59	133	42
25	56	205	93	e330	282	208	399	2200	1230	54	119	43
26	83	194	91	e300	299	198	387	1740	1010	50	100	44
27	78	186	e87	e270	320	188	370	1370	834	47	81	55
28	76	191	e83	e235	386	177	351	1080	704	45	65	59
29	70	193	80	e210	410	168	332	882	601	51	55	60
30	66	193	77	e185	---	157	318	729	522	111	50	59
31	64	---	76	e170	---	148	---	621	---	124	45	---
TOTAL	1461	5648	4668	5427	5818	7778	7965	28052	28104	4932	2436	1196
MEAN	47.1	188	151	175	201	251	265	905	937	159	78.6	39.9
MAX	83	328	249	451	410	398	406	3210	3170	455	139	60
MIN	22	59	76	56	75	116	139	247	327	45	45	31
CFSM	.11	.43	.35	.40	.46	.58	.61	2.09	2.16	.37	.18	.09
IN.	.13	.48	.40	.47	.50	.68	.68	2.40	2.41	.42	.21	.10

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 1996, BY WATER YEAR (WY)

MEAN	155	192	261	256	286	711	636	369	203	116	61.7	133
MAX	1461	837	813	1035	980	2049	1582	1812	937	1243	361	1634
(WY)	1987	1991	1991	1973	1976	1985	1947	1956	1996	1994	1994	1986
MIN	9.77	21.8	20.9	17.3	16.9	103	139	74.1	24.6	10.6	8.47	11.4
(WY)	1967	1963	1963	1963	1963	1964	1945	1977	1977	1965	1965	1962

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1944 - 1996
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ANNUAL TOTAL	84867		103485			
ANNUAL MEAN	233		283		282	
HIGHEST ANNUAL MEAN					501	1976
LOWEST ANNUAL MEAN					65.1	1963
HIGHEST DAILY MEAN	1750	Mar 16	3210	May 22	6500	Mar 20 1948
LOWEST DAILY MEAN	19	Sep 16	22	Oct 1	4.8	Sep 10 1963
ANNUAL SEVEN-DAY MINIMUM	21	Sep 10	27	Oct 1	5.6	Sep 20 1979
INSTANTANEOUS PEAK FLOW			3240	May 22	(a)8770	Sep 12 1986
INSTANTANEOUS PEAK STAGE			9.47	May 22	(b)12.33	Sep 12 1986
INSTANTANEOUS LOW FLOW			(c)16	Oct 1	4.4	Aug 13 1965
ANNUAL RUNOFF (CFSM)	.54		.65		.65	
ANNUAL RUNOFF (INCHES)	7.27		8.87		8.82	
10 PERCENT EXCEEDS	473		459		670	
50 PERCENT EXCEEDS	183		150		122	
90 PERCENT EXCEEDS	32		41		23	

(a) Result of dam failure on Rainbow Lake (Pine Creek).
(b) From floodmark.
(c) Result of regulation.
(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04115265 FISH CREEK NEAR CRYSTAL, MI

LOCATION.--Lat 43°14'59", long 84°58'52", in NW1/4 NE1/4 sec.23, T.10 N., R.6 W., Montcalm County, Hydrologic Unit 04050005, on left bank 10 ft downstream from bridge on Sidney Road, 3.5 mi southwest of Crystal.

DRAINAGE AREA.--39.7 mi².

PERIOD OF RECORD.--October 1987 to current year.

REVISED RECORDS.--WDR MI-92-1: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 795 ft above sea level, from topographic map.

REMARKS.--Records good. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	42	33	25	26	39	34	35	27	24	28	16
2	17	69	37	25	e26	32	31	31	40	24	26	16
3	19	48	37	e25	e25	31	31	30	43	25	23	16
4	26	34	40	25	e25	35	33	30	34	22	22	15
5	22	30	36	24	e25	28	32	29	32	21	20	16
6	22	29	32	24	e25	27	36	28	32	19	17	16
7	23	29	e30	24	e30	e28	33	28	34	20	16	17
8	23	27	e28	24	45	e27	31	29	38	21	16	18
9	21	25	e26	26	72	e27	31	37	38	23	14	20
10	21	33	e26	26	57	27	30	65	40	20	13	19
11	20	116	27	26	58	28	30	99	35	20	15	18
12	19	117	28	27	37	30	32	51	38	17	14	17
13	19	57	28	26	e32	37	38	38	34	18	15	17
14	19	43	35	24	28	60	34	34	30	17	17	19
15	20	36	35	23	26	59	45	32	28	17	19	21
16	20	33	32	e24	e26	44	62	32	27	17	18	19
17	21	32	30	25	e25	38	40	31	45	17	15	19
18	23	31	28	57	e25	38	35	31	108	20	14	18
19	20	32	28	132	24	38	37	29	96	21	17	17
20	26	35	27	e97	25	35	45	66	60	19	70	17
21	48	41	26	e58	40	32	39	168	43	15	50	21
22	36	33	25	33	35	31	35	95	40	15	33	34
23	30	32	26	30	31	30	36	52	34	14	67	26
24	26	29	26	30	39	31	32	45	52	14	42	24
25	26	28	26	28	44	36	31	36	55	13	29	22
26	26	29	26	27	41	33	35	34	33	13	25	22
27	37	31	e25	28	64	32	32	33	30	14	23	45
28	46	33	e25	e27	118	30	29	33	28	15	22	42
29	34	32	e24	26	54	31	29	31	27	61	21	30
30	29	31	25	e26	---	31	38	29	25	54	19	26
31	27	---	25	e26	---	31	---	28	---	32	19	---
TOTAL	782	1217	902	1048	1128	1056	1056	1369	1226	662	759	643
MEAN	25.2	40.6	29.1	33.8	38.9	34.1	35.2	44.2	40.9	21.4	24.5	21.4
MAX	48	117	40	132	118	60	62	168	108	61	70	45
MIN	16	25	24	23	24	27	29	28	25	13	13	15
CFSM	.64	1.02	.73	.85	.98	.86	.89	1.11	1.03	.64	.62	.64
IN.	.73	1.14	.85	.98	1.06	.99	.99	1.28	1.15	.62	.71	.60

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 1996, BY WATER YEAR (WY)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
MEAN	31.3	43.2	35.3	34.2	35.4	50.6	47.2	36.1	32.2	24.6	25.4	24.0	
MAX	39.2	59.5	46.1	48.9	57.7	58.8	66.6	44.7	44.3	50.9	41.7	33.8	
(WY)	1992	1995	1992	1993	1994	1994	1991	1991	1994	1994	1994	1993	
MIN	20.1	33.0	19.8	24.5	25.7	34.1	35.2	26.9	15.3	12.9	15.6	17.7	
(WY)	1990	1988	1990	1994	1989	1996	1996	1988	1988	1988	1988	1995	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1988 - 1996

ANNUAL TOTAL	11777	11848	34.9	
ANNUAL MEAN	32.3	32.4	40.7	1993
HIGHEST ANNUAL MEAN			28.6	1990
LOWEST ANNUAL MEAN			27.1	Feb 21 1994
HIGHEST DAILY MEAN	117	168	8.1	Jul 9 1988
LOWEST DAILY MEAN	15	13	9.6	Jul 4 1988
ANNUAL SEVEN-DAY MINIMUM	15	14	(a)	
INSTANTANEOUS PEAK FLOW		195	May 21	
INSTANTANEOUS PEAK STAGE		4.60	May 21	5.53
INSTANTANEOUS LOW FLOW		11	(b)	7.0
ANNUAL RUNOFF (CFSM)	.81	.82		.88
ANNUAL RUNOFF (INCHES)	11.04	11.10		11.96
10 PERCENT EXCEEDS	46	47		54
50 PERCENT EXCEEDS	31	29		30
90 PERCENT EXCEEDS	18	17		18

(a) Not determined.
(b) July 25, 26.
(c) July 10, 14, 1988.
(e) Estimated.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04117000 QUAKER BROOK NEAR NASHVILLE, MI

LOCATION.--Lat 42°33'57", long 85°05'37", in NW1/4 sec.13, T.2 N., R.7 W., Barry County, Hydrologic Unit 04050007, on left bank 150 ft upstream from culvert on Clark Road, 500 ft upstream from unnamed tributary, and 2.5 mi south of Nashville.

DRAINAGE AREA.--7.60 mi².

PERIOD OF RECORD.--August 1954 to September 1975, October 1975 to September 1994 (operated as a crest-stage partial-record station), October 1994 to current year.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 821.89 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.3	5.6	7.8	4.6	e3.6	8.5	6.3	9.9	4.5	3.6	3.5	2.5
2	3.4	9.0	6.8	4.6	e3.3	6.7	5.8	7.6	6.7	3.7	3.5	2.4
3	4.1	6.6	6.7	4.4	e2.9	5.8	5.8	7.6	6.7	3.7	3.3	2.5
4	4.6	5.5	6.2	3.7	e2.6	6.6	6.3	7.2	5.6	3.4	3.1	2.5
5	4.2	5.1	6.1	3.6	e2.6	5.8	5.9	6.7	5.1	3.3	2.8	2.4
6	4.8	5.0	5.5	3.3	e2.9	5.3	5.7	6.5	6.2	3.2	2.7	2.4
7	4.5	6.1	4.7	e3.3	3.5	5.8	5.4	6.1	7.5	3.2	2.7	2.6
8	4.1	5.4	4.3	e3.3	11	5.0	5.2	6.2	6.7	3.1	3.9	2.5
9	4.0	4.9	4.3	e3.5	12	5.1	5.2	9.2	9.0	3.1	2.9	2.6
10	3.9	8.6	4.4	3.7	9.3	4.9	5.2	23	7.9	3.2	2.7	2.8
11	3.8	4.4	4.4	e3.8	8.2	5.3	5.1	20	6.0	3.1	2.7	2.6
12	3.7	23	4.4	4.0	5.8	9.9	7.6	11	5.6	3.0	2.8	2.6
13	3.7	13	4.4	4.2	4.8	12	14	8.3	5.1	3.0	2.5	2.6
14	3.6	8.9	8.4	4.4	4.9	9.9	8.6	7.4	4.6	2.9	2.7	2.8
15	4.4	7.4	11	4.3	4.7	8.9	12	7.5	4.3	3.3	3.7	3.1
16	4.1	6.8	8.2	4.1	e4.5	7.6	13	7.7	4.0	3.0	3.1	3.0
17	3.8	6.7	6.1	12	4.4	6.8	8.7	7.2	11	3.0	2.8	2.8
18	3.7	6.8	5.4	20	e4.4	6.9	7.3	6.7	e51	3.4	2.6	2.7
19	3.7	6.9	5.2	21	4.4	6.5	8.7	6.0	56	3.2	4.4	2.6
20	6.1	7.9	4.9	11	6.3	5.9	19	7.1	18	3.0	6.4	2.6
21	9.5	9.1	4.6	6.4	8.0	5.5	14	25	10	2.8	3.8	3.4
22	7.3	7.1	4.6	5.9	5.7	5.5	20	12	8.6	2.9	3.3	5.9
23	5.5	6.3	4.6	6.4	5.7	5.4	20	8.2	6.5	2.7	3.6	3.8
24	4.7	5.5	4.7	12	8.0	5.8	11	7.7	6.6	2.7	3.3	3.7
25	4.5	5.4	4.7	6.8	6.9	7.1	9.3	6.8	5.8	2.7	2.9	3.4
26	4.4	5.6	4.7	5.9	9.8	5.8	9.8	6.0	5.1	2.7	2.7	3.7
27	8.5	7.6	4.7	7.9	23	5.6	7.8	5.8	4.7	2.7	2.7	7.4
28	7.9	14	4.5	6.7	20	5.9	6.9	5.7	4.3	2.9	2.8	5.6
29	5.8	8.3	4.1	5.2	11	6.0	7.7	5.2	4.1	6.0	2.7	4.4
30	5.1	6.6	4.3	5.0	---	5.7	12	4.9	3.8	4.4	2.6	3.8
31	5.2	---	4.6	4.1	---	6.0	---	4.7	---	3.7	2.6	---
TOTAL	149.9	268.7	169.3	199.1	204.2	203.5	279.3	270.9	291.0	100.6	97.8	97.7
MEAN	4.84	8.96	5.46	6.42	7.04	6.56	9.31	8.74	9.70	3.25	3.15	3.26
MAX	9.5	44	11	21	23	12	20	25	56	6.0	6.4	7.4
MIN	3.3	4.9	4.1	3.3	2.6	4.9	5.1	4.7	3.8	2.7	2.5	2.4
CFSM	.64	1.18	.72	.85	.93	.86	1.22	1.15	1.28	.43	.42	.43
IN.	.73	1.32	.83	.97	1.00	1.00	1.37	1.33	1.42	.49	.48	.48

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954 - 1996, BY WATER YEAR (WY)

	MEAN	4.92	6.55	7.02	6.63	7.81	11.7	10.3	8.03	5.87	3.64	3.61	3.42
MAX	14.2	14.3	14.9	15.6	17.2	25.0	23.7	15.3	12.8	7.78	13.5	8.17	
(WY)	1955	1995	1973	1974	1971	1974	1975	1973	1973	1969	1972	1972	
MIN	1.59	2.33	2.11	2.78	2.36	4.23	4.07	2.97	2.05	1.22	1.36	1.52	
(WY)	1964	1964	1964	1964	1964	1964	1963	1958	1959	1964	1964	1963	

SUMMARY STATISTICS FOR 1995 CALENDAR YEAR FOR 1996 WATER YEAR WATER YEARS 1954 - 1996

ANNUAL TOTAL	2781.3	2332.0	6.57	
ANNUAL MEAN	7.62	6.37	11.1	1974
HIGHEST ANNUAL MEAN			2.73	1964
LOWEST ANNUAL MEAN			211	Apr 19 1975
HIGHEST DAILY MEAN	44	Aug 17	56	Jun 19
LOWEST DAILY MEAN	3.2	Sep 5	2.4	(a)
ANNUAL SEVEN-DAY MINIMUM	3.4	Sep 10	2.5	Aug 31
INSTANTANEOUS PEAK FLOW			105	Jun 18
INSTANTANEOUS PEAK STAGE			4.74	Jun 18
INSTANTANEOUS LOW FLOW				(b).44
ANNUAL RUNOFF (CFSM)	1.00	.84	.86	
ANNUAL RUNOFF (INCHES)	13.61	11.41	11.74	
10 PERCENT EXCEEDS	12	9.9	12	
50 PERCENT EXCEEDS	6.3	5.2	4.5	
90 PERCENT EXCEEDS	3.8	2.8	2.2	

(a) Sept. 2, 5, 6.

(b) Result of freezeup.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04117500 THORNAPPLE RIVER NEAR HASTINGS, MI

LOCATION.--Lat 42°36'57", long 85°14'11", in SE1/4 sec.27, T.3 N., R.8 W., Barry County, Hydrologic Unit 04050007, on right bank at downstream side of bridge on McKeown Road, 0.6 mi downstream from Cedar Creek, 2.0 mi downstream from Thornapple Lake, and 3.2 mi southeast of Hastings.

DRAINAGE AREA.--385 mi².

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

GAGE.--Water-stage recorder. Datum of gage is 786.71 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Oct. 1, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	100	165	350	171	198	585	224	411	247	290	121	96
2	100	175	342	170	189	520	225	427	245	251	119	94
3	103	186	324	148	e170	399	223	414	256	227	115	92
4	107	188	308	139	e150	307	223	384	255	206	110	90
5	110	178	286	e145	e140	315	222	352	244	190	106	88
6	110	169	265	141	e130	290	219	326	238	177	103	88
7	115	168	236	e135	127	235	213	305	261	168	102	88
8	118	168	204	e130	147	212	207	288	301	159	111	88
9	120	165	186	127	234	213	201	283	336	150	111	91
10	117	172	175	128	323	205	196	356	369	145	117	93
11	118	321	180	128	375	206	193	551	399	139	115	93
12	117	554	185	128	349	211	199	707	394	134	110	95
13	114	700	189	130	275	290	271	746	361	130	104	97
14	110	707	199	135	244	409	374	703	319	127	101	97
15	113	637	240	137	219	473	442	608	278	125	111	101
16	114	533	292	135	192	461	503	505	244	121	114	103
17	114	441	296	152	178	410	541	437	265	120	111	104
18	112	374	278	291	166	364	517	390	600	120	107	103
19	112	333	256	515	170	335	459	358	1280	122	111	102
20	119	311	218	583	178	312	458	337	2090	120	119	99
21	146	318	205	577	209	288	528	494	2490	115	121	102
22	171	341	199	522	239	265	627	766	2300	112	118	126
23	178	342	197	460	239	249	731	912	1910	111	124	130
24	161	320	191	409	246	239	774	911	1540	108	123	130
25	151	288	187	363	277	233	752	837	1250	105	115	127
26	144	268	181	329	300	244	676	693	998	103	110	125
27	153	263	165	317	371	233	579	539	755	102	107	140
28	177	293	163	286	529	228	490	429	560	103	104	157
29	188	343	167	274	616	227	422	360	428	112	101	159
30	182	362	167	243	---	225	396	309	348	120	99	151
31	171	---	170	207	---	222	---	272	---	123	97	---
TOTAL	4065	9783	7001	7755	7180	9405	12085	15410	21561	4435	3437	3249
MEAN	131	326	226	250	248	303	403	497	719	143	111	108
MAX	188	707	350	583	616	585	774	912	2490	290	124	159
MIN	100	165	163	127	127	205	193	272	238	102	97	88
CFSM	.34	.85	.59	.65	.64	.79	1.05	1.29	1.87	.37	.29	.28
IN.	.39	.95	.68	.75	.69	.91	1.17	1.49	2.08	.43	.33	.31

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1996, BY WATER YEAR (WY)

	MEAN	205	271	330	351	388	691	647	398	278	162	131	148
MAX	1072	939	895	1049	959	1506	1914	1391	1011	410	385	357	
(WY)	1987	1991	1991	1973	1976	1948	1947	1956	1989	1968	1980	1992	
MIN	54.5	73.6	75.2	90.4	87.5	129	176	111	87.0	56.0	50.2	54.4	
(WY)	1964	1964	1964	1964	1963	1964	1946	1958	1964	1964	1946	1963	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1945 - 1996

ANNUAL TOTAL	107392						105366						
ANNUAL MEAN	294						288				333		
HIGHEST ANNUAL MEAN											534		1993
LOWEST ANNUAL MEAN											99.2		1964
HIGHEST DAILY MEAN	1490						2490		Jun 21	6590		Apr 7 1947	
LOWEST DAILY MEAN	94						88		Sep 5	35		Jul 31 1964	
ANNUAL SEVEN-DAY MINIMUM	101						89		Sep 3	36		Aug 7 1964	
INSTANTANEOUS PEAK FLOW							2510		Jun 21	6810		Apr 7 1947	
INSTANTANEOUS PEAK STAGE							7.42		Jun 21	(a)10.20		Apr 7 1947	
INSTANTANEOUS LOW FLOW							87		(b)	33		Aug 10 1964	
ANNUAL RUNOFF (CFSM)	.76						.75			.86			
ANNUAL RUNOFF (INCHES)	10.38						10.18			11.75			
10 PERCENT EXCEEDS	534						540			693			
50 PERCENT EXCEEDS	242						206			201			
90 PERCENT EXCEEDS	115						106			90			

(a) From graph based on gage readings.

(b) Sept. 4, 5, 6, 7, 8.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04118500 ROGUE RIVER NEAR ROCKFORD, MI

LOCATION.--Lat 43°04'56", long 85°35'27", in NE1/4 sec.15, T.8 N., R.11 W., Kent County, Hydrologic Unit 04050006, on left bank at downstream side of bridge on Packer Drive, 2.2 mi upstream from mouth, and 3.0 mi southwest of Rockford.

DRAINAGE AREA.--234 mi².

PERIOD OF RECORD.--February 1952 to September 1982, October 1987 to current year.

GAGE.--Water-stage recorder. Datum of gage is 624.80 ft above sea level (levels by Johnson and Anderson, Inc.). Prior to Aug. 30, 1952, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Slight regulation caused by mills upstream from station. Several measurements of water temperature were made during the year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Sept. 12, 1986, reached a stage of 11.35 ft, from floodmark, and discharge of approximately 6,000 ft³/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	112	204	263	176	e170	e390	259	271	214	224	182	121
2	109	276	280	179	e165	e320	260	269	279	214	175	118
3	117	271	313	e175	e160	e270	259	264	281	210	187	117
4	122	280	317	e170	e155	e245	259	245	289	205	201	115
5	125	276	322	e160	e155	e250	260	231	277	199	169	113
6	126	257	297	e155	e155	e250	265	221	275	184	151	107
7	130	230	e255	e150	e170	e215	267	214	274	183	141	107
8	132	206	e215	e150	e230	e220	260	218	287	186	134	111
9	132	196	e195	e155	e350	e205	248	235	300	188	125	126
10	127	239	e200	e155	e430	e200	234	456	301	178	123	134
11	123	489	e215	e155	e450	197	225	564	291	168	120	132
12	123	571	e235	e155	e350	198	227	614	311	163	120	128
13	121	670	e250	e150	e300	244	268	545	303	165	119	128
14	123	619	251	e150	e260	344	288	453	276	165	116	133
15	125	519	237	e155	e240	426	342	368	239	161	115	133
16	125	426	e230	e160	e220	440	380	310	214	154	116	131
17	124	363	e230	e180	e210	416	387	286	346	150	113	126
18	122	323	221	e300	e200	373	374	270	849	152	112	124
19	121	296	206	493	e190	336	369	254	1640	157	131	121
20	160	284	e200	561	e190	302	378	467	1250	155	193	117
21	228	288	e190	e620	e210	278	415	812	903	144	207	126
22	248	289	177	e515	e270	268	402	1120	700	139	200	136
23	252	284	171	392	e260	261	367	807	546	135	185	134
24	248	273	176	343	e250	248	327	627	458	131	170	134
25	220	259	178	e290	e240	265	306	464	399	127	155	129
26	185	241	e175	e240	e290	273	309	377	369	126	142	141
27	195	241	e170	192	e330	261	304	329	368	122	137	203
28	222	243	e170	e190	e370	274	294	294	335	127	134	195
29	219	239	e170	e185	e400	276	274	266	281	213	128	189
30	212	240	e175	e180	---	258	270	244	247	204	124	162
31	193	---	174	e175	---	258	---	226	---	203	124	---
TOTAL	4921	9592	6858	7406	7370	8761	9077	12321	13102	5232	4549	3991
MEAN	159	320	221	239	254	283	303	397	437	169	147	133
MAX	252	670	322	620	450	440	415	1120	1640	224	207	203
MIN	109	196	170	150	155	197	225	214	214	122	112	107
CFSM	.68	1.37	.95	1.02	1.09	1.21	1.29	1.70	1.87	.72	.63	.57
IN.	.78	1.52	1.09	1.18	1.17	1.39	1.44	1.96	2.08	.83	.72	.63

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1996, BY WATER YEAR (WY)

	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
MEAN	189	244	251	234	248	401	395	291	213	156	152	160			
MAX	528	525	557	512	567	944	836	620	457	362	317	556			
(WY)	1982	1991	1992	1973	1976	1976	1967	1956	1989	1994	1994	1975			
MIN	100	118	126	116	107	223	175	122	108	83.8	83.2	93.7			
(WY)	1965	1965	1963	1970	1963	1964	1958	1958	1964	1964	1971	1966			

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1952 - 1996
ANNUAL TOTAL	87987	93180	
ANNUAL MEAN	241	255	244
HIGHEST ANNUAL MEAN			360
LOWEST ANNUAL MEAN			155
HIGHEST DAILY MEAN	917	1640	3290
LOWEST DAILY MEAN	108	107	49
ANNUAL SEVEN-DAY MINIMUM	110	113	58
INSTANTANEOUS PEAK FLOW		1800	3540
INSTANTANEOUS PEAK STAGE		8.41	9.29
INSTANTANEOUS LOW FLOW		(b)76	28
ANNUAL RUNOFF (CFSM)	1.03	1.09	1.04
ANNUAL RUNOFF (INCHES)	13.99	14.81	14.17
10 PERCENT EXCEEDS	370	399	426
50 PERCENT EXCEEDS	223	221	193
90 PERCENT EXCEEDS	123	125	109

(a) 1976, 1991.

(b) Result of regulation.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04119000 GRAND RIVER AT GRAND RAPIDS, MI

LOCATION.--Lat 42°57'52", long 85°40'35", in NE1/4 sec.25, T.7 N., R.12 W., Kent County, Hydrologic Unit 04050006, on right bank 500 ft upstream from bridge on Fulton Street in Grand Rapids, 1.7 mi upstream from Plaster Creek, and at mile 41.

DRAINAGE AREA.--4,900 mi², approximately.

PERIOD OF RECORD.--March 1901 to December 1905, January 1906 to August 1918 (gage heights only), October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records collected in this vicinity since 1907 are contained in reports of the National Weather Service.

REVISED RECORDS.--WSP 924: 1938(M). WSP 1387: 1901-5, 1940.

GAGE.--Water-stage recorder. Datum of gage is 585.70 ft above sea level (levels by City of Grand Rapids). March 1901 to August 1918, nonrecording gage at Fulton Street Bridge and Oct. 1, 1930 to Oct. 26, 1953, water-stage recorder at sewage pumping station 1 mi downstream at datum 2.99 ft higher.

REMARKS.--Records good except for estimated daily discharges, which are fair. Moderate diurnal fluctuation at low and medium flow caused by powerplants upstream from station. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1520	2650	4240	e1850	e2400	6310	3740	5220	5100	5430	2590	1400
2	1460	3270	4350	e1900	e2200	6240	3690	5270	5120	4840	2570	1330
3	1520	3060	4250	e1850	e2100	5680	3630	5350	4950	4250	2570	1400
4	1500	3140	4250	e1800	e2000	4980	3610	5210	4780	3960	2330	1330
5	1600	3060	4230	e1750	e1900	4800	3580	4970	4470	3700	2150	1270
6	1680	3090	4140	e1700	e1800	4470	3580	4740	4160	3320	1860	1300
7	1700	2930	3650	e1650	e1800	e3800	3490	4500	4350	3210	1780	1370
8	1600	2880	2600	e1600	e1900	e3400	3410	4340	4160	2860	1820	1210
9	1740	2940	1880	e1550	e2700	e3300	3350	4110	4500	2720	1870	1290
10	1640	2830	2370	e1500	e3500	e3100	3340	5050	4630	2540	2500	1320
11	1990	4930	4100	e1450	e4100	e2900	3330	6380	4730	2320	1900	1420
12	1760	5960	e3500	e1450	e3900	e3300	3740	7330	4890	2290	1570	1300
13	2120	6580	e2900	e1450	e3500	e3800	3260	7520	6360	2260	1720	1410
14	1600	6340	e2500	e1450	e3100	4550	4070	7340	5740	2100	1600	1280
15	1660	6060	e2750	e1500	e2750	5430	4790	6970	4790	1940	1490	1410
16	1410	5940	e3000	e1600	e2500	5690	5130	6520	4380	1940	1560	1490
17	1300	5470	e3200	e1800	e2300	5520	5670	6030	5030	1770	1650	1430
18	1460	5000	e3000	3040	e2200	5190	5560	5530	8640	1900	1400	1360
19	1600	4790	e2800	5070	e2100	4970	5530	5190	11600	1940	1480	1330
20	1820	4570	e2600	5690	e2000	4750	5640	6210	13300	1980	1700	1340
21	2340	4540	e2400	6040	e2300	4520	5700	11100	15000	2020	2120	1350
22	2660	4490	e2300	6160	e2900	4240	5950	11900	16700	1680	2670	1470
23	2510	4370	e2200	5820	3320	4130	6160	12500	16700	1650	2690	1490
24	2390	4260	e2100	5530	3800	3940	6630	13300	15600	1650	2450	1540
25	2280	4070	e2050	5140	4200	3840	6880	13400	13800	1630	2440	1560
26	2230	3850	e2000	4780	4640	3870	6650	12500	12100	1620	2310	1860
27	2210	3860	e1950	e4200	5120	3850	6270	11200	10500	1620	2000	2010
28	2530	3840	e1900	e4000	5640	3880	5900	9500	8900	1540	1730	2170
29	2580	4010	e1850	e3600	6350	3870	5150	7910	7360	1920	1790	2110
30	2710	4200	e1800	e3100	---	3840	5150	6600	6210	2190	1660	2110
31	2630	---	e1800	e2750	---	3830	---	5850	---	2540	1560	---
TOTAL	59750	126980	88660	92770	89020	135990	142580	229540	238450	77330	61530	44660
MEAN	1927	4233	2860	2993	3070	4387	4753	7405	7948	2495	1985	1489
MAX	2710	6580	4350	6160	6350	6310	6880	13400	16700	5430	2690	2170
MIN	1300	2650	1800	1450	1800	2900	3260	4110	4160	1540	1400	1210
CFSM	.39	.86	.58	.61	.63	.90	.97	1.51	1.62	.51	.41	.30
IN.	.45	.96	.67	.70	.68	1.03	1.08	1.74	1.81	.59	.47	.34

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1901 - 1996, BY WATER YEAR (WY)

	MEAN	2437	2954	3403	3691	4225	7648	7055	4702	3384	2191	1735	1977
MAX	13630	7966	8794	12020	14720	21580	17900	15650	15670	7885	5225	7600	
(WY)	1987	1991	1991	1973	1938	1904	1947	1956	1905	1994	1994	1975	
MIN	906	1004	1080	1069	1079	1858	1759	1459	930	650	617	949	
(WY)	1965	1931	1964	1963	1963	1931	1931	1931	1934	1934	1934	1964	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1901 - 1996

ANNUAL TOTAL	1446070												
ANNUAL MEAN	3962												
HIGHEST ANNUAL MEAN													
LOWEST ANNUAL MEAN													
HIGHEST DAILY MEAN	12600												
LOWEST DAILY MEAN	1240												
ANNUAL SEVEN-DAY MINIMUM	1380												
INSTANTANEOUS PEAK FLOW													
INSTANTANEOUS PEAK STAGE													
INSTANTANEOUS LOW FLOW													
ANNUAL RUNOFF (CFSM)	.81												
ANNUAL RUNOFF (INCHES)	10.98												
10 PERCENT EXCEEDS	6990												
50 PERCENT EXCEEDS	3400												
90 PERCENT EXCEEDS	1670												

(a) Aug. 9, 17, 1936.

(b) Present datum; from graph based on gage readings.

(c) Sept. 8, 9.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

442805084411001 HIGGINS LAKE NEAR ROSCOMMON, MI

LOCATION.--Lat 44°25'35", long 84°40'55", in NW1/4 SW1/4 sec.33, T.24 N., R.3 W., Roscommon County, Hydrologic Unit 04060102, at South Higgins Lake State Park, 6.7 mi southwest of Roscommon.

DRAINAGE AREA.--58 mi², approximately.

WATER-LEVEL RECORDS

PERIOD OF RECORD.--September 1942 to current year.

GAGE.--Nonrecording gage. Once daily reading by observer. Datum of gage is 1,148.74 ft above sea level. Sept. 1, 1942 to Nov. 27, 1942 nonrecording gage at different datum. Nov. 27, 1942 to June 9, 1988, water-stage recorder.

REMARKS.--Top of ice readings: Nov. 11-16, Dec. 7-17, Jan. 9-16, 19-23, 25-31, Feb. 1-23, Mar. 7-11, 15-17, 19, 20, 27, 28, Apr. 3-10. Inlets are Big Creek and Little Creek. The outlet is "The Cut". Lake elevation controlled by dam. Established legal level; summer, 1,154.11 ft, winter, 1,153.61 ft, above sea level.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 6.23 ft, June 26, 1954; minimum 4.32 ft, Oct. 3, 4, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 5.72 ft, June 20; minimum observed, 5.08 ft, Mar. 21, 22, 25, 29-31, Apr. 1-10.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	5.17	5.20	---	5.18	---	5.08	5.32	5.40	5.58	5.38	---
2	5.16	5.19	5.20	---	5.18	---	5.08	5.32	5.42	5.58	5.38	5.29
3	5.10	5.16	5.18	---	5.18	---	5.08	5.31	5.44	5.58	---	5.29
4	5.19	5.16	5.18	---	5.18	---	5.08	5.31	---	---	---	5.28
5	5.20	5.14	---	---	5.18	---	5.08	5.31	5.40	5.52	---	5.29
6	5.20	5.14	5.18	5.10	5.18	---	5.08	5.31	5.43	5.48	---	5.28
7	5.18	5.14	5.20	5.10	5.18	5.14	5.08	5.31	5.43	5.46	---	5.28
8	5.18	5.13	5.20	5.10	5.18	5.14	5.08	5.34	5.45	5.45	---	5.27
9	5.18	5.12	5.20	5.10	---	5.14	5.08	5.34	5.46	5.50	---	5.29
10	5.18	---	5.20	5.10	5.18	5.14	5.08	5.33	5.48	5.48	---	5.28
11	5.17	5.20	5.20	5.10	5.18	5.14	5.13	5.34	5.52	5.45	---	5.29
12	5.17	5.20	5.20	5.10	5.18	---	5.14	5.36	5.53	5.45	---	5.29
13	5.16	5.20	5.20	5.10	5.18	5.12	5.13	5.37	5.50	---	5.30	5.32
14	---	5.20	5.20	5.10	5.18	5.12	5.13	5.36	5.50	---	5.27	---
15	5.18	5.20	5.20	5.10	5.18	5.12	5.14	5.33	5.48	5.38	5.32	---
16	5.20	5.20	5.20	5.10	5.18	5.12	5.16	5.35	---	5.38	5.32	5.26
17	5.16	---	5.20	5.14	5.18	5.12	5.22	---	5.45	5.40	5.30	5.25
18	5.14	5.14	5.18	5.14	5.18	5.10	5.21	---	5.68	---	5.28	5.25
19	5.16	5.14	---	5.14	---	5.10	5.21	---	5.68	5.45	5.27	5.19
20	5.16	5.14	---	5.14	5.18	5.10	5.21	5.50	5.72	5.45	5.31	5.21
21	5.16	5.13	---	5.14	5.18	5.08	5.23	5.46	5.71	5.45	---	---
22	5.16	5.12	---	5.14	5.18	5.08	5.23	5.45	5.70	5.45	5.33	5.25
23	5.15	5.16	---	5.14	5.18	---	5.24	5.42	5.69	5.39	5.40	5.27
24	---	---	---	5.18	5.16	---	5.28	5.43	5.63	5.38	5.30	5.27
25	5.15	5.11	---	5.17	5.16	5.08	5.27	5.42	5.66	5.38	5.36	5.22
26	5.15	5.11	---	5.18	---	---	5.27	5.42	---	---	5.33	5.19
27	5.14	5.16	---	5.18	---	5.13	5.27	5.42	---	---	5.33	5.25
28	---	5.12	---	5.18	5.18	5.12	5.27	5.42	5.60	5.38	5.33	5.23
29	---	5.14	---	5.18	---	5.08	5.28	5.40	5.58	5.38	---	5.22
30	5.16	---	---	5.18	---	5.08	5.32	5.41	5.58	5.43	---	5.20
31	5.12	---	---	5.18	---	5.08	---	5.40	---	5.40	---	---
MEAN	---	---	---	---	---	---	5.17	---	---	---	---	---
MAX	---	---	---	---	---	---	5.32	---	---	---	---	---
MIN	---	---	---	---	---	---	5.08	---	---	---	---	---

STREAMS TRIBUTARY TO LAKE MICHIGAN
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--May 1995 to current year.

REMARKS.--Samples for water analysis were collected from a pump sampler. All field parameters were measured on site with a water-quality multiprobe meter.

WATER-QUALITY DATA

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)
442813084422601		HIGGINS LAKE, SITE 1, NEAR ROSCOMMON, MI (LAT 44 28 13N LONG 084 42 26W)						
JUN 1996								
06...	1615	243	8.0	13.5	0.20	10.4	7.2	156
JUL								
09...	1245	249	8.1	20.0	0.20	8.7	7.3	162
AUG								
06...	1640	243	8.2	23.5	0.30	8.6	7.2	140
28...	1115	235	8.2	22.0	0.40	8.0	7.3	144
442818084433301		HIGGINS LAKE, SITE 2, NEAR ROSCOMMON, MI (LAT 44 28 18N LONG 084 43 33W)						
JUN 1996								
06...	1545	242	8.1	14.0	0.20	10.5	7.3	156
442748084444501		HIGGINS LAKE, SITE 3, NEAR ROSCOMMON, MI (LAT 44 27 48N LONG 084 44 45W)						
JUN 1996								
06...	1515	244	8.0	12.5	0.40	10.8	7.3	160
442803084461201		HIGGINS LAKE, SITE 4, NEAR ROSCOMMON, MI (LAT 44 28 03N LONG 084 46 12W)						
JUN 1996								
06...	1445	245	8.0	13.5	0.20	10.6	7.1	152
JUL								
09...	1245	246	8.2	21.5	0.20	9.1	7.3	154
AUG								
06...	1620	244	8.2	23.0	0.20	8.6	7.5	144
28...	1350	237	8.2	23.0	0.40	8.2	8.1	140
442903084464101		HIGGINS LAKE, SITE 5, NEAR ROSCOMMON, MI (LAT 44 29 03N LONG 084 46 41W)						
JUN 1996								
06...	1415	263	7.9	13.5	0.20	9.9	8.0	158
443011084462001		HIGGINS LAKE, SITE 6, NEAR ROSCOMMON, MI (LAT 44 30 11N LONG 084 46 20W)						
JUN 1996								
05...	1440	253	8.0	17.0	0.20	10.5	12	168
443043084450601		HIGGINS LAKE, SITE 7, NEAR ROSCOMMON, MI (LAT 44 30 43N LONG 084 45 06W)						
JUN 1996								
05...	1415	240	8.0	15.5	--	10.6	9.0	158
JUL								
10...	1615	252	8.1	21.0	0.20	9.1	8.4	162
AUG								
06...	1550	269	8.2	25.5	0.30	8.6	10	174
28...	1330	237	8.1	23.0	0.30	7.9	8.5	176
442927084414401		HIGGINS LAKE, SITE 8, NEAR ROSCOMMON, MI (LAT 44 29 27N LONG 084 41 44W)						
JUN 1996								
05...	1330	247	8.1	15.5	0.20	9.7	7.6	160

STREAMS TRIBUTARY TO LAKE MICHIGAN
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)
442903084413401		HIGGINS LAKE, SITE 9, NEAR ROSCOMMON, MI (LAT 44 29 03N LONG 084 41 34W)						
JUN 1996 05...	1220	240	8.1	14.5	--	9.9	7.3	170
442717084401501		HIGGINS LAKE, SITE 11, NEAR ROSCOMMON, MI (LAT 44 27 17N LONG 084 40 15W)						
JUN 1996 05...	1120	233	8.0	12.5	0.30	10.2	7.8	162
442617084400601		HIGGINS LAKE, SITE 12, NEAR ROSCOMMON, MI (LAT 44 26 17N LONG 084 40 06W)						
JUN 1996 05...	1030	234	8.0	12.0	0.20	10.1	7.4	158
442533084411301		HIGGINS LAKE, SITE 13, NEAR ROSCOMMON, MI (LAT 44 25 33N LONG 084 41 13W)						
JUN 1996 06...	1245	239	8.0	13.5	0.20	10.2	7.0	156
JUL 10...	1735	250	8.1	23.5	0.20	8.9	7.5	164
AUG 06...	1720	246	8.2	26.5	0.30	8.6	7.5	154
28...	1030	234	8.2	19.5	0.50	8.0	7.3	146
442603084421401		HIGGINS LAKE, SITE 14, NEAR ROSCOMMON, MI (LAT 44 26 03N LONG 084 42 14W)						
JUN 1996 06...	1200	242	8.0	13.0	0.30	10.3	6.9	156
442710084423601		HIGGINS LAKE, SITE 15, NEAR ROSCOMMON, MI (LAT 44 27 10N LONG 084 42 36W)						
JUN 1996 06...	1120	242	7.8	13.0	0.20	10.3	7.1	160

STREAMS TRIBUTARY TO LAKE MICHIGAN
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)
442803084411601		HIGGINS LAKE, SITE 10, NEAR ROSCOMMON, MI (LAT 44 28 03N LONG 084 41 16W)					
JUN 1996							
05...	1140	240	8.0	13.5	0.20	9.6	7.4
JUL							
10...	1715	243	8.1	21.0	0.20	8.9	7.2
AUG							
06...	1700	245	8.2	26.5	1.1	8.0	7.7
27...	1300	234	8.2	22.5	0.30	8.8	7.2
442533084410601		HIGGINS LAKE, SITE 20 NEAR ROSCOMMON, MI (LAT 44 25 33N LONG 084 41 06W)					
AUG 1996							
27...	1045	232	8.2	20.0	--	9.0	7.3
442640084400001		HIGGINS LAKE, SITE 21, NEAR ROSCOMMON, MI (LAT 44 26 40N LONG 084 40 00W)					
AUG 1996							
27...	1200	230	8.2	21.0	--	8.7	7.5
442811084430701		HIGGINS LAKE, SITE 22, NEAR ROSCOMMON, MI (LAT 44 28 11N LONG 084 43 07W)					
AUG 1996							
27...	1415	235	8.2	21.5	--	9.0	7.4
442958084462801		HIGGINS LAKE, SITE 23, NEAR ROCCOMMON, MI (LAT 44 29 58N LONG 084 46 28W)					
AUG 1996							
27...	1530	247	8.2	23.0	--	9.3	11
443027084460601		HIGGINS LAKE, SITE 24, NEAR ROSCOMMON, MI (LAT 44 30 27N LONG 084 46 06W)					
AUG 1996							
28...	1215	242	8.2	22.5	--	8.1	7.9
DATE	SOLIDS, RESIDUE AT 105 DEG. C. TOTAL (MG/L) (00500)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN,AM- MONIA + ORGANIC DIS- (MG/L AS N) (00623)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
442803084411601		HIGGINS LAKE, SITE 10, NEAR ROSCOMMON, MI (LAT 44 28 03N LONG 084 41 16W)					
JUN 1996							
05...	156	--	--	--	--	--	--
JUL							
10...	162	--	--	--	--	--	--
AUG							
06...	156	--	--	--	--	--	--
27...	156	<0.001	<0.005	<0.20	0.003	0.002	<0.001
442533084410601		HIGGINS LAKE, SITE 20 NEAR ROSCOMMON, MI (LAT 44 25 33N LONG 084 41 06W)					
AUG 1996							
27...	--	<0.001	0.007	0.30	0.004	0.002	<0.001
442640084400001		HIGGINS LAKE, SITE 21, NEAR ROSCOMMON, MI (LAT 44 26 40N LONG 084 40 00W)					
AUG 1996							
27...	164	<0.001	0.013	0.20	0.005	<0.001	<0.001
442811084430701		HIGGINS LAKE, SITE 22, NEAR ROSCOMMON, MI (LAT 44 28 11N LONG 084 43 07W)					
AUG 1996							
27...	168	<0.001	0.010	<0.20	0.008	<0.001	<0.001
442958084462801		HIGGINS LAKE, SITE 23, NEAR ROCCOMMON, MI (LAT 44 29 58N LONG 084 46 28W)					
AUG 1996							
27...	176	<0.001	0.010	<0.20	0.003	<0.001	<0.001
443027084460601		HIGGINS LAKE, SITE 24, NEAR ROSCOMMON, MI (LAT 44 30 27N LONG 084 46 06W)					
AUG 1996							
28...	162	<0.001	0.011	<0.20	0.004	<0.001	<0.001

STREAMS TRIBUTARY TO LAKE MICHIGAN
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

DATE	TIME	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 105 DEG. C. TOTAL (MG/L) (00500)
442803084411604 SITE 10, WATER TABLE 2 FEET BELOW LANDSURFACE (LAT 44 28 03N LONG 084 41 16W)							
AUG 1996 27...	1315	445	7.2	21.5	1.2	16	308
442533084410604 SITE 20 WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 25 33N LONG 084 41 06W)							
AUG 1996 27...	1100	648	6.7	20.5	1.7	3.4	476
442640084400004 SITE 21, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 26 40N LONG 084 40 00W)							
AUG 1996 27...	1215	263	7.6	21.5	1.3	9.0	208
442811084430704 SITE 22, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 11N LONG 084 43 07W)							
AUG 1996 27...	1430	289	7.5	21.5	3.9	9.9	--
442958084462804 SITE 23, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 29 58N LONG 084 46 28W)							
AUG 1996 27...	1545	420	7.4	21.0	1.0	41	294
443027084460604 SITE 24, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 30 27N LONG 084 46 06W)							
AUG 1996 28...	1230	445	7.5	21.0	4.0	45	280
DATE		NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
442803084411604 SITE 10, WATER TABLE 2 FEET BELOW LANDSURFACE (LAT 44 28 03N LONG 084 41 16W)							
AUG 1996 27...		<0.001	0.014	0.40	0.013	0.008	0.004
442533084410604 SITE 20 WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 25 33N LONG 084 41 06W)							
AUG 1996 27...		0.002	0.008	1.2	0.010	0.004	<0.001
442640084400004 SITE 21, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 26 40N LONG 084 40 00W)							
AUG 1996 27...		<0.001	<0.005	<0.20	0.010	<0.001	<0.001
442811084430704 SITE 22, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 11N LONG 084 43 07W)							
AUG 1996 27...		<0.001	0.009	<0.20	0.032	0.014	0.010
442958084462804 SITE 23, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 29 58N LONG 084 46 28W)							
AUG 1996 27...		<0.001	<0.005	0.20	0.012	0.008	0.004
443027084460604 SITE 24, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 30 27N LONG 084 46 06W)							
AUG 1996 28... Rfs		<0.001	0.200	<0.20	0.012	0.003	<0.001

STREAMS TRIBUTARY TO LAKE MICHIGAN
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

442955084453001 - HIGGINS LAKE, SITE 25, NEAR ROSCOMMON, MI (LAT 44 29 55N LONG 084 45 30W)

TOTAL COLUMN (COMPOSITE SAMPLE)

DATE	TIME	TUR- BID- ITY (NTU) (00076)	TRANS- PAR- ENCY (SECCHI DISK) (M) (00078)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
JUN 1996 04...	1500	0.20	5.8	6.9	150	<0.001	<0.005	<0.002	<0.20	0.003	0.002	<0.001

442955084453005 - HIGGINS LAKE, SITE 25, NEAR ROSCOMMON, MI (LAT 44 29 55N LONG 084 45 30W)

EPILIMNION (COMPOSITE SAMPLE)

DATE	TIME	TUR- BID- ITY (NTU) (00076)	TRANS- PAR- ENCY (SECCHI DISK) (M) (00078)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
JUL 1996 10...	1500	0.70	9.3	6.9	158	<0.001	<0.005	<0.002	<0.20	0.007	0.003	0.001
AUG 06...	1500	0.20	7.8	7.2	150	<0.001	<0.005	<0.002	<0.20	0.003	0.003	<0.001
SEP 04...	1500	0.30	9.1	7.2	148	<0.001	<0.005	<0.002	<0.20	0.002	0.002	<0.001

442955084453002 - HIGGINS LAKE, SITE 25, NEAR ROSCOMMON, MI (LAT 44 29 55N LONG 084 45 30W)

HYPOLIMNION (COMPOSITE SAMPLE)

DATE	TIME	TUR- BID- ITY (NTU) (00076)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
JUL 1996 10...	1500	0.20	6.8	152	<0.001	<0.005	<0.002	<0.20	0.006	0.002	<0.001
AUG 06...	1500	0.30	7.4	152	<0.001	0.019	<0.002	<0.20	0.008	0.005	0.001
SEP 04...	1515	0.30	7.1	156	<0.001	<0.005	<0.002	<0.20	0.006	0.003	<0.001

STREAMS TRIBUTARY TO LAKE MICHIGAN

HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

442658084404401 - HIGGINS LAKE, SITE 26, NEAR ROSCOMMON, MI (LAT 44 26 58N LONG 084 40 44W)

TOTAL COLUMN (COMPOSITE SAMPLE)

DATE	TIME	TUR- BID- ITY (NTU) (00076)	TRANS- PAR- ENCY (SECCHI DISK) (M) (00078)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
JUN 1996 04...	1300	0.20	5.8	7.0	152	<0.001	<0.005	<0.002	<0.20	0.005	0.005	<0.001

442658084404405 - HIGGINS LAKE, SITE 26, NEAR ROSCOMMON, MI (LAT 44 26 58N LONG 084 40 44W)

EPIPLIMNION (COMPOSITE SAMPLE)

DATE	TIME	TUR- BID- ITY (NTU) (00076)	TRANS- PAR- ENCY (SECCHI DISK) (M) (00078)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
JUL 1996 10...	1215	--	7.5	7.1	--	<0.001	<0.005	<0.002	<0.20	0.005	0.002	<0.001
AUG 06...	1130	0.20	8.0	7.4	144	<0.001	<0.005	0.004	<0.20	0.004	0.003	<0.001
SEP 04...	1245	0.30	9.4	7.6	140	<0.001	<0.005	<0.002	<0.20	0.002	0.002	<0.001

442658084404402 - HIGGINS LAKE, SITE 26, NEAR ROSCOMMON, MI (LAT 44 26 58N LONG 084 40 44W)

HYPOLIMNION (COMPOSITE SAMPLE)

DATE	TIME	TUR- BID- ITY (NTU) (00076)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS- SOLVED (MG/L AS N) (00623)	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
JUL 1996 10...	1215	--	--	--	<0.001	<0.005	<0.002	<0.20	0.006	0.003	<0.001
AUG 06...	1130	0.20	6.9	146	0.001	<0.005	0.003	<0.20	0.005	0.003	<0.001
SEP 04...	1300	0.30	7.1	152	<0.001	<0.005	<0.002	<0.20	0.003	0.002	<0.001

STREAMS TRIBUTARY TO LAKE MICHIGAN
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

442955084453003 - HIGGINS LAKE, SITE 25, NEAR ROSCOMMON, MI (LAT 44 29 55N LONG 084 45 30W)

PHOTIC ZONE			
DATE	TIME	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)
JUN 1996			
04...	1500	<0.100	<0.100
JUL			
10...	1500	0.300	<0.100
AUG			
06...	1500	0.400	<0.100
SEP			
04...	1500	E0.300	<0.100

442658084404403 - HIGGINS LAKE, SITE 26, NEAR ROSCOMMON, MI (LAT 44 26 58N LONG 084 40 44W)

PHOTIC ZONE			
DATE	TIME	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70953)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L) (70954)
JUN 1996			
04...	1300	<0.100	<0.100
JUL			
10...	1215	0.300	<0.100
AUG			
06...	1130	0.400	<0.100
SEP			
04...	1245	E0.100	<0.100

STATION NUMBER	STATION NAME	DATE	TIME	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M (00572)	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M (00573)	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2) (70957)
442813084422601	HIGGINS LAKE, SITE 1, NEAR ROSCOMMON, MI	07-09-96	1246	127.6	133.2	1.50
442813084422601	HIGGINS LAKE, SITE 1, NEAR ROSCOMMON, MI	08-27-96	1345	196.2	203.5	3.30
442700084414701	HIGGINS LAKE, SITE 16, NEAR ROSCOMMON, MI	07-09-96	1100	603.3	635.7	9.90
442700084414701	HIGGINS LAKE, SITE 16, NEAR ROSCOMMON, MI	08-28-96	1115	339.8	362.7	12.0
442604084402601	HIGGINS LAKE, SITE 17, NEAR ROSCOMMON, MI	07-09-96	1630	263.5	278.2	2.60
442604084402601	HIGGINS LAKE, SITE 17, NEAR ROSCOMMON, MI	08-27-96	1130	260.3	277.1	4.20
442840084435401	HIGGINS LAKE, SITE 18, NEAR ROSCOMMON, MI	07-09-96	1330	145.1	154.8	1.70
442756084451201	HIGGINS LAKE, SITE 19, NEAR ROSCOMMON, MI	07-09-96	1430	128.0	134.9	3.00
442756084451201	HIGGINS LAKE, SITE 19, NEAR ROSCOMMON, MI	08-27-96	1500	179.1	190.0	7.00

STREAMS TRIBUTARY TO LAKE MICHIGAN
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued
WATER-QUALITY DATA

442955084453001 - HIGGINS LAKE, SITE 25, NEAR ROSCOMMON, MI (LAT 44 29 55N LONG 084 45 30W)

DATE	TIME	DEPTH AT SAMPLE LOC- ATION, TOTAL (FEET) (81903)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)
JUN							
04...	1430	5.00	242	8.2	13.5	11.1	111
04...	1433	30.0	242	8.2	13.5	11.1	111
04...	1436	15.0	242	8.2	13.5	11.2	112
04...	1440	20.0	242	8.2	12.0	11.5	112
04...	1443	25.0	242	8.3	10.0	12.3	114
04...	1449	30.0	241	8.3	9.0	12.4	112
04...	1455	35.0	240	8.2	8.0	12.6	111
04...	1501	40.0	240	8.2	7.5	12.6	110
04...	1505	45.0	242	8.2	7.0	12.6	109
04...	1510	50.0	240	8.2	7.0	12.6	109
04...	1515	55.0	240	8.2	6.5	12.6	107
04...	1526	60.0	238	8.2	6.5	12.5	106
04...	1531	65.0	238	8.2	6.0	12.4	104
04...	1534	70.0	238	8.2	6.0	12.3	103
04...	1537	75.0	238	8.2	6.0	12.2	103
04...	1540	80.0	238	8.2	6.0	12.2	103
04...	1544	85.0	238	8.2	6.0	12.2	103
04...	1547	90.0	238	8.2	6.0	12.1	102
04...	1550	95.0	238	8.1	6.0	11.9	100
04...	1553	100.0	238	8.1	5.5	11.9	99
04...	1555	105.0	238	8.1	5.5	11.8	98
04...	1557	110.0	239	8.1	5.5	11.7	97
04...	1600	115.0	239	8.1	5.5	11.3	94
04...	1605	120.0	240	8.0	5.5	11.1	92

442955084453001 - HIGGINS LAKE, SITE 25, NEAR ROSCOMMON, MI (LAT 44 29 55N LONG 084 45 30W)

DATE	TIME	DEPTH AT SAMPLE LOC- ATION, TOTAL (FEET) (81903)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)
JUL							
10...	1400	1.00	243	8.2	19.5	8.8	100
10...	1402	5.00	243	8.2	19.5	8.8	99
10...	1404	10.0	243	8.2	19.0	8.8	99
10...	1406	15.0	243	8.2	19.0	8.8	99
10...	1408	20.0	243	8.2	19.0	8.8	99
10...	1410	25.0	242	8.2	17.5	9.4	102
10...	1412	30.0	242	8.2	15.0	10.2	105
10...	1414	35.0	242	8.3	13.0	10.6	105
10...	1416	40.0	241	8.3	11.0	10.9	103
10...	1418	45.0	241	8.2	9.5	11.1	101
10...	1420	50.0	241	8.2	8.5	11.0	98
10...	1422	55.0	241	8.2	8.0	10.9	95
10...	1424	60.0	240	8.2	7.5	10.9	94
10...	1426	65.0	240	8.1	7.5	10.9	94
10...	1428	70.0	240	8.1	7.0	10.6	91
10...	1430	75.0	240	8.0	6.5	10.4	88
10...	1432	80.0	240	8.0	6.5	10.2	86
10...	1434	85.0	240	7.9	6.0	9.9	83
10...	1436	90.0	240	7.9	6.0	9.5	79
10...	1438	95.0	240	7.9	6.0	9.3	78
10...	1440	100.0	240	7.9	6.0	9.2	77
10...	1442	105.0	240	7.8	6.0	9.0	75
10...	1444	110.0	240	7.8	6.0	8.3	69
10...	1446	115.0	240	7.8	5.5	8.1	67
10...	1448	120.0	240	7.8	5.5	8.1	67
10...	1450	125.0	240	7.8	5.5	7.6	63
10...	1452	130.0	245	7.7	5.5	7.2	59
10...	1454	135.0	245	7.7	5.5	7.0	58

STREAMS TRIBUTARY TO LAKE MICHIGAN
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued
WATER-QUALITY DATA

442955084453001 - HIGGINS LAKE, SITE 25, NEAR ROSCOMMON, MI (LAT 44 29 55N LONG 084 45 30W)

DATE	TIME	DEPTH AT SAMPLE LOC- ATION, TOTAL (FEET) (81903)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)
AUG							
06...	1350	1.00	244	8.2	23.0	8.4	102
06...	1352	5.00	244	8.2	23.0	8.3	101
06...	1354	10.0	245	8.2	22.0	8.4	100
06...	1356	15.0	244	8.2	22.0	8.4	100
06...	1358	20.0	244	8.2	22.0	8.3	99
06...	1400	25.0	244	8.2	21.5	8.3	98
06...	1402	30.0	244	8.3	20.0	8.5	97
06...	1404	35.0	244	8.3	16.5	9.9	106
06...	1406	40.0	244	8.3	10.5	11.0	103
06...	1408	45.0	244	8.3	9.5	11.0	100
06...	1410	50.0	243	8.3	9.0	10.9	98
06...	1412	55.0	244	8.2	8.5	10.6	94
06...	1414	60.0	244	8.2	8.0	10.6	93
06...	1416	65.0	244	8.2	7.5	10.6	92
06...	1418	70.0	244	8.1	7.5	10.3	89
06...	1420	75.0	245	7.9	7.0	9.3	80
06...	1422	80.0	246	7.9	6.5	9.1	77
06...	1424	85.0	245	7.8	6.5	9.0	76
06...	1426	90.0	247	7.8	6.5	8.7	74
06...	1428	95.0	246	7.8	6.0	8.5	71
06...	1430	100.0	246	7.8	6.0	8.3	69
06...	1432	105.0	247	7.7	6.0	8.0	67
06...	1434	110.0	249	7.7	6.0	7.7	64
06...	1436	115.0	251	7.7	6.0	6.7	56
06...	1438	120.0	257	7.6	5.5	5.2	43
06...	1440	125.0	254	7.6	5.5	4.1	34
06...	1442	130.0	259	7.6	5.5	2.8	23

442955084453001 - HIGGINS LAKE, SITE 25, NEAR ROSCOMMON, MI (LAT 44 29 55N LONG 084 45 30W)

DATE	TIME	DEPTH AT SAMPLE LOC- ATION, TOTAL (FEET) (81903)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)
SEP							
04...	1405	1.00	239	8.1	24.0	8.8	107
04...	1407	5.00	239	8.2	23.5	8.6	104
04...	1409	10.0	240	8.2	23.0	8.7	104
04...	1411	15.0	240	8.2	23.0	8.8	105
04...	1413	20.0	240	8.3	22.5	8.9	105
04...	1415	25.0	236	8.3	22.0	8.9	104
04...	1417	30.0	242	8.3	22.0	8.9	104
04...	1419	35.0	237	8.3	20.5	9.2	105
04...	1420	40.0	242	8.4	16.5	11.1	116
04...	1423	45.0	240	8.5	12.0	12.3	117
04...	1425	50.0	241	8.4	10.5	12.2	112
04...	1427	55.0	240	8.3	9.5	11.3	101
04...	1429	60.0	245	8.1	9.0	10.3	91
04...	1431	65.0	240	8.1	8.5	10.2	89
04...	1433	70.0	240	8.1	8.0	10.0	86
04...	1435	75.0	243	8.0	8.0	9.9	86
04...	1437	80.0	250	7.8	7.0	8.7	73
04...	1501	85.0	240	7.8	7.0	8.4	71
04...	1502	90.0	242	7.8	6.5	7.9	66
04...	1504	95.0	234	7.8	6.5	7.8	65
04...	1506	100.0	230	7.8	6.5	7.5	62
04...	1509	105.0	240	7.7	6.0	6.9	57
04...	1511	110.0	245	7.7	6.0	6.0	49
04...	1513	115.0	250	7.6	6.0	4.3	35
04...	1515	120.0	250	7.6	6.0	1.6	13

STREAMS TRIBUTARY TO LAKE MICHIGAN
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

442658084404401 - HIGGINS LAKE, SITE 26, NEAR ROSCOMMON, MI (LAT 44 26 58N LONG 084 40 44W)

DATE	TIME	DEPTH AT SAMPLE LOC- ATION, TOTAL (FEET) (81903)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)
JUN							
04...	1130	5.00	239	8.2	12.5	11.6	114
04...	1135	10.0	241	8.2	12.5	11.6	114
04...	1140	15.0	240	8.2	12.0	11.7	114
04...	1145	20.0	240	8.2	11.5	11.8	113
04...	1148	25.0	235	8.2	11.5	11.8	113
04...	1154	30.0	240	8.2	11.5	11.8	113
04...	1157	35.0	237	8.2	11.5	12.0	115
04...	1200	40.0	242	8.2	10.5	12.2	114
04...	1203	45.0	241	8.2	10.0	12.4	115
04...	1206	50.0	235	8.2	8.5	12.7	114
04...	1210	55.0	235	8.2	7.5	12.9	113
04...	1213	60.0	235	8.2	7.0	12.9	111
04...	1216	65.0	235	8.2	7.0	12.9	111
04...	1220	70.0	235	8.2	6.5	12.9	110
04...	1223	75.0	230	8.2	6.5	12.8	109
04...	1226	80.0	235	8.2	6.5	12.7	108
04...	1230	85.0	235	8.2	6.0	12.2	103
04...	1235	90.0	235	8.1	6.0	12.2	103

442658084404401 - HIGGINS LAKE, SITE 26, NEAR ROSCOMMON, MI (LAT 44 26 58N LONG 084 40 44W)

DATE	TIME	DEPTH AT SAMPLE LOC- ATION, TOTAL (FEET) (81903)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)
JUL							
10...	1045	1.00	243	8.3	19.5	8.7	99
10...	1050	5.00	245	8.3	19.5	8.7	99
10...	1052	10.0	240	8.3	19.5	8.6	97
10...	1054	15.0	240	8.3	19.5	8.6	97
10...	1056	20.0	240	8.3	19.5	8.6	97
10...	1058	25.0	240	8.3	19.5	8.6	97
10...	1100	30.0	240	8.3	19.5	8.6	97
10...	1102	35.0	240	8.3	19.5	8.6	97
10...	1104	40.0	240	8.3	12.5	10.2	100
10...	1106	45.0	240	8.3	9.5	10.9	99
10...	1108	50.0	240	8.2	8.5	11.1	99
10...	1110	55.0	240	8.2	8.0	11.1	97
10...	1112	60.0	240	8.2	7.5	10.9	94
10...	1114	65.0	240	8.2	7.5	10.9	94
10...	1116	70.0	240	8.1	7.0	10.5	90
10...	1118	75.0	240	8.1	7.0	10.2	87
10...	1120	80.0	240	8.0	7.0	10.1	86
10...	1122	85.0	240	8.0	7.0	10.0	86
10...	1124	90.0	240	7.9	6.5	8.7	74
10...	1126	95.0	245	7.8	6.5	7.9	67

STREAMS TRIBUTARY TO LAKE MICHIGAN
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued
WATER-QUALITY DATA

442658084404401 - HIGGINS LAKE, SITE 26, NEAR ROSCOMMON, MI (LAT 44 26 58N LONG 084 40 44W)

DATE	TIME	DEPTH AT SAMPLE LOC- ATION, TOTAL (FEET) (81903)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)
AUG							
06...	1024	1.00	244	8.2	21.5	8.6	101
06...	1026	5.00	244	8.2	21.5	8.5	100
06...	1028	10.0	244	8.2	21.0	8.5	99
06...	1030	15.0	244	8.2	21.0	8.4	98
06...	1032	20.0	244	8.2	21.0	8.4	98
06...	1034	25.0	242	8.2	20.5	8.5	98
06...	1036	30.0	242	8.2	19.5	8.8	100
06...	1038	35.0	242	8.3	16.5	9.8	104
06...	1040	40.0	242	8.4	13.0	10.6	105
06...	1042	45.0	242	8.3	11.0	10.8	102
06...	1044	50.0	242	8.4	9.5	10.9	99
06...	1046	55.0	242	8.3	8.5	10.6	94
06...	1048	60.0	242	8.3	8.5	10.3	92
06...	1050	65.0	242	8.3	8.0	10.2	90
06...	1052	70.0	242	8.2	8.0	9.8	86
06...	1054	75.0	242	8.1	7.5	9.7	84
06...	1056	80.0	242	8.1	7.5	9.4	82
06...	1058	85.0	248	8.0	7.5	8.6	75
06...	1100	90.0	252	7.8	7.0	7.0	60

442658084404401 - HIGGINS LAKE, SITE 26, NEAR ROSCOMMON, MI (LAT 44 26 58N LONG 084 40 44W)

DATE	TIME	DEPTH AT SAMPLE LOC- ATION, TOTAL (FEET) (81903)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION) (00301)
SEP							
04...	1145	1.00	238	8.1	23.0	8.8	105
04...	1150	5.00	238	8.1	22.5	8.7	103
04...	1152	10.0	238	8.1	22.5	8.7	103
04...	1154	15.0	238	8.2	22.5	8.7	103
04...	1156	20.0	239	8.2	22.0	8.8	103
04...	1158	25.0	241	8.2	22.0	8.9	104
04...	1200	30.0	243	8.2	21.5	8.9	103
04...	1202	35.0	234	8.2	20.5	9.3	106
04...	1204	40.0	241	8.3	16.5	10.6	111
04...	1206	45.0	240	8.4	12.0	11.7	111
04...	1208	50.0	230	8.4	10.0	11.5	104
04...	1210	55.0	240	8.2	9.0	10.7	95
04...	1212	60.0	244	8.2	8.5	10.1	88
04...	1214	65.0	250	8.1	8.5	9.7	85
04...	1216	70.0	240	8.0	8.5	9.6	84
04...	1218	75.0	250	8.0	8.0	9.4	81
04...	1220	80.0	240	7.9	8.0	9.2	79
04...	1222	85.0	245	7.9	8.0	8.3	72
04...	1224	90.0	250	7.8	7.5	5.8	50
04...	1226	95.0	250	7.6	7.5	2.7	23
04...	1228	97.0	260	7.6	7.0	2.0	17

STREAMS TRIBUTARY TO LAKE MICHIGAN

442400084472801 HOUGHTON LAKE NEAR HOUGHTON LAKE HEIGHTS, MI

LOCATION.--Lat 44°24'16", long 84°47'28", in NW1/4 NW1/4 sec.10, T.23 N., R.4 W., Roscommon County, Hydrologic Unit 04060102, on right bank of Muskegon River at upstream side of bridge on Old U.S. Highway 27, 0.4 mi downstream from Houghton Lake, and 5.2 mi north of Houghton Lake Heights.

DRAINAGE AREA.--222 mi².

PERIOD OF RECORD.--June 1942 to September 1991, September 1993 to current year, except winter period of 1942-43.

GAGE.--Nonrecording gage. Once daily reading by observer. Datum of gage is 1,130.00 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Sept. 28, 1960, nonrecording gage at datum 6.21 ft higher. Water-stage recorder Sept. 28, 1960 to Sept. 30, 1991.

REMARKS.--Backus Creek and "The Cut" from Higgins Lake, join about 1 mi upstream from Houghton Lake and become the major inlet. There are also many small tributaries which feed the lake. The outlet is Muskegon River. Houghton Lake is the largest inland lake in Michigan. Established legal level, summer, 1,138.1 ft, minimum winter, 1,137.6 ft, above sea level.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 10.18 ft, Apr. 23, 1985; minimum observed, 6.95 ft, Sept. 3, 5, Nov. 8, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 9.17 ft, June 24; minimum observed, 7.88 ft, Oct. 30.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY INSTANTANEOUS VALUES

[illegible]

LOCATION.--Lat 44°14'21", long 85°27'17", in SW1/4 SW1/4 sec.6, T.21 N., R.9 W., Wexford County, Hydrologic Unit 04060102, on right bank of channel between lakes, at William Mitchell State Park, at Cadillac.

PERIOD OF RECORD.--August 1942 to December 1959, July 1960 to current year.

GAGE.--Nonrecording gage. Once daily reading by observer. Datum of gage is 1,283.41 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--The major inlet is Mitchell Creek. The outlet is Clam River. Lake elevation controlled by dam. Established legal levels; annual maximum level, 1,290.0 ft. minimum winter level, 1,288.9 ft. summer minimum level, 1,289.7 ft. above sea level..

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 7.86 ft, Sept. 6, 1975; minimum observed, 4.62 ft, Oct. 4, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 6.89 ft, June 13; minimum observed, 5.90 ft, Jan. 23.

[illegible]

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121300 CLAM RIVER AT VOGEL CENTER, MI

LOCATION.--Lat 44°12'02", long 85°03'10", in SW1/4 NW1/4 sec.21, T.21 N., R.6 W., Missaukee County, Hydrologic Unit 04060102, on left bank 10 ft downstream from bridge on 8 Mile Road, 0.5 mi north of Vogel Center, and 3.5 mi southeast of Falmouth.

DRAINAGE AREA.--243 mi².

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,130 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Some regulation at low flow by dams upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	71	148	156	e110	e112	168	216	236	96	167	96	87
2	70	202	162	e105	e112	165	201	234	101	161	91	87
3	73	216	153	104	e111	134	191	226	107	159	88	86
4	80	184	150	98	e110	e125	186	222	101	155	85	83
5	80	161	148	e110	e110	e120	174	213	98	131	83	82
6	77	153	110	e110	e110	e115	183	204	102	107	80	83
7	81	151	e100	e110	e110	115	183	199	116	100	79	82
8	84	147	e90	111	e115	112	177	195	189	98	76	81
9	80	139	e80	111	122	117	172	218	233	100	76	90
10	78	139	e75	112	126	e118	182	260	222	98	75	88
11	77	163	e70	e108	139	e120	217	326	209	95	76	85
12	75	163	e66	e106	147	128	285	342	201	93	76	83
13	74	177	e75	e106	e135	136	338	281	192	92	74	83
14	72	160	e90	104	125	167	352	232	178	92	76	89
15	75	147	e110	e102	e122	e185	317	208	171	90	80	96
16	78	148	e100	e100	e120	e190	303	190	149	88	79	93
17	76	141	e105	98	e115	202	304	180	132	88	76	87
18	73	139	e110	125	e115	207	281	158	347	89	75	84
19	74	139	e115	211	115	216	263	148	493	91	78	83
20	82	141	e110	254	119	229	265	155	557	90	193	81
21	113	150	e105	237	135	210	263	156	468	88	254	86
22	110	151	e105	216	159	177	244	139	336	86	205	98
23	96	148	e100	193	153	156	224	128	269	85	156	97
24	91	138	e100	161	156	160	217	124	248	84	125	91
25	88	137	e100	143	172	212	216	118	230	85	105	88
26	97	135	e98	128	179	e270	222	112	217	84	95	88
27	120	125	e98	e120	185	e265	223	110	209	83	94	124
28	140	88	97	e118	194	e220	216	106	201	83	93	156
29	142	126	e98	e116	175	201	204	102	193	97	91	126
30	138	148	e100	e115	---	209	215	101	180	109	89	107
31	136	---	e105	113	---	231	---	99	---	106	88	---
TOTAL	2801	4504	3281	4055	3898	5380	7034	5722	6545	3174	3107	2774
MEAN	90.4	150	106	131	134	174	234	185	218	102	100	92.5
MAX	142	216	162	254	194	270	352	342	557	167	254	156
MIN	70	88	66	98	110	112	172	99	96	83	74	81
CFSM	.37	.62	.44	.54	.55	.71	.96	.76	.90	.42	.41	.38
IN.	.43	.69	.50	.62	.60	.82	1.08	.88	1.00	.49	.48	.42

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1996, BY WATER YEAR (WY)

	MEAN	117	138	139	123	121	194	242	154	115	91.4	85.1	101
MAX	275	248	259	187	194	389	396	245	218	238	185	281	
(WY)	1987	1986	1992	1993	1988	1976	1976	1976	1996	1969	1969	1985	
MIN	62.3	70.3	64.5	62.7	63.5	100	109	67.9	57.0	53.0	58.1	59.9	
(WY)	1967	1977	1977	1977	1977	1978	1987	1977	1977	1977	1978	1981	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1966 - 1996

ANNUAL TOTAL	44392	52275	135
ANNUAL MEAN	122	143	185
HIGHEST ANNUAL MEAN			1992
LOWEST ANNUAL MEAN			1977
HIGHEST DAILY MEAN	439	Mar 16	1680
LOWEST DAILY MEAN	65	Jun 23	47
ANNUAL SEVEN-DAY MINIMUM	66	Jun 20	50
INSTANTANEOUS PEAK FLOW			1710
INSTANTANEOUS PEAK STAGE			7.31
INSTANTANEOUS LOW FLOW			(a)29
ANNUAL RUNOFF (CFSM)	.50	.59	.56
ANNUAL RUNOFF (INCHES)	6.80	8.00	7.57
10 PERCENT EXCEEDS	188	223	224
50 PERCENT EXCEEDS	106	118	110
90 PERCENT EXCEEDS	72	81	67

(a) Result of freezeup.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121500 MUSKEGON RIVER AT EVART, MI

LOCATION.--Lat 43°53'57", long 85°15'19", in NW1/4 NE1/4 sec.3, T.17 N., R.8 W., Osceola County, Hydrologic Unit 04060102, on right bank 500 ft downstream from bridge on U.S. Highway 10 in Evert, 0.4 mi upstream from Twin Creek, and at mile 123.9.

DRAINAGE AREA.--1,433 mi², revised.

PERIOD OF RECORD.--October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1437: 1934, 1947(M).

GAGE.--Water-stage recorder. Datum of gage is 977.72 ft above sea level. Prior to Nov. 7, 1956, nonrecording gages at sites 400 ft and 500 ft upstream at present datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Some regulation at low flow by dams upstream from station. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	644	1010	1030	1100	e1150	e1900	1980	2090	1050	1760	788	620
2	626	1280	1090	e1100	e1100	1700	1920	2060	1040	1580	757	594
3	632	1340	1160	e1100	e1000	1610	1850	1980	1040	1490	714	561
4	664	1340	1220	e1100	e1000	e1450	1840	1950	982	1350	676	536
5	677	1280	1200	e1100	e1000	1330	1780	1910	904	1250	645	517
6	688	1210	1120	e1050	e1000	e1300	1760	1860	903	1170	616	500
7	708	1190	1010	e1050	e1000	e1250	1750	1800	1050	1080	595	492
8	721	1150	864	e1050	e1000	e1200	1730	1740	1340	1030	568	482
9	730	1110	757	1060	1010	e1150	1690	1840	1340	1020	544	491
10	720	1090	e680	1020	1000	e1150	1670	2280	1400	977	521	517
11	701	1340	e620	e1000	1120	1120	1730	2940	1450	958	508	516
12	691	1360	e650	997	1360	1150	1980	2900	1420	954	499	517
13	681	1320	e750	911	e1250	1290	2300	2780	1400	936	487	541
14	675	1260	e900	872	1160	1590	2410	2450	1370	908	470	566
15	681	1210	e1050	e860	1140	e1850	2460	2190	1270	879	469	628
16	681	1150	e1000	e860	e1100	e1900	2730	2040	1190	852	474	649
17	677	1150	e950	856	e1050	e2000	2780	1910	1270	821	465	649
18	669	1110	e1050	980	e1030	2070	2790	1800	2130	802	460	645
19	664	1110	e1100	1610	e980	2090	2760	1710	2550	796	467	634
20	695	1110	e1050	e1800	964	2110	2800	1800	2690	774	694	624
21	792	1170	e1000	e1800	980	2020	2780	1830	2710	750	1020	655
22	840	1170	e1000	1800	1060	1920	2680	1780	3500	733	1060	816
23	836	1150	e1000	1660	1160	1840	2570	1680	4100	715	1200	823
24	821	1080	e1000	1560	1280	1800	2410	1610	4100	681	1130	824
25	821	1060	e1000	e1450	1430	e1800	2280	1520	3840	642	960	816
26	811	1060	e960	1400	1590	e1800	2230	1440	3420	607	843	804
27	845	1060	e940	1290	1870	e1850	2160	1360	3020	585	785	961
28	927	946	e940	e1300	2150	e1900	2060	1310	2580	568	780	1080
29	927	864	e940	1300	e2000	1930	1950	1240	2230	620	755	1090
30	911	924	e1000	e1250	---	1930	1990	1170	1970	737	702	1050
31	892	---	e1050	e1200	---	1990	---	1100	---	760	655	---
TOTAL	23048	34604	30081	37486	34934	51990	65820	58070	59259	28785	21307	20198
MEAN	743	1153	970	1209	1205	1677	2194	1873	1975	929	687	673
MAX	927	1360	1220	1800	2150	2110	2800	2940	4100	1760	1200	1090
MIN	626	864	620	856	964	1120	1670	1100	903	568	460	482
CFSM	.52	.80	.68	.84	.84	1.17	1.53	1.31	1.38	.65	.48	.47
IN.	.60	.90	.78	.97	.91	1.35	1.71	1.51	1.54	.75	.55	.52

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1996, BY WATER YEAR (WY)

	MEAN	780	1005	979	868	887	1583	2238	1358	984	688	554	645
MAX	2402	2656	2270	1700	2353	4115	3869	2709	2945	2901	1243	2269	
(WY)	1987	1992	1992	1973	1938	1976	1971	1947	1945	1957	1969	1975	
MIN	374	433	499	418	327	594	934	548	409	327	316	326	
(WY)	1949	1950	1977	1936	1936	1940	1945	1977	1988	1934	1941	1948	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1931 - 1996

ANNUAL TOTAL	346293	465582	
ANNUAL MEAN	949	1272	
HIGHEST ANNUAL MEAN			(a)1056
LOWEST ANNUAL MEAN			1532
HIGHEST DAILY MEAN	2380	4100	8770
LOWEST DAILY MEAN	393	460	252
ANNUAL SEVEN-DAY MINIMUM	410	470	274
INSTANTANEOUS PEAK FLOW		4180	9040
INSTANTANEOUS PEAK STAGE		11.06	14.99
INSTANTANEOUS LOW FLOW		448	(c)164
ANNUAL RUNOFF (CFSM)	.66	.89	.74
ANNUAL RUNOFF (INCHES)	8.99	12.09	10.01
10 PERCENT EXCEEDS	1470	2090	1970
50 PERCENT EXCEEDS	827	1090	802
90 PERCENT EXCEEDS	576	631	447

(a) Does not include water years 1931, 1934.

(b) Estimated 584 ft³/s, water year 1931.

(c) Result of freezeup.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121660 MUSKEGON RIVER NEAR STANWOOD, MI

LOCATION.--Lat 43°36'47", long 85°28'40", in SE1/4 SW1/4 sec.11, T.14 N., R.8 E., Mecosta County, Hydrologic Unit 04060102, on left bank downstream from Rogers Dam, 2.8 mi northwest of Stanwood.

DRAINAGE AREA.--1,834 mi².

PERIOD OF RECORD.--October 1995 to September 1996.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1995 to September 1996.

DISSOLVED OXYGEN: October 1995 to September 1996.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 25.5°C, Aug. 8; minimum, 0.0°C on many days during winter period.

DISSOLVED OXYGEN: Maximum, 14.0 mg/L, Mar. 9; minimum, 6.5 mg/L, July 9, 20.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

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

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121660 MUSKEGON RIVER NEAR STANWOOD, MI--Continued

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	18.0	17.0	17.5	24.0	23.5	24.0	19.5	19.0	19.5	21.0	20.5	21.0
2	18.5	17.5	18.0	24.0	22.5	23.5	19.5	19.0	19.0	21.0	20.5	21.0
3	18.5	17.5	18.5	22.5	21.0	22.0	20.0	19.0	19.5	21.5	20.5	21.0
4	18.5	17.5	18.0	21.5	20.5	21.0	21.0	20.0	20.5	21.5	20.5	21.0
5	17.5	16.0	17.0	21.0	20.0	20.5	22.0	21.0	21.5	22.0	20.5	21.5
6	17.0	16.5	17.0	22.5	20.5	21.5	23.0	22.0	22.5	22.5	21.5	22.0
7	17.0	16.5	16.5	22.5	22.0	22.5	24.5	23.0	23.5	22.0	21.5	21.5
8	16.5	15.0	15.5	23.0	21.5	22.5	25.5	24.5	25.0	21.5	21.0	21.5
9	15.0	15.0	15.0	22.0	20.0	21.0	25.0	24.0	24.5	22.0	21.0	21.5
10	15.5	15.0	15.0	20.0	19.0	19.5	24.0	22.5	23.0	21.5	21.0	21.5
11	17.0	15.5	16.0	20.0	19.0	19.5	22.5	21.5	22.0	21.5	21.0	21.0
12	18.0	16.5	17.0	20.0	19.0	20.0	21.5	20.5	21.0	21.0	20.5	21.0
13	20.0	18.0	19.0	19.5	19.0	19.5	22.0	20.5	21.5	20.5	18.5	19.5
14	22.0	20.0	21.0	20.5	19.5	20.5	22.0	21.5	21.5	18.5	16.5	17.5
15	22.0	21.5	22.0	21.0	20.5	21.0	22.5	22.0	22.0	16.5	15.0	15.5
16	22.0	21.0	21.5	21.5	20.5	21.0	22.0	21.5	22.0	15.5	15.0	15.0
17	21.5	20.5	21.5	22.0	21.5	21.5	21.5	21.0	21.5	15.5	14.5	15.0
18	20.5	18.5	19.5	22.0	21.0	21.5	22.0	21.0	21.5	15.5	14.5	15.0
19	18.5	17.0	17.5	22.0	21.0	21.5	22.0	21.5	22.0	16.0	15.0	15.0
20	18.0	17.5	17.5	22.0	21.0	21.5	22.0	21.5	21.5	16.0	15.0	15.5
21	19.0	18.0	18.5	21.5	20.5	21.0	21.5	21.0	21.5	15.5	15.5	15.5
22	20.0	18.5	19.0	21.0	20.5	21.0	22.5	21.5	22.0	15.5	15.0	15.5
23	20.0	19.5	19.5	21.5	20.5	21.0	22.5	22.0	22.5	15.5	14.5	15.0
24	19.5	18.5	19.0	21.5	21.0	21.5	22.0	21.0	22.0	15.0	14.5	15.0
25	19.0	17.5	18.0	22.0	21.5	22.0	21.5	21.0	21.5	15.0	14.5	15.0
26	19.0	18.0	18.5	22.0	21.0	21.5	22.0	21.5	21.5	14.5	14.5	14.5
27	20.0	18.5	19.0	21.0	20.5	21.0	22.0	21.0	22.0	14.5	13.5	14.0
28	21.0	20.0	20.5	21.0	20.5	21.0	21.0	20.0	20.5	14.0	13.5	14.0
29	22.5	21.0	21.5	20.5	19.5	20.0	20.5	20.0	20.5	13.5	13.0	13.5
30	24.0	22.5	23.0	20.5	19.5	19.5	21.0	20.0	20.5	13.0	12.0	13.0
31	---	---	---	20.0	19.5	19.5	21.0	20.0	20.5	---	---	---
MONTH	24.0	15.0	18.5	24.0	19.0	21.0	25.5	19.0	21.5	22.5	12.0	17.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121660 MUSKEGON RIVER NEAR STANWOOD, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	10.2	9.3	9.7	11.4	11.0	11.2	13.5	13.2	13.4	12.8	12.7	12.7			
2	9.5	8.8	9.1	11.4	10.4	11.1	13.4	13.0	13.1	13.0	12.7	12.8			
3	9.1	8.6	8.8	10.6	10.1	10.3	13.2	12.9	13.1	13.2	13.0	13.1			
4	9.0	8.3	8.7	11.3	10.4	10.8	13.1	12.9	12.9	13.3	13.2	13.2			
5	9.6	8.8	9.3	11.8	11.2	11.4	13.2	12.8	13.0	13.3	13.2	13.3			
6	9.6	9.0	9.3	12.0	11.6	11.9	13.2	12.8	13.0	13.4	13.3	13.3			
7	9.6	9.1	9.3	12.0	11.5	11.8	13.2	13.0	13.1	13.5	13.4	13.4			
8	9.7	9.4	9.6	11.7	11.4	11.5	13.6	13.2	13.5	13.4	13.3	13.4			
9	10.0	9.3	9.7	11.9	11.4	11.7	13.7	13.4	13.6	13.3	13.1	13.2			
10	10.6	9.7	10.1	12.1	11.9	12.0	13.5	13.2	13.3	13.1	12.6	12.8			
11	10.5	9.7	10.1	12.2	11.8	12.0	13.3	12.9	13.1	12.7	12.4	12.5			
12	11.0	10.1	10.5	12.3	11.8	12.1	12.9	12.6	12.7	12.5	12.4	12.5			
13	10.9	10.5	10.7	12.7	12.3	12.5	12.8	12.5	12.7	12.5	12.2	12.3			
14	10.7	10.3	10.5	12.9	12.6	12.8	12.5	12.1	12.3	12.2	12.0	12.1			
15	10.3	9.8	10.0	13.1	12.8	12.9	12.1	11.6	11.8	12.1	12.0	12.0			
16	10.7	9.6	10.1	13.1	13.0	13.0	11.6	11.2	11.3	12.2	11.9	12.1			
17	11.1	10.4	10.7	13.2	13.0	13.1	11.2	11.1	11.2	12.4	12.1	12.2			
18	11.0	10.7	10.9	13.3	13.1	13.2	11.1	11.0	11.1	12.1	11.7	11.9			
19	11.0	10.6	10.8	13.1	13.0	13.1	11.0	10.9	11.0	11.9	11.7	11.8			
20	10.8	10.3	10.6	13.0	12.8	12.9	11.1	10.9	11.0	11.8	11.6	11.7			
21	10.7	9.9	10.3	12.9	12.4	12.6	11.5	11.1	11.4	11.9	11.7	11.8			
22	10.4	9.8	10.1	12.4	12.2	12.3	11.6	11.4	11.5	11.7	11.4	11.6			
23	10.9	10.3	10.5	12.7	12.4	12.5	11.8	11.6	11.7	11.4	11.1	11.2			
24	10.9	10.6	10.8	12.9	12.6	12.8	11.9	11.7	11.8	11.1	10.9	11.0			
25	10.9	10.5	10.7	13.4	12.9	13.1	12.1	11.8	12.0	11.1	10.9	11.0			
26	10.9	10.5	10.7	13.3	13.2	13.3	12.2	12.1	12.2	11.2	10.9	11.1			
27	11.0	10.5	10.8	13.2	12.9	13.1	12.5	12.2	12.4	11.1	10.8	11.0			
28	10.6	9.6	10.1	12.9	12.8	12.9	12.6	12.4	12.5	10.9	10.7	10.8			
29	9.9	9.3	9.6	13.2	12.8	13.1	12.8	12.6	12.7	11.0	10.9	10.9			
30	10.8	9.7	10.1	13.6	13.2	13.4	12.9	12.8	12.8	10.9	10.6	10.7			
31	11.4	10.6	10.9	---	---	---	12.8	12.8	12.8	10.8	10.7	10.7			
MONTH	11.4	8.3	10.1	13.6	10.1	12.3	13.7	10.9	12.4	13.5	10.6	12.1			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	10.8	10.6	10.7	13.0	12.8	12.9	12.3	11.9	12.2	10.5	10.1	10.3	
2	10.8	10.7	10.8	12.9	12.8	12.8	12.6	12.3	12.5	10.8	10.4	10.6	
3	10.8	10.7	10.7	13.0	12.8	12.9	12.5	12.2	12.4	10.8	10.2	10.6	
4	10.8	10.6	10.7	13.4	12.9	13.1	12.3	12.2	12.3	10.3	10.0	10.2	
5	10.6	10.4	10.5	13.4	13.3	13.4	12.9	12.2	12.7	10.0	9.8	9.9	
6	10.5	10.3	10.4	13.3	13.2	13.3	13.2	12.8	13.0	10.2	9.8	10.0	
7	10.4	10.2	10.3	13.6	13.2	13.4	12.9	12.5	12.8	10.2	9.9	10.1	
8	10.4	10.2	10.3	13.8	13.6	13.7	12.8	12.5	12.7	9.9	9.5	9.8	
9	10.4	10.3	10.4	14.0	13.7	13.8	13.0	12.5	12.7	9.6	9.5	9.6	
10	10.8	10.4	10.6	13.9	13.5	13.8	12.8	12.3	12.6	9.6	9.4	9.5	
11	11.1	10.7	10.9	13.7	13.5	13.6	12.4	11.7	12.2	9.7	9.3	9.5	
12	11.4	11.0	11.2	13.9	13.4	13.7	11.7	10.6	11.4	9.8	9.5	9.6	
13	11.8	11.4	11.6	---	---	---	10.8	10.5	10.6	10.0	9.7	9.8	
14	12.0	11.7	11.8	---	---	---	11.3	10.8	11.1	10.0	9.8	9.9	
15	12.0	11.6	11.8	---	---	---	11.5	11.1	11.3	10.0	9.6	9.8	
16	11.8	11.7	11.8	---	---	---	11.5	11.2	11.3	9.6	9.3	9.4	
17	11.9	11.8	11.9	---	---	---	11.6	11.5	11.6	9.4	9.0	9.3	
18	11.9	11.7	11.8	---	---	---	11.7	11.1	11.4	9.0	8.8	8.9	
19	12.0	11.8	11.9	---	---	---	11.1	10.0	10.5	8.8	8.1	8.5	
20	12.0	11.8	11.8	12.8	12.5	12.6	10.0	9.3	9.6	8.1	7.5	7.9	
21	12.0	11.7	11.9	12.9	12.5	12.8	9.3	9.0	9.1	8.0	7.5	7.8	
22	12.1	11.9	12.0	13.3	12.9	13.1	9.2	8.7	8.9	8.1	7.6	8.0	
23	12.5	12.1	12.3	13.3	13.0	13.2	9.2	8.8	9.0	8.2	7.7	8.0	
24	12.5	12.3	12.4	13.3	12.7	13.0	9.5	9.2	9.4	8.3	7.7	8.0	
25	12.6	12.4	12.5	12.8	12.3	12.6	9.6	9.2	9.4	8.7	8.1	8.3	
26	12.7	12.5	12.6	12.9	12.3	12.5	9.4	9.2	9.3	8.6	8.1	8.4	
27	12.7	12.6	12.7	13.6	12.9	13.4	10.1	9.4	9.7	8.5	8.0	8.3	
28	12.8	12.6	12.7	13.7	13.4	13.6	10.1	9.9	10.0	8.8	8.3	8.6	
29	13.1	12.8	12.9	13.5	12.9	13.2	10.1	9.8	10.0	8.9	8.5	8.7	
30	---	---	---	13.0	12.5	12.8	10.1	9.8	9.9	9.0	8.4	8.6	
31	---	---	---	12.6	11.9	12.4	---	---	---	9.2	8.2	8.8	
MONTH	13.1	10.2	11.5	---	---	---	13.2	8.7	11.1	10.8	7.5	9.2	

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121660 MUSKEGON RIVER NEAR STANWOOD, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	9.2	8.3	8.9	7.6	6.9	7.4	7.9	6.8	7.5	8.5	7.7	8.1
2	9.2	7.5	8.5	7.8	6.7	7.3	8.5	7.4	7.9	8.5	7.7	8.1
3	8.4	7.6	8.0	7.7	6.8	7.2	9.0	8.3	8.6	8.5	7.8	8.3
4	8.2	7.4	7.9	8.3	6.8	7.5	8.7	8.3	8.5	8.6	7.8	8.3
5	8.1	7.3	7.6	8.4	6.8	7.7	8.9	8.0	8.3	9.0	7.8	8.5
6	8.9	8.1	8.5	8.8	7.5	8.3	8.2	7.7	8.0	9.6	8.1	8.8
7	8.7	8.1	8.4	8.9	7.4	8.0	8.8	7.7	8.2	8.7	8.1	8.4
8	8.1	7.8	8.0	8.0	6.6	7.5	8.7	7.6	8.3	8.4	7.4	8.0
9	8.4	8.0	8.3	7.7	6.5	7.1	7.9	7.0	7.4	9.2	7.9	8.8
10	8.7	8.2	8.4	8.7	7.1	7.9	7.7	6.6	7.1	8.8	7.3	8.3
11	8.9	8.5	8.7	9.8	8.4	9.1	7.8	7.1	7.5	8.9	7.3	8.5
12	8.7	8.2	8.5	9.9	8.2	9.2	7.9	7.2	7.5	9.2	8.1	8.7
13	9.0	8.3	8.6	9.1	8.0	8.6	8.9	7.8	8.1	8.5	7.5	7.9
14	9.2	8.9	9.0	9.1	8.2	8.9	8.3	7.4	7.8	8.6	7.9	8.3
15	9.2	8.2	8.8	9.1	8.0	8.6	7.8	7.3	7.6	8.9	8.4	8.6
16	9.1	8.0	8.7	8.8	8.0	8.5	7.8	6.7	7.2	9.1	8.8	8.9
17	8.9	7.6	8.6	8.6	7.8	8.3	8.2	7.3	7.6	9.2	8.8	9.0
18	8.1	7.3	7.8	8.1	6.7	7.6	8.9	8.2	8.6	9.1	8.9	9.0
19	8.3	8.0	8.1	8.0	7.2	7.7	8.7	7.7	8.4	9.5	9.0	9.3
20	8.5	8.0	8.2	7.9	6.5	7.5	7.9	6.9	7.5	9.8	9.3	9.5
21	8.5	8.2	8.4	8.5	7.1	7.9	7.8	6.9	7.6	9.5	9.2	9.3
22	8.3	8.0	8.1	8.7	7.6	8.3	7.9	7.1	7.6	9.5	8.6	8.9
23	8.1	7.4	7.7	9.0	8.2	8.7	8.0	7.6	7.9	9.3	8.4	8.8
24	7.8	7.5	7.6	8.7	7.9	8.4	7.9	7.1	7.6	9.6	9.0	9.3
25	8.1	7.7	7.9	8.6	7.9	8.3	8.1	7.7	7.9	9.5	9.1	9.4
26	8.1	7.8	8.0	8.3	6.9	7.8	8.3	7.7	8.1	9.8	9.2	9.5
27	8.1	7.9	8.0	8.1	6.9	7.5	8.9	7.3	8.3	9.8	9.4	9.5
28	8.1	7.5	7.8	8.1	7.3	7.8	7.9	6.6	7.4	9.5	9.3	9.4
29	7.9	7.4	7.7	7.5	6.8	7.2	8.7	7.7	8.2	9.6	9.3	9.4
30	7.7	7.5	7.6	8.3	7.1	7.7	9.1	7.7	8.7	9.8	9.5	9.7
31	---	---	---	7.9	7.3	7.6	9.1	7.8	8.5	---	---	---
MONTH	9.2	7.3	8.2	9.9	6.5	8.0	9.1	6.6	7.9	9.8	7.3	8.8

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121680 MUSKEGON RIVER NEAR OXBOW, MI

LOCATION.--Lat 43°29'09", long 85°37'50", in SW1/4 SE1/4 sec.28, T.13 N., R.11 W., Newaygo County, Hydrologic Unit 04060102, on right bank downstream from Hardy Dam, 0.6 mi northwest of Oxbow.

DRAINAGE AREA.--1,931 mi².

PERIOD OF RECORD.--October 1995 to September 1996.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1995 to September 1996.

DISSOLVED OXYGEN: October 1995 to September 1996.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 22.0°C, Aug. 23, 27, 30, Sept. 2, 4-7, 9; minimum, 0.5°C on many days during winter period.

DISSOLVED OXYGEN: Maximum recorded (more than 20 percent missing record), 12.6 mg/L, Mar. 13; minimum recorded (more than 20 percent missing record), 1.2 mg/L, Aug. 7, Sept. 15, 21.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

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

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121680 MUSKEGON RIVER NEAR OXBOW, MI--Continued

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	13.0	10.0	12.0	19.0	14.0	18.0	20.0	16.5	19.0	21.5	19.0	21.0
2	13.0	10.0	12.0	19.5	14.5	18.0	20.5	16.0	19.5	22.0	18.5	21.0
3	13.0	10.5	12.5	19.5	14.0	19.0	20.5	17.0	19.5	21.5	18.5	21.0
4	13.5	11.0	13.0	---	---	---	20.5	17.0	19.5	22.0	18.5	21.0
5	13.5	11.0	13.0	---	---	---	20.5	16.5	19.0	22.0	19.0	21.0
6	14.0	11.0	13.0	---	---	---	20.5	16.5	19.0	22.0	19.0	21.0
7	14.5	10.5	13.5	---	---	---	20.5	16.5	19.0	22.0	18.5	21.0
8	14.5	11.0	13.5	---	---	---	21.0	16.0	19.0	21.5	19.0	21.0
9	14.5	11.5	14.0	19.5	15.0	19.0	21.0	16.5	19.5	22.0	18.5	21.0
10	14.5	13.0	14.5	20.0	14.5	18.5	21.0	17.5	20.5	21.5	19.0	21.0
11	14.5	13.0	14.5	19.5	14.5	18.0	21.0	17.0	20.0	21.5	19.0	21.0
12	15.0	14.5	14.5	19.5	15.5	18.5	21.0	17.0	20.0	21.5	19.0	20.5
13	14.5	14.0	14.5	19.5	14.5	18.0	21.0	17.0	20.0	21.5	18.5	20.5
14	15.5	11.5	14.5	19.5	15.0	18.0	21.0	17.5	20.0	20.5	19.0	20.0
15	16.0	11.0	15.0	19.5	15.0	18.0	21.0	17.0	20.0	20.5	18.5	20.0
16	16.0	11.5	15.0	19.5	16.5	18.5	21.0	17.0	20.0	20.0	19.0	20.0
17	16.5	11.5	15.0	19.5	15.0	18.5	21.0	17.5	20.0	20.0	18.5	19.5
18	16.5	15.0	16.0	19.5	15.5	19.0	21.0	17.5	20.0	20.5	18.5	20.0
19	16.5	16.0	16.0	20.0	19.0	19.5	21.0	17.5	19.0	20.5	18.5	20.0
20	16.0	16.0	16.0	20.5	18.0	20.0	21.0	20.5	21.0	20.0	19.0	19.5
21	16.5	16.0	16.5	20.0	15.5	19.5	21.5	21.0	21.5	20.0	19.0	19.5
22	17.0	15.5	16.5	20.0	15.5	19.0	21.5	20.5	21.0	19.5	18.5	19.0
23	17.0	16.5	17.0	20.0	15.5	18.5	22.0	20.5	21.5	19.0	18.0	18.5
24	18.0	17.0	17.5	20.0	16.0	18.5	21.5	21.0	21.5	19.0	17.5	18.5
25	18.0	17.5	17.5	20.0	16.0	19.0	21.5	19.5	21.0	18.5	17.5	18.5
26	18.0	17.5	17.5	20.5	15.5	19.0	21.5	18.5	21.0	18.5	17.5	18.0
27	17.5	17.5	17.5	20.5	16.0	19.0	22.0	17.5	20.5	18.5	17.5	18.0
28	18.0	17.0	17.5	20.0	16.5	19.5	21.5	19.0	20.5	18.0	17.5	18.0
29	17.5	17.0	17.5	20.5	16.0	19.5	21.5	19.0	20.5	18.0	17.0	17.5
30	19.0	17.0	18.0	20.5	20.0	20.0	22.0	19.0	21.0	17.5	17.0	17.5
31	---	---	---	20.0	18.0	20.0	21.5	21.5	21.5	---	---	---
MONTH	19.0	10.0	15.0	---	---	---	22.0	16.0	20.0	22.0	17.0	20.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121680 MUSKEGON RIVER NEAR OXBOW, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

[illegible][illegible]

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121680 MUSKEGON RIVER NEAR OXBOW, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	8.7	7.7	8.3	6.9	4.1	6.4	5.0	1.6	3.7	3.9	2.1	3.6
2	8.4	7.3	8.0	6.9	4.2	6.2	5.0	2.1	4.2	4.0	1.8	3.5
3	8.4	7.5	8.1	6.8	4.1	6.4	4.9	1.9	4.2	3.7	1.8	3.2
4	8.6	7.5	8.2	---	---	---	4.7	1.8	4.0	3.7	1.9	3.2
5	8.5	7.3	8.1	---	---	---	4.4	1.5	3.4	3.7	1.8	3.1
6	8.4	7.3	8.1	---	---	---	4.0	1.6	3.2	4.3	2.0	3.4
7	8.2	7.0	7.8	---	---	---	3.9	1.2	2.8	4.1	2.0	3.3
8	8.2	6.9	7.8	---	---	---	4.8	1.5	3.4	3.7	2.0	3.1
9	8.2	6.9	7.9	6.2	3.1	5.5	5.0	1.5	3.7	3.6	1.9	2.9
10	8.1	7.3	7.9	6.5	2.5	5.4	5.1	2.2	4.5	3.4	1.5	2.7
11	8.0	7.3	7.8	6.0	2.6	5.0	5.0	1.9	4.1	2.8	1.5	2.4
12	8.0	7.7	7.8	6.0	3.0	5.2	4.7	1.9	3.9	3.6	1.5	2.4
13	7.9	7.4	7.6	6.3	2.3	5.1	4.6	1.7	3.7	4.1	1.7	3.5
14	8.1	6.2	7.5	5.8	2.4	4.7	4.4	2.1	3.5	3.8	2.1	3.3
15	8.1	5.7	7.6	5.7	2.3	4.5	4.1	1.9	3.5	3.6	1.2	3.0
16	8.0	5.7	7.5	5.4	3.8	4.9	4.6	1.8	3.7	3.6	1.3	3.0
17	7.7	5.7	7.2	5.9	2.5	4.9	4.5	2.0	3.8	4.7	1.3	3.5
18	7.8	6.8	7.5	5.7	2.4	4.9	4.7	2.0	3.9	4.7	1.6	3.7
19	7.5	6.9	7.2	6.4	4.8	5.5	4.5	2.0	3.2	4.5	1.6	3.8
20	7.2	7.0	7.1	6.5	5.6	6.1	4.6	3.8	4.1	4.2	2.5	3.6
21	7.2	7.0	7.2	6.0	2.7	5.4	4.9	4.2	4.5	3.8	1.2	3.0
22	7.3	6.9	7.1	5.9	2.3	4.7	4.7	3.2	4.0	4.5	2.8	3.8
23	7.3	7.0	7.2	5.5	2.2	4.5	5.2	3.5	4.4	4.9	4.0	4.5
24	7.2	7.0	7.2	5.1	2.1	4.2	4.9	3.7	4.4	5.3	4.4	4.9
25	7.1	7.0	7.1	5.3	2.2	4.4	3.8	2.7	3.4	5.6	4.9	5.2
26	7.1	6.9	7.0	6.0	2.0	4.6	4.6	2.0	3.6	5.6	4.9	5.2
27	7.0	6.6	6.9	5.8	2.0	4.8	5.1	1.9	4.0	5.1	4.8	5.0
28	6.8	6.4	6.6	5.6	2.1	4.9	6.1	4.4	5.1	5.3	4.8	5.1
29	6.6	6.3	6.5	5.8	2.0	4.9	6.0	4.2	4.9	5.6	4.9	5.4
30	7.0	6.2	6.6	5.4	4.8	5.1	5.9	4.1	4.9	5.8	5.2	5.6
31	---	---	---	4.9	3.0	4.4	4.4	3.9	4.0	---	---	---
MONTH	8.7	5.7	7.5	---	---	---	6.1	1.2	3.9	5.8	1.2	3.7

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI

LOCATION.--Lat 43°30'09", long 85°20'33", in SW1/4 SW1/4 sec.24, T.13 N., R.9 W., Mecosta County, Hydrologic Unit 04060102, on right bank at upstream side of highway bridge on 130th Avenue, 0.5 mi downstream from the remains of Rustford Dam, and 5.2 mi east of Morley.

DRAINAGE AREA.--121 mi², revised.

PERIOD OF RECORD.--October 1966 to September 1996 (discontinued).

GAGE.--Water-stage recorder. Elevation of gage is 920 ft above sea level, from topographic map.

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

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	64	e150	e135	e105	e110	e170	171	162	96	85	105	92
2	65	e170	e140	e105	e105	e140	161	131	123	84	94	89
3	65	e180	e145	e105	e105	e130	156	120	117	87	88	76
4	75	e150	e150	e105	e105	e120	171	116	108	83	80	71
5	73	e130	e140	e100	e105	e120	173	112	104	79	73	70
6	90	e110	e130	e95	e105	e115	183	112	130	76	68	69
7	97	e90	e120	e90	e140	e115	172	109	166	77	64	67
8	95	e115	e115	e85	178	e115	160	108	165	84	62	68
9	89	e110	e110	e85	205	e115	153	132	173	89	56	79
10	85	e170	e110	e85	209	e115	149	259	166	80	49	79
11	e82	e300	e115	e85	218	e120	149	360	158	71	51	72
12	e80	e330	e120	e85	167	138	160	306	184	72	49	69
13	e80	e250	e125	e85	e130	162	193	216	173	70	57	70
14	e80	e200	e145	e90	e120	227	182	171	155	69	159	75
15	e82	e170	e145	e90	e110	247	215	157	138	68	91	78
16	e86	e150	e135	e95	e105	213	270	153	125	62	75	77
17	e90	e140	e125	108	e105	197	240	164	209	63	69	73
18	e96	e130	e120	180	e100	202	195	167	302	79	71	73
19	e85	e120	e115	327	e100	199	212	164	279	73	93	70
20	e95	e140	e110	233	113	193	235	240	250	67	257	68
21	e110	e160	e105	202	152	172	221	225	216	62	298	81
22	e125	e170	e105	161	150	164	195	182	177	58	250	141
23	e110	e140	e110	140	144	155	185	168	160	56	245	115
24	e105	e130	e110	e125	163	158	170	153	197	54	177	100
25	e100	e110	e110	e120	182	195	163	143	171	54	143	95
26	e95	e120	e105	e115	183	199	169	116	147	53	122	89
27	e110	e120	e105	e115	284	172	160	109	131	58	119	154
28	e120	e120	e105	e110	347	167	150	104	120	89	133	161
29	e120	e125	e100	e110	252	162	147	98	96	201	117	135
30	e110	e130	e105	e110	---	160	159	95	87	139	105	115
31	e105	---	e105	e110	---	166	---	92	---	114	98	---
TOTAL	2864	4630	3715	3756	4492	5023	5419	4944	4823	2456	3518	2671
MEAN	92.4	154	120	121	155	162	181	159	161	79.2	113	89.0
MAX	125	330	150	327	347	247	270	360	302	201	298	161
MIN	64	90	100	85	100	115	147	92	87	53	49	67
CFSM	.76	1.28	.99	1.00	1.28	1.34	1.49	1.32	1.33	.65	.94	.74
IN.	.88	1.42	1.14	1.15	1.38	1.54	1.67	1.52	1.48	.76	1.08	.82

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1996, BY WATER YEAR (WY)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEAN	119	142	142	124	125	198	206	148	120	83.5	84.0	105																		
MAX	363	274	265	206	200	438	344	286	198	212	170	455																		
(WY)	1987	1986	1983	1973	1976	1976	1967	1974	1989	1982	1972	1986																		
MIN	57.3	66.2	82.7	78.0	64.0	116	131	75.4	53.9	44.3	42.3	50.6																		
(WY)	1972	1972	1975	1994	1982	1978	1977	1977	1988	1988	1971	1971																		

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1967 - 1996

ANNUAL TOTAL	42872		48311		133	
ANNUAL MEAN	117		132		196	1986
HIGHEST ANNUAL MEAN					96.5	1977
LOWEST ANNUAL MEAN					2190	Sep 12 1986
HIGHEST DAILY MEAN	359	Apr 28	360	May 11	36	Aug 21 1971
LOWEST DAILY MEAN	55	Sep 12	49	Aug 10	37	Jul 4 1988
ANNUAL SEVEN-DAY MINIMUM	55	Sep 10	55	Aug 7	2300	Sep 12 1986
INSTANTANEOUS PEAK FLOW			394	May 10	8.57	Sep 12 1986
INSTANTANEOUS PEAK STAGE			3.50	May 10	22	Jul 21 1979
INSTANTANEOUS LOW FLOW			47	(a)	1.10	
ANNUAL RUNOFF (CFSM)	.97		1.09		14.92	
ANNUAL RUNOFF (INCHES)	13.18		14.85			
10 PERCENT EXCEEDS	175		202		226	
50 PERCENT EXCEEDS	110		118		110	
90 PERCENT EXCEEDS	63		72		65	

(a) Aug. 12, 13.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121944 LITTLE MUSKEGON RIVER NEAR OAK GROVE, MI

LOCATION.--Lat 43°25'51", long 85°35'44", in NE1/4 SW1/4 sec.14, T.13 N., R.11 W., Newaygo County, Hydrologic Unit 04060102, on left bank
1.6 mi downstream from Tamarack Creek, 3.2 mi east of Croton.

DRAINAGE AREA.--345 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1995 to September 1996.

GAGE.--Water-stage recorder. Elevation of gage is 750 ft above sea level, from topographic map.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e160	338	333	e260	e290	e500	e430	393	259	254	340	225
2	e160	443	366	e260	e280	e370	e400	378	288	229	293	222
3	e170	476	377	e260	e280	e350	e370	339	337	233	270	204
4	e190	429	394	e260	e280	e320	399	320	324	229	257	181
5	e180	370	392	e250	e280	e300	430	307	301	220	241	190
6	e230	313	360	e240	e280	e290	456	301	313	217	219	188
7	e240	226	e320	e230	e350	e290	450	294	386	219	209	187
8	e240	300	e300	e230	e450	e290	417	288	462	230	206	186
9	e220	281	e280	e220	e540	e290	383	302	424	238	199	200
10	e220	297	e280	e220	e550	e290	371	474	423	237	189	220
11	e220	679	e290	e220	e560	e300	353	1180	405	230	183	179
12	e215	971	e300	e220	e400	320	352	904	365	218	181	196
13	e210	677	e320	e225	e330	353	395	704	376	213	180	202
14	e210	569	e370	e230	e310	e450	429	446	365	206	198	201
15	e210	453	e370	e230	e300	e580	450	401	327	202	274	204
16	e215	404	e340	e240	e290	e520	680	383	303	199	252	202
17	e225	380	e320	e300	e280	e500	638	374	331	195	225	207
18	e230	354	e300	481	e280	e500	552	363	701	197	207	196
19	199	312	e290	1070	e270	e500	487	372	834	209	210	199
20	218	323	e280	1020	e300	e460	523	414	744	210	342	195
21	268	395	e270	853	e400	e430	562	643	580	201	563	202
22	327	432	e270	835	e450	e400	525	663	506	196	523	238
23	300	361	e270	477	e430	e380	483	580	435	190	470	261
24	273	360	e270	391	421	e430	441	500	425	180	411	246
25	257	273	e270	e330	500	e480	406	429	497	176	305	233
26	248	312	e270	e320	511	e490	363	391	451	172	262	234
27	260	319	e270	e300	775	e430	408	343	378	160	258	293
28	309	316	e260	e300	e900	e410	365	280	339	164	252	340
29	322	319	e260	e290	e800	e400	353	293	313	209	251	301
30	297	330	e260	e290	---	e410	361	285	284	504	233	269
31	276	---	e260	e290	---	e420	---	274	---	412	231	---
TOTAL	7299	12012	9512	11342	12087	12453	13232	13618	12476	6949	8434	6601
MEAN	235	400	307	366	417	402	441	439	416	224	272	220
MAX	327	971	394	1070	900	580	680	1180	834	504	563	340
MIN	160	226	260	220	270	290	352	274	259	160	180	179
CFSM	.68	1.16	.89	1.06	1.21	1.16	1.28	1.27	1.21	.65	.79	.64
IN.	.79	1.30	1.03	1.22	1.30	1.34	1.43	1.47	1.35	.75	.91	.71

SUMMARY STATISTICS

FOR 1996 WATER YEAR

ANNUAL TOTAL
ANNUAL MEAN
HIGHEST DAILY MEAN
LOWEST DAILY MEAN
ANNUAL SEVEN-DAY MINIMUM
INSTANTANEOUS PEAK FLOW
INSTANTANEOUS PEAK STAGE
INSTANTANEOUS LOW FLOW
ANNUAL RUNOFF (CFSM)
ANNUAL RUNOFF (INCHES)
10 PERCENT EXCEEDS
50 PERCENT EXCEEDS
90 PERCENT EXCEEDS

126015
344
1180 May 11
160 Oct 1
177 Jul 22
1290 May 11
5.56 May 11
151 Jul 27
1.00
13.59
505
300
202

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121944 LITTLE MUSKEGON RIVER NEAR OAK GROVE, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1995 to September 1996.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1995 to September 1996

DISSOLVED OXYGEN: October 1995 to September 1996

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum recorded (more than 20 percent missing record), 24.0°C, June 30, Aug. 7, 8; minimum recorded (more than 20 percent missing record), 0.0°C on many days during winter period.

DISSOLVED OXYGEN: Maximum recorded (more than 20 percent missing record), 16.5 mg/L, Dec. 7; minimum recorded (more than 20 percent missing record), 7.0 mg/L, Aug. 5.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

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

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121944 LITTLE MUSKEGON RIVER NEAR OAK GROVE, MI--Continued

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
JUNE				JULY				AUGUST			SEPTEMBER		
1	17.0	14.5	16.0	23.0	21.0	22.0	17.5	16.5	17.0	19.0	17.0	18.0	
2	17.5	16.0	16.5	21.0	18.5	19.5	18.0	16.0	17.0	19.0	17.5	18.0	
3	17.0	16.0	16.5	20.0	17.5	18.5	19.0	17.0	18.0	19.0	17.5	18.5	
4	17.0	15.0	16.0	19.0	16.5	18.0	20.0	18.0	19.0	19.5	17.0	18.0	
5	16.0	14.0	15.0	19.5	16.5	18.0	21.0	19.0	20.0	20.0	18.0	18.5	
6	16.0	14.5	15.0	21.0	17.5	19.0	22.5	20.0	21.0	19.5	18.0	19.0	
7	15.0	14.5	15.0	21.5	19.5	20.0	24.0	21.0	22.5	19.5	18.5	19.0	
8	14.5	14.0	14.5	20.0	18.0	19.0	24.0	22.0	22.5	19.5	17.5	18.5	
9	14.5	14.0	14.0	18.0	17.0	17.5	22.0	19.0	20.0	---	---	---	
10	15.5	14.0	14.5	18.0	15.5	17.0	19.5	17.5	18.5	19.5	18.0	18.5	
11	16.5	14.5	15.5	18.0	15.5	17.0	18.5	17.0	18.0	19.0	17.5	18.0	
12	17.5	15.5	16.5	17.5	16.5	17.0	20.0	16.5	18.0	17.5	16.0	17.0	
13	19.5	16.5	18.0	19.0	16.0	17.5	20.5	17.5	19.0	16.0	14.0	15.0	
14	21.0	18.0	19.5	19.0	17.5	18.5	20.5	18.5	19.5	14.0	13.0	13.5	
15	20.5	18.5	19.5	20.0	18.0	19.0	20.5	19.0	19.5	14.0	13.0	13.5	
16	20.0	18.5	19.5	21.5	18.0	19.5	20.0	18.0	19.0	13.5	12.5	13.0	
17	19.5	18.0	18.5	20.0	19.0	19.5	19.5	17.5	18.5	14.5	13.0	13.5	
18	18.0	17.0	17.0	19.5	18.5	19.0	20.0	17.5	18.5	14.5	12.5	13.5	
19	17.0	16.5	17.0	20.5	19.0	19.5	20.0	18.0	19.0	14.5	12.5	13.5	
20	18.5	17.0	17.5	20.0	17.0	18.5	20.5	19.0	19.5	14.0	12.0	13.0	
21	18.5	17.5	18.0	18.5	16.5	17.5	20.5	19.0	20.0	14.5	13.5	14.0	
22	20.0	18.0	19.0	19.5	16.0	17.5	21.0	19.5	20.5	15.0	14.0	14.0	
23	19.5	17.0	18.5	21.0	17.5	19.0	21.5	20.0	21.0	14.0	13.0	13.5	
24	19.0	18.0	18.0	21.0	17.5	19.0	21.0	19.0	20.0	14.5	13.5	14.0	
25	18.5	16.0	17.5	19.5	17.5	18.5	20.5	18.0	19.5	13.5	12.0	13.0	
26	19.0	16.5	18.0	18.5	16.5	17.5	20.0	18.5	19.5	12.5	12.5	12.5	
27	20.5	18.0	19.5	19.5	16.0	17.5	20.0	18.5	19.0	14.0	12.5	13.5	
28	21.5	19.0	20.5	18.0	16.5	17.0	19.0	17.0	18.0	13.5	12.5	13.0	
29	22.5	20.5	21.5	---	---	---	18.5	17.0	18.0	13.0	12.0	12.5	
30	24.0	22.0	22.5	---	---	---	19.0	17.0	18.0	12.0	10.5	11.5	
31	---	---	---	---	---	---	18.5	17.5	18.0	---	---	---	
MONTH	24.0	14.0	17.5	---	---	---	24.0	16.0	19.0	---	---	---	

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121944 LITTLE MUSKEGON RIVER NEAR OAK GROVE, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	---	---	---	12.5	8.6	10.8	13.5	11.9	12.8	---	---	---			
2	---	---	---	12.1	9.8	10.9	13.5	12.1	12.8	---	---	---			
3	---	---	---	12.8	8.7	11.2	13.2	11.9	12.5	---	---	---			
4	---	---	---	12.7	10.9	11.7	13.8	12.0	12.8	14.7	13.9	14.3			
5	---	---	---	14.1	11.7	12.2	13.7	12.1	13.0	14.6	13.9	14.2			
6	---	---	---	14.1	11.7	12.4	15.8	13.6	14.3	14.6	14.0	14.3			
7	---	---	---	12.6	11.0	11.4	16.5	14.0	15.1	14.5	13.7	14.2			
8	---	---	---	12.0	11.2	11.7	15.8	14.8	15.4	14.3	13.6	14.0			
9	---	---	---	12.8	11.8	12.2	16.4	15.1	15.5	13.9	13.5	13.7			
10	---	---	---	12.3	11.3	11.8	16.1	15.3	15.8	13.8	13.3	13.6			
11	---	---	---	12.3	10.5	11.5	16.0	15.4	15.6	13.9	13.3	13.6			
12	---	---	---	13.4	11.7	12.7	---	---	---	13.7	13.3	13.5			
13	---	---	---	13.8	12.5	13.1	---	---	---	14.0	13.2	13.6			
14	10.2	8.5	9.4	13.5	12.4	13.2	---	---	---	14.2	13.8	14.0			
15	10.5	9.0	9.6	14.0	12.0	13.1	---	---	---	14.7	14.1	14.4			
16	10.3	9.1	9.8	12.9	12.1	12.4	---	---	---	14.6	14.0	14.3			
17	10.0	9.2	9.6	14.5	12.2	12.8	---	---	---	14.0	13.6	13.8			
18	9.3	8.5	8.8	14.2	12.0	12.9	---	---	---	---	---	---			
19	8.7	8.1	8.4	12.7	11.6	12.3	---	---	---	---	---	---			
20	8.5	7.8	8.2	12.5	11.2	11.7	---	---	---	---	---	---			
21	9.0	8.4	8.7	12.9	10.9	11.7	---	---	---	---	---	---			
22	9.5	8.9	9.2	12.8	11.8	12.2	---	---	---	---	---	---			
23	10.0	9.3	9.7	13.5	11.8	12.3	---	---	---	---	---	---			
24	10.3	9.6	10.0	13.9	11.8	12.9	---	---	---	---	---	---			
25	10.4	9.6	10.0	13.6	11.7	12.4	---	---	---	14.2	13.1	13.6			
26	10.2	9.3	9.7	13.3	11.7	12.1	---	---	---	14.0	12.4	13.3			
27	9.3	8.5	8.8	13.7	11.8	12.5	---	---	---	14.4	13.2	13.9			
28	9.1	8.4	8.7	14.8	12.7	13.7	---	---	---	14.4	13.1	13.9			
29	10.4	8.6	9.1	15.1	12.7	13.8	---	---	---	14.2	13.0	13.5			
30	9.8	8.8	9.3	15.1	12.5	13.5	---	---	---	14.4	13.3	13.8			
31	10.6	8.7	9.3	---	---	---	---	---	---	14.6	13.1	13.9			
MONTH	---	---	---	15.1	8.6	12.3	---	---	---	---	---	---			

[illegible]

[illegible]

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121970 MUSKOGON RIVER NEAR CROTON, MI

LOCATION.--Lat 43°26'05", long 85°39'55", in SE1/4 NE1/4 sec.18, T.12 N., R.11 W., Newaygo County, Hydrologic Unit 04060102, on right bank 75 ft downstream from Croton Drive, 0.4 mi southwest of Croton.

DRAINAGE AREA.--2,313 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1995 to September 1996.

GAGE.--Water-stage recorder. Elevation of gage is 690 ft above sea level, from topographic map.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Flow completely regulated by Croton Dam 1,000 ft upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1560	1320	1880	1610	2400	3370	2930	2330	1700	2530	1180	1260
2	1620	1870	2070	1820	2320	3380	3090	2630	1860	2270	1420	1260
3	1600	2360	2070	e1950	2120	3350	3060	2820	2020	2120	1440	1150
4	1630	2380	2050	e1900	1990	3320	2870	2740	1990	2070	1420	1070
5	1740	2350	2120	e1850	1970	3260	2670	2540	1910	1820	1390	1070
6	1740	2180	2080	e1900	1960	3130	2540	2470	1880	1740	1340	1070
7	1560	1970	1640	e1950	2040	2980	2380	2480	1980	1770	1290	1070
8	1480	1870	1320	e1800	2140	2870	2210	2460	2300	1760	1140	1070
9	1450	1880	1300	e1800	2160	2740	2050	2500	2490	1690	1050	1150
10	1280	2040	1320	e1750	2410	2580	1740	3190	2150	1620	1070	1230
11	1220	2710	1130	e1750	2990	2650	1610	4730	2320	1570	1070	1200
12	1270	3480	1130	e1750	2880	2660	1590	4900	2430	1530	1060	1190
13	1280	3280	1350	e1750	2560	2590	1590	4580	2270	1490	1050	1160
14	1340	2360	1830	e1650	2530	2680	1610	4040	2290	1440	1070	1100
15	1310	2100	1850	e1550	2520	2980	1740	3410	2270	1420	1210	1090
16	1250	2260	1620	e1800	2470	3010	1920	3130	2170	1410	1140	1100
17	1250	2230	1640	e2000	2280	2660	1590	2950	2280	1410	1040	1080
18	1130	2080	1850	e2200	2200	3260	2450	2620	2860	1390	1040	1130
19	1210	1890	1940	e2800	2220	3330	2610	2490	3660	1360	1210	1200
20	1550	1820	1800	e3100	2280	3330	2790	2560	e4040	1440	1900	1230
21	1710	1820	1740	e3200	2420	3370	2940	3000	3860	1430	2110	1300
22	1640	1920	1730	e3200	2530	3370	3050	3230	4030	1370	2000	1490
23	1620	2130	1730	e3150	2600	3360	3160	2990	4240	1300	2020	1520
24	1460	2140	1680	e3150	2630	3340	3190	2700	e5780	1290	2020	1510
25	1580	2010	1650	e3150	2730	3240	3070	2530	e4870	1280	1920	1460
26	1220	1830	1660	e2800	2960	3280	2680	2370	4510	1180	1550	1530
27	1200	1910	1660	e2900	3450	3340	1960	2230	4310	1100	1330	1720
28	1360	2200	1630	e2900	4260	3260	1770	2090	3920	1090	1300	1860
29	1470	1970	1580	e2600	3860	3090	1820	1950	3300	1770	1290	1940
30	1490	1710	1520	2570	---	2940	1950	1860	2700	2320	1380	1750
31	1360	---	1550	2560	---	2850	---	1790	---	1530	1400	---
TOTAL	44580	64070	52120	70860	73880	95870	71200	88310	88390	49510	42850	38960
MEAN	1438	2136	1681	2286	2548	3093	2373	2849	2946	1597	1382	1299
MAX	1740	3480	2120	3200	4260	3380	3190	4900	5780	2530	2110	1940
MIN	1130	1320	1130	1550	1960	2580	1590	1790	1700	1090	1040	1070
CFSM	.62	.92	.73	.99	1.10	1.34	1.03	1.23	1.27	.69	.60	.56
IN.	.72	1.03	.84	1.14	1.19	1.54	1.15	1.42	1.42	.80	.69	.63

SUMMARY STATISTICS

FOR 1996 WATER YEAR

ANNUAL TOTAL	780600
ANNUAL MEAN	2133
HIGHEST DAILY MEAN	5780
LOWEST DAILY MEAN	1040
ANNUAL SEVEN-DAY MINIMUM	1070
INSTANTANEOUS PEAK FLOW	5780
INSTANTANEOUS PEAK STAGE	(a)8.42
INSTANTANEOUS LOW FLOW	905
ANNUAL RUNOFF (CFSM)	.92
ANNUAL RUNOFF (INCHES)	12.55
10 PERCENT EXCEEDS	3250
50 PERCENT EXCEEDS	1950
90 PERCENT EXCEEDS	1210

(a) Observed; may have been higher during period of no gage-height record June 24, 25.
(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN
04121970 MUSKEGON RIVER NEAR CROTON, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1995 to September 1996.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1995 to September 1996

DISSOLVED OXYGEN: October 1995 to September 1996

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

REMARKS.--Interruptions in the water-quality record were due to malfunction of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 23.5°C, Aug. 8, 9, 23; minimum, 0.5°C on many days during winter period, but may have been lower during instrument malfunction Jan. 3-29, Feb. 19.

DISSOLVED OXYGEN: Maximum, 13.8 mg/L, Feb. 28; minimum, 3.7 mg/L, Sept. 9.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	17.5	17.0	17.0	11.0	10.5	10.5	3.5	3.0	3.0	1.5	1.0	1.5
2	17.5	17.0	17.0	11.0	10.5	10.5	3.0	3.0	3.0	1.5	1.0	1.5
3	17.0	16.5	16.5	10.5	10.0	10.0	3.5	3.0	3.0	---	---	---
4	16.5	16.0	16.0	10.0	9.5	9.5	3.5	3.0	3.0	---	---	---
5	16.0	15.5	15.5	9.0	9.0	9.0	3.0	3.0	3.0	---	---	---
6	15.5	15.0	15.0	8.5	8.5	8.5	3.0	2.5	2.5	---	---	---
7	15.0	15.0	15.0	8.5	8.5	8.5	2.5	2.0	2.0	---	---	---
8	15.0	14.5	14.5	8.5	8.0	8.0	2.0	2.0	2.0	---	---	---
9	14.5	14.5	14.5	8.0	7.5	7.5	2.0	1.5	1.5	---	---	---
10	15.0	14.5	14.5	7.5	7.5	7.5	2.0	1.5	1.5	---	---	---
11	15.0	14.5	14.5	7.5	7.0	7.0	1.5	1.5	1.5	---	---	---
12	15.5	15.0	15.0	6.5	6.0	6.0	1.5	1.5	1.5	---	---	---
13	15.5	15.0	15.0	6.5	6.0	6.0	1.5	1.5	1.5	---	---	---
14	15.5	15.0	15.0	6.5	6.0	6.0	1.5	1.5	1.5	---	---	---
15	15.0	14.5	14.5	6.5	6.0	6.0	2.0	1.5	1.5	---	---	---
16	14.0	14.0	14.0	6.0	5.5	5.5	1.5	1.5	1.5	---	---	---
17	13.5	13.5	13.5	6.0	5.5	5.5	1.5	1.5	1.5	---	---	---
18	14.0	13.5	13.5	6.0	5.5	5.5	2.0	1.5	1.5	---	---	---
19	14.0	13.5	13.5	5.5	5.0	5.0	2.0	1.5	1.5	---	---	---
20	13.5	13.5	13.5	5.5	5.5	5.5	2.0	1.5	1.5	---	---	---
21	13.0	13.0	13.0	5.5	5.5	5.5	1.5	1.5	1.5	---	---	---
22	12.5	12.5	12.5	5.0	4.5	4.5	1.5	1.5	1.5	---	---	---
23	12.5	12.0	12.0	5.0	4.5	4.5	2.0	1.5	1.5	---	---	---
24	12.0	12.0	12.0	4.5	4.0	4.0	1.5	1.5	1.5	---	---	---
25	12.0	12.0	12.0	4.5	4.5	4.5	1.5	1.5	1.5	---	---	---
26	12.0	12.0	12.0	4.0	4.0	4.0	1.5	1.5	1.5	---	---	---
27	12.0	11.5	11.5	4.5	4.0	4.0	1.5	1.5	1.5	---	---	---
28	12.0	11.5	11.5	4.0	3.5	3.5	1.5	1.5	1.5	---	---	---
29	11.5	11.5	11.5	3.5	3.5	3.5	1.5	1.5	1.5	---	---	---
30	11.5	11.0	11.0	3.5	3.0	3.0	1.5	1.5	1.5	.5	.5	.5
31	11.0	11.0	11.0	---	---	---	1.5	1.5	1.5	.5	.5	.5
MONTH	17.5	11.0	14.0	11.0	3.0	6.5	3.5	1.5	2.0	---	---	---

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121970 MUSKEGON RIVER NEAR CROTON, MI--Continued

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	15.0	13.5	14.5	21.5	19.0	20.0	20.5	20.0	20.0	22.5	21.5	22.0
2	15.5	14.0	14.5	21.0	19.5	20.0	21.0	20.0	20.5	22.5	21.5	22.0
3	15.5	14.0	14.5	21.0	19.5	20.5	21.5	20.0	20.5	22.5	21.5	22.0
4	15.5	15.0	15.0	21.0	19.5	20.0	21.0	20.5	21.0	23.0	21.5	22.0
5	15.5	14.0	14.5	20.0	19.5	20.0	21.5	20.0	21.0	22.5	21.5	22.0
6	15.5	14.5	15.0	20.5	20.0	20.5	22.0	21.0	21.5	23.0	22.0	22.5
7	16.0	15.0	15.5	22.0	20.0	21.0	22.0	21.0	21.5	23.0	22.0	22.5
8	15.5	15.0	15.0	21.0	20.0	20.5	23.5	21.5	22.5	22.5	22.0	22.0
9	15.0	15.0	15.0	21.0	20.0	20.5	23.5	21.5	22.5	23.0	22.0	22.0
10	15.0	14.5	15.0	20.5	19.5	20.0	23.0	22.0	22.5	22.5	21.5	22.0
11	16.0	14.5	15.0	20.5	19.5	20.0	22.0	21.5	22.0	22.5	21.5	22.0
12	16.0	15.0	15.5	20.5	20.0	20.0	22.0	21.5	22.0	22.0	21.0	21.5
13	16.5	15.0	15.5	20.5	20.0	20.0	22.5	21.0	21.5	21.5	20.0	20.5
14	19.0	15.5	17.0	20.5	20.0	20.0	22.0	21.0	21.5	20.0	19.0	19.5
15	18.5	15.5	17.0	20.5	19.5	20.5	22.5	21.5	22.0	19.5	19.0	19.0
16	18.0	16.5	17.5	21.5	19.5	20.5	22.5	21.5	22.0	19.0	18.5	19.0
17	17.5	16.5	17.0	21.0	20.0	21.0	22.5	21.5	22.0	19.0	18.5	19.0
18	17.5	17.0	17.5	21.0	20.0	20.5	22.5	21.5	22.0	19.5	18.0	19.0
19	17.5	17.0	17.0	22.5	20.0	21.5	22.0	21.5	22.0	19.5	18.5	19.0
20	---	---	---	22.0	21.0	21.5	22.0	21.0	21.5	19.5	18.5	19.0
21	17.5	17.0	17.0	21.0	20.5	21.0	22.0	21.5	22.0	19.0	18.5	19.0
22	19.0	17.0	18.0	21.0	20.0	20.5	22.0	21.0	21.5	19.0	18.5	19.0
23	18.0	17.5	18.0	21.5	20.5	21.0	23.5	21.5	22.5	18.5	18.0	18.5
24	---	---	---	21.0	20.5	20.5	23.0	21.5	22.0	19.0	18.5	18.5
25	---	---	---	21.5	20.5	21.0	22.0	21.0	21.5	18.5	17.5	18.0
26	18.5	17.5	18.0	22.0	20.5	21.0	22.5	21.5	22.0	18.0	17.5	17.5
27	18.5	18.0	18.5	21.5	20.5	21.0	22.5	22.0	22.0	17.5	17.0	17.0
28	19.0	18.5	19.0	21.0	20.5	21.0	22.0	21.5	21.5	17.0	16.5	17.0
29	19.0	18.0	18.5	21.0	20.5	20.5	22.0	21.0	21.5	17.0	16.5	16.5
30	21.5	18.5	20.0	21.0	20.0	20.5	22.5	21.0	21.5	16.5	16.0	16.5
31	---	---	---	20.5	20.0	20.5	22.5	21.5	22.0	---	---	---
MONTH	---	---	---	22.5	19.0	20.5	23.5	20.0	21.5	23.0	16.0	20.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121970 MUSKEGON RIVER NEAR CROTON, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	7.7	5.5	6.8	10.5	10.1	10.3	12.5	11.3	11.8	12.5	12.1	12.3			
2	8.2	6.5	7.4	10.4	10.1	10.3	12.0	11.5	11.7	13.0	12.3	12.6			
3	8.0	7.2	7.7	10.6	10.4	10.5	12.3	11.9	12.0	---	---	---			
4	8.1	7.3	7.8	10.8	10.5	10.6	12.3	11.4	12.0	---	---	---			
5	8.4	7.6	8.0	10.7	10.5	10.6	12.5	11.2	12.1	---	---	---			
6	8.4	8.1	8.3	10.8	10.5	10.7	12.9	12.2	12.5	---	---	---			
7	8.4	8.2	8.3	11.0	10.7	10.9	12.7	11.5	12.2	---	---	---			
8	8.9	8.3	8.5	11.3	10.8	11.0	12.5	10.9	11.7	---	---	---			
9	9.2	8.7	8.9	11.5	10.4	11.2	12.8	11.2	12.0	---	---	---			
10	9.7	8.8	9.2	11.5	11.2	11.3	12.6	9.9	11.3	---	---	---			
11	9.9	7.9	9.4	11.9	11.1	11.6	12.2	10.2	11.1	---	---	---			
12	10.2	9.3	9.6	12.5	11.7	12.1	12.5	10.6	11.4	---	---	---			
13	10.2	9.0	9.6	12.3	11.5	12.0	12.8	11.3	12.1	---	---	---			
14	10.1	9.2	9.7	11.9	11.2	11.5	13.5	11.9	12.8	---	---	---			
15	9.8	9.3	9.5	12.2	11.1	11.6	13.2	12.1	12.7	---	---	---			
16	9.8	9.2	9.4	12.1	11.4	11.7	12.6	12.0	12.3	---	---	---			
17	9.5	9.1	9.3	12.2	11.4	11.7	12.8	12.1	12.3	---	---	---			
18	10.8	9.3	10.0	11.6	11.3	11.5	13.1	12.2	12.5	---	---	---			
19	10.6	9.9	10.3	12.1	11.3	11.7	12.9	12.3	12.6	---	---	---			
20	10.2	9.8	10.0	11.7	11.3	11.5	13.0	12.4	12.7	---	---	---			
21	10.1	9.7	9.8	11.8	11.4	11.6	12.7	12.3	12.5	---	---	---			
22	10.0	9.6	9.8	12.2	11.6	11.9	12.8	12.3	12.6	---	---	---			
23	10.1	9.6	9.8	12.1	11.7	11.8	13.0	12.0	12.5	---	---	---			
24	10.7	9.6	10.1	12.2	11.9	12.1	13.1	12.1	12.6	---	---	---			
25	10.3	9.8	10.0	12.1	11.2	11.7	12.7	12.0	12.4	---	---	---			
26	10.7	9.7	10.3	12.5	11.5	11.8	12.5	11.9	12.2	---	---	---			
27	10.4	10.0	10.2	12.5	11.6	11.9	12.6	12.0	12.3	---	---	---			
28	10.2	9.8	10.0	12.6	11.8	12.1	12.4	11.8	12.2	---	---	---			
29	10.4	9.8	10.1	12.1	11.4	11.8	12.7	11.7	12.1	---	---	---			
30	10.4	9.9	10.2	12.9	11.3	12.0	12.5	12.0	12.3	11.9	11.7	11.8			
31	10.4	10.0	10.2	---	---	---	12.7	12.0	12.3	11.9	11.7	11.7			
MONTH	10.8	5.5	9.3	12.9	10.1	11.4	13.5	9.9	12.2	---	---	---			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	11.9	11.6	11.7	12.4	11.8	12.0	12.9	12.5	12.7	11.8	11.3	11.5	
2	11.9	11.5	11.7	12.2	11.6	11.9	12.7	12.5	12.6	11.7	11.2	11.5	
3	11.8	11.5	11.7	11.7	11.4	11.6	12.7	12.4	12.6	12.0	11.1	11.6	
4	11.8	11.4	11.6	11.6	11.2	11.4	13.0	12.3	12.7	11.7	11.3	11.5	
5	11.7	11.4	11.6	11.7	11.3	11.5	12.7	12.4	12.6	11.5	11.2	11.4	
6	11.8	11.4	11.6	12.0	11.6	11.8	12.8	12.4	12.6	11.7	11.2	11.5	
7	11.6	11.3	11.5	12.3	11.9	12.1	12.7	12.2	12.5	12.1	11.4	11.8	
8	11.5	11.2	11.4	12.4	12.0	12.2	12.9	12.3	12.5	12.4	11.9	12.2	
9	11.6	11.2	11.4	12.8	12.3	12.5	12.6	12.1	12.4	12.3	11.8	12.0	
10	11.5	11.3	11.4	12.9	12.5	12.7	12.6	11.4	12.0	12.1	11.4	11.8	
11	11.4	11.1	11.3	13.0	12.7	12.8	12.4	11.4	11.8	11.7	11.4	11.5	
12	11.3	11.1	11.2	13.1	12.8	12.9	12.3	11.3	11.7	11.6	11.3	11.5	
13	11.4	11.1	11.3	13.4	12.7	13.0	12.3	11.1	11.6	11.5	11.2	11.4	
14	11.5	11.3	11.4	13.2	12.8	13.1	12.4	10.9	11.5	11.5	11.0	11.3	
15	11.5	11.0	11.3	13.1	12.7	12.9	12.3	11.0	11.6	11.1	10.5	10.8	
16	11.2	10.9	11.1	13.0	12.7	12.9	12.3	11.8	12.0	10.7	10.2	10.4	
17	11.1	10.9	11.0	13.0	12.7	12.8	12.6	11.8	12.2	10.3	10.0	10.2	
18	11.1	10.8	10.9	12.8	12.3	12.5	12.6	12.0	12.2	10.2	9.7	10.0	
19	---	---	---	12.6	12.2	12.4	12.3	11.9	12.1	10.1	9.5	9.9	
20	11.0	10.6	10.7	12.9	12.5	12.7	12.2	11.8	12.0	10.0	9.5	9.8	
21	11.5	10.5	10.8	12.6	12.4	12.6	12.0	11.6	11.9	9.8	9.3	9.5	
22	11.8	11.2	11.5	12.7	12.4	12.5	11.8	11.4	11.6	9.8	9.0	9.3	
23	11.8	11.1	11.3	12.7	12.4	12.5	12.2	11.2	11.7	9.8	9.2	9.4	
24	13.3	11.3	11.6	12.5	12.1	12.3	12.1	11.7	11.9	9.9	9.2	9.6	
25	11.8	11.2	11.5	12.7	11.7	12.3	12.1	11.6	11.9	9.6	9.1	9.3	
26	12.1	11.2	11.5	13.0	12.5	12.8	12.1	11.5	11.8	9.4	8.8	9.2	
27	13.0	10.4	12.0	13.0	12.7	12.8	12.0	11.5	11.7	9.3	8.6	9.0	
28	13.8	12.4	13.2	13.0	12.7	12.9	12.1	11.5	11.8	9.1	8.6	8.9	
29	13.4	11.8	12.6	12.9	12.6	12.8	12.0	11.3	11.8	9.0	8.6	8.8	
30	---	---	---	12.8	12.5	12.7	11.8	11.3	11.6	8.8	8.4	8.6	
31	---	---	---	12.8	12.5	12.6	---	---	---	8.9	8.3	8.5	
MONTH	---	---	---	13.4	11.2	12.5	13.0	10.9	12.1	12.4	8.3	10.4	

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121970 MUSKEGON RIVER NEAR CROTON, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	8.9	8.1	8.6	8.5	6.7	7.7	7.5	6.5	7.0	7.5	5.1	6.4
2	8.6	7.8	8.2	8.6	6.9	7.5	7.3	6.3	6.9	7.5	6.0	6.9
3	8.3	7.9	8.0	8.6	6.6	7.8	7.5	5.8	6.7	7.1	5.8	6.4
4	8.6	7.8	8.1	8.2	6.3	7.3	7.3	6.0	6.6	7.0	5.9	6.4
5	8.2	7.5	7.8	7.7	6.1	7.1	7.7	4.3	6.2	6.6	5.2	6.0
6	8.6	7.8	8.2	7.9	6.2	7.4	6.8	5.2	5.9	8.1	6.2	7.1
7	8.7	7.8	8.3	8.3	7.0	7.5	6.9	4.4	5.6	7.2	5.4	6.4
8	8.5	7.4	7.9	7.4	6.4	7.1	7.8	5.7	6.9	6.4	4.2	5.6
9	8.0	7.1	7.8	8.6	6.5	7.5	8.2	5.6	7.0	7.1	3.7	5.5
10	7.9	7.2	7.7	7.7	5.8	6.7	8.1	6.6	7.2	6.4	4.8	6.0
11	8.0	7.3	7.7	7.2	5.6	6.5	6.9	6.0	6.6	5.8	4.2	5.1
12	8.4	7.6	8.0	7.6	6.7	7.3	6.9	4.9	6.4	5.5	4.6	5.0
13	8.5	7.6	8.0	7.0	5.9	6.4	7.0	4.4	5.9	5.8	5.4	5.6
14	8.6	7.6	8.1	6.9	5.6	6.3	7.0	4.2	5.6	5.5	5.1	5.3
15	8.6	7.6	8.1	7.2	5.2	6.4	7.3	5.2	6.5	5.7	5.1	5.4
16	8.4	7.8	8.1	7.1	5.2	6.2	7.5	5.2	6.8	5.3	4.9	5.1
17	8.1	7.4	7.7	7.2	5.5	6.5	7.1	5.6	6.2	6.2	5.3	5.6
18	8.0	7.3	7.7	6.9	5.2	6.2	7.0	5.5	6.3	8.9	5.7	6.6
19	---	---	---	8.3	5.5	7.2	6.8	4.6	5.9	8.5	6.8	7.7
20	---	---	---	8.1	6.8	7.5	6.4	4.2	5.2	8.7	7.5	8.1
21	9.5	9.1	9.3	7.4	6.6	7.0	6.7	5.1	5.9	8.6	7.6	8.2
22	9.4	9.1	9.2	7.3	5.7	6.6	6.5	4.0	5.2	8.8	8.0	8.4
23	9.4	9.0	9.2	8.0	6.2	7.1	7.7	4.7	6.4	8.9	8.4	8.6
24	---	---	---	7.8	6.2	6.9	6.8	4.6	5.6	8.8	8.3	8.6
25	---	---	---	8.2	6.4	7.6	5.9	3.9	4.9	9.2	8.5	8.8
26	9.4	9.1	9.2	9.3	6.9	7.9	6.8	4.5	5.8	9.1	8.5	8.8
27	9.2	9.0	9.1	8.2	7.1	7.6	7.2	6.2	6.8	9.2	8.8	9.0
28	9.1	8.0	8.7	7.7	6.4	7.1	6.4	5.5	5.9	9.2	7.2	8.5
29	8.3	6.8	7.5	7.6	6.2	6.8	5.7	4.6	5.2	7.6	7.0	7.3
30	8.9	7.0	7.8	7.7	5.7	6.5	7.1	5.1	5.9	7.7	7.3	7.4
31	---	---	---	7.1	5.6	6.4	6.5	5.2	5.9	---	---	---
MONTH	---	---	---	9.3	5.2	7.0	8.2	3.9	6.2	9.2	3.7	6.9

STREAMS TRIBUTARY TO LAKE MICHIGAN

04122100 BEAR CREEK NEAR MUSKEGON, MI

LOCATION.--Lat 43°17'19", long 86°13'22", in SW1/4 NW1/4 sec.4, T.10 N., R.16 W., Muskegon County, Hydrologic Unit 04060102, on left bank at upstream side of bridge on North Getty Street, 1.5 mi upstream from Little Bear Creek, and 3.9 mi northeast of Muskegon.

DRAINAGE AREA.--14.8 mi².

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WDR MI-80-1: 1976(M), 1978(M), 1979(P).

GAGE.--Water-stage recorder. Datum of gage is 590.00 ft above sea level (Michigan Department of Natural Resources bench mark). Prior to Mar. 17, 1978, at different datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Some regulation during low flow by dams and irrigation upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996 DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.6	16	25	11	e18	25	16	23	11	14	6.4	4.2
2	5.7	25	27	11	e18	23	15	19	14	15	6.5	4.1
3	6.0	17	29	e11	e17	e22	15	17	14	15	5.8	4.2
4	6.1	14	27	e11	e17	e21	20	16	12	13	5.3	4.0
5	5.6	13	24	e11	e17	20	21	15	11	12	5.0	3.8
6	6.1	12	22	e11	e17	19	19	14	18	11	5.0	3.5
7	6.1	12	18	e11	25	e19	17	14	23	11	4.5	3.6
8	5.3	11	e15	e11	34	e18	16	14	26	11	4.0	3.5
9	5.0	10	e14	e11	45	e18	16	15	21	11	4.0	5.4
10	4.5	23	e13	e11	34	e17	15	37	19	10	3.9	4.5
11	4.4	62	e13	e11	39	17	14	37	17	9.7	3.7	3.9
12	4.1	41	e14	e11	28	19	14	25	16	9.5	3.7	4.1
13	4.2	28	e15	e11	e25	27	15	21	14	9.5	3.6	4.2
14	5.1	24	e18	11	22	28	14	19	13	9.0	3.4	4.4
15	5.5	22	e17	11	20	24	27	18	11	8.2	3.4	4.5
16	5.5	21	e16	e11	e19	21	29	17	10	8.4	3.5	4.1
17	5.3	20	e15	13	e18	19	22	16	23	8.0	2.9	3.8
18	5.7	19	15	38	e17	18	20	16	73	9.0	2.8	3.5
19	5.8	20	14	60	e16	18	20	14	55	9.0	5.3	3.7
20	13	22	13	43	17	17	22	18	34	7.8	27	3.7
21	15	23	13	35	24	16	20	30	26	7.4	11	3.7
22	13	20	12	23	25	16	21	21	23	7.1	8.5	4.1
23	9.0	18	12	22	26	15	22	19	20	7.1	7.3	4.2
24	8.2	16	12	21	30	16	19	18	52	6.5	6.7	4.2
25	7.9	16	12	e20	27	22	19	16	42	6.3	6.1	4.1
26	7.6	16	12	e19	25	19	22	15	26	6.4	5.6	5.0
27	12	18	e12	e19	44	e18	19	14	22	5.8	5.5	8.2
28	13	20	e11	e18	42	17	17	13	19	5.7	5.5	5.6
29	10	18	11	e18	29	17	17	12	17	10	5.0	5.0
30	9.0	18	10	e18	---	16	20	12	16	8.1	4.9	4.4
31	8.5	---	11	e18	---	16	---	11	---	7.0	4.5	---
TOTAL	227.8	615	492	561	735	598	563	566	698	288.5	180.3	129.2
MEAN	7.35	20.5	15.9	18.1	25.3	19.3	18.8	18.3	23.3	9.31	5.82	4.31
MAX	15	62	29	60	45	28	29	37	73	15	27	8.2
MIN	4.1	10	10	11	16	15	14	11	10	5.7	2.8	3.5
CFSM	.50	1.39	1.07	1.22	1.71	1.30	1.27	1.23	1.57	.63	.39	.29
IN.	.57	1.55	1.24	1.41	1.85	1.50	1.42	1.42	1.75	.73	.45	.32

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1996, BY WATER YEAR (WY)

	MEAN	14.1	19.2	21.1	18.6	20.8	30.9	28.2	18.7	12.1	7.13	8.41	8.99
MAX	45.2	55.2	40.5	31.3	47.8	87.9	50.6	45.2	23.6	17.6	30.2	43.0	
(WY)	1987	1986	1992	1986	1976	1976	1982	1974	1993	1994	1980	1986	
MIN	3.48	4.54	4.98	6.15	7.43	12.2	14.5	6.84	4.32	3.17	2.29	3.09	
(WY)	1972	1972	1977	1977	1977	1980	1968	1977	1977	1971	1971	1971	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1966 - 1996

ANNUAL TOTAL	5346.3	5653.8	17.3	
ANNUAL MEAN	14.6	15.4	27.4	1976
HIGHEST ANNUAL MEAN			8.36	1977
LOWEST ANNUAL MEAN			720	Mar 5 1976
HIGHEST DAILY MEAN	87	Jan 15	2.8	Aug 18
LOWEST DAILY MEAN	4.1	Oct 12	3.3	Aug 12
ANNUAL SEVEN-DAY MINIMUM	4.5	Sep 9	91	Jun 18
INSTANTANEOUS PEAK FLOW			13.48	Jun 18
INSTANTANEOUS PEAK STAGE			2.3	(c)
INSTANTANEOUS LOW FLOW			1.04	(b)16.61
ANNUAL RUNOFF (CFSM)	.99		1.17	(d)
ANNUAL RUNOFF (INCHES)	13.44		15.92	
10 PERCENT EXCEEDS	25		32	
50 PERCENT EXCEEDS	14		13	
90 PERCENT EXCEEDS	5.3		4.4	

(a) Gage height 11.00 ft, datum then in use.

(b) Present datum; backwater from ice.

(c) Aug. 17, 18.

(d) Aug. 5, 17, 22, 1971.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04122200 WHITE RIVER NEAR WHITEHALL, MI

LOCATION.--Lat 43°27'51", long 86°13'57", in SE1/4 NW1/4 sec.4, T.12 N., R.16 W., Muskegon County, Hydrologic Unit 04060101, on right bank 30 ft downstream from bridge on Fruitvale Road, 6.3 mi downstream from North Branch, and 6.9 mi northeast of Whitehall.

DRAINAGE AREA.--406 mi².

PERIOD OF RECORD.--August 1957 to current year.

REVISED RECORDS.--WDR MI-83-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 594.10 ft above sea level. Nov. 18, 1957 to Oct. 22, 1958, nonrecording gage at same site and datum.

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

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	254	405	455	e490	e470	1070	531	492	360	356	399	263
2	253	488	490	e490	e450	955	514	508	372	346	353	259
3	252	576	523	357	e440	835	498	488	417	350	329	255
4	257	586	529	321	e440	702	492	468	428	344	319	253
5	263	539	537	e400	e430	657	511	452	411	331	306	252
6	266	494	520	e400	e420	e600	533	434	423	319	290	251
7	291	449	465	e400	e420	e540	543	421	515	317	281	249
8	300	425	460	e400	e420	515	523	410	648	318	272	248
9	293	408	e300	e400	e470	e510	497	410	766	328	265	250
10	287	412	e290	e400	e520	e510	476	466	698	334	260	257
11	278	537	e280	e400	e580	e490	461	648	612	320	256	259
12	271	711	e270	e390	e600	e490	451	1020	628	309	254	257
13	268	851	e300	e370	e540	e490	454	953	605	303	253	254
14	267	775	e350	e360	e520	601	477	835	523	298	252	254
15	272	699	e450	e350	e500	710	499	765	486	293	251	255
16	278	636	e450	e340	e480	736	589	640	441	289	251	258
17	275	553	e420	e340	e470	722	709	547	448	284	251	258
18	271	502	e440	e400	e460	681	679	512	615	283	250	257
19	268	480	e450	e500	e460	640	612	489	934	300	251	253
20	300	472	e440	e700	e460	609	563	470	990	309	331	250
21	381	488	e430	e660	e490	580	555	477	843	298	459	247
22	456	528	e430	e600	e520	545	546	494	713	287	449	247
23	452	525	e420	e580	e580	512	539	494	568	280	387	250
24	417	499	e410	e560	e640	494	546	488	511	274	353	254
25	381	468	e400	e540	691	527	520	473	516	269	337	253
26	358	449	e400	e520	729	610	522	452	488	264	316	251
27	355	445	e390	e510	762	640	540	433	448	262	298	297
28	405	456	e390	e500	959	600	516	416	415	259	286	360
29	453	451	e390	e490	1180	568	484	400	391	276	279	352
30	436	452	e490	e480	---	556	474	383	372	373	273	327
31	409	---	e490	e480	---	546	---	370	---	428	268	---
TOTAL	9967	15759	13059	14128	16101	19241	15854	16308	16585	9601	9379	7930
MEAN	322	525	421	456	555	621	528	526	553	310	303	264
MAX	456	851	537	700	1180	1070	709	1020	990	428	459	360
MIN	252	405	270	321	420	490	451	370	360	259	250	247
CFSM	.79	1.29	1.04	1.12	1.37	1.53	1.30	1.30	1.36	.76	.75	.65
IN.	.91	1.44	1.20	1.29	1.48	1.76	1.45	1.49	1.52	.88	.86	.73

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1957 - 1996, BY WATER YEAR (WY)

MEAN	388	467	487	454	462	648	673	498	412	314	306	352
MAX	912	906	896	641	760	1449	1224	936	747	523	484	1071
(WY)	1987	1986	1992	1973	1985	1976	1967	1974	1989	1982	1982	1986
MIN	226	269	286	252	240	382	315	259	230	202	186	212
(WY)	1972	1972	1959	1959	1959	1964	1958	1958	1958	1964	1958	1957

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1957 - 1996

ANNUAL TOTAL	153985	163912	455
ANNUAL MEAN	422	448	635
HIGHEST ANNUAL MEAN			288
LOWEST ANNUAL MEAN			4650
HIGHEST DAILY MEAN	1130	Jan 16	1180
LOWEST DAILY MEAN	248	Sep 16	247
ANNUAL SEVEN-DAY MINIMUM	254	Sep 11	250
INSTANTANEOUS PEAK FLOW			1180
INSTANTANEOUS PEAK STAGE			4.90
INSTANTANEOUS LOW FLOW			246
ANNUAL RUNOFF (CFSM)	1.04		1.10
ANNUAL RUNOFF (INCHES)	14.11		15.02
10 PERCENT EXCEEDS	608		640
50 PERCENT EXCEEDS	401		448
90 PERCENT EXCEEDS	271		259

(a) Sept. 21, 22.

(b) Aug. 18, 19, 1958.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI

LOCATION.--Lat 43°56'42", long 86°16'43", in NW1/4 NW1/4 sec.19, T.18 N., R.16 W., Mason County, Hydrologic Unit 04060101, on right bank 20 ft upstream from highway bridge at south edge of Scottville, 1.4 mi upstream from India Creek, and 5.6 mi downstream from Big South Branch.

DRAINAGE AREA.--681 mi².

PERIOD OF RECORD.--August 1939 to current year. Prior to October 1942, published as "at Custer".

REVISED RECORDS.--WSP 1437: 1941(M), 1943(M), 1949(M), 1950. WDR MI-81-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 597.66 ft above sea level. Prior to June 12, 1943, nonrecording gage at bridge 4.5 mi upstream at different datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	484	806	840	e740	e880	1760	1030	877	658	751	683	508
2	480	914	875	742	e840	1610	997	892	685	725	634	502
3	485	1000	902	769	e820	1440	957	900	712	708	605	497
4	496	1080	926	e760	e800	e1300	972	871	750	699	593	492
5	503	1090	944	e760	e800	1230	976	852	729	676	574	486
6	511	977	952	e750	e800	1110	985	831	734	654	577	484
7	520	870	939	e750	e800	e1050	986	801	988	646	567	481
8	544	813	e600	e750	e800	1020	972	785	1320	647	557	480
9	562	779	e560	e750	e850	e980	930	793	1480	651	537	489
10	560	768	e530	e750	e950	e950	889	861	1550	659	522	505
11	545	853	e510	e740	e1100	e940	870	1010	1550	645	515	512
12	529	954	e500	e740	e1050	928	863	1160	1370	624	515	522
13	520	1090	e540	e720	e1000	938	889	1350	1200	612	515	517
14	523	1180	e620	e680	e960	1050	930	1380	1050	601	511	524
15	527	1150	e800	e650	e940	1160	997	1230	930	595	507	537
16	531	1040	e850	e640	e900	1250	1080	1090	837	587	508	542
17	536	953	e780	e640	e860	1290	1170	968	881	577	504	534
18	528	893	e820	e700	e850	1260	1250	893	1130	581	496	523
19	521	852	e840	e950	e850	1200	1210	855	1560	596	518	515
20	559	846	e840	e1300	e850	1150	1130	830	1810	605	592	506
21	690	889	e820	e1300	e900	1090	1080	833	1690	588	669	498
22	784	931	e800	e1150	e950	1040	1070	837	1480	577	763	510
23	838	948	e780	e1100	1040	961	1030	832	1310	557	703	531
24	810	918	e770	e1050	1150	926	970	807	1210	548	676	548
25	735	872	e760	e1000	1280	1010	943	790	1130	539	617	540
26	676	825	e750	e980	1340	1100	937	778	1100	533	578	534
27	690	812	e740	e960	1410	1180	931	748	1050	529	554	617
28	724	833	e730	e940	1520	1140	923	729	926	529	542	646
29	783	809	e720	e920	1640	1090	887	707	846	568	533	680
30	831	785	e730	e900	---	1070	871	686	789	649	524	638
31	778	---	e740	e900	---	1060	---	668	---	708	516	---
TOTAL	18833	27530	23508	26481	28930	35283	29725	27644	33455	19154	17705	15898
MEAN	608	918	758	854	998	1138	991	892	1115	618	571	530
MAX	838	1180	952	1300	1640	1760	1250	1380	1810	751	763	680
MIN	480	768	500	640	800	926	863	668	658	529	496	480
CFSM	.89	1.35	1.11	1.25	1.46	1.67	1.45	1.31	1.64	.91	.84	.78
IN.	1.03	1.50	1.28	1.45	1.58	1.93	1.62	1.51	1.83	1.05	.97	.87

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1939 - 1996, BY WATER YEAR (WY)

	MEAN	607	714	737	703	713	975	1043	787	680	536	495	553
MAX	1507	1523	1311	1129	1301	1779	1732	1161	1296	1232	826	1880	
(WY)	1987	1986	1992	1985	1984	1976	1993	1974	1993	1969	1994	1986	
MIN	379	439	449	427	440	526	550	425	408	368	354	369	
(WY)	1957	1945	1945	1945	1958	1940	1945	1958	1964	1963	1941	1948	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1939 - 1996

ANNUAL TOTAL	280993		304146										
ANNUAL MEAN	770		831										
HIGHEST ANNUAL MEAN										712			
LOWEST ANNUAL MEAN										1087			1986
HIGHEST DAILY MEAN	1870									472			1958
LOWEST DAILY MEAN	452									6020			Sep 13 1986
ANNUAL SEVEN-DAY MINIMUM	458									310			Aug 9 1941
INSTANTANEOUS PEAK FLOW										322			Aug 5 1941
INSTANTANEOUS PEAK STAGE										6440			Sep 13 1986
INSTANTANEOUS LOW FLOW										8.07			Sep 13 1986
ANNUAL RUNOFF (CFSM)	1.13									209			Dec 11 1962
ANNUAL RUNOFF (INCHES)	15.35									1.04			
10 PERCENT EXCEEDS	1080									14.20			
50 PERCENT EXCEEDS	740									1080			
90 PERCENT EXCEEDS	513									632			
										428			

(a) Oct. 2, Sept. 8.

(b) Gage height 4.49 ft.

(c) Backwater from ice.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

444351084561801 BEAR LAKE NEAR KALKASKA, MI

LOCATION.--Lat 44°43'51", long 84°56'18", in NW1/4 SE1/4 sec. 17, T.27 N., R.5 W., Kalkaska County, Hydrologic Unit 04060103, on east shore of Bear Lake, 11.7 mi east of Kalkaska.

DRAINAGE AREA.--Not determined.

PERIOD OF RECORD.--August 1994 to current year.

GAGE.--Nonrecording gage. Once daily reading by observer. Elevation of gage is 1,183 ft above sea level, from topographic map.

REMARKS.--No inlets or outlets.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 1.68 ft, Aug. 26, 28, 1994; minimum observed, 0.70 ft, Oct. 17, 18, 26, 1995.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 1.38 ft, June 18, 19; minimum observed, 0.70 ft, Oct. 17, 18, 26.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.76	.82	---	---	---	---	---	---	1.16	1.30	1.25	.96
2	.76	.80	---	---	---	---	---	---	1.15	1.32	---	.94
3	.78	.85	---	---	---	---	---	---	1.16	1.32	---	.94
4	.76	.84	.90	---	---	---	---	---	1.16	1.30	1.21	.92
5	.76	.82	.92	---	---	---	---	---	1.15	1.28	1.20	.90
6	.76	.84	.86	---	---	---	---	---	1.17	1.28	1.20	.90
7	---	.86	---	---	---	---	---	---	1.16	1.28	1.17	.89
8	.78	.88	---	---	---	---	---	---	1.18	1.26	1.15	.89
9	.76	.88	---	---	---	---	---	---	1.18	1.26	1.15	.88
10	.75	.90	---	---	---	---	---	---	1.26	1.24	1.15	.87
11	.75	.90	---	---	---	---	---	---	1.24	1.22	1.16	.88
12	.76	.90	---	---	---	---	---	---	1.22	1.22	1.14	.95
13	.77	.88	---	---	---	---	---	1.11	1.20	1.22	1.12	.95
14	.78	.86	---	---	---	---	---	1.12	1.20	1.21	1.10	.94
15	.76	.88	---	---	---	---	---	1.10	1.20	1.20	---	.96
16	.72	.88	---	---	---	---	---	1.10	1.20	1.20	---	.95
17	.70	.86	---	---	---	---	---	1.14	1.36	1.18	---	.94
18	.70	.84	---	---	---	---	---	1.18	1.38	1.17	1.01	.93
19	.74	.92	---	---	---	---	---	1.20	1.38	1.15	1.02	.95
20	.72	.92	---	---	---	---	---	1.19	1.36	1.18	1.06	.94
21	---	.90	---	---	---	---	---	---	1.36	1.19	1.08	.96
22	---	.92	---	---	---	---	---	1.20	1.34	1.18	1.10	.92
23	---	.94	---	---	---	---	---	1.20	1.35	1.18	1.09	.92
24	---	.94	---	---	---	---	---	---	1.34	1.19	1.07	.94
25	---	.93	---	---	---	---	---	1.18	1.32	1.18	1.01	.95
26	.70	.95	---	---	---	---	---	1.17	1.31	---	1.02	.95
27	.76	.94	---	---	---	---	---	1.16	1.30	---	1.02	.98
28	.76	.92	---	---	---	---	---	1.15	1.30	---	1.01	.98
29	.79	.92	---	---	---	---	---	1.14	1.30	---	1.00	1.02
30	.80	.90	---	---	---	---	---	1.15	1.30	---	.98	1.01
31	.80	---	---	---	---	---	---	1.14	---	---	.99	---
MEAN	---	.89	---	---	---	---	---	---	1.26	---	---	.94
MAX	---	.95	---	---	---	---	---	---	1.38	---	---	1.02
MIN	---	.80	---	---	---	---	---	---	1.15	---	---	.87

STREAMS TRIBUTARY TO LAKE MICHIGAN

04124000 MANISTEE RIVER NEAR SHERMAN, MI

LOCATION.--Lat 44°26'11", long 85°41'55", in NE1/4 NE1/4 sec.36, T.24 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on right bank 50 ft downstream from bridge on State Highway 37, 200 ft upstream from Wheeler Creek, 0.9 mi north of Sherman, and at mile 60.8.

DRAINAGE AREA.--857 mi².

PERIOD OF RECORD.--July 1903 to May 1916, October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1004: 1936(M). WSP 1307: 1911, 1913-14(M), 1934(M), 1936(M), 1937, 1939-40(M). WSP 1437: 1911, 1913(M), 1937. WDR MI-88-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 804.24 ft above sea level. Prior to Apr. 13, 1934, at various datums. Apr. 14, 1934 to Oct. 25, 1990, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e760	1140	1090	e970	1110	1160	1370	1520	1000	1050	1080	796
2	e760	1250	1120	983	e1020	e1100	1350	1620	1030	1030	1060	792
3	e770	1300	1120	e1000	e980	e1050	1340	1660	1030	1030	1010	790
4	e780	1290	1130	e1000	e940	1040	1350	1670	1030	1040	985	789
5	e780	1240	1130	e1000	e920	e1020	1280	1580	1010	1040	947	788
6	e790	1200	1110	e1000	e920	e1000	1220	1490	998	1010	923	786
7	e800	1160	981	e1000	e920	991	1210	1420	1140	987	896	786
8	e840	1130	e880	e1000	e980	e990	1180	1380	1520	985	876	786
9	e870	1110	e800	e1000	e1050	e990	1160	1350	1420	984	860	792
10	e880	1100	e700	e1000	e1150	e990	1170	1330	1270	987	847	799
11	e870	1200	e660	e960	1230	e990	1260	1390	1290	970	836	812
12	e850	1260	e700	e940	1170	e1000	1540	1370	1370	950	834	814
13	e820	1230	e800	e880	1090	1050	1860	1320	1300	944	836	853
14	e820	1210	e1000	e830	1100	1180	1940	1270	1240	937	833	878
15	e820	1180	e1100	e820	1070	1270	1930	1230	1150	928	834	936
16	e820	1130	e1000	e820	1040	1230	1970	1210	1070	922	838	918
17	e830	1100	e1050	e820	1040	1190	1880	1190	1120	910	840	922
18	e830	1090	e1100	1200	1020	1170	1790	1180	1810	903	831	898
19	e830	1080	e1100	1670	1020	1190	1810	1190	2280	962	831	864
20	e890	1090	e1050	1670	1070	1220	1930	1280	2310	1000	899	842
21	1040	1140	e1050	1490	1150	1200	2020	1320	2170	1080	894	835
22	1090	1150	e1000	e1380	1170	1150	2080	1270	1850	1050	885	869
23	1060	1130	e1000	e1310	1120	1110	2100	1240	1540	968	880	907
24	1040	1110	e1000	e1300	1100	1100	1970	1190	1370	912	863	929
25	1000	1080	e980	e1280	1130	1290	1800	1150	1270	884	851	919
26	964	1070	e960	e1250	1160	1480	1750	1110	1200	872	836	888
27	1010	1080	950	e1220	1190	1380	1650	1090	1160	868	826	964
28	1080	1080	966	e1200	1230	1310	1580	1070	1130	871	818	1020
29	1070	1040	e960	e1200	1210	1290	1510	1060	1100	934	813	1030
30	1100	1050	e960	e1150	---	1310	1450	1040	1090	1120	806	995
31	1110	---	e960	e1130	---	1360	---	1020	---	1100	799	---
TOTAL	27974	34420	30407	34473	31300	35801	48450	40210	40268	30228	27167	25997
MEAN	902	1147	981	1112	1079	1155	1615	1297	1342	975	876	867
MAX	1110	1300	1130	1670	1230	1480	2100	1670	2310	1120	1080	1030
MIN	760	1040	660	820	920	990	1160	1020	998	868	799	786
CFSM	1.05	1.34	1.14	1.30	1.26	1.35	1.88	1.51	1.57	1.14	1.02	1.01
IN.	1.21	1.49	1.32	1.50	1.36	1.55	2.10	1.75	1.75	1.31	1.18	1.13

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1903 - 1996, BY WATER YEAR (WY)

	MEAN	979	1058	1041	1002	985	1205	1539	1207	1058	942	889	921
MAX	1803	1597	1417	1224	1458	1811	2198	1742	1603	1336	1200	1610	
(WY)	1987	1989	1912	1916	1938	1913	1916	1904	1954	1994	1903	1986	
MIN	773	780	848	754	604	808	1058	834	802	740	722	717	
(WY)	1965	1982	1979	1936	1936	1940	1987	1958	1958	1936	1964	1966	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1903 - 1996

ANNUAL TOTAL	375057		406695									
ANNUAL MEAN	1028		1111							(a)1068		
HIGHEST ANNUAL MEAN										1261		1912
LOWEST ANNUAL MEAN										888		1958
HIGHEST DAILY MEAN	2010						2310	Jun 20		3500		Mar 25 1913
LOWEST DAILY MEAN	(e)660						(e)660	Dec 11		540		Feb 21 1936
ANNUAL SEVEN-DAY MINIMUM	704						777	Oct 1		549		Feb 19 1936
INSTANTANEOUS PEAK FLOW							(b)2330	Jun 19		(c)3570		Mar 25 1913
INSTANTANEOUS PEAK STAGE							(d)14.99	Dec 11		(f)15.01		Feb 17 1991
ANNUAL RUNOFF (CFSM)	1.20						1.30			1.25		
ANNUAL RUNOFF (INCHES)	16.28						17.65			16.93		
10 PERCENT EXCEEDS	1300						1430			1430		
50 PERCENT EXCEEDS	981						1050			985		
90 PERCENT EXCEEDS	780						829			823		

(a) Does not include water years 1931, 1934.

(b) Gage height 14.47 ft.

(c) Gage height 7.1 ft. from graph based on gage readings, datum then in use.

(d) Backwater from ice.

(e) Estimated.

(f) Backwater from ice, does not include water years 1903-1990.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04124500 EAST BRANCH PINE RIVER NEAR TUSTIN, MI

LOCATION.--Lat 44°06'09", long 85°31'02", in NE1/4 NW1/4 sec. 28, T.20 N., R.10 W., Osceola County, Hydrologic Unit 04060103, on left bank 75 ft downstream from bridge on Marion Road, 3.0 mi west of Tustin.

DRAINAGE AREA.--60.0 mi².

PERIOD OF RECORD.--July 1952 to September 1963, October 1963 to September 1991 (operated as a crest-stage partial-record station), October 1991 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,077.65 ft above sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	55	34	24	33	55	81	55	20	25	12	11
2	14	98	37	22	31	48	80	49	38	22	12	11
3	16	76	37	23	29	43	75	48	34	20	11	9.8
4	19	60	38	21	27	41	70	47	30	21	10	9.3
5	18	49	35	20	25	38	63	41	27	19	9.6	9.1
6	17	46	29	19	25	36	65	41	35	17	9.6	9.1
7	27	44	e28	18	25	33	62	39	68	15	9.2	8.9
8	28	38	28	17	28	32	56	44	85	15	8.9	8.8
9	23	33	26	18	35	29	54	72	66	16	8.4	9.9
10	20	34	25	18	39	28	59	105	55	14	8.4	9.7
11	18	68	24	18	47	27	75	122	95	13	8.4	8.6
12	17	60	23	19	44	30	139	87	70	12	11	10
13	16	53	21	19	44	40	133	70	52	12	10	13
14	16	46	22	20	40	65	109	58	40	11	9.6	13
15	19	40	25	19	36	79	124	50	32	11	9.8	15
16	20	36	25	19	34	69	137	46	27	11	10	14
17	18	32	25	21	32	68	113	44	55	10	9.1	12
18	17	32	25	66	30	69	97	43	137	12	8.6	11
19	15	31	25	149	29	72	96	48	108	13	9.7	11
20	29	33	24	112	29	72	114	52	81	12	62	11
21	51	42	24	96	38	63	101	51	67	11	51	11
22	48	39	24	76	41	57	87	46	107	10	48	17
23	41	36	24	61	41	51	75	42	75	9.9	47	16
24	36	29	25	55	46	58	63	42	66	9.6	33	15
25	35	30	25	49	55	131	61	39	57	9.3	26	17
26	30	29	24	47	60	106	69	35	47	9.4	21	14
27	37	26	23	43	67	94	58	31	40	9.2	18	39
28	46	28	24	40	71	78	51	27	35	9.3	16	36
29	37	30	23	39	60	77	46	25	30	17	15	35
30	33	30	23	35	---	86	50	24	28	16	13	26
31	29	---	23	36	---	97	---	22	---	13	12	---
TOTAL	804	1283	818	1239	1141	1872	2463	1545	1707	424.7	547.3	441.2
MEAN	25.9	42.8	26.4	40.0	39.3	60.4	82.1	49.8	56.9	13.7	17.7	14.7
MAX	51	98	38	149	71	131	139	122	137	25	62	39
MIN	14	26	21	17	25	27	46	22	20	9.2	8.4	8.6
CFSM	.43	.71	.44	.67	.66	1.01	1.37	.83	.95	.23	.29	.25
IN.	.50	.80	.51	.77	.71	1.16	1.53	.96	1.06	.26	.34	.27

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1996, BY WATER YEAR (WY)

	MEAN	26.4	34.4	26.1	21.5	22.7	53.9	84.2	37.1	24.8	17.0	18.0	15.0
MAX	99.9	90.8	83.8	45.3	54.4	93.6	190	75.4	70.4	45.1	68.5	44.2	
(WY)	1992	1993	1992	1995	1994	1992	1959	1960	1993	1994	1956	1993	
MIN	9.54	12.3	12.4	10.1	9.39	18.7	41.7	10.7	8.90	7.22	6.29	6.82	
(WY)	1956	1954	1956	1956	1963	1956	1958	1958	1959	1959	1957	1955	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1952 - 1996

ANNUAL TOTAL	12972.8		14285.2									
ANNUAL MEAN	35.5		39.0									
HIGHEST ANNUAL MEAN										31.7		
LOWEST ANNUAL MEAN										54.5		1992
HIGHEST DAILY MEAN	161	Mar 16	149	Jan 19						16.0		1958
LOWEST DAILY MEAN	9.8	Jun 24	8.4	Aug 9						5.3		Aug 4 1958
ANNUAL SEVEN-DAY MINIMUM	11	Jun 19	8.9	Aug 5						5.5		Aug 1 1959
INSTANTANEOUS PEAK FLOW			178	Jan 19						(a)1410		Aug 4 1956
INSTANTANEOUS PEAK STAGE			3.58	Jan 19						6.23		Aug 4 1956
INSTANTANEOUS LOW FLOW			7.8	Sep 11						(b)4.1		Mar 13 1958
ANNUAL RUNOFF (CFSM)	.59		.65							.53		
ANNUAL RUNOFF (INCHES)	8.04		8.86							7.18		
10 PERCENT EXCEEDS	68		75							68		
50 PERCENT EXCEEDS	26		32							18		
90 PERCENT EXCEEDS	14		11							8.2		

(a) From rating curve extended above 450 ft³/s.

(b) Result of freezeup.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04126740 PLATTE RIVER AT HONOR, MI

LOCATION.--Lat 44°40'05", long 86°02'05", in SW1/4 NW1/4 sec.8, T.26 N., R.14 W., Benzie County, Hydrologic Unit 04060104, on right bank 20 ft downstream from bridge on U.S. Highway 31, 1.0 mi west of Honor.

DRAINAGE AREA.--118 mi².

PERIOD OF RECORD.--April 1990 to current year.

GAGE.--Water-stage recorder. Datum of gage is 589.73 ft above sea level (Michigan Department of Transportation bench mark).

REMARKS.--Records good except for estimated daily discharges, which are fair. Some diversion for fish hatchery 6 mi upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	131	117	104	e110	109	122	148	124	137	122	112
2	105	153	114	103	e110	110	121	141	143	143	120	111
3	109	129	114	e108	e110	110	122	139	133	141	117	111
4	108	124	113	e103	e110	107	124	136	131	134	118	111
5	107	121	116	103	e110	107	120	136	130	131	117	111
6	114	120	112	101	e110	106	120	138	129	130	119	108
7	117	118	109	102	e110	e105	119	133	163	129	119	110
8	111	117	108	102	e110	e104	118	132	161	130	116	110
9	110	115	110	103	109	e103	118	132	145	128	114	110
10	108	119	e110	102	110	102	121	135	145	125	113	112
11	107	128	e110	102	111	103	134	135	158	123	111	126
12	106	121	e110	102	108	106	163	133	154	124	111	158
13	105	119	e110	102	110	113	143	132	143	124	116	152
14	111	118	e110	102	108	118	133	132	139	122	116	152
15	112	116	e110	101	105	113	146	132	137	121	113	137
16	107	117	e110	101	106	108	145	131	136	119	112	129
17	105	115	109	105	105	107	139	132	199	118	110	126
18	104	114	108	158	104	107	145	131	225	126	109	123
19	105	115	107	150	103	110	175	135	179	154	114	121
20	153	120	107	119	107	109	187	143	167	130	147	119
21	150	119	107	114	113	106	157	135	164	124	121	119
22	141	114	106	113	107	105	147	132	164	122	120	121
23	124	112	106	111	108	105	141	131	156	120	117	119
24	123	110	106	114	114	114	140	130	154	121	115	123
25	119	110	107	111	112	167	155	128	148	119	114	119
26	115	111	106	112	109	128	160	128	145	118	118	122
27	142	115	105	114	118	119	145	127	143	116	115	186
28	136	115	104	110	114	118	139	126	140	125	113	138
29	125	112	104	111	110	119	139	125	137	132	112	132
30	125	113	104	e110	---	121	145	124	141	125	112	128
31	121	---	105	e110	---	130	---	124	---	123	111	---
TOTAL	3631	3561	3374	3398	3171	3489	4183	4116	4533	3934	3602	3756
MEAN	117	119	109	110	109	113	139	133	151	127	116	125
MAX	153	153	117	158	118	167	187	148	225	154	147	186
MIN	104	110	104	101	103	102	118	124	124	116	109	108
CFSM	.99	1.01	.92	.93	.93	.95	1.18	1.13	1.28	1.08	.98	1.06
IN.	1.14	1.12	1.06	1.07	1.00	1.10	1.32	1.30	1.43	1.24	1.14	1.18

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1990 - 1996, BY WATER YEAR (WY)

	1990	1991	1992	1993	1994	1995	1996
MEAN	131	135	134	133	130	142	152
MAX	148	150	151	147	144	164	169
(WY)	1992	1993	1992	1992	1992	1992	1992
MIN	117	119	109	110	109	113	131
(WY)	1996	1996	1996	1996	1996	1996	1995

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1990 - 1996

ANNUAL TOTAL	43651	44748	
ANNUAL MEAN	120	122	135
HIGHEST ANNUAL MEAN			147
LOWEST ANNUAL MEAN			122
HIGHEST DAILY MEAN	257	Aug 17	386
LOWEST DAILY MEAN	98	Jul 30	98
ANNUAL SEVEN-DAY MINIMUM	100	Jul 25	100
INSTANTANEOUS PEAK FLOW			516
INSTANTANEOUS PEAK STAGE		(a)321	516
INSTANTANEOUS LOW FLOW		(b)3.12	(b)4.04
ANNUAL RUNOFF (CFSM)	1.01	78	78
ANNUAL RUNOFF (INCHES)	13.76	1.04	1.15
10 PERCENT EXCEEDS	135	14.11	15.57
50 PERCENT EXCEEDS	118	145	158
90 PERCENT EXCEEDS	104	118	133
		105	112

(a) Gage height, 2.49 ft.

(b) Backwater from ice.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

445331085564501 GLEN LAKE NEAR GLEN ARBOR. MI

LOCATION.--Lat 44°51'31", long 85°59'46", in SW1/4 NW1/4 sec. 3, T.28 N., R.14 W., Leelanau County, Hydrologic Unit 04060104, at bridge on State Highway 22, 2.6 mi south of Glen Arbor.

DRAINAGE AREA.--30.8 mi².

PERIOD OF RECORD.--June 1942 to current year.

GAGE.--Non recording gage. Once daily reading by observer. Datum of gage is 596.00 ft above sea level.

REMARKS.--There is one small inlet on the south side near Burdickville. The outlet is the Crystal River. Lake elevation controlled by dam.
Established legal level 596.75 ft above sea level.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 1.90 ft, June 23, 1943; minimum observed, 0.38 ft, Sept. 30, Oct. 1-4, 23-25, 29-31, 1976, Jan. 1, 1995.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 1.12 ft, June 19, 20; minimum observed, 0.50 ft, Oct. 16, 17, 19.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY INSTANTANEOUS VALUES

[illegible]

STREAMS TRIBUTARY TO LAKE MICHIGAN

443903085312101 ARBUTUS LAKE NEAR MAYFIELD, MI

LOCATION.--Lat 44°39'03", long 85°31'21", in SW1/4 NE1/4 sec. 16, T.26 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, on south side of lake at Pine Hurst Trail, 1.8 mi north of Mayfield.

DRAINAGE AREA.--Not determined.

PERIOD OF RECORD.--August 1994 to current year.

GAGE.--Nonrecording gage. Once daily reading by observer. Elevation of gage is 794 ft above sea level, from topographic map.

REMARKS.--Top of ice readings: Nov. 11, 13, 20, 27, Dec. 4, 11, 19, 25, Jan. 1, 8, 15, 22, 29, Feb. 5, 12, 19, 26, Mar. 4, 11, 14, 18, 25, Apr. 1, 8, 15. No inlets or outlets.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 5.07 ft, Feb. 13, 1995; minimum observed, 3.80 ft, Sept. 9, 1996.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 4.62 ft, Mar. 11; minimum observed, 3.80 ft, Sept. 9.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.99	4.16	---	4.44	---	---	4.36	4.35	4.21	4.34	4.22	3.90
2	4.00	4.18	---	---	---	---	---	4.36	4.20	4.32	4.24	3.89
3	4.00	4.20	---	---	---	---	---	4.36	4.20	4.30	4.24	3.88
4	4.01	4.22	4.40	---	---	4.56	---	4.36	4.23	4.28	4.22	3.87
5	4.01	4.24	---	---	4.46	---	---	4.38	4.25	4.26	4.20	3.86
6	4.02	4.23	---	---	---	---	---	4.38	4.27	4.24	4.18	3.85
7	4.02	4.22	---	---	---	---	---	4.37	4.26	4.22	4.16	3.83
8	4.02	4.24	---	4.44	---	---	4.20	4.37	4.27	4.20	4.15	3.81
9	4.01	4.26	---	---	---	---	---	4.36	4.28	4.20	4.14	3.80
10	4.01	4.22	---	---	---	---	---	4.36	4.30	4.21	4.12	3.83
11	4.01	4.24	4.44	---	---	4.62	---	4.36	4.32	4.20	4.12	3.94
12	4.02	---	---	---	4.47	---	---	4.35	4.31	4.22	4.11	4.00
13	4.01	4.26	---	---	---	---	---	4.34	4.30	4.20	4.09	4.12
14	4.01	---	---	---	---	4.36	---	4.33	4.29	4.20	4.10	4.20
15	4.00	---	---	4.44	---	---	4.33	4.32	4.29	4.19	4.09	4.21
16	4.00	---	---	---	---	---	---	4.31	4.28	4.19	4.08	4.22
17	3.99	---	---	---	---	---	---	4.30	4.27	4.18	4.07	4.21
18	3.98	---	---	4.30	---	4.58	---	4.30	4.26	4.20	4.06	4.20
19	3.97	---	4.50	---	4.48	---	---	4.29	4.25	4.30	4.05	4.19
20	3.98	4.30	---	---	---	---	---	4.28	4.26	4.28	4.04	4.18
21	3.99	---	---	---	---	---	---	4.30	4.28	4.25	4.03	4.19
22	4.01	---	---	4.45	---	---	4.32	4.29	4.30	4.24	4.02	4.20
23	4.04	---	---	---	---	---	4.32	4.29	4.32	4.23	4.01	4.20
24	4.06	---	---	---	---	---	4.31	4.30	4.34	4.22	4.00	4.20
25	4.08	---	4.44	---	---	4.52	4.32	4.30	4.36	4.20	3.98	4.20
26	4.11	---	---	---	4.50	---	4.32	4.32	4.38	4.18	3.97	4.23
27	4.14	4.36	---	---	---	---	4.32	4.32	4.40	4.20	3.96	4.25
28	4.16	---	---	---	---	---	4.33	4.28	4.39	4.24	3.94	4.26
29	4.17	---	---	4.45	---	---	4.32	4.24	4.38	4.26	3.94	4.26
30	4.16	---	---	---	---	---	4.34	4.20	4.36	4.25	3.92	4.25
31	4.14	---	---	---	---	---	---	4.20	---	4.24	3.91	---
MEAN	4.04	---	---	---	---	---	---	4.32	4.29	4.23	4.08	4.07
MAX	4.17	---	---	---	---	---	---	4.38	4.40	4.34	4.24	4.26
MIN	3.97	---	---	---	---	---	---	4.20	4.20	4.18	3.91	3.80

STREAMS TRIBUTARY TO LAKE MICHIGAN

04127800 JORDAN RIVER NEAR EAST JORDAN, MI

LOCATION.--Lat 45°06'09", long 85°05'53", in NW1/4 NW1/4 sec.7, T.31 N., R.6 W., Antrim County, Hydrologic Unit 04060105, on right bank 300 ft downstream from Webster Bridge, 4.2 mi south of East Jordan, and 4.5 mi upstream from mouth.

DRAINAGE AREA.--67.9 mi².

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1960-65. October 1966 to current year.

REVISED RECORDS.--WDR MI-83-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 596.43 ft above sea level (Antrim County Road Commission bench mark). Nov. 19, 1959 to Sept. 30, 1966, nonrecording gage at site 600 ft upstream at same datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Some regulation at low flow by fish hatchery upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	154	202	201	187	e190	194	212	264	177	168	183	157
2	156	248	198	180	e190	195	208	221	186	194	176	158
3	165	201	196	182	e190	191	200	223	186	197	171	156
4	171	199	197	e180	e190	190	202	219	184	171	168	155
5	159	191	198	e180	e190	189	196	204	183	167	167	155
6	167	204	194	e180	e190	185	198	202	190	165	166	154
7	196	209	188	e180	e190	187	197	197	197	168	165	154
8	189	196	187	e180	e190	e185	194	196	188	187	162	154
9	168	190	184	e180	e190	e185	197	198	180	191	161	155
10	163	205	180	e180	210	e185	212	212	185	170	161	157
11	161	241	e180	e180	222	184	255	216	187	166	161	169
12	160	207	e180	e180	207	194	319	197	181	168	161	160
13	159	198	e180	e180	199	214	255	192	174	170	161	165
14	163	196	e180	e180	194	236	226	190	172	166	162	187
15	188	190	e185	182	192	220	256	189	171	166	176	185
16	173	192	189	182	192	203	251	190	173	164	173	177
17	164	192	188	186	190	199	234	189	206	167	163	169
18	166	193	188	297	189	202	267	189	240	216	162	159
19	164	196	187	442	186	211	331	194	194	225	161	157
20	237	216	187	247	186	216	474	236	184	176	186	156
21	267	229	e186	e220	195	195	307	196	178	168	168	161
22	194	207	e186	200	190	190	246	187	179	165	164	201
23	181	200	186	194	188	189	223	186	174	164	167	175
24	182	192	186	e194	208	194	215	184	176	171	159	174
25	186	193	189	e194	208	272	253	184	173	168	159	171
26	175	196	187	193	200	235	329	183	170	166	171	162
27	208	197	e186	195	219	202	238	181	170	164	169	217
28	223	195	e186	190	217	195	218	180	169	176	160	178
29	201	188	186	191	199	205	211	178	168	228	159	187
30	214	192	187	188	---	219	312	177	188	306	157	172
31	192	---	188	e190	---	235	---	178	---	205	156	---
TOTAL	5646	6055	5820	6214	5701	6296	7436	6132	5483	5643	5135	5037
MEAN	182	202	188	200	197	203	248	198	183	182	166	168
MAX	267	248	201	442	222	272	474	264	240	306	186	217
MIN	154	188	180	180	186	184	194	177	168	164	156	154
CFSM	2.68	2.97	2.76	2.95	2.90	2.99	3.65	2.91	2.69	2.68	2.44	2.47
IN.	3.09	3.32	3.19	3.40	3.12	3.45	4.07	3.36	3.00	3.09	2.81	2.76

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1996, BY WATER YEAR (WY)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEAN	188	192	188	180	181	211	225	195	183	174	172	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182	182
MAX	235	226	217	201	209	281	273	237	230	210	203	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223
(WY)	1987	1993	1983	1995	1984	1979	1979	1983	1969	1975	1972	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986	1986
MIN	167	163	163	157	157	174	181	164	160	151	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
(WY)	1967	1982	1982	1971	1982	1972	1987	1982	1982	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981	1981

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1967 - 1996

	1995	1996	1967-1996
ANNUAL TOTAL	70735	70598	189
ANNUAL MEAN	194	193	204
HIGHEST ANNUAL MEAN			171
LOWEST ANNUAL MEAN			171
HIGHEST DAILY MEAN	456	474	840
LOWEST DAILY MEAN	154	154	130
ANNUAL SEVEN-DAY MINIMUM	158	155	136
INSTANTANEOUS PEAK FLOW		625	1360
INSTANTANEOUS PEAK STAGE		5.28	6.51
INSTANTANEOUS LOW FLOW		(a)147	(a)91
ANNUAL RUNOFF (CFSM)	2.85	2.84	2.79
ANNUAL RUNOFF (INCHES)	38.75	38.68	37.86
10 PERCENT EXCEEDS	219	223	223
50 PERCENT EXCEEDS	187	188	180
90 PERCENT EXCEEDS	165	162	160

(a) Result of freezeup.

(e) Estimated.

451540084560301 WALLOON LAKE AT WALLOON LAKE, MI

DRAINAGE AREA.--Not determined.

PERIOD OF RECORD.--July 1942 to September 1950, September 1995 to current year.

REMARKS.--Lake level maintained by a fix-crest concrete dam. Crest of dam is divided into two parts. The right sill is about 22 ft wide and has its crest at elevation 2.64 ft, gage datum. The left sill, 13 ft wide, is at elevation 1.93 ft, gage datum. There is a steel grate on top of weir to prevent migration of fish into lake. Established legal level is the top of right sill of the dam at lake outlet.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 3.25 ft, Apr. 30, May 4, 1996; minimum observed, 2.14 ft, Sept. 10, 1947, Oct. 7, 1948.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 3.25 ft, Apr. 30, May 4; minimum observed, 2.53 ft, Sept. 10.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY INSTANTANEOUS VALUES

[illegible]

STREAMS TRIBUTARY TO LAKE HURON

04127918 PINE RIVER NEAR RUDYARD, MI

LOCATION.--Lat 46°11'09", long 84°35'52", in NW1/4 NE1/4 sec.30, T.44 N., R.2 W., Chippewa County, Hydrologic Unit 04070002, on right bank 15 ft upstream from bridge on Mackinac Trail, 3.2 mi south of Rudyard.

DRAINAGE AREA.--184 mi².

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

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 601.50 ft above sea level. Prior to Aug. 4, 1972, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	151	e392	e150	e100	e130	e110	e220	1160	103	258	509	91
2	136	e1500	e150	e98	e120	e110	e220	912	124	187	333	87
3	133	e1300	e150	e96	e110	e110	e215	791	166	189	236	84
4	179	e1000	e150	e95	e100	e110	e210	717	154	153	191	81
5	220	e750	e140	e95	e95	e110	e210	660	161	129	172	80
6	197	e550	e140	e95	e95	e110	e210	609	155	117	164	78
7	342	e470	e140	e95	e95	e110	e210	571	176	122	192	76
8	373	e350	e130	e95	e95	e110	e210	536	173	120	252	75
9	302	e310	e130	e95	e95	e110	e220	498	150	167	203	73
10	251	e280	e120	e95	e95	e110	e250	480	133	180	175	73
11	215	e270	e120	e95	e95	e115	e500	464	123	149	156	73
12	188	e260	e120	e95	e95	e120	e1000	419	117	135	141	103
13	169	e250	e110	e95	e95	e130	e900	360	112	191	130	260
14	154	e240	e110	e95	e95	e140	e750	318	105	218	127	367
15	157	e230	e110	e95	e95	e140	e500	289	96	188	173	410
16	228	e220	e110	e95	e95	e140	e500	270	93	169	154	389
17	226	e210	e110	e100	e95	e140	e900	254	97	153	131	286
18	196	e210	e110	e200	e95	e140	e1900	244	97	170	117	213
19	174	e200	e110	e400	e95	e140	2170	240	92	793	110	173
20	637	e200	e110	e350	e95	e140	2140	251	93	410	169	142
21	1150	e190	e110	e330	e95	e140	2380	230	93	250	243	125
22	949	e190	e110	e300	e98	e140	2460	204	101	182	177	193
23	726	e180	e110	e280	e100	e140	2040	186	100	156	182	279
24	718	e180	e110	e270	e105	e140	1680	170	94	142	151	600
25	733	e170	e110	e250	e110	e170	1530	154	93	146	133	809
26	534	e170	e110	e220	e110	e230	1930	143	87	143	123	486
27	588	e170	e110	e200	e110	e230	1400	135	84	128	117	2110
28	1280	e160	e105	e180	e110	e230	1050	129	81	120	112	1790
29	948	e160	e100	e170	e110	e225	906	119	243	443	106	1160
30	658	e160	e100	e160	---	e220	1030	112	361	806	99	732
31	483	---	e100	e150	---	e220	---	108	---	890	94	---
TOTAL	13395	10922	3695	5089	2928	4530	29841	11733	3857	7604	5372	11498
MEAN	432	364	119	164	101	146	995	378	129	245	173	383
MAX	1280	1500	150	400	130	230	2460	1160	361	890	509	2110
MIN	133	160	100	95	95	110	210	108	81	117	94	73
CFSM	2.35	1.98	.65	.89	.55	.79	5.41	2.06	.70	1.33	.94	2.08
IN.	2.71	2.21	.75	1.03	.59	.92	6.03	2.37	.78	1.54	1.09	2.32

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1972 - 1996, BY WATER YEAR (WY)

	MEAN	222	291	179	120	105	267	835	268	176	110	106	158
	MAX	432	807	328	248	217	544	1589	633	432	261	349	383
	(WY)	1996	1989	1983	1980	1984	1973	1985	1972	1974	1979	1973	1996
	MIN	71.8	72.7	63.0	60.3	65.9	90.7	281	123	76.8	60.3	58.5	65.3
	(WY)	1977	1977	1977	1977	1979	1978	1987	1987	1988	1988	1991	1976

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1972 - 1996

ANNUAL TOTAL	77943	110464	235
ANNUAL MEAN	214	302	344
HIGHEST ANNUAL MEAN			1985
LOWEST ANNUAL MEAN			149
HIGHEST DAILY MEAN	1510	2460	4050
LOWEST DAILY MEAN	58	73	45
ANNUAL SEVEN-DAY MINIMUM	59	75	50
INSTANTANEOUS PEAK FLOW		2840	4500
INSTANTANEOUS PEAK STAGE		13.04	18.44
INSTANTANEOUS LOW FLOW		71	(a)33
ANNUAL RUNOFF (CFSM)	1.16	1.64	1.28
ANNUAL RUNOFF (INCHES)	15.76	22.33	17.33
10 PERCENT EXCEEDS	494	732	474
50 PERCENT EXCEEDS	120	160	127
90 PERCENT EXCEEDS	71	95	72

(a) Result of freezeup.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04127937 EAST LAKE NEAR FIBRE, MI

LOCATION.--Lat 46°07'56", long 84°47'31", in SE1/4 SW1/4 sec.10, T.43 N., R.4 W., Mackinac County, Hydrologic Unit 04070002, 5.9 mi southwest of Fibre.

DRAINAGE AREA.--5.87 mi².

PERIOD OF RECORD.--July 1967 to September 1971, June 1990 to current year.

GAGE.--Nonrecording gage. Elevation of gage is 805 ft above sea level, from topographic map. July 12, 1967 to Sept. 1, 1971, nonrecording gage at different datum.

REMARKS.--Staff gage read by observer. The inlet to East Lake is a small unnamed stream draining a marsh at the north end of the lake. The outlet is the East Lake Branch of the Carp River. Surface area of lake is 995 acres.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 5.62 ft, Dec. 2, 1991, revised; minimum observed, 3.46 ft, datum then in use, Sept. 14-16, 1969.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 4.96 ft, April 22 to May 12, May 14, 15; minimum observed, 4.00 ft, Oct. 1-4.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.00	4.34	---	---	---	---	---	4.96	4.58	4.48	4.60	4.50
2	4.00	4.48	---	---	---	---	---	4.96	4.58	4.50	4.60	4.50
3	4.00	4.50	---	---	---	---	4.56	4.96	4.58	4.48	4.60	4.48
4	4.00	4.50	---	4.39	---	---	---	4.96	4.60	---	4.60	4.48
5	4.02	4.52	---	---	---	---	---	4.96	4.60	---	4.60	4.48
6	4.02	4.60	---	---	---	---	---	4.96	4.58	---	4.60	4.46
7	4.04	4.60	---	---	---	---	---	4.96	4.58	---	4.60	4.46
8	4.08	4.60	---	---	---	---	---	4.96	4.58	---	4.62	4.46
9	4.08	4.56	---	---	---	---	---	4.96	4.58	---	4.60	4.44
10	4.10	4.56	---	---	---	---	---	4.96	4.56	---	4.58	4.44
11	4.10	4.56	---	---	---	---	---	4.96	4.56	---	4.58	4.40
12	4.10	4.54	---	---	---	---	4.86	4.96	4.56	4.38	4.56	4.46
13	4.08	4.54	---	---	---	---	4.86	4.92	4.54	4.38	4.56	4.50
14	4.08	4.54	---	---	4.49	---	4.86	4.96	4.54	4.42	4.56	4.58
15	4.10	4.54	---	---	---	---	4.86	4.96	4.50	4.48	4.56	4.60
16	4.12	4.54	---	---	---	---	4.86	4.86	4.50	4.50	4.56	4.58
17	4.12	4.54	---	---	---	---	4.86	4.84	4.48	4.50	4.56	4.60
18	4.16	4.54	---	---	---	---	4.86	4.84	4.48	4.58	4.58	4.58
19	4.16	4.54	---	---	---	---	4.86	4.84	4.48	4.56	4.58	4.58
20	4.18	---	---	---	---	---	4.86	4.84	4.46	4.52	4.58	4.58
21	4.18	---	---	---	---	---	4.86	4.82	4.46	4.50	4.60	4.60
22	4.18	---	---	---	---	---	4.96	4.82	4.46	4.50	4.60	4.60
23	4.20	---	---	---	---	---	4.96	4.76	4.46	4.50	4.56	4.64
24	4.28	---	---	---	---	---	4.96	4.76	4.44	4.48	4.56	4.64
25	4.28	---	---	---	---	---	4.96	4.74	4.42	4.48	4.54	4.70
26	4.30	---	---	---	---	---	4.96	4.72	4.40	4.48	4.54	4.70
27	4.32	---	---	---	---	---	4.96	4.70	4.40	4.46	4.52	4.90
28	4.36	---	---	---	---	---	4.96	4.68	4.40	4.50	4.52	4.90
29	4.36	---	---	---	---	---	4.96	4.64	4.40	4.52	4.52	4.90
30	4.36	---	---	---	---	---	4.96	4.60	4.50	4.60	4.50	4.90
31	4.40	---	---	---	---	---	---	4.60	---	4.59	4.50	---

STREAMS TRIBUTARY TO LAKE HURON

452600084472001 CROOKED LAKE NEAR CONWAY, MI

LOCATION.--Lat 45°23'52", long 84°49'22", in NE1/4 SW1/4 sec.29, T.35 N., R.4 W., Emmet County, Hydrologic Unit 04070004, at Minnehaha Creek Inlet on Channel Road, 2.5 mi southeast of Conway.

DRAINAGE AREA.--101 mi².

PERIOD OF RECORD.--June 1942 to July 1945 (summer months only), August 1945 to current year.

GAGE.--Water-stage recorder. Datum of gage is 593.38 ft above sea level. Prior to June 13, 1960, nonrecording gage at datum 1.00 ft higher. June 13, 1960 to June 29, 1964, nonrecording gage at same datum.

REMARKS.--Crooked Lake is the upstream end of the navigable inland water route. Major inlets are Minnehaha Creek, Round Lake Outlet, and Pickerel Lake Outlet. The outlet is Crooked River. Lake elevation controlled by dam and boat lock at Alanson.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 3.60 ft, Apr. 12, 1948, present datum; minimum, 0.54 ft, Mar. 30, 1982.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 2.81 ft, Apr. 26; minimum, 1.04 ft, Mar. 12, 13.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.27	1.93	1.83	1.48	1.41	1.53	1.60	2.79	2.34	2.29	2.45	2.14
2	2.25	1.99	1.79	1.48	1.41	1.53	1.63	2.78	2.34	2.31	2.43	2.14
3	2.25	2.02	1.76	1.46	1.41	1.53	1.66	2.74	2.35	2.31	2.41	2.14
4	2.26	2.08	1.73	1.45	1.41	1.53	1.71	2.70	2.34	2.28	2.38	2.14
5	2.26	2.05	1.72	1.45	1.40	1.53	1.72	2.69	2.33	2.25	2.35	2.15
6	2.27	2.05	1.76	1.44	1.40	1.53	1.73	2.66	2.35	2.24	2.33	2.15
7	2.29	2.07	1.68	1.44	1.40	1.53	1.74	2.64	2.38	2.23	2.30	2.14
8	2.30	2.08	1.65	1.43	1.40	1.53	1.74	2.62	2.39	2.23	2.28	2.13
9	2.30	2.06	1.63	1.41	1.40	1.53	1.76	2.61	2.39	2.23	2.26	2.14
10	2.29	2.06	1.67	1.40	1.41	1.53	1.78	2.61	2.38	2.21	2.24	2.16
11	2.29	2.10	1.70	1.40	1.41	1.53	1.84	2.63	2.38	2.20	2.21	2.15
12	2.28	2.10	1.70	1.39	1.41	1.11	1.95	2.61	2.39	2.21	2.19	2.19
13	2.27	2.09	1.70	1.38	1.41	1.04	2.05	2.58	2.37	2.21	2.19	2.22
14	2.26	2.09	1.74	1.37	1.41	1.07	2.11	2.55	2.34	2.20	2.18	2.25
15	2.32	2.08	1.75	1.35	1.41	1.09	2.19	2.53	2.33	2.19	2.18	2.28
16	2.23	2.06	1.73	1.35	1.41	1.10	2.26	2.51	2.32	2.18	2.18	2.32
17	2.12	2.04	1.71	1.35	1.41	1.11	2.31	2.51	2.33	2.18	2.17	2.31
18	2.02	2.03	1.68	1.35	1.41	1.11	2.36	2.49	2.39	2.23	2.16	2.31
19	1.97	2.02	1.66	1.53	1.41	1.11	2.43	2.48	2.40	2.41	2.16	2.30
20	1.95	2.00	1.65	1.92	1.41	1.12	2.54	2.56	2.38	2.41	2.17	2.29
21	1.99	2.03	1.63	1.75	1.40	1.15	2.61	2.57	2.39	2.38	2.17	2.29
22	1.95	2.01	1.62	1.48	1.39	1.13	2.64	2.55	2.41	2.36	2.17	2.33
23	1.90	2.01	1.61	1.44	1.38	1.15	2.63	2.54	2.39	2.35	2.17	2.35
24	1.87	1.97	1.59	1.45	1.24	1.20	2.62	2.52	2.39	2.35	2.15	2.35
25	1.85	1.96	1.58	1.44	1.18	1.30	2.66	2.49	2.37	2.34	2.13	2.34
26	1.81	1.96	1.57	1.43	1.18	1.40	2.79	2.46	2.36	2.33	2.15	2.35
27	1.80	1.96	1.56	1.45	1.20	1.46	2.79	2.44	2.34	2.31	2.16	2.45
28	1.87	1.95	1.54	1.44	1.22	1.47	2.76	2.41	2.33	2.32	2.15	2.45
29	1.87	1.89	1.52	1.43	1.52	1.48	2.74	2.39	2.31	2.41	2.15	2.43
30	1.88	1.85	1.50	1.41	---	1.52	2.78	2.36	2.32	2.47	2.15	2.42
31	1.90	---	1.49	1.41	---	1.57	---	2.34	---	2.47	2.15	---
MEAN	2.10	2.02	1.66	1.45	1.37	1.34	2.20	2.56	2.36	2.29	2.22	2.26
MAX	2.32	2.10	1.83	1.92	1.52	1.57	2.79	2.79	2.41	2.47	2.45	2.45
MIN	1.80	1.85	1.49	1.35	1.18	1.04	1.60	2.34	2.31	2.18	2.13	2.13

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.92	3.44	3.74	3.78	---	---	3.78	4.66	3.90	3.48	3.44	3.12
2	2.94	3.54	3.76	---	3.78	---	---	4.64	3.88	---	---	---
3	2.92	---	---	3.76	---	---	---	4.60	---	---	---	3.10
4	---	---	3.76	---	---	3.74	---	---	3.90	3.46	3.42	3.08
5	2.94	3.62	---	3.74	---	---	3.82	4.56	---	3.44	---	---
6	---	3.62	---	---	3.78	---	---	---	---	3.40	3.42	---
7	2.98	---	3.78	---	---	---	---	4.44	---	---	3.44	---
8	3.00	---	---	3.72	---	---	3.80	---	---	3.38	---	---
9	2.98	3.66	---	3.70	3.78	---	---	---	---	---	3.38	3.04
10	3.00	3.66	---	---	---	---	3.80	---	3.80	---	---	3.04
11	3.00	---	---	---	---	3.68	---	---	3.76	3.32	---	---
12	3.00	3.74	---	---	---	---	---	---	3.76	3.30	3.32	3.02
13	2.98	3.72	3.80	---	---	3.66	---	4.30	3.76	3.32	3.30	---
14	2.98	3.74	3.86	---	3.80	---	---	---	---	---	---	---
15	---	---	---	3.66	---	3.66	3.90	---	---	3.30	3.30	---
16	---	3.72	---	3.64	---	---	---	4.20	3.70	---	3.30	3.16
17	3.02	3.72	---	3.66	---	---	4.04	---	3.70	---	3.28	---
18	---	---	3.84	3.68	---	3.66	---	4.16	---	3.26	---	---
19	---	3.72	---	---	3.76	---	4.10	---	---	---	3.24	3.14
20	3.04	3.72	3.82	---	3.76	3.68	---	4.20	---	---	3.26	3.12
21	3.14	---	---	---	---	---	---	---	3.61	---	3.24	3.10
22	3.18	3.74	---	---	3.74	3.66	---	---	---	3.36	---	---
23	3.18	---	---	3.70	3.74	---	4.44	---	---	3.40	---	3.18
24	---	3.73	---	3.74	---	---	4.48	---	---	3.38	---	3.18
25	3.24	3.74	---	---	---	3.68	---	---	3.58	3.38	---	---
26	3.24	---	---	3.74	---	---	4.60	4.10	3.56	---	---	3.16
27	3.24	---	---	---	---	---	---	4.08	3.54	3.35	---	3.28
28	---	---	---	---	---	---	---	---	---	---	3.16	3.30
29	---	3.74	3.76	3.76	3.76	---	---	---	---	---	3.16	3.34
30	---	3.74	---	---	---	---	4.64	3.98	3.52	3.44	3.14	3.30
31	3.42	---	---	3.78	---	---	---	---	---	---	3.12	---

STREAMS TRIBUTARY TO LAKE HURON

04127997 STURGEON RIVER AT WOLVERINE, MI

LOCATION.--Lat 45°16'28", long 84°36'00", in SE1/4 SW1/4 sec.6, T.33 N., R.2 W., Cheboygan County, Hydrologic Unit 04070004, on right bank at Cedar Street in Wolverine, 0.2 mi downstream from West Branch and 11.7 mi upstream from mouth.

DRAINAGE AREA.--192 mi².

PERIOD OF RECORD.--April 1942 to current year.

REVISED RECORDS.--WSP 1307: 1944(M), 1948(M). WSP 1727: 1951(M). WDR MI-83-1: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 770 ft above sea level, from topographic map. Prior to June 15, 1942, non recording gage at site 1.7 mi downstream and June 16, 1942 to Sept. 30, 1958 at site 2.0 mi downstream at different datums. Oct. 1, 1958 to Sept. 30, 1994, water-stage recorder at site 2.7 mi downstream at different datum (Station 04128000).

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	181	277	237	207	e210	e220	253	418	211	203	210	168
2	184	397	235	e205	e210	e220	247	327	218	227	202	169
3	192	327	229	e205	e215	e220	234	321	222	304	196	169
4	215	282	229	e205	e215	e220	235	308	220	228	192	167
5	200	262	228	e205	e215	e220	227	283	220	213	187	168
6	199	266	221	e205	e215	e220	230	277	241	202	186	168
7	243	277	222	e205	e215	e210	226	270	298	197	183	166
8	246	258	221	e205	e215	e210	222	260	265	211	177	168
9	224	244	219	e205	e220	e210	227	260	235	298	177	175
10	212	253	e215	e205	e230	e210	249	287	240	232	175	201
11	204	298	e215	e205	e250	209	297	311	242	209	175	191
12	198	273	e215	e205	e230	212	402	267	251	204	172	207
13	194	250	e215	e205	e225	234	347	255	233	211	171	249
14	195	245	e215	e205	e220	271	295	250	220	199	250	276
15	247	235	e215	e205	e220	268	307	246	215	198	273	351
16	255	231	e215	e205	e215	239	300	247	217	190	206	272
17	216	230	218	e210	e215	232	285	247	241	188	188	234
18	209	234	217	270	e215	229	335	245	331	206	179	213
19	206	238	214	419	e210	239	442	257	269	301	174	200
20	263	253	213	338	e210	243	495	352	248	234	197	194
21	345	278	e210	e300	e210	225	491	281	237	204	195	194
22	262	263	e210	255	e210	218	410	253	244	195	184	253
23	236	248	210	227	e210	216	343	244	233	204	181	269
24	235	235	212	e225	e230	220	303	235	232	198	172	237
25	245	232	210	e220	e230	273	327	231	225	198	173	234
26	235	236	e210	e220	e225	299	436	227	215	192	182	214
27	269	238	e210	e220	e240	268	342	222	212	189	183	317
28	312	232	e210	217	e230	253	293	222	206	208	176	274
29	266	e235	e210	213	e220	240	282	216	204	311	171	237
30	263	238	211	e210	---	251	401	214	225	266	169	222
31	264	---	209	e210	---	263	---	213	---	225	166	---
TOTAL	7215	7765	6720	7036	6375	7262	9483	8246	7070	6845	5822	6557
MEAN	233	259	217	227	220	234	316	266	236	221	188	219
MAX	345	397	237	419	250	299	495	418	331	311	273	351
MIN	181	230	209	205	210	209	222	213	204	188	166	166
CFSM	1.21	1.35	1.13	1.18	1.14	1.22	1.65	1.39	1.23	1.15	.98	1.14
IN.	1.40	1.50	1.30	1.36	1.24	1.41	1.84	1.60	1.37	1.33	1.13	1.27

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1996, BY WATER YEAR (WY)

	MEAN	214	226	213	200	198	247	312	240	208	186	182	203
MAX	326	301	306	295	275	354	431	353	272	255	301	290	
(WY)	1984	1993	1972	1973	1984	1976	1971	1983	1969	1994	1972	1986	
MIN	153	164	157	133	130	172	198	154	149	130	134	141	
(WY)	1957	1950	1949	1957	1957	1954	1958	1958	1958	1981	1944	1948	

SUMMARY STATISTICS FOR 1995 CALENDAR YEAR FOR 1996 WATER YEAR WATER YEARS 1942 - 1996

	ANNUAL TOTAL	82046	ANNUAL MEAN	225	ANNUAL MEAN	236	ANNUAL MEAN	219	ANNUAL MEAN	268	ANNUAL MEAN	1972
HIGHEST ANNUAL MEAN												1972
LOWEST ANNUAL MEAN												1958
HIGHEST DAILY MEAN												1972
LOWEST DAILY MEAN												1958
ANNUAL SEVEN-DAY MINIMUM												1958
INSTANTANEOUS PEAK FLOW												1958
INSTANTANEOUS PEAK STAGE												1958
INSTANTANEOUS LOW FLOW												1958
ANNUAL RUNOFF (CFSM)												1958
ANNUAL RUNOFF (INCHES)												1958
10 PERCENT EXCEEDS												1958
50 PERCENT EXCEEDS												1958
90 PERCENT EXCEEDS												1958

(a) Gage height 4.39 ft.

(b) Site then in use.

(c) Backwater from ice, present site and datum; peak stage at previous site and datum, 4.48 ft, Sept. 14, 1961.

(d) Aug. 31, Sept. 7.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04128990 PIGEON RIVER NEAR VANDERBILT, MI

LOCATION.--Lat 45°09'24", long 84°28'00", in NW1/4 NW1/4 sec.20, T.32 N., R.1 W., Otsego County, Hydrologic Unit 04070004, on left bank at Sturgeon Valley Road, 9.7 mi east of Vanderbilt, 1.0 mi downstream from Lansing Club Dam, and 28.5 mi upstream from Mullett Lake.

DRAINAGE AREA.--57.7 mi².

PERIOD OF RECORD.--September 1950 to current year.

GAGE.--Water-stage recorder. Datum of gage is 909.03 ft above sea level (Wade-Trim Inc. bench mark). September 1950 to October 1990, water-stage recorder at site 2.5 mi downstream at different datum (Station 04129000).

REMARKS.--Records good except for estimated daily discharges, which are fair. Prior to May 16, 1957, and since Apr. 22, 1958, occasional regulation by Lansing Club Dam 1.0 mi upstream. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	66	112	88	77	e75	e80	102	165	71	67	78	57
2	66	218	87	74	e76	e80	97	118	75	78	71	57
3	68	146	85	e73	e76	79	92	114	74	110	69	56
4	84	109	85	e72	e76	79	88	110	75	77	66	56
5	75	98	86	e72	77	75	89	101	75	69	64	55
6	73	101	84	e72	73	78	84	99	89	65	68	57
7	102	115	80	e72	64	e78	83	99	123	67	63	57
8	93	99	80	72	70	e78	82	94	97	79	61	55
9	82	88	77	e72	77	e77	83	92	90	106	61	54
10	77	93	65	71	82	77	90	106	80	84	61	66
11	73	121	e78	71	89	72	133	129	78	72	59	63
12	70	109	e78	72	83	70	200	96	76	69	60	71
13	68	96	e78	75	80	82	157	93	75	71	58	103
14	69	92	e78	75	80	105	118	85	69	68	62	116
15	89	84	e78	69	76	106	130	87	66	65	123	145
16	106	85	e79	74	74	93	121	82	68	67	80	107
17	91	84	e80	74	e74	88	113	87	77	65	68	76
18	74	89	80	104	74	87	149	84	104	71	65	75
19	73	88	80	201	74	90	234	87	99	149	61	67
20	120	94	79	122	75	95	266	118	85	96	74	66
21	203	106	70	110	81	87	242	97	81	86	76	64
22	115	98	e78	97	78	83	182	83	77	62	66	95
23	93	90	78	83	76	81	142	84	72	69	63	107
24	84	83	77	78	80	83	117	78	71	67	62	91
25	89	82	79	74	81	111	131	77	76	70	61	81
26	81	84	73	e76	83	131	188	76	64	66	60	75
27	103	85	71	e76	86	93	127	76	66	64	68	131
28	130	84	e76	78	92	89	108	73	65	77	63	117
29	104	82	e76	78	84	88	105	72	64	141	59	85
30	97	84	76	70	---	96	185	72	70	121	60	84
31	94	---	78	72	---	108	---	72	---	87	58	---
TOTAL	2812	2999	2437	2556	2266	2719	4038	2906	2352	2505	2068	2389
MEAN	90.7	100	78.6	82.5	78.1	87.7	135	93.7	78.4	80.8	66.7	79.6
MAX	203	218	88	201	92	131	266	165	123	149	123	145
MIN	66	82	65	69	64	70	82	72	64	62	58	54
CFSM	1.57	1.73	1.36	1.43	1.35	1.52	2.33	1.62	1.36	1.40	1.16	1.38
IN.	1.81	1.93	1.57	1.65	1.46	1.75	2.60	1.87	1.52	1.62	1.33	1.54

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1951 - 1996, BY WATER YEAR (WY)

	MEAN	78.3	83.0	76.6	71.0	70.4	88.7	120	87.5	71.5	65.9	64.4	73.5
MAX	112	112	105	94.9	90.1	136	164	142	94.5	106	116	120	120
(WY)	1987	1989	1972	1973	1984	1976	1960	1983	1993	1994	1995	1961	1961
MIN	56.6	64.9	61.1	55.1	55.7	65.0	81.3	54.4	50.7	47.5	42.6	53.2	53.2
(WY)	1964	1963	1959	1959	1957	1958	1987	1958	1958	1965	1958	1966	1966

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1951 - 1996

ANNUAL TOTAL	31628		32047		79.2	
ANNUAL MEAN	86.7		87.6		90.7	1985
HIGHEST ANNUAL MEAN					62.3	1958
LOWEST ANNUAL MEAN						
HIGHEST DAILY MEAN	829	Aug 18	266	Apr 20	829	Aug 18 1995
LOWEST DAILY MEAN	53	Jun 24	54	Sep 9	24	Jan 8 1957
ANNUAL SEVEN-DAY MINIMUM	55	Jun 20	56	Sep 3	38	Aug 2 1958
INSTANTANEOUS PEAK FLOW			344	Apr 20	(a)1500	May 15 1957
INSTANTANEOUS PEAK STAGE			3.94	Apr 20	(b)6.49	Aug 18 1995
INSTANTANEOUS LOW FLOW			28	(c)	(d)8.4	Feb 17 1993
ANNUAL RUNOFF (CFSM)	1.50		1.52		1.37	
ANNUAL RUNOFF (INCHES)	20.39		20.66		18.65	
10 PERCENT EXCEEDS	113		117		110	
50 PERCENT EXCEEDS	77		80		71	
90 PERCENT EXCEEDS	63		65		55	

(a) From rating curve extended above 500 ft³/s, result of failure of Lansing Club Dam; gage height 6.80 ft, from floodmark, site and datum then in use.

(b) Present site and datum.

(c) Sept. 19, 20, 21.

(d) Result of freezeup.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04130500 BLACK RIVER NEAR TOWER, MI

LOCATION.--Lat 45°23'33", long 84°20'00", in SE1/4 NE1/4 sec.29, T.35 N., R.1 E., Cheboygan County, Hydrologic Unit 04070005, on right bank 400 ft downstream from Kleber Dam, 1,000 ft upstream from Milligan Creek, 3.0 mi northwest of Tower, and 10.8 mi upstream from Black Lake.

DRAINAGE AREA.--311 mi².

PERIOD OF RECORD.--October 1942 to current year.

REVISED RECORDS.--WSP 1307: 1942. WDR MI-83-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 658.00 ft above sea level (Stanley Engineering Co. bench mark). Prior to Aug. 1, 1949, at site 1 mi upstream at different datum.

REMARKS.--Records good. Flow completely regulated by Kleber Dam 400 ft upstream. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	179	341	364	240	216	294	400	617	194	198	430	168
2	204	413	345	245	205	250	397	615	239	199	372	156
3	176	462	311	210	237	264	401	605	252	205	286	155
4	186	565	329	165	269	264	363	526	187	222	248	144
5	206	506	328	216	260	264	318	490	198	236	204	133
6	243	468	234	228	214	263	318	446	260	205	175	132
7	221	391	193	228	213	260	328	394	261	194	173	138
8	212	418	202	217	227	221	333	351	330	193	174	161
9	246	367	287	194	211	215	326	330	340	218	187	149
10	246	348	241	195	274	212	328	372	327	248	193	138
11	247	373	192	208	234	220	420	393	256	248	166	138
12	208	371	157	215	272	279	483	408	256	230	156	228
13	191	369	195	216	247	246	547	407	252	200	142	398
14	239	366	265	214	223	365	591	373	251	185	155	465
15	218	345	239	214	295	409	585	336	196	165	256	466
16	194	256	362	225	241	435	541	322	180	186	289	471
17	210	318	226	231	241	438	517	296	207	199	329	472
18	241	316	297	228	241	398	529	296	233	189	233	392
19	242	266	284	336	241	453	600	293	329	315	186	297
20	241	301	286	442	270	406	716	422	395	350	188	213
21	342	341	229	419	243	384	777	484	336	234	189	225
22	379	342	202	403	243	344	809	429	295	198	204	294
23	375	366	312	416	244	367	826	349	278	227	209	388
24	411	334	246	415	283	320	662	319	277	212	176	424
25	384	316	248	272	293	343	631	288	215	173	176	433
26	284	264	249	307	322	423	628	262	222	188	154	441
27	331	309	204	282	243	336	613	229	190	194	159	461
28	336	226	182	293	309	418	594	230	198	195	177	442
29	357	173	224	294	312	472	535	225	198	276	192	430
30	336	200	245	300	---	350	530	232	199	399	190	430
31	388	---	297	270	---	409	---	197	---	443	165	---
TOTAL	8273	10431	7975	8338	7323	10322	15646	11536	7551	7124	6533	8982
MEAN	267	348	257	269	253	333	522	372	252	230	211	299
MAX	411	565	364	442	322	472	826	617	395	443	430	472
MIN	176	173	157	165	205	212	318	197	180	165	142	132
CFSM	.86	1.12	.83	.86	.81	1.07	1.68	1.20	.81	.74	.68	.96
IN.	.99	1.25	.95	1.00	.88	1.23	1.87	1.38	.90	.85	.78	1.07

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1996, BY WATER YEAR (WY)

	MEAN	244	270	249	220	217	339	541	348	250	204	184	219
MAX	459	489	409	433	398	594	882	638	405	408	351	367	
(WY)	1984	1946	1972	1973	1984	1976	1960	1983	1976	1974	1972	1984	
MIN	138	130	163	150	138	188	297	185	140	112	86.1	116	
(WY)	1957	1950	1990	1948	1948	1956	1987	1987	1958	1966	1949	1949	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1943 - 1996

ANNUAL TOTAL	106892						110034						
ANNUAL MEAN	293						301						
HIGHEST ANNUAL MEAN										274			
LOWEST ANNUAL MEAN										350			1985
HIGHEST DAILY MEAN	1080						826		Apr 23	1860			Apr 17 1960
LOWEST DAILY MEAN	123						132		Sep 6	4.0			Nov 27 1949
ANNUAL SEVEN-DAY MINIMUM	142						141		Sep 5	50			Jul 28 1949
INSTANTANEOUS PEAK FLOW							845		May 4	2340			Apr 17 1960
INSTANTANEOUS PEAK STAGE							4.47		May 4	7.13			Apr 17 1960
INSTANTANEOUS LOW FLOW							15		Dec 14	.60			Mar 11 1950
ANNUAL RUNOFF (CFSM)	.94						.97			.88			
ANNUAL RUNOFF (INCHES)	12.79						13.16			11.95			
10 PERCENT EXCEEDS	467						448			469			
50 PERCENT EXCEEDS	245						264			228			
90 PERCENT EXCEEDS	175						186			145			

STREAMS TRIBUTARY TO LAKE HURON

442409084274001 LAKE ST. HELEN NEAR ST. HELEN, MI

LOCATION.--Lat 44°24'09", long 84°27'40", in SW1/4 NE1/4 sec.8, T.23 N., R.1 W., Roscommon County, Hydrologic Unit 04070007, at bridge 300 ft upstream from dam.

DRAINAGE AREA.--72.2 mi² at outlet.

PERIOD OF RECORD.--June 1942 to December 1959, August 1993 to current year.

GAGE.--Nonrecording gage. Once daily reading by observer. Datum of gage is 1,149.01 ft above sea level.

REMARKS.--Inlets are Marsh Creek, Russell Creek and Cameron Creek. The outlet is South Branch of the Au Sable River. Lake elevation controlled by dam. Established legal level; 1,154.15 ft, minimum winter level, 1,153.65 ft, above sea level.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 7.26 ft, Apr. 1, 1949; minimum observed, 4.64 ft, Jan. 21, 1954.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 7.18 ft, June 21, 23; minimum observed, 5.42 ft, Jan. 17.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.14	6.02	5.98	5.60	5.78	5.62	5.88	6.78	6.38	6.92	6.42	6.30
2	6.08	6.08	6.00	5.60	5.78	5.62	5.88	6.68	6.40	6.88	6.42	6.30
3	6.06	6.14	5.96	5.60	5.78	5.62	5.90	6.68	6.42	6.82	6.44	6.28
4	6.04	6.08	5.96	5.58	5.78	5.62	5.90	6.66	6.36	6.78	6.44	6.28
5	5.98	6.10	6.02	5.56	5.74	5.62	5.92	6.66	6.32	6.78	6.44	6.28
6	6.00	6.10	5.98	5.54	5.74	5.62	5.92	6.64	6.30	6.82	6.40	6.28
7	6.10	6.02	5.94	5.52	5.62	5.62	5.94	6.64	6.30	6.66	6.40	6.26
8	6.20	6.00	5.92	5.50	5.62	5.60	5.92	6.62	6.34	6.66	6.36	6.26
9	6.20	6.06	5.92	5.52	5.62	5.60	5.92	6.60	6.38	6.66	6.40	6.26
10	6.00	6.04	5.90	5.50	5.60	5.60	5.96	6.60	6.40	6.62	6.30	6.24
11	6.04	6.10	5.88	5.50	5.60	5.60	5.98	6.58	6.42	6.60	6.30	6.24
12	6.00	6.18	5.88	5.48	5.60	5.58	6.04	6.60	6.50	6.54	6.28	6.22
13	5.98	6.18	5.86	5.48	5.58	5.58	6.06	6.60	6.48	6.52	6.28	6.22
14	5.96	6.18	5.86	5.44	5.58	5.58	6.10	6.60	6.48	6.50	6.28	6.22
15	5.92	6.16	5.86	5.44	5.58	5.58	6.14	6.58	6.48	6.48	6.26	6.20
16	5.88	6.14	5.84	5.44	5.58	5.58	6.20	6.54	6.48	6.48	6.26	6.18
17	5.98	6.14	5.84	5.42	5.58	5.60	6.30	6.54	6.52	6.46	6.26	6.18
18	5.94	6.12	5.80	5.48	5.58	5.62	6.40	6.56	6.84	6.42	6.26	6.16
19	5.90	6.10	5.78	5.50	---	5.62	6.42	6.62	7.04	6.42	6.28	6.14
20	5.88	6.08	5.78	5.54	---	5.62	6.44	6.60	7.12	6.44	6.28	6.14
21	5.92	6.06	5.76	5.58	---	5.62	6.48	6.58	7.18	6.44	6.30	6.12
22	5.94	6.06	5.74	5.62	---	5.62	6.52	6.60	7.14	6.42	6.32	6.10
23	5.96	6.04	5.72	5.64	---	5.64	6.54	6.58	7.18	6.40	6.34	6.10
24	5.98	6.04	5.72	5.66	---	5.64	6.58	6.56	7.16	6.36	6.34	6.08
25	5.95	6.02	---	5.68	5.58	5.66	6.64	6.54	7.12	6.36	6.34	6.08
26	5.94	5.80	5.70	5.70	5.58	5.68	6.68	6.50	7.10	6.32	6.32	6.08
27	6.00	6.00	5.68	5.74	5.60	5.81	6.66	6.48	7.08	6.32	6.32	6.15
28	5.92	6.04	5.66	5.76	5.49	5.76	6.62	6.46	7.06	6.31	6.30	6.14
29	5.96	6.04	5.64	5.78	5.60	5.78	6.60	6.39	7.02	6.40	6.30	6.10
30	5.96	6.02	5.64	5.76	---	5.84	6.76	6.40	6.94	6.42	6.30	6.10
31	5.94	---	5.62	5.78	---	5.84	---	6.38	---	6.42	6.30	---
MEAN	5.99	6.07	---	5.58	---	5.64	6.24	6.58	6.70	6.54	6.33	6.19
MAX	6.20	6.18	---	5.78	---	5.84	6.76	6.78	7.18	6.92	6.44	6.30
MIN	5.88	5.80	---	5.42	---	5.58	5.88	6.38	6.30	6.31	6.26	6.08

STREAMS TRIBUTARY TO LAKE HURON

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI

LOCATION.--Lat 44°36'53", long 84°27'20", in SE1/4 SE1/4 sec.29, T.26 N., R.1 W., Crawford County, Hydrologic Unit 04070007, on right bank 10 ft upstream from Smith Bridge, 400 ft downstream from bridge on State Highway 72, 4.6 mi upstream from mouth, and 9.1 mi west of Luzerne.

DRAINAGE AREA.--401 mi².

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1951-66. October 1966 to September 1989, October 1990 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 1,070 ft above sea level, from topographic map. Apr. 19, 1951 to Nov. 14, 1966, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. Occasional regulation by dams upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	137	209	230	195	e190	e220	342	412	211	258	224	137
2	136	249	235	189	e190	e210	344	412	207	253	221	135
3	140	262	240	205	e190	e200	335	410	208	263	205	133
4	147	268	243	208	e190	e190	317	396	204	254	186	132
5	150	264	e230	205	e190	e185	e270	369	198	248	173	131
6	157	256	e220	e195	e195	e180	e250	353	196	242	165	129
7	165	244	e210	e190	e200	e180	e270	341	201	232	161	129
8	166	235	e200	e185	e205	e180	e280	327	210	226	158	129
9	166	228	e190	e180	e210	e180	284	317	215	226	154	135
10	166	226	e180	e175	e210	e190	284	326	220	225	152	150
11	165	253	e170	e170	e210	198	309	350	241	222	147	147
12	159	245	e180	e165	e210	195	377	352	243	217	143	143
13	156	246	e190	e160	e205	204	443	350	278	213	142	146
14	155	262	e195	e165	e205	239	482	337	283	206	141	154
15	162	252	e200	170	205	273	479	318	264	201	150	166
16	170	244	207	173	e200	266	476	306	247	195	153	174
17	173	239	207	172	205	273	463	298	237	188	150	174
18	164	240	205	200	196	299	451	292	420	185	143	175
19	156	238	206	281	197	294	467	286	512	207	140	171
20	170	239	e200	e250	194	302	491	302	525	201	153	161
21	202	246	e190	e240	197	298	510	301	557	193	156	156
22	213	248	e195	e280	198	304	507	295	538	188	172	164
23	217	247	205	274	203	285	487	289	471	182	185	175
24	215	233	204	267	208	299	451	279	414	177	171	178
25	204	240	204	e230	220	299	426	264	376	173	163	184
26	192	243	e195	e210	231	e300	419	253	347	170	160	182
27	192	243	e190	e205	239	e270	399	245	323	167	156	193
28	196	e190	e190	e200	252	e280	376	240	303	160	151	207
29	195	e190	201	e195	e230	318	361	236	287	187	148	210
30	198	e220	197	e190	---	326	390	227	271	232	144	209
31	199	---	197	e190	---	338	---	219	---	224	141	---
TOTAL	5383	7199	6306	6314	5975	7775	11740	9702	9207	6515	5008	4809
MEAN	174	240	203	204	206	251	391	313	307	210	162	160
MAX	217	268	243	281	252	338	510	412	557	263	224	210
MIN	136	190	170	160	190	180	250	219	196	160	140	129
CFSM	.43	.60	.51	.51	.51	.63	.98	.78	.77	.52	.40	.40
IN.	.50	.67	.58	.59	.55	.72	1.09	.90	.85	.60	.46	.45

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1996, BY WATER YEAR (WY)

MEAN	215	243	237	199	186	262	400	286	211	169	152	178
MAX	456	444	373	275	251	508	596	398	307	251	255	379
(WY)	1987	1992	1992	1973	1984	1976	1985	1983	1993	1969	1994	1975
MIN	120	163	148	132	141	159	209	152	124	107	119	119
(WY)	1967	1977	1977	1977	1978	1978	1987	1987	1977	1977	1989	1989

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1967 - 1996

ANNUAL TOTAL	71601	85933	228
ANNUAL MEAN	196	235	280
HIGHEST ANNUAL MEAN			158
LOWEST ANNUAL MEAN			1110
HIGHEST DAILY MEAN	405	Apr 28	557
LOWEST DAILY MEAN	116	Jun 24	129
ANNUAL SEVEN-DAY MINIMUM	121	Jun 19	131
INSTANTANEOUS PEAK FLOW			565
INSTANTANEOUS PEAK STAGE			(b)6.04
INSTANTANEOUS LOW FLOW			127
ANNUAL RUNOFF (CFSM)	.49	.59	.57
ANNUAL RUNOFF (INCHES)	6.64	7.97	7.73
10 PERCENT EXCEEDS	277	348	357
50 PERCENT EXCEEDS	180	207	201
90 PERCENT EXCEEDS	136	156	135

(a) Sept. 6-8.

(b) Backwater from ice, maximum recorded, but may have been greater during period of no gage-height record, Feb. 10-14.

(c) Backwater from ice.

(d) Sept. 8, 9.

(e) Estimated.

(f) Result of freezeup.

STREAMS TRIBUTARY TO LAKE HURON

445512084415301 OTSEGO LAKE NEAR GAYLORD, MI

LOCATION.--Lat 44°55'52", long 84°41'33", in SW1/4 SE1/4 sec.5, T.29 N., R.3 W., Otsego County, Hydrologic Unit 04070007, at Otsego Lake State Park, 200 ft northwest of boat ramp, 6.7 mi south of Gaylord.

DRAINAGE AREA.--Not determined.

PERIOD OF RECORD.--August 1942 to current year, except for winter months 1942-43, 1943-44, 1977-78.

GAGE.--Water-stage recorder. Datum of gage is 1,270.03 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Aug. 18, 1958, nonrecording gage at datum 2.00 ft higher.

REMARKS.--Otsego Lake has no natural inlets or outlets. In December 1972 an outlet tube and pump system was installed connecting the lake with the North Branch Au Sable River to lower lake levels. Established legal level; maximum, 1,273.5 ft, minimum, 1,272.0 ft, above sea level.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 5.10 ft, May 6, 7, 1972; minimum, 0.96 ft, Aug. 14, 1959.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 3.79 ft, Dec. 14-16; minimum, 2.93 ft, Sept. 12.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAILY MEAN VALUES												
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.01	3.26	3.66	3.71	3.71	3.75	3.57	3.65	3.45	3.37	3.27	3.04
2	3.04	3.32	3.67	3.70	3.72	3.76	3.56	3.66	3.44	3.39	3.26	3.03
3	3.04	3.31	3.67	3.69	3.72	3.76	3.55	3.66	3.43	3.42	3.26	3.02
4	3.04	3.35	3.67	3.69	3.72	3.75	3.59	3.67	3.43	3.39	3.25	3.02
5	3.05	3.34	3.67	3.68	3.72	3.76	3.58	3.65	3.42	3.36	3.22	3.01
6	3.05	3.33	3.68	3.67	3.72	3.75	3.57	3.66	3.43	3.35	3.22	2.99
7	3.07	3.36	3.69	3.67	3.72	3.75	3.56	3.64	3.46	3.34	3.22	2.97
8	3.08	3.38	3.69	3.66	3.72	3.74	3.55	3.65	3.46	3.34	3.21	2.96
9	3.08	3.37	3.71	3.66	3.71	3.74	3.54	3.64	3.45	3.36	3.19	2.95
10	3.07	3.39	3.72	3.66	3.73	3.74	3.53	3.67	3.45	3.33	3.16	2.95
11	3.05	3.50	3.74	3.65	3.75	3.74	3.52	3.68	3.47	3.31	3.14	2.95
12	3.05	3.50	3.75	3.64	3.74	3.72	3.54	3.66	3.48	3.30	3.13	2.99
13	3.04	3.50	3.75	3.63	3.74	3.71	3.55	3.64	3.47	3.30	3.12	2.99
14	3.05	3.51	3.78	3.63	3.75	3.70	3.54	3.62	3.46	3.29	3.12	3.02
15	3.09	3.51	3.79	3.62	3.75	3.69	3.55	3.62	3.45	3.28	3.16	3.06
16	3.09	3.52	3.78	3.62	3.73	3.69	3.56	3.62	3.43	3.26	3.15	3.07
17	3.04	3.52	3.78	3.62	3.73	3.68	3.55	3.61	3.45	3.26	3.14	3.08
18	3.07	3.52	3.77	3.63	3.73	3.66	3.54	3.61	3.49	3.28	3.13	3.06
19	3.06	3.52	3.76	3.66	3.72	3.65	3.55	3.62	3.49	3.35	3.10	3.05
20	3.10	3.52	3.76	3.66	3.72	3.64	3.57	3.68	3.48	3.32	3.15	3.04
21	3.13	3.54	3.76	3.66	3.73	3.62	3.58	3.68	3.46	3.30	3.14	3.04
22	3.13	3.55	3.76	3.65	3.72	3.61	3.58	3.66	3.47	3.28	3.14	3.09
23	3.13	3.55	3.75	3.65	3.72	3.59	3.56	3.66	3.44	3.27	3.13	3.09
24	3.12	3.55	3.74	3.68	3.72	3.60	3.56	3.65	3.43	3.25	3.11	3.10
25	3.15	3.55	3.75	3.68	3.72	3.61	3.58	3.63	3.41	3.25	3.08	3.10
26	3.14	3.57	3.74	3.68	3.71	3.61	3.61	3.60	3.40	3.24	3.09	3.08
27	3.17	3.61	3.74	3.71	3.75	3.61	3.60	3.58	3.39	3.22	3.09	3.13
28	3.22	3.64	3.73	3.71	3.76	3.60	3.60	3.56	3.38	3.22	3.08	3.14
29	3.21	3.63	3.72	3.71	3.75	3.59	3.59	3.53	3.36	3.26	3.07	3.17
30	3.23	3.64	3.71	3.73	---	3.58	3.63	3.51	3.40	3.27	3.05	3.16
31	3.22	---	3.71	3.72	---	3.57	---	3.48	---	3.27	3.04	---
MEAN	3.10	3.48	3.73	3.67	3.73	3.68	3.57	3.63	3.44	3.30	3.15	3.04
MAX	3.23	3.64	3.79	3.73	3.76	3.76	3.63	3.68	3.49	3.42	3.27	3.17
MIN	3.01	3.26	3.66	3.62	3.71	3.57	3.52	3.48	3.36	3.22	3.04	2.95

STREAMS TRIBUTARY TO LAKE HURON

04136000 AU SABLE RIVER NEAR RED OAK, MI

LOCATION.--Lat 44°40'37", long 84°17'33", in SE1/4 NE1/4 sec.3, T.26 N., R.1 E., Oscoda County, Hydrologic Unit 04070007, at Parmalee Bridge Campground, 4.5 mi northwest of Luzerne, on County Road 489, and 85.0 mi upstream from mouth.

DRAINAGE AREA.--1,108 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1908 to May 1916, December 1930 to June 1931, October 1995 to September 1996. Prior to October 1914, published as "near Lovells".

GAGE.--Water-stage recorder. Elevation of gage is 1,000 ft above sea level, from topographic map. Prior to June 1916, nonrecording gage at site 5 mi upstream. Datum of gage 1,004.69 ft above sea level (levels by Fargo Engineering Co.). December 1930 to June 1931, nonrecording gage at present site, different datum.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are poor. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e580	782	812	e700	e660	795	1040	1510	795	783	880	609
2	e620	949	800	e640	e720	832	1030	1430	807	793	833	605
3	e630	995	803	e500	e680	781	1000	1350	827	909	793	601
4	e640	955	805	e560	e640	788	980	1300	823	859	746	595
5	e660	901	809	e640	e700	791	916	1220	800	813	710	619
6	e680	871	745	e660	e760	743	918	1150	803	788	688	e609
7	e680	857	e720	e640	e780	743	910	1110	838	765	673	607
8	e680	841	e700	e680	e800	e700	893	1060	858	766	660	607
9	e680	820	e780	e720	e820	e680	878	1040	846	796	645	632
10	e680	815	e680	e700	e820	764	899	1050	849	776	637	683
11	e660	919	e560	e680	e800	728	1010	1150	881	e750	632	669
12	e640	924	e640	e680	e780	711	1310	1110	896	739	628	671
13	e640	877	e720	e720	e740	746	1440	1060	970	741	620	753
14	637	869	e780	e740	e780	828	1410	1020	922	727	618	783
15	659	846	e800	e700	e740	894	1410	987	860	722	657	809
16	692	821	e820	e700	e700	877	1410	961	831	710	654	793
17	693	808	e820	e720	e760	854	1360	946	869	693	641	776
18	677	802	e800	e900	e740	865	1390	947	1390	689	627	744
19	657	799	e780	e1200	e760	889	1590	950	1540	838	617	716
20	695	807	e760	e1000	e780	921	1800	1110	1460	825	658	689
21	861	840	e740	e850	e800	906	1890	1130	1350	767	682	675
22	855	838	e720	e950	e780	883	1810	1060	1280	727	709	744
23	806	830	e760	e880	752	863	1670	995	1170	702	728	813
24	776	810	e780	e800	755	865	1490	969	1070	684	688	803
25	756	789	e760	e720	770	941	1400	931	1000	678	659	796
26	730	798	e700	e800	784	1060	1430	896	946	674	647	764
27	738	810	e620	e950	816	959	1350	877	903	669	653	875
28	789	761	e700	e820	856	950	1260	856	865	662	641	935
29	775	e700	e760	e820	807	e950	1190	837	835	809	631	883
30	759	860	e760	e740	---	980	1380	820	809	1050	624	832
31	746	---	e740	e640	---	1040	---	806	---	975	615	---
TOTAL	21731	25294	23174	23450	22080	26327	38464	32638	29093	23879	20894	21690
MEAN	701	843	748	756	761	849	1282	1053	970	770	674	723
MAX	861	995	820	1200	856	1060	1890	1510	1540	1050	880	935
MIN	580	700	560	500	640	680	878	806	795	662	615	595
CFSM	.63	.76	.67	.68	.69	.77	1.16	.95	.88	.70	.61	.65
IN.	.73	.85	.78	.79	.74	.88	1.29	1.10	.98	.80	.70	.73

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1996, BY WATER YEAR (WY)

MEAN	828	927	918	795	757	935	1417	1218	981	786	764	790
MAX	1156	1289	1336	1004	900	1349	1747	1592	1380	1093	1129	1223
(WY)	1912	1912	1912	1912	1912	1913	1913	1912	1912	1912	1912	1912
MIN	629	677	689	675	682	722	1048	839	749	618	650	664
(WY)	1909	1909	1909	1911	1914	1909	1910	1910	1910	1910	1910	1914

SUMMARY STATISTICS

FOR 1996 WATER YEAR

WATER YEARS 1909 - 1996

ANNUAL TOTAL	308714		
ANNUAL MEAN	843		
HIGHEST ANNUAL MEAN		926	
LOWEST ANNUAL MEAN		1207	1912
HIGHEST DAILY MEAN	1890	803	1910
LOWEST DAILY MEAN	(e)500	2850	May 29 1912
ANNUAL SEVEN-DAY MINIMUM	606	(e)500	Jan 3 1996
INSTANTANEOUS PEAK FLOW	1900	572	Aug 5 1914
INSTANTANEOUS PEAK STAGE	6.85	(a)1900	Apr 21 1996
ANNUAL RUNOFF (CFSM)	.76	(a)6.85	Jan 26 1996
ANNUAL RUNOFF (INCHES)	10.36	.84	
10 PERCENT EXCEEDS	1110	1360	
50 PERCENT EXCEEDS	797	821	
90 PERCENT EXCEEDS	641	633	

(a) Does not include water years 1909 to 1916, 1931.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04136000 AU SABLE RIVER NEAR RED OAK, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--July to September 1996.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: July to September 1996.

DISSOLVED OXYGEN: July to September 1996.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 22.5°C, Aug. 7, 8; minimum, 9.0°C, Sept. 30.

DISSOLVED OXYGEN: Maximum, 11.0 mg/L, Sept. 20; minimum, 7.0 mg/L, Aug. 7, 8.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	16.5	15.0	15.5	18.0	16.0	17.0
2	---	---	---	---	---	---	17.5	15.5	16.5	18.0	16.0	17.0
3	---	---	---	---	---	---	19.0	16.5	17.5	18.0	16.0	17.0
4	---	---	---	---	---	---	20.0	17.5	19.0	17.5	16.0	17.0
5	---	---	---	---	---	---	20.0	18.5	19.5	19.0	16.5	17.5
6	---	---	---	---	---	---	22.0	19.0	20.5	18.5	17.0	18.0
7	---	---	---	---	---	---	22.5	21.0	21.5	18.0	17.0	17.5
8	---	---	---	---	---	---	22.5	21.0	21.5	18.0	16.0	17.0
9	---	---	---	---	---	---	21.5	18.0	19.0	18.0	17.0	17.0
10	---	---	---	---	---	---	18.0	15.5	17.0	17.0	16.0	16.5
11	---	---	---	---	---	---	17.5	16.0	16.5	17.5	16.0	17.0
12	---	---	---	17.5	16.0	16.5	18.5	15.5	17.0	17.0	13.5	15.0
13	---	---	---	18.5	16.0	17.0	20.0	17.5	18.5	13.5	12.0	12.5
14	---	---	---	18.5	17.0	17.5	19.5	18.0	18.5	13.0	11.5	12.0
15	---	---	---	18.0	16.5	17.5	18.5	16.5	17.5	13.0	12.5	12.5
16	---	---	---	19.5	16.5	18.0	18.5	15.5	17.0	13.0	12.0	12.5
17	---	---	---	20.0	17.5	19.0	18.5	16.5	17.5	13.5	12.5	13.0
18	---	---	---	19.5	18.0	18.5	19.0	16.5	17.5	14.0	12.0	13.0
19	---	---	---	18.5	17.5	18.0	18.5	17.5	17.5	13.5	11.5	12.5
20	---	---	---	18.5	16.0	17.0	19.0	17.0	17.5	13.0	11.5	12.0
21	---	---	---	18.0	16.0	17.0	19.0	16.5	18.0	12.5	12.5	12.5
22	---	---	---	18.5	16.0	17.5	18.5	18.0	18.5	12.5	12.0	12.0
23	---	---	---	19.5	17.5	18.5	19.0	17.5	18.5	12.5	11.5	12.0
24	---	---	---	19.0	17.5	18.5	19.0	16.5	17.5	13.0	12.0	12.5
25	---	---	---	18.5	17.0	17.5	19.5	17.0	18.0	12.5	11.5	12.0
26	---	---	---	18.0	16.5	17.0	19.5	16.5	18.0	12.0	11.0	11.0
27	---	---	---	18.0	16.0	17.0	17.5	15.0	16.5	13.0	11.0	12.0
28	---	---	---	17.5	16.0	16.5	17.5	15.0	16.5	13.0	12.0	12.5
29	---	---	---	16.0	15.0	15.5	17.0	15.0	16.0	12.0	11.0	11.5
30	---	---	---	17.0	15.5	16.0	17.5	15.5	16.5	11.0	9.0	9.5
31	---	---	---	17.0	15.5	16.0	17.0	15.5	16.5	---	---	---
MONTH	---	---	---	---	---	---	22.5	15.0	18.0	19.0	9.0	14.0

STREAMS TRIBUTARY TO LAKE HURON

04136000 AU SABLE RIVER NEAR RED OAK, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	9.9	8.8	9.3	9.8	8.3	9.0
2	---	---	---	---	---	---	9.9	8.5	9.1	9.9	8.2	8.9
3	---	---	---	---	---	---	9.8	8.2	9.0	10.1	8.2	9.0
4	---	---	---	---	---	---	9.6	7.9	8.7	9.9	8.4	9.1
5	---	---	---	---	---	---	9.3	7.6	8.5	9.8	8.2	8.9
6	---	---	---	---	---	---	9.2	7.5	8.3	9.9	8.1	8.9
7	---	---	---	---	---	---	8.8	7.0	7.9	9.5	8.0	8.7
8	---	---	---	---	---	---	8.8	7.0	7.8	9.9	8.3	9.0
9	---	---	---	---	---	---	9.0	7.2	8.1	9.3	8.0	8.6
10	---	---	---	---	---	---	9.5	7.8	8.6	9.8	8.2	8.9
11	---	---	---	---	---	---	9.5	7.7	8.6	9.7	8.2	8.9
12	---	---	---	8.9	7.4	8.1	9.4	8.0	8.7	9.6	8.3	8.9
13	---	---	---	9.2	7.7	8.4	9.2	7.5	8.3	10.1	9.1	9.6
14	---	---	---	9.2	7.4	8.3	8.9	7.4	8.2	10.2	9.4	9.8
15	---	---	---	9.3	7.6	8.4	8.9	7.4	8.1	9.8	9.0	9.4
16	---	---	---	9.4	7.7	8.5	9.5	8.1	8.7	10.2	9.3	9.7
17	---	---	---	9.4	7.5	8.4	9.4	7.7	8.5	10.3	9.1	9.7
18	---	---	---	8.7	7.4	8.0	9.4	7.8	8.5	10.6	9.2	9.8
19	---	---	---	8.8	7.6	8.1	9.0	7.6	8.3	10.9	9.1	10.0
20	---	---	---	9.7	8.0	8.7	8.7	7.6	8.2	11.0	9.4	10.1
21	---	---	---	9.8	7.9	8.8	9.2	7.7	8.3	10.3	9.2	9.7
22	---	---	---	9.8	8.0	8.9	8.5	7.4	8.0	9.9	9.2	9.6
23	---	---	---	9.5	7.7	8.6	9.0	7.4	8.1	10.5	9.4	9.9
24	---	---	---	9.4	7.8	8.6	9.4	7.7	8.5	10.3	9.3	9.7
25	---	---	---	9.5	7.9	8.6	9.2	7.8	8.5	10.7	9.3	10.0
26	---	---	---	9.6	8.0	8.8	8.5	7.4	8.0	10.7	9.6	10.1
27	---	---	---	9.7	8.2	8.9	9.7	8.2	8.8	10.2	9.4	9.7
28	---	---	---	9.3	8.3	8.9	9.9	8.2	9.0	10.1	9.0	9.5
29	---	---	---	9.1	8.6	8.8	9.9	8.3	9.0	10.3	9.3	9.8
30	---	---	---	9.0	8.4	8.7	10.1	8.5	9.2	10.8	9.7	10.2
31	---	---	---	9.6	8.6	9.0	10.0	8.4	9.1	---	---	---
MONTH	---	---	---	---	---	---	10.1	7.0	8.5	11.0	8.0	9.4

STREAMS TRIBUTARY TO LAKE HURON

04136500 AU SABLE RIVER AT MIO, MI

LOCATION.--Lat 44°39'36", long 84°07'52", in SE1/4 NE1/4 sec.12, T.26 N., R.2 E., Oscoda County, Hydrologic Unit 04070007, on right bank 150 ft upstream from bridge on State Highway 33 in Mio, 500 ft downstream from Mio hydroelectric plant, 9.5 mi downstream from Big Creek, and 73.0 mi upstream from mouth.

DRAINAGE AREA.--1,361 mi², revised.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1952 to current year.

GAGE.--Water-stage recorder. Datum of gage is 929.60 ft above sea level.

REMARKS.--Water-discharge records good. Flow regulated by Mio Dam 500 ft upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	748	980	1030	932	803	979	1250	1750	961	936	1060	765
2	737	1100	937	842	889	1050	1230	1670	978	954	1020	761
3	732	1190	942	611	838	985	1240	1540	981	1060	986	747
4	767	1150	960	661	780	887	1260	1470	985	1050	925	737
5	811	1040	956	814	873	1040	1120	1450	980	982	881	755
6	821	975	926	831	918	937	1110	1320	978	944	872	761
7	802	1010	849	765	966	852	1100	1280	1000	939	844	748
8	789	1000	826	801	972	833	1090	1280	1020	936	826	748
9	812	979	931	917	975	835	1090	1200	1010	944	810	794
10	812	964	820	882	1030	913	1100	1310	1010	946	792	845
11	781	1110	653	795	1020	1030	1260	1370	1020	914	778	840
12	765	1100	811	835	921	897	1640	1360	1030	908	776	851
13	764	1010	882	905	909	961	1740	1240	1120	906	781	910
14	771	1020	931	922	969	1100	1650	1210	1100	900	783	969
15	777	1010	999	882	908	1150	1650	1210	1020	885	829	977
16	806	975	1000	847	870	1140	1660	1150	982	872	828	951
17	827	945	947	873	939	1100	1550	1100	1050	846	804	931
18	822	945	944	959	908	1070	1550	1130	1500	844	771	885
19	822	952	952	1490	936	1070	1870	1180	1720	1160	755	859
20	854	946	908	1310	952	1190	1980	1340	1610	986	834	856
21	969	1020	871	1030	952	1220	2110	1310	1470	906	860	841
22	1040	1050	863	1180	1010	1080	2030	1250	1440	879	872	960
23	983	1010	924	1260	963	1060	1800	1170	1360	860	905	993
24	914	967	925	1080	947	1090	1700	1140	1260	845	855	985
25	881	934	910	889	965	1120	1570	1120	1140	824	804	985
26	882	935	882	874	1010	1310	1620	1050	1120	816	801	925
27	909	959	758	1130	1100	1180	1580	1010	1080	818	809	1050
28	930	903	833	998	1070	1170	1430	1020	1020	818	804	1150
29	916	812	942	1010	1030	1150	1380	1010	1000	1010	779	1080
30	915	1060	920	897	---	1190	1620	975	984	1310	759	995
31	909	---	908	774	---	1350	---	961	---	1180	765	---
TOTAL	26068	30051	27940	28996	27423	32939	44980	38576	33929	29178	25968	26654
MEAN	841	1002	901	935	946	1063	1499	1244	1131	941	838	888
MAX	1040	1190	1030	1490	1100	1350	2110	1750	1720	1310	1060	1150
MIN	732	812	653	611	780	833	1090	961	961	816	755	737
CFSM	.62	.74	.66	.69	.89	.78	1.10	.91	.83	.69	.62	.65
IN.	.71	.82	.76	.79	.75	.90	1.23	1.05	.93	.80	.71	.73

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1996, BY WATER YEAR (WY)

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
MEAN	951	1007	975	900	885	1098	1471	1167	997	882	834	887
MAX	1779	1430	1303	1321	1152	1813	2241	1636	1422	1520	1195	1575
(WY)	1987	1992	1967	1973	1973	1976	1971	1983	1954	1994	1994	1986
MIN	685	738	711	697	660	733	977	723	683	655	578	661
(WY)	1965	1964	1964	1965	1958	1956	1958	1958	1958	1958	1958	1958

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1952 - 1996

	1995	1996	1952-1996
ANNUAL TOTAL	345224	372702	1004
ANNUAL MEAN	946	1018	1213
HIGHEST ANNUAL MEAN			1986
LOWEST ANNUAL MEAN			1958
HIGHEST DAILY MEAN	1870	2110	4110
LOWEST DAILY MEAN	653	611	21
ANNUAL SEVEN-DAY MINIMUM	713	751	420
INSTANTANEOUS PEAK FLOW		2170	4380
INSTANTANEOUS PEAK STAGE		4.53	6.20
INSTANTANEOUS LOW FLOW		529	7.0
ANNUAL RUNOFF (CFSM)	.69	.75	.74
ANNUAL RUNOFF (INCHES)	9.44	10.19	10.03
10 PERCENT EXCEEDS	1180	1310	1360
50 PERCENT EXCEEDS	919	961	932
90 PERCENT EXCEEDS	752	795	721

STREAMS TRIBUTARY TO LAKE HURON

04136500 AU SABLE RIVER AT MIO, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--July to September 1996.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: July to September 1996.

DISSOLVED OXYGEN: July to September 1996.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

REMARKS.--Interruptions in water-quality record were due to malfunction of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 23.5°C, Aug. 8; minimum, 12.0°C, Sept. 29, 30.

DISSOLVED OXYGEN: Maximum, 9.2 mg/L, Sept. 28; minimum, 6.1 mg/L, Aug. 11.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	---	---	---	---	---	---	18.0	17.0	17.5	18.5	17.5	18.0
2	---	---	---	---	---	---	18.0	17.0	17.5	18.5	17.5	18.0
3	---	---	---	---	---	---	18.0	17.0	17.5	18.5	17.5	18.0
4	---	---	---	---	---	---	19.5	17.5	18.0	19.5	18.0	18.5
5	---	---	---	---	---	---	20.0	18.0	19.0	18.5	18.0	18.5
6	---	---	---	---	---	---	21.5	19.5	20.5	---	---	---
7	---	---	---	---	---	---	23.0	20.5	21.5	---	---	---
8	---	---	---	---	---	---	23.5	21.5	22.5	---	---	---
9	---	---	---	---	---	---	22.5	22.0	22.5	---	---	---
10	---	---	---	---	---	---	22.5	21.5	22.0	19.5	19.0	19.5
11	---	---	---	19.5	18.5	19.0	21.5	20.5	21.0	19.5	19.0	19.0
12	---	---	---	18.5	18.0	18.0	21.0	19.5	20.5	19.0	18.0	18.5
13	---	---	---	19.5	17.5	18.5	20.5	19.0	20.0	18.0	16.5	17.5
14	---	---	---	19.0	18.5	19.0	20.0	19.0	19.0	16.5	15.0	16.0
15	---	---	---	19.5	18.5	19.0	20.5	19.5	20.0	15.5	14.5	15.0
16	---	---	---	20.0	19.0	19.5	20.0	19.0	19.5	14.5	13.5	13.5
17	---	---	---	20.0	19.0	19.5	20.0	19.0	19.5	13.5	13.5	13.5
18	---	---	---	20.0	19.0	19.5	19.5	19.0	19.0	14.0	13.5	13.5
19	---	---	---	20.5	19.5	20.0	19.5	18.5	19.0	14.0	13.5	14.0
20	---	---	---	20.0	19.5	19.5	20.5	19.0	20.0	14.5	13.5	14.0
21	---	---	---	20.0	19.5	19.5	20.0	19.0	19.5	14.0	13.5	14.0
22	---	---	---	20.5	19.0	20.0	20.5	19.0	19.5	14.0	13.5	14.0
23	---	---	---	21.0	19.0	20.0	20.0	19.5	20.0	13.5	13.0	13.5
24	---	---	---	21.0	19.5	20.0	21.0	19.5	20.0	14.0	13.0	13.5
25	---	---	---	20.5	19.5	20.0	20.5	19.5	20.0	13.5	13.0	13.0
26	---	---	---	20.0	19.5	20.0	20.0	19.0	19.5	13.0	12.5	12.5
27	---	---	---	20.0	19.0	19.5	19.5	18.5	19.0	13.0	12.5	13.0
28	---	---	---	19.0	18.5	18.5	20.0	18.5	19.0	13.0	12.5	12.5
29	---	---	---	18.5	18.0	18.5	19.0	18.0	18.5	12.5	12.0	12.5
30	---	---	---	18.5	17.5	18.0	19.0	18.0	18.5	12.0	12.0	12.0
31	---	---	---	17.5	17.0	17.0	18.5	18.0	18.5	---	---	---
MONTH	---	---	---	---	---	---	23.5	17.0	19.5	---	---	---

STREAMS TRIBUTARY TO LAKE HURON

04136500 AU SABLE RIVER AT MIO, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	8.1	7.6	7.9	8.4	8.0	8.2
2	---	---	---	---	---	---	7.7	7.3	7.5	8.2	8.1	8.2
3	---	---	---	---	---	---	7.9	7.3	7.7	8.4	7.9	8.2
4	---	---	---	---	---	---	8.1	7.7	7.8	8.4	7.9	8.2
5	---	---	---	---	---	---	8.1	7.6	7.8	8.1	7.9	8.0
6	---	---	---	---	---	---	8.0	7.6	7.8	---	---	---
7	---	---	---	---	---	---	8.0	7.5	7.7	---	---	---
8	---	---	---	---	---	---	7.7	7.3	7.5	---	---	---
9	---	---	---	---	---	---	7.4	6.9	7.2	---	---	---
10	---	---	---	---	---	---	7.0	6.4	6.8	7.9	7.5	7.7
11	---	---	---	8.5	8.1	8.3	6.9	6.1	6.5	7.9	7.6	7.8
12	---	---	---	8.8	8.5	8.6	7.4	6.5	7.0	8.0	7.6	7.8
13	---	---	---	8.9	8.6	8.8	7.6	6.9	7.1	7.7	7.4	7.5
14	---	---	---	8.9	8.5	8.7	7.5	7.1	7.3	7.6	7.4	7.5
15	---	---	---	9.1	8.4	8.7	7.9	7.2	7.6	8.1	7.6	7.9
16	---	---	---	8.9	8.6	8.7	7.7	7.1	7.4	8.5	8.1	8.3
17	---	---	---	8.6	8.3	8.4	7.6	7.0	7.4	8.5	8.3	8.4
18	---	---	---	8.5	8.2	8.3	7.5	6.9	7.3	8.6	8.4	8.5
19	---	---	---	8.4	7.5	7.9	7.9	7.3	7.6	8.7	8.5	8.6
20	---	---	---	7.5	7.2	7.4	8.2	7.5	7.8	8.7	8.6	8.7
21	---	---	---	7.9	7.3	7.6	7.8	7.3	7.6	8.8	8.5	8.7
22	---	---	---	8.7	7.8	8.2	8.3	7.3	7.7	8.9	8.7	8.8
23	---	---	---	8.9	7.9	8.4	8.0	7.6	7.8	8.8	8.6	8.7
24	---	---	---	8.6	7.9	8.2	8.2	7.7	7.9	9.0	8.5	8.7
25	---	---	---	8.3	7.9	8.0	8.2	7.8	8.0	8.8	8.7	8.8
26	---	---	---	8.2	7.7	7.9	8.1	7.3	7.6	8.9	8.7	8.8
27	---	---	---	7.8	6.8	7.5	7.6	7.3	7.4	9.1	8.8	8.9
28	---	---	---	7.1	6.7	6.9	8.2	7.4	7.8	9.2	9.1	9.1
29	---	---	---	7.5	6.8	7.1	8.2	7.4	7.7	9.1	9.0	9.1
30	---	---	---	8.4	7.4	8.1	8.1	7.5	7.9	9.0	8.7	8.9
31	---	---	---	8.0	7.8	7.9	8.3	7.9	8.1	---	---	---
MONTH	---	---	---	---	---	---	8.3	6.1	7.6	---	---	---

STREAMS TRIBUTARY TO LAKE HURON

04137020 AU SABLE RIVER NEAR SOUTH BRANCH, MI

LOCATION.--Lat 44°27'48", long 83°43'17", in SW1/4 NW1/4 sec.21, T.24 N., R.6 E., Iosco County, Hydrologic Unit 04070007, on right bank 75 ft downstream from Loud Dam, 8.4 mi east of South Branch.

DRAINAGE AREA.--1,689 mi².

PERIOD OF RECORD.--July to September 1996.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: July to September 1996.

DISSOLVED OXYGEN: July to September 1996.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 24.0°C, Aug. 8; minimum, 13.0°C, Sept. 30.

DISSOLVED OXYGEN: Maximum, 9.7 mg/L, Aug. 4; minimum, 6.7 mg/L, Sept. 8.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

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

STREAMS TRIBUTARY TO LAKE HURON

04137020 AU SABLE RIVER NEAR SOUTH BRANCH, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	8.0	7.5	7.7	8.5	7.9	8.1
2	---	---	---	---	---	---	7.8	7.4	7.6	8.5	7.9	8.0
3	---	---	---	---	---	---	8.0	7.5	7.7	8.4	7.8	8.0
4	---	---	---	---	---	---	9.7	7.8	8.2	8.3	7.8	8.0
5	---	---	---	---	---	---	8.5	7.2	7.9	8.3	7.8	8.0
6	---	---	---	---	---	---	8.5	7.6	8.0	8.1	7.5	7.7
7	---	---	---	---	---	---	8.6	7.8	8.1	7.7	7.4	7.6
8	---	---	---	---	---	---	8.6	7.6	8.0	7.7	6.7	7.4
9	---	---	---	---	---	---	7.9	7.5	7.7	8.3	7.1	7.7
10	---	---	---	8.3	7.4	7.7	7.7	7.1	7.5	8.0	7.2	7.7
11	---	---	---	8.6	7.9	8.1	8.0	7.0	7.6	8.3	7.0	7.5
12	---	---	---	8.5	8.1	8.2	8.1	7.6	7.9	8.3	7.7	8.0
13	---	---	---	8.5	7.9	8.1	8.7	7.7	8.0	7.7	7.3	7.5
14	---	---	---	8.6	8.0	8.2	8.5	7.8	8.1	8.1	7.6	7.9
15	---	---	---	8.7	8.2	8.3	8.8	8.0	8.4	8.4	8.0	8.1
16	---	---	---	8.6	8.0	8.3	8.8	7.7	8.4	8.2	7.8	8.0
17	---	---	---	8.5	8.0	8.2	9.0	7.5	8.3	8.3	7.9	8.0
18	---	---	---	8.5	8.1	8.3	9.2	8.3	8.6	8.4	7.9	8.2
19	---	---	---	9.5	7.8	8.2	8.9	8.0	8.4	8.7	8.0	8.3
20	---	---	---	8.2	7.5	7.8	8.6	7.7	8.3	9.0	8.4	8.6
21	---	---	---	8.3	7.9	8.1	8.6	7.7	8.2	9.1	8.6	8.8
22	---	---	---	8.2	7.7	8.0	8.7	8.3	8.5	9.0	8.5	8.7
23	---	---	---	8.3	7.8	8.0	8.4	7.8	8.2	8.6	8.2	8.5
24	---	---	---	8.1	7.8	7.9	8.7	7.8	8.2	8.9	8.4	8.6
25	---	---	---	7.9	7.7	7.8	8.6	7.9	8.2	8.9	8.5	8.7
26	---	---	---	7.9	7.6	7.8	8.0	7.3	7.8	9.0	8.5	8.7
27	---	---	---	7.8	7.4	7.5	7.9	7.0	7.5	9.1	8.7	8.9
28	---	---	---	7.8	7.6	7.7	7.4	7.1	7.3	8.8	8.5	8.6
29	---	---	---	7.9	7.7	7.8	8.2	7.3	7.8	8.9	8.5	8.7
30	---	---	---	8.0	7.8	7.9	8.4	7.9	8.1	9.1	8.6	8.8
31	---	---	---	8.1	7.8	8.0	8.6	7.8	8.0	---	---	---
MONTH	---	---	---	---	---	---	9.7	7.0	8.0	9.1	6.7	8.2

STREAMS TRIBUTARY TO LAKE HURON

04137025 AU SABLE RIVER NEAR GLENNIE, MI

LOCATION.--Lat 44°27'15", long 83°40'28", in SW1/4 SE1/4 sec.23, T.24 N., R.6 E., Iosco County, Hydrologic Unit 04070007, center of bridge on State Highway 65, 400 ft downstream from Five-Channel Dam, 7.6 mi southeast of Glennie.

DRAINAGE AREA.--1,696 mi².

PERIOD OF RECORD.--July to September 1996.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: July to September 1996.

DISSOLVED OXYGEN: July to September 1996.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 24.0°C, Aug. 8; minimum, 13.5°C, Sept. 30.

DISSOLVED OXYGEN: Maximum, 9.5 mg/L, Sept. 28; minimum, 7.2 mg/L on several days during August.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	20.5	20.0	20.0	21.5	21.5	21.5
2	---	---	---	---	---	---	20.5	20.5	20.5	22.0	21.5	21.5
3	---	---	---	---	---	---	21.0	20.5	20.5	22.0	21.5	21.5
4	---	---	---	---	---	---	21.0	20.5	21.0	22.0	21.5	22.0
5	---	---	---	---	---	---	21.5	21.0	21.5	22.0	21.5	22.0
6	---	---	---	---	---	---	22.5	21.5	22.0	22.0	21.5	22.0
7	---	---	---	---	---	---	23.0	22.5	22.5	22.0	22.0	22.0
8	---	---	---	---	---	---	24.0	23.0	23.5	22.0	22.0	22.0
9	---	---	---	---	---	---	23.5	23.0	23.0	22.0	21.5	22.0
10	---	---	---	---	---	---	23.0	22.5	23.0	21.5	21.5	21.5
11	---	---	---	21.5	21.0	21.5	22.5	22.5	22.5	21.5	21.5	21.5
12	---	---	---	21.0	21.0	21.0	23.0	22.0	22.5	21.5	21.0	21.5
13	---	---	---	21.5	21.0	21.0	22.5	22.0	22.5	21.0	20.0	20.5
14	---	---	---	21.5	21.0	21.0	22.5	22.5	22.5	20.0	19.0	19.5
15	---	---	---	22.0	21.0	21.5	23.0	22.5	22.5	19.0	18.0	18.5
16	---	---	---	22.0	21.5	21.5	22.5	22.0	22.5	18.0	17.5	18.0
17	---	---	---	22.0	21.5	22.0	22.5	22.0	22.5	17.5	17.0	17.5
18	---	---	---	22.0	22.0	22.0	22.5	22.0	22.0	17.5	17.0	17.5
19	---	---	---	22.5	22.0	22.0	22.5	22.0	22.0	17.5	17.0	17.0
20	---	---	---	22.0	22.0	22.0	22.5	22.0	22.5	17.5	17.0	17.0
21	---	---	---	22.0	21.5	21.5	22.5	22.0	22.5	17.0	17.0	17.0
22	---	---	---	22.5	21.5	22.0	22.5	22.0	22.5	17.0	16.5	17.0
23	---	---	---	22.5	22.0	22.0	23.0	22.5	22.5	16.5	16.0	16.0
24	---	---	---	22.5	22.0	22.5	23.0	22.5	22.5	16.0	15.5	16.0
25	---	---	---	22.5	22.0	22.0	23.0	22.0	22.5	15.5	15.0	15.5
26	---	---	---	22.0	22.0	22.0	22.5	22.0	22.5	15.5	15.0	15.0
27	---	---	---	22.0	21.5	22.0	22.0	21.5	22.0	15.0	15.0	15.0
28	---	---	---	21.5	21.0	21.5	21.5	21.0	21.5	15.0	14.5	15.0
29	---	---	---	21.0	21.0	21.0	21.5	21.0	21.5	14.5	14.0	14.5
30	---	---	---	21.0	20.5	20.5	21.5	21.0	21.5	14.0	13.5	14.0
31	---	---	---	20.5	20.0	20.5	22.0	21.5	21.5	---	---	---
MONTH	---	---	---	---	---	---	24.0	20.0	22.0	22.0	13.5	18.5

STREAMS TRIBUTARY TO LAKE HURON

04137025 AU SABLE RIVER NEAR GLENNIE, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	8.2	7.8	8.0	8.3	7.9	8.1
2	---	---	---	---	---	---	8.3	7.9	8.2	8.2	7.8	8.0
3	---	---	---	---	---	---	8.4	7.9	8.3	8.1	7.7	7.9
4	---	---	---	---	---	---	8.5	8.3	8.4	8.2	7.8	8.0
5	---	---	---	---	---	---	8.5	8.3	8.4	7.9	7.7	7.8
6	---	---	---	---	---	---	8.6	8.2	8.4	8.0	7.6	7.8
7	---	---	---	---	---	---	8.6	8.4	8.4	8.0	7.7	7.8
8	---	---	---	---	---	---	8.5	8.2	8.3	8.0	7.8	7.9
9	---	---	---	---	---	---	8.4	8.2	8.3	7.8	7.4	7.7
10	---	---	---	---	---	---	8.2	7.8	8.1	7.7	7.4	7.5
11	---	---	---	7.7	7.4	7.6	8.3	7.8	8.0	7.6	7.3	7.5
12	---	---	---	7.9	7.6	7.8	8.1	7.9	8.0	7.8	7.5	7.6
13	---	---	---	8.0	7.8	7.9	8.1	7.8	8.0	7.9	7.5	7.7
14	---	---	---	7.8	7.5	7.7	8.3	7.4	8.1	8.2	7.9	8.1
15	---	---	---	7.9	7.5	7.7	8.2	7.9	8.1	8.3	8.1	8.2
16	---	---	---	7.9	7.7	7.8	7.9	7.6	7.8	8.5	8.2	8.3
17	---	---	---	7.9	7.6	7.7	7.7	7.3	7.6	8.6	8.4	8.5
18	---	---	---	7.9	7.6	7.8	7.5	7.2	7.4	8.9	8.4	8.6
19	---	---	---	8.2	7.7	7.9	7.7	7.2	7.5	9.0	8.7	8.8
20	---	---	---	8.1	7.6	7.9	7.9	7.4	7.7	9.0	8.7	8.9
21	---	---	---	7.8	7.6	7.7	7.7	7.2	7.5	9.2	8.8	9.0
22	---	---	---	8.3	7.8	8.1	7.5	7.2	7.4	9.3	9.0	9.1
23	---	---	---	8.3	8.0	8.1	7.8	7.3	7.6	9.1	8.6	8.9
24	---	---	---	8.2	7.9	8.1	7.8	7.4	7.5	8.9	8.6	8.8
25	---	---	---	8.0	7.7	7.9	7.9	7.5	7.6	8.8	8.5	8.6
26	---	---	---	7.9	7.6	7.8	7.7	7.3	7.5	9.0	8.8	8.9
27	---	---	---	7.8	7.5	7.7	7.4	7.2	7.3	9.2	8.8	8.9
28	---	---	---	7.9	7.4	7.6	7.6	7.3	7.5	9.5	9.1	9.4
29	---	---	---	7.8	7.4	7.6	7.7	7.2	7.5	9.4	9.2	9.3
30	---	---	---	7.8	7.5	7.7	8.0	7.6	7.8	9.4	9.2	9.3
31	---	---	---	7.9	7.6	7.7	8.3	7.9	8.2	---	---	---
MONTH	---	---	---	---	---	---	8.6	7.2	7.9	9.5	7.3	8.4

STREAMS TRIBUTARY TO LAKE HURON

04137030 AU SABLE RIVER NEAR SIDTOWN, MI

LOCATION.--Lat 44°28'22", long 83°34'16", in NW1/4 SE1/4 sec.15, T.24 N., R.7 E., Iosco County, Hydrologic Unit 04070007, on right bank 100 ft downstream from Cooke Dam, 2 mi northeast of Sidtown.

DRAINAGE AREA.--1,718 mi².

PERIOD OF RECORD.--July to September 1996.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: July to September 1996.

DISSOLVED OXYGEN: July to September 1996.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 24.5°C, Aug. 8; minimum, 15.5°C, Sept. 30.

DISSOLVED OXYGEN: Maximum, 8.9 mg/L, Sept. 29; minimum, 7.0 mg/L, Sept. 13.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	---	---	---	---	---	---	22.0	21.5	22.0	22.5	22.5	22.5
2	---	---	---	---	---	---	22.0	21.5	21.5	22.5	22.5	22.5
3	---	---	---	---	---	---	22.0	21.5	21.5	23.0	22.5	22.5
4	---	---	---	---	---	---	22.0	21.5	21.5	23.0	22.5	23.0
5	---	---	---	---	---	---	22.5	22.0	22.0	23.0	22.5	23.0
6	---	---	---	---	---	---	23.5	22.0	22.5	23.0	22.5	22.5
7	---	---	---	---	---	---	24.0	23.0	23.5	23.0	22.5	23.0
8	---	---	---	---	---	---	24.5	23.0	23.5	23.0	22.5	22.5
9	---	---	---	---	---	---	24.0	23.0	23.5	23.0	22.5	22.5
10	---	---	---	22.5	22.0	22.0	23.5	23.0	23.0	23.0	22.5	22.5
11	---	---	---	22.5	22.0	22.0	23.5	23.0	23.0	23.0	22.5	22.5
12	---	---	---	22.0	22.0	22.0	24.0	23.0	23.5	23.0	22.0	22.5
13	---	---	---	22.5	21.5	22.0	23.5	23.0	23.5	22.0	21.5	21.5
14	---	---	---	22.5	22.0	22.0	23.5	23.0	23.0	21.5	21.0	21.0
15	---	---	---	23.0	22.0	22.0	23.5	23.0	23.5	21.0	20.5	20.5
16	---	---	---	23.0	22.0	22.5	23.5	23.0	23.0	20.5	20.0	20.5
17	---	---	---	22.5	22.0	22.0	23.5	23.0	23.0	20.0	19.5	20.0
18	---	---	---	23.0	22.0	22.5	23.5	23.0	23.0	19.5	19.0	19.5
19	---	---	---	23.0	22.5	23.0	23.5	23.0	23.0	19.0	19.0	19.0
20	---	---	---	22.5	22.0	22.5	24.0	23.0	23.5	19.0	18.5	19.0
21	---	---	---	22.5	22.0	22.5	23.5	23.0	23.5	18.5	18.5	18.5
22	---	---	---	23.0	22.5	22.5	23.5	23.0	23.5	18.5	18.0	18.5
23	---	---	---	23.5	22.5	23.0	23.5	23.0	23.5	18.0	18.0	18.0
24	---	---	---	23.5	22.5	23.0	24.0	23.0	23.5	18.0	17.5	17.5
25	---	---	---	23.0	22.5	23.0	24.0	23.0	23.5	18.0	17.5	17.5
26	---	---	---	23.0	22.5	22.5	23.5	23.0	23.0	17.5	17.0	17.0
27	---	---	---	22.5	22.5	22.5	23.0	22.5	23.0	17.0	17.0	17.0
28	---	---	---	22.5	22.0	22.0	22.5	22.5	22.5	17.0	16.5	17.0
29	---	---	---	22.0	22.0	22.0	22.0	22.0	22.5	16.5	16.0	16.5
30	---	---	---	22.0	22.0	22.0	23.0	22.0	22.5	16.0	15.5	15.5
31	---	---	---	22.0	21.5	22.0	23.0	22.5	22.5	---	---	---
MONTH	---	---	---	---	---	---	24.5	21.5	23.0	23.0	15.5	20.0

STREAMS TRIBUTARY TO LAKE HURON

04137030 AU SABLE RIVER NEAR SIDTOWN, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	8.3	8.0	8.1	8.3	8.0	8.1
2	---	---	---	---	---	---	8.3	7.9	8.1	8.3	8.1	8.2
3	---	---	---	---	---	---	8.5	8.0	8.1	8.3	8.1	8.2
4	---	---	---	---	---	---	8.3	8.0	8.2	8.4	8.0	8.2
5	---	---	---	---	---	---	8.5	8.1	8.2	8.5	7.5	8.2
6	---	---	---	---	---	---	8.4	8.0	8.2	8.7	8.3	8.5
7	---	---	---	---	---	---	8.5	7.8	8.1	8.6	8.2	8.3
8	---	---	---	---	---	---	8.4	8.0	8.1	8.4	8.0	8.2
9	---	---	---	---	---	---	8.4	8.0	8.2	8.3	8.0	8.2
10	---	---	---	8.1	7.9	8.0	8.3	8.1	8.2	8.3	8.0	8.1
11	---	---	---	7.9	7.7	7.8	8.6	7.8	8.3	8.4	8.0	8.2
12	---	---	---	7.7	7.5	7.6	8.7	7.8	8.4	8.2	7.9	8.1
13	---	---	---	7.8	7.5	7.6	8.3	7.0	8.1	8.0	7.6	7.7
14	---	---	---	7.8	7.5	7.6	8.4	7.9	8.2	7.7	7.5	7.6
15	---	---	---	7.9	7.5	7.7	8.4	8.1	8.2	7.7	7.5	7.6
16	---	---	---	8.4	7.6	8.0	8.2	7.3	8.1	7.6	7.4	7.5
17	---	---	---	7.9	7.6	7.8	8.2	8.0	8.1	7.6	7.4	7.5
18	---	---	---	8.0	7.7	7.8	8.2	8.1	8.1	7.9	7.5	7.7
19	---	---	---	8.1	7.7	7.9	8.2	8.0	8.1	8.1	7.8	7.9
20	---	---	---	8.1	7.5	7.8	8.5	7.9	8.2	8.3	7.9	8.1
21	---	---	---	8.2	7.9	8.1	8.4	7.9	8.1	8.2	8.0	8.1
22	---	---	---	8.7	8.0	8.2	8.3	7.9	8.1	8.4	8.2	8.3
23	---	---	---	8.6	7.8	8.2	8.2	7.9	8.0	8.3	8.2	8.3
24	---	---	---	8.6	8.0	8.2	8.3	8.0	8.1	8.5	8.2	8.3
25	---	---	---	8.3	7.9	8.1	8.4	7.8	8.1	8.6	8.3	8.4
26	---	---	---	8.5	8.1	8.3	8.0	7.7	7.8	8.7	8.5	8.6
27	---	---	---	8.3	7.5	8.1	7.7	7.5	7.6	8.7	8.5	8.6
28	---	---	---	8.2	8.0	8.1	7.7	7.5	7.6	8.7	8.5	8.6
29	---	---	---	8.2	8.0	8.1	8.1	7.6	7.8	8.9	8.6	8.7
30	---	---	---	8.2	8.0	8.1	8.2	7.9	8.0	8.8	8.6	8.7
31	---	---	---	8.4	8.0	8.1	8.1	7.9	8.0	---	---	---
MONTH	---	---	---	---	---	---	8.7	7.0	8.1	8.9	7.4	8.2

STREAMS TRIBUTARY TO LAKE HURON

04137500 AU SABLE RIVER NEAR AU SABLE, MI

LOCATION.--Lat 44°26'09", long 83°26'28", in NE1/4 NW1/4 sec.35, T.24 N., R.8 E., Iosco County, Hydrologic Unit 04070007, at bridge on Rea Road, 5.5 mi northwest of Au Sable, and 10.4 mi upstream from mouth.

DRAINAGE AREA.--1,739 mi², revised.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1987 to current year. Records for July 1939 to September 1940, published in WSP 874, 894, and 1307, have been found to be unreliable and should not be used.

GAGE.--Water-stage recorder. Datum of gage is 583.93 ft above sea level.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Flow regulated by Foote Dam 0.6 mi upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1300	1600	1880	1450	968	1660	1890	2470	1640	1340	2060	1130
2	1190	1960	1780	1200	1420	1660	1810	2470	1600	1190	1730	1120
3	1170	2040	1500	921	1420	1620	1870	2320	1570	1540	1540	1160
4	1230	1860	1270	866	1140	1260	1980	2180	1410	1770	1410	1170
5	1260	1700	1330	1100	1240	1420	2020	2040	1280	1610	1300	1150
6	1450	1600	1500	1230	1290	1600	1730	1930	1450	1460	1420	1170
7	1600	1600	1440	1190	1470	1290	1540	1970	1610	1210	1510	1220
8	1360	1600	1270	1170	e1740	1180	1680	1970	1610	1630	1250	1230
9	1200	1600	1650	1500	e1710	1140	1770	1860	1560	1730	1110	1250
10	1210	1560	1490	1650	1660	1230	1760	1990	1530	e1300	1070	1330
11	1250	1810	971	1320	1620	1670	1800	2200	1530	e1000	1090	1280
12	1200	1910	1080	1150	1390	1800	2290	2170	1620	1220	1180	1250
13	1150	1770	1170	1300	1220	1600	2820	2030	1680	1300	1220	1420
14	1210	1600	1510	1550	1450	1580	2620	1810	1730	1310	1250	1690
15	1270	1600	1810	1530	1360	1680	2340	1450	1790	1520	1260	1650
16	1280	1620	1740	1200	1250	1570	2340	1520	1670	1640	1210	1590
17	1280	1670	1660	1400	1580	1650	2320	1800	1560	1190	1170	1440
18	1290	1650	1600	1710	1530	1680	2250	1740	2290	1220	1230	1270
19	1280	1580	1400	2080	1400	1690	2560	1780	2380	1550	e1100	1280
20	1520	1550	1270	2120	1690	1780	2930	2060	2310	1650	e1050	1270
21	1660	1620	1330	1730	1620	1880	3090	2010	2260	1300	1600	1220
22	1550	1690	1320	1890	1540	1720	3010	1810	2000	1300	1250	1610
23	1470	1570	1470	1970	1510	1610	2500	1670	2010	1270	1460	1900
24	1470	1360	1530	1680	1520	1680	2290	1880	1800	1210	1450	1920
25	1460	1510	1320	1370	1520	1550	2440	1720	1740	1060	1240	1730
26	1430	1760	1310	1300	1560	1740	2390	1670	1780	1040	1260	1340
27	1650	1630	1220	1790	1720	1830	2280	1460	1450	1150	1300	1770
28	1790	1540	1230	1710	1740	1790	2080	1270	1410	1220	1240	2060
29	1490	1370	1490	1590	1640	1720	2010	1310	1680	1620	1130	1700
30	1240	1460	1750	1310	---	1670	2260	1410	1520	2050	1170	1490
31	1280	---	1660	951	---	1820	---	1590	---	2030	1170	---
TOTAL	42190	49390	44951	44928	42918	49770	66670	57560	51470	43630	40430	42810
MEAN	1361	1646	1450	1449	1480	1605	2222	1857	1716	1407	1304	1427
MAX	1790	2040	1880	2120	1740	1880	3090	2470	2380	2050	2060	2060
MIN	1150	1360	971	866	968	1140	1540	1270	1280	1000	1050	1120
CFSM	.78	.95	.83	.83	.85	.92	1.28	1.07	.99	.81	.75	.82
IN.	.90	1.06	.96	.96	.92	1.06	1.43	1.23	1.10	.93	.86	.92

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1996, BY WATER YEAR (WY)

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEAN	1430	1640	1502	1413	1340	1733	2122	1651	1453	1382
MAX	1770	1944	1870	1527	1480	2097	2441	1857	1952	2205
(WY)	1992	1992	1992	1992	1996	1990	1992	1996	1993	1994
MIN	1152	1100	1132	1259	1224	1533	1684	1456	1104	1056
(WY)	1990	1990	1990	1991	1989	1993	1990	1989	1988	1989

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1987 - 1996
ANNUAL TOTAL	524096	576717	
ANNUAL MEAN	1436	1576	1524
HIGHEST ANNUAL MEAN			1640
LOWEST ANNUAL MEAN			1397
HIGHEST DAILY MEAN	2760	3090	5430
LOWEST DAILY MEAN	919	866	455
ANNUAL SEVEN-DAY MINIMUM	1080	1100	656
INSTANTANEOUS PEAK FLOW		3120	5850
INSTANTANEOUS PEAK STAGE		12.22	16.27
INSTANTANEOUS LOW FLOW		573	135
ANNUAL RUNOFF (CFSM)	.83	.91	.88
ANNUAL RUNOFF (INCHES)	11.21	12.34	11.91
10 PERCENT EXCEEDS	1810	2030	2040
50 PERCENT EXCEEDS	1390	1550	1450
90 PERCENT EXCEEDS	1120	1190	1070

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04137500 AU SABLE RIVER NEAR AU SABLE, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1978-94, July to September 1996.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: April 1978 to September 1981.

WATER TEMPERATURE: April 1978 to September 1981, July to September 1996.

DISSOLVED OXYGEN: July to September 1996.

INSTRUMENTATION.--Water-quality monitor telemeter from July 11, 1996, set for one hour measurement intervals.

REMARKS.--Interruptions in water-quality record were due to malfunction of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE (water years 1978-79): Maximum daily, 346 microsiemens, Nov. 21, 1978; minimum daily, 229 microsiemens, Apr. 19, 21, 1979.

WATER TEMPERATURE (water years 1979-80, 96): Maximum measured, 28.0°C, Aug. 8, 1979; minimum daily, 0.0°C on many days during winter.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--Specific conductance of 354 microsiemens was measured Feb. 3, 1988.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 25.0°C, Aug. 8, 9; minimum, 16.5°C, Sept. 30.

DISSOLVED OXYGEN: Maximum, 8.5 mg/L, Sept. 29, 30; minimum, 7.0 mg/L, Sept. 2.

WATER TEMPERATURE, DEGREES CELSIUS, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	22.5	21.5	22.0	23.0	22.5	23.0
2	---	---	---	---	---	---	22.0	21.5	22.0	23.0	22.5	23.0
3	---	---	---	---	---	---	22.5	22.0	22.0	23.5	22.5	23.0
4	---	---	---	---	---	---	22.5	22.0	22.0	23.5	23.0	23.0
5	---	---	---	---	---	---	23.0	22.0	22.5	23.5	23.0	23.0
6	---	---	---	---	---	---	23.0	22.0	22.5	23.5	23.0	23.0
7	---	---	---	---	---	---	24.0	23.0	23.5	23.0	23.0	23.0
8	---	---	---	---	---	---	25.0	23.5	24.0	23.5	23.0	23.0
9	---	---	---	---	---	---	25.0	24.0	24.0	23.5	23.0	23.0
10	---	---	---	---	---	---	24.0	23.0	23.5	23.0	23.0	23.0
11	---	---	---	---	---	---	23.5	23.0	23.0	23.5	22.5	23.0
12	---	---	---	21.5	21.5	21.5	23.5	23.0	23.0	23.0	22.5	23.0
13	---	---	---	22.0	21.0	21.5	23.5	23.0	23.5	22.5	21.0	22.0
14	---	---	---	22.0	21.5	22.0	23.0	23.0	23.0	21.0	20.5	21.0
15	---	---	---	22.5	21.5	22.0	23.5	23.0	23.5	20.5	20.0	20.5
16	---	---	---	23.0	22.0	22.5	23.5	23.0	23.0	20.0	20.0	20.0
17	---	---	---	23.0	22.0	22.5	23.5	23.0	23.0	20.0	19.5	20.0
18	---	---	---	22.5	22.0	22.5	23.5	23.0	23.0	20.0	19.5	19.5
19	---	---	---	23.0	22.5	23.0	---	---	---	19.5	19.5	19.5
20	---	---	---	23.0	22.5	22.5	---	---	---	20.0	19.0	19.5
21	---	---	---	23.0	22.5	22.5	24.0	23.5	23.5	19.5	19.0	19.5
22	---	---	---	23.0	22.0	22.5	23.5	23.5	23.5	19.0	19.0	19.0
23	---	---	---	23.5	22.5	23.0	24.0	23.5	23.5	19.0	18.5	19.0
24	---	---	---	---	---	---	24.5	23.5	24.0	19.0	18.5	18.5
25	---	---	---	---	---	---	24.0	23.5	23.5	18.5	18.0	18.5
26	---	---	---	---	---	---	23.5	23.5	23.5	18.5	18.0	18.0
27	---	---	---	---	---	---	23.5	22.5	23.0	18.0	18.0	18.0
28	---	---	---	---	---	---	23.0	22.5	22.5	18.0	17.5	17.5
29	---	---	---	---	---	---	23.0	22.0	22.5	17.5	17.0	17.0
30	---	---	---	---	---	---	23.0	22.5	22.5	17.0	16.5	16.5
31	---	---	---	---	---	---	23.0	22.5	22.5	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	23.5	16.5	20.5

STREAMS TRIBUTARY TO LAKE HURON

04137500 AU SABLE RIVER NEAR AU SABLE, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	7.7	7.3	7.5	7.8	7.3	7.6
2	---	---	---	---	---	---	7.8	7.3	7.6	7.7	7.0	7.3
3	---	---	---	---	---	---	7.8	7.4	7.6	7.8	7.2	7.4
4	---	---	---	---	---	---	7.9	7.5	7.7	7.9	7.2	7.6
5	---	---	---	---	---	---	8.0	7.4	7.7	7.8	7.4	7.6
6	---	---	---	---	---	---	7.9	7.1	7.5	7.7	7.2	7.5
7	---	---	---	---	---	---	7.9	7.3	7.6	7.6	7.1	7.3
8	---	---	---	---	---	---	8.0	7.2	7.6	7.9	7.4	7.7
9	---	---	---	---	---	---	7.9	7.5	7.7	7.7	7.4	7.5
10	---	---	---	---	---	---	7.8	7.4	7.6	7.8	7.3	7.6
11	---	---	---	---	---	---	7.7	7.3	7.4	7.6	7.2	7.4
12	---	---	---	8.0	7.6	7.8	7.9	7.3	7.5	7.9	7.3	7.6
13	---	---	---	7.9	7.5	7.6	7.9	7.3	7.6	7.7	7.4	7.5
14	---	---	---	7.9	7.5	7.7	7.5	7.2	7.4	7.5	7.2	7.3
15	---	---	---	7.8	7.3	7.5	8.2	7.2	7.7	7.4	7.2	7.3
16	---	---	---	8.0	7.5	7.8	8.1	7.7	7.9	7.4	7.1	7.2
17	---	---	---	7.8	7.3	7.7	8.0	7.5	7.7	7.6	7.3	7.4
18	---	---	---	7.4	7.1	7.2	7.8	7.5	7.7	7.8	7.5	7.6
19	---	---	---	7.6	7.1	7.4	---	---	---	7.9	7.6	7.8
20	---	---	---	7.8	7.1	7.5	---	---	---	8.0	7.6	7.8
21	---	---	---	7.6	7.1	7.4	7.8	7.4	7.6	8.0	7.6	7.8
22	---	---	---	7.5	7.1	7.3	7.6	7.3	7.4	7.9	7.7	7.8
23	---	---	---	7.6	7.2	7.4	7.8	7.4	7.6	7.9	7.7	7.8
24	---	---	---	---	---	---	7.8	7.3	7.5	8.0	7.7	7.8
25	---	---	---	---	---	---	8.0	7.4	7.7	8.2	7.8	8.0
26	---	---	---	---	---	---	7.6	7.2	7.5	8.2	8.0	8.1
27	---	---	---	---	---	---	7.4	7.1	7.3	8.3	8.0	8.2
28	---	---	---	---	---	---	7.6	7.2	7.4	8.4	8.1	8.2
29	---	---	---	---	---	---	7.7	7.2	7.5	8.5	8.3	8.4
30	---	---	---	---	---	---	7.8	7.3	7.5	8.5	8.3	8.4
31	---	---	---	---	---	---	8.0	7.3	7.6	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	8.5	7.0	7.7

STREAMS TRIBUTARY TO LAKE HURON

04142000 RIFLE RIVER NEAR STERLING, MI

LOCATION.--Lat 44°04'21", long 84°01'12", in NE1/4 SW1/4 sec.5, T.19 N., R.4 E., Arenac County, Hydrologic Unit 04080101, on left bank 30 ft downstream from bridge on Melita Road, 2.8 mi north of Sterling, and 20 mi upstream from mouth.

DRAINAGE AREA.--320 mi², approximately.

PERIOD OF RECORD.--November 1905 to December 1908 (gage heights and discharge measurements only), October 1936 to current year.

Monthly discharge only for some periods, published in WSP 1307. Published as Rifle River at Michigan Highway 70 near Sterling 1936-61.

REVISED RECORDS.--WSP 1437: 1937(M), 1939-40(M).

GAGE.--Water-stage recorder. Datum of gage is 649.48 ft above sea level. November 1905 to December 1908, nonrecording gage at site 400 ft downstream at different datum. Jan. 13, 1937 to Jan. 10, 1939, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. Occasional regulation by dams upstream from station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	163	273	e200	e210	e300	e700	e420	902	236	282	372	171
2	162	554	e260	e205	e300	e550	e410	730	264	262	308	169
3	170	608	e270	e200	e300	e470	e410	606	326	295	269	166
4	208	425	e280	e195	e300	e420	e410	563	297	276	246	164
5	205	321	e280	e190	e300	e390	e410	488	267	248	224	162
6	197	278	e270	e190	e300	e370	e410	418	254	234	210	161
7	201	262	e260	e190	e300	e360	e410	397	297	226	205	162
8	196	247	e250	e190	e350	e350	e410	385	442	226	216	165
9	189	238	e240	e190	e450	e340	e430	435	400	248	191	178
10	182	244	e240	e190	e550	e340	e500	625	381	244	184	262
11	179	608	e240	e190	e650	e340	855	966	423	221	181	221
12	174	743	e240	e190	e550	e340	1080	807	370	211	184	198
13	172	536	e240	e190	e450	e400	1330	619	375	218	181	192
14	178	426	e280	e190	e350	e500	1190	502	372	208	178	216
15	189	358	e320	e190	e330	e650	986	440	262	206	178	238
16	189	319	e270	e190	e310	e600	1020	397	231	205	179	210
17	192	e290	e250	e210	e300	e500	881	364	317	193	171	199
18	192	283	e240	e400	e290	e400	761	361	2290	193	166	192
19	185	282	e230	e700	e290	e370	772	433	2960	249	164	183
20	194	301	e230	e1200	e290	e360	830	759	2070	261	283	176
21	278	366	e230	e750	e400	e350	787	848	1230	208	351	176
22	277	368	e230	e600	e550	e340	669	653	821	197	252	256
23	247	325	e230	e500	e500	e340	642	582	643	188	299	289
24	230	e270	e230	e450	e550	e380	565	559	679	182	244	251
25	235	e260	e230	e400	e600	e500	520	468	652	184	205	237
26	226	e255	e230	e350	e800	e600	568	408	529	180	190	215
27	236	e250	e230	e330	e1000	e500	508	357	425	177	199	325
28	321	e220	e230	e310	e1100	e477	440	329	383	178	209	522
29	293	e200	e230	e300	e900	e453	409	299	339	294	187	381
30	272	e190	e220	e300	---	e440	691	267	313	536	181	286
31	249	---	e215	e300	---	e430	---	244	---	412	175	---
TOTAL	6581	10300	7595	10190	13660	13560	19724	16211	18848	7442	6782	6723
MEAN	212	343	245	329	471	437	657	523	628	240	219	224
MAX	321	743	320	1200	1100	700	1330	966	2960	536	372	522
MIN	162	190	200	190	290	340	409	244	231	177	164	161
CFSM	.66	1.07	.77	1.03	1.47	1.37	2.05	1.63	1.96	.75	.68	.70
IN.	.77	1.20	.88	1.18	1.59	1.58	2.29	1.88	2.19	.87	.79	.78

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1937 - 1996, BY WATER YEAR (WY)

MEAN	241	295	288	251	281	562	644	395	290	196	181	206
MAX	741	826	579	538	741	1035	1160	859	842	335	339	712
(WY)	1987	1993	1992	1973	1938	1991	1959	1983	1945	1969	1995	1986
MIN	142	160	156	152	150	206	262	175	124	126	122	124
(WY)	1964	1964	1964	1956	1956	1964	1945	1977	1964	1966	1964	1948

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1937 - 1996
ANNUAL TOTAL	102694	137616	
ANNUAL MEAN	281	376	(a)320
HIGHEST ANNUAL MEAN			501
LOWEST ANNUAL MEAN			166
HIGHEST DAILY MEAN	1400	2960	4500
LOWEST DAILY MEAN	142	161	98
ANNUAL SEVEN-DAY MINIMUM	145	164	105
INSTANTANEOUS PEAK FLOW		3170	(b)5340
INSTANTANEOUS PEAK STAGE		9.78	13.74
INSTANTANEOUS LOW FLOW		160	(d)75
ANNUAL RUNOFF (CFSM)	.88	1.17	1.00
ANNUAL RUNOFF (INCHES)	11.94	16.00	13.57
10 PERCENT EXCEEDS	485	651	564
50 PERCENT EXCEEDS	230	290	230
90 PERCENT EXCEEDS	165	184	150

(a) Does not include water year 1937.

(b) From rating curve extended above 3,800 ft³/s.

(c) Oct. 1, 2, Sept. 5, 6, 7.

(d) Result of freezeup.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04144500 SHIAWASSEE RIVER AT OWOSSO, MI

LOCATION.--Lat 43°00'54", long 84°10'52", in SW1/4 sec.12, T.7 N., R.2 E., Shiawassee County, Hydrologic Unit 04080203, on right bank on grounds of sewage-treatment plant, 1.5 mi north of Owosso.

DRAINAGE AREA.--538 mi².

PERIOD OF RECORD.--March 1931 to current year. Gage-height records for flood seasons collected in this vicinity 1904, 1910-30 are contained in reports of the National Weather Service.

REVISED RECORDS.--WSP 1307: 1949(M). WSP 1337: 1932, 1934, 1936-38, 1944.

GAGE.--Water-stage recorder. Datum of gage is 707.25 ft above sea level. Prior to Oct. 15, 1933, at site 1.5 mi upstream at datum 5.46 ft higher.

REMARKS.--Records good except for estimated daily discharges, which are poor. Flow regulated below approximately 800 ft³/s by powerplant at Shiawassee town prior to February 1953; occasional regulation at low stages since. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	100	244	336	e150	e230	602	501	1020	405	280	159	63
2	86	352	377	e160	e210	593	475	1010	307	244	154	62
3	94	513	400	e165	e190	406	451	1040	259	224	151	61
4	100	293	404	e170	e180	e350	440	835	214	205	140	69
5	122	273	371	e175	e150	e310	429	735	201	187	137	104
6	144	256	318	e175	e140	e290	425	706	218	183	135	114
7	162	249	224	e170	e130	e260	459	682	297	165	152	91
8	202	254	e210	e160	e140	e250	502	640	356	171	149	82
9	195	255	e190	e145	e390	e240	419	595	433	155	130	87
10	188	277	e175	e135	e420	e240	379	771	464	140	106	86
11	184	573	e170	e130	e440	e245	356	905	444	134	91	96
12	186	729	e170	e130	e360	349	356	852	446	126	88	108
13	188	719	e175	e135	e300	397	921	901	454	120	87	129
14	173	760	e210	e140	e250	560	1180	892	380	110	87	148
15	164	610	e260	e150	e200	551	1100	804	368	102	85	134
16	160	511	e280	213	e170	517	1210	664	342	95	84	136
17	157	452	e290	311	e160	464	1140	564	323	93	77	138
18	145	423	e270	639	e160	425	1040	566	1300	72	73	129
19	135	455	e250	823	e170	394	952	606	1840	89	73	104
20	134	548	e230	806	310	379	936	667	1560	118	84	91
21	116	536	e210	860	615	377	928	2580	1500	117	80	88
22	115	516	e195	796	570	370	957	1870	1610	111	74	99
23	119	434	e190	524	497	363	1090	1330	1590	114	97	98
24	117	355	e185	403	524	455	1040	1250	1350	108	93	122
25	112	307	e180	e370	508	701	973	1090	1100	110	91	116
26	107	278	e170	e350	625	971	934	757	739	108	83	127
27	122	302	e165	e320	789	849	980	586	593	106	74	138
28	178	363	e155	e300	928	802	890	585	620	111	72	163
29	222	376	e160	e270	682	618	679	560	539	136	70	203
30	239	402	e155	e250	---	568	852	529	396	134	68	224
31	229	---	e150	e240	---	534	---	486	---	157	65	---
TOTAL	4695	12615	7225	9765	10438	14430	22994	27078	20648	4325	3109	3410
MEAN	151	420	233	315	360	465	766	873	688	140	100	114
MAX	239	760	404	860	928	971	1210	2580	1840	280	159	224
MIN	86	244	150	130	130	240	356	486	201	72	65	61
CFSM	.28	.78	.43	.59	.67	.87	1.42	1.62	1.28	.26	.19	.21
IN.	.32	.87	.50	.68	.72	1.00	1.59	1.87	1.43	.30	.21	.24

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1996, BY WATER YEAR (WY)

MEAN	198	264	320	348	446	764	727	458	280	167	123	145
MAX	1442	985	922	1066	1728	1682	2060	1950	1051	868	578	922
(WY)	1982	1993	1976	1993	1938	1948	1947	1956	1989	1994	1992	1975
MIN	32.6	52.1	56.6	66.9	65.5	119	162	119	34.0	24.0	13.2	25.0
(WY)	1964	1964	1964	1940	1940	1964	1931	1958	1934	1934	1931	1931

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1931 - 1996

ANNUAL TOTAL	146788						140732					
ANNUAL MEAN	402						385			355		
HIGHEST ANNUAL MEAN										629		1993
LOWEST ANNUAL MEAN										97.7		1964
HIGHEST DAILY MEAN	2170						2580		May 21	5920		Apr 6 1947
LOWEST DAILY MEAN	64						61		Sep 3	2.0		Jul 28 1934
ANNUAL SEVEN-DAY MINIMUM	68						65		Aug 29	7.7		Aug 11 1936
INSTANTANEOUS PEAK FLOW							2930		May 21	6240		Apr 6 1947
INSTANTANEOUS PEAK STAGE							7.26		May 21	10.35		Apr 6 1947
INSTANTANEOUS LOW FLOW							61		(a)	.20		Jul 27 1934
ANNUAL RUNOFF (CFSM)	.75						.71			.66		
ANNUAL RUNOFF (INCHES)	10.15						9.73			8.97		
10 PERCENT EXCEEDS	796						891			800		
50 PERCENT EXCEEDS	284						250			200		
90 PERCENT EXCEEDS	118						96			65		

(a) Sept. 2, 3.
(e) Estimated.

(a) $100 - 20 = 80$, $80 - 20 = 60$, $60 - 20 = 40$

STREAMS TRIBUTARY TO LAKE HURON

04146063 SOUTH BRANCH FLINT RIVER NEAR COLUMBIAVILLE, MI

LOCATION.--Lat 43°09'34", long 83°21'03", in NE1/4 NE1/4 sec.36, T.9 N., R.9 E., Lapeer County, Hydrologic Unit 04080204, on right bank at upstream side of bridge on Columbiaville Road, 3.0 mi east of Columbiaville, and 3.2 mi upstream from confluence of North and South Branches.

DRAINAGE AREA.--221 mi².

PERIOD OF RECORD.--March 1980 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 765 ft above sea level, from topographic map. Jan. 9 to Sept. 30, 1996, nonrecording gage at same site and datum.

REMARKS.--Records fair except for estimated daily discharges, which are poor. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e29	93	155	e75	e100	e210	e270	378	219	e160	74	e34
2	e26	94	156	e74	e88	e180	e250	e355	182	142	e64	e30
3	27	106	152	e74	e80	e155	229	342	172	136	e58	e27
4	46	108	153	e72	e74	e135	e220	329	175	134	e52	e23
5	47	105	148	e71	e72	e110	e210	329	161	129	e47	e21
6	80	96	136	e68	e72	e100	e200	300	154	126	e42	e20
7	92	93	e125	e64	e72	e84	e180	300	161	116	e39	e26
8	87	97	e118	e60	e76	e74	e160	236	165	113	e36	e39
9	83	94	e110	e56	e80	e72	e145	211	166	113	e34	e52
10	74	90	e105	e56	e96	e76	e140	231	184	113	e31	e70
11	64	154	e100	e56	e112	e100	e250	300	202	111	e30	85
12	60	305	e96	e56	e130	131	e450	324	206	114	e29	e100
13	55	284	e110	e56	e120	211	e460	283	204	116	e28	e110
14	49	260	e115	e76	e110	219	e480	240	200	132	e27	e130
15	47	246	e112	e117	e98	248	e500	215	184	121	e26	e160
16	47	214	e108	e180	e88	227	e560	200	166	114	e25	e140
17	47	186	e104	e230	e78	207	e520	e185	166	111	e23	e120
18	49	172	e100	e300	e72	e190	e480	e180	e350	108	e22	e100
19	55	167	e94	e440	e70	e175	e450	e180	e560	105	e21	e95
20	77	160	e90	e410	e82	e160	e420	e240	e895	103	e22	e86
21	90	169	e86	e390	e100	e145	e410	e500	e940	103	e23	e72
22	84	156	e84	e330	e120	e138	e440	e920	875	102	e27	e75
23	85	142	e81	e270	e145	e138	e440	e700	776	121	e35	e82
24	78	132	e78	e220	e175	e138	e400	e520	620	118	e45	e86
25	76	119	e77	e180	e210	e140	e320	e400	452	114	e55	e90
26	70	114	e76	e160	e250	e182	e270	300	329	111	e70	e96
27	95	116	e76	e220	e290	e420	260	300	274	106	e65	e110
28	122	167	e76	e180	e250	e380	329	305	e235	97	e58	e130
29	117	182	e76	e160	e250	e350	352	302	e210	92	e52	e160
30	116	154	e76	e130	---	e310	378	278	e180	92	e44	e190
31	102	---	e76	e110	---	e290	---	269	---	e86	e38	---
TOTAL	2176	4575	3249	4941	3560	5695	10173	10152	9763	3559	1242	2559
MEAN	70.2	152	105	159	123	184	339	327	325	115	40.1	85.3
MAX	122	305	156	440	290	420	560	920	940	160	74	190
MIN	26	90	76	56	70	72	140	180	154	86	21	20
CFSM	.32	.69	.47	.72	.56	.83	1.53	1.48	1.47	.52	.18	.39
IN.	.37	.77	.55	.83	.60	.96	1.71	1.71	1.64	.60	.21	.43

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1980 - 1996, BY WATER YEAR (WY)

MEAN	164	197	188	173	212	350	337	171	137	80.5	70.5	138
MAX	583	474	349	354	485	712	630	327	325	206	166	635
(WY)	1987	1986	1988	1993	1985	1985	1985	1996	1996	1994	1992	1985
MIN	52.7	91.8	84.1	73.1	89.4	157	198	82.4	31.2	39.1	34.6	28.7
(WY)	1983	1981	1990	1981	1982	1989	1989	1988	1988	1988	1981	1995

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1980 - 1996

ANNUAL TOTAL	53437	61644	
ANNUAL MEAN	146	168	184
HIGHEST ANNUAL MEAN			295
LOWEST ANNUAL MEAN			126
HIGHEST DAILY MEAN	819	(e)940	2950
LOWEST DAILY MEAN	15	20	14
ANNUAL SEVEN-DAY MINIMUM	16	23	16
INSTANTANEOUS PEAK FLOW		957	(a)3090
INSTANTANEOUS PEAK STAGE		5.35	(b)9.61
INSTANTANEOUS LOW FLOW			12
ANNUAL RUNOFF (CFSM)	.66	.76	.83
ANNUAL RUNOFF (INCHES)	8.99	10.38	11.29
10 PERCENT EXCEEDS	300	344	369
50 PERCENT EXCEEDS	108	118	125
90 PERCENT EXCEEDS	46	47	49

(a) Gage height 9.60 ft.

(b) Backwater from ice.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04147500 FLINT RIVER NEAR OTISVILLE, MI

LOCATION.--Lat 43°06'40", long 83°31'10", in SE1/4 sec.9, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft downstream from bridge on State Highway 15, 1.5 mi downstream from Holloway Reservoir, 3.5 mi upstream from Powers-Cullen Drain, and 3.8 mi south of Otisville.

DRAINAGE AREA.--530 mi².

PERIOD OF RECORD.--October 1952 to September 1989, October 1990 to current year.

REVISED RECORDS.--WDR MI-78-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 721.39 ft above sea level.

REMARKS.--Records good. Flow regulated by Holloway Reservoir, 1.5 mi upstream from station. From 1954 to 1991 annual mean discharge and runoff figures adjusted for change in contents in Holloway Reservoir. Several measurements of water temperature were made during the year. City of Flint gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	110	125	417	175	288	683	873	335	466	390	155	103
2	111	184	415	175	261	666	790	640	422	609	154	103
3	111	336	401	175	241	583	734	851	359	603	156	103
4	111	333	391	173	239	475	697	905	238	546	153	116
5	111	330	368	174	238	444	685	806	247	493	145	131
6	111	328	339	174	237	432	624	747	260	454	138	130
7	109	490	303	173	188	401	312	678	279	425	132	130
8	109	673	265	150	108	236	310	609	334	355	127	130
9	109	485	252	122	108	235	315	571	378	251	122	131
10	109	349	250	121	109	234	326	604	401	257	119	131
11	109	392	241	121	135	234	334	772	419	261	115	131
12	97	539	206	121	240	233	364	847	448	259	111	131
13	80	723	190	121	304	209	529	898	465	255	108	131
14	80	837	189	121	314	189	854	863	498	249	105	132
15	80	853	190	121	279	381	1160	807	516	242	102	144
16	121	717	205	121	243	570	1330	691	541	227	93	167
17	188	631	222	124	215	644	1330	618	624	150	89	186
18	158	507	233	136	199	644	1100	527	1440	111	99	186
19	121	176	232	378	185	607	955	477	2040	122	105	180
20	122	234	220	658	188	565	947	461	3090	132	105	170
21	123	291	211	757	286	471	932	1020	3340	138	105	164
22	123	323	200	816	411	411	903	1600	3180	142	105	166
23	123	315	193	814	488	385	763	2480	5970	152	107	162
24	123	295	190	732	598	379	616	2530	7240	153	108	169
25	123	269	187	587	695	495	667	2070	6020	151	107	176
26	123	255	183	477	791	831	396	1710	4320	147	105	197
27	125	259	178	443	887	1090	172	1410	3070	145	106	199
28	125	302	177	416	892	1210	172	889	1970	139	103	232
29	124	360	175	388	804	1260	173	517	998	135	103	281
30	124	395	175	365	---	1110	188	534	457	139	103	318
31	124	---	175	322	---	970	---	508	---	151	103	---
TOTAL	3617	12306	7573	9751	10171	17277	19551	28975	50030	7983	3588	4830
MEAN	117	410	244	315	351	557	652	935	1668	258	116	161
MAX	188	853	417	816	892	1260	1330	2530	7240	609	156	318
MIN	80	125	175	121	108	189	172	335	238	111	89	103

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 1996, BY WATER YEAR (WY)

	MEAN	219	271	306	287	367	799	663	379	264	167	134	209
MAX	1688	911	900	1153	1123	1984	1549	1789	1668	839	369	1507	
(WY)	1987	1993	1988	1973	1968	1976	1960	1956	1996	1994	1994	1986	
MIN	59.4	19.1	14.0	49.7	66.4	76.5	175	43.6	20.3	47.4	36.3	42.3	
(WY)	1966	1972	1972	1961	1964	1964	1964	1977	1977	1977	1977	1954	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1953 - 1996

ANNUAL TOTAL	122214												
ANNUAL MEAN	335												
HIGHEST ANNUAL MEAN													
LOWEST ANNUAL MEAN													
HIGHEST DAILY MEAN	2020												
LOWEST DAILY MEAN	80												
ANNUAL SEVEN-DAY MINIMUM	95												
INSTANTANEOUS PEAK FLOW													
INSTANTANEOUS PEAK STAGE													
INSTANTANEOUS LOW FLOW													
10 PERCENT EXCEEDS	830												
50 PERCENT EXCEEDS	219												
90 PERCENT EXCEEDS	111												

(a) Oct. 13-15.

(b) Oct. 11, 12, 1971.

STREAMS TRIBUTARY TO LAKE HURON

04148140 KEARSLEY CREEK NEAR DAVISON, MI

LOCATION.--Lat 43°02'01", long 83°34'53", in NE1/4 sec.12, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft upstream from bridge on Davison Road, 1.4 mi downstream from Black Creek, and 3.3 mi west of Davison.

DRAINAGE AREA.--99.4 mi².

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WDR MI-78-1: Drainage area. WDR MI-85-1: 1968(M), 1973(M), 1975, 1982(P).

GAGE.--Water-stage recorder. Datum of gage is 747.39 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are poor. Some diurnal fluctuation caused by small dams, and occasional diversion for irrigation upstream from station. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.9	45	57	e24	e37	e100	103	220	54	41	17	10
2	6.1	64	52	e24	e33	e86	100	203	48	38	15	8.2
3	12	47	57	e23	e30	e74	99	205	34	35	14	6.4
4	12	41	57	e23	e28	e64	98	187	39	30	12	5.5
5	15	45	53	e22	e27	e56	93	135	35	26	11	4.4
6	35	42	45	e21	e27	e48	88	118	38	22	9.3	4.1
7	35	48	e41	e20	e27	e43	84	113	46	19	8.5	6.6
8	48	40	e39	e19	e27	e36	73	110	54	26	8.1	12
9	49	37	e36	e18	e27	e33	65	90	70	31	7.7	15
10	45	43	e35	e18	e29	e33	62	167	77	26	6.7	10
11	33	147	34	e18	e33	e41	58	220	102	21	6.7	10
12	17	128	e31	e18	e37	57	69	191	219	19	6.7	13
13	9.8	120	e29	e18	e43	95	273	174	221	17	6.5	22
14	7.4	132	e34	e18	e50	106	255	149	183	15	5.9	46
15	8.4	122	e37	e25	e40	113	258	126	144	15	5.9	48
16	11	94	e36	e40	e35	111	298	100	104	16	5.5	37
17	12	74	e35	e60	e31	101	297	75	81	17	5.3	29
18	13	65	e33	e100	e27	90	249	66	634	18	5.1	16
19	15	61	e32	e150	e29	83	197	61	566	24	4.9	13
20	22	54	e30	e130	e35	78	201	65	407	24	6.1	15
21	20	47	e29	e110	e43	80	177	662	365	23	5.9	18
22	19	42	e28	e100	e50	66	173	523	325	19	6.4	32
23	24	41	e27	e86	e62	64	200	393	245	18	16	21
24	29	36	e26	e74	e76	76	204	346	188	16	12	29
25	28	45	e25	e64	e90	260	197	272	138	13	14	30
26	25	34	e24	e58	e105	279	180	188	96	12	21	30
27	40	40	e24	e88	e120	226	129	140	85	11	18	43
28	30	77	e24	e74	e135	210	107	113	75	11	15	55
29	30	61	e24	e60	e120	171	96	96	62	11	14	54
30	48	65	e24	e49	---	142	245	76	49	17	13	60
31	47	---	e24	e43	---	116	---	63	---	15	12	---
TOTAL	757.6	1937	1082	1595	1453	3138	4728	5647	4784	646	315.2	703.2
MEAN	24.4	64.6	34.9	51.5	50.1	101	158	182	159	20.8	10.2	23.4
MAX	49	147	57	150	135	279	298	662	634	41	21	60
MIN	5.9	34	24	18	27	33	58	61	34	11	4.9	4.1
CFSM	.25	.65	.35	.52	.50	1.02	1.59	1.83	1.60	.21	.10	.24
IN.	.28	.72	.40	.60	.54	1.17	1.77	2.11	1.79	.24	.12	.26

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1996, BY WATER YEAR (WY)

	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEAN	44.7	63.4	76.6	70.7	91.0	169	162	79.2	51.1	28.2	21.8	44.6																			
MAX	236	181	213	192	294	317	350	200	159	93.2	107	314																			
(WY)	1982	1986	1976	1973	1976	1973	1975	1974	1996	1994	1975	1985																			
MIN	10.7	16.2	22.2	15.6	24.3	57.9	80.9	24.7	7.39	5.48	5.83	7.06																			
(WY)	1967	1966	1970	1970	1970	1969	1966	1977	1988	1966	1966	1966																			

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1966 - 1996

ANNUAL TOTAL	23559.2	26786.0	75.0
ANNUAL MEAN	64.5	73.2	122
HIGHEST ANNUAL MEAN			35.3
LOWEST ANNUAL MEAN			1985
HIGHEST DAILY MEAN	474	662	1370
LOWEST DAILY MEAN	5.6	4.1	2.1
ANNUAL SEVEN-DAY MINIMUM	5.9	5.5	2.3
INSTANTANEOUS PEAK FLOW		852	1500
INSTANTANEOUS PEAK STAGE		10.27	(a)11.85
INSTANTANEOUS LOW FLOW		3.3	1.6
ANNUAL RUNOFF (CFSM)	.65	.74	.75
ANNUAL RUNOFF (INCHES)	8.82	10.02	10.25
10 PERCENT EXCEEDS	141	187	172
50 PERCENT EXCEEDS	42	41	41
90 PERCENT EXCEEDS	10	12	11

(a) From floodmark.

(e) Estimated.

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR		FOR 1996 WATER YEAR		WATER YEARS 1932 - 1996	
ANNUAL TOTAL	234105		304421			
ANNUAL MEAN	641		832		637	
HIGHEST ANNUAL MEAN					1258	1985
LOWEST ANNUAL MEAN					153	1964
HIGHEST DAILY MEAN	3650	Mar 15	7900	Jun 24	14500	Apr 6 1947
LOWEST DAILY MEAN	134	Oct 15	134	Oct 15	14	Aug 7 1934
ANNUAL SEVEN-DAY MINIMUM	156	Sep 11	155	Aug 13	23	Aug 14 1936
INSTANTANEOUS PEAK FLOW			8250	Jun 24	14900	Apr 6 1947
INSTANTANEOUS PEAK STAGE			14.07	Jun 24	16.95	Sep 6 1985
INSTANTANEOUS LOW FLOW			128	Oct 15	9.0	Aug 7 1934
10 PERCENT EXCEEDS	1520		1690		1480	
50 PERCENT EXCEEDS	432		473		337	
90 PERCENT EXCEEDS	203		200		99	

STREAMS TRIBUTARY TO LAKE HURON

04150500 CASS RIVER AT CASS CITY, MI

LOCATION.--Lat 43°35'03", long 83°10'34", in NE1/4 NE1/4 sec.4, T.13 N., R.11 E., Tuscola County, Hydrologic Unit 04080205, on left bank 600 ft downstream from bridge on Cemetery Road, 0.3 mi downstream from confluence of North and South Branches, and 1.1 mi south of Cass City.

DRAINAGE AREA.--359 mi².

PERIOD OF RECORD.--October 1947 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1949-50. WSP 1727: 1948(M), 1950. WDR MI-78-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 697.92 ft above sea level. Prior to Nov. 14, 1952, nonrecording gage at site 600 ft upstream at present datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.7	21	245	e47	e120	598	431	1230	183	161	105	18
2	6.9	31	354	e47	e100	329	374	777	171	134	79	16
3	7.6	42	311	e46	e90	e170	328	548	168	122	63	16
4	8.7	41	378	e46	e80	e140	306	462	184	108	53	16
5	11	38	335	e46	e72	e120	269	393	189	94	46	13
6	18	30	e200	e45	e66	e110	322	330	171	83	39	12
7	22	29	e110	e44	e62	e100	354	281	189	75	33	18
8	24	28	e90	e42	e60	e95	315	252	487	73	30	51
9	18	26	e80	e39	e200	e90	297	394	535	90	28	73
10	14	27	e72	e38	e400	e86	332	1380	1180	109	29	81
11	12	194	e66	e37	e620	e82	453	2330	736	82	25	84
12	10	500	e62	e37	e400	e80	508	1480	900	71	24	113
13	9.5	365	e60	e37	e250	e160	1610	931	697	66	23	115
14	8.8	297	e58	e37	e150	e650	2190	585	620	74	21	98
15	8.7	231	e66	e37	e90	835	1330	414	577	76	25	172
16	8.8	171	e76	e37	e72	475	1090	333	353	71	24	215
17	8.7	149	e74	e100	e64	351	778	285	280	64	27	231
18	7.6	128	e72	e700	e58	289	578	256	2880	56	26	216
19	7.7	133	e68	1820	e54	273	469	231	5030	57	23	164
20	8.6	150	e64	e1000	e52	221	428	1320	3410	59	23	117
21	12	157	e62	e600	e300	133	419	6640	2170	50	26	-93
22	15	158	e60	e350	1340	e120	366	6770	2520	42	27	111
23	14	149	e58	e250	700	136	413	3320	3660	39	33	508
24	14	e130	e56	e200	e950	165	391	1700	2120	38	35	504
25	16	e120	e54	e180	820	517	349	985	1350	39	32	656
26	15	108	e52	e170	529	2180	403	649	681	32	26	536
27	16	110	e51	e160	802	e820	389	469	425	29	28	512
28	22	e250	e50	e220	2120	e600	324	364	316	28	27	1070
29	24	e400	e49	e190	770	544	270	294	243	29	26	949
30	22	e330	e48	e160	---	517	760	241	198	154	23	640
31	19	---	e47	e140	---	476	---	209	---	180	20	---
TOTAL	416.3	4543	3428	6902	11391	11462	16846	35853	32623	2385	1049	7418
MEAN	13.4	151	111	223	393	370	562	1157	1087	76.9	33.8	247
MAX	24	500	378	1820	2120	2180	2190	6770	5030	180	105	1070
MIN	6.7	21	47	37	52	80	269	209	168	28	20	12
CFSM	.04	.42	.31	.62	1.09	1.03	1.56	3.22	3.03	.21	.09	.69
IN.	.04	.47	.36	.72	1.18	1.19	1.75	3.72	3.38	.25	.11	.77

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1948 - 1996, BY WATER YEAR (WY)

	MEAN	85.0	144	193	182	271	750	529	238	133	69.3	35.4	102
MAX	952	683	653	840	982	2260	1296	1157	1087	629	201	2239	
(WY)	1987	1993	1985	1952	1954	1985	1960	1996	1996	1994	1953	1986	
MIN	2.58	7.23	6.26	5.16	6.36	59.8	100	27.5	12.9	5.04	2.48	1.33	
(WY)	1949	1950	1959	1959	1959	1964	1964	1958	1964	1966	1963	1948	

SUMMARY STATISTICS FOR 1995 CALENDAR YEAR FOR 1996 WATER YEAR WATER YEARS 1948 - 1996

	ANNUAL TOTAL	57660.9	134316.3	(a)227	
ANNUAL MEAN	158	367	471	1985	
HIGHEST ANNUAL MEAN			27.6	1964	
LOWEST ANNUAL MEAN			11800	Sep 12 1986	
HIGHEST DAILY MEAN	2080	Mar 13	6770	May 22	
LOWEST DAILY MEAN	3.9	Sep 16	6.7	Oct 1	
ANNUAL SEVEN-DAY MINIMUM	5.0	Sep 4	8.4	Oct 14	
INSTANTANEOUS PEAK FLOW			8180	May 21	
INSTANTANEOUS PEAK STAGE			15.59	May 21	
INSTANTANEOUS LOW FLOW			6.7	(c)	
ANNUAL RUNOFF (CFSM)	.44		1.02		
ANNUAL RUNOFF (INCHES)	5.97		13.92		
10 PERCENT EXCEEDS	387		807		
50 PERCENT EXCEEDS	84		121		
90 PERCENT EXCEEDS	8.7		22		

(a) Does not include water year 1948.

(b) From floodmark.

(c) Oct. 1, 2, 3.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04151500 CASS RIVER AT FRANKENMUTH, MI

LOCATION.--Lat 43°19'40", long 83°44'53", in NW1/4 SE1/4 sec.27, T.11 N., R.6 E., Saginaw County, Hydrologic Unit 04080205, on right bank 2,000 ft downstream from dam in Frankenmuth, 3,600 ft upstream from highway bridge on Dehmel Road, 3.4 mi upstream from Dead Creek, and 17 mi upstream from mouth.

DRAINAGE AREA.--841 mi².

PERIOD OF RECORD.--February 1908 to March 1909, July 1935 to September 1936, June 1939 to current year.

REVISED RECORDS.--WSP 1307: 1936(M), 1940(M). WSP 1727: 1952. WSP 1911: 1952. WDR MI-78-1: Drainage area.

GAGE--Water-stage recorder. Datum of gage is 583.96 ft above sea level (levels by Michigan Department of Natural Resources). February 1908 to March 1909, nonrecording gage at site 2,000 ft upstream at datum 1.81 ft lower. July 18 to Sept. 11, 1935, nonrecording gage, Sept. 12, 1935 to Sept. 30, 1936, and June 20, 1939 to Sept. 30, 1949, water-stage recorder, at site 3,600 ft downstream at datum 0.04 ft higher.

REMARKS.--Records good except for estimated daily discharges, which are poor. Occasional regulation by dams upstream from station. Prior to 1950, regulation at low and medium flows by mill upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	46	114	768	e160	e340	1730	1040	2730	548	686	388	91
2	42	143	781	e160	e300	e1000	957	2220	485	561	303	84
3	45	168	877	e160	e270	e550	858	1570	459	499	251	78
4	52	164	820	e155	e240	e450	815	1290	434	436	207	73
5	58	155	826	e155	e220	e400	781	1120	427	378	183	68
6	64	137	e500	e150	e200	e360	761	955	414	338	187	68
7	74	133	e350	e145	e190	e330	846	818	484	303	155	96
8	78	130	e280	e135	e220	e310	836	722	871	285	108	72
9	83	122	e260	e125	614	e290	754	902	1170	315	116	142
10	81	128	e240	e120	1370	e280	717	1680	1390	329	110	214
11	77	544	e220	e120	1490	e270	767	4330	1790	340	102	220
12	69	1330	e210	e120	e1000	e260	921	3960	1840	290	100	252
13	63	1380	e200	e120	e700	534	1600	2330	2110	257	99	259
14	59	975	e190	e120	e500	1130	3520	1640	2490	273	92	292
15	56	740	e240	e120	e300	1800	3130	1210	2580	276	86	371
16	53	572	e250	e120	e220	1670	2210	959	1680	275	89	454
17	51	451	e250	234	e200	1150	1850	818	1160	246	90	450
18	51	398	e240	952	e180	895	1430	721	4770	222	87	399
19	55	371	e230	3130	e170	756	1200	653	8980	222	85	346
20	64	380	e220	3510	e270	701	1100	1660	9890	221	91	297
21	66	405	e210	2170	e650	534	1040	9980	6640	205	93	205
22	74	397	e200	1730	1620	409	985	13500	10400	189	100	244
23	73	372	e190	1400	1910	433	987	12100	11600	175	124	330
24	74	338	e185	1010	1480	478	993	6460	9030	162	127	759
25	73	291	e180	703	1790	761	917	2980	6190	141	119	773
26	70	279	e175	e520	1790	2230	945	1910	3370	144	109	851
27	87	297	e170	e450	1720	2790	984	1450	1950	138	110	738
28	124	475	e165	e580	3140	1630	862	1150	1410	130	119	803
29	122	e730	e165	e520	3740	1300	723	937	1090	139	113	1350
30	114	e880	e160	e450	---	1140	1420	771	863	189	104	1150
31	107	---	e160	e390	---	1090	---	644	---	299	99	---
TOTAL	2205	12999	9912	19934	26834	27661	35949	84170	96515	8663	4146	11529
MEAN	71.1	433	320	643	925	892	1198	2715	3217	279	134	384
MAX	124	1380	877	3510	3740	2790	3520	13500	11600	686	388	1350
MIN	42	114	160	120	170	260	717	644	414	130	85	68
CFSM	.08	.52	.38	.76	1.10	1.06	1.42	3.23	3.83	.33	.16	.46
IN.	.10	.57	.44	.88	1.19	1.22	1.59	3.72	4.27	.38	.18	.51

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1908 - 1996, BY WATER YEAR (WY)

	MEAN	226	331	423	438	610	1662	1187	661	388	192	105	228
MAX	2637	1374	1335	2185	2225	4943	3121	2715	3217	1884	523	5000	
(WY)	1987	1993	1985	1973	1976	1947	1996	1947	1996	1994	1953	1986	
MIN	31.7	43.1	50.7	45.1	55.6	179	201	104	60.4	20.4	20.1	23.5	
(WY)	1947	1965	1940	1959	1959	1964	1946	1941	1964	1936	1944	1941	

SUMMARY STATISTICS FOR 1995 CALENDAR YEAR FOR 1996 WATER YEAR WATER YEARS 1908 - 1996

ANNUAL TOTAL	154062	340517	
ANNUAL MEAN	422	930	
HIGHEST ANNUAL MEAN			533
LOWEST ANNUAL MEAN			1063
HIGHEST DAILY MEAN	5100	Mar 14	21700
LOWEST DAILY MEAN	33	Sep 11	(a)1.5
ANNUAL SEVEN-DAY MINIMUM	33	Sep 10	4.4
INSTANTANEOUS PEAK FLOW			22200
INSTANTANEOUS PEAK STAGE			27.52
INSTANTANEOUS LOW FLOW			1.5
ANNUAL RUNOFF (CFSM)	.50	1.11	.63
ANNUAL RUNOFF (INCHES)	6.81	15.06	8.62
10 PERCENT EXCEEDS	1050	1840	1250
50 PERCENT EXCEEDS	230	365	185
90 PERCENT EXCEEDS	54	88	48

(a) Approximately.
(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04152238 SOUTH BRANCH TOBACCO RIVER NEAR BEAVERTON, MI

LOCATION.--Lat 43°52'01", long 84°32'43", in SE1/4 NE1/4 sec.16, T.17 N., R.2 W., Gladwin County, Hydrologic Unit 04080201, on left bank 40 ft upstream from bridge on Grout Road, 3.0 mi upstream from Ross Lake, and 3.2 mi southwest of Beaverton.

DRAINAGE AREA.--160 mi².

PERIOD OF RECORD.--January 1987 to current year.

GAGE.--Water-stage recorder. Datum of gage is 709.92 ft above sea level.

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

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	52	89	e74	e76	e94	e250	e120	308	86	113	108	70
2	52	158	e90	e74	e92	e190	e120	223	92	105	91	68
3	55	181	e96	e72	e92	e160	e120	173	119	135	84	63
4	68	133	e100	e72	e92	e140	e120	154	109	133	79	61
5	79	110	e96	e70	e92	e130	e120	137	98	110	73	60
6	75	96	e92	e70	e92	e120	e120	132	93	100	69	59
7	76	90	e90	e68	e92	e115	e125	125	113	94	66	58
8	83	88	e88	e68	e100	e110	e125	112	177	90	63	59
9	78	83	e86	e68	e130	e105	e130	189	160	98	60	61
10	87	83	e84	e68	e180	e105	e130	378	182	98	58	68
11	77	186	e82	e68	e220	e105	181	709	241	87	57	66
12	70	303	e82	e68	e170	e110	239	710	229	76	56	63
13	66	205	e82	e68	e130	e130	441	356	522	84	57	62
14	65	152	e95	e68	e170	e110	406	226	342	83	59	60
15	66	129	e120	e68	e100	e250	315	196	201	78	56	68
16	67	e110	e100	e70	e96	e220	483	177	146	75	56	68
17	68	e100	e90	e80	e94	e160	400	165	138	71	54	67
18	65	e95	e86	e130	e92	e130	264	155	610	71	54	66
19	64	99	e84	e300	e92	e120	223	145	757	74	55	60
20	67	104	e82	e430	e92	e110	238	187	521	73	116	57
21	91	121	e82	e280	e120	e105	270	334	325	70	210	56
22	105	124	e82	e180	e170	e105	230	290	648	67	134	72
23	94	e100	e82	e130	e160	e105	220	202	872	66	181	91
24	95	e92	e82	e120	e180	e105	192	182	497	66	170	84
25	87	e86	e82	e110	e210	e130	167	163	347	64	114	77
26	84	e82	e82	e105	e300	e160	166	141	242	63	93	71
27	82	e78	e82	e100	e400	e140	153	126	184	62	91	89
28	108	e74	e82	e98	e460	e130	137	111	159	62	93	119
29	114	e72	e82	e96	e500	e125	122	108	140	79	83	112
30	94	e70	e80	e94	---	e120	213	100	125	161	76	102
31	84	---	e78	e94	---	e120	---	90	---	138	70	---
TOTAL	2418	3493	2695	3463	4752	4275	6290	6804	8475	2746	2686	2137
MEAN	78.0	116	86.9	112	164	138	210	219	282	88.6	86.6	71.2
MAX	114	303	120	430	500	250	483	710	872	161	210	119
MIN	52	70	74	68	92	105	120	90	86	62	54	56
CFSM	.49	.73	.54	.70	1.02	.86	1.31	1.37	1.77	.55	.54	.45
IN.	.56	.81	.63	.81	1.10	.99	1.46	1.58	1.97	.64	.62	.50

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1996, BY WATER YEAR (WY)

	115	173	136	108	111	217	241	139	130	75.4	76.5	77.8
MEAN	115	173	136	108	111	217	241	139	130	75.4	76.5	77.8
MAX	202	364	253	176	172	296	478	219	282	92.3	86.6	127
(WY)	1991	1993	1992	1993	1991	1991	1991	1996	1996	1992	1996	1992
MIN	67.6	82.3	61.2	67.6	74.4	138	115	87.2	57.2	49.5	55.3	50.6
(WY)	1995	1990	1990	1994	1993	1996	1987	1988	1988	1988	1988	1995

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1987 - 1996

ANNUAL TOTAL	36013	50234	136
ANNUAL MEAN	98.7	137	184
HIGHEST ANNUAL MEAN			100
LOWEST ANNUAL MEAN			1340
HIGHEST DAILY MEAN	600	Apr 28	872
LOWEST DAILY MEAN	39	Sep 12	52
ANNUAL SEVEN-DAY MINIMUM	40	Sep 10	56
INSTANTANEOUS PEAK FLOW			(a)934
INSTANTANEOUS PEAK STAGE			(c)10.11
INSTANTANEOUS LOW FLOW			51
ANNUAL RUNOFF (CFSM)	.62	.86	(d)
ANNUAL RUNOFF (INCHES)	8.37	11.68	11.53
10 PERCENT EXCEEDS	158	240	237
50 PERCENT EXCEEDS	81	100	94
90 PERCENT EXCEEDS	52	66	62

(a) Gage height 9.47 ft.

(b) Gage height 10.74 ft.

(c) Backwater from ice.

(d) Oct. 1, 2.

(e) Estimated.

(f) July 6, Sept. 9, 1988, Sept. 12, 13, 1995.

STREAMS TRIBUTARY TO LAKE HURON

04154000 CHIPPEWA RIVER NEAR MOUNT PLEASANT, MI

LOCATION.--Lat 43°37'32", long 84°42'28", in NW1/4 NW1/4 sec.8, T.14 N., R.3 W., Isabella County, Hydrologic Unit 04080202, on right bank 12 ft downstream from bridge on South Leaton Road, 3.8 mi northeast of Mount Pleasant, and 36 mi upstream from mouth.

DRAINAGE AREA.--416 mi².

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to current year. Gage-height records for flood seasons collected in this vicinity 1910-27, are contained in reports of National Weather Service.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1337: 1931, 1933-40, 1945, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 710.38 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Oct. 21, 1938, nonrecording gage at site 30 ft upstream at present datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. Diurnal fluctuation below 750 ft³/s caused by powerplant at Mount Pleasant prior to 1962, occasional regulation at low flow since. Since July 30, 1968, occasional regulation by control structures on lake outlets. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	145	356	356	e230	e260	e600	e410	510	304	332	293	206
2	142	454	387	e230	e260	e500	e400	472	324	327	268	196
3	146	426	383	e225	e260	e400	e400	446	342	321	245	188
4	155	380	407	e220	e260	e370	e400	423	333	296	227	181
5	159	357	395	e210	e260	e350	e400	405	337	284	213	175
6	159	343	385	e200	e260	e330	e400	395	332	271	201	170
7	164	331	e360	e195	e260	e320	e410	376	367	266	190	167
8	167	321	e330	e190	e300	e310	e410	360	403	268	183	167
9	161	314	e310	e190	e400	e305	e410	393	452	268	170	185
10	159	332	e290	e190	e500	e300	420	604	479	259	162	180
11	154	604	e280	e190	e600	e300	420	1080	480	250	156	179
12	147	638	e270	e190	e480	450	452	996	504	255	155	177
13	142	504	e260	e190	e350	504	559	898	1020	256	154	170
14	139	461	e290	e190	e300	560	568	770	633	249	156	175
15	139	435	e350	e190	e280	533	582	646	498	238	158	182
16	138	414	e300	e210	e270	483	833	570	444	228	154	183
17	153	398	e270	e250	e260	e420	735	519	447	220	148	181
18	199	389	e260	e400	e260	e370	671	486	792	209	146	180
19	246	385	e250	e600	e260	e310	620	466	965	209	146	173
20	321	401	e240	e900	e310	e300	642	490	825	209	225	167
21	355	441	e235	e700	e450	e300	639	689	715	201	343	169
22	351	412	e230	e540	e430	e300	597	625	663	195	393	217
23	338	385	e230	e450	e400	e300	578	542	591	187	369	237
24	328	368	e230	e370	e450	e320	537	497	548	179	329	244
25	318	356	e230	e330	e500	e380	510	461	554	167	287	239
26	311	350	e230	e310	e700	e420	494	433	507	163	252	227
27	331	e345	e230	e290	e850	e400	467	405	467	159	230	277
28	340	e345	e230	e280	e1000	e380	445	381	431	153	238	315
29	325	e345	e230	e270	e850	422	427	357	396	277	244	318
30	313	347	e230	e265	---	413	482	337	365	417	233	294
31	301	---	e230	e260	---	413	---	319	---	327	217	---
TOTAL	6946	11937	8908	9455	12020	12063	15318	16351	15518	7640	6885	6119
MEAN	224	398	287	305	414	389	511	527	517	246	222	204
MAX	355	638	407	900	1000	600	833	1080	1020	417	393	318
MIN	138	314	230	190	260	300	400	319	304	153	146	167
CFSM	.54	.96	.69	.73	1.00	.94	1.23	1.27	1.24	.59	.53	.49
IN.	.62	1.07	.80	.85	1.07	1.08	1.37	1.46	1.39	.68	.62	.55

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1996, BY WATER YEAR (WY)

	MEAN	252	306	304	279	330	574	591	385	283	195	174	227
MAX	1058	836	627	655	1401	1709	1204	934	711	694	585	1682	
(WY)	1987	1986	1992	1973	1938	1976	1967	1974	1943	1969	1972	1986	
MIN	117	151	144	112	124	204	231	175	117	77.3	70.6	97.7	
(WY)	1947	1939	1931	1945	1940	1937	1945	1977	1941	1936	1931	1931	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1931 - 1996

ANNUAL TOTAL	104789												
ANNUAL MEAN	287												
HIGHEST ANNUAL MEAN													1976
LOWEST ANNUAL MEAN													1931
HIGHEST DAILY MEAN	977												Sep 12 1986
LOWEST DAILY MEAN	135												Aug 16 1936
ANNUAL SEVEN-DAY MINIMUM	141												Aug 10 1936
INSTANTANEOUS PEAK FLOW													Sep 12 1986
INSTANTANEOUS PEAK STAGE							(a)1210			6660			Sep 12 1986
INSTANTANEOUS LOW FLOW							(b)9.01			(c)15.58			Sep 12 1986
ANNUAL RUNOFF (CFSM)	.69						133		(d)	12			Aug 18 1945
ANNUAL RUNOFF (INCHES)	9.37						.85			.78			
10 PERCENT EXCEEDS	426						11.55			10.60			
50 PERCENT EXCEEDS	270						572			592			
90 PERCENT EXCEEDS	163						322			242			
							170			132			

(a) Gage height 6.61 ft.

(b) Backwater from ice.

(c) From floodmark.

(d) Oct. 3, 9, 17.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04155000 PINE RIVER AT ALMA, MI

LOCATION.--Lat 43°22'46", long 84°39'20", in SW1/4 SE1/4 sec.34, T.12 N., R.3 W., Gratiot County, Hydrologic Unit 04080202, on right bank 270 ft downstream from Superior Street Bridge in Alma, 0.6 mi downstream from municipal reservoir, and 38 mi upstream from mouth.

DRAINAGE AREA.--288 mi².

PERIOD OF RECORD.--October 1930 to current year. Gage-height records for flood seasons collected in this vicinity 1910-28 are contained in reports of National Weather Service.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1307: 1945(M). WSP 1337: 1931, 1932-34(M), 1936, 1939, 1945, 1949.

GAGE.--Water-stage recorder. Datum of gage is 718.37 ft above sea level. Prior to Dec. 10, 1930, nonrecording gage at Superior Street Bridge at different datum. Dec. 10, 1930 to June 15, 1938, nonrecording gage at site 70 ft downstream from bridge, and June 16 to Oct. 25, 1938, nonrecording gage at bridge at present datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. Flow regulated by dam 0.6 mi upstream from station, and by variable backwater from powerplant at St. Louis, 5.2 mi downstream. About 2.4 ft³/s diverted upstream from station for municipal and industrial use; sewage effluent is returned downstream from station. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	61	190	297	e140	e175	691	250	317	212	210	347	104
2	56	239	324	e140	e175	689	251	323	218	188	348	95
3	78	283	322	e140	e170	e400	248	320	246	197	246	103
4	131	304	379	e140	e170	e290	260	287	285	175	183	115
5	116	319	344	e135	e170	e250	259	246	292	156	161	101
6	95	251	e240	e130	169	e230	277	235	246	144	149	89
7	103	230	e180	e125	190	e220	305	224	227	135	140	88
8	102	189	e150	e120	348	e210	314	217	258	129	149	89
9	103	166	e150	e120	459	e210	300	236	302	135	134	94
10	103	174	e150	e120	444	e210	267	411	335	157	124	100
11	104	394	e155	e120	450	e210	243	650	343	186	117	112
12	100	460	e170	e120	e330	266	250	625	346	178	110	110
13	98	505	e200	e120	e230	334	306	680	402	162	123	100
14	94	e520	238	e120	e220	451	303	631	395	148	160	98
15	90	e500	236	e120	e200	468	360	497	381	140	169	99
16	88	e420	245	e130	e190	539	427	395	389	135	159	101
17	86	e320	246	200	e180	565	420	325	354	132	143	109
18	87	e260	e210	484	e180	534	453	295	745	172	119	103
19	89	e240	e190	697	e180	463	478	268	1080	164	114	95
20	109	257	e170	503	232	385	430	456	1090	152	156	99
21	136	298	e160	439	372	356	369	1180	1110	136	219	111
22	163	306	e155	492	294	341	381	1060	965	124	302	117
23	175	296	e150	502	288	293	419	1020	741	120	341	140
24	196	267	e145	e350	e310	269	384	867	789	143	320	174
25	158	234	e140	e250	e350	287	338	647	570	137	260	133
26	139	213	e140	e220	380	302	307	537	553	123	188	109
27	165	e200	e140	e200	654	306	280	421	500	122	150	124
28	170	e190	e140	e190	797	284	261	343	421	125	151	152
29	183	e185	e140	e185	611	266	262	288	323	201	145	205
30	195	217	e140	e180	---	255	315	260	246	226	128	197
31	197	---	e140	e175	---	253	---	232	---	292	116	---
TOTAL	3770	8627	6186	7107	8938	10827	9717	14493	14364	4944	5671	3466
MEAN	122	288	200	229	308	349	324	468	479	159	183	116
MAX	197	520	379	697	797	691	478	1180	1110	292	348	205
MIN	56	166	140	120	169	210	243	217	212	120	110	88
CFSM	.42	1.00	.69	.80	1.07	1.21	1.12	1.62	1.66	.55	.64	.40
IN.	.49	1.11	.80	.92	1.15	1.40	1.26	1.87	1.86	.64	.73	.44

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1996, BY WATER YEAR (WY)

MEAN	164	212	215	195	236	472	437	281	190	112	97.2	141
MAX	894	574	488	680	997	1214	1054	677	575	420	276	1364
(WY)	1987	1993	1983	1973	1938	1976	1967	1956	1989	1994	1994	1986
MIN	66.4	82.6	78.4	66.6	72.6	161	159	109	50.8	35.6	34.7	47.5
(WY)	1939	1931	1940	1945	1940	1937	1945	1949	1934	1934	1936	1932

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1931 - 1996

ANNUAL TOTAL	79312		98110			
ANNUAL MEAN	217		268		229	
HIGHEST ANNUAL MEAN					398	1986
LOWEST ANNUAL MEAN					97.8	1931
HIGHEST DAILY MEAN	796	Mar 16	1180	May 21	4960	Sep 12 1986
LOWEST DAILY MEAN	56	Oct 2	56	Oct 2	.40	Sep 6 1964
ANNUAL SEVEN-DAY MINIMUM	66	Sep 15	90	Oct 13	10	Jul 6 1988
INSTANTANEOUS PEAK FLOW			1310	May 21	5160	Sep 12 1986
INSTANTANEOUS PEAK STAGE			6.35	May 21	(a)12.82	Sep 12 1986
INSTANTANEOUS LOW FLOW			54	Oct 2	(b).40	Sep 6 1964
ANNUAL RUNOFF (CFSM)	.75		.93		.80	
ANNUAL RUNOFF (INCHES)	10.24		12.67		10.81	
10 PERCENT EXCEEDS	383		486		474	
50 PERCENT EXCEEDS	185		217		152	
90 PERCENT EXCEEDS	87		110		68	

(a) From floodmark.

(b) Caused by closing dam during construction of waterworks.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04155500 PINE RIVER NEAR MIDLAND, MI

LOCATION.--Lat 43°33'52", long 84°22'09", in SW1/4 NW1/4 sec.4, T.13 N., R.1 E., Midland County, Hydrologic Unit 04080202, on left bank at downstream side of bridge on Meridian Road, 7.2 mi southwest of Midland, and 7.8 mi upstream from Chippewa River.

DRAINAGE AREA.--390 mi², approximately.

PERIOD OF RECORD.--May 1934 to September 1938, February 1948 to current year.

REVISED RECORDS.--WSP 1207: Drainage area. WSP 1307: 1935(M). WSP 1337: 1936-38, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 623.94 ft above sea level. Prior to Sept. 30, 1938, nonrecording gage at same site at datum 5.55 ft lower. Feb. 3, 1948 to Dec. 13, 1951, nonrecording gage at present site and datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. Regulation at low and medium flows by hydroelectric powerplant at St. Louis. Some diversion upstream from station for irrigation.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	113	244	e230	e150	e240	e900	338	473	289	292	337	146
2	112	244	e350	e150	e235	e950	341	427	299	278	410	143
3	104	272	475	e150	e235	e600	341	379	304	266	311	100
4	45	315	502	e150	e230	e450	360	380	306	274	279	90
5	72	301	601	e145	e230	e350	345	350	313	250	187	118
6	225	391	e400	e140	e230	e320	396	284	351	212	153	124
7	114	194	e250	e135	e230	e300	381	270	328	205	151	107
8	120	257	e190	e130	e400	e290	403	269	276	201	114	101
9	125	229	e170	e125	e600	e280	407	282	326	158	133	107
10	122	210	e160	e125	e700	e280	401	452	405	136	131	103
11	124	373	e160	e125	e600	e280	389	1190	418	129	120	102
12	122	816	e180	e125	e450	e280	348	968	492	179	120	118
13	121	546	e210	e125	e350	e350	411	786	673	190	117	130
14	117	704	e250	e125	e300	e500	504	819	712	187	84	138
15	115	644	e270	e125	e270	e600	442	754	569	171	148	136
16	115	571	e280	e150	e250	e700	563	524	506	152	156	133
17	114	480	e250	e200	e240	e800	572	476	503	150	155	143
18	116	387	e220	e500	e240	e700	547	407	1070	97	150	136
19	114	346	e200	e1000	e240	e620	542	368	1900	143	132	135
20	119	328	e190	e800	e240	572	599	633	1750	176	139	118
21	122	372	e180	e600	e350	439	530	2420	1490	172	224	101
22	130	379	e170	e650	e460	384	444	1930	1350	156	176	130
23	231	398	e160	e700	e400	408	438	1440	1150	135	402	149
24	140	e370	e155	e500	e390	388	502	1300	987	89	376	152
25	231	e340	e150	e400	e450	351	436	981	1200	100	335	231
26	198	313	e150	e300	e700	340	405	667	593	128	277	236
27	135	286	e150	e280	e1100	379	362	694	728	109	204	199
28	166	e240	e150	e260	e1300	362	342	485	525	103	142	186
29	184	e230	e150	e250	e850	343	283	439	502	135	145	182
30	182	e230	e150	e245	---	332	368	332	424	350	171	267
31	154	---	e150	e240	---	336	---	321	---	243	153	---
TOTAL	4202	11010	7253	9100	12510	14184	12740	21500	20739	5566	6132	4261
MEAN	136	367	234	294	431	458	425	694	691	180	198	142
MAX	231	816	601	1000	1300	950	599	2420	1900	350	410	267
MIN	45	194	150	125	230	280	283	269	276	89	84	90
CFSM	.35	.94	.60	.75	1.11	1.17	1.09	1.78	1.77	.46	.51	.36
IN.	.40	1.05	.69	.87	1.19	1.35	1.22	2.05	1.98	.53	.58	.41

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1934 - 1996, BY WATER YEAR (WY)

	MEAN	228	276	298	262	342	686	624	363	252	150	135	199
MAX	1238	784	647	865	1356	1725	1549	980	900	655	421	2034	
(WY)	1987	1993	1983	1973	1938	1976	1967	1956	1989	1994	1972	1986	
MIN	72.0	94.8	96.9	70.5	91.3	207	211	106	43.9	35.5	37.4	58.0	
(WY)	1949	1950	1963	1977	1963	1964	1963	1958	1934	1934	1936	1948	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1934 - 1996

ANNUAL TOTAL	99633	129197		
ANNUAL MEAN	273	353		
HIGHEST ANNUAL MEAN			318	
LOWEST ANNUAL MEAN			541	1986
HIGHEST DAILY MEAN	1080	Mar 15	150	1963
LOWEST DAILY MEAN	45	Oct 4	8750	Sep 12 1986
ANNUAL SEVEN-DAY MINIMUM	76	Sep 7	7.8	Jul 2 1988
INSTANTANEOUS PEAK FLOW			17	Aug 13 1936
INSTANTANEOUS PEAK STAGE			(b)9360	Sep 12 1986
INSTANTANEOUS LOW FLOW			(c)12.08	Feb 2 1968
ANNUAL RUNOFF (CFSM)	.70		(d)7.6	(f)
ANNUAL RUNOFF (INCHES)	9.50		11.08	
10 PERCENT EXCEEDS	545		660	
50 PERCENT EXCEEDS	220		200	
90 PERCENT EXCEEDS	110		83	

(a) Gage height 6.86 ft.

(b) Gage height 11.74 ft.

(c) Backwater from ice.

(d) Does not include water years 1934 to 1952.

(e) Estimated.

(f) July 1, 2, 1988.

STREAMS TRIBUTARY TO LAKE HURON

04156000 TITABAWASSEE RIVER AT MIDLAND, MI

LOCATION.--Lat 43°35'43", long 84°14'08", in NW1/4 NE1/4 sec.28, T.14 N., R.2 E., Midland County, Hydrologic Unit 04080201, on right bank 2,000 ft downstream from dam at Dow Chemical Co. in Midland, 0.7 mi upstream from Bullock Creek, 1.4 mi downstream from Chippewa River, and 23 mi upstream from mouth.

DRAINAGE AREA.--2,400 mi², approximately.

PERIOD OF RECORD.--March 1936 to current year. Gage-height records for flood seasons collected in this vicinity 1910-26, 1928, are contained in reports of National Weather Service.

REVISED RECORDS.--WSP 1045: 1945. WSP 1144: 1948.

GAGE.--Water-stage recorder. Datum of gage is 580.08 ft above sea level (levels by Wade-Trim Assoc.). Prior to Sept. 30, 1955, at datum 10.20 ft higher, Oct. 1, 1955 to Sept. 30, 1993, at datum 0.20 ft higher.

REMARKS.--Records good except for estimated daily discharges, which are poor. Approximately 3.4 ft³/s diverted upstream from station for industrial use, flow partially returned to river 0.25 mi downstream from station, remainder returned 1 mi downstream. Prior to 1992 water year, diversion was used in computing annual mean discharge and runoff figures, extremes and daily discharge were not adjusted for diversion. Prior to May 20, 1970, discharge below 4,000 ft³/s regulated by dam 2,000 ft upstream from station; fixed crest dam since. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	321	1530	2140	e600	e1900	5220	1530	4450	1100	1610	1940	411
2	467	1650	1570	e1000	e1800	4130	1980	3830	845	1860	1510	390
3	564	1920	1540	e1100	e1200	e3500	1950	3410	1610	1740	1100	689
4	861	1760	2020	e1200	e650	e3000	2670	2750	1970	1030	700	702
5	520	1090	2660	e1400	e1000	e2300	2700	2190	1670	1340	840	701
6	780	1450	e2200	e900	e1100	e2100	2690	2160	1510	1050	996	721
7	450	1370	e1600	e500	e1200	e2000	1770	1890	1470	664	820	358
8	349	1150	e1500	e750	e1800	e1200	1520	1730	1340	1160	865	279
9	734	1110	e1400	e950	e3000	e950	2670	2020	2120	1030	538	710
10	778	1040	e750	e1200	e4000	e800	3220	4650	2610	1120	378	835
11	767	2480	e1200	e1100	e3700	e1100	3000	10900	2620	1060	327	659
12	605	3520	e1300	e950	e3500	1820	3050	10900	2790	1150	653	638
13	663	3300	e1400	e650	e3000	2080	3760	6760	3730	680	725	710
14	397	2920	e1400	e500	e2400	3190	4510	4760	6090	553	551	515
15	329	2680	e1400	e1000	e2300	4500	4420	4180	4280	955	537	360
16	680	2320	e950	e1300	e2000	3940	4840	3160	2020	1180	557	636
17	767	2290	e700	1540	e1300	3730	5340	2430	2240	633	395	1060
18	769	1510	e1100	2470	e800	3630	4210	2210	10200	630	340	820
19	638	1140	e1400	6390	e700	3700	3920	1770	18200	778	658	567
20	750	1590	e1400	7870	e1600	3350	3580	2930	16900	679	867	591
21	605	2270	e1900	6470	e2100	3130	4060	9020	10700	630	1150	331
22	586	2470	e1800	4680	e2100	2910	3490	9410	13800	611	1340	328
23	1150	1620	e800	2730	e2700	2660	3420	6340	13700	581	2540	716
24	1350	1760	e550	e2000	e2700	1640	2760	5250	8580	552	1690	976
25	916	1430	e600	e1500	e2000	1940	2650	4120	5940	512	909	871
26	1010	1020	e1200	e1000	e3000	2310	2830	2740	4330	709	1160	945
27	1210	1480	e1700	e750	4390	2200	2140	2140	3760	384	1330	1290
28	684	1870	e1800	e700	8080	2750	2210	2060	2590	306	696	804
29	651	1550	e1200	e900	7770	2720	2200	2170	1960	1320	598	1220
30	978	1940	e650	e1600	---	1480	2710	1520	1300	1890	828	1420
31	1020	---	e600	e1600	---	1090	---	1380	---	2160	504	---
TOTAL	22349	55240	42430	57300	73790	81070	91800	125230	151975	30557	28042	21253
MEAN	721	1841	1369	1848	2544	2615	3060	4040	5066	986	905	708
MAX	1350	3520	2660	7870	8080	5220	5340	10900	18200	2160	2540	1420
MIN	321	1020	550	500	650	800	1520	1380	845	306	327	279
CFSM	.30	.77	.57	.77	1.06	1.09	1.27	1.68	2.11	.41	.38	.30
IN.	.35	.86	.66	.89	1.14	1.26	1.42	1.94	2.36	.47	.43	.33

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1936 - 1996, BY WATER YEAR (WY)

MEAN	1079	1494	1539	1390	1701	3907	3734	2148	1414	740	599	926
MAX	6318	6097	3907	5564	6455	10660	8096	5573	5270	4492	2236	10300
(WY)	1987	1986	1992	1973	1938	1976	1967	1956	1945	1957	1972	1986
MIN	344	493	462	388	466	1027	969	567	355	234	217	250
(WY)	1949	1950	1964	1945	1963	1964	1945	1977	1964	1941	1936	1948

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1936 - 1996

ANNUAL TOTAL	515842	781036	
ANNUAL MEAN	1413	2134	
HIGHEST ANNUAL MEAN			1728
LOWEST ANNUAL MEAN			3318
HIGHEST DAILY MEAN	8600	18200	36200
LOWEST DAILY MEAN	284	279	111
ANNUAL SEVEN-DAY MINIMUM	373	522	126
INSTANTANEOUS PEAK FLOW		19200	38700
INSTANTANEOUS LOW FLOW		25.01	(a)33.89
ANNUAL RUNOFF (CFSM)	.59	.89	.72
ANNUAL RUNOFF (INCHES)	8.00	12.11	9.78
10 PERCENT EXCEEDS	2690	4140	3960
50 PERCENT EXCEEDS	1120	1490	949
90 PERCENT EXCEEDS	520	589	374

(a) From floodmark.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04157000 SAGINAW RIVER AT SAGINAW, MI

LOCATION.--Lat 43°24'46", long 83°57'47", in NW1/4 SE1/4 sec.26, T.12 N., R.4 E., Saginaw County, Hydrologic Unit 04080206, on right bank 1,000 ft downstream from bridge on Rust Avenue in Saginaw, 1.9 mi downstream from Tittabawassee River, and 20.3 mi upstream from mouth.

DRAINAGE AREA.--6,060 mi², approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--1904, 1908-9, 1912-13, 1916, 1918-19, 1929-30, and 1942 (flood discharge for certain periods only) in WSP 1084; December 1942 to September 1991 and October 1994 to current year, daily discharges greater than 10,000 ft³/s only; no daily discharges greater than 10,000 ft³/s water years 1944, 1949, 1953, 1955, 1958, 1961, 1963, 1964, 1966. Continuous-record station October 1991 to July 1994. Gage-height records for flood seasons 1910-20 are contained in reports of National Weather Service.

GAGE.--Water-stage recorder. Datum of gage is 565.05 ft, International Great Lakes datum. Prior to Oct. 1, 1972, nonrecording gage at site 1.9 mi downstream at same datum. Auxiliary water-stage recorders on right bank at Essexville or on right bank Alpin Beach.

REMARKS.--Water-discharge records fair except for estimated daily discharges, which are poor. Minimum flows affected by wind direction and seiche on Saginaw Bay, 20.3 mi downstream. Considerable diversion through metropolitan area of Saginaw. National Weather Service gage-height telemeter at station.

COOPERATION.--Auxiliary gage-height record at Alpin Beach furnished by National Oceanic Atmospheric Administration.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 68,000 ft³/s, Mar. 30, 1904, gage height, 24.9 ft, site then in use.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 30,400 ft³/s, May 23; maximum daily gage height, 19.16 ft, June 21, 24.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	e13000	---	10500	---	---	---	---
2	---	---	---	---	---	e11000	---	11900	---	---	---	---
3	---	---	---	---	---	---	---	10700	---	---	---	---
4	---	---	---	---	---	---	---	10100	---	---	---	---
5	---	---	---	---	---	---	---	---	---	---	---	---
6	---	---	---	---	---	---	---	---	---	---	---	---
7	---	---	---	---	---	---	---	---	---	---	---	---
8	---	---	---	---	---	---	---	---	---	---	---	---
9	---	---	---	---	---	---	---	---	---	---	---	---
10	---	---	---	---	---	---	---	---	---	---	---	---
11	---	---	---	---	---	---	---	13000	---	---	---	---
12	---	---	---	---	---	---	---	19200	---	---	---	---
13	---	---	---	---	---	---	---	19900	---	---	---	---
14	---	---	---	---	---	---	11400	16100	---	---	---	---
15	---	---	---	---	---	---	13200	12700	---	---	---	---
16	---	---	---	---	---	---	12600	---	---	---	---	---
17	---	---	---	---	---	---	13000	---	---	---	---	---
18	---	---	---	---	---	---	11800	---	13300	---	---	---
19	---	---	---	e10000	---	---	10200	---	22000	---	---	---
20	---	---	---	e13000	---	---	---	12000	28100	---	---	---
21	---	---	---	e15000	---	---	---	19400	29400	---	---	---
22	---	---	---	e15600	---	---	---	27900	29000	---	---	---
23	---	---	---	e12000	---	---	---	30400	28700	---	---	---
24	---	---	---	---	---	---	---	28800	28800	---	---	---
25	---	---	---	---	---	---	---	26200	27800	---	---	---
26	---	---	---	---	---	---	---	e20000	26000	---	---	---
27	---	---	---	---	e11000	---	---	e14000	22800	---	---	---
28	---	---	---	---	e14000	---	---	e10000	17800	---	---	---
29	---	---	---	---	e15000	---	---	---	12100	---	---	---
30	---	---	---	---	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	---	---	---	---	---	---	---	---	---	---	---	---
MEAN	---	---	---	---	---	---	---	---	---	---	---	---
MAX	---	---	---	---	---	---	---	---	---	---	---	---
MIN	---	---	---	---	---	---	---	---	---	---	---	---
CFSM	---	---	---	---	---	---	---	---	---	---	---	---
IN.	---	---	---	---	---	---	---	---	---	---	---	---

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04157000 SAGINAW RIVER AT SAGINAW, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1975-86, 1989 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: November 1974 to September 1981.

WATER TEMPERATURE: November 1974 to September 1981.

INSTRUMENTATION.--Water-quality monitor from Nov. 6, 1976 to Sept. 30, 1981.

REMARKS.--Cross-sectional samples were collected at Rust Avenue bridge.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE (water years 1975, 1977, 1979): Maximum recorded (more than 20 percent missing record), 1,230 microsiemens, Jan. 5, 1977; minimum recorded (more than 20 percent missing record), 224 microsiemens, Mar. 13, 1977.

WATER TEMPERATURE (water years 1975-77, 1979): Maximum, 30.0°C, July 10, 14, 20, 1977; minimum, 0.0°C on many days during winter.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

		DIS- CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE- CIFIC CON- DUCT- ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND- ARD UNITS) (00400)	TEMPER- ATURE WATER (DEG C) (00010)	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- TOCOCI FECAL, KF AGAR (COLS. PER 100 ML) (31673)	
OCT 26...	1300	600	660	7.9	10.5	15	9.2	85	--	--	
APR 18...	1300	12000	550	8.2	8.0	13	--	--	K64	170	
MAY 30...	1100	6670	542	8.2	15.5	23	9.0	92	140	K28	
AUG 04...	1400	3540	653	8.5	24.0	38	9.8	119	K13	K40	
DATE		HARD- NESS TOTAL (MG/L AS CACO3) (00900)	HARD- NESS NONCARB DISSOLV FLD. AS CACO3 (MG/L) (00904)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	BICAR- BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	CAR- BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	ALKA- LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)
OCT 26...	220	45	58	19	45	3.1	218	--	179	34	
APR 18...	220	59	61	16	19	3.4	195	--	160	40	
MAY 30...	260	--	73	18	17	3.3	--	--	--	33	
AUG 04...	220	43	59	17	46	3.5	199	7	175	39	
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, DIS- SOLVED (TONS PER AC-FT) (70303)	SOLIDS, DIS- SOLVED (TONS PER DAY) (70302)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)
OCT 26...	80	0.30	5.9	392	0.53	635	0.010	0.660	0.070	0.70	
APR 18...	44	0.20	5.1	329	0.45	10700	0.030	3.00	0.060	1.0	
MAY 30...	38	0.20	5.5	339	0.46	6110	0.050	2.50	0.040	1.1	
AUG 04...	87	0.30	3.1	428	0.58	4090	0.030	0.380	0.030	1.0	

STREAMS TRIBUTARY TO LAKE HURON

04157000 SAGINAW RIVER AT SAGINAW, MI--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DATE	PHOS- PHORUS TOTAL (MG/L AS P) (00665)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)	ALUM- INUM, DIS- SOLVED (UG/L AS AL) (01106)	BARIUM, DIS- SOLVED (UG/L AS BA) (01005)	COBALT, DIS- SOLVED (UG/L AS CO) (01035)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	LITHIUM DIS- SOLVED (UG/L AS LI) (01130)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)
OCT 26...	0.100	0.030	0.020	<10	39	<3.0	15	6	9.0
APR 18...	0.070	0.020	0.010	40	36	<3.0	70	5	12
MAY 30...	0.120	0.020	0.010	20	41	<3.0	74	<4	11
AUG 04...	0.050	<0.010	<0.010	<5.0	43	<3.0	<3.0	4	3.0

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)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDE (T/DAY) (80155)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331)
OCT 26...	10	<1.0	<1	<1.0	310	<6	29	47	92
APR 18...	<10	1.0	<1	<1.0	190	<6	47	1520	86
MAY 30...	10	1.0	<1	<1.0	190	<6	51	918	98
AUG 04...	<10	2.0	<1	<1.0	310	<6	53	507	94

STREAMS TRIBUTARY TO ST. CLAIR RIVER

04159492 BLACK RIVER NEAR JEDDO, MI
(National water-quality assessment program station)

LOCATION.--Lat 43°09'09", long 82°37'27", in SE1/4 SE1/4 sec.6, T.8 N., R.16 E., St. Clair County, Hydrologic Unit 04090001, on right bank 650 ft upstream from bridge on Jeddo Road, 0.4 mi downstream from Silver Creek, and 2.2 mi west of Jeddo.

DRAINAGE AREA.--464 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--February 1944 to current year. Published as "near Fargo" prior to October 1991.

REVISED RECORDS.--WSP 1307: 1950(M). WSP 1627: 1956-58. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 655 ft above sea level, from topographic map. Prior to July 9, 1954 nonrecording gage and July 10, 1954 to September 1991 water-stage recorder, at site 7.6 mi downstream, at different datum (station 04159500).

REMARKS.--Water-discharge records good except for estimated daily discharges, which are poor.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	26	275	e49	e86	291	e280	2020	189	230	101	35
2	19	38	323	e49	e78	288	e270	902	172	180	99	33
3	21	54	314	e48	e66	176	e260	533	163	155	112	33
4	23	51	309	e48	e60	e120	e250	488	269	138	87	34
5	33	40	285	e48	e54	e100	e240	438	356	117	70	33
6	70	33	208	e48	e47	e90	e230	354	249	101	75	33
7	61	34	132	e48	e42	e80	e230	296	320	92	65	45
8	52	35	e105	e48	121	e73	e230	266	1030	92	51	97
9	39	36	e90	e48	577	e70	e230	359	874	192	56	257
10	34	36	e80	e43	1040	e65	e230	833	1340	185	51	214
11	28	459	e76	e39	948	e62	e260	1980	810	123	47	118
12	26	1120	e70	e39	610	e60	430	1130	933	98	45	93
13	25	545	e68	e39	346	181	3550	659	1110	86	48	102
14	23	307	e63	e39	e200	826	4140	444	722	86	35	88
15	22	212	e68	e40	e140	1280	1580	339	566	98	41	118
16	23	159	e74	65	e80	568	1310	281	361	98	43	180
17	38	127	e82	159	e56	313	971	241	269	88	44	150
18	33	113	e79	1330	e44	235	636	217	3190	85	42	113
19	29	118	e76	2590	e37	229	495	198	7300	79	40	110
20	28	135	e72	1110	98	225	493	195	5160	104	39	74
21	28	137	e70	465	1010	104	529	5800	2440	90	39	72
22	28	125	e66	e270	1680	88	462	7780	5500	72	39	96
23	26	108	e63	e180	827	83	687	2880	6350	70	43	626
24	25	94	e61	e160	2070	87	571	1450	3640	67	42	642
25	23	77	e58	e140	1620	666	425	934	2310	69	42	674
26	23	80	e56	e120	630	e3300	467	622	1210	61	39	433
27	26	98	e54	e150	527	e1300	485	463	721	55	37	345
28	30	808	e52	e210	2110	e600	361	370	509	52	36	1440
29	33	719	e51	e170	749	e400	275	303	391	49	36	1300
30	29	372	e50	e130	---	e350	1210	250	304	49	37	644
31	26	---	e50	e100	---	e300	---	213	---	63	36	---
TOTAL	945	6296	3480	8022	15953	12610	21787	33238	48758	3124	1617	8232
MEAN	30.5	210	112	259	550	407	726	1072	1625	101	52.2	274
MAX	70	1120	323	2590	2110	3300	4140	7780	7300	230	112	1440
MIN	19	26	50	39	37	60	230	195	163	49	35	33
CFSM	.07	.45	.24	.56	1.19	.88	1.57	2.31	3.50	.22	.11	.59
IN.	.08	.50	.28	.64	1.28	1.01	1.75	2.66	3.91	.25	.13	.66

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 1996, BY WATER YEAR (WY)

	MEAN	114	170	253	254	418	1012	667	303	189	79.3	59.6	115
MAX	1316	972	1031	1315	1855	3218	2102	1511	1625	517	559	2237	
(WY)	1987	1993	1951	1952	1954	1985	1947	1956	1996	1994	1953	1986	
MIN	7.62	10.5	10.3	8.37	15.8	48.9	54.2	40.4	22.4	13.1	8.34	5.53	
(WY)	1964	1945	1959	1945	1959	1964	1946	1958	1949	1966	1948	1948	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1944 - 1996

ANNUAL TOTAL	73979		164062										
ANNUAL MEAN	203		448										
HIGHEST ANNUAL MEAN													
LOWEST ANNUAL MEAN													
HIGHEST DAILY MEAN	3130												
LOWEST DAILY MEAN	18												
ANNUAL SEVEN-DAY MINIMUM	19												
INSTANTANEOUS PEAK FLOW													
INSTANTANEOUS PEAK STAGE													
INSTANTANEOUS LOW FLOW													
ANNUAL RUNOFF (CFSM)	.44												
ANNUAL RUNOFF (INCHES)	5.93												
10 PERCENT EXCEEDS	509												
50 PERCENT EXCEEDS	70												
90 PERCENT EXCEEDS	23												

(a) From rating curve extended above 9,500 ft³/s.

(b) Present site and datum; peak stage observed at previous site and datum, 18.05 ft, Feb. 20, 1951, backwater from ice.

(c) Observed; site then in use.

(d) Sept. 18, 19, 1946.

(e) Estimated.

STREAMS TRIBUTARY TO ST. CLAIR RIVER

04159492 BLACK RIVER NEAR JEDDO, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--April to September 1996.

REMARKS.--Samples were collected at or near bridge on Jeddo Road.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)	E. COLI WATER WHOLE TOTAL UREASE (COL / 100 ML) (31633)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)
APR 03...	1100	--	558	8.2	4.0	12.8	100	K26	44	240
MAY 03...	1310	512	627	8.2	9.0	10.6	94	K110	96	290
MAY 16...	1200	282	660	8.3	12.0	10.4	99	280	--	350
JUN 06...	1210	243	580	8.3	16.5	8.7	91	K1000	K1000	290
JUN 19...	1520	7290	353	8.0	17.5	7.2	78	>600	>800	150
JUL 11...	1230	120	742	8.4	20.0	8.5	95	K1300	720	340
AUG 13...	1440	46	822	8.4	23.0	9.0	108	68	K25	330
SEP 11...	1150	114	673	8.3	20.5	7.7	88	K1500	K340	260
DATE	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	CAR-BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	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 03...	68	17	17	4.9	166	--	136	64	37	0.20
MAY 03...	78	23	19	5.0	212	--	174	75	49	0.20
MAY 16...	94	27	18	4.0	239	--	196	88	45	0.20
JUN 06...	81	22	16	5.0	226	--	185	68	39	0.30
JUN 19...	43	11	4.7	7.2	--	--	--	22	17	0.20
JUL 11...	93	27	25	4.8	278	7	240	90	50	0.30
AUG 13...	88	27	34	5.0	278	7	240	92	67	0.30
SEP 11...	67	22	32	5.4	203	--	166	76	63	0.20
DATE	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
APR 03...	4.5	334	0.030	3.60	0.190	1.1	0.90	0.120	0.050	0.040
MAY 03...	4.1	464	0.030	6.70	0.020	1.1	1.1	0.170	0.060	0.030
MAY 16...	2.1	482	0.040	5.70	0.030	1.1	1.0	0.060	<0.010	0.020
JUN 06...	4.0	412	0.100	4.50	0.320	1.9	1.2	0.240	0.090	0.060
JUN 19...	5.8	252	0.090	7.00	0.210	1.9	2.0	0.310	0.310	0.110
JUL 11...	5.5	498	0.040	2.30	0.080	0.90	0.80	0.100	0.040	0.030
AUG 13...	4.7	511	0.020	1.10	0.040	0.70	0.50	0.020	<0.010	<0.010
SEP 11...	5.5	404	0.050	2.40	0.080	0.80	0.80	0.100	0.020	0.030

STREAMS TRIBUTARY TO ST. CLAIR RIVER
04159492 BLACK RIVER NEAR JEDDO, MI--Continued
WATER-QUALITY DATA, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DATE	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDE TOTAL (MG/L AS C) (00689)	SEDI- MENT, SUS- PENDE (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDE (T/DAY) (80155)	ACETO- CHLOR, WATER FLTRD REC (UG/L) (49260)	ALA- CHLOR, WATER, DISS, REC (UG/L) (46342)	ATRA- ZINE, WATER, DISS, REC (UG/L) (39632)	DEETHYL ATRA- ZINE, WATER, DISS, REC (UG/L) (04040)	METHYL AZIN- PHOS WAT FLT 0.7 U GF REC (UG/L) (82686)
APR 03...	59	32	8.4	1.3	16	42	0.009	0.010	0.089	E0.017	<0.001
MAY 03...	58	23	12	0.80	35	49	0.005	0.012	0.120	E0.025	<0.001
16...	140	35	14	1.0	18	19	0.012	0.006	0.080	E0.019	<0.001
JUN 06...	41	12	10	2.6	118	77	E3.80	0.430	E6.90	E0.110	<0.001
19...	240	14	9.8	4.5	162	3190	0.559	0.665	7.08	E0.065	<0.001
JUL 11...	34	17	8.9	1.0	176	57	0.430	0.560	3.00	E0.120	<0.001
AUG 13...	3.0	31	7.9	0.70	103	13	0.015	0.068	0.956	E0.036	<0.001
SEP 11...	7.0	5.0	6.9	1.1	--	--	0.017	0.040	0.307	E0.049	<0.001
DATE	BEN- FLUR- ALIN WAT FLT 0.7 U GF REC (UG/L) (82673)	BUTYL- ATE, WATER, DISS, REC (UG/L) (04028)	CAR- BARYL WATER FLTRD 0.7 U GF REC (UG/L) (82680)	CARBO- FURAN WATER FLTRD 0.7 U GF REC (UG/L) (82674)	CHLOR- PYRIFOS DIS- SOLVED (UG/L) (38933)	CYANA- ZINE, WATER, DISS, REC (UG/L) (04041)	DCPA WATER FLTRD 0.7 U GF REC (UG/L) (82682)	P,P' DDE DISSOLV (UG/L) (34653)	DI- AZINON, DIS- SOLVED (UG/L) (39572)	DI- ELDRIN DIS- SOLVED (UG/L) (39381)	
APR 03...	<0.002	<0.002	<0.003	<0.003	<0.004	0.027	<0.002	<0.006	<0.002	<0.001	
MAY 03...	<0.002	<0.002	<0.003	<0.003	<0.004	0.032	<0.002	<0.006	<0.002	<0.001	
16...	<0.002	<0.002	<0.003	<0.003	<0.004	0.018	<0.002	<0.006	<0.002	<0.001	
JUN 06...	<0.002	0.021	<0.003	<0.003	<0.004	2.00	<0.002	<0.006	<0.002	<0.001	
19...	<0.002	0.011	E0.019	E0.006	0.005	0.913	E0.003	<0.006	0.010	<0.001	
JUL 11...	<0.002	<0.002	<0.003	<0.003	<0.004	1.30	E0.002	<0.006	<0.002	<0.001	
AUG 13...	<0.002	<0.002	<0.003	<0.003	<0.004	0.165	<0.002	<0.006	<0.002	<0.001	
SEP 11...	<0.002	<0.002	<0.003	<0.003	0.018	0.140	<0.002	<0.006	0.028	<0.001	
DATE	2,6-DI- ETHYL ANILINE WAT FLT 0.7 U GF REC (UG/L) (82660)	DISUL- FOTON WATER FLTRD 0.7 U GF REC (UG/L) (82677)	EPTC WATER FLTRD 0.7 U GF REC (UG/L) (82668)	ETHAL- FLUR- ALIN WAT FLT 0.7 U GF REC (UG/L) (82663)	ETHO- PROP WATER FLTRD 0.7 U GF REC (UG/L) (82672)	FONOFOS WATER DISS REC (UG/L) (04095)	ALPHA BHC DIS- SOLVED (UG/L) (34253)	LINDANE DIS- SOLVED (UG/L) (39341)	LIN- URON WATER FLTRD 0.7 U GF REC (UG/L) (82666)	MALA- THON, DIS- SOLVED (UG/L) (39532)	
APR 03...	<0.003	<0.017	0.011	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	
MAY 03...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	0.007	<0.005	
16...	<0.003	<0.017	E0.004	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	
JUN 06...	<0.003	<0.017	0.031	<0.004	<0.003	0.021	<0.002	<0.004	0.068	<0.005	
19...	<0.003	<0.017	0.177	<0.004	<0.003	0.008	<0.002	<0.004	0.049	<0.005	
JUL 11...	<0.003	<0.017	0.067	<0.004	<0.003	<0.003	<0.002	<0.004	0.040	<0.005	
AUG 13...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	0.090	<0.005	
SEP 11...	<0.003	<0.017	E0.001	<0.004	<0.003	<0.003	<0.002	<0.004	0.014	<0.005	

STREAMS TRIBUTARY TO ST. CLAIR RIVER

04159492 BLACK RIVER NEAR JEDDO, MI--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DATE	METO- LACHLOR WATER DISSOLV (UG/L) (39415)	METRI- BUZIN WATER DISSOLV (UG/L) (82630)	MOL- INATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)	NAPROP- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82684)	PARA- THION, DIS- SOLVED (UG/L) (39542)	METHYL PARA- THION WAT FLT 0.7 U GF, REC (UG/L) (82667)	PEB- ULATE WATER FLTRD 0.7 U GF, REC (UG/L) (82669)
APR 03...	0.120	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
MAY 03...	0.130	0.009	<0.004	<0.003	<0.004	<0.006	<0.004
MAY 16...	0.170	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
JUN 06...	E9.40	0.230	<0.004	<0.003	<0.004	<0.006	<0.004
JUN 19...	12.0	0.293	<0.004	<0.003	<0.004	<0.006	<0.004
JUL 11...	2.10	0.640	<0.004	<0.003	<0.004	<0.006	<0.004
AUG 13...	1.18	0.020	<0.004	<0.003	<0.004	<0.006	<0.004
SEP 11...	0.267	0.032	<0.004	<0.003	<0.004	<0.006	<0.004

DATE	PENDI- METH- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	PER- METHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	PRO- METON, WATER, DISS, REC (UG/L) (04037)	PRON- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	PROP- CHLOR, WATER, DISS, REC (UG/L) (04024)	PRO- PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)
APR 03...	<0.004	<0.005	<0.002	E0.005	<0.003	<0.007	<0.004
MAY 03...	<0.004	<0.005	<0.002	<0.018	<0.003	<0.007	<0.004
MAY 16...	<0.004	<0.005	<0.002	E0.007	<0.003	<0.007	<0.004
JUN 06...	<0.004	<0.005	<0.002	E0.009	<0.003	<0.007	<0.004
JUN 19...	0.036	<0.005	<0.002	E0.007	<0.003	<0.007	<0.004
JUL 11...	<0.010	<0.005	<0.002	E0.018	<0.003	<0.007	<0.004
AUG 13...	<0.004	<0.005	<0.002	0.032	<0.003	<0.007	<0.004
SEP 11...	<0.004	<0.005	<0.002	0.025	<0.003	<0.007	<0.004

DATE	PRO- PARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	SI- MAZINE, WATER, DISS, REC (UG/L) (04035)	TEBU- THURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)	TER- BACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	TER- BUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	THIO- BENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TRIAL- LATE WATER FLTRD 0.7 U GF, REC (UG/L) (82678)	TRI- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)
APR 03...	<0.013	<0.005	E0.002	<0.007	<0.013	<0.002	<0.001	<0.002
MAY 03...	<0.013	0.005	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
MAY 16...	<0.013	0.007	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUN 06...	<0.013	0.140	<0.010	E0.005	<0.013	<0.002	<0.001	E0.003
JUN 19...	<0.013	0.035	<0.010	<0.007	<0.013	<0.002	<0.001	E0.003
JUL 11...	<0.013	0.042	<0.010	E0.021	<0.013	<0.002	<0.001	0.006
AUG 13...	<0.013	0.013	<0.010	E0.012	<0.013	<0.002	<0.001	<0.002
SEP 11...	<0.013	0.009	<0.010	E0.007	<0.013	<0.002	<0.001	0.005

STREAMS TRIBUTARY TO ST. CLAIR RIVER

04159900 MILL CREEK NEAR AVOCA, MI

LOCATION.--Lat 43°03'16", long 82°44'05", in NW1/4 sec.8, T.7 N., R.15 E., St. Clair County, Hydrologic Unit 04090001, on left bank at downstream side of bridge on Bricker Road, 0.2 mi upstream from Gleason Drain, and 2.3 mi west of Avoca.

DRAINAGE AREA.--169 mi².

PERIOD OF RECORD.--April 1963 to September 1975, October 1975 to September 1979 (operated as a crest-stage partial-record station), October 1987 to current year. Also operated as a low-flow partial-record station in water year 1979.

GAGE.--Water-stage recorder. Datum of gage is 711.31 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are poor. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.8	12	73	e15	e36	e160	204	409	34	524	26	7.8
2	3.8	18	54	e15	e32	e120	169	275	29	368	26	7.6
3	3.6	14	54	e15	e27	e88	139	181	26	254	22	7.9
4	5.3	23	51	e14	e25	e60	123	139	32	159	18	8.0
5	5.9	18	50	e14	e22	e47	112	111	48	97	16	7.9
6	24	14	53	e14	e20	e37	101	81	38	60	14	7.7
7	12	18	52	e14	e19	e33	94	63	32	46	13	11
8	17	16	45	e14	82	e30	86	48	32	40	12	17
9	14	15	34	e12	172	e29	81	44	58	54	12	42
10	9.7	16	e28	e11	239	e27	78	141	56	72	11	33
11	7.6	91	e24	e11	248	e25	75	312	56	62	11	33
12	6.5	120	e21	e11	e150	e56	92	293	52	48	11	23
13	5.7	140	e18	e11	e90	138	797	211	58	40	11	21
14	5.4	101	e19	e11	e52	280	1060	148	49	42	11	22
15	8.0	71	e21	e11	e35	336	743	102	42	70	11	20
16	10	51	e23	e11	e27	265	584	72	32	61	11	20
17	8.1	41	e25	e35	e21	171	442	55	28	44	10	22
18	6.8	36	e23	e120	e18	97	324	44	375	36	9.5	19
19	6.0	34	e22	e250	e17	84	243	37	1000	38	9.2	16
20	9.6	31	e21	e200	e47	80	213	31	1030	40	9.4	15
21	13	30	e20	e150	e115	37	235	720	1000	42	10	14
22	11	29	e18	e120	e200	32	204	977	2760	34	9.8	23
23	13	27	e17	e84	323	e31	220	680	2450	30	11	24
24	11	26	e16	e60	606	52	195	465	1990	30	10	42
25	9.4	24	e16	e54	536	241	149	330	2130	25	10	41
26	9.7	22	e16	e50	414	653	133	234	1810	21	9.7	43
27	15	26	e15	e94	312	490	118	161	1540	19	9.1	44
28	16	53	e15	e80	358	363	88	114	1260	17	8.9	90
29	11	82	e15	e66	275	282	66	84	980	15	8.4	115
30	14	92	e15	e52	---	244	262	62	737	15	8.0	91
31	14	---	e15	e41	---	224	---	44	---	18	7.9	---
TOTAL	309.9	1291	889	1660	4518	4812	7430	6668	19764	2421	376.9	887.9
MEAN	10.0	43.0	28.7	53.5	156	155	248	215	659	78.1	12.2	29.6
MAX	24	140	73	250	606	653	1060	977	2760	524	26	115
MIN	3.6	12	15	11	17	25	66	31	26	15	7.9	7.6
CFSM	.06	.25	.17	.32	.92	.92	1.47	1.27	3.90	.46	.07	.18
IN.	.07	.28	.20	.37	.99	1.06	1.64	1.47	4.35	.53	.08	.20

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1963 - 1996, BY WATER YEAR (WY)

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEAN	19.1	56.7	86.5	106	133	280	245	95.3	82.4	22.6	14.7	13.5																						
MAX	67.4	261	266	404	382	664	715	328	659	78.1	57.3	95.9																						
(WY)	1991	1993	1988	1974	1968	1973	1975	1974	1996	1996	1973	1992																						
MIN	2.76	5.25	3.72	6.03	6.21	11.2	26.1	16.2	5.91	2.36	3.17	2.39																						
(WY)	1964	1965	1964	1964	1964	1964	1964	1964	1964	1963	1964	1963																						

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1963 - 1996

	1995	1996	1963-1996
ANNUAL TOTAL	26956.5	51027.7	97.5
ANNUAL MEAN	73.9	139	174
HIGHEST ANNUAL MEAN			7.84
LOWEST ANNUAL MEAN			1974
HIGHEST DAILY MEAN	841	2760	3940
LOWEST DAILY MEAN	3.6	3.6	.90
ANNUAL SEVEN-DAY MINIMUM	4.4	7.1	1.2
INSTANTANEOUS PEAK FLOW		3700	4570
INSTANTANEOUS PEAK STAGE		8.83	8.87
INSTANTANEOUS LOW FLOW		3.0	.80
ANNUAL RUNOFF (CFSM)	.44	.82	.58
ANNUAL RUNOFF (INCHES)	5.93	11.23	7.84
10 PERCENT EXCEEDS	197	315	230
50 PERCENT EXCEEDS	28	36	26
90 PERCENT EXCEEDS	7.0	10	5.2

(a) Aug. 9-11, 1964.

(e) Estimated.

STREAMS TRIBUTARY TO ST. CLAIR RIVER

04160570 NORTH BRANCH BELLE RIVER AT IMLAY CITY, MI

LOCATION.--Lat 43°01'49", long 83°04'02", in SW1/4 NW1/4 sec.16, T.7 N., R.12 E., Lapeer County, Hydrologic Unit 04090001, on left bank 12 ft upstream from bridge on State Highway 21, 0.6 mi northeast of Imlay City.

DRAINAGE AREA.--18.0 mi².

PERIOD OF RECORD.--August 1965 to current year.

GAGE.--Water-stage recorder. Concrete control Aug. 20, 1965 to Nov. 2, 1981. Datum of gage is 789.69 ft above sea level (levels by Boldt, McLeod, and Johnson, Inc.). Prior to Feb. 24, 1985, at datum 2.00 ft higher.

REMARKS.--Records good except for estimated daily discharges, which are poor. Some diversion by pumping for sprinkler irrigation. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.4	4.9	8.4	e4.2	e5.2	e14	19	e81	6.6	14	5.2	3.1
2	2.0	11	8.6	e4.2	e4.7	e10	17	e52	6.8	11	4.6	2.9
3	3.0	8.4	9.3	e4.1	e4.3	e7.0	17	e36	7.9	9.0	4.9	3.0
4	4.5	6.0	9.0	e4.1	e3.9	e6.0	16	e23	8.1	7.6	4.3	3.1
5	5.5	5.1	8.3	e4.0	e3.6	e5.4	14	e17	9.7	6.6	4.0	3.1
6	16	4.7	9.3	e4.0	e3.5	e5.0	13	e15	8.7	5.9	3.8	3.1
7	11	6.2	6.9	e4.0	e8.0	e4.7	12	e13	31	6.3	3.9	6.1
8	7.5	6.1	e5.0	e3.8	e25	e4.3	11	e12	72	11	3.7	11
9	5.5	5.2	e5.0	e3.5	47	e4.0	12	15	63	15	3.5	13
10	4.6	6.0	e5.0	e3.3	38	e3.9	12	53	63	8.5	3.5	8.6
11	3.9	44	e4.9	e3.2	33	e3.7	12	61	43	6.9	3.4	6.9
12	3.7	43	e5.0	e3.2	e20	e7.0	21	35	62	6.1	3.3	8.8
13	3.5	21	e6.0	e3.2	e14	e11	102	23	39	6.8	4.3	6.7
14	3.3	12	e7.2	e3.2	e10	e16	77	18	22	9.4	3.7	7.0
15	3.1	8.4	e8.7	e3.2	e8.0	e11	58	15	14	7.6	3.4	11
16	3.1	7.0	e7.7	e3.2	e6.6	e8.0	41	14	9.9	6.5	3.2	7.6
17	2.9	6.1	e7.0	e7.0	e5.4	e6.0	32	13	20	5.7	3.1	6.6
18	2.9	5.9	e6.4	e17	e4.6	e5.0	29	12	146	5.7	3.0	5.9
19	3.2	5.9	e5.8	e45	e3.8	e4.0	e23	11	145	7.9	2.8	5.3
20	3.8	5.9	e5.5	e30	e8.0	e3.5	e27	15	151	6.3	3.5	5.1
21	4.5	6.0	e5.2	e20	e16	e3.2	e34	118	113	5.9	3.5	4.6
22	4.5	6.0	e5.1	e12	28	e3.0	e30	86	158	5.5	3.4	13
23	4.3	5.7	e5.0	e9.4	39	e2.9	e32	61	133	6.1	5.1	12
24	4.1	5.3	e4.8	e7.0	91	9.9	e26	36	111	5.4	4.5	11
25	3.6	5.3	e4.6	e6.4	35	57	e22	22	96	5.0	4.0	10
26	3.3	5.3	e4.5	e6.2	24	81	e19	16	81	4.7	3.7	8.5
27	7.2	6.4	e4.4	e18	33	51	e17	13	64	4.5	3.7	11
28	8.1	12	e4.4	e12	38	26	e14	14	44	4.4	3.5	22
29	6.1	9.8	e4.3	e9.0	24	23	e12	11	32	4.2	3.4	17
30	5.3	8.2	e4.3	e7.0	---	23	e37	9.3	20	4.9	3.3	12
31	4.8	---	e4.2	e6.0	---	21	---	8.0	---	6.2	3.3	---
TOTAL	151.2	292.8	189.8	270.4	584.6	440.5	808	928.3	1780.7	220.6	116.5	249.0
MEAN	4.88	9.76	6.12	8.72	20.2	14.2	26.9	29.9	59.4	7.12	3.76	8.30
MAX	16	44	9.3	45	91	81	102	118	158	15	5.2	22
MIN	2.0	4.7	4.2	3.2	3.5	2.9	11	8.0	6.6	4.2	2.8	2.9
CFSM	.27	.54	.34	.48	1.12	.79	1.50	1.66	3.30	.40	.21	.46
IN.	.31	.61	.39	.56	1.21	.91	1.67	1.92	3.68	.46	.24	.51

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 1996, BY WATER YEAR (WY)

MEAN	7.67	10.6	11.9	10.9	16.1	29.4	24.0	11.6	10.9	5.01	3.61	6.13
MAX	36.8	31.0	28.2	32.9	46.6	60.5	59.6	32.3	59.4	12.5	10.1	38.4
(WY)	1987	1986	1988	1973	1976	1973	1975	1974	1996	1980	1980	1986
MIN	.82	2.49	2.71	2.64	3.24	8.92	9.15	2.76	1.21	.41	.57	.64
(WY)	1967	1966	1977	1977	1980	1989	1966	1977	1988	1966	1966	1965

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1965 - 1996

ANNUAL TOTAL	4054.3	6032.4	
ANNUAL MEAN	11.1	16.5	12.3
HIGHEST ANNUAL MEAN			20.6
LOWEST ANNUAL MEAN			5.13
HIGHEST DAILY MEAN	64	158	307
LOWEST DAILY MEAN	1.8	2.0	.01
ANNUAL SEVEN-DAY MINIMUM	2.1	3.1	.14
INSTANTANEOUS PEAK FLOW		176	(a)354
INSTANTANEOUS PEAK STAGE		7.17	(b)7.33
INSTANTANEOUS LOW FLOW		1.9	.00
ANNUAL RUNOFF (CFSM)	.62	.92	.68
ANNUAL RUNOFF (INCHES)	8.38	12.47	9.29
10 PERCENT EXCEEDS	24	39	27
50 PERCENT EXCEEDS	7.7	7.0	6.2
90 PERCENT EXCEEDS	3.7	3.4	1.8

(a) From rating curve extended above 100 ft³/s.

(b) Present datum.

(c) Part of each day June 27, 28, 1977, June 26-28, 1979, June 30, 1988, caused by irrigation pumpage.

(e) Estimated.

STREAMS TRIBUTARY TO ST. CLAIR RIVER

04160600 BELLE RIVER AT MEMPHIS, MI

LOCATION.--Lat 42°54'03", long 82°46'09", in NW1/4 SE1/4 sec.35, T.6 N., R.14 E., St. Clair County, Hydrologic Unit 04090001, on right downstream side of bridge on State Highway 19 at Memphis.

DRAINAGE AREA.--151 mi².

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

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 705.41 ft above sea level (Michigan Department of Transportation bench mark).

REMARKS.--Records good except for estimated daily discharges which are poor. Several measurements of water temperature were made during the year.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1947 reached a stage of about 9 ft, from information by local residents.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	22	73	e20	e32	e90	169	494	54	70	31	12
2	13	23	70	e20	e28	e45	146	290	49	56	27	13
3	15	41	67	e19	e26	e37	131	181	49	49	23	12
4	16	42	67	e19	e23	e32	123	155	56	43	23	12
5	22	33	64	e19	e21	e28	120	139	71	37	22	12
6	27	28	59	e19	e19	e26	106	115	62	32	20	12
7	49	25	51	e19	e18	e24	97	101	55	27	19	17
8	37	28	63	e18	62	e22	87	86	64	29	19	29
9	27	29	45	e16	218	e20	83	89	107	37	18	41
10	21	28	32	e15	255	e19	82	167	101	45	16	35
11	18	84	e28	e15	206	e18	78	323	98	35	15	32
12	16	393	e27	e15	142	e30	83	283	75	30	15	27
13	15	371	e25	e15	87	e45	583	191	72	47	15	30
14	14	187	e24	e15	e50	e70	1080	138	62	85	18	28
15	14	122	e27	e15	e35	e130	569	110	50	68	18	27
16	14	95	e29	e15	e25	e110	375	97	41	52	16	33
17	13	76	e32	e30	e21	95	304	87	36	41	15	28
18	13	67	e31	e60	e18	78	225	79	192	35	14	24
19	13	64	e29	e120	e16	77	178	75	615	35	13	22
20	13	65	e28	e250	e30	76	193	71	973	40	13	20
21	14	63	e27	e160	e70	36	277	559	823	37	15	19
22	19	58	e26	e110	e130	e30	229	893	1430	31	14	25
23	18	53	e25	e80	211	e29	250	437	1310	28	15	47
24	17	48	e23	e50	486	55	217	266	897	29	21	43
25	16	47	e23	e35	556	236	164	189	645	27	18	39
26	17	43	e22	e32	252	730	149	136	426	24	16	35
27	18	42	e21	e58	214	500	140	107	227	23	14	36
28	26	86	e20	e94	353	270	111	88	148	21	14	67
29	34	131	e20	e60	244	197	93	76	111	20	14	79
30	29	98	e20	e46	---	192	255	68	90	20	14	58
31	24	---	e20	e37	---	187	---	60	---	24	14	---
TOTAL	613	2492	1118	1496	3848	3534	6697	6150	8989	1177	539	914
MEAN	19.8	83.1	36.1	48.3	133	114	223	198	300	38.0	17.4	30.5
MAX	49	393	73	250	556	730	1080	893	1430	85	31	79
MIN	11	22	20	15	16	18	78	60	36	20	13	12
CFSM	.13	.55	.24	.32	.88	.75	1.48	1.31	1.98	.25	.12	.20
IN.	.15	.61	.28	.37	.95	.87	1.65	1.52	2.21	.29	.13	.23

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1963 - 1996, BY WATER YEAR (WY)

	MEAN	42.7	70.0	92.8	84.6	134	260	210	89.2	59.5	26.4	19.4	31.7
MAX	330	375	247	315	528	595	617	270	300	82.3	91.3	256	
(WY)	1982	1986	1988	1973	1976	1973	1975	1974	1996	1967	1992	1985	
MIN	5.00	7.62	5.50	8.92	8.00	15.8	25.9	20.9	6.44	5.21	5.08	5.54	
(WY)	1964	1965	1964	1964	1963	1964	1964	1977	1964	1965	1963	1979	

SUMMARY STATISTICS FOR 1995 CALENDAR YEAR FOR 1996 WATER YEAR WATER YEARS 1963 - 1996

	ANNUAL TOTAL	27268.8	37567	93.0	
ANNUAL MEAN		74.7	103	168	1985
HIGHEST ANNUAL MEAN				11.3	1964
LOWEST ANNUAL MEAN					
HIGHEST DAILY MEAN	710	Mar 13	1430	3320	Apr 19 1975
LOWEST DAILY MEAN	9.8	Sep 12	11	2.4	Sep 6 1978
ANNUAL SEVEN-DAY MINIMUM	11	Sep 9	12	2.6	Sep 5 1978
INSTANTANEOUS PEAK FLOW			1800	4520	Apr 19 1975
INSTANTANEOUS PEAK STAGE			7.34	8.96	Apr 19 1975
INSTANTANEOUS LOW FLOW			9.5	2.3	(a)
ANNUAL RUNOFF (CFSM)	.49		.68	.62	
ANNUAL RUNOFF (INCHES)	6.72		9.25	8.37	
10 PERCENT EXCEEDS	170		238	220	
50 PERCENT EXCEEDS	36		40	31	
90 PERCENT EXCEEDS	14		15	9.0	

(a) Sept. 6, 10, 1978.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04160800 SASHABAW CREEK NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°43'12", long 83°21'13", in SE1/4 sec.26, T.4 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on right bank at upstream side of culverts on Maybee Road, 1.1 mi upstream from mouth, and 2.5 mi northeast of Drayton Plains.

DRAINAGE AREA.--20.9 mi².

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Metal V-notch weir Aug. 30, 1961 to Mar. 6, 1968. Elevation of gage is 970 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.28	2.6	9.4	4.4	e6.5	e16	22	42	13	18	5.6	2.2
2	.28	6.9	8.8	e4.5	e6.0	e13	21	36	13	17	4.9	2.1
3	.66	6.7	8.3	e5.0	e5.6	e12	21	33	14	16	4.7	1.8
4	1.4	5.1	7.9	3.9	e5.4	e11	23	31	15	14	4.4	1.7
5	1.7	3.6	7.6	3.7	e5.0	e10	24	28	15	12	4.1	1.6
6	4.5	3.2	e7.2	e3.6	e4.7	e9.0	22	26	16	12	3.6	1.6
7	3.2	3.9	e6.6	e3.5	e4.5	e8.0	21	24	19	11	3.3	2.3
8	2.3	3.6	e5.9	e3.5	e8.0	e7.2	20	22	19	10	3.1	4.4
9	1.7	3.0	e5.5	e3.4	13	e6.5	19	24	22	9.7	2.7	4.9
10	1.6	3.6	e5.3	e3.4	12	e5.6	18	40	25	10	2.6	4.2
11	1.6	20	e5.0	e3.4	9.6	5.4	18	46	20	9.2	2.4	3.5
12	1.5	23	e4.9	e3.4	e8.0	7.2	23	39	19	8.5	2.3	3.2
13	1.2	15	e4.7	e3.3	e6.8	10	78	34	17	8.9	2.1	2.9
14	1.0	13	9.8	e3.3	e5.8	15	72	29	15	12	1.9	2.8
15	.96	12	10	e3.3	e5.4	17	69	27	13	11	1.7	3.4
16	.94	10	8.9	e3.3	e5.2	16	66	26	12	9.8	1.7	3.2
17	.87	9.6	6.9	e4.0	e5.0	16	58	24	11	8.7	1.6	2.9
18	.87	10	6.4	e14	e5.0	15	52	22	49	8.0	1.5	2.6
19	.87	10	6.1	30	e5.4	16	51	20	100	8.6	1.4	3.0
20	1.3	10	5.7	29	e7.0	e17	56	20	79	8.7	1.4	2.5
21	2.1	9.8	5.6	15	e16	16	52	50	60	8.7	1.4	2.6
22	1.9	9.5	5.2	12	14	16	50	39	45	8.8	1.2	4.8
23	1.5	9.5	5.3	11	14	15	53	35	37	7.8	3.0	5.7
24	1.4	8.9	5.2	11	23	16	48	31	38	7.0	3.6	5.1
25	1.5	8.5	5.0	e10	20	31	44	26	38	6.9	3.2	5.1
26	1.3	8.1	e4.9	8.8	19	34	41	23	32	6.5	2.8	5.3
27	5.0	8.8	e4.8	12	24	e27	37	21	29	6.1	3.0	8.0
28	6.2	12	4.7	e11	27	24	34	19	26	5.6	4.1	11
29	3.6	11	4.4	e9.5	23	24	32	17	23	5.3	4.3	7.8
30	2.8	9.4	4.4	e8.0	---	24	44	16	20	6.0	3.4	6.5
31	2.5	---	4.5	e7.0	---	23	---	15	---	5.6	2.5	---
TOTAL	58.53	270.3	194.9	251.2	313.9	482.9	1189	885	854	297.4	89.5	118.7
MEAN	1.89	9.01	6.29	8.10	10.8	15.6	39.6	28.5	28.5	9.59	2.89	3.96
MAX	6.2	23	10	30	27	34	78	50	100	18	5.6	11
MIN	.28	2.6	4.4	3.3	4.5	5.4	18	15	11	5.3	1.2	1.6
CFSM	.09	.43	.30	.39	.52	.75	1.90	1.37	1.36	.46	.14	.19
IN.	.10	.48	.35	.45	.56	.86	2.12	1.58	1.52	.53	.16	.21

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 1996, BY WATER YEAR (WY)

	MEAN	6.92	10.8	13.0	12.7	14.4	26.2	29.1	18.3	11.6	5.93	4.51	5.70
MAX	38.4	38.2	28.2	36.5	39.1	61.2	45.5	41.6	28.5	14.8	19.5	31.9	
(WY)	1982	1986	1988	1993	1976	1976	1975	1974	1996	1989	1975	1975	
MIN	.37	1.02	.95	1.46	2.15	6.28	13.0	8.03	1.58	.74	.30	.41	
(WY)	1964	1965	1964	1961	1964	1964	1964	1988	1988	1965	1984	1963	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1960 - 1996

ANNUAL TOTAL	4108.18	5005.33	
ANNUAL MEAN	11.3	13.7	
HIGHEST ANNUAL MEAN			13.2
LOWEST ANNUAL MEAN			21.5
HIGHEST DAILY MEAN	45	100	4.12
LOWEST DAILY MEAN	.28	.28	146
ANNUAL SEVEN-DAY MINIMUM	.42	.96	.04
INSTANTANEOUS PEAK FLOW		118	.04
INSTANTANEOUS PEAK STAGE		4.09	181
INSTANTANEOUS LOW FLOW		.28	4.53
ANNUAL RUNOFF (CFSM)	.54	.65	.03
ANNUAL RUNOFF (INCHES)	7.31	8.91	.63
10 PERCENT EXCEEDS	21	32	8.61
50 PERCENT EXCEEDS	10	8.6	30
90 PERCENT EXCEEDS	2.1	2.1	9.4
			1.7

(a) Oct. 1-3.

(b) July 9, 16, 1988.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04160900 CLINTON RIVER NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°39'37", long 83°23'25", in NE1/4 sec.21, T.3 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on State Highway 59, 2.0 mi south of Drayton Plains.

DRAINAGE AREA.--79.2 mi².

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 940 ft above sea level, from topographic map. Jan. 29 to July 9, 1964, nonrecording gage at same site and datum.

REMARKS.--Records good. Some regulation and occasional diversion for lake-level control at many lakes upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.3	41	64	38	e60	72	78	128	38	120	29	13
2	6.2	44	63	36	e58	73	77	129	40	107	26	13
3	7.5	41	62	e46	e56	73	79	128	50	75	26	14
4	14	40	61	e37	e53	72	80	125	82	32	26	14
5	26	39	60	e35	e50	73	79	119	97	30	25	14
6	30	39	57	e34	48	73	78	105	94	25	20	13
7	39	50	55	e34	45	72	77	85	98	27	15	14
8	39	67	54	36	e47	69	75	64	100	34	14	12
9	39	65	54	34	e48	67	57	70	103	42	13	15
10	39	59	53	36	50	64	39	98	98	31	12	14
11	38	68	e50	35	50	63	36	125	95	32	12	13
12	38	66	49	35	50	62	35	126	94	33	12	14
13	28	69	48	35	50	61	67	126	94	35	11	12
14	15	85	51	36	52	60	95	124	92	38	12	12
15	15	104	48	37	53	60	105	122	91	50	13	12
16	15	96	47	37	52	59	112	110	88	68	13	12
17	14	90	46	41	52	59	116	92	96	54	12	12
18	12	88	45	45	e51	59	124	76	131	53	11	12
19	7.0	86	45	51	51	61	129	76	148	53	10	11
20	14	85	44	50	53	70	136	78	158	51	10	12
21	25	83	44	52	55	73	134	105	170	49	12	13
22	25	81	44	54	53	72	137	131	177	39	12	16
23	25	79	43	56	56	72	136	132	177	19	12	17
24	25	76	43	60	58	73	133	126	175	15	11	55
25	25	73	43	60	66	74	133	109	168	14	11	86
26	25	70	43	63	71	74	131	137	155	15	11	57
27	35	70	42	67	73	73	130	130	144	14	11	60
28	40	70	42	66	70	76	127	111	138	15	11	75
29	40	68	41	e63	70	78	127	78	132	15	12	83
30	40	66	41	e62	---	79	129	45	127	21	12	80
31	40	---	39	e61	---	79	---	37	---	31	13	---
TOTAL	787.0	2058	1521	1432	1601	2145	2991	3247	3450	1237	450	800
MEAN	25.4	68.6	49.1	46.2	55.2	69.2	99.7	105	115	39.9	14.5	26.7
MAX	40	104	64	67	73	79	137	137	177	120	29	86
MIN	6.2	39	39	34	45	59	35	37	38	14	10	11
CFSM	.32	.87	.62	.58	.70	.87	1.26	1.32	1.45	.50	.18	.34
IN.	.37	.97	.71	.67	.75	1.01	1.40	1.53	1.62	.58	.21	.38

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 1996, BY WATER YEAR (WY)

MEAN	38.3	51.6	61.4	56.7	57.7	82.1	92.8	62.1	46.0	30.0	25.3	29.8
MAX	114	107	109	114	115	188	168	137	115	82.0	68.5	129
(WY)	1982	1986	1986	1973	1974	1976	1974	1974	1996	1968	1968	1975
MIN	4.83	7.90	15.6	15.5	16.6	28.8	52.5	22.9	6.47	5.79	6.39	4.80
(WY)	1965	1965	1964	1964	1964	1964	1987	1988	1988	1988	1963	1963

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1960 - 1996

	1995 CALENDAR YEAR	1996 WATER YEAR	WATER YEARS 1960 - 1996
ANNUAL TOTAL	18278.9	21719.0	
ANNUAL MEAN	50.1	59.3	52.8
HIGHEST ANNUAL MEAN			87.9
LOWEST ANNUAL MEAN			20.0
HIGHEST DAILY MEAN	109	177	274
LOWEST DAILY MEAN	6.0	6.2	3.1
ANNUAL SEVEN-DAY MINIMUM	6.5	11	3.5
INSTANTANEOUS PEAK FLOW		185	276
INSTANTANEOUS PEAK STAGE		4.39	4.95
INSTANTANEOUS LOW FLOW		6.0	2.4
ANNUAL RUNOFF (CFSM)	.63	.75	.67
ANNUAL RUNOFF (INCHES)	8.59	10.20	9.05
10 PERCENT EXCEEDS	88	125	102
50 PERCENT EXCEEDS	49	53	46
90 PERCENT EXCEEDS	11	13	11

(a) Oct. 2, 3.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161540 PAINT CREEK AT ROCHESTER, MI

LOCATION.--Lat 42°41'18", long 83°08'35", in NW1/4 SE1/4 sec.10, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Ludlow Street in Rochester, 1.5 mi upstream from mouth.

DRAINAGE AREA.--70.9 mi².

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.11 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Occasional regulation by Lake Orion. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	36	44	32	e37	65	72	115	40	49	e29	23
2	12	77	42	32	e34	60	69	97	43	43	e24	20
3	22	58	41	e30	e32	e52	66	87	44	e39	e21	19
4	29	42	40	e30	e30	e50	68	84	50	e36	e28	19
5	39	36	40	e29	e28	50	66	81	46	e30	e24	18
6	76	35	39	e29	e28	48	61	78	53	e24	e19	17
7	39	38	e39	e29	e27	e48	55	74	61	e29	e17	42
8	34	35	e38	e29	e50	e47	53	72	65	e42	e17	57
9	28	34	e37	e28	e84	e46	52	77	84	e45	e17	37
10	26	41	e36	e28	e60	e44	50	103	82	e35	e16	32
11	26	177	e35	e28	e50	43	50	143	101	e29	e16	30
12	25	126	e35	e27	e44	46	66	116	173	e26	e17	31
13	25	85	e35	e27	e43	57	335	103	106	e26	e27	28
14	23	70	75	e27	e41	67	182	94	81	e30	28	28
15	23	60	67	e26	e39	69	159	85	69	e50	22	30
16	22	55	47	e33	e39	58	179	78	62	e56	20	27
17	20	52	43	e50	e39	52	170	70	62	e38	19	25
18	32	52	38	e75	e39	51	148	59	e500	e30	17	25
19	33	50	36	125	e39	51	141	58	e480	e34	17	24
20	36	48	e35	e65	52	60	173	71	272	e30	29	23
21	35	47	e35	e55	110	59	135	305	231	e27	25	25
22	32	50	e35	e50	64	56	132	155	204	e25	22	49
23	30	48	35	45	57	56	133	123	168	e27	49	39
24	30	44	34	54	106	60	118	112	144	30	44	39
25	28	42	34	e48	76	134	112	97	133	29	41	37
26	26	41	33	47	67	111	111	89	109	e20	34	34
27	58	45	e33	87	108	79	101	83	89	e18	31	64
28	43	65	e33	e55	106	76	90	75	72	e17	29	90
29	33	51	e32	48	75	75	84	64	63	e20	27	61
30	30	46	e32	e44	---	74	149	52	55	e43	27	47
31	34	---	32	e40	---	74	---	44	---	e32	25	---
TOTAL	961	1686	1210	1352	1604	1918	3380	2944	3742	1009	778	1040
MEAN	31.0	56.2	39.0	43.6	55.3	61.9	113	95.0	125	32.5	25.1	34.7
MAX	76	177	75	125	110	134	335	305	500	56	49	90
MIN	12	34	32	26	27	43	50	44	40	17	16	17
CFSM	44	79	55	62	78	87	1.59	1.34	1.76	46	35	49
IN.	.50	.88	.63	.71	.84	1.01	1.77	1.54	1.96	.53	.41	.55

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 1996, BY WATER YEAR (WY)

	MEAN	38.7	45.9	51.8	50.8	58.6	95.8	99.3	63.1	47.4	29.0	25.8	34.2
MAX	123	120	103	127	160	204	194	146	125	58.0	66.7	104	
(WY)	1982	1986	1976	1973	1976	1976	1975	1974	1996	1992	1975	1975	
MIN	8.50	11.0	14.5	14.9	15.4	25.9	37.2	28.5	13.5	11.7	12.0	12.2	
(WY)	1964	1964	1965	1964	1963	1964	1964	1977	1988	1963	1965	1963	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1960 - 1996

ANNUAL TOTAL	17315	21624	
ANNUAL MEAN	47.4	59.1	53.3
HIGHEST ANNUAL MEAN			86.7
LOWEST ANNUAL MEAN			20.4
HIGHEST DAILY MEAN	242	500	660
LOWEST DAILY MEAN	11	12	6.8
ANNUAL SEVEN-DAY MINIMUM	12	17	7.9
INSTANTANEOUS PEAK FLOW		(e)890	(a)918
INSTANTANEOUS PEAK STAGE		(b)	(c)5.95
INSTANTANEOUS LOW FLOW		12	(f)1.2
ANNUAL RUNOFF (CFSM)	.67	.83	.75
ANNUAL RUNOFF (INCHES)	9.08	11.35	10.21
10 PERCENT EXCEEDS	80	110	103
50 PERCENT EXCEEDS	40	44	40
90 PERCENT EXCEEDS	19	25	16

(a) Gage height 5.22 ft.

(b) Not determined.

(c) Backwater from ice.

(d) Oct. 1, 2, 3.

(e) Estimated.

(f) Result of regulation due to bridge construction.

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161580 STONY CREEK NEAR ROMEO, MI

LOCATION.--Lat 42°48'03", long 83°05'25", in SW1/4 sec.31, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side of culvert on Romeo Road, 4.0 mi west of Romeo.

DRAINAGE AREA.--25.6 mi².

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

GAGE.--Water-stage recorder. Datum of gage is 861.64 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.7	9.4	14	8.0	e7.0	e25	24	42	10	12	5.7	4.0
2	16	19	14	7.9	e6.0	e21	21	34	9.9	11	5.4	3.9
3	5.9	16	13	7.2	e5.6	e18	26	31	11	11	5.3	3.9
4	5.3	13	13	e6.6	e5.2	e17	26	32	15	9.8	5.0	4.0
5	7.7	20	12	e6.1	e4.7	e16	24	28	12	8.7	4.8	4.6
6	19	24	10	e5.9	e4.5	e15	21	25	12	8.1	5.5	4.7
7	11	19	9.6	e5.8	e4.3	e14	18	19	16	8.1	5.1	8.5
8	7.4	14	8.2	e5.7	e12	e13	17	18	36	8.0	4.8	15
9	6.6	10	e8.2	e5.6	26	e12	16	20	28	7.8	4.5	9.8
10	6.0	12	e8.1	e5.5	20	e12	16	34	34	7.9	4.3	15
11	5.6	39	e8.0	e5.4	18	e12	16	48	51	7.5	4.2	11
12	5.5	45	e8.0	e5.4	e13	e13	22	42	45	7.0	4.3	11
13	5.6	35	e8.0	e5.3	e12	17	102	34	36	19	4.2	8.6
14	6.0	29	13	e5.2	e11	22	113	27	29	25	4.2	10
15	5.9	25	16	e5.0	e10	27	95	23	15	13	4.0	12
16	5.6	21	13	e6.0	e9.6	23	82	18	11	12	4.0	11
17	5.6	21	11	e9.8	e9.5	20	70	17	9.8	9.9	4.5	15
18	5.3	20	11	22	e9.3	21	58	16	75	8.9	4.3	13
19	5.7	20	10	42	e10	20	44	15	169	17	4.2	7.9
20	6.5	19	9.4	31	e11	16	51	16	196	13	4.3	6.9
21	8.6	17	9.5	21	22	15	49	67	161	9.9	4.9	9.4
22	9.0	16	9.2	18	17	e16	48	75	128	8.8	4.4	21
23	9.0	15	9.2	17	25	e17	54	62	94	9.6	35	16
24	8.6	13	8.9	e16	72	19	45	55	68	9.1	19	15
25	8.5	13	8.8	15	41	43	40	43	64	8.6	15	13
26	8.2	13	8.7	15	36	44	36	35	55	6.2	12	12
27	14	14	e8.4	23	44	e32	29	29	40	5.7	5.5	20
28	15	21	8.1	e15	46	27	26	24	24	5.1	4.6	31
29	12	16	7.8	e12	e30	29	24	13	17	5.1	4.4	22
30	9.6	14	7.9	e10	---	32	42	12	14	5.6	4.0	17
31	9.5	---	8.0	e8.2	---	31	---	12	---	5.7	4.0	---
TOTAL	255.9	582.4	312.0	371.6	541.7	659	1255	966	1485.7	304.1	205.4	356.2
MEAN	8.25	19.4	10.1	12.0	18.7	21.3	41.8	31.2	49.5	9.81	6.63	11.9
MAX	19	45	16	42	72	44	113	75	196	25	35	31
MIN	1.7	9.4	7.8	5.0	4.3	12	16	12	9.8	5.1	4.0	3.9
CFSM	.32	.76	.39	.47	.73	.83	1.63	1.22	1.93	.38	.26	.46
IN.	.37	.85	.45	.54	.79	.96	1.82	1.40	2.16	.44	.30	.52

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 1996, BY WATER YEAR (WY)

	MEAN	10.5	15.7	17.8	16.8	20.5	35.3	35.3	18.5	14.2	8.22	7.02	8.73
MAX	25.1	46.2	41.3	47.7	62.9	79.7	75.1	57.1	49.5	20.0	48.5	41.2	
(WY)	1982	1986	1976	1973	1976	1976	1975	1974	1996	1969	1975	1975	
MIN	1.79	2.06	3.56	5.26	7.22	14.6	18.2	5.82	2.67	1.47	1.63	1.52	
(WY)	1967	1965	1965	1965	1979	1983	1966	1977	1988	1965	1965	1966	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1965 - 1996

ANNUAL TOTAL	4817.6	7295.0	
ANNUAL MEAN	13.2	19.9	17.3
HIGHEST ANNUAL MEAN			31.5
LOWEST ANNUAL MEAN			9.38
HIGHEST DAILY MEAN	66	Mar 14	245
LOWEST DAILY MEAN	1.1	Sep 20	.92
ANNUAL SEVEN-DAY MINIMUM	1.3	Sep 15	1.2
INSTANTANEOUS PEAK FLOW			290
INSTANTANEOUS PEAK STAGE			5.19
INSTANTANEOUS LOW FLOW			.92
ANNUAL RUNOFF (CFSM)	.52		.68
ANNUAL RUNOFF (INCHES)	7.00		9.21
10 PERCENT EXCEEDS	25		37
50 PERCENT EXCEEDS	10		11
90 PERCENT EXCEEDS	2.2		3.3

(a) Oct. 5, 9, 1967.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161790 STONY LAKE NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'58", long 83°05'58", in SE1/4 sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank 1,000 ft east of bridge over dam on Stony Creek, 2.7 mi west of Washington.

DRAINAGE AREA.--68.0 mi².

PERIOD OF RECORD.--February 1963 to current year.

REVISED RECORDS.--WDR MI-77-1: 1976.

GAGE.--Water-stage recorder. Datum of gage is 790.00 ft above sea level (levels by Huron-Clinton Metropolitan Authority); gage readings have been converted to elevations above sea level.

REMARKS.--Reservoir is formed by an earthfill dam with concrete spillway completed in 1962. The spillway section includes a drum gate with minimum crest elevation of 796 ft, maximum of 802 ft; and 2 sluices, one on each side, with valve controls capable of draining lake. Total capacity, 4,649 acre-ft at elevation of 802 ft. The reservoir began filling February 1963. Lake is used for recreational purposes.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 5,495 acre-ft, May 17, 18, 1974, Apr. 20, 1975, Apr. 1, 1993, elevation, 803.60 ft; minimum recorded, 1,758 acre-ft, Nov. 21, 1967, elevation, 794.7 ft.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 5,274 acre-ft, Apr. 20, elevation, 803.19 ft; minimum, 3,201 acre-ft, Sept. 27, elevation, 798.90 ft.

MONTHEND ELEVATION, IN FEET ABOVE SEA LEVEL, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

Date	Elevation (feet)	Contents (acre-feet)	Change in contents	
			(acre- feet)	(equivalent in ft ³ /s)
Sept. 30	801.96	4,629	--	--
Oct. 31	802.18	4,743	+114	+1.9
Nov. 30	800.61	3,966	-777	-13.1
Dec. 31	799.69	3,545	-421	-6.8
CAL YR 1995	--	--	-97	-0.1
Jan. 31	800.29	3,816	+271	+4.4
Feb. 29	800.09	3,724	-92	-1.6
Mar. 31	801.62	4,459	+735	+12.0
Apr. 30	802.53	4,925	+466	+7.8
May 31	802.28	4,795	-130	-2.1
June 30	802.34	4,826	+31	+0.5
July 31	802.17	4,737	-89	-1.4
Aug. 31	802.13	4,717	-20	-0.3
Sept. 30	799.06	3,268	-1,449	-24.4
WTR YR 1996	--	--	-1,361	-1.9

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161800 STONY CREEK NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'55", long 83°05'31", in SW1/4 sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on Mt. Vernon Road, 500 ft downstream from Stony Lake Dam, and 2.9 mi west of Washington.

DRAINAGE AREA.--68.2 mi².

PERIOD OF RECORD.--July 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 772.59 ft above sea level (levels by Huron-Clinton Metropolitan Authority).

REMARKS.--Records good. Occasional diurnal fluctuation caused by mills upstream from station prior to February 1963; occasional regulation by Stony Lake since (see preceding page). From 1963 to 1991 annual mean discharge and runoff figures adjusted for change in contents in Stony Lake. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.8	44	65	26	51	85	40	90	35	47	27	13
2	7.9	63	65	27	51	84	37	89	34	39	35	45
3	12	62	65	23	51	84	38	82	35	35	30	64
4	18	61	64	17	51	76	43	78	41	28	25	64
5	27	60	64	17	51	61	43	57	40	25	20	63
6	41	59	38	16	35	50	46	52	41	23	17	63
7	40	59	28	17	23	36	46	53	47	21	16	63
8	36	59	28	17	23	36	45	53	51	20	14	63
9	30	58	28	17	24	36	44	56	63	21	12	63
10	25	57	28	17	20	36	44	74	72	19	10	62
11	22	58	28	17	18	36	42	91	75	18	8.3	62
12	20	58	28	17	18	37	48	91	110	17	7.6	62
13	19	58	27	16	23	37	125	86	137	17	8.4	62
14	17	64	27	16	34	36	202	77	104	19	9.1	62
15	15	68	27	16	38	35	210	69	79	30	8.6	61
16	13	67	27	16	39	36	195	63	59	31	7.0	61
17	11	67	27	16	39	36	169	57	47	31	6.5	54
18	12	67	28	16	39	36	148	53	102	30	5.9	47
19	12	67	28	22	39	36	134	50	228	36	5.4	47
20	14	67	28	35	39	36	133	52	268	33	6.2	47
21	15	67	28	39	50	36	125	126	287	30	8.3	47
22	15	66	27	45	65	36	120	143	260	28	10	47
23	15	66	27	49	65	37	119	137	214	24	25	48
24	15	66	28	49	66	36	109	122	178	20	35	48
25	14	66	28	50	67	36	100	100	143	18	35	48
26	15	65	28	50	75	37	95	86	119	17	32	48
27	25	65	28	50	84	36	85	72	103	15	30	48
28	33	65	28	50	84	37	76	64	87	13	24	49
29	33	65	27	50	85	38	69	57	70	12	20	51
30	28	65	27	50	---	38	79	45	58	16	17	51
31	28	---	27	51	---	38	---	38	---	19	15	---
TOTAL	635.7	1879	1051	914	1347	1350	2809	2363	3187	752	530.3	1613
MEAN	20.5	62.6	33.9	29.5	46.4	43.5	93.6	76.2	106	24.3	17.1	53.8
MAX	41	68	65	51	85	85	210	143	287	47	35	64
MIN	7.8	44	27	16	18	35	37	38	34	12	5.4	13

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 1996, BY WATER YEAR (WY)

MEAN	31.2	43.6	46.1	41.9	48.6	76.9	78.2	49.7	37.0	21.6	19.4	23.8
MAX	85.8	105	94.0	115	144	199	142	132	120	50.7	76.0	97.7
(WY)	1982	1986	1976	1973	1976	1976	1975	1974	1989	1969	1975	1975
MIN	10.3	10.2	9.11	10.7	9.79	5.14	10.0	17.2	6.93	4.41	4.00	4.72
(WY)	1963	1964	1964	1963	1963	1964	1963	1963	1964	1988	1964	1964

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1958 - 1996

ANNUAL TOTAL	13336.1	18431.0	43.2
ANNUAL MEAN	36.5	50.4	79.1
HIGHEST ANNUAL MEAN			12.0
LOWEST ANNUAL MEAN			407
HIGHEST DAILY MEAN	131	287	Jun 21
LOWEST DAILY MEAN	2.6	5.4	Aug 19
ANNUAL SEVEN-DAY MINIMUM	4.0	6.8	Aug 15
INSTANTANEOUS PEAK FLOW		291	Jun 21
INSTANTANEOUS PEAK STAGE		4.92	Jun 21
INSTANTANEOUS LOW FLOW		5.1	Aug 19
10 PERCENT EXCEEDS	70	88	87
50 PERCENT EXCEEDS	29	39	32
90 PERCENT EXCEEDS	9.6	16	10

(a) July 31, Aug. 1, 1964.

(b) From rating curve extended above 380 ft³/s; result of momentary release of water from Stony Lake; gage height 6.44 ft.

(c) Backwater from ice.

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI
(National water-quality assessment program station)

LOCATION.--Lat 42°36'52", long 83°01'36", in NE1/4 SW1/4 sec.3, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, at bridge on Riverland Road at Sterling Heights.

DRAINAGE AREA.--309 mi².

PERIOD OF RECORD.--April to September 1996.

REMARKS.--Cross-sectional samples were collected at or near bridge.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML) (31625)	E. COLI WATER WHOLE TOTAL UREASE (COL/100 ML) (31633)	HARD-NESS TOTAL (MG/L AS CaCO3) (00900)
APR 04...	0830	257	852	8.4	5.5	12.1	99	80	44	270
MAY 02...	1225	470	762	8.3	10.0	13.8	126	68	K91	240
15...	1300	386	745	8.3	11.5	11.6	109	83	89	260
JUN 05...	1155	289	741	8.3	17.0	9.1	96	260	200	250
20...	1425	1150	606	8.2	21.0	7.6	88	<3	1200	220
JUL 10...	1115	185	763	8.3	18.0	8.4	90	>120	>160	240
AUG 14...	1030	83	622	7.9	21.0	7.2	83	>1200	>1600	200
SEP 10...	1058	184	686	8.3	20.5	8.2	93	390	300	220
DATE	CALCIUM DIS-SOLVED (MG/L AS Ca) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS Mg) (00925)	SODIUM, DIS-SOLVED (MG/L AS Na) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	CAR-BONATE WATER DIS IT FIELD MG/L AS CO3 (00452)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CaCO3 (39086)	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 04...	73	21	74	3.3	227	2	190	37	140	0.30
MAY 02...	65	19	58	2.8	215	--	176	34	110	0.20
15...	71	21	60	3.0	239	--	196	34	110	0.20
JUN 05...	67	20	57	3.2	231	--	189	33	110	0.30
20...	60	16	38	3.1	220	--	181	26	72	0.20
JUL 10...	65	19	61	3.5	225	--	184	32	110	0.30
AUG 14...	55	14	45	5.0	168	--	138	28	98	0.30
SEP 10...	57	18	45	3.5	212	--	174	31	86	0.30
DATE	SILICA, DIS-SOLVED (MG/L AS SiO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2-NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
APR 04...	1.5	488	0.010	1.60	0.090	0.60	0.50	0.030	<0.010	<0.010
MAY 02...	3.6	487	0.010	0.810	0.040	0.50	0.40	0.040	0.020	<0.010
15...	3.2	454	0.020	0.900	0.090	0.60	0.60	0.020	<0.010	<0.010
JUN 05...	3.2	448	0.020	0.840	0.100	0.80	0.50	0.090	0.050	0.030
20...	5.3	356	0.030	0.570	0.070	0.50	0.50	<0.010	0.020	0.020
JUL 10...	5.3	455	0.030	2.50	0.140	0.70	0.70	0.070	0.030	0.030
AUG 14...	4.4	370	0.060	1.90	0.120	0.90	0.50	0.080	0.060	0.050
SEP 10...	6.4	389	0.030	1.30	0.080	0.70	0.40	0.130	0.050	0.080

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DATE	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C) (00689)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	ACETO- CHLOR, WATER FLTRD REC (UG/L) (49260)	ALA- CHLOR, WATER, DISS, REC, (UG/L) (46342)	ATRA- ZINE, WATER, DISS, REC (UG/L) (39632)	DEETHYL ATRA- ZINE, WATER, DISS, REC (UG/L) (04040)	METHYL AZIN- PHOS WAT FLT 0.7 U GF, REC (UG/L) (82686)
APR 04...	84	50	7.9	1.1	6	4.2	<0.002	<0.002	0.012	E0.006	<0.001
MAY 02...	29	21	5.6	0.80	24	30	0.005	<0.002	0.035	E0.005	<0.001
MAY 15...	49	25	5.7	0.90	20	21	E0.004	<0.002	0.027	E0.008	<0.001
JUN 05...	46	14	5.4	0.90	40	31	0.022	0.016	0.055	E0.012	<0.001
JUN 20...	27	9.0	6.7	1.5	73	227	0.320	0.087	0.410	E0.009	<0.001
JUL 10...	61	13	5.8	1.2	45	22	0.014	0.012	0.081	E0.018	<0.001
AUG 14...	18	17	6.3	1.0	25	5.6	<0.002	<0.002	0.031	E0.004	<0.001
SEP 10...	23	12	5.6	0.90	--	--	0.010	0.005	0.084	E0.013	<0.001
DATE	BEN- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82673)	BUTYL- ATE, WATER, DISS, REC (UG/L) (04028)	CAR- BARYL WATER FLTRD 0.7 U GF, REC (UG/L) (82680)	CARBO- FURAN WATER FLTRD 0.7 U GF, REC (UG/L) (82674)	CHLOR- PYRIFOS DIS- SOLVED (UG/L) (38933)	CYANA- ZINE, WATER, DISS, REC (UG/L) (04041)	DCPA WATER FLTRD 0.7 U GF, REC (UG/L) (82682)	P,P' DDE DISSOLV (UG/L) (34653)	DI- AZINON, DIS- SOLVED (UG/L) (39572)	DI- ELDRIN DIS- SOLVED (UG/L) (39381)	
APR 04...	<0.002	<0.002	<0.003	<0.003	<0.004	<0.004	<0.002	<0.006	<0.002	<0.001	
MAY 02...	<0.004	<0.002	<0.007	<0.003	<0.004	0.010	<0.002	<0.006	0.017	<0.001	
MAY 15...	<0.002	<0.002	<0.003	<0.003	<0.004	<0.004	<0.002	<0.006	0.014	<0.001	
JUN 05...	<0.002	<0.002	E0.018	<0.003	0.005	0.013	<0.002	<0.006	0.021	<0.001	
JUN 20...	<0.002	<0.002	E0.013	<0.003	E0.004	0.006	E0.001	<0.006	0.034	<0.001	
JUL 10...	<0.002	<0.002	E0.102	<0.003	0.011	0.022	E0.003	<0.006	0.043	<0.001	
AUG 14...	<0.002	<0.002	E0.139	<0.003	<0.008	<0.004	0.005	<0.006	0.197	<0.001	
SEP 10...	<0.002	<0.002	E0.015	<0.003	<0.004	0.014	<0.002	<0.006	0.021	<0.001	
DATE	2,6-DI- ETHYL ANILINE WAT FLT 0.7 U GF, REC (UG/L) (82660)	DISUL- FOTON WATER FLTRD 0.7 U GF, REC (UG/L) (82677)	EPTC WATER FLTRD 0.7 U GF, REC (UG/L) (82668)	ETHAL- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82663)	ETHO- PROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	FONOFOS WATER DISS REC (UG/L) (04095)	ALPHA BHC DIS- SOLVED (UG/L) (34253)	LINDANE DIS- SOLVED (UG/L) (39341)	LIN- URON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	MALA- THON, DIS- SOLVED (UG/L) (39532)	
APR 04...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	
MAY 02...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	
MAY 15...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	
JUN 05...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	
JUN 20...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	
JUL 10...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	0.010	
AUG 14...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	0.026	
SEP 10...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DATE	METO- LACHLOR WATER DISSOLV (UG/L) (39415)	METRI- BUZIN WATER DISSOLV (UG/L) (82630)	MOL- INATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)	NAPROP- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82684)	PARA- THION, DIS- SOLVED (UG/L) (39542)	METHYL PARA- THION WAT FLT 0.7 U GF, REC (UG/L) (82667)	PEB- ULATE WATER FLTRD 0.7 U GF, REC (UG/L) (82669)
APR 04...	0.004	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
MAY 02...	0.012	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
MAY 15...	0.011	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
JUN 05...	0.025	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
JUN 20...	0.260	0.012	<0.004	<0.003	<0.004	<0.006	<0.004
JUL 10...	0.052	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
AUG 14...	0.017	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
SEP 10...	0.043	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004

DATE	PENDI- METH- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	PER- METHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	PRO- METON, WATER, DISS, REC (UG/L) (04037)	PRON- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	PROP- CHLOR, WATER, DISS, REC (UG/L) (04024)	PRO- PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)
APR 04...	<0.004	<0.005	<0.002	E0.010	<0.003	<0.007	<0.004
MAY 02...	<0.004	<0.005	<0.002	E0.011	<0.003	<0.007	<0.004
MAY 15...	<0.004	<0.005	<0.002	E0.013	<0.003	<0.007	<0.004
JUN 05...	<0.004	<0.005	<0.002	E0.012	<0.003	<0.007	<0.004
JUN 20...	0.007	<0.005	<0.002	E0.015	<0.003	<0.007	<0.004
JUL 10...	<0.009	<0.005	<0.010	0.036	<0.003	<0.007	<0.004
AUG 14...	<0.004	<0.005	<0.002	0.228	<0.003	<0.007	<0.004
SEP 10...	<0.004	<0.005	<0.002	0.139	<0.003	<0.007	<0.004

DATE	PRO- PARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	SI- MAZINE, WATER, DISS, REC (UG/L) (04035)	TEBU- THIURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)	TER- BACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	TER- BUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	THIO- BENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TRIAL- LATE WATER FLTRD 0.7 U GF, REC (UG/L) (82678)	TRI- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)
APR 04...	<0.013	0.015	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
MAY 02...	<0.013	0.014	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
MAY 15...	<0.013	0.019	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUN 05...	<0.013	0.070	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUN 20...	<0.013	0.047	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUL 10...	<0.013	0.026	E0.006	<0.007	<0.013	<0.002	<0.001	0.006
AUG 14...	<0.013	<0.005	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
SEP 10...	<0.013	0.028	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04163400 PLUM BROOK AT UTICA, MI

LOCATION.--Lat 42°36'05", long 83°04'27", in SE1/4 NE1/4 sec.7, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at upstream side of bridge on Ryan Road, 1.0 mi southwest of Utica.

DRAINAGE AREA.--16.5 mi².

PERIOD OF RECORD.--July 1965 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 619.79 ft above sea level (levels by Johnson and Anderson, Inc.).

REMARKS.--Records good except for estimated daily discharges, which are fair. Occasional diversion for sprinkler irrigation. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.3	4.7	8.4	e3.4	e4.4	e16	13	39	7.5	7.7	6.3	1.0
2	1.5	43	6.5	e3.3	e3.7	e13	12	23	10	5.9	4.5	.53
3	7.5	27	5.9	e3.3	e3.4	e10	12	18	16	5.4	3.3	.55
4	17	11	5.5	e3.2	e3.2	e9.6	13	16	26	4.5	3.5	.64
5	20	6.5	5.2	e3.1	e2.8	e9.3	14	14	13	3.9	3.4	.69
6	73	5.0	e5.1	e3.0	e2.6	e9.0	13	14	16	3.3	2.6	.77
7	17	9.1	e4.9	e3.0	e2.5	e8.8	10	12	46	14	2.4	.20
8	9.0	5.9	e4.7	e2.9	e13	e8.6	10	11	30	24	2.7	.39
9	6.8	5.2	e4.5	e2.9	32	e8.4	10	32	38	15	2.0	.11
10	5.4	6.4	e4.5	e2.8	14	8.3	10	113	45	11	.61	.14
11	4.4	122	e4.5	e2.8	12	9.2	8.5	59	62	7.0	.69	.13
12	4.1	48	e4.6	e2.8	e8.0	15	13	31	105	5.8	1.6	.87
13	4.2	19	e4.7	e2.7	e5.6	20	97	24	57	5.7	6.2	.44
14	5.0	14	21	e2.7	e5.4	18	52	19	26	6.6	11	3.2
15	4.1	12	35	e2.6	e5.1	18	31	18	18	19	5.3	3.4
16	3.7	10	18	e2.6	e4.9	16	36	19	14	15	.82	3.2
17	3.9	8.3	13	e7.0	e4.7	13	22	18	13	7.7	.73	2.8
18	4.6	8.4	10	e23	e4.6	13	18	14	406	5.4	.69	2.6
19	4.7	8.0	e7.8	68	e4.4	13	18	13	340	4.8	2.3	2.3
20	4.9	6.8	e6.5	19	16	e22	119	12	74	3.7	6.9	1.9
21	6.5	6.4	e5.5	13	48	21	45	188	38	3.3	11	2.6
22	4.7	5.8	5.2	11	20	19	52	55	29	3.1	3.9	.40
23	4.0	5.5	5.0	9.9	14	18	49	28	19	5.6	1.5	.15
24	3.4	5.1	4.9	19	21	24	29	22	33	2.9	10	.87
25	3.2	4.8	4.8	13	15	70	24	16	24	1.3	8.2	6.6
26	3.2	4.9	e4.5	10	13	40	21	13	14	1.2	2.9	6.1
27	23	8.4	4.2	30	86	20	16	12	12	1.3	2.2	.33
28	15	26	4.0	14	59	17	13	12	10	3.3	1.1	.42
29	6.2	13	3.7	e11	25	16	14	10	8.7	9.2	.52	.13
30	4.1	9.6	e3.6	e8.0	---	14	73	8.5	7.4	16	1.7	.86
31	3.7	---	e3.5	e6.0	---	14	---	7.3	---	10	1.7	---
TOTAL	279.1	469.8	229.2	309.0	453.3	531.2	867.5	890.8	1557.6	232.6	112.26	309.28
MEAN	9.00	15.7	7.39	9.97	15.6	17.1	28.9	28.7	51.9	7.50	3.62	10.3
MAX	73	122	35	68	86	70	119	188	406	24	11	.42
MIN	1.3	4.7	3.5	2.6	2.5	8.3	8.5	7.3	7.4	1.2	.52	.53
CFSM	.55	.95	.45	.60	.95	1.04	1.75	1.74	3.15	.45	.22	.62
IN.	.63	1.06	.52	.70	1.02	1.20	1.96	2.01	3.51	.52	.25	.70

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 1996, BY WATER YEAR (WY)

	MEAN	7.48	12.1	15.1	12.6	17.6	30.6	25.3	14.6	11.2	6.90	5.43	5.88
MAX	33.7	39.8	37.7	40.7	60.3	83.6	47.4	39.9	51.9	23.0	16.0	18.6	18.6
(WY)	1982	1986	1973	1993	1976	1982	1979	1968	1996	1969	1972	1986	1986
MIN	.82	1.45	1.99	1.23	2.62	10.1	8.30	3.46	1.51	.29	.43	.44	.44
(WY)	1967	1966	1977	1977	1980	1981	1971	1971	1988	1965	1965	1969	1969

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1965 - 1996

ANNUAL TOTAL	4179.5	6241.64	
ANNUAL MEAN	11.5	17.1	13.8
HIGHEST ANNUAL MEAN			20.5
LOWEST ANNUAL MEAN			6.67
HIGHEST DAILY MEAN	124	406	707
LOWEST DAILY MEAN	1.3	.52	.04
ANNUAL SEVEN-DAY MINIMUM	1.7	.84	.09
INSTANTANEOUS PEAK FLOW		(a)1290	(a)1290
INSTANTANEOUS PEAK STAGE		10.62	10.62
INSTANTANEOUS LOW FLOW		.16	.00
ANNUAL RUNOFF (CFSM)	.69	1.03	.83
ANNUAL RUNOFF (INCHES)	9.42	14.07	11.32
10 PERCENT EXCEEDS	25	35	30
50 PERCENT EXCEEDS	6.5	9.0	5.9
90 PERCENT EXCEEDS	2.5	2.7	1.3

(a) From rating curve extended above 800 ft³/s.

(b) Part of each day July 19, 28, 1966, Aug. 22-28, Sept. 3, 11, 1969.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04164000 CLINTON RIVER NEAR FRASER, MI

LOCATION.--Lat 42°34'38", long 82°57'05", in SE1/4 NE1/4 sec.19, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank 50 ft downstream from bridge on Garfield Road, 2.8 mi north of Fraser, and 4.0 mi upstream from North Branch.

DRAINAGE AREA.--444 mi².

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 577.71 ft above sea level (Macomb County bench mark). Prior to Nov. 17, 1949, and from May 29 to July 31, 1990, nonrecording gage at same site and datum. Nov. 17, 1949 to Apr. 5, 1990, water-stage recorder at site 800 ft downstream at same datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 5 or 6, 1947, reached a stage of 20 ft, from floodmark, and discharge of about 9,000 ft³/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	92	262	406	e175	e260	447	400	914	251	449	260	113
2	93	934	372	e170	e245	426	373	690	319	372	217	106
3	276	681	367	e170	e230	e375	355	630	466	346	185	145
4	390	388	358	e165	e220	e360	409	594	753	266	271	155
5	451	323	355	e165	e210	e370	392	558	520	205	213	153
6	1750	296	354	e160	e200	e340	358	519	522	192	165	155
7	492	356	267	e155	e240	e300	344	485	777	255	155	545
8	371	318	209	e155	384	e270	330	453	696	421	146	949
9	305	307	e230	e150	e700	e260	328	702	725	394	136	384
10	265	336	e240	e150	449	e265	321	1730	801	318	127	278
11	228	1750	e245	e145	377	300	313	1180	687	250	113	271
12	200	1290	e240	e145	301	355	334	829	1050	230	112	332
13	189	625	e230	e140	255	400	1250	671	1180	228	144	240
14	173	543	680	e140	e265	384	1300	581	699	279	205	216
15	144	517	690	e140	e260	415	886	620	548	520	127	219
16	133	484	439	e165	e255	373	880	592	418	376	111	203
17	130	458	332	348	e250	337	730	536	376	281	107	201
18	128	453	312	621	e250	332	653	461	1830	258	101	188
19	139	432	291	1110	e255	332	631	404	4220	315	102	182
20	189	419	271	473	478	550	2510	409	2640	252	118	160
21	231	408	255	344	739	480	1210	2320	1560	216	244	178
22	188	402	244	309	544	455	1050	1700	1340	208	141	1030
23	171	399	260	303	406	451	1060	1000	1080	248	263	389
24	169	383	245	573	545	509	768	790	989	275	253	278
25	164	372	241	364	466	856	689	703	893	258	217	321
26	161	367	232	312	435	745	675	627	716	159	185	300
27	590	454	211	671	1320	511	652	554	631	158	168	575
28	520	788	e205	410	1180	434	594	501	570	149	144	883
29	285	480	e195	348	543	416	585	419	524	189	132	504
30	250	422	e185	290	---	415	1230	345	484	410	129	417
31	255	---	e180	e275	---	401	---	291	---	259	120	---
TOTAL	9122	15647	9341	9241	12262	12864	21610	22808	28265	8736	5111	10070
MEAN	294	522	301	298	423	415	720	736	942	282	165	336
MAX	1750	1750	690	1110	1320	856	2510	2320	4220	520	271	1030
MIN	92	262	180	140	200	260	313	291	251	149	101	106
CFSM	.66	1.17	.68	.67	.95	.93	1.62	1.66	2.12	.63	.37	.76
IN.	.76	1.31	.78	.77	1.03	1.08	1.81	1.91	2.37	.73	.43	.84

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1947 - 1996, BY WATER YEAR (WY)

MEAN	269	335	390	384	448	663	656	458	359	263	222	238
MAX	1021	834	837	975	1119	1313	1237	1382	942	664	480	758
(WY)	1982	1986	1968	1950	1976	1976	1950	1956	1996	1957	1980	1975
MIN	72.3	78.2	93.1	91.8	112	217	259	127	120	87.1	69.5	73.3
(WY)	1954	1954	1959	1961	1963	1964	1958	1958	1949	1955	1954	1954

SUMMARY STATISTICS FOR 1995 CALENDAR YEAR FOR 1996 WATER YEAR WATER YEARS 1947 - 1996

ANNUAL TOTAL	135928	165077	
ANNUAL MEAN	372	451	389
HIGHEST ANNUAL MEAN			595
LOWEST ANNUAL MEAN			189
HIGHEST DAILY MEAN	2010	4220	6930
LOWEST DAILY MEAN	90	92	49
ANNUAL SEVEN-DAY MINIMUM	92	124	59
INSTANTANEOUS PEAK FLOW		4420	8840
INSTANTANEOUS PEAK STAGE		16.17	19.56
INSTANTANEOUS LOW FLOW		88	47
ANNUAL RUNOFF (CFSM)	.84	1.02	.88
ANNUAL RUNOFF (INCHES)	11.39	13.83	11.91
10 PERCENT EXCEEDS	660	837	743
50 PERCENT EXCEEDS	306	345	280
90 PERCENT EXCEEDS	121	154	116

(a) Oct. 1, 2.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04164100 EAST POND CREEK AT ROMEO, MI

LOCATION.--Lat 42°49'21", long 83°01'13", in NE1/4 SE1/4 sec.27, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on State Highway 53, 1.4 mi north of Romeo.

DRAINAGE AREA.--21.8 mi².

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 780 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges, which are fair. Occasional regulation by lakes upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.2	7.7	12	8.5	e11	e24	25	34	16	18	6.2	4.6
2	4.5	12	11	e8.2	e9.7	e21	24	32	15	16	5.9	4.4
3	5.4	13	11	e7.8	e8.8	e20	23	32	15	14	5.6	4.4
4	6.4	11	10	e7.4	e7.6	e18	23	31	15	12	5.4	4.2
5	6.9	10	10	e7.0	e6.5	e17	22	27	14	11	5.3	4.2
6	13	9.5	10	e6.8	e5.7	e16	21	25	15	9.8	5.3	4.2
7	11	9.9	e9.9	e6.6	e5.4	e15	20	24	16	9.1	5.1	6.5
8	9.9	9.6	e9.5	e6.4	e30	e15	19	22	17	8.6	5.0	10
9	8.5	9.0	e9.2	e6.2	53	e14	18	22	20	8.3	4.7	8.6
10	7.7	9.2	e9.0	e6.0	40	e14	17	27	23	8.2	4.5	7.2
11	7.0	23	e8.9	e5.8	18	e14	17	31	22	7.4	4.5	6.9
12	6.6	30	e8.7	e5.6	e16	15	19	27	24	7.0	4.5	8.9
13	6.5	20	e8.7	e5.5	e15	18	100	25	24	10	4.4	7.9
14	6.3	17	15	e5.4	e14	21	82	22	21	18	4.4	8.0
15	6.3	16	16	e5.4	e14	22	63	20	19	14	4.3	8.9
16	6.0	15	12	e5.3	e13	20	68	20	18	11	4.3	8.5
17	5.9	14	e11	e12	e13	19	59	19	16	9.3	4.3	7.9
18	5.9	14	10	e20	e13	19	46	19	61	9.0	4.2	7.4
19	6.0	14	10	48	e13	19	42	18	148	12	4.1	7.0
20	6.2	13	e9.7	55	e14	20	43	18	182	11	4.1	6.7
21	6.7	12	e9.5	50	23	20	38	60	163	9.2	4.4	6.4
22	6.6	12	e9.5	23	21	19	36	43	133	8.2	4.4	11
23	6.3	12	9.5	20	19	18	36	33	91	8.2	14	10
24	6.1	e11	9.2	e20	42	18	32	32	69	8.3	10	11
25	6.1	11	9.2	e19	40	32	30	29	51	8.4	7.3	9.9
26	6.0	11	e9.1	19	29	43	30	27	41	7.5	6.0	8.9
27	9.1	11	e9.1	29	34	32	27	25	33	6.8	5.4	11
28	9.9	14	9.0	e24	40	28	24	23	28	6.3	5.2	17
29	9.0	13	9.0	19	28	27	22	20	24	6.0	5.1	13
30	8.2	12	9.1	e16	---	27	34	18	20	6.3	4.8	12
31	7.9	---	8.9	e14	---	26	---	17	---	6.4	4.7	---
TOTAL	222.1	395.9	312.7	491.9	596.7	651	1060	822	1354	305.3	167.4	246.6
MEAN	7.16	13.2	10.1	15.9	20.6	21.0	35.3	26.5	45.1	9.85	5.40	8.22
MAX	13	30	16	55	53	43	100	60	182	18	14	17
MIN	4.2	7.7	8.7	5.3	5.4	14	17	17	14	6.0	4.1	4.2
CFSM	.33	.61	.46	.73	.94	.96	1.62	1.22	2.07	.45	.25	.38
IN.	.38	.68	.53	.84	1.02	1.11	1.81	1.40	2.31	.52	.29	.42

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 1996, BY WATER YEAR (WY)

	MEAN	10.2	14.0	15.3	14.7	18.5	32.5	31.7	19.0	14.2	8.85	7.15	8.70
MAX	35.1	45.0	35.7	42.6	54.0	67.9	71.4	52.2	52.9	22.9	35.0	52.3	52.3
(WY)	1987	1986	1988	1973	1968	1976	1975	1974	1989	1969	1975	1985	1985
MIN	1.92	2.32	1.64	2.89	2.93	7.81	13.1	7.77	2.76	2.07	1.30	2.02	2.02
(WY)	1964	1964	1964	1959	1964	1964	1963	1977	1963	1964	1965	1966	1966

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1958 - 1996

ANNUAL TOTAL	4418.1	6625.6	
ANNUAL MEAN	12.1	18.1	16.2
HIGHEST ANNUAL MEAN			29.0
LOWEST ANNUAL MEAN			4.99
HIGHEST DAILY MEAN	53	Jun 28	302
LOWEST DAILY MEAN	3.0	Sep 17	.90
ANNUAL SEVEN-DAY MINIMUM	3.1	Sep 13	.99
INSTANTANEOUS PEAK FLOW			(a)358
INSTANTANEOUS PEAK STAGE			(b)4.56
INSTANTANEOUS LOW FLOW			.80
ANNUAL RUNOFF (CFSM)	.56	.83	.74
ANNUAL RUNOFF (INCHES)	7.54	11.31	10.11
10 PERCENT EXCEEDS	20	32	33
50 PERCENT EXCEEDS	10	12	11
90 PERCENT EXCEEDS	5.1	5.4	3.3

(a) Gage height 4.48 ft.

(b) Backwater from ice.

(c) July 30, 31, 1964, Aug. 6, 7, 1965.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04164300 EAST BRANCH COON CREEK AT ARMADA, MI

LOCATION.--Lat 42°50'45", long 82°53'06", in NE1/4 sec.23, T.5 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank at downstream side of bridge on Prospect Street in Armada.

DRAINAGE AREA.--13.0 mi².

PERIOD OF RECORD.--October 1958 to current year.

REVISED RECORDS.--WDR MI-83-1: 1982.

GAGE.--Water-stage recorder and concrete control. Elevation of gage is 735 ft above sea level, from topographic map.

REMARKS.--Records fair except for daily discharges below 1.0 ft³/s and estimated daily discharges, which are poor. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.41	.54	3.8	e.74	e1.1	e3.5	11	41	1.8	1.3	.13	.20
2	.46	1.2	3.5	e.68	e1.0	e2.3	8.4	15	1.7	1.1	.12	.24
3	.83	.83	2.9	e.66	e.90	e1.8	7.4	9.3	2.0	1.1	.10	.26
4	.48	.75	2.7	e.61	e.77	e1.4	7.6	8.9	2.4	.93	.08	.28
5	1.3	.54	2.2	e.60	e.65	e1.2	6.9	7.2	2.4	.71	.04	.25
6	.93	.42	2.0	e.58	e.60	e1.1	5.8	5.7	2.0	.52	.06	.35
7	.69	.65	1.7	e.56	e.54	e1.1	4.8	4.6	2.4	.39	.08	1.3
8	.93	.57	1.4	e.54	e.50	e1.1	4.3	4.2	2.1	.32	.10	.40
9	.52	.57	1.3	e.53	e50	e1.0	4.6	5.8	2.5	.28	.12	.55
10	.38	.84	e1.1	e.52	e20	e1.0	4.6	28	2.8	.32	.13	.40
11	.31	15	e.96	e.52	e7.0	e1.1	4.5	39	1.9	.31	.14	.65
12	.29	62	e.90	e.51	e2.5	e1.3	15	17	1.9	.20	.15	4.0
13	.29	21	.79	e.51	e1.0	e2.0	235	9.8	1.5	1.8	.23	1.9
14	.29	9.0	1.6	e.50	e.90	6.3	98	6.7	1.3	4.9	.15	.81
15	.34	5.2	3.8	e.50	e.84	13	46	5.3	1.1	2.3	.14	.63
16	.45	3.9	5.2	e.50	e.80	5.4	32	4.7	.89	1.2	.13	.73
17	.44	3.0	3.7	e1.0	e.75	3.1	18	4.6	1.2	.66	.13	.60
18	.28	2.5	2.7	28	e.73	2.4	12	4.2	.44	.39	.13	.54
19	.45	e2.3	2.1	82	e.70	2.7	9.2	3.7	140	.73	.14	.47
20	.36	e2.1	1.8	45	e.80	2.8	13	4.5	198	.60	.17	.44
21	.13	e2.0	1.6	8.5	e26	.93	11	172	50	.44	.32	.68
22	.13	e1.8	1.5	3.0	e14	1.8	13	66	53	.33	.37	4.4
23	.13	e1.7	1.3	2.2	8.3	2.1	18	30	38	.52	.46	4.5
24	.13	e1.6	1.2	e2.1	e85	2.6	11	15	15	.49	.15	2.2
25	.13	1.5	1.2	2.6	25	35	8.0	8.2	12	.36	.13	2.3
26	.13	1.5	1.1	2.0	11	127	7.7	6.0	6.5	.30	.13	1.6
27	.73	2.0	1.1	e55	41	33	5.9	4.8	4.2	.24	.15	3.3
28	.39	7.2	.98	e8.0	65	12	4.3	3.8	3.1	.15	.16	1.8
29	.46	7.8	e.88	e3.0	11	11	3.7	3.5	2.3	.13	.19	7.4
30	.47	4.9	.86	e1.5	---	13	59	2.7	1.6	.12	.22	3.1
31	.47	---	.79	e1.3	---	13	---	2.3	---	.14	.24	---
TOTAL	13.73	164.91	58.66	254.26	378.38	307.03	689.7	543.5	599.59	23.28	4.99	62.48
MEAN	.44	5.50	1.89	8.20	13.0	9.90	23.0	17.5	20.0	.75	.16	2.08
MAX	1.3	62	5.2	82	85	127	235	172	198	4.9	.46	18
MIN	.13	.42	.79	.50	.50	.93	3.7	2.3	.89	.12	.04	.20
CFSM	.03	.42	.15	.63	1.00	.76	1.77	1.35	1.54	.06	.01	.16
IN.	.04	.47	.17	.73	1.08	.88	1.97	1.56	1.72	.07	.01	.18

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 1996, BY WATER YEAR (WY)

	MEAN	2.27	5.27	8.19	6.36	10.6	24.5	16.1	5.48	4.49	1.63	1.24	2.04
MAX	24.1	43.3	35.7	37.6	60.3	75.2	47.1	23.5	21.9	19.7	12.3	33.9	
(WY)	1982	1986	1973	1974	1976	1982	1967	1974	1989	1967	1975	1985	
MIN	.047	.088	.074	.078	.087	.23	.83	.61	.059	.047	.055	.056	
(WY)	1964	1964	1964	1961	1964	1964	1964	1977	1964	1964	1963	1964	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1959 - 1996

ANNUAL TOTAL	2239.16	3100.51	7.33	
ANNUAL MEAN	6.13	8.47	14.9	1985
HIGHEST ANNUAL MEAN			.36	1964
LOWEST ANNUAL MEAN			497	Apr 19 1975
HIGHEST DAILY MEAN	170	Mar 8	.04	(a)
LOWEST DAILY MEAN	.13	Oct 21	.08	Aug 5
ANNUAL SEVEN-DAY MINIMUM	.16	Oct 20		Aug 2
INSTANTANEOUS PEAK FLOW			325	Jun 20
INSTANTANEOUS PEAK STAGE			4.44	Jun 20
INSTANTANEOUS LOW FLOW				6.69
ANNUAL RUNOFF (CFSM)	.47			.00
ANNUAL RUNOFF (INCHES)	6.41		.65	.56
10 PERCENT EXCEEDS	12		8.87	7.66
50 PERCENT EXCEEDS	1.5		17	14
90 PERCENT EXCEEDS	.30		1.5	1.0
			.20	.10

(a) Jan. 25 to Feb. 9, 1961, result of freezeup.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04164500 NORTH BRANCH CLINTON RIVER NEAR MOUNT CLEMENS, MI

LOCATION.--Lat 42°37'45", long 82°53'25", in SW1/4 sec.35, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 30 ft upstream from bridge on State Highway 59, 2 mi north of Mount Clemens, and 3.6 mi upstream from mouth.

DRAINAGE AREA.--199 mi².

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 1437: 1948. WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since September 1961. Datum of gage is 576.38 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Nov. 15, 1949, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Some regulation at times by mill upstream from station. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 5 or 6, 1947, reached a stage of 20.0 ft, from floodmark.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.7	26	97	e31	e40	526	217	e600	63	69	27	8.2
2	9.2	31	79	e31	e30	e200	201	e370	58	57	23	7.0
3	15	62	73	e30	e24	e140	171	e280	59	52	19	7.5
4	17	77	67	30	e21	e100	159	e200	132	46	17	6.3
5	36	58	63	28	e19	e80	164	e170	124	39	16	4.7
6	58	43	57	25	e18	e66	152	e140	87	33	14	4.7
7	71	37	45	22	e20	e60	134	e120	109	30	13	12
8	62	36	48	21	e30	e53	116	e100	358	28	11	27
9	38	37	e40	21	e100	e50	105	e110	279	27	9.0	46
10	26	35	e35	e21	e260	e48	102	e250	233	29	8.2	31
11	20	103	e32	e21	e200	e46	98	e370	181	27	6.7	23
12	16	366	e31	e20	e120	58	103	e300	123	25	7.1	20
13	14	450	e29	e20	e90	99	711	e230	263	22	7.6	39
14	13	349	e30	e20	e60	218	2440	e170	253	36	7.7	36
15	11	183	e50	e20	e50	317	1620	e140	119	82	6.9	27
16	11	119	108	e24	e40	e280	790	125	81	59	6.1	26
17	11	94	116	30	e35	167	e530	114	65	41	5.6	26
18	12	83	91	59	e32	127	e330	107	209	33	4.9	23
19	11	79	74	308	e31	119	e230	100	2190	34	4.6	20
20	14	77	62	410	e30	136	e260	89	2710	48	4.7	17
21	15	73	53	e330	e60	112	e300	595	2330	42	8.8	17
22	14	68	47	e220	e100	94	e270	1880	1360	31	11	47
23	18	62	e42	e160	e200	96	e250	1060	672	27	13	66
24	20	57	e39	e180	331	108	e220	468	400	27	45	59
25	18	48	e36	e150	447	281	e200	245	259	28	28	46
26	17	51	e34	e120	603	830	e180	171	218	27	18	40
27	20	51	e32	e160	553	946	e150	131	173	23	14	36
28	30	78	e31	e210	703	543	e130	112	128	20	16	78
29	45	142	e31	e200	800	273	e110	96	103	18	14	129
30	38	108	e31	e120	---	223	e300	82	86	20	11	97
31	29	---	e31	e60	---	220	---	71	---	22	9.4	---
TOTAL	733.9	3083	1634	3102	5047	6616	10743	8996	13425	1102	407.3	1026.4
MEAN	23.7	103	52.7	100	174	213	358	290	447	35.5	13.1	34.2
MAX	71	450	116	410	800	946	2440	1880	2710	82	45	129
MIN	4.7	26	29	20	18	46	98	71	58	18	4.6	4.7
CFSM	.12	.52	.26	.50	.87	1.07	1.80	1.46	2.25	.18	.07	.17
IN.	.14	.58	.31	.58	.94	1.24	2.01	1.68	2.51	.21	.08	.19

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1947 - 1996, BY WATER YEAR (WY)

	MEAN	51.3	91.9	134	130	196	356	273	137	81.7	33.0	25.1	39.4
MAX	479	595	460	507	766	928	560	790	447	127	247	484	
(WY)	1982	1986	1968	1974	1976	1982	1975	1956	1996	1992	1975	1985	
MIN	3.71	7.12	5.63	5.55	8.77	29.6	72.6	25.9	7.08	3.44	2.14	3.12	
(WY)	1964	1964	1959	1961	1963	1964	1963	1958	1988	1955	1955	1963	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1947 - 1996

ANNUAL TOTAL	35672.8	55915.6	
ANNUAL MEAN	97.7	153	128
HIGHEST ANNUAL MEAN			230
LOWEST ANNUAL MEAN			25.4
HIGHEST DAILY MEAN	1250	Mar 9	5040
LOWEST DAILY MEAN	3.1	Sep 17	.09
ANNUAL SEVEN-DAY MINIMUM	4.0	Sep 13	.10
INSTANTANEOUS PEAK FLOW			6700
INSTANTANEOUS PEAK STAGE			18.62
INSTANTANEOUS LOW FLOW			.08
ANNUAL RUNOFF (CFSM)	.49		.65
ANNUAL RUNOFF (INCHES)	6.67		8.77
10 PERCENT EXCEEDS	234		309
50 PERCENT EXCEEDS	50		41
90 PERCENT EXCEEDS	9.9		7.2

(a) Part of each day July 4-10, 14, 15, 1988.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI

LOCATION.--Lat 42°35'45", long 82°54'35", Macomb County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on Moravian Drive, 0.2 mi downstream from North Branch, and 0.5 mi west of Mount Clemens.

DRAINAGE AREA.--734 mi².

PERIOD OF RECORD.--May 1934 to current year.

REVISED RECORDS.--WSP 1084: 1943, 1945-46. WSP 1937: 1935, 1936(M), 1937-39, 1949(M), 1950. WSP 1557: Drainage area. WSP 1727: 1952(M), 1954(M).

GAGE.--Water-stage recorder. Datum of gage is 570.43 ft above sea level. May 10, 1934 to Jan. 11, 1939, nonrecording gage at same site and datum. Auxiliary gage is a water-stage recorder on right bank 2.0 mi downstream from base gage at same datum. Mar. 15, 1938 to Jan. 3, 1952, auxiliary nonrecording gage 1.6 mi downstream from base gage at same datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	149	383	562	e230	e350	1050	701	1710	314	532	321	e145
2	135	1200	539	e225	e300	766	662	1450	372	450	271	e140
3	300	1020	504	e220	e280	e580	606	1160	488	422	243	e170
4	552	566	482	e215	e270	e520	656	1020	1150	355	293	e185
5	469	478	489	e210	e260	e490	625	951	770	286	255	e185
6	2250	453	436	e205	e250	e450	544	868	649	264	225	191
7	800	482	346	e200	e320	e400	486	775	1090	325	206	617
8	558	417	e310	e195	e500	e370	442	705	1480	473	e195	1060
9	420	431	e300	e190	e900	e350	420	975	1160	448	e185	e450
10	352	475	e305	e190	e800	e350	401	2500	1250	397	e170	e360
11	301	2180	e310	e190	e650	e400	388	2180	928	312	e150	e340
12	265	2140	e310	e185	e500	493	434	1750	1310	288	e140	e400
13	246	1290	e300	e180	e400	598	2590	1270	1740	281	e170	e330
14	225	1060	e800	e180	e370	675	4400	958	1070	331	241	e290
15	180	805	e820	e180	e350	832	2950	911	702	620	e170	e280
16	170	720	657	e200	e330	760	2030	908	506	453	e150	e260
17	175	662	533	310	e320	596	1520	807	417	334	e140	e240
18	170	636	485	801	e320	539	1220	708	1990	315	e130	219
19	180	606	454	1620	e330	525	1040	593	7120	364	e135	206
20	235	583	415	889	545	773	3320	562	5990	310	e160	195
21	323	530	381	674	e1000	669	2200	3540	4190	279	274	218
22	240	526	356	541	e900	605	1690	4230	2940	262	186	1280
23	220	513	370	472	735	594	1830	2430	1860	304	298	e500
24	210	496	340	815	962	710	1430	1470	1520	317	306	e400
25	199	494	321	563	939	1500	1170	1090	1280	331	256	e420
26	197	475	313	457	1000	1930	1060	888	1030	230	222	e400
27	723	551	281	967	2010	1590	1000	746	868	e210	208	e600
28	731	1110	275	731	2400	1180	898	660	744	e200	e190	e1100
29	395	729	252	621	1350	832	881	548	662	254	e170	e800
30	354	645	e240	e500	---	749	1730	431	600	449	e160	e600
31	363	---	e235	e400	---	725	---	362	---	319	e150	---
TOTAL	12087	22656	12721	13556	19641	22601	39324	39156	46190	10715	6370	12581
MEAN	390	755	410	437	677	729	1311	1263	1540	346	205	419
MAX	2250	2180	820	1620	2400	1930	4400	4230	7120	620	321	1280
MIN	135	383	235	180	250	350	388	362	314	200	130	140
CFSM	.53	1.03	.56	.60	.92	.99	1.79	1.72	2.10	.47	.28	.57
IN.	.61	1.15	.64	.69	1.00	1.15	1.99	1.98	2.34	.54	.32	.64

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1934 - 1996, BY WATER YEAR (WY)

	MEAN	312	419	532	548	731	1134	1058	683	481	294	245	268
MAX	1550	1492	1615	1739	2407	2255	3090	2747	1543	865	744	1144	
(WY)	1982	1986	1968	1993	1938	1982	1947	1943	1989	1969	1975	1975	
MIN	64.1	79.0	84.3	93.9	118	263	249	164	52.9	50.9	51.7	52.5	
(WY)	1935	1945	1945	1945	1940	1964	1946	1958	1934	1934	1934	1941	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1934 - 1996

ANNUAL TOTAL	203392	257598	
ANNUAL MEAN	557	704	
HIGHEST ANNUAL MEAN			560
LOWEST ANNUAL MEAN			929
HIGHEST DAILY MEAN	3410	Mar 8	230
LOWEST DAILY MEAN	135	Sep 13	1974
ANNUAL SEVEN-DAY MINIMUM	138	Sep 13	1964
INSTANTANEOUS PEAK FLOW			19200
INSTANTANEOUS PEAK STAGE			Jun 19
ANNUAL RUNOFF (CFSM)	.76		25
ANNUAL RUNOFF (INCHES)	10.31		28
10 PERCENT EXCEEDS	1130	1460	Aug 24 1934
50 PERCENT EXCEEDS	415	475	Aug 22 1934
90 PERCENT EXCEEDS	170	194	Apr 6 1947
			Apr 6 1947
			1180
			324
			119

(a) From floodmark.

(e) Estimated.

STREAMS TRIBUTARY TO DETROIT RIVER

04166000 RIVER ROUGE AT BIRMINGHAM, MI

LOCATION.--Lat 42°32'45", long 83°13'25", in NW1/4 sec.36, T.2 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on left bank 25 ft downstream from mouth of Quarton Lake outlet, and 100 ft upstream from bridge on Maple Road at Birmingham.

DRAINAGE AREA.--33.3 mi². Prior to water year 1971, drainage area was 36.9 mi². An area of 3.6 mi² noncontributing since then.

PERIOD OF RECORD.--June 1950 to current year.

REVISED RECORDS.--WSP 1387: 1951-52(M). WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since July 27, 1962. Datum of gage is 715.94 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Occasional regulation by Quarton Lake upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.1	e11	14	11	13	24	20	48	20	23	16	6.7
2	4.8	e80	13	11	12	22	19	33	25	23	12	6.0
3	18	e55	13	11	11	19	19	29	27	22	9.4	6.0
4	23	e22	13	10	10	18	21	27	30	20	30	6.0
5	32	e15	12	8.9	11	20	20	25	24	20	18	5.5
6	86	e14	12	9.0	11	19	18	24	34	19	12	5.4
7	26	e17	11	9.4	11	17	18	23	53	18	10	37
8	16	e14	10	9.1	38	16	17	22	32	31	10	46
9	13	e12	11	9.6	51	17	16	57	64	30	8.6	16
10	11	17	10	9.5	24	17	17	134	51	23	8.6	12
11	9.3	174	9.1	9.0	22	19	17	67	31	19	8.7	18
12	8.5	72	8.7	9.2	18	26	24	45	59	17	8.6	26
13	7.5	33	8.8	9.6	15	29	91	36	58	18	8.4	13
14	7.1	25	32	10	16	27	54	32	31	18	7.8	11
15	6.5	19	41	11	15	26	42	35	24	37	7.2	11
16	6.4	16	24	9.8	14	22	48	34	21	23	6.5	10
17	6.1	15	17	22	14	20	34	30	21	17	6.7	9.1
18	6.1	17	15	53	13	20	28	29	437	16	6.5	8.2
19	5.9	16	14	97	14	20	32	27	425	17	6.0	7.9
20	9.1	15	13	29	32	37	146	26	109	15	7.8	7.4
21	12	14	13	21	67	29	56	228	72	14	13	8.0
22	8.3	13	12	19	30	26	64	65	60	14	9.3	38
23	6.8	12	12	18	21	24	57	41	46	15	19	23
24	6.2	12	12	34	37	29	39	36	58	17	14	15
25	6.1	11	12	20	24	62	35	31	43	16	10	12
26	6.5	11	12	17	24	43	33	29	35	12	8.9	14
27	55	17	11	57	129	26	28	27	33	10	7.9	44
28	30	35	11	23	68	23	25	26	30	9.5	7.2	57
29	14	19	11	19	31	23	26	24	28	21	7.7	22
30	12	16	11	16	---	21	96	21	26	37	7.1	14
31	11	---	11	14	---	21	---	21	---	15	6.6	---
TOTAL	475.3	819	429.6	616.1	796	762	1160	1332	2007	606.5	319.5	515.2
MEAN	15.3	27.3	13.9	19.9	27.4	24.6	38.7	43.0	66.9	19.6	10.3	17.2
MAX	86	174	41	97	129	62	146	228	437	37	30	57
MIN	4.8	11	8.7	8.9	10	16	18	21	20	9.5	6.0	5.4
CFSM	.46	.82	.42	.60	.82	.74	1.16	1.29	2.01	.59	.31	.52
IN.	.53	.91	.48	.69	.89	.85	1.30	1.49	2.24	.68	.36	.58

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1950 - 1996, BY WATER YEAR (WY)

	MEAN	12.1	16.6	20.0	19.5	23.6	39.0	36.1	25.8	19.8	12.7	10.1	10.7
MAX	50.7	47.7	51.5	56.0	71.5	82.5	63.6	98.1	84.0	48.2	25.6	42.3	42.3
(WY)	1982	1993	1988	1993	1976	1982	1974	1956	1989	1968	1968	1986	1986
MIN	1.48	2.11	1.88	2.18	2.21	7.59	10.4	5.82	4.33	1.42	1.58	1.42	1.42
(WY)	1965	1965	1964	1963	1963	1964	1963	1958	1966	1966	1954	1963	1963

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1950 - 1996

ANNUAL TOTAL	8467.1	9838.2	
ANNUAL MEAN	23.2	26.9	(a)20.5
HIGHEST ANNUAL MEAN			35.6
LOWEST ANNUAL MEAN			4.55
HIGHEST DAILY MEAN	174	437	902
LOWEST DAILY MEAN	4.4	4.8	20
ANNUAL SEVEN-DAY MINIMUM	5.2	6.0	34
INSTANTANEOUS PEAK FLOW		1070	1390
INSTANTANEOUS PEAK STAGE		7.36	8.70
INSTANTANEOUS LOW FLOW		4.6	10
ANNUAL RUNOFF (CFSM)	.70	.81	.62
ANNUAL RUNOFF (INCHES)	9.46	10.99	8.37
10 PERCENT EXCEEDS	43	52	42
50 PERCENT EXCEEDS	17	18	12
90 PERCENT EXCEEDS	7.2	8.4	3.1

(a) Annual mean, water years 1951-70, 15.3 ft³/s, 5.63 in/yr; water years 1971-96, 24.5 ft³/s, 9.99 in/yr.

(b) Oct. 2, 3, Sept. 5.

(c) Aug. 8, 9, 1963.

(e) Estimated.

STREAMS TRIBUTARY TO DETROIT RIVER

04166100 RIVER ROUGE AT SOUTHFIELD, MI

LOCATION.--Lat 42°26'52", long 83°17'52", in SW1/4 sec.32, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank at downstream side of bridge on Beech Road at Southfield, 4.2 mi east of Farmington.

DRAINAGE AREA.--87.9 mi².

PERIOD OF RECORD.--April 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 609.62 ft above sea level (City of Southfield bench mark). Prior to Sept. 30, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	38	50	30	e43	89	59	176	44	56	38	20
2	23	277	45	29	e40	73	54	113	59	52	33	19
3	83	196	44	27	e37	59	53	93	59	50	28	19
4	123	78	42	e27	e34	e58	65	84	70	46	39	19
5	100	53	41	e26	e34	63	59	73	52	44	36	18
6	416	45	40	25	e34	59	51	68	110	41	27	18
7	119	60	37	26	e36	53	48	62	166	39	23	84
8	64	50	e37	25	e80	e52	45	59	93	46	25	148
9	46	40	e35	e28	295	e53	43	149	307	60	23	47
10	41	48	e33	e30	e120	e54	43	560	224	51	22	33
11	37	615	e31	e30	e80	59	43	234	115	41	23	31
12	35	405	e30	e30	e64	77	54	142	348	36	24	56
13	33	129	e30	e31	e53	98	241	111	487	55	23	33
14	33	95	166	e32	e50	86	168	91	124	55	22	27
15	33	74	208	e33	e48	83	115	104	83	95	21	29
16	32	62	117	e35	e46	67	143	105	64	76	21	26
17	31	55	76	e70	e45	57	101	85	63	41	20	23
18	31	59	59	240	e44	56	78	77	489	38	20	22
19	31	54	49	399	e45	58	87	69	1650	117	20	20
20	60	49	43	e100	e90	148	787	88	485	43	25	20
21	78	47	42	e80	322	107	223	916	234	34	31	20
22	43	44	e42	e65	127	84	225	286	209	32	24	164
23	34	42	e41	e56	65	81	209	133	152	34	45	88
24	31	39	40	137	118	111	135	110	186	63	38	43
25	30	38	36	69	84	231	121	87	141	52	26	32
26	30	38	33	e58	84	152	113	77	111	33	23	40
27	231	68	e33	192	421	85	89	69	97	28	22	168
28	132	154	e32	e80	381	73	74	64	84	26	21	207
29	55	71	31	e60	114	70	76	57	74	28	21	78
30	40	53	31	e50	---	63	401	51	66	185	20	47
31	39	---	31	e46	---	61	---	47	---	48	19	---
TOTAL	2137	3076	1605	2166	3034	2520	4003	4440	6446	1645	803	1599
MEAN	68.9	103	51.8	69.9	105	81.3	133	143	215	53.1	25.9	53.3
MAX	416	615	208	399	421	231	787	916	1650	185	45	207
MIN	23	38	30	25	34	52	43	47	44	26	19	18
CFSM	.78	1.17	.59	.79	1.19	.92	1.52	1.63	2.44	.60	.29	.61
IN.	.90	1.30	.68	.92	1.28	1.07	1.69	1.88	2.73	.70	.34	.68

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 1996, BY WATER YEAR (WY)

	MEAN	42.6	58.8	67.8	63.9	76.7	132	119	77.5	66.4	39.0	35.3	38.0
MAX	207	164	178	203	254	327	225	191	241	118	142	147	147
(WY)	1982	1993	1988	1993	1976	1982	1977	1983	1989	1968	1995	1986	1986
MIN	4.08	7.24	6.92	8.95	9.14	38.9	38.5	19.6	13.7	5.52	3.77	3.37	3.37
(WY)	1964	1964	1964	1961	1963	1964	1963	1958	1971	1964	1963	1963	1963

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1958 - 1996

ANNUAL TOTAL	32866	33474	68.4	
ANNUAL MEAN	90.0	91.5	105	1993
HIGHEST ANNUAL MEAN			20.4	1964
LOWEST ANNUAL MEAN				
HIGHEST DAILY MEAN	688	1650	3210	Jun 26 1968
LOWEST DAILY MEAN	21	18	.30	Jul 31 1964
ANNUAL SEVEN-DAY MINIMUM	23	19	.66	Jul 26 1964
INSTANTANEOUS PEAK FLOW		2250	4900	Jun 26 1968
INSTANTANEOUS PEAK STAGE		13.89	19.04	Jun 26 1968
INSTANTANEOUS LOW FLOW		17	.10	Aug 2 1964
ANNUAL RUNOFF (CFSM)	1.02	1.04	.78	
ANNUAL RUNOFF (INCHES)	13.91	14.17	10.58	
10 PERCENT EXCEEDS	183	185	133	
50 PERCENT EXCEEDS	55	54	38	
90 PERCENT EXCEEDS	29	26	11	

(a) Oct. 3, Sept. 6.

(e) Estimated.

STREAMS TRIBUTARY TO DETROIT RIVER

04166200 EVANS DITCH AT SOUTHFIELD, MI

LOCATION.--Lat 42°27'28", long 83°16'03", in SE1/4 sec.28, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank 70 ft upstream from bridge on Nine Mile Road at Southfield, 1.6 mi upstream from mouth, and 5.5 mi east of Farmington.

DRAINAGE AREA.--9.49 mi².

PERIOD OF RECORD.--September 1958 to current year.

REVISED RECORDS.--WSP 1912: 1963.

GAGE.--Water-stage recorder. Datum of gage is 615.07 ft above sea level (City of Southfield bench mark).

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.4	5.9	3.9	e1.8	e2.8	4.9	4.5	13	3.5	2.9	1.5	e1.1
2	2.7	73	3.2	e1.7	e2.6	e4.5	4.3	9.0	9.0	2.8	2.1	e1.1
3	35	8.7	3.2	e1.7	e2.5	e3.8	4.3	8.3	31	3.0	2.2	e1.1
4	3.9	3.3	2.9	e1.7	e2.4	e3.6	9.0	6.6	6.8	2.5	1.3	e1.0
5	72	2.6	2.9	1.6	e2.4	e5.0	4.6	5.5	4.0	2.5	1.3	e1.0
6	35	2.4	2.8	1.6	e2.4	e4.0	4.0	5.2	27	2.3	1.3	e1.0
7	3.4	5.8	2.5	1.6	e3.2	e3.4	3.7	4.8	16	2.4	1.3	59
8	2.4	2.2	2.3	1.6	e1.5	e3.0	3.5	4.9	5.4	2.3	1.5	5.8
9	e2.0	2.0	2.4	1.7	11	2.6	3.5	83	98	4.0	1.2	4.3
10	e1.8	13	2.3	1.8	6.3	2.8	3.4	62	13	3.0	1.2	1.9
11	e1.6	116	2.1	1.6	4.9	5.7	3.3	18	14	2.2	1.2	2.3
12	e1.5	11	2.0	1.7	3.1	8.3	11	11	141	2.2	1.2	2.3
13	e1.5	6.1	2.0	1.8	2.6	6.5	29	8.2	30	7.7	1.4	1.8
14	e1.4	4.9	42	e1.8	e3.3	6.2	7.7	6.9	8.5	3.3	1.3	2.4
15	e1.4	4.3	12	e1.8	e3.0	5.7	16	14	5.4	11	1.3	2.1
16	e1.3	4.0	6.1	1.8	e2.7	5.0	12	7.7	4.5	2.5	1.4	1.7
17	e1.3	3.6	3.9	15	e2.7	4.5	6.3	6.4	6.6	2.2	1.4	1.7
18	e1.3	5.2	3.4	23	e2.7	4.7	5.3	6.0	201	2.9	1.4	1.7
19	e2.5	3.5	3.1	49	e2.8	8.5	8.3	5.1	32	33	1.4	1.6
20	9.9	3.3	2.8	5.1	16	24	138	26	11	2.4	2.9	1.6
21	2.1	3.1	2.6	4.1	17	12	14	167	7.6	2.1	2.2	2.6
22	1.9	3.8	2.5	3.8	4.8	9.3	35	13	20	2.0	1.3	50
23	1.3	2.9	2.4	5.1	3.4	10	18	8.5	5.5	2.7	3.5	4.4
24	1.3	2.5	2.3	23	6.9	16	11	6.9	19	17	1.2	2.6
25	1.2	2.6	2.3	5.0	3.8	27	12	5.6	5.1	2.9	1.2	1.8
26	1.4	2.6	2.2	9.2	6.6	9.3	11	5.6	4.2	2.0	1.2	7.3
27	58	28	2.1	19	75	6.2	6.9	4.7	3.8	1.8	e1.2	45
28	4.9	16	2.0	5.2	15	5.9	5.9	5.2	3.5	1.9	e1.2	13
29	2.2	4.8	1.9	e4.0	6.4	5.6	8.7	4.0	3.3	6.2	e1.2	2.6
30	2.0	3.9	1.8	e3.4	---	4.9	80	3.7	3.0	19	e1.1	2.1
31	2.9	---	e1.8	e3.0	---	4.9	---	3.5	---	1.7	e1.1	---
TOTAL	262.5	351.0	131.7	204.2	233.3	227.8	484.2	539.3	742.7	156.4	46.2	227.9
MEAN	8.47	11.7	4.25	6.59	8.04	7.35	16.1	17.4	24.8	5.05	1.49	7.80
MAX	72	116	42	49	75	27	198	167	201	33	3.5	59
MIN	1.2	1.0	1.8	1.6	2.4	2.6	3.3	3.5	3.0	1.7	1.1	1.0
CFSM	.89	1.23	.45	.69	.85	.77	1.70	1.83	2.61	.53	.16	.80
IN.	1.03	1.38	.52	.80	.91	.89	1.90	2.11	2.91	.61	.18	.89

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 1996, BY WATER YEAR (WY)

	MEAN	5.93	7.95	8.94	7.32	9.10	14.2	13.5	9.02	9.58	6.97	6.83	6.38
MAX	23.3	19.8	25.4	26.7	32.1	32.6	27.4	27.1	30.5	23.7	22.4	20.0	
(WY)	1982	1993	1968	1974	1971	1974	1977	1968	1968	1992	1995	1986	
MIN	.44	1.13	.71	.49	.79	5.28	3.27	2.35	1.68	.73	1.35	.58	
(WY)	1964	1964	1964	1963	1963	1964	1971	1962	1959	1962	1960	1965	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1958 - 1996

ANNUAL TOTAL	3605.4	3607.2	8.80	
ANNUAL MEAN	9.88	9.86		
HIGHEST ANNUAL MEAN			16.9	1968
LOWEST ANNUAL MEAN			3.12	1963
HIGHEST DAILY MEAN	230	201	442	Oct 1 1981
LOWEST DAILY MEAN	1.2	(e)1.0	.00	(b)
ANNUAL SEVEN-DAY MINIMUM	1.3	1.1	.27	Dec 15 1963
INSTANTANEOUS PEAK FLOW		704	(c)1200	Oct 1 1981
INSTANTANEOUS PEAK STAGE		11.39	(d)15.03	Oct 1 1981
ANNUAL RUNOFF (CFSM)	1.04	1.04	.93	
ANNUAL RUNOFF (INCHES)	14.13	14.14	12.60	
10 PERCENT EXCEEDS	22	19	18	
50 PERCENT EXCEEDS	3.4	3.5	3.4	
90 PERCENT EXCEEDS	1.9	1.4	1.1	

(a) Sept. 4-6.

(b) June 13-15, 1986, result of regulation from unknown source.

(c) From rating curve extended above 410 ft³/s.

(d) From floodmark.

(e) Estimated.

STREAMS TRIBUTARY TO DETROIT RIVER

04166300 UPPER RIVER ROUGE AT FARMINGTON, MI

LOCATION.--Lat 42°27'52", long 83°22'11", in NW1/4 sec.27, T.1 N., R.9 E., Oakland County, Hydrologic Unit 04090004, on left bank 800 ft downstream from bridge on Shiawassee Road at Farmington.

DRAINAGE AREA.--17.5 mi².

PERIOD OF RECORD.--March 1958 to current year.

REVISED RECORDS.--WSP 1912: 1959(M), 1960(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 690.4 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.7	11	10	e5.6	e5.2	e18	16	40	e12	9.3	14	e3.9
2	4.5	61	9.3	e5.5	e4.7	e15	15	24	17	9.4	10	e3.8
3	17	44	8.9	e5.4	e4.4	e13	15	20	e15	9.4	8.3	e3.7
4	16	21	8.4	e5.3	e4.2	e12	17	18	e12	8.5	7.4	e3.6
5	27	14	8.2	e5.2	e4.0	e11	16	16	10	8.0	6.6	e3.6
6	64	11	7.8	e5.1	e3.8	e10	14	15	26	7.6	6.3	e3.5
7	24	13	6.8	e5.0	e3.6	e9.5	13	14	25	7.1	6.0	e12
8	13	11	6.5	e4.9	e15	e9.0	12	14	17	7.0	6.1	e43
9	10	9.6	6.2	e4.8	e55	e8.5	12	40	55	8.3	5.4	e25
10	8.7	13	e6.0	e4.8	e22	e8.2	12	96	41	7.2	5.0	e15
11	7.6	129	e5.8	e4.9	e15	e8.5	11	53	23	6.5	4.9	e8.0
12	7.1	73	e5.7	e5.1	e12	e9.0	15	34	56	6.3	5.2	e15
13	6.9	38	e5.6	e5.3	e10	e9.5	47	24	63	7.8	5.1	e10
14	6.7	24	e30	e5.6	e8.5	10	38	19	27	7.0	4.8	e7.0
15	6.4	18	e37	e6.0	e7.5	16	30	21	17	13	4.8	e8.0
16	5.8	14	e22	e6.5	e6.8	15	e30	22	13	8.5	4.7	e6.5
17	5.6	12	e16	e15	e6.4	13	23	19	13	7.5	4.2	e5.7
18	5.8	12	e11	e45	e6.0	12	16	17	164	8.4	4.2	e5.3
19	5.8	11	e9.3	e70	e6.5	13	18	16	286	22	4.0	e5.2
20	9.5	10	e8.7	e27	e15	27	109	20	98	10	5.7	5.0
21	9.4	9.5	e8.1	e16	e70	21	44	170	51	7.8	5.8	8.4
22	8.0	8.9	e7.7	e13	e30	18	51	68	43	7.4	5.3	40
23	6.7	8.5	e7.4	e12	e14	18	44	38	28	6.9	12	23
24	6.6	7.6	e7.1	e25	e22	25	29	28	35	12	e8.0	12
25	6.2	7.4	e6.9	e14	e9.5	57	25	21	22	9.5	e6.0	8.8
26	6.1	7.3	e6.7	e12	e13	40	23	19	16	7.3	e5.3	11
27	40	14	e6.5	e35	125	22	18	17	14	6.3	e4.9	42
28	29	28	e6.3	e15	80	20	15	18	12	5.9	e4.7	48
29	15	15	e6.1	e10	e25	17	16	16	11	7.7	e4.5	21
30	11	11	e5.9	e7.0	---	16	70	e14	10	57	e4.3	12
31	9.8	---	e5.7	e6.0	---	15	---	e13	---	23	e4.1	---
TOTAL	403.9	666.8	303.6	407.0	604.1	516.2	814	964	1232	329.6	187.6	419.0
MEAN	13.0	22.2	9.79	13.1	20.8	16.7	27.1	31.1	41.1	10.6	6.05	14.0
MAX	64	129	37	70	125	57	109	170	286	57	14	48
MIN	4.5	7.3	5.6	4.8	3.6	8.2	11	13	10	5.9	4.0	3.5
CFSM	.74	1.27	.56	.75	1.19	.95	1.55	1.78	2.35	.61	.35	.80
IN.	.86	1.42	.65	.87	1.28	1.10	1.73	2.05	2.62	.70	.40	.89

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 1996, BY WATER YEAR (WY)

	MEAN	7.86	11.2	12.4	12.6	15.8	27.0	24.0	15.8	13.3	7.20	6.62	7.14
MAX	42.2	31.3	29.0	39.8	51.6	63.6	42.3	38.7	63.9	24.8	24.9	26.5	
(WY)	1982	1993	1991	1974	1976	1982	1977	1983	1989	1992	1995	1975	
MIN	1.10	1.69	1.70	2.06	2.20	6.81	9.10	3.46	2.13	1.00	.97	1.00	
(WY)	1965	1965	1964	1961	1963	1964	1971	1971	1971	1964	1963	1964	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1958 - 1996

ANNUAL TOTAL	6442.8	6847.8	13.5
ANNUAL MEAN	17.7	18.7	21.2
HIGHEST ANNUAL MEAN			4.54
LOWEST ANNUAL MEAN			1968
HIGHEST DAILY MEAN	129	Nov 11	286
LOWEST DAILY MEAN	4.5	Oct 2	(e)3.5
ANNUAL SEVEN-DAY MINIMUM	5.1	Sep 13	3.7
INSTANTANEOUS PEAK FLOW			548
INSTANTANEOUS PEAK STAGE			5.96
INSTANTANEOUS LOW FLOW			Jun 18
ANNUAL RUNOFF (CFSM)	1.01	1.07	8.70
ANNUAL RUNOFF (INCHES)	13.70	14.56	(b).07
10 PERCENT EXCEEDS	38	40	.77
50 PERCENT EXCEEDS	12	11	10.46
90 PERCENT EXCEEDS	5.9	5.2	28
			7.2
			2.2

(a) Aug. 10, 1964, Aug. 29, 1966.

(b) Result of regulation.

(c) Estimated.

STREAMS TRIBUTARY TO DETROIT RIVER

04166500 RIVER ROUGE AT DETROIT, MI

LOCATION.--Lat 42°22'20", long 83°15'20", in SW1/4 sec.27, T.1 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 500 ft upstream from bridge on Plymouth Road at Detroit, 4 mi upstream from Middle River Rouge.

DRAINAGE AREA.--187 mi².

PERIOD OF RECORD.--October 1930 to current year.

REVISED RECORDS.--WSP 1034: 1933(M). WSP 1054: 1939, 1943, 1945(M). WSP 1437: 1931-32, 1934, 1936(M), 1937-38, 1944(M), 1945. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 584.00 ft above sea level. Prior to Oct. 16, 1948, nonrecording gage at site 1 mi downstream at datum 4.6 ft lower.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	29	74	95	e51	e62	187	119	450	78	84	81	29
2	29	518	86	e50	e56	159	109	242	113	74	65	30
3	105	550	80	e49	e51	131	104	181	181	72	63	29
4	252	197	72	e47	e48	e115	131	173	197	65	49	29
5	180	123	69	e45	e45	e130	143	146	106	62	62	27
6	725	93	67	43	e43	e120	108	132	209	56	47	26
7	240	106	58	45	e42	e110	95	121	358	53	39	122
8	108	112	e67	43	e70	e98	87	116	228	68	39	308
9	69	83	e62	e43	335	e93	82	285	445	80	43	110
10	58	81	e58	49	220	e90	81	1150	584	77	36	73
11	49	770	e56	50	157	104	78	626	241	61	34	57
12	45	888	e54	53	110	161	117	325	301	52	35	116
13	43	317	e54	55	81	218	423	230	856	68	36	65
14	41	193	282	56	e76	178	404	184	293	160	41	51
15	39	149	482	e58	e72	177	218	179	167	189	33	57
16	39	126	241	59	e68	147	309	221	127	141	31	46
17	37	116	151	108	e64	121	209	170	116	70	32	41
18	36	118	120	401	e65	114	156	155	526	57	31	38
19	37	114	94	719	69	121	171	140	2090	207	30	37
20	59	96	82	333	125	363	1200	125	1420	96	31	32
21	136	88	e78	e220	490	269	815	1020	439	58	63	32
22	64	79	e74	e160	350	203	451	850	368	48	41	368
23	52	72	e69	e100	144	191	483	283	255	52	55	227
24	43	68	65	331	177	228	286	206	292	104	69	95
25	43	62	e62	165	175	438	257	163	246	164	42	67
26	42	62	e59	e100	151	368	225	141	173	58	38	56
27	357	106	55	354	584	191	190	130	140	44	32	287
28	386	425	e54	190	832	156	150	126	125	40	32	450
29	135	176	52	e110	283	142	155	110	111	66	30	172
30	82	111	e52	e90	---	131	660	96	97	433	29	89
31	68	---	e52	e75	---	123	---	84	---	152	28	---
TOTAL	3628	6073	3002	4252	5045	5377	8016	8560	10882	3011	1317	3166
MEAN	117	202	96.8	137	174	173	267	276	363	97.1	42.5	106
MAX	725	888	482	719	832	438	1200	1150	2090	433	81	450
MIN	29	62	52	43	42	90	78	84	78	40	28	26
CFSM	.63	1.08	.52	.73	.93	.93	1.43	1.48	1.94	.52	.23	.56
IN.	.72	1.21	.60	.85	1.00	1.07	1.59	1.70	2.16	.60	.26	.63

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1996, BY WATER YEAR (WY)

	MEAN	66.9	91.3	113	120	163	235	232	167	113	67.5	57.5	58.0
MAX	450	321	321	456	519	488	965	683	478	385	223	274	
(WY)	1982	1993	1968	1950	1938	1950	1947	1943	1968	1957	1995	1975	
MIN	8.35	16.3	16.6	13.6	18.2	59.5	49.3	23.9	7.92	6.46	5.58	7.03	
(WY)	1964	1954	1940	1961	1963	1931	1931	1934	1934	1934	1931	1931	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1931 - 1996

ANNUAL TOTAL	57147	62329	123
ANNUAL MEAN	157	170	222
HIGHEST ANNUAL MEAN			25.7
LOWEST ANNUAL MEAN			1968
HIGHEST DAILY MEAN	1110	Mar 8	2090
LOWEST DAILY MEAN	29	Sep 30	26
ANNUAL SEVEN-DAY MINIMUM	31	Sep 26	28
INSTANTANEOUS PEAK FLOW			2610
INSTANTANEOUS PEAK STAGE			15.96
INSTANTANEOUS LOW FLOW			24
ANNUAL RUNOFF (CFSM)	.84	.91	1.8
ANNUAL RUNOFF (INCHES)	11.37	12.40	.66
10 PERCENT EXCEEDS	330	368	263
50 PERCENT EXCEEDS	102	104	61
90 PERCENT EXCEEDS	44	41	16

(a) Aug. 1, 2, 1964.

(e) Estimated.

STREAMS TRIBUTARY TO DETROIT RIVER

04167000 MIDDLE RIVER ROUGE NEAR GARDEN CITY, MI

LOCATION.--Lat 42°20'55", long 83°18'45", in SW1/4 NW1/4 sec.6, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 200 ft downstream from bridge on Inkster Road, 1.8 mi northeast of Garden City, and 6.0 mi upstream from mouth.

DRAINAGE AREA.--99.9 mi².

PERIOD OF RECORD.--October 1930 to September 1933 (published as "at Detroit"), June 1947 to September 1977, October 1977 to September 1983 (operated as a crest-stage partial-record station), October 1983 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 600.95 ft above sea level. Nov. 21, 1930 to Sept. 30, 1933, nonrecording gage at site 4.8 mi downstream at datum 17.48 ft lower. June 6, 1947 to Oct. 18, 1948, nonrecording gage at site 200 ft upstream at present datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Occasional regulation by reservoirs upstream from station since 1956. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	31	71	70	e36	e48	e110	81	259	55	54	52	20
2	31	283	65	e35	e42	e95	77	177	74	50	40	19
3	95	244	64	e35	e40	e80	73	138	135	48	32	19
4	108	109	61	e34	e37	75	90	127	79	43	29	20
5	164	76	60	e33	e35	90	85	113	59	40	27	19
6	304	65	58	e32	e33	e85	73	103	146	37	29	19
7	107	64	54	e32	e32	e72	68	98	169	38	28	93
8	62	61	50	e31	e75	e68	65	94	90	37	33	89
9	47	53	e48	e31	105	e66	63	244	218	33	27	67
10	42	60	e47	e31	84	e64	63	832	149	32	24	44
11	40	391	e45	e32	73	68	60	521	102	34	23	55
12	39	342	44	e34	65	88	97	296	182	31	23	98
13	39	173	44	e35	e60	108	204	203	307	57	27	36
14	40	114	176	e37	56	102	155	158	158	49	38	33
15	39	92	170	e38	52	102	127	136	98	105	28	35
16	36	80	102	e39	e50	93	142	128	75	56	24	29
17	35	75	74	74	e46	83	115	117	76	37	22	26
18	35	83	64	175	e48	76	97	111	320	34	22	24
19	35	76	56	365	49	87	108	102	654	34	22	22
20	62	72	52	173	86	189	697	93	363	39	38	22
21	67	68	e50	118	191	129	456	406	200	33	35	28
22	55	64	48	91	154	108	339	340	161	30	28	151
23	44	62	45	84	98	104	300	191	131	32	28	91
24	43	60	43	179	106	119	226	132	131	89	32	56
25	40	58	43	e95	107	188	222	104	119	60	27	38
26	39	57	42	88	108	192	178	87	92	38	23	42
27	217	105	e41	167	416	129	147	78	80	30	21	164
28	153	202	e40	117	432	102	121	74	72	27	21	218
29	80	104	e39	88	200	92	135	68	66	55	21	90
30	60	79	e37	75	---	86	377	61	61	307	20	52
31	58	---	e37	e60	---	83	---	57	---	120	21	---
TOTAL	2247	3443	1869	2494	2928	3133	5041	5648	4622	1710	865	1719
MEAN	72.5	115	60.3	80.5	101	101	168	182	154	55.2	27.9	57.3
MAX	304	391	176	365	432	192	697	832	654	307	52	218
MIN	31	53	37	31	32	64	60	57	55	27	20	19
CFSM	.73	1.15	.60	.81	1.01	1.01	1.68	1.82	1.54	.55	.28	.57
IN.	.84	1.28	.70	.93	1.09	1.17	1.88	2.10	1.72	.64	.32	.64

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1996, BY WATER YEAR (WY)

	MEAN	40.4	58.3	73.9	81.0	103	147	134	92.3	65.8	42.5	35.9	41.6
MAX	124	178	177	269	324	313	313	310	225	179	90.6	171	171
(WY)	1955	1993	1988	1952	1976	1976	1950	1956	1968	1957	1994	1975	1975
MIN	7.83	9.46	10.4	9.65	14.2	42.3	32.6	21.9	17.8	8.85	5.64	4.97	4.97
(WY)	1932	1965	1964	1961	1963	1931	1931	1958	1959	1931	1931	1931	1931

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1931 - 1996

ANNUAL TOTAL	33136	35719	76.0
ANNUAL MEAN	90.8	97.6	133
HIGHEST ANNUAL MEAN			20.8
LOWEST ANNUAL MEAN			1976
HIGHEST DAILY MEAN	708	832	2060
LOWEST DAILY MEAN	21	19	1.4
ANNUAL SEVEN-DAY MINIMUM	24	20	3.0
INSTANTANEOUS PEAK FLOW		965	(b)2330
INSTANTANEOUS PEAK STAGE		8.70	(c)10.50
INSTANTANEOUS LOW FLOW			.90
ANNUAL RUNOFF (CFSM)	.91	.98	.76
ANNUAL RUNOFF (INCHES)	12.34	13.30	10.33
10 PERCENT EXCEEDS	184	191	163
50 PERCENT EXCEEDS	63	67	42
90 PERCENT EXCEEDS	33	30	14

(a) Sept. 2, 3, 5, 6.

(b) Gage height 9.96 ft.

(c) From floodmark.

(e) Estimated.

STREAMS TRIBUTARY TO DETROIT RIVER

04168000 LOWER RIVER ROUGE AT INKSTER, MI

LOCATION.--Lat 42°18'00", long 83°18'00", in SW1/4 SE1/4 sec.19, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 10 ft downstream from bridge on John Daly Road, 0.6 mi northeast of Inkster, and 4.8 mi upstream from mouth.

DRAINAGE AREA.--83.2 mi².

PERIOD OF RECORD.--June 1947 to current year.

REVISED RECORDS.--WSP 1174: 1948(M). WSP 1437: 1949. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 593.14 ft above sea level. Prior to Oct. 20, 1948, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Since 1995, flow contains effluent, from sewage-treatment plant, which originates outside the basin. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	48	59	34	e45	103	75	252	41	39	55	34
2	29	238	56	34	e43	84	68	139	53	32	37	32
3	72	210	51	34	e41	60	65	103	70	30	40	31
4	61	77	48	32	e40	57	72	91	64	31	38	31
5	126	54	44	e32	e39	68	65	85	46	32	37	32
6	225	47	44	e32	e38	62	60	76	85	31	33	34
7	66	51	42	33	e36	55	59	70	88	31	33	84
8	44	44	44	32	e50	50	53	67	59	33	34	67
9	39	41	39	30	62	50	55	139	98	31	33	50
10	38	45	36	26	49	46	53	964	66	31	32	40
11	33	294	e35	e32	55	55	52	821	54	30	34	44
12	36	269	34	48	42	75	77	262	119	32	34	83
13	34	94	36	35	39	121	159	159	131	45	36	46
14	33	71	128	33	38	101	151	113	78	50	33	40
15	31	59	154	36	34	105	107	97	56	61	31	41
16	32	53	83	34	35	86	114	92	47	36	33	35
17	32	47	63	83	34	74	99	81	56	33	40	33
18	33	55	54	197	35	69	83	71	170	42	33	33
19	32	52	51	452	35	77	82	65	406	33	34	32
20	46	49	41	144	69	208	530	56	151	32	41	33
21	44	48	41	86	198	153	586	203	93	29	39	39
22	37	46	41	65	182	131	316	138	71	35	33	95
23	35	44	37	69	81	114	316	76	58	43	34	66
24	32	41	37	210	99	158	188	62	53	69	33	49
25	33	36	37	113	89	384	144	52	48	54	34	38
26	31	36	37	79	106	230	121	42	43	36	33	48
27	141	75	35	184	477	111	99	49	39	33	31	115
28	105	200	34	105	725	93	79	47	38	28	27	142
29	54	101	34	67	170	84	90	42	37	49	27	66
30	42	68	34	52	---	79	364	46	36	226	29	47
31	43	---	34	e47	---	76	---	42	---	79	33	---
TOTAL	1667	2593	1543	2490	2986	3219	4382	4602	2454	1396	1074	1560
MEAN	53.8	86.4	49.8	80.3	103	104	146	148	81.8	45.0	34.6	52.0
MAX	225	294	154	452	725	384	586	964	406	226	55	142
MIN	28	36	34	26	34	46	52	42	36	28	27	31

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1947 - 1996, BY WATER YEAR (WY)

MEAN	20.8	38.0	60.9	57.8	85.7	133	113	58.3	36.0	20.0	14.8	20.5
MAX	110	176	179	294	307	301	280	183	221	95.8	65.7	99.5
(WY)	1982	1986	1968	1952	1976	1982	1950	1983	1968	1969	1975	1975
MIN	2.11	3.23	2.32	1.86	4.18	19.4	22.2	4.47	2.75	2.26	.83	1.86
(WY)	1949	1964	1964	1961	1964	1964	1958	1958	1949	1948	1950	1952

SUMMARY STATISTICS FOR 1995 CALENDAR YEAR FOR 1996 WATER YEAR WATER YEARS 1947 - 1996

ANNUAL TOTAL	24219.2	29966	54.6
ANNUAL MEAN	66.4	81.9	98.8
HIGHEST ANNUAL MEAN			15.9
LOWEST ANNUAL MEAN			2520
HIGHEST DAILY MEAN	928	964	May 10
LOWEST DAILY MEAN	1.0	26	Jan 10
ANNUAL SEVEN-DAY MINIMUM	3.4	30	Aug 27
INSTANTANEOUS PEAK FLOW		1470	May 10
INSTANTANEOUS PEAK STAGE		10.73	May 10
INSTANTANEOUS LOW FLOW			13.62
10 PERCENT EXCEEDS	137	153	.20
50 PERCENT EXCEEDS	40	49	121
90 PERCENT EXCEEDS	17	32	17
			2.7

(a) Sept. 13, 1955, Jan. 23, 1961.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ERIE

04170000 HURON RIVER AT MILFORD, MI

LOCATION.--Lat 42°34'44", long 83°37'36", in NE1/4 sec.16, T.2 N., R.7 E., Oakland County, Hydrologic Unit 04090005, on left bank 40 ft downstream from bridge on General Motors Road, 0.5 mi downstream from Sherwood Creek, and 0.5 mi west of Milford.

DRAINAGE AREA.--132 mi².

PERIOD OF RECORD.--September 1948 to current year.

REVISED RECORDS.--WSP 1337: 1952(m). WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 880.00 ft above sea level. Prior to Apr. 1, 1970, at site 240 ft upstream at same datum.

REMARKS.--Records good. Flow below about 300 ft³/s regulated by powerplant 1.5 mi upstream from station prior to May 20, 1957; occasional regulation for lake level control since. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	51	103	146	89	99	137	115	172	114	179	74	38
2	51	144	146	90	96	129	103	155	104	165	71	37
3	61	160	142	87	93	125	96	146	98	153	67	18
4	78	160	141	85	92	125	96	143	100	143	59	17
5	80	146	139	83	92	130	93	138	96	135	55	36
6	113	134	136	81	92	128	88	131	106	125	52	36
7	107	129	133	78	91	128	81	129	122	114	49	45
8	92	123	129	77	99	124	78	129	114	105	46	55
9	86	116	127	77	113	122	75	137	125	101	43	70
10	86	118	124	77	105	118	73	190	141	91	41	70
11	86	199	118	75	105	116	72	237	135	84	40	63
12	86	262	118	75	98	118	77	231	136	77	41	61
13	85	256	121	73	94	126	113	212	136	65	44	57
14	83	212	134	72	94	129	123	198	133	59	44	59
15	80	182	145	72	92	132	112	194	134	57	43	62
16	84	172	143	71	89	137	112	189	123	59	43	62
17	82	164	138	84	88	137	110	179	118	64	43	59
18	86	161	133	125	87	136	107	158	207	68	41	57
19	88	161	129	171	86	129	115	144	360	76	42	54
20	91	160	124	155	91	142	141	136	419	73	44	52
21	103	159	120	135	116	136	150	205	419	68	46	52
22	95	157	114	120	109	128	148	238	366	66	43	75
23	88	152	110	114	104	125	156	223	319	64	55	92
24	82	146	106	118	115	131	146	197	322	63	52	79
25	78	141	103	117	118	151	141	178	305	62	46	72
26	76	139	101	110	120	155	139	169	286	56	43	69
27	107	147	97	121	144	141	136	164	252	54	43	88
28	126	166	95	116	167	133	141	159	229	51	43	113
29	112	160	92	109	153	130	144	152	208	53	43	104
30	99	149	91	104	---	125	171	141	192	77	41	89
31	97	---	90	102	---	119	---	127	---	76	40	---
TOTAL	2719	4778	3785	3063	3042	4042	3452	5301	5919	2683	1477	1881
MEAN	87.7	159	122	98.8	105	130	115	171	197	86.5	47.6	62.7
MAX	126	262	146	171	167	155	171	238	419	179	74	113
MIN	51	103	90	71	86	116	72	127	96	51	40	36
CFSM	.66	1.21	.92	.75	.79	.99	.87	1.30	1.49	.66	.36	.47
IN.	.77	1.35	1.07	.86	.86	1.14	.97	1.49	1.67	.76	.42	.53

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1948 - 1996, BY WATER YEAR (WY)

	MEAN	80.9	96.4	108	106	112	155	163	117	88.7	67.0	54.1	64.7
MAX	283	179	218	211	226	337	389	340	197	233	142	247	
(WY)	1982	1993	1951	1993	1951	1976	1950	1956	1996	1968	1968	1975	
MIN	32.6	34.0	35.8	42.5	42.0	66.9	79.4	51.8	28.8	19.3	26.5	27.2	
(WY)	1965	1964	1964	1964	1963	1964	1963	1988	1988	1988	1971	1964	

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1948 - 1996
ANNUAL TOTAL	41783	42142	
ANNUAL MEAN	114	115	101
HIGHEST ANNUAL MEAN			157
LOWEST ANNUAL MEAN			44.6
HIGHEST DAILY MEAN	262	419	632
LOWEST DAILY MEAN	35	36	5.2
ANNUAL SEVEN-DAY MINIMUM	36	37	11
INSTANTANEOUS PEAK FLOW		433	(a)648
INSTANTANEOUS PEAK STAGE		7.23	8.26
INSTANTANEOUS LOW FLOW		35	(b)
ANNUAL RUNOFF (CFSM)	.87	.87	.76
ANNUAL RUNOFF (INCHES)	11.78	11.88	10.39
10 PERCENT EXCEEDS	163	170	184
50 PERCENT EXCEEDS	113	112	85
90 PERCENT EXCEEDS	55	52	38

(a) Gage height 7.87 ft.

(b) Sept. 5, 6.

STREAMS TRIBUTARY TO LAKE ERIE

04170490 KENT LAKE NEAR NEW HUDSON, MI

LOCATION.--Lat 42°30'45", long 83°40'34", in sec.1, T.1 N., R.6 E., Livingston County, Hydrologic Unit 04090005, at Kent Lake Dam, 2 mi upstream from Woodruff Creek, and 3 mi west of New Hudson.

DRAINAGE AREA.--148 mi².

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

GAGE.--Water-stage recorder. Datum of gage is 868.00 ft above sea level (Huron-Clinton Metropolitan Authority bench mark).

REMARKS.--Records fair. The inlet and outlet is the Huron River which enters the northeast end of the lake and leaves the southwest end of the lake. Streamflow records are currently collected on the Huron River at sites about 1 mi upstream (04170000) and 150 ft downstream (04170500) from Kent Lake. Maximum depth, 38 ft, surface area, 1,200 acres. A concrete dam with steel drum spillway is used to control the lake level.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 16.68 ft, Apr. 6, 1950; minimum observed, 9.46 ft, Jan. 9, 1996, due to construction, but may have been lower during period of no gage-height record Dec. 30, 1995 to Jan. 20, 1996.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 16.10 ft, June 21; minimum observed, 9.46 ft, Jan. 9, due to construction, but may have been lower during period of no gage-height record Dec. 30 to Jan. 20.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.47	15.64	12.29	---	10.94	12.70	13.38	15.45	15.54	15.79	15.55	15.45
2	15.48	15.72	12.23	---	10.93	12.70	13.46	15.44	15.52	15.76	15.55	15.44
3	15.51	15.76	12.19	---	10.92	12.69	13.52	15.43	15.51	15.73	15.53	15.44
4	15.54	15.78	11.94	---	10.90	12.69	13.57	15.41	15.50	15.69	15.52	15.44
5	15.58	15.77	11.75	---	10.87	12.71	13.63	15.39	15.50	15.66	15.50	15.44
6	15.63	15.69	11.67	---	10.85	12.71	13.67	15.37	15.53	15.64	15.49	15.43
7	15.63	15.44	11.62	---	10.85	12.70	13.69	15.35	15.57	15.61	15.48	15.46
8	15.62	15.14	11.54	---	10.89	12.70	13.69	15.35	15.57	15.58	15.47	15.50
9	15.60	14.82	11.41	---	11.03	12.69	13.71	15.36	15.59	15.57	15.46	15.57
10	15.59	14.45	11.32	---	11.17	12.67	13.75	15.46	15.60	15.54	15.45	15.58
11	15.58	14.26	11.24	---	11.27	12.67	13.78	15.55	15.61	15.51	15.43	15.56
12	15.58	14.16	11.13	---	11.33	12.66	13.83	15.56	15.62	15.48	15.43	15.55
13	15.57	14.05	11.02	---	11.36	12.67	13.93	15.59	15.62	15.45	15.44	15.53
14	15.56	13.95	10.98	---	11.43	12.69	14.07	15.68	15.62	15.42	15.44	15.52
15	15.55	13.75	10.96	---	11.47	12.71	14.14	15.74	15.61	15.41	15.44	15.53
16	15.55	13.55	10.95	---	11.49	12.74	14.20	15.75	15.61	15.40	15.44	15.54
17	15.54	13.35	10.91	---	11.52	12.76	14.31	15.71	15.60	15.40	15.44	15.54
18	15.55	13.25	10.85	---	11.52	12.77	14.36	15.66	15.75	15.41	15.43	15.53
19	15.56	13.19	10.78	---	11.53	12.78	14.47	15.62	15.94	15.45	15.44	15.52
20	15.58	13.11	10.71	---	11.57	12.81	14.70	15.60	16.03	15.44	15.45	15.51
21	15.60	12.98	10.64	10.71	11.69	12.77	14.90	15.72	16.09	15.43	15.47	15.51
22	15.60	12.90	10.53	10.79	11.84	12.74	15.06	15.76	16.08	15.42	15.46	15.56
23	15.60	12.87	10.45	10.93	12.02	12.72	15.23	15.78	16.03	15.41	15.50	15.61
24	15.57	12.84	10.33	10.96	12.19	12.71	15.30	15.77	16.04	15.44	15.50	15.61
25	15.58	12.81	10.20	10.92	12.31	12.72	15.33	15.72	16.00	15.47	15.48	15.60
26	15.57	12.80	10.09	10.91	12.40	12.87	15.36	15.69	15.96	15.48	15.46	15.59
27	15.62	12.81	9.91	10.91	12.50	12.95	15.36	15.67	15.92	15.48	15.47	15.62
28	15.67	12.84	9.73	10.92	12.58	13.06	15.36	15.65	15.89	15.47	15.46	15.68
29	15.67	12.69	9.60	10.88	12.65	13.14	15.39	15.63	15.85	15.47	15.46	15.69
30	15.66	12.43	---	10.86	---	13.25	15.41	15.60	15.82	15.51	15.45	15.66
31	15.65	---	---	10.94	---	13.33	---	15.57	---	15.53	15.45	---
MEAN	15.58	13.96	---	---	11.52	12.79	14.35	15.58	15.74	15.52	15.47	15.54
MAX	15.67	15.78	---	---	12.65	13.33	15.41	15.78	16.09	15.79	15.55	15.69
MIN	15.47	12.43	---	---	10.85	12.66	13.38	15.35	15.50	15.40	15.43	15.43

STREAMS TRIBUTARY TO LAKE ERIE

04170500 HURON RIVER NEAR NEW HUDSON, MI

LOCATION.--Lat 42°30'45", long 83°40'35", in NE1/4 sec.1, T.1 N., R.6 E., Livingston County, Hydrologic Unit 04090005, on right bank 150 ft downstream from Kent Lake Dam, 2 mi upstream from Woodruff Creek, and 3 mi west of New Hudson.

DRAINAGE AREA.--148 mi².

PERIOD OF RECORD.--August 1948 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 868.00 ft above sea level (Huron-Clinton Metropolitan Authority bench mark).

REMARKS.--Records good except for estimated daily discharges, which are poor. Occasional regulation by Kent Lake (see preceding page). Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47	118	209	156	108	140	e100	171	136	237	88	44
2	48	144	192	155	108	141	e98	167	130	220	88	43
3	60	159	183	116	108	138	e96	161	122	203	86	41
4	71	168	207	94	107	136	e94	157	116	183	78	41
5	85	166	205	94	106	142	e92	150	113	168	71	40
6	101	235	193	94	104	143	e90	142	123	158	67	39
7	103	288	189	94	96	141	e85	137	138	141	61	44
8	99	285	187	93	95	139	e80	135	143	124	59	54
9	91	290	191	90	88	135	e77	140	150	119	53	76
10	87	334	188	90	85	132	e75	170	156	113	53	77
11	84	325	185	90	85	130	e74	199	162	99	48	73
12	83	323	182	91	85	129	e80	206	164	93	46	68
13	83	303	181	90	89	132	e90	166	166	83	50	64
14	80	301	180	88	88	136	e97	156	169	72	50	61
15	77	297	180	87	87	133	e100	176	169	71	50	66
16	76	292	180	87	89	134	70	193	167	65	49	68
17	75	265	179	87	90	139	69	196	165	65	49	66
18	79	225	179	88	93	142	86	178	223	70	49	62
19	81	204	178	91	93	152	42	163	317	87	49	60
20	88	239	177	96	87	e155	38	152	380	85	51	57
21	96	231	176	104	88	e150	89	189	419	79	55	57
22	99	205	174	98	70	e145	74	204	418	78	52	71
23	96	194	172	94	55	e140	97	213	385	71	63	87
24	87	183	171	116	63	e140	120	211	383	56	61	89
25	91	176	168	131	85	e130	131	192	365	59	54	83
26	87	172	166	131	105	e120	140	183	340	63	52	79
27	107	174	165	132	129	e115	139	176	314	64	50	90
28	126	186	163	133	152	e110	139	172	295	62	47	111
29	126	220	161	136	144	e110	146	165	270	63	46	112
30	121	227	160	118	---	e105	158	156	254	77	46	102
31	119	---	158	106	---	e105	---	147	---	85	45	---
TOTAL	2753	6929	5579	3270	2782	4139	2866	5323	6852	3213	1766	2025
MEAN	88.8	231	180	105	95.9	134	95.5	172	228	104	57.0	67.5
MAX	126	334	209	156	152	155	158	213	419	237	88	112
MIN	47	118	158	87	55	105	38	135	113	56	45	39

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1948 - 1996, BY WATER YEAR (WY)

	MEAN	97.1	151	134	123	129	165	142	123	103	74.8	63.6	75.3
MAX	262	233	248	236	252	315	357	357	379	228	219	147	231
(WY)	1982	1995	1951	1951	1951	1974	1950	1956	1996	1957	1968	1975	1975
MIN	35.1	70.1	63.2	53.8	53.7	61.7	42.9	34.5	33.6	21.6	27.9	31.5	31.5
(WY)	1964	1964	1961	1964	1964	1964	1966	1988	1988	1988	1963	1966	1966

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1948 - 1996
ANNUAL TOTAL	49398	47497	115
ANNUAL MEAN	135	130	181
HIGHEST ANNUAL MEAN			52.3
LOWEST ANNUAL MEAN			1974
HIGHEST DAILY MEAN	334	Nov 10	582
LOWEST DAILY MEAN	42	Jun 23	6.4
ANNUAL SEVEN-DAY MINIMUM	44	Sep 12	12
INSTANTANEOUS PEAK FLOW			(a)1080
INSTANTANEOUS PEAK STAGE			5.05
INSTANTANEOUS LOW FLOW			2.6
10 PERCENT EXCEEDS	205	206	203
50 PERCENT EXCEEDS	132	112	102
90 PERCENT EXCEEDS	58	57	43

(a) From rating curve extended above 600 ft³/s.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ERIE

04172000 HURON RIVER NEAR HAMBURG, MI

LOCATION.--Lat 42°27'55", long 83°48'00", in sec.24, T.1 N., R.5 E., Livingston County, Hydrologic Unit 04090005, on right bank at downstream side of bridge on Hamburg Road, 1.1 mi north of Hamburg, and 3 mi upstream from Strawberry Lake.

DRAINAGE AREA.--308 mi².

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 850.00 ft above sea level (levels by Michigan Department of Natural Resources). Prior to Aug. 12, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Occasional regulation by Kent Lake (station 04170490), 11 mi upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	94	162	323	e230	e220	348	255	365	277	414	150	97
2	88	189	324	e230	e200	343	230	372	254	385	154	94
3	89	229	310	e190	e190	333	220	374	238	361	154	90
4	105	253	290	e170	e180	317	229	370	219	333	151	88
5	122	259	287	e165	e170	308	214	359	202	306	143	86
6	165	255	293	e160	e170	e295	205	342	199	280	135	85
7	194	270	282	e155	e180	e285	203	320	229	258	129	87
8	198	318	275	e155	e200	e275	201	301	242	237	122	96
9	184	353	e270	e150	221	e270	197	296	251	219	115	110
10	166	370	e265	e150	202	e260	181	336	257	207	109	130
11	148	441	e260	e145	190	250	170	377	259	194	103	139
12	135	505	e280	e145	180	240	176	422	262	182	97	138
13	125	523	e300	e140	e180	242	219	463	265	171	95	130
14	118	522	e320	e140	e175	252	232	463	263	160	95	123
15	110	502	e330	e140	173	264	249	431	258	154	96	122
16	102	486	e310	e140	166	265	269	414	249	148	95	121
17	97	470	e300	e160	e165	265	247	406	243	141	93	121
18	94	454	e290	e200	e165	268	242	403	310	137	91	116
19	94	419	e280	e250	e165	272	256	388	412	142	89	111
20	96	383	e270	e300	165	298	249	368	489	148	94	106
21	104	361	e270	321	171	307	259	400	570	147	100	104
22	111	360	e265	296	184	301	295	423	618	141	103	112
23	113	346	e265	269	174	289	310	450	628	136	109	124
24	112	321	e260	257	176	283	320	469	634	130	117	137
25	107	297	e260	263	187	298	332	463	620	124	119	141
26	105	277	e255	267	212	296	344	442	593	118	113	138
27	117	268	e250	276	269	298	343	412	558	116	109	148
28	149	286	e245	276	324	286	334	384	521	115	105	186
29	167	295	e240	272	349	276	327	357	483	114	102	212
30	170	304	e240	e260	---	255	350	331	449	121	100	211
31	165	---	e235	e240	---	246	---	306	---	140	99	---
TOTAL	3944	10478	8644	6512	5703	8785	7658	12007	11052	5979	3486	3703
MEAN	127	349	279	210	197	283	255	387	368	193	112	123
MAX	198	523	330	321	349	348	350	469	634	414	154	212
MIN	88	162	235	140	165	240	170	296	199	114	89	85
CFSM	.41	1.13	.91	.68	.64	.92	.83	1.26	1.20	.63	.37	.40
IN.	.48	1.27	1.04	.79	.69	1.06	.92	1.45	1.33	.72	.42	.45

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1996, BY WATER YEAR (WY)

	MEAN	163	240	229	223	236	348	331	265	205	152	126	132
MAX	490	425	355	499	457	705	626	626	895	406	534	297	424
(WY)	1982	1993	1976	1993	1968	1974	1974	1956	1989	1968	1968	1975	1975
MIN	52.0	100	102	84.5	89.5	122	144	92.3	82.0	41.9	49.6	53.8	53.8
(WY)	1965	1964	1961	1961	1964	1964	1964	1958	1965	1965	1965	1964	1964

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1952 - 1996

ANNUAL TOTAL	94451		87951		221	
ANNUAL MEAN	259		240		337	
HIGHEST ANNUAL MEAN					97.2	1974
LOWEST ANNUAL MEAN						1964
HIGHEST DAILY MEAN	555	Mar 17	634	Jun 24	1560	May 15 1956
LOWEST DAILY MEAN	86	Sep 15	85	Sep 6	27	Jul 15 1988
ANNUAL SEVEN-DAY MINIMUM	90	Sep 11	89	Sep 2	28	Jul 10 1988
INSTANTANEOUS PEAK FLOW			641	Jun 24	(a)1560	May 15 1956
INSTANTANEOUS PEAK STAGE			6.53	Jun 24	8.46	Jun 30 1968
INSTANTANEOUS LOW FLOW			83	Sep 7	26	(b)
ANNUAL RUNOFF (CFSM)	.84		.78		.72	
ANNUAL RUNOFF (INCHES)	11.41		10.62		9.73	
10 PERCENT EXCEEDS	380		392		391	
50 PERCENT EXCEEDS	263		240		192	
90 PERCENT EXCEEDS	110		106		84	

(a) Gage height 8.35 ft.

(b) July 15, 1988.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE ERIE

04173500 MILL CREEK NEAR DEXTER, MI

LOCATION.--Lat 42°18'00", long 83°53'55", in SW1/4 sec.18, T.2 S., R.5 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 12 ft downstream from bridge on Parker Road, 2.5 mi south of Dexter, and 4 mi upstream from mouth.

DRAINAGE AREA.--128 mi².

PERIOD OF RECORD.--February 1952 to December 1982, October 1994 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 850 ft above sea level, from topographic map. Prior to May 23, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	70	91	e52	e57	e150	117	279	59	57	31	22
2	31	140	90	e52	e56	e130	109	199	61	54	30	21
3	36	206	89	e50	e54	e110	104	158	66	52	29	23
4	54	146	88	e49	e52	e100	106	147	63	49	27	22
5	48	104	87	e47	e51	e95	102	130	59	46	26	21
6	97	84	83	e46	e50	e90	95	117	83	43	26	21
7	76	76	e77	e44	e49	e86	89	108	119	41	25	23
8	63	69	e72	e43	e60	e82	84	101	91	40	26	25
9	53	61	e65	e42	e110	e78	80	103	107	38	25	28
10	48	59	e64	e41	e150	e74	77	246	131	36	24	28
11	46	248	e63	e41	e150	69	77	269	100	34	24	25
12	43	389	e62	e40	e100	114	84	218	93	33	24	34
13	41	284	e61	e40	e80	170	142	165	109	33	24	28
14	41	205	e75	e40	e75	165	154	136	92	33	24	27
15	41	146	115	e41	e70	173	133	127	76	34	24	29
16	41	117	111	e44	e66	149	150	138	66	32	23	26
17	40	100	95	e70	e61	124	131	127	63	31	24	25
18	40	93	79	e200	e58	118	115	117	163	31	23	24
19	40	93	e74	381	e56	118	130	106	462	32	24	23
20	41	98	e71	e260	e70	159	253	94	330	30	27	23
21	57	97	e67	e180	e200	147	255	193	209	29	28	23
22	52	87	e63	e90	e150	141	247	184	148	30	25	27
23	49	78	e59	69	e120	127	298	130	115	29	37	28
24	46	67	e58	97	e120	160	227	111	130	29	29	26
25	44	62	e56	e75	e120	290	180	96	127	31	25	25
26	43	59	e56	61	e150	235	159	86	98	28	24	24
27	77	65	e56	127	e200	160	137	81	84	28	23	37
28	110	141	e55	e90	e250	137	119	77	75	27	23	79
29	89	125	e55	e62	e200	130	119	72	68	28	23	55
30	70	97	e53	e60	---	123	279	67	62	35	23	41
31	67	---	e52	e58	---	119	---	63	---	31	22	---
TOTAL	1654	3666	2242	2592	2985	4123	4352	4245	3509	1104	792	863
MEAN	53.4	122	72.3	83.6	108	133	145	137	117	35.6	25.5	28.8
MAX	110	389	115	381	250	290	298	279	462	57	37	79
MIN	30	59	52	40	49	69	77	63	59	27	22	21
CFSM	.42	.95	.57	.65	.80	1.04	1.13	1.07	.91	.28	.20	.22
IN.	.48	1.07	.65	.75	.87	1.20	1.26	1.23	1.02	.32	.23	.25

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1996, BY WATER YEAR (WY)

	MEAN	41.3	60.7	82.9	73.6	98.4	181	157	99.6	65.7	40.8	35.1	34.1
MAX	193	122	192	251	337	423	271	265	256	165	146	180	180
(WY)	1955	1996	1958	1974	1976	1982	1969	1956	1968	1968	1995	1975	1975
MIN	11.0	14.6	13.8	18.8	18.4	47.7	73.8	29.7	20.9	16.0	12.9	11.0	11.0
(WY)	1964	1964	1964	1964	1964	1964	1963	1958	1958	1965	1963	1963	1963

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1952 - 1996
ANNUAL TOTAL	35855	32127	
ANNUAL MEAN	98.2	87.8	80.4
HIGHEST ANNUAL MEAN			142
LOWEST ANNUAL MEAN			29.9
HIGHEST DAILY MEAN	632	Aug 4	1380
LOWEST DAILY MEAN	29	Jun 23	9.5
ANNUAL SEVEN-DAY MINIMUM	31	Sep 26	9.9
INSTANTANEOUS PEAK FLOW			1500
INSTANTANEOUS PEAK STAGE			12.95
INSTANTANEOUS LOW FLOW			7.3
ANNUAL RUNOFF (CFSM)	.77	.69	.63
ANNUAL RUNOFF (INCHES)	10.42	9.34	8.53
10 PERCENT EXCEEDS	194	164	173
50 PERCENT EXCEEDS	74	69	46
90 PERCENT EXCEEDS	36	26	19

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ERIE

04174500 HURON RIVER AT ANN ARBOR, MI

LOCATION.--Lat 42°17'10", long 83°44'00", in NW1/4 sec.28, T.2 S., R.6 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 100 ft upstream from bridge on Wall Street in Ann Arbor, 0.7 mi downstream from Argo Dam, and 4.2 mi upstream from Geddes Dam.

DRAINAGE AREA.--729 mi².

PERIOD OF RECORD.--February 1904 to current year. Monthly discharge only for February 1904 to September 1914 and October 1947 to July 1948, published in WSP 1307. Published as "at Geddes" February 1904 to December 1914 and as "at Barton" January 1914 to September 1940.

REVISED RECORDS.--WSP 874: 1938. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 744.81 ft above sea level (levels by Michigan Department of Natural Resources). February 1904 to December 1914 at Geddes Dam, 4.2 mi downstream, and January 1914 to September 1947 at Barton Dam, 2.6 mi upstream, flow computed from records of operation of powerplants and records of depth of flow over dam and/or flow through undersluices.

REMARKS.--Records good. Prior to 1955, diversion upstream from station for Ann Arbor municipal supply had negligible effect on natural flow; annual mean discharge and runoff figures adjusted for diversion from 1955 to 1991. Flow regulated by powerplants prior to May 1962. From June 1962 to 1975 occasional regulation for lake level control operations upstream from station. Since 1975 extensive regulation of flow exists due to automation of gates at dams upstream from station. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	148	347	579	372	407	811	600	1120	599	760	201	106
2	145	483	579	364	363	763	566	1010	593	507	196	103
3	191	596	583	343	366	681	559	1050	525	578	219	99
4	273	612	595	334	345	659	519	1000	512	547	231	100
5	262	553	512	316	340	661	525	874	495	489	200	89
6	296	522	537	290	341	618	512	666	575	287	189	90
7	361	503	513	265	340	577	464	790	507	461	168	127
8	323	366	478	237	363	542	460	844	559	411	169	136
9	309	397	456	237	180	521	481	941	570	358	126	200
10	295	581	411	255	178	491	389	1220	615	174	127	148
11	292	1010	395	e260	273	490	262	1220	593	215	106	223
12	281	1800	408	265	422	525	218	1110	584	258	102	164
13	269	1390	400	277	377	579	360	1040	594	262	103	171
14	262	1010	471	262	376	569	609	1160	614	257	101	210
15	253	661	508	262	346	580	610	1210	591	265	100	196
16	239	892	505	242	328	567	609	1140	578	235	92	214
17	233	857	496	338	334	543	590	974	573	189	99	194
18	169	827	492	520	358	534	550	927	781	203	93	190
19	171	792	478	721	324	551	600	838	1410	199	106	177
20	189	767	447	591	361	599	924	780	1430	190	132	149
21	216	738	445	563	474	594	964	1110	1300	174	129	194
22	256	700	430	528	430	600	949	1260	1340	177	121	152
23	243	714	424	537	392	588	1000	1230	1230	177	160	140
24	236	653	417	564	426	628	913	1040	1240	191	157	171
25	232	602	416	522	387	817	844	828	1230	192	133	221
26	281	569	402	520	446	827	831	832	1150	184	129	221
27	358	596	379	528	757	701	836	854	1110	174	131	330
28	364	637	396	508	1010	670	802	833	969	162	132	458
29	418	635	374	496	948	641	824	784	768	169	120	389
30	386	599	380	425	---	624	1080	641	821	206	113	278
31	313	---	376	438	---	613	---	510	---	196	108	---
TOTAL	8264	21409	14282	12380	11991	19164	19450	29836	24556	8847	4293	5640
MEAN	267	714	461	399	413	618	648	962	819	285	138	188
MAX	418	1800	595	721	1010	827	1080	1260	1430	760	231	458
MIN	145	347	374	237	178	490	218	510	495	162	92	89

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1915 - 1996, BY WATER YEAR (WY)

MEAN	268	384	423	447	539	861	866	603	401	242	181	213
MAX	904	1018	1080	1257	1431	2308	2647	2085	1341	1130	584	919
(WY)	1982	1993	1951	1950	1976	1918	1947	1943	1943	1968	1995	1975
MIN	71.6	109	123	131	145	189	274	187	72.0	31.5	21.1	55.8
(WY)	1935	1935	1935	1925	1934	1934	1931	1925	1934	1934	1934	1934

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1915 - 1996

ANNUAL TOTAL	194758	180112	
ANNUAL MEAN	534	492	(a)451
HIGHEST ANNUAL MEAN			824
LOWEST ANNUAL MEAN			171
HIGHEST DAILY MEAN	1800	1800	5840
LOWEST DAILY MEAN	108	89	(b)4.0
ANNUAL SEVEN-DAY MINIMUM	144	99	13
INSTANTANEOUS PEAK FLOW		2070	11
INSTANTANEOUS PEAK STAGE		14.58	(d)17.50
10 PERCENT EXCEEDS	914	943	927
50 PERCENT EXCEEDS	471	451	329
90 PERCENT EXCEEDS	195	159	119

(a) Does not include water year 1948.

(b) Plant leakage, but doubtful due to possible change in leakage.

(c) Aug. 2, Sept. 11, 1931.

(d) Present site and datum.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ERIE

04174950 WILLOW RUN NEAR RAWSONVILLE, MI

LOCATION.--Lat 42°13'09", long 83°32'13", in SW1/4 sec.18, T.3 S., R.8 E., Wayne County, Hydrologic Unit 04090005, on right bank 30 ft upstream from culverts on North I-94 Service Road, 0.7 mi upstream from mouth, and 0.8 mi northeast of Rawsonville.

DRAINAGE AREA.--Indeterminate.

PERIOD OF RECORD.--April 1986 to current year (seasonal records only, April to September).

GAGE.--Water-stage recorder. Elevation of gage is 670 ft above sea level, from topographic map.

REMARKS.--Records good. Actual surface drainage area is 6.28 mi². Flow contains effluent from sewage-treatment plant about 1 mi upstream from station. Some of this flow originates from ground-water sources and other sources outside the basin. Several measurements of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge during period April to September, 142 ft³/s, Aug. 19, 1990; minimum daily, 3.9 ft³/s, Aug. 21, 1996.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	9.5	17	11	9.1	13	7.1
2	---	---	---	---	---	---	9.4	14	11	11	12	6.5
3	---	---	---	---	---	---	9.4	13	9.3	10	9.6	7.7
4	---	---	---	---	---	---	10	12	10	8.2	8.4	9.4
5	---	---	---	---	---	---	10	12	9.3	6.9	13	9.4
6	---	---	---	---	---	---	9.7	11	17	6.9	12	7.7
7	---	---	---	---	---	---	9.4	11	13	7.1	12	16
8	---	---	---	---	---	---	9.6	11	11	8.6	13	12
9	---	---	---	---	---	---	9.4	39	16	9.9	11	17
10	---	---	---	---	---	---	9.5	66	12	9.9	7.3	12
11	---	---	---	---	---	---	9.5	24	12	9.3	7.7	36
12	---	---	---	---	---	---	18	19	26	9.7	9.7	17
13	---	---	---	---	---	---	21	15	39	9.2	15	13
14	---	---	---	---	---	---	12	13	13	11	11	11
15	---	---	---	---	---	---	14	15	12	12	12	9.0
16	---	---	---	---	---	---	12	13	10	12	11	8.7
17	---	---	---	---	---	---	9.5	12	14	10	7.8	8.3
18	---	---	---	---	---	---	9.3	12	31	10	7.4	4.7
19	---	---	---	---	---	---	11	12	16	11	10	5.6
20	---	---	---	---	---	---	111	11	13	8.3	8.3	4.9
21	---	---	---	---	---	---	33	27	12	7.0	3.9	6.3
22	---	---	---	---	---	---	28	12	12	8.4	4.1	13
23	---	---	---	---	---	---	39	12	9.7	10	8.0	10
24	---	---	---	---	---	---	24	12	11	21	8.1	8.7
25	---	---	---	---	---	---	15	12	9.4	13	7.5	7.5
26	---	---	---	---	---	---	13	12	9.1	12	8.5	8.1
27	---	---	---	---	---	---	11	11	9.0	8.7	9.6	15
28	---	---	---	---	---	---	11	12	11	8.9	9.2	14
29	---	---	---	---	---	---	14	9.4	9.7	11	9.4	8.6
30	---	---	---	---	---	---	31	9.3	8.5	14	9.3	8.5
31	---	---	---	---	---	---	---	9.4	---	17	8.8	---
TOTAL	---	---	---	---	---	---	542.2	490.1	407.0	321.1	297.6	322.7
MEAN	---	---	---	---	---	---	18.1	15.8	13.6	10.4	9.60	10.8
MAX	---	---	---	---	---	---	111	66	39	21	15	36
MIN	---	---	---	---	---	---	9.3	9.3	8.5	6.9	3.9	4.7

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1986 - 1996, BY WATER YEAR (WY)

MEAN	---	---	---	---	---	---	37.1	32.4	33.0	28.1	29.8	28.6
MAX	---	---	---	---	---	---	49.3	39.8	46.7	33.1	39.0	43.1
(WY)	---	---	---	---	---	---	1993	1990	1995	1992	1990	1990
MIN	---	---	---	---	---	---	18.1	15.8	13.6	10.4	9.60	10.0
(WY)	---	---	---	---	---	---	1996	1996	1996	1996	1996	1995

STREAMS TRIBUTARY TO LAKE ERIE

04175600 RIVER RAISIN NEAR MANCHESTER, MI
(National water-quality assessment program station)

LOCATION.--Lat 42°10'05", long 84°04'34", in NE1/4 SE1/4 sec.33, T.3 S., R.3 E., Washtenaw County, Hydrologic Unit 04100002, on left bank at downstream side of bridge on Sharon Valley Road, 2.5 mi northwest of Manchester.

DRAINAGE AREA.--132 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--January 1970 to September 1981, January 1985 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 900 ft above sea level, from topographic map. Prior to July 30, 1970, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Occasional regulation caused by many dams upstream from station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	67	121	e60	e100	154	130	245	82	93	31	15
2	27	110	117	e59	e95	145	129	224	83	83	29	15
3	28	160	116	e59	e90	132	127	204	87	75	27	15
4	44	142	115	e58	e85	e130	124	194	84	66	25	15
5	46	122	e110	e58	e80	e125	123	183	83	58	24	15
6	75	108	e100	e57	e75	e120	118	170	94	54	23	14
7	76	101	e93	e57	e70	e115	113	161	139	49	22	15
8	67	94	e90	e57	e69	e110	109	151	135	46	21	17
9	58	83	e88	e56	e74	e110	104	150	142	42	20	23
10	52	81	e87	e56	e80	e110	99	190	163	39	20	28
11	48	135	e87	e56	e90	e110	97	210	157	34	16	31
12	45	193	e90	e55	e83	e115	108	210	153	32	17	41
13	43	171	e92	e55	e78	126	161	192	172	32	17	33
14	44	153	102	e55	e76	129	177	177	150	32	17	29
15	42	136	114	e55	e74	135	166	169	132	35	16	31
16	39	126	114	e58	e73	129	175	174	119	30	18	27
17	35	120	e100	e80	e72	121	164	171	113	28	16	25
18	33	120	96	e140	e72	119	152	167	162	29	15	24
19	33	121	91	e200	e72	118	160	162	279	29	16	22
20	35	124	e85	e180	76	143	214	154	227	26	22	21
21	48	124	e81	e155	99	152	233	180	196	25	23	21
22	50	118	e78	e135	90	152	233	181	177	25	21	27
23	47	112	e76	e125	85	144	261	168	157	28	24	29
24	43	103	e74	e125	98	154	240	157	164	29	25	26
25	42	96	e72	e120	99	190	223	141	173	39	22	25
26	35	93	e70	e120	112	185	209	127	154	34	20	24
27	52	96	e68	e120	173	151	193	117	139	29	19	36
28	95	130	e66	e120	220	140	178	111	127	26	17	88
29	86	132	e65	e120	136	174	104	114	114	27	17	80
30	70	122	e64	e115	---	134	227	94	104	29	17	58
31	63	---	e62	e110	---	133	---	87	---	29	16	---
TOTAL	1525	3593	2784	2876	2740	4167	4921	5125	4261	1232	633	870
MEAN	49.2	120	89.8	92.8	94.5	134	164	165	142	39.7	20.4	29.0
MAX	95	193	121	200	220	190	261	245	279	93	31	88
MIN	24	67	62	55	69	110	97	87	82	25	15	14
CFSM	.37	.91	.68	.70	.72	1.02	1.24	1.25	1.08	.30	.15	.22
IN.	.43	1.01	.78	.81	.77	1.17	1.39	1.44	1.20	.35	.18	.25

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1970 - 1996, BY WATER YEAR (WY)

MEAN	66.6	95.6	111	111	121	199	190	121	90.7	54.9	48.6	55.6
MAX	169	212	160	280	241	356	275	191	249	114	116	142
(WY)	1987	1993	1991	1993	1976	1976	1978	1974	1989	1981	1981	1981
MIN	24.8	25.1	30.7	27.6	45.0	123	116	52.7	13.9	10.4	12.4	15.1
(WY)	1980	1972	1977	1977	1972	1987	1987	1971	1988	1988	1971	1971

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1970 - 1996

ANNUAL TOTAL	35272	34727	106
ANNUAL MEAN	96.6	94.9	155
HIGHEST ANNUAL MEAN			1993
LOWEST ANNUAL MEAN			1977
HIGHEST DAILY MEAN	240	279	690
LOWEST DAILY MEAN	22	14	5.7
ANNUAL SEVEN-DAY MINIMUM	25	15	6.1
INSTANTANEOUS PEAK FLOW		294	869
INSTANTANEOUS PEAK STAGE		4.75	7.21
INSTANTANEOUS LOW FLOW			4.5
ANNUAL RUNOFF (CFSM)	.73	.72	.80
ANNUAL RUNOFF (INCHES)	9.94	9.79	10.89
10 PERCENT EXCEEDS	170	174	210
50 PERCENT EXCEEDS	90	90	86
90 PERCENT EXCEEDS	34	24	26

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ERIE

04175600 RIVER RAISIN NEAR MANCHESTER, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1970-71, April to September 1996.

REMARKS.--Samples were collected at or near bridge on Sharon Valley Road.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPE-CIFIC CON-DUCT-ANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STAND-ARD UNITS) (00400)	TEMPER-ATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION) (00301)	COLI-FORM, FECAL, 0.7 UM-MF (COLS/100 ML) (31625)	E. COLI WATER WHOLE TOTAL UREASE (COL/100 ML) (31633)	HARD-NESS TOTAL (MG/L AS CACO3) (00900)
APR 02...	0950	129	486	8.2	7.0	12.4	105	K23	K4	240
MAY 01...	1500	240	470	8.4	8.5	11.8	106	20	K16	210
MAY 14...	1210	177	472	8.3	11.0	10.5	97	K28	35	240
JUN 04...	1345	84	476	8.4	18.0	8.6	91	62	54	230
JUN 18...	1230	140	484	7.8	20.0	6.5	75	110	170	240
JUL 09...	1345	41	500	8.2	21.0	6.8	79	54	--	230
AUG 15...	1120	16	510	8.1	21.0	7.0	82	60	68	240
SEP 09...	1134	24	494	8.2	21.0	7.0	82	K870	K1100	230
DATE	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	SODIUM, DIS-SOLVED (MG/L AS NA) (00930)	POTAS-SIUM, DIS-SOLVED (MG/L AS K) (00935)	BICAR-BONATE WATER DIS IT FIELD MG/L AS HCO3 (00453)	ALKA-LINITY WAT DIS TOT IT FIELD MG/L AS CACO3 (39086)	SULFATE DIS-SOLVED (MG/L AS SO4) (00945)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL) (00940)	FLUO-RIDE, DIS-SOLVED (MG/L AS F) (00950)	SILICA, DIS-SOLVED (MG/L AS SIO2) (00955)
APR 02...	67	18	9.9	1.7	--	--	25	20	0.20	4.6
MAY 01...	58	17	9.7	1.5	229	188	22	18	0.20	4.3
MAY 14...	63	19	11	1.5	--	188	21	19	0.20	2.9
JUN 04...	59	19	10	1.6	244	200	22	20	0.20	2.8
JUN 18...	63	19	9.7	1.5	249	204	17	17	0.20	5.6
JUL 09...	61	20	10	1.5	251	206	20	21	0.20	7.7
AUG 15...	62	21	9.9	1.6	266	218	24	21	0.20	9.0
SEP 09...	58	20	10	1.7	246	202	24	22	0.20	9.9
DATE	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	NITRO-GEN, AM-MONIA + ORGANIC DIS. (MG/L AS N) (00623)	PHOS-PHORUS TOTAL (MG/L AS P) (00665)	PHOS-PHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOS-PHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)	IRON, DIS-SOLVED (UG/L AS FE) (01046)
APR 02...	286	<0.010	0.580	0.040	0.50	0.50	0.020	<0.010	<0.010	73
MAY 01...	295	<0.010	0.230	0.020	0.50	0.40	0.020	<0.010	<0.010	56
MAY 14...	289	0.010	0.210	0.030	0.70	0.50	0.010	<0.010	<0.010	86
JUN 04...	286	0.010	0.190	0.050	0.60	0.50	0.030	0.020	0.010	110
JUN 18...	274	0.010	0.290	0.090	0.70	0.50	0.060	<0.010	<0.010	180
JUL 09...	297	0.020	0.500	0.090	0.50	0.40	<0.010	<0.010	<0.010	92
AUG 15...	296	0.020	0.540	0.110	0.40	0.40	<0.010	<0.010	0.020	87
SEP 09...	280	0.030	0.570	0.090	0.40	0.40	0.020	<0.010	<0.010	65

STREAMS TRIBUTARY TO LAKE ERIE

04175600 RIVER RAISIN NEAR MANCHESTER, MI--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DATE	MANGANESE, DIS-SOLVED (UG/L AS MN) (01056)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS-PENDED TOTAL (MG/L AS C) (00689)	SEDI-MENT, SUS-PENDED (MG/L) (80154)	SEDI-MENT, DIS-CHARGE, SUS-PENDED (T/DAY) (80155)	ACETO-CHLOR, WATER FLTRD REC (UG/L) (49260)	ALA-CHLOR, WATER, DISS, REC, (UG/L) (46342)	ATRA-ZINE, WATER, DISS, REC (UG/L) (39632)	DEETHYL ATRA-ZINE, WATER, DISS, REC (UG/L) (04040)	METHYL AZIN- PHOS WAT FLT 0.7 U GF, REC (UG/L) (82686)
APR 02...	44	5.3	0.20	8	2.8	<0.002	<0.002	0.016	E0.007	<0.001
MAY 01...	18	7.2	0.40	9	6.0	0.008	E0.003	0.039	E0.006	<0.001
14...	28	7.2	0.70	12	5.6	0.011	<0.002	0.038	E0.010	<0.001
JUN 04...	42	6.4	0.90	23	5.2	0.042	0.017	0.056	E0.008	<0.001
18...	54	7.8	2.7	16	5.9	0.028	0.040	0.280	E0.022	<0.001
JUL 09...	36	6.0	0.40	13	1.5	0.006	0.007	0.089	E0.018	<0.001
AUG 15...	56	4.6	0.30	25	1.1	<0.002	<0.002	0.016	E0.003	<0.001
SEP 09...	55	5.1	0.60	--	--	<0.002	<0.002	0.012	E0.004	<0.001
DATE	BEN-FLUR-ALIN WAT FLD 0.7 U GF, REC (UG/L) (82673)	BUTYL-ATE, WATER, DISS, REC (UG/L) (04028)	CAR-BARYL WATER FLTRD 0.7 U GF, REC (UG/L) (82680)	CARBO-FURAN WATER FLTRD 0.7 U GF, REC (UG/L) (82674)	CHLOR-PYRIFOS DIS-SOLVED (UG/L) (38933)	CYANA-ZINE, WATER, DISS, REC (UG/L) (04041)	DCPA WATER FLTRD 0.7 U GF, REC (UG/L) (82682)	P,P' DDE DISSOLV (UG/L) (34653)	DI-AZINON, DIS-SOLVED (UG/L) (39572)	DI-ELDRIN DIS-SOLVED (UG/L) (39381)
APR 02...	<0.002	<0.002	<0.003	<0.003	<0.004	<0.004	<0.002	<0.006	0.007	<0.001
MAY 01...	<0.002	<0.002	<0.003	<0.003	<0.004	0.010	<0.002	<0.006	E0.003	<0.001
14...	<0.002	<0.002	<0.003	<0.003	<0.004	<0.004	<0.002	<0.006	<0.002	<0.001
JUN 04...	<0.002	<0.002	<0.003	<0.003	<0.004	0.016	<0.002	<0.006	<0.002	<0.001
18...	<0.002	<0.002	<0.003	<0.003	<0.004	0.030	<0.002	<0.006	0.008	<0.001
JUL 09...	<0.002	<0.002	<0.003	<0.003	<0.004	0.019	<0.002	<0.006	<0.002	<0.001
AUG 15...	<0.002	<0.002	<0.003	<0.003	<0.004	<0.004	<0.002	<0.006	E0.003	<0.001
SEP 09...	<0.002	<0.002	<0.003	<0.003	<0.004	<0.004	<0.002	<0.006	<0.002	<0.001
DATE	2,6-DI-ETHYL ANILINE WAT FLT 0.7 U GF, REC (UG/L) (82660)	DISUL-FOTON WATER FLTRD 0.7 U GF, REC (UG/L) (82677)	EPTC WATER FLTRD 0.7 U GF, REC (UG/L) (82668)	ETHAL-FLUR-ALIN WAT FLT 0.7 U GF, REC (UG/L) (82663)	ETHO-PROP WATER FLTRD 0.7 U GF, REC (UG/L) (82672)	FONOFOS WATER DISS REC (UG/L) (04095)	ALPHA BHC DIS-SOLVED (UG/L) (34253)	LINDANE DIS-SOLVED (UG/L) (39341)	LIN-URON WATER FLTRD 0.7 U GF, REC (UG/L) (82666)	MALA-THION, DIS-SOLVED (UG/L) (39532)
APR 02...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005
MAY 01...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005
14...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005
JUN 04...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005
18...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005
JUL 09...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005
AUG 15...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005
SEP 09...	<0.003	<0.017	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005

STREAMS TRIBUTARY TO LAKE ERIE

04175600 RIVER RAISIN NEAR MANCHESTER, MI--Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

DATE	METO- LACHLOR WATER DISSOLV (UG/L) (39415)	METRI- BUZIN WATER DISSOLV (UG/L) (82630)	MOL- INATE WATER FLTRD 0.7 U GF, REC (UG/L) (82671)	NAPROP- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82684)	PARA- THION, DIS- SOLVED (UG/L) (39542)	METHYL PARA- THION WAT FLT 0.7 U GF, REC (UG/L) (82667)	PEB- ULATE WATER FLTRD 0.7 U GF, REC (UG/L) (82669)
APR 02...	0.004	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
MAY 01...	0.017	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
14...	0.017	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
JUN 04...	0.032	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
18...	0.067	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
JUL 09...	0.036	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
AUG 15...	0.011	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004
SEP 09...	0.007	<0.004	<0.004	<0.003	<0.004	<0.006	<0.004

DATE	PENDI- METH- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82683)	PER- METHRIN CIS WAT FLT 0.7 U GF, REC (UG/L) (82687)	PHORATE WATER FLTRD 0.7 U GF, REC (UG/L) (82664)	PRO- METON, WATER, DISS, REC (UG/L) (04037)	PRON- AMIDE WATER FLTRD 0.7 U GF, REC (UG/L) (82676)	PROP- CHLOR, WATER, DISS, REC (UG/L) (04024)	PRO- PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)
APR 02...	<0.004	<0.005	<0.002	<0.018	<0.003	<0.007	<0.004
MAY 01...	<0.004	<0.005	<0.002	<0.018	<0.003	<0.007	<0.004
14...	<0.004	<0.005	<0.002	<0.018	<0.003	<0.007	<0.004
JUN 04...	<0.004	<0.005	<0.002	E0.009	<0.003	<0.007	<0.004
18...	<0.004	<0.005	<0.002	0.018	<0.003	<0.007	<0.004
JUL 09...	<0.004	<0.005	<0.002	E0.016	<0.003	<0.007	<0.004
AUG 15...	<0.004	<0.005	<0.002	E0.009	<0.003	<0.007	<0.004
SEP 09...	<0.004	<0.005	<0.002	E0.008	<0.003	<0.007	<0.004

DATE	PRO- PARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)	SI- MAZINE, WATER, DISS, REC (UG/L) (04035)	TEBU- THIURON WATER FLTRD 0.7 U GF, REC (UG/L) (82670)	TER- BACIL WATER FLTRD 0.7 U GF, REC (UG/L) (82665)	TER- BUFOS WATER FLTRD 0.7 U GF, REC (UG/L) (82675)	THIO- BENCARB WATER FLTRD 0.7 U GF, REC (UG/L) (82681)	TRIAL- LATE WATER FLTRD 0.7 U GF, REC (UG/L) (82678)	TRI- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)
APR 02...	<0.013	0.038	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
MAY 01...	<0.013	0.039	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
14...	<0.013	0.032	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUN 04...	<0.013	0.130	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
18...	<0.013	0.063	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUL 09...	<0.013	0.062	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
AUG 15...	<0.013	0.035	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
SEP 09...	<0.013	0.044	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002

STREAMS TRIBUTARY TO LAKE ERIE

04176000 RIVER RAISIN NEAR ADRIAN, MI

LOCATION.--Lat 41°54'15", long 83°58'50", in NW1/4 sec.5, T.7 S., R.4 E., Lenawee County, Hydrologic Unit 04100002, on right bank at downstream side of bridge on Academy Road, 1.7 mi east of Adrian, and 2.6 mi downstream from South Branch.

DRAINAGE AREA.--463 mi².

PERIOD OF RECORD.--October 1953 to September 1978, October 1978 to September 1984 (operated as a crest-stage partial-record station), October 1984 to current year. Records for October 1930 to August 1931 and October 1932 to April 1938, published as "Raisin River" in WSP 714, 744, 759, 784, 804, 824, and 854, have been found to be unreliable and should not be used.

REVISÉD RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 693.2 ft above sea level.

REMARKS.--Records good except for estimated daily discharges, which are fair. Diurnal fluctuation caused by powerplant at Tecumseh, 11 mi upstream from station, prior to June 27, 1968. Several measurements of water temperature were made during the year. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	77	245	437	e160	e350	e930	433	1330	252	284	136	54
2	78	399	392	e160	e310	e700	409	1340	256	216	126	52
3	116	754	370	e155	e280	e500	362	929	254	213	102	52
4	154	887	351	e155	e240	e450	376	755	250	205	105	54
5	153	739	336	e155	e210	e420	372	671	231	195	99	53
6	246	503	e300	e150	e190	e390	356	607	268	185	92	54
7	238	487	e275	e150	e175	e360	339	549	319	174	90	57
8	229	385	e260	e150	e180	e340	321	495	342	163	86	60
9	210	338	e250	e150	e190	e320	305	491	411	150	83	74
10	e185	312	e245	e145	e250	e310	294	1330	495	144	76	78
11	e160	491	e240	e145	e320	312	283	2160	532	137	73	81
12	e145	881	e250	e145	e280	356	304	1980	561	129	73	110
13	e135	1170	e280	e145	e260	397	542	1390	532	125	71	103
14	e130	942	e310	e140	e240	397	788	965	468	121	68	105
15	e125	646	e340	e160	e220	401	789	755	411	130	65	106
16	e120	538	403	e200	e200	406	663	677	349	123	63	97
17	e120	471	383	e250	e190	381	620	616	314	117	62	95
18	e115	448	342	500	e180	354	555	588	737	112	62	90
19	e115	435	310	913	e180	340	506	550	2010	111	72	84
20	e120	449	274	1020	e200	505	965	506	2500	107	81	79
21	e125	502	e250	e960	e250	604	1870	500	2000	103	81	76
22	e130	525	e230	e900	e300	549	1880	513	1220	101	80	89
23	e135	458	e220	e890	e350	496	1740	509	787	98	79	94
24	e135	409	e215	e880	e370	525	1730	466	581	100	75	97
25	e130	374	e210	e870	e400	805	1270	427	539	114	74	98
26	e140	349	e200	e820	e650	1040	921	393	492	118	72	94
27	e160	339	e195	e750	e900	813	741	366	433	114	67	121
28	e180	370	e185	e650	e1100	585	626	332	390	108	66	98
29	e200	462	e175	e550	1500	510	604	307	355	127	62	179
30	e210	459	e170	e450	---	475	853	293	322	135	59	195
31	e230	---	e165	e400	---	453	---	238	---	133	56	---
TOTAL	4746	15767	8563	13268	10465	15424	21817	23028	18611	4392	2456	2779
MEAN	153	526	276	428	361	498	727	743	620	142	79.2	92.6
MAX	246	1170	437	1020	1500	1040	1880	2160	2500	284	136	195
MIN	77	245	165	140	175	310	283	238	231	98	56	52
CFSM	.33	1.14	.60	.92	.78	1.07	1.57	1.60	1.34	.31	.17	.20
IN.	.38	1.27	.69	1.07	.84	1.24	1.75	1.85	1.50	.35	.20	.22

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954 - 1996, BY WATER YEAR (WY)

MEAN	182	282	360	380	461	712	623	380	277	178	134	133
MAX	576	941	871	1271	1176	1517	1115	939	1025	609	520	420
(WY)	1991	1993	1988	1993	1976	1986	1978	1956	1989	1968	1995	1992
MIN	52.1	57.9	66.6	65.6	74.1	179	239	144	69.7	46.1	47.5	46.0
(WY)	1964	1965	1964	1963	1964	1964	1963	1964	1988	1988	1963	1955

SUMMARY STATISTICS	FOR 1995 CALENDAR YEAR	FOR 1996 WATER YEAR	WATER YEARS 1954 - 1996
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ANNUAL TOTAL	131855		141316			
ANNUAL MEAN	361		386		341	
HIGHEST ANNUAL MEAN					605	1993
LOWEST ANNUAL MEAN					99.8	1964
HIGHEST DAILY MEAN	1660	Jan 22	2500	Jun 20	5350	Feb 25 1985
LOWEST DAILY MEAN	77	Oct 1	52	Sep 2	25	Oct 26 1964
ANNUAL SEVEN-DAY MINIMUM	85	Sep 15	54	Aug 31	27	Oct 25 1964
INSTANTANEOUS PEAK FLOW			2580	Jun 20	6660	Mar 15 1982
INSTANTANEOUS PEAK STAGE			11.71	Jun 20	15.77	Mar 15 1982
INSTANTANEOUS LOW FLOW			50	Sep 3	18	Aug 10 1964
ANNUAL RUNOFF (CFSM)	.78		.83		.74	
ANNUAL RUNOFF (INCHES)	10.59		11.35		10.02	
10 PERCENT EXCEEDS	662		830		725	
50 PERCENT EXCEEDS	291		280		220	
90 PERCENT EXCEEDS	120		81		76	

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ERIE

04176500 RIVER RAISIN NEAR MONROE, MI

LOCATION.--Lat 41°57'38", long 83°31'52", Monroe County, Hydrologic Unit 04100002, on left bank 0.8 mi downstream from bridge on Ida Maybee Road, 5.0 mi downstream from Saline River, and 7.5 mi west of Monroe.

DRAINAGE AREA.--1,042 mi².

PERIOD OF RECORD.--September 1937 to current year. Published as "Raisin River at Monroe" 1937-52 and as "River Raisin at Monroe" 1952-53.

REVISED RECORDS.--WSP 954: 1938-40(M), 1941. WSP 1437: 1939, 1948. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 616.26 ft above sea level. Prior to Oct. 1, 1953, at site 9 mi downstream at datum 46.26 ft lower.

REMARKS.--Records good except for estimated daily discharges, which are fair. Diurnal fluctuation caused by powerplants upstream from station prior to June 27, 1968. At times, flow is affected by irrigation pumpage. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	135	314	703	e275	e730	2360	1100	2240	422	502	198	78
2	127	468	670	e270	e630	2060	1000	2290	376	445	202	76
3	138	1230	624	e270	e640	e1300	919	2250	387	385	196	74
4	154	1210	575	e265	e470	e800	837	2070	394	318	179	72
5	196	1280	531	e265	e400	e750	765	1680	381	297	160	71
6	347	1290	e490	e260	e350	e700	728	1350	374	279	143	75
7	352	1080	e430	e260	e320	e650	686	1150	395	264	141	85
8	391	826	e360	e255	e300	e600	643	1010	447	252	120	84
9	364	712	e300	e255	e310	e550	604	927	495	222	109	85
10	325	596	e270	e255	e330	e530	567	2550	626	212	104	87
11	285	697	e300	e255	e500	e530	531	2970	704	205	101	97
12	252	1480	e310	e250	e580	e550	519	2810	835	197	103	101
13	231	1520	e310	e250	e550	654	854	2880	857	188	98	118
14	213	1670	e370	e245	e450	716	1400	2690	845	178	96	128
15	198	1640	e480	e240	e400	747	1510	2240	766	181	93	133
16	193	1390	e560	e270	e370	751	1520	1690	658	178	86	126
17	192	1050	e620	e340	e340	724	1380	1320	598	175	82	126
18	189	860	e660	e660	e320	706	1180	1130	1170	171	74	120
19	185	787	e620	1680	e300	715	1050	1020	3210	159	78	114
20	187	853	e540	e1750	293	1130	2300	935	3830	143	91	111
21	181	933	e480	e1700	358	1270	3150	885	5220	134	96	109
22	182	944	e420	e1650	490	1490	3320	879	4710	139	110	117
23	192	929	e380	1420	546	1430	4010	849	3640	138	111	119
24	197	845	e370	1570	602	1440	3730	786	2630	140	107	125
25	190	733	e365	e1500	627	2500	3390	728	1670	184	105	119
26	196	656	e360	e1420	659	2570	2920	662	1080	167	97	118
27	221	614	e350	e1440	1360	2420	2360	614	882	153	91	127
28	241	630	e330	e1300	2890	2160	1740	576	757	151	89	141
29	273	684	e310	e1100	2430	1680	1350	536	649	154	93	170
30	297	680	e290	e950	---	1340	1770	488	563	162	85	211
31	306	---	e280	e820	---	1200	---	453	---	187	83	---
TOTAL	7130	28601	13658	23440	18445	37023	47833	44658	39571	6660	3521	3317
MEAN	230	953	441	756	636	1194	1594	1441	1319	215	114	111
MAX	391	1670	703	1750	2890	2570	4010	2970	5220	502	202	211
MIN	127	314	270	240	293	530	519	453	374	134	74	71
CFSM	.22	.91	.42	.73	.61	1.15	1.53	1.38	1.27	.21	.11	.11
IN.	.25	1.02	.49	.84	.66	1.32	1.71	1.59	1.41	.24	.13	.12

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1937 - 1996, BY WATER YEAR (WY)

	MEAN	300	500	738	805	1058	1673	1476	925	619	354	225	242
MAX	1678	2267	2618	3058	3296	4440	4055	4678	2770	1453	1161	2666	
(WY)	1982	1993	1968	1952	1976	1982	1947	1943	1989	1951	1980	1981	
MIN	57.2	74.6	87.5	106	107	343	313	248	99.2	60.3	40.3	45.2	
(WY)	1964	1965	1964	1964	1963	1964	1946	1941	1988	1988	1941	1963	

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1937 - 1996

ANNUAL TOTAL	251566						273857						
ANNUAL MEAN	689						748						
HIGHEST ANNUAL MEAN										741			
LOWEST ANNUAL MEAN										1374			1943
HIGHEST DAILY MEAN										178			1964
LOWEST DAILY MEAN										14600			Mar 16 1982
ANNUAL SEVEN-DAY MINIMUM	2970				Jan 21		5220		Jun 21				
INSTANTANEOUS PEAK FLOW	115				Jun 25		71		Sep 5				Sep 30 1941
INSTANTANEOUS PEAK STAGE	138				Jun 20		76		Aug 31				Sep 26 1941
INSTANTANEOUS LOW FLOW							5390		Jun 21	(a)15300			Mar 16 1982
ANNUAL RUNOFF (CFSM)							7.45		Jun 21	(b)11.16			Mar 15 1982
ANNUAL RUNOFF (INCHES)							68		(c)	(d)2.0			(f)
10 PERCENT EXCEEDS	.66						.72			.71			
50 PERCENT EXCEEDS	8.98						9.78			9.66			
90 PERCENT EXCEEDS	1510						1690			1830			
	505						475			360			
	190						111			105			

(a) Gage height 10.4 ft.

(b) Backwater from ice.

(c) Sept. 4, 5.

(d) Approximately, site then in use.

(e) Estimated.

(f) Sept. 4, 1938, Sept. 19, 20, 1941.

STREAMS TRIBUTARY TO LAKE ERIE

04176605 OTTER CREEK AT LA SALLE, MI

LOCATION.--Lat 41°52'01", long 83°27'13", in NW1/4 NW1/4 sec.23 (private claim 47), T.7 S., R.8 E., Monroe County, Hydrologic Unit 04100001, on right bank 150 ft upstream from bridge on State Highway 125 in La Salle, 2.3 mi downstream from South Branch, and 4.6 mi southwest of Monroe.

DRAINAGE AREA.--51.0 mi².

PERIOD OF RECORD.--October 1987 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 580 ft above sea level, from topographic map.

REMARKS.--Records good except for estimated daily discharges and discharges below 1.0 ft³/s, which are poor. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.08	21	23	e5.2	e14	e50	e55	224	10	9.2	3.7	.00
2	.22	64	20	e4.7	e12	e38	e50	121	11	8.1	2.8	.00
3	.24	132	19	e4.5	e10	e29	e45	91	13	7.3	2.2	.00
4	2.0	75	18	e4.4	e9.0	e25	e60	93	16	6.1	1.7	.00
5	16	47	17	e4.2	e8.0	e21	e45	70	14	5.1	1.3	.00
6	238	36	15	e4.0	e7.5	e19	e40	62	12	4.7	1.1	.00
7	113	45	e13	e3.9	e7.0	e18	e37	51	17	4.2	.80	.00
8	54	47	e12	e3.7	e6.5	e17	e35	46	18	3.7	.65	.00
9	33	37	e11	e3.5	e12	e16	e33	44	22	3.4	.48	.00
10	24	30	e9.5	e3.4	e22	e15	e32	242	33	3.4	.41	.00
11	18	124	e10	e3.3	e35	e70	e31	168	27	3.0	.33	.00
12	15	171	e13	e3.2	e20	380	e35	100	51	2.8	.32	.01
13	13	89	e14	e3.2	e16	e215	e80	66	32	2.6	.41	.03
14	12	63	31	e3.2	e13	e125	e130	49	22	2.4	.41	.04
15	11	50	68	e6.0	e11	e75	e190	43	16	3.0	.25	.04
16	9.8	40	55	e17	e10	e80	e110	47	13	2.9	.17	.11
17	8.5	34	e35	e45	e9.5	e80	e75	43	12	2.4	.08	.18
18	7.9	36	e26	e150	e9.5	e65	59	39	435	2.2	.05	.14
19	7.9	64	e21	291	e9.0	e60	51	32	971	2.3	.04	.06
20	7.9	76	e18	e95	e13	e50	792	26	406	2.0	.06	.03
21	9.1	64	e15	e55	e22	e45	439	26	189	1.6	.26	.02
22	10	48	e13	46	e21	e40	317	25	106	1.4	.32	.14
23	9.7	40	e12	41	e19	e30	370	20	64	1.5	.21	.26
24	8.9	32	e11	259	e21	e30	278	18	45	2.3	.11	.32
25	5.2	28	e10	e100	e23	e30	180	17	33	7.3	.04	.23
26	9.6	27	e8.8	e60	27	e240	125	16	24	4.1	.02	.14
27	9.4	27	e8.0	e40	256	e190	87	15	20	2.3	.01	.22
28	21	27	e7.2	e30	398	e110	64	16	16	1.8	.00	1.5
29	21	24	e6.6	e25	e100	e90	84	15	14	1.7	.00	1.5
30	18	23	e6.2	e20	---	e75	338	12	11	2.8	.00	.93
31	17	---	e5.6	e16	---	e65	---	11	---	4.3	.00	---
TOTAL	730.44	1621	551.9	1350.4	1141.0	2393	4267	1848	2673	111.9	18.23	5.90
MEAN	23.6	54.0	17.8	43.6	39.3	77.2	142	59.6	89.1	3.61	.59	.20
MAX	238	171	68	291	398	380	792	242	971	9.2	3.7	1.5
MIN	.08	21	5.6	3.2	6.5	15	31	11	10	1.4	.00	.00
CFSM	.46	1.06	.35	.85	.77	1.51	2.79	1.17	1.75	.07	.01	.00
IN.	.53	1.18	.40	.98	.83	1.75	3.11	1.35	1.95	.08	.01	.00

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 1996, BY WATER YEAR (WY)

	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEAN	17.5	43.2	56.3	63.7	58.6	87.5	97.6	52.1	44.9
MAX	53.3	144	168	181	186	199	152	130	141
(WY)	1993	1993	1991	1993	1990	1993	1993	1991	1989
MIN	.33	3.14	5.69	17.6	16.6	24.7	49.6	9.47	.58
(WY)	1995	1995	1990	1994	1989	1989	1988	1988	1988

SUMMARY STATISTICS

FOR 1995 CALENDAR YEAR

FOR 1996 WATER YEAR

WATER YEARS 1988 - 1996

ANNUAL TOTAL	11843.33	16711.77	
ANNUAL MEAN	32.4	45.7	
HIGHEST ANNUAL MEAN			45.5
LOWEST ANNUAL MEAN			74.9
HIGHEST DAILY MEAN	420	971	27.5
LOWEST DAILY MEAN	.08	.00	1480
ANNUAL SEVEN-DAY MINIMUM	.32	.00	.00
INSTANTANEOUS PEAK FLOW		1270	(c)2050
INSTANTANEOUS PEAK STAGE		9.67	10.73
ANNUAL RUNOFF (CFSM)	.64	.90	.89
ANNUAL RUNOFF (INCHES)	8.64	12.19	12.12
10 PERCENT EXCEEDS	76	102	107
50 PERCENT EXCEEDS	18	16	18
90 PERCENT EXCEEDS	1.6	.18	.70

(a) Aug. 28 to Sept. 11.

(b) On several days in water years 1988, 1991, 1992, 1994, 1996.

(c) From rating curve extended above 1,000 ft³/s.

(e) Estimated.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

As the number of streams on which streamflow information is likely to be desired far exceeds the number of stream-gaging stations feasible to operate at one time, the Geological Survey collects limited streamflow data at sites other than stream-gaging stations. When limited streamflow data are collected on a systematic basis over a period of years for use in hydrologic analyses, the site at which the data are collected is called a partial-record station. Data collected at these partial-record stations are usable in low-flow or 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 time 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 crest-stage partial-record stations are presented in the following table. Discharge measurements made at low-flow partial-record sites and at miscellaneous sites and for special studies are given in separate tables.

Crest-stage partial-record stations

The following table contains annual maximum discharges 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 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.

Maximum discharge at crest-stage partial-record stations

Station name and number	Location and drainage area	Period of record	Date	<u>Water year 1996 maximum</u>		<u>Period of record maximum</u>		
				Gage height (ft)	Dis- charge (ft ³ /s)	Date	Gage height (ft)	Dis- charge (ft ³ /s)
STREAMS TRIBUTARY TO LAKE SUPERIOR								
Two Hearted River near Paradise, MI (04044813)	Lat 46°41'15", long 85°26'26", in SE1/4 NW1/4 sec.33, T.50 N., R.9 W., Luce County, Hydrologic Unit 04020201, on right bank 300 ft down- stream from end of Trail Road, 3.2 mi upstream from mouth, and 20 mi northwest of Paradise. Drainage area is 200 mi ² .	1973-96	04-25-96	11.94	1,600	04-25-85	a8.42	3,210
West Branch Waika River near Brimley, MI (04045538)	Lat 46°21'18", long 84°35'35", in SW1/4 NW1/4 sec.29, T.46 N., R.2 W., Chippewa County, Hydrologic Unit 04020203, at Tilson Road, 3.2 mi upstream from mouth, and 3.5 mi south of Brimley. Drainage area is 40.7 mi ² .	1973-96	04-22-96	8.61	744	04-18-74	b9.19	1,200
STREAMS TRIBUTARY TO LAKE MICHIGAN								
Tenmile Creek at Perronville, MI (04059400)	Lat 45°48'38", long 87°22'00", in NW1/4 NW1/4 sec.2, T.39 N., R.25 W., Menominee County, Hydrologic Unit 04030109, at county road, 1 mi northwest of Perron- ville, and 11.5 mi upstream from Ford River. Drainage area is 38.4 mi ² .	1971-77†, 1978-96	04-25-96	--	e660	04-24-75	c5.42	810

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Maximum discharge at crest-stage partial-record stations--Continued

Station name and number	Location and drainage area	Period of record	Date	Water year 1996 maximum		Period of record maximum		
				Gage height (ft)	Dis- charge (ft ³ /s)	Date	Gage height (ft)	Dis- charge (ft ³ /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued								
Portage River near Vicksburg, MI (04097170)	Lat 42°06'53", long 85°29'08", in SW1/4 sec.16, T.4 S., R.10 W., Kalamazoo County, Hydrologic Unit 04050001, at W Avenue, 2.4 mi east of Vicksburg. Datum of gage is 839.94 ft above sea level. Drainage area is 68.2 mi ² .	1946-51‡, 1965-80‡, 1980-96	11-12-95	4.89	162	06-02-89	d5.81	416
Rabbit River at Hamilton, MI (04108645)	Lat 42°40'31", long 86°00'13", in NE1/4 sec.6, T.3 N., R.14 W., Allegan County, Hydro- logic Unit 04050003, at State Highway 40 in Hamil- ton. Drainage area is 274 mi ² .	1979-96	05-21-96	15.42	2,270	06-01-89	f18.2	5,260
Sycamore Creek near Mason, MI (04112700)	Lat 42°36'40", long 84°27'58", in NE1/4 NE1/4 sec.31, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, at Harper Road, 0.7 mi downstream from Aurelius and Vevay Drain, and 2.6 mi northwest of Mason. Drain- age area is 39.5 mi ² .	1975-96	06-19-96	9.97	300	04-19-75	12.53	1,080
Flat River at Smyrna, MI (04116500)	Lat 43°03'10", long 85°15'53", in NW1/4 sec.28, T.8 N., R.8 W., Ionia County, Hydrologic Unit 04050006, on right bank at downstream side of bridge on Ingalls Road, 0.5 mi south of Smyrna. Datum of gage is 729.53 ft above sea level. Drainage area is 528 mi ² .	1951-86‡, 1993-96	05-22-96	g5.61	1,380	09-13-86	9.05	4,700
Thornapple River near Caledonia, MI (04118000)	Lat 42°48'40", long 85°29'00", in NW1/4 sec.22, T.5 N., R.10 W., Kent County, Hy- drologic Unit 04050007, on right bank 200 ft down- stream from LaBarge power- plant, 200 ft upstream from 84th Street, 2.3 mi northeast of Caledonia, and 3.3 mi downstream from Coldwater River. Datum of gage is 676.31 ft above sea level. Drainage area is 773 mi ² .	1931-38‡, 1952-82‡, 1984-94‡, 1995-96	06-22-96	8.45	3,780	02-27-85	11.43	6,700

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Maximum discharge at crest-stage partial-record stations--Continued

Station name and number	Location and drainage area	Period of record	Date	Water year 1996 maximum		Period of record maximum		
				Gage height (ft)	Dis- charge (ft ³ /s)	Date	Gage height (ft)	Dis- charge (ft ³ /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued								
Plaster Creek at Grand Rapids, MI (04119055)	Lat 42°54'46", long 85°39'02", in SE1/4 sec.7, T.6 N., R.11 W., Kent County, Hydrologic Unit 04050006, at 28th Street in Grand Rapids. Drainage area is 46.6 mi ² .	1974-96	05-21-96	11.67	1,640	03-04-79	--	e1,700
Buck Creek at Grandville, MI (04119160)	Lat 42°54'09", long 85°45'46", in SE1/4 sec.18, T.6 N., R.12 W., Kent County, Hydrologic Unit 04050006, at Wilson Avenue in Grandville. Drainage area is 50.5 mi ² .	1974-96	05-21-96	9.55	1,300	05-12-81	10.30	1,580
North Branch Pentwater River near Pentwater, MI (04122230)	Lat 43°47'42", long 86°21'30", in NE1/4 SE1/4 sec.8, T.16 N., R.17 W., Oceana County, Hydrologic Unit 04060101, at Oceana Drive, 3.5 mi northeast of Pentwater. Drainage area is 42.3 mi ² .	1975-96	06-18-96	3.00	223	09-11-86	6.33	2,860
Betsie River near Benzonia, MI (04126600)	Lat 44°36'02", long 86°05'57", in NW1/4 NW1/4 sec.2, T.25 N., R.15 W., Benzie County, Hydrologic Unit 04060104, at U.S. Highway 31, 1.2 mi south of Benzonia. Datum of gage is 602.15 ft above sea level. Drainage area is approximately 170 mi ² .	1975-96	06-18-96	3.93	678	03-28-89	5.46	993
STREAMS TRIBUTARY TO LAKE HURON								
Rifle River at Selkirk, MI (04140500)	Lat 44°18'48", long 84°04'10", in SE1/4 NE1/4 sec.9, T.22 N., R.3 E., Ogemaw County, Hydrologic Unit 04080101, at State Road in Selkirk. Datum of gage is 828.47 ft above sea level. Drainage area is 117 mi ² .	1950-82†, 1983-96	06-19-96	h	e1,100	05-20-59	6.76	2,760
North Branch Flint River near Columbiaville, MI (04146450)	Lat 43°11'18", long 83°22'03", in NW1/4 sec. 24, T.9 N., R.9 E., Lapeer County, Hydro- logic Unit 04080204, at Barnes Lake Road, 2.9 mi northeast of Columbiaville. Drainage area is 223 mi ² .	1987-96	06-21-96	20.25	4,800	06-21-96	20.25	4,800

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Maximum discharge at crest-stage partial-record stations--Continued

Station name and number	Location and drainage area	Period of record	Date	Water year 1996 maximum		Period of record maximum		
				Gage height (ft)	Dis- charge (ft ³ /s)	Date	Gage height (ft)	Dis- charge (ft ³ /s)
STREAMS TRIBUTARY TO LAKE HURON--Continued								
Swartz Creek at Flint, MI (04148300)	Lat 42°59'16", long 83°43'57", in NW1/4 sec. 26, T.7 N., R.6 E., Genesee County, Hydro- logic Unit 04080204, at South Ballenger Highway in Flint, 3.6 mi upstream from mouth. Datum of gage is 727.05 ft above sea level. Drainage area is 115 mi ² .	1970-84†, 1991-96	05-21-96	8.03	1,940	04-19-75	9.02	3,160
Thread Creek near Flint, MI (04148440)	Lat 42°58'30", long 83°38'09", in SE1/4 SE1/4 sec. 28, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, at Bristol Road, 6.0 mi upstream from mouth, and 4.0 mi southeast of Flint. Datum of gage is 764.36 ft above sea level. Drainage area is 54.4 mi ² .	1970-84†, 1991-96	05-21-96	6.05	560	04-19-75	7.65	1,260
STREAMS TRIBUTARY TO ST. CLAIR RIVER								
Pine River near Rattle Run, MI (04160350)	Lat 42°52'49", long 82°34'04", in NE1/4 sec.9, T.5 N., R.16 E., St. Clair County, Hydro- logic Unit 04090001, at Gratiot Road, 1.9 mi north- east of Rattle Run. Drainage area is 135 mi ² .	1974-96	06-22-96	24.24	5,730	06-22-96	24.24	5,730
STREAMS TRIBUTARY TO LAKE ST. CLAIR								
West Branch Stony Creek near Washington, MI (04161760)	Lat 42°43'53", long 83°06'02", in SE1/4 sec.25, T.4 N., R.11 E., Oakland County, Hydro- logic Unit 04090003, at Huron-Clinton Metropoli- tan Park Road, 3.4 mi west of Washington. Drainage area is 22.5 mi ² .	1965-96	06-19-96	3.70	234	04-19-75	4.42	470
North Branch Clinton River at Almont, MI (04164010)	Lat 42°54'59", long 83°02'42", in NE1/4 sec.28, T.6 N., R.12 E., Lapeer County, Hydro- logic Unit 04090003, at State Highway 53 in Al- mont. Drainage area is 9.56 mi ² .	1959-62, 1963-68†, 1969-96	06-19-96	5.73	426	09-06-85	8.60	818
North Branch Clinton River near Romeo, MI (04164050)	Lat 42°49'11", long 82°58'35", in NW1/4 sec.31, T.5 N., R.13 E., Macomb County, Hydrologic Unit 04090003, at 33 Mile Road, 2.2 mi northeast of Romeo. Drain- age area is 49.7 mi ² .	1959-64, 1965-69†, 1970-96	06-19-96	4.52	1,150	04-19-75	5.44	3,500

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Maximum discharge at crest-stage partial-record stations--Continued

Station name and number	Location and drainage area	Period of record	Date	Water year 1996 maximum		Period of record maximum		
				Gage height (ft)	Dis- charge (ft ³ /s)	Date	Gage height (ft)	Dis- charge (ft ³ /s)
STREAMS TRIBUTARY TO LAKE ST. CLAIR--Continued								
North Branch Clinton River near Meade, MI (04164150)	Lat 42°43'50", long 82°54'23", in NE1/4 sec.34, T.4 N., R.13 E., Macomb County, Hydro- logic Unit 04090003, at 27 Mile Road, 1.9 mi northwest of Meade. Drainage area is 89.6 mi ² .	1959-67, 1968-72‡, 1973-96	06-19-96	7.62	1,800	04-19-75	m7.76	4,500
Coon Creek near Armada, MI (04164200)	Lat 42°47'41", long 82°52'58", in SW1/4 sec.1, T.4 N., R.13 E., Macomb County, Hydro- logic Unit 04090003, at North Road, 3.4 mi south of Armada. Drainage area is 10.0 mi ² .	1959-65, 1966-70‡, 1971-96	06-19-96	5.94	242	04-19-75	n6.25	480
Highbank Creek near Armada, MI (04164350)	Lat 42°28'24", long 82°51'08", in NW1/4 sec.6, T.4 N., R.14 E., Macomb County, Hydro- logic Unit 04090003, at 32 Mile Road, 3.0 mi southeast of Armada. Drainage area is 14.9 mi ² .	1959-65, 1965-70‡, 1971-96	06-19-96	15.80	682	09-06-85	16.77	2,240
East Branch Coon Creek near New Haven, MI (04164360)	Lat 42°45'46", long 82°50'57", in NW1/4 sec.19, T.4 N., R.14 E., Macomb County, Hydrologic Unit 04090003, at 29 Mile Road, 3.4 mi northwest of New Haven. Drainage area is 36.1 mi ² .	1959-67, 1968-72‡, 1973-96	06-20-96	o7.72	742	04-19-75	p8.95	2,700
Deer Creek near Meade, MI (04164400)	Lat 42°42'39", long 82°51'32", in NW1/4 sec.6, T.3 N., R.14 E., Macomb County, Hydro- logic Unit 04090003, at 25 1/2 Mile Road, 0.9 mi southeast of Meade. Drain- age area is 12.7 mi ² .	1959-60, 1960-65‡, 1966-96	06-19-96	8.34	605	09-06-85	8.90	691
McBride Drain near Macomb, MI (04164450)	Lat 42°41'14", long 82°55'14", in NE1/4 NE1/4 sec.16, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, at 24 Mile Road, 2.2 mi southeast of Macomb. Drainage area is 5.79 mi ² .	1960-64‡, 1965-96	06-19-96	9.15	162	02-10-65	q8.82	220
Middle Branch Clinton River near Macomb, MI (04164600)	Lat 42°42'03", long 82°59'44", in SE1/4 sec.2, T.3 N., R.12 E., Macomb County, Hydro- logic Unit 04090003, at Schoenherr Road, 2.0 mi west of Macomb. Drainage area is 22.2 mi ² .	1959-64, 1965-69‡, 1971-96	06-19-96	11.67	709	06-26-68	r12.17	1,400

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Maximum discharge at crest-stage partial-record stations--Continued

Station name and number	Location and drainage area	Period of record	Date	<u>Water year 1996 maximum</u>		<u>Period of record maximum</u>		
				Gage height (ft)	Dis- charge (ft ³ /s)	Date	Gage height (ft)	Dis- charge (ft ³ /s)
STREAMS TRIBUTARY TO DETROIT RIVER								
Frank and Poet Drain at Trenton, MI (04168660)	Lat 42°09'19", long 83°12'22", in NW1/4 sec.13, T.4 S., R.10 E., Wayne County, Hydro- logic Unit 04090004, at King Road in Trenton. Drainage area is 19.3 mi ² .	1972-96	05-10-96	7.84	249	09-07-90	9.55	655
STREAMS TRIBUTARY TO LAKE ERIE								
Saline River near Saline, MI (04176400)	Lat 42°07'50", long 83°46'35", in SW1/4 sec.18, T.4 S., R.6 E., Washtenaw County, Hydrologic Unit 04100002, at Maple Road, 2.8 mi south of Saline. Drainage area is 94.6 mi ² .	1966-77‡, 1978-96	04-21-96	10.34	830	06-26-68	13.37	3,990

‡ Operated as a continuous-record gaging station.

a Maximum gage height, 12.36 ft, Apr. 9, 1991, site and datum then in use.

b Maximum gage height, 9.84 ft, Apr. 6, 1988.

c Maximum gage height, 8.94 ft, Mar. 30, 1977, backwater from ice.

d Maximum gage height, 5.86 ft, Dec. 31, 1988, backwater from ice.

e Estimated.

f From floodmark.

g Maximum gage height, 8.31 ft, backwater from ice, date not determined.

h Maximum gage height, 4.70 ft, backwater from ice, date not determined.

i Maximum gage height, 5.93 ft, Jan. 27, 1974, backwater from ice.

j Maximum gage height, 8.62 ft, Apr. 19, 1975.

k Maximum gage height, 7.1 ft, Mar. 12 or 13, 1962, backwater from ice, site and datum then in use.

m Maximum gage height, 7.85 ft, Mar. 12, 1962, backwater from ice.

n Maximum gage height, 6.95 ft, Sept. 6, 1985.

o Maximum gage height, 7.75 ft, backwater from ice, date not determined.

p Maximum gage height, 9.48 ft, Sept. 6, 1985.

q Maximum gage height, 9.55 ft, June 26, 1968.

r Maximum gage height, 15.89 ft, Mar. 14, 1972, backwater from ice.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Low-flow partial-record stations

Measurements of streamflow in the area covered by this report made at low-flow partial-record stations are given in the following table. These measurements were made during periods of base flow when streamflow is primarily from ground-water storage. These measurements, when correlated with the simultaneous discharge of a nearby stream where continuous records are available, will give a picture of the low-flow potentiality of a stream. The column headed "Period of record" shows the water years in which measurements were made at the same, or practically the same, site.

Discharge measurements made at low-flow partial-record stations during water year 1996

Station No.	Station name	Location	Drainage area (mi ²)	Period of record	Measurements	
					Date	Discharge (ft ³ /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN						
04096517	South Branch Hog Creek Tributary near Allen, MI	Lat 41°57'33", long 84°49'33", in SW1/4 SW1/4 sec.7, T.6 S., R.4 W., Hillsdale County, Hydrologic Unit 04050001, at Squires Road, 0.3 mi upstream from mouth, and 3.0 mi west of Allen.	2.61	1969-95	05-09-96	a8.51
					08-01-96	1.57
					09-13-96	1.33
04114594	Maple River near St. Johns, MI	Lat 43°02'43", long 84°28'11", in SW1/4 SE1/4 sec.30, T.8 N., R.1 W., Clinton County, Hydrologic Unit 04050005, at Colony Road, 4.5 mi northeast of St. Johns.	--	1981-95	10-11-95	27.1
					04-25-96	a165
					06-05-96	a74.3
					07-23-96	29.2

a Not base flow.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Special study and miscellaneous sites

Discharge measurements in the following table were made at special study and miscellaneous sites throughout the State.

Discharge measurements made at special study and miscellaneous sites during water year 1996

Station No.	Stream	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Measurements	
						Date	Dis-charge (ft ³ /s)
STREAMS TRIBUTARY TO LAKE SUPERIOR							
04034100	Bond Falls Lower By-Pass	Middle Branch Ontonagon River	Lat 46°24'27", long 89°07'44", in SE1/4 SW1/4 sec.1, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, at Bond Falls Road, 2.2 mi west of Calderwood.	--	1942,1945, 1963-64, 1967,1969, 1971-72, 1974, 1979-81, 1983-84, 1987-95	07-22-96	a41.7
04040338	Unnamed Tributary	Snake Creek	Lat 47°20'54", long 88°10'43", in NW1/4 SE1/4 sec.12, T.57 N., R.31 W., Keweenaw County, Hydrologic Unit 04020103, at two-track trail upstream from 1100 ft contour, 7.0 mi southeast of Phoenix.	--	--	07-31-96	b0.39
04040340	Snake Creek	Tobacco River	Lat 47°20'09", long 88°09'32", in NW1/4 SE1/4 sec.18, T.57 N., R.30 W., Keweenaw County, Hydrologic Unit 04020103, at two-track trail downstream from 760 ft contour, 8.0 mi southeast of Phoenix.	--	--	07-31-96	b0.87
04044050	Whetstone Brook	Lake Superior	Lat 46°32'49", long 87°26'12", in NW1/4 NE1/4 sec.21, T.48 N., R.25 W., Marquette County, Hydrologic Unit 04020105, at Vandenboom Road, 1.0 mi west of Marquette.	--	--	08-07-96 08-14-96 08-14-96 09-05-96	5.70 *1.98 *1.91 *1.51
04044400	Carp River	Lake Superior	Lat 46°31'29", long 87°34'25", in SE1/4 sec.29, T.48 N., R.26 W., Marquette County, Hydrologic Unit 04020105, at U.S. Highway 41, 2.0 mi northeast of Negaunee.	51.4	1961-86‡, 1987-92‡, 1993-95	06-19-96 08-07-96 09-05-96 09-11-96	a94.3 a72.4 a35.6 a33.2
STREAMS TRIBUTARY TO LAKE MICHIGAN							
04058120	Green Creek	Middle Branch Escanaba River	Lat 46°22'22", long 87°36'21", in NW1/4 sec.19, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, at County Highway 565, 4.5 mi south of Palmer.	8.42	1961-65, 1970-92‡, 1993-95	06-17-96 06-17-96 08-07-96 09-05-96 09-11-96	a2.31 a2.88 a16.8 a3.95 a2.80

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at special study and miscellaneous sites during water year 1996--Continued

Station No.	Stream	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Measurements	
						Date	Dis-charge (ft ³ /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued							
04059034	Escanaba River	Lake Michigan	Lat 45°48'22", long 87°05'51", in SW1/4 NW1/4 sec.1, T.39 N., R.23 W., Delta County, Hydrologic Unit 04030110, 600 ft downstream from Bichler Creek, 2.0 mi north-west of Wells, and 2.5 mi upstream from mouth.	c920	1981-92†, 1993-95	06-21-96 07-24-96 08-08-96 09-11-96 09-12-96	a680 a868 a1190 a351 a488
04110663	Unnamed Tributary	Perry Creek	Lat 42°27'38", long 84°28'57", in SW1/4 NW1/4 sec.19, T.1 N., R.1 W., Ingham County, Hydrologic Unit 04050004, at Ridley Road, 2.0 mi west of Leslie.	--	1990-95	06-18-96	b27.8
04112670	Willow Creek	Sycamore Creek	Lat 42°32'18", long 84°29'26", in SW1/4 SE1/4 sec.24, T.2 N., R.2 W., Ingham County, Hydrologic Unit 04050004, at Toles Road, 3.7 mi southwest of Mason.	--	1990-95	12-20-95 02-27-96 02-28-96 04-30-96 05-10-96 06-18-96	*b1.30 b10.8 b2.35 b2.59 b3.91 b6.98
04118256	Unnamed Tributary	Bear Creek	Lat 43°03'08", long 85°29'02", in SE1/4 NW1/4 sec.27, T.8 N., R.10 W., Kent County, Hydrologic Unit 04050006, at private drive of Meandering Creek Estates, 0.6 mi west of Cannonsburg.	--	1995	01-18-96	b2.86
04118264	Armstrong Creek	Bear Creek	Lat 43°03'29", long 85°30'46", in SE1/4 SE1/4 sec.20, T.8 N., R.10 W., Kent County, Hydrologic Unit 04050006, at Cannonsburg Road, 2.0 mi west of Cannonsburg.	--	1994-95	01-18-96	b2.34
04118269	Stout Creek	Bear Creek	Lat 43°03'53", long 85°31'39", in SW1/4 NW1/4 sec.20, T.8 N., R.10 W., Kent County, Hydrologic Unit 04050006, 0.5 mi south of 7 Mile Road, 2.8 mi northwest of Cannonsburg.	--	1995	01-18-96	b5.26
04121239	Clam River	Muskegon River	Lat 44°15'49", long 85°24'04", in NE1/4 NE1/4 sec.33, T.22 N., R.9 W., Wexford County, Hydrologic Unit 04060102, at Smith Street in Cadillac.	c48	1983-84†, 1986-92†, 1993-95	10-20-95 01-23-96 05-16-96 08-20-96	13.6 37.3 7.80 5.86

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at special study and miscellaneous sites during water year 1996--Continued

Station No.	Stream	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Measurements	
						Date	Dis- charge (ft ³ /s)
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued							
04125550	Manistee River	Manistee Lake	Lat 44°15'34", long 85°56'27", in NW1/4 SW1/4 sec.31, T.22 N., R.13 W., Manistee County, Hydrologic Unit 04060103, at Tippy Dam, 3.0 mi north of Wellston.	--	1987, 1990	07-18-96	a674
						07-18-96	a1690
						07-18-96	a3110
						07-18-96	a3750
						07-19-96	a1270
						07-19-96	a2480
	07-19-96	a4310					
04126860	Lake Leelanau Narrows	Lake Leelanau	Lat 44°58'53", long 85°42'42", in NW1/4 NW1/4 sec.25, T.30 N., R.12 W., Leelanau County, Hydrologic Unit 04060104, at State Highway 204, in Lake Leelanau.	--	1995	10-06-95	b147
						11-21-95	b96.8
						01-26-96	b139
						02-26-96	b128
						03-27-96	b194
04126865	Lake Leelanau Outlet	Lake Michigan	Lat 45°01'21", long 85°45'37", in SW1/4 NW1/4 sec.9, T.30 N., R.12 W., Leelanau County, Hydrologic Unit 04060104, at State Highway 22, in Leland.	--	1995	10-06-95	b165
						11-21-95	b297
						01-26-96	b170
						02-26-96	b164
						03-27-96	b178
						04-26-96	b277
04127505	Mitchell Creek	East Arm Grand Traverse Bay	Lat 44°42'54", long 85°35'30", in NW1/4 NW1/4 sec.25, T.27 N., R.11 W., Grand Traverse County, Hydrologic Unit 04060105, at Hammond Road, 2.0 mi southeast of Traverse City.	--	--	04-17-96	3.92
						05-21-96	4.09
041275055	Unnamed Tributary	Mitchell Creek	Lat 44°42'55", long 85°34'41", in SE1/4 SE1/4 sec.24, T.27 N., R.11 W., Grand Traverse County, Hydrologic Unit 04060105, at Hammond Road, 2.2 mi southeast of Traverse City.	--	--	04-16-96	1.22
						05-21-96	0.58
						06-18-96	2.29
						07-29-96	3.04
STREAMS TRIBUTARY TO DETROIT RIVER							
04165980	River Rouge	Detroit River	Lat 42°34'27", long 83°12'26", in NW1/4 NW1/4 sec.19, T.2 N., R.11 E., Oakland County, Hydrologic Unit 04090004, at Adams Road in Troy.	12.0	1994-95	02-27-96	112
						08-28-96	*3.29
						09-06-96	*2.68
						09-19-96	*3.43
						09-27-96	8.78
04166020	River Rouge	Detroit River	Lat 42°30'36", long 83°15'45", in SW1/4 NW1/4 sec.10, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, at Lahser Road in Beverly Hills.	--	1994-95	08-28-96	*12.5
						09-06-96	*9.65
						09-19-96	*11.7
						09-23-96	30.2
04166225	River Rouge	Detroit River	Lat 42°26'12", long 83°16'27", in NW1/4 sec.4, T.1 S., R.10 E., Wayne County, Hydrologic Unit 04090004, at footbridge near Bonnie Brook Golf Course clubhouse, 0.2 mi east of Telegraph Road, in Red- ford.	100	1994-95	08-28-96	*21.1
						09-06-96	*16.8
						09-23-96	85.0

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at special study and miscellaneous sites during water year 1996--Continued

Station No.	Stream	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Measurements	
						Date	Dis-charge (ft ³ /s)
STREAMS TRIBUTARY TO DETROIT RIVER--Continued							
04166435	Bell Branch	Upper River Rouge	Lat 42°24'23", long 83°18'55", in SE1/4 NE1/4 sec.13, T.1 S., R.9 E., Wayne County, Hydrologic Unit 04090004, at Inkster Road in Livonia.	--	1995	08-28-96	*2.58
						09-03-96	*2.58
						09-23-96	24.8
						09-27-96	41.1
04166470	Upper River Rouge	River Rouge	Lat 42°23'38", long 83°16'35", in SW1/4 NE1/4 sec.20, T.1 S., R.10 E., Wayne County, Hydrologic Unit 04090004, at Telegraph Road in Detroit.	67.3	1979-80, 1994-95	08-28-96	*7.31
						09-03-96	*7.82
						09-23-96	63.1
04166598	Walled Lake Branch	Middle River Rouge	Lat 42°27'08", long 83°27'37", in NW1/4 NE1/4 sec.35, T.1 N., R.8 E., Oakland County, Hydrologic Unit 04090004, at 9 Mile Road in Novi.	--	1994-95	02-27-96	171
04166700	Johnson Drain	Middle River Rouge	Lat 42°25'33", long 83°28'52", in SW1/4 SE1/4 sec.3, T.1 S., R.8 E., Wayne County, Hydrologic Unit 04090004, at Hines Drive, 0.1 mi upstream from confluence with Walled Lake Branch, in Northville.	26.1	1967-68, 1976-77, 1986-88, 1994-95	02-27-96	105
						08-28-96	*4.94
						09-06-96	*4.32
						09-27-96	7.00
04167150	Middle River Rouge	River Rouge	Lat 42°19'50", long 83°14'53", in SW1/4 sec.10, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, at Hines Drive in Dearborn Heights.	110	1994-95	08-28-96	*20.2
						09-03-96	*18.1
						09-23-96	117
04167665	Lower River Rouge	River Rouge	Lat 42°17'06", long 83°23'02", in NW1/4 SE1/4 sec.28, T.2 S., R.9 E., Wayne County, Hydrologic Unit 04090004, at Wayne Road in Wayne.	71.2	1994-95	08-28-96	*14.9
						09-03-96	*25.6
						09-23-96	69.0
04168400	Lower River Rouge	River Rouge	Lat 42°18'31", long 83°15'10", in NE1/4 sec.22, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, at Military Road in Dearborn.	c91	1979-80, 1994-95	08-28-96	*23.9
						09-03-96	*28.9
						09-23-96	79.2

* Base flow.

† Operated as a low-flow partial-record station.

‡ Operated as a continuous-record gaging station.

a Affected by regulation and/or diversion.

b Discharge measurement made by employees of Michigan Department of Environmental Quality.

c Approximately.

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Concentrations of trace elements and organic compounds in stream-bed sediments from selected sites in the Lake Erie - Lake St. Clair basin
(National water-quality assessment program)

Stream bed sediment samples were collected during low-flow conditions in the Lake Erie - Lake St. Clair basin at 3 sites in Michigan in 1996 to determine concentrations of trace elements and hydrophobic organic compounds in stream bed sediment. Samples of bed sediment are used to assess contaminants in stream systems. Since contaminants are often concentrated in bed sediment and bioaccumulate or bioconcentrate in tissues their use in assessments increases the probability of detecting low-level concentrations of contaminants. Bed sediment and tissues also provide an assessment of contaminant levels over time and are a direct measure of the availability of contaminants to organisms. When used together, bed sediment, tissue, and water samples provide a better understanding of the distribution and fate of contaminants than any one measure can provide on its own.

Composite bed sediments samples were collected at each site through collection of the top 1 to 2 centimeters of material from at least 5 different depositional areas within the stream reach. A subsample from the composite sample collected at each site was shipped to the Iowa City sediment laboratory for particle-size analysis. Additionally, subsamples from the composite were: (1) processed using a 2.0-millimeter stainless-steel mesh sieve (WS, <2MM) for preparation of material for organic contaminant analysis, and (2) processed using a 63-micrometer nylon-cloth sieve (<63U WS) for preparation of material for trace element analysis. More specific details describing the guidelines used in collection and in processing the stream bed sediment samples can be found in Shelton and Capel (1994).

Results of the laboratory analyses and the field measurements recorded at the time of sample collection are summarized in the following tables. Constituent concentrations are provided on a dry-weight (DW) basis. Constituent names are abbreviated as follows: DDD, dichlorodiphenyldichloroethane; DDE, dichlorodiphenyldichloroethene; DCPA, dimethyl tetrachloroterephthalate; DDT, dichlorodiphenyltrichloroethane; BHC, hexachlorocyclohexane; PCB, polychlorinated biphenyls. (BOT MAT = bottom material, SED, BM = sediment, bottom material, BED MAT. = bed material, REC = recoverable, 49239 = number in parentheses beneath the constituent description is the USGS National Water Quality Laboratory parameter code). Additional surface-water and water-quality data for these sampling sites can be found in the continuous-record station section.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

STATION NUMBER	STATION NAME	LATITUDE	LONGITUDE	DRAINAGE AREA (MI ²)	DATE	TIME
04159492	BLACK RIVER NEAR JEDDO, MI	43° 09' 09" N	082° 37' 27" W	464	07-11-96	1130
04161820	CLINTON RIVER AT STERLING HEIGHTS, MI	42° 36' 52" N	083° 01' 36" W	309	07-12-96	0900
04175600	RIVER RAISIN NEAR MANCHESTER, MI	42° 10' 05" N	084° 04' 34" W	132	07-10-96	1545

STATION NUMBER	DATE	SPECIFIC CONDUCTANCE (US/CM)	PH WATER WHOLE FIELD (STANDARD UNITS)	TEMPERATURE AIR (DEG C)	TEMPERATURE WATER (DEG C)	TEMPERATURE SEDIMENT (DEG C)	BAROMETRIC PRESSURE (MM OF HG)	OXYGEN DIS-SOLVED (MG/L)	ALUMINUM BOT MAT <63U WS FIELD PERCENT (34790)	CALCIUM BOT MAT <63U WS FIELD PERCENT (34830)	IRON BOT MAT <63U WS FIELD PERCENT (34880)
04159492	07-11-96	784	8.35	28	19.6	20	753	8.57	5.7	6.6	3.2
04161820	07-12-96	832	7.90	19.5	18.8	19	752	8.59	4.9	7.6	3.1
04175600	07-10-96	500	7.78	21	20.7	20	752	9.47	4.6	7.2	3.3

STATION NUMBER	DATE	MAGNESIUM BOT MAT <63U WS FIELD PERCENT (34900)	SODIUM BOT MAT <63U WS FIELD PERCENT (34960)	POTASSIUM BOT MAT <63U WS FIELD PERCENT (34940)	PHOSPHORUS BOT MAT <63U WS FIELD PERCENT (34935)	TITANIUM BOT MAT <63U WS FIELD PERCENT (49274)	ANTI-MONY BOT MAT <63U WS FIELD (UG/G) (34795)	ARSENIC BOT MAT <63U WS FIELD (UG/G) (34800)	BARIUM BOT MAT <63U WS FIELD (UG/G) (34805)	BERYLLIUM BOT MAT <63U WS FIELD (UG/G) (34810)	BISMUTH BOT MAT <63U WS FIELD (UG/G) (34816)
04159492	07-11-96	2.7	0.72	1.9	0.07	0.260	0.7	10	410	1	<10
04161820	07-12-96	2.8	0.75	1.6	0.11	0.240	1.0	13	420	1	<10
04175600	07-10-96	2.0	0.60	1.5	0.09	0.210	0.7	21	450	1	<10

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Concentrations of trace elements and organic compounds in stream-bed sediments
from selected sites in the Lake Erie - Lake St. Clair basin -- Continued

STATION NUMBER	DATE	CAD- MIUM BOT MAT <63U WS FIELD (UG/G) (34825)	CERIUM BOT MAT <63U WS FIELD (UG/G) (34835)	CHRO- MIUM BOT MAT <63U WS FIELD (UG/G) (34840)	COBALT BOT MAT <63U WS FIELD (UG/G) (34845)	COPPER BOT MAT <63U WS FIELD (UG/G) (34850)	EURO- PIUM BOT MAT <63U WS FIELD (UG/G) (34855)	GALLIUM BOT MAT <63U WS FIELD (UG/G) (34860)	GOLD BOT MAT <63U WS FIELD (UG/G) (34870)	HOLMIUM BOT MAT <63U WS FIELD (UG/G) (34875)	LANTHA- NUM BOT MAT <63U WS FIELD (UG/G) (34885)
04159492	07-11-96	0.4	63	60	14	27	<2	15	<8	<4	33
04161820	07-12-96	1.1	52	87	12	59	<2	13	<8	<4	28
04175600	07-10-96	0.5	46	44	11	16	<2	15	<8	<4	26
STATION NUMBER	DATE	LEAD BOT MAT <63U WS FIELD (UG/G) (34890)	LITHIUM BOT MAT <63U WS FIELD (UG/G) (34895)	MANGA- NESE BOT MAT <63U WS FIELD (UG/G) (34905)	MERCURY BOT MAT <63U WS FIELD (UG/G) (34910)	MOLYB- DENUM BOT MAT <63U WS FIELD (UG/G) (34915)	NEODYM- IUM BOT MAT <63U WS FIELD (UG/G) (34920)	NICKEL BOT MAT <63U WS FIELD (UG/G) (34925)	NIObIUM BOT MAT <63U WS FIELD (UG/G) (34930)	SCAN- DIUM BOT MAT <63U WS FIELD (UG/G) (34945)	SELE- NIUM BOT MAT <63U WS FIELD (UG/G) (34950)
04159492	07-11-96	22	50	580	0.06	<2	38	31	11	10	0.4
04161820	07-12-96	75	30	900	0.25	<2	38	35	11	9	0.8
04175600	07-10-96	20	30	2100	0.15	<2	32	24	11	8	0.8
STATION NUMBER	DATE	SILVER BOT MAT <63U WS FIELD (UG/G) (34955)	STRON- TIUM BOT MAT <63U WS FIELD (UG/G) (34965)	SULFUR BOT MAT <63U WS FIELD (UG/G) (34970)	TANTA- LUM BOT MAT <63U WS FIELD (UG/G) (34975)	THORIUM BOT MAT <63U WS FIELD (UG/G) (34980)	TIN BOT MAT <63U WS FIELD (UG/G) (34985)	URANIUM BOT MAT <63U WS FIELD (UG/G) (35000)	VANA- DIUM BOT MAT <63U WS FIELD (UG/G) (35005)	YTTR- IUM BOT MAT <63U WS FIELD (UG/G) (35010)	YTTER- BIUM BOT MAT <63U WS FIELD (UG/G) (35015)
04159492	07-11-96	0.1	150	0.07	<40	10	<10	3.0	91	19	2
04161820	07-12-96	1	170	0.16	<40	5.6	<10	2.6	73	17	2
04175600	07-10-96	0.2	180	0.24	<40	6.5	<10	3.2	74	15	2
STATION NUMBER	DATE	ZINC BOT MAT <63U WS FIELD (UG/G) (35020)	CARBON ORG + INORG SED, BM WS, <2MM DW, REC PERCENT (49267)	CARBON ORGANIC SED, BM WS, <63U DW, REC PERCENT (49266)	CARBON INORG SED, BM WS, <63U DW, REC PERCENT (49269)	CARBON ORG + INORG SED, BM WS, <2MM DW, REC (G/KG) (49272)	CARBON ORGANIC SED, BM WS, <2MM DW, REC (G/KG) (49271)	CARBON INORG SED, BM WS, <2MM DW, REC (G/KG) (49270)	PCB SED, BM DW, REC (UG/KG) (49459)	ACENAPH- THYLENE SED, BM DW, REC (UG/KG) (49428)	ACENAPH- THENE SED, BM WS, <2MM DW, REC (UG/KG) (49429)
04159492	07-11-96	89	4.02	1.43	2.59	17.0	5.00	12.0	<50	<50	<50
04161820	07-12-96	220	6.21	3.26	2.95	27.0	14.0	13.0	<50	e42	e30
04175600	07-10-96	82	7.08	4.60	2.48	21.0	14.0	6.80	<50	e19	<50
STATION NUMBER	DATE	ACRI- DINE SED, BM WS, <2MM DW, REC (UG/KG) (49430)	ALDRIN SED, BM WS, <2MM DW, REC (UG/KG) (49319)	PHENOL C8- ALKYL- SED, BM WS, <2MM DW, REC (UG/KG) (49424)	ANTHRA- CENE SED, BM WS, <2MM DW, REC (UG/KG) (49434)	9, 10- ANTHRA- QUINONE SED, BM WS, <2MM DW, REC (UG/KG) (49437)	AZO- BENZENE SED, BM WS, <2MM DW, REC (UG/KG) (49443)	BENZ (A) ANTHRA- CENE SED, BM WS, <2MM DW, REC (UG/KG) (49436)	BENZOCI- NNOLINE SED, BM WS, <2MM DW, REC (UG/KG) (49468)	BENZO B FLUOR- ANTHENE SED, BM WS, <2MM DW, REC (UG/KG) (49458)	BENZO K FLUOR- ANTHENE SED, BM WS, <2MM DW, REC (UG/KG) (49397)
04159492	07-11-96	<50	<1.00	<50	<50	<50	<50	e16	<50	<50	<50
04161820	07-12-96	e45	<1.00	<50	89	160	<50	320	<50	540	340
04175600	07-10-96	<50	<1.00	<50	e17	<50	<50	e20	<50	e33	e10

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Concentrations of trace elements and organic compounds in stream-bed sediments
from selected sites in the Lake Erie - Lake St. Clair basin -- Continued

STATION NUMBER	DATE	BENZO (G HI) PERY LENE SED, BM WS, <2MM DW, REC (UG/KG) (49408)	BENZO (A) PYRENE SED, BM WS, <2MM DW, REC (UG/KG) (49389)	2, 2'-BI QUINO- LINE SED, BM WS, <2MM DW, REC (UG/KG) (49391)	4-BROMO PHNPHNL ETHER SED, BM WS, <2MM DW, REC (UG/KG) (49454)	PHTHALA TEBUTYL BENZYL- SED, BM WS, <2MM DW, REC (UG/KG) (49427)	CARBA- ZOLE SED, BM WS, <2MM DW, REC (UG/KG) (49449)	CIS- CHLOR- DANE SED, BM WS, <2MM DW, REC (UG/KG) (49320)	TRANS- CHLOR- DANE SED, BM WS, <2MM DW, REC (UG/KG) (49321)	METHANE 2CHLORO ETHOXY SED, BM WS, <2MM DW, REC (UG/KG) (49401)	M-CRE- SOL, 4- CHLORO- SED, BM WS, <2MM DW, REC (UG/KG) (49422)
04159492	07-11-96	<50	<50	<50	<50	e35	<50	<1.00	<1.00	<50	<50
04161820	07-12-96	230	500	<50	<50	93	82	<1.00	<1.00	<50	<50
04175600	07-10-96	<50	e35	<50	<50	e39	e18	<1.00	<1.00	<50	<50
STATION NUMBER	DATE	NAPHTHAL ENE, 2- CHLORO- SED, BM WS, <2MM DW, REC (UG/KG) (49407)	CHLORO- NEB SED, BM WS, <2MM DW, REC (UG/KG) (49322)	PHENOL 2CHLORO BED MAT SED, BM WS, <2MM DW, REC (UG/KG) (49467)	4CHLORO PHNPHNL LEATHER SED, BM WS, <2MM DW, REC (UG/KG) (49455)	CHRY- SENE SED, BM WS, <2MM DW, REC (UG/KG) (49450)	P- CRESOL SED, BM WS, <2MM DW, REC (UG/KG) (49451)	DCPA SED, BM WS, <2MM DW, REC (UG/KG) (49324)	O, P'- DDD SED, BM WS, <2MM DW, REC (UG/KG) (49325)	P, P'- DDD SED, BM WS, <2MM DW, REC (UG/KG) (49326)	O, P'- DDE SED, BM WS, <2MM DW, REC (UG/KG) (49327)
04159492	07-11-96	<50	<5.00	<50	<50	e14	e20	<5.00	<1.00	<1.00	<1.00
04161820	07-12-96	<50	<5.00	<50	<50	470	240	<5.00	<1.00	2.70	<1.00
04175600	07-10-96	<50	<5.00	<50	<50	e22	170	<5.00	<1.00	<1.00	<1.00
STATION NUMBER	DATE	P, P'- DDE SED, BM WS, <2MM DW, REC (UG/KG) (49328)	O, P'- DDT SED, BM WS, <2MM DW, REC (UG/KG) (49329)	P, P'- DDT SED, BM WS, <2MM DW, REC (UG/KG) (49330)	DIBENZ (AH), AN THRACEN SED, BM WS, <2MM DW, REC (UG/KG) (49461)	THIOPH ENE, DI- BENZO- SED, BM WS, <2MM DW, REC (UG/KG) (49452)	PHTHAL- ATE DIBUTYL SED, BM WS, <2MM DW, REC (UG/KG) (49381)	BENZENE O-DI- CHLORO- SED, BM WS, <2MM DW, REC (UG/KG) (49439)	BENZENE M-DI- CHLORO- SED, BM WS, <2MM DW, REC (UG/KG) (49441)	BENZENE P-DI- CHLORO- SED, BM WS, <2MM DW, REC (UG/KG) (49442)	DIEL- DRIN SED, BM WS, <2MM DW, REC (UG/KG) (49331)
04159492	07-11-96	<1.00	<2.00	<2.00	<50	<50	e49	<50	<50	<50	<1.00
04161820	07-12-96	3.70	3.30	<2.00	130	e41	61	<50	<50	e6.0	<1.00
04175600	07-10-96	<1.00	<2.00	<2.00	e28	e20	61	<50	<50	<50	<1.00
STATION NUMBER	DATE	PHTHAL ATE, DI- ETHYL SED, BM WS, <2MM DW, REC (UG/KG) (49383)	NAPHTHAL ENE, 12 DIMETHYL SED, BM WS, <2MM DW, REC (UG/KG) (49403)	NAPHTHAL ENE, 16 DIMETHYL SED, BM WS, <2MM DW, REC (UG/KG) (49404)	NAPHTHAL ENE, 26 DIMETHYL SED, BM WS, <2MM DW, REC (UG/KG) (49406)	3,5- XYLENOL SED, BM WS, <2MM DW, REC (UG/KG) (49421)	PHTHAL- ATE, DI- METHYL SED, BM WS, <2MM DW, REC (UG/KG) (49384)	TOLUENE 2,4- DI- NITRO- SED, BM WS, <2MM DW, REC (UG/KG) (49395)	TOLUENE 2,6- DI- NITRO- SED, BM WS, <2MM DW, REC (UG/KG) (49396)	PHTHAL ATE, D IOCTYL SED, BM WS, <2MM DW, REC (UG/KG) (49382)	ENDO- SULFAN I, SED, BM WS, <2MM DW, REC (UG/KG) (49332)
04159492	07-11-96	e22	<50	e8.0	e12	<50	<50	<50	<50	<50	<1.00
04161820	07-12-96	e26	<50	e18	e39	e37	e10	<50	<50	87	<1.00
04175600	07-10-96	e22	<50	<50	e39	<50	<50	<50	e20	55	<1.00
STATION NUMBER	DATE	ENDRIN SED, BM WS, <2MM DW, REC (UG/KG) (49335)	PHTHALA TE, BIS2 ETHHEXL SED, BM WS, <2MM DW, REC (UG/KG) (49426)	NAPHTHAL ENE, 2- ETHYL- SED, BM WS, <2MM DW, REC (UG/KG) (49490)	FLUOR- ANTHENE BED MAT SED, BM WS, <2MM DW, REC (UG/KG) (49466)	9H-FLU- ORENE SED, BM WS, <2MM DW, REC (UG/KG) (49399)	ALPHA- BHC SED, BM WS, <2MM DW, REC (UG/KG) (49338)	BETA- BHC SED, BM WS, <2MM DW, REC (UG/KG) (49339)	LINDANE SED, BM WS, <2MM DW, REC (UG/KG) (49345)	HEPTA- CHLOR SED, BM WS, <2MM DW, REC (UG/KG) (49341)	HEPTA- CHLOR EPOXIDE SED, BM WS, <2MM DW, REC (UG/KG) (49342)
04159492	07-11-96	<2.00	e36	<50	e23	e19	<1.00	<1.00	<1.00	<1.00	<1.00
04161820	07-12-96	<2.00	400	e9	910	e42	<1.00	<1.00	<1.00	<1.00	<1.00
04175600	07-10-96	<2.00	e49	<50	e39	e20	<1.00	<1.00	<1.00	<1.00	<1.00

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Concentrations of trace elements and organic compounds in stream-bed sediments
from selected sites in the Lake Erie - Lake St. Clair basin -- Continued

STATION NUMBER	DATE	BENZENE HEXA- CHLORO- SED, BM WS, <2MM DW, REC (UG/KG) (49343)	INDENO 123- CD PYRENE SED, BM WS, <2MM DW, REC (UG/KG) (49390)	ISODRIN SED, BM WS, <2MM DW, REC (UG/KG) (49344)	ISOPHOR ONE SED, BM WS, <2MM DW, REC (UG/KG) (49400)	ISO- QUINO- LINE SED, BM WS, <2MM DW, REC (UG/KG) (49394)	METHOXY CHLOR O,P'- SED, BM WS, <2MM DW, REC (UG/KG) (49347)	METHOXY CHLOR P,P'- SED, BM WS, <2MM DW, REC (UG/KG) (49346)	ANTHRA- CENE, 2- METHYL- SED, BM WS, <2MM DW, REC (UG/KG) (49435)	4HCYPEN PHENAN THRENE SED, BM WS, <2MM DW, REC (UG/KG) (49411)	9H-FLU- ORENE 1METHYL SED, BM WS, <2MM DW, REC (UG/KG) (49398)
		04159492	07-11-96	<50.0	<50	<1.00	<50	<50	<5.00	<5.00	<50
04161820	07-12-96	<50.0	370	<1.00	<50	<50	<5.00	<5.00	e34	78	<50
04175600	07-10-96	<50.0	e29	<1.00	<50	<50	<5.00	<5.00	e21	e21	<50
STATION NUMBER	DATE	PHENAN THRENE 1METHYL SED, BM WS, <2MM DW, REC (UG/KG) (49410)	PYRENE 1- METHYL SED, BM WS, <2MM DW, REC (UG/KG) (49388)	MIREX SED, BM WS, <2MM DW, REC (UG/KG) (49348)	NAPHTH- ALENE SED, BM WS, <2MM DW, REC (UG/KG) (49402)	BENZENE NITRO- SED, BM WS, <2MM DW, REC (UG/KG) (49444)	DIPHNYL AMINE, N NITROSO SED, BM WS, <2MM DW, REC (UG/KG) (49433)	DPROPYL AMINE,N NITROSO SED, BM WS, <2MM DW, REC (UG/KG) (49431)	CIS- NONA- CHLOR SED, BM WS, <2MM DW, REC (UG/KG) (49316)	TRANS- NONA- CHLOR SED, BM WS, <2MM DW, REC (UG/KG) (49317)	OXY- CHLOR- DANE SED, BM WS, <2MM DW, REC (UG/KG) (49318)
		04159492	07-11-96	e19	e18	<1.00	<50	<50	<50	<1.00	<1.00
04161820	07-12-96	e43	50	<1.00	e12	<50	<50	<50	<1.00	<1.00	<1.00
04175600	07-10-96	e19	e19	<1.00	<50	<50	<50	<50	<1.00	<1.00	<1.00
STATION NUMBER	DATE	PENTA- CHLORO- ANISOLE SED, BM WS, <2MM DW, REC (UG/KG) (49460)	BENZENE PNTCHLR NITRO- SED, BM WS, <2MM DW, REC (UG/KG) (49446)	CIS- PER- METHRIN SED, BM WS, <2MM DW, REC (UG/KG) (49349)	TRANS- PER- METHRIN SED, BM WS, <2MM DW, REC (UG/KG) (49350)	PHENAN THRENE SED, BM WS, <2MM DW, REC (UG/KG) (49409)	PHENAN- THRI- DINE SED, BM WS, <2MM DW, REC (UG/KG) (49393)	PHENOL SED, BM WS, <2MM DW, REC (UG/KG) (49413)	PYRENE SED, BM WS, <2MM DW, REC (UG/KG) (49387)	QUINO- LINE SED, BM WS, <2MM DW, REC (UG/KG) (49392)	TOXA- PHENE SED, BM WS, <2MM DW, REC (UG/KG) (49351)
		04159492	07-11-96	<50	<50	<5.00	<5.00	e11	<50	e10	e21
04161820	07-12-96	<50	<50	<5.00	<5.00	380	e31	e25	740	<50	<200
04175600	07-10-96	<50	<50	<5.00	<5.00	e16	<50	e15	e32	<50	<200
STATION NUMBER	DATE	BENZENE 124TRI- CHLORO- SED, BM WS, <2MM DW, REC (UG/KG) (49438)	NAPHTHAL ENE, 236 TRIMETH SED, BM WS, <2MM DW, REC (UG/KG) (49405)	BED MAT. SIEVE DIAM. % FINER THAN .002 MM	BED MAT. SIEVE DIAM. % FINER THAN .004 MM	BED MAT. SIEVE DIAM. % FINER THAN .008 MM	BED MAT. SIEVE DIAM. % FINER THAN .016 MM	BED MAT. SIEVE DIAM. % FINER THAN .031 MM			
		04159492	07-11-96	<50	<50	3.2	3.5	3.9	4.7	6.6	
04161820	07-12-96	<50	e7.0	4.7	7.9	9.4	16.6	--			
04175600	07-10-96	<50	<50	7.8	9.3	10.1	12.4	--			

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Concentrations of trace elements and organochlorine compounds in
fish tissue from selected sites in the Lake Erie - Lake St. Clair basin
(National water-quality assessment program)

The purpose of this survey was to assess the occurrence and distribution of trace metals (table 1) and organochlorine compounds (table 2) in fish tissue. The following species were collected: common carp (*Cyprinus carpio*), and rock bass (*Ambloplites rupestris*). More information regarding methods can be found in Crawford and Luoma, 1993 (see NAWQA section introductory text).

Table 1. Concentrations of trace elements in fish-liver composites

Each sample for trace elements analyses consisted of a composite of liver tissue from 1 to 8 fish. Sexually-mature fish were sought. Laboratory procedures included (1) drying, (2) digestion, and (3) analysis by use of inductively coupled plasma emission spectrometry (for Al, Ba, B, Cr, Cu, Fe, Mn, Sr, and Zn), inductively coupled plasma mass spectrometry (for Sb, As, Be, Cd, Co, Pb, Mo, Ni, Se, Ag, U, and V), and cold vapor atomic absorption (for Hg). Constituent concentrations are provided on a dry-weight (DW) basis. (SDEV = Standard deviation, F = Female, M = Male, REC = recoverable, 49239 = number in parentheses beneath the constituent description is the USGS National Water Quality Laboratory parameter code).

WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

STATION NUMBER	STATION NAME	DATE	TIME	SPECIES	NUMBER IN COMPOSITE		
					M	F	TOTAL
04159492	BLACK RIVER NEAR JEDDO, MI	07-24-96	1300	COMMON CARP	3	1	4
04161820	CLINTON RIVER AT STERLING HEIGHTS, MI	09-04-96	1400	COMMON CARP	1	0	1
04175600	RIVER RAISIN NEAR MANCHESTER, MI	07-23-96	1300	ROCK BASS	2	6	8

STATION NUMBER	SPECIES	TOTAL LENGTH OF FISH (MM)				WATER PRESENT BIOTA, TISSUE, DRY WGT REC PERCENT	ALUMI- NUM, BIOTA, TISSUE, DRY WGT REC (UG/G)	ANTI- MONY, BIOTA, TISSUE, DRY WGT REC (UG/G)	ARSENIC BIOTA, TISSUE, DRY WGT REC (UG/G)	BARIUM BIOTA, TISSUE, DRY WGT REC (UG/G)	BERYL- LIUM, BIOTA, TISSUE, DRY WGT REC (UG/G)
		MEAN	SDEV	MIN	MAX	(49273)	(49237)	(49246)	(49247)	(49238)	(49248)
04159492	COMMON CARP	429	100	285	515	74	1.7	<0.2	0.6	<0.1	<0.2
04161820	COMMON CARP	591	--	591	591	69	13	<0.2	0.2	0.1	<0.2
04175600	ROCK BASS	163	59	79	240	79	<1.0	<0.3	0.6	0.5	<0.3

STATION NUMBER	SPECIES	BORON BIOTA, TISSUE, DRY WGT REC (UG/G)	CADMIUM BIOTA, TISSUE, DRY WGT REC (UG/G)	CHROM- IUM, BIOTA, TISSUE, DRY WGT REC (UG/G)	COBALT BIOTA, TISSUE, DRY WGT REC (UG/G)	COPPER BIOTA, TISSUE, DRY WGT REC (UG/G)	IRON BIOTA, TISSUE, DRY WGT REC (UG/G)	LEAD BIOTA, TISSUE, DRY WGT REC (UG/G)	MANGA- NESE, BIOTA, TISSUE, DRY WGT REC (UG/G)	MER- CURY, BIOTA, TISSUE, DRY WGT REC (UG/G)
		(49239)	(49249)	(49240)	(49250)	(49241)	(49242)	(49251)	(49243)	(49258)
04159492	COMMON CARP	0.3	3.2	<0.5	<0.2	95	620	<0.2	6.0	0.9
04161820	COMMON CARP	<0.2	1.7	<0.5	<0.2	93	1300	0.6	3.4	0.2
04175600	ROCK BASS	1.1	2.0	0.7	0.5	8.5	300	<0.3	7.6	0.3

STATION NUMBER	SPECIES	MOLYB- DENUM, BIOTA, TISSUE, DRY WGT REC (UG/G)	NICKEL BIOTA, TISSUE, DRY WGT REC (UG/G)	SELEN- IUM, BIOTA, TISSUE, DRY WGT REC (UG/G)	SILVER BIOTA, TISSUE, DRY WGT REC (UG/G)	STRON- TIUM, BIOTA, TISSUE, DRY WGT REC (UG/G)	URAN- IUM, BIOTA, TISSUE, DRY WGT REC (UG/G)	VANA- DIUM, BIOTA, TISSUE, DRY WGT REC (UG/G)	ZINC BIOTA, TISSUE, DRY WGT REC (UG/G)
		(49252)	(49253)	(49254)	(49255)	(49244)	(49257)	(49465)	(49245)
04159492	COMMON CARP	1.1	<0.2	5.3	0.8	0.2	<0.2	0.4	670
04161820	COMMON CARP	0.7	<0.2	6.1	0.6	0.3	<0.2	0.6	1500
04175600	ROCK BASS	1.1	<0.3	8.3	<0.3	1.1	<0.3	<0.3	88

Table 2. Concentrations of organochlorine compounds in whole fish

WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

STATION	SPECIES	TOTAL LENGTH OF FISH (MM)				LIPIDS, BIOTA, WH ORG WW, REC PERCENT	ALDRIN, BIOTA, WH ORG WW, REC (UG/KG)	CIS- CHLOR- DANE, BIOTA, WH ORG WW, REC (UG/KG)	TRANS- CHLOR- DANE, BIOTA, WH ORG WW, REC (UG/KG)	DCPA, BIOTA, WH ORG WW, REC (UG/KG)
		MEAN	SDEV	MIN	MAX	(49289)	(49353)	(49380)	(49379)	(49378)
04159492	COMMON CARP	428	86	305	533	6.10	<5.00	<5.00	<5.00	<5.00
04161820	ROCK BASS	195	48	164	250	3.80	<5.00	<5.00	<5.00	<5.00
04175600	ROCK BASS	186	30	138	223	2.60	<5.00	<5.00	<5.00	<5.00

[illegible][illegible]

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Concentrations of trace elements and organochlorine compounds in fish tissue from selected sites in the Lake Erie - Lake St. Clair basin-- Continued

Table 2. Concentrations of organochlorine compounds in whole fish

Each sample for organochlorine analyses consisted of a composite of 3 to 8 whole fish. Sexually-mature fish were sought. Laboratory procedures included (1) homogenization, (2) extraction by use of methylene chloride in a soxhlet apparatus, (3) clean-up by use of gel permeation chromatography, (4) fractionation by use of alumina/silica gel, and (5) analysis by gas chromatography with two dissimilar capillary columns coupled with an electron capture detector. Constituent concentrations are provided on a wet-weight (WW) basis. Constituent names are abbreviated as follows: DDD, dichlorodiphenyldichloroethane; DDE, dichlorodiphenyldichloroethene; DCPA, dimethyl tetrachloroterephthalate; DDT, dichlorodiphenyltrichloroethane; BHC, hexachlorocyclohexane; PCB, polychlorinated biphenyls. (SDEV = standard deviation, F = female, M = male, REC = recoverable, 49239 = National Water Quality Laboratory parameter code, e = estimated).

WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996

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Figure 10.--Location of ground-water wells published in this report.

GROUND-WATER LEVELS

BRANCH COUNTY

415602084593701. Local number, 6S 6W 22CABA.

LOCATION.--Lat 41°56'02", long 84°59'37", Hydrologic Unit 04050001, at Bennett and Tibbits Streets in Coldwater. Owner: City of Coldwater.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in., depth 113 ft, screened 108 ft to 113 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 970 ft above sea level, from topographic map. Measuring point: Plywood shelter base, 2.5 ft above land-surface datum.

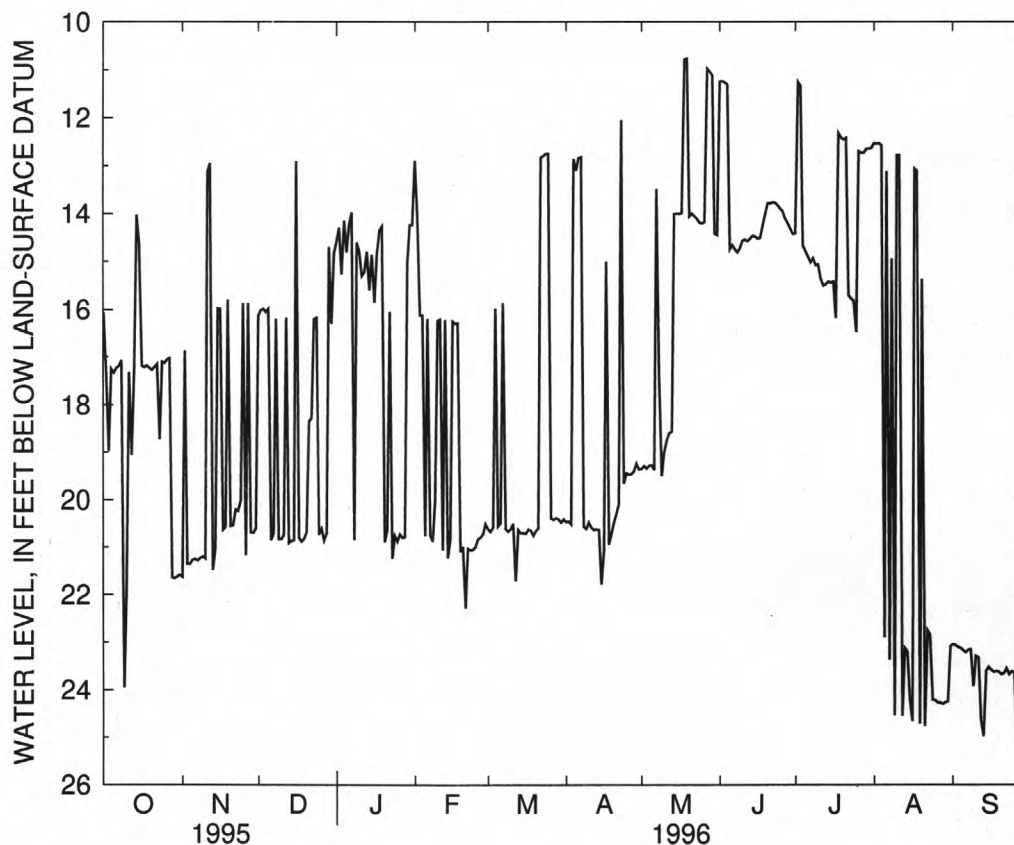
REMARKS.--Water levels affected by nearby pumping.

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 8.77 ft below land-surface datum, June 4, 1989; lowest recorded, 25.9 ft below land-surface datum, May 25, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	17.33	21.27	15.99	14.80	20.76	20.56	13.10	19.28	14.75	14.79	22.91	23.19
10	21.85	21.24	20.83	14.78	16.24	20.62	20.48	19.01	14.57	15.07	12.78	23.31
15	14.63	15.98	20.86	14.86	20.84	20.71	21.79	14.00	14.48	15.45	24.22	23.54
20	17.27	20.55	20.68	20.89	21.00	20.66	20.47	14.06	13.79	12.45	15.38	23.69
25	17.12	15.87	20.73	20.88	21.01	12.75	19.45	14.21	13.90	16.48	24.23	23.65
EOM	21.59	20.60	14.83	14.24	20.51	20.41	19.37	14.45	14.43	12.63	23.10	23.68
WTR YR 1996	HIGHEST			9.94	JUN 22, 23			LOWEST	24.98	SEP 13		



GROUND-WATER LEVELS

CALHOUN COUNTY

422032085091801. Local number, 1S 7W 32BDCC1.

LOCATION.--Lat 42°20'32", long 85°09'18", Hydrologic Unit 04050003, at Hopkins Street and State Highway 66, at Battle Creek. Owner: Pennfield Township.

AQUIFER.--Marshall Formation.

WELL CHARACTERISTICS.--Drilled well, diameter 6 in., depth 95 ft, cased to about 40 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 845 ft above sea level, from topographic map. Measuring point: Top of shelter base, 1.0 ft above land-surface datum.

REMARKS.--Water levels affected by nearby pumping.

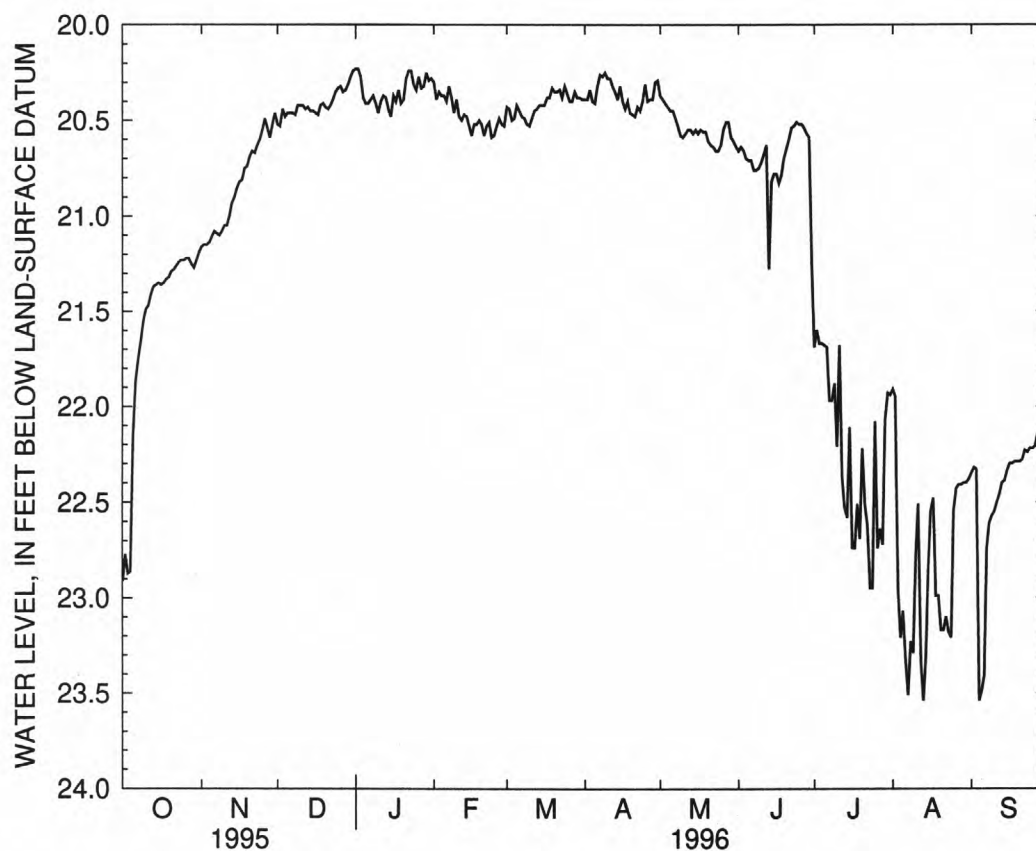
PERIOD OF RECORD.--February 1964 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 15.6 ft below land-surface datum, April 1974; lowest recorded, 27.0 ft, below land-surface datum, August 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	22.15	21.11	20.46	20.41	20.37	20.42	20.41	20.45	20.71	21.68	23.07	23.49
10	21.49	21.05	20.42	20.46	20.39	20.53	20.28	20.59	20.72	22.21	22.78	22.55
15	21.35	20.85	20.45	20.48	20.53	20.42	20.32	20.55	20.78	22.11	22.83	22.34
20	21.29	20.69	20.43	20.39	20.52	20.35	20.47	20.61	20.65	22.22	23.17	22.29
25	21.23	20.55	20.33	20.34	20.58	20.36	20.31	20.63	20.52	22.08	22.55	22.22
EOM	21.19	20.46	20.24	20.28	20.53	20.39	20.29	20.64	21.25	21.94	22.38	22.08

WTR YR 1996 HIGHEST 20.11 JAN 26 LOWEST 23.54 AUG 13, SEP 4



GROUND-WATER LEVELS

CLARE COUNTY

434900084462501. Local number, 17N 4W 34DCAD.

LOCATION.--Lat 43°49'00", long 84°46'25", Hydrologic Unit 04080201, at Clare. Owner: City of Clare.

AQUIFER.--Gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in., depth 91 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 850 ft above sea level, from topographic map. Measuring point: Top of shelter base, 3.50 ft above land-surface datum.

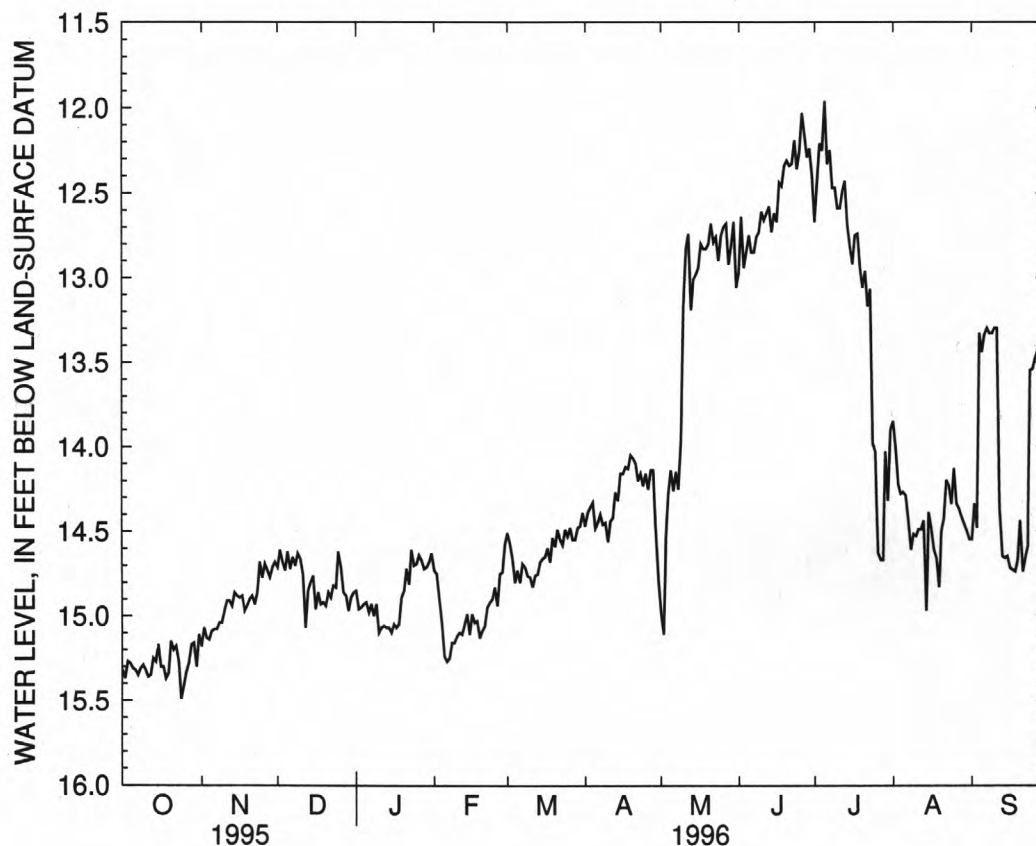
REMARKS.--Levels affected by nearby pumping.

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 7.91 ft below land-surface datum, Mar. 31, 1976; lowest recorded, 24.95 ft below land-surface datum, May 28, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	15.31	15.09	14.62	14.92	15.24	14.73	14.48	14.14	12.75	11.96	14.27	13.44
10	15.32	14.97	14.66	15.10	15.12	14.77	14.56	13.17	12.61	12.59	14.53	13.30
15	15.17	14.88	14.76	15.10	15.11	14.66	14.16	12.98	12.62	12.81	14.39	14.65
20	15.15	14.90	14.94	14.85	15.09	14.59	14.07	12.80	12.31	13.06	14.50	14.44
25	15.41	14.77	14.62	14.69	14.83	14.53	14.16	12.75	12.26	14.03	14.13	13.54
EOM	15.11	14.68	14.86	14.63	14.58	14.39	14.80	13.06	12.40	13.90	14.55	13.35
WTR YR 1996	HIGHEST			9.51	JUN 24			LOWEST	15.49	OCT 24		



GROUND-WATER LEVELS

EATON COUNTY

424058084380301. Local number, 3N 3W 2BA.

LOCATION.--Lat 42°40'58", long 84°38'03", Hydrologic Unit 04050004, on Stiefel Farm grounds, 1.6 mi north of Dimondale. Owner: City of Lansing.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 1.25 in., depth 66 ft, screened 63 ft to 66 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 839 ft above sea level. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

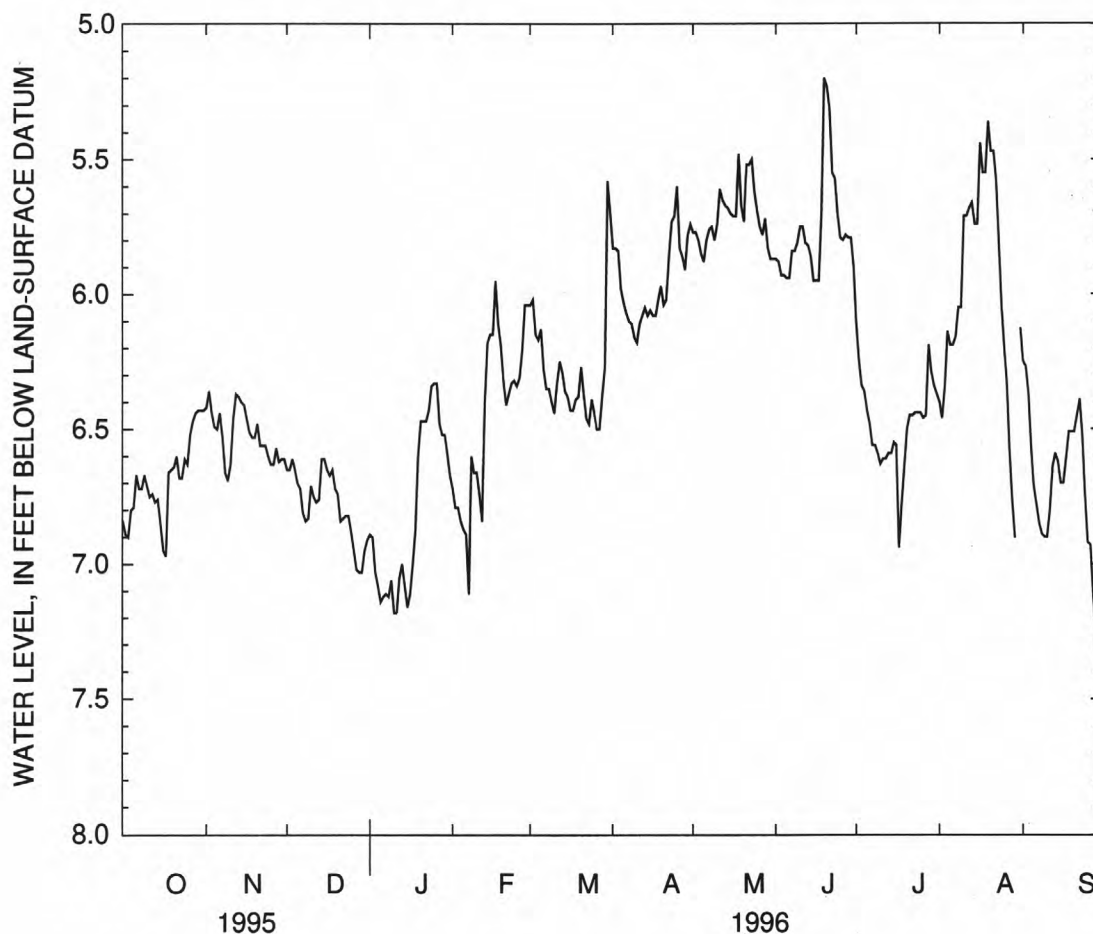
REMARKS.--Water levels affected by pumping.

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 2.98 ft below land-surface datum, June 11, 1986; lowest recorded, 18.0 ft below land-surface datum, November 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	6.79	6.50	6.70	7.14	6.87	6.13	6.03	5.88	5.94	6.43	6.19	6.71
10	6.71	6.63	6.71	7.18	6.66	6.44	6.18	5.74	5.75	6.63	5.71	6.90
15	6.85	6.41	6.61	7.16	6.15	6.38	6.06	5.70	5.95	6.55	5.74	6.70
20	6.64	6.48	6.74	6.47	6.32	6.27	6.04	5.73	5.23	6.50	5.47	6.51
25	6.63	6.63	6.88	6.33	6.34	6.44	5.60	5.69	5.79	6.44	6.20	6.92
EOM	6.43	6.61	6.91	6.67	6.04	5.70	5.74	5.87	5.90	6.37	6.13	7.43
WTR YR 1996	HIGHEST			4.93	AUG 18			LOWEST	7.43	SEP 30		



GROUND-WATER LEVELS

EATON COUNTY

424435084365001. Local number, 4N 3W 12CDAD.

LOCATION.--Lat 42°44'35", long 84°36'50", Hydrologic Unit 04050004, at Robins Road, in Delta Township, 0.5 mi west of Lansing. Owner: F. Wheeler.

AQUIFER.--Saginaw Formation of Pennsylvanian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in., depth 381 ft, cased to 140 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 861.91 ft above sea level. Measuring point: Plywood instrument shelf, 1.0 ft above land-surface datum.

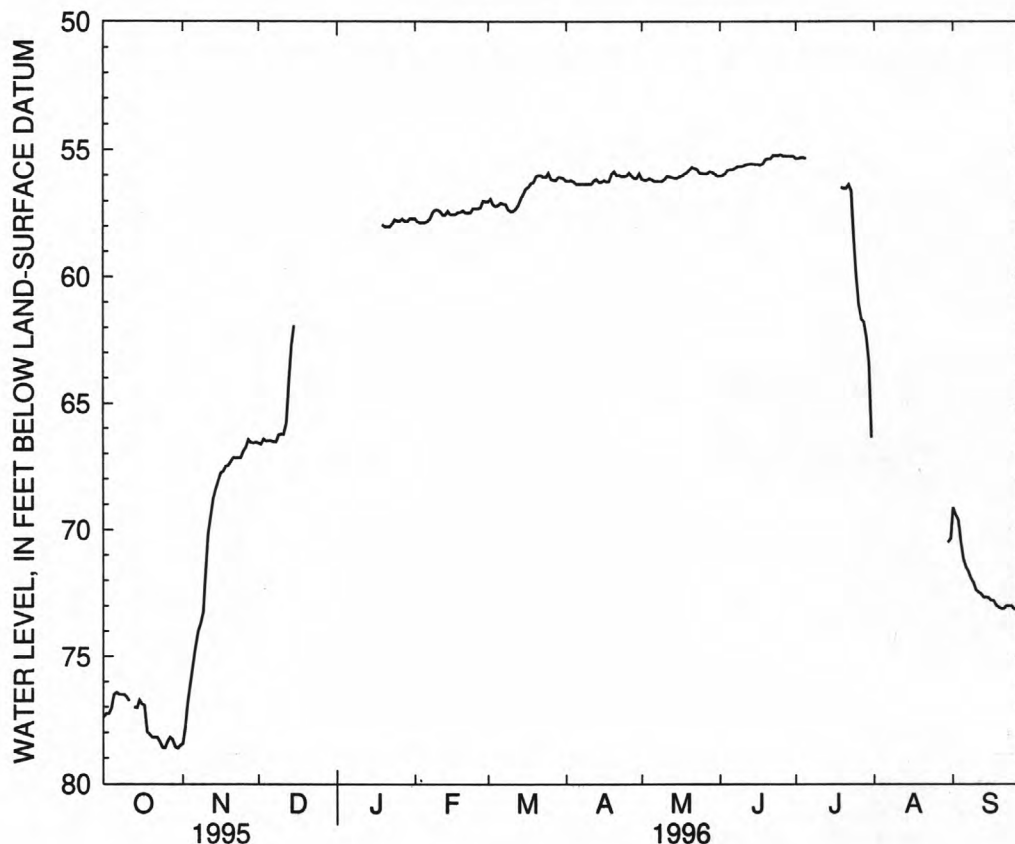
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--October 1953 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 55.19 ft below land-surface datum, June 24, 1996; lowest recorded, 103.6 ft below land-surface datum, Aug. 28, 1969.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	76.50	75.31	66.49	---	57.86	57.17	56.34	56.17	55.78	55.34	---	71.14
10	76.61	71.58	66.24	---	57.35	57.42	56.34	56.15	55.65	---	---	72.38
15	76.74	68.07	61.93	---	57.53	56.73	56.26	56.11	55.58	---	---	72.69
20	78.19	67.31	---	58.02	57.38	56.05	55.85	55.79	55.35	56.50	---	73.12
25	78.60	66.91	---	57.80	57.30	55.92	56.02	55.93	55.19	60.02	---	73.13
EOM	78.51	66.55	---	57.71	57.02	56.12	55.94	56.03	55.25	66.39	70.38	72.99
WTR YR 1996	HIGHEST		55.19	JUN 24		LOWEST		78.61	OCT 30			



GROUND-WATER LEVELS

HURON COUNTY

434103083130301. Local number, 15N 11E 32BBCB.

LOCATION.--Lat 43°41'03", long 83°13'03", Hydrologic Unit 04080103, 2 mi northeast of Gagetown at Gagetown State Game Area. Owner: Huron County.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 4 in., depth 91 ft, screened 87 ft to 91 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 746 ft above sea level, from topographic map. Measuring point: Top of casing, 1.6 ft above land-surface datum.

PERIOD OF RECORD.--February 1991 to current year.

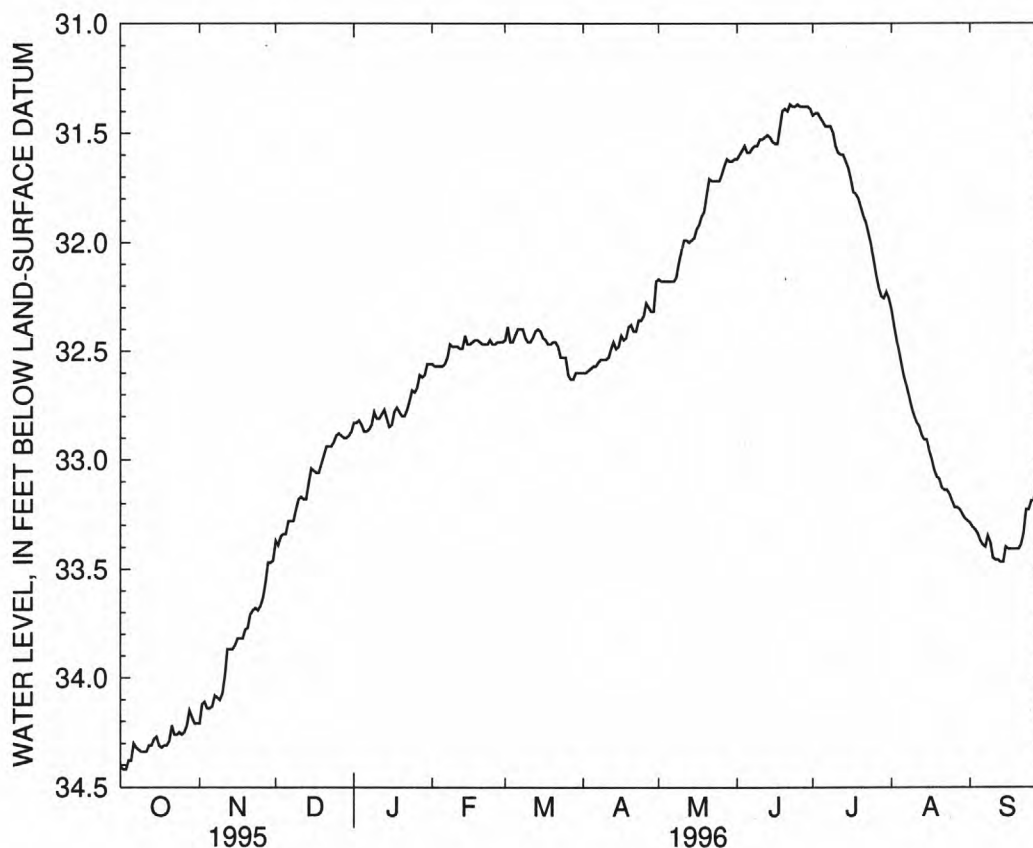
EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 30.38 ft below land-surface datum, May 6, 1991; lowest recorded, 34.50 ft below land-surface datum, Sept. 15, 16, 1995.

EXTREMES OUTSIDE PERIOD OF RECORD.--Lowest water level measured, 35.60 ft below land-surface datum, June 2, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	34.38	34.14	33.34	32.87	32.57	32.43	32.57	32.18	31.59	31.45	32.56	33.37
10	34.34	34.07	33.18	32.81	32.48	32.46	32.54	32.04	31.53	31.56	32.80	33.45
15	34.27	33.85	33.04	32.85	32.47	32.41	32.48	31.98	31.54	31.66	32.91	33.40
20	34.29	33.77	32.98	32.80	32.46	32.46	32.38	31.78	31.39	31.84	33.09	33.41
25	34.26	33.67	32.89	32.69	32.47	32.53	32.34	31.72	31.37	32.08	33.19	33.19
EOM	34.21	33.46	32.87	32.56	32.46	32.60	32.18	31.62	31.39	32.26	33.28	33.04

WTR YR 1996 HIGHEST 31.35 JUN 22, 24, 25 LOWEST 34.42 OCT 2, 3



GROUND-WATER LEVELS

HURON COUNTY

434323082561901. Local number, 15N 13E 22BBCC.

LOCATION.--Lat.43°43'23", long 82°56'19", Hydrologic Unit 04080205, on State Highway 19, 1 mi north of Ubly. Owner: Huron County.

AQUIFER.--Napoleon Sandstone Member of Marshall Formation.

WELL CHARACTERISTICS.--Rotary drilled observation well, diameter 4 in., depth 70 ft, cased to top of Napoleon Sandstone.

INSTRUMENTATION.--Water-level recorder.

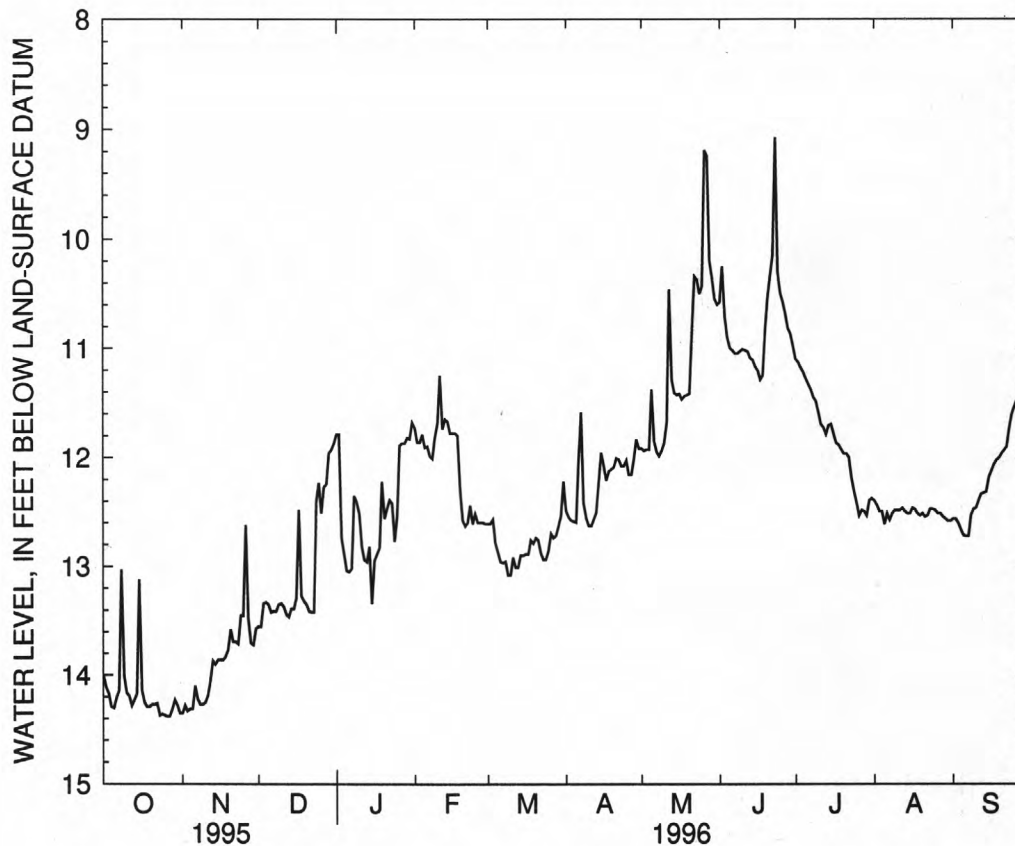
DATUM.--Elevation of land-surface datum is 795 ft above sea level, from topographic map. Measuring point: Top of casing, 2.81 ft above land-surface datum.

PERIOD OF RECORD.--December 1988 to September 1989, December 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 8.92 ft below land-surface datum, June 23, 1996; lowest recorded, 16.38 ft below land-surface datum, July 26, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	14.30	14.31	13.35	13.04	11.91	12.87	12.60	11.38	11.00	11.28	12.62	12.72
10	14.16	14.25	13.34	12.51	11.69	13.08	12.63	11.87	11.01	11.59	12.49	12.47
15	13.12	13.86	13.39	13.34	11.78	12.90	11.96	11.43	11.17	11.70	12.52	12.19
20	14.27	13.58	13.35	12.56	12.58	12.74	12.09	11.42	10.54	11.97	12.52	11.97
25	14.37	13.45	12.23	12.54	12.52	12.86	12.03	10.43	10.49	12.42	12.49	11.54
EOM	14.35	13.57	11.87	11.68	12.61	12.22	11.92	10.60	10.98	12.38	12.59	11.20
WTR YR 1996	HIGHEST		8.92	JUN 23		LOWEST		14.38	OCT 26, 27			



GROUND-WATER LEVELS

HURON COUNTY

434947083233301. Local number, 16N 9E 2CDCA.

LOCATION.--Lat 43°49'47", long 83°23'33", Hydrologic Unit 04080103, 6 mi west of Pigeon at Wildfowl Bay State Wildlife Area. Owner: Huron County.

AQUIFER.--Saginaw, Marshall Formation (Pennsylvanian, Mississippian age).

WELL CHARACTERISTICS.--Drilled artesian well, diameter 4 in., depth 180 ft, cased to 147 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 582 ft above sea level, from topographic map. Measuring point: Top of casing, 2.2 ft above land-surface datum.

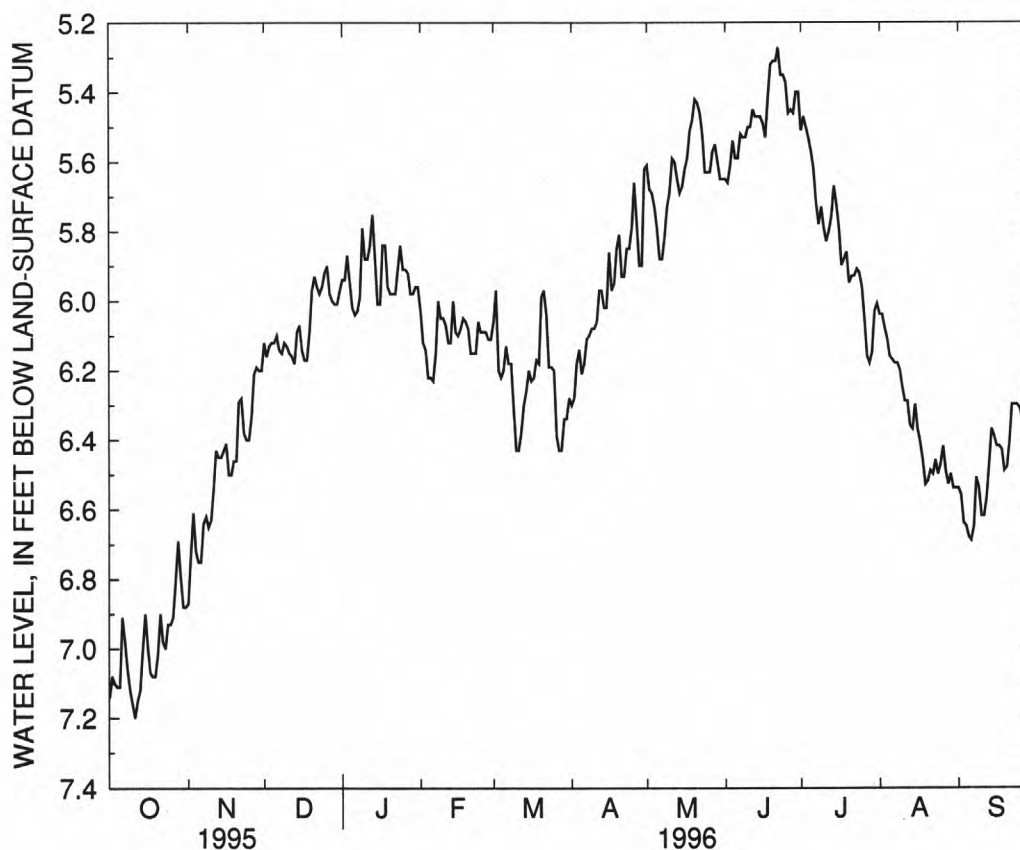
PERIOD OF RECORD.--February 1991 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 3.12 ft below land-surface datum, Apr. 20, 1993; lowest recorded, 7.24 ft below land-surface datum, Sept. 29, 1995.

EXTREMES OUTSIDE PERIOD OF RECORD.--Lowest water level measured, 12.30 ft below land-surface datum, June 2, 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	7.11	6.75	6.12	6.02	6.22	6.20	6.21	5.79	5.59	5.57	6.16	6.68
10	7.16	6.63	6.13	5.88	6.05	6.43	6.08	5.69	5.50	5.79	6.25	6.62
15	6.90	6.43	6.07	6.01	6.09	6.20	6.02	5.67	5.47	5.72	6.30	6.39
20	7.02	6.46	5.97	5.98	6.08	5.99	5.81	5.42	5.31	5.95	6.52	6.48
25	6.93	6.40	5.92	5.91	6.09	6.20	5.79	5.63	5.37	5.96	6.47	6.31
EOM	6.88	6.20	5.97	5.96	6.11	6.28	5.62	5.65	5.40	6.01	6.54	6.29
WTR YR 1996	HIGHEST			5.25	JUN 22			LOWEST	7.20	OCT 11		



GROUND-WATER LEVELS

HURON COUNTY

435736083094801. Local number, 18N 11E 27AADD.

LOCATION.--Lat 43°57'36", long 83°09'48", Hydrologic Unit 04080103, 6 mi northeast of Caseville at Rush Lake State Game Area. Owner: Huron County.

AQUIFER.--Marshall Sandstone, Lower

WELL CHARACTERISTICS.--Rotary drilled observation well, diameter 4 in., depth 200 ft, cased to 178 ft.

INSTRUMENTATION.--Water-level recorder.

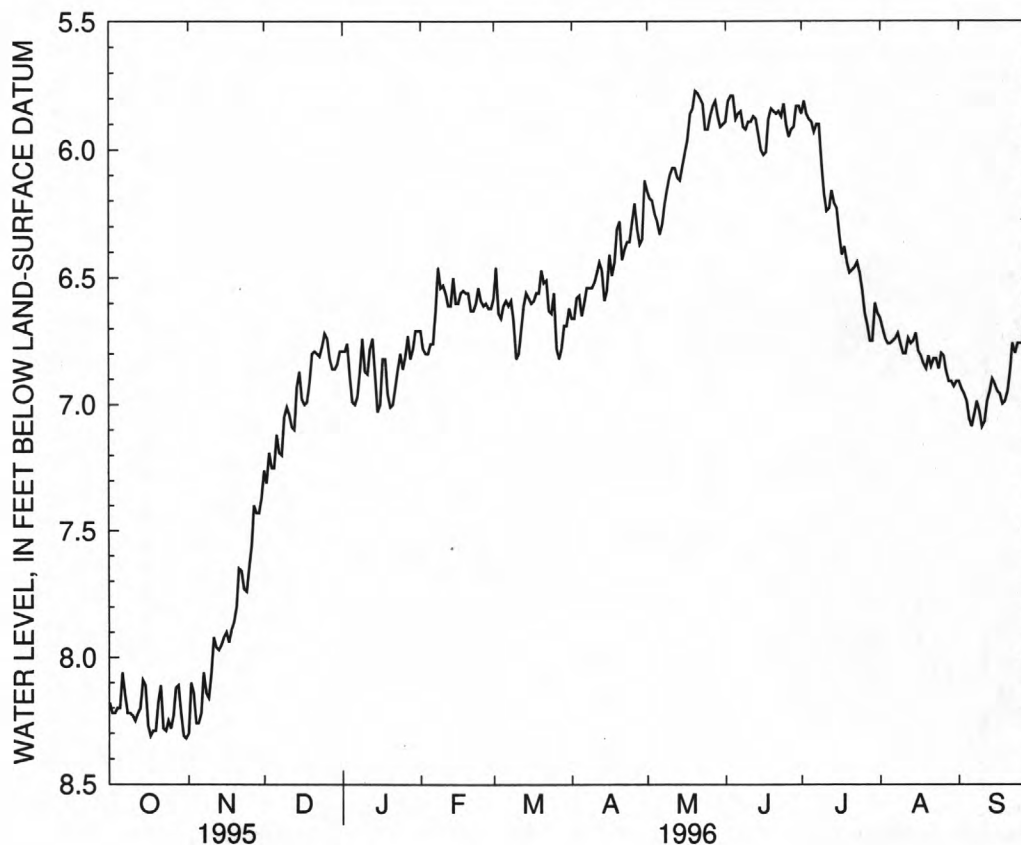
DATUM.--Elevation of land-surface datum is 600 ft above sea level, from topographic map. Measuring Point: Top of casing, 4.03 ft above land-surface datum.

PERIOD OF RECORD.--October 1988 to August 1989, December 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 5.50 ft below land-surface datum, Feb. 10, 1995; lowest recorded, 8.62 ft below land-surface datum, Aug. 16, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	8.20	8.26	7.25	6.99	6.76	6.61	6.65	6.28	5.88	5.89	6.76	7.06
10	8.23	8.06	7.01	6.87	6.53	6.82	6.52	6.10	5.89	6.17	6.80	7.09
15	8.11	7.92	6.87	7.03	6.60	6.58	6.55	6.06	6.00	6.23	6.72	6.92
20	8.18	7.80	6.80	7.01	6.56	6.47	6.28	5.77	5.85	6.48	6.81	6.95
25	8.28	7.65	6.72	6.86	6.59	6.56	6.28	5.92	5.90	6.55	6.80	6.76
EOM	8.32	7.37	6.79	6.71	6.62	6.62	6.12	5.90	5.83	6.64	6.91	6.61
WTR YR 1996	HIGHEST			5.67	MAY 20, 21			LOWEST	8.32	OCT 31		



GROUND-WATER LEVELS

INGHAM COUNTY

423127084321901. Local number, 4N 2W 16DAAA.

LOCATION.--Lat 42°43'57", long 84°32'51", Hydrologic Unit 04050004, between Cedar Street and Museum Drive, in Lansing Township, in Lansing. Owner: City of Lansing.

AQUIFER.--Saginaw Formation.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 12 in., depth 417 ft, cased.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 829.10 ft above sea level. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

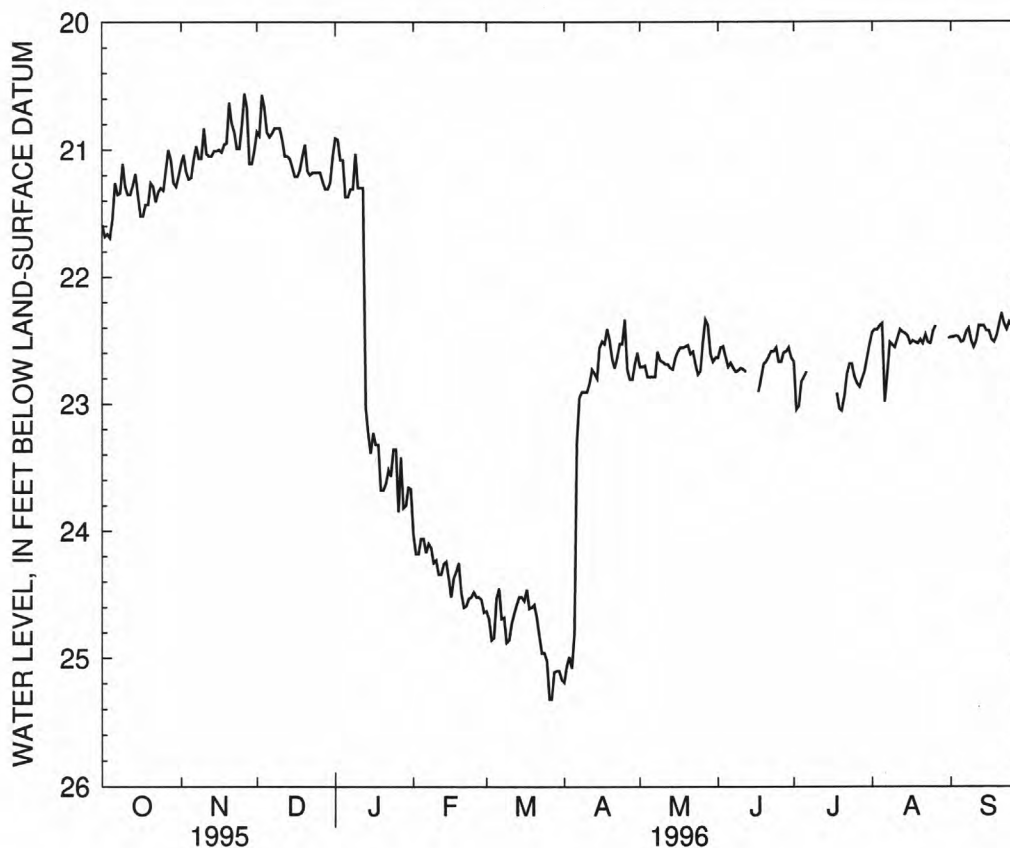
REMARKS.--Water levels affected by regional pumping.

PERIOD OF RECORD.--September 1945 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 18.26 ft below land-surface datum, May 9, 1994; lowest recorded, 67.0 ft below land-surface datum, August 1949.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	21.54	21.22	20.86	21.37	24.06	24.53	24.81	22.79	22.71	22.79	22.37	22.52
10	21.29	20.83	20.83	21.30	24.23	24.86	22.91	22.67	22.72	---	22.56	22.56
15	21.35	21.01	21.14	23.39	24.37	24.52	22.56	22.64	---	---	22.47	22.43
20	21.26	20.63	20.96	23.68	24.48	24.58	22.65	22.54	22.67	23.06	22.50	22.37
25	21.32	20.81	21.18	23.36	24.48	25.02	22.34	22.74	22.67	22.79	22.43	22.39
EOM	21.21	21.01	21.05	23.67	24.64	25.17	22.60	22.64	22.64	22.54	22.49	22.42
WTR YR 1996	HIGHEST			20.32	NOV 26			LOWEST	25.32	MAR 26, 27		



GROUND-WATER LEVELS

INGHAM COUNTY

423805084311801. Local number, 3N 2W 23BCBD.

LOCATION.--Lat 42°38'05", long 84°31'18", Hydrologic Unit 04050004, at Holt High School, at Sycamore Street, in Delhi Township, in Holt.

Owner: Holt High School.

AQUIFER.--Saginaw Formation.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in., depth 188 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 895 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

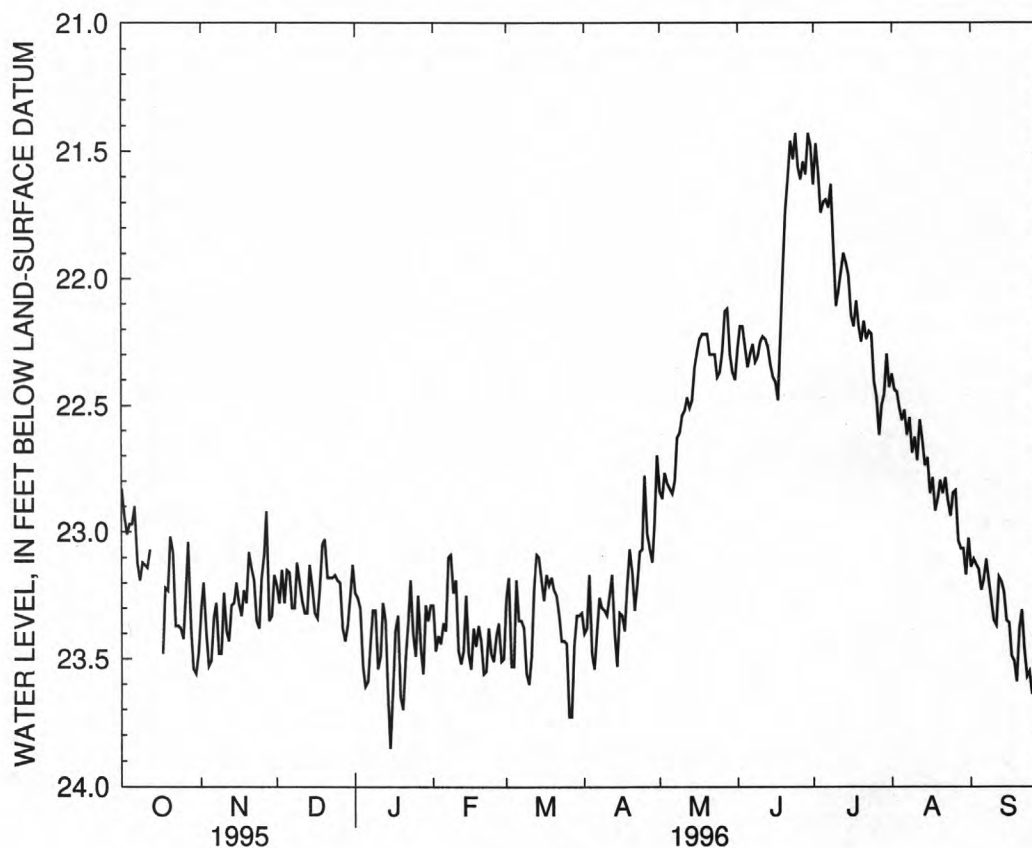
REMARKS.--Water levels affected by regional pumping.

PERIOD OF RECORD.--March 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 18.3 ft below land-surface datum, May 1983; lowest recorded, 26.34 ft below land-surface datum, June 5, 1991.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	22.97	23.51	23.15	23.61	23.36	23.19	23.54	22.83	22.35	21.70	22.56	23.23
10	23.13	23.24	23.20	23.54	23.19	23.60	23.33	22.54	22.25	22.11	22.63	23.35
15	---	23.20	23.22	23.85	23.48	23.19	23.32	22.35	22.39	21.99	22.71	23.35
20	23.02	23.08	23.03	23.70	23.43	23.23	23.16	22.22	21.73	22.25	22.80	23.38
25	23.42	23.18	23.19	23.49	23.51	23.44	22.78	22.37	21.56	22.41	22.85	23.64
EOM	23.48	23.17	23.13	23.29	23.50	23.32	22.70	22.40	21.48	22.43	23.03	23.74
WTR YR 1996	HIGHEST		21.30	JUN 24		LOWEST		23.85	JAN 15			



GROUND-WATER LEVELS

INGHAM COUNTY

424235084311201. Local number, 4N 2W 27BB.

LOCATION.--Lat 42°42'35", long 84°31'12", Hydrologic Unit 04050004, at Fenner Arboretum, in Lansing. Owner: U.S. Geological Survey.

AQUIFER.--Saginaw Formation.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 215 ft, cased to 51 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 835 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 3.7 ft above land-surface datum.

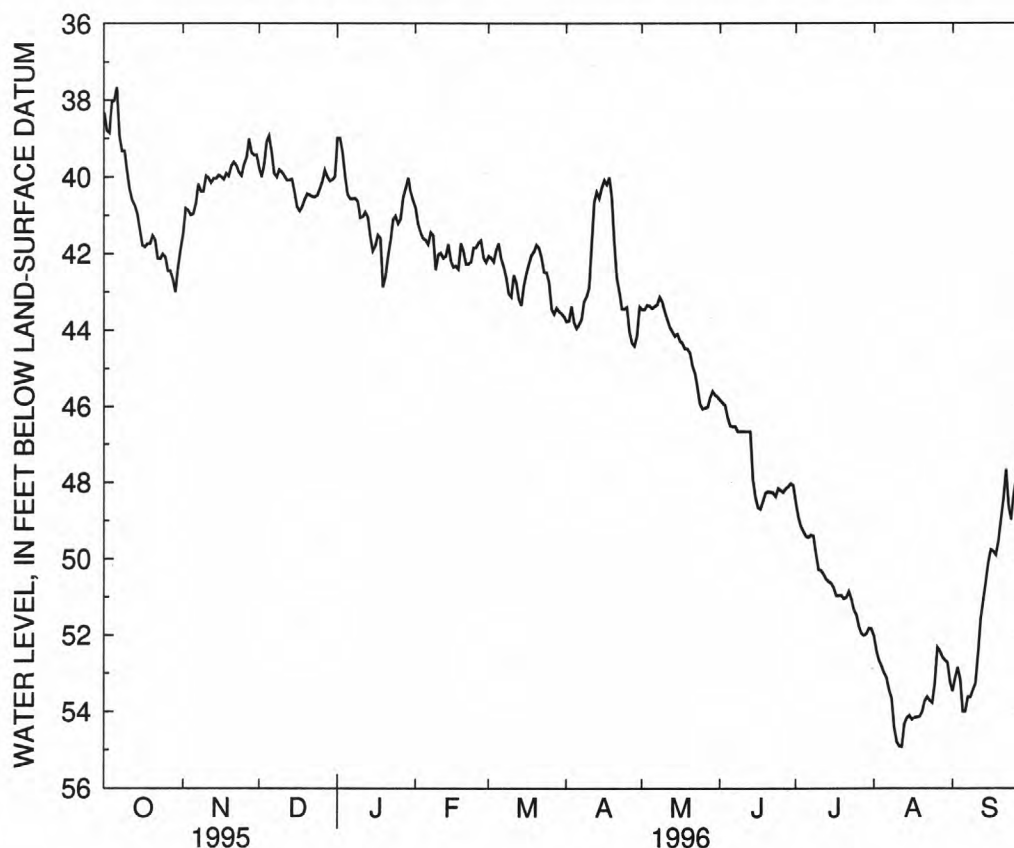
REMARKS.--Water levels affected by regional pumping.

PERIOD OF RECORD.--July 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 20.24 ft below land-surface datum, Dec. 29, 1993; lowest recorded, 89.5 ft below land-surface datum, October 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	38.00	40.96	38.93	40.46	41.65	41.74	43.96	43.44	46.54	49.42	53.00	54.00
10	39.85	39.97	39.87	41.06	42.03	43.14	42.90	43.52	46.68	50.30	54.79	53.29
15	41.36	39.95	40.40	41.93	42.19	42.84	40.29	44.12	48.39	50.66	54.11	50.13
20	41.53	39.71	40.44	42.59	41.93	41.78	41.76	44.61	48.26	51.07	54.02	48.97
25	42.09	39.68	40.31	41.22	41.85	42.76	43.41	46.08	48.23	51.50	53.29	48.35
EOM	41.90	39.42	39.99	40.60	42.23	43.65	43.40	45.77	48.10	51.86	53.25	45.66
WTR YR 1996	HIGHEST		37.56	OCT 5, 6		LOWEST		54.92	AUG 12			



GROUND-WATER LEVELS

INGHAM COUNTY

424424084340301. Local number, 4N 2W 17ABAA.

LOCATION.--Lat 42°44'24", long 84°34'03", Hydrologic Unit 04050004, at Kirby and Logan Streets, in Lansing. Owner: City of Lansing.

AQUIFER.--Saginaw Formation of Pennsylvanian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 20 in., depth 424 ft.

INSTRUMENTATION.--Water-level recorder. Monthly measurements prior to August 1960.

DATUM.--Elevation of land-surface datum is 858.72 ft above sea level. Measuring point: Plywood shelter base at land-surface datum.

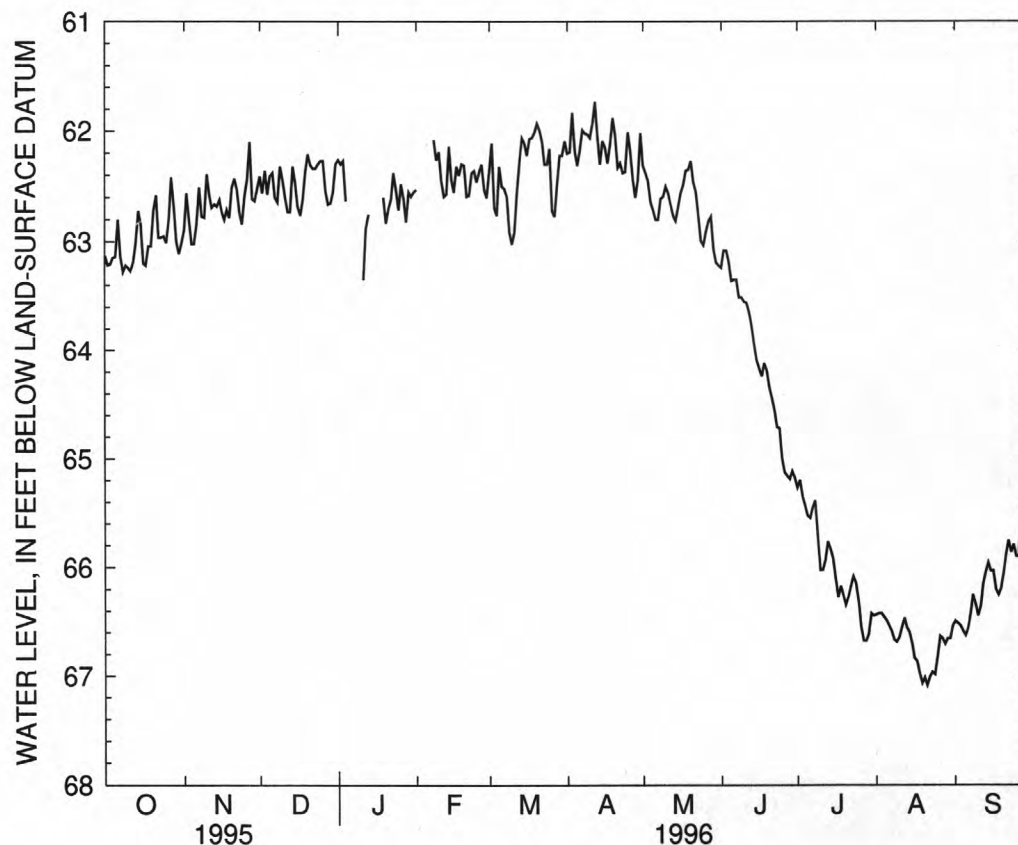
REMARKS.--Water levels affected by regional pumping.

PERIOD OF RECORD.--December 1929 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 34.3 ft below land-surface datum, December 1929; lowest recorded, 168.3 ft below land-surface datum, May 7, 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	63.14	63.02	62.41	---	---	62.32	62.31	62.71	63.36	65.53	66.49	66.63
10	63.24	62.39	62.44	---	62.19	63.02	62.06	62.50	63.55	66.03	66.65	66.45
15	62.84	62.62	62.47	---	62.44	62.11	62.09	62.68	64.09	65.92	66.70	66.04
20	62.71	62.51	62.21	62.83	62.31	61.93	62.04	62.27	64.34	66.35	67.02	66.06
25	63.01	62.59	62.27	62.71	62.46	62.16	62.01	63.03	65.00	66.32	66.83	65.91
EOM	63.02	62.52	62.30	62.55	62.60	62.09	62.02	63.22	65.18	66.45	66.54	65.81
WTR YR 1996	HIGHEST		61.40	APR 25		LOWEST		67.09	AUG 21			



GROUND-WATER LEVELS

INGHAM COUNTY

424502084331301. Local number, 4N 2W 9BDAD.

LOCATION.--Lat 42°45'02", 84°33'13", Hydrologic Unit 04050004, at North Grand River Avenue, in Lansing Township, in Lansing. Owner: City of Lansing.

AQUIFER.--Saginaw Formation.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 14 in., depth 401 ft, cased to 49 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 828.81 ft above sea level. Measuring point: Plywood instrument shelf, 4.0 ft above land-surface datum.

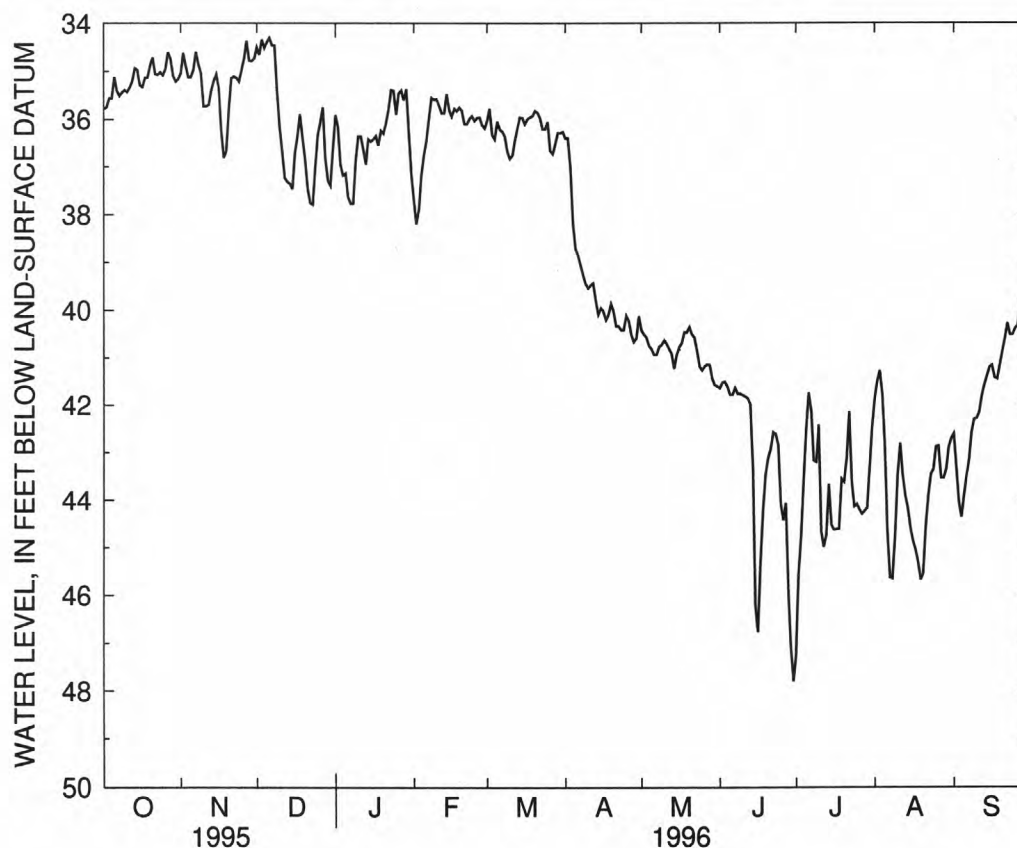
REMARKS.--Water levels affected by regional pumping.

PERIOD OF RECORD.--1929 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 15.6 ft below land-surface datum, March 1931; lowest recorded, 179.4 ft below land-surface datum, April 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	35.56	35.12	34.39	37.14	36.75	36.05	38.72	40.82	41.79	42.50	42.88	43.89
10	35.39	35.73	36.16	36.36	35.58	36.83	39.54	40.64	41.80	42.42	43.48	42.29
15	34.97	35.06	37.46	36.47	35.81	35.97	39.96	40.95	46.19	44.53	44.58	41.21
20	34.88	35.77	36.83	36.30	35.82	35.83	40.02	40.36	43.12	43.62	45.55	40.88
25	35.08	34.98	36.33	35.90	36.03	36.06	40.12	41.27	44.08	44.09	42.88	40.39
EOM	35.16	34.73	36.60	37.16	36.19	36.27	40.13	41.61	47.79	42.44	42.71	39.93
WTR YR 1996	HIGHEST		33.93	DEC 5	LOWEST		47.79	JUN 30				



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421151085351601. Local number, 3S 11W 22BBCD.

LOCATION.--Lat 42°11'51", long 85°35'16", Hydrologic Unit 04050003, at Portage Central High School, in Kalamazoo Township, in Portage.

Owner: Portage Public Schools.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 12 in., depth 102 ft., screened 87 ft to 102 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 877 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 2.0 ft above land-surface datum.

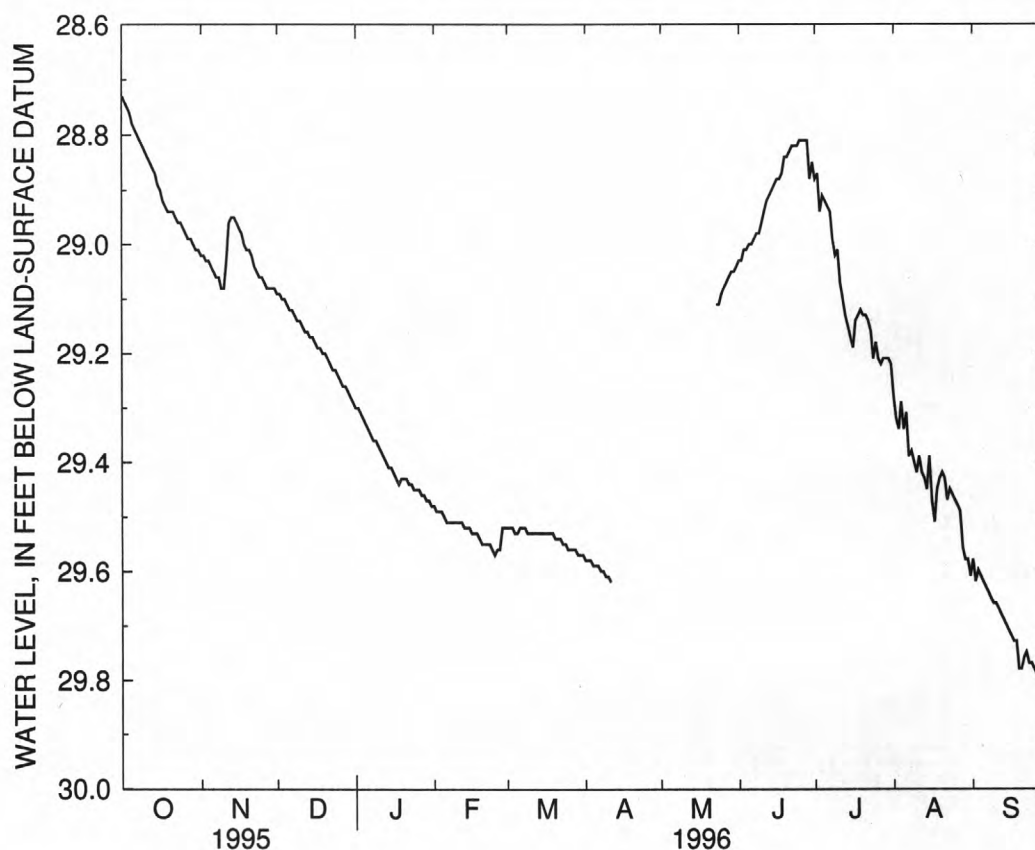
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--June 1982 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 24.8 ft below land-surface datum, April 1985; lowest recorded, 29.79 ft below land-surface datum, Sept. 30, 1996.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	28.78	29.04	29.11	29.33	29.50	29.53	29.59	---	29.00	28.92	29.34	29.62
10	28.83	29.08	29.14	29.37	29.51	29.53	29.61	---	28.96	29.01	29.42	29.66
15	28.89	28.96	29.17	29.41	29.52	29.53	---	---	28.89	29.17	29.39	29.71
20	28.94	29.01	29.20	29.43	29.55	29.54	---	---	28.84	29.13	29.42	29.78
25	28.97	29.06	29.24	29.45	29.57	29.56	---	29.09	28.81	29.18	29.47	29.78
EOM	29.01	29.08	29.29	29.48	29.52	29.57	---	29.04	28.85	29.22	29.61	29.79
WTR YR 1996	HIGHEST			28.72	OCT 1			LOWEST	29.79	SEP 30		



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421325085404801. Local number, 3S 12W 11BDAD.

LOCATION.--Lat 42°13'25", long 85°40'48", Hydrologic Unit 04050003, at Kalamazoo Valley Community College. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 3 in., depth 248 ft, screened 245 ft to 248 ft.

INSTRUMENTATION.--Water-level recorder.

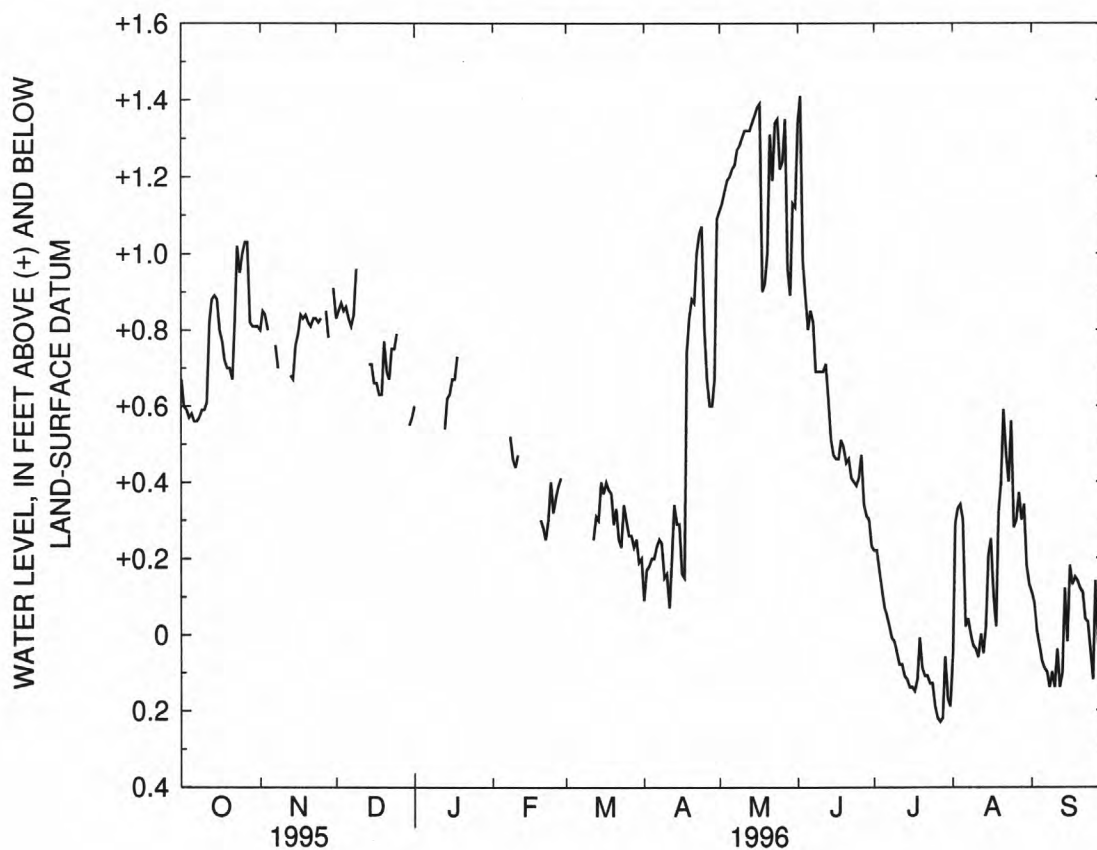
DATUM.--Elevation of land-surface datum is 880 ft above sea level, from topographic map. Measuring point: Top of shelter base, 3.5 ft above land-surface datum.

PERIOD OF RECORD.--March 1961 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, +2.98 ft above land-surface datum, Sept. 4, 1969; lowest recorded, 1.10 ft below land-surface datum, July 14, 15, 1988.

WATER LEVEL, IN FEET ABOVE (+) AND BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	+58	---	+86	---	---	---	+20	+1.20	+80	+07	+30	.07
10	+59	+75	---	---	+44	+38	+16	+1.30	+69	.05	.04	.14
15	+88	+76	+71	+63	---	+40	+29	+1.36	+47	.14	+21	.02
20	+70	+82	+77	---	+30	+29	+88	+1.00	+45	.09	+40	+12
25	+1.00	+83	+79	---	+32	+30	+80	+1.22	+41	.19	+28	.12
EOM	+81	+91	+57	---	---	+20	+1.09	+1.12	+23	.19	+13	.18
WTR YR 1996	HIGHEST			+1.44	JUN 3		LOWEST		.23	JUL 27		



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421332085401901. Local number, 3S 12W 11AD1.

LOCATION.--Lat 42°13'32", long 85°40'19", Hydrologic Unit 04050003, at Al Sabo Land Preserve, Texas Township, 3.0 mi west of Portage. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 300 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 877 ft above sea level. Measuring point: Plywood instrument shelf, 2.5 ft above land-surface datum.

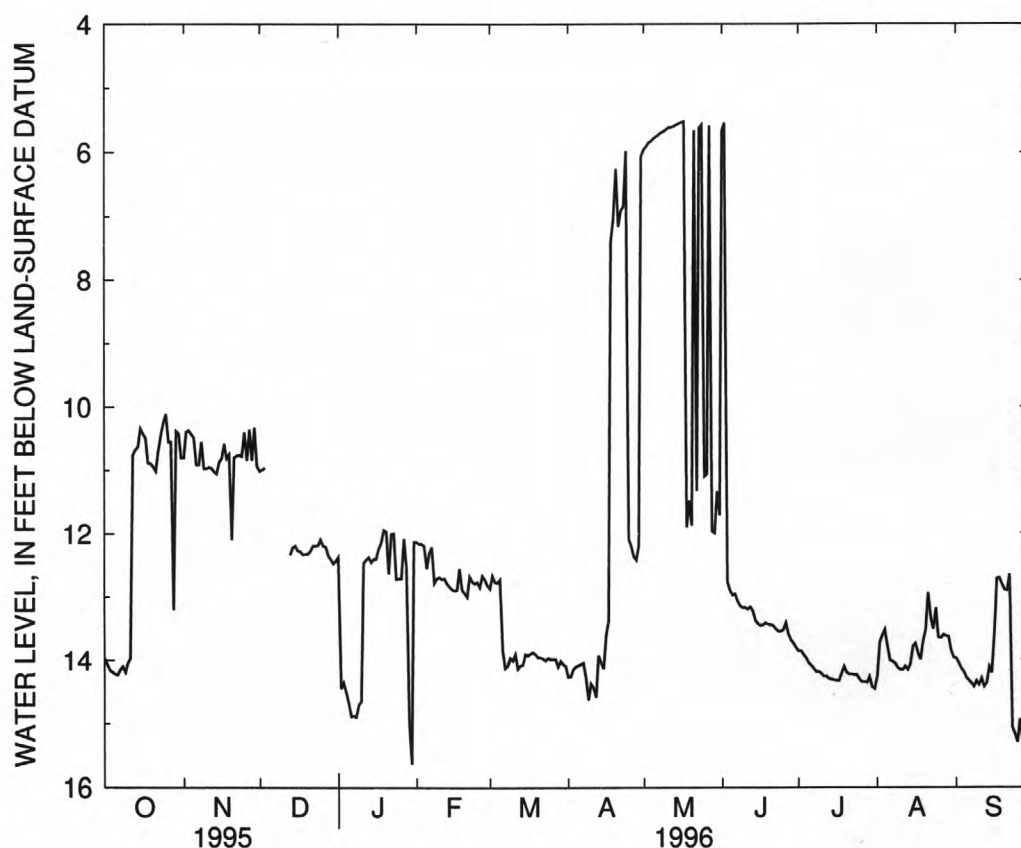
REMARKS.--Water levels affected by pumping.

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 4.5 ft below land-surface datum, July 1973; lowest recorded, 17.09 ft below land-surface datum, July 20, 1994.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	14.22	10.48	---	14.68	12.55	12.73	14.09	5.78	12.98	14.05	13.78	14.29
10	14.04	10.97	---	14.65	12.69	14.01	14.38	5.64	13.18	14.22	14.16	14.40
15	10.34	10.87	12.19	12.40	12.88	13.91	14.14	5.55	13.43	14.32	13.79	14.21
20	10.94	12.09	12.32	11.96	12.94	13.96	6.26	11.87	13.45	14.20	13.53	12.91
25	10.11	10.40	12.09	12.71	12.77	13.99	12.09	11.09	13.53	14.31	13.65	15.30
EOM	10.80	10.93	12.43	12.13	12.82	14.10	6.06	11.71	13.81	14.46	13.97	15.53
WTR YR 1996	HIGHEST			5.46	JUN 3			LOWEST	15.64	JAN 30		



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421332085401902. Local number, 3S 12W 22AD2.

LOCATION.--Lat 42°13'32", long 85°40'19", Hydrologic Unit 04050003, at Al Sabo Land Preserve, Texas Township, 3.0 mi west of Portage. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 38 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 877 ft above sea level. Measuring point: Plywood instrument shelf, 2.5 ft above land-surface datum.

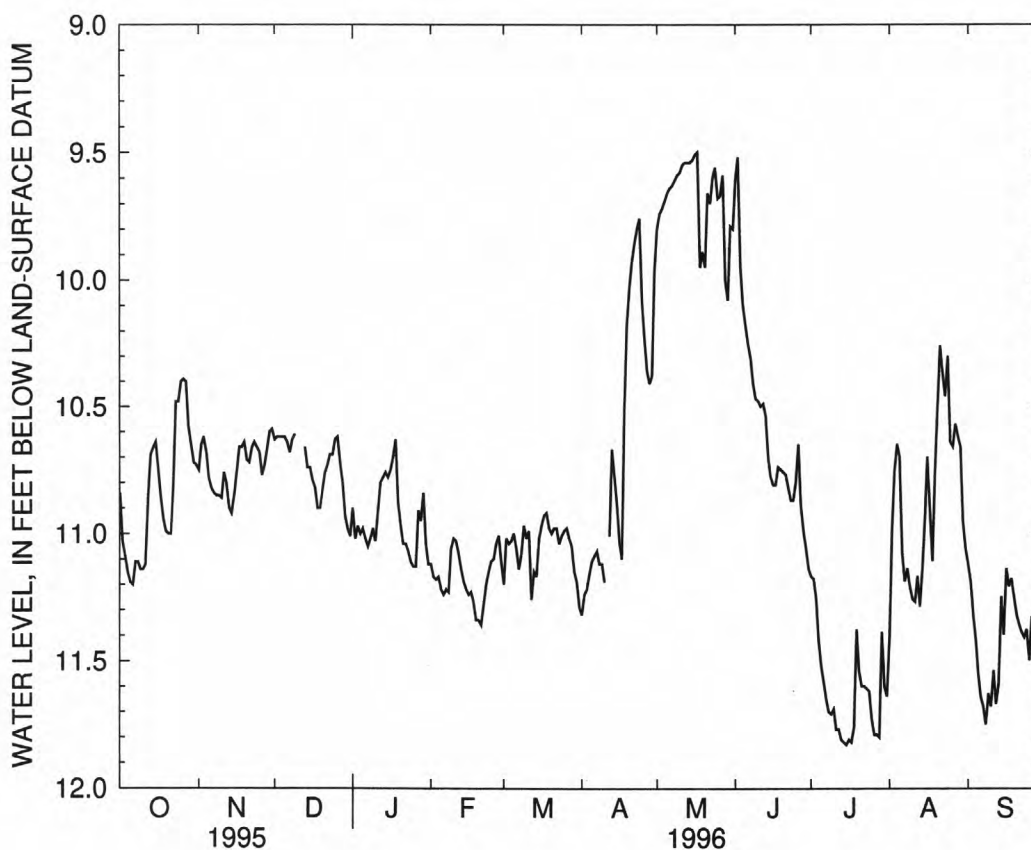
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--January 1973 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 9.1 ft below land-surface datum, August 1975; lowest recorded, 12.8 ft below land-surface datum, August, 1984.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	11.19	10.78	10.62	10.98	11.22	11.00	11.11	9.66	10.18	11.52	10.70	11.55
10	11.14	10.86	---	11.03	11.02	11.02	11.19	9.58	10.48	11.69	11.26	11.68
15	10.64	10.85	10.74	10.78	11.22	11.02	10.89	9.53	10.78	11.83	10.95	11.40
20	11.00	10.71	10.83	10.97	11.34	11.00	10.03	9.95	10.76	11.54	10.50	11.32
25	10.40	10.68	10.63	11.13	11.11	10.99	10.08	9.68	10.80	11.73	10.64	11.50
EOM	10.73	10.59	11.01	11.12	11.11	11.29	9.96	9.80	11.14	11.64	11.06	11.77
WTR YR 1996	HIGHEST		9.43	JUN 3		LOWEST		11.83	JUL 15			



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421435085353701. Local number, 3S 11W 4ABAD1.

LOCATION.--Lat 42°14'35", long 85°35'37", Hydrologic Unit 04050003, at Kilgore Road pump station No. 9, in Kalamazoo. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 36 ft, screened 33 ft to 36 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 860 ft above sea level. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

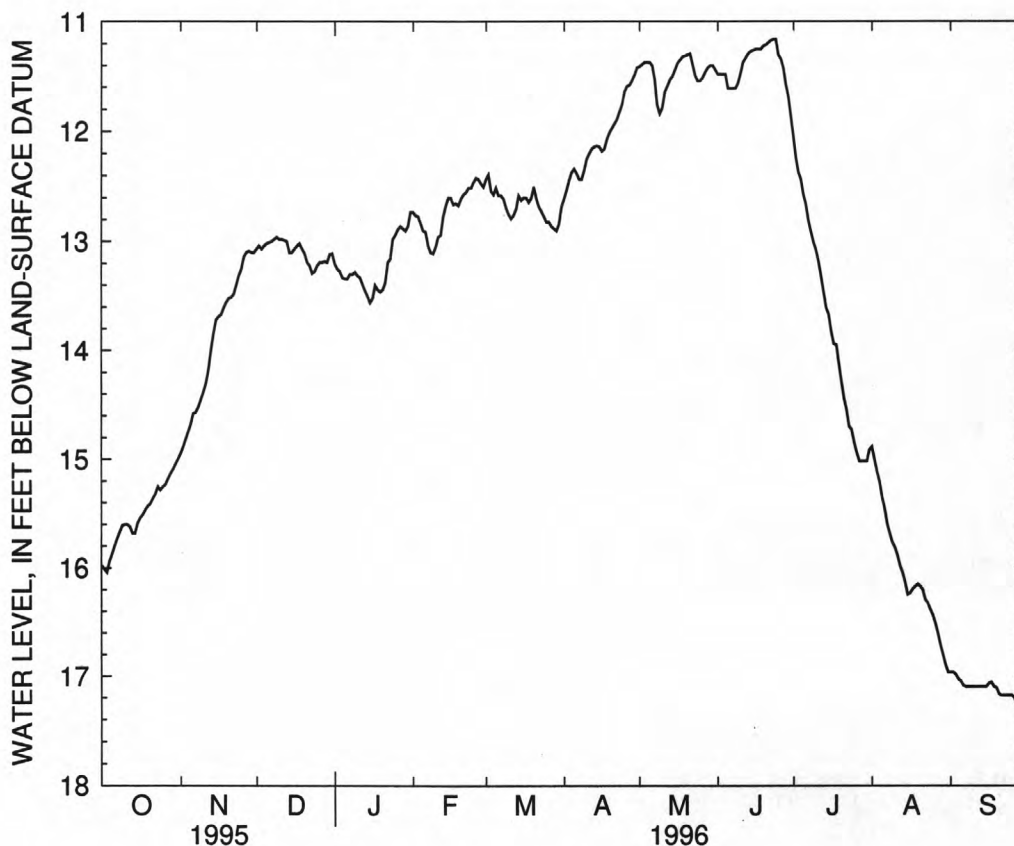
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--September 1987 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 9.17 ft below land-surface datum, Apr. 27, 1993; lowest recorded, 17.27 ft below land-surface datum, Sept. 27, 1996.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	15.87	14.68	13.02	13.34	12.90	12.51	12.34	11.37	11.61	12.57	15.35	17.05
10	15.60	14.38	12.98	13.31	13.05	12.75	12.25	11.79	11.47	13.08	15.82	17.10
15	15.59	13.72	13.10	13.56	12.60	12.62	12.14	11.44	11.26	13.67	16.25	17.10
20	15.41	13.52	13.11	13.44	12.61	12.50	11.97	11.30	11.21	14.28	16.18	17.17
25	15.25	13.25	13.22	12.94	12.46	12.82	11.64	11.54	11.30	14.85	16.44	17.18
EOM	15.00	13.10	13.11	12.73	12.50	12.68	11.42	11.44	11.87	14.92	16.97	17.05
WTR YR 1996	HIGHEST		11.16	JUN 22-25		LOWEST		17.27	SEP 27			



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421435085353702. Local number, 3S 11W 4ABAD2.

LOCATION.--Lat 42°14'35", long 85°35'37", Hydrologic Unit 04050003, at Kilgore Road pump station No.9, in Kalamazoo. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 148 ft, screened 145 ft to 148 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 860 ft above sea level. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

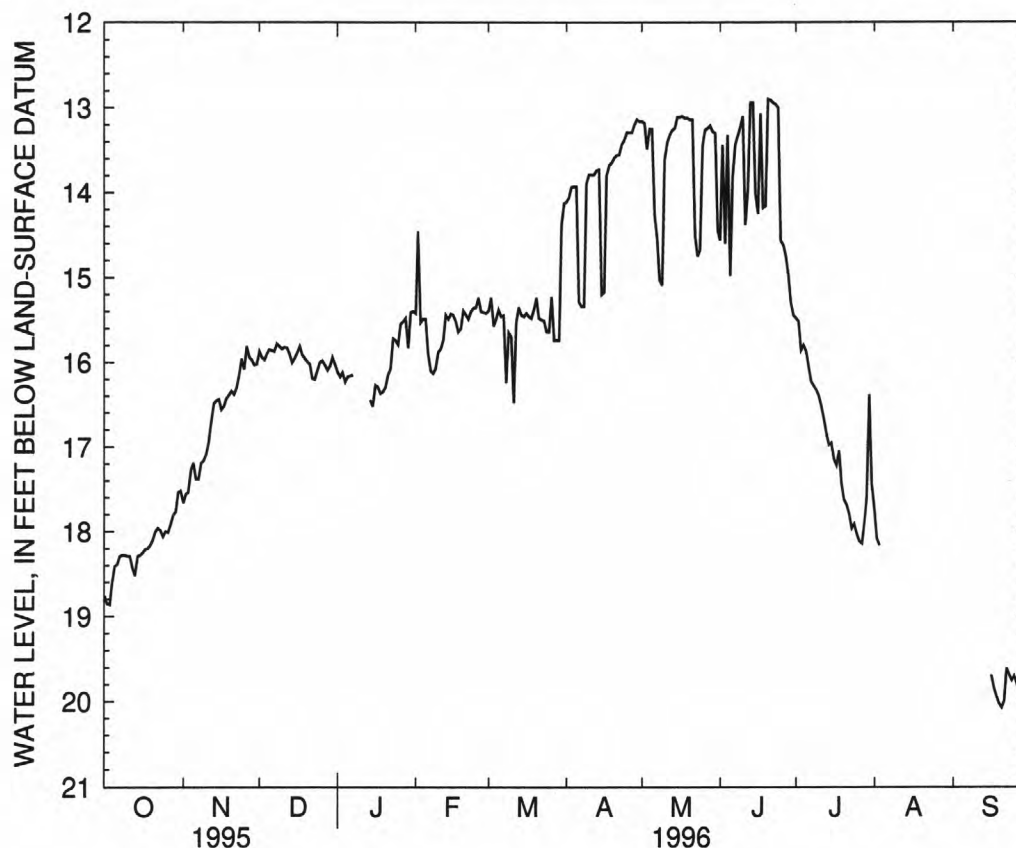
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--September 1987 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 10.73 ft below land-surface datum, May 4, 5, 1993; lowest recorded, 20.08 ft below land-surface datum, Sept. 20, 1996.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	18.41	17.19	15.85	16.17	15.49	15.38	13.93	13.25	14.98	15.87	---	---
10	18.29	17.08	15.84	---	15.88	15.70	13.79	13.61	13.10	16.40	---	---
15	18.28	16.44	15.95	16.52	15.43	15.46	15.20	13.11	14.01	16.96	---	---
20	18.10	16.34	15.99	16.29	15.39	15.24	13.59	13.14	12.90	17.63	---	20.08
25	18.00	16.08	16.00	15.79	15.35	15.64	13.29	13.45	14.57	18.04	---	19.71
EOM	17.52	16.02	16.02	15.40	15.42	14.13	13.16	14.46	15.45	17.44	---	19.65
WTR YR 1996	HIGHEST			12.82	JUN 20, 21			LOWEST	20.08	SEP 20		



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421448085383601. Local number, 2S 11W 31CD.

LOCATION.--Lat 42°14'48", long 85°38'36", Hydrologic Unit 04050003, at city well field, 1,000 ft from U.S. Highway 131, in Kalamazoo. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 226 ft, screened 216 ft to 226 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 910 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

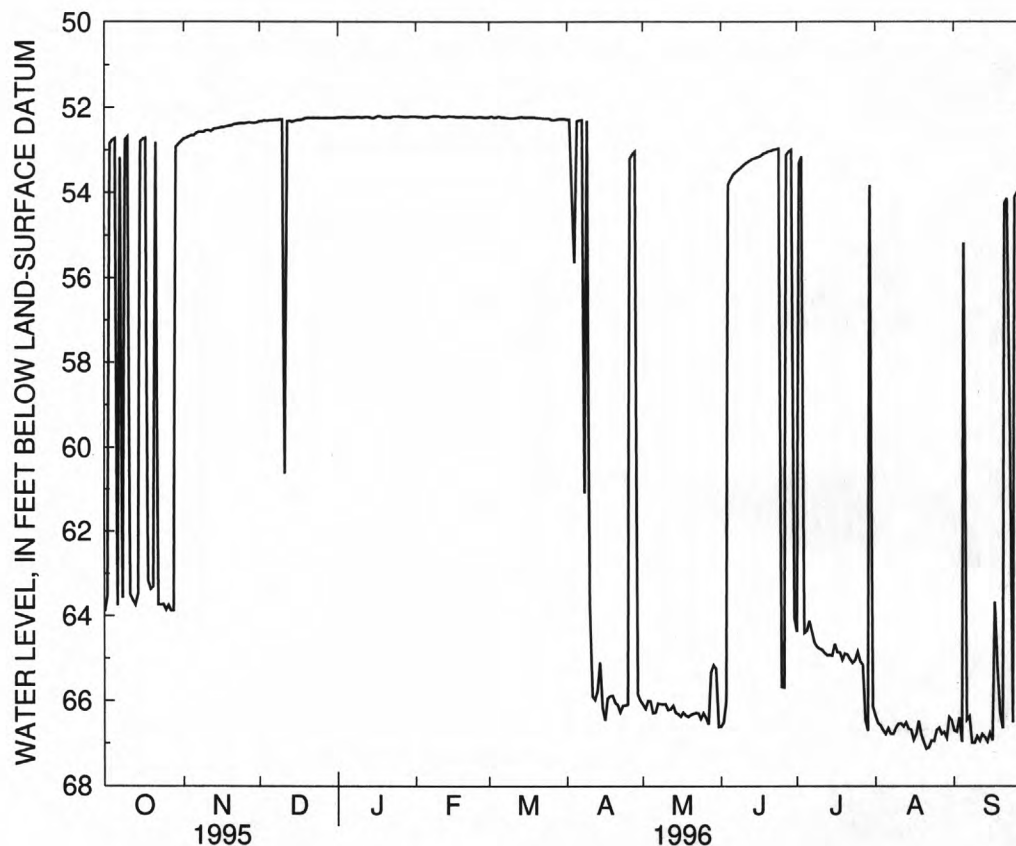
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--August 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 41.39 ft below land-surface datum, Sept. 12, 1982; lowest recorded, 71.75 ft below land-surface datum, May 22, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	52.72	52.65	52.30	52.23	52.23	52.21	52.32	66.29	53.68	64.36	66.78	55.17
10	52.68	52.53	52.28	52.23	52.20	52.25	63.76	66.08	53.36	64.78	66.55	66.84
15	52.79	52.48	52.31	52.25	52.21	52.23	66.17	66.32	53.18	64.94	66.69	66.76
20	63.31	52.42	52.24	52.23	52.21	52.24	66.05	66.33	53.03	64.90	66.98	66.65
25	63.86	52.37	52.24	52.21	52.23	52.26	66.09	66.30	65.68	64.85	66.70	54.10
EOM	52.79	52.35	52.24	52.21	52.23	52.27	66.00	66.62	64.07	66.14	66.46	66.88
WTR YR 1996		HIGHEST		52.18	JAN 18, 26, 27, FEB 13, 14			LOWEST		67.13	AUG 21	



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421457085325801. Local number, 2S 11W 36CB.

LOCATION.--Lat 42°14'57", long 85°32'58", Hydrologic Unit 04050003, in city well field, 500 ft from Emerald Street, in Kalamazoo. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 226 ft, screened 216 ft to 226 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 860 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 3.5 ft above land-surface datum.

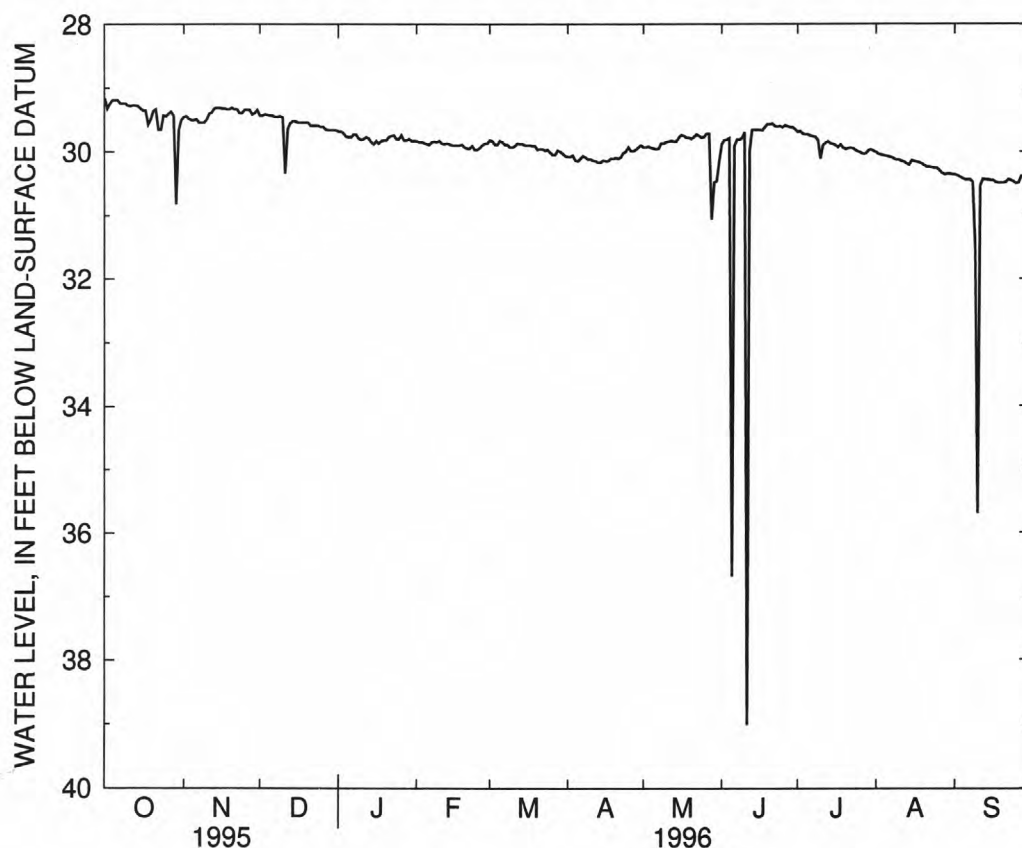
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--August 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 25.35 ft below land-surface datum, April 1985; lowest recorded, 50.4 ft below land-surface datum, June 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	29.19	29.50	29.43	29.77	29.88	29.83	30.15	29.95	36.69	29.73	30.07	30.44
10	29.27	29.49	29.46	29.81	29.83	29.93	30.12	29.85	29.70	30.11	30.13	35.70
15	29.32	29.31	29.52	29.88	29.90	29.90	30.14	29.78	29.66	29.88	30.14	30.45
20	29.36	29.31	29.54	29.82	29.93	29.97	30.10	29.80	29.57	29.96	30.22	30.49
25	29.44	29.34	29.61	29.80	29.97	30.01	29.93	29.77	29.62	30.00	30.26	30.50
EOM	29.50	29.34	29.66	29.83	29.87	30.07	29.90	30.14	29.65	29.99	30.36	30.44
WTR YR 1996	HIGHEST			29.12	OCT 1	LOWEST			39.02	JUN 11		



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421614085270801. Local number, 2S 10W 26BCC.

LOCATION.--Lat 42°16'14", long 85°27'08", Hydrologic Unit 04050003, at end of Miller Road by Morrow Lake, Comstock Township, 4.0 mi east of Kalamazoo. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 27 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 790 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 2.5 ft above land-surface datum.

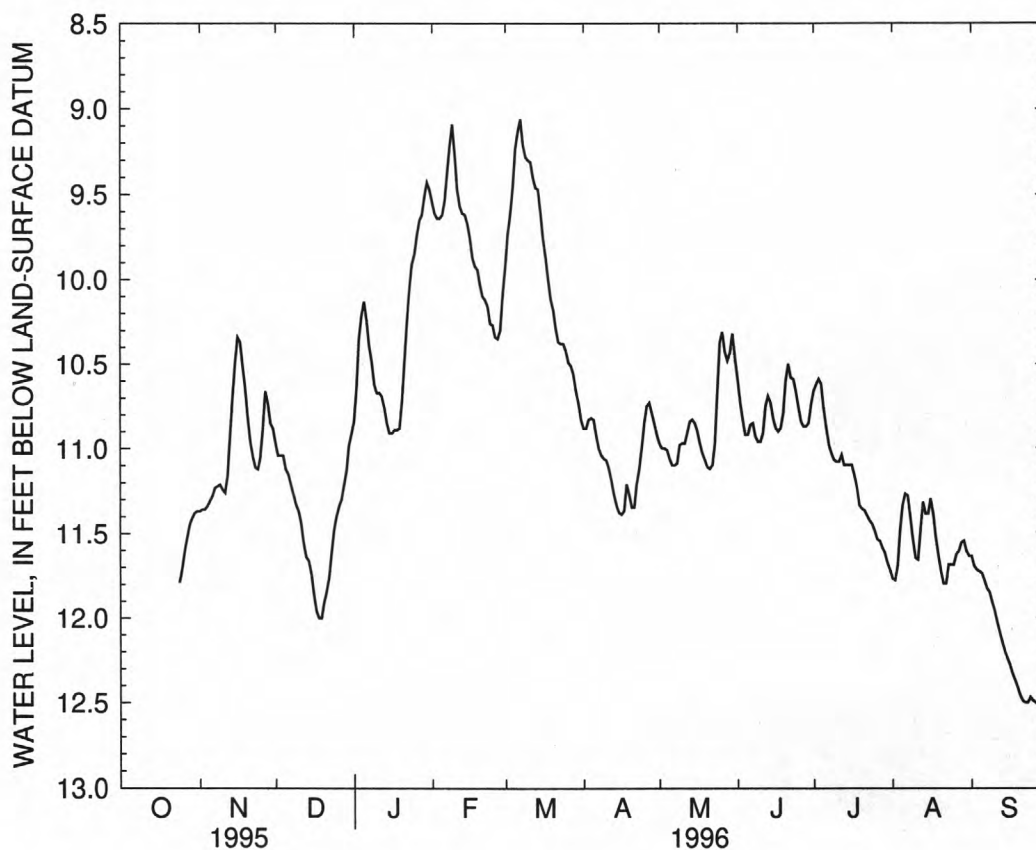
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--February 1987 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 5.9 ft below land-surface datum, April 1988; lowest recorded, 13.1 ft below land-surface datum, September 1988.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	---	11.31	11.12	10.13	9.62	9.23	10.83	11.06	10.92	10.77	11.34	11.74
10	---	11.24	11.37	10.67	9.27	9.30	11.07	10.97	10.96	11.08	11.65	11.96
15	---	10.49	11.74	10.91	9.67	9.61	11.38	10.85	10.82	11.10	11.39	12.24
20	---	10.82	11.91	10.71	10.03	10.18	11.35	11.11	10.60	11.36	11.73	12.46
25	11.71	11.05	11.40	9.85	10.27	10.42	10.85	10.37	10.75	11.49	11.69	12.49
EOM	11.37	10.88	10.91	9.47	10.09	10.83	10.92	10.47	10.74	11.72	11.64	12.52
WTR YR 1996	HIGHEST		9.06	MAR 6-8		LOWEST		12.52	SEP 29, 30			



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421614085354001. Local number, 2S 11W 28AA.

LOCATION.--Lat 42°16'14", long 85°35'40", Hydrologic Unit 04050003, near intersection of Peeler Street and Crosstown Parkway, in Kalamazoo.

Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 245 ft, screened 235 ft to 245 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 820 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 4.0 ft above land-surface datum.

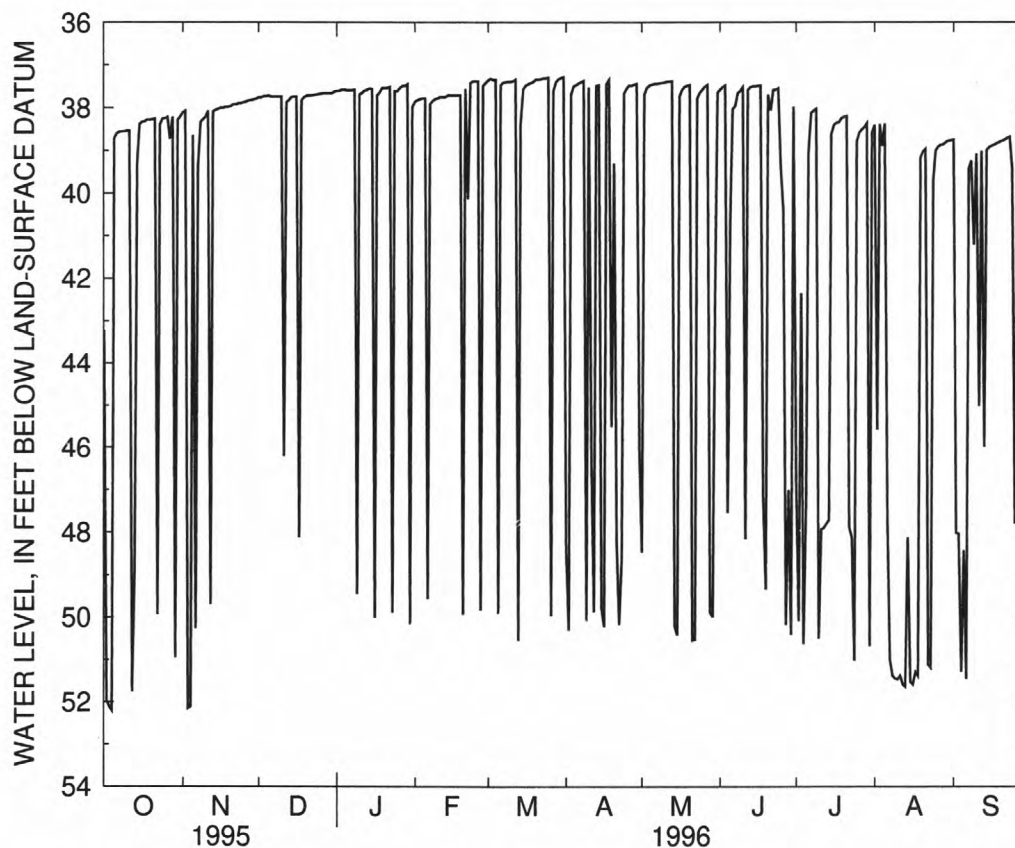
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--August 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 29.0 ft below land-surface datum, May 1988; lowest recorded, 64.63 ft below land-surface datum, July 15, 1986.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	38.72	38.65	37.72	37.59	37.78	49.92	37.47	37.46	40.72	47.31	38.38	48.45
10	38.54	38.21	37.74	37.69	37.78	37.39	37.52	37.41	37.52	50.51	51.48	39.08
15	38.38	38.03	37.74	37.56	37.71	37.57	49.78	50.43	37.50	38.62	51.54	38.93
20	38.27	37.96	37.72	37.54	49.94	37.34	39.30	37.47	37.70	38.22	39.03	38.78
25	38.25	37.87	37.68	37.61	37.38	37.29	37.55	37.58	39.35	38.79	39.00	47.82
EOM	38.21	37.79	37.62	37.98	37.42	37.28	46.08	37.65	37.98	38.59	38.77	38.60
WTR YR 1996	HIGHEST		37.25	MAR 25		LOWEST		52.20	OCT 4			



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421641085350601. Local number, 2S 11W 22CD.

LOCATION.--Lat 42°16'41", long 85°35'06", Hydrologic Unit 04050003, at intersection of Crosstown Parkway and Stockbridge Avenue, in Kalamazoo. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 137 ft, screened 134 ft to 137 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 764.7 ft above sea level. Measuring point: Plywood instrument shelf, 2.6 ft above land-surface datum.

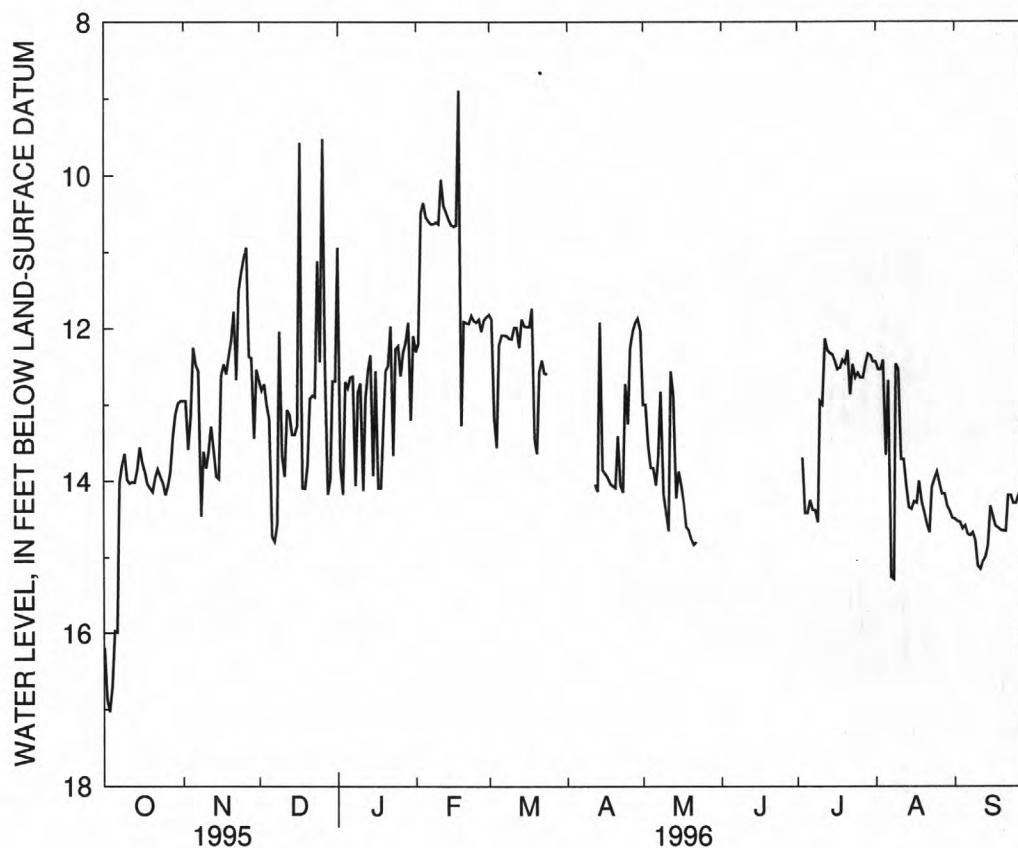
REMARKS.--Water levels affected by pumping.

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 3.60 ft below land-surface datum, May 5-6, 1995; lowest recorded, 31.1 ft below land surface datum, August 1961.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	15.97	12.25	13.19	12.78	10.54	12.22	---	13.83	---	14.43	13.66	14.60
10	13.98	13.83	13.66	12.72	10.63	12.14	---	14.41	---	12.96	12.54	15.13
15	13.55	13.97	13.39	13.93	10.64	11.97	13.86	13.88	---	12.35	14.38	14.34
20	14.14	12.15	13.80	12.56	11.91	13.64	14.09	14.77	---	12.46	14.42	14.67
25	14.18	11.08	12.44	12.23	11.92	---	13.25	---	---	12.59	13.89	14.31
EOM	12.95	12.54	12.69	12.10	11.85	---	12.03	---	---	12.44	14.50	13.68
WTR YR 1996	HIGHEST			5.60	JAN 30			LOWEST	17.03	OCT 3		



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421716085373702. Local number, 2S 11W 20BB2.

LOCATION.--Lat 42°17'16", long 85°37'37", Hydrologic Unit 04050003, at intersection of Howard Street and Kendall Street, in Kalamazoo Township, in Kalamazoo. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 106 ft, screened 103 ft to 106 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 880 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 2.3 ft above land-surface datum.

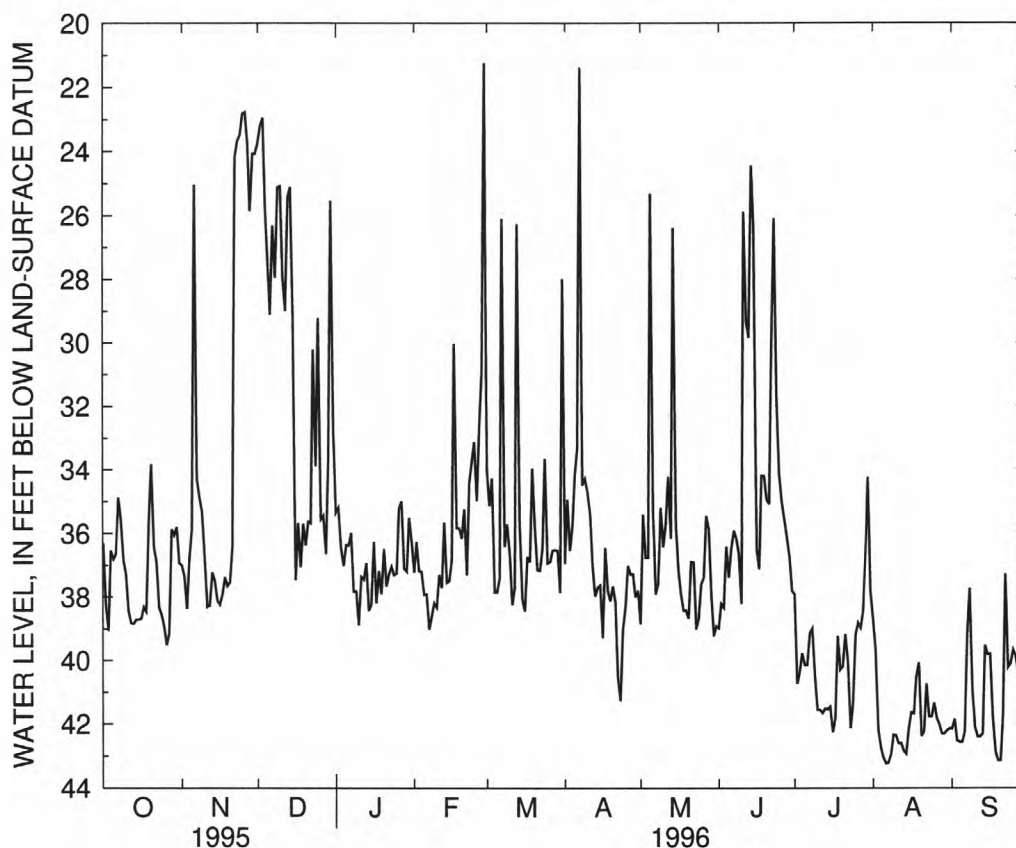
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--May 1968 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 12.5 ft below land-surface datum, February 1976; lowest recorded, 48.4 ft below land-surface datum, June 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	36.80	35.87	27.41	36.37	37.93	37.87	34.18	25.31	37.39	40.14	43.04	42.56
10	37.29	36.80	25.08	38.88	38.33	36.68	34.68	36.44	38.23	41.56	42.36	42.10
15	38.71	38.12	29.15	38.24	37.50	38.08	37.64	35.81	26.40	41.46	42.12	39.81
20	33.83	37.53	36.37	36.49	36.16	35.83	37.67	38.68	34.95	40.19	42.38	43.14
25	38.94	22.82	29.22	37.26	33.13	36.94	38.32	37.60	34.13	39.20	41.34	39.67
EOM	36.93	24.07	32.74	36.24	21.23	27.99	37.81	38.93	37.83	37.82	42.14	39.26
WTR YR 1996	HIGHEST			19.69	DEC 25	LOWEST			43.23	AUG 6		



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421918085283801. Local number, 2S 10W 4D.

LOCATION.--Lat 42°19'18", long 85°28'38", Hydrologic Unit 04050003, at Campbell well field, near Campbell Lake, 2 mi east of Eastwood. Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 13 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 836.50 ft above sea level. Measuring point: Plywood instrument shelf, 1.0 ft above land-surface datum.

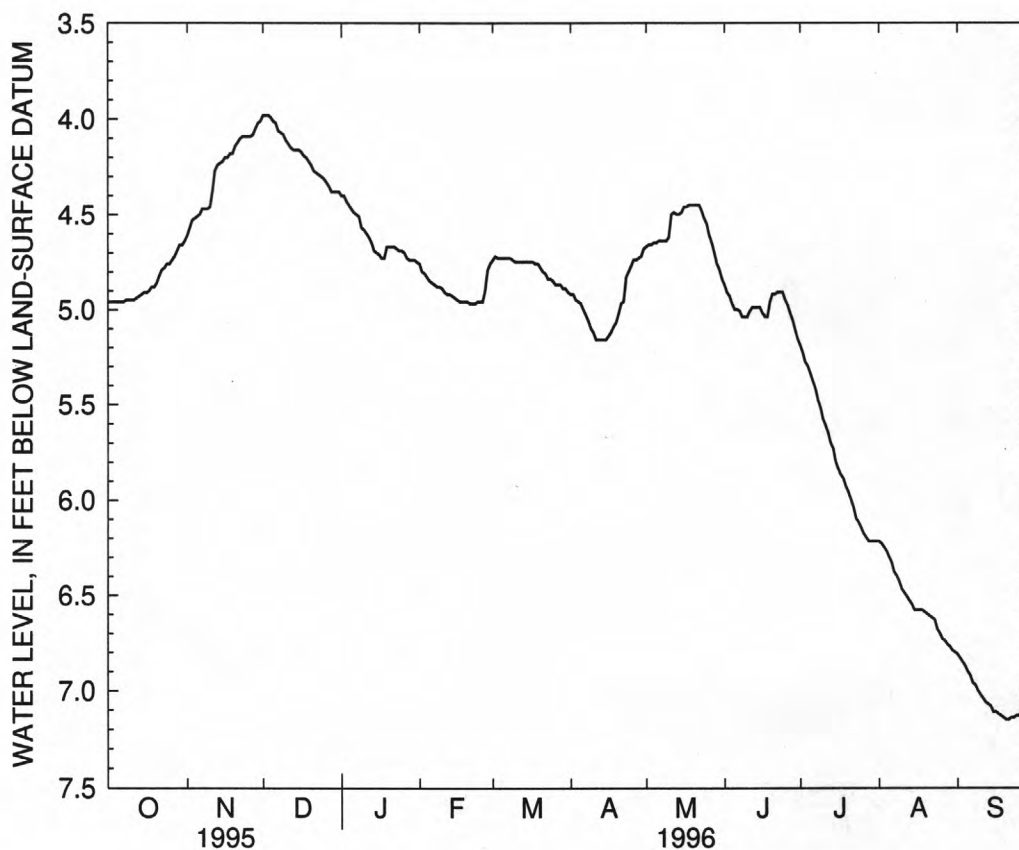
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--March 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 1.9 ft below land-surface datum, April 1974; lowest recorded, 7.15 ft below land-surface datum, Sept. 20, 21, 1996.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	4.96	4.51	4.01	4.47	4.85	4.73	4.97	4.65	5.00	5.34	6.30	6.90
10	4.95	4.46	4.11	4.58	4.89	4.75	5.12	4.62	5.04	5.58	6.47	7.02
15	4.91	4.22	4.16	4.70	4.94	4.75	5.16	4.49	4.99	5.80	6.58	7.11
20	4.86	4.14	4.24	4.67	4.96	4.78	5.02	4.45	4.92	5.96	6.60	7.15
25	4.76	4.09	4.31	4.69	4.96	4.85	4.77	4.55	4.95	6.15	6.70	7.13
EOM	4.64	4.01	4.38	4.75	4.76	4.91	4.68	4.84	5.16	6.22	6.80	6.93
WTR YR 1996	HIGHEST			3.98	NOV 30- DEC 4			LOWEST	7.15	SEP 20, 21		



GROUND-WATER LEVELS

LIVINGSTON COUNTY

422853083402801. Local number, 1N 6E 13DBAB.

LOCATION.--Lat 42°28'53", long 83°40'28", Hydrologic Unit 04090005, at Twelve Mile Road, 2 mi northwest of South Lyon. Owner: American Aggregates Company.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 2 in., depth 29 ft, 1.25 in. diameter screen.

INSTRUMENTATION.--Water-level recorder.

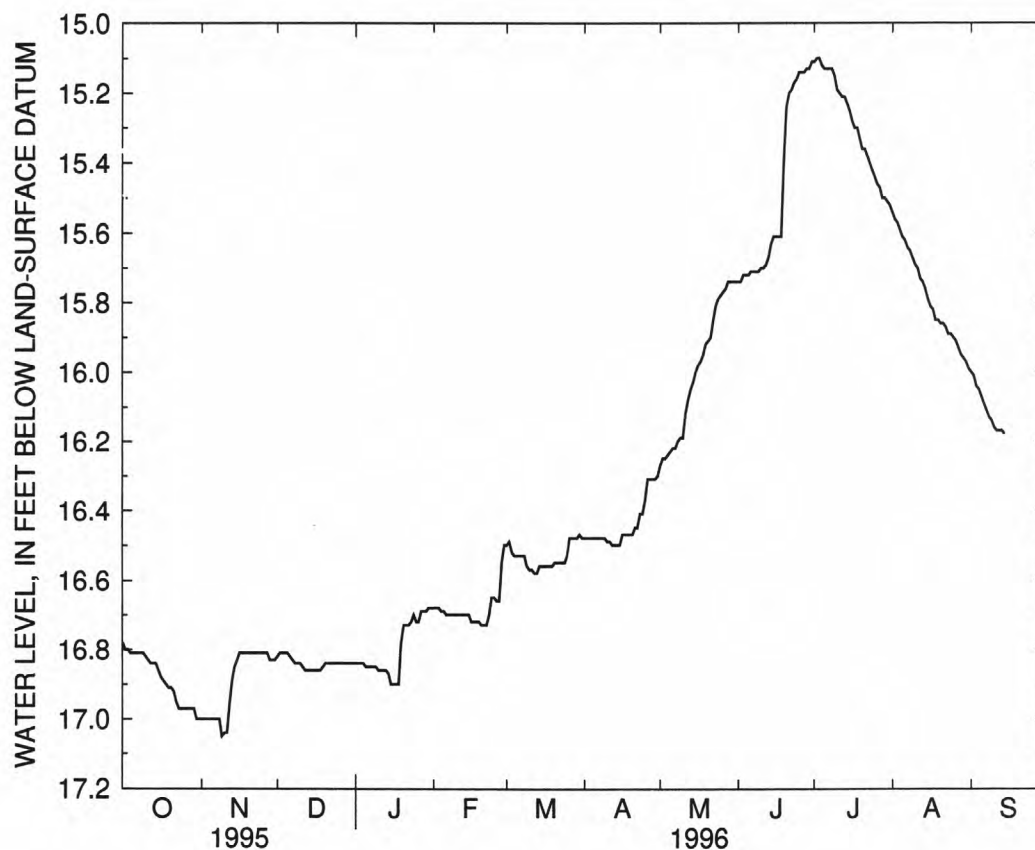
DATUM.--Elevation of land-surface datum is 930 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 2.5 ft above land-surface datum.

PERIOD OF RECORD.--April 1970 to September 1996 (discontinued).

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 12.1 ft below land-surface datum, Apr. 22, 1974; lowest recorded, 21.58 ft below land-surface datum, Oct. 30, 31, Nov. 1, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	16.81	17.00	16.81	16.85	16.69	16.53	16.48	16.23	15.72	15.13	15.61	16.07
10	16.82	17.04	16.84	16.86	16.70	16.57	16.49	16.19	15.70	15.19	15.69	16.16
15	16.86	16.83	16.86	16.90	16.70	16.56	16.50	16.00	15.61	15.25	15.79	---
20	16.91	16.81	16.84	16.73	16.73	16.55	16.47	15.91	15.24	15.36	15.86	---
25	16.97	16.81	16.84	16.72	16.65	16.53	16.37	15.78	15.14	15.44	15.90	---
EOM	17.00	16.83	16.84	16.68	16.50	16.48	16.30	15.74	15.11	15.52	15.99	---
WTR YR 1996	HIGHEST		15.10	JUL 1-4		LOWEST		17.05	NOV 9			



GROUND-WATER LEVELS

MARQUETTE COUNTY

461931087250701. Local number, 45N 25W 01DABA.

LOCATION.--Lat 46°19'31", long 87°25'07", Hydrologic Unit 04030110, 600 ft south of intersection of Panther Road and Aircobra Road, K.I. Sawyer Air Force Base, 5.0 mi northeast of Gwinn. Owner: K.I. Sawyer Air Force Base.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 125 ft, screened 121 ft to 125 ft.

INSTRUMENTATION.--Water-level recorder.

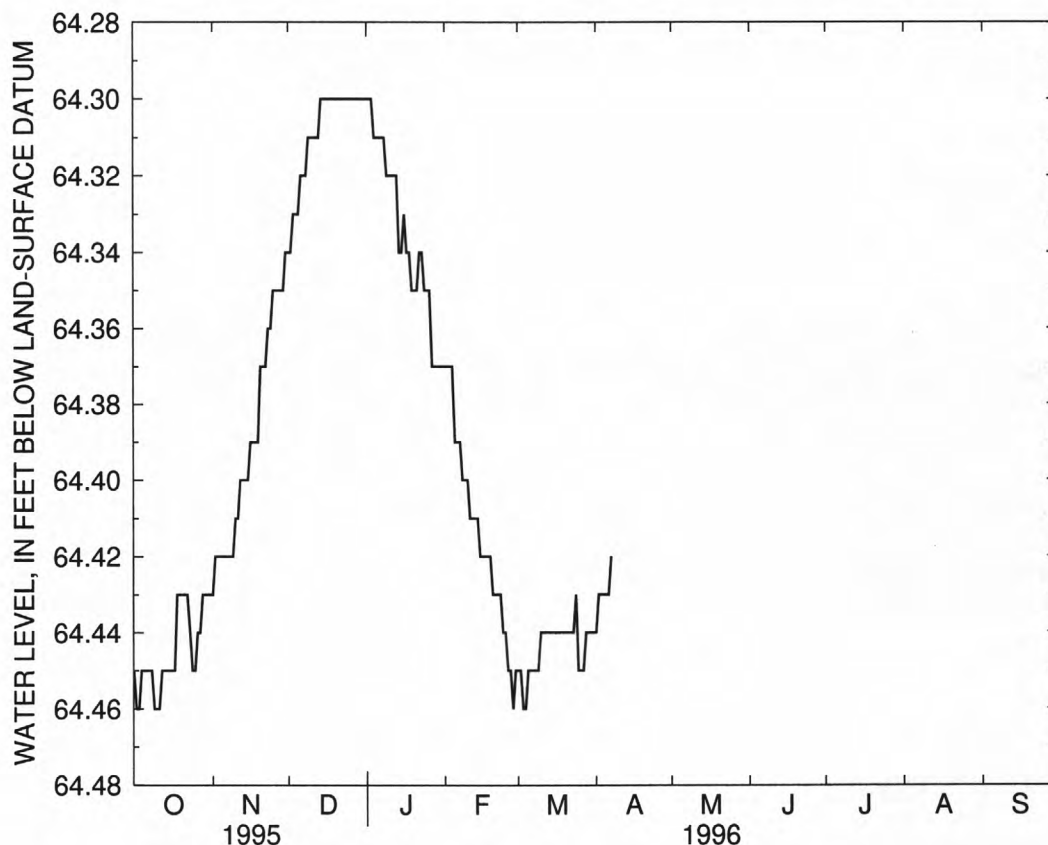
DATUM.--Elevation of land-surface datum is 1,171.59 ft above sea level. Measuring point: Top of well casing, 3.0 ft above land-surface datum.

PERIOD OF RECORD.--April 1995 to April 1996 (discontinued).

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 64.29 ft below land-surface datum, Dec. 13, 14, 1996; lowest recorded, 64.46 ft below land-surface datum, Oct. 2, 3, 9-11, 1995, Feb. 28, Mar. 3, 4, 1996.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	64.45	64.42	64.33	64.31	64.39	64.45	64.43	---	---	---	---	---
10	64.46	64.41	64.31	64.32	64.40	64.44	---	---	---	---	---	---
15	64.45	64.40	64.30	64.34	64.42	64.44	---	---	---	---	---	---
20	64.43	64.37	64.30	64.35	64.43	64.44	---	---	---	---	---	---
25	64.45	64.35	64.30	64.35	64.44	64.45	---	---	---	---	---	---
EOM	64.43	64.34	64.30	64.37	64.45	64.44	---	---	---	---	---	---
WTR YR 1996	HIGHEST		64.29	DEC 13, 14		LOWEST	64.46	OCT 2, 3, 9-11, FEB 28, MAR 3, 4				



GROUND-WATER LEVELS

MARQUETTE COUNTY

461947087210901. Local number, 45N 24W 06ABCA.

LOCATION.--Lat 46°19'47", long 87°21'09", Hydrologic Unit 04030110, near McDonald School, K.I. Sawyer Air Force Base, 5.3 mi northeast of Gwinn. Owner: K.I. Sawyer Air Force Base.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 6 in., depth 180 ft, screened 160 to 180 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 1,173.38 ft above sea level. Measuring point: Top of well casing, 3.0 ft above land-surface datum.

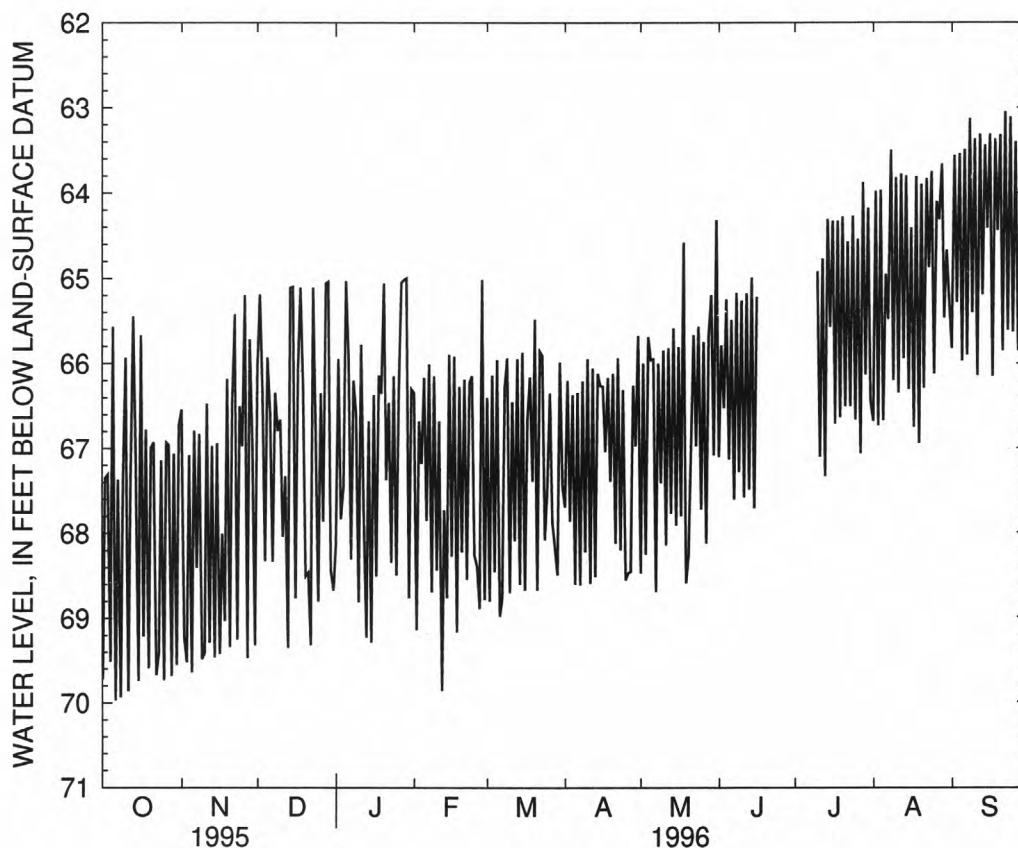
REMARKS.--Water levels affected by nearby pumping.

PERIOD OF RECORD.--August 1994 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 62.03 ft below land-surface datum, Sep. 27, 1996; lowest recorded, 74.56 ft below land-surface datum, Aug. 26, 1994.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	65.57	69.64	65.93	65.03	66.17	65.96	68.60	65.96	67.13	---	66.67	65.97
10	65.93	69.41	66.66	68.81	68.43	68.70	65.95	65.85	65.26	64.92	63.82	63.37
15	69.74	66.94	65.10	69.29	65.90	65.87	66.26	67.91	67.71	65.57	66.30	64.41
20	66.99	69.34	68.50	65.06	68.22	65.48	66.12	68.25	---	64.28	63.90	63.32
25	69.73	66.97	68.80	68.49	68.26	67.48	68.55	67.72	---	66.66	66.12	65.63
EOM	66.72	69.32	68.67	66.30	68.78	67.43	65.68	64.32	---	66.44	65.29	63.07
WTR YR 1996	HIGHEST		62.03	SEP 27		LOWEST		69.97	OCT 6			



GROUND-WATER LEVELS

OAKLAND COUNTY

423622083390701. Local number, 2N 7E 5BAAD.

LOCATION.--Lat 42°36'22", long 83°39'07", Hydrologic Unit 04090005, at Honeywell Lake Road, 3.5 mi northwest of Milford. Owner: American Aggregates Company.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Bored observation well, diameter 2 in., depth 44 ft, screened 41 ft to 44 ft.

INSTRUMENTATION.--Water-level recorder.

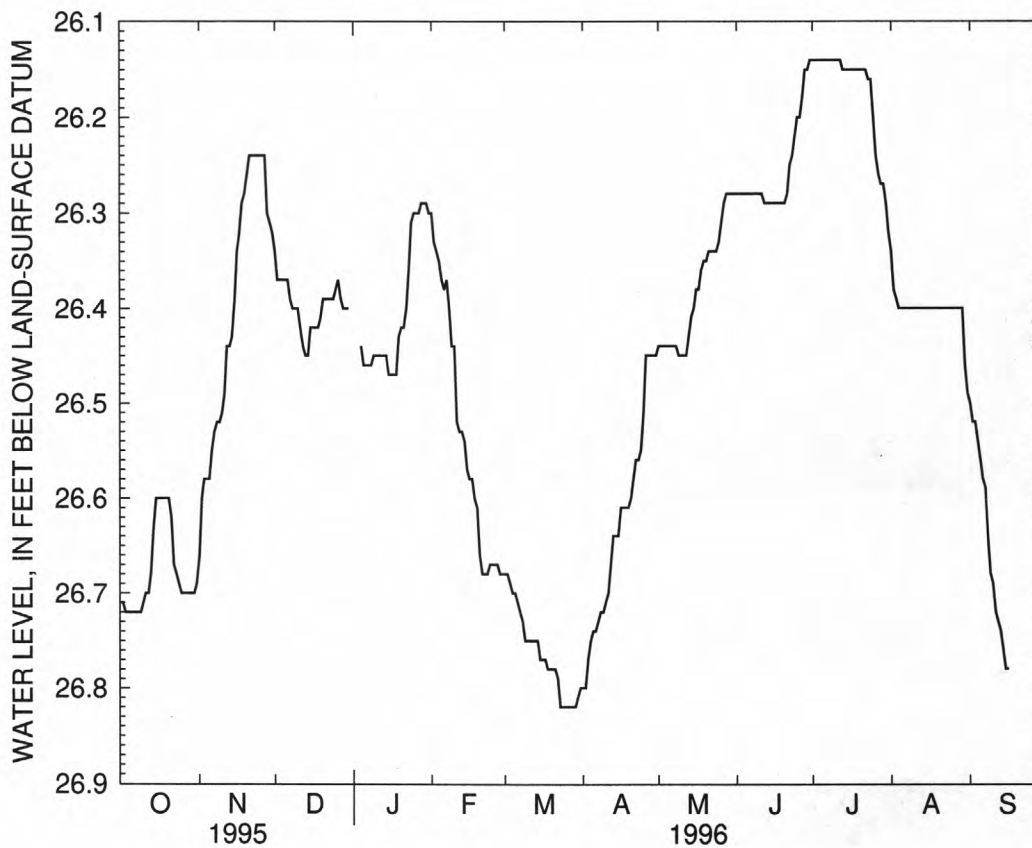
DATUM.--Elevation of land-surface datum is 1,020 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

PERIOD OF RECORD.--March 1968 to September 1996 (discontinued).

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 23.9 ft below land-surface datum, April 1976; lowest recorded, 28.89 ft below land-surface datum, Dec. 1, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	26.72	26.58	26.37	26.46	26.37	26.70	26.74	26.44	26.28	26.14	26.40	26.56
10	26.71	26.51	26.40	26.45	26.44	26.75	26.71	26.45	26.28	26.14	26.40	26.69
15	26.60	26.39	26.42	26.47	26.57	26.77	26.64	26.40	26.29	26.15	26.40	26.78
20	26.60	26.26	26.39	26.42	26.66	26.78	26.60	26.35	26.29	26.15	26.40	---
25	26.70	26.24	26.38	26.30	26.67	26.82	26.51	26.33	26.20	26.20	26.40	---
EOM	26.69	26.32	---	26.30	26.68	26.80	26.45	26.28	26.14	26.32	26.49	---
WTR YR 1996	HIGHEST			26.13	JUN 29			LOWEST	26.82	MAR 23-29		



GROUND-WATER LEVELS

OAKLAND COUNTY

424109083384301. Local number, 3N 7E 5BA.

LOCATION.--Lat 42°41'09", long 83°38'43", Hydrologic Unit 04080203, 150 ft west of Fish Lake Road, 1.2 mi east of Clyde. Owner: American Aggregates Company.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 2 in., depth 49 ft.

INSTRUMENTATION.--Water-level recorder.

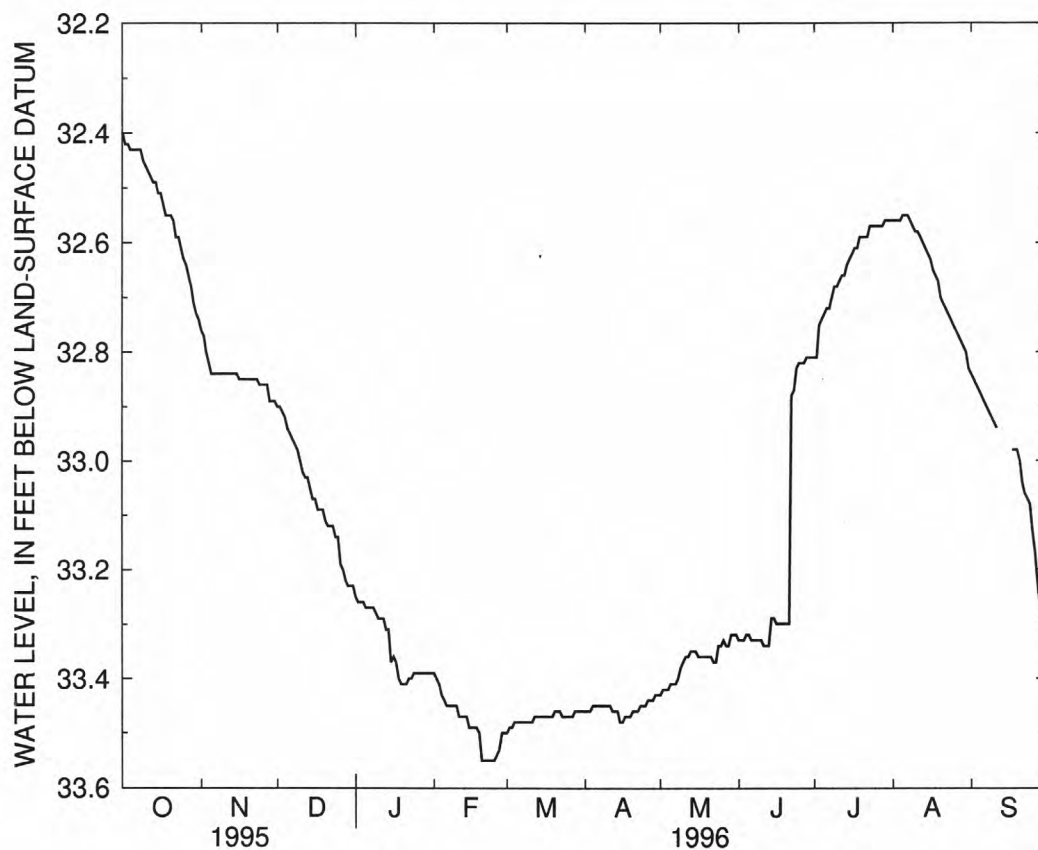
DATUM.--Elevation of land-surface datum is 1,055 ft above sea level, from topographic map. Measuring point: Top of flange, 3.0 ft above land-surface datum.

PERIOD OF RECORD.--Apr. 24, 1969 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 29.5 ft below land-surface datum, June 1976; lowest recorded, 38.7 ft below land-surface datum, December 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	32.43	32.84	32.94	33.27	33.44	33.48	33.45	33.41	33.32	32.73	32.55	32.88
10	32.46	32.84	33.00	33.29	33.45	33.48	33.45	33.37	33.33	32.68	32.58	32.93
15	32.51	32.84	33.07	33.37	33.49	33.47	33.48	33.35	33.29	32.63	32.62	---
20	32.55	32.85	33.11	33.41	33.55	33.46	33.46	33.36	33.30	32.59	32.70	33.00
25	32.63	32.86	33.14	33.39	33.55	33.47	33.45	33.34	32.82	32.57	32.75	33.13
EOM	32.74	32.89	33.23	33.39	33.50	33.46	33.43	33.32	32.81	32.56	32.83	---
WTR YR 1996	HIGHEST 32.40			OCT 1, 2		LOWEST 33.55		FEB 20-25				



GROUND-WATER LEVELS

ROSCOMMON COUNTY

442722084350701. Local number, 24N 2W 20BABA.

LOCATION.--Lat 44°27'22", long 84°35'07", Hydrologic Unit 04070007, at State Highway 103, 2 mi south of Roscommon. Owner: Michigan

Department of Natural Resources.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Jetted water-table well, diameter 8 in., depth 14 ft, open bottom.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 1,145.30 ft above sea level. Measuring point: Top of casing, 2.5 ft above land-surface datum.

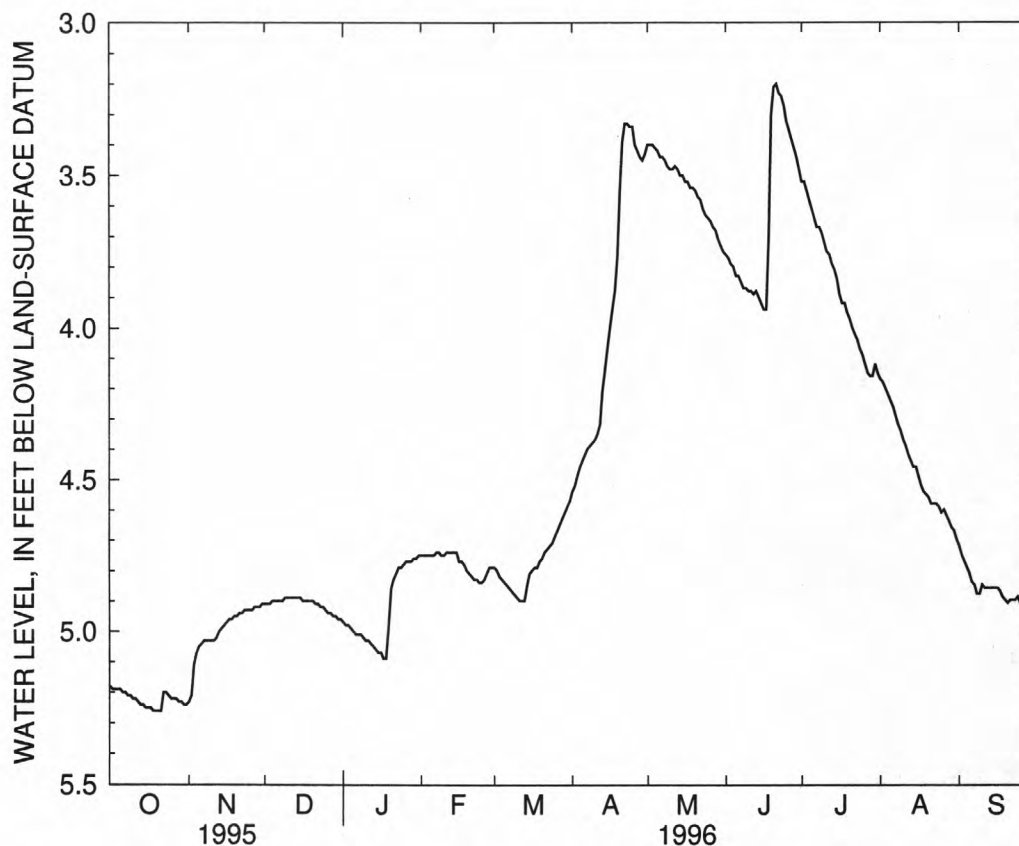
REMARKS.--Federal key well.

PERIOD OF RECORD.--December 1934 to September 1996 (discontinued).

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 2.29 ft below land-surface datum, Apr. 19, 1985; lowest recorded, 6.23 ft below land-surface datum, Dec. 6-11, 1949.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	5.19	5.05	4.90	5.00	4.75	4.84	4.44	3.42	3.83	3.61	4.24	4.81
10	5.22	5.03	4.89	5.03	4.75	4.89	4.37	3.48	3.88	3.72	4.37	4.85
15	5.25	4.98	4.89	5.07	4.74	4.81	4.07	3.50	3.92	3.84	4.46	4.86
20	5.26	4.95	4.90	4.86	4.81	4.76	3.55	3.55	3.21	3.97	4.56	4.91
25	5.22	4.93	4.93	4.78	4.84	4.69	3.34	3.64	3.32	4.09	4.61	4.91
EOM	5.24	4.91	4.96	4.75	4.79	4.57	3.43	3.75	3.48	4.15	4.70	4.83
WTR YR 1996	HIGHEST			3.19	JUN 21, 22		LOWEST	5.26	OCT 18-21			



GROUND-WATER LEVELS

WASHTENAW COUNTY

421322083441301. Local number, 3S 6E 16BCCD.

LOCATION.--Lat 42°13'22", long 83°44'13", Hydrologic Unit 04090005, at Ann Arbor Municipal Airport. Owner: City of Ann Arbor.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 10 in., depth 55 ft, screened 35 ft to 55 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 821.50 ft above sea level. Measuring point: Plywood instrument shelf, 2.5 ft above land-surface datum.

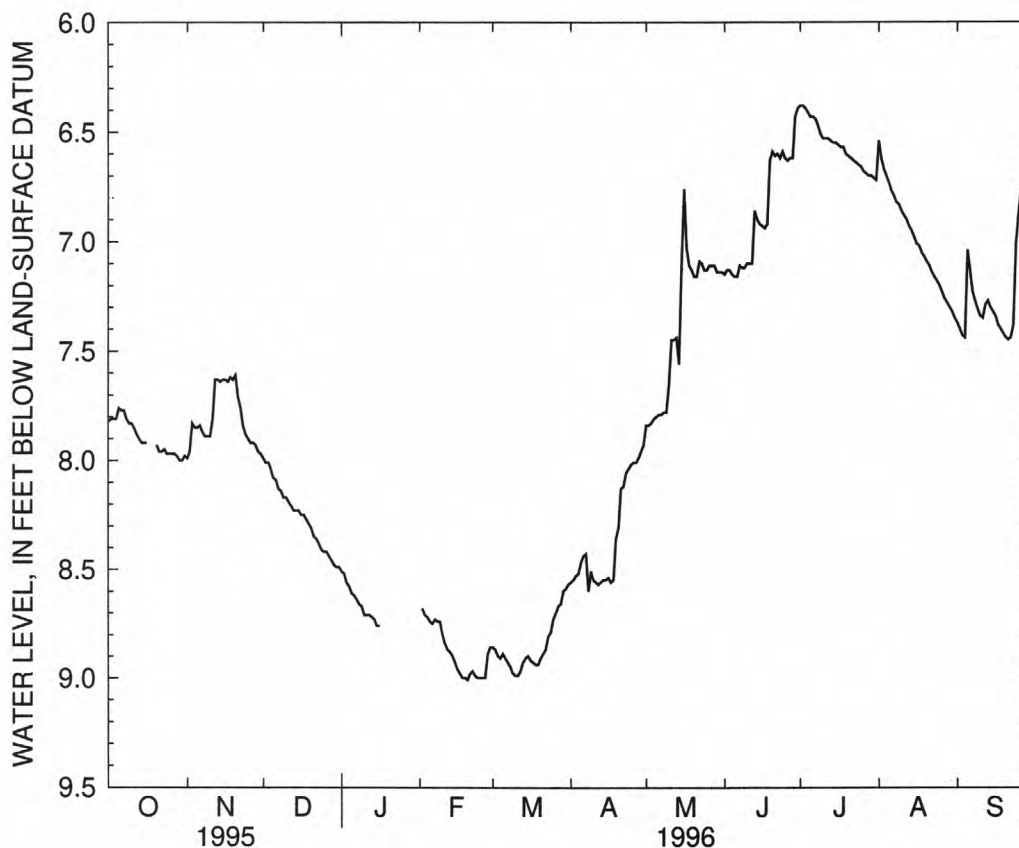
REMARKS.--Water levels affected by pumping.

PERIOD OF RECORD.--September 1963 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 0.69 ft below land-surface datum, Mar. 10, 1974; lowest recorded, 15.86 ft below land-surface datum, Oct. 18, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	7.76	7.85	8.08	8.61	8.74	8.89	8.47	7.80	7.16	6.43	6.73	7.04
10	7.83	7.89	8.17	8.71	8.80	8.99	8.55	7.66	7.10	6.53	6.86	7.34
15	7.92	7.63	8.23	8.76	8.93	8.90	8.55	7.09	6.92	6.55	6.98	7.32
20	7.93	7.61	8.31	---	9.01	8.91	8.31	7.16	6.59	6.61	7.09	7.44
25	7.97	7.90	8.42	---	9.00	8.73	8.02	7.13	6.62	6.66	7.20	6.87
EOM	7.98	7.97	8.49	---	8.86	8.57	7.93	7.14	6.39	6.72	7.35	7.02
WTR YR 1996	HIGHEST			6.23	AUG 1			LOWEST	9.01	FEB 20		



GROUND-WATER LEVELS

WASHTENAW COUNTY

421532083382001. Local number, 3S 7E 5BBAC.

LOCATION.--Lat 42°15'32", long 83°38'20", Hydrologic Unit 04090005, at Superior Road, 1.5 mi northwest of Ypsilanti. Owner: City of Ypsilanti.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 8 in., depth 70 ft, screened 40 ft to 70 ft.

INSTRUMENTATION.--Water-level recorder.

DATUM.--Elevation of land-surface datum is 720 ft above sea level, from topographic map. Measuring point: Plywood instrument shelf, 6.0 ft above land-surface datum.

REMARKS.--Water levels affected by pumping.

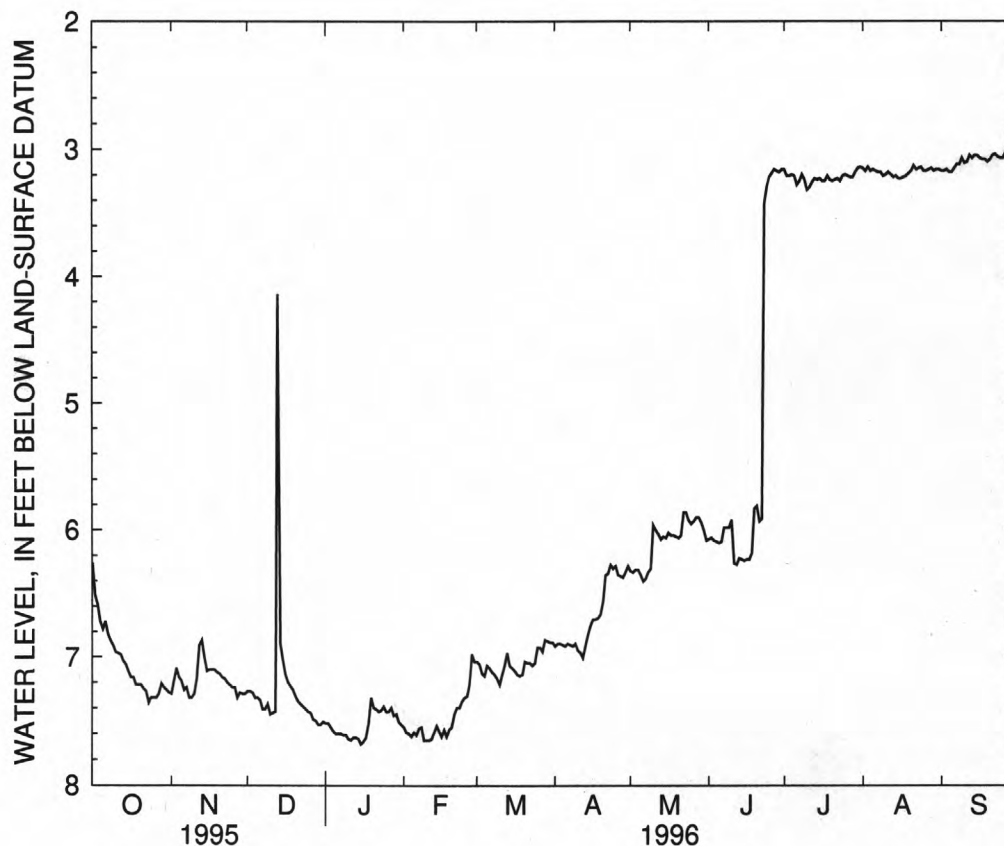
PERIOD OF RECORD.--July 1962 to September 1996 (discontinued).

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 1.22 ft below land-surface datum, Jan. 30, 1992; lowest recorded, 21.4 ft below land-surface datum, Dec. 25, 1965.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1995 TO SEPTEMBER 1996
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	6.78	7.19	7.32	7.60	7.59	7.07	6.92	6.36	6.11	3.21	3.16	3.18
10	6.96	7.29	7.45	7.64	7.65	7.22	6.95	5.97	5.93	3.32	3.20	3.11
15	7.11	7.11	7.03	7.68	7.58	7.09	6.76	6.07	6.25	3.23	3.23	3.05
20	7.22	7.13	7.31	7.40	7.55	7.04	6.57	6.07	5.82	3.25	3.17	3.08
25	7.32	7.24	7.43	7.43	7.32	6.93	6.29	5.96	3.22	3.20	3.17	3.07
EOM	7.28	7.29	7.51	7.53	7.04	6.89	6.29	6.09	3.16	3.14	3.16	2.96

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
<i>Length</i>		
inch (in.)	2.54×10^1	millimeter
	2.54×10^{-2}	meter
foot (ft)	3.048×10^{-1}	meter
mile (mi)	1.609×10^0	kilometer
<i>Area</i>		
acre	4.047×10^3	square meter
	4.047×10^{-1}	square hectometer
	4.047×10^{-3}	square kilometer
square mile (mi ²)	2.590×10^0	square kilometer
<i>Volume</i>		
gallon (gal)	3.785×10^0	liter
	3.785×10^0	cubic decimeter
	3.785×10^{-3}	cubic meter
million gallons (Mgal)	3.785×10^3	cubic meter
	3.785×10^{-3}	cubic hectometer
cubic foot (ft ³)	2.832×10^1	cubic decimeter
	2.832×10^{-2}	cubic meter
cubic-foot-per-second day [(ft ³ /s) d]	2.447×10^3	cubic meter
	2.447×10^{-3}	cubic hectometer
acre-foot (acre-ft)	1.233×10^3	cubic meter
	1.233×10^{-3}	cubic hectometer
	1.233×10^{-6}	cubic kilometer
<i>Flow</i>		
cubic foot per second (ft ³ /s)	2.832×10^1	liter per second
	2.832×10^1	cubic decimeter per second
	2.832×10^{-2}	cubic meter per second
gallon per minute (gal/min)	6.309×10^{-2}	liter per second
	6.309×10^{-2}	cubic decimeter per second
	6.309×10^{-5}	cubic meter per second
million gallons per day (Mgal/d)	4.381×10^1	cubic decimeter per second
	4.381×10^{-2}	cubic meter per second
<i>Mass</i>		
ton (short)	9.072×10^{-1}	megagram or metric ton

Sea level: In this report “sea level” refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)—a geodetic datum derived from a general adjustment for the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

U.S. DEPARTMENT OF THE INTERIOR
U.S. Geological Survey
6520 Mercantile Way, Suite 5
Lansing, MI 48911
