

Water Resources Data Michigan Water Year 1997



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MI-97-1
Prepared in cooperation with the State of Michigan
and with other agencies



CALENDAR FOR WATER YEAR 1997

1996

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						1	2	1	2	3	4	5	6	7
6	7	8	9	10	11	12	3	4	5	6	7	8	9	8	9	10	11	12	13	14
13	14	15	16	17	18	19	10	11	12	13	14	15	16	15	16	17	18	19	20	21
20	21	22	23	24	25	26	17	18	19	20	21	22	23	22	23	24	25	26	27	28
27	28	29	30	31			24	25	26	27	28	29	30	29	30	31				

1997

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							1							1
5	6	7	8	9	10	11	2	3	4	5	6	7	8	2	3	4	5	6	7	8
12	13	14	15	16	17	18	9	10	11	12	13	14	15	9	10	11	12	13	14	15
19	20	21	22	23	24	25	16	17	18	19	20	21	22	16	17	18	19	20	21	22
26	27	28	29	30	31		23	24	25	26	27	28		23	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					1	2	3	1	2	3	4	5	6	7
6	7	8	9	10	11	12	4	5	6	7	8	9	10	8	9	10	11	12	13	14
13	14	15	16	17	18	19	11	12	13	14	15	16	17	15	16	17	18	19	20	21
20	21	22	23	24	25	26	18	19	20	21	22	23	24	22	23	24	25	26	27	28
27	28	29	30				25	26	27	28	29	30	31	29	30					

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Water Resources Data Michigan Water Year 1997

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



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U.S. DEPARTMENT OF THE INTERIOR

BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY

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1998

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:

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This report was prepared in cooperation with the State of Michigan and with other agencies under the general supervision of J. Nicholas, 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 1997 water year for Michigan consists of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground-water wells. This report contains discharge records for 146 streamflow-gaging stations; stage only records for 1 stream-gaging station and 20 lake-gaging stations; stage and contents for 3 lakes and reservoirs; water-quality records for 20 streamflow-gaging stations and 1 lake-gaging station; water-level records for 31 ground-water wells. Also included are 31 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 39 discharge measuring sites and 40 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)	04001000	29
Clark Lake near Watersmeet (e)	461420089195001	30
Bond Falls Reservoir:		
Bond Falls Canal near Paulding (d)	04033500	31
Bond Falls Reservoir near Paulding (e)	04034000	32
Middle Branch Ontonagon River near Trout Creek (d)	04034500	33
Middle Branch Ontonagon River near Rockland (d)	04035500	34
Lake Gogebic near Bergland (e)	04035995	35
West Branch Ontonagon River near Bergland (d)	04036000	36
South Branch Ontonagon River:		
Cisco Lake near Watersmeet (e)	04037400	37
Cisco Branch Ontonagon River at Cisco Lake Outlet (d)	04037500	38
Ontonagon River near Rockland (d)	04040000	39
Portage River (Portage Lake):		
Sturgeon River near Sidnaw (d)	04040500	40
Sturgeon River near Alston (d)	04041500	41
Trap Rock River near Lake Linden (d)	04043050	42
Dead River:		
McClure Storage Basin Release near Marquette (d)	04043800	43
Sand River Wildlife Flooding at Sand River (e)	04044609	44
Au Train River at Forest Lake (d)	04044724	45
Grand Sable Lake near Grand Marais (e)	463910086014201	46
Muskallonge Lake near Deer Park (e)	04044796	47
Tahquamenon River near Paradise (d)	04045500	48
STREAMS TRIBUTARY TO LAKE MICHIGAN		
Black River near Garnet (d)	04046000	49
Manistique River near Manistique (d)	04056500	50
Sturgeon River near Nahma Junction (d)	04057510	51
Middle Branch Escanaba River at Humboldt (d)	04057800	52
Greenwood Reservoir near Greenwood (e)	04057811	54
Greenwood Diversion near Greenwood (d)	04057813	55
Greenwood Release (Middle Branch Escanaba River) near Greenwood (d)	04057814	56
Middle Branch Escanaba River near Princeton (d)	04058100	57
Schweitzer Creek (head of East Branch Escanaba River):		
Schweitzer Reservoir near Palmer (e)	04058190	58
Schweitzer Creek near Palmer (d)	04058200	59
Escanaba River near St. Nicholas (e)	04058940	60
Escanaba River at Cornell (d)	04059000	61
Ford River near Hyde (d)	04059500	62
Brule River near Florence, WI (d)	04060993	63
Paint River near Alpha (d)	04062000	64
Brule River near Commonwealth, WI (d)	04062011	65
Michigamme River near Crystal Falls (d)	04062500	66
Menominee River at Twin Falls near Iron Mountain (d)	04063500	67
Menominee River at Niagara, WI (d)	04065106	68
Menominee River near Vulcan (d)	04065722	69
Menominee River below Pemene Creek near Pembine, WI (d)	04066003	70
Galien River near Sawyer (d)	04096015	71
St. Joseph River at Burlington (d)	04096405	72
Coldwater River:		
South Branch Hog Creek near Allen (d)	04096515	73
Nottawa Creek near Athens (d)	04096900	74
St. Joseph River at Three Rivers (d)	04097500	75
Prairie River near Nottawa (d)	04097540	76
St. Joseph River at Mottville (d)	04099000	77
Pigeon River near Scott, IN (d)	04099750	78
North Branch Elkhart River at Cosperville, IN (d)	04100222	79
Elkhart River at Goshen, IN (d)	04100500	80
St. Joseph River at Elkhart, IN (d)	04101000	81
St. Joseph River at Niles (d)	04101500	82
Dowagiac River at Sumnerville (d)	04101800	83
Paw Paw River at Riverside (d)	04102500	84
Black River:		
South Branch Black River near Bangor (d)	04102700	85
Middle Branch Black River near South Haven (d)	04102776	86

SURFACE-WATER STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED IN THIS VOLUME--Continued

	Station number	Page
ST. LAWRENCE RIVER BASIN--Continued		
STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued		
Kalamazoo River near Marengo (d)	04103010	87
Battle Creek:		
Wanadoga Creek near Battle Creek (d)	04104945	8 ²
Battle Creek at Battle Creek (d)	04105000	8 ²
Kalamazoo River near Battle Creek (d)	04105500	9 ¹
Augusta Creek near Augusta (d)	04105700	91
Kalamazoo River at Comstock (d)	04106000	9 ²
Portage Creek at Portage (d)	04106180	9 ²
Portage Creek near Kalamazoo (d)	04106300	9 ⁴
West Fork Portage Creek near Oshtemo (d)	04106320	9 ⁵
West Fork Portage Creek at Kalamazoo (d)	04106400	9 ⁵
Rabbit River near Hopkins (d)	04108600	97
Macatawa River near Zeeland (d)	04108800	9 ⁷
Grand River at Jackson (d)	04109000	9 ⁷
Grand River near Eaton Rapids (d)	04111000	10 ⁷
Red Cedar River:		
Deer Creek near Dansville (d)	04111500	101
Sloan Creek near Williamston (d)	04112000	10 ⁷
Red Cedar River at East Lansing (d)	04112500	10 ⁷
Sycamore Creek near Holt (d)	04112850	10 ⁴
Grand River at Lansing (d)	04113000	10 ⁷
Grand River at Portland (d)	04114000	107
Maple River at Maple Rapids (d)	04115000	10 ⁷
Fish Creek near Crystal (d)	04115265	10 ⁷
Grand River at Ionia (d)	04116000	110
Thornapple River:		
Quaker Brook near Nashville (d)	04117000	111
Thornapple River near Hastings (d)	04117500	112
Rogue River near Rockford (d)	04118500	113
Grand River at Grand Rapids (d)	04119000	114
Muskegon River:		
Higgins Lake near Roscommon (b,c,e,m,o,t)	442805084411001	116
Houghton Lake near Houghton Lake Heights (e)	442400084472801	130
Clam River:		
Lake Mitchell-Cadillac at Cadillac (e)	441508085244001	131
Clam River at Vogel Center (d)	04121300	132
Muskegon River at Evart (d)	04121500	133
Muskegon River near Stanwood (t,o)	04121660	134
Muskegon River near Oxbow (t,o)	04121680	138
Little Muskegon River near Oak Grove (d,t,o)	04121944	142
Muskegon River near Croton (d,t,o)	04121970	147
Bear Creek near Muskegon (d)	04122100	152
White River near Whitehall (d)	04122200	153
Pere Marquette River at Scottville (d)	04122500	154
Bear Lake near Kalkaska (e)	444351084561801	155
Manistee River near Sherman (d,t,o)	04124000	156
Manistee River near Mesick (d,t,o)	04124200	161
Pine River:		
East Branch Pine River near Tustin (d)	04124500	166
Pine River near Hoxeyville (d,t,o)	04125460	167
Manistee River near Wellston (d,t,o)	04125550	172
Platte River at Honor (d)	04126740	177
Glen Lake near Glen Arbor (e)	445331085564501	178
Arbutus Lake near Mayfield (e)	443903085312101	179
Jordan River near East Jordan (d)	04127800	180
Walloon Lake at Walloon Lake (e)	451540084560301	181
STREAMS TRIBUTARY TO LAKE HURON		
Pine River near Rudyard (d)	04127918	182
East Lake near Fibre (e)	04127937	182
Burt Lake (head of Cheboygan River):		
Crooked Lake near Conway (e)	452600084472001	184
Douglas Lake near Pellston (e)	453345084401501	185
Sturgeon River at Wolverine (d)	04127997	186
Pigeon River near Vanderbilt (d)	04128990	187
Cheboygan River (continuation of Indian River):		
Black River near Tower (d)	04130500	188
Au Sable River:		
South Branch Au Sable River:		
Lake St. Helen near St. Helen (e)	442409084274001	189
South Branch Au Sable River near Luzerne (d)	04135700	190
North Branch Au Sable River:		
Otsego Lake near Gaylord (e)	445512084415301	191
Au Sable River near Red Oak (d,t,o)	04136000	192

SURFACE-WATER STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED IN THIS VOLUME--Continued

	Station number	Page
ST. LAWRENCE RIVER BASIN--Continued		
STREAMS TRIBUTARY TO LAKE HURON--Continued		
Au Sable River at Mio (d,t,o)	04136500	197
Au Sable River near McKinley (d,t,o)	04136900	202
Au Sable River near Curtisville (d,t,o)	04137005	207
Au Sable River near South Branch (t,o)	04137020	212
Au Sable River near Glennie (t,o)	04137025	216
Au Sable River near Sidtown (t,o)	04137030	220
Au Sable River near Au Sable (d,t,o)	04137500	224
Rifle River near Sterling (d)	04142000	229
Shiawassee River (head of Saginaw River) at Owosso (d)	04144500	230
Flint River:		
South Branch Flint River:		
Farmers Creek near Lapeer (d)	04146000	231
South Branch Flint River near Columbiaville (d)	04146063	232
Flint River near Otisville (d)	04147500	233
Kearsley Creek near Davison (d)	04148140	234
Flint River near Flint (d)	04148500	235
Cass River at Cass City (d)	04150500	236
Cass River at Frankenmuth (d)	04151500	237
Tittabawassee River:		
South Branch Tobacco River near Beaverton (d)	04152238	238
Chippewa River near Mount Pleasant (d)	04154000	239
Pine River at Alma (d)	04155000	240
Pine River near Midland (d)	04155500	241
Tittabawassee River at Midland (d)	04156000	242
Saginaw River at Saginaw (d,c,m,s)	04157000	243
STREAMS TRIBUTARY TO ST. CLAIR RIVER		
Black River near Jeddo (d,b,c,s)	04159492	246
Mill Creek near Avoca (d)	04159900	251
Belle River:		
North Branch Belle River at Imlay City (d)	04160570	252
Belle River at Memphis (d)	04160600	253
STREAMS TRIBUTARY TO LAKE ST. CLAIR		
Clinton River:		
Sashabaw Creek near Drayton Plains (d)	04160800	254
Clinton River near Drayton Plains (d)	04160900	255
Paint Creek at Rochester (d)	04161540	256
Stony Creek near Romeo (d)	04161580	257
Stony Lake near Washington (e)	04161790	258
Stony Creek near Washington (d)	04161800	259
Clinton River at Sterling Heights (d,b,c,p,s)	04161820	260
Red Run:		
Plum Brook at Utica (d)	04163400	285
Clinton River near Fraser (d)	04164000	286
North Branch Clinton River:		
East Pond Creek at Romeo (d)	04164100	287
Coon Creek:		
East Branch Coon Creek at Armada (d)	04164300	288
North Branch Clinton River near Mount Clemens (d)	04164500	289
Clinton River at Mount Clemens (d)	04165500	290
STREAMS TRIBUTARY TO DETROIT RIVER		
River Rouge at Birmingham (d)	04166000	291
River Rouge at Southfield (d)	04166100	292
Evans Ditch at Southfield (d)	04166200	293
Upper River Rouge at Farmington (d)	04166300	294
River Rouge at Detroit (d)	04166500	295
Middle River Rouge near Garden City (d)	04167000	296
Lower River Rouge at Inkster (d)	04168000	297
STREAMS TRIBUTARY TO LAKE ERIE		
Huron River at Milford (d)	04170000	298
Kent Lake near New Hudson (e)	04170490	299
Huron River near New Hudson (d)	04170500	300
Huron River near Hamburg (d)	04172000	301
Mill Creek near Dexter (d)	04173500	302
Huron River at Ann Arbor (d)	04174500	303
Willow Run near Rawsonville (d)	04174950	304
River Raisin near Manchester (d,b,c,s)	04175600	305
River Raisin near Adrian (d)	04176000	310
River Raisin near Monroe (d)	04176500	311
Otter Creek at La Salle (d)	04176605	312

GROUND-WATER WELLS, BY COUNTY, FOR WHICH RECORDS ARE PUBLISHED IN THIS VOLUME

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Oakland	405
Washtenaw	406

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	1978-42
Manistique River at Germfask, MI (d)	04049500*	341	1978-70
Goose Pen Outlet at Germfask, MI (d)	04050000	--	1979-41
Grays Creek near Germfask, MI (d)	04050500	a36	1978-40
Pine Creek near Germfask, MI (d)	04051000	a11	1978-40
Sand Creek near Germfask, MI (d)	04051500	a6	1978-40
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	1937-56
Indian Lake near Manistique, MI (e)	04057000	302	1937-95
Indian River near Manistique, MI (d)	04057000*	302	1937-71, 1997-93
Manistique River above Manistique, MI (d)	04057004	a1,445	1994-96
Sturgeon River near St. Jacques, MI (d)	04057500	167	1957-52
Middle Branch Escanaba River near Greenwood, MI (d)	04057820*	73.3	1977-82
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, 1977-78
Goose Lake Outlet near Sands Station, MI (d)	04058400*	37.5	1967-82
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	1949-80
Paint River at Crystal Falls, MI (d)	04061500*	597	1944-96
Peshekee River near Michigamme, MI (d)	04062100	66.5	1961-68, 1997-95
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 Florence, WI (d)	04063000	1,760	1914-96
Menominee River near Iron Mountain, MI (d)	04065000	2,430	1889-99, 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

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			
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
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	1905-73
Portage Creek near Portage, MI (d)	04106190	18.6	1905-67
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	1900-36, 1909-93
Kalamazoo River at New Richmond, MI (d)	04108660	a1,980	1949-96
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	1904-56
Looking Glass River near Eagle, MI (d)	04114500	281	1944-96
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
Little Muskegon River near Morley, MI (d)	04121900	121	1967-96
Muskegon River at Newaygo, MI (d)	04122000	a2,350	1909-20, 1901-93
Muskegon River at Muskegon, MI (d)	04122150	2,680	1904-96
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	1902-63
Pine River near Hoxeyville, MI (d)	04125500	251	1902-82
Manistee River near Manistee, MI (d)	04126000	1,677	1902-93
Little Manistee River near Freesoil, MI (d)	04126200*	178	1907-75
Little Manistee River near Stronach, MI (d)	04126500	a196	1931
Boardman River near Mayfield, MI (d)	04127000	182	1902-89
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

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			
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	1943-81
Rainy River near Onaway, MI (d)	04131000	75.7	1942-82
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	1943-81
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 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	1950-92
South Branch Shepards Creek near Selkirk, MI (d)	04141000*	1.15	1952-78
West Branch Rifle River near Selkirk, MI (d)	04141500*	a52	1952-83
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

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			
State Drain near Sebewaing, MI (d)	04157500	67.3	1940-54
Columbia Drain near Sebewaing, 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
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
STREAMS TRIBUTARY TO LAKE ST. CLAIR			
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
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)	04175100	851	1904-11

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

Station name	Station number	Drainage area (mi ²)	Period of record
STREAMS TRIBUTARY TO LAKE ERIE--Continued			
Huron River at Flat Rock, MI (e)	04175100	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				
Washington Creek at Windigo, MI	04001000	13.2	Temp.	1965-91
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.	1971-77
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 1977-77
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.	1973-77
Greenwood Afterbay near Greenwood, MI	04057812	67.4	Temp.	1973-83
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.	1973-77
Black River near Republic, MI	04057900	34.4	Sed.	1962-63, 1965,
Middle Branch Escanaba River near Ishpeming, MI	04058000	128	Temp.	1962-63 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.	1977-81
			Sed.	1955-64 1962-63
Escanaba River at Cornell	04059000	870	Temp., S.C.	1975-81
Ford River near Hyde, MI	04059500	450	Temp.	1956-81
Paint River near Alpha, MI	04062000	631	S.C.	1975-81
Peshekee River near Champion, MI	04062200	133	Temp.	1953-54, 1956-57
Michigamme River near Witch Lake, MI	04062400	316	Temp., Sed.	1967, 1964-78 1965-68
East Branch Sturgeon River at Hardwood, MI	04065397	90.8	Temp.	1978-88
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.	1976-77
			Sed.	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, 1977
St. Joseph River at Clarendon, MI	04096340	144	Temp., Sed.	1975-76, 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, 1972-73
Portage Creek at Kalamazoo, MI	04106500	46.8	S.C. Temp., S.C. Temp.	1968, 1972-75, 1976-86
Kalamazoo River near Cooper Center, MI	04106770	1,248	Temp. Temp., S.C.	1968, 1970, 1969, 1971-75
Kalamazoo River at Saugatuck, MI	04108690	a2,020	S.C. Temp, S.C.	1974, 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 Evart, 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.	1957-83
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
			Temp., S.C.	
Shiawassee River at Byron, MI	04144000	365	Temp.	1952-81
Shiawassee River at Owosso, MI	04144500	538	Sed.	1956-72
Cass River at Frankenmuth, MI	04151500	841	Sed.	1956-72
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.	1966, 1979-82
			Temp.	
STREAMS TRIBUTARY TO LAKE ST. CLAIR				
Clinton River near Drayton Plains, MI	04160900	79.2	Temp.	1952-74
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.	1956-72
			Temp., S.C.	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 146 streamflow-gaging stations, 31 crest-stage partial-record stations, 2 low-flow partial-record stations, and 39 miscellaneous sites; (2) stage only records for 1 stream-gaging station and 20 lake-gaging stations; (3) stage and content records for 3 lakes and reservoirs; (4) water-quality records for 20 streamflow-gaging stations, 1 lake-gaging station, 10 miscellaneous sites, and 30 ground-water wells; (5) water-level records for 31 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-97-1." 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, James R. DeSana, Director.

Assistance with funds or services was given by the U.S. Army Corps of Engineers in collecting records for 6 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); Furon 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 Energy; Cleveland Cliffs Iron Co.; Dow Chemical Co.; French Paper Co.; Lansing Board of Water and Light; 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 below normal and continued below normal during October. By November, streamflow had returned to the normal range where it remained through the winter months and into early spring. The months of April and May had above normal streamflow partially due to the large amount of snowfall received during the winter. However, by June, and for the remainder of the year streamflow became increasingly deficient. Mean discharge for both August and September was less than 50 percent of the long term monthly median flow and the September mean was below the twenty-fifth percentile for the long term median. The 1997 annual mean discharge of 204 ft³/s (cubic feet per second) was only slightly below the 1961-1990 yearly mean discharge of 218 ft³/s.

In the Lower Peninsula, streamflow at Muskegon River at Evart began the year slightly above the normal range. Streamflow then became close to the long term monthly median for the remainder of the year, except during the months of January through March. These months had the most significant departure from normal and recorded monthly mean flows above the seventy-fifth percentile. By September, streamflow returned to the normal range. At the Red Cedar River at East Lansing streamflow began the year in the normal range and remained there through December. Like the Muskegon River at Evart, it also became above normal beginning in January and continuing through March. In April, streamflow returned close to normal and remained in the normal range until September when it increased to above normal. The September monthly mean discharge was above the seventy-fifth percentile for the long term median discharge.

During June, locally heavy precipitation in southwestern Michigan caused new peak discharges for the period of record at three long-term gaging stations and one crest-stage partial-record station. In the Rabbit River basin, the station near Hopkins had a peak discharge of 3,740 ft³/s and the station at Hamilton, a crest-stage partial-record station, had a peak discharge of 12,000 ft³/s. Both peaks occurred on June 21 and both had recurrence frequencies of greater than 100 years. Peak discharges for the Macatawa River near Zeeland of 8,810 ft³/s and for West Fork Portage Creek at Kalamazoo of 46 ft³/s were recorded on June 21. Both discharges had recurrence frequencies of greater than 100 years. A February storm, which was responsible for many annual peaks across the southern half of the lower peninsula, also established two peak discharges for the period of record. South Branch Black River near Bangor had a discharge of 2,390 ft³/s on February 21 and Plaster Creek at Grand Rapids had a discharge of 2,300 ft³/s on February 22. Recurrence frequencies for these discharges were between 50 and 100 years.

Water levels of Lake Superior, Lakes Michigan-Huron and Lake Erie were above the long-term average at the end of the 1997 water year continuing the trend begun in late spring 1996 when they rose from near normal levels. Water levels for Lake St. Clair were also above average at the end of the 1997 water 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 were close to average, ending the year about 0.2 ft above average. Water levels for Lakes Michigan-Huron ended the year about 1.8 ft above average, and water levels for Lake St. Clair and Lake Erie ended the year about 2.0 ft above the long-term average.

Water Quality

Surface-water-quality data were collected at one long-term sampling location on the Saginaw River and at 3 locations in southeastern Michigan as part of the Lake Erie-Lake St. Clair Basin NAWQA study. Continuous water temperature and dissolved oxygen record were collected at 16 other sampling stations during the 1997 water year.

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 31 wells during the 1997 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 1997 water year generally followed seasonal patterns. Ground-water levels at one well in the southwestern Lower Peninsula (Kalamazoo County) established a new low for the period of record. This well also set new low records in 1995 and 1996; monitoring has occurred at this station for 15 years. It is important to note that the Kalamazoo County well has historically been affected by pumpage. In the eastcentral Lower Peninsula (Huron County) one well reached a new record high water level. The Huron County well has been monitored for only 6 years.

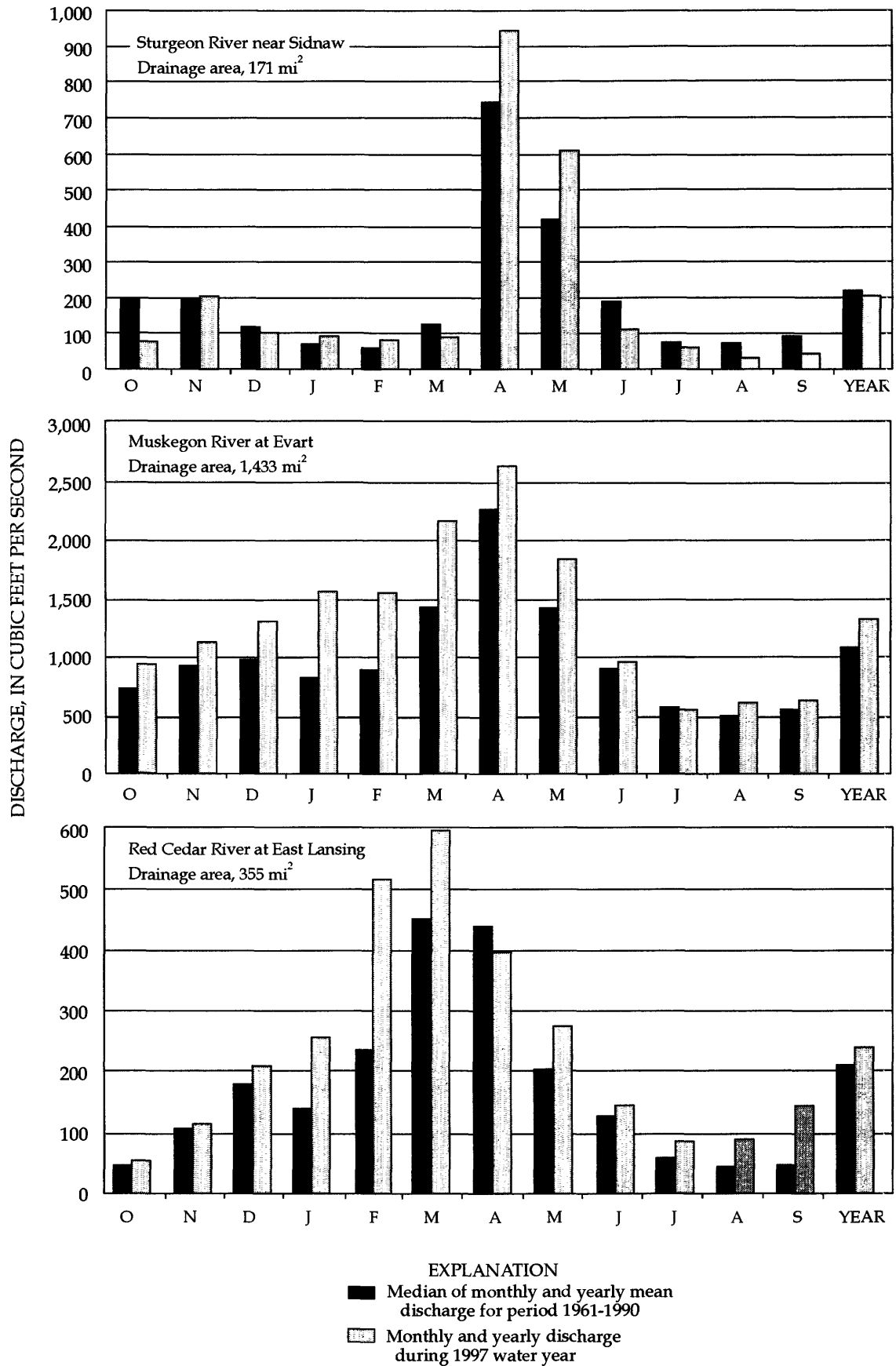


Figure 1. Discharge during 1997 water year compared with median discharge for period 1961-90 for three representative stations.

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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://wwwrvares.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 1997 water year that began October 1, 1996, and ended September 30, 1997. 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.)

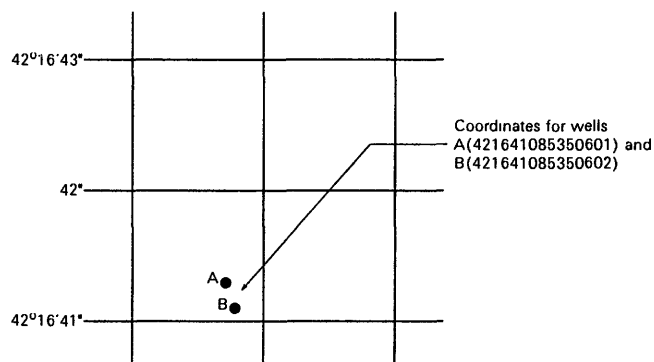


Figure 2.--System for numbering wells (latitude and longitude).

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.

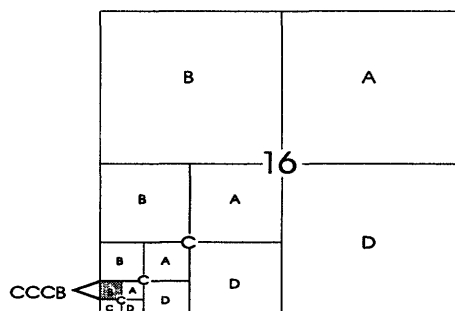


Figure 3.--Local well numbering system in Michigan.

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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 Record's" 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, gate-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 figure 6.

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 Louisville, Kentucky and Heidelberg College water quality laboratory in Tiffin, Ohio. 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.
V	Analyte was detected in both the environmental sample and the associated blanks.

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.

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Data Collection and Computation

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

Tables of water-level data are presented by counties arranged in alphabetical order. The prime identification number for a given well is the 15-digit number that appears 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.

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ACCESS TO USGS WATER DATA

The U.S. Geological Survey provides near real-time stage and discharge data for many of the gaging stations equipped with the necessary telemetry and historic daily-mean and peak-flow discharge data for most current or discontinued gaging stations through the world wide web (WWW). These data may be accessed at:

<http://water.usgs.gov>

Some water-quality and ground-water data also are available through the WWW. In addition, data can be provided in various machine-readable formats on magnetic tape or 3-1/2 inch floppy disk. Information about the availability of specific types of data or products, and user charges, can be obtained locally from each of the Water Resources Division District offices (see address on the back of the title page).

DEFINITION OF TERMS

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

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

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.

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.

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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.

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 μm 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.

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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.

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's data system, National Water Information System (NWIS), to uniquely identify a specific constituent. The codes used in NWIS are the same as those used in the U.S. Environmental Protection Agency's data system, STORET.

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

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

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

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

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

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

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.

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 [$\text{mg (C/m}^2\text{) / time}$ for periphyton and macrophytes and $\text{mg (C/m}^3\text{) / time}$ 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.

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Milligrams of oxygen per area or volume per unit time [$\text{mg } (\text{O}_2/\text{m}^2) / \text{time}$] for periphyton and macrophytes and [$\text{mg } (\text{O}_2/\text{m}^3) / \text{time}$] 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 (ft^3/s) x 0.0027.

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

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.

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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 emerged 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.

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
Genus	<u>Hexagenia</u>
Species	<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.

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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, 1997, is called the "1997 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.
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- 3-A19. *Levels at streamflow gaging stations*, by E. J. Kennedy: USGS--TWRI Book 3, Chapter A19. 1990. 31 pages.
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- 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

- 3-B7. *Analytical solutions for one-, two-, and three-dimensional solute transport in ground-water systems with uniform flow*, by E. J. Wexler: USGS--TWRI Book 3, Chapter B7. 1992. 190 pages.
- 3-C1. *Fluvial sediment concepts*, by H. P. Guy: USGS--TWRI Book 3, Chapter C1. 1970. 55 pages.
- 3-C2. *Field methods for measurement of fluvial sediment*, by H. P. Guy and V. W. Norman: USGS--TWRI Book 3, Chapter C2. 1970. 59 pages.
- 3-C3. *Computation of fluvial-sediment discharge*, by George Porterfield: USGS--TWRI Book 3, Chapter C3. 1972. 66 pages.
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- 4-A2. *Frequency curves*, by H. C. Riggs: USGS--TWRI Book 4, Chapter A2. 1968. 15 pages.
- 4-B1. *Low-flow investigations*, by H. C. Riggs: USGS--TWRI Book 4, Chapter B1. 1972. 18 pages.
- 4-B2. *Storage analyses for water supply*, by H. C. Riggs and C. H. Hardison: USGS--TWRI Book 4, Chapter B2. 1973. 20 pages.
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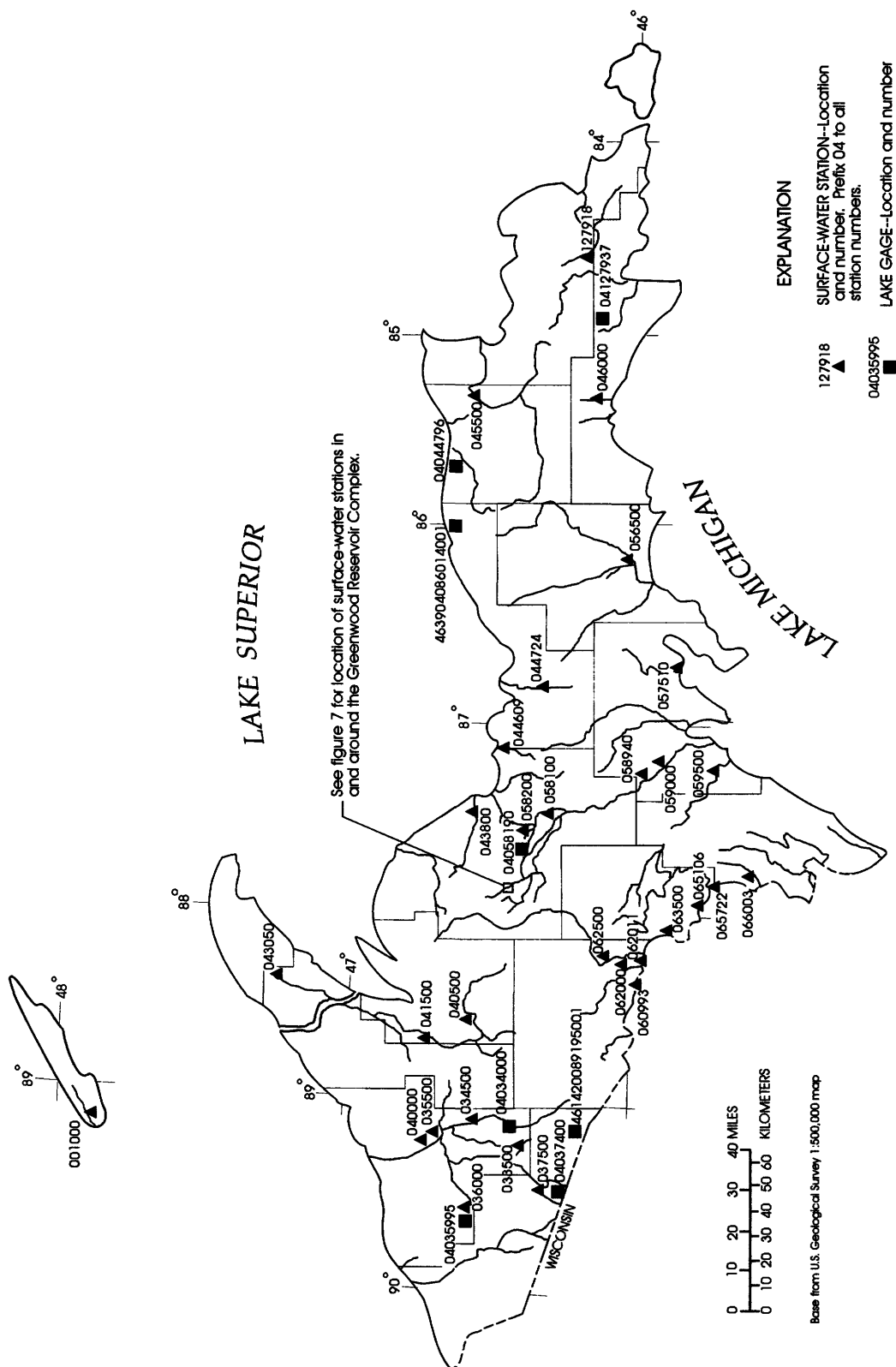


Figure 4. Identification number and location of active surface-water gaging stations in the Upper Peninsula of Michigan.

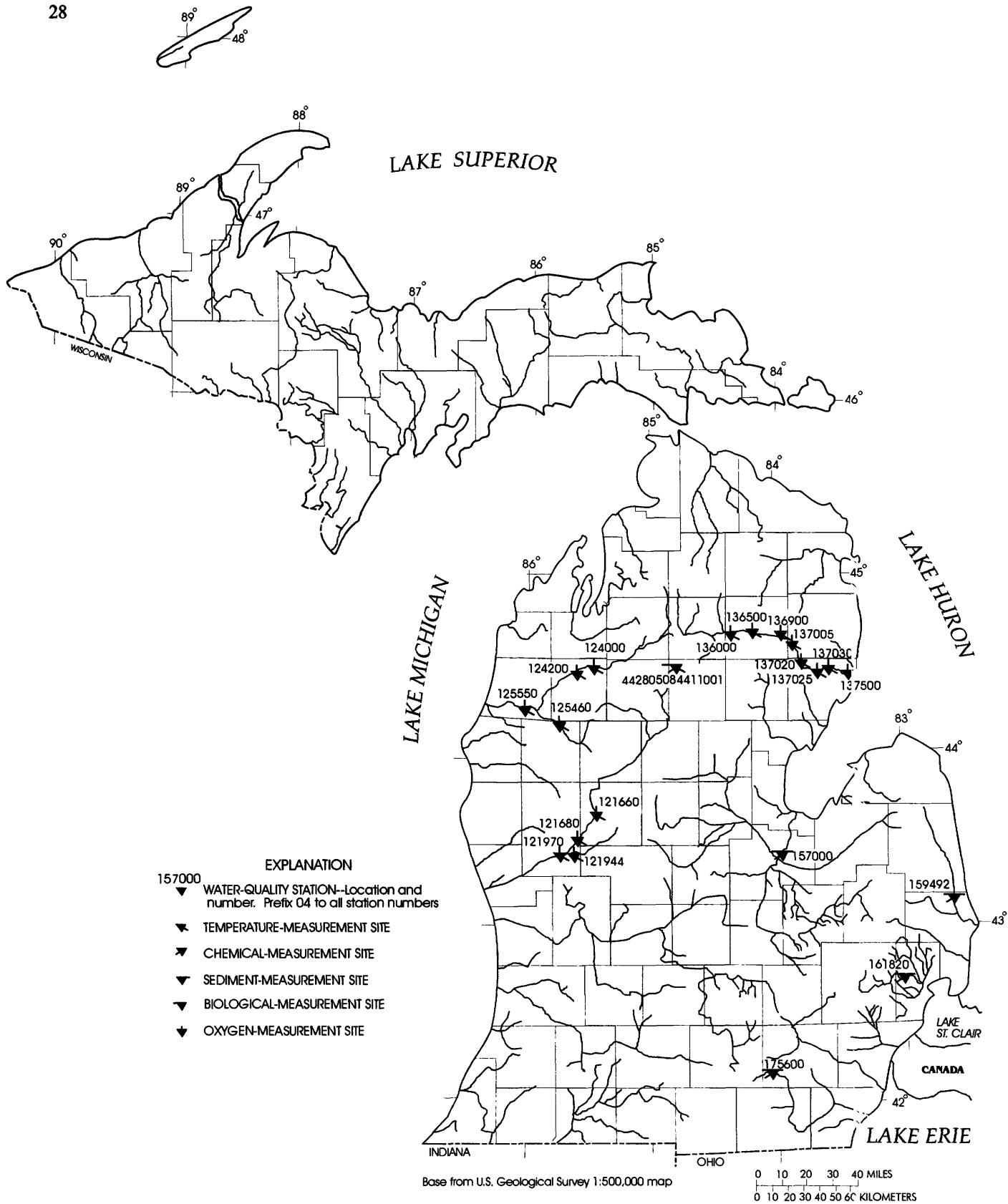


Figure 6. Identification number and location of active surface-water-quality stations in Michigan.

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.

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.--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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	e30	e60	7.1	5.0	3.3	e20	68	11	6.7	1.4	1.2
2	9.3	e25	e45	7.1	e4.8	3.3	35	59	9.8	23	1.3	1.1
3	e7.0	e20	e28	7.1	e4.6	3.3	67	55	8.9	65	1.3	1.0
4	e5.0	e18	e20	7.1	e4.5	3.3	98	51	7.8	55	1.2	1.0
5	e4.0	e25	e15	7.1	4.4	3.3	105	48	7.2	34	1.0	1.2
6	e3.3	e30	e13	e7.0	4.4	3.3	e200	44	6.6	23	1.1	1.4
7	e3.2	e25	e12	e7.0	4.4	3.3	e160	38	7.8	18	1.2	1.3
8	e3.1	e22	e11	e6.8	4.4	3.3	e120	54	7.5	13	1.2	1.3
9	e3.3	e20	e10	e6.5	4.4	3.3	e90	58	6.3	10	1.2	1.5
10	e3.3	e18	e9.0	e6.5	4.4	3.3	e65	47	5.5	8.4	1.3	1.3
11	e3.5	e15	e9.0	e6.5	4.4	3.3	e50	39	4.8	7.2	1.2	1.2
12	e3.3	e14	e9.0	e6.2	4.3	3.2	e40	44	4.5	6.1	1.2	1.1
13	e3.3	e14	e9.0	e6.0	4.2	e3.2	e38	39	4.8	5.7	1.2	1.1
14	e3.2	e13	e9.0	e6.0	3.9	e3.2	e50	34	4.0	5.5	1.1	1.1
15	e3.2	e30	e9.0	e6.0	3.8	e3.2	e70	35	3.8	4.7	1.1	1.1
16	e3.2	e50	e9.0	e5.8	3.8	e3.2	e100	31	4.3	5.4	1.3	1.1
17	e10	e120	e9.0	e5.5	3.8	e3.2	e65	29	3.9	5.7	1.2	5.0
18	e18	e80	e9.0	e5.4	3.7	3.1	e55	26	4.2	4.5	1.1	2.6
19	e13	e50	e9.0	e5.2	3.5	3.1	e60	32	3.9	3.6	1.0	2.4
20	e10	e35	e9.0	5.2	3.5	e3.1	e75	34	3.6	3.3	2.4	2.1
21	e9.0	e26	e9.0	5.2	3.5	e3.1	e110	30	3.3	3.2	2.8	1.7
22	e10	e21	e8.8	5.2	3.5	e3.0	e100	26	2.9	2.9	1.9	1.6
23	e11	e18	e8.5	5.2	3.5	3.0	e90	23	3.7	2.5	1.6	1.6
24	e15	e17	e8.0	5.2	3.5	3.2	e80	23	11	2.3	1.5	1.5
25	e20	e15	e8.5	5.2	3.5	3.3	108	21	45	2.2	1.4	1.5
26	e15	e14	e8.0	5.2	3.3	3.4	113	19	26	2.3	1.4	1.5
27	e13	e14	7.7	5.2	3.3	3.8	116	17	17	2.2	1.3	1.4
28	e10	e13	7.6	5.2	3.3	9.8	100	15	12	1.9	1.2	1.5
29	e10	e13	7.4	5.2	---	e20	100	14	9.1	1.6	1.2	1.7
30	e100	e30	7.3	5.2	---	e30	91	13	7.2	1.5	1.2	1.6
31	e60	---	7.1	5.2	---	e23	---	12	---	1.4	1.3	---
TOTAL	395.2	835	400.9	184.3	111.6	170.4	257.1	1078	257.4	331.8	41.8	46.7
MEAN	12.7	27.8	12.9	5.95	3.99	5.50	85.7	34.8	8.58	10.7	1.35	1.56
MAX	100	120	60	7.1	5.0	30	200	68	45	65	2.8	5.0
MIN	3.1	13	7.1	5.2	3.3	3.0	20	12	2.9	1.4	1.0	1.0
CFSM	.97	2.11	.98	.45	.30	.42	6.49	2.63	.65	.81	.10	.12
IN.	1.11	2.35	1.13	.52	.31	.48	7.25	3.04	.73	.94	.12	.13

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 1997, BY WATER YEAR (WY)

MEAN	12.0	14.9	7.37	4.29	3.70	12.1	68.8	40.8	13.5	7.10	4.28	7.44
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	1966	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 1996 CALENDAR YEAR		FOR 1997 WATER YEAR		WATER YEARS 1965 - 1997	
ANNUAL TOTAL	7910.4		6424.1			
ANNUAL MEAN	21.6		17.6		16.4	
HIGHEST ANNUAL MEAN					33.1	
LOWEST ANNUAL MEAN					8.42	
HIGHEST DAILY MEAN	439	May 18	(e)200	Apr 6	439	May 18 1996
LOWEST DAILY MEAN	2.0	Feb 19	1.0	Aug 5	.44	Aug 25 1977
ANNUAL SEVEN-DAY MINIMUM	2.1	Feb 17	1.1	Aug 13	.47	Aug 19 1977
INSTANTANEOUS PEAK FLOW			(e)230	Apr 6	(a)657	May 18 1996
INSTANTANEOUS PEAK STAGE					8.17	May 18 1996
INSTANTANEOUS LOW FLOW			.93	Aug 11	.43	Sep 2 1995
ANNUAL RUNOFF (CFSM)	1.64		1.33		1.24	
ANNUAL RUNOFF (INCHES)	22.29		18.10		16.84	
10 PERCENT EXCEEDS	60		52		39	
50 PERCENT EXCEEDS	7.8		6.2		5.9	
90 PERCENT EXCEEDS	2.4		1.3		1.4	

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

(e) Estimated.

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 September 1997 (discontinued).

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, 4.38 ft, May 30, 1997; minimum observed, 1.60 ft, Apr. 7, 1994.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 4.38 ft, May 30; minimum observed, 3.18 ft, Oct. 16.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	4.15	---	4.16	3.80	3.82
2	---	3.28	---	---	---	---	---	---	---	---	3.78	---
3	3.27	---	---	---	---	---	---	---	---	4.16	3.76	3.82
4	---	3.28	---	---	---	---	---	4.15	---	---	3.75	---
5	3.25	---	---	---	---	---	---	---	4.37	4.18	---	3.82
6	---	3.28	---	---	---	3.60	---	4.15	---	4.10	---	---
7	---	---	---	---	---	---	---	---	4.34	---	3.70	3.78
8	3.22	---	---	---	---	---	---	---	4.34	4.15	3.68	---
9	---	---	---	---	---	---	---	---	4.32	4.14	3.66	3.76
10	3.22	---	---	---	---	---	---	---	4.29	4.12	---	3.76
11	---	---	---	---	---	---	---	---	4.28	---	3.60	3.74
12	3.20	---	---	---	---	---	---	---	4.27	4.10	3.58	---
13	---	---	---	---	---	---	---	---	4.24	4.09	3.56	3.70
14	---	---	---	---	---	---	---	---	---	---	---	---
15	---	---	---	---	---	---	---	4.26	4.24	4.08	---	3.68
16	3.18	---	---	3.25	---	---	---	---	---	---	3.68	---
17	---	---	---	---	---	---	---	---	4.20	---	3.68	---
18	---	---	---	---	---	---	---	---	4.19	4.04	3.68	---
19	---	---	---	---	---	---	---	4.37	4.19	4.00	3.68	3.82
20	---	---	---	---	---	---	---	---	4.18	3.99	---	3.84
21	3.22	---	---	---	---	---	---	---	4.16	---	---	---
22	---	---	---	---	---	---	---	---	4.16	---	3.69	---
23	---	---	---	---	---	---	---	---	---	---	---	---
24	---	---	---	---	---	---	---	---	---	---	3.68	---
25	---	---	---	---	---	---	---	---	4.18	3.93	---	---
26	---	3.38	---	---	---	---	---	4.37	---	3.92	---	---
27	---	---	---	---	---	---	---	---	4.16	3.90	---	3.72
28	3.26	---	---	---	---	---	---	4.36	4.14	3.87	---	---
29	---	---	---	---	---	---	---	4.35	4.12	3.85	3.64	---
30	---	---	---	---	---	---	---	4.38	4.14	3.82	3.82	3.70
31	---	---	---	---	---	---	---	---	---	3.80	3.82	---

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 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	294	7.6	9.6	214	25	110	11	4.1	217	308	291	39
2	293	7.6	9.8	213	25	112	11	16	217	308	216	39
3	291	7.6	9.8	134	25	108	11	44	218	307	146	39
4	255	7.7	9.8	42	25	106	11	35	217	306	144	39
5	213	7.7	9.8	41	25	122	12	26	217	305	144	68
6	212	7.6	41	41	25	e135	13	15	217	305	144	171
7	211	7.6	68	40	25	e150	11	14	217	305	144	171
8	211	7.7	58	40	25	198	12	14	214	304	160	171
9	210	8.0	58	41	25	243	12	17	176	303	192	171
10	209	8.1	58	41	25	242	12	24	132	302	192	171
11	209	8.1	58	40	25	240	13	29	133	301	192	179
12	209	8.0	58	40	86	235	13	24	128	300	191	254
13	208	8.1	58	40	e145	e235	13	16	116	298	190	260
14	188	8.1	58	78	e145	e235	14	16	109	296	190	260
15	162	8.3	58	145	e150	e235	14	16	109	296	190	259
16	161	8.5	95	145	e150	e235	14	22	109	296	190	258
17	162	8.2	150	143	162	e235	14	33	109	295	189	258
18	161	8.1	150	144	205	e235	14	34	109	293	189	138
19	145	8.5	150	143	205	e235	14	26	109	292	166	11
20	115	8.5	149	143	205	e235	14	16	109	290	108	10
21	111	8.5	150	144	204	e235	15	15	151	297	106	10
22	106	8.5	150	145	202	e235	14	15	180	304	106	10
23	107	8.9	183	e145	e200	e235	15	15	192	303	107	99
24	57	8.9	217	e145	e200	e235	15	15	136	302	106	203
25	8.3	8.9	215	e145	e200	e235	38	15	11	301	106	203
26	8.0	8.9	e215	e145	e200	248	47	15	19	299	106	203
27	7.6	8.9	e215	143	148	300	25	112	85	298	125	203
28	7.6	9.1	e215	140	106	299	18	217	335	297	152	202
29	8.0	9.4	e215	118	---	160	4.7	217	312	295	156	202
30	7.7	9.7	214	54	---	11	4.3	217	310	294	107	253
31	7.5	---	214	25	---	11	---	217	---	293	40	---
TOTAL	4554.7	249.3	3518.8	3257	3188	6085	449.0	1511.1	4913	9293	4785	4204
MEAN	147	8.31	114	105	114	196	15.0	48.7	164	300	154	140
MAX	294	9.7	217	214	205	300	47	217	335	308	291	260
MIN	7.5	7.6	9.6	25	25	11	4.3	4.1	11	290	40	10

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1997, BY WATER YEAR (WY)

	MEAN	104	97.7	143	187	207	140	30.9	114	167	173	163	137
	MAX	257	253	292	303	305	287	194	310	312	300	320	275
	(WY)	1959	1972	1972	1986	1969	1984	1973	1986	1966	1997	1947	1944
	MIN	.000	6.24	10.2	55.2	88.8	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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1942 - 1997
ANNUAL TOTAL	53651.9	46007.9	
ANNUAL MEAN	147	126	139
HIGHEST ANNUAL MEAN			206
LOWEST ANNUAL MEAN			55.9
HIGHEST DAILY MEAN	332	Aug 3	368
LOWEST DAILY MEAN	3.3	May 29	(a)
ANNUAL SEVEN-DAY MINIMUM	3.4	May 27	(b)
10 PERCENT EXCEEDS	302	292	296
50 PERCENT EXCEEDS	130	118	137
90 PERCENT EXCEEDS	7.6	8.9	5.0

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

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

(c) 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, 39,140 acre-ft, May 19, 20, gage height, 140.1 ft; minimum observed, 9,640 acre-ft, Oct. 15-18, gage height, 125.8 ft.

MONTHEND GAGE HEIGHT AND CONTENTS AT 1030, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)	(equivalent in ft ³ /s)
Sept. 30	127.8	13,420	--	--
Oct. 31	127.6	13,040	-380	-6.2
Nov. 30	133.3	24,100	+11,060	+185.9
Dec. 31	133.6	24,700	+600	+9.8
CAL YR 1996			-5,760	-7.9
Jan. 31	134.3	26,130	+1,430	+23.3
Feb. 28	134.1	25,710	-420	-7.6
Mar. 31	131.6	20,700	-5,010	-81.5
Apr. 30	139.7	38,210	+17,510	+274.3
May 31	139.9	38,670	+460	+7.5
June 30	138.7	35,910	-2,760	-46.4
July 31	133.1	23,700	-12,210	-198.6
Aug. 31	131.4	20,300	-3,400	-55.3
Sept. 30	131.7	20,900	+600	+10.1
WTR YR 1997			+7,480	+10.3

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. 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	44	48	49	47	46	47	53	361	47	56	54	57
2	43	49	47	47	45	46	64	293	49	56	53	54
3	42	49	47	47	45	46	75	292	54	57	53	46
4	42	48	46	46	45	47	81	291	55	57	53	45
5	42	50	47	48	45	46	106	262	64	56	53	45
6	43	48	47	47	46	43	150	222	64	55	53	45
7	43	48	47	48	45	e45	96	221	58	54	53	45
8	42	48	47	e48	e45	e45	67	222	56	57	52	45
9	44	48	46	48	e45	46	59	228	56	56	52	45
10	45	48	46	47	e45	46	56	227	55	54	52	44
11	46	48	47	46	e45	46	55	231	58	54	51	44
12	45	48	47	46	e45	45	55	234	59	54	51	44
13	45	48	46	47	e45	43	55	271	56	54	51	44
14	45	47	46	47	e45	43	57	326	56	54	52	44
15	45	50	47	47	e45	e44	66	330	59	54	53	44
16	45	59	46	e46	46	e45	161	332	58	54	56	44
17	53	58	47	e46	47	e45	333	330	57	54	53	54
18	48	50	45	e46	49	e46	514	345	59	53	52	44
19	47	47	44	e46	46	46	625	452	58	53	51	54
20	46	46	42	e46	47	46	620	613	57	53	58	44
21	46	45	46	46	46	46	504	620	56	53	55	44
22	46	45	47	e46	45	45	342	473	56	53	54	44
23	54	44	46	e46	43	45	341	380	56	53	54	44
24	53	46	44	e46	e45	46	380	288	57	53	54	44
25	48	45	e44	e46	47	46	417	240	58	54	54	44
26	47	46	e45	e46	47	46	404	237	55	54	54	44
27	47	46	e45	e46	45	48	405	157	55	53	53	44
28	47	47	e45	e46	46	51	406	48	54	53	53	44
29	49	48	e45	e46	---	51	407	47	54	51	53	44
30	56	51	46	e46	---	50	406	50	56	51	99	44
31	49	---	47	46	---	50	---	47	---	52	67	---
TOTAL	1437	1448	1426	1442	1276	1430	7360	8670	1692	1675	1706	1394
MEAN	46.4	48.3	46.0	46.5	45.6	46.1	245	280	56.4	54.0	55.0	46.5
MAX	56	59	49	48	49	51	625	620	64	57	99	57
MIN	42	44	42	46	43	43	53	47	47	51	51	44

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1997, BY WATER YEAR (WY)

	MEAN	55.0	56.2	48.3	46.9	46.4	50.5	88.0	121	97.6	70.5	57.9	53.5
MAX	221	239	102	84.7	76.8	118	297	745	461	253	105	216	
(WY)	1943	1943	1943	1943	1943	1943	1943	1996	1943	1953	1952	1943	
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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1942 - 1997
ANNUAL TOTAL	47009	30956	
ANNUAL MEAN	128	84.8	65.6
HIGHEST ANNUAL MEAN			187
LOWEST ANNUAL MEAN			42.4
HIGHEST DAILY MEAN	1470	625	1550
LOWEST DAILY MEAN	41	42	30
ANNUAL SEVEN-DAY MINIMUM	42	42	31
INSTANTANEOUS PEAK FLOW		722	1750
INSTANTANEOUS PEAK STAGE		3.53	5.05
INSTANTANEOUS LOW FLOW			14
10 PERCENT EXCEEDS	267	227	66
50 PERCENT EXCEEDS	47	48	50
90 PERCENT EXCEEDS	43	45	44

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

(e) Estimated.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04035500 MIDDLE BRANCH ONTONAGON RIVER NEAR ROCKLAND, MI

LOCATION.--Lat 46°41'57", long 89°09'36", in SE1/4 sec.27, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 10 ft upstream from bridge on U.S. Highway 45, 700 ft downstream from East Branch, and 2.8 mi southeast of Rockland.

DRAINAGE AREA.--671 mi².

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

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 661.1 ft above sea level. Prior to Apr. 1, 1959, nonrecording gage at site 400 ft upstream at same datum. Apr. 1, 1959, to Oct. 21, 1968, nonrecording gage at present site and datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Regulation by Bond Falls Reservoir (station 040~4000) 30.0 mi upstream. Diversion to South Branch Ontonagon River by Bond Falls Canal (station 04033500) 31.0 mi upstream. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	255	474	705	e350	e350	e335	1100	1050	315	285	225	508
2	243	391	524	e350	e350	e335	2050	849	299	291	225	406
3	241	357	422	e350	e350	e335	3780	775	292	396	225	328
4	241	363	374	e350	e350	e335	4890	715	310	450	223	279
5	240	712	356	e350	e350	e335	6090	664	334	363	224	259
6	230	625	361	e350	e350	e335	7950	604	454	320	225	251
7	240	471	359	e350	e345	e335	4600	561	368	293	223	250
8	241	407	349	e350	e345	e340	1950	552	329	277	222	247
9	241	389	340	e350	e345	e340	1330	832	298	277	220	243
10	256	382	338	e350	e345	e340	1100	772	275	274	220	241
11	262	362	338	e350	e345	e340	931	658	254	256	222	245
12	253	348	338	e350	e345	e340	890	949	260	250	220	257
13	244	361	338	e350	e345	e340	806	1440	263	244	220	249
14	241	340	335	e350	e345	e340	1080	1700	262	248	221	234
15	237	347	323	e350	e345	e340	1910	1620	255	273	242	229
16	229	1640	325	e350	e345	e340	2160	1370	296	248	330	239
17	250	3080	317	e350	e345	e340	1410	1380	304	244	295	792
18	286	1530	347	e350	e345	e345	1510	1200	561	235	264	545
19	293	776	e360	e350	e345	e345	1680	2740	631	233	241	1800
20	270	573	e400	e350	e345	e350	1960	2080	401	230	337	763
21	257	478	e400	e350	e345	e350	2020	1600	330	230	430	501
22	254	447	e400	e350	e345	e355	1750	1150	292	230	325	357
23	350	404	e380	e350	e340	e355	1690	915	269	230	282	295
24	635	343	e360	e350	e340	e360	1780	767	269	230	265	268
25	476	354	e350	e350	e340	e360	1720	635	359	234	254	253
26	361	346	e350	e350	e340	e370	1610	577	299	272	249	245
27	306	339	e350	e350	e335	455	1570	530	268	256	241	233
28	278	352	e350	e350	e335	822	1580	361	256	237	241	230
29	273	371	e350	e350	---	1370	1390	333	251	230	241	230
30	1000	568	e350	e350	---	1250	1190	333	251	229	779	236
31	698	---	e350	e350	---	1040	---	331	---	225	1160	---
TOTAL	9881	17930	11539	10850	9645	13872	65477	30043	9605	8300	9291	11213
MEAN	319	598	372	350	344	447	2183	999	320	268	300	374
MAX	1000	3080	705	350	350	1370	7950	2740	631	450	1160	1800
MIN	229	339	317	350	335	335	806	331	251	225	220	229

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1997, BY WATER YEAR (WY)

	MEAN	439	465	325	268	267	570	1568	778	545	365	331	355
MAX	1026	1145	618	378	634	1652	2919	1974	1396	1181	1091	1224	
(WY)	1986	1989	1983	1946	1984	1973	1971	1996	1944	1949	1953	1942	
MIN	191	214	209	193	187	183	385	245	189	182	173	175	
(WY)	1949	1949	1990	1995	1949	1965	1987	1977	1992	1988	1976	1948	

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1942 - 1997

ANNUAL TOTAL	241999	207646	
ANNUAL MEAN	661	569	
HIGHEST ANNUAL MEAN			520
LOWEST ANNUAL MEAN			756
HIGHEST DAILY MEAN	7330	Apr 22	1987
LOWEST DAILY MEAN	188	Jun 16	1942
ANNUAL SEVEN-DAY MINIMUM	202	Jun 20	1942
INSTANTANEOUS PEAK FLOW			145
INSTANTANEOUS PEAK STAGE			163
INSTANTANEOUS LOW FLOW			(a)27000
10 PERCENT EXCEEDS	1530	1280	(b)21.2
50 PERCENT EXCEEDS	300	345	(c)
90 PERCENT EXCEEDS	235	240	(d)142

(a) From rating curve extended above 7,500 ft³/s on basis of slope-area measurement of peak flow.

(b) From floodmark.

(c) Part or all of each day Aug. 8-14.

(d) Discharge measurement.

(e) Estimated.

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, which are fair. Flow regulated by Lake Gogebic (station 04037995). Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.6	342	272	245	301	226	169	597	117	56	47	39
2	4.8	322	247	241	293	222	176	516	117	57	45	35
3	4.1	322	194	236	285	214	195	391	115	55	41	34
4	4.0	298	170	238	276	212	221	264	117	55	41	34
5	4.0	270	168	251	272	208	270	254	117	55	40	34
6	4.2	204	168	251	265	204	373	209	116	52	41	33
7	4.0	177	169	247	257	199	460	163	115	52	42	33
8	4.0	165	168	241	251	195	521	167	115	52	42	30
9	3.8	166	168	237	246	196	561	157	114	50	41	29
10	3.8	169	164	235	239	192	581	162	204	48	40	29
11	4.9	203	160	236	237	188	589	165	241	48	40	28
12	32	254	159	234	230	183	591	167	201	48	40	27
13	64	251	158	229	225	179	591	169	188	48	40	23
14	62	244	154	225	220	182	592	171	187	47	40	21
15	66	267	159	220	215	184	603	177	192	45	40	18
16	62	262	159	221	212	183	625	252	179	44	41	16
17	75	383	156	220	209	179	635	319	177	39	41	16
18	132	366	159	214	204	176	643	361	175	38	41	15
19	233	402	164	211	200	173	651	548	175	39	41	14
20	225	401	164	206	198	170	660	684	172	39	42	14
21	218	396	162	202	190	168	671	676	168	39	42	14
22	211	387	160	205	187	166	683	665	162	40	43	13
23	218	379	162	206	185	165	693	651	160	40	43	13
24	237	372	165	207	181	162	701	619	159	41	43	13
25	237	330	164	208	179	164	708	463	210	43	42	12
26	237	298	161	205	173	162	710	114	277	44	42	9.7
27	252	289	160	204	168	157	710	115	220	44	41	7.7
28	231	281	161	202	197	158	716	115	188	44	40	7.4
29	223	271	160	197	---	160	719	116	104	45	40	6.5
30	323	273	161	262	---	164	694	117	56	46	41	4.6
31	391	---	212	305	---	166	---	118	---	47	40	---
TOTAL	3775.2	8744	5308	7041	6295	5657	16712	9662	4838	1440	1283	622.9
MEAN	122	291	171	227	225	182	557	312	161	46.5	41.4	20.8
MAX	391	402	272	305	301	226	719	684	277	57	47	39
MIN	3.8	165	154	197	168	157	169	114	56	38	40	4.6

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1997, BY WATER YEAR (WY)

	MEAN	133	158	172	170	158	146	333	300	217	136	82.2	81.8
MAX	698	489	346	360	257	327	742	995	550	578	550	408	408
(WY)	1986	1989	1968	1966	1969	1973	1943	1996	1954	1952	1972	1980	1980
MIN	.65	3.68	18.5	23.3	35.8	55.8	10.7	3.09	21.5	7.09	1.25	.88	.88
(WY)	1990	1990	1949	1949	1949	1949	1949	1987	1986	1988	1963	1963	1963

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1942 - 1997

ANNUAL TOTAL	86088.3	71378.1	173
ANNUAL MEAN	235	196	288
HIGHEST ANNUAL MEAN			70.1
LOWEST ANNUAL MEAN			1380
HIGHEST DAILY MEAN	1180	May 9	719
LOWEST DAILY MEAN	3.8	Oct 9	3.8
ANNUAL SEVEN-DAY MINIMUM	4.0	Oct 4	4.0
INSTANTANEOUS PEAK FLOW			744
INSTANTANEOUS PEAK STAGE			4.41
ANNUAL RUNOFF (CFSM)	1.45		1.21
ANNUAL RUNOFF (INCHES)	19.77		16.39
10 PERCENT EXCEEDS	679		393
50 PERCENT EXCEEDS	164		171
90 PERCENT EXCEEDS	15		33

(a) Nov. 16, 17, 1989.

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 excellent except for 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	92	78	25	76	57	81	6.1	39	65	.71	94
2	.80	92	77	58	74	80	81	5.0	39	66	.70	91
3	.80	91	45	82	43	79	104	4.6	38	46	.72	88
4	.73	89	22	83	14	77	121	3.9	38	25	.71	49
5	.70	89	22	86	9.5	76	124	2.5	54	26	.70	25
6	.70	66	23	106	9.5	49	133	2.3	68	25	.74	14
7	.80	44	41	119	9.6	21	136	2.0	67	25	.70	2.9
8	.80	44	58	116	9.9	21	137	1.9	66	49	.70	2.4
9	.61	45	81	80	10	22	137	2.3	42	67	.70	2.3
10	.86	45	96	38	36	23	137	4.7	34	66	.69	2.0
11	16	46	61	39	60	23	135	3.8	30	64	.70	1.6
12	27	46	35	40	59	23	133	16	17	62	.70	1.8
13	26	68	35	40	59	31	131	68	2.1	61	.67	1.4
14	47	87	35	49	58	40	130	119	1.7	35	.68	.96
15	67	87	37	57	57	41	129	139	.97	1.7	.71	16
16	64	95	56	57	57	41	128	140	.85	1.3	1.0	49
17	99	99	78	57	40	66	126	138	.96	1.3	1.1	.98
18	116	98	77	57	21	81	126	138	7.7	1.3	.29	118
19	113	116	78	56	21	79	126	139	15	1.3	.94	121
20	111	137	77	46	e21	77	126	101	15	1.2	112	117
21	108	132	76	37	e21	76	124	67	15	1.1	111	115
22	104	128	75	38	e21	60	123	67	15	1.1	70	62
23	105	124	75	48	e21	45	122	68	15	.94	.27	23
24	105	121	75	60	e21	45	121	67	16	.85	.28	13
25	105	77	75	61	e21	45	120	67	30	.80	.28	2.6
26	103	49	74	61	e21	45	119	66	47	.76	.27	2.5
27	99	70	55	61	e22	45	119	65	47	.89	.26	1.8
28	96	80	28	60	24	47	86	52	46	.85	.15	1.4
29	97	78	21	69	---	48	60	37	44	.84	4.4	1.1
30	96	79	23	77	---	49	34	39	55	.80	4.9	1.2
31	94	---	25	76	---	65	---	39	---	.72	.96	---
TOTAL	1822.00	2514	1714	1938	916.5	1577	3509	1671.1	906.26	699.77	729.03	1119.18
MEAN	58.8	83.8	55.3	62.5	32.7	50.9	117	53.9	30.2	22.6	23.5	37.3
MAX	116	137	96	119	76	81	137	140	68	67	112	121
MIN	.70	44	21	25	9.5	21	34	1.9	.85	.72	.67	.98

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1997, BY WATER YEAR (WY)

	MEAN	69.5	67.8	48.7	39.4	34.9	43.6	61.6	47.4	45.8	32.4	26.2	38.4
MAX	151	116	84.1	62.6	81.0	92.1	117	160	123	113	99.7	104	104
(WY)	1986	1968	1961	1983	1945	1973	1997	1996	1953	1953	1978	1977	1977
MIN	13.1	14.5	23.5	23.1	20.6	24.1	2.02	.17	.11	.25	.15	.23	.23
(WY)	1958	1945	1990	1959	1950	1956	1948	1977	1977	1977	1970	1976	1976

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1945 - 1997

ANNUAL TOTAL	23802.33	19115.86	
ANNUAL MEAN	65.0	52.4	46.3
HIGHEST ANNUAL MEAN			65.9
LOWEST ANNUAL MEAN			25.2
HIGHEST DAILY MEAN	194	May 20	288
LOWEST DAILY MEAN	.61	Jun 16	.08
ANNUAL SEVEN-DAY MINIMUM	.76	Oct 2	.09
INSTANTANEOUS PEAK FLOW			288
INSTANTANEOUS PEAK STAGE			(c)6.10
ANNUAL RUNOFF (CFPM)	1.28		.91
ANNUAL RUNOFF (INCHES)	17.46		12.41
10 PERCENT EXCEEDS	163	119	103
50 PERCENT EXCEEDS	51	47	37
90 PERCENT EXCEEDS	3.1	.98	1.0

(a) May 1-4, 1951.

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

(c) Present datum.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI

LOCATION.--Lat 46°43'15", long 89°12'25", in NE1/4 sec.20, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 150 ft downstream from bridge on Victoria Road, 1.8 mi southwest of Rockland, and 2.4 mi downstream from confluence of Middle and V'est Branches.

DRAINAGE AREA.--1,340 mi².

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

REVISED RECORDS.--WSP 1387: 1943, 1946-47. WSP 1911: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 638.72 ft above sea level. Prior to Nov. 23, 1943, nonrecording gage and Nov. 23, 1943, to Oct. 17, 1967, water-stage recorder at site 50 ft upstream at same datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Flow regulated by Victoria powerplant on West Branch 5 mi upstream; Bond Falls Reservoir (station 04034000) 34 mi upstream; Lake Gogebic (station 04035995) and Cisco Lake (station 04037400), in headwaters. 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	758	1660	1680	e1000	e1000	e1080	e2200	2670	1180	1080	698	1380
2	738	1410	1640	e1000	e980	e1080	e3500	2230	1140	1230	663	1030
3	701	1380	e1100	e1000	e980	e1100	e7000	2090	991	1230	571	698
4	653	1130	e1000	e1000	e960	e1100	e10000	1740	1050	1430	494	789
5	592	1740	e900	e1000	e960	e1100	e13000	1530	1150	1330	393	685
6	522	1870	e960	e1000	e950	e1100	16300	1440	1400	1060	480	647
7	533	1470	761	e1000	e950	e1100	13500	1480	1560	973	541	518
8	578	1170	960	e1000	e940	e1100	9620	1310	1110	982	488	684
9	519	1220	931	e1000	e940	e1080	6160	1830	915	927	481	556
10	675	1100	879	e1000	e920	e1050	4240	1760	1030	1100	538	469
11	636	1040	790	e980	e900	e1050	3450	1400	1060	1040	455	614
12	672	1020	963	e960	e900	e1030	3120	2120	1010	843	577	468
13	590	1020	931	e950	e900	e1000	3020	2760	831	819	495	649
14	699	867	857	e950	e900	e950	3270	3330	821	907	478	711
15	699	936	810	e950	e900	e900	4810	3550	861	797	629	560
16	511	2670	951	e950	e900	e900	6550	3270	807	696	848	658
17	729	6090	799	e980	e900	e900	4800	3190	970	869	750	1400
18	855	5320	e900	e1000	e900	e900	4620	3050	1280	868	696	1520
19	1030	3230	e850	e1000	e940	e950	4530	5970	1450	557	627	3400
20	1060	e1800	e880	e1000	e1000	e950	4860	5820	1120	856	770	2050
21	1020	e1600	e900	e1000	e1000	e950	5720	4480	1000	638	1000	1370
22	818	e1400	e940	e1000	e1000	e950	5120	3160	884	715	874	1110
23	1070	e1300	e950	e1000	e1000	e950	4850	2550	957	720	809	932
24	1790	e1200	e980	e1000	e1050	e950	5040	2120	854	616	777	750
25	1670	e1100	e980	e1000	e1050	e950	4980	1970	1050	709	758	883
26	1340	e1000	e980	e1000	e1050	e1000	4720	1630	915	850	650	601
27	1190	e900	e1000	e1000	e1050	e1150	4290	1180	1020	724	491	682
28	934	920	e1000	e1000	e1050	e1600	4360	968	750	798	572	611
29	1030	1090	e1000	e1000	---	e2200	3960	1160	907	658	498	735
30	2210	1440	e1000	e1000	---	e2000	3490	1180	949	649	1380	723
31	2190	---	e1000	e1000	---	e1800	---	1160	---	611	1830	---
TOTAL	29012	50093	30072	30720	26970	34920	175080	74098	31022	27282	21311	27883
MEAN	936	1670	970	991	963	1126	5836	2390	1034	880	687	929
MAX	2210	6090	1680	1000	1050	2200	16300	5970	1560	1430	1830	3400
MIN	511	867	761	950	900	900	2200	968	750	557	393	468

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1997, BY WATER YEAR (WY)

	MEAN	1145	1263	948	843	853	1526	4102	2074	1481	1010	814	884
MAX	3767	3232	1683	1473	1525	4355	6912	5257	3309	2879	2563	2679	
(WY)	1986	1989	1983	1969	1984	1973	1971	1996	1951	1952	1942	1942	
MIN	333	401	410	396	505	667	922	404	431	314	359	312	
(WY)	1949	1949	1949	1949	1949	1956	1987	1977	1988	1988	1976	1976	

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1942 - 1997
ANNUAL TOTAL	683875	558463	
ANNUAL MEAN	1869	1530	1404
HIGHEST ANNUAL MEAN			1967
LOWEST ANNUAL MEAN			774
HIGHEST DAILY MEAN	19500	16300	31200
LOWEST DAILY MEAN	268	393	170
ANNUAL SEVEN-DAY MINIMUM	496	482	246
INSTANTANEOUS PEAK FLOW		18100	(b)42000
INSTANTANEOUS PEAK STAGE		16.96	(c)28.6
ANNUAL RUNOFF (CFSM)	1.39	1.14	1.05
ANNUAL RUNOFF (INCHES)	18.99	15.50	14.23
10 PERCENT EXCEEDS	4140	3250	2800
50 PERCENT EXCEEDS	1000	1000	886
90 PERCENT EXCEEDS	699	637	529

(a) Aug. 13, 14, 1991.

(b) From rating curve extended above 14,000 ft³/s on basis of slope-area measurement of peak flow.

(c) From floodmark.

(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 excellent 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	44	231	158	e91	e90	e78	e250	1230	184	50	23	78
2	42	190	141	e91	e90	e78	e350	952	162	61	21	71
3	41	174	130	e91	e89	e77	e500	772	144	132	18	57
4	38	164	123	e91	e88	e78	e700	662	129	167	18	49
5	37	197	115	e91	e86	e80	1060	588	124	141	16	42
6	37	226	111	e91	e85	e80	1590	549	125	116	14	37
7	39	218	110	e91	e84	e80	1600	509	127	97	13	35
8	40	190	108	e91	e84	e80	1330	477	128	88	13	31
9	41	178	109	e91	e83	e80	1160	517	120	81	12	32
10	57	166	109	e91	e82	e80	989	570	110	72	12	34
11	54	151	107	e91	e81	e80	861	549	93	63	11	31
12	51	151	104	e91	e80	e80	771	607	84	58	11	28
13	50	144	102	e91	e80	e80	702	634	74	60	10	26
14	46	133	100	e91	e80	e80	694	714	66	58	9.4	24
15	43	125	e98	e91	e80	e80	793	836	67	54	12	21
16	41	208	e96	e91	e80	e80	925	809	141	47	51	20
17	49	437	e94	e91	e80	e80	794	747	187	48	51	46
18	70	460	e92	e91	e81	e80	774	726	176	44	49	61
19	75	398	e90	e91	e84	e80	766	985	172	38	42	68
20	73	324	e90	e91	e85	e80	802	977	153	36	44	68
21	66	289	e89	e91	e85	e82	886	851	134	33	58	67
22	64	231	e89	e92	e84	e83	903	697	112	30	59	55
23	78	197	e89	e94	e83	e83	877	566	96	28	52	46
24	132	199	e89	e94	e82	e83	942	467	87	27	45	41
25	156	165	e89	e94	e80	e84	1020	405	93	26	38	36
26	137	150	e89	e94	e78	e86	1100	356	89	41	38	32
27	120	136	e89	e94	e78	e95	1170	304	79	42	30	29
28	106	131	e89	e94	e78	e110	1230	263	68	40	25	27
29	98	128	e90	e94	---	e150	1300	230	59	34	23	27
30	250	148	e91	e94	---	e170	1330	212	53	29	29	36
31	279	---	e91	e92	---	e160	---	199	---	25	69	---
TOTAL	2454	6239	3171	2847	2320	2777	28169	18960	3436	1866	916.4	1255
MEAN	79.2	208	102	91.8	82.9	89.6	939	612	115	60.2	29.6	41.8
MAX	279	460	158	94	90	170	1600	1230	187	167	69	78
MIN	37	125	89	91	78	77	250	199	53	25	9.4	20
CFSM	.46	1.22	.60	.54	.48	.52	5.49	3.58	.67	.35	.17	.24
IN.	.53	1.36	.69	.62	.50	.60	6.13	4.12	.75	.41	.20	.27

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 1997, BY WATER YEAR (WY)

MEAN	182	196	117	71.3	62.7	157	761	470	212	128	81.4	125
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1913 - 1997

ANNUAL TOTAL	97536	74410.4	213
ANNUAL MEAN	266	204	311
HIGHEST ANNUAL MEAN			1968
LOWEST ANNUAL MEAN			104
HIGHEST DAILY MEAN	2330	1600	4450
LOWEST DAILY MEAN	31	9.4	2.7
ANNUAL SEVEN-DAY MINIMUM	35	11	3.2
INSTANTANEOUS PEAK FLOW		1730	4630
INSTANTANEOUS PEAK STAGE		7.96	11.63
INSTANTANEOUS LOW FLOW		9.1	2.7
ANNUAL RUNOFF (CFSM)	1.56	1.19	1.24
ANNUAL RUNOFF (INCHES)	21.22	16.19	16.89
10 PERCENT EXCEEDS	802	701	522
50 PERCENT EXCEEDS	105	90	100
90 PERCENT EXCEEDS	47	32	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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	182	565	268	243	249	206	294	1850	452	163	118	261
2	180	563	299	243	249	208	612	1800	439	187	110	344
3	181	561	326	248	268	217	913	1380	424	212	109	222
4	181	443	325	254	291	258	1260	1010	345	452	111	145
5	181	278	325	254	281	371	2060	918	309	469	112	121
6	182	278	296	254	256	433	3290	822	364	212	112	122
7	184	481	271	271	e260	455	3210	742	386	216	112	122
8	186	561	271	294	e260	475	2120	623	345	221	112	144
9	177	469	274	290	e260	470	1530	650	286	220	98	172
10	171	467	280	290	e250	466	1550	650	263	222	116	183
11	171	362	271	290	e245	458	1440	650	269	209	128	189
12	171	271	262	289	243	366	1340	1070	279	230	133	172
13	172	216	261	283	241	262	1320	1380	276	201	70	156
14	167	166	261	282	226	239	1050	1060	273	195	73	156
15	129	166	261	259	215	238	1170	1160	272	187	121	139
16	156	230	261	239	215	238	1460	1380	284	220	121	124
17	156	592	261	239	242	238	1470	1210	291	187	223	123
18	167	643	262	241	215	232	1310	1200	578	188	141	123
19	180	657	262	241	215	232	1190	1400	347	186	154	207
20	180	657	262	253	215	232	1210	1650	442	186	239	275
21	233	654	264	268	240	232	1430	1550	372	192	273	274
22	287	411	265	268	261	232	1560	1230	186	180	204	220
23	310	214	265	268	261	232	1460	959	262	165	180	226
24	331	219	266	268	280	232	1390	734	328	165	180	179
25	365	453	265	268	293	232	1490	736	327	152	166	177
26	392	655	253	268	264	232	1580	735	283	140	177	177
27	390	450	239	255	236	232	1680	685	232	140	150	174
28	342	268	239	245	219	232	1760	458	222	169	124	174
29	287	268	239	249	---	257	1750	305	205	208	123	173
30	397	268	241	245	---	278	1770	397	163	195	121	173
31	645	---	243	245	---	288	---	453	---	174	121	---
TOTAL	7433	12486	8338	8104	6950	8968	45669	30847	9504	6443	4332	5447
MEAN	240	416	269	261	248	289	1522	995	317	208	140	182
MAX	645	657	326	294	293	475	3290	1850	578	469	273	344
MIN	129	166	239	239	215	206	294	305	163	140	70	121
CFSM	.69	1.20	.78	.76	.72	.84	4.40	2.88	.92	.60	.40	.52
IN.	.80	1.34	.90	.87	.75	.96	4.91	3.32	1.02	.69	.47	.59

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1932 - 1997, BY WATER YEAR (WY)

	MEAN	348	386	269	212	200	365	1163	810	439	304	228	273
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1932 - 1997

ANNUAL TOTAL	187800		154521									
ANNUAL MEAN	513		423									
HIGHEST ANNUAL MEAN										418		
LOWEST ANNUAL MEAN										582		1360
HIGHEST DAILY MEAN	3420									247		1348
LOWEST DAILY MEAN	123									6820		Apr 25 1960
ANNUAL SEVEN-DAY MINIMUM	129									(a)1.0		(b)
INSTANTANEOUS PEAK FLOW										1.1		Aug 14 1960
INSTANTANEOUS PEAK STAGE										7360		Apr 24 1960
ANNUAL RUNOFF (CFSM)	1.48									(c)13.75		Apr 24 1960
ANNUAL RUNOFF (INCHES)	20.19									1.21		
10 PERCENT EXCEEDS	1310									16.42		
50 PERCENT EXCEEDS	271									847		
90 PERCENT EXCEEDS	174									265		
										138		

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

(b) Aug. 14-19, 1960.

(c) Present datum.

(e) Estimated.

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. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	54	88	e23	e23	21	43	136	28	16	11	10
2	18	42	59	e23	e23	21	68	109	26	17	11	11
3	17	37	45	e23	23	21	122	99	24	29	11	10
4	16	34	39	23	23	20	172	88	22	30	11	10
5	15	42	34	25	23	20	238	86	22	23	10	10
6	15	51	32	24	23	e20	409	86	21	20	10	11
7	14	45	32	24	e21	e20	355	66	20	18	10	10
8	14	38	31	24	21	20	231	134	20	17	10	10
9	14	38	29	24	e21	e20	162	169	19	16	10	14
10	15	35	28	24	e21	e20	116	114	18	16	10	13
11	16	32	27	22	e21	e20	92	82	17	15	9.8	12
12	16	28	26	23	21	e20	82	111	18	15	9.9	11
13	15	27	26	23	21	19	80	145	17	14	10	10
14	15	25	26	23	e21	19	102	104	17	14	9.9	10
15	14	30	e25	23	21	e19	162	92	17	14	14	10
16	14	154	e25	23	21	e19	206	82	19	13	15	10
17	20	216	e25	e23	21	e19	122	90	18	17	13	18
18	30	148	e25	e23	21	19	115	70	19	15	12	15
19	23	80	e24	e23	21	19	113	116	20	14	12	28
20	20	58	e24	e23	20	19	157	107	18	14	14	20
21	18	47	e23	e23	e20	19	229	73	17	15	18	16
22	19	41	e23	e23	e20	19	214	59	16	14	15	14
23	21	36	e22	e23	e20	19	226	55	16	13	14	13
24	29	32	e21	e23	20	19	340	53	25	13	13	13
25	33	30	e22	e23	e20	20	344	49	58	13	12	11
26	27	28	e22	e23	e20	20	327	43	35	14	11	11
27	25	27	e22	e23	20	24	329	38	24	13	11	11
28	21	27	e22	e23	19	36	328	34	19	13	11	12
29	20	26	e22	e23	---	47	273	32	17	12	11	13
30	144	55	e22	e23	---	49	271	31	17	12	11	15
31	92	---	e22	e23	---	49	---	29	---	11	10	---
TOTAL	789	1563	913	719	590	716	6028	2582	644	490	360.6	382
MEAN	25.5	52.1	29.5	23.2	21.1	23.1	201	83.3	21.5	15.8	11.6	12.7
MAX	144	216	88	25	23	49	409	169	58	30	18	28
MIN	14	25	21	22	19	19	43	29	16	11	9.8	10
CFSM	.91	1.86	1.05	.83	.75	.82	7.18	2.97	.77	.56	.42	.45
IN.	1.05	2.08	1.21	.96	.78	.95	8.01	3.43	.86	.65	.48	.51

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1997, BY WATER YEAR (WY)

	MEAN	33.1	40.9	26.8	20.9	20.1	41.4	179	80.7	37.8	21.9	17.8	22.8
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1967 - 1997

ANNUAL TOTAL	20736	15776.6	45.2	
ANNUAL MEAN	56.7	43.2	62.6	1979
HIGHEST ANNUAL MEAN			31.5	1990
LOWEST ANNUAL MEAN				
HIGHEST DAILY MEAN	547	409	1120	May 10 1979
LOWEST DAILY MEAN	12	9.8	6.8	Oct 3 1976
ANNUAL SEVEN-DAY MINIMUM	13	9.9	7.1	Oct 1 1976
INSTANTANEOUS PEAK FLOW		453	1590	May 10 1979
INSTANTANEOUS PEAK STAGE		7.57	10.72	May 10 1979
INSTANTANEOUS LOW FLOW		6.6	(a)1.7	Jan 18 1990
ANNUAL RUNOFF (CFSM)	2.02	1.54	1.61	
ANNUAL RUNOFF (INCHES)	27.55	20.96	21.94	
10 PERCENT EXCEEDS	145	108	92	
50 PERCENT EXCEEDS	23	22	22	
90 PERCENT EXCEEDS	15	11	13	

(a) Result of ice jam upstream.

(e) 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. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	178	150	165	197	335	328	171	340	330	.80	26	74
2	179	150	165	197	335	330	177	340	331	1.1	17	275
3	168	150	166	195	335	333	224	338	292	1.4	12	370
4	168	150	166	192	335	326	318	339	248	.92	.16	277
5	167	135	202	193	334	309	e320	337	248	.59	.19	270
6	166	153	193	195	335	247	e320	336	234	.60	.19	277
7	163	153	189	194	335	194	e328	336	207	33	20	177
8	153	160	188	192	339	189	e310	334	205	30	.08	173
9	153	161	183	186	338	188	293	338	232	69	.06	171
10	154	161	180	185	337	173	335	336	233	71	.05	219
11	154	162	180	186	315	162	333	335	230	71	.07	242
12	152	139	181	186	339	162	332	338	235	38	33	309
13	132	164	181	239	338	164	331	339	229	29	.17	314
14	150	163	182	275	337	162	332	338	202	.37	.17	310
15	151	163	181	273	339	163	335	339	202	.35	.23	226
16	149	164	182	277	339	163	339	338	234	.30	.71	176
17	151	164	189	272	341	175	335	337	238	33	.21	178
18	152	165	202	202	337	181	334	336	248	.33	.15	143
19	152	164	195	277	339	176	333	344	247	.28	.21	253
20	152	164	191	280	342	173	334	341	238	.29	.17	257
21	152	164	190	279	340	177	336	335	211	28	35	241
22	150	164	190	275	341	179	336	335	210	.32	.15	179
23	154	165	191	276	343	178	339	333	242	.30	.06	179
24	152	165	190	289	344	172	343	332	225	21	.04	112
25	156	165	193	336	339	169	344	334	223	.26	.03	98
26	126	164	193	337	330	172	346	334	210	.33	.04	114
27	147	164	187	340	333	172	352	333	222	.26	33	171
28	148	164	183	339	334	173	369	331	196	28	.09	171
29	148	164	183	340	---	173	358	331	196	.21	.12	111
30	150	165	184	339	---	172	353	332	235	.21	.43	95
31	150	---	192	337	---	173	---	332	---	.20	.32	---
TOTAL	4777	4779	5737	7880	9428	6208	9610	10421	7033	460.42	194.95	5822
MEAN	154	159	185	254	337	200	320	336	234	14.9	6.29	174
MAX	179	165	202	340	344	333	369	344	331	71	35	314
MIN	126	135	165	185	315	162	171	331	196	.20	.03	74

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1990 - 1997, BY WATER YEAR (WY)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
MEAN	132	184	197	173	197	226	269	268	209	139	83.0	177
MAX	213	295	304	254	337	309	323	355	347	242	170	194
(WY)	1991	1991	1992	1997	1997	1996	1991	1996	1996	1996	1996	1977
MIN	83.3	126	139	124	110	178	195	189	73.7	14.9	6.29	57.3
(WY)	1992	1995	1995	1995	1995	1995	1995	1994	1991	1997	1997	1977

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1990 - 1977

ANNUAL TOTAL	85707	72350.37	183
ANNUAL MEAN	234	198	234
HIGHEST ANNUAL MEAN			141
LOWEST ANNUAL MEAN			197
HIGHEST DAILY MEAN	370	May 20	369
LOWEST DAILY MEAN	126	Oct 26	.03
ANNUAL SEVEN-DAY MINIMUM	146	Oct 26	2.9
10 PERCENT EXCEEDS	352		338
50 PERCENT EXCEEDS	182		188
90 PERCENT EXCEEDS	153		.41
			62

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

(e) Estimated.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04044609 SAND RIVER WILDLIFE FLOODING AT SAND RIVER, MI

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 recorded, 10.06 ft, Nov. 20, but may have been higher during period of no gage-height record, Nov. 5-20; minimum, 4.95 ft, Mar. 24.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.33	9.50	9.79	5.06	5.07	5.01	5.52	6.16	9.43	8.73	8.11	8.02
2	9.28	9.53	9.81	5.07	5.06	5.03	5.73	5.98	9.45	8.74	8.07	8.00
3	9.26	9.56	9.65	5.06	5.04	5.03	6.22	5.82	9.47	8.77	8.04	7.99
4	9.25	9.55	8.70	5.08	5.04	5.03	6.43	5.70	9.47	8.80	8.00	7.99
5	9.24	---	7.12	5.08	5.03	5.03	6.99	5.60	9.46	8.81	7.97	7.99
6	9.21	---	5.32	5.11	5.03	5.02	8.03	5.54	9.45	8.80	7.95	7.97
7	9.16	---	5.24	5.10	5.03	5.02	8.50	5.46	9.47	8.79	7.91	7.95
8	9.14	---	5.21	5.10	5.02	5.01	7.43	5.65	9.48	8.77	7.90	7.95
9	9.12	---	5.18	5.10	5.03	5.00	6.66	6.70	9.48	8.74	7.87	7.93
10	9.10	---	5.16	5.10	5.03	5.00	6.29	7.28	9.47	8.71	7.83	7.92
11	9.12	---	5.15	5.10	5.03	4.99	6.12	7.64	9.44	8.68	7.81	7.90
12	9.11	---	5.13	5.09	5.02	4.99	5.96	8.09	9.42	8.64	7.80	7.89
13	9.09	---	5.12	5.08	5.02	4.98	5.83	8.85	9.33	8.62	7.78	7.88
14	9.08	---	5.11	5.07	5.03	5.03	5.80	9.33	9.26	8.63	7.77	7.87
15	9.09	---	5.17	5.07	5.02	5.00	6.00	8.99	9.23	8.60	7.79	7.84
16	9.07	---	5.29	5.07	5.02	5.01	6.34	8.61	9.19	8.57	7.84	7.84
17	9.09	---	5.26	5.08	5.02	4.99	6.25	8.26	9.17	8.56	7.90	7.83
18	9.11	---	5.25	5.07	5.04	4.98	5.95	7.86	9.14	8.53	7.94	7.82
19	9.11	---	5.15	5.07	5.06	4.98	5.93	7.79	9.11	8.49	7.95	7.86
20	9.12	---	5.14	5.05	5.07	4.97	5.96	8.12	9.09	8.47	7.97	7.86
21	9.13	9.99	5.12	5.04	5.08	4.97	6.00	7.93	9.07	8.44	7.99	7.88
22	9.14	9.93	5.12	5.07	5.07	4.97	5.97	7.45	9.03	8.41	8.00	7.88
23	9.17	9.89	5.11	5.08	5.05	4.96	6.05	7.18	9.00	8.37	8.00	7.86
24	9.23	9.85	5.09	5.11	5.04	4.96	6.18	7.85	8.99	8.33	7.99	7.87
25	9.28	9.81	5.11	5.14	5.03	4.97	6.21	8.33	8.96	8.31	7.98	7.83
26	9.34	9.78	5.11	5.12	5.02	4.98	6.22	8.67	8.93	8.32	7.97	7.83
27	9.36	9.75	5.10	5.11	5.02	5.02	6.36	8.90	8.90	8.29	7.94	7.82
28	9.34	9.73	5.09	5.11	5.01	5.11	6.50	9.05	8.86	8.25	7.91	7.82
29	9.34	9.72	5.09	5.10	---	5.24	6.37	9.17	8.80	8.21	7.91	7.79
30	9.42	9.74	5.07	5.09	---	5.34	6.26	9.28	8.76	8.17	7.93	7.77
31	9.47	---	5.06	5.09	---	5.42	---	9.37	---	8.14	7.98	---
MEAN	9.20	---	5.77	5.09	5.04	5.03	6.34	7.63	9.21	8.54	7.93	7.89
MAX	9.47	---	9.81	5.14	5.08	5.42	8.50	9.37	9.48	8.81	8.11	8.02
MIN	9.07	---	5.06	5.04	5.01	4.96	5.52	5.46	8.76	8.14	7.77	7.77

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. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	S*P
1	133	e130	130	71	127	64	136	502	145	50	41	139
2	124	e130	130	71	128	64	136	484	144	51	41	139
3	117	e130	130	71	128	64	136	416	141	51	41	138
4	94	e130	131	71	116	88	136	373	136	50	40	138
5	75	e130	103	71	107	109	137	331	128	50	41	137
6	75	e130	70	71	84	110	139	294	106	50	44	137
7	68	e130	70	72	68	111	138	280	90	50	44	137
8	68	e130	70	71	68	113	137	265	90	50	44	104
9	75	e130	71	70	68	113	138	237	90	48	43	74
10	90	e130	71	69	68	114	139	246	90	49	43	70
11	135	e130	71	70	72	127	139	250	89	49	41	63
12	135	e130	71	70	70	137	139	261	90	49	61	55
13	135	e130	71	102	70	137	139	292	83	48	82	55
14	135	e115	71	130	70	136	140	310	75	47	81	55
15	134	e115	71	129	70	136	140	297	76	47	82	55
16	134	e115	71	129	70	136	140	306	74	46	83	54
17	134	e115	71	129	70	124	142	291	71	46	81	54
18	134	e115	71	129	70	127	143	290	65	46	81	54
19	133	e120	71	129	68	135	144	282	61	47	81	54
20	133	e130	71	94	65	135	145	292	60	47	82	54
21	129	130	71	69	64	134	146	287	60	47	117	54
22	133	130	71	69	64	135	148	273	60	47	141	53
23	133	131	71	100	64	135	150	257	60	46	141	49
24	133	131	71	129	64	134	168	219	61	46	141	46
25	128	130	71	129	64	136	252	192	61	45	140	45
26	111	130	72	129	64	136	330	181	58	45	139	45
27	111	130	72	129	64	136	380	169	56	45	139	45
28	113	130	71	129	64	136	424	162	54	43	139	45
29	112	130	71	129	---	136	474	154	54	41	139	40
30	115	130	71	128	---	136	496	148	52	41	139	37
31	132	---	71	127	---	136	---	146	---	41	139	---
TOTAL	3611	3817	2469	3086	2169	3770	5751	8487	2480	1458	2691	2225
MEAN	116	127	79.6	99.5	77.5	122	192	274	82.7	47.0	86.8	74.2
MAX	135	131	131	130	128	137	496	502	145	51	141	139
MIN	68	115	70	69	64	64	136	146	52	41	40	37
CFSM	1.44	1.57	.98	1.23	.96	1.50	2.37	3.38	1.02	.58	1.07	.92
IN.	1.66	1.75	1.13	1.42	1.00	1.73	2.64	3.90	1.14	.67	1.24	1.02

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1994 - 1997, BY WATER YEAR (WY)

	1994	1995	1996	1997	1994	1995	1996	1997	1994	1995	1996	1997
MEAN	83.5	105	77.2	76.0	83.6	103	135	213	78.6	54.5	70.7	73.3
MAX	116	136	82.7	99.5	127	122	192	428	124	72.5	86.8	103
(WY)	1997	1994	1996	1997	1996	1997	1997	1996	1996	1996	1997	1996
MIN	35.0	25.4	70.8	63.3	57.8	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1994 - 1997

ANNUAL TOTAL	47674		42014			
ANNUAL MEAN	130		115			96.2
HIGHEST ANNUAL MEAN						127
LOWEST ANNUAL MEAN						65.8
HIGHEST DAILY MEAN	670	May 11	502	May 1	670	May 11 1996
LOWEST DAILY MEAN	59	Jul 1	37	Sep 30	25	(a)
ANNUAL SEVEN-DAY MINIMUM	60	Jun 28	41	Jul 29	25	Nov 19 1994
INSTANTANEOUS PEAK FLOW			527	May 1	686	May 11 1996
INSTANTANEOUS PEAK STAGE			5.54	May 1	6.08	May 11 1996
ANNUAL RUNOFF (CFSM)	1.61		1.42		1.19	
ANNUAL RUNOFF (INCHES)	21.89		19.30		16.13	
10 PERCENT EXCEEDS	176		152		140	
50 PERCENT EXCEEDS	103		111		71	
90 PERCENT EXCEEDS	65		48		44	

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

(e) Estimated.

STREAMS TRIBUTARY TO LAKE SUPERIOR

463910086014201 GRAND SABLE LAKE NEAR GRAND MARAIS, MI

LOCATION.--Lat 46°39'10", long 86°01'42", in SW1/4 SW1/4 sec.11, T.49 N., R.14 W., Alger County, Hydrologic Unit 04020201, at U.S. National Park Service Public Access Site, 2.5 mi southwest of Grand Marais.

DRAINAGE AREA.--15 mi², approximately.

PERIOD OF RECORD.--October 1944 to September 1950, June 1979 to September 1982, October 1992 to current year.

GAGE.--Nonrecording gage. Elevation of gage is 743 ft above sea level, from topographic map. Oct. 18, 1944 to Sept. 23, 1950, nor recording gage at different site and datum.

REMARKS.--Staff gage read by observer. Intermittent record only for some periods. Inlets are Rhody Creek, DeMull Creek, and Towes Creek. The outlet is Sable Creek. Partial-record site at outlet 1979-82. Surface area of lake is 628 acres.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height observed, 3.30 ft, Apr. 28, 1994, May 2, 1995, July 30, 1996; minimum observed, 0.55 ft, Sept. 5, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 2.92 ft, Apr. 9; minimum observed, 1.32 ft, Sept. 6, 7, 9.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.10	---	---	---	---	---	---	---	2.18	---	---	---
2	---	2.50	---	---	---	---	---	---	---	1.86	---	1.34
3	---	2.50	---	2.90	---	---	---	---	2.12	---	1.48	---
4	---	---	---	---	---	---	---	---	---	1.92	---	1.34
5	---	2.62	---	---	---	---	---	---	2.08	---	1.46	---
6	2.00	---	---	---	---	---	---	---	---	1.90	---	1.32
7	---	2.66	---	---	---	---	---	---	2.02	---	1.42	1.32
8	2.02	---	---	---	---	---	---	2.81	---	1.90	---	---
9	---	2.76	---	---	---	---	2.92	---	1.98	---	---	1.32
10	2.00	---	---	---	---	---	---	---	1.96	1.88	---	---
11	---	2.78	---	---	---	---	---	---	1.92	---	---	1.34
12	2.00	2.81	---	---	---	---	---	---	---	---	1.36	---
13	2.00	---	---	---	---	---	---	2.86	1.88	1.84	---	1.38
14	---	---	---	---	---	---	---	---	---	---	1.34	1.38
15	2.00	---	---	---	---	---	---	---	---	1.80	---	---
16	---	---	---	---	---	---	---	2.86	1.80	---	1.36	1.36
17	2.06	---	---	---	---	---	---	---	---	1.80	1.40	---
18	---	---	---	---	---	---	---	2.66	1.80	---	1.44	1.40
19	2.14	---	---	---	---	---	---	---	---	1.74	---	---
20	2.20	---	---	---	---	---	---	2.66	---	---	---	---
21	---	---	---	---	---	---	---	---	1.76	1.68	1.50	---
22	2.20	---	---	---	---	---	---	2.60	1.80	---	---	---
23	---	---	---	---	---	---	---	---	---	1.64	1.52	---
24	2.30	---	---	---	---	---	---	---	1.74	---	1.40	1.50
25	---	---	---	---	---	---	---	2.40	---	---	---	---
26	2.40	---	---	---	---	---	---	---	1.74	1.62	1.36	1.48
27	2.40	---	---	---	---	---	---	2.32	---	1.60	---	---
28	---	---	---	---	---	---	---	---	1.72	---	1.36	1.54
29	2.44	---	---	---	---	---	---	2.26	1.72	1.57	---	---
30	---	---	---	---	---	---	---	---	---	---	1.34	1.52
31	2.48	---	---	---	---	---	---	2.20	---	1.52	1.36	---

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, 19.65 ft, Aug. 4, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 21.86 ft, May 9, 12, 14, 16, 22-24; minimum observed, 21.14 ft, Aug. 11, 12.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21.50	---	---	---	---	---	---	21.84	---	21.42	21.28	21.18
2	---	---	---	---	---	---	---	---	---	---	21.28	---
3	---	---	---	21.67	---	---	---	---	21.76	---	---	---
4	21.44	21.58	---	---	---	---	---	---	---	21.58	21.28	21.18
5	---	---	---	---	---	---	---	21.84	---	21.58	21.26	---
6	---	21.60	---	---	---	---	---	---	---	---	---	---
7	21.46	---	---	---	---	---	---	21.84	21.66	---	---	---
8	---	21.60	---	---	---	---	---	---	21.66	21.54	21.24	21.18
9	21.44	---	---	---	---	---	21.80	21.86	21.66	---	---	---
10	21.44	---	---	---	---	---	---	---	21.63	---	---	21.18
11	21.44	21.60	---	---	---	---	---	---	---	21.50	21.14	---
12	---	21.66	---	---	---	---	---	21.86	---	21.50	21.14	---
13	---	---	---	---	---	---	---	---	---	---	---	---
14	21.44	---	---	---	---	---	---	21.86	21.58	21.48	---	---
15	---	---	---	---	---	---	---	---	21.58	21.48	---	---
16	21.44	---	---	---	---	---	---	21.86	21.54	---	21.16	---
17	---	---	---	---	---	---	---	---	21.54	---	21.22	---
18	21.52	---	---	---	---	---	---	---	---	21.42	---	21.22
19	---	21.66	---	---	---	---	---	---	---	21.40	---	---
20	---	---	---	---	21.73	---	---	---	---	21.40	21.22	---
21	21.52	---	---	---	---	---	---	---	21.48	21.40	---	---
22	---	---	---	---	---	---	21.78	21.86	21.46	21.38	---	---
23	21.54	---	---	---	---	---	---	21.86	21.48	---	21.22	---
24	---	---	---	---	---	---	---	21.86	---	---	21.22	---
25	21.54	---	---	---	---	---	21.76	21.84	21.50	21.36	---	---
26	---	---	---	---	---	---	---	---	---	21.36	21.22	---
27	---	---	---	---	---	---	---	21.84	---	---	---	---
28	21.56	---	---	---	---	---	21.78	---	21.46	---	---	---
29	21.56	---	---	---	---	---	21.78	---	---	21.34	21.18	---
30	---	---	---	---	---	---	---	21.78	21.40	---	21.18	21.20
31	21.56	---	---	---	---	---	---	21.76	---	---	---	---

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 (upper) 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1890	1820	932	650	777	585	828	3600	758	404	211	294
2	1850	1790	1010	637	769	583	909	3650	704	409	197	283
3	1800	1750	1040	619	757	581	1040	3550	653	481	198	288
4	1720	1690	1060	616	742	584	1190	3460	600	578	190	287
5	1610	1660	1050	619	730	585	1360	3360	551	639	189	281
6	1470	1630	1020	619	723	585	1720	3200	495	689	192	268
7	1320	1690	1020	623	708	583	2100	3050	460	707	189	263
8	1230	1710	984	626	699	581	2240	2890	420	699	194	262
9	1150	1700	961	628	688	581	2480	2740	396	675	192	257
10	1070	1670	914	635	675	579	2610	2600	376	658	186	275
11	1020	1620	880	636	663	573	2730	2490	364	621	191	297
12	936	1570	833	636	649	569	2840	2380	365	576	195	316
13	853	1460	808	636	639	566	2910	2310	357	530	192	327
14	784	1330	801	631	625	564	3020	2220	363	494	200	317
15	736	1220	786	628	612	558	3140	2090	372	454	207	303
16	678	1160	843	625	604	543	3300	2030	417	425	245	299
17	659	1210	892	620	602	535	3420	1920	526	390	290	318
18	773	1320	919	610	594	529	3510	1820	546	354	311	363
19	893	1380	883	600	599	530	3540	1750	542	325	312	447
20	988	1400	851	593	608	529	3560	1720	518	309	303	549
21	1050	1400	840	589	611	530	3570	1660	500	294	301	615
22	1070	1380	821	598	616	531	3580	1620	588	286	309	613
23	1110	1290	809	643	626	531	3640	1560	678	280	320	567
24	1290	1200	770	698	627	535	3730	1470	782	266	319	549
25	1520	1130	734	729	622	535	3780	1350	788	252	311	477
26	1660	1040	716	749	605	534	3820	1250	749	240	301	457
27	1760	1000	712	763	593	541	3810	1160	696	236	276	427
28	1790	953	699	776	587	593	3760	1050	602	226	269	403
29	1770	905	686	782	---	672	3710	925	518	226	267	380
30	1800	884	677	782	---	739	3610	835	442	218	264	378
31	1840	---	664	782	---	784	---	794	---	215	272	---
TOTAL	40090	41962	26615	20378	18350	17848	85457	66504	16126	13156	7593	11160
MEAN	1293	1399	859	657	655	576	2849	2145	538	424	245	372
MAX	1890	1820	1060	782	777	784	3820	3650	788	707	320	615
MIN	659	884	664	589	587	529	828	794	357	215	186	257
CFSM	1.64	1.77	1.09	.83	.83	.73	3.61	2.72	.68	.54	.31	.47
IN.	1.89	1.98	1.25	.96	.86	.84	4.02	3.13	.76	.62	.36	.53

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 1997, BY WATER YEAR (WY)

	MEAN	872	1041	785	500	470	718	2736	1714	690	508	434	622
MAX	1768	2284	1756	983	809	1710	4575	4511	1736	1081	1126	1623	
(WY)	1979	1989	1967	1983	1984	1973	1976	1960	1974	1956	1973	1970	
MIN	256	420	339	303	279	335	1537	511	244	209	217	249	
(WY)	1964	1977	1977	1963	1963	1956	1987	1986	1988	1963	1991	1955	

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1953 - 1997

ANNUAL TOTAL	422155						365239				924		
ANNUAL MEAN	1153						1001				1294		1971
HIGHEST ANNUAL MEAN											616		1963
LOWEST ANNUAL MEAN											6820		May 10 1960
HIGHEST DAILY MEAN	5100				Apr 27		3820		Apr 26		165		Jul 8 1988
LOWEST DAILY MEAN	215				Sep 11		186		Aug 10		172		Jul 6 1988
ANNUAL SEVEN-DAY MINIMUM	228				Sep 6		190		Aug 4		6990		May 10 1960
INSTANTANEOUS PEAK FLOW							3840		Apr 26		10.26		May 10 1960
INSTANTANEOUS PEAK STAGE							8.17		Apr 26		157		(b)
INSTANTANEOUS LOW FLOW							178		(a)		1.17		
ANNUAL RUNOFF (CFSM)	1.46						1.27				15.89		
ANNUAL RUNOFF (INCHES)	19.88						17.20						
10 PERCENT EXCEEDS	1850						2230				1920		
50 PERCENT EXCEEDS	821						672				585		
90 PERCENT EXCEEDS	461						282				303		

(a) Aug. 4, 10.

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

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. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	51	39	21	e19	13	23	151	34	14	9.9	9.4
2	34	45	37	21	e18	13	25	128	31	14	10	8.5
3	30	41	34	21	e18	13	32	99	29	16	10	8.2
4	27	39	31	21	e17	13	36	81	26	15	9.9	8.0
5	25	42	30	21	e17	13	43	73	24	14	9.5	8.0
6	24	40	29	21	e16	e12	81	67	22	14	9.6	8.0
7	32	46	29	21	e16	e12	87	59	21	13	9.7	7.9
8	28	42	29	20	e16	12	82	74	20	14	9.7	7.6
9	25	38	28	20	e16	12	81	86	19	14	9.5	7.8
10	23	36	27	20	16	13	79	72	18	13	10	8.3
11	21	34	26	20	16	12	81	62	17	13	10	8.1
12	21	32	25	20	e16	12	86	71	17	13	9.9	7.6
13	20	30	24	19	e15	e12	90	72	16	13	9.8	7.4
14	19	29	24	19	e15	12	101	63	15	15	9.1	7.3
15	18	27	27	19	15	e12	111	57	15	14	10	7.5
16	18	28	34	18	15	e12	122	51	24	12	11	7.3
17	26	35	32	e18	e15	e12	102	48	21	12	10	11
18	59	39	30	e17	15	e12	96	49	19	12	9.6	9.4
19	45	35	28	e17	16	12	94	71	18	11	9.3	15
20	38	32	27	17	14	12	94	66	17	11	9.6	12
21	34	30	26	17	14	13	90	57	19	12	9.9	10
22	31	28	25	e22	14	13	94	50	22	11	9.9	9.8
23	59	28	24	e30	e13	13	107	45	19	11	9.2	9.5
24	101	26	23	e27	e13	e13	113	42	18	11	8.6	9.1
25	83	25	e22	e24	13	13	117	40	17	11	8.6	9.0
26	64	24	e22	e23	13	13	111	37	16	12	8.6	8.7
27	54	24	e22	e22	13	14	103	34	15	12	8.5	8.5
28	47	24	e21	e21	e13	19	98	32	15	11	8.3	8.8
29	41	24	21	e21	---	23	94	30	14	11	8.3	9.0
30	72	31	21	e20	---	24	95	40	14	10	8.7	9.6
31	61	---	21	e19	---	23	---	38	---	9.7	10	---
TOTAL	1217	1005	838	637	427	427	2568	1945	592	388.7	294.7	266.3
MEAN	39.3	33.5	27.0	20.5	15.3	13.8	85.6	62.7	19.7	12.5	9.51	8.83
MAX	101	51	39	30	19	24	122	151	34	16	11	15
MIN	18	24	21	17	13	12	23	30	14	9.7	8.3	7.3
CFSM	1.40	1.20	.97	.73	.54	.49	3.06	2.24	.70	.45	.34	.32
IN.	1.62	1.34	1.11	.85	.57	.57	3.41	2.58	.79	.52	.39	.35

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1997, BY WATER YEAR (WY)

	MEAN	24.6	31.4	24.7	15.9	13.3	21.3	90.8	49.1	25.0	18.3	14.4	19.8
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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1952 - 1997
ANNUAL TOTAL	11609.3	10605.7	
ANNUAL MEAN	31.7	29.1	29.0
HIGHEST ANNUAL MEAN			49.9
LOWEST ANNUAL MEAN			15.6
HIGHEST DAILY MEAN	230	151	752
LOWEST DAILY MEAN	8.0	7.3	5.2
ANNUAL SEVEN-DAY MINIMUM	8.8	7.6	5.4
INSTANTANEOUS PEAK FLOW		164	(a)860
INSTANTANEOUS PEAK STAGE		4.85	8.55
INSTANTANEOUS LOW FLOW		(b)7.2	4.9
ANNUAL RUNOFF (CFSM)	1.13	1.04	1.04
ANNUAL RUNOFF (INCHES)	15.42	14.09	14.09
10 PERCENT EXCEEDS	57	72	58
50 PERCENT EXCEEDS	22	20	17
90 PERCENT EXCEEDS	11	9.6	8.7

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

(b) Discharge measurement.

(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. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	966	2020	1750	e1190	e1170	e1070	e1520	3940	1690	737	540	608
2	941	1990	1880	e1170	e1160	e1060	e1650	4010	1630	745	533	648
3	901	1910	1940	e1170	e1150	e1060	e2000	4060	1570	874	526	632
4	862	1830	1920	e1170	e1140	e1050	e2500	4000	1510	995	520	585
5	834	1790	1860	e1160	e1130	e1040	e3300	3840	1460	1050	512	551
6	813	1800	1790	e1160	e1130	e1030	e3600	3620	1400	1010	505	529
7	816	1900	1730	e1170	e1120	e1030	e4000	3380	1350	932	501	516
8	813	2070	1690	e1180	e1120	e1020	e4500	3190	1300	880	498	509
9	808	2130	1660	e1180	e1120	e1020	e5000	3120	1240	857	495	517
10	803	2100	1630	e1190	e1120	e1010	e5500	3070	1190	829	492	588
11	781	2040	1580	e1190	e1120	e1010	5590	3000	1140	790	486	637
12	766	1960	1540	e1190	e1110	e1010	5480	3000	1100	755	481	650
13	759	1820	1510	e1190	e1110	e1000	5430	3100	1080	727	482	628
14	747	1770	1470	e1190	e1100	e1000	5340	3230	1100	708	478	587
15	737	1730	1490	e1180	e1100	e1000	5240	3330	1050	691	483	557
16	731	1760	1640	e1170	e1100	e990	5370	3360	1100	675	521	533
17	773	1760	1770	e1160	e1100	e990	5710	3310	1130	661	600	580
18	1190	1890	1820	e1140	e1120	e990	5840	3240	1120	644	687	641
19	1630	2080	1680	e1120	e1130	e990	5610	3270	1060	624	715	735
20	1770	2170	1440	e1100	e1130	e1000	5290	3340	1000	612	664	928
21	1810	2180	e1400	e1100	e1120	e1000	5050	3330	977	610	626	969
22	1750	2160	e1400	e1140	e1110	e1000	4850	3250	1000	606	608	958
23	1730	2060	e1390	e1200	e1100	e1000	4610	3110	975	604	599	908
24	e1850	1910	e1370	e1190	e1090	e1000	4390	2920	927	593	589	820
25	e1990	1850	e1350	e1190	e1070	e1000	4270	2710	899	580	567	756
26	1990	1770	e1350	e1190	e1070	e1010	4220	2510	877	581	539	704
27	1930	1740	e1330	e1180	e1070	e1010	4190	2320	844	588	523	667
28	1830	1740	e1300	e1170	e1070	e1100	4140	2150	815	602	509	642
29	1730	1790	e1280	e1170	---	e1240	4050	1990	780	584	496	625
30	1790	1710	e1250	e1160	---	e1390	3960	1830	754	567	501	630
31	1970	---	e1200	e1160	---	e1450	---	1750	---	551	563	---
TOTAL	38811	57430	48410	36220	31180	32570	132200	96280	34068	22262	16839	19838
MEAN	1252	1914	1562	1168	1114	1051	4407	3106	1136	718	543	661
MAX	1990	2180	1940	1200	1170	1450	5840	4060	1690	1050	715	969
MIN	731	1710	1200	1100	1070	990	1520	1750	754	551	478	509
CFSM	1.14	1.74	1.42	1.06	1.01	.96	4.01	2.82	1.03	.65	.49	.60
IN.	1.31	1.94	1.64	1.22	1.05	1.10	4.47	3.26	1.15	.75	.57	.67

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 1997, BY WATER YEAR (WY)

MEAN	1151	1532	1267	955	857	1302	4020	2380	1313	897	698	815
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	603	402	384	350
(WY)	1949	1977	1977	1977	1963	1963	1946	1987	1988	1956	1963	1948

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1938 - 1997

ANNUAL TOTAL	668329	566108	1432
ANNUAL MEAN	1826	1551	2229
HIGHEST ANNUAL MEAN			1960
LOWEST ANNUAL MEAN			1948
HIGHEST DAILY MEAN	11200	5840	16500
LOWEST DAILY MEAN	690	478	290
ANNUAL SEVEN-DAY MINIMUM	712	485	294
INSTANTANEOUS PEAK FLOW		5920	16900
INSTANTANEOUS PEAK STAGE		10.48	12.85
INSTANTANEOUS LOW FLOW		474	288
ANNUAL RUNOFF (CFSM)	1.66	1.41	1.30
ANNUAL RUNOFF (INCHES)	22.60	19.14	17.68
10 PERCENT EXCEEDS	3080	3320	2760
50 PERCENT EXCEEDS	1300	1130	1000
90 PERCENT EXCEEDS	832	585	561

(a) Aug. 14, 15.

(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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	133	327	285	e205	e185	e125	e240	640	209	75	55	13 ²
2	122	280	267	e205	e180	e125	e250	659	193	76	55	117
3	112	254	247	e200	e175	e125	e290	603	181	93	53	10 ²
4	104	239	235	e200	e170	e125	e350	537	169	102	53	9 ²
5	99	246	225	e200	e170	e125	e480	475	159	99	51	8 ²
6	94	261	217	e200	e170	e125	819	433	155	94	49	7 ²
7	98	250	204	e200	e170	e125	1010	381	169	87	49	7 ²
8	98	239	184	e200	e165	e125	853	395	171	86	49	7 ²
9	94	221	180	e200	e165	e125	805	459	153	87	48	7 ²
10	e90	216	175	e200	e160	e125	740	415	140	81	48	10 ²
11	e90	212	170	e200	e160	e125	746	375	130	77	48	10 ²
12	e88	e210	165	e200	e155	e125	762	430	123	74	46	9 ²
13	e88	e210	162	e200	e155	e125	701	476	118	72	46	8 ²
14	e87	e220	160	e200	e155	e120	677	440	111	75	46	7 ²
15	e86	e345	221	e200	e150	e120	701	456	108	74	52	7 ²
16	e84	263	378	e195	e150	e120	779	441	177	72	72	7 ²
17	e91	294	353	e190	e145	e120	751	443	162	71	87	13 ²
18	e100	422	307	e190	e145	e120	712	432	140	68	91	13 ²
19	e120	380	254	e190	e145	e120	687	600	125	65	85	21 ²
20	e138	339	e250	e190	e140	e120	660	590	119	67	84	26 ²
21	e171	309	e245	e190	e140	e120	636	507	114	70	102	20 ²
22	e200	274	e245	e195	e135	e120	626	435	109	68	92	171
23	e235	250	e240	e205	e135	e120	640	380	102	65	82	14 ²
24	e250	237	e240	e205	e130	e125	664	342	99	62	76	12 ²
25	284	217	e235	e200	e130	e125	668	318	96	61	71	114
26	253	e190	e230	e200	e130	e140	648	288	90	68	68	10 ²
27	231	e180	e225	e195	e130	e155	622	265	85	71	67	97
28	204	e180	e220	e195	e130	e175	605	243	81	68	63	97
29	186	e180	e215	e195	---	e195	579	227	77	61	61	10 ²
30	406	223	e210	e190	---	e215	557	225	75	59	74	117
31	415	---	e205	e190	---	e240	---	221	---	56	175	---
TOTAL	4851	7668	7149	6125	4270	4195	19258	13131	3940	2304	2098	3491
MEAN	156	256	231	198	153	135	642	424	131	74.3	67.7	11 ²
MAX	415	422	378	205	185	240	1010	659	209	102	175	26 ²
MIN	84	180	160	190	130	120	240	221	75	56	46	7 ²
CFSM	.86	1.40	1.26	1.08	.83	.74	3.51	2.31	.72	.41	.37	.64
IN.	.99	1.56	1.45	1.25	.87	.85	3.91	2.67	.80	.47	.43	.71

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1997, BY WATER YEAR (WY)

MEAN	178	228	171	110	97.9	172	552	301	182	121	110	137
MAX	337	532	369	198	181	378	847	590	411	254	330	354
(WY)	1983	1978	1971	1997	1984	1973	1979	1996	1979	1968	1978	1977
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	1977

	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1967 - 1997
ANNUAL TOTAL	88905	78480	196
ANNUAL MEAN	243	215	289
HIGHEST ANNUAL MEAN			197 ²
LOWEST ANNUAL MEAN			121
HIGHEST DAILY MEAN	1850	1010	2030
LOWEST DAILY MEAN	73	46	33
ANNUAL SEVEN-DAY MINIMUM	76	47	35
INSTANTANEOUS PEAK FLOW		1020	2120
INSTANTANEOUS PEAK STAGE		7.98	11.50
INSTANTANEOUS LOW FLOW		45	32
ANNUAL RUNOFF (CFSM)	1.33	1.17	1.07
ANNUAL RUNOFF (INCHES)	18.07	15.95	14.55
10 PERCENT EXCEEDS	447	457	400
50 PERCENT EXCEEDS	156	169	130
90 PERCENT EXCEEDS	88	72	66

(a) Aug. 14, 15.

(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 10⁶ 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	81	44	e30	e25	e20	57	357	62	36	13	24
2	20	67	42	e30	e26	e20	69	258	55	32	11	19
3	19	58	39	e29	e25	e20	97	206	52	46	9.7	15
4	17	53	e37	e29	e25	e20	118	178	48	43	9.9	14
5	18	62	e36	e28	e25	e20	141	160	47	36	9.4	13
6	19	65	e35	e28	e25	e20	217	152	47	33	9.5	13
7	19	61	e34	e28	e25	e20	357	140	62	29	9.9	12
8	19	55	e33	e28	e24	e20	476	137	69	27	11	11
9	17	51	e33	e27	e24	e20	451	157	58	26	11	12
10	20	48	e33	e27	e24	e20	344	161	51	23	11	12
11	20	45	e33	e27	e23	e20	261	142	44	21	10	12
12	20	43	e33	e27	e23	e20	211	140	41	20	9.7	10
13	19	40	e33	e26	e23	e20	181	136	40	20	9.4	9.9
14	18	38	e33	e26	e22	e20	163	128	36	27	9.0	10
15	18	37	e32	e25	e21	e20	168	136	39	24	13	8.7
16	27	54	e32	e25	e21	e20	189	136	83	20	28	8.6
17	70	90	e32	e25	e21	e20	173	143	68	20	23	12
18	52	117	e32	e25	e22	e20	170	131	57	23	16	12
19	45	e78	e31	e24	e22	e20	168	164	51	26	14	31
20	40	e62	e30	e24	e21	e20	157	206	46	23	15	25
21	36	e56	e30	e24	e21	e20	171	174	41	22	19	17
22	38	e52	e30	e24	e21	e20	181	137	36	20	17	17
23	58	e46	e30	e25	e21	e20	183	117	32	17	15	14
24	59	e44	e29	e25	e20	e20	205	108	31	15	13	13
25	52	e42	e29	e25	e20	e21	232	102	34	14	12	e11
26	49	e39	e29	e25	e20	e22	257	92	32	20	13	e10
27	45	e38	e29	e25	e20	e23	282	84	27	19	12	e9.8
28	40	e37	e29	e25	e20	e28	405	76	25	17	11	e12
29	76	39	e29	e25	---	e34	508	72	23	15	9.5	e16
30	116	42	e30	e25	---	e45	437	69	25	13	17	e18
31	107	---	e30	e25	---	53	---	66	---	12	36	---
TOTAL	1196	1640	1011	811	630	706	7029	4465	1362	739	427.0	422.0
MEAN	38.6	54.7	32.6	26.2	22.5	22.8	234	144	45.4	23.8	13.8	14.1
MAX	116	117	44	30	26	53	508	357	83	46	36	31
MIN	17	37	29	24	20	20	57	66	23	12	9.0	8.6
CFSM	.84	1.19	.71	.57	.49	.50	5.09	3.13	.99	.52	.30	.31
IN.	.97	1.33	.82	.66	.51	.57	5.68	3.61	1.10	.60	.35	.34

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 1997, BY WATER YEAR (WY)

	MEAN	55.9	59.5	38.5	24.3	21.0	38.6	200	128	60.9	32.1	26.2	37.2
MAX	191	198	77.5	41.5	55.9	149	423	326	153	89.9	76.5	194	
(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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1959 - 1997

ANNUAL TOTAL	28472		20438.0		60.0	
ANNUAL MEAN	77.8		56.0		95.3	1960
HIGHEST ANNUAL MEAN					33.8	1987
LOWEST ANNUAL MEAN						
HIGHEST DAILY MEAN	1000	May 20	508	Apr 29	1830	Apr 20 1985
LOWEST DAILY MEAN	15	Sep 8	8.6	Sep 16	4.2	Sep 12 1976
ANNUAL SEVEN-DAY MINIMUM	16	Sep 5	10	Aug 2	4.5	Sep 7 1976
INSTANTANEOUS PEAK FLOW			517	Apr 29	1930	Apr 20 1985
INSTANTANEOUS PEAK STAGE			5.66	Apr 29	9.21	Apr 20 1985
INSTANTANEOUS LOW FLOW			7.1	Sep 16	4.0	Sep 12 1976
ANNUAL RUNOFF (CFSM)	1.69		1.22		1.30	
ANNUAL RUNOFF (INCHES)	23.03		16.53		17.73	
10 PERCENT EXCEEDS	250		147		131	
50 PERCENT EXCEEDS	34		28		32	
90 PERCENT EXCEEDS	23		13		12	

(e) Estimated.

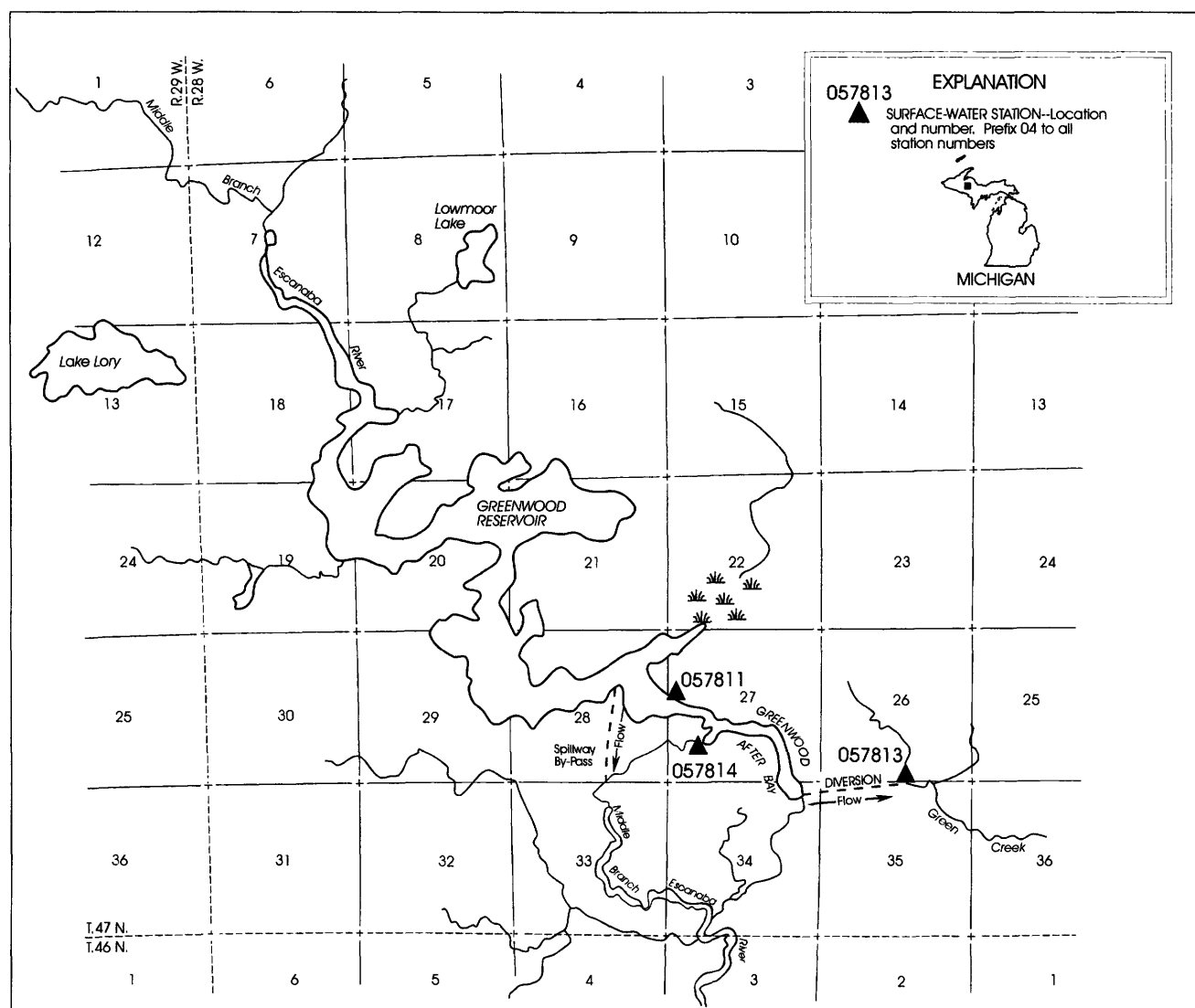


Figure 7. Identification number and location of active surface-water gaging stations in and around the Greenwood Reservoir Complex.

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, 24,658 acre-ft, Apr. 30, elevation, 1,515.97 ft; minimum, 17,148 acre-ft, Sept. 30, elevation, 1,510.04 ft.

MONTHEND ELEVATION, IN FEET ABOVE SEA LEVEL, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

Date	Elevation (feet)	Contents (acre-feet)	Change in content	
			(acre- feet)	(equivalent in ft ³ /s)
Sept. 30	1,513.53	21,389	--	--
Oct. 31	1,513.13	20,869	-520	-8.4
Nov. 30	1,513.34	21,142	+273	+4.6
Dec. 31	1,512.96	20,652	-490	-8.0
CAL YR 1996	--	--	-2,232	-3.1
Jan. 31	1,512.75	20,400	-252	-4.1
Feb. 28	1,511.50	18,900	-1,500	-27.0
Mar. 31	1,510.84	18,108	-792	-12.9
Apr. 30	1,515.96	24,644	+6,536	+110
May 31	1,515.22	23,608	-1,036	-16.8
June 30	1,515.01	23,314	-294	-4.9
July 31	1,513.87	21,831	-1,483	-24.1
Aug. 31	1,511.87	19,344	-2,487	-40.4
Sept. 30	1,510.06	17,172	-2,172	-36.5
WTR YR 1997			-4,217	-5.8

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. 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. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	23	26	17	14	24	1.6	1.9	9.1	6.3	23	26
2	24	23	26	17	14	24	1.7	1.9	12	8.2	23	26
3	24	23	24	16	14	21	1.7	1.7	15	8.1	23	26
4	24	18	19	15	15	18	1.9	1.7	15	8.0	23	24
5	24	18	17	15	15	18	1.9	1.7	15	8.0	23	23
6	24	19	15	15	15	16	1.9	1.7	15	8.0	22	23
7	24	24	15	15	17	15	1.9	1.7	14	8.0	22	23
8	24	22	14	15	20	15	1.9	1.7	5.0	7.9	22	20
9	24	26	14	15	20	15	1.9	1.7	2.9	7.8	22	18
10	24	27	14	14	20	15	1.9	1.7	.86	7.8	22	18
11	24	26	14	14	20	15	1.9	1.7	.86	7.8	22	18
12	24	26	14	14	21	13	1.9	1.7	.86	7.8	22	18
13	24	25	14	14	25	11	1.9	1.7	.86	7.8	22	18
14	24	25	14	14	24	11	1.9	1.7	.86	7.8	23	18
15	24	25	14	14	24	11	1.9	1.7	.86	13	25	18
16	24	25	14	14	24	11	1.9	1.7	.86	18	25	15
17	24	25	15	14	24	11	1.9	1.7	.86	22	25	11
18	24	25	18	14	24	11	1.9	1.7	.86	23	25	10
19	24	25	21	14	25	11	1.9	1.8	.86	23	25	10
20	24	25	22	14	25	11	1.9	1.8	.86	24	25	10
21	24	26	22	14	25	11	1.9	1.8	.86	24	26	10
22	24	26	22	14	25	11	1.9	1.8	.86	24	26	9.9
23	24	26	20	14	25	11	1.9	1.8	.86	24	26	9.9
24	23	26	18	14	25	10	1.9	1.8	.86	24	26	15
25	23	26	18	14	25	10	1.9	1.8	.86	23	26	23
26	23	26	18	14	24	9.7	1.9	1.8	.86	23	26	23
27	23	26	18	14	24	8.6	1.9	1.9	.86	23	26	23
28	23	26	18	14	24	8.7	1.9	1.9	.86	23	26	23
29	23	26	18	14	---	8.9	1.9	1.9	.86	23	26	23
30	23	26	18	14	---	8.9	1.9	6.0	5.3	23	26	23
31	23	---	18	14	---	4.4	---	9.2	---	23	26	---
TOTAL	736	735	552	448	597	399.2	56.3	66.3	125.50	491.3	750	555.8
MEAN	23.7	24.5	17.8	14.5	21.3	12.9	1.88	2.14	4.18	15.8	24.2	18.5
MAX	24	27	26	17	25	24	1.9	9.2	15	24	26	26
MIN	23	18	14	14	14	4.4	1.6	1.7	.86	7.8	22	9.9

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1973 - 1997, 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	1997
MEAN	14.6	12.3	14.1	17.9	18.0	13.9	7.04	9.01	12.4	17.4	17.4	16.8													
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	1977	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 1996 CALENDAR YEAR FOR 1997 WATER YEAR WATER YEARS 1973 - 1997

	1996	1997	1973-1997
ANNUAL TOTAL	5920.39	5512.40	
ANNUAL MEAN	16.2	15.1	14.4
HIGHEST ANNUAL MEAN			22.4
LOWEST ANNUAL MEAN			4.06
HIGHEST DAILY MEAN	27	Nov 10	30
LOWEST DAILY MEAN	.02	May 20	(a)
ANNUAL SEVEN-DAY MINIMUM	.03	May 16	(b)
10 PERCENT EXCEEDS			.86
50 PERCENT EXCEEDS	25		.86
90 PERCENT EXCEEDS	18		Jun 10
	.05		.02
			Apr 11 1987
			14
			.93

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

(b) June 10-29.

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

(d) 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 04031110, 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 good. 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	25	28	29	31	31	34	30	25	27	32	30
2	22	26	28	28	31	31	35	29	24	26	31	30
3	22	27	28	28	31	31	35	29	24	25	31	31
4	22	28	29	28	31	32	35	29	26	25	31	31
5	22	30	30	29	31	32	35	29	26	24	31	31
6	22	32	28	29	31	33	35	29	27	24	31	31
7	22	31	27	30	31	33	32	29	30	24	31	31
8	22	31	27	32	31	33	31	29	32	25	31	28
9	22	30	27	30	31	33	30	29	32	25	31	25
10	22	29	27	29	31	33	30	29	34	25	31	26
11	22	28	27	28	31	33	30	29	35	26	31	26
12	22	27	27	27	31	33	30	29	34	26	31	26
13	22	27	27	26	31	32	30	29	33	25	31	26
14	22	26	27	26	31	32	30	28	32	25	31	26
15	22	26	27	26	31	32	30	28	31	26	31	25
16	22	27	27	26	31	e32	30	28	31	28	32	25
17	22	27	27	26	31	e32	30	28	31	30	32	26
18	22	27	27	26	31	e32	30	28	34	31	32	26
19	22	27	28	26	31	e32	30	28	32	32	30	26
20	22	27	29	26	31	e32	30	28	28	33	29	26
21	22	27	30	27	31	e32	30	28	29	33	29	26
22	22	27	30	27	31	e32	30	28	29	33	29	25
23	25	27	30	27	31	e32	30	28	29	33	30	25
24	27	27	31	28	31	e32	30	28	28	33	30	25
25	26	27	31	28	31	e32	30	28	28	33	30	27
26	25	27	31	29	31	e32	30	28	28	33	30	26
27	25	27	31	29	31	e32	30	27	28	32	30	26
28	24	27	31	30	31	e32	30	27	28	32	30	26
29	25	28	31	30	---	e32	30	27	28	31	30	26
30	26	28	31	30	---	e32	30	27	28	31	30	25
31	25	---	30	31	---	32	---	26	---	31	30	---
TOTAL	713	830	889	871	868	996	932	876	884	887	949	809
MEAN	23.0	27.7	28.7	28.1	31.0	32.1	31.1	28.3	29.5	28.6	30.6	27.0
MAX	27	32	31	32	31	33	35	30	35	33	32	31
MIN	22	25	27	26	31	31	30	26	24	24	29	25

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1973 - 1997, 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	1997
MEAN	30.3	29.9	26.3	25.5	26.4	29.0	28.9	27.3	27.2	26.5	25.8	25.9													
MAX	141	122	35.6	32.6	35.9	56.3	44.9	40.3	42.2	42.2	30.6	30.2													
(WY)	1973	1973	1974	1974	1986	1989	1989	1976	1975	1974	1997	1984													
MIN	21.7	21.6	23.3	18.9	22.0	22.0	23.2	22.0	21.7	20.3	21.8	22.0													
(WY)	1996	1996	1996	1973	1973	1973	1987	1995	1995	1973	1995	1995													

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1973 - 1997
ANNUAL TOTAL	9223	10504	
ANNUAL MEAN	25.2	28.8	27.4
HIGHEST ANNUAL MEAN			44.8
LOWEST ANNUAL MEAN			23.3
HIGHEST DAILY MEAN	36	Feb 21	(a)290
LOWEST DAILY MEAN	19	Jul 16	(c)6.4
ANNUAL SEVEN-DAY MINIMUM	19	Jul 13	11
10 PERCENT EXCEEDS	30		30
50 PERCENT EXCEEDS	25		26
90 PERCENT EXCEEDS	22		24

(a) Apr. 2-6, June 11.

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

(c) Oct. 2-22.

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

(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 26 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 15.1 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, 5,684 acre-ft, June 7, 8, elevation, 1,338.96 ft; minimum, 4,713 acre-ft, Oct. 1, elevation, 1,336.21 ft.

MONTHEND ELEVATION, IN FEET ABOVE SEA LEVEL, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre- feet)	(equivalent in ft ³ /s)
Sept. 30	1,336.20	4,710	--	--
Oct. 31	1,338.07	5,328	+618	+10.0
Nov. 30	1,337.91	5,268	-60	-1.0
Dec. 31	1,338.08	5,332	+64	+1.0
CAL YR 1996			+8	0.0
Jan. 31	1,337.65	5,177	-155	-2.5
Feb. 28	1,337.97	5,289	+112	+2.0
Mar. 31	1,337.30	5,055	-234	-3.8
Apr. 30	1,338.47	5,488	+433	+7.3
May 31	1,337.95	5,282	-206	-3.3
June 30	1,337.25	5,037	-245	-4.1
July 31	1,337.15	5,002	-35	-0.6
Aug. 31	1,337.73	5,205	+203	+3.3
Sept. 30	1,336.98	4,944	-261	-4.4
WTR YR 1997			+234	+0.3

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 26 ft³/s (furnished by Cleveland Cliffs Iron Co.) was diverted from Schweitzer Reservoir by industry for iron ore processing, 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.8	14	4.4	e4.1	e4.0	e4.4	4.9	71	5.1	5.3	4.6	4.9
2	4.1	7.8	4.3	e4.1	e4.0	e4.3	5.6	52	5.0	5.3	4.5	4.7
3	4.7	5.1	e4.2	e4.1	e4.0	e4.2	8.6	41	4.8	5.2	4.6	4.7
4	3.6	4.6	e4.3	e4.1	e4.0	e4.2	7.3	30	4.7	5.0	4.6	4.6
5	3.7	4.4	e4.4	e4.1	e4.0	e4.2	52	24	4.9	4.8	4.6	4.7
6	3.6	4.3	e4.4	e4.1	e4.0	e4.2	169	20	4.8	4.7	4.7	4.7
7	6.7	4.4	e4.3	e4.0	e4.0	e4.2	219	15	135	4.7	4.7	4.7
8	4.7	4.3	e4.3	e3.9	e4.0	e4.2	165	16	250	4.9	4.6	4.8
9	4.3	4.4	e4.3	e4.0	e4.0	e4.2	102	22	122	4.8	4.7	4.8
10	4.1	4.4	e4.3	e4.2	e4.0	e4.2	72	19	60	4.8	4.7	4.8
11	4.1	4.4	e4.2	e4.2	e4.0	e4.2	57	17	33	4.9	4.6	4.7
12	4.2	4.3	e4.2	e4.2	e4.0	e4.1	50	24	23	4.7	5.1	4.6
13	4.1	4.4	e4.1	e4.2	e4.0	e4.1	44	25	22	4.9	4.4	4.5
14	4.2	4.3	e4.1	4.2	e4.0	e4.1	43	28	15	5.7	4.6	4.5
15	4.6	4.3	e4.1	4.2	e4.0	e4.0	53	36	11	5.0	7.2	6.8
16	4.2	5.0	e4.2	4.2	e4.0	e4.1	76	38	20	4.9	5.1	4.4
17	5.4	4.8	e4.2	4.2	e4.0	e4.1	65	38	18	4.7	4.6	4.6
18	4.4	4.5	e4.2	e4.2	e4.3	e4.2	57	36	13	4.7	4.5	4.5
19	4.3	5.0	e4.3	e4.2	e4.2	e4.3	52	56	8.3	4.7	4.6	5.1
20	4.3	4.9	e4.3	4.2	e4.0	e4.4	47	68	5.7	4.8	4.9	4.5
21	4.3	4.5	e4.3	4.2	e4.3	e4.4	52	50	5.0	4.8	4.8	4.7
22	4.3	4.4	e4.3	4.2	e4.4	e4.3	57	35	4.9	4.7	4.7	4.7
23	4.9	4.4	e4.3	e4.2	e4.5	e4.3	58	26	4.9	4.6	4.6	5.7
24	4.6	4.4	e4.2	4.2	e4.8	e4.3	66	21	5.1	4.5	4.7	4.4
25	4.5	4.4	e4.1	4.2	e4.8	e4.3	68	17	5.0	4.7	4.7	4.4
26	4.5	4.4	e4.1	e4.2	e4.7	e4.3	65	13	5.0	4.9	4.5	4.4
27	4.4	4.4	e4.1	e4.2	e4.6	e4.4	66	9.6	5.0	4.6	4.6	4.4
28	4.4	4.4	e4.1	e4.2	e4.4	e4.4	98	6.2	4.9	4.5	4.5	4.5
29	4.5	4.4	4.2	e4.2	---	e4.5	99	5.4	4.9	4.5	4.5	4.5
30	9.5	4.5	4.2	e4.2	---	e4.7	78	5.3	4.6	4.5	5.6	4.8
31	18	---	4.2	e4.2	---	e4.8	---	5.2	---	4.5	5.2	---
TOTAL	156.0	147.7	131.2	128.9	117.0	132.6	2054.4	869.7	815.6	149.3	148.3	141.7
MEAN	5.03	4.92	4.23	4.16	4.18	4.28	68.5	28.1	27.2	4.82	4.78	4.72
MAX	18	14	4.4	4.2	4.8	4.8	219	71	250	5.7	7.2	6.3
MIN	3.6	4.3	4.1	3.9	4.0	4.0	4.9	5.2	4.7	4.5	4.4	4.4

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEAR 1961 - 1997, BY WATER YEAR (WY)

	MEAN	10.9	12.0	7.84	5.71	5.12	7.30	48.4	28.8	15.6	8.39	7.08	9.15
MAX	41.8	41.3	24.0	13.5	9.98	35.3	115	98.1	55.8	24.2	28.9	56.5	56.5
(WY)	1986	1989	1966	1966	1961	1966	1985	1972	1968	1979	1973	1978	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	3.62
(WY)	1964	1964	1990	1963	1963	1963	1963	1963	1977	1990	1963	1963	1963

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1961 - 1997

ANNUAL TOTAL	5970.3	4992.4	13.9	1966
ANNUAL MEAN	16.3	13.7	26.4	1987
HIGHEST ANNUAL MEAN			4.64	
LOWEST ANNUAL MEAN			1.0	(b)
HIGHEST DAILY MEAN	231	Apr 25	699	Apr 20 1985
LOWEST DAILY MEAN	3.6	Oct 4	1.0	(b)
ANNUAL SEVEN-DAY MINIMUM	3.9	Mar 4	1.0	Apr 9 1963
INSTANTANEOUS PEAK FLOW			860	May 31 1970
INSTANTANEOUS PEAK STAGE			6.50	May 31 1970
INSTANTANEOUS LOW FLOW			.40	Sep 6 1962
10 PERCENT EXCEEDS	49	39	30	
50 PERCENT EXCEEDS	4.7	4.6	5.6	
90 PERCENT EXCEEDS	4.2	4.1	4.0	

(a) Oct. 4, 6.

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

(c) 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, or 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, 5.01 ft, Apr. 6; minimum daily, 1.97 ft, Aug. 12.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	2.41	2.23	---	2.28	2.80	4.37	2.78	---	2.04	2.68
2	---	---	2.37	2.27	---	2.28	2.95	4.30	2.73	---	2.04	2.67
3	---	---	2.35	2.27	---	2.30	3.18	4.18	2.70	---	2.02	2.54
4	---	---	2.28	2.27	---	2.29	3.56	4.02	2.63	---	2.02	2.32
5	---	2.63	2.26	2.22	---	2.26	3.84	3.86	2.58	---	2.00	2.25
6	---	2.66	2.31	2.22	---	2.24	4.34	3.68	2.55	---	2.01	2.23
7	---	2.59	2.27	2.23	---	2.24	4.60	3.56	2.57	---	2.04	2.20
8	---	2.61	2.22	2.24	---	2.24	4.53	3.53	2.81	---	2.05	2.19
9	---	2.57	2.26	2.28	---	2.22	4.44	3.54	3.24	---	2.01	2.20
10	---	2.52	2.24	2.29	---	2.23	4.32	3.49	3.05	---	1.99	2.20
11	---	2.42	2.30	2.26	---	2.22	4.22	3.41	2.84	---	1.98	2.19
12	---	2.32	2.26	2.26	---	2.23	4.16	3.49	2.68	---	1.97	2.17
13	---	2.26	2.30	2.27	---	2.22	4.07	3.60	2.52	---	1.98	2.11
14	---	2.20	2.26	2.25	2.23	2.21	4.07	3.59	2.58	---	1.98	2.10
15	---	2.22	2.17	2.24	2.24	2.18	4.17	3.63	2.58	---	2.06	2.08
16	---	2.46	2.27	2.22	2.24	2.19	4.30	3.70	2.62	---	2.38	2.08
17	---	2.43	2.29	2.22	2.24	2.22	4.29	3.70	---	---	2.57	2.11
18	---	2.57	2.30	2.24	2.23	2.21	4.19	3.70	---	---	2.63	2.10
19	---	2.55	2.07	2.23	2.25	2.22	4.15	3.92	---	---	2.40	2.33
20	---	2.44	2.17	2.23	2.26	2.22	4.10	4.04	---	---	2.32	2.47
21	---	2.48	2.08	2.22	2.28	2.22	4.05	4.03	---	---	2.35	2.38
22	---	2.43	2.25	2.22	2.29	2.23	4.04	3.88	---	---	2.33	2.30
23	---	2.37	2.22	2.22	2.28	2.23	4.05	3.66	---	---	2.28	2.22
24	---	2.31	2.18	2.25	2.27	2.21	4.09	3.50	---	2.09	2.21	2.18
25	---	2.28	2.14	2.26	2.27	2.23	4.13	3.40	---	2.09	2.18	2.15
26	---	2.23	2.16	2.28	2.27	2.21	4.14	3.28	---	2.13	2.12	2.12
27	---	2.33	2.16	---	2.28	2.27	4.15	3.16	---	2.13	2.09	2.11
28	---	2.22	2.25	---	2.28	2.37	4.23	3.05	---	2.10	2.07	2.09
29	---	2.25	2.26	---	---	2.52	4.28	2.95	---	2.08	2.06	2.09
30	---	2.33	2.24	---	---	2.67	4.33	2.90	---	2.06	2.17	2.09
31	---	---	2.23	---	---	2.68	---	2.82	---	2.00	2.56	---
MEAN	---	---	2.24	---	---	2.28	4.06	3.61	---	---	2.16	2.23
MAX	---	---	2.41	---	---	2.68	4.60	4.37	---	---	2.63	2.68
MIN	---	---	2.07	---	---	2.18	2.80	2.82	---	---	1.97	2.08

STREAMS TRIBUTARY TO LAKE MICHIGAN

04059000 ESCANABA RIVER AT CORNELL, MI

LOCATION.--Lat 45°54'31", long 87°12'49", in NW1/4 sec.32, T.41 N., R.23 W., Delta County, Hydrologic Unit 04030110, on right bank 50 ft downstream from bridge on County Road 519, 0.4 mi downstream from Bobs Creek, 0.7 mi northeast of Cornell, and 16 mi upstream from mouth. DRAINAGE AREA.--870 mi².

PERIOD OF RECORD.--August 1903 to December 1912, January 1913 to November 1915 (gage heights only), October 1950 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "near Escanaba" 1903-15.

REVISED RECORDS.--WSP 1387: 1904. WDR MI-85-1: 1970 (M).

GAGE.--Water-stage recorder. Datum of gage is 749.26 ft above sea level (levels by Michigan Department of Natural Resources). August 1903 to November 1915, nonrecording gage at site 10 mi downstream at different datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Since 1950, diurnal fluctuation and slight regulation by Boney Falls powerplant 7 mi upstream. Since August 1962, some regulation by Schweitzer Reservoir (station 04058190) approximately 50 mi upstream. Since December 1972, some regulation by Greenwood Reservoir (station 04057811) approximately 60 mi upstream. Gage-height telemeter at station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	325	1070	501	e400	e405	e420	e850	3370	805	337	251	756
2	318	821	550	e400	e405	e420	e960	3180	759	403	247	718
3	309	756	490	e400	e405	e420	e1100	2830	721	471	242	568
4	305	705	477	e400	e405	e420	e1800	2440	656	526	237	452
5	293	714	454	e400	e405	e420	e3000	2150	622	476	226	385
6	294	735	456	e400	e400	e410	4420	1900	595	429	235	363
7	278	728	435	e400	e400	e400	5260	1680	643	408	255	350
8	288	705	400	e400	e400	e400	4800	1650	788	415	256	375
9	290	655	433	e400	e400	e400	4320	1670	1290	377	231	358
10	285	613	460	e400	e400	e390	3860	1600	1070	375	226	349
11	295	570	469	e400	e400	e390	3520	1510	852	337	219	358
12	312	571	426	e400	e400	e390	3190	1620	701	312	217	375
13	303	536	428	e400	e400	e390	2930	1770	580	315	218	255
14	282	463	418	e400	e400	e380	2920	1750	612	368	220	251
15	288	529	420	e400	e400	e380	3130	1800	613	378	261	270
16	284	549	482	e400	e400	e375	3530	1880	691	363	431	265
17	385	538	505	e400	e400	e375	3460	1900	633	330	613	355
18	455	731	507	e400	e400	e375	3260	1940	583	316	663	252
19	533	699	371	e400	e410	e375	3080	2340	590	273	496	429
20	500	568	e400	e400	e420	e375	2900	2540	592	278	430	525
21	447	588	e400	e400	e420	e380	2760	2500	553	283	452	457
22	431	550	e400	e405	e420	e380	2710	2240	519	289	443	422
23	548	468	e400	e405	e420	e380	2760	1920	498	286	404	375
24	751	480	e400	e405	e420	e390	2800	1690	453	273	356	345
25	811	428	e380	e405	e420	e390	2850	1530	388	273	324	321
26	730	394	e390	e405	e420	e400	2840	1390	422	309	303	308
27	659	490	e400	e405	e420	e430	2830	1230	380	313	278	295
28	604	452	e400	e405	e420	e500	3030	1110	352	290	262	298
29	584	501	e400	e405	---	e540	3120	993	360	272	256	285
30	867	475	e400	e405	---	e700	3260	932	339	265	339	285
31	1130	---	e400	e405	---	e730	---	853	---	242	633	---
TOTAL	14184	18082	13452	12450	11415	13125	91250	57908	18660	10582	10226	11427
MEAN	458	603	434	402	408	423	3042	1868	622	341	330	381
MAX	1130	1070	550	405	420	730	5260	3370	1290	526	663	755
MIN	278	394	371	400	400	375	850	853	339	242	217	265
CFSM	.53	.69	.50	.46	.47	.49	3.50	2.15	.71	.39	.38	.41
IN.	.61	.77	.58	.53	.49	.56	3.90	2.48	.80	.45	.44	.49

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1903 - 1997, BY WATER YEAR (WY)

	MEAN	716	790	546	373	345	566	2583	1719	951	608	494	621
MAX	1690	2230	945	720	959	1663	4329	4388	2172	1859	2014	1874	1874
(WY)	1986	1989	1907	1969	1984	1973	1951	1907	1968	1951	1911	1977	1977
MIN	196	218	230	190	185	227	830	481	255	222	194	194	194
(WY)	1964	1977	1977	1964	1959	1964	1990	1977	1988	1988	1963	1977	1977

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1903 - 1997

ANNUAL TOTAL	357008	282759	(a)833
ANNUAL MEAN	975	775	1385
HIGHEST ANNUAL MEAN			1960
LOWEST ANNUAL MEAN			506
HIGHEST DAILY MEAN	8120	5260	10400
LOWEST DAILY MEAN	251	217	(b)90
ANNUAL SEVEN-DAY MINIMUM	287	227	159
INSTANTANEOUS PEAK FLOW		(c)6180	(d)10700
INSTANTANEOUS PEAK STAGE		(f)4.48	(f)6.40
INSTANTANEOUS LOW FLOW		156	(b)90
ANNUAL RUNOFF (CFSM)	1.12	.89	.96
ANNUAL RUNOFF (INCHES)	15.27	12.09	13.01
10 PERCENT EXCEEDS	2440	1930	1880
50 PERCENT EXCEEDS	520	420	520
90 PERCENT EXCEEDS	328	288	258

(a) Does not include water years 1904-12.

(b) Observed; site and datum then in use, but may have been less during extended periods of no gage-height record during winter periods of 1903-12, or periods of ice effect in 1959.

(c) Gage height 4.00 ft.

(d) Gage height 5.00 ft.

(e) Estimated.

(f) Backwater from ice.

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	125	613	e145	e120	e110	e94	e350	1330	362	97	89	334
2	117	613	e145	e120	e110	e94	e500	1340	334	99	82	388
3	110	560	e145	e125	e110	e94	e800	1280	295	133	76	382
4	103	486	e145	e125	e105	e94	e1200	1170	257	163	71	330
5	98	431	e140	e120	e105	e94	e2100	1060	239	162	66	268
6	96	396	e140	e120	e100	e94	e3300	951	237	157	62	219
7	93	390	e140	e120	e100	e94	3690	812	264	138	63	185
8	90	378	e140	e120	e100	e94	3430	756	314	133	62	160
9	87	354	e140	e120	e98	e94	3250	744	332	138	59	153
10	86	328	e140	e120	e96	e94	3040	688	355	130	56	155
11	85	262	e140	e120	e96	e94	2940	638	342	131	53	163
12	85	195	e135	e120	e95	e94	2700	664	296	120	49	148
13	83	182	e130	e120	e94	e94	2420	717	264	105	49	132
14	83	212	e130	e120	e94	e94	2030	712	260	103	47	122
15	83	223	e130	e120	e94	e94	1900	739	237	135	53	119
16	82	223	e130	e120	e94	e95	1940	747	311	144	57	110
17	102	258	e130	e120	e94	e96	1830	795	375	143	105	144
18	135	239	e130	e120	e94	e98	1730	833	364	121	215	146
19	161	244	e125	e120	e94	e100	1660	985	331	106	258	160
20	214	e240	e125	e120	e94	e105	1580	1060	301	104	271	189
21	238	e225	e125	e120	e94	e110	1480	1070	282	115	264	250
22	216	e210	e125	e120	e94	e110	1400	1030	253	125	261	295
23	262	e190	e125	e120	e94	e115	1330	963	223	129	244	293
24	327	e170	e125	e120	e94	e120	1300	857	202	121	216	256
25	360	e160	e125	e120	e94	e125	1260	747	181	109	177	215
26	380	e145	e120	e120	e94	e130	1220	630	159	128	148	176
27	376	e140	e120	e120	e94	e140	1180	551	146	142	130	149
28	349	e140	e120	e120	e94	e150	1200	473	127	142	118	138
29	321	e140	e120	e120	---	e160	1230	403	113	128	107	127
30	515	e145	e120	e120	---	e180	1250	381	103	110	113	120
31	605	---	e120	e115	---	e200	---	380	---	96	198	---
TOTAL	6067	8492	4070	3725	2729	3444	55240	25506	7859	3907	3819	6026
MEAN	196	283	131	120	97.5	111	1841	823	262	126	123	201
MAX	605	613	145	125	110	200	3690	1340	375	163	271	388
MIN	82	140	120	115	94	94	350	380	103	96	47	110
CFSM	.43	.63	.29	.27	.22	.25	4.09	1.83	.58	.28	.27	.45
IN.	.50	.70	.34	.31	.23	.28	4.57	2.11	.65	.32	.32	.50

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1955 - 1997, BY WATER YEAR (WY)

	MEAN	307	391	209	118	102	249	1316	816	410	208	164	255
MAX	819	1246	589	346	493	1078	2353	2483	1006	793	713	1013	1013
(WY)	1960	1986	1966	1966	1984	1973	1979	1960	1966	1968	1978	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	26.2
(WY)	1977	1977	1977	1977	1977	1964	1990	1986	1988	1988	1970	1976	1976

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1955 - 1997

ANNUAL TOTAL	178509						130884						
ANNUAL MEAN	488						359						
HIGHEST ANNUAL MEAN										379			
LOWEST ANNUAL MEAN										640			1960
HIGHEST DAILY MEAN										183			1963
LOWEST DAILY MEAN										6850		May 8	1960
ANNUAL SEVEN-DAY MINIMUM	5470				Apr 26		3690		Apr 7			Aug 30	1976
LOWEST DAILY MEAN	72				Sep 8		47		Aug 14			Aug 30	1976
ANNUAL SEVEN-DAY MINIMUM	77				Sep 3		52		Aug 10			May 7	1960
INSTANTANEOUS PEAK FLOW							(a)3930		Apr 7	7590		May 7	1960
INSTANTANEOUS PEAK STAGE							(b)6.53		Apr 6	8.27		May 7	1960
INSTANTANEOUS LOW FLOW							47		(c)	18		(d)	
ANNUAL RUNOFF (CFSM)	1.08						.80			.84			
ANNUAL RUNOFF (INCHES)	14.76						10.82			11.43			
10 PERCENT EXCEEDS	1200						972			934			
50 PERCENT EXCEEDS	169						140			180			
90 PERCENT EXCEEDS	115						94			54			

(a) Gage height, 6.49 ft.

(b) Backwater from ice.

(c) Aug. 14, 15.

(d) 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 excellent 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	277	467	351	e280	e270	e210	e430	741	373	321	228	532
2	263	394	334	e280	e270	e210	e490	665	354	323	230	425
3	257	368	321	e290	e270	e210	674	596	336	346	229	335
4	256	358	322	e290	e260	e210	879	534	328	366	232	317
5	259	376	334	e290	e260	e210	1120	499	400	345	228	279
6	272	381	330	e290	e250	e210	1590	481	434	321	223	276
7	277	371	320	e290	e250	e210	2010	444	482	304	217	271
8	266	354	315	e280	e240	e210	1830	440	496	357	213	276
9	258	340	314	e280	e240	e220	1450	449	422	412	235	279
10	271	329	e310	e280	e230	e220	1170	424	374	351	228	379
11	279	314	309	e280	e230	e220	1010	415	360	315	222	307
12	271	317	304	e280	e220	e220	921	449	480	293	212	276
13	264	309	303	e280	e220	e220	863	478	442	294	214	279
14	263	303	304	e280	e210	e220	839	471	370	292	210	279
15	266	311	310	e280	e210	e220	874	518	372	277	259	254
16	270	401	299	e280	e210	e250	993	499	596	270	439	279
17	384	602	e280	e280	e210	e275	998	506	529	272	503	303
18	413	602	e250	e280	e210	e280	924	529	457	272	404	279
19	367	472	e230	e280	e220	e280	861	669	445	266	332	520
20	323	432	e240	e280	e220	e290	840	716	402	263	363	774
21	309	406	e250	e280	e220	e290	831	637	375	262	460	579
22	298	363	e270	e280	e215	e300	818	570	346	255	393	371
23	373	349	e280	e280	e210	e300	807	516	324	256	334	328
24	484	336	e280	e280	e210	e310	798	505	311	252	306	300
25	435	357	e280	e280	e210	e315	775	522	316	258	285	278
26	394	350	e280	e280	e210	e320	750	472	304	306	277	272
27	357	321	e280	e280	e210	e330	743	450	287	286	269	257
28	336	342	e280	e280	e210	e350	716	414	275	258	257	255
29	327	355	e280	e280	---	e360	681	399	268	238	250	273
30	607	350	e280	e275	---	e380	689	412	288	228	358	279
31	628	---	e280	e275	---	e400	---	399	---	225	628	---
TOTAL	10304	11330	9120	8720	6395	8250	28374	15819	11546	9084	9238	9856
MEAN	332	378	294	281	228	266	946	510	385	293	298	329
MAX	628	602	351	290	270	400	2010	741	596	412	628	774
MIN	256	303	230	275	210	210	430	399	268	225	210	279
CFSM	.91	1.03	.80	.77	.62	.73	2.58	1.39	1.05	.80	.81	.90
IN.	1.05	1.15	.93	.89	.65	.84	2.88	1.61	1.17	.92	.94	1.00

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1914 - 1997, BY WATER YEAR (WY)

MEAN	328	339	278	252	244	319	656	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	179
(WY)	1949	1990	1990	1995	1995	1965	1990	1988	1988	1989	1948	1948

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1914 - 1997

ANNUAL TOTAL	161589	138036	353	
ANNUAL MEAN	442	378	512	1973
HIGHEST ANNUAL MEAN			221	1970
LOWEST ANNUAL MEAN			221	
HIGHEST DAILY MEAN	3060	2010	4420	Jul 2 1953
LOWEST DAILY MEAN	230	210	130	Dec 2 1953
ANNUAL SEVEN-DAY MINIMUM	250	210	140	Jan 2 1955
INSTANTANEOUS PEAK FLOW		(a)2090	4700	Jul 2 1953
INSTANTANEOUS PEAK STAGE		(b)6.57	(c)7.45	Apr 26 1956
INSTANTANEOUS LOW FLOW		208	(d)	Dec 2 1953
ANNUAL RUNOFF (CFSM)	1.21	1.03	.97	
ANNUAL RUNOFF (INCHES)	16.42	14.03	13.12	
10 PERCENT EXCEEDS	667	615	557	
50 PERCENT EXCEEDS	316	304	290	
90 PERCENT EXCEEDS	258	220	205	

(a) Gage height 6.42 ft.

(b) Backwater from ice.

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

(d) Aug. 12, 14.

(e) Estimated.

(f) Discharge measurement.

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, WDR MI-96-1: 1985 (M)

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

REMARKS.--Records fair. 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.

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

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	101	94	94	e90	e87	e90	e97	94	89	89	88	96
2	92	94	94	e90	e87	e90	e97	93	89	89	87	106
3	92	94	94	e90	e87	e90	e97	92	89	89	85	97
4	92	94	e94	e90	e87	e90	969	92	89	89	85	96
5	92	94	94	e90	e87	e90	1620	91	90	87	92	96
6	91	94	94	e90	e87	e90	2050	91	90	87	89	96
7	89	94	94	e90	e87	e92	2650	92	390	87	89	96
8	91	94	94	e90	e87	e92	2870	98	320	88	89	96
9	92	94	94	e90	e87	e92	2860	94	91	87	91	96
10	92	94	94	e90	e87	e94	2530	93	162	87	92	97
11	92	94	94	e89	e87	e94	2280	452	165	86	92	98
12	92	94	94	e88	e87	e94	1460	868	89	86	92	98
13	92	94	95	e88	e87	e95	1100	442	88	86	92	98
14	92	94	96	e88	e87	e96	1100	249	89	86	92	98
15	e92	94	97	e88	e87	e97	781	264	90	86	92	97
16	e92	94	98	e87	e87	e97	449	710	91	85	94	96
17	e92	95	96	e87	e87	e97	462	990	89	85	93	96
18	e92	118	96	e87	e87	e97	444	987	90	85	94	97
19	e92	103	e96	e87	e87	e97	421	1460	89	86	94	99
20	e92	99	e95	e87	e87	e97	414	1930	88	87	94	98
21	e92	94	e95	e87	e87	e97	308	1790	87	87	94	98
22	e92	95	e95	e87	e87	e97	94	1570	87	86	94	98
23	e92	117	e95	e87	e87	e97	93	997	87	87	94	98
24	e92	115	e95	e87	e87	e97	92	430	87	88	94	98
25	96	95	e95	e87	e87	e97	98	428	87	89	95	96
26	92	102	e94	e87	e88	e97	94	261	87	89	96	97
27	92	96	e94	e87	e88	e97	94	93	87	89	96	98
28	92	96	e93	e87	e90	e97	93	92	87	87	95	98
29	93	96	e92	e87	---	e97	93	92	88	87	94	98
30	94	96	e92	e87	---	e97	94	92	87	87	96	97
31	94	---	e92	e87	---	e97	---	91	---	88	96	---
TOTAL	2865	2921	2929	2733	2441	2938	25904	15218	3338	2701	2860	2923
MEAN	92.4	97.4	94.5	88.2	87.2	94.8	863	491	111	87.1	92.3	97.4
MAX	101	118	98	90	90	97	2870	1930	390	89	96	106
MIN	89	94	92	87	87	90	92	91	87	85	85	96

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1997, BY WATER YEAR (WY)

	MEAN	127	119	92.7	89.8	92.4	103	465	392	206	140	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1952 - 1997

ANNUAL TOTAL	130552	69771	
ANNUAL MEAN	357	191	
HIGHEST ANNUAL MEAN			169
LOWEST ANNUAL MEAN			356
HIGHEST DAILY MEAN			91.4
LOWEST DAILY MEAN	5130	2870	7380
ANNUAL SEVEN-DAY MINIMUM	84	85	62
INSTANTANEOUS PEAK FLOW	84	86	65
INSTANTANEOUS PEAK STAGE		3190	8050
10 PERCENT EXCEEDS	931	7.67	10.50
50 PERCENT EXCEEDS	94	199	119
90 PERCENT EXCEEDS	86	93	91
		87	86

(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 04060106, 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 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. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	235	571	486	383	416	401	592	889	492	472	e325	718
2	238	493	423	442	431	413	703	842	486	465	e325	561
3	252	480	437	461	419	419	830	756	469	474	e325	488
4	280	460	403	470	408	401	1510	651	456	504	e325	438
5	237	506	411	448	431	397	2350	661	512	481	e325	431
6	226	478	456	401	418	414	3280	555	576	441	e330	404
7	233	464	437	430	416	363	4110	576	916	448	339	415
8	250	461	430	434	429	365	4360	554	927	486	319	403
9	338	440	433	401	372	428	4090	548	565	548	360	368
10	384	431	433	442	423	380	3700	523	522	484	392	460
11	398	401	411	458	419	389	3360	867	642	444	335	463
12	389	388	415	410	403	387	2450	1370	616	431	331	425
13	379	366	430	421	406	363	1990	974	573	423	348	386
14	358	371	419	432	389	330	1980	791	508	434	330	382
15	370	354	400	426	402	292	1730	832	544	396	379	397
16	414	598	398	433	402	292	1520	1210	810	395	575	375
17	481	804	392	394	393	344	1540	1490	661	392	728	446
18	440	715	470	397	400	378	1420	1540	634	384	563	420
19	249	534	314	424	427	372	1320	2090	560	e380	470	680
20	325	507	260	421	439	391	1310	2650	551	e375	513	850
21	461	502	322	397	419	410	1220	2420	501	e360	589	700
22	425	465	448	420	421	374	952	2120	482	e360	537	480
23	500	452	458	429	388	411	991	1550	467	e360	465	488
24	630	403	356	435	407	387	908	1000	421	e360	448	414
25	531	423	343	442	385	368	933	1030	483	e380	387	433
26	503	381	349	427	413	402	878	801	403	e430	408	401
27	448	372	380	421	414	475	880	539	438	e390	400	399
28	456	411	400	422	400	549	823	558	391	e370	378	389
29	460	446	457	419	---	641	868	513	402	e350	369	395
30	720	474	431	408	---	581	814	535	407	e330	535	387
31	810	---	418	399	---	516	---	530	---	e325	797	---
TOTAL	12420	14151	12620	13147	11490	12633	53412	31965	16415	12862	13250	13996
MEAN	401	472	407	424	410	408	1780	1031	547	415	427	467
MAX	810	804	486	470	439	641	4360	2650	927	548	797	850
MIN	226	354	260	383	372	292	592	513	391	325	319	368

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1990 - 1997, BY WATER YEAR (WY)

	MEAN	429	408	349	330	329	408	1037	935	497	426	362	374
MAX	712	571	416	424	410	506	2288	2757	730	610	465	467	
(WY)	1991	1993	1992	1997	1997	1991	1996	1996	1996	1996	1996	1997	
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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1990 - 1997
ANNUAL TOTAL	292758	218361	
ANNUAL MEAN	800	598	490
HIGHEST ANNUAL MEAN			810
LOWEST ANNUAL MEAN			325
HIGHEST DAILY MEAN	7750	4360	7750
LOWEST DAILY MEAN	226	226	182
ANNUAL SEVEN-DAY MINIMUM	243	243	202
INSTANTANEOUS PEAK FLOW		5000	8480
INSTANTANEOUS PEAK STAGE		11.31	13.91
10 PERCENT EXCEEDS	1500	897	700
50 PERCENT EXCEEDS	428	431	373
90 PERCENT EXCEEDS	344	355	273

(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 except for estimated daily discharges, which are fair. Flow regulated by powerplant and by Michigamme Reservoir, capacity, 119,950 acre-ft, 5 mi upstream. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	615	211	675	1010	e1210	679	604	241	982	699	267	233
2	386	208	672	1010	e1210	660	454	601	848	705	270	219
3	442	206	726	1010	e1210	655	608	876	996	702	270	212
4	427	206	799	1010	e1210	649	1100	727	996	702	270	491
5	420	209	849	1010	1210	643	1210	643	983	701	279	544
6	410	209	873	1000	1220	603	1320	689	929	699	271	541
7	398	208	872	1070	1260	466	1340	568	1070	595	270	537
8	388	366	871	1120	1280	461	1340	564	1220	602	268	519
9	406	425	869	1070	1270	461	1350	1210	908	663	269	503
10	399	424	869	919	1270	469	1340	1780	735	659	266	500
11	388	400	867	916	1260	458	1340	1990	725	655	266	499
12	395	377	867	1010	1250	458	1340	2280	712	654	556	499
13	380	322	866	1080	1250	457	1330	1870	713	653	1050	497
14	391	183	864	1080	1260	451	1340	1750	709	649	1060	496
15	388	185	870	1060	1270	412	1360	1680	713	648	1090	494
16	407	201	865	1070	1270	389	1380	1960	716	878	527	458
17	398	207	921	1070	1260	399	1350	1920	714	1140	190	431
18	445	205	e930	1070	1250	412	1350	1990	713	612	179	431
19	405	201	e930	1060	1240	452	1330	2240	768	595	174	478
20	395	387	e930	1130	1240	441	1190	2150	639	556	182	469
21	264	432	e930	1190	1240	411	991	2200	761	476	180	447
22	191	431	e940	1200	1230	413	666	2100	593	508	504	448
23	204	430	e940	1190	1210	411	521	1880	579	534	649	428
24	205	429	946	1210	1190	418	501	1680	594	553	383	452
25	203	551	944	1220	1180	442	337	1570	654	514	496	449
26	200	652	941	1220	935	450	216	1570	698	541	517	448
27	201	652	941	1210	1180	452	228	1360	699	606	459	445
28	199	653	940	1210	1020	528	353	1050	697	551	462	445
29	205	606	970	e1210	---	522	323	1140	696	479	463	446
30	226	528	993	e1210	---	491	239	1300	700	369	405	464
31	219	---	1010	e1210	---	626	---	1250	---	439	227	---
TOTAL	10600	10704	27480	34055	34085	15229	28351	44939	23460	19337	12719	13523
MEAN	342	357	866	1099	1217	491	945	1450	782	624	410	451
MAX	615	653	1010	1220	1280	679	1380	2280	1220	1140	1090	544
MIN	191	183	672	916	935	389	216	241	579	369	174	212

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 1997, BY WATER YEAR (WY)

	MEAN	506	564	802	873	823	529	658	1102	824	676	597	521
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1944 - 1997

ANNUAL TOTAL	343196	274482	706
ANNUAL MEAN	938	752	1049
HIGHEST ANNUAL MEAN			382
LOWEST ANNUAL MEAN			1977
HIGHEST DAILY MEAN	4700	2280	6940
LOWEST DAILY MEAN	183	174	71
ANNUAL SEVEN-DAY MINIMUM	200	200	83
INSTANTANEOUS PEAK FLOW		2540	7260
INSTANTANEOUS PEAK STAGE		6.71	10.73
10 PERCENT EXCEEDS	1550	1270	1180
50 PERCENT EXCEEDS	863	652	653
90 PERCENT EXCEEDS	357	255	168

(e) 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 Beaver Pond, capacity, 33,860 acre-ft, on Michigamme River, and by many smaller reservoirs upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	895	1780	1890	1890	2110	e1930	1980	3100	2140	1660	1300	1870
2	880	1840	1890	1880	2100	e1900	2020	3590	2190	1670	942	1670
3	1010	1900	1890	1880	2090	e1860	2170	3210	2100	1760	885	1740
4	908	1840	1890	1880	2070	1820	3620	2890	1700	1710	933	1670
5	1030	1720	1900	1870	2040	1860	4250	2430	2060	1750	1020	1570
6	817	1420	1870	1880	1990	1860	5470	2290	2140	1650	819	1370
7	1100	1320	1890	1880	2060	1990	6390	1860	2770	1520	838	1170
8	1080	1510	1880	1880	2080	1980	6620	2250	3240	1680	727	1270
9	1010	1580	1890	1870	2040	1960	6640	2580	2890	1800	921	1180
10	1050	1270	1890	1890	2070	1960	6030	3080	2510	1760	785	1440
11	1100	1630	1860	1890	2070	1960	5860	3350	1950	1850	799	1770
12	1050	1290	1830	1890	2070	1980	4910	3950	2000	1780	858	1530
13	1070	1340	1880	1890	2080	2010	4280	3570	1930	1850	1520	1180
14	1140	1290	1890	1900	2060	1960	4380	3490	1550	1710	1550	1070
15	1120	1060	1890	1890	2090	1980	4190	3460	1400	1690	1490	1270
16	1090	1500	1900	1890	2090	1970	3960	3800	2370	1650	1640	1370
17	1340	1890	1890	1900	2070	1930	4070	4120	2350	1670	1720	1470
18	1880	1850	1890	1930	1910	2020	3860	4160	2220	1360	1560	1430
19	1430	1810	1630	1920	2050	1940	3820	4850	2330	1100	1620	1370
20	895	1830	1890	1890	2020	2010	3930	5860	2010	960	1460	1670
21	1340	1820	1780	1990	2010	1950	3680	5480	1710	1350	1770	1870
22	1370	1860	1700	2080	2010	1700	3350	5040	1710	1430	1610	1730
23	1610	1770	1700	2100	2010	1330	3010	4250	1730	1480	1270	1670
24	1790	1830	1800	2070	2020	1010	2960	3470	1560	1170	1360	1330
25	1450	1610	1690	2030	2000	1050	2710	3670	1690	1130	1290	1370
26	1280	1480	1630	2090	1990	1090	2410	3300	1820	1200	1390	1320
27	1760	1450	1690	2060	e2000	1270	2440	2650	1730	1290	1380	1070
28	1580	1350	1840	2080	e1960	1620	2660	2600	1390	1190	1350	1070
29	921	1410	1900	2050	---	2030	2910	2420	1100	1520	1320	1270
30	1550	1840	1870	2070	---	2070	2830	2490	1700	1210	1390	1270
31	1720	---	1890	2110	---	2150	---	2530	---	1190	1710	---
TOTAL	38266	48090	56920	60520	57160	56150	117410	105790	59990	46740	39227	42970
MEAN	1234	1603	1836	1952	2041	1811	3914	3413	2000	1508	1265	1431
MAX	1880	1900	1900	2110	2110	2150	6640	5860	3240	1850	1770	1870
MIN	817	1060	1630	1870	1910	1010	1980	1860	1100	960	727	1070

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1914 - 1997, BY WATER YEAR (WY)

	1485	1618	1469	1407	1378	1600	3204	3084	2158	1610	1312	1416
MEAN	1485	1618	1469	1407	1378	1600	3204	3084	2158	1610	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	1958
MIN	726	725	765	691	647	692	707	595	799	721	545	778
(WY)	1949	1964	1925	1924	1926	1914	1990	1987	1988	1925	1925	1926

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1914 - 1997
ANNUAL TOTAL	870108	729193	1812
ANNUAL MEAN	2377	1998	3069
HIGHEST ANNUAL MEAN			922
LOWEST ANNUAL MEAN			18100
HIGHEST DAILY MEAN	10900	6640	Apr 9
LOWEST DAILY MEAN	725	727	Aug 8
ANNUAL SEVEN-DAY MINIMUM	850	821	Aug 6
INSTANTANEOUS PEAK FLOW		7150	Apr 7
INSTANTANEOUS PEAK STAGE		10.44	Apr 7
INSTANTANEOUS LOW FLOW		625	Oct 26
10 PERCENT EXCEEDS	4560	3260	3060
50 PERCENT EXCEEDS	1820	1860	1480
90 PERCENT EXCEEDS	1270	1100	855

(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 from gage. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1190	2680	2230	e2200	e2400	e2100	2690	4210	2670	2030	1440	2740
2	1220	2670	2280	e2100	e2300	e2100	2720	5010	2670	2070	1160	2470
3	1250	2550	2240	e2200	e2300	e2100	3230	4710	2560	2080	1170	2360
4	1250	2490	2210	e2200	e2300	e2100	5040	4020	2070	2150	1150	2390
5	1280	2260	2110	e2200	e2300	e2000	6520	3620	2370	2240	1080	2150
6	1200	2070	2240	e2100	e2200	e2100	8370	3270	2550	2050	1100	1870
7	1310	1990	2170	e2100	e2200	e2100	9500	2540	3370	2050	1030	1620
8	1330	2010	2280	e2200	e2200	e2200	8900	3220	4180	2030	998	1720
9	1280	2050	2250	e2200	e2200	e2200	8960	3310	3540	2240	1010	1750
10	1290	1690	2130	e2200	e2300	e2200	8110	3820	3150	2370	1000	1920
11	1310	2170	2190	e2200	e2300	e2300	7880	4080	2490	2270	981	2180
12	1410	1660	2240	e2200	e2300	e2200	6960	4970	2440	2240	950	2030
13	1400	1630	2160	e2200	e2300	e2200	5840	4220	2340	2120	1680	1600
14	1410	1590	2040	e2100	e2300	e2100	5990	4270	2000	2100	1650	1450
15	1350	1370	2260	e2100	e2300	e2000	5940	4300	1790	1940	1680	1640
16	1400	1990	e2100	e2100	e2300	e2100	5700	4670	3180	2000	1840	1630
17	1610	2340	e2100	e2000	e2300	e2200	5800	5150	3450	1960	1940	1890
18	2270	2550	e2200	e2100	e2300	e2200	5510	5300	3230	1850	2030	1850
19	2030	2310	e1900	e2100	e2200	e2100	5350	5790	3470	1190	2040	1900
20	1240	2470	e2000	e2200	e2300	e2100	5580	7150	2990	1150	1890	2140
21	1790	2380	e2100	e2200	e2300	e2100	5380	6650	2520	1720	2270	2380
22	1810	2370	e1800	e2200	e2300	e2100	4860	6110	2390	1680	2040	2330
23	1930	2280	e1900	e2200	e2300	1670	4540	5240	2270	1660	1730	2070
24	2430	2190	e2000	e2200	e2300	1360	4240	4260	2150	1420	1780	1650
25	2180	1990	e2000	e2300	e2300	1330	4190	4340	2040	1350	1610	1770
26	1850	1730	e1900	e2300	e2300	1460	3670	4220	2250	1620	1580	1570
27	2310	1760	e2000	e2300	e2300	1550	3680	3420	2130	1620	1650	1370
28	2100	1670	e2000	e2300	e2200	1970	3940	3070	1780	1670	1810	1360
29	1370	1890	e2200	e2300	---	2800	4070	3010	1460	1680	1550	1590
30	2290	2120	e2300	e2300	---	2720	4130	3080	1910	1440	1820	1550
31	2590	---	e2300	e2300	---	2690	---	3080	---	1520	2440	---
TOTAL	50680	62910	65830	67900	64000	64450	167290	134110	77410	57510	48099	56940
MEAN	1635	2097	2124	2190	2286	2079	5576	4326	2580	1855	1552	1898
MAX	2590	2680	2300	2300	2400	2800	9500	7150	4180	2370	2440	2740
MIN	1190	1370	1800	2000	2200	1330	2690	2540	1460	1150	950	1360

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1993 - 1997, BY WATER YEAR (WY)

	1993	1994	1995	1996	1997
MEAN	1896	2006	1977	1901	1957
MAX	2810	2531	2458	2258	2286
(WY)	1996	1993	1993	1993	1995
MIN	1632	1283	1542	1369	1391
(WY)	1993	1995	1995	1995	1994

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1993 - 1997
ANNUAL TOTAL	1104380	917129	
ANNUAL MEAN	3017	2513	2381
HIGHEST ANNUAL MEAN			3135
LOWEST ANNUAL MEAN			1894
HIGHEST DAILY MEAN	16000	Apr 27	16000
LOWEST DAILY MEAN	1170	Sep 30	950
ANNUAL SEVEN-DAY MINIMUM	1210	Sep 28	1010
INSTANTANEOUS PEAK FLOW			10300
INSTANTANEOUS PEAK STAGE			12.37
10 PERCENT EXCEEDS	5860		4230
50 PERCENT EXCEEDS	2170		2200
90 PERCENT EXCEEDS	1610		1410

(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 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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1390	3280	2310	2270	2650	2450	3200	e5600	e3270	2310	e1500	3230
2	1410	3320	2380	2240	2580	2350	3290	e6200	e3250	2370	e1400	3020
3	1460	3250	2410	2280	2510	2390	3940	e6000	e3230	2370	e1350	2840
4	1570	2980	2390	2280	2630	2570	5910	e5200	e2540	2410	e1300	2700
5	1470	2750	2220	2370	2600	2340	8030	e4500	e2800	2580	e1250	2590
6	1370	2480	2370	2240	2430	2530	10000	e3800	e3000	2440	e1200	2180
7	1480	2470	2300	2190	2440	2340	12300	e3500	e3400	2370	e1200	1950
8	1500	2410	2330	2320	2480	2650	11900	e3700	e4400	2350	1180	2000
9	1460	2460	2370	2310	2480	2520	11800	e4340	e4000	2520	1150	2020
10	1450	1990	2280	2230	2540	2530	10700	e4980	e3500	2810	1160	2080
11	1480	2570	2220	2300	2690	2580	10100	e5090	e3100	2590	1160	2450
12	1610	1980	2300	2270	2540	2490	9140	e6030	e2900	2500	1090	2450
13	1590	1820	2200	2260	2570	2640	7770	e5220	e2700	2410	1560	1930
14	1560	1800	2110	2280	2510	2470	7670	e5140	e2500	2390	1790	1710
15	1560	1620	2280	2230	2510	2630	7670	e5320	e2300	2190	1810	1980
16	1510	2100	2220	2420	2540	2500	7290	e5450	e3500	2210	1830	1920
17	1790	2490	2200	2810	2550	2500	7480	e6040	e4500	2250	2160	2040
18	2550	2920	2330	2720	2540	2520	7300	e6400	e4200	2240	2300	2260
19	2370	2550	2040	2680	2400	2510	6910	e6690	4310	1540	2430	2140
20	1620	2660	2120	2530	2610	2460	7220	e8310	3630	1350	2120	2490
21	2120	2700	2260	2430	2540	2510	7080	e7950	3150	1900	2670	2730
22	2180	2610	1910	2410	2680	2450	6400	e7210	2910	1900	2500	2780
23	2290	2490	1970	2310	2540	1780	6170	e6260	2700	1910	2010	2550
24	2750	2400	2080	2590	2560	1630	5740	e5230	2560	1710	2120	1950
25	2840	2220	2090	2560	2580	1550	5800	e5130	2400	1640	1950	2740
26	2210	1820	1930	2610	2550	1680	5210	e5160	2600	e1800	1870	1890
27	2770	1850	2110	2560	2560	1880	e4800	e4300	2480	e2000	1890	1920
28	2740	1850	2080	2610	2530	2130	e4900	e3890	2200	e1900	1970	1900
29	1670	1880	2310	2730	---	3010	e5000	e3720	1600	e1800	1860	1920
30	2620	2380	2360	2670	---	3100	e5200	e3700	2200	e1700	1950	1760
31	3270	---	2420	2540	---	3160	---	e3800	---	e1600	2650	---
TOTAL	59640	72100	68880	75230	71340	74630	215700	163860	91830	66160	54380	66720
MEAN	1924	2403	2222	2427	2548	2407	7190	5286	3061	2134	1754	2024
MAX	3270	3320	2420	2810	2690	3180	12300	8310	4500	2810	2670	3030
MIN	1370	1620	1910	2190	2400	1550	3200	3500	1600	1350	1090	1900

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 1997, BY WATER YEAR (WY)

	MEAN	2033	2453	2294	2080	2011	2413	4400	4069	3004	2159	1698	1955
MAX	3401	4412	3008	2533	2548	2849	8159	8850	4832	3359	2598	2456	
(WY)	1996	1989	1989	1993	1997	1991	1996	1996	1993	1996	1996	1994	
MIN	1081	1382	1555	1489	1443	2028	1356	1720	1062	1100	1256	1223	
(WY)	1990	1990	1990	1995	1995	1994	1990	1988	1988	1988	1989	1989	

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1988 - 1997

ANNUAL TOTAL	1315630						1080470						
ANNUAL MEAN	3595						2960						
HIGHEST ANNUAL MEAN										2612			
LOWEST ANNUAL MEAN										3781			1996
HIGHEST DAILY MEAN	21500						12300		Apr 7	21500			Apr 27 1996
LOWEST DAILY MEAN	1350						1090		Aug 12	846			Aug 3 1988
ANNUAL SEVEN-DAY MINIMUM	1440						1160		Aug 6	932			Oct 1 1989
INSTANTANEOUS PEAK FLOW							12500		Apr 7	22000			Apr 27 1996
INSTANTANEOUS PEAK STAGE							13.43		Apr 7	17.39			Apr 27 1996
INSTANTANEOUS LOW FLOW							990		Oct 16	603			Aug 1 1992
10 PERCENT EXCEEDS	6850						5220			4200			
50 PERCENT EXCEEDS	2490						2450			2150			
90 PERCENT EXCEEDS	1830						1620			1350			

(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, 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, 10.6 mi southeast of Pembine, WI, 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 ft, from river-profile map, and Oct. 28, 1972, to August 1982, water-stage recorder at site 1.5 mi upstream at elevation 770 ft, 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1550	3550	2510	e2700	e3000	e2700	3450	5470	3390	2260	1720	3230
2	1560	3500	2640	e2700	e2900	e2700	3580	6090	3210	2490	1520	3180
3	1620	3450	2700	e2700	e2900	e2700	4080	6230	3160	2470	1350	2920
4	1680	3100	2690	e2800	e3000	e2700	5970	5390	2580	2450	1420	2720
5	1610	2990	2550	e2800	e2900	e2800	8580	4740	2900	2650	1290	2700
6	1550	2590	2610	e2700	e2800	e2700	10600	4250	3070	2600	1360	2230
7	1600	2670	2620	e2600	e2800	e2600	13700	3780	3410	2360	1280	2140
8	1670	2580	2610	e2800	e2800	e2800	13400	3800	5340	2430	1240	1920
9	1660	2780	2640	e2800	e2800	e2800	12800	3920	4730	2520	1170	2120
10	1610	2060	2580	e2800	e2900	e2900	11900	4630	4140	2880	1180	2030
11	1600	2700	2480	e2700	e2900	e2900	10900	4610	3320	2660	1180	2520
12	1610	2200	2590	e2700	e2900	e2800	9960	5520	3290	2620	1150	2600
13	1720	1990	2530	e2700	e2800	e2800	8100	5180	3010	2450	1470	1910
14	1660	1990	2530	e2700	e2800	e2700	7750	4960	2900	2350	1840	1820
15	1710	1920	2570	e2700	e2800	e2500	7860	5290	2300	2260	1830	1830
16	1660	2120	2690	e2600	e2800	e2700	7330	5190	4000	2190	1860	1890
17	1770	2690	e2600	e2500	e2900	e2700	7710	5940	5070	2270	2120	2180
18	2580	3050	e2700	e2600	e2800	e2700	7390	6280	4250	2250	2300	2450
19	2730	2810	e2500	e2700	e2800	e2700	6800	6380	4780	1630	2480	2270
20	1950	2810	e2600	e2800	e2900	e2700	7150	7960	3870	1510	2110	2530
21	1990	2920	e2700	e2800	e2900	e2600	7030	8030	3500	1670	2690	2780
22	2300	2740	e2300	e2800	e2900	e2600	6340	7200	3130	1970	2670	2830
23	2380	2720	e2400	e2800	e2800	e2000	6060	6380	2860	1900	2070	2640
24	3010	2650	e2500	e2800	e2800	e1900	5460	5500	2750	1800	2120	1990
25	3110	2450	e2500	e2800	e2900	e1800	5620	4740	2530	1720	2030	2000
26	2440	2170	e2400	e2800	e2900	e1800	4920	5370	2630	1850	1900	1990
27	2930	2180	e2500	e2900	e2900	1840	4880	4310	2550	2180	1870	1610
28	2880	2250	e2500	e2900	e2800	2210	5020	3810	2450	1780	1930	1720
29	2060	209	e2800	e2900	---	3090	5330	3650	1650	2180	2040	1630
30	2820	2680	e2900	e2900	---	3230	5360	3630	2230	1690	1730	1890
31	3550	---	e2900	e2900	---	3300	---	3700	---	1730	2820	---
TOTAL	64570	78400	80340	85400	80100	81070	225030	161930	99020	67760	55740	68270
MEAN	2083	2613	2592	2755	2861	2615	7501	5224	3301	2186	1798	2276
MAX	3550	3550	2900	2900	3000	3300	13700	8030	5340	2880	2820	3230
MIN	1550	1920	2300	2500	2800	1800	3450	3630	1650	1510	1150	1610

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1950 - 1997, BY WATER YEAR (WY)

	MEAN	2510	2662	2330	2143	2099	2605	5641	4893	3430	2544	2107	2345
MAX	5660	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1950 - 1997

ANNUAL TOTAL	1408430						1147630						
ANNUAL MEAN	3848						3144						
HIGHEST ANNUAL MEAN										2942			
LOWEST ANNUAL MEAN										4318			1960
HIGHEST DAILY MEAN										1778			1977
LOWEST DAILY MEAN										26700			May 8 1960
ANNUAL SEVEN-DAY MINIMUM	22200				Apr 27		13700		Apr 7	840			Aug 14 1977
INSTANTANEOUS PEAK FLOW	1550				Oct 1,6		1150		Aug 12	914			Aug 8 1977
INSTANTANEOUS PEAK STAGE	1600				Oct 1		1220		Aug 6	(a)26900			May 8 1960
10 PERCENT EXCEEDS	6990						14000		Apr 7	(b)18.94			Dec 17 1985
50 PERCENT EXCEEDS	2700						(b)15.55		Jan 18	4980			
90 PERCENT EXCEEDS	1910						5360			2330			
							1720			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 04040001, 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 current year.

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	73	309	134	117	403	154	103	94	65	26	32
2	35	65	476	143	131	321	128	96	86	56	26	31
3	35	60	255	133	133	253	113	111	80	51	25	30
4	35	56	199	130	189	213	103	93	73	49	26	29
5	35	53	157	225	323	182	120	82	68	48	25	29
6	34	52	151	132	201	164	138	76	119	45	24	28
7	34	124	161	101	143	144	106	68	115	46	24	27
8	36	332	133	90	119	138	93	85	84	43	23	27
9	46	376	113	e85	108	136	86	80	71	48	23	29
10	42	423	104	e84	103	142	82	71	62	43	24	33
11	39	288	136	e87	98	126	81	66	57	40	29	32
12	38	199	198	e90	92	111	112	65	55	38	38	30
13	38	148	134	e95	86	105	120	60	54	36	40	28
14	38	124	112	e92	83	195	104	59	50	36	31	28
15	37	111	102	e90	80	156	91	65	48	47	29	28
16	38	103	97	e89	77	120	86	66	59	39	30	27
17	41	125	93	e88	76	116	80	61	65	36	52	50
18	267	153	86	e87	114	110	78	58	56	34	47	53
19	177	120	e84	e86	335	107	75	104	51	34	39	49
20	94	104	e80	e88	249	108	72	80	48	32	35	164
21	69	96	e76	e90	984	96	70	67	445	33	42	74
22	58	94	74	e500	1140	90	70	60	493	35	40	47
23	62	95	113	852	628	84	69	56	219	35	34	41
24	63	90	555	386	407	80	67	54	138	35	56	37
25	56	94	304	270	296	89	65	72	104	32	52	33
26	52	89	191	e200	280	87	62	70	90	31	42	30
27	50	80	142	168	913	82	61	60	78	30	37	28
28	48	78	150	139	666	85	62	56	69	30	34	27
29	49	76	260	e125	---	428	61	210	61	29	32	27
30	144	151	196	e110	---	362	61	220	55	28	31	26
31	95	---	146	105	---	215	---	119	---	27	34	---
TOTAL	1922	4032	5387	5094	8171	5048	2870	2593	3147	1211	1050	1154
MEAN	62.0	134	174	164	292	163	89.0	83.6	105	39.1	33.9	38.5
MAX	267	423	555	852	1140	428	154	220	493	65	56	164
MIN	34	52	74	84	76	80	61	54	48	27	23	26
CFSM	.77	1.67	2.15	2.04	3.62	2.02	1.10	1.04	1.30	.48	.42	.48
IN.	.89	1.86	2.48	2.35	3.77	2.33	1.23	1.20	1.45	.56	.48	.53

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1995 - 1997, BY WATER YEAR (WY)

	MEAN	48.2	133	114	116	184	116	101	266	159	71.1	45.5	32.2
MAX	62.0	134	174	164	292	163	112	449	213	127	51.5	38.5	
(WY)	1997	1997	1997	1997	1997	1997	1996	1996	1996	1996	1995	1997	
MIN	34.3	133	54.6	67.8	79.4	68.7	89.0	83.6	105	39.1	33.9	24.2	
(WY)	1996	1996	1996	1996	1996	1996	1997	1997	1997	1997	1997	1995	

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1995 - 1997
ANNUAL TOTAL	48078	41479	
ANNUAL MEAN	131	114	116
HIGHEST ANNUAL MEAN			119
LOWEST ANNUAL MEAN			114
HIGHEST DAILY MEAN	2640	May 10	2640
LOWEST DAILY MEAN	28	Sep 5	22
ANNUAL SEVEN-DAY MINIMUM	28	Sep 5	23
INSTANTANEOUS PEAK FLOW			24
INSTANTANEOUS PEAK STAGE			1470
ANNUAL RUNOFF (CFSM)	1.63		11.96
ANNUAL RUNOFF (INCHES)	22.16		1.41
10 PERCENT EXCEEDS	290		19.12
50 PERCENT EXCEEDS	68		208
90 PERCENT EXCEEDS	34		61
			28

(a) Aug. 8, 9.

(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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	59	89	119	243	250	706	523	192	201	112	43	78
2	55	83	130	232	236	667	509	190	211	109	40	74
3	52	77	133	230	217	633	482	212	241	102	38	70
4	49	73	134	226	212	613	453	227	259	98	39	66
5	48	70	134	229	239	596	447	225	275	93	38	62
6	47	72	132	229	251	568	459	228	283	90	39	59
7	46	119	129	223	246	525	424	223	284	91	36	56
8	45	171	126	208	234	483	393	228	278	91	32	55
9	48	184	122	186	221	446	371	229	260	94	30	65
10	49	181	119	173	207	422	352	222	234	93	30	116
11	49	170	125	139	195	395	335	216	198	86	38	146
12	49	156	145	149	186	370	325	215	176	79	50	160
13	47	142	166	e155	172	350	315	207	165	71	69	150
14	46	130	171	e160	e165	364	301	205	154	70	72	133
15	45	116	174	e165	e160	379	288	206	144	71	68	121
16	45	110	179	e170	e155	350	281	199	144	66	76	110
17	45	107	182	e175	156	348	272	196	147	61	104	124
18	50	105	179	e180	160	375	261	191	147	57	123	138
19	50	103	157	e175	197	378	251	221	143	53	131	146
20	53	99	e145	e175	237	386	244	225	135	48	127	254
21	53	96	e140	e180	371	387	239	218	176	70	121	264
22	49	92	e145	e200	485	377	232	213	194	92	115	260
23	58	89	173	e220	494	361	220	206	194	99	105	281
24	62	90	265	e250	456	346	210	193	187	90	107	287
25	65	94	247	e260	e450	347	209	191	174	82	112	278
26	63	95	e220	e260	e500	350	201	193	161	75	112	255
27	60	93	e215	e260	715	335	196	199	144	68	105	223
28	57	92	e210	e255	762	332	194	202	130	62	96	197
29	59	87	256	e255	---	443	191	205	120	57	89	180
30	79	106	287	e255	---	557	190	206	114	51	84	164
31	86	---	270	e250	---	531	---	203	---	47	82	---
TOTAL	1668	3291	5329	6467	8329	13720	9368	6486	5673	2428	2351	4572
MEAN	53.8	110	172	209	297	443	312	209	189	78.3	75.8	152
MAX	86	184	287	260	762	706	523	229	284	112	131	287
MIN	45	70	119	139	155	332	190	190	114	47	30	55
CFSM	.26	.53	.83	1.01	1.44	2.15	1.52	1.02	.92	.38	.37	.74
IN.	.30	.59	.96	1.17	1.50	2.48	1.69	1.17	1.02	.44	.42	.83

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1963 - 1997, BY WATER YEAR (WY)

MEAN	101	139	181	182	204	311	309	225	190	114	86.1	86.0
MAX	357	378	308	508	428	668	567	426	641	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1963 - 1997

ANNUAL TOTAL	56395	69682	
ANNUAL MEAN	154	191	177
HIGHEST ANNUAL MEAN			270
LOWEST ANNUAL MEAN			47.6
HIGHEST DAILY MEAN	618	May 17	1330
LOWEST DAILY MEAN	30	Aug 18	8.0
ANNUAL SEVEN-DAY MINIMUM	32	Sep 4	35
INSTANTANEOUS PEAK FLOW			779
INSTANTANEOUS PEAK STAGE			6.16
INSTANTANEOUS LOW FLOW			28
ANNUAL RUNOFF (CFSM)	.75		.93
ANNUAL RUNOFF (INCHES)	10.18		12.58
10 PERCENT EXCEEDS	300		371
50 PERCENT EXCEEDS	135		171
90 PERCENT EXCEEDS	45		54

(a) Aug. 9, 10.

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

(c) Present site and datum.

(d) 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 fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	21	34	65	58	259	121	37	55	21	3.5	15
2	9.3	19	32	66	56	228	107	37	62	19	3.2	13
3	8.4	17	27	69	55	197	96	46	77	18	3.0	12
4	7.6	16	26	66	56	168	89	63	78	16	8.6	11
5	7.1	17	24	79	67	144	91	59	71	15	7.0	9.4
6	6.7	17	24	e90	56	127	103	57	62	14	5.1	8.3
7	6.4	39	24	e70	46	e105	106	52	55	15	4.2	7.5
8	6.4	74	23	e55	e39	99	101	51	48	14	3.6	7.2
9	7.7	68	22	e45	e35	91	92	53	42	18	3.2	18
10	8.6	53	21	e40	e32	89	84	48	38	16	2.9	91
11	7.5	44	25	e36	e31	85	77	43	34	14	3.5	105
12	6.8	38	36	e34	e30	80	75	53	32	13	7.9	91
13	6.5	34	47	e33	e28	74	77	55	30	12	14	69
14	6.4	31	46	e32	e27	89	76	49	27	11	10	48
15	5.8	e28	43	e32	e26	133	71	50	26	11	8.4	39
16	5.7	26	44	e32	e26	e150	67	49	28	9.9	14	33
17	5.7	27	43	e33	e26	142	63	47	34	8.9	39	38
18	12	28	e39	e34	e27	134	59	43	31	8.1	42	47
19	12	26	e34	e36	47	129	55	54	28	7.2	35	48
20	10	23	e30	e38	65	123	51	57	26	5.7	29	97
21	9.8	22	e33	e40	168	114	47	49	36	11	29	135
22	9.1	21	39	60	285	105	44	42	40	15	26	141
23	12	21	49	88	295	96	42	38	34	12	22	124
24	14	21	93	109	e250	87	41	36	31	10	25	106
25	13	22	95	110	e210	84	40	50	27	8.8	32	89
26	11	23	e100	e85	170	86	38	75	29	7.9	28	74
27	11	e20	98	e77	194	84	36	74	29	7.2	25	61
28	11	e17	84	e68	259	81	39	64	26	6.9	21	49
29	11	e17	79	e62	---	101	39	60	24	5.7	18	45
30	24	22	75	e60	---	126	37	61	22	4.6	17	40
31	25	---	70	e59	---	131	---	56	---	3.8	16	---
TOTAL	307.5	852	1459	1803	2664	3741	2064	1608	1182	359.7	506.1	1671.4
MEAN	9.92	28.4	47.1	58.2	95.1	121	68.8	51.9	39.4	11.6	16.3	55.7
MAX	25	74	100	110	295	259	121	75	78	21	42	141
MIN	5.7	16	21	32	26	74	36	36	22	3.8	2.9	7.2
CFSM	.20	.58	.97	1.19	1.95	2.48	1.41	1.07	.81	.24	.34	1.14
IN.	.23	.65	1.11	1.38	2.03	2.86	1.58	1.23	.90	.27	.39	1.28

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1970 - 1997, BY WATER YEAR (WY)

MEAN	21.1	33.9	44.4	45.9	52.9	87.8	80.7	54.1	48.2	22.0	17.2	17.7
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1970 - 1997

ANNUAL TOTAL	17272.6	18217.7	
ANNUAL MEAN	47.2	49.9	
HIGHEST ANNUAL MEAN			43.7
LOWEST ANNUAL MEAN			67.4
HIGHEST DAILY MEAN			23.8
LOWEST DAILY MEAN	456	295	629
ANNUAL SEVEN-DAY MINIMUM	4.7	2.9	.58
INSTANTANEOUS PEAK FLOW	5.7	4.2	.84
INSTANTANEOUS PEAK STAGE		308	(a)664
INSTANTANEOUS LOW FLOW		4.83	6.20
ANNUAL RUNOFF (CFSM)	.97	1.02	.48
ANNUAL RUNOFF (INCHES)	13.19	13.92	.90
10 PERCENT EXCEEDS	95	102	12.20
50 PERCENT EXCEEDS	32	37	94
90 PERCENT EXCEEDS	7.5	8.4	30
			7.0

(a) Gage height 6.0 ft, from floodmark.

(e) 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 September 1997 (discontinued).

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	53	106	113	195	205	486	378	152	130	95	53	65
2	49	94	137	189	187	462	341	157	134	91	50	63
3	46	81	139	193	172	425	305	163	153	88	50	62
4	44	74	126	194	173	379	275	180	167	87	57	58
5	44	70	114	192	199	338	262	187	160	85	57	55
6	43	69	109	185	214	302	273	180	145	84	52	53
7	43	92	107	166	208	275	288	171	133	88	52	52
8	44	146	106	144	193	253	280	165	123	87	52	49
9	48	183	104	e140	180	239	261	169	115	86	50	52
10	50	182	101	e130	168	236	240	172	109	80	48	82
11	49	169	107	e125	158	240	223	163	105	76	54	113
12	47	145	132	e120	152	234	214	156	103	75	65	129
13	46	120	159	e115	142	223	212	151	101	74	81	129
14	45	106	170	e115	137	233	211	144	99	74	81	119
15	44	94	161	e115	137	259	207	143	95	80	79	104
16	44	90	158	e120	133	270	202	144	99	81	82	88
17	45	91	156	e125	127	270	202	143	106	78	90	88
18	64	95	146	e130	134	267	194	140	106	76	90	105
19	72	97	135	e140	170	260	187	156	103	71	85	123
20	73	93	110	e150	223	248	180	184	100	66	81	176
21	65	87	112	e155	322	233	174	188	133	76	81	201
22	60	84	125	189	453	219	170	176	170	86	76	205
23	67	83	140	239	563	206	165	155	185	87	71	195
24	79	83	224	286	539	195	159	137	182	86	75	176
25	84	85	289	298	470	196	156	136	167	82	81	152
26	77	84	282	278	405	210	153	140	146	75	83	127
27	70	81	277	254	410	222	151	139	129	71	80	108
28	66	78	276	264	475	225	149	129	116	70	74	96
29	66	77	235	222	---	290	147	128	107	67	70	90
30	86	88	223	209	---	372	145	132	100	61	67	85
31	103	---	211	218	---	400	---	134	---	56	67	---
TOTAL	1816	3027	4984	5595	7079	8687	6504	4814	3821	2439	2134	3200
MEAN	58.6	101	161	180	253	280	217	155	127	78.7	68.8	107
MAX	103	183	289	298	563	486	378	188	185	95	90	205
MIN	43	69	101	115	127	195	145	128	95	56	48	49
CFSM	.36	.62	.99	1.11	1.56	1.73	1.34	.96	.79	.49	.42	.66
IN.	.42	.70	1.14	1.28	1.63	1.99	1.49	1.11	.88	.56	.49	.73

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1997, BY WATER YEAR (WY)

	MEAN	99.5	134	158	154	172	248	239	178	163	109	91.3	84.9
MAX	344	290	273	366	302	475	386	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1967 - 1997

ANNUAL TOTAL	45904	54080	152	
ANNUAL MEAN	125	148	211	1989
HIGHEST ANNUAL MEAN			80.0	1977
LOWEST ANNUAL MEAN			2170	Jun 2 1989
HIGHEST DAILY MEAN	340	563	21	Jul 29 1977
LOWEST DAILY MEAN	43	43	23	Jul 29 1977
ANNUAL SEVEN-DAY MINIMUM	45	45	23	Jul 29 1977
INSTANTANEOUS PEAK FLOW		569	2190	Jun 2 1989
INSTANTANEOUS PEAK STAGE		4.26	7.85	Jun 2 1989
INSTANTANEOUS LOW FLOW			21	(b)
ANNUAL RUNOFF (CFSM)	.77	.91	.94	
ANNUAL RUNOFF (INCHES)	10.54	12.42	12.77	
10 PERCENT EXCEEDS	213	263	278	
50 PERCENT EXCEEDS	114	130	122	
90 PERCENT EXCEEDS	57	61	59	

(a) Oct. 6, 7.

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

(c) 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 except for estimated daily discharges, which are fair. 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	491	787	870	1710	1590	4330	3620	1550	1500	1200	526	856
2	498	597	1010	1620	1540	4240	3690	1560	1530	998	343	778
3	471	789	1060	1620	1530	4170	3570	1490	1540	970	373	805
4	460	932	916	1610	1600	3990	3380	1520	1550	952	499	793
5	485	771	1110	1520	1670	3720	3260	1570	1580	908	347	771
6	463	750	1050	1560	1750	3270	3030	1580	1500	702	375	566
7	375	818	880	1450	1800	3180	3000	1580	1600	1030	476	618
8	535	919	956	1420	1760	3020	2920	1570	1530	885	426	724
9	415	1180	921	1380	1670	2900	2810	1530	1430	886	258	769
10	559	1230	961	1260	1580	2840	2700	1590	1400	870	398	775
11	450	1240	973	e1150	1490	2600	2490	1530	1320	895	491	787
12	302	1220	1080	e1000	1440	2620	2450	1460	1270	850	635	953
13	517	1200	1100	e1050	1340	2530	2370	1510	1200	563	512	1140
14	452	1130	1130	e1050	1350	2470	2210	1440	1120	569	591	1190
15	381	1100	1100	e1100	1300	2390	2100	1390	860	842	521	1170
16	437	1030	1170	e1150	1250	2650	2000	1470	1180	599	721	1130
17	445	967	1200	e1200	1220	2410	2040	1420	1160	594	1360	1190
18	641	856	1180	e1250	1230	2450	2100	1340	880	719	1240	1190
19	544	980	1110	e1200	1250	2650	1980	1560	1070	534	1020	1170
20	501	947	1120	e1200	1460	2510	1850	1510	1090	522	1210	1750
21	509	880	741	e1200	2100	2480	1740	1540	1570	543	1200	1810
22	514	828	869	e1300	2810	2390	1570	1510	1900	515	1230	2140
23	623	767	1170	1450	3350	2360	1600	1540	2120	662	1160	2260
24	602	765	1410	1670	3780	2330	1570	1440	1970	690	1120	2270
25	561	893	1600	1840	3730	2240	1580	1470	1760	788	1050	2230
26	623	684	1520	1850	3790	2170	1530	1520	1570	538	1170	2040
27	425	902	1600	1820	3660	2260	1520	1480	1470	536	1090	1940
28	656	666	1830	e1800	3920	2260	1450	1450	1380	677	1040	1720
29	692	797	1710	e1700	---	2570	1420	1460	905	540	895	1640
30	685	839	1750	1660	---	3090	1340	1520	1110	505	675	1530
31	878	---	1690	1690	---	3410	---	1480	---	468	1030	---
TOTAL	16190	27464	36787	44480	56960	88500	68890	46580	42065	22540	23982	38705
MEAN	522	915	1187	1435	2034	2855	2296	1503	1402	727	774	1290
MAX	878	1240	1830	1850	3920	4330	3690	1590	2120	1200	1360	2270
MIN	302	597	741	1000	1220	2170	1340	1340	860	468	258	566
CFSM	.39	.68	.88	1.06	1.51	2.11	1.70	1.11	1.04	.54	.57	.96
IN.	.45	.76	1.01	1.23	1.57	2.44	1.90	1.28	1.16	.82	.86	1.07

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 1997, BY WATER YEAR (WY)

	MEAN	725	927	1121	1187	1311	1968	2033	1604	1178	800	654	638
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	294	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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1953 - 1997
ANNUAL TOTAL	403027	513143	
ANNUAL MEAN	1101	1406	1182
HIGHEST ANNUAL MEAN			1850
LOWEST ANNUAL MEAN			365
HIGHEST DAILY MEAN	2780	4330	7810
LOWEST DAILY MEAN	214	258	78
ANNUAL SEVEN-DAY MINIMUM	335	393	126
INSTANTANEOUS PEAK FLOW		4580	8180
INSTANTANEOUS PEAK STAGE		7.92	10.69
INSTANTANEOUS LOW FLOW		250	
ANNUAL RUNOFF (CFSM)	.82	1.04	.88
ANNUAL RUNOFF (INCHES)	11.11	14.14	11.90
10 PERCENT EXCEEDS	2060	2500	2280
50 PERCENT EXCEEDS	994	1230	961
90 PERCENT EXCEEDS	444	531	402

(e) Estimated.

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 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	52	62	89	125	101	370	310	125	135	85	22	100
2	52	60	97	124	99	343	272	124	136	80	23	96
3	52	61	98	123	97	306	247	128	136	73	24	91
4	51	60	97	121	101	274	230	132	132	71	24	87
5	51	59	94	120	110	251	229	132	126	70	26	83
6	51	58	93	119	116	234	231	127	122	66	22	80
7	51	79	92	117	114	220	230	123	124	65	19	78
8	52	111	90	111	109	209	220	122	118	62	17	76
9	55	133	88	107	104	202	206	120	111	61	16	83
10	56	135	86	108	100	199	194	117	105	63	18	111
11	56	125	91	e105	96	195	186	114	100	60	21	129
12	55	115	100	e105	93	190	182	115	96	58	29	161
13	55	106	108	e100	90	183	180	114	93	54	39	163
14	55	99	112	104	88	195	177	113	90	50	43	146
15	55	94	112	112	86	207	171	112	87	49	45	127
16	56	91	112	115	86	227	166	111	89	46	69	111
17	57	90	113	e100	85	224	161	109	92	42	178	117
18	60	89	110	e105	84	216	157	110	92	37	217	125
19	52	88	e105	94	93	210	153	125	89	33	198	134
20	52	86	e100	114	105	203	151	126	87	32	169	190
21	51	84	e95	122	164	196	146	121	142	35	146	217
22	49	82	91	124	278	187	143	114	178	41	128	244
23	54	81	103	136	381	181	139	107	178	50	115	228
24	56	80	129	156	362	174	135	102	164	54	119	202
25	56	80	e145	153	307	173	132	114	134	52	131	180
26	54	79	e150	e135	269	175	129	134	122	46	132	161
27	54	77	142	e125	288	174	125	156	112	44	124	144
28	53	76	134	e120	332	176	125	158	103	40	115	133
29	53	75	132	e115	---	217	132	153	93	35	109	128
30	61	81	132	e110	---	284	128	146	88	29	103	124
31	63	---	128	104	---	335	---	140	---	25	104	---
TOTAL	1680	2596	3368	3629	4338	6930	5387	3844	3464	1608	2545	4049
MEAN	54.2	86.5	109	117	155	224	180	124	115	51.9	82.1	135
MAX	63	135	150	156	381	370	310	158	178	85	217	244
MIN	49	58	86	94	84	173	125	102	87	25	16	76
CFSM	.51	.82	1.02	1.10	1.46	2.11	1.69	1.17	1.09	.49	.77	1.27
IN.	.59	.91	1.18	1.27	1.52	2.43	1.89	1.35	1.22	.56	.89	1.42

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1963 - 1997, BY WATER YEAR (WY)

	MEAN	62.8	83.8	107	107	114	153	157	120	99.8	64.8	54.1	55.1
MAX	150	222	177	258	218	336	259	226	254	144	148	135	135
(WY)	1987	1993	1983	1993	1968	1982	1978	1983	1989	1986	1981	1997	1997
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1963 - 1997

ANNUAL TOTAL	36287	43438	98.0
ANNUAL MEAN	99.1	119	153
HIGHEST ANNUAL MEAN			33.5
LOWEST ANNUAL MEAN			1993
HIGHEST DAILY MEAN	471	381	782
LOWEST DAILY MEAN	29	16	5.7
ANNUAL SEVEN-DAY MINIMUM	30	20	7.9
INSTANTANEOUS PEAK FLOW		388	797
INSTANTANEOUS PEAK STAGE		5.08	6.30
INSTANTANEOUS LOW FLOW			5.4
ANNUAL RUNOFF (CFSM)	.94	1.12	.92
ANNUAL RUNOFF (INCHES)	12.73	15.24	12.56
10 PERCENT EXCEEDS	169	204	175
50 PERCENT EXCEEDS	86	111	84
90 PERCENT EXCEEDS	47	51	35

(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. National Weather Service gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	846	1140	1440	2340	2290	5240	4350	1960	2150	1700	793	1510
2	829	1000	1530	2300	2210	5330	4510	2110	2200	1470	625	1310
3	784	1160	1620	2250	2210	5200	4490	2110	2220	1410	841	1330
4	680	1280	1400	2290	2250	5070	4330	2040	2230	1380	803	1330
5	760	1160	1650	2160	2230	4850	4220	2090	2250	1340	649	1250
6	800	1150	1620	2190	2350	4520	4020	2120	2150	1090	599	1040
7	616	1330	1370	2140	2420	4150	3900	2140	2250	1300	692	1070
8	792	1420	1520	2020	2410	4100	3770	2110	2190	1480	676	1160
9	728	1760	1440	2020	2290	3920	3630	2110	2070	1320	513	1260
10	864	1790	1500	1890	2220	3840	3550	2160	2010	1340	579	1270
11	672	1810	1520	1530	2100	3630	3330	2020	1920	1320	768	1340
12	481	1810	1660	1420	2060	3530	3230	2050	1860	1270	951	1480
13	824	1780	1610	e1470	1920	3470	3170	2030	1780	974	855	1710
14	744	1710	1810	e1500	1920	3430	3060	1960	1690	968	913	1760
15	608	1660	1700	e1550	1870	3320	2890	1930	1260	1200	815	1780
16	632	1590	1820	e1600	1820	3430	2740	1980	1660	933	1230	1720
17	688	1600	1820	e1700	1760	3410	2730	1990	1730	918	2200	1880
18	968	1380	1750	e1750	1800	3220	2790	1920	1360	1070	2160	1850
19	832	1440	1590	e1700	1860	3470	2730	1990	1270	802	1750	1930
20	792	1400	1490	e1650	2020	3390	2570	2120	1450	819	1930	2380
21	816	1370	1250	e1700	2690	3320	2470	2120	2070	875	1890	2530
22	760	1250	1350	e1800	3500	3220	2260	2090	2610	845	1920	2750
23	880	1220	1820	e1950	4080	3160	2240	2070	2750	1000	1790	2960
24	981	1210	2090	e2300	4480	3100	2190	2050	2720	1050	1890	2980
25	894	1340	2200	2390	4650	3070	2160	2070	2500	1080	1630	2950
26	944	1140	2080	2450	4710	2940	2170	2110	2300	911	1760	2820
27	757	1320	2140	2360	4910	3010	2040	2050	2120	871	1720	2650
28	1020	1130	2450	e2330	4920	3030	2020	2060	2000	1090	1670	2490
29	1060	1220	2450	e2300	---	3350	2040	2140	1500	896	1560	2330
30	1050	1350	2340	2270	---	3650	2010	2130	1610	847	1300	2200
31	1260	---	2390	2360	---	4120	---	2190	---	762	1610	---
TOTAL	25362	41920	54420	61680	76050	116490	91610	64020	59880	34331	38882	57020
MEAN	818	1397	1755	1990	2716	3758	3054	2065	1996	1107	1254	1901
MAX	1260	1810	2450	2450	4920	5330	4510	2190	2750	1700	2200	2980
MIN	481	1000	1250	1420	1760	2940	2010	1920	1260	762	513	1040
CFSM	.44	.75	.94	1.07	1.46	2.01	1.64	1.11	1.07	.59	.67	1.02
IN.	.51	.84	1.08	1.23	1.52	2.32	1.83	1.28	1.19	.68	.78	1.14

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

	MEAN	1100	1342	1572	1732	1861	2563	2682	2126	1683	1170	957	962
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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1924 - 1997
ANNUAL TOTAL	573834	721665	
ANNUAL MEAN	1568	1977	(a)1647
HIGHEST ANNUAL MEAN			2856
LOWEST ANNUAL MEAN			580
HIGHEST DAILY MEAN	3650	5330	10700
LOWEST DAILY MEAN	448	481	39
ANNUAL SEVEN-DAY MINIMUM	577	639	278
INSTANTANEOUS PEAK FLOW		5450	(b)11400
INSTANTANEOUS PEAK STAGE		7.01	(c)10.76
INSTANTANEOUS LOW FLOW		250	
ANNUAL RUNOFF (CFSM)	.84	1.06	.88
ANNUAL RUNOFF (INCHES)	11.44	14.39	11.99
10 PERCENT EXCEEDS	2790	3400	3000
50 PERCENT EXCEEDS	1440	1860	1390
90 PERCENT EXCEEDS	729	846	637

(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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	186	220	316	527	e410	1460	763	335	614	363	222	293
2	183	206	347	505	e390	1390	715	329	616	350	214	264
3	177	202	348	487	e380	1350	680	346	627	327	209	259
4	173	203	372	468	e410	1300	670	358	601	306	209	247
5	168	203	377	471	442	1230	676	344	565	293	201	235
6	166	200	382	479	452	1160	711	340	548	284	185	224
7	164	279	379	e450	451	1080	657	336	552	287	181	213
8	161	487	364	e410	467	985	598	345	530	284	177	209
9	167	452	343	e380	463	886	552	345	483	335	162	233
10	167	397	323	e360	446	841	536	337	450	381	158	327
11	162	439	322	e340	427	774	521	325	419	305	190	309
12	159	404	356	e320	411	732	528	325	406	348	222	293
13	155	391	395	e310	e380	687	526	314	381	321	277	294
14	154	383	424	e290	e360	734	507	301	354	302	240	299
15	153	343	464	e280	e340	837	469	311	346	296	215	299
16	150	302	496	e275	e330	851	461	313	348	271	260	289
17	151	295	513	e260	e325	841	450	297	393	252	632	337
18	198	292	512	e250	e320	883	433	290	389	217	732	459
19	210	278	e480	e240	383	918	420	364	375	217	620	422
20	190	262	e450	e235	435	892	407	400	367	215	554	448
21	182	257	e430	e230	778	850	396	369	497	236	520	443
22	175	251	e420	e250	1120	787	353	355	591	345	479	421
23	185	242	e430	e560	1210	733	359	349	489	339	430	442
24	192	235	540	e550	1160	676	360	339	447	337	430	442
25	188	238	e560	e520	1150	653	359	519	425	338	471	426
26	183	237	e550	e500	1150	654	351	752	452	329	433	403
27	182	225	e560	e520	1270	592	345	721	451	322	394	372
28	183	223	594	e530	1460	580	344	631	414	343	364	347
29	183	218	622	e510	---	733	339	672	394	314	325	338
30	238	249	610	e480	---	891	331	682	379	275	314	305
31	251	---	565	e440	---	845	---	645	---	245	309	---
TOTAL	5536	8617	13844	12427	17320	27825	14847	12689	13903	9377	10329	9892
MEAN	179	287	447	401	619	898	495	409	463	302	333	330
MAX	251	487	622	560	1460	1460	763	752	627	381	732	459
MIN	150	200	316	230	320	580	331	290	346	215	158	209
CFSM	.58	.94	1.45	1.31	2.01	2.92	1.61	1.33	1.51	.99	1.09	1.07
IN.	.67	1.04	1.68	1.51	2.10	3.37	1.80	1.54	1.68	1.14	1.25	1.20

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1968 - 1997, BY WATER YEAR (WY)

	MEAN	223	306	374	393	431	602	592	459	391	268	220	207
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	
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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1968 - 1997
ANNUAL TOTAL	150865	156606	
ANNUAL MEAN	412	429	371
HIGHEST ANNUAL MEAN			545
LOWEST ANNUAL MEAN			207
HIGHEST DAILY MEAN	1670	Jun 20	1460
LOWEST DAILY MEAN	150	Oct 16	150
ANNUAL SEVEN-DAY MINIMUM	155	Oct 11	155
INSTANTANEOUS PEAK FLOW			1510
INSTANTANEOUS PEAK STAGE			6.44
ANNUAL RUNOFF (CFSM)	1.34	1.40	1.21
ANNUAL RUNOFF (INCHES)	18.28	18.98	16.40
10 PERCENT EXCEEDS	794	725	685
50 PERCENT EXCEEDS	296	364	300
90 PERCENT EXCEEDS	183	202	148

(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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	52	112	192	e156	572	293	113	211	220	115	152
2	22	50	122	191	e152	572	287	115	217	211	108	172
3	20	49	125	191	e150	565	280	115	217	200	101	155
4	19	48	124	190	e160	545	273	116	191	189	94	141
5	19	48	125	196	179	523	277	117	184	178	87	127
6	27	47	123	201	184	492	280	119	176	169	80	114
7	47	64	122	195	182	465	277	122	174	169	75	103
8	38	94	118	188	177	434	272	124	169	163	70	93
9	32	109	116	e175	171	410	264	121	158	175	65	88
10	28	114	115	e160	165	389	255	119	148	173	61	89
11	24	115	127	e145	159	370	246	117	139	168	60	86
12	22	115	149	e135	154	349	242	112	132	166	65	83
13	20	113	159	e125	e145	333	234	111	125	161	74	79
14	19	110	163	e115	e135	364	229	109	115	155	72	76
15	21	107	164	e110	e130	389	220	106	106	150	71	74
16	22	103	166	e108	e125	390	211	106	124	152	83	71
17	25	102	169	e104	e120	382	203	104	145	146	184	111
18	35	100	169	e100	e115	379	193	101	140	139	241	147
19	41	98	e160	e96	136	367	185	115	132	132	264	166
20	42	96	e150	e94	161	352	176	131	125	125	279	171
21	42	95	e140	e92	254	339	168	136	166	129	289	176
22	43	92	e130	e100	327	325	161	137	193	139	297	175
23	47	89	e150	e150	359	312	153	136	209	139	301	171
24	47	89	195	e170	373	300	145	135	211	135	308	165
25	47	92	210	e182	377	293	139	169	224	130	307	167
26	46	93	212	e180	383	287	134	198	261	124	297	160
27	45	92	209	e178	482	277	129	207	263	120	286	142
28	43	90	204	e174	550	271	127	210	255	129	270	133
29	43	88	204	e170	---	286	122	213	244	132	252	127
30	46	98	202	e165	---	298	119	212	232	129	232	123
31	50	---	196	e160	---	297	---	211	---	123	211	---
TOTAL	1046	2652	4830	4732	6161	11927	6294	4257	5386	4770	5299	3845
MEAN	33.7	88.4	156	153	220	385	210	137	180	154	171	178
MAX	50	115	212	201	550	572	293	213	263	220	308	182
MIN	19	47	112	92	115	271	119	101	106	120	60	71
CFSM	.24	.62	1.10	1.07	1.55	2.71	1.48	.97	1.26	1.08	1.20	.80
IN.	.27	.69	1.27	1.24	1.61	3.12	1.65	1.12	1.41	1.25	1.39	1.01

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1972 - 1997, BY WATER YEAR (WY)

	MEAN	82.3	121	146	157	154	259	242	172	150	90.0	65.1	66.7
MAX	272	314	341	542	272	553	530	354	405	211	171	161	161
(WY)	1987	1973	1986	1993	1990	1985	1985	1996	1996	1981	1997	1972	1972
MIN	17.8	17.8	46.5	42.2	43.2	118	133	67.2	18.1	16.4	18.3	13.9	13.9
(WY)	1975	1972	1972	1977	1972	1996	1987	1988	1988	1988	1978	1984	1984

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1972 - 1997

ANNUAL TOTAL	53037	61199	142
ANNUAL MEAN	145	168	222
HIGHEST ANNUAL MEAN			85.7
LOWEST ANNUAL MEAN			1983
HIGHEST DAILY MEAN	575	572	916
LOWEST DAILY MEAN	17	19	2.2
ANNUAL SEVEN-DAY MINIMUM	21	22	2.8
INSTANTANEOUS PEAK FLOW		576	919
INSTANTANEOUS PEAK STAGE		6.86	8.12
ANNUAL RUNOFF (CFSM)	1.02	1.18	1.00
ANNUAL RUNOFF (INCHES)	13.89	16.03	13.58
10 PERCENT EXCEEDS	363	297	298
50 PERCENT EXCEEDS	102	146	112
90 PERCENT EXCEEDS	35	51	31

(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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e238	326	936	954	e660	2540	1200	634	872	e720	e360	e447
2	e231	315	966	962	e640	2240	1120	614	969	e780	e350	e422
3	e222	307	782	961	e680	2040	1070	644	1130	e840	e330	e411
4	e215	300	662	922	e740	1910	1040	635	e1010	e760	e320	e385
5	e209	299	640	968	980	1800	1080	640	e914	e700	e310	e363
6	e209	296	635	966	843	1700	1210	661	e885	e680	e300	e346
7	e210	424	626	833	764	1580	1090	653	e914	e640	e290	e327
8	e240	1040	621	e720	730	1480	1010	672	e877	e620	e280	e315
9	e254	1120	603	e640	706	1420	970	670	e831	e580	e270	e363
10	e244	923	586	e560	686	1480	945	660	e800	e540	e265	e557
11	233	772	632	e520	667	1400	916	659	e774	e500	e270	e446
12	224	658	997	e490	648	1280	896	643	e805	e470	e275	e358
13	216	600	1010	e480	592	1200	877	623	e818	e430	e230	e327
14	214	568	866	e470	593	1370	844	615	e757	e410	e197	e310
15	209	547	803	e455	580	1680	819	610	e700	e400	e167	e300
16	207	528	867	e450	561	1440	804	583	e600	e380	e185	e290
17	211	518	e800	e440	523	1350	784	562	e1100	e350	e514	e472
18	297	513	e700	e435	535	1350	760	563	e1150	e370	e568	e878
19	348	499	e600	e430	791	1330	741	745	e920	e420	e393	e584
20	307	483	e540	e425	913	1300	721	856	e760	e400	e383	e571
21	295	470	e520	e450	2150	1250	698	745	e900	e410	e425	e593
22	290	457	678	757	3100	1200	669	704	e1400	e480	e376	e548
23	295	446	890	1390	2460	1140	655	682	e1200	e480	e625	e534
24	296	441	1420	1380	1970	1090	646	678	e900	e460	e698	e514
25	295	449	1480	1060	1700	1090	660	915	e800	e440	e754	e490
26	285	463	1030	e880	1620	1100	631	1180	e1100	e430	e695	e467
27	280	452	965	e840	2260	1050	609	977	e1150	e420	e645	e446
28	279	447	943	e810	3030	1050	611	892	e980	e420	e605	e432
29	281	447	1020	e760	---	1430	622	962	e840	e410	e569	e417
30	325	566	1060	e720	---	1670	620	1010	e780	e400	e513	e389
31	352	---	1010	e680	---	1370	---	915	---	e370	e477	---
TOTAL	8011	15674	25888	22808	32122	45330	25318	22602	27636	15710	12639	13302
MEAN	258	522	835	736	1147	1462	844	729	921	507	408	443
MAX	352	1120	1480	1390	3100	2540	1210	1180	1400	840	754	878
MIN	207	296	520	425	523	1050	609	562	600	350	167	290
CFSM	.44	.88	1.41	1.24	1.93	2.46	1.42	1.23	1.55	.85	.69	.75
IN.	.50	.98	1.62	1.43	2.01	2.84	1.59	1.42	1.73	.98	.79	.83

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1932 - 1997, BY WATER YEAR (WY)

MEAN	315	397	503	591	694	942	939	712	515	361	271	254
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1932 - 1997

ANNUAL TOTAL	227516		267040			
ANNUAL MEAN	622		732		540	1950
HIGHEST ANNUAL MEAN					1005	1964
LOWEST ANNUAL MEAN					197	1964
HIGHEST DAILY MEAN	3260	Jun 10	3100	Feb 22	6010	Feb 24 1985
LOWEST DAILY MEAN	180	Jan 11	167	Aug 15	7.0	Aug 11 1964
ANNUAL SEVEN-DAY MINIMUM	180	Jan 8	216	Oct 11	50	Sep 21 1941
INSTANTANEOUS PEAK FLOW			3340	Feb 22	6360	Feb 24 1985
INSTANTANEOUS PEAK STAGE			7.83	Feb 22	11.94	Mar 14 1982
ANNUAL RUNOFF (CFSM)	1.05		1.23		.91	
ANNUAL RUNOFF (INCHES)	14.25		16.72		12.35	
10 PERCENT EXCEEDS	1310		1230		1110	
50 PERCENT EXCEEDS	427		640		391	
90 PERCENT EXCEEDS	224		296		156	

(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 except for estimated daily discharges, which are poor. Flow regulated by Elkhart Hydroelectric Plant.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1880	2240	3370	4560	4370	10600	7320	3640	4310	3550	1800	2920
2	1770	2210	3480	4530	4180	10400	7320	3780	4420	3670	1780	2600
3	1720	2130	3470	4490	4190	9890	7260	3830	4630	3550	1600	2690
4	1550	2210	3110	4440	4290	9510	7090	3730	4460	3290	1800	2540
5	1720	2160	3310	4380	4650	9120	6990	3760	4330	3090	1680	2360
6	1650	2150	3330	4390	4480	8650	7020	3820	4200	2970	1430	2310
7	1510	2560	3000	4200	4480	7930	6690	3790	4290	3140	1650	2160
8	1680	3450	3260	3910	4360	7680	6340	3800	4230	3190	1490	2170
9	1660	4070	2960	e3600	4240	7290	6120	3770	4000	3350	1490	2490
10	1760	3770	3070	e3300	4130	7080	5850	3800	3820	3020	1320	2740
11	1580	3570	3240	e3000	3990	6830	5700	3670	3680	2840	1650	2910
12	1540	3510	3830	e2800	3900	6370	5520	3690	3640	2820	2000	2770
13	1620	3370	3800	e2770	3690	6320	5420	3600	3560	2550	2130	2910
14	1610	3280	3760	e2740	3600	6630	5280	3550	3340	2400	1970	2910
15	1470	3140	3450	e2700	3580	6960	5040	3480	2940	2490	2020	2930
16	1570	3040	3960	e2690	3480	6630	4860	3490	3220	2430	2330	2850
17	1570	3040	4040	e2670	3330	6640	4800	3480	3960	2260	4680	3220
18	1980	2780	3930	e2650	3360	6300	4740	3410	3890	2200	4830	3750
19	2100	2890	e3100	e2630	3800	6460	4690	3800	3360	2110	4010	3610
20	1870	2790	e2800	e2600	4130	6460	4440	4070	3280	1970	3980	3990
21	1760	2740	e2700	e2800	6150	6330	4370	3890	4630	2060	3860	4300
22	1800	2540	e2680	e4000	9250	6110	4130	3780	6230	2160	3790	4280
23	1910	2660	4130	5480	9110	5940	3950	3680	5970	2280	3560	4570
24	2040	2530	5260	5480	8770	5770	3950	3670	5380	2430	3820	4530
25	1850	2560	4990	4900	8560	5700	3880	4310	4860	2300	3640	4480
26	1920	2610	4340	4630	8500	5650	3890	4670	4760	2320	3580	4330
27	1820	2490	4400	4530	10000	5660	3680	4430	4840	2170	3460	4100
28	1980	2500	4760	4520	10900	5530	3750	4300	4360	2320	3320	3930
29	1950	2430	4950	4310	---	6580	3650	4530	3640	2190	3110	3690
30	2190	2920	4720	4240	---	7210	3650	4470	3620	2070	2870	3540
31	2390	---	4690	4300	---	7400	---	4480	---	1930	2950	---
TOTAL	55420	84340	115890	118240	151470	221530	157390	120170	125850	81120	83600	98580
MEAN	1788	2811	3738	3814	5410	7146	5246	3876	4195	2617	2697	3286
MAX	2390	4070	5260	5480	10900	10600	7320	4670	6230	3670	4830	4570
MIN	1470	2130	2680	2600	3330	5530	3650	3410	2940	1930	1320	2160
CFSM	.53	.83	1.11	1.13	1.61	2.12	1.56	1.15	1.24	.78	.80	.98
IN.	.61	.93	1.28	1.31	1.67	2.45	1.74	1.33	1.39	.90	.92	1.09

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1948 - 1997, BY WATER YEAR (WY)

	MEAN	2194	2653	3228	3585	3858	5129	5209	4119	3287	2398	1976	1599
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	1581	
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	1564	

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1948 - 1997
ANNUAL TOTAL	1196080	1413600	
ANNUAL MEAN	3268	3873	3291
HIGHEST ANNUAL MEAN			5264
LOWEST ANNUAL MEAN			1283
HIGHEST DAILY MEAN	9930	Jun 11	18500
LOWEST DAILY MEAN	1420	Sep 20	336
ANNUAL SEVEN-DAY MINIMUM	1550	Aug 12	561
INSTANTANEOUS PEAK FLOW			18800
INSTANTANEOUS PEAK STAGE		24.15	27.91
ANNUAL RUNOFF (CFSM)	.97	1.15	.98
ANNUAL RUNOFF (INCHES)	13.20	15.60	13.27
10 PERCENT EXCEEDS	6070	6330	5830
50 PERCENT EXCEEDS	2700	3650	2810
90 PERCENT EXCEEDS	1690	1940	1390

(e) Estimated.

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 except for estimated daily discharges, which are fair. Flow regulated by powerplants upstream from station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2430	2570	3920	5160	4850	11900	e8200	4000	4950	4080	2110	3340
2	2110	2530	4310	5130	4630	11400	e8200	4400	4900	4250	2160	2960
3	2050	2330	4010	5180	4710	11000	e8100	4180	5160	4150	1950	3040
4	1990	2470	3700	4980	4810	10600	e8000	4290	5140	3790	2000	2790
5	1800	2560	3600	5050	5340	10100	e7900	4250	4840	3590	2010	2780
6	2070	2430	3820	4980	5130	9680	e7700	4260	5080	3400	1910	2670
7	2010	2780	3580	4760	4980	8960	e7400	4230	5060	3870	1680	2470
8	1880	4260	3600	4510	4930	8550	e7100	4380	5000	3620	1840	2490
9	2100	4880	3380	4380	4740	8280	e6800	4300	4580	3860	1860	2680
10	1940	4660	3380	4320	4600	7990	e6500	4000	4500	3520	1650	3160
11	2080	4370	3790	3000	4480	7610	e6300	4130	4200	3300	1760	3250
12	1820	4090	4990	e3250	4360	7110	e6200	4080	4200	3260	2330	3060
13	1650	3910	4620	e3400	4240	7160	e6100	4180	4150	3020	2660	3200
14	2060	3820	4210	e3500	3940	7450	e5900	4040	4000	2690	2270	3210
15	1800	3630	4150	3650	4060	8020	e5700	4050	3620	2930	2450	3170
16	1640	3530	4290	3770	3910	7400	e5500	3860	3580	2980	2410	3260
17	1900	3480	4600	e3780	3770	7350	e5400	4000	4520	2610	4920	3420
18	2600	3320	4540	3790	3760	7230	e5300	3830	4680	2570	5670	4040
19	2560	3260	4050	e3700	4340	7070	e5200	4380	4080	2590	4780	4060
20	2250	3220	3130	3600	4810	7170	e5000	4610	3660	2290	4380	4280
21	2170	3130	3120	3650	7840	6980	e4850	4560	4780	2420	4370	4490
22	2030	3010	3380	4580	11900	6750	e4650	4180	6620	2540	4210	4660
23	2230	2920	4430	6340	11000	6610	4510	4230	6920	2480	4140	4790
24	2270	2790	6440	6160	10000	6300	4480	4090	5940	2800	4370	4900
25	2200	2940	5950	5590	9640	e6350	4370	4800	5490	2740	4460	4880
26	2200	3010	5150	4900	9420	e6250	4440	5320	5180	2690	3910	4730
27	2190	2700	4890	5020	11300	e6200	4280	5190	5410	2570	4080	4540
28	1970	2940	5330	4960	12800	e6200	4230	4830	4960	2690	3800	4310
29	2270	2650	5620	4540	---	e7300	3990	5260	4440	2680	3480	4040
30	2420	3240	5460	4640	---	e8000	4300	5160	4070	2310	3450	3960
31	2710	---	5350	4640	---	e8200	---	5020	---	2330	3180	---
TOTAL	65400	97430	134790	138910	174290	247170	176600	136090	143710	94620	96250	108630
MEAN	2110	3248	4348	4481	6225	7973	5887	4390	4790	3052	3105	3621
MAX	2710	4880	6440	6340	12800	11900	8200	5320	6920	4250	5670	4900
MIN	1640	2330	3120	3000	3760	6200	3990	3830	3580	2290	1650	2470
CFSM	.58	.89	1.19	1.22	1.70	2.17	1.61	1.20	1.31	.83	.85	.99
IN.	.66	.99	1.37	1.41	1.77	2.51	1.79	1.38	1.46	.96	.98	1.10

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1997, BY WATER YEAR (WY)

	MEAN	2337	2753	3182	3576	3921	5260	5447	4411	3507	2550	2127	2061
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1931 - 1997

ANNUAL TOTAL	1431400						1613890						
ANNUAL MEAN	3911						4422						
HIGHEST ANNUAL MEAN										3424			
LOWEST ANNUAL MEAN										5718			1950
HIGHEST DAILY MEAN										1464			1964
LOWEST DAILY MEAN	13500					Jun 11	12800		Feb 28	19800		Mar 21	1982
ANNUAL SEVEN-DAY MINIMUM	1640					Oct 16	1640		Oct 16	420		Aug 30	1931
INSTANTANEOUS PEAK FLOW	1850					Oct 11	1820		Aug 5	728		Aug 26	1940
INSTANTANEOUS PEAK STAGE							13300		Feb 28	20200		Apr 5	1951
ANNUAL RUNOFF (CFSM)							11.81		Feb 28	(a)15.10		Apr 5	1950
ANNUAL RUNOFF (INCHES)	1.07						1.21			.93			
10 PERCENT EXCEEDS	7270						7130			6140			
50 PERCENT EXCEEDS	3200						4180			2840			
90 PERCENT EXCEEDS	2060						2270			1490			

(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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	222	279	390	344	364	701	506	369	385	295	168	215
2	207	258	448	350	361	628	460	388	379	364	165	232
3	198	248	387	344	354	562	432	394	370	337	163	226
4	194	240	354	337	372	523	414	366	338	288	170	213
5	191	240	340	383	447	496	437	343	310	277	164	204
6	188	237	332	348	424	474	486	346	334	261	158	197
7	187	320	325	320	391	447	437	322	383	257	155	192
8	191	467	311	305	363	440	411	350	340	249	151	191
9	218	433	298	301	344	437	398	351	308	259	149	223
10	213	424	290	303	332	455	388	335	284	241	152	330
11	203	401	321	256	322	435	382	321	263	228	172	314
12	199	376	373	274	317	413	428	317	255	219	204	290
13	197	353	343	286	298	403	449	303	253	213	228	275
14	195	333	319	283	308	479	421	303	241	230	212	256
15	193	313	306	286	299	473	397	318	232	247	207	212
16	193	303	302	281	297	437	383	321	257	232	217	232
17	198	358	293	e225	291	435	370	308	287	224	268	423
18	369	407	282	e290	313	437	360	293	269	218	282	469
19	324	364	250	e285	497	435	353	388	256	205	259	403
20	276	331	244	e280	526	417	343	361	244	194	248	894
21	257	311	247	278	983	398	339	320	702	238	243	664
22	243	297	249	524	1270	381	337	298	798	258	239	489
23	257	285	305	688	1050	366	328	285	586	241	220	439
24	265	279	525	559	736	357	318	277	466	236	332	397
25	258	281	438	481	596	389	308	413	407	222	359	357
26	247	271	379	432	560	397	298	412	368	216	302	331
27	240	261	350	413	882	378	295	352	335	206	280	310
28	239	256	346	390	861	391	295	325	314	202	259	298
29	241	253	395	360	---	729	288	477	295	192	241	291
30	334	307	390	361	---	777	287	506	281	183	229	278
31	319	---	361	351	---	590	---	425	---	175	257	---
TOTAL	7256	9486	10493	10917	14158	14680	11348	10887	10540	7407	6853	9905
MEAN	234	316	338	352	506	474	378	351	351	249	221	330
MAX	369	467	525	688	1270	777	506	506	798	364	359	814
MIN	187	237	244	225	291	357	287	277	232	175	149	151
CFSM	.92	1.24	1.33	1.38	1.98	1.86	1.48	1.38	1.38	.94	.87	1.29
IN.	1.06	1.38	1.53	1.59	2.07	2.14	1.66	1.59	1.54	1.08	1.00	1.44

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 1997, BY WATER YEAR (WY)

MEAN	259	311	334	315	337	410	404	335	274	221	196	214
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	1981
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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1961 - 1997
ANNUAL TOTAL	105166	123930	301
ANNUAL MEAN	287	340	401
HIGHEST ANNUAL MEAN			177
LOWEST ANNUAL MEAN			1550
HIGHEST DAILY MEAN	829	Jun 10	1550
LOWEST DAILY MEAN	105	Aug 31	87
ANNUAL SEVEN-DAY MINIMUM	110	Aug 29	89
INSTANTANEOUS PEAK FLOW			1590
INSTANTANEOUS PEAK STAGE		8.45	9.26
INSTANTANEOUS LOW FLOW		148	86
ANNUAL RUNOFF (CFSM)	1.13	1.33	1.18
ANNUAL RUNOFF (INCHES)	15.34	18.08	16.02
10 PERCENT EXCEEDS	419	471	468
50 PERCENT EXCEEDS	274	314	279
90 PERCENT EXCEEDS	156	207	164

(e) Estimated.

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 fair. Diurnal fluctuation, principally during low flow, caused by paper mill upstream from station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	296	339	418	649	787	1270	859	450	561	523	255	291
2	272	347	496	608	758	1230	939	502	558	477	245	283
3	261	353	536	591	753	1250	946	522	565	457	246	278
4	249	346	528	574	752	1170	847	525	541	434	246	272
5	244	333	530	577	763	1050	748	522	490	411	247	267
6	242	309	550	623	696	948	702	517	459	375	245	263
7	243	324	557	594	632	861	677	512	460	353	236	259
8	246	383	540	551	623	778	637	504	454	349	234	255
9	260	427	501	526	626	716	616	506	426	347	231	264
10	270	449	464	e490	594	680	612	510	412	338	231	264
11	271	459	450	e460	546	653	595	502	400	330	243	293
12	274	460	458	e440	508	629	577	493	398	316	253	353
13	276	457	461	e425	474	608	579	482	367	310	275	372
14	268	452	451	e415	453	600	588	459	371	305	281	363
15	261	439	447	e410	438	603	582	445	368	301	284	332
16	261	423	446	e430	427	599	577	447	363	305	284	303
17	255	424	436	e460	416	585	576	450	377	303	277	354
18	291	446	e410	e450	416	580	569	450	375	299	295	389
19	285	460	e390	e440	486	587	551	471	384	289	321	406
20	281	462	e370	e430	614	589	529	507	363	272	323	493
21	297	465	e360	e430	1190	573	507	505	447	270	308	580
22	299	474	e360	e550	2350	558	491	490	774	285	298	593
23	297	469	393	909	2510	547	478	486	1070	296	299	585
24	290	439	521	1280	3030	532	466	475	1430	312	341	575
25	287	404	627	1140	2540	528	458	457	1870	297	363	545
26	286	381	691	1040	1780	540	450	443	1470	292	351	469
27	284	366	722	1040	1500	548	442	431	1150	295	351	397
28	279	356	658	1110	1460	546	434	423	940	278	331	352
29	280	346	656	1050	---	616	427	442	778	270	300	333
30	322	359	728	e950	---	917	425	528	617	265	283	320
31	338	---	708	862	---	887	---	576	---	258	294	---
TOTAL	8565	12151	15863	20504	28122	22778	17884	15032	19238	10212	8775	11103
MEAN	276	405	512	661	1004	735	596	485	641	329	283	370
MAX	338	474	728	1280	3030	1270	946	576	1870	523	363	593
MIN	242	309	360	410	416	528	425	423	363	258	231	255
CFSM	.71	1.04	1.31	1.70	2.58	1.88	1.53	1.24	1.64	.84	.73	.95
IN.	.82	1.16	1.51	1.96	2.68	2.17	1.71	1.43	1.84	.97	.84	1.06

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1997, BY WATER YEAR (WY)

	MEAN	381	448	513	511	544	680	648	508	405	321	285	304
MAX	1217	826	906	1038	1004	1234	961	799	686	581	557	569	
(WY)	1987	1989	1991	1952	1997	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1952 - 1997

ANNUAL TOTAL	140977	190227	
ANNUAL MEAN	385	521	462
HIGHEST ANNUAL MEAN			606
LOWEST ANNUAL MEAN			273
HIGHEST DAILY MEAN	839	3030	3460
LOWEST DAILY MEAN	178	231	120
ANNUAL SEVEN-DAY MINIMUM	182	238	134
INSTANTANEOUS PEAK FLOW		3110	3580
INSTANTANEOUS PEAK STAGE		10.66	10.90
INSTANTANEOUS LOW FLOW			99
ANNUAL RUNOFF (CFSM)	.99	1.34	1.18
ANNUAL RUNOFF (INCHES)	13.45	18.14	16.09
10 PERCENT EXCEEDS	601	811	756
50 PERCENT EXCEEDS	371	450	406
90 PERCENT EXCEEDS	214	272	232

(a) Aug. 9, 10.

(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 fair. 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	36	49	115	143	e180	531	215	95	169	148	41	44
2	33	45	191	140	e160	446	168	116	133	154	40	43
3	31	43	160	140	140	373	143	114	114	121	41	42
4	30	42	132	132	139	302	130	106	101	99	42	41
5	29	41	119	192	217	256	135	91	89	86	41	40
6	28	41	111	190	223	222	175	89	84	78	40	40
7	28	48	109	152	186	194	158	83	98	71	38	39
8	29	66	104	127	156	170	132	90	86	68	38	41
9	34	65	95	114	136	153	117	102	76	68	38	41
10	33	66	88	e105	123	151	107	93	69	64	38	44
11	32	68	89	e100	113	146	101	85	65	60	40	45
12	31	69	108	e95	106	134	117	80	63	57	44	44
13	31	70	105	e97	e100	126	149	74	62	54	49	42
14	31	68	98	e105	e98	126	143	72	59	53	45	41
15	30	65	93	e100	94	130	124	78	56	51	44	41
16	30	62	88	e98	90	121	119	86	65	50	43	40
17	31	82	85	e96	86	117	115	88	80	48	52	62
18	49	127	82	e94	93	118	108	87	72	47	55	70
19	45	109	e76	e92	220	118	101	200	65	46	51	64
20	41	90	e74	e90	309	114	95	205	64	45	48	101
21	38	77	e72	e95	1300	108	92	160	1350	51	50	90
22	36	69	e72	e200	1810	105	92	126	1390	54	49	72
23	37	64	e95	556	1040	101	89	109	880	52	47	61
24	40	62	311	586	787	96	85	96	680	59	55	56
25	40	61	301	455	672	107	82	96	519	53	57	51
26	39	58	236	347	597	133	78	100	403	50	53	47
27	38	55	260	e280	667	126	75	91	327	48	51	44
28	37	53	201	e230	715	119	73	81	266	46	48	43
29	37	52	183	e200	---	238	72	129	196	44	45	43
30	55	62	188	e195	---	372	71	232	138	43	44	41
31	54	---	163	e190	---	293	---	216	---	41	44	---
TOTAL	1113	1929	4204	5736	10557	5846	3461	3470	7819	2009	1411	1513
MEAN	35.9	64.3	136	185	377	189	115	112	261	64.8	45.5	50.4
MAX	55	127	311	586	1810	531	215	232	1390	154	57	101
MIN	28	41	72	90	86	96	71	72	56	41	38	39
CFSM	.43	.77	1.62	2.21	4.51	2.26	1.38	1.34	3.12	.78	.54	.60
IN.	.50	.86	1.87	2.55	4.70	2.60	1.54	1.54	3.48	.89	.63	.67

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1997, BY WATER YEAR (WY)

	MEAN	68.6	97.6	134	125	145	188	166	105	89.8	60.6	46.0	59.6
MAX	362	282	272	244	377	389	327	182	261	181	141	329	
(WY)	1987	1991	1983	1973	1997	1979	1975	1975	1997	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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1966 - 1997
ANNUAL TOTAL	28601	49068	
ANNUAL MEAN	78.1	134	107
HIGHEST ANNUAL MEAN			134
LOWEST ANNUAL MEAN			72.8
HIGHEST DAILY MEAN	482	Jun 18	1810
LOWEST DAILY MEAN	24	Sep 4	28
ANNUAL SEVEN-DAY MINIMUM	25	Aug 31	30
INSTANTANEOUS PEAK FLOW		(b)2390	Feb 21
INSTANTANEOUS PEAK STAGE		14.90	Feb 21
INSTANTANEOUS LOW FLOW			20
ANNUAL RUNOFF (CFSM)	.93	1.61	1.28
ANNUAL RUNOFF (INCHES)	12.73	21.83	17.40
10 PERCENT EXCEEDS	156	226	207
50 PERCENT EXCEEDS	62	88	75
90 PERCENT EXCEEDS	30	40	34

(a) Oct. 6, 7.

(b) From rating curve extended above 1,800 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	36	58	111	131	e180	453	169	94	138	163	55	54
2	35	54	161	132	e150	423	157	103	125	171	54	52
3	34	52	134	134	138	373	147	108	110	142	52	51
4	33	50	125	127	145	336	134	105	98	127	54	48
5	33	48	121	151	198	301	136	99	90	118	52	45
6	32	47	114	148	202	269	161	100	85	109	49	45
7	32	55	110	133	183	239	147	95	89	102	47	45
8	33	74	106	126	171	218	133	103	84	103	46	45
9	38	74	99	115	154	202	123	113	77	116	46	46
10	39	78	93	e110	137	197	115	104	72	102	46	47
11	35	80	93	e105	125	190	111	98	68	94	49	52
12	33	80	103	e100	117	180	126	93	66	89	59	51
13	33	79	100	e105	105	171	144	86	65	85	70	49
14	32	76	98	e110	e100	166	137	84	65	81	63	48
15	30	73	97	e105	e98	161	128	91	62	79	61	49
16	30	71	97	e100	e96	151	128	98	74	75	62	47
17	30	88	92	e98	95	148	127	96	87	69	64	68
18	39	121	89	e96	109	145	118	95	77	68	67	91
19	48	111	e85	e94	192	139	112	192	72	65	61	79
20	40	101	e84	e92	234	135	106	239	75	62	58	110
21	38	94	e83	e100	666	131	103	216	2720	73	66	99
22	38	87	e82	e170	1450	127	103	217	2980	79	66	83
23	40	82	e100	385	1220	121	99	167	1750	72	60	77
24	44	80	182	410	733	117	96	127	897	87	67	72
25	44	79	174	e340	534	122	92	116	567	82	78	66
26	42	75	147	e310	418	135	89	114	410	74	68	61
27	41	71	198	e300	445	131	87	104	316	71	65	58
28	39	70	230	e250	484	131	86	96	247	69	55	55
29	40	68	171	e200	---	157	83	110	195	63	56	56
30	61	77	157	e195	---	182	81	144	160	60	54	54
31	69	---	139	e190	---	176	---	136	---	57	54	---
TOTAL	1191	2253	3775	5162	8879	6127	3578	3743	11921	2807	1806	1803
MEAN	38.4	75.1	122	167	317	198	119	121	397	90.5	58.5	60.1
MAX	69	121	230	410	1450	453	189	239	2980	171	75	110
MIN	30	47	82	92	95	117	81	84	62	57	46	45
CFSM	.46	.90	1.47	2.01	3.82	2.38	1.44	1.45	4.79	1.09	.70	.72
IN.	.53	1.01	1.69	2.31	3.98	2.75	1.60	1.68	5.34	1.26	.81	.81

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1995 - 1997, BY WATER YEAR (WY)

MEAN	44.2	114	109	140	173	139	120	120	203	59.7	41.5	39.5
MAX	47.7	155	122	167	317	198	160	122	397	90.5	58.5	60.1
(WY)	1996	1995	1997	1997	1997	1997	1995	1995	1997	1997	1997	1997
MIN	38.4	75.1	88.5	91.0	95.2	77.8	79.0	118	61.7	41.9	31.0	28.8
(WY)	1997	1997	1996	1996	1996	1996	1996	1996	1995	1995	1996	1996

SUMMARY STATISTICS FOR 1996 CALENDAR YEAR FOR 1997 WATER YEAR WATER YEARS 1995 - 1997

ANNUAL TOTAL	29043	53045	108	1997
ANNUAL MEAN	79.4	145	145	1996
HIGHEST ANNUAL MEAN			80.3	1996
LOWEST ANNUAL MEAN				
HIGHEST DAILY MEAN	499	2980	2980	Jun 22 1997
LOWEST DAILY MEAN	24	30	24	(a) (b)
ANNUAL SEVEN-DAY MINIMUM	24	32	24	Oct 11 Sep 1 1996
INSTANTANEOUS PEAK FLOW		(c)4340	(c)4340	Jun 21 1997
INSTANTANEOUS PEAK STAGE		12.85	12.85	Jun 21 1997
ANNUAL RUNOFF (CFSM)	.96	1.75	1.30	
ANNUAL RUNOFF (INCHES)	13.02	23.77	17.68	
10 PERCENT EXCEEDS	137	202	171	
50 PERCENT EXCEEDS	70	96	85	
90 PERCENT EXCEEDS	30	47	33	

(a) Oct. 15-17.

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

(c) From rating curve extended above 1,400 ft³/s.

(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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	135	174	174	198	187	508	528	243	237	179	123	145
2	130	164	184	195	179	492	453	238	264	179	121	142
3	123	152	184	199	176	451	400	278	314	166	118	138
4	121	144	176	202	187	411	369	288	335	159	123	136
5	118	140	170	219	206	368	387	293	318	156	121	133
6	117	138	170	e210	219	345	413	293	289	152	117	128
7	115	223	169	e190	212	316	396	273	258	150	113	128
8	114	286	167	e170	199	304	375	280	234	151	111	122
9	122	290	165	e160	188	298	344	280	219	153	109	147
10	121	262	162	e150	182	297	319	275	209	163	108	241
11	120	227	167	e140	177	292	305	266	202	155	120	250
12	121	201	188	e140	172	283	307	263	198	149	130	238
13	120	185	210	e145	167	269	314	264	195	144	166	216
14	118	173	210	e148	e165	337	316	262	190	140	152	192
15	118	162	204	e150	163	379	310	266	185	152	149	174
16	117	158	198	e150	159	395	299	258	193	142	168	165
17	119	158	e190	e150	152	382	289	258	194	140	201	219
18	160	156	e180	e153	165	368	283	252	196	137	224	218
19	147	158	e150	e156	191	356	274	315	191	128	224	209
20	143	153	e140	e160	235	336	266	310	193	124	210	293
21	142	147	e140	e165	400	324	261	290	336	143	198	335
22	136	144	e150	e170	521	310	257	263	316	182	188	338
23	154	142	223	e180	531	300	254	243	306	192	178	311
24	155	144	286	e190	488	292	252	229	285	180	185	271
25	152	147	292	e195	419	309	248	230	248	166	186	236
26	149	145	255	e200	370	327	241	242	220	157	182	211
27	144	141	281	e205	457	333	238	242	200	149	173	195
28	137	142	227	e206	507	343	241	233	186	146	162	186
29	142	141	215	e200	---	489	243	237	175	140	154	188
30	189	153	216	e195	---	599	239	247	169	132	147	179
31	177	---	207	e190	---	594	---	240	---	127	153	---
TOTAL	4176	5150	6050	5481	7374	11407	9421	8151	7055	4733	4814	6084
MEAN	135	172	195	177	263	368	314	263	235	153	155	203
MAX	189	290	292	219	531	599	528	315	336	192	224	338
MIN	114	138	140	140	152	269	238	229	169	124	108	122
CFSM	.50	.64	.73	.66	.99	1.38	1.18	.98	.88	.57	.58	.76
IN.	.58	.72	.84	.76	1.03	1.59	1.31	1.14	.98	.66	.67	.85

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1997, BY WATER YEAR (WY)

	MEAN	220	257	243	260	251	309	317	251	244	182	174	183
MAX	349	383	356	466	340	445	468	386	530	274	226	272	272
(WY)	1987	1989	1991	1993	1991	1990	1993	1990	1989	1993	1989	1993	1993
MIN	135	167	160	158	173	186	225	177	126	111	116	112	112
(WY)	1997	1988	1996	1996	1996	1996	1987	1987	1988	1988	1996	1996	1996

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1987 - 1997
ANNUAL TOTAL	63293	79896	
ANNUAL MEAN	173	219	241
HIGHEST ANNUAL MEAN			332
LOWEST ANNUAL MEAN			176
HIGHEST DAILY MEAN	394	Apr 23	1140
LOWEST DAILY MEAN	97	Aug 18	95
ANNUAL SEVEN-DAY MINIMUM	100	Sep 1	98
INSTANTANEOUS PEAK FLOW		(a)620	1160
INSTANTANEOUS LOW FLOW		(b)8.54	10.18
ANNUAL RUNOFF (CFSM)	.65	106	88
ANNUAL RUNOFF (INCHES)	8.82	.82	.90
10 PERCENT EXCEEDS	256	11.13	366
50 PERCENT EXCEEDS	158	191	219
90 PERCENT EXCEEDS	113	134	138

(a) Gage height 8.44 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	42	36	52	48	187	122	37	38	43	13	16
2	15	36	41	49	46	153	98	39	39	41	13	16
3	13	30	41	52	44	130	79	44	41	33	13	15
4	12	25	37	52	45	112	66	47	38	28	17	14
5	12	22	33	54	53	97	65	46	34	25	15	14
6	12	19	31	53	57	85	75	60	30	22	14	14
7	13	27	31	50	63	73	77	73	29	21	13	13
8	15	42	31	e42	58	65	78	78	27	20	13	13
9	19	44	30	e37	49	60	70	78	25	23	13	16
10	19	42	29	e34	43	61	61	73	23	21	13	27
11	18	36	30	e32	38	60	54	66	22	19	14	28
12	17	31	34	e31	36	58	54	57	22	17	19	24
13	16	27	43	e31	e34	56	60	49	27	16	26	19
14	15	24	47	e30	e32	60	62	44	32	16	22	17
15	15	21	47	e30	31	66	61	47	30	18	20	17
16	14	21	45	e29	30	66	59	49	28	17	24	16
17	14	22	42	e29	30	70	56	50	30	15	27	37
18	29	23	39	e29	30	71	52	49	28	15	24	59
19	30	25	37	e30	45	69	48	69	25	14	20	59
20	28	23	32	e31	56	67	45	73	25	14	19	73
21	25	21	28	e35	117	63	43	70	55	16	20	66
22	22	21	27	e47	342	58	44	61	102	18	20	53
23	27	20	34	e54	440	53	43	51	170	17	18	43
24	30	20	64	e66	289	49	42	43	150	15	21	33
25	29	21	75	e90	183	51	40	40	104	14	26	26
26	26	21	98	e94	129	58	38	39	67	14	23	22
27	23	20	101	e80	126	58	36	37	48	14	20	20
28	20	20	74	e70	160	60	35	33	35	14	18	19
29	21	21	59	e60	---	84	34	35	27	13	16	20
30	37	26	56	e56	---	122	33	39	24	13	16	18
31	40	---	55	50	---	144	---	40	---	13	16	---
TOTAL	642	793	1407	1479	2654	2466	1730	1616	1375	599	566	827
MEAN	20.7	26.4	45.4	47.7	94.8	79.5	57.7	52.1	45.8	19.3	18.3	27.6
MAX	40	44	101	94	440	187	122	78	170	43	27	73
MIN	12	19	27	29	30	49	33	33	22	13	13	13
CFSM	.43	.55	.94	.99	1.96	1.65	1.19	1.08	.95	.40	.38	.57
IN.	.49	.61	1.08	1.14	2.04	1.90	1.33	1.24	1.06	.46	.44	.64

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1995 - 1997, BY WATER YEAR (WY)

	1995	1996	1997	1995	1996	1997	1995	1996	1997	1995	1996	1997
MEAN	25.4	46.2	44.3	45.0	54.0	60.0	53.7	52.0	38.2	16.9	17.9	18.6
MAX	35.0	69.0	60.0	54.0	94.8	79.5	57.7	52.1	45.8	19.3	24.4	27.6
(WY)	1995	1995	1995	1995	1997	1997	1997	1997	1997	1997	1995	1997
MIN	20.6	26.4	27.4	33.4	32.7	42.2	48.7	51.9	25.4	12.1	11.2	12.4
(WY)	1996	1997	1996	1996	1996	1996	1996	1996	1995	1996	1996	1996

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1995 - 1997

ANNUAL TOTAL	11600.7	16154	
ANNUAL MEAN	31.7	44.3	39.3
HIGHEST ANNUAL MEAN			44.3
LOWEST ANNUAL MEAN			31.5
HIGHEST DAILY MEAN	109	Mar 1	440
LOWEST DAILY MEAN	9.3	Sep 2	12
ANNUAL SEVEN-DAY MINIMUM	9.4	Sep 1	13
INSTANTANEOUS PEAK FLOW			488
INSTANTANEOUS PEAK STAGE			7.36
ANNUAL RUNOFF (CFSM)	.66		.92
ANNUAL RUNOFF (INCHES)	8.93		12.44
10 PERCENT EXCEEDS	61		73
50 PERCENT EXCEEDS	27		34
90 PERCENT EXCEEDS	11		15

(a) Oct. 4-6.

(b) Sept. 2, 4-6, 1996.

(c) 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. 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	69	127	113	320	246	1110	821	178	246	225	62	70
2	63	127	131	295	235	1140	733	178	247	223	57	74
3	59	117	137	272	228	1010	604	200	250	220	55	66
4	58	105	145	261	235	873	506	213	237	211	70	71
5	56	91	144	262	246	738	449	223	225	192	64	63
6	56	95	133	261	262	624	420	243	212	165	62	68
7	57	105	130	250	288	531	398	273	194	139	66	68
8	57	133	123	169	311	463	388	311	175	123	57	67
9	64	153	121	191	309	413	384	350	159	117	55	82
10	64	166	124	175	281	381	359	356	139	112	54	107
11	63	178	118	136	245	361	328	345	131	105	66	127
12	59	169	128	132	218	345	303	330	121	99	72	148
13	60	147	138	148	178	337	291	307	123	93	93	157
14	59	121	159	158	180	334	286	280	133	87	95	147
15	57	110	174	168	170	329	283	262	138	84	95	126
16	56	107	189	157	166	317	286	254	137	88	99	111
17	52	103	194	140	145	361	281	254	136	87	109	140
18	65	101	188	141	168	382	267	257	138	82	109	191
19	77	105	131	131	215	373	251	295	133	75	101	237
20	91	105	130	130	262	362	237	340	131	72	93	302
21	78	99	125	131	380	350	222	376	188	76	89	362
22	76	95	134	164	618	333	216	474	272	88	88	366
23	82	94	146	211	1310	313	211	462	410	87	86	371
24	92	94	209	242	1490	291	208	410	641	88	93	352
25	94	94	223	284	1270	277	206	376	669	85	106	283
26	97	94	220	367	1100	276	205	346	548	80	100	230
27	87	92	239	415	931	282	197	308	425	76	96	203
28	83	91	315	400	918	299	186	276	346	73	90	169
29	87	89	343	352	---	353	187	259	281	67	82	139
30	105	94	340	311	---	430	178	252	230	66	78	136
31	123	---	339	278	---	672	---	247	---	58	78	---
TOTAL	2246	3401	5483	7052	12605	14660	9891	9235	7415	3443	2520	5033
MEAN	72.5	113	177	227	450	473	330	298	247	111	81.3	168
MAX	123	178	343	415	1490	1140	821	474	669	225	109	371
MIN	52	89	113	130	145	276	178	178	121	58	54	63
CFSM	.30	.47	.73	.94	1.87	1.96	1.37	1.24	1.03	.46	.34	.70
IN.	.35	.52	.85	1.09	1.95	2.26	1.53	1.43	1.14	.53	.39	.78

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1997, BY WATER YEAR (WY)

MEAN	124	164	196	208	243	414	393	263	192	109	88.3	98.7
MAX	673	474	468	591	593	936	1163	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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1931 - 1997
ANNUAL TOTAL	55003	82984	
ANNUAL MEAN	150	227	(a)211
HIGHEST ANNUAL MEAN			394
LOWEST ANNUAL MEAN			64.1
HIGHEST DAILY MEAN	628	1490	3560
LOWEST DAILY MEAN	43	52	22
ANNUAL SEVEN-DAY MINIMUM	46	58	25
INSTANTANEOUS PEAK FLOW		1650	3640
INSTANTANEOUS PEAK STAGE		2.78	(b)4.48
INSTANTANEOUS LOW FLOW		50	22
ANNUAL RUNOFF (CFSM)	.62	.94	.87
ANNUAL RUNOFF (INCHES)	8.49	12.81	11.89
10 PERCENT EXCEEDS	288	386	420
50 PERCENT EXCEEDS	126	169	137
90 PERCENT EXCEEDS	53	70	60

(a) Does not include water year 1931.

(b) From floodmark.

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	359	497	503	795	723	1930	1850	671	750	675	344	382
2	344	471	540	767	692	1820	1680	689	787	626	337	369
3	325	440	544	745	677	1690	1480	749	853	619	334	364
4	320	423	537	747	706	1680	1310	819	847	597	377	356
5	311	400	531	744	745	1590	1280	813	802	572	362	350
6	304	399	503	755	766	1420	1260	842	748	536	345	345
7	311	527	498	714	820	1270	1190	846	700	510	340	339
8	315	714	492	583	794	1150	1160	902	637	484	325	345
9	337	739	484	602	771	1080	1110	930	593	479	315	484
10	330	706	486	565	715	1040	1010	936	554	467	314	844
11	326	666	488	e400	671	1010	947	904	524	460	417	793
12	314	623	549	e380	641	959	945	865	582	440	430	724
13	315	555	604	e370	560	927	930	848	538	428	510	664
14	316	499	628	e370	582	1020	923	809	516	446	458	613
15	310	475	634	e380	563	1040	904	799	506	528	429	549
16	307	453	640	e380	544	1040	889	783	541	460	451	498
17	301	440	646	e380	516	1070	870	776	548	436	526	769
18	380	461	626	e380	537	1100	835	763	521	423	527	851
19	389	439	442	e390	664	1070	805	917	502	407	525	833
20	389	441	413	e410	823	1010	757	987	547	389	514	990
21	366	428	465	e510	1380	970	763	979	970	445	492	1070
22	359	417	538	674	1700	924	739	1040	1210	478	476	1050
23	421	408	660	832	e1900	892	729	1000	1180	499	450	1040
24	424	413	935	862	e2200	857	716	914	1300	476	493	963
25	419	414	890	876	e2100	884	711	890	1270	445	513	833
26	409	410	762	861	e1900	889	695	844	1100	420	494	723
27	379	402	788	896	e1800	916	668	810	917	406	471	668
28	364	401	935	923	e1800	977	663	749	790	401	424	608
29	399	398	872	826	---	1280	666	755	695	391	398	574
30	484	438	842	738	---	1530	666	758	617	371	383	551
31	514	---	846	752	---	1750	---	727	---	319	393	---
TOTAL	11141	14497	19321	19607	28290	36785	29151	26115	22625	14633	13170	19542
MEAN	359	483	623	632	1010	1187	972	842	754	472	425	651
MAX	514	739	935	923	2200	1930	1850	1040	1300	675	528	1070
MIN	301	398	413	370	516	857	663	671	502	319	314	339
CFSM	.44	.59	.76	.77	1.23	1.44	1.18	1.02	.92	.57	.52	.79
IN.	.50	.65	.87	.89	1.28	1.66	1.32	1.18	1.02	.66	.59	.88

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1937 - 1997, BY WATER YEAR (WY)

	MEAN	492	589	655	673	765	1120	1100	843	681	487	422	433
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1937 - 1997

ANNUAL TOTAL	209351		254877										
ANNUAL MEAN	572		698										
HIGHEST ANNUAL MEAN										688			
LOWEST ANNUAL MEAN										1081		1943	
HIGHEST DAILY MEAN										250		1964	
LOWEST DAILY MEAN	1420						2200		Feb 24	7130		Aug 7 1947	
ANNUAL SEVEN-DAY MINIMUM	260						301		Oct 17	86		Aug 5 1964	
INSTANTANEOUS PEAK FLOW	271						313		Oct 11	106		Aug 4 1964	
INSTANTANEOUS PEAK STAGE										(a)7290		Apr 7 1947	
INSTANTANEOUS LOW FLOW										(b)7.95		Feb 26 1985	
ANNUAL RUNOFF (CFSM)	.69						.85		Jul 31	50		Sep 22 1939	
ANNUAL RUNOFF (INCHES)	9.45						11.51			.83			
10 PERCENT EXCEEDS	922						1070			1220			
50 PERCENT EXCEEDS	498						626			550			
90 PERCENT EXCEEDS	320						368			295			

(a) Gage height 9.13 ft, site and datum then in use.

(b) Present site and datum.

(c) 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	48	50	43	44	87	67	41	46	44	21	30
2	30	41	53	45	43	85	61	41	47	43	21	29
3	29	38	48	48	41	79	57	45	47	35	21	28
4	28	36	43	49	44	74	54	44	43	32	22	27
5	27	34	41	54	51	69	61	43	40	30	23	27
6	27	34	41	52	48	67	69	59	38	29	23	28
7	27	48	40	45	45	63	63	54	38	28	24	26
8	28	61	40	39	42	62	57	55	36	29	22	25
9	32	58	39	41	40	62	54	55	34	32	22	35
10	32	51	37	38	39	64	51	50	33	29	22	49
11	31	46	39	34	39	63	50	46	32	28	26	46
12	30	42	43	e31	38	61	56	44	32	26	31	41
13	29	39	47	e31	33	59	60	42	35	25	37	37
14	28	37	45	e32	38	64	57	42	33	26	33	36
15	28	35	43	e33	37	64	52	50	31	32	32	36
16	27	34	43	e33	36	61	51	49	35	30	34	35
17	28	37	42	e32	35	62	51	48	38	27	48	58
18	51	39	41	e32	38	63	49	45	36	26	44	78
19	52	38	33	e34	55	60	48	68	33	25	38	69
20	44	36	35	e35	59	58	45	63	35	24	36	82
21	39	34	33	37	110	56	46	55	80	25	36	73
22	35	33	33	60	145	54	48	48	84	29	34	61
23	42	33	47	72	133	52	46	44	70	28	31	53
24	45	34	74	68	102	51	44	42	60	27	36	47
25	42	35	65	61	84	58	43	45	50	26	39	42
26	38	33	56	51	78	60	41	46	42	25	36	39
27	36	32	50	49	90	57	41	43	38	25	34	36
28	34	32	48	46	93	60	41	40	35	24	32	35
29	36	32	49	42	---	82	40	49	33	23	30	37
30	57	39	48	43	---	82	40	56	31	22	29	34
31	55	---	45	42	---	74	---	50	---	21	30	---
TOTAL	1099	1169	1391	1352	1680	2013	1543	1502	1265	875	947	1279
MEAN	35.5	39.0	44.9	43.6	60.0	64.9	51.4	48.5	42.2	28.2	30.5	42.6
MAX	57	61	74	72	145	87	69	68	84	44	48	82
MIN	27	32	33	31	33	51	40	40	31	21	21	25
CFSM	.91	1.00	1.15	1.12	1.54	1.67	1.32	1.25	1.08	.73	.79	1.10
IN.	1.05	1.12	1.33	1.29	1.61	1.93	1.48	1.44	1.21	.84	.91	1.22

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 1997, BY WATER YEAR (WY)

	MEAN	40.8	46.6	48.3	43.8	46.3	57.4	59.4	47.8	43.4	35.7	34.2	37.0
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1965 - 1997

ANNUAL TOTAL	13554		16115									
ANNUAL MEAN	37.0		44.2							45.0		
HIGHEST ANNUAL MEAN										57.5		1975
LOWEST ANNUAL MEAN										30.3		1965
HIGHEST DAILY MEAN	102	Jun 19	145	Feb 22	454						Jun 27 1978	
LOWEST DAILY MEAN	21	Feb 17	21	Jul 31	14						Aug 24 1984	
ANNUAL SEVEN-DAY MINIMUM	21	Sep 5	22	Jul 29	14						Aug 21 1984	
INSTANTANEOUS PEAK FLOW			161	Feb 22	560						Jun 27 1978	
INSTANTANEOUS PEAK STAGE			2.57	Feb 22	3.41						Jun 27 1978	
INSTANTANEOUS LOW FLOW			(a)19	Feb 13	(a)8.9						Jan 26 1978	
ANNUAL RUNOFF (CFSM)	.95		1.13		1.16							
ANNUAL RUNOFF (INCHES)	12.96		15.41		15.73							
10 PERCENT EXCEEDS	51		63		67							
50 PERCENT EXCEEDS	35		41		42							
90 PERCENT EXCEEDS	23		28		27							

(a) Result of freezeup.

(e) 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	548	827	720	1030	1080	2510	2000	942	1030	953	493	518
2	493	774	732	1140	976	2570	2180	940	1020	951	493	633
3	494	744	750	1030	889	2620	2080	944	1040	867	470	501
4	435	722	759	975	953	2470	1850	954	1070	840	403	622
5	419	659	766	1030	1050	2230	1780	987	1130	867	510	534
6	492	606	768	992	1060	1970	1660	1080	1110	708	508	492
7	469	719	760	997	1030	1800	1610	1140	1010	712	504	493
8	399	748	751	864	1090	1640	1530	1190	977	772	498	498
9	499	958	746	781	1050	1480	1480	1210	942	705	493	514
10	498	1010	736	e790	1020	1440	1460	1220	862	594	373	827
11	535	943	739	e700	896	1400	1350	1220	705	630	473	1110
12	498	879	738	e560	926	1340	1320	1180	722	775	674	975
13	498	820	759	e620	888	1340	1310	1100	864	583	731	939
14	481	784	853	e680	808	1360	1290	1140	860	503	719	821
15	402	766	891	e720	817	1440	1250	1080	702	646	594	779
16	499	741	880	e740	790	1390	1250	1050	705	725	638	774
17	491	723	879	e720	768	1370	1210	1070	719	591	741	944
18	632	708	883	e700	767	1400	1170	1090	842	627	739	1140
19	640	702	823	e680	788	1470	1150	1270	793	585	733	1240
20	589	698	662	e780	969	1390	1090	1300	705	495	731	1310
21	624	569	481	e660	1760	1330	1070	1250	1010	512	725	1380
22	582	637	650	e800	2150	1290	1040	1300	1460	654	690	1390
23	555	705	867	e1000	2320	1280	1020	1350	1590	717	609	1380
24	680	563	1140	e1100	2610	1180	1010	1300	1500	592	714	1320
25	623	639	1300	e1120	3000	1220	1010	1230	1550	636	712	1200
26	580	707	995	e1140	2910	1270	987	1240	1590	657	711	1060
27	638	617	873	e1150	2690	1240	974	1130	1410	474	589	921
28	646	565	1250	e1180	2530	1310	959	1030	1160	637	669	869
29	503	637	1320	e1200	---	1580	947	1020	1010	582	614	828
30	586	634	1070	e1100	---	1750	944	1030	990	495	619	753
31	724	---	1120	1110	---	1890	---	1050	---	498	593	---
TOTAL	16752	21804	26661	28089	38585	49970	39981	35037	31078	20583	18763	26765
MEAN	540	727	860	906	1378	1612	1333	1130	1036	664	605	892
MAX	724	1010	1320	1200	3000	2620	2180	1350	1590	953	741	1390
MIN	399	563	481	560	767	1180	944	702	474	373	492	492
CFSM	.54	.72	.85	.90	1.36	1.50	1.32	1.12	1.03	.66	.60	.88
IN.	.62	.80	.98	1.03	1.42	1.84	1.47	1.29	1.14	.76	.69	.99

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1997, BY WATER YEAR (WY)

	MEAN	681	799	864	914	978	1372	1350	1057	875	673	575	584
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1931 - 1997

ANNUAL TOTAL	276628		354068										
ANNUAL MEAN	756		970										
HIGHEST ANNUAL MEAN										894			
LOWEST ANNUAL MEAN										1387		1943	
HIGHEST DAILY MEAN										368		1964	
LOWEST DAILY MEAN	1610		Jun 23		3000		Feb 25		6830		Apr 8	1947	
ANNUAL SEVEN-DAY MINIMUM	266		Sep 20		373		Aug 10		185		Aug 7	1934	
INSTANTANEOUS PEAK FLOW	370		Sep 3		457		Oct 2		217		Aug 1	1934	
INSTANTANEOUS PEAK STAGE					3110		Feb 25		6910		Apr 8	1947	
INSTANTANEOUS LOW FLOW					7.30		Feb 25		(a)10.94		Apr 8	1947	
ANNUAL RUNOFF (CFSM)	.75				265		Aug 10		119		May 29	1958	
ANNUAL RUNOFF (INCHES)	10.19				.96				.89				
10 PERCENT EXCEEDS	1170				13.04				12.03				
50 PERCENT EXCEEDS	714				1450				1520				
90 PERCENT EXCEEDS	464				867				746				
					509				407				

(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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	15	21	16	16	24	23	21	19	18	14	17
2	13	14	19	17	15	24	21	21	20	18	14	16
3	12	14	17	17	15	21	21	22	20	17	14	16
4	12	14	16	18	19	20	20	21	19	17	14	16
5	12	14	16	20	20	20	26	22	18	17	14	15
6	12	13	16	17	18	19	25	24	19	18	13	15
7	12	21	15	16	17	18	23	21	23	18	13	15
8	12	22	15	16	16	18	21	24	20	17	13	15
9	13	18	15	16	16	19	21	23	18	17	13	17
10	13	17	15	16	15	20	21	21	17	16	14	19
11	12	17	17	15	15	20	21	21	17	16	16	18
12	12	16	19	15	15	19	23	20	17	16	17	17
13	12	15	18	14	15	19	24	20	17	16	18	16
14	12	15	17	14	15	25	22	20	16	17	16	16
15	12	15	16	15	15	23	21	20	16	17	15	16
16	12	15	16	15	15	22	21	20	19	16	16	16
17	13	18	16	23	15	22	21	20	18	16	21	28
18	20	18	15	14	15	23	20	19	17	15	18	23
19	16	17	14	20	20	23	20	24	16	15	16	25
20	14	16	15	14	22	22	20	21	22	15	17	37
21	14	15	15	14	53	21	20	20	87	17	21	25
22	13	16	15	24	45	21	20	19	50	17	18	20
23	16	15	22	22	29	21	20	19	32	16	16	19
24	15	16	30	19	23	20	20	18	25	16	21	18
25	14	16	21	18	20	25	20	21	22	15	22	17
26	14	16	18	17	21	24	20	20	20	15	20	17
27	13	15	17	16	33	23	20	19	19	15	19	16
28	13	16	17	16	27	27	20	19	19	15	17	16
29	15	16	18	15	---	44	20	20	18	15	17	16
30	21	18	17	15	---	31	20	20	18	14	17	16
31	17	---	16	15	---	25	---	19	---	14	17	---
TOTAL	424	483	534	519	580	703	635	639	678	501	511	553
MEAN	13.7	16.1	17.2	16.7	20.7	22.7	21.2	20.6	22.6	16.2	16.5	18.4
MAX	21	22	30	24	53	44	26	24	87	18	22	37
MIN	12	13	14	14	15	18	20	18	16	14	13	15
CFSM	.83	.98	1.04	1.01	1.26	1.37	1.28	1.25	1.37	.98	1.00	1.12
IN.	.96	1.09	1.20	1.17	1.31	1.58	1.43	1.44	1.53	1.13	1.15	1.25

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1983 - 1997, BY WATER YEAR (WY)

	MEAN	18.2	20.2	19.3	18.4	18.6	20.8	21.0	19.7	18.1	16.6	16.2	16.4
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	16.1	15.4	14.8	14.7	15.0	17.0	16.2	13.8	12.3	11.4	12.0	
(WY)	1996	1997	1996	1996	1996	1996	1996	1994	1987	1996	1996	1996	

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1983 - 1997
ANNUAL TOTAL	5422	6760	
ANNUAL MEAN	14.8	18.5	18.6
HIGHEST ANNUAL MEAN			21.2
LOWEST ANNUAL MEAN			14.8
HIGHEST DAILY MEAN	30	Apr 22	87
LOWEST DAILY MEAN	10	Aug 9	12
ANNUAL SEVEN-DAY MINIMUM	10	Aug 30	12
INSTANTANEOUS PEAK FLOW			113
INSTANTANEOUS PEAK STAGE			4.11
ANNUAL RUNOFF (CFSM)	90		1.12
ANNUAL RUNOFF (INCHES)	12.22		1.13
10 PERCENT EXCEEDS	19		15.35
50 PERCENT EXCEEDS	15		23
90 PERCENT EXCEEDS	11		18
			14

(a) Oct. 3-8, 11-16.

(b) Sept. 15, 1988, Sept. 30 to Oct. 2, 1995, Aug. 9-13, Aug. 30 to Sept. 6, 1996.

(c) Gage height 3.87 ft.

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	27	37	35	39	48	50	48	39	35	33	27
2	25	26	29	35	39	53	49	47	42	40	33	35
3	25	28	26	27	39	49	46	46	40	40	31	36
4	22	24	28	37	50	48	45	44	40	41	32	33
5	24	24	33	42	46	46	63	48	36	41	30	31
6	23	27	29	33	40	44	56	51	43	44	36	31
7	25	55	30	35	42	44	48	47	48	44	39	23
8	25	48	36	35	41	43	47	56	41	42	38	26
9	29	39	36	36	41	48	47	50	40	36	36	37
10	23	31	36	36	42	48	47	47	38	40	40	41
11	23	31	41	30	40	46	47	49	35	39	57	33
12	29	32	41	30	34	44	53	48	36	42	43	37
13	34	35	40	26	38	45	50	47	34	40	48	33
14	22	25	40	32	37	59	48	45	33	44	40	33
15	21	27	40	35	40	45	48	46	31	45	41	31
16	21	37	37	33	42	47	49	48	44	40	41	28
17	23	43	37	29	42	47	48	46	38	35	60	79
18	50	42	36	35	42	47	46	46	37	33	47	45
19	29	40	32	35	48	45	45	59	35	35	41	51
20	35	34	26	35	53	45	45	47	47	36	43	87
21	37	29	26	36	118	41	46	47	233	45	46	46
22	36	26	32	64	92	44	47	45	105	36	42	39
23	38	25	58	50	64	43	42	46	71	33	33	34
24	28	25	59	42	54	41	44	45	58	39	53	34
25	25	25	44	39	48	51	44	54	50	40	53	34
26	34	24	39	36	52	45	42	47	46	40	42	30
27	26	26	36	37	77	39	43	45	45	41	38	36
28	24	25	39	34	58	57	42	43	43	39	37	32
29	32	24	42	36	---	82	42	48	42	37	34	35
30	51	29	40	30	---	55	45	45	37	35	33	36
31	32	---	37	40	---	50	---	40	---	32	35	---
TOTAL	898	933	1142	1115	1398	1489	1414	1470	1507	1209	1255	1133
MEAN	29.0	31.1	36.8	36.0	49.9	48.0	47.1	47.4	50.2	39.0	40.5	37.8
MAX	51	55	59	64	118	82	63	59	233	45	60	87
MIN	21	24	26	26	34	39	42	40	31	32	30	23

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 1997, BY WATER YEAR (WY)

	MEAN	37.3	39.5	40.1	39.7	41.9	47.2	49.0	44.7	42.1	39.2	37.5	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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1965 - 1997
ANNUAL TOTAL	13250	14963	
ANNUAL MEAN	36.2	41.0	41.3
HIGHEST ANNUAL MEAN			51.5
LOWEST ANNUAL MEAN			32.0
HIGHEST DAILY MEAN	80	233	257
LOWEST DAILY MEAN	21	21	17
ANNUAL SEVEN-DAY MINIMUM	24	24	22
INSTANTANEOUS PEAK FLOW		279	(b)407
INSTANTANEOUS PEAK STAGE		2.73	4.49
INSTANTANEOUS LOW FLOW			(c)8.0
10 PERCENT EXCEEDS	47	51	53
50 PERCENT EXCEEDS	36	40	40
90 PERCENT EXCEEDS	25	27	29

(a) Oct. 15, 16.

(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 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.4	6.8	6.0	6.3	6.9	8.3	8.8	3.1	7.2	4.6	2.9	4.6
2	3.4	6.8	6.3	6.6	6.7	8.0	7.8	2.9	6.8	4.6	2.9	4.6
3	3.1	6.6	6.1	6.8	6.3	7.4	7.1	3.1	6.2	4.3	2.9	4.6
4	3.0	6.5	5.7	6.9	6.6	6.8	6.7	3.0	5.9	4.1	2.9	4.6
5	2.8	6.2	5.6	7.4	7.2	6.4	7.1	2.9	5.9	4.0	2.8	4.5
6	2.7	6.1	5.6	6.9	6.9	6.2	7.6	3.1	6.0	3.9	2.7	4.2
7	2.6	7.4	5.3	6.5	6.5	5.9	7.1	3.1	7.1	3.9	2.7	3.9
8	2.7	8.8	5.2	6.2	6.0	5.8	6.8	3.8	6.7	4.0	2.7	3.8
9	3.0	8.5	5.0	6.3	5.6	5.8	6.5	4.1	5.9	3.9	2.6	4.0
10	3.0	8.1	4.8	6.7	5.4	6.1	6.3	4.1	5.1	3.8	2.7	4.7
11	2.9	8.1	5.0	e5.6	e5.0	6.1	6.1	4.0	4.6	3.8	3.7	4.9
12	2.7	7.5	5.4	e5.4	e4.8	5.9	6.7	3.8	4.5	3.7	4.3	5.1
13	2.6	6.7	5.4	e4.9	e4.7	5.8	6.9	3.4	4.2	3.7	5.0	5.2
14	2.6	6.0	5.1	e4.9	e4.7	7.0	6.8	3.1	3.9	3.7	5.1	5.2
15	2.5	5.5	5.0	e5.0	e4.6	7.2	6.6	3.2	4.4	3.7	5.0	5.3
16	2.5	5.3	5.0	e5.0	e4.6	6.9	6.5	3.1	5.0	3.6	5.0	5.3
17	2.6	5.7	5.0	e5.0	e4.6	6.7	6.3	3.0	5.3	3.6	6.3	8.0
18	7.7	6.2	4.9	e5.0	5.1	6.4	6.1	2.8	5.4	3.4	6.6	9.4
19	10	6.1	4.4	e5.0	6.0	6.1	6.0	3.1	5.0	3.2	6.3	10
20	9.2	5.7	4.6	e5.0	6.6	5.7	5.7	2.9	5.4	3.1	6.3	14
21	8.0	5.5	4.7	e5.6	12	5.3	5.5	2.7	18	3.5	6.3	14
22	6.9	5.2	4.8	8.1	16	5.1	5.4	3.4	21	3.8	5.9	13
23	6.8	5.0	5.6	9.3	14	5.0	4.9	18	18	3.8	5.4	11
24	6.8	5.0	8.2	9.0	11	5.2	4.6	21	14	3.9	5.8	10
25	6.2	5.0	7.9	8.5	9.0	6.2	4.1	17	11	3.8	6.0	9.4
26	5.7	5.0	7.2	8.4	7.9	6.6	3.6	14	8.6	3.8	5.9	8.5
27	5.4	4.8	6.8	8.1	9.2	6.3	3.2	10	7.1	3.7	5.7	7.9
28	5.1	4.8	6.6	7.6	8.9	6.6	3.1	7.9	6.0	3.6	5.3	7.5
29	5.3	4.6	6.6	7.6	---	9.8	3.1	8.3	5.3	3.4	4.9	6.9
30	6.9	5.1	6.4	7.6	---	11	2.8	8.6	4.8	3.2	4.7	6.4
31	7.1	---	6.3	7.4	---	9.6	---	7.9	---	3.0	4.6	---
TOTAL	145.2	184.6	176.5	204.6	202.8	207.2	175.8	184.4	224.3	116.1	141.9	210.5
MEAN	4.68	6.15	5.69	6.60	7.24	6.68	5.86	5.95	7.48	3.75	4.58	7.02
MAX	10	8.8	8.2	9.3	16	11	8.8	21	21	4.6	6.6	14
MIN	2.5	4.6	4.4	4.9	4.6	5.0	2.8	2.7	3.9	3.0	2.6	3.8
CFSM	.36	.47	.44	.51	.56	.51	.45	.46	.58	.29	.35	.54
IN.	.42	.53	.51	.59	.58	.59	.50	.53	.64	.33	.41	.60

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1972 - 1997, BY WATER YEAR (WY)

	MEAN	6.27	7.05	7.10	6.75	6.71	7.32	7.29	6.23	5.32	4.81	5.21	5.83
	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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1972 - 1997
ANNUAL TOTAL	1869.54	2173.9	
ANNUAL MEAN	5.11	5.96	6.29
HIGHEST ANNUAL MEAN			10.0
LOWEST ANNUAL MEAN			3.87
HIGHEST DAILY MEAN	12	21	35
LOWEST DAILY MEAN	.34	2.5	.34
ANNUAL SEVEN-DAY MINIMUM	.66	2.6	.63
INSTANTANEOUS PEAK FLOW		22	36
INSTANTANEOUS PEAK STAGE		1.94	2.47
INSTANTANEOUS LOW FLOW			.20
ANNUAL RUNOFF (CFSM)	.39	.46	.48
ANNUAL RUNOFF (INCHES)	5.35	6.22	6.57
10 PERCENT EXCEEDS	8.1	8.5	9.8
50 PERCENT EXCEEDS	5.1	5.5	5.9
90 PERCENT EXCEEDS	2.1	3.1	3.1

(a) Dec. 6, 1992, Oct. 28, 1994.

(b) Oct. 15, 16.

(c) Dec. 5, 1992, Oct. 28, 1994, Apr. 16, 1995.

(e) Estimated.

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.3	5.7	8.0	8.4	e9.4	e11	13	5.7	11	8.2	4.4	7.4
2	3.9	5.5	8.5	8.5	e8.8	e11	12	5.4	10	7.7	4.3	7.1
3	3.4	5.4	7.7	8.7	e8.8	e10	11	5.4	10	7.1	4.3	6.8
4	2.9	5.2	7.4	9.2	e9.4	e9.6	10	5.3	9.1	6.5	4.6	6.6
5	2.7	5.1	7.1	10	e9.6	e9.0	13	5.1	8.7	6.0	4.6	6.4
6	2.5	5.0	7.1	9.2	e9.4	e8.5	14	5.3	11	5.6	4.7	6.3
7	2.4	7.4	6.9	8.8	e8.8	e8.1	12	4.7	13	5.4	4.8	6.1
8	2.3	9.7	6.7	8.2	e8.2	e8.0	11	5.5	11	5.1	4.9	5.9
9	2.8	9.2	6.4	7.8	e7.8	e8.0	9.9	5.8	9.7	5.1	4.8	6.6
10	2.8	9.1	6.0	e7.0	e7.4	e8.1	9.7	5.4	8.8	5.0	4.8	8.8
11	2.7	9.2	6.7	e6.8	e7.0	e8.1	9.3	5.1	8.1	4.9	7.6	8.3
12	2.6	8.8	7.1	e6.6	e6.6	8.1	10	5.2	9.3	4.9	8.5	7.7
13	2.6	7.9	7.1	e6.6	e6.4	8.0	10	5.1	12	4.7	9.1	7.4
14	2.4	7.2	6.8	e6.6	e6.4	10	9.8	5.0	9.1	4.6	8.3	7.4
15	2.1	6.4	6.6	e6.6	e6.4	10	9.3	5.4	7.7	4.6	8.3	7.4
16	1.9	6.0	6.5	e6.6	e6.4	9.7	9.1	5.6	8.1	4.5	8.6	7.2
17	1.9	6.3	6.4	e6.6	e6.6	9.3	9.0	5.3	8.9	4.4	12	14
18	5.6	6.9	6.2	e6.6	e7.2	9.2	8.7	4.9	8.6	4.4	12	15
19	7.4	6.9	5.5	e6.8	e8.0	8.8	8.5	6.6	8.4	4.5	10	14
20	8.3	6.9	5.6	e7.0	e12	8.5	8.1	6.3	9.6	4.4	9.9	19
21	8.1	6.9	6.2	e8.0	e18	7.7	7.9	5.6	40	5.7	11	18
22	6.9	6.8	6.8	e11	e25	7.2	7.8	5.3	38	6.4	9.8	16
23	6.9	6.5	8.6	e12	e21	6.8	7.4	6.3	30	6.3	8.7	15
24	6.7	6.4	13	e12	e18	6.5	7.2	17	25	6.0	10	14
25	5.9	6.4	12	e12	e12	8.3	6.7	24	19	5.9	11	13
26	5.3	6.3	12	e11	e11	8.4	6.0	22	16	5.6	10	12
27	4.8	5.7	11	e11	e13	8.2	5.6	16	12	5.6	9.3	11
28	4.5	5.6	10	e10	e12	9.5	5.3	14	11	5.5	8.5	10
29	4.6	5.5	9.7	e10	---	17	5.1	14	9.3	5.0	7.9	9.7
30	6.6	6.2	9.1	e10	---	16	4.9	14	8.6	4.8	7.5	8.9
31	6.2	---	8.7	e9.8	---	15	---	13	---	4.4	7.7	---
TOTAL	134.0	202.1	243.4	269.4	290.6	291.6	271.3	259.3	401.0	168.8	241.9	303.0
MEAN	4.32	6.74	7.85	8.69	10.4	9.41	9.04	8.36	13.4	5.45	7.80	10.1
MAX	8.3	9.7	13	12	25	17	14	24	40	8.2	12	19
MIN	1.9	5.0	5.5	6.6	6.4	6.5	4.9	4.7	7.7	4.4	4.3	5.9
CFSM	.23	.36	.42	.46	.56	.50	.48	.45	.71	.29	.42	.54
IN.	.27	.40	.48	.54	.58	.58	.54	.52	.80	.34	.48	.60

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 1997, BY WATER YEAR (WY)

	MEAN	9.56	10.3	10.4	9.79	10.2	11.6	11.5	9.91	8.88	7.78	7.74	8.74
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	1966	1963	1965	1988	1964	1964	1964	

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1959 - 1997

ANNUAL TOTAL	2372.28	3076.4	9.70	
ANNUAL MEAN	6.48	8.43	14.1	1975
HIGHEST ANNUAL MEAN			4.85	1965
LOWEST ANNUAL MEAN			(a)	
HIGHEST DAILY MEAN	17	Apr 22	40	Jun 21
LOWEST DAILY MEAN	.89	Jul 27	1.9	Oct 16
ANNUAL SEVEN-DAY MINIMUM	1.2	Jul 22	2.3	Oct 11
INSTANTANEOUS PEAK FLOW			46	Jun 21
INSTANTANEOUS PEAK STAGE			3.33	Jun 21
INSTANTANEOUS LOW FLOW			1.7	(b)
ANNUAL RUNOFF (CFSM)	.35	.45	.52	(c)
ANNUAL RUNOFF (INCHES)	4.72	6.12	7.05	
10 PERCENT EXCEEDS	10	12	14	
50 PERCENT EXCEEDS	6.5	7.7	9.3	
90 PERCENT EXCEEDS	2.3	4.8	5.2	

(a) Dec. 7, 1992, June 21, 1997.

(b) Oct. 16, 17.

(c) July 26, 27, 28, 1996.

(e) 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT
1	27	46	89	60	90	298	80	61	41	91	25	21
2	23	39	134	71	83	284	74	59	36	93	26	20
3	21	35	83	76	74	241	71	66	35	85	26	20
4	18	31	62	75	94	196	69	61	31	80	28	19
5	15	29	54	165	173	170	81	53	28	76	26	18
6	13	28	50	118	133	153	102	62	26	71	24	18
7	12	36	51	85	99	135	84	54	24	68	23	18
8	14	69	55	85	82	135	72	64	22	67	22	18
9	18	57	47	80	74	128	68	71	20	78	21	19
10	18	47	43	e72	63	134	65	59	19	70	21	43
11	15	46	59	e66	57	127	64	51	18	64	23	35
12	15	44	90	e60	53	115	94	48	19	60	28	29
13	16	42	78	e56	51	109	128	43	19	56	45	26
14	16	38	71	e54	57	108	108	40	17	55	31	25
15	15	35	65	e52	47	99	89	45	16	56	34	27
16	15	34	57	e50	40	91	91	48	19	52	39	25
17	16	38	51	e50	44	99	92	52	23	49	32	65
18	29	42	47	e50	60	96	80	47	19	48	32	69
19	35	37	40	e52	181	89	72	49	17	43	28	43
20	28	32	e38	e54	178	88	65	45	186	40	26	46
21	25	29	e38	e60	841	85	62	39	2320	43	28	38
22	23	27	41	e280	815	81	63	36	927	51	29	31
23	28	26	64	549	483	76	58	33	530	43	25	29
24	37	26	184	339	332	72	55	31	315	40	26	26
25	35	25	104	222	251	89	54	32	202	37	28	24
26	31	24	89	158	224	104	50	32	146	35	25	23
27	28	23	95	128	322	93	48	28	120	35	24	22
28	27	23	93	112	382	88	47	26	106	33	24	21
29	27	22	120	87	---	110	45	34	96	30	23	21
30	74	33	92	89	---	98	43	67	89	28	22	22
31	63	---	71	88	---	88	---	49	---	26	21	---
TOTAL	777	1063	2255	3543	5383	3879	2174	1485	5486	1703	835	841
MEAN	25.1	35.4	72.7	114	192	125	72.5	47.9	183	54.9	26.9	28.7
MAX	74	69	184	549	841	298	128	71	2320	93	45	69
MIN	12	22	38	40	72	43	26	16	26	21	18	18
CFSM	.35	.50	1.02	1.60	2.69	1.75	1.01	.67	2.56	.77	.38	.40
IN.	.40	.55	1.17	1.85	2.80	2.02	1.13	.77	2.86	.89	.44	.45

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1997, BY WATER YEAR (WY)

	MEAN	41.1	59.9	73.9	67.2	77.8	109	94.7	62.4	59.3	34.2	28.8	33.7
MAX	119	171	131	146	192	227	153	124	183	99.0	86.8	123	123
(WY)	1987	1991	1976	1993	1997	1979	1993	1981	1997	1986	1994	1978	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	11.9
(WY)	1969	1972	1977	1970	1970	1969	1968	1977	1987	1987	1970	1969	1969

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1966 - 1997
ANNUAL TOTAL	20540	29444	
ANNUAL MEAN	56.1	80.7	61.7
HIGHEST ANNUAL MEAN			89.3
LOWEST ANNUAL MEAN			32.5
HIGHEST DAILY MEAN	635	2320	2320
LOWEST DAILY MEAN	12	12	9.2
ANNUAL SEVEN-DAY MINIMUM	13	15	9.8
INSTANTANEOUS PEAK FLOW		(b)3740	(b)3740
INSTANTANEOUS PEAK STAGE		11.11	11.11
ANNUAL RUNOFF (CFSM)	.79	1.13	.86
ANNUAL RUNOFF (INCHES)	10.70	15.34	11.75
10 PERCENT EXCEEDS	100	130	115
50 PERCENT EXCEEDS	40	50	43
90 PERCENT EXCEEDS	17	21	19

(a) Aug. 27, 28, 1970, Sept. 18, 1971, Aug. 7, 1987.

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

(c) 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 fair. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.4	7.9	191	69	128	481	34	18	10	84	6.8	5.8
2	2.6	6.6	225	140	121	423	31	17	9.3	42	6.9	5.5
3	2.7	6.0	65	129	111	232	30	24	8.8	28	6.3	5.5
4	2.8	5.3	44	104	173	170	30	20	7.7	23	6.4	5.2
5	2.7	5.3	39	322	435	150	44	17	7.1	19	6.2	5.1
6	2.9	5.6	39	110	272	129	65	30	7.9	16	5.7	5.0
7	3.5	6.7	54	61	155	96	42	20	11	14	5.6	4.9
8	4.2	6.2	72	52	119	95	31	58	7.7	59	5.5	4.9
9	5.0	5.6	44	43	108	92	26	54	6.5	65	5.4	5.0
10	3.3	6.4	36	e40	84	118	24	31	5.7	30	5.6	6.9
11	2.8	9.3	59	e39	77	93	23	22	5.0	21	6.2	5.9
12	3.2	13	110	e38	70	75	54	19	5.2	17	7.4	5.7
13	3.5	16	108	e37	61	67	103	16	5.1	15	9.0	5.3
14	3.4	16	72	e37	69	70	64	16	4.6	15	6.5	6.5
15	3.3	19	61	e37	57	58	43	21	4.2	13	11	6.7
16	3.5	17	59	e37	62	54	70	20	8.1	11	8.3	7.9
17	3.8	75	45	e37	69	57	58	22	7.2	13	6.8	7.0
18	8.2	75	40	e37	208	58	40	19	5.6	13	7.4	4.4
19	4.8	35	e37	e37	634	50	32	73	5.1	11	6.5	12
20	3.9	20	e36	e40	357	50	26	41	135	10	6.9	10
21	3.7	14	e37	e50	2420	48	24	22	e5540	16	7.3	8.2
22	4.0	11	e40	601	2180	45	23	16	e1530	16	6.9	7.5
23	6.7	9.6	98	1250	871	39	21	14	e660	12	6.2	6.5
24	6.1	9.4	594	681	528	36	18	13	379	11	6.6	5.9
25	4.6	8.8	235	403	334	62	16	12	218	10	6.5	5.5
26	4.3	8.2	120	243	241	76	14	11	96	9.6	6.2	4.9
27	4.3	7.6	108	201	666	54	14	9.7	58	9.0	5.8	4.7
28	4.3	7.4	120	176	789	47	14	8.8	39	8.3	5.8	4.9
29	7.4	7.4	294	e150	---	52	14	13	31	7.2	5.6	5.1
30	32	28	158	e140	---	45	13	18	33	7.0	5.5	4.8
31	12	---	90	125	---	40	---	12	---	7.0	6.2	---
TOTAL	161.9	468.3	3330	5466	11419	3162	1041	707.5	8850.8	632.1	205.0	285.8
MEAN	5.22	15.6	107	176	408	102	34.7	22.8	295	20.4	6.61	9.53
MAX	32	75	594	1250	2420	481	103	73	5540	84	11	70
MIN	2.4	5.3	36	37	57	36	13	8.8	4.2	7.0	5.4	4.7
CFSM	.08	.24	1.63	2.68	6.20	1.55	.53	.35	4.48	.31	.10	.14
IN.	.09	.26	1.88	3.09	6.46	1.79	.59	.40	5.00	.36	.12	.16

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 1997, BY WATER YEAR (WY)

MEAN	30.7	79.0	101	83.2	117	171	105	60.3	48.9	22.8	17.4	32.4
MAX	152	333	328	278	408	499	206	288	295	185	122	252
(WY)	1987	1991	1983	1974	1997	1979	1993	1981	1997	1982	1994	1986
MIN	2.66	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1961 - 1997

ANNUAL TOTAL	25661.1		35729.4		72.1	
ANNUAL MEAN	70.1		97.9		115	1993
HIGHEST ANNUAL MEAN					24.6	1977
LOWEST ANNUAL MEAN					5540	Jun 21 1997
HIGHEST DAILY MEAN	3130	May 21	5540	Jun 21	1.2	Aug 2 1987
LOWEST DAILY MEAN	1.3	Sep 4	2.4	Oct 1	1.2	Aug 1 1987
ANNUAL SEVEN-DAY MINIMUM	1.5	Aug 31	2.8	Oct 1		Jun 21 1997
INSTANTANEOUS PEAK FLOW			(a)8810	Jun 21	(a)8810	Jun 21 1997
INSTANTANEOUS PEAK STAGE			(b)16.72	Jun 21	(b)16.72	Jun 21 1997
INSTANTANEOUS LOW FLOW					.83	Aug 3 1988
ANNUAL RUNOFF (CFSM)	1.07		1.49		1.10	
ANNUAL RUNOFF (INCHES)	14.51		20.20		14.88	
10 PERCENT EXCEEDS	135		163		150	
50 PERCENT EXCEEDS	22		20		20	
90 PERCENT EXCEEDS	2.6		5.1		3.3	

(a) From rating curve extended above 2,000 ft³/s.

(b) From floodmark.

(c) 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	102	140	104	122	146	486	323	158	129	88	64	75
2	103	140	144	131	142	455	317	172	163	84	63	75
3	100	138	153	181	142	433	310	209	172	79	60	73
4	97	107	153	199	169	421	302	202	216	72	62	71
5	95	93	116	229	161	414	326	211	222	68	61	70
6	87	91	112	241	160	406	312	216	218	68	60	67
7	70	226	141	253	159	388	301	209	212	71	59	63
8	68	238	140	226	159	372	251	230	203	83	59	63
9	71	252	140	148	155	359	196	223	186	80	57	87
10	68	243	136	110	154	342	183	215	126	73	55	171
11	67	242	151	101	144	301	209	208	112	71	85	141
12	65	182	158	110	117	271	230	221	105	69	96	133
13	64	148	152	116	99	254	238	210	103	66	94	132
14	68	142	147	108	112	296	236	209	91	73	74	93
15	68	135	152	102	107	302	231	209	84	72	72	82
16	68	126	152	100	99	324	228	202	104	69	134	81
17	67	122	128	98	102	303	220	179	91	83	145	152
18	115	112	111	97	157	281	213	132	86	71	122	154
19	74	86	83	97	164	270	203	233	82	64	84	164
20	70	83	92	100	204	266	195	195	101	60	95	170
21	74	83	99	126	358	262	205	187	222	134	96	161
22	75	82	94	199	408	247	172	141	222	99	93	160
23	104	82	156	172	423	238	120	135	231	86	86	160
24	83	118	149	170	427	236	115	125	191	82	114	153
25	79	128	113	157	430	251	111	134	173	79	97	143
26	76	126	114	150	452	260	106	166	130	75	91	130
27	76	123	135	158	513	262	104	174	107	73	86	123
28	79	113	146	156	484	278	113	173	99	72	83	123
29	111	77	179	150	---	345	109	180	92	71	80	119
30	174	88	186	152	---	332	110	170	92	67	77	113
31	145	---	136	151	---	331	---	161	---	65	89	---
TOTAL	2663	4066	4172	4610	6347	9986	6289	5789	4365	2367	2593	3518
MEAN	85.9	136	135	149	227	322	210	187	146	76.4	83.6	117
MAX	174	252	186	253	513	486	326	233	231	134	145	171
MIN	64	77	83	97	99	236	104	125	82	60	55	63
CFSM	49	78	77	85	130	185	120	107	84	44	48	67
IN.	.57	.87	.89	.99	1.36	2.13	1.34	1.24	.93	.51	.55	.75

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1935 - 1997, BY WATER YEAR (WY)

	MEAN	79.6	107	115	123	144	223	226	165	130	84.7	67.2	66.9
MAX	214	305	210	343	301	501	589	484	433	349	193	222	222
(WY)	1991	1993	1993	1993	1976	1976	1950	1943	1943	1968	1995	1975	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	25.2
(WY)	1964	1964	1964	1964	1964	1964	1935	1936	1936	1936	1936	1936	1963

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1935 - 1997
ANNUAL TOTAL	47496	56765	
ANNUAL MEAN	130	156	128
HIGHEST ANNUAL MEAN			216
LOWEST ANNUAL MEAN			44.3
HIGHEST DAILY MEAN	330	513	971
LOWEST DAILY MEAN	47	55	12
ANNUAL SEVEN-DAY MINIMUM	52	59	14
INSTANTANEOUS PEAK FLOW		(a)570	(b)1070
INSTANTANEOUS PEAK STAGE		12.77	15.44
INSTANTANEOUS LOW FLOW		50	9.2
ANNUAL RUNOFF (CFSM)	.75	.89	.74
ANNUAL RUNOFF (INCHES)	10.15	12.14	9.99
10 PERCENT EXCEEDS	232	270	258
50 PERCENT EXCEEDS	112	134	95
90 PERCENT EXCEEDS	61	71	39

(a) Gage height 12.43 ft.

(b) Gage height 13.50 ft.

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 current year. 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. Gage-height telemeter at station.

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	170	416	351	701	e600	1930	1670	550	678	498	175	225
2	165	398	396	696	e540	1880	1440	559	684	402	153	232
3	183	360	444	710	e580	1740	1300	563	693	440	159	202
4	228	364	422	726	e620	1580	1230	625	692	337	167	193
5	226	295	423	735	e700	1510	1230	678	679	354	157	193
6	168	280	444	e740	e760	1360	1240	746	666	291	154	182
7	176	338	443	e620	e770	1340	1270	759	642	299	152	177
8	198	639	416	e550	e740	1270	1210	770	608	267	151	180
9	175	593	415	e475	e660	1230	1130	776	574	259	150	214
10	179	666	418	e410	e600	1220	1030	771	562	253	150	380
11	162	669	437	e350	e580	1200	965	748	533	248	148	464
12	172	632	448	e400	e550	1180	908	729	494	239	155	483
13	170	618	543	e450	e510	1130	891	699	499	198	275	418
14	168	562	575	e460	e450	1110	908	683	480	231	318	392
15	171	514	547	e440	e430	1120	890	696	429	200	264	333
16	153	479	548	e420	e380	1090	866	696	399	228	273	319
17	166	458	579	e470	e370	1070	824	698	354	212	280	423
18	177	452	558	e430	e410	1150	819	691	366	199	330	588
19	197	417	e460	e420	531	1130	790	924	336	206	344	542
20	304	395	e350	e390	674	1080	749	1070	335	191	308	717
21	227	372	e330	e350	1120	993	757	1090	411	191	244	703
22	196	307	e340	e475	1540	959	729	1010	675	228	307	866
23	202	271	499	e550	1560	972	717	849	710	318	256	644
24	233	315	789	e800	e1400	859	702	778	798	242	281	592
25	267	323	864	e850	e1350	854	684	742	736	280	284	556
26	231	337	850	e900	1400	891	656	721	627	215	319	481
27	270	334	792	e800	1620	874	633	703	567	187	300	471
28	213	329	643	e750	1860	934	619	684	529	227	262	437
29	218	307	854	e600	---	1230	576	681	438	173	258	409
30	310	316	904	e550	---	1540	573	682	372	165	226	368
31	379	---	785	e500	---	1730	---	686	---	173	209	---
TOTAL	6454	12756	16867	17718	23305	38156	28006	23057	16566	7951	7209	12184
MEAN	208	425	544	572	832	1231	934	744	552	256	233	406
MAX	379	689	904	900	1860	1930	1670	1090	798	498	344	717
MIN	153	271	330	350	370	854	573	550	335	165	148	177
CFSM	.31	.64	.82	.86	1.26	1.86	1.41	1.13	.84	.39	.35	.61
IN.	.36	.72	.95	1.00	1.31	2.15	1.58	1.30	.93	.45	.41	.69

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1951 - 1997, BY WATER YEAR (WY)

	MEAN	240	339	429	457	559	934	939	644	408	268	190	194
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 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1951 - 1997

ANNUAL TOTAL	169748						210229						
ANNUAL MEAN	464						576			466			
HIGHEST ANNUAL MEAN										769		1974	
LOWEST ANNUAL MEAN										147		1964	
HIGHEST DAILY MEAN	1590					Jun 19	1930		Mar 1	3400		Feb 22 1971	
LOWEST DAILY MEAN	119					Sep 6	148		Aug 11	21		Oct 12 1963	
ANNUAL SEVEN-DAY MINIMUM	123					Sep 4	151		Aug 6	52		Oct 10 1963	
INSTANTANEOUS PEAK FLOW							1970		Mar 1	(a)3500		Feb 21 1971	
INSTANTANEOUS PEAK STAGE							5.70		(b)	8.19		Jun 28 1968	
INSTANTANEOUS LOW FLOW							135		Oct 11	14		(c)	
ANNUAL RUNOFF (CFSM)	.70						.87			.70			
ANNUAL RUNOFF (INCHES)	9.55						11.83			9.58			
10 PERCENT EXCEEDS	905						1110			1000			
50 PERCENT EXCEEDS	415						498			321			
90 PERCENT EXCEEDS	163						192			116			

(a) Gage height 7.52 ft.

(b) Jan. 12, backwater from ice; Mar. 1.

(c) Dec. 20, 1962, Oct. 14, 1966.

(e) 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.66	1.8	4.6	13	11	78	39	7.4	7.1	3.8	1.1	1.8
2	.56	1.6	4.8	14	10	65	31	7.1	8.7	9.7	1.1	1.7
3	.61	1.5	3.9	16	11	41	25	12	9.3	48	1.5	1.6
4	.64	1.4	3.5	15	14	32	23	12	7.6	18	1.9	1.5
5	.68	1.3	3.6	19	31	27	32	10	6.5	11	1.6	1.4
6	.62	1.3	3.5	15	24	25	39	22	5.6	7.4	1.4	1.4
7	.62	5.7	3.7	11	18	22	26	16	5.0	5.9	1.4	1.3
8	.74	18	3.8	e10	15	21	19	18	4.6	5.1	1.3	1.3
9	.75	8.3	3.6	e7.3	13	20	16	20	4.2	5.0	1.0	1.9
10	.69	5.5	3.6	e7.5	11	23	14	16	3.9	4.0	1.0	9.0
11	.60	4.3	4.2	e7.0	9.7	23	14	14	3.6	3.4	1.2	9.0
12	.60	3.6	6.9	e6.8	8.7	19	16	12	4.5	2.9	1.8	5.4
13	.64	3.1	11	e7.5	7.8	17	18	11	11	2.6	5.7	4.2
14	.59	2.8	9.2	e8.3	7.8	39	16	10	14	2.4	3.0	3.5
15	.67	2.4	7.7	e8.2	7.0	e38	14	15	7.4	2.2	3.8	3.1
16	.58	2.5	8.7	e7.5	e6.5	e23	13	14	6.2	2.0	5.0	2.6
17	.60	2.6	8.5	e7.0	e7.0	22	12	14	6.1	2.0	6.7	25
18	1.1	2.9	7.4	e6.7	8.8	25	11	13	5.0	2.5	5.7	26
19	1.1	2.8	e6.5	e6.6	22	21	10	21	6.0	1.9	4.1	11
20	.90	2.5	e5.7	e6.5	21	19	9.6	17	16	1.7	3.4	35
21	.90	2.3	e5.0	e9.0	158	18	9.4	13	15	2.3	3.7	18
22	.87	2.1	5.8	65	134	16	9.6	11	21	2.3	3.4	11
23	1.2	2.1	14	82	66	14	9.1	10	12	2.0	2.9	8.5
24	1.5	2.2	76	35	e40	13	8.7	9.2	14	1.9	2.5	6.9
25	1.2	2.2	33	24	e30	24	8.1	9.5	8.7	1.7	2.6	5.9
26	1.1	2.1	e19	e16	27	29	7.5	8.9	6.4	2.0	2.4	4.8
27	1.1	1.8	e15	e14	147	22	7.7	7.7	5.0	1.7	2.2	4.4
28	1.0	2.0	14	e12	116	25	7.9	6.8	4.1	1.5	1.9	4.1
29	1.1	2.0	17	e11	---	161	7.4	7.3	3.5	1.3	1.8	4.1
30	3.0	2.7	17	11	---	111	7.1	8.4	3.2	1.2	1.8	3.6
31	2.5	---	15	11	---	60	---	7.4	---	1.1	1.8	---
TOTAL	29.42	97.4	345.2	489.9	982.3	1093	480.1	380.7	235.2	160.5	80.7	219.0
MEAN	.95	3.25	11.1	15.8	35.1	35.3	16.0	12.3	7.84	5.18	2.60	7.30
MAX	3.0	18	76	82	158	161	39	22	21	48	6.7	35
MIN	.56	1.3	3.5	6.5	6.5	13	7.1	6.8	3.2	1.1	1.0	1.3
CFSM	.06	.20	.68	.97	2.15	2.16	.98	.75	.48	.32	.16	.45
IN.	.07	.22	.79	1.12	2.24	2.49	1.10	.87	.54	.37	.18	.50

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954 - 1997, BY WATER YEAR (WY)

	MEAN	5.53	9.38	12.3	11.1	16.7	29.8	24.1	12.4	8.75	4.03	2.53	3.10
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	1983	1973	1974	1985	1982	1975	1966	1968	1957	1992	1992	
MIN	.35	.66	.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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1954 - 1997

ANNUAL TOTAL	3289.52	4593.42	
ANNUAL MEAN	8.99	12.6	11.6
HIGHEST ANNUAL MEAN			22.8
LOWEST ANNUAL MEAN			1.86
HIGHEST DAILY MEAN	135	161	720
LOWEST DAILY MEAN	.28	.56	.05
ANNUAL SEVEN-DAY MINIMUM	.33	.61	.09
INSTANTANEOUS PEAK FLOW		210	(a)962
INSTANTANEOUS PEAK STAGE		6.32	(b)12.18
INSTANTANEOUS LOW FLOW		.51	(c)
ANNUAL RUNOFF (CFSM)	.55	.77	.71
ANNUAL RUNOFF (INCHES)	7.51	10.48	9.65
10 PERCENT EXCEEDS	19	25	26
50 PERCENT EXCEEDS	4.4	7.1	4.7
90 PERCENT EXCEEDS	.60	1.3	.70

(a) From rating curve extended above 610 ft³/s.

(b) From floodmark.

(c) Oct. 2, 3, 11, 16, 17, 18.

(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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e.20	.47	.79	4.7	4.0	45	15	2.7	2.4	.84	.25	.36
2	e.21	.39	.82	5.1	3.8	37	10	2.4	2.4	.76	.24	.34
3	e.24	.36	.74	6.3	3.9	25	8.6	2.8	2.4	.70	.40	.31
4	e.26	.35	.71	5.7	7.8	19	7.8	2.7	2.2	.71	1.2	.27
5	e.26	.33	.71	7.5	20	14	12	2.8	2.0	.62	.54	.25
6	e.26	.33	.72	5.1	14	12	15	4.5	1.8	.60	.46	.24
7	e.23	1.7	.78	3.9	8.8	9.2	9.5	3.9	1.7	.72	.58	.23
8	e.26	3.7	.82	3.4	6.8	9.1	7.2	4.5	1.5	e.88	.38	.24
9	e.25	1.9	.78	3.2	5.5	9.1	5.8	5.5	1.4	e.92	.30	.77
10	.21	1.3	.77	2.9	4.6	11	5.2	4.6	1.3	.61	.28	1.1
11	e.21	.99	.80	2.5	4.1	11	4.9	4.0	1.2	.53	.34	7.7
12	e.21	.83	1.2	2.3	3.4	8.4	6.1	3.8	1.8	.60	.53	3.4
13	e.21	.73	2.4	2.2	3.1	7.4	7.4	3.3	1.8	.58	2.6	2.4
14	e.20	.66	2.2	2.2	3.2	23	6.3	3.2	1.5	e.55	1.1	1.8
15	e.20	.59	1.9	2.2	2.8	17	5.5	4.7	1.3	e.46	1.2	1.5
16	.20	.59	2.3	2.2	2.5	9.7	5.2	4.4	1.4	e.35	1.2	1.2
17	.20	.62	2.3	2.0	2.5	9.5	4.8	5.2	1.4	.38	1.4	2.1
18	e.33	.62	2.0	e.19	4.9	12	4.4	4.6	1.2	.42	1.7	1.8
19	.29	e.58	1.5	e.18	16	9.1	4.1	9.0	1.1	.34	1.1	7.0
20	.27	.54	1.2	2.0	15	8.5	3.8	7.0	1.2	.32	.84	4.5
21	.25	.51	1.1	1.8	119	7.8	3.8	5.2	2.0	.47	.87	3.3
22	.24	.48	1.3	30	64	6.6	3.7	4.2	3.0	.61	.85	2.6
23	.32	.48	6.2	39	35	5.7	3.5	3.7	2.0	.46	.67	2.3
24	.37	.48	30	18	24	5.4	3.3	3.4	1.7	.42	.57	1.9
25	.33	.48	12	12	17	12	3.0	3.3	1.4	.35	.57	1.7
26	.29	.47	6.6	7.5	15	13	2.8	3.0	1.2	1.4	.55	1.4
27	.28	.42	4.9	6.5	95	9.0	2.9	2.6	.98	.73	.49	1.2
28	e.26	.40	4.8	4.9	52	17	2.9	2.4	.88	e.47	.40	1.1
29	.31	.41	8.2	4.3	---	54	2.7	2.7	.80	.34	.39	1.1
30	e.92	.55	7.5	4.3	---	33	2.6	2.7	.77	.29	.37	.96
31	.65	---	5.7	4.3	---	21	---	2.4	---	.26	.36	---
TOTAL	8.92	22.26	113.74	201.7	557.7	490.5	179.8	121.2	47.83	17.69	22.73	100.07
MEAN	.29	.74	3.67	6.51	19.9	15.8	5.99	3.91	1.59	.57	.73	3.34
MAX	.92	3.7	30	39	119	54	15	9.0	3.0	1.4	2.6	21
MIN	.20	.33	.71	1.8	2.5	5.4	2.6	2.4	.77	.26	.24	.23
CFSM	.03	.08	.39	.70	2.13	1.69	.64	.42	.17	.06	.08	.36
IN.	.04	.09	.45	.80	2.22	1.95	.72	.48	.19	.07	.09	.40

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954 - 1997, BY WATER YEAR (WY)

	MEAN	2.76	4.28	5.95	5.21	8.27	16.5	12.9	5.86	4.60	1.94	1.15	1.45
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1954 - 1997

ANNUAL TOTAL	1561.04	1884.14	
ANNUAL MEAN	4.27	5.16	
HIGHEST ANNUAL MEAN			5.90
LOWEST ANNUAL MEAN			10.5
HIGHEST DAILY MEAN			.72
LOWEST DAILY MEAN	198	Jun 18	536
ANNUAL SEVEN-DAY MINIMUM	.14	Sep 5	.02
INSTANTANEOUS PEAK FLOW	.15	Aug 31	.03
INSTANTANEOUS PEAK STAGE			(c)1290
INSTANTANEOUS LOW FLOW			9.99
ANNUAL RUNOFF (CFSM)	.46		.01
ANNUAL RUNOFF (INCHES)	6.22		.63
10 PERCENT EXCEEDS	8.6		8.58
50 PERCENT EXCEEDS	1.3		14
90 PERCENT EXCEEDS	.21		1.7
			.19

(a) 1973, 1993.

(b) Oct. 1, 14-17.

(c) From rating curve extended above 660 ft³/s on basis of computation of peak flow through culvert and over road embankment.

(d) 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	103	101	305	e200	1520	1090	178	209	90	56	62
2	43	93	120	276	e205	1420	935	173	204	89	53	59
3	39	82	134	284	211	1230	778	179	206	95	86	58
4	37	77	132	302	232	994	666	201	206	188	106	56
5	39	74	123	330	349	810	616	225	196	159	86	53
6	39	80	121	345	464	681	634	257	177	126	99	51
7	41	125	119	300	435	581	627	289	162	103	86	51
8	42	231	119	195	376	506	555	303	148	100	66	51
9	46	264	119	172	310	452	476	323	134	94	57	174
10	45	227	115	144	253	429	412	327	119	86	53	270
11	44	193	111	e130	235	424	367	307	106	78	57	273
12	42	164	122	e130	217	405	362	283	96	71	69	179
13	42	139	147	e150	141	374	382	257	110	66	101	130
14	41	120	177	e160	e160	420	373	242	116	62	119	177
15	40	105	179	e150	e175	528	342	270	109	58	127	95
16	42	97	176	e145	149	522	313	286	101	56	132	85
17	48	95	181	e135	122	465	289	298	97	57	134	170
18	70	97	176	e125	185	454	266	297	96	57	132	378
19	61	99	104	e125	298	441	246	340	89	54	125	262
20	61	98	102	e125	408	414	226	401	109	52	113	179
21	57	92	e110	128	834	385	220	399	143	81	105	257
22	53	88	e125	219	1430	350	221	370	186	70	102	267
23	63	85	160	498	1520	317	209	338	204	67	96	237
24	62	83	379	622	1290	291	202	303	231	64	89	214
25	64	84	570	589	980	307	194	270	201	58	81	174
26	63	82	488	460	805	390	183	242	162	114	79	176
27	59	77	349	354	986	420	172	225	131	145	75	178
28	57	74	397	308	1450	414	169	208	106	119	70	113
29	73	75	417	248	---	633	171	212	92	92	68	174
30	101	87	401	e215	---	904	170	213	83	72	65	94
31	109	---	352	e200	---	1090	---	210	---	62	62	---
TOTAL	1671	3390	6426	7869	14420	18571	11866	8426	4329	2685	2749	4277
MEAN	53.9	113	207	254	515	599	396	272	144	86.6	88.7	143
MAX	109	264	570	622	1520	1520	1090	401	231	188	134	328
MIN	37	74	101	125	122	291	169	173	83	52	53	51
CFSM	.15	.32	.58	.72	1.45	1.69	1.11	.77	.41	.24	.25	.40
IN.	.18	.36	.67	.82	1.51	1.95	1.24	.88	.45	.28	.29	.45

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1902 - 1997, BY WATER YEAR (WY)

MEAN	104	146	183	209	285	503	472	284	181	90.3	61.0	75.6
MAX	571	735	494	739	1024	1162	1494	1310	627	578	366	476
(WY)	1982	1993	1995	1993	1938	1948	1947	1956	1968	1994	1992	1973
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	1979

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1902 - 1977
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ANNUAL TOTAL	70067		86679			
ANNUAL MEAN	191		237		217	
HIGHEST ANNUAL MEAN					431	1973
LOWEST ANNUAL MEAN					43.3	1974
HIGHEST DAILY MEAN	1940	Jun 20	1520	Feb 23	5720	Apr 20 1975
LOWEST DAILY MEAN	29	Sep 3	37	Oct 4	3.0	Jul 31 1971
ANNUAL SEVEN-DAY MINIMUM	31	Sep 1	40	Oct 2	3.9	Jul 15 1974
INSTANTANEOUS PEAK FLOW			1560	Feb 23	5940	Apr 20 1975
INSTANTANEOUS PEAK STAGE			6.49	Feb 23	11.95	Apr 20 1975
INSTANTANEOUS LOW FLOW			37	(a)	3.0	Jul 31 1971
ANNUAL RUNOFF (CFSM)	.54		.67		.61	
ANNUAL RUNOFF (INCHES)	7.34		9.08		8.31	
10 PERCENT EXCEEDS	421		464		506	
50 PERCENT EXCEEDS	119		156		105	
90 PERCENT EXCEEDS	41		58		29	

(a) Oct. 3, 4, 5.

(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 October 1997 (discontinued).

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. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	19	24	60	e42	384	200	49	44	36	11	13
2	10	18	26	61	e43	318	149	46	51	38	10	14
3	10	15	23	68	55	228	122	58	52	131	17	13
4	10	14	22	65	64	170	115	68	46	84	17	12
5	10	13	21	73	122	141	134	60	42	49	14	11
6	9.3	13	22	66	113	125	199	98	38	38	12	11
7	9.9	35	22	e50	90	108	164	91	34	33	11	11
8	11	94	22	e35	76	105	126	86	32	30	11	11
9	12	61	22	e32	64	99	100	98	29	30	10	21
10	11	42	21	e29	58	109	86	81	28	26	10	98
11	11	31	22	e28	53	105	81	69	27	23	12	86
12	11	27	28	e29	49	93	90	64	28	22	17	47
13	10	24	44	e31	e45	85	104	57	46	20	40	35
14	10	21	42	e33	e37	130	96	53	50	19	20	29
15	9.6	19	36	e32	e33	165	86	78	38	19	19	26
16	9.7	19	41	e31	e32	117	82	72	36	17	22	23
17	9.4	19	39	e29	e37	101	77	72	38	18	28	79
18	22	20	e33	e27	45	110	73	65	32	21	25	159
19	17	20	e30	e26	88	99	68	97	29	17	21	83
20	14	19	e27	e27	92	90	63	115	39	15	19	126
21	12	17	e24	e35	353	82	62	85	48	20	20	140
22	11	16	e23	104	562	76	69	69	63	19	20	77
23	18	16	e35	331	424	69	64	60	49	17	18	56
24	19	16	205	254	257	66	60	54	66	16	16	44
25	16	17	192	159	166	84	55	54	52	16	17	38
26	14	16	119	e90	134	112	51	53	38	15	16	33
27	13	13	114	e80	374	98	48	46	31	15	15	29
28	13	15	85	e65	509	94	49	42	27	13	14	26
29	14	14	74	e55	---	338	47	48	24	12	14	28
30	40	18	74	e47	---	416	44	53	23	11	13	28
31	24	---	67	e43	---	293	---	47	---	11	14	---
TOTAL	421.9	701	1579	2095	4017	4610	2764	2088	1180	851	523	1407
MEAN	13.6	23.4	50.9	67.6	143	149	92.1	67.4	39.3	27.5	16.9	46.9
MAX	40	94	205	331	562	416	200	115	66	131	40	159
MIN	9.3	13	21	26	32	66	44	42	23	11	10	11
CFSM	.17	.29	.63	.84	1.78	1.85	1.14	.84	.49	.34	.21	.58
IN.	.19	.32	.73	.97	1.85	2.13	1.28	.96	.54	.39	.24	.65

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 1997, BY WATER YEAR (WY)

	MEAN	19.6	40.5	51.4	51.2	71.2	140	126	64.2	48.2	21.4	24.1	29.5
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1975 - 1997

ANNUAL TOTAL	16628.2						22236.9						
ANNUAL MEAN	45.4						60.9			54.0			
HIGHEST ANNUAL MEAN										76.4		1976	
LOWEST ANNUAL MEAN										26.4		1977	
HIGHEST DAILY MEAN	568						562		Feb 22	1990		Apr 19 1975	
LOWEST DAILY MEAN	8.4						9.3		Oct 6	3.9		Sep 29 1979	
ANNUAL SEVEN-DAY MINIMUM	9.1						10		Oct 1	4.4		Sep 24 1979	
INSTANTANEOUS PEAK FLOW							602		Feb 22	2110		Apr 19 1975	
INSTANTANEOUS PEAK STAGE							7.21		Feb 22	10.00		Apr 19 1975	
INSTANTANEOUS LOW FLOW										3.8		(a)	
ANNUAL RUNOFF (CFSM)	.56						.76			.67			
ANNUAL RUNOFF (INCHES)	7.67						10.26			9.10			
10 PERCENT EXCEEDS	93						120			123			
50 PERCENT EXCEEDS	27						38			28			
90 PERCENT EXCEEDS	11						13			10			

(a) Sept. 29, Oct. 1, 1979.

(e) Estimated.

[illegible]

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	372	558	539	1180	962	4360	3390	946	1050	562	316	367
2	222	584	544	1100	878	4150	3040	771	1020	745	287	235
3	206	538	646	1130	913	3730	2550	933	1010	584	308	307
4	270	413	605	1190	1010	3230	2340	883	1070	765	459	363
5	294	462	601	1260	1280	2750	2380	1060	959	605	250	279
6	286	433	604	1300	1500	2530	2350	1190	944	553	260	273
7	182	596	651	1070	1460	2230	2320	1370	885	477	323	303
8	151	896	615	942	1360	2170	2210	1390	807	488	324	220
9	171	1050	585	808	1200	1980	2030	1510	787	503	218	584
10	183	950	567	691	999	1990	1800	1380	741	364	202	898
11	296	1000	592	522	987	1930	1690	1330	691	402	272	909
12	214	832	694	590	935	1890	1760	1280	698	407	326	787
13	186	762	740	723	650	1760	1660	1140	681	287	406	724
14	249	767	868	750	731	1990	1700	1090	723	393	510	555
15	249	663	879	701	750	2080	1580	1260	686	314	653	569
16	249	654	809	677	689	2020	1590	1220	620	254	489	447
17	245	575	827	733	571	1960	1470	1210	575	421	504	822
18	350	588	885	657	690	1880	1400	1190	568	412	500	1140
19	272	609	613	657	965	2000	1290	1320	406	212	532	1260
20	309	513	517	637	1280	1900	1290	1800	704	292	521	962
21	428	554	478	569	2900	1760	1200	1790	803	438	482	1270
22	264	481	502	925	4030	1610	1290	1700	881	341	449	1350
23	404	439	877	1480	4160	1670	1170	1530	1210	381	420	1170
24	300	351	1490	1870	3710	1510	1110	1250	1180	502	418	875
25	305	492	1800	1770	2880	1510	1080	1250	1310	248	408	979
26	428	491	1570	1620	2730	1690	989	1120	1030	494	408	660
27	305	432	1090	1340	3330	1710	937	1090	779	370	410	684
28	369	460	1290	1250	4190	1700	929	975	723	305	404	646
29	418	450	1430	1030	---	2300	903	1100	644	435	390	684
30	534	449	1620	918	---	2920	815	1070	552	243	247	464
31	447	---	1470	862	---	3270	---	946	---	232	381	---
TOTAL	9158	18032	26998	30952	47740	70180	50263	38094	24737	13049	12077	20786
MEAN	295	601	871	998	1705	2264	1675	1229	825	421	390	693
MAX	534	1050	1800	1870	4190	4360	3990	1800	1310	785	653	1350
MIN	151	351	478	522	571	1510	815	771	406	212	202	220
CFSM	.24	.49	.71	.81	1.39	1.84	1.36	1.00	.67	.34	.32	.56
IN.	.28	.55	.82	.94	1.44	2.12	1.52	1.15	.75	.39	.37	.63

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1901 - 1997, BY WATER YEAR (WY)

	MEAN	462	627	741	817	1019	1925	1783	1121	836	485	356	362
	MAX	1880	2559	1666	2669	2550	7246	5113	3815	2803	2205	1178	1279
	(WY)	1987	1993	1976	1993	1976	1904	1947	1956	1905	1902	1992	1903
	MIN	88.5	139	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1901 - 1997

ANNUAL TOTAL	285811						362066						
ANNUAL MEAN	781						992						
HIGHEST ANNUAL MEAN										876			
LOWEST ANNUAL MEAN										1638			1993
HIGHEST DAILY MEAN										232			1964
LOWEST DAILY MEAN										22700			Mar 26 1904
ANNUAL SEVEN-DAY MINIMUM	4590					Jun 20	4360		Mar 1	20			Aug 25 1941
INSTANTANEOUS PEAK FLOW	148					Sep 5	151		Oct 8	44			Aug 15 1936
INSTANTANEOUS LOW FLOW	175					Sep 5	198		Oct 7	(a)24500			Mar 26 1904
ANNUAL RUNOFF (CFSM)							4390		Mar 1	(b)15.43			Apr 20 1975
ANNUAL RUNOFF (INCHES)							9.10		Mar 1	2.8			Sep 9 1963
10 PERCENT EXCEEDS							.81		(c)	.71			
50 PERCENT EXCEEDS							10.95			9.67			
90 PERCENT EXCEEDS							1580			1910			
							597			550			
							230			183			

(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) June 19, Sept. 30.

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 1907-2⁺ (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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	389	546	562	1430	e950	5000	3420	954	1030	793	277	434
2	430	634	698	1240	e1100	5030	3360	1020	1070	746	358	432
3	285	651	646	1270	1010	4520	2890	918	1070	868	384	311
4	252	591	753	1290	1060	3920	2520	1000	1050	705	421	366
5	301	498	703	1440	1330	3340	2370	998	1080	866	537	402
6	343	522	698	1450	1540	2980	2670	1250	971	669	329	373
7	346	540	706	1330	1600	2560	2480	1250	982	633	313	295
8	267	870	748	1150	1500	2430	2300	1410	890	572	370	393
9	207	1050	704	1060	1380	2310	2190	1440	866	625	391	263
10	219	1050	670	922	1230	2130	1980	1460	827	578	292	849
11	221	974	664	e800	1090	2170	1750	1340	793	459	249	1040
12	319	1020	705	e600	1090	2060	1810	1300	764	458	332	942
13	307	888	932	e700	963	1970	1910	1260	755	475	455	840
14	224	812	938	e800	e750	2010	1790	1110	765	386	488	784
15	275	807	1030	e850	e820	2160	1730	1250	768	457	591	621
16	304	729	1010	e800	845	2160	1630	1260	739	414	788	631
17	299	720	933	e760	814	2080	1630	1250	722	306	569	613
18	345	654	982	e820	663	2040	1450	1230	618	521	608	1000
19	458	666	955	e750	950	1990	1430	1400	642	484	571	1200
20	337	667	682	e740	1270	2050	1300	1450	529	300	609	1160
21	353	587	e600	e690	3540	1920	1310	1810	837	349	591	1010
22	481	617	e550	e640	5800	1770	1330	1680	1080	587	558	1270
23	376	547	625	e1000	5250	1600	1330	1560	1090	432	517	1250
24	462	509	1600	e1600	4760	1740	1210	1410	1220	461	489	1070
25	389	435	1880	e2100	3890	1560	1180	1200	1200	570	487	926
26	367	563	1910	e1950	3150	1660	1140	1230	1230	346	478	963
27	478	549	1570	e1800	3580	1780	1050	1110	969	569	481	716
28	381	510	1330	e1500	4620	1730	1030	1080	876	453	478	741
29	436	527	1460	e1400	---	2150	1020	1060	764	358	470	708
30	666	530	1550	e1150	---	2660	988	1180	691	496	455	725
31	630	---	1710	e1050	---	3260	---	1080	---	332	324	---
TOTAL	11147	20263	30504	35082	56545	76740	54198	38950	26888	16268	14240	22328
MEAN	360	675	984	1132	2019	2475	1807	1256	896	525	459	744
MAX	666	1050	1910	2100	5800	5030	3420	1810	1230	868	768	1270
MIN	207	435	550	600	663	1560	988	918	529	300	249	263
CFSM	.26	.49	.71	.82	1.46	1.79	1.30	.91	.65	.38	.33	.54
IN.	.30	.54	.82	.94	1.52	2.06	1.46	1.05	.72	.44	.38	.60

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1997, BY WATER YEAR (WY)

MEAN	556	797	925	954	1129	2050	1966	1287	858	567	443	436
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1952 - 1997

ANNUAL TOTAL	324317	403153	994
ANNUAL MEAN	886	1105	1830
HIGHEST ANNUAL MEAN			282
LOWEST ANNUAL MEAN			1993
HIGHEST DAILY MEAN	6150	5800	12200
LOWEST DAILY MEAN	184	207	58
ANNUAL SEVEN-DAY MINIMUM	209	252	85
INSTANTANEOUS PEAK FLOW		(a)6050	12400
INSTANTANEOUS PEAK STAGE		(b)10.41	12.98
INSTANTANEOUS LOW FLOW		191	38
ANNUAL RUNOFF (CFSM)	.64	.80	.72
ANNUAL RUNOFF (INCHES)	8.71	10.83	9.75
10 PERCENT EXCEEDS	1720	2050	2130
50 PERCENT EXCEEDS	699	866	640
90 PERCENT EXCEEDS	289	367	234

(a) Gage height 10.01 ft.

(b) Backwater from ice.

(c) 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.

REVISED 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	53	209	113	428	e486	2750	553	257	224	91	169	36
2	47	214	176	417	e433	3070	527	252	213	80	147	37
3	44	207	211	455	e398	3020	497	252	201	70	120	37
4	41	200	224	546	371	2670	473	236	186	69	96	35
5	39	206	226	685	360	2240	456	230	175	67	78	33
6	39	192	224	806	366	e1870	448	230	164	62	64	32
7	46	187	218	e775	385	e1590	451	224	153	57	55	33
8	54	220	212	e697	399	e1330	468	e215	140	53	49	32
9	57	263	208	e610	401	e1130	457	e210	123	58	44	31
10	59	286	204	e522	e381	1000	434	e216	109	54	39	41
11	56	292	202	462	360	970	409	e224	99	52	40	50
12	54	284	199	415	341	964	398	228	91	48	41	61
13	53	270	240	376	e321	916	392	227	120	45	48	68
14	53	253	305	344	e296	836	432	222	117	42	49	65
15	53	235	359	320	274	e751	480	221	99	43	56	59
16	55	218	390	303	255	e679	499	221	87	44	71	51
17	91	204	406	e296	240	617	497	242	84	41	67	55
18	98	193	404	e274	218	582	479	261	78	40	61	62
19	99	184	385	e252	300	549	457	291	72	37	55	64
20	98	176	354	233	406	523	433	323	82	32	52	81
21	118	168	325	216	e890	498	409	346	99	32	52	79
22	113	159	307	267	e3950	482	387	357	130	36	52	71
23	108	151	296	476	e4140	462	368	352	156	33	50	62
24	111	141	332	e655	e3860	438	351	339	182	35	49	43
25	137	129	398	e779	e3500	426	334	327	173	35	48	37
26	134	119	444	e761	e2950	447	318	307	170	161	46	37
27	121	108	462	e717	2660	477	305	281	162	219	44	38
28	111	100	455	e670	2780	491	291	259	146	231	36	38
29	104	96	451	e617	---	514	277	245	125	235	31	37
30	141	100	448	573	---	547	266	238	103	218	28	36
31	187	---	441	e527	---	561	---	231	---	192	30	---
TOTAL	2574	5764	9619	15474	31720	33400	12546	8064	4063	2512	1869	1441
MEAN	83.0	192	310	499	1133	1077	418	260	135	81.0	60.3	48.0
MAX	187	292	462	806	4140	3070	553	357	224	235	169	81
MIN	39	96	113	216	218	426	266	210	72	32	28	31
CFSM	.19	.44	.71	1.15	2.61	2.48	.96	.60	.31	.19	.14	.11
IN.	.22	.49	.82	1.33	2.72	2.86	1.08	.69	.35	.22	.16	.12

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 1997, BY WATER YEAR (WY)

MEAN	154	192	261	261	302	718	632	367	202	116	61.6	132
MAX	1461	837	813	1035	1133	2049	1582	1812	937	1243	361	1634
(WY)	1987	1991	1991	1973	1997	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1944 - 1997

ANNUAL TOTAL	109665	129046	
ANNUAL MEAN	300	354	
HIGHEST ANNUAL MEAN			283
LOWEST ANNUAL MEAN			501
HIGHEST DAILY MEAN	3210	May 22	65.1
LOWEST DAILY MEAN	31	Sep 7	4.8
ANNUAL SEVEN-DAY MINIMUM	34	Sep 3	5.6
INSTANTANEOUS PEAK FLOW		4530	(a)8770
INSTANTANEOUS PEAK STAGE		9.95	(b)12.33
INSTANTANEOUS LOW FLOW		27	(c)
ANNUAL RUNOFF (CFSM)	.69	.81	.65
ANNUAL RUNOFF (INCHES)	9.40	11.06	8.86
10 PERCENT EXCEEDS	464	593	670
50 PERCENT EXCEEDS	186	218	123
90 PERCENT EXCEEDS	49	43	23

(a) Result of dam failure on Rainbow Lake (Pine Creek).

(b) From floodmark.

(c) Aug. 30, 31.

(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 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	50	60	27	33	81	47	50	37	27	18	20
2	22	38	90	30	33	111	45	48	35	27	17	20
3	21	33	50	50	32	87	47	70	33	26	17	19
4	21	31	39	51	33	71	54	54	31	25	19	19
5	20	30	34	84	39	67	63	45	30	24	16	18
6	20	30	34	53	36	63	74	48	30	23	16	18
7	24	42	33	36	34	55	56	41	30	22	15	17
8	35	52	32	31	33	55	47	61	28	32	15	18
9	41	38	31	29	36	53	44	67	28	37	14	17
10	33	32	30	33	34	59	42	50	27	27	17	21
11	27	30	30	e29	32	68	48	43	27	24	20	21
12	26	28	30	e29	31	61	55	42	26	21	24	22
13	25	26	33	e29	e30	54	62	40	30	20	31	22
14	24	26	34	29	30	51	74	39	28	35	24	20
15	24	25	33	29	29	46	57	57	26	35	24	20
16	24	26	35	29	29	44	58	51	26	26	25	20
17	24	30	33	e28	32	50	55	55	27	23	22	38
18	53	34	31	e28	32	60	48	46	26	20	22	30
19	39	29	28	e28	61	51	43	55	25	17	21	25
20	30	27	e27	e28	57	53	41	46	31	16	23	30
21	28	26	27	e29	173	58	40	41	45	28	26	25
22	26	26	26	64	e250	57	43	38	41	33	27	23
23	40	26	29	77	e160	52	45	36	45	25	23	22
24	40	26	51	e65	90	52	43	36	39	24	22	21
25	31	26	36	43	83	67	42	35	31	22	25	20
26	29	25	32	38	66	78	40	35	27	50	23	19
27	28	25	e31	e35	85	60	39	33	25	33	22	19
28	27	25	30	e33	102	59	40	32	24	27	21	19
29	33	25	29	e33	---	69	39	38	22	23	20	21
30	118	30	29	e33	---	58	38	50	22	20	19	21
31	101	---	28	33	---	54	---	41	---	18	20	---
TOTAL	1057	917	1095	1183	1715	1904	1469	1423	902	810	648	645
MEAN	34.1	30.6	35.3	38.2	61.3	61.4	49.0	45.9	30.1	26.1	20.9	21.5
MAX	118	52	90	84	250	111	74	70	45	50	31	38
MIN	20	25	26	27	29	44	38	32	22	16	14	17
CFSM	.86	.77	.89	.96	1.54	1.55	1.23	1.16	.76	.66	.53	.54
IN.	.99	.86	1.03	1.11	1.61	1.78	1.38	1.33	.85	.76	.61	.60

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 1997, BY WATER YEAR (WY)

	MEAN	31.6	41.9	35.3	34.6	37.9	51.7	47.3	37.1	32.0	24.8	25.0	23.8
MAX	39.2	59.5	46.1	48.9	61.3	61.4	66.6	45.9	44.3	50.9	41.7	33.8	
(WY)	1992	1995	1992	1993	1997	1997	1991	1997	1994	1994	1994	1993	
MIN	20.1	30.6	19.8	24.5	25.7	34.1	35.2	26.9	15.3	12.9	15.6	17.7	
(WY)	1990	1997	1990	1994	1989	1996	1996	1988	1988	1988	1988	1995	

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1988 - 1997

ANNUAL TOTAL	12016		13768										
ANNUAL MEAN	32.8		37.7										
HIGHEST ANNUAL MEAN										35.2			
LOWEST ANNUAL MEAN										40.7		1993	
HIGHEST DAILY MEAN	168	May 21	250	Feb 22	271	Feb 21	1994			28.6		1990	
LOWEST DAILY MEAN	13	Jul 25	14	Aug 9	8.1	Jul 9	1988			9.6		Jul 4	1988
ANNUAL SEVEN-DAY MINIMUM	14	Jul 21	16	Aug 3	9.6	Jul 4	1988						
INSTANTANEOUS PEAK FLOW			(a)320	Feb 21	(b)								
INSTANTANEOUS PEAK STAGE			(c)5.19	Feb 22	5.53	Mar 12	1990						
INSTANTANEOUS LOW FLOW			14	(d)	7.0	(f)							
ANNUAL RUNOFF (CFSM)	.83		.95		.89								
ANNUAL RUNOFF (INCHES)	11.26		12.90		12.05								
10 PERCENT EXCEEDS	50		59		55								
50 PERCENT EXCEEDS	30		31		30								
90 PERCENT EXCEEDS	18		20		18								

(a) Gage height 4.99 ft.

(b) Not determined.

(c) Backwater from ice.

(d) Aug. 7, 8, 9.

(e) Estimated.

(f) July 10, 14, 1988.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04116000 GRAND RIVER AT IONIA, MI

LOCATION.--Lat 42°58'20", long 85°04'13", in NW1/4 sec.30, T.7 N., R.6 W., Ionia County, Hydrologic Unit 04050006, on left bank 15 ft downstream from bridge on State Highway 66 in Ionia, 2.7 mi downstream from Prairie Creek, and at mile 87.

DRAINAGE AREA.--2,840 mi², approximately.

PERIOD OF RECORD.--March to June 1931, July 1951 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 615.38 ft above sea level. Mar. 19 to Sept. 24, 1931, nonrecording gage at site 1.5 mi upstream at different datum.

REMARKS.--Records good except for estimated daily discharges, which are fair. Diurnal fluctuation below approximately 5,000 ft³/s 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	584	1430	1230	2940	e3000	11800	5000	2020	2040	1430	927	595
2	696	1430	1580	2660	e2800	12300	5050	2000	1990	1530	876	671
3	842	1480	1710	2750	e2750	12300	4880	2080	2050	1310	987	686
4	509	1420	1720	2990	e2700	11200	4370	1910	1970	1330	1090	579
5	527	1300	1710	3350	e2800	9810	4180	2040	1880	1170	895	594
6	464	1160	1660	3670	e3100	8550	4340	2200	1910	1260	834	635
7	580	1400	1650	3540	e3500	7410	4470	2340	1760	1080	669	642
8	690	1510	1610	3110	e3300	6670	4090	2340	1620	1090	605	556
9	617	2030	1590	2770	e3150	6240	3850	2580	1560	1060	687	588
10	601	2070	1570	2510	e3000	5840	3700	2530	1380	1080	723	798
11	583	1950	1470	2210	2610	5470	3440	2500	1420	893	578	1350
12	588	1880	1500	1910	e2250	5350	3300	2390	1290	828	604	1350
13	517	1840	1780	1660	e2000	5010	3530	2250	1280	798	645	1230
14	624	1780	2080	e1750	e1800	4810	3790	2220	1340	831	806	1160
15	609	1600	2090	e1800	e1700	4650	3620	2180	1310	785	989	1050
16	604	1480	2180	e1750	e1650	4400	3550	2370	1290	769	1060	907
17	628	1540	2150	e1700	e1600	4410	3360	2250	1270	739	1070	1120
18	672	1390	2140	e1700	e1700	4170	3200	2260	1110	680	924	1280
19	865	1290	2060	e1750	2100	4030	3040	3380	1060	836	1070	1660
20	865	1400	2020	e1800	2660	3890	2950	3940	1120	754	897	1790
21	798	1230	e1600	e1700	5390	3870	2780	3350	1320	657	902	1490
22	738	1200	e1200	e2400	13600	3650	2770	3270	1660	729	906	1430
23	916	1190	e1500	e3000	17300	3470	2690	2990	1780	858	893	1700
24	835	1110	e2300	e3700	15500	3300	2650	2790	2090	702	825	1530
25	932	1010	3580	e4200	12900	3400	2440	2560	2090	781	778	1260
26	838	958	3080	e4400	10600	3480	2360	2350	2010	934	824	1230
27	820	1110	2620	e4200	9460	3540	2260	2420	1880	1290	751	1220
28	823	993	2620	e4000	10900	3640	2130	2210	1520	1370	788	981
29	860	1010	2780	e3800	---	3840	2100	2220	1400	1230	733	984
30	1250	1080	3040	e3500	---	4380	2070	2310	1270	1080	712	975
31	1680	---	3040	e3250	---	4740	---	2310	---	1130	697	---
TOTAL	23155	42271	62880	86470	145820	179620	101960	76560	47670	31014	25745	32041
MEAN	747	1409	2028	2789	5208	5794	3399	2470	1589	1000	830	1068
MAX	1680	2070	3580	4400	17300	12300	5050	3940	2090	1530	1090	1790
MIN	464	958	1200	1660	1600	3300	2070	1910	1060	657	578	556
CFSM	.26	.50	.71	.98	1.83	2.04	1.20	.87	.56	.35	.29	.38
IN.	.30	.55	.82	1.13	1.91	2.35	1.34	1.00	.62	.41	.34	.42

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1997, BY WATER YEAR (WY)

MEAN	1244	1643	1974	2008	2384	4410	4092	2559	1628	1078	787	939
MAX	7613	4931	4672	5715	6170	9398	7492	9715	4963	4468	2416	4613
(WY)	1987	1993	1991	1993	1976	1985	1993	1956	1989	1994	1994	1975
MIN	254	380	346	375	377	802	702	567	464	287	310	300
(WY)	1964	1965	1964	1963	1963	1964	1931	1931	1988	1965	1965	1963

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1931 - 1997

ANNUAL TOTAL	688535	855186	2072
ANNUAL MEAN	1881	2343	3482
HIGHEST ANNUAL MEAN			631
LOWEST ANNUAL MEAN			21300
HIGHEST DAILY MEAN	12600	Jun 20	17300
LOWEST DAILY MEAN	428	Sep 8	464
ANNUAL SEVEN-DAY MINIMUM	478	Sep 7	570
INSTANTANEOUS PEAK FLOW			17500
INSTANTANEOUS PEAK STAGE			22.04
INSTANTANEOUS LOW FLOW			421
ANNUAL RUNOFF (CFSM)	.66	.82	.73
ANNUAL RUNOFF (INCHES)	9.02	11.20	9.91
10 PERCENT EXCEEDS	3310	4190	4440
50 PERCENT EXCEEDS	1500	1700	1300
90 PERCENT EXCEEDS	587	708	452

(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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.4	5.9	12	6.6	7.6	18	9.1	7.5	6.1	6.7	2.8	3.4
2	3.3	5.2	10	7.9	7.1	18	8.4	7.0	6.5	4.9	2.8	3.2
3	3.2	4.8	6.6	8.8	6.8	13	8.2	8.4	6.6	4.1	2.8	3.1
4	3.2	4.6	5.9	8.6	9.2	11	8.2	7.1	5.7	4.2	3.1	2.5
5	3.3	4.6	5.7	11	14	10	14	8.0	5.1	3.9	2.8	2.7
6	3.2	4.5	5.7	7.7	9.6	9.9	18	15	4.8	3.7	2.5	2.7
7	3.3	9.4	6.0	5.9	7.7	8.2	11	8.5	4.8	3.6	2.5	2.7
8	3.4	16	6.0	5.4	7.0	8.8	8.4	13	4.5	4.4	2.5	2.8
9	4.6	8.7	5.5	5.2	6.2	9.3	7.7	11	4.2	4.7	2.4	4.1
10	4.2	6.4	5.3	5.2	5.8	11	7.6	8.3	4.1	3.9	2.5	8.2
11	3.6	5.5	6.0	5.6	5.7	10	7.5	6.9	4.0	3.6	3.2	5.5
12	3.5	5.2	8.1	5.5	5.6	8.6	13	6.7	4.4	3.5	4.1	4.1
13	3.5	4.9	11	5.2	5.0	8.2	12	6.2	4.6	3.5	4.7	3.8
14	e3.5	4.5	8.3	5.2	5.3	13	9.5	6.7	4.0	3.5	3.3	3.8
15	e3.5	4.2	7.2	5.1	5.3	11	8.2	11	3.9	3.7	4.6	3.5
16	e3.4	4.5	7.4	5.2	5.1	8.6	8.7	8.2	5.4	3.4	4.2	3.2
17	3.3	5.2	6.7	5.1	5.3	11	8.0	8.1	5.1	3.4	4.3	1.5
18	9.7	5.7	5.7	5.1	7.4	12	7.4	7.4	4.4	3.3	4.0	1.5
19	7.0	5.0	4.7	4.9	15	9.0	6.9	11	4.1	3.1	3.4	6.2
20	4.9	4.4	4.1	5.2	12	8.6	6.5	8.1	7.8	3.0	3.5	1.5
21	4.3	4.4	3.9	5.2	109	8.5	7.7	6.7	39	3.9	3.6	6.2
22	4.1	4.4	4.4	33	61	8.3	8.3	6.0	29	4.7	3.4	4.7
23	7.5	4.5	9.4	31	23	7.7	7.2	5.7	13	3.9	3.1	4.6
24	7.5	4.8	27	13	16	7.2	6.9	5.6	8.0	3.7	4.2	4.1
25	5.4	4.6	11	9.7	13	11	6.2	7.4	6.1	3.4	4.2	3.8
26	4.7	4.4	6.9	7.3	12	10	6.1	7.0	5.4	3.3	3.6	3.5
27	4.5	4.2	6.5	8.1	38	8.5	6.0	5.7	4.5	3.2	3.3	3.6
28	4.3	4.2	7.1	6.8	25	11	6.1	5.3	4.1	3.2	3.1	3.6
29	5.3	4.2	9.6	6.3	---	23	5.8	11	3.9	2.9	3.1	3.8
30	15	7.4	8.2	6.1	---	18	5.9	9.3	4.0	2.8	3.1	3.4
31	9.2	---	7.1	6.3	---	12	---	6.7	---	2.8	3.6	---
TOTAL	152.8	166.3	239.0	257.2	449.7	342.4	254.5	250.5	217.1	115.9	104.3	146.8
MEAN	4.93	5.54	7.71	8.30	16.1	11.0	8.48	8.08	7.24	3.74	3.36	4.89
MAX	15	16	27	33	109	23	18	15	39	6.7	4.7	15
MIN	3.2	4.2	3.9	4.9	5.0	7.2	5.8	5.3	3.9	2.8	2.4	2.7
CFSM	.65	.73	1.01	1.09	2.11	1.45	1.12	1.06	.95	.49	.44	.64
IN.	.75	.81	1.17	1.26	2.20	1.68	1.25	1.23	1.06	.57	.51	.72

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954 - 1997, BY WATER YEAR (WY)

	MEAN	4.92	6.51	7.05	6.69	8.14	11.7	10.2	8.03	5.92	3.64	3.60	3.48
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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1954 - 1997
ANNUAL TOTAL	2302.2	2696.5	
ANNUAL MEAN	6.29	7.39	6.60
HIGHEST ANNUAL MEAN			11.1
LOWEST ANNUAL MEAN			2.73
HIGHEST DAILY MEAN	56	109	211
LOWEST DAILY MEAN	2.4	2.4	.70
ANNUAL SEVEN-DAY MINIMUM	2.5	2.6	.73
INSTANTANEOUS PEAK FLOW		147	470
INSTANTANEOUS PEAK STAGE		5.92	9.45
INSTANTANEOUS LOW FLOW		2.1	(a).44
ANNUAL RUNOFF (CFSM)	.83	.97	.87
ANNUAL RUNOFF (INCHES)	11.27	13.20	11.81
10 PERCENT EXCEEDS	10	12	12
50 PERCENT EXCEEDS	5.2	5.7	4.5
90 PERCENT EXCEEDS	2.8	3.3	2.2

(a) Result of freezeup.

(e) 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 100 ft upstream from 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	139	250	171	452	422	1850	633	231	282	194	100	97
2	128	225	234	416	402	1860	632	242	265	223	98	95
3	120	198	262	415	390	1790	589	246	254	234	98	94
4	115	177	246	431	383	1590	518	246	243	220	98	91
5	112	165	225	455	427	1380	474	247	229	202	97	89
6	109	160	210	494	512	1170	497	262	215	183	95	86
7	109	173	202	481	543	991	559	289	204	169	93	87
8	108	228	199	376	510	832	590	308	191	160	93	85
9	113	285	196	340	447	713	560	330	177	164	90	88
10	117	298	191	301	391	644	495	340	167	158	88	108
11	115	267	188	249	348	612	432	329	159	151	92	128
12	112	234	194	225	322	579	419	307	153	143	101	135
13	111	209	224	231	269	544	448	284	154	138	116	131
14	111	188	285	252	262	511	487	269	154	137	120	124
15	109	172	321	267	270	507	492	272	154	149	120	118
16	106	160	320	265	255	512	466	287	159	143	122	111
17	108	159	308	250	229	511	435	299	169	138	127	139
18	135	161	292	240	239	516	403	297	165	135	126	186
19	165	162	239	234	317	510	371	301	158	129	122	201
20	170	157	195	224	464	500	338	319	165	122	117	215
21	159	149	177	220	1000	479	320	319	279	126	114	207
22	149	142	192	292	2230	453	317	303	437	138	114	194
23	160	139	211	593	2960	424	314	278	537	143	113	180
24	178	139	335	884	2940	393	305	259	552	140	112	162
25	185	139	465	1010	2540	382	292	251	490	133	114	148
26	178	137	484	1040	2170	402	277	252	403	128	112	137
27	164	134	439	969	1900	417	261	242	319	125	109	127
28	154	132	468	821	1850	424	249	228	258	120	106	122
29	152	129	522	6650	---	466	241	241	218	114	101	120
30	186	136	532	527	---	540	236	282	196	109	97	117
31	237	---	499	466	---	604	---	297	---	103	96	---
TOTAL	4314	5404	9016	14060	24992	23106	12650	8657	7506	4671	3701	3922
MEAN	139	180	291	454	893	745	422	279	250	151	106	131
MAX	237	298	532	1040	2960	1860	633	340	552	234	127	215
MIN	106	129	171	220	229	382	236	228	153	103	88	85
CFSM	.36	.47	.76	1.18	2.32	1.94	1.10	.73	.65	.39	.28	.34
IN.	.42	.52	.87	1.36	2.41	2.23	1.22	.84	.73	.45	.32	.38

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 1997, BY WATER YEAR (WY)

	MEAN	204	269	329	353	398	692	643	395	277	162	130	147
MAX	1072	939	895	1049	959	1506	1914	1391	1011	410	385	358	
(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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1945 - 1997

ANNUAL TOTAL	103251		121599										
ANNUAL MEAN	282		333										
HIGHEST ANNUAL MEAN													
LOWEST ANNUAL MEAN													
HIGHEST DAILY MEAN	2490		2960										
LOWEST DAILY MEAN	88		85										
ANNUAL SEVEN-DAY MINIMUM	89		89										
INSTANTANEOUS PEAK FLOW			3140										
INSTANTANEOUS PEAK STAGE			8.14										
INSTANTANEOUS LOW FLOW			83										
ANNUAL RUNOFF (CFSM)	.73		.87										
ANNUAL RUNOFF (INCHES)	9.98		11.75										
10 PERCENT EXCEEDS	524		543										
50 PERCENT EXCEEDS	202		229										
90 PERCENT EXCEEDS	107		111										

(a) From graph based on gage readings.

(e) 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 down-stream 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SE
1	150	281	270	234	163	784	302	246	213	197	107	117
2	139	277	301	231	159	827	285	251	200	187	105	115
3	132	246	314	257	162	752	272	287	190	164	106	115
4	132	210	306	299	178	711	266	281	181	152	117	105
5	130	193	287	383	195	570	290	283	172	145	117	107
6	128	184	259	399	223	496	317	281	167	140	113	105
7	149	198	237	e360	239	409	320	264	163	133	114	104
8	158	196	227	e310	237	428	312	318	160	146	121	105
9	193	197	218	e260	233	393	294	333	156	160	114	115
10	181	190	210	e240	231	384	273	333	152	158	114	155
11	166	183	207	e230	229	383	260	323	147	144	121	131
12	154	177	207	e215	224	371	284	301	147	134	135	125
13	150	172	210	e200	e190	364	319	271	144	125	155	115
14	145	167	220	e190	e200	362	340	254	141	127	153	115
15	142	162	234	e185	e200	332	348	257	136	141	156	115
16	140	161	242	e180	e195	311	359	256	163	132	160	121
17	141	169	243	e175	e195	337	343	261	174	138	163	295
18	191	173	242	e180	e215	337	319	255	166	138	156	225
19	179	174	e180	e185	327	332	296	280	153	130	143	205
20	180	167	e160	e190	381	331	274	282	189	119	138	195
21	167	163	e180	e195	971	329	259	280	348	152	141	175
22	160	161	e195	e215	1160	320	250	255	358	171	142	169
23	189	160	225	e360	1370	313	245	233	333	161	135	155
24	193	161	281	e530	1020	305	240	221	323	143	129	135
25	197	159	e260	e500	705	330	237	213	294	132	127	132
26	189	159	e230	e430	601	334	236	208	345	133	125	127
27	178	154	e230	e340	634	332	231	201	263	133	121	124
28	167	153	e230	e260	710	340	227	194	188	130	116	124
29	199	152	246	e215	---	344	223	196	164	121	111	125
30	328	177	273	e190	---	328	221	209	154	115	112	122
31	290	---	264	e175	---	314	---	213	---	110	116	---
TOTAL	5337	5476	7388	8313	11547	12803	8442	8040	6084	4411	3983	4175
MEAN	172	183	238	268	412	413	281	259	203	142	128	139
MAX	328	281	314	530	1370	827	359	333	358	197	163	295
MIN	128	152	160	175	159	305	221	194	136	110	105	105
CFSM	.74	.78	1.02	1.15	1.76	1.76	1.20	1.11	.87	.61	.55	.59
IN.	.85	.87	1.17	1.32	1.84	2.04	1.34	1.28	.97	.70	.63	.66

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1997, BY WATER YEAR (WY)

	MEAN	188	243	251	235	252	401	392	290	213	156	152	155
MAX	528	525	557	512	567	944	836	620	457	362	317	317	555
(WY)	1982	1991	1992	1973	1976	1976	1967	1956	1989	1994	1994	1975	1975
MIN	100	118	126	116	107	223	175	122	108	83.8	83.2	93.7	93.7
(WY)	1965	1965	1963	1970	1963	1964	1958	1958	1964	1964	1971	1967	1967

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1952 - 1997
ANNUAL TOTAL	90010	85999	244
ANNUAL MEAN	246	236	360
HIGHEST ANNUAL MEAN			155
LOWEST ANNUAL MEAN			164
HIGHEST DAILY MEAN	1640	1370	3290
LOWEST DAILY MEAN	107	103	49
ANNUAL SEVEN-DAY MINIMUM	113	107	58
INSTANTANEOUS PEAK FLOW		1490	3540
INSTANTANEOUS PEAK STAGE		8.32	9.29
INSTANTANEOUS LOW FLOW		102	28
ANNUAL RUNOFF (CFSM)	1.05	1.01	1.04
ANNUAL RUNOFF (INCHES)	14.31	13.67	14.16
10 PERCENT EXCEEDS	377	343	423
50 PERCENT EXCEEDS	207	196	193
90 PERCENT EXCEEDS	131	124	109

(a) 1976, 1991.

(e) 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1760	3530	3140	5830	6740	18100	7700	4220	4260	2750	2010	1520
2	1640	3460	3860	5490	6410	18300	7880	4200	4000	2950	1770	1440
3	1650	3550	4010	5080	5890	18500	7910	4350	3920	2900	1730	1340
4	1750	3210	4030	5330	5610	18400	7790	4460	3900	2720	1860	1450
5	1420	3060	4020	6320	5590	17600	7480	4260	3610	2600	2020	1310
6	1440	2970	3870	6810	5700	16100	7380	4550	3590	2400	1790	1290
7	1490	2900	3770	6720	5860	14400	7470	4610	3600	2410	1630	1310
8	1700	3290	3680	6440	5980	13100	7400	4960	3330	2290	1420	1410
9	1910	3460	3390	5830	5910	12000	7060	5160	3230	2360	1330	1240
10	1940	3890	3400	5330	5530	11100	6830	5240	3200	2270	1340	1680
11	2230	3950	3330	e4500	5200	10200	6840	5130	3020	2350	1500	1680
12	1770	3720	3300	e3900	4950	9590	6560	5030	2990	2000	1480	2280
13	1730	3540	3400	e3500	4630	9170	6350	4790	2830	1870	1590	2280
14	1420	3470	3690	e3600	4370	8790	6390	4500	2670	1800	1670	2140
15	1370	3220	4150	e3750	4010	8400	6590	4490	2680	1820	1850	2120
16	1390	2940	4270	e3700	4000	8010	6780	4480	2780	1900	2090	1960
17	1690	2950	4340	e3600	3830	7730	6650	4620	2720	1870	2210	3730
18	1900	3050	4310	e3550	3930	7700	6380	4560	2610	1830	2260	3100
19	2050	2800	4150	e3600	4590	7410	6040	5150	2260	1690	2040	3210
20	2260	2710	3060	e4200	5160	7200	5720	6210	2750	1770	2050	3650
21	2140	2770	2300	e5200	10100	7060	5430	6430	4490	1920	1920	3320
22	2140	2520	2790	e6400	15400	6920	5230	5940	4670	1940	1880	2950
23	2200	2500	3780	7670	18000	6670	5230	5600	4520	1810	1880	2780
24	2310	2410	4740	8660	21400	6420	5420	5160	4440	1980	1860	2980
25	2300	2340	5430	9320	23100	6440	5060	4790	4460	1740	1740	2690
26	2330	2150	5730	9640	22000	6630	4690	4430	4390	1730	1650	2410
27	2270	2200	5190	9760	20500	6630	4630	4270	4160	1940	1720	2220
28	2120	2170	5550	9500	19100	6680	3970	4230	3650	2440	1660	2260
29	2310	2110	5880	8950	---	6890	4100	4140	3000	2410	1610	1910
30	3230	2320	6080	8130	---	7070	4110	4270	2860	2190	1610	1900
31	3470	---	6080	7350	---	7390	---	4360	---	2030	1530	---
TOTAL	61330	89160	128720	187660	253490	316600	187070	148590	104590	66680	54700	65560
MEAN	1978	2972	4152	6054	9053	10210	6236	4793	3486	2151	1765	2185
MAX	3470	3950	6080	9760	23100	18500	7910	6430	4670	2950	2260	3730
MIN	1370	2110	2300	3500	3830	6420	3970	4140	2260	1690	1330	1240
CFSM	.40	.61	.85	1.24	1.85	2.08	1.27	.98	.71	.44	.36	.45
IN.	.47	.68	.98	1.42	1.92	2.40	1.42	1.13	.79	.51	.42	.50

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1901 - 1997, BY WATER YEAR (WY)

MEAN	2430	2954	3413	3725	4293	7684	7044	4703	3385	2190	1735	1980
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1901 - 1997

ANNUAL TOTAL	1391080	1664150	
ANNUAL MEAN	3801	4559	
HIGHEST ANNUAL MEAN			3790
LOWEST ANNUAL MEAN			6314
HIGHEST DAILY MEAN			1264
LOWEST DAILY MEAN			1264
HIGHEST SEVEN-DAY MINIMUM	16700	Jun 22	53300
LOWEST DAILY MEAN	1210	Sep 8	381
ANNUAL SEVEN-DAY MINIMUM	1300	Sep 4	1340
INSTANTANEOUS PEAK FLOW			23500
INSTANTANEOUS PEAK STAGE			17.87
INSTANTANEOUS LOW FLOW			1050
ANNUAL RUNOFF (CFSM)	.78	.93	.77
ANNUAL RUNOFF (INCHES)	10.56	12.63	10.51
10 PERCENT EXCEEDS	6220	7700	7630
50 PERCENT EXCEEDS	3300	3680	2580
90 PERCENT EXCEEDS	1500	1730	1190

(a) Aug. 9, 17, 1936.

(b) Present datum; from graph based on gage readings.

(c) Estimated.

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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	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	TURBIDITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	CHLORIDE, DIS-SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)
44274808444501 HIGGINS LAKE, SITE 3, NEAR ROSCOMMON, MI (LAT 44 27 48N LONG 084 44 45W)								
MAY 1997								
28...	1315	280	8.0	12.0	0.27	11.1	13	173
AUG 27...	1445	266	8.3	21.0	0.50	8.6	10	160
442803084411601 HIGGINS LAKE, SITE 10, NEAR ROSCOMMON, MI (LAT 44 28 03N LONG 084 41 16W)								
MAY 1997								
27...	1330	244	8.1	11.0	--	11.3	--	--
442717084401501 HIGGINS LAKE, SITE 11, NEAR ROSCOMMON, MI (LAT 44 27 17N LONG 084 40 15W)								
MAY 1997								
27...	1130	249	8.1	8.5	--	11.0	--	--
442617084400601 HIGGINS LAKE, SITE 12, NEAR ROSCOMMON, MI (LAT 44 26 17N LONG 084 40 06W)								
MAY 1997								
27...	0945	242	8.3	9.0	--	11.7	--	--
442533084410601 HIGGINS LAKE, SITE 20 NEAR ROSCOMMON, MI (LAT 44 25 33N LONG 084 41 06W)								
MAY 1997								
20...	1200	242	8.1	7.5	0.35	11.8	7.7	152
SEP 02...	0945	241	8.0	18.5	0.75	8.6	7.4	158
DATE		BORON, DIS-SOLVED (UG/L AS B) (01020)	NITROGEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC DIS-SOLVED (MG/L AS N) (00623)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS, ORTHO, DIS-SOLVED (MG/L AS P) (00671)
44274808444501 HIGGINS LAKE, SITE 3, NEAR ROSCOMMON, MI (LAT 44 27 48N LONG 084 44 45W)								
MAY 1997								
28...	11	0.004	0.086	0.010	<0.20	0.010	0.002	0.002
AUG 27...	13	0.001	0.055	0.002	<0.20	0.020	0.002	0.001
442803084411601 HIGGINS LAKE, SITE 10, NEAR ROSCOMMON, MI (LAT 44 28 03N LONG 084 41 16W)								
MAY 1997								
27...	--	0.003	0.021	0.005	<0.20	0.006	0.001	0.002
442717084401501 HIGGINS LAKE, SITE 11, NEAR ROSCOMMON, MI (LAT 44 27 17N LONG 084 40 15W)								
MAY 1997								
27...	--	0.009	0.022	0.009	<0.20	0.006	0.002	0.002
442617084400601 HIGGINS LAKE, SITE 12, NEAR ROSCOMMON, MI (LAT 44 26 17N LONG 084 40 06W)								
MAY 1997								
27...	--	0.008	0.015	0.010	<0.20	0.014	0.005	0.006
442533084410601 HIGGINS LAKE, SITE 20 NEAR ROSCOMMON, MI (LAT 44 25 33N LONG 084 41 06W)								
MAY 1997								
20...	13	0.002	0.011	<0.002	<0.20	0.002	0.001	0.002
SEP 02...	14	<0.001	<0.005	<0.002	1.0	0.006	0.002	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)	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)	
442640084400001		HIGGINS LAKE, SITE 21, NEAR ROSCOMMON, MI (LAT 44 26 40N LONG 084 40 00W)							
MAY 1997									
27...	1030	243	8.2	9.5	--	11.5	--	--	
SEP 02...	1230	235	8.2	20.0	0.50	8.7	8.0	149	
442811084430701		HIGGINS LAKE, SITE 22, NEAR ROSCOMMON, MI (LAT 44 28 11N LONG 084 43 07W)							
MAY 1997									
21...	1345	247	8.1	9.5	0.50	11.3	7.3	157	
442958084462801		HIGGINS LAKE, SITE 23, NEAR ROCCOMMON, MI (LAT 44 29 58N LONG 084 46 28W)							
MAY 1997									
28...	1230	276	8.1	15.5	--	9.6	--	--	
443027084460601		HIGGINS LAKE, SITE 24, NEAR ROSCOMMON, MI (LAT 44 30 27N LONG 084 46 06W)							
MAY 1997									
28...	1045	266	8.1	11.5	--	10.6	--	--	
AUG 27...	1230	270	8.2	21.0	2.0	9.0	13	171	
442940084414901		HIGGINS LAKE, SITE 27, NEAR ROSCOMON, MI (LAT 44 29 40N LONG 084 41 49W)							
MAY 1997									
28...	1000	240	8.2	10.0	--	11.0	--	--	
AUG 27...	1045	252	8.3	19.5	0.40	8.3	7.7	150	
DATE		BORON, DIS- SOLVED (UG/L AS B) (01020)	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. (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)
442640084400001		HIGGINS LAKE, SITE 21, NEAR ROSCOMMON, MI (LAT 44 26 40N LONG 084 40 00W)							
MAY 1997									
27...	--	0.008	0.016	0.012	<0.20	0.006	0.001	0.002	
SEP 02...	11	<0.001	<0.005	<0.002	<0.20	0.005	0.002	0.001	
442811084430701		HIGGINS LAKE, SITE 22, NEAR ROSCOMMON, MI (LAT 44 28 11N LONG 084 43 07W)							
MAY 1997									
21...	11	0.003	0.021	0.002	<0.20	0.005	0.003	0.003	
442958084462801		HIGGINS LAKE, SITE 23, NEAR ROCCOMMON, MI (LAT 44 29 58N LONG 084 46 28W)							
MAY 1997									
28...	--	0.007	0.037	0.006	0.21	0.016	0.003	0.003	
443027084460601		HIGGINS LAKE, SITE 24, NEAR ROSCOMMON, MI (LAT 44 30 27N LONG 084 46 06W)							
MAY 1997									
28...	--	0.002	0.093	0.003	<0.20	0.006	0.002	<0.001	
AUG 27...	12	0.002	0.016	0.002	<0.20	0.012	0.002	0.001	
442940084414901		HIGGINS LAKE, SITE 27, NEAR ROSCOMON, MI (LAT 44 29 40N LONG 084 41 49W)							
MAY 1997									
28...	--	0.007	0.025	0.011	<0.20	0.012	0.001	0.003	
AUG 27...	13	0.001	0.011	0.003	<0.20	0.006	0.002	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)	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)	
442629084421701		HIGGINS LAKE, SITE 28, NEAR ROSCOMMON, MI (LAT 44 26 29N LONG 084 42 17W)							
MAY 1997									
21...	1500	254	8.1	11.5	0.30	12.0	8.6	159	
SEP									
02...	1030	245	8.1	18.5	0.41	8.6	8.6	157	
443019084461301		HIGGINS LAKE, SITE 29, NEAR ROSCOMMON, MI (LAT 44 30 19N LONG 084 46 13W)							
MAY 1997									
28...	1130	258	8.1	12.0	--	10.3	--	--	
AUG									
27...	1400	271	8.2	22.5	0.60	9.0	12	159	
442748084450601		HIGGINS LAKE, SITE 30, NEAR ROSCOMMON, MI (LAT 44 27 48N LONG 084 45 06W)							
MAY 1997									
21...	1240	252	8.3	8.5	0.45	11.9	9.2	162	
AUG									
27...	1530	252	8.3	21.5	0.23	8.8	8.2	149	
442851084433001		HIGGINS LAKE, SITE 31, NEAR ROSCOMMON, MI (LAT 44 28 51N LONG 084 43 30W)							
MAY 1997									
28...	1430	238	8.2	11.5	--	10.3	--	--	
DATE		BORON, DIS- SOLVED (UG/L AS B) (01020)	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. (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)
442629084421701		HIGGINS LAKE, SITE 28, NEAR ROSCOMMON, MI (LAT 44 26 29N LONG 084 42 17W)							
MAY 1997									
21...	9.2	<0.001	0.025	<0.002	<0.20	0.008	0.002	0.002	
SEP									
02...	15	<0.001	0.007	<0.002	<0.20	0.007	0.001	<0.001	
443019084461301		HIGGINS LAKE, SITE 29, NEAR ROSCOMMON, MI (LAT 44 30 19N LONG 084 46 13W)							
MAY 1997									
28...	--	0.003	0.026	0.005	<0.20	0.005	0.001	0.002	
AUG									
27...	13	0.001	0.005	0.003	<0.20	0.007	0.002	0.001	
442748084450601		HIGGINS LAKE, SITE 30, NEAR ROSCOMMON, MI (LAT 44 27 48N LONG 084 45 06W)							
MAY 1997									
21...	9.9	<0.001	0.034	<0.002	<0.20	0.004	0.002	0.002	
AUG									
27...	12	0.072	1.04	0.042	<0.20	0.006	0.004	0.004	
442851084433001		HIGGINS LAKE, SITE 31, NEAR ROSCOMMON, MI (LAT 44 28 51N LONG 084 43 30W)							
MAY 1997									
28...	--	0.011	0.016	0.011	<0.20	0.004	0.002	0.002	

STREAMS TRIBUTARY TO LAKE MICHIGAN

HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	TURBIDITY (NTU) (00076)	OXYGEN, DIS-SOLVED (MG/L) (00300)	CHLORIDE, DIS-SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)
442755084404401 HIGGINS LAKE, SITE 32, NEAR ROSCOMMON, MI (LAT 44 27 55N LONG 084 40 44W)								
MAY 1997								
27...	1245	244	8.1	11.0	--	11.4	--	--
SEP 02...	1100	240	8.1	20.0	0.24	8.4	7.8	152
442815084412901 HIGGINS LAKE, SITE 33, NEAR ROSCOMMON, MI (LAT 44 28 15N LONG 084 41 29W)								
MAY 1997								
27...	1415	245	8.1	11.5	--	11.7	--	--
442755084404401 HIGGINS LAKE, SITE 32, NEAR ROSCOMMON, MI (LAT 44 27 55N LONG 084 40 44W)								
DATE	BORON, DIS-SOLVED (UG/L AS B) (01020)	NITROGEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC DIS (MG/L AS N) (00623)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
442755084404401 HIGGINS LAKE, SITE 32, NEAR ROSCOMMON, MI (LAT 44 27 55N LONG 084 40 44W)								
MAY 1997								
27...	--	0.010	0.021	0.015	<0.20	0.006	0.002	0.002
SEP 02...	13	<0.001	0.006	<0.002	<0.20	0.004	0.001	0.001
442815084412901 HIGGINS LAKE, SITE 33, NEAR ROSCOMMON, MI (LAT 44 28 15N LONG 084 41 29W)								
MAY 1997								
27...	--	0.004	0.013	0.006	<0.20	0.008	0.003	0.002
442748084444504 SITE 3, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 27 48N LONG 084 44 45W)								
DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	E. COLI WATER WHOLE TOTAL UREASE (COL/100 ML) (31633)	CHLORIDE, DIS-SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)
442748084444504 SITE 3, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 27 48N LONG 084 44 45W)								
MAY 1997								
28...	1330	665	7.5	11.5	8.1	--	73	458
AUG 27...	1500	742	7.3	18.5	7.2	K4	77	431
442748084444504 SITE 3, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 27 48N LONG 084 44 45W)								
DATE	BORON, DIS-SOLVED (UG/L AS B) (01020)	NITROGEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC DIS (MG/L AS N) (00623)	PHOSPHORUS TOTAL (MG/L AS P) (00665)	PHOSPHORUS DIS-SOLVED (MG/L AS P) (00666)	PHOSPHORUS ORTHO, DIS-SOLVED (MG/L AS P) (00671)
442748084444504 SITE 3, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 27 48N LONG 084 44 45W)								
MAY 1997								
28...	107	0.003	1.67	0.038	0.20	0.017	0.001	<0.001
AUG 27...	557	<0.001	0.891	<0.002	<0.20	0.013	0.003	0.002

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)	E. COLI WATER WHOLE TOTAL UREASE (COL / 100 ML) (31633)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 106 DEG. C, TOTAL (MG/L) (00500)
442803084411604		SITE 10, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 03N LONG 084 41 16W)						
MAY 1997 27...	1345	298	7.6	10.0	1.0	--	1.8	198
442717084401504		SITE 11, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 27 17N LONG 084 40 15W)						
MAY 1997 27...	1145	186	8.1	10.0	1.3	--	0.92	163
442617084400604		SITE 12, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 26 17N LONG 084 40 06W)						
MAY 1997 27...	1000	412	6.9	10.5	1.1	--	18	321
442533084410604		SITE 20, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 25 33N LONG 084 41 06W)						
MAY 1997 20...	1215	400	7.4	8.0	3.1	--	1.3	237
SEP 02...	1000	713	6.5	18.5	--	K6	1.4	--
442640084400004		SITE 21, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 26 40N LONG 084 40 00W)						
MAY 1997 27...	1045	730	7.4	11.0	--	--	88	509
SEP 02...	1245	470	7.6	19.0	0.6	K1	25	324
442811084430704		SITE 22 , WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 11N LONG 084 43 07W)						
MAY 1997 21...	1400	347	8.0	8.0	--	--	34	243
DATE	BORON, DIS- SOLVED (UG/L AS B) (01020)	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. (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 LAND-SURFACE (LAT 44 28 03N LONG 084 41 16W)						
MAY 1997 27...	21	0.001	<0.005	0.008	<0.20	0.013	0.004	0.001
442717084401504		SITE 11, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 27 17N LONG 084 40 15W)						
MAY 1997 27...	4.8	0.001	<0.005	0.020	<0.20	0.053	0.039	0.036
442617084400604		SITE 12, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 26 17N LONG 084 40 06W)						
MAY 1997 27...	12	<0.001	0.009	1.62	4.2	0.023	0.002	0.001
442533084410604		SITE 20, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 25 33N LONG 084 41 06W)						
MAY 1997 20...	<4.0	0.001	0.283	<0.002	<0.20	0.003	0.001	0.002
SEP 02...	8.6	0.002	<0.005	1.68	2.2	0.033	0.012	0.011
442640084400004		SITE 21, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 26 40N LONG 084 40 00W)						
MAY 1997 27...	141	<0.001	<0.005	0.123	<0.20	0.015	0.007	0.007
SEP 02...	41	0.204	1.25	<0.002	<0.20	0.029	0.024	0.020
442811084430704		SITE 22 , WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 11N LONG 084 43 07W)						
MAY 1997 21...	4.5	<0.001	<0.005	0.029	<0.20	0.014	0.008	0.006

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)	E. COLI WATER WHOLE TOTAL UREASE (COL/ 100 ML) (31633)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)
442958084462804 SITE 23, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 29 58N LONG 084 46 28W)								
MAY 1997								
28...	1245	244	7.9	11.0	1.0	--	4.1	283
443027084460604 SITE 24, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 30 27N LONG 084 46 06W)								
MAY 1997								
28...	1100	504	7.4	10.5	4.0	--	54	317
AUG								
27...	1300	431	7.0	15.0	1.4	K8	57	248
442940084414904 SITE 27, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 29 40N LONG 084 41 49W)								
MAY 1997								
28...	1015	289	6.9	10.0	1.1	--	18	188
AUG								
27...	1100	282	7.4	17.0	0.5	<1	4.5	214
442629084421704 SITE 28, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 26 29N LONG 084 42 17W)								
MAY 1997								
21...	1515	641	7.2	10.5	5.8	--	17	413
SEP								
02...	1045	606	7.0	18.0	7.3	22	15	402
443019084461304 SITE 29, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 30 19N LONG 084 46 13W)								
MAY 1997								
28...	1145	665	7.4	10.5	1.0	--	100	356
AUG								
27...	1415	548	6.8	19.0	0.3	K4	83	328
DATE	BORON, DIS- SOLVED (UG/L AS B) (01020)	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- (MG/L AS N) (00623)	PHOS- PHORUS TOTAL (MG/L AS P) (00666)	PHOS- PHORUS DIS- SOLVED (MG/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (MG/L AS P) (00671)
442958084462804 SITE 23, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 29 58N LONG 084 46 28W)								
MAY 1997								
28...	<4.0	0.001	<0.005	0.025	<0.20	0.026	0.005	0.003
443027084460604 SITE 24, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 30 27N LONG 084 46 06W)								
MAY 1997								
28...	14	0.001	1.82	0.008	<0.20	0.019	0.009	<0.001
AUG								
27...	21	0.006	1.69	0.007	<0.20	0.015	0.007	0.008
442940084414904 SITE 27, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 29 40N LONG 084 41 49W)								
MAY 1997								
28...	30	<0.001	0.009	0.007	<0.20	0.015	0.004	0.003
AUG								
27...	17	0.003	<0.005	0.059	0.38	0.029	0.012	0.011
442629084421704 SITE 28, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 26 29N LONG 084 42 17W)								
MAY 1997								
21...	45	0.138	7.65	0.310	0.33	0.147	0.147	0.775
SEP								
02...	16	<0.001	0.664	<0.002	<0.20	0.067	0.002	0.001
443019084461304 SITE 29, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 30 19N LONG 084 46 13W)								
MAY 1997								
28...	47	0.003	<0.005	0.012	<0.20	0.087	0.063	0.062
AUG								
27...	84	0.013	1.03	0.194	0.34	0.020	0.003	0.001

STREAMS TRIBUTARY TO LAKE MICHIGAN
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

DATE	TIME	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	OXYGEN, DIS-SOLVED (MG/L) (00300)	E. COLI WATER WHOLE TOTAL UREASE (COL/100 ML) (31633)	CHLORIDE, DIS-SOLVED (MG/L AS CL) (00940)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L) (00500)
442748084450604 SITE 30, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 27 48N LONG 084 45 06W)								
MAY 1997								
21...	1240	1390	7.4	8.0	4.3	--	270	1250
AUG								
27...	1530	1770	7.2	21.0	1.0	20	270	1060
442851084433004 SITE 31, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 51N LONG 084 43 30W)								
MAY 1997								
28...	1415	271	7.7	10.5	0.9	--	5.2	181
442755084404404 SITE 32, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 27 55N LONG 084 40 44W)								
MAY 1997								
27...	1300	326	7.4	10.5	0.9	--	17	224
SEP								
02...	1115	281	7.7	19.5	2.0	--	11	198
442815084412904 SITE 33, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 15N LONG 084 41 29W)								
MAY 1997								
27...	1430	342	7.7	11.5	1.8	--	12	233
DATE	BORON, DIS-SOLVED (UG/L AS B) (01020)	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 (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)
442748084450604 SITE 30, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 27 48N LONG 084 45 06W)								
MAY 1997								
21...	34	0.008	3.66	0.018	0.20	0.012	0.002	0.003
AUG								
27...	73	<0.001	0.011	<0.002	<0.20	0.005	0.002	0.001
442851084433004 SITE 31, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 51N LONG 084 43 30W)								
MAY 1997								
28...	5.9	<0.001	0.009	0.014	0.23	0.045	0.023	0.020
442755084404404 SITE 32, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 27 55N LONG 084 40 44W)								
MAY 1997								
27...	26	<0.001	0.010	0.940	1.1	0.025	0.010	0.011
SEP								
02...	20	0.001	<0.005	0.010	<0.20	0.016	0.012	0.010
442815084412904 SITE 33, WATER TABLE 2 FEET BELOW LAND-SURFACE (LAT 44 28 15N LONG 084 41 29W)								
MAY 1997								
27...	43	0.139	2.30	<0.002	<0.20	0.008	0.002	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 WATER 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)	BORON, DIS- SOLVED (UG/L AS B) (01020)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)
MAY 1997 21...	1000	0.25	7.8	7.5	151	9.2	<0.001
DATE		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)
MAY 1997 21...	0.006	<0.002	<0.20	0.005	0.001	0.001	

442955084453005 - HIGGINS LAKE, SITE 25, NEAR ROSCOMMON, MI (LAT 44 29 55N LONG 084 45 30W)

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)	BORON, DIS- SOLVED (UG/L AS B) (01020)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)
JUL 1997 22...	1430	0.35	9.1	7.8	156	12	0.006
AUG 28...	1400	0.60	7.2	6.7	161	13	<0.001
DATE		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 1997 22...	0.007	<0.002	<0.20	0.001	0.002	0.002	
AUG 28...	<0.005	<0.002	<0.20	0.004	0.002	0.001	

STREAMS TRIBUTARY TO LAKE MICHIGAN
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

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)	BORON, DIS- SOLVED (UG/L AS B) (01020)	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 1997												
22...	1400	0.30	7.3	158	11	0.006	0.006	<0.002	<0.20	0.003	0.002	0.001
AUG												
28...	1330	0.22	6.7	152	11	<0.001	<0.005	<0.002	<0.20	--	0.005	0.001

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)
MAY 1997			
21...	1000	0.610	<0.100
JUL			
22...	1430	0.460	<0.100
AUG			
28...	1400	0.490	<0.100

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 WATER 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)	BORON, DIS- SOLVED (UG/L AS B) (01020)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)
MAY 1997 20...	1000	0.21	5.9	7.4	147	9.9	0.001
DATE		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. (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)
MAY 1997 20...	0.005	<0.002	<0.20	0.003	0.001	0.002	

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)	BORON, DIS- SOLVED (UG/L AS B) (01020)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)
JUL 1997 22...	1115	0.25	9.8	7.4	143	12	0.009
AUG 28...	1130	0.12	7.2	6.7	158	8.7	<0.001
DATE		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. (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 1997 22...	0.007	<0.002	<0.20	0.001	0.001	0.001	
AUG 28...	<0.005	<0.002	<0.20	--	0.006	0.001	

STREAMS TRIBUTARY TO LAKE MICHIGAN
HIGGINS LAKE NEAR ROSCOMMON, MI--Continued

WATER-QUALITY DATA

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)	BORON, DIS- SOLVED (UG/L AS B) (01020)	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 ORTHOPHOS- PHATE DIS- SOLVED (MG/L AS P) (00671)
JUL 1997												
22...	1030	0.30	8.3	158	14	0.007	<0.005	<0.002	<0.20	0.004	0.002	0.002
AUG												
28...	1100	0.36	6.6	169	14	<0.001	<0.005	<0.002	<0.20	0.012	0.010	0.008

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)
MAY 1997			
20...	1000	0.630	<0.100
JUL			
22...	1115	0.530	<0.100
AUG			
28...	1130	0.610	<0.100

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 WHELD 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)
MAY 1997							
21...	0945	1.00	239	8.1	6.0	12.1	101
21...	0948	5.00	239	8.1	6.0	12.1	101
21...	0951	10.0	239	8.1	6.0	12.1	101
21...	0954	20.0	239	8.1	6.0	12.1	101
21...	0957	30.0	239	8.1	6.0	12.0	100
21...	1001	40.0	239	8.1	6.0	12.0	100
21...	1003	50.0	239	8.1	6.0	12.0	100
21...	1006	60.0	240	8.1	6.0	12.0	100
21...	1009	70.0	239	8.1	6.0	11.9	99
21...	1011	80.0	241	8.1	6.0	11.9	99
21...	1013	90.0	240	8.1	6.0	12.0	100
21...	1015	100.0	240	8.1	6.0	11.9	99
21...	1018	110.0	235	8.1	6.0	11.9	99
21...	1021	120.0	235	8.1	5.5	11.8	97
21...	1023	125.0	235	8.1	5.5	11.7	96
21...	1026	128.0	242	8.1	5.5	11.6	96
JUL							
22...	1249	1.00	234	8.2	21.5	8.6	101
22...	1250	5.00	237	8.3	21.5	8.6	101
22...	1251	10.0	234	8.3	21.5	8.6	101
22...	1252	20.0	230	8.3	21.5	8.7	102
22...	1253	30.0	234	8.3	21.0	8.7	101
22...	1254	40.0	230	8.2	13.0	10.8	106
22...	1255	50.0	230	8.2	10.0	11.0	101
22...	1256	60.0	230	8.1	9.0	10.7	96
22...	1257	70.0	229	8.1	8.5	10.8	96
22...	1258	80.0	228	8.0	8.0	10.3	90
22...	1259	90.0	226	8.0	7.5	10.0	87
22...	1300	100.0	235	7.9	7.0	9.3	79
AUG							
28...	1330	1.00	255	8.3	18.0	9.2	102
28...	1333	10.0	255	8.3	18.0	9.2	102
28...	1336	20.0	255	8.3	18.0	9.2	102
28...	1339	30.0	255	8.3	18.0	9.2	102
28...	1341	35.0	255	8.3	18.0	9.2	102
28...	1343	40.0	255	8.2	13.0	10.8	107
28...	1346	45.0	255	8.2	12.0	11.0	107
28...	1349	50.0	255	8.2	10.5	10.6	99
28...	1352	55.0	255	8.1	10.0	10.2	94
28...	1355	65.0	255	8.0	9.5	9.7	89
28...	1358	75.0	255	7.9	8.5	9.2	82
28...	1401	85.0	255	7.8	7.5	8.2	71
28...	1404	95.0	255	7.8	7.0	7.4	64
28...	1407	105.0	255	7.7	6.5	6.0	51
28...	1410	115.0	255	7.7	6.5	3.0	25
28...	1413	125.0	255	7.7	6.5	2.5	21

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)
MAY 1997							
20...	0920	1.00	237	8.1	6.0	12.1	102
20...	0923	5.00	237	8.1	6.5	12.0	102
20...	0926	10.0	237	8.1	6.5	11.9	101
20...	0929	20.0	236	8.1	6.5	11.9	101
20...	0931	30.0	239	8.1	6.5	11.9	101
20...	0934	40.0	234	8.1	6.0	11.9	100
20...	0937	50.0	238	8.1	6.0	11.9	100
20...	0940	60.0	227	8.1	6.0	11.8	99
20...	0943	70.0	235	8.1	6.0	11.8	99
20...	0946	80.0	232	8.1	6.0	11.8	99
20...	0949	90.0	240	8.1	6.0	11.8	99
20...	0951	95.0	240	8.1	6.0	11.6	97
JUL							
22...	1000	1.00	235	8.2	21.5	8.4	99
22...	1004	5.00	235	8.2	21.5	8.4	99
22...	1006	10.0	235	8.2	21.5	8.4	99
22...	1007	20.0	235	8.2	21.5	8.6	101
22...	1008	30.0	232	8.2	17.0	9.9	106
22...	1009	40.0	229	8.2	13.0	10.8	106
22...	1010	50.0	229	8.2	10.0	11.1	102
22...	1011	60.0	228	8.1	9.0	10.9	98
22...	1012	70.0	228	8.1	8.5	10.7	95
22...	1013	80.0	229	8.0	8.5	10.3	91
22...	1014	90.0	237	7.7	8.0	7.4	65
22...	1015	95.0	239	7.7	7.5	6.6	57
22...	1016	99.0	242	7.6	7.5	5.1	44
AUG							
28...	1008	1.00	255	8.3	19.0	9.0	101
28...	1010	10.0	255	8.3	19.0	8.9	100
28...	1011	20.0	255	8.3	19.0	8.9	100
28...	1012	30.0	255	8.3	19.0	8.9	100
28...	1014	35.0	255	8.3	19.0	8.9	100
28...	1016	40.0	255	8.3	18.5	8.9	99
28...	1018	45.0	255	8.3	16.5	9.3	100
28...	1020	50.0	255	8.2	11.5	10.4	100
28...	1022	55.0	255	8.1	10.0	10.0	93
28...	1024	60.0	255	8.0	10.0	9.6	89
28...	1026	70.0	255	7.9	9.0	8.9	80
28...	1030	91.0	255	7.7	8.5	4.7	42

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.--Water-stage recorder. 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. September 1993 to Nov. 26, 1996, nonrecording gage.

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. Gage-height telemeter at station.

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, 9.30 ft, May 8; minimum, 7.99 ft, Sept. 25, 30.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	8.11	8.20	8.33	8.50	8.73	9.05	---	8.47	8.25	8.28
2	---	---	8.16	8.20	8.32	8.51	8.75	9.16	---	8.49	8.21	8.18
3	---	---	8.16	8.20	8.31	8.51	8.79	9.08	8.97	8.33	8.24	8.17
4	---	---	8.17	8.21	8.31	8.51	8.84	9.08	8.92	8.31	8.19	8.19
5	---	---	8.17	8.29	8.33	8.52	8.91	9.13	8.91	8.35	8.17	8.20
6	---	---	8.18	8.29	8.33	8.53	9.00	9.03	8.90	8.32	8.18	8.17
7	---	---	8.20	8.29	8.32	8.53	9.07	9.10	8.89	8.33	8.17	8.18
8	---	---	8.20	8.29	8.31	8.54	9.11	9.18	8.82	8.38	8.17	8.20
9	---	---	8.21	8.29	8.31	8.55	9.14	9.00	8.77	8.35	8.18	8.19
10	---	---	8.20	8.31	8.30	8.57	9.16	8.99	8.75	8.37	8.14	8.13
11	---	---	8.20	8.31	8.29	8.56	9.18	9.11	8.72	8.37	8.14	8.15
12	---	---	8.19	8.31	8.28	8.56	9.19	9.02	8.69	8.36	8.18	8.19
13	---	---	8.21	8.30	8.28	8.56	9.19	9.02	8.63	8.37	8.13	8.23
14	---	---	8.21	8.30	8.27	8.57	9.22	9.05	8.59	8.36	8.20	8.22
15	---	---	8.21	8.30	8.26	8.57	9.26	9.02	8.62	8.31	8.25	8.22
16	---	---	8.21	8.31	8.25	8.57	9.20	9.06	8.56	8.34	8.20	8.28
17	---	---	8.20	8.32	8.26	8.56	9.17	9.10	8.54	8.31	8.23	8.24
18	---	---	8.22	8.31	8.25	8.55	9.21	9.14	8.53	8.28	8.23	8.22
19	---	8.10	8.21	8.31	8.25	8.55	9.23	9.10	8.55	8.31	8.25	8.24
20	---	---	8.20	8.29	8.25	8.54	9.23	9.10	8.55	8.33	8.26	8.21
21	---	---	8.20	8.28	8.32	8.54	9.23	9.08	8.54	8.28	8.22	8.25
22	---	---	8.18	8.31	8.41	8.54	9.20	9.11	8.53	8.28	8.18	8.24
23	---	---	8.19	8.31	8.42	8.55	9.19	9.13	8.56	8.26	8.24	8.17
24	---	---	8.23	8.31	8.42	8.55	9.18	9.12	8.55	8.24	8.30	8.19
25	---	---	8.23	8.32	8.43	8.58	9.16	9.11	8.50	8.22	8.30	8.10
26	---	8.08	8.23	8.33	8.43	8.59	9.18	9.09	8.46	8.35	8.29	8.14
27	---	8.08	8.22	8.33	8.46	8.60	9.17	9.10	8.48	8.34	8.25	8.17
28	---	8.07	8.22	8.33	8.50	8.62	9.14	9.09	8.47	8.27	8.23	8.16
29	---	8.06	8.21	8.33	---	8.64	9.14	9.08	8.49	8.28	8.26	8.10
30	8.11	8.06	8.21	8.33	---	8.68	9.11	9.04	8.47	8.26	8.29	8.01
31	---	---	8.20	8.33	---	8.70	---	---	---	8.26	8.27	---
MEAN	---	---	8.20	8.29	8.33	8.56	9.11	---	---	8.33	8.22	8.19
MAX	---	---	8.23	8.33	8.50	8.70	9.26	---	---	8.49	8.30	8.28
MIN	---	---	8.11	8.20	8.25	8.50	8.73	---	---	8.22	8.13	8.01

(a) Observed.

STREAMS TRIBUTARY TO LAKE MICHIGAN

441508085244001 LAKE MITCHELL-CADILLAC AT CADILLAC, MI

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.

DRAINAGE AREA.--46.6 mi².

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, 1953.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 6.83 ft, May 6; minimum observed, 5.91 ft, Dec. 14-16, 22-24, Jan. 4, Feb. 17.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.49	6.15	5.95	5.94	6.12	---	6.31	6.73	6.59	6.57	6.35	---
2	6.51	6.17	5.95	5.93	6.11	6.25	6.35	6.75	6.57	6.59	6.33	---
3	6.53	6.15	5.95	5.93	6.11	6.25	6.39	6.77	6.56	6.59	6.29	---
4	6.51	6.15	5.95	5.91	6.11	6.25	6.43	---	6.53	6.57	---	---
5	6.49	6.14	5.95	5.97	6.13	6.23	6.51	6.81	6.53	6.57	6.29	---
6	6.35	6.13	5.95	5.99	6.11	6.23	6.57	6.83	6.63	6.55	6.25	---
7	6.31	6.15	5.95	5.99	6.11	6.21	6.64	6.79	6.52	6.55	6.25	---
8	6.29	6.13	5.95	6.01	6.09	6.23	6.71	6.79	6.51	6.53	6.25	---
9	6.25	6.13	5.93	6.01	6.10	6.23	6.77	6.79	6.50	6.53	6.25	---
10	6.23	6.13	5.93	6.03	6.11	6.23	6.77	6.77	6.50	6.53	6.25	---
11	6.21	6.13	5.93	6.02	6.09	6.23	6.75	6.77	6.50	6.52	6.25	---
12	6.21	6.11	5.93	6.03	6.09	6.21	6.77	6.77	6.50	6.53	6.29	---
13	6.17	6.11	5.93	6.03	6.07	6.21	6.79	6.77	6.50	---	6.38	---
14	6.15	6.09	5.91	6.03	6.05	6.21	6.79	6.73	6.49	6.51	6.46	---
15	6.11	6.07	5.91	6.03	5.94	6.21	6.77	6.75	6.49	6.49	6.53	---
16	6.09	6.03	5.91	---	5.93	6.19	6.77	6.75	6.49	6.47	6.53	---
17	6.07	6.03	5.93	6.03	5.91	6.17	6.77	6.75	6.49	6.47	6.53	---
18	6.11	6.01	5.93	6.03	5.99	6.17	6.75	6.75	6.49	6.47	6.53	---
19	6.11	6.01	5.93	6.01	5.97	6.15	6.71	6.75	6.47	6.45	6.52	---
20	6.11	6.01	5.93	6.00	5.99	6.15	6.71	6.75	6.49	6.43	6.51	---
21	6.09	5.99	5.93	5.99	6.11	6.14	6.70	6.75	6.53	6.41	6.51	---
22	6.07	5.97	5.91	6.07	6.15	---	6.70	6.73	6.57	---	6.55	---
23	6.11	5.97	5.91	6.11	6.13	6.13	6.69	6.70	6.59	6.41	6.55	---
24	6.13	5.97	5.91	6.12	6.15	6.13	6.69	6.67	6.61	---	6.57	---
25	6.13	5.97	5.93	6.13	6.15	6.17	6.65	6.67	6.64	6.39	6.59	---
26	6.13	5.95	5.93	6.13	6.17	6.17	6.65	6.65	6.63	6.44	6.59	---
27	6.13	5.95	---	6.12	---	6.17	6.67	6.65	6.63	6.45	6.57	---
28	6.13	---	---	6.13	6.21	6.19	6.69	6.65	6.61	6.45	6.57	---
29	6.15	---	---	6.13	---	6.21	6.69	6.63	6.57	6.43	6.57	---
30	6.21	---	5.93	6.13	---	6.25	6.69	6.65	6.57	6.40	6.55	---
31	6.22	---	5.93	6.13	---	6.27	---	6.63	---	6.39	6.57	---
MEAN	6.22	---	---	---	---	---	6.66	---	6.54	---	---	---
MAX	6.53	---	---	---	---	---	6.79	---	6.64	---	---	---
MIN	6.07	---	---	---	---	---	6.31	---	6.47	---	---	---

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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	96	206	146	125	146	194	423	164	137	115	77	102
2	93	175	188	126	147	200	361	202	132	115	77	99
3	90	158	175	131	147	216	377	180	127	98	78	96
4	99	149	153	143	147	215	406	173	124	94	79	94
5	117	143	141	211	143	208	409	179	119	94	79	93
6	123	138	135	231	146	197	403	198	111	92	76	93
7	125	139	135	207	149	184	366	205	108	88	77	94
8	123	142	133	202	149	183	312	197	106	96	76	93
9	122	139	132	194	149	179	274	217	103	118	75	89
10	121	137	130	139	142	177	256	232	101	106	78	85
11	121	134	129	146	138	179	246	224	100	94	86	84
12	120	131	128	143	135	177	242	213	102	90	91	88
13	120	129	128	e140	114	172	241	207	102	87	104	90
14	118	127	129	e140	130	166	253	202	96	85	102	87
15	116	121	133	e135	140	143	254	220	95	82	98	85
16	115	130	142	e130	137	167	251	246	94	81	107	83
17	117	132	143	125	129	175	246	254	93	83	109	101
18	137	144	138	118	135	171	238	242	92	84	120	117
19	147	141	109	138	164	172	228	235	92	82	115	107
20	135	133	113	144	180	167	220	229	95	81	108	122
21	127	128	121	141	234	172	217	214	104	83	124	114
22	123	124	127	153	252	209	213	200	112	85	131	98
23	138	125	133	204	316	239	207	188	102	83	116	92
24	179	123	151	246	292	236	196	178	94	80	107	88
25	175	122	144	205	265	236	194	173	98	79	109	95
26	154	119	128	202	242	248	188	173	95	90	107	109
27	140	117	123	176	213	283	166	161	90	99	103	112
28	132	118	129	163	214	368	147	153	88	88	102	112
29	129	122	149	162	---	497	139	138	87	81	101	114
30	177	124	147	151	---	608	129	137	87	79	100	119
31	220	---	132	141	---	544	---	141	---	78	101	---
TOTAL	4048	4070	4244	5014	4895	7282	7802	6075	3084	2790	3013	2955
MEAN	131	136	137	162	175	236	260	196	103	90.0	97.2	98.5
MAX	220	206	188	248	316	608	423	254	137	118	131	122
MIN	90	117	109	118	114	143	129	137	87	78	75	83
CFSM	.54	.56	.56	.67	.72	.97	1.07	.81	.42	.37	.40	.41
IN.	.62	.62	.65	.77	.75	1.11	1.19	.93	.47	.43	.46	.45

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1997, BY WATER YEAR (WY)

	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
MEAN	118	138	139	124	123	195	243	156	115	91.4	85.5	101
MAX	275	248	259	187	194	389	396	245	218	238	185	281
(WY)	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1966 - 1997

ANNUAL TOTAL	54051	55272	
ANNUAL MEAN	148	151	
HIGHEST ANNUAL MEAN			136
LOWEST ANNUAL MEAN			185
HIGHEST DAILY MEAN			185
LOWEST DAILY MEAN			81.2
ANNUAL SEVEN-DAY MINIMUM	557	608	1680
INSTANTANEOUS PEAK FLOW	74	77	47
INSTANTANEOUS PEAK STAGE	76	77	50
ANNUAL RUNOFF (CFSM)		5.06	1710
ANNUAL RUNOFF (INCHES)	.61	73	7.31
10 PERCENT EXCEEDS	223	235	225
50 PERCENT EXCEEDS	128	133	112
90 PERCENT EXCEEDS	87	88	67

(a) Aug. 2, 9, 10.

(b) Result of freezeup.

(c) 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 Evart, 0.4 mi upstream from Twin Creek, and at mile 123.9.

DRAINAGE AREA.--1,433 mi².

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), WDR MI-96-1: Drainage area.

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. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1010	1600	1140	1210	e1600	2050	3730	1560	1400	669	456	593
2	972	1520	1550	1250	e1600	e2140	3750	1680	1350	680	443	570
3	932	1420	1610	1260	e1520	e2240	3610	1740	1310	668	434	548
4	884	1340	1530	1380	e1460	2350	3490	1700	1270	627	437	526
5	858	1290	1450	2080	e1440	2380	3580	1680	1250	602	435	508
6	861	1250	1410	2240	e1390	2380	3750	1760	1210	569	427	506
7	859	1270	1400	2160	e1320	2290	3840	1780	1160	552	436	501
8	860	1260	1390	1990	e1290	2050	3790	1810	1120	615	435	507
9	849	1220	1360	1840	e1260	e2000	3610	2030	1080	712	419	514
10	824	1170	1330	1660	e1250	1950	3330	2030	1050	695	421	495
11	811	1130	1290	1550	e1220	1900	3100	1960	1010	639	440	509
12	799	1100	1260	1480	1220	1810	2940	1880	971	599	496	535
13	788	1110	1250	1420	e1150	1700	2810	1810	934	568	733	541
14	766	1070	1240	1380	e1060	1630	2680	1770	891	547	704	534
15	749	983	1260	1400	1130	1500	2530	1900	849	526	659	525
16	740	991	1340	1350	e1160	1460	2450	2040	838	505	665	526
17	743	1010	1370	1200	e1170	e1490	2360	2140	810	494	651	627
18	848	1050	1330	e1100	1060	e1520	2250	2120	774	481	690	677
19	906	1050	1190	e1050	1330	1540	2130	2130	749	469	664	742
20	911	1030	1040	e1000	1530	1570	2030	2110	811	460	669	923
21	898	1030	988	e1100	1900	1770	1960	2070	919	468	761	874
22	881	1030	1040	e1400	2200	2080	1920	2010	967	468	839	842
23	986	1030	1090	e1700	e2300	2240	1850	1960	912	454	807	807
24	1120	1010	1310	e1800	e2170	2160	1790	1890	831	448	906	763
25	1180	982	1380	e1800	e2110	2190	1730	1860	823	441	910	735
26	1160	970	1320	e1750	e2090	2400	1650	1810	800	503	803	710
27	1130	941	1250	e1700	e2080	2540	1590	1700	738	517	734	703
28	1100	913	1180	e1700	2050	2880	1530	1590	693	660	677	703
29	1090	914	1280	e1700	---	3260	1470	1520	662	579	638	703
30	1380	941	1170	e1650	---	3590	1420	1490	639	524	611	710
31	1570	---	1200	e1650	---	3720	---	1440	---	486	602	---
TOTAL	29465	33625	39948	47950	43080	66780	78670	56970	28841	17225	19002	18963
MEAN	950	1121	1289	1547	1539	2154	2622	1838	961	556	613	632
MAX	1570	1600	1610	2240	2300	3720	3840	2140	1400	712	910	923
MIN	740	913	988	1000	1060	1460	1420	1440	639	441	419	495
CFSM	.66	.78	.90	1.08	1.07	1.50	1.83	1.28	.67	.39	.43	.44
IN.	.76	.87	1.04	1.24	1.12	1.73	2.04	1.48	.75	.45	.49	.49

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1997, BY WATER YEAR (WY)

MEAN	783	1007	984	879	897	1591	2244	1366	984	686	555	645
MAX	2402	2656	2270	1700	2353	4115	3869	2709	2945	2901	1243	2267
(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	325
(WY)	1949	1950	1977	1936	1936	1940	1945	1977	1988	1934	1941	1948

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1931 - 1997

ANNUAL TOTAL	480887	480522	(a)1060
ANNUAL MEAN	1314	1316	1532
HIGHEST ANNUAL MEAN			(b)613
LOWEST ANNUAL MEAN			8770
HIGHEST DAILY MEAN	4100	Jun 23	3840
LOWEST DAILY MEAN	460	Aug 18	419
ANNUAL SEVEN-DAY MINIMUM	470	Aug 13	430
INSTANTANEOUS PEAK FLOW			(c)3850
INSTANTANEOUS PEAK STAGE			(d)11.02
INSTANTANEOUS LOW FLOW			412
ANNUAL RUNOFF (CFSM)	.92	.92	.74
ANNUAL RUNOFF (INCHES)	12.48	12.47	10.05
10 PERCENT EXCEEDS	2090	2160	1980
50 PERCENT EXCEEDS	1150	1180	807
90 PERCENT EXCEEDS	644	526	448

(a) Does not include water years 1931, 1934.

(b) Estimated 584 ft³/s, water year 1931.

(c) Gage height 10.76 ft.

(d) Backwater from ice.

(e) Estimated.

(f) Result of freezeup.

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, or left bank downstream from Rogers Dam, 2.8 mi northwest of Stanwood.

DRAINAGE AREA.--1,834 mi².

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1995 to current year.

DISSOLVED OXYGEN: October 1995 to current year.

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, 1996, July 18, 28, 1997; minimum, 0.0°C, on many days during winter periods.

DISSOLVED OXYGEN: Maximum, 14.0 mg/L, Mar. 9, 1996; minimum, 5.4 mg/L, Aug. 6, 1997.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 25.5°C, July 18, 28; minimum, 0.0°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum recorded, 13.6 mg/L, Nov. 28, 29, but may have been higher during instrument malfunction Nov. 14-26; minimum, 5.4 mg/L, Aug. 6.

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

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

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121660 MUSKEGON RIVER NEAR STANWOOD, MI--Continued

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

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	15.5	14.5	15.0	24.5	23.5	24.0	23.0	22.0	22.5	18.5	18.0	18.0
2	17.0	15.5	16.5	24.0	23.0	23.5	22.5	22.0	22.0	19.5	18.0	18.5
3	19.0	17.0	18.0	24.0	22.0	23.0	22.5	22.0	22.5	19.0	18.0	18.5
4	19.0	18.5	18.5	22.0	19.5	21.0	22.5	22.0	22.5	18.0	16.5	17.5
5	19.5	18.5	19.0	19.5	18.5	19.0	22.5	21.0	21.5	17.0	16.5	17.0
6	19.5	18.5	19.0	19.5	19.0	19.5	21.0	20.5	21.0	17.0	16.0	16.5
7	19.5	18.5	19.0	20.0	19.0	19.5	21.0	20.0	20.5	17.5	17.0	17.0
8	20.0	18.5	19.0	20.0	19.0	19.5	21.0	20.0	20.5	17.5	16.5	17.0
9	20.5	19.0	19.5	20.0	18.5	19.5	21.0	20.0	20.5	17.0	16.5	17.0
10	21.0	20.0	20.5	19.5	18.5	19.0	21.5	20.5	21.0	17.5	17.0	17.0
11	21.5	21.0	21.0	21.0	19.5	20.0	21.5	20.0	21.0	17.0	16.5	17.0
12	21.5	21.0	21.0	21.5	20.5	21.0	20.0	19.0	19.5	16.5	16.0	16.5
13	22.0	21.5	21.5	23.0	21.5	22.0	19.0	17.5	18.5	16.0	15.5	16.0
14	21.5	20.5	21.0	24.0	22.5	23.0	18.0	17.0	17.5	16.5	16.0	16.5
15	20.5	20.0	20.5	24.5	23.5	24.0	18.5	17.0	17.5	17.0	16.5	16.5
16	20.5	20.0	20.5	25.0	24.5	24.5	19.5	18.5	18.5	17.5	16.5	17.0
17	20.0	19.5	19.5	25.0	24.5	25.0	19.5	19.0	19.5	19.0	17.5	18.0
18	20.0	19.5	19.5	25.5	24.5	25.0	19.0	17.5	18.0	19.0	18.0	18.5
19	20.5	20.0	20.0	25.0	24.5	24.5	18.0	17.5	18.0	19.0	18.5	18.5
20	20.5	20.0	20.5	24.5	23.5	24.0	18.5	18.0	18.0	18.5	17.0	18.0
21	20.5	19.5	20.0	23.5	23.0	23.5	18.0	17.0	17.5	17.0	15.0	16.0
22	20.5	19.0	19.5	23.0	22.0	22.5	17.5	16.5	17.0	15.5	14.0	15.0
23	22.0	20.0	21.0	22.0	21.5	21.5	17.5	16.5	17.0	15.0	14.5	14.5
24	23.5	22.0	22.5	21.5	21.5	21.5	17.5	17.0	17.5	14.5	13.5	14.0
25	24.0	23.0	23.5	22.5	21.5	22.0	17.0	16.5	17.0	14.5	13.5	14.0
26	24.5	24.0	24.0	23.5	22.5	22.5	17.0	16.5	16.5	15.0	14.0	14.5
27	24.0	23.0	23.5	24.5	23.5	24.0	19.0	17.0	17.5	14.5	14.0	14.0
28	24.0	23.0	23.5	25.5	24.5	25.0	19.0	18.5	19.0	14.0	14.0	14.0
29	24.5	23.5	24.0	25.0	23.5	24.5	18.5	17.5	18.5	14.0	13.5	14.0
30	24.5	23.5	24.0	23.5	22.5	23.0	18.0	17.5	18.0	14.0	13.5	13.5
31	---	---	---	23.0	22.0	22.5	18.5	17.5	18.0	---	---	---
MONTH	24.5	14.5	20.5	25.5	18.5	22.5	23.0	16.5	19.0	19.5	13.5	16.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121660 MUSKEGON RIVER NEAR STANWOOD, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUAR ^v		
1	10.1	9.7	9.9	11.3	10.8	11.1	13.2	12.4	12.8	12.7	12.6	12.7
2	10.2	9.9	10.1	11.5	11.3	11.4	12.5	12.1	12.2	12.8	12.6	12.7
3	9.9	9.5	9.7	11.7	11.5	11.6	12.5	12.2	12.4	12.7	12.5	12.6
4	10.4	9.6	10.0	11.9	11.7	11.8	12.7	12.5	12.6	12.7	12.5	12.6
5	10.8	10.2	10.5	11.9	11.8	11.8	12.9	12.7	12.8	12.6	12.4	12.5
6	10.7	10.5	10.6	11.8	11.4	11.6	12.8	12.7	12.8	12.6	12.0	12.2
7	10.7	10.5	10.6	11.4	10.7	11.1	12.8	12.6	12.7	12.1	12.0	12.1
8	10.5	9.9	10.1	10.7	10.3	10.5	12.8	12.6	12.7	12.2	12.1	12.1
9	10.0	9.6	9.8	10.8	10.4	10.6	12.7	12.6	12.7	12.3	12.2	12.3
10	10.4	10.0	10.2	11.0	10.7	10.8	12.8	12.6	12.7	12.3	12.1	12.2
11	10.5	10.3	10.4	11.6	10.8	11.3	12.8	12.7	12.8	12.1	11.8	11.9
12	10.9	10.5	10.6	12.1	11.5	11.7	12.7	12.6	12.7	11.8	11.7	11.7
13	10.7	10.6	10.7	12.4	12.1	12.2	12.6	12.5	12.6	11.8	11.7	11.8
14	10.8	10.4	10.6	---	---	---	12.7	12.5	12.6	11.9	11.7	11.8
15	10.4	10.1	10.2	---	---	---	12.7	12.5	12.6	11.9	11.7	11.8
16	10.2	10.0	10.1	---	---	---	12.5	12.3	12.4	11.8	11.6	11.8
17	10.1	9.8	10.0	---	---	---	12.5	12.3	12.4	11.6	11.4	11.5
18	9.9	9.3	9.6	---	---	---	12.6	12.4	12.5	11.4	11.3	11.3
19	9.3	9.1	9.1	---	---	---	12.9	12.5	12.7	11.3	11.2	11.3
20	9.7	9.1	9.5	---	---	---	13.1	12.9	13.0	11.3	11.1	11.2
21	10.0	9.6	9.8	---	---	---	13.4	13.1	13.2	11.1	10.7	10.9
22	10.0	9.7	9.8	---	---	---	13.2	12.8	13.1	10.7	10.5	10.6
23	10.0	9.0	9.8	---	---	---	12.8	12.5	12.7	10.7	10.6	10.7
24	9.9	9.7	9.8	---	---	---	12.7	12.4	12.5	10.7	10.6	10.7
25	10.0	9.8	9.9	---	---	---	12.7	12.3	12.4	10.6	10.5	10.6
26	10.4	10.0	10.2	---	---	---	12.9	12.7	12.8	10.5	10.4	10.5
27	10.4	10.2	10.3	13.4	13.1	13.2	13.0	12.8	12.9	10.5	10.3	10.4
28	10.3	10.0	10.2	13.6	13.3	13.4	12.9	12.7	12.8	10.3	10.2	10.3
29	10.2	9.9	10.0	13.6	13.3	13.4	12.7	12.4	12.6	10.2	10.2	10.2
30	10.3	10.1	10.2	13.4	13.1	13.3	12.5	12.4	12.4	10.3	10.2	10.2
31	10.8	10.2	10.5	---	---	---	12.6	12.4	12.5	10.3	10.2	10.2
MONTH	10.9	9.0	10.1	---	---	---	13.4	12.1	12.7	12.8	10.2	11.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	10.2	10.1	10.2	12.5	12.3	12.4	12.3	12.1	12.2	9.5	9.1	9.3	
2	10.3	10.1	10.2	12.4	12.2	12.3	12.2	11.8	12.0	9.9	9.3	9.7	
3	10.5	10.2	10.4	12.6	12.3	12.4	12.0	11.4	11.6	10.3	9.8	10.1	
4	10.8	10.5	10.6	12.6	12.4	12.5	11.6	11.0	11.2	10.4	10.0	10.2	
5	11.2	10.8	11.0	12.5	12.3	12.4	11.0	10.3	10.6	10.4	10.1	10.3	
6	11.4	11.2	11.3	12.5	12.4	12.4	10.4	10.1	10.2	10.2	10.0	10.1	
7	11.7	11.4	11.6	12.8	12.5	12.6	10.9	10.2	10.5	10.3	9.9	10.1	
8	11.9	11.7	11.8	12.8	12.6	12.7	11.6	10.8	11.1	10.3	9.7	10.0	
9	12.1	11.8	12.0	12.9	12.6	12.7	12.1	11.6	11.8	9.8	9.6	9.7	
10	12.4	12.1	12.3	12.8	12.6	12.7	12.3	11.8	12.1	10.3	9.7	10.1	
11	12.4	12.4	12.4	12.7	12.4	12.6	12.3	11.9	12.0	10.4	9.8	10.1	
12	12.5	12.4	12.4	12.6	12.4	12.5	12.0	11.6	11.8	9.9	9.5	9.8	
13	12.5	12.4	12.4	12.7	12.5	12.6	11.9	11.7	11.8	10.3	9.8	10.0	
14	12.6	12.4	12.5	12.8	12.5	12.7	11.9	11.6	11.7	10.3	10.1	10.2	
15	12.6	12.5	12.6	13.0	12.8	12.9	11.8	11.5	11.7	10.4	10.2	10.3	
16	12.7	12.6	12.6	13.1	12.9	13.0	11.6	11.0	11.3	10.7	10.2	10.5	
17	12.7	12.6	12.6	13.1	12.9	13.0	11.1	10.9	11.1	11.1	10.6	10.8	
18	12.8	12.6	12.7	12.9	12.4	12.6	11.2	10.9	11.1	10.9	10.4	10.7	
19	12.8	12.5	12.6	12.6	12.4	12.5	11.1	10.8	11.0	10.5	10.0	10.3	
20	12.6	12.4	12.5	12.7	12.2	12.5	11.0	10.7	10.9	10.2	9.9	10.0	
21	12.7	12.3	12.6	12.2	11.6	11.9	10.7	10.4	10.6	10.2	9.9	10.1	
22	12.5	12.3	12.4	11.7	11.5	11.6	10.7	10.4	10.6	10.2	9.8	10.0	
23	12.5	12.4	12.5	11.9	11.6	11.8	10.7	10.4	10.5	10.0	9.3	9.7	
24	12.6	12.5	12.5	12.2	11.9	12.0	10.8	10.4	10.6	9.6	8.9	9.3	
25	12.6	12.5	12.6	12.4	12.2	12.3	10.8	10.5	10.6	9.1	8.6	8.9	
26	12.6	12.3	12.4	12.3	12.1	12.3	10.8	10.4	10.6	8.9	8.5	8.7	
27	12.4	12.1	12.2	12.3	12.0	12.2	10.7	10.1	10.4	9.2	8.8	9.0	
28	12.4	12.1	12.3	12.1	11.4	11.7	10.1	9.8	9.9	9.1	8.7	8.9	
29	---	---	---	11.4	11.2	11.3	10.3	9.7	10.0	8.8	8.3	8.6	
30	---	---	---	11.7	11.3	11.5	10.0	9.3	9.7	8.3	8.1	8.2	
31	---	---	---	12.2	11.7	12.0	---	---	---	8.6	8.0	8.3	
MONTH	12.8	10.1	12.0	13.1	11.2	12.3	12.3	9.3	11.0	11.1	8.0	9.7	

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121660 MUSKEGON RIVER NEAR STANWOOD, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	8.9	8.4	8.7	7.7	6.2	6.8	7.6	6.5	7.0	8.6	7.9	8.3
2	9.0	8.5	8.7	7.8	6.4	7.3	7.0	6.1	6.5	9.2	8.2	8.8
3	8.9	8.4	8.6	7.5	5.9	6.8	7.8	6.7	7.1	9.0	8.0	8.6
4	9.0	8.2	8.5	7.2	5.9	6.6	8.2	7.0	7.7	8.6	6.3	8.1
5	9.0	7.8	8.6	8.0	6.5	7.3	8.3	6.3	7.6	9.1	8.4	8.7
6	9.1	7.8	8.5	8.8	7.3	8.0	7.5	5.4	7.0	9.2	8.6	8.9
7	8.7	7.8	8.2	9.2	7.6	8.7	8.0	7.0	7.4	9.3	8.9	9.1
8	8.0	7.3	7.7	10.0	7.9	8.7	6.0	7.3	7.7	9.2	8.3	8.8
9	7.3	6.8	7.0	9.0	7.8	8.4	8.1	7.2	7.7	8.7	8.1	8.4
10	7.4	6.4	6.9	9.3	8.2	8.7	7.9	7.5	7.7	9.0	8.3	8.8
11	7.0	6.2	6.6	9.5	8.5	9.0	7.7	6.3	7.3	8.6	7.9	8.3
12	7.4	5.6	6.5	9.6	8.6	9.1	7.4	5.8	6.5	8.0	7.3	7.8
13	8.2	6.9	7.5	9.2	8.2	8.7	7.6	6.7	7.2	8.4	7.6	8.0
14	8.0	5.9	7.1	8.8	7.5	8.2	8.0	7.5	7.7	8.9	8.1	8.4
15	7.4	6.2	7.0	8.4	7.3	7.9	8.3	7.7	8.0	8.5	8.0	8.3
16	7.4	6.3	6.8	8.0	7.0	7.7	8.3	7.9	8.1	8.9	8.3	8.6
17	7.1	6.2	6.8	8.1	6.7	7.5	8.2	7.7	7.9	8.8	8.0	8.4
18	7.9	6.8	7.4	8.5	7.1	7.6	7.7	6.9	7.3	8.4	7.6	8.1
19	8.5	7.7	8.1	9.0	7.5	8.2	8.6	6.9	8.0	8.3	7.9	8.1
20	8.5	7.0	8.0	8.4	6.1	7.7	8.8	8.3	8.5	8.3	7.6	7.9
21	8.2	7.1	7.6	8.3	6.8	7.6	8.6	7.8	8.3	8.2	7.7	8.0
22	8.5	7.4	7.8	8.0	7.0	7.7	8.6	7.8	8.2	8.8	8.2	8.6
23	8.6	7.5	8.3	8.5	7.4	7.8	9.2	8.3	8.8	9.6	8.7	8.3
24	8.6	7.7	8.2	8.1	7.5	7.8	9.2	8.5	8.9	9.5	9.0	8.3
25	8.5	7.1	7.7	8.7	8.0	8.3	8.5	7.9	8.2	10.0	9.3	8.7
26	7.9	6.8	7.4	8.4	7.8	8.0	8.4	7.7	8.1	10.2	9.7	9.9
27	8.0	6.0	7.0	8.2	7.6	7.9	8.8	8.1	8.5	9.8	9.4	9.6
28	8.0	6.3	7.3	8.1	6.9	7.7	8.9	8.3	8.6	9.9	9.4	9.6
29	8.2	7.1	7.5	7.5	6.6	7.0	8.4	7.8	8.0	9.6	9.1	9.4
30	8.2	6.5	7.6	7.2	6.6	6.9	8.4	7.6	8.1	9.5	9.1	9.3
31	---	---	---	7.2	6.4	6.9	9.0	7.9	8.6	---	---	---
MONTH	9.1	5.6	7.7	10.0	5.9	7.8	9.2	5.4	7.8	10.2	6.3	8.7

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 0406010", on right bank downstream from Hardy Dam, 0.6 mi northwest of Oxbow.

DRAINAGE AREA.--1,931 mi².

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1995 to current year.

DISSOLVED OXYGEN: October 1995 to current year.

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, 1996; minimum, 0.5°C, on many days during winter periods.

DISSOLVED OXYGEN: Maximum recorded, 13.0 mg/L, Dec. 24, 25, 1996, but may have been higher during instrument malfunction Dec. 20-23, 1996; minimum, 1.2 mg/L, Aug. 7, Sept. 15, 21, 1996, Aug. 8, 1997.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 20.0°C, July 28, 30, Aug. 4, 5, 28, 29, Sept. 2; minimum, 0.5°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum recorded, 13.0 mg/L, Dec. 24, 25, but may have been higher during instrument malfunction Dec. 20-23; minimum, 1.2 mg/L, Aug. 8.

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	17.5	17.0	17.5	11.5	11.5	11.5	5.0	5.0	5.0	2.0	1.5	1.5
2	17.5	17.0	17.0	11.5	11.0	11.0	5.0	4.5	4.5	1.5	1.5	1.5
3	17.0	16.5	17.0	11.0	10.5	11.0	4.5	4.5	4.5	2.0	1.5	1.5
4	17.0	16.0	16.5	10.5	10.5	10.5	4.5	4.5	4.5	2.0	1.5	1.5
5	16.5	15.5	16.0	10.5	10.0	10.5	4.5	4.0	4.0	1.5	1.5	1.5
6	16.0	15.5	16.0	10.0	9.5	10.0	4.0	4.0	4.0	1.5	1.5	1.5
7	16.0	15.5	16.0	9.5	9.5	9.5	4.0	3.5	4.0	1.5	1.0	1.5
8	15.5	15.0	15.5	9.5	9.0	9.0	4.0	3.5	3.5	1.5	1.0	1.0
9	15.5	14.5	15.0	9.0	8.5	9.0	3.5	3.0	3.5	1.5	1.0	1.0
10	15.0	14.5	15.0	9.0	8.0	8.5	3.5	3.0	3.0	1.0	1.0	1.0
11	15.0	14.0	14.5	8.0	7.5	8.0	3.0	2.5	3.0	1.0	1.0	1.0
12	14.5	14.0	14.5	8.0	7.0	7.5	2.5	2.5	2.5	1.0	1.0	1.0
13	14.5	13.5	14.0	7.5	7.0	7.5	3.0	2.5	2.5	1.0	1.0	1.0
14	14.5	13.0	14.0	7.5	7.0	7.5	3.0	2.5	2.5	1.0	1.0	1.0
15	14.0	13.0	14.0	7.0	7.0	7.0	3.0	2.5	2.5	1.5	1.0	1.0
16	14.0	13.0	13.5	7.0	7.0	7.0	2.5	2.5	2.5	1.5	1.0	1.0
17	14.0	13.0	13.5	7.0	7.0	7.0	2.5	2.0	2.5	1.5	1.0	1.0
18	13.5	13.0	13.5	7.0	6.5	7.0	2.5	2.0	2.5	2.0	1.0	1.0
19	13.5	12.5	13.5	7.0	6.5	6.5	2.5	2.0	2.0	2.0	1.0	1.0
20	13.5	12.5	13.0	6.5	6.5	6.5	---	---	---	2.5	1.0	1.0
21	13.5	12.5	13.0	6.5	6.0	6.5	---	---	---	2.5	1.0	1.0
22	13.5	12.5	13.0	6.5	6.0	6.0	---	---	---	2.5	1.0	1.0
23	13.0	12.5	13.0	6.5	6.0	6.0	---	---	---	1.0	1.0	1.0
24	13.0	12.5	13.0	6.0	6.0	6.0	2.0	1.5	1.5	1.0	1.0	1.0
25	13.0	12.0	12.5	6.0	5.5	6.0	2.0	1.5	1.5	1.0	1.0	1.0
26	13.0	12.0	12.5	6.0	5.5	5.5	2.0	1.5	1.5	1.0	1.0	1.0
27	13.0	12.5	12.5	5.5	5.0	5.5	2.0	1.5	1.5	1.0	1.0	1.0
28	13.0	12.0	12.5	5.5	5.0	5.0	2.5	1.5	1.5	1.0	1.0	1.0
29	12.5	12.0	12.5	5.0	5.0	5.0	2.5	1.5	1.5	1.0	1.0	1.0
30	12.5	12.0	12.0	5.0	5.0	5.0	1.5	1.5	1.5	1.0	1.0	1.0
31	12.0	11.5	12.0	---	---	---	1.5	1.5	1.5	1.0	1.0	1.0
MONTH	17.5	11.5	14.0	11.5	5.0	7.5	---	---	---	2.5	1.0	1.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121680 MUSKEGON RIVER NEAR OXBOW, MI--Continued

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

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY			AUGUST			SEPTEMBER		
1	12.5	10.5	12.0	18.0	12.0	17.0	19.5	14.0	17.5	19.5	16.0	18.5
2	13.0	10.5	12.5	18.0	14.5	17.0	19.5	13.5	17.5	20.0	16.5	18.5
3	13.5	10.5	12.5	17.5	16.5	17.0	19.5	13.5	17.5	19.5	16.0	18.5
4	13.5	11.0	12.5	18.0	12.5	17.0	20.0	13.5	18.0	19.5	16.0	18.5
5	13.0	11.5	12.5	17.5	12.5	17.0	20.0	13.5	16.5	19.0	18.0	19.0
6	13.5	11.0	12.5	18.0	12.0	16.5	19.5	14.5	18.5	19.0	16.5	18.5
7	14.0	10.5	13.0	18.0	12.5	16.5	19.5	13.5	17.0	19.0	16.5	18.5
8	14.5	10.5	13.5	18.0	13.0	16.5	19.5	13.5	17.0	19.0	17.0	18.5
9	14.5	11.0	13.0	18.0	13.0	17.5	19.5	13.5	17.5	19.0	17.5	19.0
10	14.5	14.0	14.0	18.0	14.5	17.5	19.0	13.5	17.5	19.5	17.5	19.0
11	14.5	13.0	14.0	18.0	14.0	17.5	19.5	13.5	17.5	19.0	17.0	18.5
12	14.5	12.5	14.5	18.0	13.5	17.5	19.5	15.5	19.0	19.0	17.0	18.5
13	16.0	12.5	15.0	18.0	13.0	17.0	19.5	18.5	19.5	19.0	17.0	18.5
14	15.5	13.5	15.0	18.0	12.5	17.0	19.5	14.5	18.5	19.0	17.0	18.5
15	15.0	13.0	14.5	18.5	12.5	17.0	19.5	15.0	18.0	19.0	17.0	18.5
16	15.5	13.0	14.0	18.5	13.0	17.0	19.5	14.5	18.5	19.0	17.0	18.5
17	16.0	13.5	15.5	18.0	13.0	17.0	19.5	15.0	18.5	19.0	17.0	18.5
18	16.0	13.5	15.5	19.5	13.0	17.0	19.5	15.0	18.5	19.5	17.5	18.5
19	16.0	13.0	15.5	19.5	13.0	17.0	19.5	15.0	18.5	18.5	18.0	18.5
20	15.5	14.5	15.0	19.0	13.0	17.0	19.5	15.0	18.5	18.5	18.5	18.5
21	16.0	15.0	15.5	19.0	13.0	17.0	19.5	18.5	19.5	18.5	18.0	18.5
22	16.5	15.5	16.0	19.5	13.5	17.0	19.5	17.0	19.0	18.5	18.5	18.5
23	16.5	16.0	16.0	19.5	13.5	17.5	19.5	15.5	18.5	18.5	18.0	18.5
24	16.5	16.0	16.0	19.0	13.0	17.0	19.5	15.5	18.0	18.0	17.5	18.0
25	16.5	16.0	16.0	19.0	13.0	17.0	19.0	15.5	18.5	18.5	17.0	18.0
26	17.5	15.5	17.0	19.0	13.5	17.5	19.5	16.0	19.0	18.0	17.0	18.0
27	17.5	13.5	17.0	19.5	13.0	17.5	19.5	15.5	18.5	18.0	17.0	18.0
28	17.5	13.0	17.0	20.0	13.0	18.0	20.0	16.5	19.0	18.0	17.0	17.5
29	17.5	12.5	17.0	19.0	14.0	16.5	20.0	18.5	19.5	18.0	17.0	17.5
30	18.0	12.5	17.0	20.0	14.0	17.5	19.5	16.0	18.5	17.5	16.5	17.0
31	---	---	---	19.5	13.5	17.5	19.5	16.5	18.5	---	---	---
MONTH	18.0	10.5	14.5	20.0	12.0	17.0	20.0	13.5	18.5	20.0	16.0	18.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121680 MUSKEGON RIVER NEAR OXBOW, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	5.8	5.3	5.6	9.1	8.8	8.9	11.2	11.1	11.2	12.5	12.2	12.4			
2	6.2	5.4	5.8	9.2	9.0	9.1	11.3	11.1	11.1	12.5	12.2	12.3			
3	6.4	5.7	6.2	9.4	9.2	9.3	11.3	11.1	11.2	12.4	11.8	12.3			
4	6.7	6.0	6.5	9.5	9.3	9.4	11.4	11.1	11.2	12.4	11.5	12.2			
5	6.8	6.1	6.5	9.6	9.3	9.4	11.4	11.1	11.2	12.4	12.1	12.2			
6	6.8	6.3	6.6	9.5	9.3	9.4	11.3	11.2	11.2	12.6	12.1	12.3			
7	7.0	6.4	6.7	9.5	9.3	9.4	11.3	11.2	11.3	12.6	12.4	12.5			
8	7.2	6.6	7.0	9.6	9.5	9.5	11.5	11.3	11.3	12.6	12.2	12.5			
9	7.4	6.5	7.1	9.7	9.5	9.6	11.6	11.3	11.4	12.6	12.4	12.5			
10	7.6	6.8	7.3	9.8	9.6	9.7	11.6	11.3	11.4	12.6	12.4	12.5			
11	7.6	7.1	7.4	10.0	9.8	9.8	11.8	11.6	11.7	12.5	12.4	12.5			
12	7.7	6.9	7.3	10.1	9.9	9.9	11.9	11.5	11.8	12.5	12.4	12.5			
13	7.7	7.0	7.4	10.2	10.0	10.1	11.8	11.6	11.8	12.5	12.4	12.4			
14	7.9	7.1	7.6	10.2	10.0	10.1	11.8	11.5	11.7	12.5	12.4	12.4			
15	8.0	7.3	7.7	10.4	10.0	10.2	11.8	11.5	11.6	12.5	12.0	12.4			
16	8.0	7.4	7.8	10.5	10.1	10.3	11.7	11.5	11.6	12.4	11.9	12.4			
17	8.1	7.5	7.7	10.5	10.0	10.2	11.8	11.6	11.7	12.4	11.9	12.4			
18	8.1	7.4	7.8	10.5	10.3	10.4	11.6	11.5	11.5	12.4	10.7	12.2			
19	8.4	7.6	8.1	10.6	10.4	10.5	11.7	11.6	11.7	12.4	10.6	12.1			
20	8.7	7.8	8.3	10.8	10.5	10.6	---	---	---	12.4	10.3	12.0			
21	9.0	8.1	8.6	10.9	10.6	10.7	---	---	---	12.4	10.0	12.0			
22	8.9	8.2	8.7	10.9	10.7	10.8	---	---	---	12.4	10.0	11.9			
23	8.7	8.0	8.5	11.0	10.7	10.8	---	---	---	12.4	12.3	12.3			
24	8.6	7.9	8.3	11.1	10.9	10.9	13.0	12.6	12.8	12.4	12.3	12.3			
25	8.6	7.9	8.3	11.2	10.9	11.0	13.0	12.3	12.7	12.4	12.3	12.3			
26	8.6	7.8	8.4	11.3	11.1	11.2	12.8	12.3	12.6	12.3	12.3	12.3			
27	8.5	7.8	8.2	11.4	11.2	11.3	12.7	12.2	12.6	12.3	12.3	12.3			
28	8.7	7.7	8.4	11.4	11.1	11.2	12.6	11.9	12.4	12.3	12.1	12.2			
29	8.6	7.6	8.3	11.4	11.1	11.2	12.5	11.6	12.3	12.3	12.1	12.2			
30	8.6	7.5	8.0	11.4	11.0	11.1	12.6	12.4	12.5	12.3	12.1	12.1			
31	8.9	8.6	8.7	---	---	---	12.5	12.3	12.4	12.2	12.0	12.1			
MONTH	9.0	5.3	7.6	11.4	8.8	10.2	---	---	---	12.6	10.0	12.3			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	12.1	11.9	12.0	12.1	12.0	12.1	12.0	11.8	11.9	11.0	9.6	10.5	
2	12.1	11.9	12.1	12.1	11.9	12.1	12.1	11.7	11.9	10.6	10.1	10.4	
3	12.2	11.9	12.1	12.2	11.9	12.0	12.1	11.9	12.0	11.0	10.3	10.6	
4	12.2	12.0	12.1	12.1	11.8	12.0	11.9	11.3	11.6	11.0	10.5	10.9	
5	12.2	11.9	12.0	12.1	12.0	12.1	11.8	11.3	11.6	10.9	10.2	10.6	
6	12.2	11.9	12.1	12.1	12.1	12.1	11.7	11.3	11.5	10.7	10.4	10.6	
7	12.2	11.4	12.0	12.1	12.0	12.1	11.6	11.3	11.5	10.4	9.9	10.2	
8	12.1	11.0	11.9	12.1	11.8	12.0	11.6	11.3	11.5	10.6	10.0	10.3	
9	11.9	10.0	11.7	12.1	11.8	12.0	11.6	11.1	11.4	10.8	10.3	10.5	
10	11.9	9.9	11.6	12.1	11.7	11.9	11.6	11.0	11.3	10.7	10.4	10.5	
11	12.0	10.2	11.7	12.1	11.8	11.9	11.4	10.7	11.2	10.5	9.9	10.2	
12	11.9	10.1	11.6	12.0	11.8	12.0	11.1	10.5	10.8	10.2	9.8	10.1	
13	11.8	10.2	11.5	12.1	11.8	11.9	11.1	10.4	10.9	10.3	9.8	10.1	
14	11.7	9.8	11.3	12.0	11.7	11.8	11.1	10.5	10.8	10.4	9.6	10.2	
15	11.8	9.6	11.3	12.0	11.7	11.9	11.1	10.4	10.7	10.1	9.4	9.9	
16	11.7	9.3	11.3	11.9	11.5	11.7	11.0	10.6	10.8	10.3	9.9	10.1	
17	11.9	11.3	11.5	11.9	11.5	11.7	11.0	10.4	10.8	10.1	9.6	9.9	
18	11.5	9.5	11.2	11.7	11.5	11.6	10.9	10.5	10.7	10.2	9.6	9.9	
19	11.5	10.1	11.3	11.9	11.6	11.7	10.8	10.2	10.4	10.0	9.7	9.9	
20	11.5	11.2	11.4	12.0	11.5	11.8	10.9	10.2	10.6	10.1	9.7	9.9	
21	11.5	11.2	11.4	12.0	11.6	11.8	10.7	10.4	10.6	10.0	9.6	9.8	
22	11.6	11.4	11.5	12.0	11.7	11.9	10.7	9.9	10.3	9.7	9.4	9.6	
23	11.7	11.5	11.6	12.1	11.7	12.0	10.7	9.7	10.3	9.6	9.2	9.4	
24	11.7	11.3	11.6	12.1	12.0	12.0	10.6	9.4	10.1	9.7	9.3	9.4	
25	11.8	11.6	11.7	12.1	11.9	12.0	10.6	9.6	10.2	9.7	9.5	9.6	
26	11.9	11.7	11.8	12.0	11.6	11.9	10.8	9.0	10.2	9.7	9.5	9.6	
27	11.9	11.8	11.9	12.0	11.6	11.8	11.0	9.7	10.6	9.7	9.4	9.5	
28	12.1	11.5	11.9	12.0	11.8	11.9	10.9	9.7	10.4	9.6	9.0	9.4	
29	---	---	---	12.0	11.5	11.8	11.0	9.8	10.4	9.4	8.8	9.2	
30	---	---	---	12.0	11.8	11.9	11.0	9.8	10.5	9.4	8.7	9.2	
31	---	---	---	12.2	11.9	12.0	---	---	---	9.3	8.3	9.1	
MONTH	12.2	9.3	11.7	12.2	11.5	11.9	12.1	9.0	10.9	11.0	8.3	10.0	

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121680 MUSKEGON RIVER NEAR OXBOW, MI--Continued

OXYGEN DISSOLVED (MGL), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	9.2	8.3	9.0	6.8	4.4	6.4	5.2	2.2	3.9	5.8	2.2	4.5
2	9.2	8.1	8.9	6.8	5.2	6.3	5.3	1.7	3.8	6.9	2.4	5.0
3	9.0	8.2	8.7	6.3	5.6	6.1	5.5	1.7	4.1	6.8	2.3	5.1
4	8.9	7.9	8.6	6.7	4.6	6.3	6.2	1.7	4.5	6.2	1.5	4.7
5	10.0	8.5	8.9	6.7	4.4	6.3	7.8	1.6	5.3	6.5	3.6	5.1
6	8.8	7.9	8.5	6.7	4.2	6.1	5.6	2.1	4.4	4.6	1.5	3.6
7	8.6	7.6	8.3	6.9	4.3	6.2	4.5	1.3	3.1	6.3	1.9	4.9
8	8.6	7.5	8.2	7.0	4.4	6.2	4.5	1.2	3.3	6.4	2.1	5.3
9	10.0	8.2	8.8	7.0	4.6	6.6	4.8	1.3	3.5	6.3	3.2	5.7
10	8.4	8.2	8.3	7.2	5.5	6.9	3.9	1.5	3.0	6.5	3.1	5.9
11	8.4	7.9	8.2	7.1	5.0	6.7	4.8	1.4	3.7	6.0	2.6	4.9
12	8.4	7.7	8.2	7.0	4.6	6.5	4.8	2.4	4.5	5.7	2.6	4.7
13	8.2	7.7	8.1	6.6	4.3	6.3	4.9	4.6	4.8	5.8	2.9	4.6
14	8.0	7.1	7.8	6.7	4.0	6.1	4.9	2.2	4.3	5.6	2.6	4.7
15	8.2	7.3	7.9	6.8	3.9	6.0	4.3	2.0	3.6	5.4	2.4	4.7
16	8.2	7.5	8.0	7.0	4.1	6.3	4.6	1.8	3.7	5.2	2.0	4.4
17	8.3	8.0	8.1	6.6	4.2	5.9	5.0	2.5	4.4	5.0	1.9	4.2
18	8.2	7.6	8.1	7.2	3.7	6.0	5.2	2.1	4.5	4.6	3.2	4.1
19	8.3	7.4	8.1	7.2	3.7	5.8	5.0	2.4	4.3	5.1	4.0	4.4
20	8.5	7.4	7.8	6.5	3.3	5.3	5.4	2.1	4.4	5.8	5.1	5.5
21	7.7	7.4	7.5	6.9	3.4	5.7	5.4	5.0	5.2	5.8	5.5	5.7
22	7.9	7.5	7.7	9.0	4.4	7.0	5.4	4.0	5.1	5.8	5.4	5.6
23	7.7	7.4	7.5	6.7	3.2	5.7	5.2	2.1	4.4	6.0	5.3	5.7
24	7.6	7.2	7.4	6.5	2.9	5.2	5.2	2.0	4.2	6.1	4.3	5.6
25	7.3	6.9	7.1	6.0	2.8	4.9	5.1	2.2	4.5	6.1	3.5	5.3
26	7.6	6.9	7.3	5.8	2.6	4.9	5.1	2.3	4.6	6.2	3.6	5.4
27	7.5	5.7	7.1	6.1	2.3	4.8	5.0	2.1	4.2	5.8	3.9	5.2
28	7.3	5.4	7.0	6.5	2.3	5.1	6.1	2.5	5.1	5.7	3.3	4.9
29	7.0	4.9	6.7	6.0	2.8	4.7	6.1	4.8	5.5	5.0	2.6	4.3
30	6.9	5.1	6.6	6.5	2.5	4.9	5.4	2.3	4.3	5.9	3.1	4.8
31	---	---	---	5.6	2.1	4.2	5.5	2.3	4.3	---	---	---
MONTH	10.0	4.9	7.9	9.0	2.1	5.9	7.8	1.2	4.3	6.9	1.5	5.0

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 current year.

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	246	518	376	304	e380	838	570	363	319	229	166	193
2	226	448	622	306	e370	1130	512	407	308	235	142	190
3	239	358	550	365	359	1130	466	477	293	227	153	185
4	232	302	450	459	351	1070	432	481	274	224	164	180
5	223	316	396	803	358	847	498	451	263	224	162	177
6	219	309	369	761	355	740	593	457	264	218	163	179
7	227	331	359	576	345	630	567	444	263	203	163	177
8	242	342	357	531	334	613	536	451	254	216	160	177
9	258	336	350	e490	322	535	485	536	242	264	157	177
10	256	322	338	461	315	e550	429	530	233	251	163	179
11	245	308	331	e420	312	e600	362	467	232	222	188	179
12	231	296	328	e380	308	666	433	425	232	208	205	183
13	213	278	331	e350	e300	632	446	422	231	202	227	184
14	229	275	341	e330	e300	567	508	413	221	229	217	183
15	228	265	358	e310	e300	502	496	421	212	225	215	181
16	224	265	383	e300	296	486	487	450	225	207	230	185
17	220	269	388	e290	e300	473	461	486	230	201	217	238
18	250	286	372	e280	309	529	435	472	221	199	214	285
19	283	295	343	e280	422	537	401	451	215	192	212	248
20	275	289	e330	e270	530	532	389	421	246	186	211	270
21	251	280	e320	e270	e800	566	381	389	359	203	226	305
22	248	272	e310	e450	e1200	611	384	350	472	211	224	264
23	292	269	300	e800	1640	605	385	346	441	202	213	233
24	354	270	363	e700	1450	564	379	339	375	194	204	217
25	347	266	410	e620	1040	555	369	336	299	189	214	208
26	311	251	407	e550	839	647	350	330	296	187	222	203
27	279	251	e380	e500	834	645	344	315	269	186	213	198
28	275	253	e350	e470	887	636	347	287	249	182	203	195
29	274	250	345	e440	---	679	338	298	234	175	197	196
30	479	267	332	e410	---	676	333	319	228	169	194	195
31	646	---	317	e390	---	637	---	326	---	166	193	---
TOTAL	8522	9037	11506	13866	15556	20428	13116	12660	8200	6426	6032	6164
MEAN	275	301	371	447	556	659	437	408	273	207	195	205
MAX	646	518	622	803	1640	1130	593	536	472	264	230	305
MIN	213	250	300	270	296	473	333	287	212	166	142	177
CFSM	.80	.87	1.08	1.30	1.61	1.91	1.27	1.18	.79	.60	.56	.60
IN.	.92	.97	1.24	1.50	1.68	2.20	1.41	1.37	.88	.69	.65	.66

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 1997, BY WATER YEAR (WY)

	MEAN	255	351	339	407	485	530	439	424	345	216	233	213
MAX	275	400	371	447	556	659	441	439	416	224	272	220	220
(WY)	1997	1996	1997	1997	1997	1997	1996	1996	1996	1996	1996	1996	1996
MIN	235	301	307	366	417	402	437	408	273	207	195	205	205
(WY)	1996	1997	1996	1996	1996	1996	1997	1997	1997	1997	1997	1997	1997

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1996 - 1997

ANNUAL TOTAL	126257		131513										
ANNUAL MEAN	345		360										
HIGHEST ANNUAL MEAN										352			
LOWEST ANNUAL MEAN										360			1997
HIGHEST DAILY MEAN	1180		May 11		1640		Feb 23		1640		Feb 27		1997
LOWEST DAILY MEAN	160		Jul 27		142		Aug 2		142		Aug 2		1997
ANNUAL SEVEN-DAY MINIMUM	177		Jul 22		158		Aug 2		158		Aug 2		1997
INSTANTANEOUS PEAK FLOW					1870		Feb 23		1870		Feb 23		1997
INSTANTANEOUS PEAK STAGE					6.28		Feb 23		6.28		Feb 27		1997
INSTANTANEOUS LOW FLOW					134		Aug 2		134		Aug 2		1997
ANNUAL RUNOFF (CFSM)	1.00				1.04				1.02				
ANNUAL RUNOFF (INCHES)	13.61				14.18				13.87				
10 PERCENT EXCEEDS	505				572				550				
50 PERCENT EXCEEDS	304				309				305				
90 PERCENT EXCEEDS	206				193				199				

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121944 LITTLE MUSKEGON RIVER NEAR OAK GROVE, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1995 to current year.

DISSOLVED OXYGEN: October 1995 to current year.

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, 1996; minimum, -0.5°C, Dec. 19, 1996, Jan. 8, Feb. 16, 24, 1997.

DISSOLVED OXYGEN: Maximum recorded (more than 20 percent missing record), 16.5 mg/L, Dec. 7, 1995; minimum, 6.1 mg/L, June 22, 1997.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 23.5°C, July 28; minimum, -0.5°C, Dec. 19, Jan. 8, Feb. 16, 24.

DISSOLVED OXYGEN: Maximum 14.7 mg/L, Jan. 27; minimum, 6.1 mg/L, June 22.

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

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

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121944 LITTLE MUSKEGON RIVER NEAR OAK GROVE, MI--Continued

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

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
JUNE				JULY				AUGUST				SEPTEMBER			
1	15.5	13.5	14.5	21.5	20.0	20.5	19.5	18.0	18.5	17.5	15.5	16.5			
2	17.5	14.5	16.0	21.5	20.0	20.5	21.0	17.5	19.0	18.0	16.0	16.5			
3	18.5	16.0	17.5	20.5	17.0	19.0	19.5	18.5	19.0	16.0	14.5	15.0			
4	---	---	---	17.0	15.5	16.0	20.0	17.5	18.5	15.0	12.5	14.0			
5	17.5	16.0	17.0	17.0	13.5	15.0	19.5	17.0	18.0	13.5	12.5	13.0			
6	17.5	16.5	17.0	16.5	15.0	15.5	18.0	15.5	16.5	16.0	13.0	14.5			
7	18.5	16.0	17.0	17.0	14.0	15.5	18.5	15.0	16.5	16.0	15.0	15.5			
8	18.5	16.5	17.5	16.5	15.0	16.0	19.0	16.0	17.5	16.0	15.0	15.5			
9	19.5	16.5	18.0	17.5	15.5	16.5	19.0	16.5	17.5	16.5	15.0	16.0			
10	19.5	17.0	18.5	18.5	16.0	17.0	19.5	18.0	18.5	16.0	15.5	16.0			
11	20.0	18.0	19.0	19.0	16.5	17.5	18.5	16.0	17.5	15.5	15.0	15.0			
12	19.0	18.0	18.5	20.0	17.5	18.5	16.0	15.5	15.5	15.0	14.5	15.0			
13	19.5	17.5	18.5	20.5	18.5	19.5	17.5	15.5	16.0	15.5	14.0	15.0			
14	19.0	16.5	18.0	22.5	19.5	20.5	16.5	14.5	15.5	16.0	14.5	15.5			
15	18.5	15.5	17.5	22.5	20.0	21.0	18.0	15.5	16.5	17.0	14.5	15.5			
16	18.0	17.0	17.5	22.5	20.0	21.0	19.5	17.5	18.0	17.0	16.0	16.5			
17	18.0	15.5	16.5	21.5	20.0	21.0	19.0	16.5	18.0	18.5	17.0	17.5			
18	18.5	16.0	17.0	22.0	19.0	20.5	17.0	15.0	16.0	17.5	15.5	16.5			
19	19.0	17.0	18.0	21.5	19.0	20.5	17.5	15.5	16.5	17.0	16.5	17.0			
20	18.5	17.5	18.0	20.0	17.5	18.5	16.5	15.5	16.0	17.0	15.0	16.0			
21	17.5	17.0	17.5	19.5	18.5	19.0	16.0	15.0	15.5	15.0	13.0	14.0			
22	19.5	17.0	18.0	18.5	17.0	17.5	16.5	14.5	15.5	13.5	12.5	13.0			
23	20.0	17.5	19.0	20.0	17.0	18.5	16.0	14.0	15.0	14.0	13.0	13.5			
24	22.0	19.5	20.5	20.5	18.0	19.0	16.0	15.5	15.5	13.0	11.0	12.0			
25	22.5	21.0	21.5	20.5	18.0	19.5	16.5	15.5	16.0	14.0	12.0	13.0			
26	22.5	20.5	21.5	22.5	19.5	20.5	17.0	15.5	16.0	13.5	12.0	13.0			
27	21.5	19.5	20.5	22.5	20.0	21.0	18.5	16.0	17.0	13.0	11.5	12.5			
28	22.0	19.5	20.5	23.5	21.0	22.0	18.0	16.5	17.0	13.0	12.5	12.5			
29	22.0	20.0	21.0	21.0	18.5	19.5	16.5	15.5	16.0	13.5	12.5	13.0			
30	21.5	20.5	21.0	20.0	17.0	18.5	16.5	15.0	16.0	13.0	12.5	13.0			
31	---	---	---	20.5	17.0	18.5	17.0	16.0	16.5	---	---	---			
MONTH	---	---	---	23.5	13.5	19.0	21.0	14.0	17.0	18.5	11.0	14.5			

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121944 LITTLE MUSKEGON RIVER NEAR OAK GROVE, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	11.1	9.8	10.3	11.5	10.9	11.2	12.5	12.2	12.3	13.2	12.8	13.1			
2	10.6	9.6	10.0	11.5	11.2	11.4	13.2	12.5	12.9	12.8	12.3	12.6			
3	11.8	10.0	10.9	11.4	11.2	11.3	13.5	13.2	13.3	12.4	12.2	12.3			
4	12.4	10.8	11.5	11.6	11.2	11.4	14.0	13.4	13.7	12.2	12.0	12.2			
5	12.2	10.9	11.4	11.2	10.6	10.9	13.6	13.3	13.4	12.3	11.9	12.0			
6	12.3	10.5	11.3	11.1	9.9	10.6	13.4	13.0	13.2	12.9	12.3	12.7			
7	10.7	9.9	10.3	10.1	9.7	9.9	13.3	12.9	13.1	13.1	12.8	13.0			
8	11.3	10.3	10.7	10.9	9.9	10.4	13.2	12.8	13.0	13.4	11.6	12.9			
9	12.1	10.6	11.2	11.2	10.3	10.7	13.6	12.9	13.2	13.1	11.2	12.4			
10	12.0	10.7	11.2	11.8	10.9	11.3	13.5	13.1	13.2	13.0	12.8	12.9			
11	12.5	11.2	11.7	12.2	11.4	11.8	13.3	12.8	13.0	13.4	13.0	13.2			
12	12.0	10.7	11.2	12.6	11.9	12.3	13.1	12.7	12.9	13.6	13.3	13.5			
13	11.6	10.4	10.8	13.0	12.3	12.7	13.4	12.9	13.1	13.8	13.5	13.6			
14	11.7	10.2	10.8	13.3	12.6	13.0	13.3	12.8	13.0	13.8	13.6	13.7			
15	11.9	10.0	10.9	13.7	12.9	13.3	12.9	12.6	12.7	13.7	13.0	13.4			
16	11.8	10.3	10.8	13.0	12.3	12.7	13.1	12.6	12.8	13.3	13.0	13.1			
17	11.7	10.1	10.6	12.3	11.9	12.0	13.1	12.7	12.8	13.4	13.2	13.3			
18	10.9	9.9	10.3	12.7	11.8	12.2	13.3	12.6	12.9	13.3	13.0	13.2			
19	11.7	10.5	11.1	13.0	12.2	12.6	13.9	10.9	12.7	13.1	12.8	13.0			
20	11.9	10.4	11.1	13.3	12.6	12.9	11.3	9.6	10.6	13.0	12.8	12.8			
21	11.9	10.2	11.0	13.2	12.7	12.9	10.6	9.1	10.2	13.2	13.0	13.2			
22	10.8	9.8	10.2	13.5	12.8	13.1	13.5	10.4	12.0	13.2	12.6	12.8			
23	10.1	9.4	9.7	13.0	12.6	12.8	13.3	12.6	13.0	13.5	12.9	13.3			
24	11.3	9.6	10.1	13.4	12.7	13.0	13.1	12.4	12.7	13.6	13.2	13.5			
25	11.0	9.9	10.4	14.0	13.1	13.5	13.7	13.1	13.4	13.5	13.2	13.3			
26	10.6	10.0	10.2	14.1	13.2	13.6	13.7	13.4	13.5	14.6	13.4	13.8			
27	10.3	9.4	9.9	14.4	13.6	13.9	13.5	13.3	13.4	14.7	13.7	14.1			
28	10.6	9.4	10.0	14.3	13.5	13.8	13.3	13.0	13.1	14.5	13.7	13.9			
29	10.8	9.9	10.3	14.3	13.3	13.7	13.1	12.9	13.0	14.2	13.7	14.0			
30	10.3	9.7	9.9	13.3	12.4	12.8	13.4	13.0	13.2	13.8	13.2	13.6			
31	10.9	10.0	10.5	---	---	---	13.3	13.0	13.2	13.4	13.0	13.2			
MONTH	12.5	9.4	10.7	14.4	9.7	12.3	14.0	9.1	12.9	14.7	11.2	13.1			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH				APRIL				MAY
1	13.3	13.0	13.2	13.1	12.8	12.9	12.3	11.2	11.9	10.5	9.2	9.8
2	13.4	13.3	13.3	13.0	12.7	12.8	11.6	10.4	11.2	10.9	9.8	10.4
3	13.6	13.4	13.5	13.2	12.8	13.0	10.6	10.1	10.4	10.9	10.1	10.5
4	13.5	13.2	13.4	13.2	12.9	13.1	10.4	9.5	10.1	11.3	10.2	10.8
5	13.4	13.2	13.3	13.1	12.7	12.9	9.6	9.4	9.5	10.6	10.0	10.3
6	13.5	13.3	13.4	13.1	12.7	12.9	9.8	9.4	9.5	11.0	10.0	10.4
7	13.5	13.3	13.4	13.7	13.0	13.4	11.1	9.8	10.6	11.0	9.8	10.3
8	13.5	13.3	13.4	13.4	12.7	13.2	11.9	11.0	11.6	10.3	9.5	9.8
9	13.5	13.1	13.3	13.0	12.6	12.8	12.4	11.7	12.1	10.5	9.6	10.0
10	13.5	13.1	13.3	13.1	12.4	12.7	12.3	11.6	12.0	11.1	10.1	10.6
11	13.4	13.0	13.2	---	---	---	11.9	11.3	11.6	10.6	9.8	10.1
12	13.4	13.0	13.2	---	---	---	11.8	11.3	11.6	10.7	9.5	10.1
13	13.9	13.4	13.7	---	---	---	12.0	11.3	11.8	11.3	10.1	10.6
14	13.6	13.2	13.4	---	---	---	11.9	11.0	11.5	10.8	9.8	10.3
15	13.5	13.2	13.3	---	---	---	11.5	10.6	11.1	10.9	9.7	10.3
16	13.6	12.4	13.4	---	---	---	10.9	10.3	10.6	11.5	10.4	10.8
17	13.8	12.4	13.5	---	---	---	11.3	10.4	10.8	11.4	10.2	10.7
18	13.3	12.4	13.0	---	---	---	11.8	10.9	11.3	10.8	9.4	10.1
19	12.5	12.2	12.4	---	---	---	11.7	10.7	11.2	10.1	9.1	9.6
20	13.0	12.4	12.7	11.8	9.9	10.8	11.5	10.5	11.0	11.0	9.5	10.2
21	---	---	---	11.5	9.9	10.8	11.2	10.3	10.7	11.2	9.4	10.2
22	---	---	---	12.5	10.3	11.1	11.4	10.5	10.9	11.3	9.1	10.0
23	13.2	12.8	13.1	12.9	11.0	12.2	11.6	10.6	11.0	11.2	8.7	9.7
24	13.3	11.9	12.7	12.8	10.1	11.6	11.5	10.5	10.9	10.8	8.3	9.3
25	13.3	13.1	13.2	13.0	10.1	11.2	11.6	10.6	11.0	10.3	8.1	9.1
26	13.1	12.9	13.0	13.4	11.0	12.9	11.8	10.6	11.2	11.4	8.9	9.9
27	13.0	12.8	12.9	12.7	11.6	12.4	11.4	10.3	10.9	11.3	8.7	9.7
28	13.3	13.0	13.2	11.7	11.0	11.3	11.5	10.5	11.0	10.9	8.4	9.4
29	---	---	---	11.1	10.8	11.0	11.5	10.3	10.8	9.6	8.2	8.9
30	---	---	---	11.6	11.0	11.3	10.9	9.4	10.3	10.1	8.5	9.1
31	---	---	---	12.3	11.5	12.0	---	---	---	10.6	8.5	9.4
MONTH	---	---	---	---	---	---	12.4	9.4	11.0	11.5	8.1	10.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121944 LITTLE MUSKEGON RIVER NEAR OAK GROVE, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	10.7	8.4	9.3	8.2	7.3	7.7	10.6	7.9	8.9	10.2	8.0	8.8
2	10.6	8.0	8.9	8.4	7.3	7.7	11.3	7.9	9.1	10.0	7.9	8.6
3	10.2	7.5	8.6	8.7	7.4	8.1	10.0	7.7	8.5	10.3	8.0	8.9
4	---	---	---	9.6	8.2	8.8	10.7	8.0	8.9	10.6	8.0	9.2
5	10.5	7.5	8.8	10.2	8.6	9.3	11.0	7.9	9.1	10.5	8.6	9.3
6	10.3	7.7	8.7	9.9	8.5	9.0	10.7	8.3	9.2	10.7	8.5	9.3
7	10.8	7.9	9.0	10.4	8.8	9.4	11.6	8.4	9.6	10.6	8.3	9.2
8	10.5	7.8	8.9	8.9	8.4	8.7	11.6	8.2	9.5	10.3	8.3	9.1
9	10.7	7.9	8.9	9.4	8.3	8.7	11.8	8.1	9.4	10.8	8.2	9.1
10	10.0	7.7	8.6	9.6	8.3	8.8	10.7	7.9	8.8	9.5	8.1	8.7
11	9.5	6.8	8.2	9.8	8.2	8.8	10.1	8.0	8.8	10.1	8.3	9.0
12	9.2	7.1	8.0	9.8	8.1	8.7	9.1	8.6	8.8	10.4	8.5	9.2
13	8.9	6.7	7.7	9.5	7.8	8.5	10.0	8.5	8.9	10.6	8.6	9.3
14	9.1	6.8	7.7	8.9	7.5	8.0	10.5	8.4	9.2	10.2	8.5	9.1
15	9.3	7.2	8.1	9.1	7.5	8.1	9.6	8.1	8.7	10.4	8.3	9.1
16	8.8	6.8	7.7	9.5	7.5	8.3	9.7	7.8	8.5	9.7	8.2	8.7
17	10.1	7.1	8.3	9.2	7.5	8.1	8.6	7.7	8.1	9.0	7.9	8.3
18	8.8	7.2	7.8	9.7	7.7	8.4	10.1	8.3	9.0	9.1	7.9	8.4
19	8.7	6.8	7.6	9.8	7.7	8.5	10.1	8.4	9.0	8.2	7.7	7.9
20	7.8	6.4	7.1	10.1	7.9	8.8	9.2	8.2	8.6	9.3	8.2	8.6
21	8.0	6.5	7.2	8.5	7.9	8.2	9.7	8.3	8.9	9.7	8.7	9.2
22	7.5	6.1	6.9	9.7	8.0	8.7	10.1	8.5	9.0	10.2	9.0	9.5
23	7.7	6.4	7.1	9.9	8.1	8.8	10.5	8.4	9.2	10.2	9.0	9.5
24	8.3	6.2	7.4	9.6	7.3	8.2	9.7	8.4	8.8	10.0	9.0	9.4
25	7.6	6.7	7.2	9.2	6.9	7.9	10.0	8.4	9.0	9.7	8.8	9.1
26	8.2	6.6	7.5	9.7	6.9	7.8	10.1	8.3	8.9	9.8	8.7	9.2
27	8.9	7.4	8.0	10.0	7.5	8.4	9.9	8.0	8.7	10.3	8.9	9.4
28	8.5	7.1	7.7	10.0	7.5	8.3	9.7	7.8	8.6	9.4	8.7	9.0
29	8.5	7.0	7.6	10.3	7.6	8.7	9.9	8.1	8.8	9.5	8.5	8.8
30	8.2	7.1	7.6	10.7	8.1	9.0	10.1	8.1	8.9	9.6	8.3	8.9
31	---	---	---	10.9	8.0	9.0	9.5	7.9	8.5	---	---	---
MONTH	---	---	---	10.9	6.9	8.5	11.8	7.7	8.9	10.8	7.7	9.0

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 current year.

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1650	2900	2040	2170	3100	4470	4920	2170	2360	1450	1010	1720
2	1590	2660	2640	2370	3130	4460	4720	2720	2150	1570	1020	1710
3	1560	2440	2910	2320	2990	4510	4560	2890	1990	1480	1020	1150
4	1510	2190	2780	2550	2820	4730	4500	2880	1980	1370	1030	1100
5	1460	2040	2550	3890	2820	4910	4710	2860	1920	1280	999	1790
6	1490	2070	2410	4380	2690	4920	4710	2850	1930	1240	992	1770
7	1510	e2150	2300	3410	2570	4770	4590	2850	1890	1210	979	1770
8	1520	e2300	2280	3400	2550	4530	4470	3090	1740	1360	971	1770
9	1490	e2300	2300	3370	2480	4230	4280	3320	1660	1410	1000	1770
10	1500	e2100	2290	3240	2430	3920	3890	3380	1600	1370	1050	1760
11	1460	1860	2180	3050	2390	3780	3470	3390	1540	1350	1210	1760
12	1400	1830	2080	2770	2380	3890	3390	3260	1530	1320	1450	1760
13	1430	1830	2080	2630	2250	3650	3360	3040	1570	1270	1580	1760
14	1450	1820	2170	2600	2090	3000	3190	2910	1560	1420	1480	1100
15	1430	1790	2230	2570	2230	2770	3120	3000	1540	1210	1510	1790
16	1440	1670	2220	2560	2320	2440	3080	3090	1570	1200	1560	1130
17	1520	1700	2250	2350	2310	2370	2900	3220	1570	1180	1540	1470
18	1610	1880	2330	2100	2250	2700	2770	3280	1560	1140	1470	1710
19	1650	1880	2280	2010	2370	2860	2650	3410	1550	1020	1360	1770
20	1630	1820	1770	2000	2970	2960	2570	3300	1590	1030	1340	1770
21	1560	1760	1430	2150	3700	3070	2480	3120	2050	1260	1390	1850
22	1590	1760	1590	2720	4810	3270	2370	3010	2220	1140	1360	1780
23	1850	1770	2010	3360	4440	3530	2330	2810	2230	1050	1400	1780
24	2010	1770	2520	3480	4210	3880	2240	2750	2320	1030	1550	1490
25	2030	1760	2610	3480	4080	4060	2070	2810	2040	1040	1870	1380
26	2080	1730	2300	3370	4060	4050	2000	2810	1540	1100	1990	1390
27	1980	1670	2110	3260	4360	4060	2000	2690	1420	1130	1730	1370
28	1830	1640	2120	3290	4490	4280	1920	2520	1400	1130	1640	1310
29	1940	1650	2360	3320	---	4500	1950	2440	1400	1260	1380	1320
30	2640	1740	2230	3240	---	4460	1900	2460	1360	1140	1210	1340
31	2950	---	1780	3090	---	4760	---	2460	---	980	1210	---
TOTAL	52760	58480	69150	90500	85290	119790	97110	90790	52780	38140	41301	39740
MEAN	1702	1949	2231	2919	3046	3864	3237	2929	1759	1230	1332	1301
MAX	2950	2900	2910	4380	4810	4920	4920	3410	2360	1570	1990	1850
MIN	1400	1640	1430	2000	2090	2370	1900	2170	1360	980	971	1760
CFSM	.74	.84	.96	1.26	1.32	1.67	1.40	1.27	.76	.53	.58	.56
IN.	.85	.94	1.11	1.46	1.37	1.93	1.56	1.46	.85	.61	.66	.63

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 1997, BY WATER YEAR (WY)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
MEAN	1570	2043	1956	2603	2792	3478	2805	2889	2353	1414	1357	1300
MAX	1702	2136	2231	2919	3046	3864	3237	2929	2946	1597	1382	1301
(WY)	1997	1996	1997	1997	1997	1997	1997	1997	1996	1996	1996	1997
MIN	1438	1949	1681	2286	2548	3093	2373	2849	1759	1230	1332	1399
(WY)	1996	1997	1996	1996	1996	1996	1996	1996	1997	1997	1997	1996

SUMMARY STATISTICS

	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1996 - 1997
ANNUAL TOTAL	800220	835131	
ANNUAL MEAN	2186	2288	2210
HIGHEST ANNUAL MEAN			2288
LOWEST ANNUAL MEAN			2133
HIGHEST DAILY MEAN	5780	Jun 24	5780
LOWEST DAILY MEAN	1040	Aug 17	971
ANNUAL SEVEN-DAY MINIMUM	1070	Aug 8	999
INSTANTANEOUS PEAK FLOW			5410
INSTANTANEOUS PEAK STAGE			8.23
INSTANTANEOUS LOW FLOW			704
ANNUAL RUNOFF (CFSM)	.95	.99	.96
ANNUAL RUNOFF (INCHES)	12.87	13.43	12.98
10 PERCENT EXCEEDS	3210	3890	3370
50 PERCENT EXCEEDS	2050	2080	2010
90 PERCENT EXCEEDS	1270	1170	1210

(a) Mar. 6, Apr. 1.

(b) Observed; may have been higher during period of no gage-height record June 24, 25.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121970 MUSKEGON RIVER NEAR CROTON, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1995 to current year.

DISSOLVED OXYGEN: October 1995 to current year.

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, 24.5°C, July 28, 1997; minimum recorded, 0.5°C, on many days during winter periods, but may have been lower during instrument malfunction Jan. 3-29, Feb. 19, 1996.

DISSOLVED OXYGEN: Maximum, 14.3 mg/L, Feb. 24, 1997; minimum, 3.7 mg/L, Sept. 9, 1996.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 24.5°C, July 28; minimum, 0.5°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 14.3 mg/L, Feb. 24; minimum, 5.4 mg/L, Aug. 7.

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	16.5	16.0	16.5	10.0	9.0	9.5	4.0	3.5	3.5	1.5	1.0	1.0
2	17.0	16.5	16.5	9.0	8.5	9.0	3.5	3.0	3.5	1.5	1.0	1.5
3	16.5	16.0	16.0	9.0	8.5	8.5	3.5	3.0	3.5	1.5	1.0	1.0
4	16.0	15.5	15.5	9.0	8.0	8.5	3.5	3.0	3.5	1.5	1.0	1.5
5	15.5	15.0	15.5	9.5	8.5	9.0	3.5	3.0	3.5	1.5	1.5	1.5
6	15.5	15.0	15.0	9.5	8.5	9.0	3.5	2.5	3.0	1.5	1.0	1.5
7	15.5	15.0	15.5	---	---	---	3.5	2.5	3.0	1.0	1.0	1.0
8	15.5	14.5	15.0	---	---	---	3.5	2.5	3.0	1.0	.5	1.0
9	15.0	14.5	14.5	---	---	---	3.5	2.5	3.0	1.0	.5	.5
10	14.5	14.0	14.5	---	---	---	3.5	2.5	3.0	1.0	.5	1.0
11	14.0	13.5	13.5	8.0	7.5	7.5	3.0	2.5	3.0	1.0	.5	1.0
12	13.5	13.5	13.5	7.5	7.0	7.0	3.0	2.0	2.5	1.0	.5	1.0
13	14.0	13.5	13.5	7.0	6.5	6.5	3.0	2.5	2.5	1.0	.5	.5
14	14.5	13.5	14.0	6.5	6.0	6.0	3.0	2.5	2.5	1.0	.5	.5
15	14.0	13.5	13.5	6.0	5.0	5.5	3.0	2.5	2.5	1.0	.5	.5
16	14.0	13.5	13.5	5.5	5.0	5.0	2.5	2.5	2.5	1.0	.5	.5
17	14.0	13.0	13.5	5.5	5.0	5.0	2.5	2.0	2.5	1.0	.5	.5
18	14.0	13.5	14.0	5.5	5.0	5.5	2.5	2.0	2.0	.5	.5	.5
19	13.5	13.0	13.5	5.5	4.5	5.0	2.0	1.5	2.0	.5	.5	.5
20	13.5	13.0	13.0	5.5	4.5	5.0	1.5	1.5	1.5	.5	.5	.5
21	13.5	13.0	13.0	5.0	4.5	5.0	1.5	1.0	1.0	.5	.5	.5
22	13.5	13.0	13.0	5.0	4.0	4.5	1.5	1.0	1.5	.5	.5	.5
23	13.0	12.5	12.5	5.0	4.0	4.5	1.5	1.5	1.5	1.0	.5	.5
24	12.5	12.0	12.0	5.0	4.0	4.5	1.5	1.0	1.5	1.0	.5	1.0
25	12.5	12.0	12.0	5.0	4.0	4.5	1.5	1.0	1.5	1.0	.5	1.0
26	12.0	12.0	12.0	4.5	3.5	4.0	1.5	1.0	1.5	.5	.5	.5
27	12.5	12.0	12.0	4.0	3.5	4.0	1.5	1.0	1.0	.5	.5	.5
28	12.5	12.0	12.0	4.0	3.5	3.5	1.0	1.0	1.0	.5	.5	.5
29	12.0	11.5	11.5	4.0	3.0	3.5	1.5	1.0	1.0	.5	.5	.5
30	11.5	11.0	11.5	4.0	3.0	3.5	1.5	1.0	1.0	.5	.5	.5
31	11.0	10.0	10.5	---	---	---	1.5	1.0	1.0	.5	.5	.5
MONTH	17.0	10.0	13.5	---	---	---	4.0	1.0	2.0	1.5	.5	1.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121970 MUSKEGON RIVER NEAR CROTON, MI--Continued

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

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
		JUNE				JULY		AUGUST				SEPTEMBER	
1	13.5	13.0	13.0	20.5	19.5	20.5	21.0	20.0	20.5	20.0	19.5	19.5	
2	14.0	13.5	13.5	20.5	18.5	19.5	21.5	20.0	21.0	21.0	19.5	20.0	
3	14.5	13.5	14.0	19.5	19.0	19.0	21.5	20.5	21.0	20.0	19.5	19.5	
4	15.0	14.5	14.5	19.5	18.5	19.5	22.5	20.5	22.0	19.5	18.5	19.0	
5	15.0	14.0	14.5	19.5	18.0	18.5	22.5	21.0	22.0	19.0	18.0	19.5	
6	15.5	14.0	15.0	20.0	18.5	19.0	21.0	20.0	20.5	19.0	18.0	19.5	
7	16.5	14.5	15.0	20.0	18.5	19.5	20.5	20.0	20.5	19.5	18.5	19.0	
8	17.5	16.0	16.5	19.5	18.5	19.0	21.0	20.0	20.5	19.5	19.0	19.0	
9	17.5	16.0	16.5	20.0	19.0	19.5	21.0	20.0	20.5	19.5	19.0	19.0	
10	17.0	16.0	16.5	20.0	19.0	19.5	20.5	20.0	20.0	19.5	19.0	19.5	
11	17.5	15.5	16.5	20.0	19.0	19.5	21.0	20.5	21.0	19.0	18.5	19.0	
12	17.5	16.0	16.5	20.5	19.0	19.5	20.5	20.0	20.0	18.5	18.5	19.5	
13	20.0	16.0	18.0	20.5	19.5	20.0	20.5	19.5	20.0	19.0	18.0	19.5	
14	19.0	17.0	18.0	20.5	20.0	20.0	19.5	19.0	19.5	19.0	18.0	19.5	
15	17.5	15.0	16.0	21.5	19.5	20.5	19.5	19.0	19.5	19.0	18.5	19.0	
16	18.0	15.5	16.5	21.5	19.5	21.0	21.0	19.5	20.0	19.5	18.5	19.0	
17	18.0	17.0	17.5	22.0	20.0	21.0	20.5	20.0	20.0	20.0	18.5	19.0	
18	18.5	17.0	18.0	22.5	20.5	21.5	20.0	19.5	20.0	19.5	18.5	19.0	
19	18.0	17.5	18.0	22.0	20.5	21.5	20.0	19.5	19.5	19.5	19.0	19.0	
20	18.0	16.5	17.0	21.5	20.5	21.0	20.0	20.0	20.0	19.5	18.5	19.0	
21	18.0	16.0	17.0	22.0	21.0	21.5	20.0	19.5	19.5	18.5	18.0	19.5	
22	18.5	17.0	17.5	21.5	21.0	21.0	19.5	19.0	19.0	18.0	18.0	19.0	
23	18.5	17.0	17.5	21.5	20.5	21.0	19.5	18.5	19.0	18.0	17.5	19.0	
24	18.5	16.5	17.5	21.5	20.5	21.0	19.0	18.5	19.0	17.5	17.0	17.5	
25	19.5	17.5	18.5	21.5	20.5	21.0	19.0	19.0	19.0	18.0	17.0	17.5	
26	21.5	18.5	19.5	22.0	20.5	21.0	19.5	19.0	19.0	18.0	17.0	17.5	
27	20.0	18.5	19.5	21.5	20.5	21.5	20.5	19.0	19.5	17.5	17.0	17.5	
28	20.0	19.0	19.5	24.5	21.0	22.5	20.5	19.5	20.0	17.5	17.0	17.5	
29	20.5	19.5	20.0	23.0	21.5	22.0	20.0	19.5	19.5	17.0	17.0	17.0	
30	20.5	19.5	20.0	22.5	21.0	21.5	19.5	19.0	19.5	17.0	16.5	17.5	
31	---	---	---	21.5	20.5	21.0	20.0	19.0	19.5	---	---	---	
MONTH	21.5	13.0	17.0	24.5	18.0	20.5	22.5	18.5	20.0	21.0	16.5	19.5	

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121970 MUSKEGON RIVER NEAR CROTON, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	8.0	7.1	7.4	9.5	9.2	9.4	12.0	11.5	11.7	12.4	12.2	12.3			
2	8.0	7.4	7.7	9.6	9.4	9.5	12.1	11.8	11.9	12.3	12.0	12.1			
3	8.5	7.8	8.1	9.7	9.4	9.6	11.9	11.7	11.8	12.3	12.1	12.2			
4	8.4	7.9	8.1	9.8	9.4	9.6	12.0	11.6	11.8	12.2	12.1	12.2			
5	8.4	7.8	8.1	9.8	9.4	9.6	12.0	11.6	11.7	13.3	12.1	12.5			
6	8.4	7.8	8.1	9.7	9.5	9.6	12.1	11.5	11.8	13.4	12.3	13.0			
7	8.4	8.0	8.3	---	---	---	12.0	11.5	11.7	12.5	12.3	12.4			
8	8.6	8.3	8.4	---	---	---	12.0	11.5	11.8	12.5	12.4	12.5			
9	8.9	8.2	8.5	---	---	---	12.1	11.6	11.8	12.6	12.4	12.5			
10	9.0	8.5	8.7	---	---	---	12.1	11.5	11.8	12.5	12.3	12.4			
11	9.0	8.6	8.8	10.1	9.9	10.0	12.2	11.8	12.0	12.4	12.2	12.3			
12	9.2	8.5	8.9	10.2	9.9	10.1	12.5	11.9	12.2	12.4	12.2	12.3			
13	9.5	8.9	9.2	10.3	10.0	10.2	12.5	12.1	12.3	12.3	12.2	12.3			
14	10.2	9.2	9.6	10.6	10.3	10.4	12.3	12.0	12.2	12.4	12.2	12.3			
15	10.2	9.6	9.9	10.9	10.4	10.7	12.3	12.0	12.2	12.4	12.1	12.3			
16	10.2	9.4	9.8	11.1	10.7	10.9	12.5	12.2	12.3	12.4	12.1	12.2			
17	10.1	9.2	9.7	11.2	10.7	11.0	12.5	12.2	12.4	12.4	12.1	12.2			
18	10.1	9.3	9.8	11.3	10.9	11.1	12.6	12.3	12.4	12.4	12.1	12.2			
19	10.2	9.7	9.9	11.6	11.1	11.3	12.6	12.3	12.5	12.5	12.2	12.3			
20	10.1	9.6	9.8	11.5	11.1	11.3	12.9	12.5	12.7	12.3	12.0	12.2			
21	10.3	9.7	10.0	11.5	11.1	11.3	12.9	12.6	12.8	12.3	12.0	12.2			
22	9.9	9.5	9.7	11.7	11.2	11.4	13.0	12.5	12.8	12.1	11.9	12.0			
23	9.7	9.3	9.5	11.7	11.1	11.4	12.7	12.3	12.6	12.2	11.9	12.0			
24	9.5	9.1	9.3	11.9	11.3	11.6	12.6	12.4	12.5	12.1	11.9	12.0			
25	9.6	9.2	9.4	11.9	11.4	11.6	12.5	12.2	12.4	12.2	11.9	12.0			
26	9.7	9.4	9.5	12.1	11.5	11.8	12.5	12.2	12.4	12.2	12.0	12.1			
27	9.6	9.4	9.5	12.2	11.5	11.8	12.6	12.3	12.4	12.2	12.0	12.1			
28	9.7	9.2	9.4	12.0	11.6	11.8	12.6	12.3	12.5	12.2	11.9	12.0			
29	9.4	9.2	9.3	12.2	11.6	11.9	12.5	12.3	12.4	12.1	11.9	12.0			
30	9.3	9.1	9.2	12.1	11.5	11.8	12.5	12.3	12.4	12.1	11.9	12.0			
31	9.4	9.2	9.3	---	---	---	12.5	12.3	12.4	12.1	11.9	11.9			
MONTH	10.3	7.1	9.1	---	---	---	13.0	11.5	12.2	13.4	11.9	12.2			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	12.0	11.8	11.9	13.4	13.1	13.3	13.0	12.5	12.8	11.9	11.1	11.6	
2	12.0	11.8	11.9	13.5	13.1	13.3	12.9	12.4	12.6	11.7	9.9	11.2	
3	11.9	11.7	11.8	13.6	13.2	13.4	12.7	12.4	12.5	11.3	10.8	11.0	
4	11.9	11.7	11.8	13.7	13.2	13.5	12.7	11.9	12.4	11.4	10.8	11.1	
5	12.0	11.8	11.9	13.8	13.4	13.6	12.1	11.5	11.9	11.2	10.7	10.9	
6	12.1	11.8	11.9	13.9	13.4	13.6	12.4	11.5	12.0	11.4	10.7	11.1	
7	12.1	11.8	12.0	13.8	13.4	13.6	12.6	12.1	12.4	11.3	10.9	11.1	
8	12.2	11.9	12.0	14.0	13.4	13.7	13.0	12.5	12.8	11.2	10.7	10.9	
9	12.2	11.9	12.0	13.8	13.2	13.5	13.3	12.8	13.0	11.0	10.6	10.8	
10	12.2	11.9	12.0	13.5	12.6	13.1	13.0	12.3	12.7	10.9	10.5	10.7	
11	12.3	11.8	12.0	13.2	12.3	12.9	12.5	11.9	12.3	10.7	10.4	10.6	
12	12.2	11.8	12.0	13.5	12.6	13.1	12.3	11.9	12.1	10.8	10.4	10.6	
13	12.3	11.8	12.0	13.4	11.8	12.5	12.5	11.9	12.2	10.7	10.4	10.6	
14	12.3	11.7	12.0	12.2	11.8	12.0	12.4	11.7	12.1	10.7	10.3	10.5	
15	12.3	11.7	12.0	12.2	11.7	11.9	12.6	10.6	11.9	10.7	9.0	10.1	
16	12.4	11.8	12.1	12.3	11.7	12.1	11.9	11.4	11.6	10.2	8.9	9.1	
17	12.2	11.8	12.0	12.4	11.7	12.0	11.8	11.4	11.6	10.5	10.2	10.4	
18	12.3	11.8	12.1	12.2	11.7	11.9	11.8	11.4	11.6	11.0	10.3	10.7	
19	12.4	11.7	12.0	12.0	11.5	11.8	11.7	11.3	11.5	10.5	10.2	10.3	
20	12.1	11.7	12.0	12.0	11.5	11.7	11.8	11.4	11.6	10.2	10.0	10.1	
21	13.5	11.9	12.4	11.8	11.3	11.6	11.9	11.5	11.6	10.2	9.5	9.8	
22	14.0	13.2	13.7	11.8	11.4	11.6	12.0	11.5	11.7	10.1	9.4	9.7	
23	14.1	13.8	13.9	12.2	11.5	11.8	11.8	11.3	11.6	9.9	9.3	9.6	
24	14.3	13.9	14.1	12.9	11.7	12.4	12.0	11.5	11.7	9.8	9.3	9.6	
25	14.2	13.5	13.8	12.7	12.3	12.5	12.0	11.3	11.7	9.5	9.2	9.4	
26	13.8	13.4	13.6	12.7	12.3	12.5	12.0	11.2	11.6	9.5	9.1	9.3	
27	13.7	13.4	13.6	12.7	12.2	12.5	12.0	11.4	11.7	9.7	9.2	9.5	
28	13.8	13.2	13.6	12.6	12.2	12.4	12.7	11.4	12.0	9.8	9.3	9.6	
29	---	---	---	12.6	12.2	12.4	11.5	9.8	11.2	9.7	9.4	9.5	
30	---	---	---	12.8	12.4	12.5	11.9	11.0	11.4	9.8	9.4	9.6	
31	---	---	---	13.0	12.5	12.7	---	---	---	9.9	9.4	9.6	
MONTH	14.3	11.7	12.4	14.0	11.3	12.6	13.3	9.8	12.0	11.9	8.9	10.3	

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121970 MUSKEGON RIVER NEAR CROTON, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	10.2	9.4	9.8	7.9	6.7	7.4	6.8	5.9	6.3	7.9	6.9	7.5
2	10.0	9.6	9.8	7.8	7.0	7.5	7.3	6.1	6.8	8.9	6.8	8.2
3	9.8	9.4	9.6	7.4	7.0	7.2	7.4	5.6	6.8	8.4	6.7	7.6
4	9.8	9.4	9.6	7.9	7.0	7.4	8.5	6.3	7.7	7.9	7.0	7.4
5	9.7	9.3	9.5	7.3	6.5	6.8	8.8	6.6	7.6	7.6	6.2	7.1
6	9.6	9.0	9.3	8.1	6.4	7.3	6.8	5.7	6.2	7.0	6.1	6.5
7	9.2	8.8	9.0	8.2	6.8	7.4	6.5	5.4	5.8	8.7	6.1	7.5
8	9.3	8.8	9.1	7.8	7.1	7.3	7.1	5.5	6.5	8.9	7.8	8.4
9	9.1	8.6	8.8	8.5	7.5	7.9	8.1	5.9	7.1	9.1	7.5	8.3
10	9.3	8.7	9.0	7.8	6.1	7.4	7.0	5.7	6.2	9.0	7.6	8.6
11	9.1	8.7	8.9	7.9	6.9	7.5	8.0	7.0	7.7	8.5	7.6	8.0
12	9.0	8.6	8.9	8.0	7.4	7.6	9.1	7.0	7.4	7.6	7.1	7.4
13	9.1	8.5	8.7	7.9	6.9	7.5	8.1	6.4	7.7	7.5	6.3	7.6
14	8.8	8.2	8.5	7.5	7.0	7.2	6.6	5.5	6.2	7.7	6.0	7.6
15	8.3	7.4	8.0	7.5	6.8	7.2	7.0	5.8	6.4	8.3	7.4	7.8
16	8.0	7.3	7.7	7.5	7.0	7.2	8.0	6.6	7.3	8.3	6.8	7.7
17	8.1	7.5	7.8	7.4	6.6	6.9	8.3	7.6	8.1	8.1	6.3	7.4
18	7.7	7.1	7.5	7.4	6.7	7.1	8.1	7.5	7.8	8.4	7.5	8.0
19	8.9	7.2	8.3	7.6	6.5	7.0	7.9	7.3	7.6	8.0	7.5	7.8
20	8.5	7.6	8.0	7.7	6.9	7.2	8.9	7.6	8.3	8.3	7.8	8.1
21	8.3	7.2	7.8	7.8	7.0	7.4	8.6	7.8	8.3	8.7	8.2	8.4
22	8.1	7.2	7.6	7.6	6.8	7.3	8.2	7.7	8.0	8.6	8.2	8.4
23	8.2	7.2	7.8	7.8	6.9	7.4	8.2	7.3	7.8	8.3	7.9	8.1
24	8.2	7.3	7.7	7.5	6.7	7.1	8.2	7.3	7.8	8.2	7.4	7.8
25	8.2	7.6	8.0	7.8	6.9	7.2	8.2	7.8	7.9	8.0	7.1	7.6
26	9.0	7.6	8.3	7.7	6.7	7.2	8.0	6.8	7.5	8.3	7.6	7.8
27	8.3	7.8	8.1	7.8	6.7	7.3	8.0	6.7	7.3	8.5	7.7	8.0
28	8.3	7.8	8.0	8.6	7.1	7.8	8.1	7.1	7.6	8.3	5.5	7.5
29	8.2	7.6	7.9	8.8	6.9	7.9	7.9	6.6	7.5	8.0	5.5	7.7
30	8.1	7.4	7.8	7.8	6.6	7.3	7.8	5.6	6.9	8.0	7.7	7.8
31	---	---	---	7.0	6.0	6.6	7.7	5.7	7.2	---	---	---
MONTH	10.2	7.1	8.5	8.8	6.0	7.3	9.1	5.4	7.3	9.1	5.5	7.8

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.--16.7 mi², revised.

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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.8	11	16	15	22	56	19	23	11	7.1	3.8	4.2
2	4.1	10	15	19	21	73	18	20	10	6.8	3.8	4.0
3	3.9	9.4	12	26	20	51	18	25	9.8	6.5	3.6	3.6
4	3.7	9.1	12	33	22	43	19	20	9.5	6.6	3.7	3.4
5	4.2	8.6	11	58	29	39	23	18	9.1	6.3	3.2	3.5
6	3.9	8.6	12	37	24	37	28	22	9.2	6.1	3.3	3.7
7	4.6	11	12	28	22	32	23	18	12	5.8	3.2	3.5
8	4.9	9.7	12	24	20	31	20	38	10	7.7	3.0	3.3
9	4.4	9.3	11	22	19	31	19	40	9.3	7.1	2.9	3.7
10	4.3	9.4	11	22	18	37	18	29	8.6	6.0	3.3	4.7
11	4.1	9.4	11	21	18	35	18	23	8.0	5.9	4.1	3.8
12	4.3	8.9	12	e20	17	31	21	22	7.8	5.7	6.9	3.5
13	4.6	8.7	13	e19	e17	29	25	20	7.6	5.2	6.5	3.1
14	4.6	8.5	13	18	e16	28	24	19	7.1	8.2	4.9	4.2
15	4.5	8.3	14	18	e16	25	21	21	6.9	5.9	10	3.6
16	4.6	8.8	14	e17	16	24	21	20	14	5.1	7.2	9.2
17	7.3	11	13	e16	18	27	20	20	11	5.5	6.7	20
18	16	10	13	e16	18	32	18	18	9.3	5.3	7.1	8.5
19	7.8	9.3	e13	e15	37	27	18	24	8.5	4.7	5.2	10
20	7.0	9.0	e14	e15	35	26	17	19	8.9	4.8	5.9	12
21	6.5	8.6	e14	e15	115	25	17	17	22	7.4	6.2	8.4
22	6.3	8.5	15	55	149	23	16	16	19	7.1	5.6	7.2
23	13	8.8	15	72	63	22	15	15	16	5.8	5.0	6.8
24	10	8.8	27	45	46	21	16	14	14	5.0	5.3	6.1
25	8.6	8.5	22	34	40	26	16	14	11	4.7	5.3	5.8
26	7.7	8.4	e21	30	37	26	15	13	9.6	5.6	5.0	5.6
27	7.5	8.1	e19	e27	60	23	14	12	8.5	5.3	4.7	5.4
28	7.3	8.4	18	26	71	22	14	12	7.9	6.2	4.7	5.3
29	12	8.3	18	e24	---	24	14	12	7.3	4.9	4.7	5.0
30	23	14	17	e23	---	22	14	12	7.1	4.6	4.1	5.0
31	14	---	15	e22	---	21	---	12	---	3.8	4.5	---
TOTAL	222.5	278.4	455	832	1006	969	559	608	310.0	182.7	153.4	176.1
MEAN	7.18	9.28	14.7	26.8	35.9	31.3	18.6	19.6	10.3	5.89	4.95	5.87
MAX	23	14	27	72	149	73	28	40	22	8.2	10	20
MIN	3.7	8.1	11	15	16	21	14	12	6.9	3.8	2.9	3.1
CFSM	.43	.56	.88	1.61	2.15	1.87	1.12	1.17	.62	.35	.30	.35
IN.	.50	.62	1.01	1.85	2.24	2.16	1.25	1.35	.69	.41	.34	.39

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1997, BY WATER YEAR (WY)

	MEAN	13.9	18.8	20.9	18.9	21.3	31.0	27.9	18.7	12.1	7.09	8.30	8.89
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1966 - 1997

ANNUAL TOTAL	5274.9	5752.1	
ANNUAL MEAN	14.4	15.8	17.3
HIGHEST ANNUAL MEAN			27.4
LOWEST ANNUAL MEAN			8.36
HIGHEST DAILY MEAN	73	149	720
LOWEST DAILY MEAN	2.8	2.9	1.6
ANNUAL SEVEN-DAY MINIMUM	3.3	3.2	2.0
INSTANTANEOUS PEAK FLOW		246	(a)930
INSTANTANEOUS PEAK STAGE		14.92	(b)16.61
INSTANTANEOUS LOW FLOW		2.6	1.0
ANNUAL RUNOFF (CFSM)	.86	.94	1.04
ANNUAL RUNOFF (INCHES)	11.75	12.81	14.07
10 PERCENT EXCEEDS	25	28	32
50 PERCENT EXCEEDS	13	12	13
90 PERCENT EXCEEDS	4.2	4.4	4.6

(a) Gage height 11.00 ft, datum then in use.

(b) Present datum; backwater from ice.

(c) Aug. 8, 9.

(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 fair except for estimated daily discharges, which are poor.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	304	571	444	428	e480	747	673	450	394	348	247	253
2	289	517	500	428	e480	758	617	548	379	351	245	253
3	278	448	519	475	e480	918	571	601	363	343	245	243
4	272	396	502	554	e470	906	550	617	349	331	254	243
5	269	372	464	652	e470	816	561	583	331	323	252	243
6	268	357	440	849	e470	749	590	552	356	311	248	247
7	287	358	431	911	e470	698	621	554	420	301	242	243
8	269	372	425	854	e470	643	599	566	395	339	239	244
9	271	369	422	818	e470	614	551	630	360	339	237	283
10	271	365	414	731	460	607	513	706	339	381	236	283
11	271	371	406	693	448	635	492	669	325	347	242	263
12	270	373	407	645	441	675	490	603	317	321	284	257
13	271	368	415	e560	415	695	500	550	310	311	356	251
14	271	362	436	e520	e420	673	511	516	301	317	351	250
15	270	353	456	e490	e430	633	514	504	306	314	335	250
16	270	349	480	e470	e440	570	501	521	378	300	327	243
17	270	375	493	e450	444	553	499	541	392	291	324	323
18	328	438	476	e450	461	564	493	549	355	285	322	418
19	384	438	460	e450	476	602	480	537	327	278	313	393
20	362	407	418	e450	578	608	460	521	361	271	301	415
21	333	381	421	e450	658	620	450	491	542	318	300	418
22	314	366	507	e500	856	665	450	461	777	325	305	393
23	349	366	553	e700	1230	717	447	437	1000	312	304	353
24	402	365	567	e950	1150	725	442	421	893	293	295	316
25	407	359	635	e800	975	699	437	414	763	281	288	303
26	388	352	585	e700	905	690	432	410	602	275	286	283
27	356	346	510	e620	818	734	426	402	470	270	281	283
28	335	344	560	e560	770	746	429	387	413	266	275	283
29	335	343	605	e540	---	760	420	375	380	260	268	293
30	418	369	531	e520	---	760	408	382	358	254	263	283
31	543	---	451	e490	---	728	---	398	---	250	259	---
TOTAL	9905	11550	14933	18708	16635	21508	15127	15896	13256	9560	8724	8853
MEAN	320	385	482	603	594	694	504	513	442	308	281	295
MAX	543	571	635	950	1230	916	673	706	1000	393	356	418
MIN	267	343	406	428	415	553	408	375	301	250	236	244
CFSM	.79	.95	1.19	1.49	1.46	1.71	1.24	1.26	1.09	.76	.69	.73
IN.	.91	1.06	1.37	1.71	1.52	1.97	1.39	1.46	1.21	.88	.80	.83

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1957 - 1997, BY WATER YEAR (WY)

	MEAN	386	465	487	457	465	650	669	499	412	313	305	351
MAX	912	906	896	641	760	1449	1224	936	747	523	484	1073	1073
(WY)	1987	1986	1992	1973	1985	1976	1967	1974	1989	1982	1982	1982	1982
MIN	226	269	286	252	240	382	315	259	230	202	186	212	212
(WY)	1972	1972	1959	1959	1959	1964	1958	1958	1958	1964	1958	1957	1957

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1957 - 1997
ANNUAL TOTAL	161515	164660	
ANNUAL MEAN	441	451	455
HIGHEST ANNUAL MEAN			635
LOWEST ANNUAL MEAN			288
HIGHEST DAILY MEAN	1180	Feb 29	4650
LOWEST DAILY MEAN	247	Sep 21	164
ANNUAL SEVEN-DAY MINIMUM	250	Sep 20	169
INSTANTANEOUS PEAK FLOW		(a)1290	5400
INSTANTANEOUS PEAK STAGE		(b)5.37	7.46
INSTANTANEOUS LOW FLOW			163
ANNUAL RUNOFF (CFSM)	1.09	1.11	1.12
ANNUAL RUNOFF (INCHES)	14.80	15.09	15.24
10 PERCENT EXCEEDS	619	696	707
50 PERCENT EXCEEDS	422	418	400
90 PERCENT EXCEEDS	261	270	253

(a) Gage height 5.08 ft.

(b) Backwater from ice.

(c) Aug. 18, 19, 1958.

(e) 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 fair. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	602	1030	730	760	e840	1310	1530	831	812	578	473	550
2	582	1050	814	740	e820	1360	1400	913	778	627	468	543
3	565	955	867	782	e800	1430	1270	1030	722	677	475	529
4	553	834	864	883	e800	1440	1180	1080	686	637	492	516
5	549	760	807	1100	e800	1380	1120	1050	663	609	485	509
6	546	720	768	1210	e800	1320	1110	1010	655	591	475	509
7	550	731	751	1290	e800	1230	1110	967	673	568	462	508
8	550	730	739	1390	e800	1150	1110	974	682	598	454	506
9	555	745	734	1260	e800	1080	1070	953	676	658	450	504
10	556	731	720	e1100	e800	1060	1000	968	644	719	455	565
11	551	728	710	e1000	796	1050	947	998	621	703	470	534
12	547	721	705	e880	785	1060	920	969	607	615	529	524
13	546	712	717	e850	769	1080	924	923	603	575	667	518
14	545	699	741	e820	799	1080	926	893	598	556	736	517
15	545	679	778	e800	792	1050	926	878	589	544	763	511
16	550	669	818	e780	776	953	918	899	599	530	665	509
17	592	709	852	e780	775	945	903	954	606	530	619	606
18	696	776	864	e780	745	955	908	992	619	520	665	630
19	710	804	832	e780	856	981	892	1010	603	515	725	680
20	709	782	758	e780	999	1010	859	971	631	506	694	666
21	669	734	724	e780	1290	1060	832	925	711	500	659	682
22	637	699	767	e800	1610	1130	812	868	830	502	658	744
23	678	692	763	e1200	1790	1240	807	820	908	507	665	675
24	752	687	845	e1600	1850	1330	807	783	920	499	649	622
25	810	683	898	e1500	1730	1360	799	845	830	489	672	586
26	818	667	950	e1300	1590	1370	796	889	755	502	716	563
27	756	652	868	e1100	1440	1400	789	884	724	497	724	549
28	703	645	967	e1000	1350	1460	775	809	667	513	652	539
29	698	635	699	e920	---	1510	758	751	619	535	592	534
30	833	663	828	e880	---	1560	751	751	590	511	567	531
31	932	---	819	e850	---	1580	---	791	---	483	559	---
TOTAL	19885	22322	24897	30695	28802	37924	28949	28379	20621	17394	18335	16959
MEAN	641	744	803	990	1029	1223	965	915	687	561	591	565
MAX	932	1050	967	1600	1850	1580	1530	1080	920	719	763	744
MIN	545	635	705	740	745	945	751	751	589	483	450	504
CFSM	.94	1.09	1.18	1.45	1.51	1.80	1.42	1.34	1.01	.82	.87	.83
IN.	1.09	1.22	1.36	1.68	1.57	2.07	1.58	1.55	1.13	.95	1.00	.93

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1939 - 1997, BY WATER YEAR (WY)

MEAN	607	714	738	708	718	980	1041	789	680	537	497	554
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1939 - 1997

ANNUAL TOTAL	301379						295162					
ANNUAL MEAN	823						809			713		
HIGHEST ANNUAL MEAN										1087		1986
LOWEST ANNUAL MEAN										472		1958
HIGHEST DAILY MEAN	1810				Jun 20		1850	Feb 24		6020	Sep 13	1986
LOWEST DAILY MEAN	480				Sep 8		450	Aug 9		310	Aug 9	1941
ANNUAL SEVEN-DAY MINIMUM	487				Sep 3		464	Aug 5		322	Aug 5	1941
INSTANTANEOUS PEAK FLOW							(a)1880	Feb 24		6440	Sep 13	1986
INSTANTANEOUS PEAK STAGE							(b)5.52	Jan 24		8.07	Sep 13	1986
INSTANTANEOUS LOW FLOW							447	Aug 10		209	Dec 11	1962
ANNUAL RUNOFF (CFSM)	1.21						1.19			1.05		
ANNUAL RUNOFF (INCHES)	16.46						16.12			14.23		
10 PERCENT EXCEEDS	1160						1160			1080		
50 PERCENT EXCEEDS	768						760			637		
90 PERCENT EXCEEDS	534						529			429		

- (a) Gage height 4.68 ft.
(b) Backwater from ice.
(c) Estimated.

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 040601C3, 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.

WATER-DISCHARGE RECORDS

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.--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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	932	1130	1000	1000	1130	1180	1740	1470	1160	916	797	842
2	900	1090	1070	989	1150	1250	1750	1660	1140	920	794	847
3	869	1060	1110	1010	1160	1280	1870	1610	1110	898	793	840
4	845	1020	1100	1050	1140	1250	2000	1590	1080	880	796	828
5	845	998	1070	1260	1120	1220	2110	1520	1060	876	800	819
6	845	995	1040	1350	1100	1200	2150	1490	1030	876	808	817
7	861	1030	1030	1260	1090	1150	2200	1430	1030	871	817	816
8	852	1030	1020	1200	1050	1130	2310	1390	1010	905	795	819
9	843	1020	1010	1110	1030	1120	2300	1430	1000	975	789	820
10	838	1020	1000	e1050	1030	1120	2170	1430	993	1000	817	822
11	830	1010	996	e1020	1020	1100	1940	1390	975	979	853	829
12	825	998	988	e1000	1020	1090	1790	1350	968	925	864	872
13	823	989	990	e1000	940	1070	1720	1310	993	887	917	888
14	820	975	999	e980	998	1060	1690	1300	969	872	910	871
15	817	938	1020	e960	1050	1040	1660	1350	946	859	908	854
16	815	937	1070	e950	1050	974	1620	1500	951	847	976	840
17	866	1010	1070	e940	967	1060	1590	1600	957	840	993	895
18	995	1070	1050	e960	1050	1070	1570	1650	949	838	990	903
19	998	1100	1000	e980	1170	1040	1530	1690	938	834	941	876
20	983	1090	911	e980	1250	1040	1470	1650	957	838	910	897
21	967	1060	934	e980	1320	1050	1420	1540	1010	847	965	880
22	922	1020	979	1420	1440	1110	1390	1430	1020	853	1020	849
23	952	1010	1020	1470	1360	1140	1370	1360	977	856	972	839
24	1080	993	1090	1390	1260	1120	1370	1300	945	839	960	835
25	1100	974	1130	1350	1140	1130	1370	1270	927	829	937	826
26	1090	958	1060	1250	e1200	1200	1350	1240	914	865	890	815
27	1060	946	1050	1180	e1300	1290	1320	1210	897	868	873	810
28	1000	932	1100	1150	e1250	1550	1290	1180	882	847	857	808
29	965	932	1120	1090	---	1830	1260	1150	871	826	843	811
30	1070	951	1070	1050	---	1880	1240	1170	873	813	838	828
31	1150	---	1020	1090	---	1820	---	1160	---	803	842	---
TOTAL	28758	30286	32117	34469	31785	37564	50560	43820	29532	27082	27265	25296
MEAN	928	1010	1036	1112	1135	1212	1685	1414	984	874	880	843
MAX	1150	1130	1130	1470	1440	1880	2310	1690	1160	1000	1020	903
MIN	815	932	911	940	940	974	1240	1150	871	803	789	808
CFSM	1.08	1.18	1.21	1.30	1.32	1.41	1.97	1.65	1.15	1.02	1.03	.98
IN.	1.25	1.31	1.39	1.50	1.38	1.63	2.19	1.90	1.28	1.18	1.18	1.10

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1903 - 1997, BY WATER YEAR (WY)

	MEAN	979	1057	1041	1004	987	1205	1541	1210	1057	941	889	920
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1903 - 1997

ANNUAL TOTAL	405055	398534	(a)1068
ANNUAL MEAN	1107	1092	1261
HIGHEST ANNUAL MEAN			888
LOWEST ANNUAL MEAN			1912
HIGHEST DAILY MEAN	2310	2310	3500
LOWEST DAILY MEAN	786	789	540
ANNUAL SEVEN-DAY MINIMUM	788	799	549
INSTANTANEOUS PEAK FLOW		2320	(b)3570
INSTANTANEOUS PEAK STAGE		14.74	(c)15.01
ANNUAL RUNOFF (CFSM)	1.29	1.27	1.25
ANNUAL RUNOFF (INCHES)	17.58	17.30	16.93
10 PERCENT EXCEEDS	1430	1470	1430
50 PERCENT EXCEEDS	1030	1010	986
90 PERCENT EXCEEDS	837	837	823

(a) Does not include water years 1931, 1934.

(b) Gage height 7.1 ft, from graph based on gage readings, datum then in use.

(c) Backwater from ice, does not include water years 1903-1990.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04124000 MANISTEE RIVER NEAR SHERMAN, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1996 to September 1997.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1996 to September 1997

DISSOLVED OXYGEN: October 1996 to September 1997

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, 22.5°C, July 15; minimum, -0.5°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 15.3 mg/L, Nov. 15; minimum, 5.4 mg/L, Oct. 30.

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

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

STREAMS TRIBUTARY TO LAKE MICHIGAN

04124000 MANISTEE RIVER NEAR SHERMAN, MI--Continued

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

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	15.5	13.0	14.0	20.5	19.0	19.5	19.0	17.0	18.0	17.0	14.5	15.5
2	16.5	14.0	15.0	20.5	18.5	19.5	20.5	17.0	18.5	17.0	15.5	16.5
3	17.0	15.0	16.0	20.0	17.5	18.5	20.0	18.0	18.5	16.0	14.0	15.0
4	17.0	15.5	16.5	17.5	16.0	16.5	19.0	17.0	18.0	15.0	12.5	14.0
5	17.0	15.5	16.0	17.5	15.0	16.0	18.0	16.0	17.0	14.0	12.5	13.0
6	16.0	15.0	15.5	17.0	15.5	16.5	17.5	15.5	16.5	14.5	12.5	13.5
7	17.0	15.0	16.0	17.0	14.5	16.0	18.0	15.0	16.5	14.5	14.0	14.0
8	17.0	15.5	16.0	17.0	15.0	15.5	18.5	16.0	17.5	15.0	13.5	14.0
9	17.5	15.5	16.5	17.0	14.0	15.5	18.0	16.5	17.5	14.5	13.5	14.0
10	18.5	16.0	17.0	17.5	15.0	16.0	17.5	17.0	17.5	14.0	13.5	13.5
11	18.5	17.0	17.5	18.5	15.5	17.0	17.5	15.5	16.5	13.5	13.0	13.0
12	18.5	17.0	18.0	19.5	16.5	18.0	16.5	14.5	15.0	13.5	12.5	13.0
13	18.5	17.0	18.0	20.5	18.0	19.0	16.5	14.0	15.0	14.5	12.0	13.0
14	18.0	16.0	17.0	21.5	19.5	20.5	15.5	13.5	14.5	14.0	13.0	13.5
15	17.5	15.5	16.5	22.5	20.0	21.0	15.5	14.5	15.0	15.5	13.0	14.0
16	17.0	16.0	16.5	22.0	20.5	21.0	16.0	15.0	15.5	15.5	14.0	15.0
17	17.5	15.0	16.0	21.5	20.0	20.5	15.5	14.5	15.0	17.0	15.5	16.0
18	17.0	15.0	16.0	21.5	19.5	20.5	15.5	13.0	14.5	16.5	14.5	15.5
19	17.0	15.5	16.5	21.0	19.0	20.0	15.5	14.0	14.5	16.0	15.0	15.5
20	17.5	16.5	17.0	20.5	18.0	18.5	15.0	14.0	14.5	15.0	14.0	14.5
21	17.5	16.5	17.0	18.5	17.5	18.0	14.0	13.5	14.0	14.0	12.0	13.0
22	19.0	16.5	17.5	18.5	16.5	17.5	15.5	13.0	14.0	12.5	10.5	11.5
23	19.5	17.5	18.5	18.0	16.5	17.5	15.5	13.0	14.5	12.5	11.5	12.0
24	21.0	18.5	19.5	18.5	16.5	17.5	15.5	14.5	15.0	12.0	10.0	11.0
25	21.5	19.5	20.5	19.0	17.5	18.5	16.0	14.0	15.0	12.5	11.0	11.5
26	21.5	19.5	20.5	20.0	18.5	19.0	16.5	15.0	15.5	12.5	11.0	12.0
27	21.0	19.0	20.0	21.0	18.5	19.5	18.0	15.5	16.5	12.5	11.0	12.0
28	20.5	18.5	20.0	22.0	20.0	21.0	17.5	16.0	16.0	12.5	11.5	12.0
29	21.0	19.0	20.0	21.0	18.0	19.5	16.5	15.0	16.0	12.5	11.5	12.0
30	20.5	19.5	20.0	20.0	17.0	18.5	16.0	14.5	15.0	12.0	11.0	11.5
31	---	---	---	20.0	16.5	18.5	16.0	15.0	15.5	---	---	---
MONTH	21.5	13.0	17.5	22.5	14.0	18.5	20.5	13.0	16.0	17.0	10.0	13.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04124000 MANISTEE RIVER NEAR SHERMAN, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	8.9	8.5	8.7	8.0	7.4	7.7	9.4	8.5	8.9	10.1	9.4	9.7
2	9.0	8.5	8.6	8.5	7.8	8.1	9.3	8.6	8.9	9.9	9.2	9.5
3	8.7	8.3	8.5	8.8	8.0	8.3	8.8	8.3	8.6	10.3	9.5	9.8
4	8.9	8.5	8.7	9.4	7.6	8.5	9.1	8.4	8.7	10.5	9.8	10.1
5	9.4	8.8	9.1	9.5	8.3	8.9	9.4	8.6	8.9	10.5	9.9	10.2
6	9.9	8.8	9.4	9.1	8.3	8.7	9.4	8.6	9.0	10.6	9.9	10.2
7	10.0	9.4	9.7	9.0	8.0	8.5	9.4	8.8	9.1	10.2	9.7	9.9
8	9.9	9.6	9.8	9.7	7.8	8.6	9.5	8.7	9.1	10.4	9.8	10.0
9	9.8	9.4	9.6	9.7	8.8	9.2	9.2	8.6	8.9	10.2	9.6	9.9
10	9.6	9.3	9.4	9.6	8.2	9.0	8.9	8.5	8.7	10.0	9.6	9.8
11	9.4	9.0	9.2	9.3	7.9	8.5	9.3	8.6	9.0	10.0	9.6	9.8
12	9.2	8.9	9.0	9.2	7.7	8.3	9.2	9.0	9.1	10.5	9.9	10.1
13	9.2	8.7	9.0	7.9	7.5	7.7	9.8	9.2	9.5	10.6	10.0	10.3
14	9.6	9.0	9.2	8.3	7.4	7.7	9.9	9.2	9.5	10.3	10.0	10.1
15	9.7	9.1	9.4	8.4	7.5	7.9	9.6	9.1	9.3	10.5	9.9	10.1
16	9.3	8.7	9.0	8.4	7.9	8.1	9.3	9.0	9.2	10.1	8.7	9.7
17	9.9	9.0	9.3	8.4	7.9	8.1	9.6	9.1	9.3	9.7	9.1	9.4
18	9.7	9.0	9.2	8.3	7.8	8.1	10.1	9.5	9.7	9.9	9.1	9.4
19	9.5	8.8	9.0	8.7	7.9	8.3	10.0	9.4	9.7	9.4	9.0	9.1
20	8.9	8.6	8.7	9.2	8.1	8.7	9.7	9.3	9.5	10.0	9.1	9.5
21	8.7	8.4	8.6	9.2	8.0	8.7	9.9	9.4	9.7	10.4	9.7	10.0
22	9.0	8.1	8.5	9.3	8.1	8.8	10.1	9.7	9.9	10.9	10.0	10.4
23	8.6	8.2	8.4	9.2	8.5	8.9	10.0	9.6	9.8	10.7	10.0	10.3
24	9.1	8.1	8.5	9.1	8.0	8.6	9.8	9.3	9.5	10.9	9.8	10.5
25	8.9	8.3	8.6	8.6	7.6	8.0	9.8	9.3	9.5	10.5	9.9	10.2
26	8.6	7.8	8.1	7.8	7.2	7.5	9.8	9.1	9.4	10.6	10.0	10.2
27	8.1	7.5	7.8	7.9	6.9	7.3	9.7	9.2	9.4	10.5	9.8	10.1
28	8.4	7.5	7.8	8.9	6.7	7.8	9.5	9.0	9.2	10.1	9.6	9.8
29	8.1	7.5	7.7	9.2	8.2	8.7	9.8	9.1	9.4	10.1	9.5	9.7
30	8.0	7.6	7.8	9.5	8.5	8.9	9.9	9.2	9.6	9.9	8.9	9.6
31	---	---	---	9.5	8.8	9.0	9.8	9.3	9.5	---	---	---
MONTH	10.0	7.5	8.8	9.7	6.7	8.4	10.1	8.3	9.3	10.9	8.7	9.9

STREAMS TRIBUTARY TO LAKE MICHIGAN

04124200 MANISTEE RIVER NEAR MESICK, MI

LOCATION.--Lat 44°21'30", long 85°49'15", in SE1/4 NE1/4 sec.25, T.23 N., R.13 W., Manistee County, Hydrologic Unit 04060103, on right bank 200 ft downstream from Hodenpyl Dam, 6.2 mi southwest of Mesick.

DRAINAGE AREA.--1,018 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--December 1996 to September 1997.

GAGE.--Water-stage recorder. Datum of gage is 732.22 ft above sea level (Consumers Energy benchmark).

REMARKS.--Water-discharge records fair. Flow completely regulated by Hodenpyl Dam 200 ft upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	1200	1250	e1450	1390	1950	e2000	e1350	e1050	991	958
2	---	---	1280	1220	e1300	1400	1950	e2100	e1350	e1050	1040	990
3	---	---	1320	1220	e1350	1430	2170	e2000	1310	e1050	1040	968
4	---	---	1360	e1350	e1400	1460	2440	e1900	e1250	e1050	949	961
5	---	---	1340	e1750	e1400	1450	2360	e2000	e1200	e1000	917	978
6	---	---	1300	e1700	e1300	1380	2350	e1900	e1200	e1000	e940	977
7	---	---	1250	e1600	e1200	1320	2530	e1700	e1250	e1000	e940	978
8	---	---	1200	e1450	e1150	1310	2850	e1850	e1250	1240	e940	974
9	---	---	1230	e1300	e1200	1260	2700	e1900	e1200	1140	e940	978
10	---	---	1240	e1150	e1200	1260	2470	e1700	e1150	1040	e950	992
11	---	---	1230	e1100	e1150	1280	2100	e1750	e1150	1120	e950	1000
12	---	---	1230	e1100	e1150	1290	1880	e1800	e1150	1150	e1000	1010
13	---	---	1240	e1200	e1150	1300	1840	e1550	e1150	1080	e1100	1070
14	---	---	1240	e1200	e1100	1310	1830	e1600	e1150	1110	e1000	1170
15	---	---	1210	e1350	e1200	1310	1780	e1900	e1150	904	e1100	1060
16	---	---	1230	e1300	e1200	1190	1910	e1900	e1150	1050	e1150	922
17	---	---	1280	e1200	e1250	1340	e1800	e1950	e1150	e1000	e1150	993
18	---	---	1320	e1150	e1400	1410	e1700	e2100	e1150	e1000	e1100	992
19	---	---	1350	e1100	e1500	1300	e1700	e2100	e1100	e980	e1100	996
20	---	---	1250	e1200	e1450	1260	e1750	e2000	e1100	e960	e1100	1050
21	---	---	1000	e1400	e1550	1270	e1800	e1800	e1250	e960	e1250	1000
22	---	---	1080	e1700	1650	1400	e1750	e1700	e1200	e950	e1150	1000
23	---	---	1400	e1700	1500	1520	e1700	e1600	e1150	e950	e1100	1000
24	---	---	1460	e1700	1430	1520	e1650	e1550	e1100	e950	e1200	1000
25	---	---	1400	e1650	1300	1550	e1650	e1500	e1000	943	e1250	1000
26	---	---	1280	e1450	1290	1490	e1650	e1450	e1000	1070	e1050	1000
27	---	---	1020	e1450	1500	1420	e1700	e1450	e1000	1000	e1000	1000
28	---	---	1170	e1350	1450	1700	e1600	e1400	e1000	1050	e1000	1000
29	---	---	1480	e1250	---	2020	e1500	e1450	e1000	1060	e980	945
30	---	---	1310	e1200	---	2040	e1550	e1550	e1000	977	e980	1000
31	---	---	1360	e1400	---	1900	---	e1450	---	898	e960	---
TOTAL	---	---	39260	42140	37170	44480	58610	54600	34610	31782	32317	30192
MEAN	---	---	1266	1359	1328	1435	1954	1761	1154	1025	1042	1006
MAX	---	---	1480	1750	1650	2040	2850	2100	1350	1240	1250	1170
MIN	---	---	1000	1100	1100	1190	1500	1400	1000	898	917	902
CFSM	---	---	1.27	1.36	1.33	1.44	1.96	1.76	1.15	1.03	1.04	1.01
IN.	---	---	1.46	1.57	1.38	1.66	2.18	2.03	1.29	1.18	1.20	1.12

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04124200 MANISTEE RIVER NEAR MESICK, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--December 1996 to September 1997.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: December 1996 to September 1997.

DISSOLVED OXYGEN: December 1996 to September 1997.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 22.0°C, July 19; minimum, 0.0°C, Feb. 10-13.

DISSOLVED OXYGEN: Maximum, 14.2 mg/L, Feb. 17; minimum, 7.1 mg/L, July 8.

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	---	---	---	---	---	---	1.5	1.5	1.5	1.0	1.0	1.0
2	---	---	---	---	---	---	1.5	1.5	1.5	1.0	1.0	1.0
3	---	---	---	---	---	---	1.5	1.0	1.0	1.0	1.0	1.0
4	---	---	---	---	---	---	1.0	1.0	1.0	1.0	1.0	1.0
5	---	---	---	---	---	---	1.0	1.0	1.0	1.0	.5	.5
6	---	---	---	---	---	---	1.0	1.0	1.0	.5	.5	.5
7	---	---	---	---	---	---	1.0	1.0	1.0	1.0	.5	.5
8	---	---	---	---	---	---	1.0	1.0	1.0	1.0	1.0	1.0
9	---	---	---	---	---	---	1.0	1.0	1.0	1.0	1.0	1.0
10	---	---	---	---	---	---	1.0	1.0	1.0	1.0	1.0	1.0
11	---	---	---	---	---	---	1.0	1.0	1.0	1.0	1.0	1.0
12	---	---	---	---	---	---	1.0	1.0	1.0	1.0	1.0	1.0
13	---	---	---	---	---	---	1.0	1.0	1.0	1.0	1.0	1.0
14	---	---	---	---	---	---	1.0	1.0	1.0	1.0	1.0	1.0
15	---	---	---	---	---	---	1.0	1.0	1.0	1.0	1.0	1.0
16	---	---	---	---	---	---	1.0	1.0	1.0	1.0	1.0	1.0
17	---	---	---	---	---	---	1.0	1.0	1.0	1.0	1.0	1.0
18	---	---	---	---	---	---	1.0	1.0	1.0	1.0	1.0	1.0
19	---	---	---	---	---	---	1.5	1.0	1.5	1.0	1.0	1.0
20	---	---	---	---	---	---	1.5	1.5	1.5	1.0	1.0	1.0
21	---	---	---	---	---	---	1.5	1.0	1.5	1.0	1.0	1.0
22	---	---	---	---	---	---	1.5	1.0	1.5	1.0	.5	.5
23	---	---	---	---	---	---	1.0	1.0	1.0	.5	.5	.5
24	---	---	---	---	---	---	1.0	1.0	1.0	.5	.5	.5
25	---	---	---	---	---	---	1.0	1.0	1.0	.5	.5	.5
26	---	---	---	---	---	---	1.0	1.0	1.0	.5	.5	.5
27	---	---	---	---	---	---	1.0	1.0	1.0	.5	.5	.5
28	---	---	---	---	---	---	1.0	1.0	1.0	.5	.5	.5
29	---	---	---	---	---	---	1.0	1.0	1.0	.5	.5	.5
30	---	---	---	---	---	---	1.0	1.0	1.0	.5	.5	.5
31	---	---	---	---	---	---	1.0	1.0	1.0	.5	.5	.5
MONTH	---	---	---	---	---	---	1.5	1.0	1.0	1.0	.5	1.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04124200 MANISTEE RIVER NEAR MESICK, MI--Continued

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

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY				AUGUST			SEPTEMBER	
1	13.5	12.5	13.0	21.0	20.5	20.5	21.0	20.5	20.5	17.0	17.0	17.0
2	14.5	13.5	14.0	21.0	20.0	20.5	21.0	20.5	20.5	18.0	17.0	17.5
3	14.5	14.0	14.5	20.5	20.0	20.0	21.0	20.5	21.0	18.0	17.5	17.5
4	14.5	14.5	14.5	20.5	20.0	20.5	21.5	21.0	21.0	17.5	17.0	17.5
5	14.5	14.0	14.5	21.0	20.0	20.5	21.0	21.0	21.0	17.0	16.5	17.0
6	15.0	14.0	14.5	21.0	20.5	20.5	21.0	20.5	20.5	17.0	16.5	17.0
7	15.5	14.5	15.0	20.5	20.5	20.5	20.5	20.5	20.5	17.0	17.0	17.0
8	16.5	15.5	15.5	20.5	20.0	20.5	20.5	20.0	20.5	17.0	17.0	17.0
9	16.5	15.5	16.0	20.5	20.0	20.0	20.5	20.0	20.5	17.0	17.0	17.0
10	17.0	16.0	16.0	20.0	20.0	20.0	20.0	20.0	20.0	17.0	17.0	17.0
11	16.5	16.0	16.0	20.0	19.5	19.5	20.5	20.0	20.0	17.0	16.5	17.0
12	16.5	16.0	16.0	19.5	19.5	19.5	20.0	20.0	20.0	16.5	16.5	16.5
13	16.0	16.0	17.0	19.5	19.0	19.5	20.0	19.5	20.0	16.5	16.0	16.0
14	17.5	17.0	17.5	19.5	19.0	19.5	19.5	19.5	19.5	16.0	16.0	16.0
15	17.5	16.5	17.0	20.0	19.5	20.0	19.5	19.0	19.5	16.0	15.5	16.0
16	17.5	16.5	17.0	20.5	20.0	20.0	19.0	19.0	19.0	16.0	15.5	16.0
17	18.0	17.0	17.5	20.0	19.5	20.0	19.0	19.0	19.0	15.5	15.0	15.5
18	18.0	17.5	17.5	21.5	20.0	21.0	19.0	18.5	18.5	16.0	15.0	15.5
19	18.0	17.5	18.0	22.0	21.0	21.5	18.5	18.0	18.5	16.0	15.5	16.0
20	18.0	17.5	17.5	21.5	21.0	21.0	18.0	18.0	18.0	16.5	16.0	16.0
21	18.0	17.0	17.5	21.5	21.0	21.5	18.0	17.5	18.0	16.0	16.0	16.0
22	16.0	17.5	18.0	21.5	21.0	21.5	18.0	17.5	17.5	16.0	15.5	16.0
23	18.0	18.0	18.0	21.5	21.0	21.5	17.5	17.0	17.5	16.0	16.0	16.0
24	18.5	18.0	18.0	21.5	20.5	21.0	17.5	17.0	17.0	16.0	15.5	15.5
25	18.5	17.5	18.0	20.5	20.0	20.5	17.0	17.0	17.0	16.0	15.5	16.0
26	19.5	18.5	19.0	20.5	20.0	20.0	17.0	16.5	17.0	16.0	15.5	15.5
27	19.5	19.5	19.5	20.5	20.0	20.0	17.0	16.5	17.0	16.0	15.5	15.5
28	20.0	19.5	20.0	21.5	20.5	21.0	17.0	17.0	17.0	15.5	15.0	15.5
29	20.5	20.0	20.0	21.5	21.0	21.0	17.0	17.0	17.0	15.5	14.5	15.0
30	21.0	20.0	20.5	21.5	21.0	21.0	17.0	16.5	17.0	15.0	14.5	14.5
31	---	---	---	21.5	21.0	21.0	17.0	17.0	17.0	---	---	---
MONTH	21.0	12.5	17.0	22.0	19.0	20.5	21.5	16.5	19.0	18.0	14.5	16.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04124200 MANISTEE RIVER NEAR MESICK, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	---	---	---	---	---	---	13.3	13.2	13.2	13.2	13.1	13.2
2	---	---	---	---	---	---	13.4	13.3	13.3	13.2	13.1	13.1
3	---	---	---	---	---	---	13.4	13.2	13.3	13.2	13.1	13.1
4	---	---	---	---	---	---	13.4	13.3	13.4	13.2	12.8	13.0
5	---	---	---	---	---	---	13.5	13.2	13.4	12.9	12.8	12.8
6	---	---	---	---	---	---	13.6	13.5	13.6	13.0	12.8	12.9
7	---	---	---	---	---	---	13.6	13.5	13.5	12.9	12.8	12.9
8	---	---	---	---	---	---	13.7	13.5	13.6	12.9	12.8	12.8
9	---	---	---	---	---	---	13.8	13.5	13.7	12.9	12.6	12.7
10	---	---	---	---	---	---	13.6	13.4	13.5	12.9	12.6	12.8
11	---	---	---	---	---	---	13.7	13.6	13.7	13.0	12.9	12.9
12	---	---	---	---	---	---	13.7	13.6	13.6	13.3	12.9	13.1
13	---	---	---	---	---	---	13.6	13.4	13.6	13.3	12.8	13.1
14	---	---	---	---	---	---	13.6	13.5	13.6	13.0	12.8	12.9
15	---	---	---	---	---	---	13.6	13.4	13.5	13.0	12.6	12.8
16	---	---	---	---	---	---	13.6	13.4	13.5	12.8	12.6	12.7
17	---	---	---	---	---	---	13.5	13.4	13.5	13.3	12.7	13.1
18	---	---	---	---	---	---	13.5	13.3	13.4	14.1	13.3	13.8
19	---	---	---	---	---	---	13.4	13.4	13.4	14.0	13.9	14.0
20	---	---	---	---	---	---	13.6	13.3	13.5	14.0	13.0	13.4
21	---	---	---	---	---	---	14.1	13.5	13.9	13.2	13.0	13.1
22	---	---	---	---	---	---	14.1	13.2	13.6	13.0	12.6	12.8
23	---	---	---	---	---	---	13.3	13.0	13.1	12.8	12.6	12.7
24	---	---	---	---	---	---	13.1	13.0	13.1	12.6	12.6	12.6
25	---	---	---	---	---	---	13.2	13.0	13.1	12.7	12.6	12.6
26	---	---	---	---	---	---	13.3	13.0	13.2	12.9	12.5	12.7
27	---	---	---	---	---	---	14.1	13.3	13.7	12.8	12.4	12.6
28	---	---	---	---	---	---	14.0	12.9	13.3	12.5	12.4	12.5
29	---	---	---	---	---	---	13.0	12.9	12.9	13.0	12.4	12.7
30	---	---	---	---	---	---	13.0	13.0	13.0	12.9	12.7	12.8
31	---	---	---	---	---	---	13.3	12.9	13.1	12.7	12.2	12.5
MONTH	---	---	---	---	---	---	14.1	12.9	13.4	14.1	12.2	12.9

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY				MARCH				APRIL			MAY	
1	12.3	12.2	12.3	13.0	12.9	13.0	11.2	11.0	11.1	10.8	10.6	10.7
2	12.6	12.3	12.5	13.2	13.0	13.1	11.1	10.9	11.0	10.9	10.7	10.8
3	12.6	12.4	12.5	13.2	13.1	13.2	10.9	10.6	10.8	10.8	10.7	10.7
4	12.5	12.4	12.4	13.3	13.2	13.2	10.7	10.6	10.6	10.8	10.7	10.7
5	12.4	12.3	12.4	13.6	13.0	13.2	10.6	10.5	10.6	10.8	10.7	10.8
6	12.6	12.4	12.5	13.3	13.1	13.2	10.7	10.5	10.6	10.8	10.6	10.8
7	12.7	12.5	12.6	13.2	13.0	13.2	10.9	10.7	10.8	10.9	10.8	10.8
8	12.7	12.6	12.7	13.2	13.0	13.1	11.0	10.9	11.0	10.8	10.6	10.7
9	12.7	12.6	12.7	13.0	12.8	12.9	11.0	10.5	10.9	10.8	10.6	10.7
10	12.7	12.6	12.7	12.9	12.8	12.8	11.1	10.9	11.0	10.8	10.7	10.7
11	12.8	12.7	12.7	12.7	12.5	12.6	11.0	10.9	11.0	10.7	10.4	10.5
12	12.9	12.7	12.8	12.7	12.6	12.7	11.2	10.9	11.0	10.6	10.5	10.6
13	13.3	12.7	13.0	12.7	12.5	12.6	11.2	11.0	11.1	10.6	10.4	10.5
14	14.1	12.9	13.3	12.5	12.5	12.5	11.9	11.1	11.3	10.6	10.4	10.5
15	13.0	12.6	12.8	12.7	12.5	12.8	11.5	11.3	11.4	10.6	10.4	10.5
16	12.8	12.6	12.7	13.0	12.6	12.8	11.8	11.5	11.6	10.4	10.4	10.4
17	14.2	12.7	13.4	12.8	12.3	12.5	11.8	11.7	11.7	10.4	10.3	10.3
18	14.1	12.6	13.1	12.4	12.3	12.4	11.8	11.6	11.7	10.4	10.2	10.3
19	12.9	12.6	12.7	12.5	12.3	12.4	11.7	11.6	11.7	10.4	10.2	10.3
20	13.0	12.9	13.0	12.4	12.3	12.3	11.7	11.5	11.6	10.5	10.3	10.4
21	13.0	12.7	12.8	12.4	12.2	12.2	11.6	11.2	11.4	10.6	10.4	10.5
22	12.9	12.7	12.8	12.3	12.1	12.2	11.2	11.1	11.2	10.6	10.5	10.5
23	13.0	12.9	13.0	12.2	12.0	12.1	11.2	11.1	11.2	10.7	10.5	10.6
24	13.0	12.9	12.9	12.2	12.0	12.1	11.1	11.0	11.1	10.6	10.4	10.6
25	13.1	12.9	13.0	12.0	11.9	11.9	11.2	11.0	11.1	10.5	10.3	10.4
26	13.1	12.8	12.9	12.0	11.8	11.9	11.1	11.0	11.1	10.4	10.2	10.3
27	12.8	12.7	12.8	11.9	11.6	11.7	11.1	11.0	11.0	10.3	10.2	10.3
28	13.0	12.8	12.9	11.6	11.3	11.5	11.1	11.0	11.0	10.2	10.1	10.2
29	---	---	---	11.4	11.3	11.3	11.0	10.8	10.9	10.1	10.0	10.1
30	---	---	---	11.4	11.3	11.3	10.9	10.8	10.9	10.0	9.9	9.9
31	---	---	---	11.3	11.1	11.2	---	---	---	9.9	9.7	9.8
MONTH	14.2	12.2	12.8	13.6	11.1	12.4	11.9	10.5	11.1	10.9	9.7	10.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04124200 MANISTEE RIVER NEAR MESICK, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	9.8	9.6	9.7	7.7	7.6	7.7	8.4	7.8	8.1	8.7	8.5	8.6
2	9.6	9.5	9.6	7.6	7.4	7.5	7.9	7.8	7.9	8.7	8.5	8.6
3	9.6	9.4	9.5	7.5	7.3	7.4	8.0	7.8	7.9	8.8	8.6	8.7
4	9.5	9.4	9.4	7.7	7.5	7.6	8.5	7.9	8.2	8.8	8.7	8.8
5	9.5	9.3	9.4	8.1	7.6	7.9	8.6	8.4	8.5	8.7	8.5	8.6
6	9.5	9.3	9.4	8.0	7.8	7.9	8.5	7.8	8.1	8.6	8.4	8.5
7	9.5	9.3	9.3	8.2	7.6	7.7	8.0	7.9	7.9	8.7	8.4	8.5
8	9.4	9.3	9.4	7.7	7.1	7.3	8.0	7.8	8.0	8.7	8.6	8.6
9	9.4	9.3	9.3	7.9	7.4	7.7	8.0	7.8	8.0	8.7	8.5	8.6
10	9.6	9.2	9.3	7.9	7.8	7.8	8.1	7.8	7.9	8.7	8.5	8.6
11	9.4	9.2	9.3	7.9	7.7	7.8	8.3	8.0	8.1	8.8	8.6	8.7
12	9.3	9.1	9.2	8.1	7.8	8.0	8.3	7.7	8.0	8.8	8.6	8.7
13	9.2	9.1	9.1	8.2	8.0	8.1	8.2	7.7	7.9	8.7	8.5	8.6
14	9.2	9.0	9.1	8.3	7.8	8.1	8.1	7.8	8.0	8.7	8.4	8.5
15	9.1	8.7	9.0	8.6	8.2	8.5	8.0	7.3	7.7	9.0	8.6	8.8
16	8.8	8.6	8.7	8.6	8.1	8.3	8.0	7.5	7.7	9.0	8.7	8.8
17	8.7	8.5	8.6	8.3	8.1	8.2	8.3	7.7	8.0	8.7	8.4	8.6
18	8.5	8.4	8.5	8.3	8.2	8.2	8.4	8.0	8.2	9.0	8.7	8.8
19	8.5	8.4	8.4	8.3	8.1	8.2	8.4	8.1	8.2	9.1	8.8	8.9
20	8.4	8.1	8.3	8.2	8.0	8.2	8.5	8.3	8.4	9.3	8.9	9.1
21	8.2	7.8	8.0	8.1	8.0	8.1	8.6	8.2	8.4	9.3	9.1	9.2
22	8.2	7.8	8.0	8.1	8.0	8.1	8.8	8.2	8.5	9.3	9.0	9.2
23	8.2	7.9	8.0	8.2	8.1	8.2	8.6	8.4	8.5	9.3	9.1	9.2
24	8.2	7.7	8.0	8.2	7.8	8.0	8.5	8.0	8.3	9.3	9.0	9.1
25	8.1	7.8	7.9	7.9	7.7	7.8	8.6	8.1	8.3	9.2	8.9	9.0
26	8.0	7.8	7.9	7.7	7.3	7.4	8.5	8.4	8.5	9.1	8.8	9.0
27	8.0	7.8	7.9	7.6	7.3	7.5	8.6	8.4	8.5	9.1	8.7	8.9
28	8.0	7.8	7.9	7.9	7.5	7.7	8.7	8.5	8.6	9.1	8.8	8.9
29	7.8	7.7	7.8	8.1	7.7	7.9	8.7	8.6	8.6	9.4	8.8	9.1
30	7.7	7.6	7.7	8.4	8.0	8.2	8.7	8.5	8.6	9.5	8.9	9.2
31	---	---	---	8.5	8.3	8.4	8.6	8.5	8.5	---	---	---
MONTH	9.8	7.6	8.7	8.6	7.1	7.9	8.8	7.3	8.2	9.5	8.4	8.8

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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	55	44	26	38	68	143	87	35	31	12	21
2	20	46	47	26	36	85	143	78	31	29	12	18
3	18	40	41	34	35	83	149	70	27	23	12	19
4	16	35	35	45	34	73	152	57	24	21	13	19
5	16	31	30	98	34	67	165	54	22	18	12	16
6	18	28	28	68	34	62	158	71	20	16	11	16
7	18	36	28	65	33	57	131	57	20	15	11	15
8	21	34	27	58	32	56	107	59	18	33	11	16
9	18	31	26	50	31	50	87	66	17	39	12	15
10	16	29	25	49	31	48	73	59	17	30	18	15
11	15	27	25	42	30	47	64	54	16	25	17	17
12	15	25	25	38	27	45	60	56	15	22	29	19
13	14	23	25	35	28	41	60	51	16	19	43	18
14	14	20	26	32	28	42	62	48	15	16	30	17
15	15	19	29	31	27	39	54	69	13	15	30	17
16	14	19	32	29	26	39	57	67	12	14	30	16
17	16	26	31	29	26	39	52	73	12	13	30	43
18	32	31	28	28	30	44	46	62	11	12	31	36
19	28	28	24	27	53	42	42	59	11	12	26	42
20	27	25	25	26	55	44	37	54	29	12	26	49
21	25	23	23	26	114	61	34	46	43	12	39	37
22	23	21	22	83	127	83	38	40	47	12	34	32
23	38	21	24	103	126	79	41	36	33	12	29	29
24	56	20	43	89	99	70	41	34	25	12	57	27
25	49	20	37	72	85	89	65	43	26	12	63	26
26	41	18	37	62	76	99	76	40	23	27	49	24
27	36	17	32	55	72	123	62	34	19	18	40	20
28	31	17	29	49	74	186	47	30	16	16	34	17
29	30	17	28	44	---	241	39	30	14	15	29	15
30	74	24	27	42	---	219	36	43	15	13	25	22
31	68	---	27	39	---	166	---	43	---	12	24	---
TOTAL	845	806	930	1500	1441	2487	2321	1670	642	576	839	693
MEAN	27.3	26.9	30.0	48.4	51.5	80.2	77.4	53.9	21.4	18.6	27.1	23.1
MAX	74	55	47	103	127	241	165	87	47	39	63	49
MIN	14	17	22	26	26	39	34	30	11	12	11	15
CFSM	.45	.45	.50	.81	.86	1.34	1.29	.90	.36	.31	.45	.39
IN.	.52	.50	.58	.93	.89	1.54	1.44	1.04	.40	.36	.52	.43

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1997, BY WATER YEAR (WY)

	MEAN	26.5	34.0	26.4	23.1	24.4	55.4	83.8	38.1	24.6	17.1	18.5	15.5
MAX	99.9	90.8	83.8	48.4	54.4	93.6	190	75.4	70.4	45.1	68.5	44.2	
(WY)	1992	1993	1992	1997	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1952 - 1997

ANNUAL TOTAL	13961.2	14750	
ANNUAL MEAN	38.1	40.4	32.2
HIGHEST ANNUAL MEAN			54.5
LOWEST ANNUAL MEAN			16.0
HIGHEST DAILY MEAN	149	241	753
LOWEST DAILY MEAN	8.4	11	5.3
ANNUAL SEVEN-DAY MINIMUM	8.9	12	5.5
INSTANTANEOUS PEAK FLOW		253	(a)1410
INSTANTANEOUS PEAK STAGE		3.99	Mar 29
INSTANTANEOUS LOW FLOW		11	(b)
ANNUAL RUNOFF (CFSM)	.64	.67	(c)4.1
ANNUAL RUNOFF (INCHES)	8.66	9.15	.54
10 PERCENT EXCEEDS	75	73	7.30
50 PERCENT EXCEEDS	30	31	68
90 PERCENT EXCEEDS	11	15	19
			8.3

(a) From rating curve extended above 450 ft³/s.

(b) Part or all of each day Nov. 14, 15, June 17-20, July 19, 20, 23-25, Aug. 1-3, 5-9.

(c) Result of freezeup.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04125460 PINE RIVER NEAR HOXEYVILLE, MI

LOCATION.--Lat 44°11'36", long 85°46'11", in NW1/4 NE1/4 sec.28, T.21 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on right bank 75 ft downstream from High School Bridge on S 5 1/2 Road, 2.5 mi west of Hoxeyville.

DRAINAGE AREA.--245 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1952 to September 1982, October 1996 to September 1997.

GAGE.--Water-stage recorder. Elevation of gage is 850 ft above sea level, from topographic map. July 1952 to September 1982 water-stage recorder at site 3.5 mi downstream at different datum (station 04125500).

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e180	e380	285	248	280	350	537	366	309	254	223	250
2	e175	e330	338	251	273	402	510	465	283	288	222	245
3	e170	e300	305	265	269	430	532	393	268	260	228	237
4	e190	e280	279	310	270	390	566	366	260	249	228	233
5	e220	e270	266	461	269	361	596	344	255	243	228	233
6	e230	e260	260	499	267	348	642	381	252	235	222	233
7	e240	e265	259	e420	264	322	594	376	250	230	221	233
8	e230	e270	258	e400	262	324	495	352	247	247	220	235
9	e230	e265	255	e370	259	316	416	395	243	320	221	235
10	e230	e260	252	e310	257	307	375	394	240	285	244	234
11	e230	e255	250	295	257	304	355	360	238	258	272	235
12	e230	e250	251	280	256	299	348	354	241	246	272	241
13	e230	e245	253	273	236	295	349	346	240	241	344	243
14	e225	e240	257	268	258	289	360	327	234	238	314	238
15	e220	e230	270	266	257	284	351	360	230	234	278	236
16	e220	e240	288	262	250	273	349	404	231	231	282	236
17	e230	e250	286	256	238	290	358	402	231	230	285	291
18	e260	e270	271	269	259	297	331	386	227	232	299	250
19	e280	e265	250	266	303	297	315	363	225	230	291	212
20	e260	e250	239	270	354	294	305	348	284	227	271	238
21	e240	e240	250	260	494	328	300	327	375	228	287	220
22	e230	e240	244	376	713	406	298	307	364	228	318	281
23	e270	e235	250	594	575	429	302	295	314	225	286	265
24	e340	e240	295	495	471	377	302	290	280	223	314	255
25	e330	e240	323	420	376	396	300	303	276	226	418	249
26	e300	238	273	360	377	474	313	313	270	254	352	244
27	e270	234	266	324	364	506	316	292	248	269	303	240
28	e250	234	270	312	346	676	303	279	239	245	282	237
29	e240	234	263	284	---	851	289	274	234	236	267	238
30	e350	248	257	285	---	860	283	296	233	227	257	239
31	e410	---	251	301	---	687	---	326	---	225	252	---
TOTAL	7710	7758	8314	10250	9054	12462	11690	10784	7821	7564	8501	7656
MEAN	249	259	268	331	323	402	390	348	261	244	274	255
MAX	410	380	338	594	713	860	642	465	375	320	418	350
MIN	170	230	239	248	236	273	283	274	225	223	220	233
CFSM	1.02	1.06	1.09	1.35	1.32	1.64	1.59	1.42	1.06	1.00	1.12	1.04
IN.	1.17	1.18	1.26	1.56	1.37	1.89	1.77	1.64	1.19	1.15	1.29	1.16

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1997, BY WATER YEAR (WY)

	MEAN	264	278	276	256	263	351	444	316	278	248	244	249
MAX	373	339	408	350	361	629	670	436	391	427	393	504	
(WY)	1955	1976	1966	1973	1976	1976	1959	1960	1974	1969	1956	1975	
MIN	219	227	223	205	208	254	286	222	206	196	198	203	
(WY)	1964	1954	1964	1961	1959	1978	1958	1958	1964	1966	1958	1955	

SUMMARY STATISTICS

FOR 1997 WATER YEAR

WATER YEARS 1952 - 1997

ANNUAL TOTAL	109564		
ANNUAL MEAN	300	289	
HIGHEST ANNUAL MEAN		356	1976
LOWEST ANNUAL MEAN		233	1958
HIGHEST DAILY MEAN	860	1830	Aug 5 1956
LOWEST DAILY MEAN	170	170	Oct 3 1996
ANNUAL SEVEN-DAY MINIMUM	201	180	Jan 21 1961
INSTANTANEOUS PEAK FLOW	916	(a)2440	Aug 6 1956
INSTANTANEOUS PEAK STAGE	5.95	(b)5.95	Mar 29 1997
ANNUAL RUNOFF (CFSM)	1.23	1.18	
ANNUAL RUNOFF (INCHES)	16.64	16.01	
10 PERCENT EXCEEDS	395	392	
50 PERCENT EXCEEDS	270	254	
90 PERCENT EXCEEDS	230	215	

(a) From rating curve extended above 1,000 ft³/s; gage height 6.82 ft, site and datum then in use.

(b) Present site and datum.

(c) Estimated.

PERIOD OF RECORD.--December 1996 to September 1997.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: December 1996 to September 1997.

DISSOLVED OXYGEN: December 1996 to September 1997.

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, 19.5°C, June 25; minimum, -0.5°C, on several days during winter period.

DISSOLVED OXYGEN: Maximum, 14.0 mg/L, Jan. 23, 24; minimum, 7.4 mg/L, July 28.

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

[illegible]

STREAMS TRIBUTARY TO LAKE MICHIGAN

04125460 PINE RIVER NEAR HOXEYVILLE, MI--Continued

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

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY			AUGUST			SEPTEMBER		
1	15.0	12.5	14.0	17.0	15.0	16.0	15.0	14.0	14.5	14.0	12.5	13.5
2	16.0	13.0	14.5	17.5	15.5	16.5	16.5	14.0	15.0	14.5	13.5	13.5
3	16.5	14.0	15.0	17.0	14.5	15.5	16.0	14.5	15.0	13.5	12.0	12.5
4	15.5	13.5	14.5	14.5	13.5	14.0	15.5	14.0	14.5	12.0	10.5	11.5
5	14.5	13.0	14.0	15.0	12.0	13.5	15.0	13.0	14.0	11.0	10.0	10.5
6	14.5	13.0	13.5	15.0	13.5	14.0	14.5	12.5	13.5	12.5	11.0	11.5
7	15.5	13.0	14.0	14.5	12.0	13.5	14.5	12.5	13.5	12.5	12.0	12.0
8	15.5	13.0	14.5	14.0	13.0	13.5	15.0	13.5	14.0	13.5	12.0	12.5
9	16.0	13.5	15.0	15.0	12.5	13.5	14.5	13.5	14.0	12.5	12.0	12.0
10	16.5	14.0	15.5	15.0	13.0	14.5	14.5	14.0	14.0	12.5	12.0	12.0
11	16.5	14.5	15.5	16.0	13.5	15.0	14.5	13.5	14.0	12.0	11.5	12.0
12	15.5	14.5	15.0	16.5	14.0	15.5	14.0	12.5	13.0	12.0	11.5	12.0
13	16.0	13.5	15.0	17.5	15.0	16.0	14.0	12.5	13.0	12.5	11.0	11.5
14	15.5	13.0	14.5	18.5	16.0	17.5	13.5	12.5	13.0	12.0	12.0	12.0
15	14.5	12.5	13.5	18.5	16.5	17.5	14.0	13.0	13.5	13.5	11.5	12.5
16	14.5	13.5	14.0	18.5	16.5	17.5	14.5	13.5	14.0	14.0	13.0	13.5
17	15.0	12.0	13.5	18.0	16.5	17.0	14.0	12.5	13.5	15.5	14.0	14.5
18	14.5	13.0	14.0	18.0	15.5	17.0	13.5	11.5	12.5	14.5	13.0	14.0
19	15.0	13.0	14.0	17.5	15.0	16.5	14.0	12.0	13.0	14.5	13.5	14.0
20	15.0	14.0	14.5	16.5	14.5	15.0	13.5	12.5	13.0	13.5	12.5	13.0
21	15.5	14.5	15.0	15.0	14.5	14.5	12.5	12.0	12.5	12.5	11.0	11.5
22	17.0	14.5	15.5	15.5	13.5	14.5	13.5	12.0	13.0	11.0	10.0	10.5
23	17.0	15.5	16.5	15.5	14.0	15.0	13.5	12.0	12.5	11.5	11.0	11.0
24	18.5	16.0	17.5	15.5	14.0	15.0	13.0	12.5	13.0	11.0	9.0	10.0
25	19.5	17.0	18.0	15.5	14.5	15.0	14.0	12.5	13.0	11.0	9.5	10.5
26	18.5	16.5	17.5	17.0	15.0	16.0	14.0	13.0	13.5	11.0	10.0	10.5
27	18.0	15.5	17.0	16.0	16.0	17.0	15.5	13.5	14.5	11.0	10.0	10.5
28	17.5	15.0	16.5	18.5	16.5	17.5	15.0	13.5	14.0	11.0	10.5	10.5
29	17.5	15.0	16.5	17.0	14.5	16.0	13.5	13.0	13.5	11.0	10.5	11.0
30	17.0	16.0	16.5	16.0	13.5	15.0	13.5	12.5	13.0	11.0	10.5	11.0
31	---	---	---	16.0	13.5	15.0	14.0	13.0	13.5	---	---	---
MONTH	19.5	12.0	15.0	18.5	12.0	15.5	16.5	11.5	13.5	15.5	9.0	12.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04125460 PINE RIVER NEAR HOXEYVILLE, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	---	---	---	---	---	---	11.4	11.1	11.2	12.1	11.7	12.0
2	---	---	---	---	---	---	---	---	---	11.7	11.2	11.5
3	---	---	---	---	---	---	12.1	11.8	11.9	11.4	11.1	11.2
4	---	---	---	---	---	---	12.2	11.8	11.9	11.3	11.2	11.2
5	---	---	---	---	---	---	11.8	11.4	11.6	11.6	11.2	11.3
6	---	---	---	---	---	---	11.7	11.3	11.4	12.6	11.6	12.3
7	---	---	---	---	---	---	11.7	11.2	11.4	---	---	---
8	---	---	---	---	---	---	11.7	11.2	11.5	---	---	---
9	---	---	---	---	---	---	12.0	11.5	11.7	---	---	---
10	---	---	---	---	---	---	12.0	11.6	11.8	---	---	---
11	---	---	---	---	---	---	12.1	11.5	11.7	12.8	12.2	12.5
12	---	---	---	---	---	---	11.9	11.6	11.8	13.0	12.6	12.9
13	---	---	---	---	---	---	12.3	11.8	11.9	13.2	12.9	13.0
14	---	---	---	---	---	---	12.2	11.8	11.9	13.5	12.9	13.2
15	---	---	---	---	---	---	11.9	11.8	11.8	13.1	12.7	12.9
16	---	---	---	---	---	---	12.3	11.8	12.0	13.5	11.5	12.8
17	---	---	---	---	---	---	12.4	12.1	12.2	11.6	11.0	11.3
18	---	---	---	---	---	---	12.8	12.2	12.5	13.0	11.0	11.9
19	---	---	---	---	---	---	13.4	12.6	13.1	13.1	12.8	12.9
20	---	---	---	---	---	---	13.4	13.1	13.2	13.1	12.8	13.0
21	---	---	---	---	---	---	13.2	12.7	13.0	13.3	12.5	13.0
22	---	---	---	---	---	---	12.7	12.1	12.5	12.8	12.2	12.4
23	---	---	---	---	---	---	12.1	11.8	12.0	14.0	12.7	13.5
24	---	---	---	---	---	---	12.3	11.7	12.0	14.0	13.4	13.7
25	---	---	---	---	---	---	13.0	12.3	12.8	13.5	13.2	13.3
26	---	---	---	---	---	---	13.2	13.0	13.1	13.8	13.4	13.6
27	---	---	---	---	---	---	13.1	12.7	13.0	13.7	13.4	13.5
28	---	---	---	---	---	---	12.7	11.9	12.3	13.6	13.3	13.4
29	---	---	---	---	---	---	12.0	11.8	11.9	13.8	12.3	13.3
30	---	---	---	---	---	---	12.3	11.9	12.1	13.6	13.2	13.4
31	---	---	---	---	---	---	12.6	12.1	12.3	13.2	12.5	12.9
MONTH	---	---	---	---	---	---	---	---	---	---	---	---

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	12.6	12.4	12.5	12.0	11.6	11.8	12.0	10.3	11.0	10.2	9.5	9.9	
2	12.4	12.3	12.4	12.0	11.7	11.8	11.9	11.1	11.6	10.5	10.0	10.3	
3	12.7	12.3	12.5	12.3	12.0	12.2	11.2	10.6	11.0	10.5	10.2	10.3	
4	12.6	12.3	12.5	12.2	11.8	12.0	11.0	10.3	10.7	10.8	10.0	10.4	
5	12.7	12.5	12.6	11.9	11.6	11.8	10.5	10.0	10.3	10.3	10.0	10.2	
6	12.7	12.5	12.6	12.2	11.6	12.0	10.3	10.0	10.2	10.7	10.1	10.4	
7	12.7	12.2	12.5	12.8	12.2	12.5	11.2	10.3	10.9	10.7	9.8	10.3	
8	12.5	12.1	12.3	12.5	12.1	12.3	12.0	11.2	11.7	10.1	9.7	9.9	
9	12.9	12.2	12.5	12.3	11.8	12.1	12.3	11.8	12.1	10.3	9.8	10.0	
10	12.7	12.4	12.6	12.0	11.5	11.8	12.1	11.5	11.9	10.7	9.9	10.4	
11	12.6	12.2	12.4	11.7	11.4	11.5	11.5	11.0	11.4	10.4	9.7	10.1	
12	12.9	12.2	12.5	12.1	11.4	11.8	11.3	11.0	11.1	10.4	9.7	10.0	
13	13.5	12.8	13.2	12.3	11.7	12.0	11.5	11.1	11.3	10.7	10.2	10.4	
14	13.2	12.7	13.0	12.2	12.0	12.1	11.5	10.9	11.2	10.8	10.3	10.6	
15	12.8	12.5	12.7	12.8	12.1	12.5	11.2	10.6	11.0	10.8	10.3	10.6	
16	12.9	12.5	12.7	12.9	12.2	12.6	10.7	10.4	10.6	11.2	10.8	10.9	
17	13.2	12.4	12.9	12.3	11.4	11.9	11.0	10.6	10.8	11.1	10.4	10.8	
18	12.4	11.5	12.0	11.9	11.3	11.6	11.1	10.5	10.8	10.8	10.1	10.5	
19	11.8	11.4	11.6	12.1	11.2	11.7	11.0	10.4	10.7	10.4	10.0	10.2	
20	12.5	11.8	12.1	11.3	10.6	11.1	10.8	10.4	10.6	10.9	10.2	10.5	
21	12.5	11.7	12.0	10.9	10.6	10.7	10.7	10.3	10.5	11.0	10.1	10.5	
22	13.1	12.4	12.9	11.2	10.7	11.0	10.7	10.3	10.5	11.0	9.9	10.4	
23	13.0	12.8	12.9	11.7	11.1	11.5	10.6	10.2	10.4	10.7	9.6	10.1	
24	13.2	12.8	12.9	12.0	11.3	11.7	10.7	10.2	10.4	10.3	9.5	9.8	
25	13.1	12.5	12.8	11.4	11.0	11.3	10.8	10.2	10.5	10.4	9.5	9.9	
26	12.6	11.8	12.2	11.6	11.3	11.4	10.9	10.1	10.5	10.8	9.7	10.2	
27	12.1	11.6	11.9	11.3	10.8	11.1	10.5	10.0	10.2	10.8	9.5	10.1	
28	12.3	12.0	12.2	10.9	10.5	10.7	10.6	9.8	10.2	10.7	9.5	10.0	
29	---	---	---	11.0	10.1	10.5	10.4	9.6	10.0	10.3	9.5	9.8	
30	---	---	---	10.8	10.3	10.7	10.1	9.5	9.8	10.2	9.6	9.9	
31	---	---	---	11.2	10.3	10.8	---	---	---	10.6	9.4	10.1	
MONTH	13.5	11.4	12.5	12.9	10.1	11.6	12.3	9.5	10.8	11.2	9.4	10.2	

STREAMS TRIBUTARY TO LAKE MICHIGAN

04125460 PINE RIVER NEAR HOXEYVILLE, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	10.4	9.2	9.7	9.4	8.1	8.6	10.2	8.9	9.4	10.2	9.2	9.6
2	10.3	9.0	9.6	8.6	7.9	8.3	9.7	8.4	9.0	10.1	9.2	9.5
3	10.2	8.9	9.5	8.7	7.9	8.3	9.2	8.2	8.6	10.4	9.3	9.8
4	10.3	9.0	9.6	9.7	8.5	9.0	9.7	8.4	9.0	10.8	9.7	10.1
5	10.4	9.2	9.7	10.0	8.8	9.4	10.0	8.7	9.2	10.4	9.6	10.0
6	10.3	9.2	9.6	9.8	8.7	9.2	10.1	8.8	9.4	10.3	9.3	9.8
7	10.3	9.1	9.6	10.2	8.8	9.4	10.1	8.9	9.4	9.9	9.2	9.5
8	10.3	9.0	9.5	9.4	8.8	9.1	10.6	8.7	9.3	10.5	9.4	9.8
9	10.2	8.9	9.5	9.8	8.9	9.4	10.1	8.7	9.3	10.1	9.2	9.6
10	10.1	8.8	9.3	9.9	8.9	9.3	9.4	8.6	9.0	9.8	9.2	9.4
11	10.1	8.7	9.3	10.2	8.9	9.4	9.5	8.4	8.9	9.9	9.2	9.5
12	9.7	8.7	9.1	10.0	8.7	9.2	9.1	8.6	8.9	10.4	9.5	9.8
13	10.1	8.7	9.3	9.7	8.4	9.0	9.4	8.7	9.0	10.6	9.5	9.9
14	10.3	8.8	9.4	9.6	8.2	8.8	9.8	8.7	9.3	10.0	9.3	9.6
15	10.4	9.0	9.6	9.5	8.1	8.6	9.6	9.0	9.2	10.6	9.4	9.9
16	9.7	8.8	9.1	9.6	8.0	8.7	9.5	8.9	9.1	10.3	8.9	9.5
17	10.5	8.9	9.5	9.3	8.0	8.6	9.4	8.8	9.1	9.0	8.6	8.8
18	10.3	8.9	9.5	9.6	7.7	8.7	10.2	9.3	9.6	9.2	8.8	9.0
19	10.2	8.8	9.4	9.7	8.1	8.8	10.1	9.2	9.6	8.8	8.6	8.7
20	8.8	8.5	8.7	9.5	8.3	8.9	9.6	9.0	9.3	9.5	8.8	9.2
21	8.8	8.5	8.6	9.8	8.6	9.1	10.0	9.3	9.6	10.1	9.3	9.7
22	9.1	8.3	8.7	10.0	8.8	9.3	10.0	9.2	9.6	10.7	9.7	10.1
23	9.0	8.2	8.6	10.0	8.2	9.2	10.2	9.2	9.6	10.6	9.8	10.1
24	8.9	7.8	8.3	9.8	8.6	9.1	9.6	8.9	9.2	11.0	9.8	10.3
25	8.8	7.7	8.1	9.8	8.5	9.1	9.6	8.9	9.4	10.6	9.9	10.2
26	9.0	7.7	8.2	9.4	8.3	8.7	9.7	9.2	9.4	10.8	9.8	10.2
27	9.2	7.9	8.4	9.3	8.2	8.6	9.8	9.0	9.3	11.0	9.9	10.3
28	9.3	8.0	8.5	8.5	7.4	8.0	9.7	8.9	9.3	10.5	9.8	10.1
29	9.3	8.0	8.5	9.4	7.7	8.5	9.9	9.2	9.5	10.4	9.6	9.9
30	9.7	7.9	8.5	9.8	8.3	9.0	9.9	9.2	9.5	10.2	9.4	9.7
31	---	---	---	10.3	8.9	9.4	9.8	9.1	9.4	---	---	---
MONTH	10.5	7.7	9.1	10.3	7.4	8.9	10.6	8.2	9.3	11.0	8.6	9.7

STREAMS TRIBUTARY TO LAKE MICHIGAN

04125550 MANISTEE RIVER NEAR WELLSTON, MI

LOCATION.--Lat 44°15'34", long 85°56'30", in NE1/4 SE1/4 sec.36, T.22 N., R.14 W., Manistee County, Hydrologic Unit 04060103, on right bank 700 ft downstream from Tippy Dam, at public access site, 3.2 mi north of Wellston, and 5.0 mi southeast of Brethren.

DRAINAGE AREA.--1,451 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1996 to September 1997.

GAGE.--Water-stage recorder. Elevation of gage is 640 ft above sea level, from topographic map.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Flow completely regulated by Tippy Dam 700 ft upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1690	2030	1700	1660	1890	1910	2760	2300	1720	1340	1210	1450
2	1530	1870	1810	1660	1790	2080	2590	2550	1710	1500	1310	1420
3	1420	1670	1750	1710	1760	2040	2730	2560	1700	e1400	1340	1350
4	e1420	1610	1750	1800	1830	2050	3090	2280	1630	e1350	1250	1320
5	1420	1600	1790	2210	1840	2040	3280	2330	1590	e1250	1140	1360
6	1450	1640	1840	2380	1780	1930	3300	2410	1530	e1250	1210	1380
7	1540	1880	1750	2220	1700	1880	3340	2190	1580	e1300	1290	1380
8	1540	1820	1700	2010	1600	1870	3430	2200	1610	e1650	1290	1380
9	1410	e1750	1680	1910	1600	1850	3360	2370	1500	1570	1290	1370
10	1340	e1700	1660	1760	1650	1790	3130	2250	1480	1490	1290	1450
11	1370	e1800	1660	1670	1690	1770	2860	2170	1450	1510	1300	1340
12	1400	e1650	1660	1590	1660	1770	2550	2270	1470	1450	1550	1290
13	1400	1650	1660	1620	1470	1760	2490	2030	1510	1390	1630	1390
14	1370	1650	1660	1700	1390	1750	2370	1970	1540	1510	1420	1500
15	1420	1580	1700	1710	1660	1680	2310	2220	1480	1200	1540	1410
16	1380	1530	1740	1830	1760	1550	2500	2220	1470	1230	1650	1380
17	e1450	1750	1770	1540	1520	1710	2500	2270	1520	1520	1580	1650
18	e1800	1800	1770	1300	1810	1840	2140	2370	1490	1360	1570	1580
19	e1700	1760	1760	1200	2120	1660	1980	2390	1440	1270	1510	1590
20	e1650	1770	1660	1340	1710	1600	2240	2320	1680	1270	1530	1560
21	e1600	1700	1410	1540	2210	1620	2230	2170	1850	1270	1690	1480
22	e1550	1690	1440	2110	2650	1900	2090	2120	1730	1320	1640	1470
23	1640	1760	1820	2630	2620	1990	2120	2010	1670	1320	1530	1370
24	1840	1730	2110	2290	2240	1940	2060	1910	1530	1300	1750	1320
25	1980	1640	1860	2240	1910	2020	1990	1880	1410	1300	1740	1350
26	1890	1570	1690	2010	1890	2030	2040	1890	1570	1510	1580	1360
27	1750	1500	1400	1870	2150	2190	2060	1740	1460	1370	1510	1360
28	1640	1540	1610	1930	2080	2590	2040	1720	1430	1430	1490	1360
29	1730	1550	1890	1710	---	3150	1910	1760	1350	1320	1420	1330
30	1870	1540	1890	1550	---	3140	1880	1900	1350	1210	1380	1320
31	1970	---	1800	1810	---	2880	---	1880	---	1190	1410	---
TOTAL	48960	50730	53390	56510	51980	61980	75370	66650	46450	42350	45040	42270
MEAN	1579	1691	1722	1823	1856	1999	2512	2150	1548	1366	1453	1409
MAX	1980	2030	2110	2630	2650	3150	3430	2560	1850	1650	1750	1650
MIN	1340	1500	1400	1200	1390	1550	1880	1720	1350	1190	1140	1290
CFSM	1.09	1.17	1.19	1.26	1.28	1.38	1.73	1.48	1.07	.94	1.00	.97
IN.	1.26	1.30	1.37	1.45	1.33	1.59	1.93	1.71	1.19	1.09	1.15	1.08

SUMMARY STATISTICS

FOR 1997 WATER YEAR

ANNUAL TOTAL	641680	
ANNUAL MEAN	1758	
HIGHEST DAILY MEAN	3430	Apr 8
LOWEST DAILY MEAN	1140	Aug 5
ANNUAL SEVEN-DAY MINIMUM	1240	Jul 30
INSTANTANEOUS PEAK FLOW	3520	Apr 9
INSTANTANEOUS PEAK STAGE	9.73	Apr 9
INSTANTANEOUS LOW FLOW	775	Sep 10
ANNUAL RUNOFF (CFSM)	1.21	
ANNUAL RUNOFF (INCHES)	16.45	
10 PERCENT EXCEEDS	2270	
50 PERCENT EXCEEDS	1670	
90 PERCENT EXCEEDS	1340	

(e) Estimated.

STREAMS TRIBUTARY TO LAKE MICHIGAN

04125550 MANISTEE RIVER NEAR WELLSTON, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1996 to September 1997.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1996 to September 1997

DISSOLVED OXYGEN: October 1996 to September 1997

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 or record was deleted because of questionable recorded values.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum recorded, 22.0°C, July 19; minimum, 0.0°C, on several days during winter period.

DISSOLVED OXYGEN: Maximum, 16.0 mg/L, Mar. 11, 12; minimum, 7.3 mg/L, July 13.

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

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

STREAMS TRIBUTARY TO LAKE MICHIGAN

04125550 MANISTEE RIVER NEAR WELLSTON, MI--Continued

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

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY				AUGUST		SEPTEMBER		
1	14.5	12.5	13.5	21.0	20.5	21.0	21.0	21.0	21.0	18.0	17.0	17.5
2	15.0	13.0	14.5	21.5	20.0	21.0	21.0	20.5	21.0	17.5	16.5	17.5
3	15.5	13.5	14.5	---	---	---	21.5	20.5	21.0	17.5	16.5	17.0
4	14.5	13.5	14.0	---	---	---	21.0	20.0	20.5	17.5	17.0	17.0
5	15.0	14.0	14.5	---	---	---	21.0	20.0	20.5	17.5	17.0	17.0
6	16.0	15.0	15.5	---	---	---	20.5	20.0	20.5	17.5	16.5	17.0
7	17.0	15.0	16.0	---	---	---	20.5	20.5	20.5	17.0	17.0	17.0
8	17.0	15.0	16.0	---	---	---	20.5	20.5	20.5	17.0	17.0	17.0
9	17.0	15.5	16.0	20.0	19.0	19.5	21.0	20.5	20.5	17.0	16.5	17.0
10	17.0	16.0	16.5	19.5	19.0	19.5	20.5	20.0	20.5	16.5	16.0	16.5
11	17.0	16.0	17.0	19.5	19.0	19.5	20.5	20.0	20.0	16.0	16.0	16.0
12	17.5	16.5	17.0	20.0	19.5	19.5	20.0	19.5	20.0	16.5	16.0	16.0
13	18.0	17.0	17.5	20.5	20.0	20.0	19.5	19.0	19.0	16.5	16.0	16.5
14	18.0	17.0	17.5	20.5	19.5	20.0	19.5	19.0	19.0	16.5	16.0	16.5
15	18.5	17.5	18.0	21.0	19.5	20.5	19.5	18.5	19.0	16.5	18.0	16.5
16	18.5	17.0	18.0	21.5	20.5	21.0	18.5	18.5	18.5	17.0	16.5	16.5
17	18.5	17.0	18.0	21.0	20.5	21.0	18.5	18.5	18.5	17.0	16.0	16.5
18	18.0	17.5	18.0	21.5	21.0	21.0	18.5	18.0	18.0	17.5	16.5	17.0
19	18.5	17.5	18.0	22.0	21.0	21.5	18.5	18.0	18.0	17.5	16.5	17.0
20	---	---	---	21.5	21.0	21.5	18.5	18.0	18.0	16.5	16.0	16.0
21	---	---	---	21.5	21.0	21.0	18.0	17.0	17.5	16.5	16.0	16.5
22	---	---	---	21.5	21.0	21.5	17.5	17.0	17.0	16.0	15.5	16.0
23	---	---	---	21.5	21.0	21.0	17.5	17.0	17.5	16.0	15.5	15.5
24	20.5	18.5	19.0	21.0	20.5	21.0	18.0	17.5	17.5	15.5	15.5	15.5
25	19.5	18.0	19.0	21.5	20.5	21.0	17.5	17.0	17.5	15.5	15.0	15.5
26	20.0	19.0	19.5	21.0	20.5	20.5	17.5	17.0	17.0	15.5	15.0	15.5
27	20.5	20.0	20.0	21.0	20.5	21.0	17.5	17.0	17.0	15.5	15.5	15.5
28	20.5	20.0	20.5	21.5	20.5	21.0	17.5	17.0	17.0	15.5	15.0	15.5
29	21.0	20.5	20.5	21.5	20.5	21.0	17.5	17.0	17.5	15.0	14.0	14.5
30	21.0	20.5	21.0	21.5	21.0	21.0	17.5	17.0	17.5	14.5	14.0	14.0
31	---	---	---	21.5	21.0	21.0	17.5	17.0	17.5	---	---	---
MONTH	---	---	---	---	---	---	21.5	17.0	19.0	18.0	14.0	16.5

STREAMS TRIBUTARY TO LAKE MICHIGAN

04125550 MANISTEE RIVER NEAR WELLSTON, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	8.3	7.9	8.1	7.5	7.4	7.5	12.9	12.6	12.8	13.4	13.1	13.2
2	8.1	7.7	7.9	7.7	7.5	7.6	12.9	12.7	12.8	13.3	13.1	13.1
3	8.2	7.9	8.0	7.9	7.7	7.8	13.0	12.8	12.9	13.2	13.1	13.1
4	---	---	---	7.9	7.8	7.9	13.0	12.8	12.9	13.2	13.0	13.1
5	8.4	8.2	8.3	8.0	7.7	7.9	13.4	12.9	13.0	13.1	12.9	13.0
6	8.3	7.8	8.1	8.0	7.8	7.9	13.0	12.8	12.9	13.0	12.9	13.0
7	8.2	7.8	8.0	8.0	7.8	7.9	13.0	12.9	12.9	13.1	12.9	13.0
8	8.5	8.1	8.3	8.1	8.0	8.0	12.9	12.9	12.9	13.2	13.1	13.1
9	8.5	8.2	8.4	---	---	---	13.0	12.8	12.9	13.2	13.1	13.1
10	8.7	8.3	8.5	---	---	---	13.1	12.9	13.0	13.5	13.1	13.2
11	8.7	8.1	8.5	---	---	---	13.3	13.0	13.2	13.5	13.2	13.4
12	8.5	8.1	8.3	---	---	---	13.2	13.1	13.2	13.6	13.4	13.5
13	8.7	8.4	8.6	---	---	---	13.1	13.0	13.1	13.7	13.4	13.5
14	8.6	8.4	8.5	---	---	---	13.2	13.0	13.1	13.6	13.1	13.3
15	8.8	8.5	8.7	---	---	---	13.2	12.9	13.1	13.3	13.0	13.1
16	9.3	8.4	8.7	---	---	---	13.1	13.0	13.0	13.4	13.2	13.3
17	---	---	---	---	---	---	13.2	13.0	13.1	13.5	13.3	13.4
18	---	---	---	---	---	---	13.2	13.0	13.1	13.5	13.4	13.4
19	---	---	---	---	---	---	13.4	13.2	13.3	13.5	13.3	13.4
20	---	---	---	---	---	---	13.5	13.2	13.3	13.4	13.3	13.3
21	---	---	---	---	---	---	13.4	13.3	13.3	13.4	13.2	13.4
22	---	---	---	---	---	---	13.5	13.3	13.3	13.3	13.0	13.1
23	---	---	---	---	---	---	13.4	13.2	13.3	13.1	13.0	13.0
24	---	---	---	---	---	---	13.3	13.2	13.3	13.1	12.8	12.5
25	---	---	---	---	---	---	13.4	13.3	13.3	13.0	12.8	12.5
26	---	---	---	12.6	12.4	12.5	13.5	13.1	13.3	13.1	13.0	13.1
27	---	---	---	12.7	12.5	12.6	13.4	13.1	13.3	13.1	13.0	13.1
28	---	---	---	13.0	12.6	12.8	13.4	13.0	13.2	13.3	13.0	13.1
29	---	---	---	13.1	12.9	13.0	13.4	13.1	13.3	13.3	13.2	13.2
30	10.0	9.6	9.8	13.0	12.8	12.9	13.6	13.2	13.4	13.2	13.1	13.2
31	10.0	7.4	8.7	---	---	---	13.6	13.2	13.4	13.1	12.9	13.0
MONTH	---	---	---	---	---	---	13.6	12.6	13.1	13.7	12.8	13.2

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	13.1	13.0	13.1	15.3	14.2	14.8	11.8	11.4	11.6	10.6	10.4	10.5	
2	13.1	13.1	13.1	15.2	14.4	14.8	11.5	11.3	11.4	10.6	10.4	10.5	
3	13.2	13.0	13.1	15.3	14.4	14.9	11.5	11.3	11.4	10.6	10.4	10.4	
4	13.1	12.9	13.0	15.3	14.7	15.0	11.4	11.2	11.3	10.5	10.3	10.4	
5	13.0	12.9	12.9	15.2	14.5	14.9	11.2	10.9	11.0	10.5	10.3	10.4	
6	13.0	12.9	12.9	15.6	14.9	15.3	11.0	10.8	10.9	10.6	10.4	10.5	
7	13.0	12.9	12.9	15.8	14.7	15.5	10.9	10.8	10.9	10.6	10.4	10.5	
8	13.1	12.9	13.0	15.8	15.2	15.5	11.1	10.9	10.9	10.5	10.4	10.4	
9	13.1	13.0	13.0	15.9	14.8	15.5	11.2	11.0	11.1	10.5	10.4	10.4	
10	13.1	12.9	13.0	15.9	15.2	15.6	11.2	11.1	11.2	10.6	10.4	10.5	
11	13.0	12.9	13.0	16.0	15.3	15.7	11.1	11.0	11.1	10.7	10.4	10.6	
12	13.1	12.9	13.0	16.0	14.8	15.5	11.1	11.0	11.1	10.6	10.5	10.5	
13	13.3	13.1	13.1	15.6	14.8	15.3	11.1	11.0	11.1	10.7	10.5	10.6	
14	13.1	13.0	13.1	15.3	14.3	15.0	11.2	11.1	11.1	10.9	10.6	10.7	
15	13.2	13.0	13.0	15.8	14.5	14.9	11.1	11.0	11.1	10.7	10.5	10.6	
16	13.1	13.0	13.0	15.0	13.9	14.7	11.0	11.0	11.0	10.6	10.5	10.6	
17	13.2	13.0	13.1	15.3	14.2	14.7	11.1	11.0	11.0	10.6	10.4	10.5	
18	13.1	12.7	12.9	14.7	14.1	14.5	11.1	10.9	11.0	10.6	10.4	10.5	
19	13.0	12.8	12.9	14.7	14.1	14.4	11.1	10.9	11.0	10.7	10.4	10.5	
20	13.1	12.6	12.9	14.5	14.0	14.3	11.1	10.9	11.0	10.8	10.6	10.6	
21	---	---	---	14.3	13.4	14.0	11.1	11.0	11.0	10.7	10.6	10.7	
22	---	---	---	14.0	13.2	13.6	11.0	10.9	11.0	10.7	10.6	10.7	
23	---	---	---	13.6	13.0	13.4	11.0	10.9	10.9	10.6	10.5	10.6	
24	---	---	---	13.5	12.7	13.2	11.0	10.8	10.9	10.5	10.4	10.5	
25	---	---	---	12.9	12.5	12.7	10.9	10.7	10.8	10.5	10.4	10.4	
26	---	---	---	12.8	12.4	12.6	11.0	10.7	10.9	10.5	10.3	10.4	
27	14.9	14.1	14.5	12.7	12.2	12.5	10.9	10.7	10.8	10.5	10.3	10.4	
28	15.0	14.3	14.7	12.4	12.0	12.2	10.9	10.6	10.8	10.4	10.3	10.4	
29	---	---	---	12.2	11.9	12.0	10.8	10.6	10.7	10.4	10.1	10.2	
30	---	---	---	12.2	11.9	12.1	10.7	10.5	10.6	10.1	10.0	10.0	
31	---	---	---	12.1	11.7	11.9	---	---	---	10.1	9.8	10.0	
MONTH	---	---	---	16.0	11.7	14.2	11.8	10.5	11.0	10.9	9.8	10.5	

STREAMS TRIBUTARY TO LAKE MICHIGAN

04125550 MANISTEE RIVER NEAR WELLSTON, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

[illegible]

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. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	126	130	132	125	135	146	146	206	142	127	116	170
2	123	128	127	126	135	148	156	159	140	125	116	118
3	121	127	122	128	133	141	164	158	139	124	117	116
4	118	125	120	162	135	139	170	151	138	124	117	114
5	118	123	121	207	137	138	172	160	137	122	114	114
6	119	128	122	152	135	137	176	160	143	121	113	115
7	132	134	123	142	134	134	160	152	149	120	113	114
8	122	126	123	138	133	135	153	158	138	158	112	115
9	119	126	122	138	133	136	152	155	136	137	111	170
10	119	128	120	138	132	138	151	154	134	128	113	173
11	116	130	119	138	132	135	152	150	132	126	113	170
12	115	128	118	137	132	132	152	154	132	125	125	118
13	114	127	119	135	e132	132	155	155	131	124	123	115
14	114	126	121	134	132	137	153	151	127	127	117	116
15	114	124	124	133	130	134	150	164	125	124	134	117
16	114	127	123	e130	130	132	149	160	140	122	130	118
17	133	148	120	e130	133	133	147	161	134	122	124	171
18	155	135	120	e130	139	132	145	159	129	120	121	117
19	128	127	119	e130	146	130	144	166	128	118	119	120
20	124	124	120	e130	142	132	142	157	130	124	130	120
21	121	121	118	131	172	136	141	152	138	127	137	116
22	120	121	118	179	155	136	142	149	131	125	128	114
23	158	126	125	154	145	134	143	148	127	121	122	113
24	170	123	155	143	140	131	141	148	127	120	138	112
25	138	121	133	144	139	145	140	149	126	121	125	112
26	130	120	129	140	140	143	138	145	124	125	122	112
27	129	118	126	140	145	152	139	143	122	123	120	111
28	127	119	125	138	141	162	139	142	121	122	119	112
29	131	119	124	136	---	169	137	143	120	119	117	112
30	167	131	123	135	---	151	145	147	123	117	119	114
31	138	---	125	136	---	144	---	144	---	116	125	---
TOTAL	3973	3790	3836	4359	3867	4324	4494	4800	3963	3854	3750	3489
MEAN	128	126	124	141	138	139	150	155	132	124	121	116
MAX	170	148	155	207	172	169	176	206	149	158	138	133
MIN	114	118	118	125	130	130	137	142	120	116	111	111
CFSM	1.09	1.07	1.05	1.19	1.17	1.18	1.27	1.31	1.12	1.05	1.03	.99
IN.	1.25	1.19	1.21	1.37	1.22	1.36	1.42	1.51	1.25	1.21	1.18	1.10

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1990 - 1997, BY WATER YEAR (WY)

MEAN	130	134	132	134	131	141	152	142	138	131	125	130
MAX	148	150	151	147	144	164	169	155	165	152	135	158
(WY)	1992	1993	1992	1992	1992	1992	1992	1997	1993	1993	1991	1993
MIN	117	119	109	110	109	113	131	124	109	104	116	110
(WY)	1996	1996	1996	1996	1996	1996	1995	1995	1995	1995	1996	1995

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1990 - 1997

ANNUAL TOTAL	45781	48499		
ANNUAL MEAN	125	133		
HIGHEST ANNUAL MEAN			135	
LOWEST ANNUAL MEAN			147	1993
HIGHEST DAILY MEAN	225	207	122	1996
LOWEST DAILY MEAN	101	111	98	Oct 25 1991
ANNUAL SEVEN-DAY MINIMUM	102	112	100	Jul 30 1995
INSTANTANEOUS PEAK FLOW		(a)279	516	Jul 25 1995
INSTANTANEOUS PEAK STAGE		(b)3.00	516	Oct 25 1991
INSTANTANEOUS LOW FLOW		(b)4.04	78	Jan 19 1994
ANNUAL RUNOFF (CFSM)	1.06	1.13	1.14	Sep 6 1996
ANNUAL RUNOFF (INCHES)	14.43	15.29	15.53	
10 PERCENT EXCEEDS	146	154	157	
50 PERCENT EXCEEDS	122	130	133	
90 PERCENT EXCEEDS	107	117	114	

(a) Gage height, 2.29 ft.

(b) Backwater from ice.

(c) Estimated.

[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. 10, 18, 25, Dec. 2, 9, 11, 16, 23, 29, Jan. 6, 13, 20, 27, Feb. 3, 10, 12, 17, 24, Mar. 3, 10, 17, 24, 31, Apr. 7, 14. 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, 4.89 ft, May 20; minimum observed, 4.16 ft, Oct. 15, 16.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.25	4.31	---	---	---	---	---	4.65	4.85	4.72	4.51	---
2	4.25	4.30	4.48	---	---	---	---	4.66	4.86	4.71	4.52	---
3	4.24	4.30	---	---	4.70	4.76	---	4.66	4.85	4.70	---	---
4	4.24	4.30	---	---	---	---	---	4.67	4.85	4.70	---	---
5	4.23	4.30	---	---	---	---	---	4.68	4.84	4.69	---	---
6	4.22	4.31	---	4.66	---	---	---	4.70	4.84	4.68	---	---
7	4.21	4.32	---	---	---	---	4.68	4.72	4.83	4.67	---	---
8	4.20	4.32	---	---	---	---	---	4.72	4.81	4.66	---	---
9	4.20	4.33	4.44	---	---	---	---	4.74	4.80	4.66	---	---
10	4.20	4.33	---	---	4.71	4.78	---	4.74	4.79	4.64	---	---
11	4.19	---	4.44	---	---	---	---	4.76	4.76	4.63	---	---
12	4.19	---	---	---	4.54	---	---	4.78	4.73	4.62	---	4.54
13	4.18	---	---	4.67	---	---	---	4.79	4.72	4.62	---	---
14	4.17	---	---	---	---	---	4.70	4.81	4.70	4.64	---	---
15	4.16	---	---	---	---	---	---	4.83	4.69	4.64	---	---
16	4.16	---	4.52	---	---	---	---	4.84	4.68	4.62	---	---
17	4.22	---	---	---	4.71	4.77	---	4.62	4.85	4.64	---	---
18	4.26	4.38	---	---	---	---	---	4.62	4.86	4.62	---	---
19	4.26	---	---	---	---	---	---	4.62	4.88	4.61	---	---
20	4.26	---	---	4.69	---	---	---	4.60	4.89	4.60	---	---
21	4.25	---	---	---	---	---	4.60	4.88	4.62	4.58	---	---
22	4.26	---	---	---	---	---	4.61	4.87	4.64	4.57	---	---
23	4.30	---	4.58	---	---	---	4.61	4.87	4.62	4.57	---	---
24	4.32	---	---	---	4.73	4.69	---	4.62	4.86	4.60	---	---
25	4.31	4.46	---	---	---	---	---	4.62	4.85	4.60	---	---
26	4.30	---	---	---	---	---	4.62	4.85	4.58	4.55	---	---
27	4.30	---	---	4.70	---	---	4.62	4.86	4.58	4.55	---	---
28	4.29	---	---	---	---	---	4.62	4.86	4.56	4.54	---	---
29	4.29	---	4.60	---	---	---	4.64	4.86	4.54	4.53	---	---
30	4.28	---	---	---	---	---	4.64	4.85	4.54	4.53	---	---
31	4.29	---	---	---	---	4.57	---	4.84	---	4.52	---	---
MEAN	4.24	---	---	---	---	---	---	4.80	4.70	4.61	---	---
MAX	4.32	---	---	---	---	---	---	4.89	4.86	4.72	---	---
MIN	4.16	---	---	---	---	---	---	4.65	4.54	4.52	---	---

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	167	176	225	180	185	190	228	248	e175	183	152	185
2	162	176	219	182	184	210	274	218	e174	168	153	175
3	162	177	188	192	183	193	312	199	e172	167	153	171
4	159	176	182	227	185	188	323	233	e172	182	157	170
5	159	175	180	400	189	187	379	214	e172	161	152	172
6	159	173	181	249	184	186	441	192	e172	157	151	178
7	176	205	185	211	184	181	315	203	e172	156	150	174
8	166	183	186	198	183	183	230	221	e175	232	150	174
9	162	178	184	193	181	182	218	207	e177	196	150	173
10	163	184	182	192	181	188	214	201	e178	164	196	176
11	161	181	181	189	181	185	213	221	e179	159	193	198
12	161	178	180	186	182	181	211	206	176	156	188	199
13	160	179	183	185	172	178	221	291	175	155	198	181
14	159	183	187	184	e176	184	220	229	173	162	173	176
15	159	184	194	185	181	181	226	220	173	171	207	177
16	160	184	202	e182	178	184	226	211	201	168	215	175
17	199	237	186	e180	e184	181	211	220	188	171	181	201
18	235	227	183	e180	190	180	204	201	177	171	177	181
19	177	187	178	e180	215	178	204	192	174	169	171	188
20	168	181	e176	e180	197	180	201	186	177	176	177	185
21	166	178	175	e180	238	186	203	185	179	179	199	177
22	164	177	177	251	222	191	203	e190	178	173	182	175
23	209	183	181	239	198	185	201	e200	170	171	173	174
24	246	177	235	e207	191	181	197	e195	169	161	172	173
25	193	176	198	199	e188	199	192	e182	177	153	170	173
26	174	175	196	198	186	205	190	e175	169	160	171	173
27	171	174	181	e191	192	226	189	e175	166	160	172	173
28	168	176	182	187	186	279	188	e180	164	156	169	173
29	171	177	183	e186	---	341	188	e180	166	152	171	175
30	224	194	180	e185	---	267	435	e178	166	152	174	205
31	188	---	181	e185	---	221	---	e175	---	151	229	---
TOTAL	5448	5511	5831	6263	5296	6181	7255	6328	5236	5192	5426	5380
MEAN	176	184	188	202	189	199	242	204	175	167	175	179
MAX	246	237	235	400	238	341	441	291	201	232	229	205
MIN	159	173	175	180	172	178	188	175	164	151	150	170
CFSM	2.59	2.71	2.77	2.98	2.79	2.94	3.56	3.01	2.57	2.47	2.58	2.64
IN.	2.98	3.02	3.19	3.43	2.90	3.39	3.97	3.47	2.87	2.84	2.97	2.95

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1997, BY WATER YEAR (WY)

MEAN	187	191	188	181	181	211	225	195	182	174	172	182
MAX	235	226	217	202	209	281	273	237	230	210	203	223
(WY)	1987	1993	1983	1997	1984	1979	1979	1983	1969	1975	1972	1986
MIN	167	163	163	157	157	174	181	164	160	151	150	150
(WY)	1967	1982	1982	1971	1982	1972	1987	1982	1982	1981	1981	1981

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1967 - 1997

	1996	1997	1967-1997
ANNUAL TOTAL	69867	69347	189
ANNUAL MEAN	191	190	204
HIGHEST ANNUAL MEAN			171
LOWEST ANNUAL MEAN			171
HIGHEST DAILY MEAN	474	441	840
LOWEST DAILY MEAN	154	150	130
ANNUAL SEVEN-DAY MINIMUM	155	152	136
INSTANTANEOUS PEAK FLOW		599	1360
INSTANTANEOUS PEAK STAGE		5.24	6.51
INSTANTANEOUS LOW FLOW		(a)133	(a)91
ANNUAL RUNOFF (CFSM)	2.81	2.80	2.79
ANNUAL RUNOFF (INCHES)	38.28	37.99	37.86
10 PERCENT EXCEEDS	223	221	223
50 PERCENT EXCEEDS	184	181	180
90 PERCENT EXCEEDS	162	163	160

(a) Result of freezeup.

(e) Estimated.

[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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	503	496	505	e180	e230	e170	e310	1540	e200	91	61	76
2	403	407	491	e180	e225	e170	e320	1230	e180	94	62	69
3	360	349	377	e180	e220	e170	e400	806	e160	111	61	65
4	303	323	308	e180	e215	e170	e500	592	e140	118	60	61
5	256	382	267	e180	e210	e170	e700	487	122	102	59	59
6	235	381	255	e180	e205	e170	e1100	471	116	97	59	62
7	439	420	257	e180	e200	e170	e1700	419	108	96	59	65
8	349	370	262	e180	e200	e170	e1500	425	103	90	59	62
9	278	313	258	e180	e195	e170	e1350	661	98	108	59	61
10	241	282	248	e175	e195	e170	e1200	536	95	102	59	63
11	214	269	206	e175	e190	e165	e1100	440	93	90	63	66
12	203	255	e200	e170	e190	e165	e1000	445	92	85	61	68
13	188	e250	e205	e170	e185	e165	e960	531	90	81	62	66
14	176	e245	e210	e170	e180	e180	1410	452	87	78	62	63
15	161	e240	231	e170	e180	e170	1730	383	85	76	67	61
16	156	245	434	e165	e180	e170	1960	326	113	74	90	61
17	223	429	373	e180	e175	e170	1360	296	133	73	90	67
18	922	629	308	e170	e175	e170	1210	274	115	70	76	84
19	639	453	260	e170	e175	e170	1130	475	104	67	69	98
20	453	354	e240	e170	e180	e170	1110	500	100	66	66	117
21	346	294	e230	e170	e175	e165	1030	397	100	70	67	94
22	285	270	e200	e200	e175	e165	1060	320	135	72	73	82
23	465	246	e215	e270	e170	e165	1200	275	123	69	77	75
24	1430	e230	e210	e265	e170	e170	1250	e250	141	66	69	69
25	1100	e220	e205	e260	e170	e175	1170	e230	137	65	66	66
26	716	e210	e200	e260	e170	e180	1000	211	121	66	64	66
27	511	e200	e195	e255	e170	e190	863	187	105	72	62	65
28	416	e195	e190	e250	e170	e210	769	e175	96	71	61	64
29	341	190	e185	e245	--	e280	687	e160	89	66	60	64
30	1010	231	e185	e240	--	e320	672	e190	e90	64	61	64
31	688	--	e180	e235	--	e310	--	e230	--	62	69	--
TOTAL	14010	9378	8110	6135	5275	5705	31751	13914	3471	2512	2033	2103
MEAN	452	313	262	198	188	184	1058	449	116	81.0	65.6	70.1
MAX	1430	629	505	270	230	320	1960	1540	200	118	90	117
MIN	156	190	180	160	170	160	310	160	85	62	59	59
CFSM	2.46	1.70	1.42	1.08	1.02	1.00	5.75	2.44	.63	.44	.36	.38
IN.	2.83	1.90	1.64	1.24	1.07	1.15	6.42	2.81	.70	.51	.41	.43

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1972 - 1997, BY WATER YEAR (WY)

MEAN	232	292	183	123	108	264	844	275	174	109	105	154
MAX	452	807	328	248	217	544	1589	633	432	261	349	383
(WY)	1997	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1972 - 1997

ANNUAL TOTAL	113950		104397									
ANNUAL MEAN	311		286							237		
HIGHEST ANNUAL MEAN										344		1985
LOWEST ANNUAL MEAN										149		1987
HIGHEST DAILY MEAN	2460		1960		Apr 22		Apr 16		4050		Apr 21	1985
LOWEST DAILY MEAN	73		59		Sep 9		Aug 5		45		Aug 13	1991
ANNUAL SEVEN-DAY MINIMUM	75		59		Sep 5		Aug 4		50		Aug 28	1991
INSTANTANEOUS PEAK FLOW			(a)2460				Apr 16		4500		Mar 30	1986
INSTANTANEOUS PEAK STAGE			(b)14.38				Apr 7		18.44		Mar 30	1986
INSTANTANEOUS LOW FLOW			58				(c)		(d)33		Nov 16	1989
ANNUAL RUNOFF (CFSM)	1.69		1.55						1.29			
ANNUAL RUNOFF (INCHES)	23.04		21.11						17.48			
10 PERCENT EXCEEDS	645		648						480			
50 PERCENT EXCEEDS	192		180						130			
90 PERCENT EXCEEDS	95		65						71			

(a) Gage height 11.72 ft.

(b) Backwater from ice.

(c) Aug. 5, 6, 7, 9, Sept. 5.

(d) 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.

REVISED RECORDS.--WDR MI-96-1: 1991 (M).

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; minimum observed, 3.46 ft, datum then in use, Sept. 14-16, 1969.

EXTREMES FOR CURRENT YEAR.--Maximum gage height observed, 5.10 ft, May 2; minimum observed, 3.60 ft, Aug. 12, 13, Sept. 7-9, 16.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.90	---	---	---	---	---	---	5.02	4.60	4.20	3.80	3.63
2	4.85	---	---	4.73	---	---	---	5.10	4.58	4.20	3.78	3.64
3	4.88	---	---	---	---	---	---	5.08	4.56	4.20	3.76	3.64
4	4.80	---	---	---	---	---	---	5.06	4.56	4.20	3.74	3.64
5	4.80	---	---	---	---	---	---	5.04	4.54	4.18	3.70	3.62
6	4.80	---	---	---	---	---	---	5.00	4.52	4.16	3.70	3.62
7	4.80	---	---	---	---	---	---	4.98	4.50	4.14	3.68	3.60
8	4.78	---	---	---	---	---	4.84	4.96	4.48	4.14	3.68	3.60
9	4.78	---	---	---	---	---	---	4.94	4.46	4.12	3.66	3.60
10	4.78	---	---	---	---	---	---	4.92	4.44	4.12	3.64	3.62
11	4.76	---	---	---	---	---	---	4.92	4.42	4.10	3.62	3.62
12	4.76	---	---	---	---	---	---	4.92	4.42	4.10	3.60	3.62
13	4.76	4.81	---	---	---	---	---	4.90	4.40	4.10	3.60	3.62
14	4.74	---	---	---	---	---	---	4.88	4.38	4.08	3.62	3.62
15	4.74	---	---	---	---	---	---	4.84	4.36	4.06	3.70	3.62
16	4.74	---	---	---	---	---	---	4.82	4.36	4.04	3.70	3.60
17	4.70	---	---	---	---	---	---	4.80	4.34	4.02	3.70	3.64
18	4.80	---	---	---	---	---	---	---	4.32	4.00	3.70	3.64
19	4.80	---	---	---	4.68	---	---	4.80	4.30	3.96	3.70	3.64
20	4.80	---	---	---	---	---	---	4.80	4.30	3.94	3.68	3.62
21	4.80	---	---	---	---	---	---	4.80	4.30	3.92	3.68	3.62
22	4.82	---	---	---	---	---	---	4.78	4.30	3.90	3.70	3.70
23	4.84	---	---	---	---	---	---	4.76	4.28	3.88	3.70	3.74
24	4.84	---	---	---	---	---	---	4.74	4.26	3.88	3.70	3.74
25	4.94	---	---	---	---	---	4.98	4.72	4.26	3.86	3.68	3.70
26	4.90	---	---	---	---	---	4.98	4.70	4.24	3.84	3.68	3.68
27	---	---	---	---	---	---	4.98	4.68	4.24	3.84	3.68	3.68
28	---	---	---	---	---	---	5.00	4.66	4.22	3.84	3.66	3.68
29	---	---	---	---	---	---	5.00	4.64	4.20	3.82	3.66	3.68
30	---	---	---	---	---	---	5.00	4.64	4.20	3.80	3.66	3.68
31	---	---	---	---	---	---	---	4.62	---	3.80	3.66	---

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, 2.75 ft, May 2, 3, 5; minimum, 1.34 ft, Mar. 24, 25.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.40	1.75	1.48	1.55	1.73	1.58	1.52	2.64	2.46	2.22	---	2.30
2	2.40	1.77	1.53	1.53	1.71	1.58	1.55	2.74	2.46	2.23	---	2.29
3	2.38	1.75	1.52	1.51	1.66	1.57	1.62	2.75	2.44	2.23	---	2.28
4	2.36	1.73	1.52	1.55	1.65	1.56	1.71	2.72	2.41	2.26	---	2.26
5	2.35	1.73	1.51	1.70	1.68	1.55	1.80	2.70	2.41	2.23	---	2.24
6	2.34	1.73	1.51	1.80	1.66	1.54	1.96	2.71	2.40	2.23	---	2.24
7	2.39	1.73	1.51	1.88	1.64	1.52	2.15	2.67	2.40	2.22	---	2.25
8	2.39	1.73	1.51	1.75	1.62	1.50	2.18	2.65	2.37	2.26	2.11	2.25
9	2.36	1.72	1.51	1.75	1.63	1.50	2.17	2.63	2.36	2.29	2.10	2.26
10	2.29	1.71	1.50	1.76	1.59	1.50	2.18	2.60	2.35	2.28	2.11	2.28
11	2.22	1.70	1.49	1.74	1.57	1.48	2.18	2.59	2.33	2.27	2.13	2.30
12	2.17	1.69	1.49	1.73	1.56	1.46	2.19	2.57	2.32	2.26	2.14	2.33
13	2.18	1.67	1.49	1.71	1.58	1.44	2.20	2.58	2.32	2.25	2.16	2.33
14	2.11	1.65	1.49	1.69	1.54	1.53	2.21	2.58	2.29	2.27	2.15	2.32
15	2.03	1.63	1.48	1.67	1.52	1.55	2.22	2.60	2.27	2.26	2.19	2.32
16	1.97	1.62	1.47	1.69	1.51	1.51	2.25	2.59	2.27	2.24	2.24	2.32
17	1.95	1.61	1.48	1.69	1.50	1.48	2.27	2.58	2.28	2.23	2.24	2.34
18	1.95	1.58	1.49	1.69	1.49	1.45	2.28	2.60	2.27	2.23	2.23	2.35
19	1.91	1.59	1.48	1.69	1.49	1.43	2.28	2.60	2.27	2.21	2.23	2.37
20	1.86	1.58	1.47	1.72	1.50	1.41	2.28	2.59	2.27	2.20	2.23	2.38
21	1.82	1.56	1.45	1.70	1.57	1.40	2.27	2.59	2.28	2.21	2.25	2.35
22	1.78	1.54	1.44	1.74	1.86	1.39	2.28	2.56	2.27	2.21	2.26	2.32
23	1.80	1.54	1.44	1.75	1.63	1.37	2.28	2.55	2.27	---	2.24	2.33
24	1.84	1.54	1.54	1.76	1.62	1.35	2.28	2.54	2.27	---	2.24	2.30
25	1.84	1.53	1.55	1.79	1.61	1.36	2.26	2.55	2.25	---	2.23	2.30
26	1.82	1.51	1.55	1.78	1.59	1.37	2.27	2.53	2.25	---	2.23	2.29
27	1.78	1.49	1.54	1.78	1.59	1.36	2.30	2.51	2.24	---	2.23	2.29
28	1.75	1.48	1.54	1.78	1.59	1.39	2.32	2.50	2.23	---	2.23	2.29
29	1.72	1.46	1.52	1.78	---	1.44	2.33	2.48	2.22	---	2.22	2.27
30	1.81	1.46	1.51	1.78	---	1.49	2.38	2.48	2.21	---	2.23	2.32
31	1.75	---	1.56	1.78	---	1.51	---	2.47	---	---	2.30	---
MEAN	2.06	1.63	1.50	1.72	1.60	1.47	2.14	2.60	2.31	---	---	2.30
MAX	2.40	1.77	1.56	1.88	1.86	1.58	2.38	2.75	2.46	---	---	2.38
MIN	1.72	1.46	1.44	1.51	1.49	1.35	1.52	2.47	2.21	---	---	2.24

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	219	253	266	207	e220	224	279	695	229	186	173	232
2	211	242	297	209	220	260	335	579	226	194	174	201
3	204	241	244	221	218	239	406	378	219	218	170	192
4	200	248	229	257	216	225	405	324	219	235	179	186
5	199	256	224	478	223	220	474	320	214	210	172	183
6	198	241	224	371	218	218	650	345	212	192	169	185
7	235	259	224	286	212	209	681	292	214	193	167	188
8	219	249	225	258	209	216	446	285	208	273	176	192
9	206	234	224	e240	e205	211	337	295	206	325	166	187
10	202	234	220	e230	e205	217	310	283	201	228	191	187
11	198	232	216	e226	204	212	302	270	197	210	229	251
12	198	226	213	226	204	207	297	290	195	203	200	299
13	196	226	217	e225	e204	e208	305	279	196	200	235	225
14	193	225	216	223	e204	209	324	269	195	199	194	202
15	195	e225	224	220	e204	213	348	339	196	193	208	202
16	193	228	241	220	203	e210	401	314	206	190	266	196
17	227	264	225	e215	218	e205	351	296	213	192	209	222
18	355	284	218	e212	249	205	328	279	198	190	203	220
19	270	244	e210	e212	271	203	326	290	196	182	187	250
20	228	228	e205	e214	245	204	323	284	198	184	186	238
21	221	221	204	e220	272	209	318	270	201	196	227	212
22	217	218	210	e290	270	212	318	259	204	194	215	201
23	274	222	208	e280	258	206	327	255	199	184	198	199
24	374	215	248	e260	241	201	318	255	192	180	187	194
25	306	213	227	e250	e240	221	314	271	195	182	184	194
26	252	210	219	e240	e230	236	306	252	192	208	184	193
27	242	204	e215	e230	226	245	302	240	185	203	183	191
28	226	205	e210	e225	222	297	300	229	183	192	178	191
29	217	208	e205	e225	---	345	290	233	179	184	180	195
30	307	220	204	e225	---	335	310	242	176	181	185	225
31	279	---	209	e220	---	281	---	240	---	175	273	---
TOTAL	7261	6975	6921	7615	6311	7103	10731	9452	6044	6276	6048	6233
MEAN	234	233	223	246	225	229	358	305	201	202	195	208
MAX	374	284	297	478	272	345	681	695	229	325	273	299
MIN	193	204	204	207	203	201	279	229	176	175	166	183
CFSM	1.22	1.21	1.16	1.28	1.17	1.19	1.86	1.59	1.05	1.05	1.02	1.08
IN.	1.41	1.35	1.34	1.48	1.22	1.38	2.08	1.83	1.17	1.22	1.17	1.21

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 1997, BY WATER YEAR (WY)

	MEAN	214	226	213	201	198	246	313	241	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1942 - 1997

ANNUAL TOTAL	85853						86970						
ANNUAL MEAN	235						238						
HIGHEST ANNUAL MEAN										219			
LOWEST ANNUAL MEAN										268			
HIGHEST DAILY MEAN										167			1972
LOWEST DAILY MEAN										1080			1958
ANNUAL SEVEN-DAY MINIMUM	495				Apr 20		695		May 1				Sep 29 1972
INSTANTANEOUS PEAK FLOW	166				Aug 31		166		Aug 9				Aug 6 1968
INSTANTANEOUS PEAK STAGE	168				Aug 31		171		Aug 3				Aug 3 1958
INSTANTANEOUS LOW FLOW							(a)779		May 1		(b)1290		Sep 29 1972
ANNUAL RUNOFF (CFSM)							(c)5.80		Jan 30		(c)5.80		Jan 30 1997
ANNUAL RUNOFF (INCHES)							160		Aug 9		93		Mar 18 1993
10 PERCENT EXCEEDS	1.22						1.24				1.14		
50 PERCENT EXCEEDS	16.63						16.85				15.52		
90 PERCENT EXCEEDS	298						310				294		
10 PERCENT EXCEEDS	221						220				204		
50 PERCENT EXCEEDS	192						188				159		

(a) Gage height 4.86 ft.

(b) Site then in use.

(c) Maximum recorded, backwater from ice, but may have been greater during period of no gage-height record, Jan. 21-29, 1997; peak stage at previous site and datum, 4.48 ft, Sept. 14, 1961.

(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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	79	88	99	70	73	98	100	248	81	58	52	82
2	70	82	134	71	77	100	122	210	73	61	54	71
3	70	90	94	77	73	87	165	138	72	71	54	64
4	70	77	83	97	74	86	174	112	70	75	65	60
5	66	93	77	192	76	79	212	107	71	65	56	60
6	64	88	78	137	75	81	283	115	70	63	54	62
7	66	80	77	105	73	78	299	95	70	62	54	63
8	74	86	78	90	72	75	158	99	69	104	53	63
9	63	73	75	75	e70	75	123	96	68	129	55	63
10	68	79	75	e72	70	79	111	94	67	77	69	64
11	63	75	75	e70	72	75	114	91	64	66	81	107
12	70	77	74	e68	71	74	108	104	62	64	70	130
13	61	72	78	e66	64	e72	111	96	63	64	94	91
14	66	68	76	e64	e64	70	130	93	62	60	68	72
15	62	70	79	e64	e66	76	138	126	60	59	98	69
16	62	70	87	e62	e66	74	174	120	63	59	128	69
17	86	90	84	61	67	e72	142	109	67	58	84	79
18	139	96	77	e62	85	72	121	94	63	61	73	71
19	107	80	67	e64	98	72	123	107	59	56	68	79
20	82	77	64	e66	87	73	129	94	63	59	65	78
21	78	71	70	73	97	76	122	91	64	64	87	70
22	71	72	70	103	91	81	125	89	63	61	86	69
23	108	78	71	e92	86	78	134	83	59	57	61	65
24	139	78	94	e80	75	77	130	84	61	56	64	63
25	109	64	84	e72	e72	77	130	90	61	57	61	62
26	80	66	68	68	e70	90	116	89	58	63	62	61
27	85	65	e68	e66	e68	91	125	77	58	61	62	65
28	75	69	e68	e66	66	117	114	76	56	58	60	68
29	80	68	e68	67	---	157	110	79	55	54	60	61
30	124	80	e68	e68	---	146	113	83	56	54	62	75
31	112	---	69	e70	---	118	---	78	---	54	101	---
TOTAL	2549	2322	2429	2458	2098	2676	4256	3267	1928	2010	2161	2156
MEAN	82.2	77.4	78.4	79.3	74.9	86.3	142	105	64.3	64.8	69.7	71.9
MAX	139	96	134	192	98	157	299	248	81	129	128	130
MIN	61	64	64	61	64	70	100	76	55	54	52	60
CFSM	1.43	1.34	1.36	1.37	1.30	1.50	2.46	1.83	1.11	1.12	1.21	1.25
IN.	1.64	1.50	1.57	1.58	1.35	1.73	2.74	2.11	1.24	1.30	1.39	1.35

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1951 - 1997, BY WATER YEAR (WY)

	MEAN	78.4	82.9	76.7	71.2	70.5	88.7	120	87.9	71.3	65.9	64.5	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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1951 - 1997
ANNUAL TOTAL	31099	30310	
ANNUAL MEAN	85.0	83.0	79.3
HIGHEST ANNUAL MEAN			90.7
LOWEST ANNUAL MEAN			62.3
HIGHEST DAILY MEAN	266	299	829
LOWEST DAILY MEAN	54	52	24
ANNUAL SEVEN-DAY MINIMUM	56	54	38
INSTANTANEOUS PEAK FLOW		393	(a)1500
INSTANTANEOUS PEAK STAGE		4.35	(b)6.49
INSTANTANEOUS LOW FLOW		17	(c)8.4
ANNUAL RUNOFF (CFSM)	1.47	1.44	1.37
ANNUAL RUNOFF (INCHES)	20.05	19.54	18.67
10 PERCENT EXCEEDS	116	120	110
50 PERCENT EXCEEDS	77	73	71
90 PERCENT EXCEEDS	64	61	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) 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 0407000 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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	375	447	284	224	262	289	656	652	292	203	154	231
2	320	472	405	295	262	300	611	876	297	221	153	262
3	264	472	424	294	265	357	720	904	299	248	148	273
4	280	460	452	306	278	386	886	804	241	296	148	215
5	243	403	434	408	285	408	978	700	236	246	148	190
6	199	385	377	394	286	369	1270	532	227	246	148	169
7	303	403	317	456	270	321	1460	490	226	205	148	166
8	259	390	295	466	259	309	1400	465	226	215	148	188
9	241	293	362	425	272	291	1130	465	226	258	125	189
10	243	255	279	343	259	319	1100	444	211	367	137	189
11	243	378	262	280	243	324	826	417	193	349	182	218
12	243	284	311	278	244	324	671	417	182	269	216	276
13	243	243	326	317	256	297	625	380	183	210	215	376
14	222	243	279	344	255	259	550	350	216	208	184	356
15	224	243	285	344	215	144	600	428	224	195	222	306
16	189	216	314	329	229	190	630	432	221	175	267	286
17	191	273	341	302	246	315	597	376	219	179	301	267
18	346	344	338	199	240	323	628	419	166	179	275	244
19	353	284	227	206	272	312	658	456	171	180	215	291
20	353	273	179	236	321	311	537	437	212	181	205	273
21	350	284	184	325	368	310	557	399	205	141	210	241
22	317	264	216	335	361	275	544	338	182	166	218	207
23	303	233	327	313	315	270	527	352	205	181	229	217
24	413	223	342	352	309	284	527	297	217	164	243	212
25	493	238	306	374	309	285	527	324	191	142	243	184
26	520	238	224	333	299	294	492	342	162	171	211	200
27	466	238	189	314	292	347	500	323	168	182	205	198
28	466	238	233	310	300	382	483	341	168	182	170	198
29	417	238	295	292	---	518	462	336	167	166	159	188
30	419	238	341	278	---	621	446	282	167	140	173	186
31	438	---	282	266	---	592	---	281	---	140	205	---
TOTAL	9936	9193	9430	9938	7772	10326	21598	14059	6300	6405	6005	6996
MEAN	321	306	304	321	278	333	720	454	210	207	194	233
MAX	520	472	452	466	368	621	1460	904	299	367	301	376
MIN	189	216	179	199	215	144	446	281	162	140	125	166
CFSM	1.03	.99	.98	1.03	.89	1.07	2.31	1.46	.68	.66	.62	.75
IN.	1.19	1.10	1.13	1.19	.93	1.24	2.58	1.68	.75	.77	.72	.84

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 1997, BY WATER YEAR (WY)

	MEAN	245	271	250	222	218	339	544	350	249	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	117	
(WY)	1957	1950	1990	1948	1948	1956	1987	1987	1958	1966	1949	1949	

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1943 - 1997

ANNUAL TOTAL	111914	117958	274
ANNUAL MEAN	306	323	350
HIGHEST ANNUAL MEAN			188
LOWEST ANNUAL MEAN			1860
HIGHEST DAILY MEAN	826	Apr 23	1460
LOWEST DAILY MEAN	132	Sep 6	125
ANNUAL SEVEN-DAY MINIMUM	141	Sep 5	143
INSTANTANEOUS PEAK FLOW			1470
INSTANTANEOUS PEAK STAGE			5.56
INSTANTANEOUS LOW FLOW			3.9
ANNUAL RUNOFF (CFSM)	.98		1.04
ANNUAL RUNOFF (INCHES)	13.39		14.11
10 PERCENT EXCEEDS	462		496
50 PERCENT EXCEEDS	274		282
90 PERCENT EXCEEDS	188		181
			145
			7.13
			.60
			.88
			11.99
			470
			229
			145
			1860
			Apr 17 1960
			Nov 27 1949
			Ju 28 1949
			Apr 17 1960
			Apr 17 1960
			Mar 11 1950

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, 6.94 ft, Apr. 9, 10; minimum observed, 5.52 ft, Feb. 19.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY INSTANTANEOUS VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.08	5.94	5.62	5.72	5.74	5.90	6.30	6.60	6.40	6.10	6.02	6.04
2	6.08	5.94	5.68	5.72	5.72	5.92	6.30	6.60	6.36	6.10	6.02	6.06
3	6.04	5.90	5.70	5.74	5.72	5.94	6.32	6.58	6.32	6.10	6.00	6.06
4	6.04	5.88	5.70	5.74	5.70	5.96	6.38	6.58	6.32	6.10	5.98	6.06
5	6.02	5.88	5.74	5.78	5.70	5.96	6.50	6.58	6.36	6.08	5.96	6.04
6	6.02	5.86	5.76	5.82	5.70	5.96	6.62	6.48	6.32	6.08	5.96	6.04
7	5.92	5.86	5.78	5.82	5.68	5.96	6.70	6.52	6.32	6.08	5.96	6.02
8	5.92	5.86	5.80	5.82	5.68	5.98	6.76	6.52	6.30	6.08	5.94	6.02
9	5.92	5.84	5.80	5.82	5.66	5.96	6.94	6.48	6.28	6.08	5.92	6.02
10	5.92	5.84	5.82	5.82	5.66	5.94	6.94	6.50	6.26	6.08	5.92	6.04
11	5.90	5.82	5.82	5.84	5.64	5.94	6.90	6.50	6.24	6.08	5.90	6.10
12	5.90	5.80	5.82	5.86	5.64	5.94	6.86	6.52	6.24	6.06	5.90	6.12
13	5.90	5.80	5.82	5.86	5.62	5.92	6.86	6.48	6.22	6.06	5.98	6.18
14	5.88	5.78	5.80	5.86	5.62	5.92	6.82	6.46	6.20	6.06	5.98	6.18
15	5.88	5.76	5.80	5.88	5.60	5.92	6.80	6.46	6.16	6.04	5.98	6.18
16	5.86	5.76	5.80	5.88	5.54	5.90	6.80	6.48	6.16	6.04	6.00	6.20
17	5.86	5.74	5.80	5.86	5.54	5.90	6.78	6.48	6.16	6.02	6.00	6.20
18	5.86	5.70	5.82	5.82	5.54	5.88	6.78	6.60	6.16	6.00	6.02	6.22
19	5.84	5.70	5.82	5.80	5.52	5.88	6.74	6.64	6.16	6.00	6.04	6.22
20	5.82	5.70	5.82	5.76	5.54	5.88	6.74	6.54	6.18	6.02	6.04	6.26
21	5.82	5.68	5.84	5.74	5.56	5.88	6.72	6.54	6.18	6.02	6.04	6.26
22	5.82	5.68	5.82	5.72	5.56	5.90	6.70	6.54	6.20	6.02	6.04	6.30
23	5.84	5.66	5.80	5.72	5.60	5.90	6.68	6.54	6.20	6.00	6.06	6.30
24	5.84	5.66	5.80	5.72	5.64	5.88	6.68	6.54	6.18	6.00	6.06	6.30
25	5.84	5.64	---	5.74	5.70	5.88	6.64	6.54	6.18	5.98	6.08	6.26
26	5.84	5.62	5.78	5.74	5.76	5.88	6.62	6.54	6.18	5.98	6.06	6.30
27	5.86	5.60	5.76	5.74	5.80	5.88	6.62	6.54	6.14	5.98	6.06	6.30
28	5.86	5.60	5.74	5.74	5.84	5.88	6.62	6.50	6.14	5.98	6.04	6.24
29	5.88	5.60	5.72	5.74	---	5.86	6.62	6.50	6.10	6.00	6.04	6.24
30	5.90	5.60	5.72	5.77	---	5.86	6.62	6.46	6.10	6.00	6.04	6.24
31	5.92	---	5.70	5.76	---	5.86	---	6.42	---	6.00	6.04	---
MEAN	5.91	5.76	---	5.79	5.65	5.91	6.68	6.52	6.22	6.04	6.00	6.17
MAX	6.08	5.94	---	5.88	5.84	5.98	6.94	6.64	6.40	6.10	6.08	6.30
MIN	5.82	5.60	---	5.72	5.52	5.86	6.30	6.42	6.10	5.98	5.90	6.02

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 fair. Occasional regulation by dams upstream from station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	205	260	231	211	218	279	467	386	290	143	126	127
2	197	263	292	210	215	291	487	409	283	146	123	127
3	188	260	293	212	214	295	517	412	274	147	123	127
4	182	253	287	223	214	297	570	402	264	145	124	124
5	178	244	295	261	215	300	700	388	254	147	124	121
6	178	239	289	286	213	302	801	389	247	146	123	118
7	178	236	272	284	213	e280	932	373	239	139	121	118
8	178	235	258	e260	213	e290	918	371	213	138	120	118
9	178	233	249	e250	e190	292	912	391	196	155	118	118
10	178	230	242	e240	e200	285	910	378	191	164	118	119
11	178	225	237	e240	215	282	804	364	187	154	119	134
12	177	218	233	e240	206	272	592	357	e185	145	122	164
13	174	211	232	e235	e180	271	561	349	e180	139	133	178
14	170	196	231	e230	e190	271	542	340	e180	137	140	174
15	168	e180	235	e220	e195	e250	529	382	e175	136	141	154
16	166	198	243	e210	195	e250	530	425	e175	134	149	151
17	166	204	245	e190	197	253	530	447	e170	134	156	148
18	182	212	243	e180	202	246	513	463	e170	134	156	151
19	192	210	e210	e200	210	244	492	467	e170	137	151	157
20	193	208	e180	e220	224	259	469	450	e164	138	145	175
21	196	203	e190	222	245	260	453	428	168	139	150	191
22	194	199	216	222	278	277	441	405	177	140	159	208
23	200	198	221	256	290	287	429	383	176	140	163	201
24	225	194	246	280	e270	275	422	362	168	139	156	175
25	232	187	244	262	e260	307	411	350	169	136	147	163
26	234	189	e210	e240	290	303	394	335	169	135	144	162
27	231	177	e180	e230	287	307	379	321	160	134	138	164
28	225	177	e220	e220	282	353	364	312	152	134	131	163
29	214	184	219	e220	---	408	352	304	149	134	128	163
30	244	188	216	e220	---	456	344	300	146	131	127	169
31	260	---	213	e215	---	466	---	296	---	128	126	---
TOTAL	6061	6411	7372	7189	6321	9208	16765	11739	5841	4348	4201	4662
MEAN	196	214	238	232	226	297	559	379	195	140	136	152
MAX	260	263	295	286	290	466	932	467	290	164	163	208
MIN	166	177	180	180	180	244	344	296	146	128	118	118
CFSM	.49	.53	.59	.58	.56	.74	1.39	.94	.49	.35	.34	.38
IN.	.56	.59	.68	.67	.59	.85	1.56	1.09	.54	.40	.39	.42

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 1997, BY WATER YEAR (WY)

	MEAN	214	242	237	200	187	263	406	290	211	168	152	177
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1967 - 1997

ANNUAL TOTAL	86889	90018	
ANNUAL MEAN	237	247	229
HIGHEST ANNUAL MEAN			280
LOWEST ANNUAL MEAN			158
HIGHEST DAILY MEAN	557	Jun 21	932
LOWEST DAILY MEAN	129	Sep 6	118
ANNUAL SEVEN-DAY MINIMUM	131	Sep 2	119
INSTANTANEOUS PEAK FLOW			940
INSTANTANEOUS PEAK STAGE			6.87
INSTANTANEOUS LOW FLOW			Apr 7
ANNUAL RUNOFF (CFSM)	.59	.62	(c)7.75
ANNUAL RUNOFF (INCHES)	8.06	8.35	(d)7.8
10 PERCENT EXCEEDS	348	406	358
50 PERCENT EXCEEDS	210	214	202
90 PERCENT EXCEEDS	160	135	135

(a) Aug. 9, 10, Sept. 6-9.

(b) Gage height 7.30.

(c) Backwater from ice.

(d) Result of freezeup.

(e) Estimated.

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, 3.84 ft, May 3; minimum, 2.79 ft, Aug. 9.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SF ²
1	3.15	3.28	3.41	3.67	3.78	3.73	3.64	3.77	3.62	3.16	2.90	2.94
2	3.17	3.30	3.43	3.67	3.78	3.73	3.64	3.75	3.61	3.15	2.89	2.94
3	3.15	3.28	3.43	3.67	3.77	3.72	3.63	3.78	3.59	3.16	2.89	2.94
4	3.14	3.28	3.44	3.70	3.77	3.71	3.64	3.76	3.57	3.18	2.91	2.91
5	3.12	3.29	3.45	3.77	3.78	3.70	3.65	3.74	3.55	3.15	2.89	2.89
6	3.11	3.28	3.47	3.79	3.77	3.69	3.68	3.77	3.53	3.13	2.86	2.87
7	3.15	3.31	3.49	3.80	3.76	3.69	3.70	3.74	3.51	3.11	2.84	2.88
8	3.14	3.31	3.49	3.79	3.76	3.69	3.71	3.72	3.50	3.17	2.83	2.88
9	3.13	3.31	3.50	3.79	3.74	3.69	3.70	3.75	3.49	3.21	2.81	2.87
10	3.14	3.32	3.51	3.79	3.73	3.69	3.70	3.74	3.47	3.20	2.86	2.87
11	3.10	3.34	3.51	3.79	3.72	3.69	3.69	3.71	3.45	3.19	2.88	2.90
12	3.09	3.34	3.51	3.78	3.72	3.68	3.69	3.72	3.44	3.18	2.88	2.93
13	3.10	3.35	3.53	3.78	3.71	3.67	3.71	3.73	3.44	3.17	2.91	2.93
14	3.10	3.36	3.53	3.76	3.70	3.70	3.70	3.72	3.41	3.16	2.89	2.93
15	3.08	3.35	3.53	3.76	3.70	3.70	3.70	3.78	3.35	3.15	2.92	2.93
16	3.09	3.35	3.53	3.78	3.70	3.71	3.70	3.77	3.35	3.13	2.97	2.92
17	3.11	3.35	3.54	3.79	3.69	3.69	3.70	3.77	3.34	3.12	2.97	2.93
18	3.17	3.35	3.55	3.80	3.67	3.69	3.69	3.76	3.33	3.12	2.97	2.93
19	3.18	3.36	3.55	3.78	3.67	3.67	3.68	3.78	3.30	3.09	2.95	2.93
20	3.17	3.36	3.55	3.78	3.66	3.66	3.68	3.77	3.29	3.06	2.95	2.95
21	3.16	3.36	3.55	3.77	3.70	3.66	3.67	3.77	3.29	3.06	2.99	2.95
22	3.15	3.35	3.55	3.79	3.73	3.66	3.67	3.75	3.29	3.05	2.99	2.93
23	3.19	3.37	3.57	3.79	3.72	3.64	3.67	3.73	3.26	3.03	2.97	2.92
24	3.23	3.37	3.61	3.78	3.71	3.63	3.67	3.73	3.24	3.02	2.96	2.91
25	3.23	3.37	3.62	3.81	3.70	3.65	3.68	3.74	3.24	3.01	2.94	2.89
26	3.23	3.37	3.63	3.81	3.69	3.66	3.67	3.72	3.24	3.01	2.94	2.89
27	3.23	3.36	3.63	3.80	3.72	3.65	3.66	3.69	3.21	3.00	2.94	2.88
28	3.24	3.36	3.63	3.80	3.73	3.64	3.66	3.67	3.19	3.00	2.94	2.87
29	3.21	3.37	3.64	3.80	---	3.66	3.64	3.65	3.17	2.97	2.93	2.87
30	3.28	3.37	3.64	3.80	---	3.66	3.67	3.64	3.16	2.95	2.91	2.87
31	3.27	---	3.66	3.79	---	3.66	---	3.64	---	2.93	2.94	---
MEAN	3.16	3.34	3.54	3.77	3.72	3.68	3.68	3.73	3.38	3.10	2.92	2.91
MAX	3.28	3.37	3.66	3.81	3.78	3.73	3.71	3.78	3.62	3.21	2.99	2.95
MIN	3.08	3.28	3.41	3.67	3.66	3.63	3.63	3.64	3.16	2.93	2.81	2.87

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 Parrvalee Bridge Campground, on County Road 489, 4.5 mi northwest of Luzerne, 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 current year. Prior to October 1914, published as "near Lovells".

REVISED RECORDS.--WDR MI-96-1: Drainage area.

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	792	918	850	770	e840	919	1350	1440	1060	664	597	682
2	764	878	1110	764	e860	961	1440	1590	1030	708	601	677
3	730	853	1020	771	e840	959	1620	1540	989	762	631	657
4	710	832	949	801	e820	945	1820	1430	951	721	683	641
5	698	825	913	1080	e800	931	2090	1330	922	703	661	632
6	691	814	902	1100	800	920	2560	1370	898	698	640	634
7	693	815	881	1010	794	e820	2920	1300	888	675	630	632
8	691	812	853	e940	779	e860	2640	1240	852	769	614	640
9	690	801	831	e880	755	897	2270	1300	806	1000	603	639
10	688	783	815	e860	838	897	2010	1270	781	892	615	654
11	681	778	800	e860	796	886	1840	1220	763	799	656	803
12	677	765	794	e860	767	865	1800	1200	762	731	684	862
13	671	753	807	e850	e600	845	1740	1190	760	698	784	817
14	665	732	802	e850	e720	864	1720	1170	743	680	732	766
15	658	718	810	e840	e730	819	1700	1310	729	669	743	720
16	655	732	838	807	e730	848	1810	1460	738	e655	888	708
17	668	756	832	e700	e730	867	1810	1460	760	e655	828	724
18	780	779	819	e740	e760	840	1730	1430	738	e655	781	722
19	807	772	737	e770	825	811	1650	1460	722	653	730	736
20	779	755	e680	e800	837	831	1580	1400	722	650	710	795
21	755	740	e720	e820	939	845	1540	1320	735	679	820	781
22	741	731	817	e880	993	892	1520	1270	751	675	826	775
23	781	735	770	e960	e900	900	1500	1230	731	658	781	757
24	901	725	889	e900	e820	879	1470	1180	721	639	731	717
25	895	713	867	e980	e860	912	1430	1160	733	628	698	697
26	852	704	e760	e880	946	956	1380	1140	715	639	685	686
27	819	692	e700	e860	935	965	1330	1110	691	639	677	683
28	786	681	e740	e840	887	1090	1280	1090	681	628	660	689
29	762	694	803	e800	---	1300	1240	1080	661	623	655	696
30	875	697	774	e760	---	1460	1200	1080	657	617	653	721
31	964	---	763	e820	---	1390	---	1080	---	605	671	---
TOTAL	23319	22983	25646	26553	22901	29174	51990	39850	23690	21467	21668	21343
MEAN	752	766	827	857	818	941	1733	1285	790	692	699	711
MAX	964	918	1110	1100	993	1460	2920	1590	1060	1000	888	862
MIN	655	681	680	700	600	811	1200	1080	657	605	597	632
CFSM	.68	.69	.75	.77	.74	.85	1.56	1.16	.71	.62	.63	.64
IN.	.78	.77	.86	.89	.77	.98	1.75	1.34	.80	.72	.73	.72

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 1997, BY WATER YEAR (WY)

	MEAN	818	907	907	803	764	935	1456	1226	957	774	755	780
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 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1909 - 1997

ANNUAL TOTAL	310463						330584						
ANNUAL MEAN	848						906						
HIGHEST ANNUAL MEAN										924			
LOWEST ANNUAL MEAN										1207			1912
HIGHEST DAILY MEAN										803			1910
LOWEST DAILY MEAN										2920			Apr 7 1997
ANNUAL SEVEN-DAY MINIMUM	1890					Apr 21	2920		Apr 7				
INSTANTANEOUS PEAK FLOW	500					Jan 3	597		Aug 1	(e)500			Jan 3 1996
ANNUAL SEVEN-DAY MINIMUM	606					Sep 2	615		Jul 28	572			Aug 5 1914
INSTANTANEOUS PEAK STAGE							2980		Apr 7	(a)2980			Apr 7 1997
INSTANTANEOUS LOW FLOW							6.39		Apr 7	(b)6.85			Jan 26 1996
ANNUAL RUNOFF (CFSM)	.77						590		(c)				
ANNUAL RUNOFF (INCHES)	10.42						.82			.83			
10 PERCENT EXCEEDS	1110						11.10			11.33			
50 PERCENT EXCEEDS	796						1370			1370			
90 PERCENT EXCEEDS	659						801			821			
							658			635			

(a) Does not include water years 1909 to 1916, 1931.

(b) Backwater from ice; does not include water years 1909 to 1916, 1931.

(c) Aug. 1, 2, 3, 10.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04136000 AU SABLE RIVER NEAR RED OAK, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: July 1996 to current year.

DISSOLVED OXYGEN: July 1996 to current year.

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, 23.0°C, July 15, 1997, but may have been higher during instrument malfunction July 16-18, 1997; minimum, -0.5°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 14.3 mg/L, Dec. 31, 1996; minimum, 7.0 mg/L, Aug. 7, 8, 1996.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum recorded, 23.0°C, July 15, but may have been higher during instrument malfunction July 16-18; minimum, -0.5°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 14.3 mg/L, Dec. 31; minimum, 7.2 mg/L, July 28, but may have been lower during instrument malfunction July 11-24.

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

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

STREAMS TRIBUTARY TO LAKE HURON

04136000 AU SABLE RIVER NEAR RED OAK, MI--Continued

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

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			MEAN
1	16.5	14.0	15.0	20.5	19.5	20.0	19.0	17.0	17.5	16.5	14.5	15.0
2	17.5	14.5	16.0	20.5	18.5	19.5	20.0	16.0	18.0	17.0	15.5	16.0
3	17.5	15.5	16.5	20.0	16.0	18.0	19.5	17.0	18.0	16.0	14.0	15.0
4	17.5	15.5	16.0	16.0	14.0	15.0	18.0	16.0	17.0	14.5	12.0	13.5
5	16.5	15.0	16.0	17.5	14.0	16.0	17.5	16.0	17.0	13.5	12.0	12.5
6	17.0	15.0	16.0	17.0	16.0	16.5	17.5	15.5	16.5	15.5	12.5	14.0
7	17.5	15.0	16.0	16.5	14.5	15.5	18.0	15.5	16.5	15.5	13.5	14.5
8	18.0	15.5	16.5	16.5	13.5	15.0	18.5	16.5	17.5	14.5	13.0	13.5
9	18.5	16.0	17.0	16.0	12.5	14.0	18.5	16.5	17.5	14.5	13.5	14.0
10	19.0	16.5	18.0	18.0	14.5	16.0	18.0	17.5	18.0	14.5	13.5	13.5
11	19.0	17.5	18.5	19.5	16.5	18.0	17.5	15.5	16.0	13.5	13.0	13.0
12	19.0	17.0	18.0	20.5	17.5	19.0	16.0	13.0	14.0	13.5	13.0	13.0
13	18.5	16.5	17.5	21.5	19.0	20.0	16.0	13.0	14.5	15.0	13.0	13.5
14	18.0	16.0	17.0	22.5	20.5	21.5	15.5	14.0	14.5	15.0	14.0	14.5
15	17.5	15.0	16.5	23.0	21.0	22.0	15.5	14.5	15.0	16.0	13.5	14.5
16	17.0	16.0	16.5	---	---	---	16.5	15.0	15.5	15.5	14.5	15.0
17	17.5	14.5	16.0	---	---	---	16.5	13.5	15.0	17.0	15.0	16.0
18	17.0	15.0	16.0	---	---	---	15.0	12.0	13.5	16.5	14.0	15.5
19	17.0	15.5	16.5	21.0	18.5	19.5	16.0	13.5	15.0	15.5	15.0	15.5
20	19.0	15.5	17.0	19.0	15.5	17.0	15.5	13.5	14.5	15.0	13.5	14.5
21	19.0	17.0	17.5	17.0	15.0	16.0	13.5	13.0	13.0	13.5	11.0	12.0
22	19.5	16.0	17.5	17.5	15.0	16.0	15.0	13.0	14.0	12.0	10.5	11.0
23	19.0	17.5	18.5	18.5	15.5	17.0	15.5	13.0	14.5	13.0	12.0	12.5
24	22.0	18.5	20.0	19.0	16.5	18.0	15.0	14.5	15.0	12.0	10.0	10.5
25	22.5	20.5	21.5	19.0	17.0	18.0	16.5	14.0	15.0	12.5	10.5	11.5
26	22.0	19.5	20.5	21.0	18.5	19.5	16.0	15.0	15.5	12.5	11.0	12.0
27	21.0	18.5	19.5	22.0	19.0	20.5	18.0	15.0	16.5	12.0	11.0	11.5
28	21.5	18.5	20.0	22.0	20.5	21.5	17.5	15.0	16.0	12.0	11.0	11.5
29	21.0	19.0	20.0	20.5	17.5	18.5	15.0	14.5	14.5	12.5	11.5	12.0
30	21.0	19.5	20.5	18.5	16.5	17.5	15.5	13.5	14.5	12.5	11.0	12.0
31	---	---	---	19.5	16.5	18.0	15.5	15.0	15.0	---	---	---
MONTH	22.5	14.0	17.5	---	---	---	20.0	12.0	15.5	17.0	10.0	13.5

STREAMS TRIBUTARY TO LAKE HURON

04136000 AU SABLE RIVER NEAR RED OAK, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	10.9	10.0	10.4	12.5	11.7	12.1	11.9	11.5	11.7	14.1	13.5	13.8			
2	10.3	9.1	9.7	12.7	11.9	12.3	12.7	11.9	12.3	13.5	12.7	13.1			
3	11.8	10.0	10.9	12.6	12.0	12.3	13.0	12.6	12.8	12.7	12.4	12.6			
4	12.3	10.9	11.5	12.6	11.9	12.2	13.1	12.7	12.9	12.8	12.5	12.6			
5	11.9	10.8	11.3	12.0	11.4	11.7	13.0	12.7	12.9	12.6	12.4	12.5			
6	11.5	10.3	10.9	11.6	11.0	11.3	12.9	12.6	12.8	13.6	12.6	13.2			
7	10.7	9.4	10.0	11.0	10.2	10.5	12.9	12.5	12.7	13.9	12.7	13.7			
8	11.5	10.2	10.7	11.7	10.6	11.1	12.9	12.4	12.7	14.0	12.5	13.5			
9	12.1	10.7	11.3	12.1	11.3	11.7	13.1	12.6	12.8	13.3	12.4	12.8			
10	11.7	10.5	11.1	12.7	11.7	12.2	13.0	12.7	12.8	12.9	12.3	12.6			
11	12.4	11.0	11.6	13.0	12.2	12.6	13.1	12.7	12.9	13.2	12.1	12.7			
12	11.8	10.8	11.3	13.5	12.7	13.1	12.9	12.6	12.7	13.3	12.6	13.0			
13	11.5	10.2	10.8	13.6	13.0	13.3	13.2	12.6	12.9	13.3	12.8	13.1			
14	11.5	9.9	10.7	13.8	13.1	13.5	13.0	12.6	12.8	13.5	12.8	13.2			
15	11.7	10.4	11.0	14.0	13.6	13.8	12.7	12.4	12.6	13.2	12.4	12.8			
16	11.4	10.3	10.8	13.7	12.7	13.2	12.9	12.3	12.5	13.0	12.3	12.7			
17	10.7	9.8	10.2	12.7	11.8	12.2	13.1	12.7	12.9	13.1	11.7	12.7			
18	10.2	9.3	9.8	12.7	11.7	12.2	13.4	12.7	13.0	12.4	11.9	12.1			
19	11.2	9.9	10.5	12.8	12.1	12.4	14.1	13.3	13.7	12.6	11.7	11.9			
20	11.1	10.2	10.6	13.1	12.3	12.7	14.0	13.7	13.9	12.7	11.7	12.2			
21	10.7	9.9	10.3	13.1	12.5	12.8	13.9	13.7	13.8	13.3	12.2	12.6			
22	10.9	10.0	10.4	13.0	12.5	12.7	13.8	13.3	13.5	13.3	11.8	12.3			
23	10.5	10.0	10.2	12.7	12.2	12.4	13.3	12.8	13.1	13.8	11.9	12.6			
24	10.8	10.1	10.4	13.4	12.6	13.0	13.3	12.4	12.8	13.8	13.5	13.7			
25	11.4	10.4	10.8	13.3	12.8	13.0	14.1	13.3	13.7	13.5	13.0	13.2			
26	11.5	10.5	11.0	13.5	12.7	13.1	14.0	13.8	13.9	13.8	13.4	13.5			
27	10.9	10.0	10.4	13.9	13.2	13.5	14.0	13.5	13.8	13.8	13.3	13.5			
28	11.0	9.7	10.3	13.5	13.1	13.3	13.8	13.2	13.4	13.5	13.1	13.2			
29	11.6	10.4	11.0	13.3	12.7	13.1	13.2	13.0	13.1	13.5	13.2	13.3			
30	11.0	10.3	10.5	12.7	11.9	12.2	13.9	13.1	13.6	13.4	12.9	13.1			
31	12.1	10.6	11.4	---	---	---	14.3	13.8	14.0	13.0	12.5	12.6			
MONTH	12.4	9.1	10.7	14.0	10.2	12.5	14.3	11.5	13.1	14.1	11.7	12.9			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	12.6	12.3	12.4	13.2	12.4	12.7	12.6	11.9	12.3	11.1	10.4	11.7	
2	12.6	12.3	12.4	12.8	12.2	12.5	12.3	11.6	11.9	11.8	11.0	11.4	
3	12.9	12.4	12.6	13.4	12.7	13.1	11.6	11.2	11.5	11.4	10.9	11.2	
4	12.9	12.7	12.8	13.1	12.6	12.8	11.7	11.2	11.5	11.7	11.0	11.3	
5	13.3	12.8	13.0	12.6	12.2	12.4	11.4	11.1	11.3	11.3	10.7	11.0	
6	13.3	13.0	13.1	13.1	12.4	12.7	11.1	10.8	11.0	11.8	11.0	11.3	
7	13.4	13.1	13.2	13.8	12.9	13.4	12.0	10.8	11.5	11.8	11.0	11.4	
8	13.6	13.1	13.4	13.5	13.0	13.3	12.3	12.0	12.2	11.1	10.3	11.7	
9	13.8	13.4	13.6	13.3	12.8	13.0	12.6	12.1	12.4	11.4	10.8	11.1	
10	13.8	13.5	13.6	12.9	12.3	12.7	12.2	11.4	12.0	12.0	11.3	11.6	
11	13.6	13.2	13.3	12.8	12.0	12.4	12.0	11.3	11.7	11.7	10.9	11.3	
12	13.6	12.9	13.2	13.3	12.2	12.8	11.6	11.2	11.4	11.7	10.9	11.3	
13	14.0	13.4	13.8	13.7	12.8	13.2	12.0	11.3	11.8	12.0	11.4	11.7	
14	13.9	13.3	13.5	13.5	13.0	13.2	11.9	11.1	11.5	12.0	11.4	11.7	
15	13.6	13.2	13.4	13.7	13.1	13.4	11.5	10.8	11.2	11.9	11.2	11.5	
16	14.0	12.2	13.5	13.6	13.2	13.5	11.1	10.6	10.8	12.3	11.5	11.9	
17	13.9	12.2	13.2	13.3	12.7	13.0	11.6	11.1	11.3	12.0	11.4	11.7	
18	13.7	12.5	13.2	13.4	12.4	12.9	11.7	10.9	11.3	11.8	11.1	11.4	
19	12.6	12.0	12.3	13.5	12.6	13.0	11.5	10.8	11.2	11.3	10.6	11.0	
20	13.3	12.6	13.0	12.9	12.0	12.5	11.4	10.6	11.0	11.9	11.0	11.4	
21	12.9	12.3	12.5	12.1	11.4	11.7	11.2	10.6	10.9	11.9	11.2	11.6	
22	13.6	12.9	13.4	12.4	11.2	11.8	11.3	11.0	11.1	11.8	10.9	11.3	
23	13.7	12.4	13.2	12.7	11.8	12.2	11.3	10.7	11.0	11.3	10.4	10.8	
24	14.0	12.9	13.5	13.3	12.0	12.7	11.3	10.6	11.0	11.0	10.0	10.5	
25	13.9	13.3	13.6	12.5	11.9	12.2	11.4	10.7	11.0	11.1	10.2	10.6	
26	13.3	12.8	13.1	12.8	12.1	12.5	11.7	10.8	11.2	11.4	10.3	10.8	
27	13.4	12.4	12.8	12.2	11.2	11.8	11.1	10.4	10.8	11.6	10.1	10.8	
28	13.6	13.2	13.4	11.4	10.8	11.1	11.3	10.6	10.9	11.6	10.0	10.8	
29	---	---	---	11.4	10.8	11.1	11.1	10.4	10.8	10.9	9.9	10.4	
30	---	---	---	12.2	11.3	11.7	10.9	10.1	10.5	11.1	10.3	10.7	
31	---	---	---	12.7	12.0	12.3	---	---	---	11.5	10.5	11.0	
MONTH	14.0	12.0	13.1	13.8	10.8	12.6	12.6	10.1	11.3	12.3	9.9	11.2	

STREAMS TRIBUTARY TO LAKE HURON

04136000 AU SABLE RIVER NEAR RED OAK, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	11.1	9.8	10.4	9.4	7.8	8.6	9.7	7.9	8.8	10.4	8.8	9.5
2	11.1	9.5	10.3	9.4	7.9	8.5	9.9	8.4	9.1	10.3	8.6	9.4
3	10.5	9.1	9.9	8.9	7.3	8.1	9.2	7.7	8.5	10.7	8.8	9.7
4	10.7	9.1	9.9	10.3	8.5	9.3	9.9	8.3	9.0	11.0	9.2	10.0
5	10.7	9.1	9.9	10.2	8.7	9.4	10.0	8.3	9.1	10.7	9.2	9.9
6	10.4	9.0	9.7	9.9	8.1	9.0	10.1	8.4	9.2	10.5	9.2	9.8
7	10.8	9.3	10.0	10.3	8.5	9.4	10.3	8.5	9.3	9.8	8.6	9.2
8	10.2	8.9	9.6	9.2	8.2	8.7	10.0	8.2	9.1	10.7	9.2	9.9
9	10.3	8.8	9.5	9.8	8.9	9.2	10.1	8.1	9.1	10.5	9.0	9.8
10	10.1	8.6	9.3	9.6	8.3	8.9	9.2	8.0	8.6	9.6	8.9	9.3
11	10.1	8.4	9.3	---	---	---	10.2	8.3	9.2	9.7	9.1	9.4
12	10.0	8.5	9.1	---	---	---	9.6	8.7	9.2	9.9	9.1	9.5
13	10.2	8.4	9.4	---	---	---	10.2	9.0	9.5	10.4	9.2	9.8
14	10.4	8.5	9.4	---	---	---	10.3	8.6	9.4	10.4	9.0	9.6
15	10.4	8.8	9.5	---	---	---	9.5	8.7	9.1	10.6	9.0	9.7
16	9.6	8.4	9.0	---	---	---	9.6	8.5	9.0	10.7	8.7	9.6
17	10.2	8.7	9.5	---	---	---	9.8	8.6	9.2	10.1	8.6	9.3
18	10.4	8.5	9.4	---	---	---	10.8	9.3	10.0	10.6	8.7	9.6
19	9.9	8.6	9.2	---	---	---	10.6	9.0	9.8	9.6	8.5	9.1
20	9.7	8.4	9.0	---	---	---	9.7	8.7	9.2	10.4	8.9	9.6
21	9.0	7.8	8.4	---	---	---	10.1	9.2	9.6	11.3	9.7	10.4
22	10.1	8.5	9.1	---	---	---	10.5	9.3	9.8	11.4	10.0	10.6
23	9.9	8.2	9.0	---	---	---	10.6	9.2	9.8	10.7	9.5	10.2
24	9.8	8.2	8.9	---	---	---	10.5	8.8	9.6	11.5	9.8	10.5
25	9.6	7.8	8.7	9.7	7.9	8.7	10.5	9.0	9.7	10.7	9.6	10.1
26	10.1	8.0	9.0	9.3	7.5	8.3	10.3	8.7	9.5	11.1	9.5	10.2
27	10.0	8.4	9.2	9.4	7.4	8.4	10.3	8.8	9.5	11.2	9.4	10.3
28	9.8	7.9	8.9	9.4	7.2	8.3	10.1	8.4	9.2	10.6	9.6	10.1
29	9.6	7.9	8.7	9.8	7.7	8.7	10.2	9.0	9.5	10.4	9.2	9.8
30	9.5	7.6	8.5	10.0	8.3	9.2	10.5	9.0	9.6	10.3	9.1	9.7
31	---	---	---	10.2	8.3	9.2	9.8	8.6	9.2	---	---	---
MONTH	11.1	7.6	9.3	---	---	---	10.8	7.7	9.3	11.5	8.5	9.8

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.

WATER-DISCHARGE RECORDS

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

REVISED RECORDS.--WDR MI-96-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 929.60 ft above sea level.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Flow regulated by Mio Dam 500 ft upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	961	1120	1090	958	1060	1080	1560	1610	1200	835	733	790
2	955	1030	1420	1000	1060	1130	1720	1800	1160	929	730	800
3	930	1030	1240	983	1050	1160	2080	1760	1130	978	749	775
4	872	1030	1120	1040	1040	1150	2440	1590	1120	901	896	720
5	864	1030	1140	1420	1050	1110	2610	1520	1080	886	820	712
6	874	1000	1120	1390	1020	1110	3330	1560	1060	873	775	785
7	885	990	1100	1250	984	1060	3650	1530	1040	e860	769	749
8	894	994	1070	1180	979	1070	3140	1450	1020	e980	761	757
9	874	986	1040	1060	936	1100	2610	1500	1000	1160	746	731
10	898	957	1030	1060	952	1080	2330	1490	975	1090	738	812
11	868	945	1030	1070	1010	1070	2210	1450	952	979	795	909
12	841	946	997	1060	978	1050	1990	1410	963	899	807	1050
13	861	939	997	1090	770	1030	1920	1400	1000	882	958	949
14	871	928	1010	1050	930	1050	1920	1350	982	879	903	925
15	858	870	1020	1080	1050	981	1920	1620	946	858	876	835
16	853	922	1050	1030	949	1010	2000	1670	945	820	1010	733
17	870	948	1070	740	822	1100	2040	1650	968	824	1010	833
18	964	962	1050	780	1080	1010	1940	1840	952	845	930	832
19	1030	969	931	890	1020	995	1800	1690	924	832	887	925
20	972	955	841	1030	1060	1010	1740	1620	941	820	840	939
21	931	934	921	1070	1210	1020	1740	1510	943	840	999	853
22	923	916	1050	1070	1240	1060	1720	1370	961	841	1030	877
23	975	931	1050	1220	1140	1080	1670	1390	950	831	941	871
24	1110	924	1110	1110	1050	1050	1650	1340	930	816	877	875
25	1100	912	1090	1220	1030	1090	1610	1320	944	788	812	823
26	1030	902	939	1050	1220	1120	1560	1290	912	792	794	732
27	1010	886	813	1040	1150	1140	1470	1250	861	795	819	773
28	1000	881	1090	1040	1090	1270	1450	1220	849	787	792	734
29	964	898	1140	960	---	1630	1450	1200	854	761	774	876
30	1050	911	1020	948	---	1830	1440	1220	857	760	754	814
31	1190	---	958	1050	---	1700	---	1230	---	746	809	---
TOTAL	29278	28646	32547	32939	28930	35346	60710	45650	29419	26891	26134	25026
MEAN	944	955	1050	1063	1033	1140	2024	1473	981	867	843	834
MAX	1190	1120	1420	1420	1240	1830	3650	1800	1200	1160	1030	1050
MIN	841	870	813	740	770	981	1440	1200	849	746	730	720
CFSM	.69	.70	.77	.78	.76	.84	1.49	1.08	.72	.64	.62	.61
IN.	.80	.78	.89	.90	.79	.97	1.66	1.25	.80	.74	.71	.68

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1997, BY WATER YEAR (WY)

	MEAN	951	1006	977	904	888	1099	1483	1173	997	882	835	826
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	1996	
MIN	685	738	711	697	660	733	977	723	683	655	578	621	
(WY)	1965	1964	1964	1965	1958	1956	1958	1958	1958	1958	1958	1958	1978

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1952 - 1997
ANNUAL TOTAL	379114	401516	
ANNUAL MEAN	1036	1100	1006
HIGHEST ANNUAL MEAN			1213
LOWEST ANNUAL MEAN			746
HIGHEST DAILY MEAN	2110	3650	4110
LOWEST DAILY MEAN	611	720	21
ANNUAL SEVEN-DAY MINIMUM	751	752	420
INSTANTANEOUS PEAK FLOW		3800	4380
INSTANTANEOUS PEAK STAGE		5.85	6.20
INSTANTANEOUS LOW FLOW		547	7.0
ANNUAL RUNOFF (CFSM)	.76	.81	.74
ANNUAL RUNOFF (INCHES)	10.36	10.97	10.05
10 PERCENT EXCEEDS	1330	1600	1370
50 PERCENT EXCEEDS	981	1000	934
90 PERCENT EXCEEDS	817	804	722

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04136500 AU SABLE RIVER NEAR MIO, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1952-66, 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: July 1952 to September 1966, July 1996 to current year.

DISSOLVED OXYGEN: July 1996 to current year.

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, 25.0°C, Aug. 4, 1955; minimum, 0.0°C, on many days during winter periods.

DISSOLVED OXYGEN: Maximum, 13.1 mg/L, Nov. 18, 1997; minimum, 6.1 mg/L, Aug. 11, 1996.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum recorded, 23.5°C, July 16-18, but may have been higher during instrument malfunction July 2-8; minimum, 0.0 °C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 13.1 mg/L, Nov. 18; minimum recorded, 7.1 mg/L, June 28, 29, but may have been lower during instrument malfunction July 2-8.

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

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

STREAMS TRIBUTARY TO LAKE HURON

04136500 AU SABLE RIVER AT MIO, MI--Continued

WATER-QUALITY RECORDS

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

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

STREAMS TRIBUTARY TO LAKE HURON

04136500 AU SABLE RIVER AT MIO, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
OCTOBER				NOVEMBER				DECEMBER				JANUARY	
1	9.0	8.8	8.9	11.3	10.2	11.0	12.6	12.5	12.6	12.0	11.9	12.0	
2	9.3	9.0	9.2	11.5	11.3	11.4	12.6	11.9	12.2	12.3	12.0	12.2	
3	9.6	9.3	9.5	11.9	10.7	11.5	11.9	11.7	11.8	12.4	12.3	12.4	
4	9.7	9.6	9.6	12.0	11.8	11.9	11.9	11.7	11.8	12.3	12.0	12.2	
5	9.6	9.4	9.5	11.9	11.8	11.9	12.2	11.9	12.0	12.0	11.6	11.8	
6	10.1	9.5	9.9	11.9	11.7	11.8	12.3	12.1	12.2	11.6	11.5	11.6	
7	10.2	10.1	10.1	11.7	11.3	11.5	12.3	12.2	12.3	11.7	11.3	11.5	
8	10.2	10.2	10.2	11.3	10.9	11.2	12.2	12.2	12.2	11.8	11.4	11.6	
9	10.2	9.7	10.0	10.9	10.5	10.7	12.3	12.1	12.2	12.1	11.8	12.0	
10	9.7	9.5	9.6	10.6	10.4	10.5	12.3	12.2	12.3	12.3	12.1	12.2	
11	9.9	9.5	9.6	11.1	10.5	10.8	---	---	---	12.3	12.2	12.2	
12	10.2	9.8	10.1	11.6	11.1	11.4	---	---	---	12.2	11.9	12.0	
13	10.2	10.2	10.2	12.0	11.6	11.8	12.0	11.8	11.9	11.9	11.8	11.9	
14	10.2	10.2	10.2	12.2	12.0	12.1	11.9	11.8	11.9	12.1	11.9	12.0	
15	10.2	10.2	10.2	12.6	12.2	12.5	11.9	11.7	11.8	12.1	12.0	12.1	
16	10.2	9.9	10.0	12.8	12.6	12.7	11.9	11.8	11.9	12.2	12.1	12.1	
17	9.9	9.7	9.8	13.0	12.8	12.9	11.9	11.7	11.8	12.2	12.0	12.2	
18	---	---	---	13.1	12.5	12.8	11.8	11.6	11.8	12.1	12.0	12.1	
19	---	---	---	12.5	11.9	12.2	11.9	11.8	11.8	12.2	12.0	12.0	
20	---	---	---	11.9	11.7	11.8	12.0	11.9	11.9	12.2	12.0	12.1	
21	---	---	---	11.8	11.7	11.7	12.2	11.9	12.1	12.1	11.7	11.9	
22	---	---	---	11.9	11.7	11.8	12.4	12.1	12.3	11.8	11.6	11.7	
23	10.0	9.9	9.9	12.0	11.9	11.9	12.4	12.3	12.4	11.6	11.4	11.6	
24	10.0	9.8	9.9	12.1	11.9	12.0	12.4	12.1	12.3	11.7	11.5	11.6	
25	9.9	9.8	9.9	12.1	11.9	12.0	12.1	11.8	12.0	12.0	11.5	11.7	
26	10.0	9.8	9.9	12.0	11.9	11.9	11.9	11.7	11.8	12.1	12.0	12.0	
27	10.2	9.9	10.1	12.3	12.0	12.2	12.1	11.8	11.9	12.1	11.9	12.0	
28	10.3	10.2	10.2	12.4	12.2	12.4	12.5	12.1	12.3	12.2	11.9	12.0	
29	10.2	10.1	10.2	12.5	12.3	12.4	12.5	12.3	12.5	12.2	12.0	12.2	
30	10.1	9.9	10.0	12.6	12.5	12.6	12.4	12.2	12.3	12.0	11.9	12.0	
31	11.0	10.1	10.5	---	---	---	12.2	11.9	12.0	12.1	12.0	12.0	
MONTH	---	---	---	13.1	10.2	11.8	---	---	---	12.4	11.3	12.0	

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	12.1	11.9	12.0	11.4	11.2	11.3	11.2	10.7	11.0	9.6	9.1	9.3	
2	11.9	11.6	11.8	11.6	11.3	11.5	11.5	10.9	11.3	9.5	9.2	9.3	
3	11.6	11.5	11.5	11.6	11.1	11.3	11.3	11.1	11.2	10.0	9.5	9.7	
4	11.5	11.4	11.5	11.1	10.9	11.0	11.3	10.8	10.9	10.3	9.9	10.1	
5	11.6	11.4	11.5	11.2	10.9	11.1	10.9	10.6	10.7	10.3	9.9	10.1	
6	11.7	11.6	11.6	11.2	11.0	11.1	10.9	10.7	10.8	10.2	9.9	10.1	
7	11.9	11.7	11.8	11.0	10.7	10.9	11.3	10.9	11.0	10.2	9.9	10.0	
8	11.9	11.8	11.9	11.0	10.7	10.8	11.7	11.2	11.4	10.1	9.9	10.0	
9	11.9	11.8	11.9	11.3	10.9	11.2	12.1	11.7	11.8	10.0	9.6	9.9	
10	12.0	11.9	11.9	11.4	11.3	11.4	12.3	12.0	12.2	9.9	9.6	9.8	
11	12.1	12.0	12.0	11.4	11.0	11.2	12.3	12.0	12.1	10.1	9.9	10.0	
12	12.2	12.1	12.2	11.1	10.9	11.0	12.0	11.7	11.8	10.2	9.6	9.9	
13	12.2	12.0	12.1	10.9	10.6	10.8	11.7	11.4	11.6	9.7	9.5	9.7	
14	12.0	11.8	11.9	10.8	10.6	10.7	11.7	11.5	11.6	9.7	9.6	9.6	
15	12.1	11.8	12.0	11.2	10.8	11.0	11.7	11.5	11.6	10.0	9.6	9.8	
16	12.2	12.0	12.1	11.3	11.1	11.2	11.6	10.4	10.9	10.3	9.9	10.1	
17	12.0	11.9	12.0	11.4	11.2	11.3	10.6	10.0	10.2	10.3	10.2	10.2	
18	12.1	12.0	12.1	11.7	11.3	11.5	10.6	10.0	10.3	10.3	10.1	10.2	
19	12.3	12.1	12.2	11.5	11.1	11.3	10.6	10.2	10.4	10.1	10.0	10.0	
20	12.2	11.7	12.0	11.2	10.9	11.0	10.6	10.0	10.3	10.0	9.8	9.9	
21	11.7	11.2	11.4	11.0	10.8	10.9	10.4	10.0	10.2	10.1	9.8	9.9	
22	11.5	11.3	11.4	10.9	10.6	10.8	10.2	9.8	10.0	10.2	10.1	10.1	
23	11.5	11.3	11.4	10.6	9.9	10.3	10.2	9.9	10.1	10.3	9.9	10.1	
24	11.7	11.4	11.6	10.3	9.9	10.1	10.3	9.9	10.1	9.9	9.6	9.8	
25	12.0	11.7	11.8	10.5	10.1	10.3	10.2	9.9	10.0	9.6	9.2	9.4	
26	12.0	11.9	12.0	10.8	10.4	10.6	10.1	9.8	10.0	9.2	9.1	9.2	
27	12.0	11.7	11.9	10.8	10.6	10.7	10.1	9.9	10.0	9.4	9.2	9.3	
28	11.8	11.4	11.6	10.9	10.6	10.8	10.0	9.7	9.9	9.6	9.3	9.4	
29	---	---	---	10.8	10.1	10.5	9.8	9.5	9.7	9.5	9.1	9.3	
30	---	---	---	10.1	10.0	10.0	9.7	9.2	9.5	9.3	9.0	9.2	
31	---	---	---	10.7	10.1	10.4	---	---	---	9.0	8.7	8.8	
MONTH	12.3	11.2	11.8	11.7	9.9	10.9	12.3	9.2	10.8	10.3	8.7	9.7	

STREAMS TRIBUTARY TO LAKE HURON

04136500 AU SABLE RIVER AT MIO, MI--Continued

OXYGEN DISSOLVED (MGL), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	9.3	8.9	9.1	7.8	7.5	7.7	8.4	7.4	7.8	8.8	8.2	8.5
2	9.5	9.1	9.4	---	---	---	8.0	7.7	7.9	8.9	8.6	8.8
3	9.5	9.2	9.3	---	---	---	8.0	7.6	7.9	9.1	8.5	8.8
4	9.6	9.2	9.4	---	---	---	8.0	7.5	7.8	9.3	8.9	9.1
5	9.4	8.6	9.0	---	---	---	8.1	7.8	8.0	9.4	8.9	9.1
6	8.8	8.5	8.6	---	---	---	8.2	7.7	7.9	9.3	9.0	9.2
7	8.6	8.2	8.4	---	---	---	8.2	7.7	8.0	9.3	9.0	9.2
8	8.6	8.2	8.4	---	---	---	8.4	7.9	8.1	9.3	9.2	9.2
9	8.7	8.3	8.5	9.1	8.8	8.9	8.6	8.0	8.3	9.4	9.0	9.2
10	8.8	8.5	8.6	8.9	8.7	8.8	8.6	7.9	8.4	9.4	9.0	9.2
11	9.0	8.5	8.7	9.4	8.8	9.1	8.3	7.9	8.1	9.5	9.1	9.4
12	8.8	8.3	8.6	9.3	9.0	9.1	8.0	7.3	7.7	9.2	8.9	9.1
13	8.9	8.3	8.6	9.2	8.9	9.1	8.3	7.5	7.9	9.0	8.8	8.9
14	8.4	7.9	8.1	9.0	8.6	8.8	8.5	7.8	8.1	9.1	8.8	8.9
15	9.1	8.2	8.6	8.8	8.2	8.6	8.8	8.1	8.4	9.2	8.8	9.0
16	8.7	8.2	8.4	8.5	8.0	8.3	9.0	8.6	8.8	9.0	8.7	8.8
17	8.4	8.0	8.2	8.4	8.0	8.2	8.9	8.4	8.5	9.1	8.7	8.9
18	8.7	8.3	8.4	8.4	8.0	7.7	8.7	8.4	8.5	9.0	8.7	8.9
19	8.9	8.1	8.4	7.5	7.2	7.3	8.5	8.1	8.3	8.9	8.6	8.7
20	9.4	8.2	8.8	7.4	7.2	7.3	8.8	8.2	8.6	8.6	8.3	8.4
21	8.7	7.9	8.3	7.5	7.2	7.3	9.0	8.6	8.9	8.5	8.2	8.4
22	8.8	8.0	8.3	7.8	7.5	7.6	8.9	8.5	8.8	8.6	8.3	8.5
23	8.3	7.7	8.1	8.5	7.8	8.2	9.2	8.9	9.1	10.4	8.6	9.2
24	8.9	7.8	8.4	8.9	8.4	8.7	9.3	9.0	9.1	9.5	9.1	9.3
25	8.8	7.9	8.4	8.8	8.6	8.7	9.1	8.9	9.1	9.7	9.5	9.7
26	8.5	8.0	8.2	8.8	8.5	8.6	9.6	8.9	9.2	9.6	9.4	9.6
27	8.4	7.9	8.1	8.5	8.2	8.4	9.6	8.9	9.3	9.6	9.4	9.6
28	6.0	7.1	7.7	8.4	8.1	8.2	9.6	9.1	9.3	9.8	9.5	9.6
29	8.1	7.1	7.6	8.2	7.9	8.1	9.1	8.2	8.6	10.0	9.7	9.8
30	7.9	7.3	7.7	8.2	7.7	8.0	8.3	7.7	8.2	9.8	9.6	9.7
31	---	---	---	7.8	7.4	7.6	8.2	7.4	7.9	---	---	---
MONTH	9.6	7.1	8.5	---	---	---	9.6	7.3	8.4	10.4	8.2	9.1

STREAMS TRIBUTARY TO LAKE HURON

04136900 AU SABLE RIVER NEAR MC KINLEY, MI

LOCATION.--Lat 44°36'46", long 83°50'16", in SE1/4 SW1/4 sec.28, T.26 N., R.5 E., Alcona County, Hydrologic Unit 04070007, or right bank at upstream side of U.S. Forest Service 4001 bridge on Au Sable River Road, 5.5 mi southeast of McKinley.

DRAINAGE AREA.--1,513 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1996 to September 1997.

GAGE.--Water-stage recorder. Elevation of gage is 830 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1090	1320	1200	1200	e1210	1250	e1790	e1860	1360	977	894	1020
2	1080	1160	1540	1170	e1180	1280	e1970	e1970	1310	1040	881	954
3	1070	1150	1490	1180	e1170	1290	e2390	e1950	1270	1230	914	994
4	1040	1160	1260	1170	e1170	1290	e2800	e1770	1250	1080	1040	908
5	1010	1170	1280	1490	e1140	1270	e2880	e1680	1220	1040	1030	898
6	1020	1140	1270	1650	e1120	1270	e3390	e1800	1200	1020	944	947
7	1020	1150	1260	e1400	e1100	e1130	e4210	e1690	1180	998	935	922
8	1030	1140	1250	e1270	e1090	e1130	e3270	1690	1160	1060	933	922
9	1020	1130	1230	e1200	e1010	e1190	e2800	1670	1140	1310	910	931
10	1010	1100	1230	e1130	e1010	e1190	2660	1730	1120	1290	898	984
11	1030	1080	1230	e1110	e1120	e1150	2500	1660	1090	1140	923	1160
12	971	1080	1220	e1120	e1120	e1120	2340	1640	1090	1050	1010	1290
13	993	1080	1210	e1170	e890	e1100	2200	1600	1110	1010	1090	1210
14	999	1070	1220	e1140	e1060	e1130	2220	1580	1120	1010	1130	1130
15	995	1030	1230	e1150	e1200	e1070	2220	1700	1080	995	1050	1050
16	974	1020	1240	e1120	e1090	e1060	2260	1930	1070	966	1120	961
17	997	1090	1250	e850	e910	e1170	2300	1850	1100	950	1240	1050
18	1060	1100	1240	e900	e1130	e1110	2220	1860	1090	980	1140	1040
19	1150	1120	1170	e1020	e1170	e1030	2110	1870	1070	983	1090	1060
20	1130	1110	1010	e1180	e1140	e1100	2010	1880	1070	970	1060	1220
21	1060	1090	1070	e1230	e1370	e1110	2010	1720	1090	979	1130	1050
22	1050	1060	1190	e1230	e1380	e1120	2000	1590	1090	993	1260	1060
23	1080	1070	1230	e1400	e1310	e1160	1960	1530	1090	971	1140	1070
24	1200	1080	1280	e1240	1270	e1090	1930	1540	1060	966	1060	1010
25	1250	1060	1280	e1260	1280	e1180	1900	1480	1060	945	1000	1010
26	1180	1040	e1080	e1160	1330	e1250	1850	1470	1070	940	956	975
27	1120	1030	e940	e1150	1310	e1260	1760	1410	1000	953	991	938
28	1120	1010	e1250	e1080	1270	e1380	1690	1380	980	933	973	950
29	1100	1030	1320	e990	---	e1810	1680	1330	975	919	967	971
30	1150	1060	1230	e1020	---	e2000	1680	1330	989	896	936	983
31	1290	---	1190	e1170	---	e1870	---	1370	---	909	963	---
TOTAL	33289	32930	38090	36550	32550	38560	69000	51530	33504	31503	31608	30668
MEAN	1074	1098	1229	1179	1163	1244	2300	1662	1117	1016	1020	1022
MAX	1290	1320	1540	1650	1380	2000	4210	1970	1360	1310	1260	1290
MIN	971	1010	940	850	890	1030	1680	1330	975	896	881	898
CFSM	.71	.73	.81	.78	.77	.82	1.52	1.10	.74	.67	.67	.68
IN.	.82	.81	.94	.90	.80	.95	1.70	1.27	.82	.77	.78	.75

SUMMARY STATISTICS

FOR 1997 WATER YEAR

ANNUAL TOTAL
ANNUAL MEAN
HIGHEST DAILY MEAN
LOWEST DAILY MEAN
ANNUAL SEVEN-DAY MINIMUM
ANNUAL RUNOFF (CFSM)
ANNUAL RUNOFF (INCHES)
10 PERCENT EXCEEDS
50 PERCENT EXCEEDS
90 PERCENT EXCEEDS

459782
1260
4210
850
907
11.30
1800
1130
966

Apr 7
Jan 17
Jul 28

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04136900 AU SABLE RIVER NEAR MCKINLEY, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.-- October 1996 to September 1997.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1996 to September 1997.

DISSOLVED OXYGEN: October 1996 to September 1997.

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, 24.0°C, July 18; minimum, -0.5°C, on several days during winter period.

DISSOLVED OXYGEN: Maximum recorded, 13.7 mg/L, Mar. 3, but may have been higher during instrument malfunction Jan. 7-15, Jan. 24 to Feb. 6, Feb. 14-2, and Mar. 7 to Apr. 9; minimum, 6.6 mg/L, July 28.

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

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

STREAMS TRIBUTARY TO LAKE HURON

04136900 AU SABLE RIVER NEAR MCKINLEY, MI--Continued

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

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE			JULY			AUGUST			SEPTEMBER			
1	16.0	12.0	14.0	23.0	20.5	22.0	22.5	19.0	20.0	18.0	16.0	16.5
2	17.0	12.0	14.5	22.0	20.0	21.0	22.5	19.0	20.5	17.5	16.0	17.0
3	17.5	13.5	15.5	21.5	19.0	20.0	21.5	19.0	19.5	17.0	14.5	16.0
4	18.0	14.0	16.0	20.0	17.5	18.5	20.5	18.0	19.0	17.0	13.0	15.5
5	18.0	15.5	17.0	21.0	17.0	19.0	20.0	17.0	19.0	16.5	13.5	15.0
6	18.5	15.5	17.0	20.5	17.0	18.5	20.0	17.0	18.5	18.0	14.5	16.5
7	18.5	15.0	17.0	19.5	15.5	17.5	21.0	17.0	19.0	17.5	15.0	16.0
8	19.5	15.0	17.0	19.0	15.5	16.5	20.5	17.5	19.5	15.5	14.0	15.0
9	20.0	15.5	17.5	19.5	15.0	17.0	21.0	18.0	19.5	16.5	14.0	15.0
10	20.5	16.0	18.5	20.0	14.5	17.5	21.0	18.5	19.5	16.0	14.5	15.0
11	20.0	17.0	18.5	20.0	15.5	18.0	19.0	17.0	18.0	15.0	14.0	14.5
12	21.0	17.0	19.0	21.5	16.5	19.0	18.5	16.0	16.5	15.0	14.5	15.0
13	21.0	17.5	19.5	22.0	18.0	20.0	19.0	16.0	17.5	16.5	14.0	15.0
14	21.0	17.0	19.0	23.5	19.5	21.5	18.0	15.0	17.0	16.0	13.5	15.0
15	20.5	15.5	18.5	23.5	20.5	22.0	17.5	16.0	16.5	16.5	14.5	15.5
16	20.0	18.0	18.5	23.5	20.0	22.0	18.5	16.0	17.0	16.5	14.5	15.5
17	20.0	16.0	18.5	23.5	21.0	22.5	18.0	15.0	16.0	17.5	15.5	16.5
18	19.5	15.0	17.5	24.0	21.0	22.5	17.5	14.0	15.5	17.5	14.0	16.0
19	19.0	16.0	18.0	23.5	19.5	21.5	17.5	13.5	16.0	17.5	15.5	16.5
20	20.5	15.5	18.0	22.5	18.0	19.5	17.0	14.0	15.0	16.5	15.0	15.5
21	20.0	18.0	18.5	20.5	19.0	19.5	15.0	14.0	14.5	15.0	12.5	14.0
22	21.5	17.0	19.0	21.0	17.0	19.5	16.0	14.5	15.0	15.5	12.5	14.0
23	21.0	17.5	19.5	21.0	17.0	19.0	17.0	13.5	15.5	15.5	13.5	14.5
24	23.0	18.5	21.0	20.5	16.5	19.0	16.5	14.0	15.0	13.5	11.0	12.5
25	23.0	20.5	22.0	20.5	17.5	19.0	17.0	14.0	15.5	13.5	12.0	13.0
26	22.5	19.0	21.0	22.0	19.0	20.5	17.0	14.5	16.0	14.0	11.5	13.0
27	23.5	18.5	21.0	23.5	19.5	22.0	19.0	15.5	17.0	13.5	11.0	12.5
28	23.5	19.5	22.0	23.0	20.5	22.0	18.5	16.0	17.0	13.5	11.0	12.5
29	23.5	20.0	22.0	21.5	18.5	20.5	17.0	16.0	16.5	13.5	12.5	13.0
30	23.5	20.5	22.0	22.5	18.0	20.0	18.0	15.5	17.0	13.5	12.0	12.5
31	---	---	---	23.0	18.5	21.0	17.5	16.5	16.5	---	---	---
MONTH	23.5	12.0	18.5	24.0	14.5	20.0	22.5	13.5	17.0	18.0	11.0	15.0

STREAMS TRIBUTARY TO LAKE HURON

04136900 AU SABLE RIVER NEAR MCKINLEY, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	11.0	10.3	10.6	9.1	6.9	8.0	8.9	6.9	7.8	10.9	8.5	9.5
2	10.9	10.4	10.6	9.0	7.1	7.9	9.1	7.1	8.1	10.9	8.6	9.7
3	10.9	10.2	10.5	9.0	7.2	8.0	9.0	7.0	7.9	11.0	9.0	9.9
4	10.7	10.1	10.4	9.9	7.7	8.7	9.3	7.5	8.3	11.2	8.6	9.9
5	11.0	9.9	10.4	9.9	7.8	8.9	9.5	7.5	8.5	11.0	9.0	9.9
6	10.8	9.4	10.1	9.9	7.7	8.8	9.6	7.5	8.5	10.8	8.8	9.7
7	10.9	9.3	10.1	10.4	8.3	9.3	9.6	7.4	8.5	10.2	8.7	9.4
8	11.0	9.5	10.2	9.3	8.0	8.8	9.6	7.5	8.5	11.2	9.2	10.1
9	10.7	9.2	10.0	10.5	8.6	9.5	9.7	7.3	8.5	11.2	9.1	10.1
10	10.6	9.0	9.8	10.9	8.7	9.7	9.2	7.3	8.1	9.8	9.0	9.3
11	10.1	8.7	9.4	10.6	8.4	9.4	10.0	7.6	8.7	9.9	8.7	9.2
12	10.4	8.5	9.3	10.3	8.0	9.1	9.1	8.0	8.6	10.1	8.8	9.3
13	10.3	8.1	9.2	10.1	7.6	8.8	9.7	7.9	8.8	10.9	9.0	9.8
14	10.2	8.4	9.3	9.8	7.3	8.5	10.2	7.9	9.0	10.5	8.8	9.6
15	10.2	8.4	9.3	9.3	6.9	8.1	9.7	8.0	8.7	10.8	8.8	9.6
16	9.6	7.9	8.7	9.2	7.0	8.0	10.0	8.1	8.9	10.6	8.6	9.5
17	10.0	8.1	9.1	9.6	6.9	8.3	9.7	8.1	8.9	10.2	8.3	9.1
18	10.0	8.3	9.2	9.4	7.2	8.4	10.2	8.7	9.4	10.5	8.3	9.3
19	9.9	8.1	8.9	9.6	7.3	8.5	10.4	8.5	9.4	9.5	8.1	8.7
20	9.6	7.9	8.7	9.2	7.5	8.4	9.7	8.3	9.0	9.9	8.1	8.9
21	8.8	7.3	8.0	9.7	7.7	8.7	10.2	9.0	9.5	10.6	8.8	9.7
22	9.8	7.9	8.8	9.8	7.9	8.9	10.8	9.0	9.7	10.8	8.8	9.7
23	10.1	8.0	9.0	9.9	7.7	8.8	11.0	9.1	10.0	10.4	8.5	9.4
24	9.6	7.8	8.7	9.9	7.9	8.9	11.2	9.0	10.0	11.0	9.2	10.0
25	9.4	7.3	8.4	9.8	7.7	8.7	11.2	9.1	10.1	10.3	8.8	9.5
26	9.3	7.4	8.3	9.4	7.2	8.2	10.9	8.9	9.8	10.7	8.8	9.7
27	9.1	7.3	8.2	9.3	7.1	8.1	10.8	8.4	9.6	11.0	8.9	9.9
28	9.2	7.1	8.1	9.1	6.6	7.9	10.3	8.2	9.2	10.7	8.6	9.5
29	9.3	7.0	8.2	9.1	7.0	8.1	10.4	8.4	9.3	10.2	8.6	9.3
30	9.4	7.1	8.2	9.2	7.1	8.1	10.8	8.4	9.5	10.3	8.6	9.4
31	---	---	---	9.2	7.0	8.1	9.9	8.2	9.0	---	---	---
MONTH	11.0	7.0	9.3	10.9	6.6	8.6	11.2	6.9	9.0	11.2	8.1	9.6

STREAMS TRIBUTARY TO LAKE HURON

04137005 AU SABLE RIVER NEAR CURTISVILLE, MI

LOCATION.--Lat 44°33'39", long 83°48'10", in SW1/4 NW1/4 sec.14, T.25 N., R.5 E., Alcona County, Hydrologic Unit 04070007, on left bank 200 ft upstream from Bamfield Road, 3.2 mi east of Curtisville.

DRAINAGE AREA.--1,598 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1996 to September 1997.

GAGE.--Water-stage recorder. Elevation of gage is 800 ft above sea level, from topographic map.

REMARKS.--Water-discharge records good except for estimated daily discharges, which are fair. Flow completely regulated by Alcona Dam 300 ft upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1120	1320	1200	1160	1300	1300	1820	2000	1480	1140	903	1070
2	1100	1210	1600	1220	1280	1290	1900	2120	1440	1130	928	1050
3	1040	1160	1590	1190	1270	1320	2230	2100	1380	1310	889	1050
4	1010	1180	1300	1170	1260	1370	2760	1900	1360	1240	1030	988
5	988	1180	1290	1620	1240	1350	3100	1810	1360	1150	1030	993
6	972	1170	1320	1750	1200	1290	3640	1940	1320	1110	970	1010
7	975	1170	1330	1510	1180	1220	4520	1820	1280	1070	957	997
8	1030	1170	1230	1370	1170	1210	3520	1800	1270	1170	946	976
9	1020	1150	1200	1290	1090	1280	3010	1790	1240	1350	934	1010
10	988	1130	1220	1220	1090	1280	2730	1750	1220	1340	916	1120
11	992	1090	1200	1190	1200	1240	2610	1730	1180	1220	e950	1290
12	987	1080	1210	1200	1200	1200	2500	1710	1190	1140	e1030	1340
13	972	1090	1190	1260	988	1170	2390	1700	1210	1120	e1100	1280
14	946	1080	1170	1230	966	1210	2300	1750	1180	1130	e1150	1190
15	958	1050	1190	1240	1220	1140	2270	1980	1140	1110	e1090	1110
16	1030	1030	1210	1200	1180	1130	2290	2030	1130	1030	1200	1050
17	1030	1080	1260	949	984	1260	2390	2010	1140	1040	1190	1160
18	1120	1110	1220	817	1230	1190	2330	1980	1200	1050	1160	1090
19	1170	1110	1120	886	1270	1110	2180	2000	1160	1000	e1090	e1180
20	1100	1110	1020	1140	1240	1170	2120	1970	1170	980	e1070	1290
21	1070	1100	1040	1240	1470	1190	2090	1810	1200	1010	e1160	1150
22	1080	1080	1190	1270	1480	1200	2110	1660	1230	1010	1260	1100
23	1150	1070	1270	1370	1410	1240	2020	1710	1170	990	1190	1100
24	1240	1070	1230	1340	1220	1160	1930	1610	1190	975	1140	1100
25	1250	1060	1240	1370	1240	1260	1940	1620	1220	966	1070	1100
26	1210	1040	1140	1260	1420	1330	1920	1600	1220	990	1050	1030
27	1170	1040	977	1250	1440	1340	1880	1500	1140	1010	1060	991
28	1130	1050	1130	1160	1350	1470	1780	1500	1080	996	1060	1020
29	1130	1020	1330	1070	---	1940	1700	1500	1120	934	1050	1050
30	1240	1050	1270	1110	---	2140	1730	1490	1140	941	1030	1070
31	1340	---	1150	1270	---	2010	---	1490	---	917	1070	---
TOTAL	33558	33250	38037	38322	34588	41010	71710	55380	36760	33569	32673	32955
MEAN	1083	1108	1227	1236	1235	1323	2390	1786	1225	1083	1054	1099
MAX	340	1320	1600	1750	1480	2140	4520	2120	1480	1350	1260	1340
MIN	946	1020	977	817	966	1110	1700	1490	1080	917	889	976
CFSM	.68	.69	.77	.77	.77	.83	1.50	1.12	.77	.68	.66	.69
IN.	.78	.77	.89	.89	.81	.95	1.67	1.29	.86	.78	.76	.77

SUMMARY STATISTICS

FOR 1997 WATER YEAR

ANNUAL TOTAL	481812	
ANNUAL MEAN	1320	
HIGHEST DAILY MEAN	4520	Apr 7
LOWEST DAILY MEAN	817	Jan 18
ANNUAL SEVEN-DAY MINIMUM	930	Jul 28
INSTANTANEOUS PEAK FLOW	4660	Apr 7
INSTANTANEOUS PEAK STAGE	12.73	Apr 7
INSTANTANEOUS LOW FLOW	634	Jan 18
ANNUAL RUNOFF (CFSM)	.83	
ANNUAL RUNOFF (INCHES)	11.22	
10 PERCENT EXCEEDS	1920	
50 PERCENT EXCEEDS	1190	
90 PERCENT EXCEEDS	993	

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04137005 AU SABLE RIVER NEAR CURTISVILLE, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.-- October 1996 to September 1997.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1996 to September 1997.

DISSOLVED OXYGEN: October 1996 to September 1997.

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, 24.0°C, July 28; minimum, 0.0°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 12.9 mg/L, Jan. 2-4, Mar. 22; minimum, 6.3 mg/L, July 2.

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

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

STREAMS TRIBUTARY TO LAKE HURON

04137005 AU SABLE RIVER NEAR CURTISVILLE, MI--Continued

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

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY			AUGUST			SEPTEMBER		
1	14.5	13.5	14.0	23.5	22.5	23.0	22.0	21.5	21.5	17.5	17.5	17.5
2	15.0	14.5	15.0	23.0	22.0	23.0	23.0	21.5	22.0	19.0	17.0	18.0
3	16.0	15.0	15.5	23.0	22.0	23.0	22.0	21.5	21.5	18.0	17.5	18.0
4	17.0	16.0	16.5	22.0	21.5	21.5	22.0	21.0	21.5	18.0	17.0	17.5
5	17.5	16.0	16.5	21.5	20.5	21.0	22.0	20.5	21.5	17.5	17.0	17.0
6	17.5	16.5	17.0	21.0	19.5	20.0	21.0	20.5	21.0	17.5	17.0	17.0
7	18.0	17.0	17.5	20.5	19.5	20.0	21.0	20.0	20.5	17.5	16.5	17.0
8	18.5	18.0	18.0	19.5	19.0	19.5	20.5	20.0	20.5	17.0	16.5	16.5
9	18.5	18.0	18.5	19.5	18.5	19.0	21.0	20.0	20.5	16.5	16.5	16.5
10	20.0	18.5	19.0	19.0	18.0	18.5	22.0	20.5	21.0	17.0	16.5	17.0
11	20.0	19.0	19.5	19.0	18.0	18.5	---	---	---	17.0	16.5	16.5
12	20.0	19.0	19.5	19.5	18.5	19.0	---	---	---	16.5	16.0	16.0
13	21.0	19.5	20.0	20.0	19.0	19.5	---	---	---	16.0	15.5	16.0
14	20.5	19.5	20.0	21.5	19.5	20.0	---	---	---	16.5	15.5	16.0
15	20.0	19.0	19.5	22.5	20.5	21.5	---	---	---	17.0	16.0	16.0
16	20.5	20.0	20.0	22.5	21.5	22.0	19.5	18.0	18.5	16.0	15.5	16.0
17	20.5	19.0	19.5	23.5	21.5	22.5	19.0	18.0	18.5	17.5	15.0	16.5
18	20.5	19.0	19.5	23.5	22.5	23.0	18.5	18.0	18.0	17.5	16.5	17.0
19	19.5	19.0	19.0	23.0	22.5	23.0	---	---	---	18.0	16.5	17.0
20	19.5	18.5	19.0	23.0	22.5	22.5	---	---	---	18.0	17.0	17.5
21	19.5	19.0	19.0	22.5	21.5	22.0	---	---	---	17.0	16.5	16.5
22	20.5	19.0	19.5	21.5	21.0	21.5	17.0	16.5	16.5	16.5	16.0	16.0
23	20.0	19.0	19.5	21.0	21.0	21.0	17.0	16.0	16.5	16.5	15.5	16.0
24	21.0	19.5	20.0	21.0	20.5	21.0	16.5	16.0	16.0	15.5	15.0	15.0
25	22.5	20.0	21.5	21.0	20.5	21.0	16.5	16.0	16.0	15.0	15.0	15.0
26	23.0	21.0	22.0	22.0	20.5	21.5	17.0	16.0	16.5	15.0	14.0	14.5
27	22.0	21.5	22.0	22.5	21.5	22.0	18.5	16.5	17.0	14.0	13.5	14.0
28	22.5	21.5	21.5	24.0	22.0	23.0	18.0	17.5	17.5	14.5	13.5	14.0
29	22.5	22.0	22.0	23.0	22.0	22.5	17.5	17.0	17.5	14.5	13.5	14.0
30	23.0	22.5	22.5	22.5	21.5	22.0	17.5	17.0	17.0	14.5	14.0	14.0
31	---	---	---	22.5	21.5	22.0	17.5	17.0	17.5	---	---	---
MONTH	23.0	13.5	19.0	24.0	18.0	21.5	---	---	---	19.0	13.5	16.0

STREAMS TRIBUTARY TO LAKE HURON

04137005 AU SABLE RIVER NEAR CURTISVILLE, MI--Continued

OXYGEN DISSOLVED (MGL), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER			NOVEMBER			DECEMBER			JANUARY			
1	9.0	8.3	8.7	10.8	10.6	10.7	12.4	12.3	12.4	12.7	12.6	12.7
2	9.1	8.5	8.8	11.1	10.8	10.9	12.3	12.1	12.2	12.9	12.7	12.7
3	9.3	9.0	9.1	11.3	10.9	11.1	12.2	12.0	12.1	12.9	12.8	12.9
4	9.2	9.0	9.2	11.3	11.2	11.2	12.0	11.9	12.0	12.9	12.7	12.8
5	9.1	8.9	9.0	11.3	11.2	11.3	11.9	11.8	11.9	12.7	12.4	12.5
6	9.4	9.0	9.1	11.5	11.2	11.4	11.9	11.8	11.9	12.7	12.6	12.6
7	9.7	9.4	9.5	11.5	11.3	11.4	11.8	11.7	11.8	12.6	12.3	12.5
8	9.7	9.5	9.6	11.6	11.4	11.5	11.8	11.6	11.7	12.4	12.3	12.4
9	9.8	9.6	9.6	11.6	11.5	11.6	11.7	11.6	11.6	12.4	12.4	12.4
10	9.8	9.6	9.7	11.5	11.4	11.5	11.9	11.5	11.6	12.5	12.4	12.5
11	9.7	9.5	9.6	11.6	11.4	11.5	11.6	11.6	11.6	12.6	12.5	12.5
12	9.8	9.5	9.7	11.9	11.5	11.6	11.7	11.6	11.7	12.6	12.5	12.5
13	10.0	9.8	9.8	11.9	11.7	11.8	11.8	11.7	11.7	12.5	12.4	12.5
14	10.2	10.0	10.1	12.3	11.9	12.1	11.8	11.7	11.7	12.5	12.4	12.5
15	10.0	9.8	9.9	12.1	11.9	12.0	11.8	11.7	11.7	12.5	12.5	12.5
16	10.1	9.9	10.0	12.2	11.9	12.1	11.9	11.7	11.8	12.6	12.5	12.5
17	10.0	9.5	9.8	12.4	12.2	12.3	12.0	11.8	11.9	12.6	12.0	12.5
18	9.9	9.6	9.8	12.7	12.4	12.6	12.0	11.8	11.9	12.5	12.5	12.5
19	10.1	9.8	9.9	12.8	12.7	12.7	12.0	12.0	12.0	12.5	12.4	12.5
20	10.1	10.0	10.0	12.8	12.6	12.7	12.1	12.0	12.1	12.4	12.3	12.4
21	10.0	9.6	9.8	12.7	12.6	12.6	12.3	12.1	12.2	12.4	12.3	12.4
22	9.6	9.4	9.5	12.8	12.6	12.7	12.3	12.2	12.3	12.3	12.1	12.2
23	9.8	9.6	9.6	12.7	12.5	12.6	12.4	12.3	12.4	12.1	12.0	12.0
24	10.0	9.8	9.8	12.7	12.6	12.7	12.5	12.3	12.4	12.1	12.0	12.0
25	9.9	9.8	9.8	12.7	12.3	12.4	12.4	12.3	12.4	12.0	11.8	11.8
26	9.8	9.7	9.8	12.4	12.3	12.4	12.5	12.4	12.4	12.1	11.8	12.0
27	10.1	9.6	9.8	12.4	12.3	12.4	12.8	12.5	12.6	12.1	11.9	12.0
28	10.2	10.0	10.1	12.5	12.3	12.4	12.7	12.7	12.7	12.0	11.9	12.0
29	10.2	10.0	10.1	12.4	12.3	12.4	12.8	12.7	12.7	12.0	11.9	12.0
30	10.2	10.2	10.2	12.4	12.2	12.3	12.8	12.7	12.7	12.1	12.0	12.0
31	10.6	10.2	10.4	---	---	---	12.8	12.6	12.7	12.0	12.0	12.0
MONTH	10.6	8.3	9.7	12.8	10.6	12.0	12.8	11.5	12.1	12.9	11.8	12.4

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
FEBRUARY			MARCH			APRIL			MAY			
1	12.0	12.0	12.0	12.5	12.4	12.5	11.7	11.5	11.6	10.3	10.0	10.1
2	12.0	11.9	12.0	12.5	12.5	12.5	11.8	11.7	11.8	10.1	9.8	9.9
3	12.0	11.8	11.9	12.5	12.4	12.4	11.9	11.8	11.8	10.2	9.9	10.1
4	11.9	11.8	11.9	12.4	12.3	12.3	11.8	11.7	11.8	10.4	10.0	10.2
5	11.9	11.8	11.9	12.5	12.3	12.4	11.7	11.6	11.6	10.2	10.0	10.1
6	12.0	11.9	11.9	12.5	12.3	12.5	11.6	11.3	11.4	10.5	10.2	10.4
7	12.0	12.0	12.0	12.3	12.2	12.3	11.6	11.4	11.5	10.5	10.2	10.3
8	12.0	12.0	12.0	12.2	12.1	12.2	12.0	11.4	11.8	10.3	10.1	10.2
9	12.1	12.0	12.1	12.3	12.2	12.3	12.2	12.0	12.1	10.3	10.2	10.2
10	12.2	12.1	12.1	12.3	12.2	12.3	12.3	12.0	12.1	10.4	9.9	10.2
11	12.3	12.2	12.2	12.3	12.2	12.3	12.2	12.0	12.1	9.9	9.7	9.8
12	12.4	12.3	12.3	12.4	12.3	12.3	12.2	12.0	12.1	9.9	9.7	9.8
13	12.5	12.3	12.4	12.4	12.2	12.3	12.1	12.0	12.1	9.9	9.7	9.7
14	12.4	12.2	12.3	12.4	12.3	12.3	12.1	11.8	11.9	9.8	9.6	9.7
15	12.3	12.2	12.3	12.6	12.4	12.5	11.8	10.7	11.3	9.9	9.7	9.8
16	12.5	12.3	12.4	12.6	12.5	12.6	11.5	10.4	10.7	10.1	9.8	9.9
17	12.6	12.4	12.5	12.6	12.5	12.5	11.5	11.4	11.5	10.1	10.0	10.1
18	12.4	12.2	12.3	12.7	12.5	12.6	11.5	11.3	11.4	10.1	10.0	10.0
19	12.5	12.3	12.4	12.7	12.5	12.6	11.3	11.1	11.2	10.4	10.1	10.2
20	12.6	12.5	12.5	12.5	12.5	12.5	11.2	11.0	11.1	10.3	10.1	10.2
21	12.5	12.1	12.3	12.8	12.5	12.6	11.0	10.9	11.0	10.4	10.2	10.3
22	12.4	12.1	12.3	12.9	12.6	12.8	11.0	10.9	10.9	10.4	10.2	10.3
23	12.4	12.4	12.4	12.6	12.4	12.5	10.9	10.7	10.8	10.3	10.1	10.2
24	12.5	12.4	12.4	12.4	12.1	12.2	10.7	10.6	10.7	10.3	10.1	10.2
25	12.4	12.3	12.4	12.2	12.1	12.1	10.6	10.5	10.6	10.3	10.1	10.2
26	12.5	12.3	12.4	12.2	12.1	12.2	10.6	10.5	10.6	10.2	9.9	10.1
27	12.7	12.5	12.6	12.2	11.9	12.1	10.6	10.4	10.5	9.9	9.8	9.9
28	12.6	12.5	12.5	12.0	11.9	11.9	10.8	10.4	10.5	10.0	9.8	9.9
29	---	---	---	12.0	11.7	11.9	10.6	10.2	10.4	9.9	9.6	9.8
30	---	---	---	11.8	11.6	11.7	10.5	10.2	10.4	9.6	9.5	9.6
31	---	---	---	11.6	11.5	11.6	---	---	---	9.6	9.2	9.3
MONTH	12.7	11.8	12.2	12.9	11.5	12.3	12.3	10.2	11.3	10.5	9.2	10.0

STREAMS TRIBUTARY TO LAKE HURON

04137005 AU SABLE RIVER NEAR CURTISVILLE, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	9.5	8.7	9.2	7.1	6.7	6.9	7.7	7.0	7.3	8.6	8.3	8.5
2	9.5	9.2	9.3	7.2	6.3	6.8	7.8	7.1	7.4	9.3	8.1	8.7
3	9.5	9.3	9.4	7.9	6.9	7.5	7.4	7.0	7.2	9.2	8.5	8.9
4	9.6	9.4	9.5	8.0	7.5	7.7	7.9	6.9	7.4	8.9	8.5	8.7
5	9.5	9.0	9.3	7.7	6.6	7.1	8.1	6.8	7.4	8.7	8.1	8.4
6	9.3	8.6	8.9	7.7	6.4	7.0	7.4	6.9	7.1	8.4	7.3	7.8
7	9.0	8.6	8.8	8.0	7.4	7.7	7.8	7.2	7.5	8.8	6.5	8.0
8	8.8	8.6	8.8	9.0	7.2	8.4	8.2	7.6	8.0	8.9	8.6	8.8
9	8.7	8.3	8.5	8.5	7.7	8.1	8.6	7.9	8.2	8.9	8.5	8.7
10	8.5	8.3	8.4	8.2	7.7	8.0	8.4	7.8	8.1	9.2	7.7	8.7
11	8.7	8.3	8.5	8.3	7.8	8.0	---	---	---	9.1	8.6	8.8
12	8.7	8.0	8.5	8.6	7.8	8.1	---	---	---	9.1	8.4	8.8
13	8.5	8.0	8.2	8.3	7.5	7.9	---	---	---	8.5	8.2	8.4
14	8.6	7.7	8.1	8.0	7.2	7.6	---	---	---	9.0	8.4	8.6
15	8.0	7.1	7.7	7.6	6.9	7.2	---	---	---	9.2	8.6	8.9
16	8.6	7.6	7.9	7.3	6.9	7.0	9.2	7.3	8.5	9.4	9.0	9.1
17	8.4	7.4	7.8	7.0	6.6	6.8	8.9	8.5	8.7	9.7	7.9	8.9
18	8.0	7.5	7.8	6.9	6.6	6.7	8.9	8.6	8.7	9.1	8.6	8.9
19	7.9	7.4	7.6	6.9	6.6	6.7	---	---	---	9.1	8.3	8.7
20	8.0	7.1	7.5	7.2	6.6	6.9	---	---	---	9.2	8.5	8.8
21	7.9	6.5	7.5	7.3	6.4	7.0	---	---	---	8.9	8.3	8.6
22	8.2	7.6	7.8	6.8	6.4	6.6	9.0	8.5	8.8	8.6	7.9	8.3
23	8.1	7.8	7.9	7.3	6.8	7.0	8.7	8.1	8.3	9.2	8.2	8.6
24	9.5	7.7	8.5	7.6	7.1	7.3	8.7	8.3	8.4	8.4	6.5	8.1
25	8.4	7.7	8.0	7.9	7.4	7.6	8.9	8.4	8.8	9.2	6.5	8.3
26	7.8	7.3	7.6	7.9	7.3	7.7	9.2	8.8	9.0	9.3	9.0	9.2
27	7.6	6.9	7.2	7.9	7.4	7.7	9.4	8.7	9.0	9.4	8.3	9.1
28	7.5	6.8	7.2	7.9	7.4	7.7	9.0	8.7	8.9	9.8	7.6	9.1
29	7.6	6.9	7.3	7.8	7.4	7.6	8.9	8.6	8.7	9.8	9.3	9.5
30	7.2	6.9	7.1	7.8	7.3	7.5	8.6	8.2	8.4	9.8	7.6	8.9
31	---	---	---	7.4	6.9	7.3	8.6	8.1	8.3	---	---	---
MONTH	9.6	6.5	8.2	9.0	6.3	7.4	---	---	---	9.8	6.5	8.7

STREAMS TRIBUTARY TO LAKE HURON

04137020 AU SABLE RIVER NEAR SOUTH BRANCH, MI--Continued

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

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	15.0	14.0	14.5	24.0	23.5	24.0	23.0	22.5	23.0	18.5	18.0	17.5
2	16.0	14.5	15.0	24.5	23.0	24.0	23.5	22.5	22.5	19.0	18.0	18.5
3	17.0	15.5	16.0	24.5	22.5	23.5	22.5	22.0	22.0	18.0	17.5	18.0
4	17.5	16.5	17.0	22.5	21.0	22.0	22.5	22.0	22.5	18.5	17.5	18.0
5	18.0	17.0	17.5	21.5	21.0	21.0	22.0	21.5	21.5	18.0	17.5	17.5
6	18.0	17.0	17.5	21.0	20.5	21.0	22.0	21.5	21.5	18.5	17.0	17.5
7	18.5	17.5	18.0	21.0	20.5	20.5	22.5	21.5	22.0	18.0	17.5	17.5
8	18.5	18.0	18.0	20.5	20.0	20.0	22.5	21.5	22.0	17.5	17.5	17.5
9	19.5	18.5	19.0	20.0	19.0	19.5	22.5	22.0	22.0	17.5	17.0	17.5
10	20.5	19.0	19.5	20.5	19.0	19.5	22.5	22.0	22.5	17.5	17.5	17.5
11	21.5	19.5	20.5	21.0	20.0	20.5	22.0	21.5	21.5	17.5	17.0	17.0
12	21.5	20.0	21.0	21.5	20.5	21.0	21.5	20.5	21.0	17.0	16.5	17.5
13	21.5	20.5	21.0	22.5	21.0	21.5	20.5	20.0	20.5	17.5	16.5	17.5
14	21.0	20.0	20.5	23.5	21.5	22.5	20.0	19.5	19.5	18.0	17.0	17.5
15	21.0	20.0	20.5	24.0	22.5	23.0	20.0	19.5	19.5	18.0	17.0	17.5
16	20.5	20.0	20.0	24.0	23.0	23.5	20.0	19.5	19.5	17.5	17.0	17.0
17	20.0	19.5	20.0	24.5	23.0	23.5	19.5	19.0	19.0	18.5	17.0	18.0
18	20.5	19.5	20.0	24.5	23.5	24.0	19.0	18.5	18.5	18.0	17.5	17.5
19	20.5	20.0	20.0	24.0	23.5	23.5	19.0	18.5	18.5	18.0	17.5	17.5
20	21.0	20.0	20.5	23.5	23.0	23.0	19.0	18.5	18.5	18.0	17.0	17.5
21	20.5	20.0	20.5	23.0	22.0	22.5	18.5	17.5	18.0	17.0	16.5	17.0
22	21.5	20.0	20.5	22.0	21.5	21.5	17.5	16.5	17.0	16.5	16.0	16.5
23	21.0	20.0	20.5	22.0	21.5	22.0	17.5	16.5	17.0	16.0	16.0	16.0
24	22.5	21.0	21.5	22.0	22.0	22.0	17.5	17.0	17.0	16.0	15.5	15.5
25	23.0	22.0	22.5	23.0	22.0	22.5	17.5	17.0	17.0	15.5	15.0	15.5
26	23.5	22.5	22.5	24.0	22.5	23.0	18.0	17.5	17.5	15.0	14.5	15.0
27	23.5	22.5	23.0	24.0	22.5	23.0	19.0	18.0	18.5	15.0	14.5	15.0
28	24.0	23.0	23.5	24.5	23.5	24.0	18.5	18.0	18.5	15.5	15.0	15.0
29	24.0	23.5	23.5	23.5	23.0	23.5	18.0	18.0	18.0	15.5	15.0	15.0
30	24.5	23.5	24.0	23.5	23.0	23.0	18.5	18.0	18.0	15.0	14.5	14.5
31	---	---	---	23.5	22.5	23.0	18.5	18.0	18.5	---	---	---
MONTH	24.5	14.0	20.0	24.5	19.0	22.5	23.5	16.5	20.0	19.0	14.5	17.0

STREAMS TRIBUTARY TO LAKE HURON

04137020 AU SABLE RIVER NEAR SOUTH BRANCH, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	9.2	8.9	9.0	11.1	10.8	11.0	---	---	---	13.0	13.0	13.0			
2	9.3	9.1	9.2	11.3	11.0	11.2	---	---	---	13.1	12.8	13.0			
3	9.3	9.1	9.2	11.5	11.1	11.3	---	---	---	13.0	12.8	12.9			
4	9.5	9.2	9.4	11.4	11.3	11.3	---	---	---	13.0	12.8	13.0			
5	9.9	9.5	9.7	11.4	11.2	11.3	---	---	---	13.0	12.8	13.0			
6	10.1	9.8	10.0	11.4	11.0	11.3	---	---	---	13.0	12.8	12.9			
7	10.0	9.7	9.8	11.3	11.2	11.3	12.2	12.0	12.1	13.0	12.5	12.9			
8	9.8	9.4	9.6	11.3	11.1	11.2	12.0	11.9	12.0	13.2	12.8	13.0			
9	9.7	9.4	9.5	11.4	11.0	11.1	12.0	11.9	11.9	13.2	13.1	13.1			
10	10.0	9.6	9.8	11.5	11.2	11.3	12.0	11.9	11.9	13.2	13.0	13.1			
11	10.2	9.8	10.0	11.7	11.4	11.5	12.0	11.9	11.9	13.0	12.8	12.9			
12	10.3	10.1	10.2	11.9	11.5	11.7	12.1	11.9	12.0	13.0	12.9	13.0			
13	10.4	10.2	10.3	12.4	11.9	12.0	12.1	12.1	12.1	13.2	13.0	13.1			
14	10.3	10.0	10.1	12.4	12.3	12.4	12.1	12.0	12.1	13.3	13.1	13.2			
15	10.1	9.9	10.0	12.5	12.2	12.4	12.2	12.1	12.2	13.3	13.2	13.2			
16	10.1	9.9	10.0	12.7	12.5	12.6	12.3	12.2	12.3	13.3	13.2	13.3			
17	10.2	9.9	10.0	12.7	12.5	12.6	12.3	12.2	12.2	13.2	13.0	13.1			
18	10.3	10.0	10.1	12.6	12.4	12.5	12.4	12.2	12.3	13.1	13.0	13.1			
19	10.1	9.6	9.8	12.5	12.4	12.4	12.4	12.4	12.4	13.3	13.1	13.2			
20	9.9	9.5	9.7	12.8	12.5	12.7	12.5	12.4	12.5	13.3	13.2	13.3			
21	10.1	9.8	10.0	13.0	12.7	12.8	12.6	12.5	12.6	13.2	13.0	13.1			
22	10.1	9.8	9.9	---	---	---	12.7	12.6	12.7	13.1	12.8	12.9			
23	10.1	9.8	10.0	---	---	---	12.7	12.6	12.6	12.9	12.6	12.7			
24	10.3	10.0	10.1	---	---	---	12.6	12.5	12.6	12.7	12.5	12.6			
25	10.3	10.1	10.2	---	---	---	12.7	12.6	12.6	12.7	12.5	12.6			
26	10.4	10.1	10.2	---	---	---	12.9	12.7	12.7	12.6	12.3	12.4			
27	10.4	10.1	10.3	---	---	---	12.9	12.8	12.9	12.4	12.3	12.4			
28	10.3	10.0	10.2	---	---	---	12.9	12.9	12.9	12.5	12.4	12.4			
29	10.5	10.0	10.3	---	---	---	12.9	12.8	12.9	12.5	12.4	12.4			
30	10.6	10.4	10.5	---	---	---	13.0	12.8	12.8	12.5	12.4	12.4			
31	10.8	10.5	10.6	---	---	---	13.0	12.9	12.9	12.5	12.4	12.5			
MONTH	10.8	8.9	9.9	---	---	---	---	---	---	13.3	12.3	12.9			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	12.5	12.3	12.4	12.6	12.5	12.5	12.0	11.7	11.8	10.4	10.2	10.3	
2	12.3	12.2	12.2	12.6	12.4	12.5	12.0	11.8	11.9	10.4	10.1	10.2	
3	12.3	12.2	12.3	12.5	12.3	12.4	12.0	11.8	11.9	10.4	10.3	10.4	
4	12.3	12.2	12.3	12.6	12.4	12.5	11.9	11.7	11.8	10.5	10.2	10.4	
5	12.3	12.2	12.3	12.6	12.5	12.5	11.8	11.6	11.7	10.6	10.4	10.5	
6	12.3	12.2	12.2	12.5	12.4	12.4	11.7	11.5	11.5	10.6	10.4	10.5	
7	12.3	12.2	12.3	12.4	12.3	12.4	11.8	11.5	11.6	10.7	10.4	10.6	
8	12.4	12.3	12.3	12.5	12.4	12.5	12.0	11.7	11.8	10.6	10.5	10.6	
9	12.4	12.4	12.4	12.5	12.4	12.4	12.4	12.0	12.0	10.5	10.3	10.3	
10	12.5	12.4	12.5	12.4	12.3	12.4	12.2	12.0	12.1	10.6	10.2	10.4	
11	12.6	12.5	12.5	12.4	12.3	12.3	12.2	12.0	12.1	10.5	10.3	10.4	
12	12.6	12.4	12.5	12.3	12.2	12.2	12.1	12.0	12.1	10.4	10.2	10.3	
13	12.5	12.4	12.5	12.4	12.2	12.3	12.1	12.0	12.0	10.4	10.1	10.2	
14	12.6	12.4	12.5	12.5	12.4	12.4	12.1	11.9	12.0	10.4	10.1	10.2	
15	12.7	12.6	12.7	12.5	12.4	12.5	12.0	11.8	11.9	10.4	10.2	10.3	
16	12.7	12.5	12.6	12.5	12.4	12.4	11.9	11.6	11.8	10.6	10.2	10.4	
17	12.6	12.5	12.5	12.6	12.4	12.5	11.7	11.5	11.6	10.6	10.4	10.5	
18	12.7	12.6	12.6	12.6	12.5	12.5	11.6	11.4	11.5	10.8	10.4	10.7	
19	12.7	12.4	12.6	12.5	12.4	12.5	11.5	11.3	11.4	10.7	10.4	10.6	
20	12.4	12.4	12.4	12.7	12.5	12.6	11.4	11.2	11.3	10.8	10.3	10.6	
21	12.7	12.4	12.6	12.7	12.5	12.6	11.2	11.0	11.1	10.9	10.6	10.8	
22	12.6	12.4	12.5	12.5	12.4	12.4	11.1	11.0	11.0	10.9	10.7	10.8	
23	12.4	12.4	12.4	12.5	12.3	12.4	11.1	10.9	11.0	11.1	10.8	11.0	
24	12.5	12.4	12.5	12.6	12.4	12.5	11.1	10.9	11.0	11.0	10.8	10.9	
25	12.6	12.5	12.5	12.6	12.5	12.5	10.9	10.7	10.8	11.0	10.5	10.7	
26	12.7	12.6	12.6	12.5	12.1	12.3	10.9	10.8	10.8	10.7	10.2	10.5	
27	12.6	12.4	12.5	12.1	12.1	12.1	11.0	10.8	10.9	10.8	10.3	10.6	
28	12.5	12.4	12.4	12.2	11.9	12.1	10.9	10.7	10.8	10.8	10.5	10.6	
29	---	---	---	12.0	11.7	11.9	10.7	10.5	10.6	10.6	10.2	10.4	
30	---	---	---	11.8	11.7	11.7	10.6	10.4	10.5	10.4	9.7	10.1	
31	---	---	---	12.0	11.7	11.8	---	---	---	10.2	9.6	9.9	
MONTH	12.7	12.2	12.4	12.7	11.7	12.4	12.4	10.4	11.5	11.1	9.6	10.5	

STREAMS TRIBUTARY TO LAKE HURON

04137020 AU SABLE RIVER NEAR SOUTH BRANCH, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	10.3	10.1	10.2	8.5	6.5	7.5	8.4	8.1	8.2	8.8	8.5	8.6
2	10.3	10.0	10.1	8.3	7.3	7.9	8.4	7.6	8.1	8.9	8.5	8.7
3	10.2	9.8	10.0	8.0	7.6	7.8	8.2	7.6	7.9	8.8	8.3	8.5
4	10.0	9.8	9.9	7.6	7.2	7.4	8.3	7.7	8.0	9.0	8.4	8.7
5	9.8	9.4	9.6	8.3	7.4	7.8	8.0	7.5	7.8	9.2	8.8	9.0
6	9.5	9.1	9.3	8.5	7.9	8.2	8.5	7.7	7.9	9.2	8.7	8.9
7	9.3	8.7	8.9	8.4	7.9	8.2	8.8	8.3	8.5	8.9	8.7	8.8
8	9.0	8.6	8.8	8.2	7.5	7.9	8.7	8.4	8.6	8.8	8.4	8.6
9	9.0	8.5	8.8	8.3	8.1	8.3	8.7	8.3	8.5	8.5	8.2	8.3
10	8.6	8.4	8.5	9.0	8.1	8.6	8.6	8.2	8.4	8.9	8.4	8.6
11	8.6	8.2	8.3	9.1	8.6	8.8	8.6	8.0	8.3	8.8	8.4	8.7
12	8.3	7.9	8.2	9.3	8.7	8.9	8.2	7.5	8.0	8.6	8.0	8.4
13	8.3	7.9	8.1	9.2	8.7	8.9	8.9	8.1	8.6	8.9	8.2	8.5
14	8.1	7.6	7.9	9.0	8.5	8.7	9.0	8.5	8.7	9.4	8.7	8.9
15	8.3	7.8	8.0	8.8	8.1	8.5	9.0	8.6	8.8	9.3	8.8	9.0
16	8.1	7.5	7.8	8.4	8.0	8.2	9.1	8.7	8.9	9.6	8.7	9.1
17	7.9	7.5	7.7	8.3	7.9	8.1	8.9	8.5	8.7	9.9	9.0	9.5
18	8.2	7.7	7.9	8.1	7.8	8.0	8.9	8.5	8.7	9.7	9.2	9.4
19	8.2	7.8	8.1	8.1	7.7	7.9	9.2	8.6	8.8	9.7	9.3	9.5
20	8.5	7.6	8.1	7.9	7.4	7.6	9.1	8.6	8.9	9.4	8.9	9.1
21	8.2	7.5	7.9	7.5	7.0	7.3	9.1	8.7	8.9	9.0	8.6	8.8
22	8.3	7.7	7.9	7.3	7.0	7.1	8.8	8.5	8.7	9.5	8.8	9.1
23	8.4	7.8	8.1	7.7	7.0	7.3	9.1	8.5	8.8	9.7	9.3	9.5
24	8.5	7.9	8.1	7.9	7.5	7.7	9.6	8.9	9.1	9.8	9.4	9.6
25	8.3	7.9	8.1	8.2	7.7	7.9	9.5	8.9	9.2	9.8	9.6	9.7
26	8.4	7.6	7.8	8.2	7.8	8.0	9.4	9.0	9.2	9.7	9.4	9.5
27	8.2	7.6	7.9	8.3	7.8	8.1	9.4	8.9	9.1	9.7	9.3	9.5
28	8.1	7.5	7.8	8.3	7.8	8.1	9.3	9.0	9.1	9.8	9.4	9.6
29	7.8	7.2	7.4	8.2	7.9	8.1	9.2	8.6	8.9	9.7	9.3	9.5
30	7.3	6.9	7.1	8.1	7.6	7.9	8.9	8.6	8.7	9.4	8.7	9.0
31	---	---	---	8.3	7.9	8.1	8.8	8.5	8.6	---	---	---
MONTH	10.3	6.9	8.4	9.3	6.5	8.0	9.6	7.5	8.6	9.9	8.0	9.0

[illegible]

STREAMS TRIBUTARY TO LAKE HURON

04137025 AU SABLE RIVER NEAR GLENNIE, MI--Continued

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

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	14.5	13.5	14.0	24.0	24.0	24.0	23.5	23.0	23.5	19.0	18.5	18.5
2	15.5	14.5	14.5	24.0	24.0	24.0	23.5	23.0	23.0	19.0	18.5	18.5
3	16.5	15.5	15.5	24.0	23.0	24.0	23.0	22.5	23.0	18.5	18.5	18.5
4	17.5	16.0	16.5	23.0	22.0	22.5	22.5	22.5	22.5	18.5	18.0	18.0
5	17.5	17.0	17.5	22.0	21.5	22.0	22.5	22.0	22.5	18.0	18.0	18.0
6	18.0	17.5	17.5	22.0	21.0	21.5	22.0	22.0	22.0	18.5	17.5	18.0
7	18.5	18.0	18.0	21.5	21.0	21.0	22.5	22.0	22.0	18.0	18.0	18.0
8	18.5	18.0	18.5	21.0	20.5	20.5	22.5	22.0	22.0	18.0	17.5	17.5
9	19.0	18.5	18.5	20.5	20.0	20.0	22.5	22.0	22.0	17.5	17.5	17.5
10	20.0	19.0	19.5	20.0	19.5	20.0	23.0	22.5	22.5	18.0	17.5	18.0
11	20.5	20.0	20.0	21.0	20.0	20.5	22.5	22.0	22.0	17.5	17.0	17.5
12	21.0	20.5	20.5	21.5	20.5	21.0	22.0	21.0	21.5	17.0	17.0	17.0
13	21.5	21.0	21.0	22.0	21.5	21.5	21.0	21.0	21.0	17.0	17.0	17.0
14	21.5	20.5	21.0	23.0	22.0	22.5	21.0	20.0	20.5	17.5	17.0	17.0
15	21.0	20.5	21.0	23.5	22.5	23.5	20.0	20.0	20.0	18.0	17.5	17.5
16	21.0	20.5	20.5	24.0	23.0	23.5	20.5	20.0	20.0	18.0	17.5	17.5
17	20.5	20.0	20.5	24.5	23.5	24.0	20.0	19.5	20.0	18.0	17.5	18.0
18	20.5	20.0	20.5	24.5	24.0	24.0	19.5	19.0	19.0	18.5	17.5	18.0
19	20.5	20.0	20.0	24.0	23.5	24.0	19.0	18.5	19.0	18.0	18.0	18.0
20	20.5	20.0	20.5	24.0	23.5	23.5	19.0	18.5	19.0	18.0	17.5	18.0
21	20.5	20.5	20.5	23.5	22.5	23.0	18.5	18.0	18.5	17.5	17.0	17.5
22	21.5	20.5	21.0	22.5	22.0	22.5	18.0	17.5	18.0	17.0	16.5	17.0
23	21.0	20.5	20.5	22.5	22.0	22.0	17.5	17.0	17.5	17.0	16.5	16.5
24	22.0	21.0	21.5	22.5	22.0	22.0	17.0	17.0	17.0	18.5	16.0	16.0
25	23.0	22.0	22.5	23.0	22.5	22.5	17.5	17.0	17.5	16.0	15.5	15.5
26	23.5	22.5	23.0	23.5	22.5	23.0	18.0	17.5	18.0	15.5	15.0	15.5
27	23.5	22.5	23.0	24.0	23.0	23.5	19.0	18.0	18.5	15.0	15.0	15.0
28	24.0	23.0	23.5	24.5	23.5	24.0	18.5	18.5	18.5	15.5	15.0	15.0
29	24.0	23.5	23.5	24.0	23.5	23.5	18.5	18.5	18.5	15.5	15.5	15.5
30	24.0	23.5	24.0	23.5	23.5	23.5	18.5	18.0	18.5	15.5	15.0	15.0
31	---	---	---	24.0	23.5	23.5	18.5	18.0	18.5	---	---	---
MONTH	24.0	13.5	20.0	24.5	19.5	22.5	23.5	17.0	20.0	19.0	15.0	17.0

STREAMS TRIBUTARY TO LAKE HURON

04137025 AU SABLE RIVER NEAR GLENNIE, MI--Continued

OXYGEN DISSOLVED (MGL), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
OCTOBER				NOVEMBER			DECEMBER			JANUARY		
1	9.4	9.0	9.2	10.9	10.6	10.8	---	---	---	13.1	13.1	13.1
2	9.3	9.0	9.2	11.1	10.9	11.0	---	---	---	13.2	13.0	13.1
3	9.5	9.1	9.4	11.2	11.0	11.1	12.2	12.0	12.1	13.1	13.0	13.1
4	9.6	9.5	9.5	11.4	11.1	11.2	---	---	---	13.0	12.9	13.0
5	9.6	9.5	9.5	11.5	11.4	11.5	---	---	---	13.0	12.9	12.9
6	10.0	9.6	9.8	11.7	10.5	11.4	---	---	---	13.0	12.8	12.9
7	10.1	9.9	10.1	11.6	11.4	11.5	---	---	---	12.9	12.7	12.8
8	10.1	9.9	10.0	11.5	11.3	11.4	---	---	---	12.8	12.7	12.8
9	10.0	9.8	9.9	11.4	11.2	11.3	---	---	---	12.9	12.8	12.8
10	9.9	9.8	9.8	11.4	11.2	11.3	---	---	---	12.9	12.8	12.8
11	10.0	9.8	9.9	11.6	11.3	11.4	---	---	---	12.9	12.8	12.9
12	10.3	9.9	10.1	11.9	11.4	11.7	---	---	---	12.8	12.7	12.8
13	10.4	10.1	10.3	12.0	11.8	11.9	---	---	---	12.8	12.7	12.7
14	10.5	10.3	10.4	12.3	12.0	12.2	---	---	---	12.8	12.7	12.8
15	10.5	10.4	10.4	12.4	12.2	12.3	---	---	---	13.0	12.8	12.9
16	10.5	10.3	10.4	12.6	12.4	12.5	---	---	---	13.1	13.0	13.0
17	10.4	10.2	10.3	12.7	12.4	12.5	---	---	---	13.1	13.0	13.0
18	10.5	10.2	10.4	12.7	12.5	12.6	---	---	---	13.0	13.0	13.0
19	10.5	10.4	10.5	12.7	12.5	12.6	---	---	---	13.0	12.9	12.9
20	10.5	10.2	10.4	12.5	12.4	12.5	---	---	---	13.1	12.9	13.0
21	10.3	10.2	10.2	12.6	12.4	12.5	13.4	13.2	13.3	13.1	13.0	13.1
22	10.4	10.3	10.3	12.8	12.5	12.7	13.5	13.3	13.4	13.1	13.0	13.0
23	10.5	10.4	10.4	---	---	---	13.4	13.3	13.3	13.0	12.9	13.0
24	10.4	10.3	10.4	---	---	---	13.4	13.2	13.3	13.0	12.8	12.9
25	10.5	10.3	10.4	---	---	---	13.3	13.2	13.2	12.9	12.8	12.9
26	10.4	10.3	10.3	---	---	---	13.2	13.1	13.1	12.9	12.7	12.8
27	10.5	10.3	10.4	---	---	---	13.2	13.0	13.1	12.7	12.6	12.7
28	---	---	---	---	---	---	13.3	13.2	13.3	12.6	12.3	12.5
29	---	---	---	---	---	---	13.3	13.1	13.3	12.7	12.6	12.6
30	10.7	10.4	10.5	---	---	---	13.2	13.1	13.2	12.7	12.6	12.7
31	10.7	10.4	10.6	---	---	---	13.1	13.0	13.1	12.7	12.6	12.7
MONTH	---	---	---	---	---	---	---	---	---	13.2	12.3	12.9

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	12.8	12.7	12.7	12.5	12.4	12.4	11.9	11.8	11.8	10.4	10.3	10.4	
2	12.7	12.6	12.7	12.5	12.4	12.5	11.9	11.8	11.9	10.3	10.2	10.2	
3	12.6	12.4	12.5	12.6	12.4	12.5	11.9	11.8	11.8	10.3	10.2	10.2	
4	12.5	12.4	12.5	12.5	12.1	12.4	11.9	11.8	11.8	10.4	10.3	10.4	
5	12.5	12.5	12.5	12.6	12.4	12.5	11.9	11.6	11.8	10.5	10.3	10.4	
6	12.6	12.5	12.5	12.6	12.3	12.5	12.1	11.6	11.7	10.5	10.4	10.5	
7	12.5	12.4	12.5	12.4	12.3	12.3	12.7	12.1	12.4	10.6	10.5	10.5	
8	12.6	12.4	12.5	12.3	12.2	12.3	12.8	12.2	12.4	10.5	10.4	10.5	
9	12.6	12.5	12.6	12.4	12.3	12.3	12.3	12.2	12.3	10.5	10.4	10.4	
10	12.7	12.6	12.6	12.4	12.2	12.3	12.3	12.2	12.2	10.4	10.3	10.4	
11	12.7	12.6	12.6	12.3	12.2	12.3	12.3	12.2	12.2	10.4	10.3	10.3	
12	12.7	12.6	12.7	12.3	12.2	12.2	12.3	12.2	12.2	10.4	10.3	10.3	
13	12.7	12.6	12.7	12.2	12.1	12.2	12.2	12.1	12.2	10.4	10.1	10.3	
14	12.7	12.6	12.7	12.2	12.1	12.1	12.2	12.1	12.2	10.3	10.1	10.2	
15	12.8	12.6	12.7	12.2	12.1	12.2	12.1	12.0	12.1	10.2	10.2	10.2	
16	12.9	12.7	12.8	12.3	12.2	12.3	12.1	11.9	12.0	10.4	10.2	10.3	
17	12.9	12.7	12.8	12.3	12.2	12.2	11.9	11.6	11.8	10.5	10.3	10.4	
18	12.8	12.7	12.8	12.4	12.2	12.3	11.7	11.6	11.6	10.5	10.4	10.5	
19	12.8	12.7	12.7	12.5	12.4	12.4	11.6	11.5	11.5	10.6	10.4	10.5	
20	12.8	12.7	12.7	12.4	12.3	12.3	11.5	11.3	11.4	10.6	10.5	10.5	
21	12.7	12.6	12.6	12.5	12.3	12.4	11.4	11.1	11.3	10.8	10.5	10.6	
22	12.8	12.6	12.7	12.5	12.2	12.4	11.2	11.0	11.1	10.9	10.7	10.8	
23	12.7	12.6	12.7	12.3	12.1	12.2	11.0	10.9	10.9	10.9	10.7	10.8	
24	12.6	12.5	12.5	12.2	12.1	12.1	10.9	10.8	10.9	10.9	10.7	10.8	
25	12.6	12.5	12.6	12.3	12.1	12.2	10.9	10.8	10.9	10.8	10.6	10.7	
26	12.7	12.6	12.7	12.3	12.2	12.3	10.9	10.8	10.8	10.8	10.0	10.5	
27	12.7	12.6	12.6	12.3	12.0	12.2	10.9	10.8	10.8	10.7	10.1	10.6	
28	12.6	12.4	12.5	12.2	12.0	12.1	10.9	10.7	10.8	10.6	9.9	10.4	
29	---	---	---	12.9	12.0	12.1	10.7	10.6	10.7	10.7	9.7	10.3	
30	---	---	---	13.0	12.7	12.8	10.6	10.4	10.5	10.5	10.3	10.4	
31	---	---	---	13.1	11.8	12.8	---	---	---	10.3	10.0	10.1	
MONTH	12.9	12.4	12.6	13.1	11.8	12.3	12.8	10.4	11.6	10.9	9.7	10.4	

STREAMS TRIBUTARY TO LAKE HURON

04137025 AU SABLE RIVER NEAR GLENNIE, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	10.1	9.9	10.0	8.5	7.9	8.3	8.0	7.7	7.8	9.0	8.8	8.9
2	10.1	9.9	10.0	8.5	7.7	8.1	8.0	7.7	7.8	9.0	8.9	8.9
3	10.1	9.8	9.9	8.2	7.1	7.7	7.9	7.6	7.8	9.1	8.8	8.9
4	9.9	9.7	9.8	7.6	7.1	7.3	7.9	7.6	7.7	9.0	8.9	9.0
5	9.7	9.4	9.6	7.8	7.1	7.4	8.0	7.8	7.9	9.0	8.9	8.9
6	9.5	9.2	9.3	7.7	7.3	7.4	8.0	7.8	7.8	9.1	8.8	9.0
7	9.5	9.2	9.4	7.9	7.4	7.7	8.0	7.8	7.9	9.0	8.9	9.0
8	9.5	9.2	9.3	8.5	7.8	8.0	8.2	7.9	8.1	9.0	8.9	8.9
9	9.4	9.0	9.2	8.2	7.9	8.0	8.3	8.1	8.2	9.1	8.9	9.0
10	9.2	8.9	9.0	8.4	8.0	8.2	8.4	8.2	8.3	9.0	8.7	8.9
11	9.1	8.9	9.0	8.7	8.3	8.5	8.2	8.0	8.1	8.9	8.7	8.7
12	9.0	8.7	8.8	8.7	8.5	8.6	8.1	7.9	8.0	8.9	8.7	8.8
13	8.8	8.5	8.6	8.9	8.5	8.7	8.0	7.8	7.9	8.7	8.6	8.6
14	8.6	8.2	8.4	9.0	8.5	8.7	8.1	7.9	8.0	9.0	8.7	8.8
15	8.5	8.2	8.4	9.0	8.1	8.5	8.2	8.0	8.1	9.2	8.9	9.0
16	8.4	8.1	8.2	8.3	7.9	8.1	8.4	8.1	8.2	9.3	9.0	9.1
17	8.3	7.9	8.1	8.1	7.6	7.8	8.3	8.2	8.3	9.4	9.2	9.3
18	8.3	8.0	8.2	8.2	7.7	7.9	8.3	8.1	8.1	9.4	9.1	9.2
19	8.3	7.8	8.0	8.2	7.8	8.0	8.5	8.2	8.3	9.1	8.9	9.0
20	8.3	7.9	8.1	8.1	7.6	7.9	8.5	8.4	8.4	9.0	8.8	8.9
21	8.2	7.9	8.1	8.1	7.6	7.9	8.6	8.4	8.5	9.0	8.8	8.9
22	8.2	7.9	8.1	7.9	7.7	7.8	8.6	8.5	8.6	8.9	8.6	8.8
23	8.1	7.5	7.9	7.9	7.4	7.7	8.6	8.5	8.5	8.8	8.5	8.6
24	8.4	7.8	8.1	8.0	7.8	7.9	8.8	8.6	8.7	9.0	8.6	8.8
25	8.4	7.9	8.1	8.0	7.7	7.8	9.1	8.8	8.9	9.0	8.9	9.0
26	8.3	7.9	8.1	7.9	7.7	7.7	9.1	8.9	9.0	9.0	8.8	8.9
27	8.4	8.0	8.2	7.8	7.5	7.7	9.4	8.9	9.2	8.9	8.7	8.9
28	8.6	8.2	8.4	8.1	7.5	7.8	9.4	9.2	9.3	8.9	8.8	8.9
29	8.6	7.4	8.4	8.2	7.7	7.9	9.3	9.1	9.2	9.0	8.8	8.9
30	8.6	8.2	8.4	8.3	7.9	8.1	9.3	9.0	9.2	8.8	8.6	8.7
31	---	---	---	8.0	7.8	7.9	9.1	9.0	9.1	---	---	---
MONTH	10.1	7.4	8.7	9.0	7.1	8.0	9.4	7.6	8.4	9.4	8.5	8.9

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.--Water years 1996 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: July 1996 to current year.

DISSOLVED OXYGEN: July 1996 to current year.

INSTRUMENTATION.--Water-quality monitor telemeter, set for one hour measurement intervals.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 25.0°C, July 17, 18, 28, 1997; minimum, 0.0°C, on many days during winter periods

DISSOLVED OXYGEN: Maximum, 13.1 mg/L, Dec. 13, 1996; minimum, 6.5 mg/L, June 28, 1997.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 25.0°C, July 17, 18, 28; minimum, 0.0°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 13.1 mg/L, Dec. 13; minimum, 6.5 mg/L, June 28.

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

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

STREAMS TRIBUTARY TO LAKE HURON

04137030 AU SABLE RIVER NEAR SIDTOWN, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
OCTOBER				NOVEMBER				DECEMBER				JANUARY	
1	8.8	8.5	8.7	10.6	10.3	10.5	12.7	12.5	12.6	12.8	12.7	12.8	
2	9.0	8.5	8.7	10.9	10.5	10.7	12.7	12.6	12.7	12.8	12.7	12.8	
3	8.9	8.7	8.8	11.0	10.7	10.9	12.7	12.7	12.7	12.8	12.8	12.8	
4	8.9	8.5	8.7	11.2	10.8	11.0	12.8	12.7	12.7	12.8	12.7	12.7	
5	9.1	8.7	8.9	11.3	11.0	11.2	12.8	12.7	12.7	12.8	12.7	12.7	
6	9.4	8.8	9.1	11.3	11.0	11.2	12.8	12.7	12.7	12.8	12.7	12.7	
7	9.4	9.0	9.2	11.3	11.2	11.3	12.7	12.6	12.7	12.8	12.7	12.8	
8	9.2	9.0	9.2	11.5	11.2	11.3	12.8	12.7	12.7	12.8	12.7	12.8	
9	9.4	9.1	9.2	11.5	11.3	11.4	12.8	12.7	12.7	12.8	12.8	12.8	
10	9.7	9.3	9.5	11.5	11.3	11.4	12.7	12.6	12.7	12.9	12.8	12.9	
11	9.8	9.6	9.7	11.5	11.3	11.4	12.8	10.7	12.3	12.9	12.8	12.9	
12	10.0	9.7	9.9	11.4	11.2	11.3	12.6	12.5	12.6	13.0	12.8	12.9	
13	10.3	9.6	9.9	11.5	11.3	11.4	13.1	12.1	12.6	12.9	12.8	12.9	
14	10.3	9.9	10.1	11.6	11.3	11.5	12.7	12.4	12.6	12.9	12.8	12.8	
15	10.2	9.8	10.0	11.7	11.3	11.6	12.6	12.5	12.5	12.8	12.8	12.8	
16	10.3	10.0	10.1	11.8	11.4	11.7	12.6	12.5	12.6	12.8	12.7	12.8	
17	10.4	10.0	10.2	11.8	11.6	11.7	12.7	12.5	12.6	12.7	12.6	12.7	
18	10.4	10.1	10.3	12.0	11.6	11.8	12.7	12.7	12.7	12.7	12.6	12.7	
19	10.5	10.2	10.3	12.3	11.8	12.1	12.8	12.7	12.7	12.8	12.6	12.7	
20	10.3	10.0	10.2	12.4	12.2	12.3	12.8	12.7	12.8	12.8	12.7	12.7	
21	10.2	9.9	10.1	12.4	12.3	12.3	12.8	12.7	12.7	12.8	12.7	12.7	
22	10.2	9.8	9.9	12.4	12.3	12.4	12.8	12.7	12.8	12.8	12.7	12.7	
23	10.0	9.7	9.8	12.4	12.3	12.4	12.8	12.7	12.8	12.8	12.8	12.8	
24	10.1	9.8	9.9	12.4	12.3	12.4	12.8	12.5	12.7	12.8	12.8	12.8	
25	10.0	9.8	9.9	12.5	12.3	12.4	12.8	12.2	12.6	12.8	12.8	12.8	
26	10.1	9.9	10.0	12.7	12.5	12.6	12.8	12.6	12.7	12.8	12.7	12.7	
27	10.4	9.9	10.1	12.6	12.6	12.6	12.7	12.6	12.6	12.7	12.6	12.7	
28	10.4	10.0	10.2	12.6	12.5	12.6	12.7	12.4	12.7	12.7	12.6	12.6	
29	10.3	10.1	10.2	12.7	12.5	12.6	12.7	12.7	12.7	12.6	12.5	12.6	
30	10.3	10.2	10.2	12.6	12.5	12.6	12.7	12.7	12.7	12.6	12.5	12.6	
31	10.5	10.2	10.4	---	---	---	12.7	12.6	12.7	12.5	12.4	12.5	
MONTH	10.5	8.5	9.7	12.7	10.3	11.8	13.1	10.7	12.7	13.0	12.4	12.7	

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	12.5	12.4	12.4	12.2	12.2	12.2	12.1	12.0	12.1	12.2	12.0	12.0	
2	12.4	12.2	12.3	12.2	11.9	12.1	12.3	12.1	12.2	12.2	12.0	12.0	
3	12.3	12.2	12.2	12.1	11.9	12.1	12.3	12.2	12.3	12.1	11.9	12.0	
4	12.2	12.2	12.2	12.1	11.9	12.1	12.2	12.0	12.1	12.0	11.8	11.9	
5	12.3	12.0	12.2	12.1	11.9	12.1	12.0	11.8	11.9	11.9	11.8	11.8	
6	12.2	12.2	12.2	12.1	11.9	12.1	11.8	11.7	11.7	11.9	11.8	11.9	
7	12.2	12.2	12.2	12.1	11.9	12.1	11.9	11.7	11.8	11.9	10.6	11.3	
8	12.2	12.2	12.2	12.2	11.9	12.1	12.0	11.8	11.9	11.4	10.6	11.1	
9	12.2	12.0	12.1	12.1	11.9	12.0	12.2	12.0	12.1	11.6	11.2	11.4	
10	12.1	12.0	12.1	12.1	11.9	12.0	12.4	12.2	12.3	11.5	11.2	11.3	
11	12.1	12.0	12.1	12.1	11.9	12.0	12.3	12.3	12.3	11.4	11.2	11.3	
12	12.1	12.1	12.1	12.1	12.0	12.0	12.4	12.2	12.3	11.4	10.1	10.9	
13	12.1	12.0	12.1	12.0	12.0	12.0	12.3	12.2	12.3	10.9	9.7	10.4	
14	12.1	12.0	12.1	12.0	12.0	12.0	12.3	12.2	12.3	10.5	7.9	10.1	
15	12.2	12.1	12.1	12.0	12.0	12.0	12.3	12.2	12.2	10.5	9.7	10.1	
16	12.2	12.0	12.1	12.0	11.8	11.9	12.3	12.2	12.2	10.2	10.1	10.2	
17	12.1	12.0	12.1	11.9	11.7	11.9	12.3	12.2	12.2	10.1	9.9	10.0	
18	12.1	12.0	12.1	11.9	11.7	11.9	12.3	12.1	12.2	10.0	9.9	10.0	
19	12.2	12.1	12.1	11.9	11.7	11.9	12.3	12.1	12.2	10.1	9.9	10.0	
20	12.3	12.1	12.2	11.9	11.7	11.9	12.2	12.1	12.1	10.1	10.0	10.1	
21	12.2	12.1	12.2	11.9	11.9	11.9	12.1	12.0	12.1	10.2	10.0	10.1	
22	12.3	12.2	12.3	12.0	11.9	11.9	12.1	12.0	12.0	10.2	10.0	10.1	
23	12.3	12.2	12.2	12.0	11.7	11.9	12.1	12.0	12.0	10.3	10.1	10.2	
24	12.3	12.2	12.2	11.9	11.7	11.9	12.1	12.0	12.1	10.4	10.1	10.3	
25	12.2	12.1	12.2	11.8	11.7	11.8	12.1	11.9	12.0	10.3	10.1	10.2	
26	12.3	12.2	12.2	12.0	11.7	11.9	12.1	11.9	12.0	10.2	10.1	10.2	
27	12.3	12.2	12.2	12.1	12.0	12.0	12.2	12.0	12.1	10.3	10.1	10.2	
28	12.3	12.2	12.2	12.1	12.0	12.0	12.3	12.1	12.2	10.4	10.2	10.3	
29	---	---	---	12.2	12.0	12.1	12.4	12.2	12.3	10.4	10.1	10.3	
30	---	---	---	12.2	12.1	12.2	12.2	12.0	12.2	10.4	10.1	10.2	
31	---	---	---	12.1	12.0	12.1	---	---	---	10.2	10.1	10.1	
MONTH	12.5	12.0	12.2	12.2	11.7	12.0	12.4	11.7	12.1	12.2	7.9	10.7	

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.

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.

REVISED RECORDS.--WDR MI-96-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 583.93 ft above sea level.

REMARKS.--Water-discharge records good. Flow regulated by Foote Dam 0.6 mi upstream. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1500	1700	1630	1560	1520	1840	2440	2180	1630	1190	967	1320
2	1600	1460	1860	1550	1590	1700	2520	2360	1730	1230	1040	1110
3	1440	1320	1950	1430	1660	1580	2820	2400	1650	1570	1120	1190
4	1250	1300	1920	1450	1650	1740	3190	2420	1660	1650	1400	1170
5	1240	1310	1870	1900	1670	1910	3530	2190	1650	1310	1360	1140
6	1260	1260	1770	1990	1650	1870	3880	2150	1570	1180	1130	1090
7	1310	1270	1740	1910	1620	1630	5100	2230	1520	1190	1130	1060
8	1460	1330	1740	1940	1570	1520	3930	2080	1500	1490	1100	1080
9	1510	1340	1710	1930	1360	1680	2920	2030	1310	1660	1120	1140
10	1320	1340	1660	1830	1170	1760	3000	2000	1220	1600	1150	1720
11	1320	1340	1630	1660	1440	1640	3000	2000	1230	1550	1170	2020
12	1290	1350	1570	1540	1620	1610	2920	2070	1250	1310	1220	1720
13	1270	1340	1540	1550	1320	1630	2840	2090	1480	1130	1710	1490
14	1240	1340	1540	1560	1170	1700	2710	2070	1500	1260	1370	1370
15	1220	1490	1540	1560	1580	1670	2530	1910	1400	1090	1470	1340
16	1280	1610	1560	1470	1590	1540	2570	2800	1290	1090	1570	1390
17	1890	1480	1680	1150	1330	1450	2660	2440	1450	1330	1320	1620
18	2260	1330	1750	1000	1360	1500	2630	2190	1510	1230	1170	1140
19	2210	1350	1630	1060	1720	1540	2470	2240	1300	1200	1290	1560
20	1950	1490	1370	1480	1700	1520	2390	2300	1220	1190	1510	1780
21	1620	1620	1230	1720	1920	1580	2350	2200	1450	1230	1830	1600
22	1510	1580	1530	1680	2070	1670	2370	1960	1630	1230	1680	1280
23	1570	1520	1720	1740	2010	1680	2340	2010	1360	1240	1430	1210
24	1600	1310	1670	1710	1840	1620	2300	2020	1210	1250	1400	1350
25	1420	1170	1620	1750	1500	1700	2330	1890	1490	1190	1200	1280
26	1410	1250	1450	1720	1960	1780	2280	1820	1380	1150	1320	1140
27	1610	1310	1310	1460	1880	1850	2160	1680	1110	1180	1390	1150
28	1580	1320	1590	1430	1840	1910	2130	1690	1070	1130	1140	1200
29	1520	1510	1830	1600	---	2390	2130	1750	1070	1060	996	1390
30	1680	1600	1700	1590	---	2820	2040	1710	1120	1030	1040	1360
31	1870	---	1570	1550	---	2630	---	1710	---	961	1310	---
TOTAL	47210	41940	50880	49470	45310	54660	82480	64590	41960	39101	40053	40410
MEAN	1523	1398	1641	1596	1618	1763	2749	2084	1399	1261	1292	1347
MAX	2260	1700	1950	1990	2070	2820	5100	2800	1730	1660	1830	2020
MIN	1220	1170	1230	1000	1170	1450	2040	1680	1070	961	967	1060
CFSM	.88	.80	.94	.92	.93	1.01	1.58	1.20	.80	.73	.74	.77
IN.	1.01	.90	1.09	1.06	.97	1.17	1.76	1.38	.90	.84	.86	.86

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1997, BY WATER YEAR (WY)

MEAN	1439	1616	1516	1431	1367	1736	2185	1694	1447	1370	1346	1304
MAX	1770	1944	1870	1596	1618	2097	2749	2084	1952	2205	1834	1605
(WY)	1992	1992	1992	1997	1997	1990	1997	1997	1993	1994	1994	1994
MIN	1152	1100	1132	1259	1224	1533	1684	1456	1104	1056	1167	1099
(WY)	1990	1990	1990	1991	1989	1993	1990	1989	1988	1989	1991	1989

SUMMARY STATISTICS

	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1987 - 1997
ANNUAL TOTAL	580216	598064	
ANNUAL MEAN	1585	1639	1536
HIGHEST ANNUAL MEAN			1640
LOWEST ANNUAL MEAN			1397
HIGHEST DAILY MEAN	3090	5100	5430
LOWEST DAILY MEAN	866	961	455
ANNUAL SEVEN-DAY MINIMUM	1100	1040	656
INSTANTANEOUS PEAK FLOW		5170	5850
INSTANTANEOUS PEAK STAGE		15.31	16.27
INSTANTANEOUS LOW FLOW		762	135
ANNUAL RUNOFF (CFSM)	.91	.94	.88
ANNUAL RUNOFF (INCHES)	12.41	12.79	12.00
10 PERCENT EXCEEDS	2040	2250	2060
50 PERCENT EXCEEDS	1560	1560	1460
90 PERCENT EXCEEDS	1210	1170	1080

(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, 1996 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: April 1978 to September 1981.

WATER TEMPERATURE: April 1978 to September 1981, July 1996 to current year.

DISSOLVED OXYGEN: July 1996 to current year.

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, 1996-97): Maximum measured, 28.0°C, Aug. 8, 1979; minimum, 0.0°C, on many days during winter periods.

DISSOLVED OXYGEN: Maximum, 13.2 mg/L, Dec. 22, 1996; minimum, 7.0 mg/L, Sept. 2, 1996.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--Specific conductance of 354 microsiemens was measured Feb. 3, 1988.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURE: Maximum, 25.5°C, July 17; minimum, 0.0°C, on many days during winter period.

DISSOLVED OXYGEN: Maximum, 13.2 mg/L, Dec. 22; minimum, 7.1 mg/L, July 2, Aug. 6.

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	17.0	16.5	16.5	9.5	8.5	9.0	1.5	1.5	1.5	.5	.5	.5			
2	16.5	16.0	16.5	9.0	8.5	8.5	1.5	1.5	1.5	.5	.5	.5			
3	16.0	15.5	15.5	8.5	8.0	8.0	1.5	1.5	1.5	.5	.5	.5			
4	15.5	15.0	15.0	8.0	8.0	8.0	1.5	1.0	1.5	.5	.5	.5			
5	15.5	15.0	15.0	8.0	8.0	8.0	1.5	1.0	1.5	.5	.5	.5			
6	15.5	15.0	15.0	8.0	8.0	8.0	1.5	1.0	1.0	.5	.5	.5			
7	---	---	---	8.0	8.0	8.0	1.0	1.0	1.0	.5	.5	.5			
8	14.5	14.0	14.5	8.0	8.0	8.0	1.0	1.0	1.0	.5	.5	.5			
9	14.0	14.0	14.0	8.0	7.5	7.5	1.0	1.0	1.0	.5	.5	.5			
10	14.0	13.5	13.5	7.5	7.0	7.0	1.0	1.0	1.0	.5	.5	.5			
11	13.5	13.0	13.0	7.0	6.5	6.5	1.0	1.0	1.0	.5	.5	.5			
12	13.5	13.0	13.0	6.5	6.0	6.0	1.0	1.0	1.0	.5	.5	.5			
13	13.5	13.0	13.0	6.0	5.5	5.5	1.0	1.0	1.0	.5	.5	.5			
14	13.0	13.0	13.0	5.5	5.0	5.0	1.0	1.0	1.0	.5	.0	.5			
15	13.0	12.5	13.0	5.0	4.5	4.5	1.0	1.0	1.0	.0	.0	.0			
16	13.0	12.5	12.5	4.5	4.5	4.5	1.0	1.0	1.0	.0	.0	.0			
17	12.5	12.5	12.5	4.5	4.5	4.5	1.0	1.0	1.0	.0	.0	.0			
18	12.5	12.5	12.5	4.5	4.0	4.5	1.0	.5	1.0	.0	.0	.0			
19	12.5	12.0	12.0	4.0	4.0	4.0	1.0	.5	1.0	.0	.0	.0			
20	12.0	12.0	12.0	4.0	3.5	3.5	1.0	.5	.5	.0	.0	.0			
21	12.0	12.0	12.0	3.5	3.0	3.5	1.0	.5	.5	.0	.0	.0			
22	12.0	12.0	12.0	3.0	3.0	3.0	1.0	1.0	1.0	.0	.0	.0			
23	12.0	11.5	12.0	3.0	2.5	3.0	1.0	1.0	1.0	.0	.0	.0			
24	11.5	11.5	11.5	2.5	2.5	2.5	1.0	1.0	1.0	.0	.0	.0			
25	11.5	11.0	11.5	2.5	2.5	2.5	1.0	1.0	1.0	.0	.0	.0			
26	11.5	11.0	11.5	2.5	2.0	2.0	1.0	1.0	1.0	.0	.0	.0			
27	12.0	11.0	11.5	2.0	1.5	2.0	1.0	1.0	1.0	.0	.0	.0			
28	11.5	11.5	11.5	1.5	1.5	1.5	1.0	1.0	1.0	.0	.0	.0			
29	11.5	11.0	11.0	1.5	1.5	1.5	1.0	.5	1.0	.0	.0	.0			
30	11.0	10.5	11.0	1.5	1.5	1.5	1.0	.5	.5	.0	.0	.0			
31	10.5	9.5	10.0	---	---	---	.5	.5	.5	.0	.0	.0			
MONTH-	--	---	---	9.5	1.5	5.0	1.5	.5	1.0	.5	.0	.0			

STREAMS TRIBUTARY TO LAKE HURON

04137500 AU SABLE RIVER NEAR AU SABLE, MI--Continued

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

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

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
JUNE				JULY			AUGUST			SEPTEMBER		
1	13.5	13.0	13.0	24.0	23.0	23.5	24.0	23.5	24.0	20.5	20.0	20.0
2	14.0	13.0	13.5	23.5	22.5	23.5	24.5	23.5	24.0	20.5	20.0	20.0
3	14.5	13.5	14.0	24.0	23.5	24.0	24.0	23.5	23.5	20.0	19.5	20.0
4	16.0	14.0	15.0	23.5	22.5	23.0	23.5	23.5	23.5	20.0	19.0	19.5
5	16.0	15.0	15.5	23.0	22.0	22.5	23.5	23.0	23.0	19.5	19.0	19.5
6	16.0	15.0	15.5	22.5	22.0	22.0	23.5	22.5	23.0	20.0	19.0	19.5
7	16.5	15.0	16.0	22.0	21.5	22.0	23.5	22.5	23.0	19.5	19.0	19.5
8	17.0	16.0	16.5	21.5	21.0	21.5	24.0	23.0	23.0	19.0	19.0	19.0
9	18.0	16.5	17.5	21.0	21.0	21.0	23.5	23.0	23.5	19.0	19.0	19.0
10	19.0	17.0	18.0	21.5	21.0	21.0	23.5	23.0	23.5	19.0	19.0	19.0
11	19.0	17.5	18.5	22.0	21.0	21.5	23.5	22.5	23.0	19.0	18.5	18.5
12	19.5	18.0	19.0	22.5	21.5	22.0	22.5	22.5	22.5	18.5	18.5	18.5
13	20.0	18.5	19.0	23.0	22.0	22.5	22.5	22.0	22.5	19.0	18.5	18.5
14	20.0	18.5	19.0	24.0	22.0	23.0	22.5	22.0	22.0	19.0	18.5	18.5
15	19.5	18.5	19.0	25.0	23.5	24.0	22.0	21.5	22.0	19.5	18.5	19.0
16	20.0	19.0	19.5	24.5	23.5	24.0	22.5	21.5	22.0	19.0	18.5	19.0
17	19.5	19.0	19.0	25.5	24.0	24.5	22.0	21.5	21.5	19.5	18.5	19.0
18	19.5	19.0	19.0	25.0	23.5	24.0	21.5	21.0	21.5	19.5	19.0	19.0
19	20.0	19.0	19.5	24.0	23.5	24.0	21.5	21.0	21.0	19.0	19.0	19.0
20	20.5	19.0	19.5	23.5	23.0	23.5	21.0	20.5	21.0	19.0	18.5	19.0
21	20.0	20.0	20.0	23.5	23.0	23.0	20.5	20.0	20.5	18.5	18.0	18.5
22	21.5	20.0	20.5	23.5	23.0	23.0	20.0	20.0	20.0	18.5	18.0	18.0
23	21.0	20.5	20.5	23.5	23.0	23.0	20.5	19.5	20.0	18.0	17.5	18.0
24	22.5	20.5	21.5	23.5	23.0	23.0	20.0	20.0	20.0	18.0	17.5	17.5
25	23.5	22.0	22.5	24.0	23.0	23.5	20.0	19.5	20.0	17.5	17.0	17.5
26	23.0	22.0	22.5	24.0	23.5	23.5	20.0	19.5	20.0	17.5	17.0	17.0
27	23.5	22.0	22.5	24.5	23.5	24.0	21.0	20.0	20.5	17.5	17.0	17.0
28	23.0	22.0	22.5	25.0	24.0	24.5	20.5	20.0	20.5	17.5	17.0	17.0
29	23.5	22.5	23.0	24.5	24.0	24.0	20.5	20.0	20.0	17.5	17.0	17.0
30	24.0	23.0	23.0	24.5	23.5	24.0	20.5	20.0	20.0	17.0	16.5	17.0
31	---	---	---	24.5	23.5	24.0	20.0	20.0	20.0	---	---	---
MONTH	24.0	13.0	19.0	25.5	21.0	23.0	24.5	19.5	22.0	20.5	16.5	18.5

STREAMS TRIBUTARY TO LAKE HURON

04137500 AU SABLE RIVER NEAR AU SABLE, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN			
OCTOBER				NOVEMBER				DECEMBER				JANUARY			
1	8.7	8.4	8.5	10.3	10.0	10.1	12.5	12.3	12.4	12.7	12.4	12.6			
2	8.9	8.4	8.6	10.5	10.1	10.3	12.6	12.4	12.5	12.6	12.4	12.5			
3	9.0	8.7	8.8	10.7	10.4	10.6	12.6	12.5	12.5	12.7	12.4	12.5			
4	9.0	8.7	8.9	10.8	10.5	10.7	12.6	12.5	12.6	12.6	12.2	12.4			
5	9.3	8.9	9.1	10.8	10.6	10.7	12.6	12.3	12.5	12.4	12.2	12.3			
6	9.2	8.9	9.0	10.7	10.5	10.6	12.5	12.3	12.4	12.4	12.3	12.3			
7	---	---	---	10.8	10.6	10.7	12.5	12.3	12.4	12.5	12.2	12.3			
8	9.0	8.8	9.0	10.7	10.6	10.7	12.5	12.3	12.4	12.5	12.3	12.3			
9	9.3	9.0	9.2	10.8	10.6	10.7	12.5	12.4	12.4	12.4	12.2	12.3			
10	9.4	9.0	9.2	10.9	10.7	10.8	12.8	12.4	12.6	12.4	12.2	12.3			
11	9.6	9.3	9.5	11.0	10.8	10.9	12.8	12.6	12.7	12.5	12.2	12.4			
12	9.6	9.4	9.5	11.2	11.0	11.2	12.9	12.6	12.8	12.6	12.4	12.5			
13	9.9	9.5	9.6	11.4	11.1	11.3	13.0	12.8	12.9	12.6	12.4	12.5			
14	9.8	9.5	9.6	11.5	11.3	11.4	13.0	12.8	12.9	12.6	12.4	12.5			
15	9.8	9.5	9.7	11.5	11.3	11.4	12.9	12.7	12.8	12.5	12.3	12.4			
16	9.8	9.4	9.6	11.7	11.4	11.6	13.0	12.7	12.9	12.8	12.3	12.5			
17	9.5	9.3	9.5	11.8	11.6	11.7	12.9	12.7	12.8	12.8	12.6	12.7			
18	9.6	9.4	9.5	11.9	11.8	11.9	13.0	12.8	12.9	12.8	12.6	12.7			
19	9.7	9.4	9.6	12.0	11.8	11.9	13.0	12.8	12.9	12.8	12.6	12.7			
20	9.8	9.6	9.7	12.1	11.9	12.0	13.1	12.9	13.0	12.8	12.4	12.6			
21	9.8	9.5	9.6	12.1	12.0	12.1	13.1	13.0	13.1	12.6	12.4	12.5			
22	9.7	9.5	9.6	12.2	12.1	12.1	13.2	12.8	13.0	12.7	12.4	12.6			
23	9.6	9.5	9.6	12.2	12.1	12.2	13.0	12.7	12.8	12.7	12.5	12.6			
24	9.8	9.5	9.6	12.3	12.1	12.2	12.9	12.7	12.8	12.8	12.4	12.6			
25	10.0	9.6	9.8	12.3	12.1	12.2	12.9	12.7	12.8	12.8	12.5	12.7			
26	9.9	9.7	9.8	12.5	12.2	12.4	13.0	12.7	12.9	12.8	12.6	12.7			
27	10.0	9.7	9.9	12.6	12.5	12.6	13.0	12.7	12.8	12.8	12.5	12.6			
28	10.0	9.8	9.9	12.7	12.5	12.6	12.8	12.5	12.7	12.7	12.5	12.6			
29	9.9	9.6	9.8	12.6	12.5	12.6	12.7	12.5	12.6	12.7	12.5	12.6			
30	9.7	9.5	9.6	12.5	12.4	12.4	12.8	12.4	12.6	12.6	12.4	12.5			
31	10.1	9.7	9.9	---	---	---	12.7	12.5	12.6	12.6	12.4	12.5			
MONTH	---	---	---	12.7	10.0	11.5	13.2	12.3	12.7	12.8	12.2	12.5			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	
FEBRUARY				MARCH				APRIL				MAY	
1	12.6	12.4	12.5	12.2	12.1	12.2	12.0	11.9	12.0	10.7	10.5	10.6	
2	12.6	12.3	12.5	12.3	12.1	12.3	12.0	11.9	12.0	10.6	10.4	10.5	
3	12.5	12.3	12.4	12.3	12.2	12.3	12.0	11.9	12.0	10.5	10.3	10.4	
4	12.4	12.2	12.3	12.3	12.2	12.2	12.0	11.9	11.9	10.5	10.3	10.4	
5	12.4	12.2	12.3	12.2	12.1	12.1	12.0	11.9	11.9	10.4	10.2	10.4	
6	12.4	12.2	12.3	12.2	12.0	12.1	12.2	12.0	12.1	10.5	10.2	10.4	
7	12.4	12.2	12.3	12.3	12.1	12.2	12.5	12.2	12.4	10.4	10.2	10.3	
8	12.5	12.2	12.3	12.3	12.2	12.2	12.5	12.0	12.2	10.4	10.2	10.3	
9	12.4	12.1	12.3	12.3	12.1	12.2	12.1	12.0	12.1	10.4	10.2	10.3	
10	12.4	12.2	12.3	12.2	12.1	12.2	12.2	12.1	12.1	10.4	10.2	10.3	
11	12.3	12.1	12.2	12.2	12.1	12.2	12.2	12.1	12.1	10.3	10.1	10.3	
12	12.2	12.1	12.2	12.2	12.1	12.2	12.1	12.0	12.0	10.3	10.1	10.2	
13	12.5	12.1	12.3	12.2	12.1	12.2	12.0	12.0	12.0	10.2	10.0	10.1	
14	12.5	12.0	12.3	12.1	12.1	12.1	12.0	11.8	12.0	10.1	9.9	10.0	
15	12.2	12.1	12.1	12.2	12.1	12.2	12.0	11.9	11.9	10.2	9.9	10.0	
16	12.2	12.0	12.1	12.3	12.1	12.2	11.9	11.8	11.8	10.1	10.0	10.1	
17	12.4	12.0	12.2	12.2	12.1	12.1	11.8	11.7	11.8	10.1	10.0	10.1	
18	12.4	12.1	12.2	12.2	12.1	12.2	11.9	11.7	11.8	10.1	9.9	10.0	
19	12.2	12.1	12.1	12.2	12.0	12.1	11.8	11.7	11.8	10.2	9.6	9.9	
20	12.2	12.0	12.2	12.1	12.0	12.1	11.8	11.6	11.7	10.1	9.7	9.9	
21	12.1	11.9	12.0	12.1	12.0	12.0	11.7	11.5	11.6	10.1	9.7	9.9	
22	12.1	11.9	12.0	12.1	12.0	12.1	11.6	11.4	11.5	10.1	9.7	9.9	
23	12.1	12.0	12.1	12.1	11.9	12.0	11.4	11.3	11.4	10.0	9.6	9.8	
24	12.2	12.0	12.1	12.1	11.9	12.0	11.4	11.2	11.3	10.0	9.4	9.8	
25	12.3	12.1	12.2	11.9	11.8	11.9	11.3	11.2	11.3	10.0	9.5	9.8	
26	12.2	12.1	12.1	12.0	11.8	11.9	11.4	11.2	11.3	10.0	9.5	9.7	
27	12.2	12.0	12.1	11.9	11.8	11.9	11.2	11.1	11.1	9.7	9.4	9.5	
28	12.2	12.1	12.2	11.9	11.8	11.8	11.2	10.9	11.0	10.0	9.2	9.6	
29	---	---	---	11.9	11.7	11.8	11.3	10.7	11.0	9.7	9.3	9.5	
30	---	---	---	12.0	11.8	11.9	11.0	10.6	10.8	9.8	9.3	9.6	
31	---	---	---	12.0	11.9	11.9	---	---	---	9.8	9.5	9.7	
MONTH	12.6	11.9	12.2	12.3	11.7	12.1	12.5	10.6	11.7	10.7	9.2	10.0	

STREAMS TRIBUTARY TO LAKE HURON

04137500 AU SABLE RIVER NEAR AU SABLE, MI--Continued

OXYGEN DISSOLVED (MG/L), WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	10.0	9.6	9.8	8.0	7.5	7.6	8.1	7.7	7.9	8.0	7.5	7.8
2	10.0	9.4	9.8	7.7	7.1	7.5	8.0	7.6	7.8	8.3	7.7	8.1
3	10.0	9.4	9.7	7.8	7.4	7.6	7.9	7.4	7.7	8.3	7.9	8.1
4	10.2	9.5	9.9	7.8	7.5	7.6	7.6	7.2	7.4	8.3	7.8	8.0
5	10.0	9.2	9.7	7.9	7.5	7.7	7.6	7.2	7.4	8.3	7.9	8.1
6	10.0	9.5	9.8	8.0	7.5	7.7	7.8	7.1	7.5	8.4	7.9	8.1
7	10.0	9.5	9.8	7.9	7.5	7.6	7.9	7.3	7.6	8.1	7.9	8.0
8	9.8	9.3	9.6	7.6	7.3	7.5	7.8	7.3	7.6	8.1	7.8	8.0
9	9.7	9.3	9.5	8.4	7.4	7.7	7.7	7.3	7.5	8.2	7.9	8.0
10	9.6	9.3	9.4	7.8	7.4	7.6	7.8	7.3	7.5	8.1	7.8	7.9
11	9.4	9.0	9.2	8.0	7.5	7.9	7.9	7.5	7.7	8.1	8.0	8.1
12	9.1	8.9	9.0	8.4	7.8	8.1	7.8	7.4	7.6	8.2	8.0	8.1
13	9.0	8.8	8.9	8.4	8.1	8.3	7.8	7.4	7.6	8.4	8.1	8.2
14	9.0	8.7	8.8	8.5	8.0	8.2	7.9	7.3	7.6	8.5	8.1	8.3
15	8.9	8.5	8.7	8.4	8.0	8.2	7.6	7.2	7.4	8.6	8.2	8.4
16	8.8	8.4	8.6	8.2	7.7	8.0	7.8	7.3	7.5	8.5	8.1	8.3
17	8.6	8.4	8.5	8.4	7.7	8.1	7.7	7.3	7.6	8.5	7.9	8.2
18	8.7	8.3	8.5	7.9	7.3	7.7	8.0	7.5	7.8	8.7	8.1	8.3
19	8.8	8.3	8.4	7.8	7.3	7.6	7.9	7.4	7.7	8.4	8.0	8.2
20	8.8	8.4	8.5	7.8	7.4	7.6	7.6	7.4	7.6	8.4	8.1	8.2
21	8.5	8.1	8.3	7.9	7.4	7.6	7.9	7.4	7.7	8.4	8.1	8.2
22	8.4	8.1	8.2	8.0	7.4	7.7	7.9	7.6	7.7	8.5	8.0	8.2
23	8.2	8.0	8.1	7.9	7.4	7.6	8.2	7.7	7.9	8.6	8.1	8.4
24	8.3	7.8	8.1	8.1	7.2	7.8	8.3	7.7	8.0	8.8	8.4	8.5
25	8.4	7.8	8.2	8.1	7.3	7.7	8.1	7.6	7.8	8.7	8.3	8.5
26	8.2	7.8	8.0	8.2	7.8	8.0	8.3	7.4	7.9	8.8	8.4	8.6
27	8.1	7.7	7.9	8.5	7.7	8.0	8.2	7.8	8.0	8.8	8.4	8.6
28	8.0	7.6	7.8	8.4	7.5	8.0	8.2	7.8	8.0	8.7	8.3	8.5
29	7.9	7.5	7.8	8.5	7.7	8.0	8.1	7.8	7.9	8.7	8.3	8.5
30	7.9	7.5	7.7	8.2	7.6	7.9	8.0	7.5	7.8	8.7	8.3	8.5
31	---	---	---	8.2	7.7	7.9	7.8	7.5	7.7	---	---	---
MONTH	10.2	7.5	8.8	8.5	7.1	7.8	8.3	7.1	7.7	8.8	7.5	8.2

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 1°36-61.

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 470 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	255	408	338	e260	e330	e660	1280	384	318	172	157	183
2	237	328	852	e250	e320	e850	1240	468	293	193	159	182
3	223	293	713	e250	e320	e1200	1390	416	274	209	157	171
4	213	277	465	e400	e320	e1000	1450	390	257	193	169	163
5	208	287	385	e850	e320	e850	1430	349	245	184	172	161
6	206	298	356	e700	e320	e650	1540	444	238	176	161	161
7	211	320	349	e550	e320	e500	1420	417	231	180	161	161
8	225	388	341	e450	e320	e450	1070	373	225	216	162	161
9	225	351	327	e400	e310	e420	788	559	220	326	158	164
10	219	308	315	e370	e300	e400	679	529	215	228	158	189
11	210	281	307	e350	e290	e450	622	418	206	193	170	358
12	205	265	311	e330	e280	e420	587	444	209	181	190	468
13	205	248	382	e310	e270	e400	580	416	211	174	356	332
14	202	235	411	e290	e270	e380	670	390	202	171	239	257
15	200	e220	404	e270	e260	e370	640	597	193	169	217	220
16	198	e210	483	e260	e260	e360	606	995	193	165	270	209
17	199	238	473	e250	e260	411	597	796	201	181	224	223
18	226	265	411	e250	e280	440	517	659	191	177	217	261
19	288	263	e290	e240	e350	422	457	689	186	170	197	313
20	263	250	e270	e240	e500	412	410	665	202	159	200	543
21	254	237	e250	e240	e1000	502	405	535	244	169	488	396
22	247	230	e240	e450	e1700	757	422	455	277	170	440	291
23	274	231	e230	e800	e1400	759	408	399	233	183	285	248
24	400	232	e300	e650	e1100	641	385	354	213	175	224	221
25	353	227	e400	e550	e900	667	386	351	213	175	207	209
26	302	224	e350	e500	e800	821	369	349	202	277	192	199
27	273	e210	e330	e450	e740	957	353	317	188	268	187	193
28	265	e205	e300	e410	e700	1460	340	300	179	194	178	191
29	260	e200	e280	e380	---	1790	332	291	175	173	173	206
30	401	222	e270	e360	---	1900	324	326	172	164	172	202
31	559	---	e260	e340	---	1560	---	337	---	160	175	---
TOTAL	8006	7951	11393	12400	14540	22859	21697	14412	6606	5925	6615	7253
MEAN	258	265	368	400	519	737	723	465	220	191	213	242
MAX	559	408	852	850	1700	1900	1540	995	318	326	488	543
MIN	198	200	230	240	260	360	324	291	172	159	157	161
CFSM	.81	.83	1.15	1.25	1.62	2.30	2.26	1.45	.69	.60	.67	.76
IN.	.93	.92	1.32	1.44	1.69	2.66	2.52	1.68	.77	.69	.77	.84

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1937 - 1997, BY WATER YEAR (WY)

	MEAN	241	295	289	253	285	565	645	396	289	196	182	207
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1937 - 1997

ANNUAL TOTAL	140490												
ANNUAL MEAN	384												
HIGHEST ANNUAL MEAN										(a)321			
LOWEST ANNUAL MEAN										501			1991
HIGHEST DAILY MEAN	2960									166			1964
LOWEST DAILY MEAN	161					Jun 19	1900	Mar 30	4500				Mar 28 1950
ANNUAL SEVEN-DAY MINIMUM	164					Sep 6	157	Aug 1	98				Jul 30 1964
INSTANTANEOUS PEAK FLOW						Sep 2	162	Jul 31	105				Jul 26 1964
INSTANTANEOUS LOW FLOW							(b)1950	Mar 30	(c)5340				Mar 28 1950
ANNUAL RUNOFF (CFSM)	1.20						(d)7.33	Feb 22	13.74				Mar 28 1950
ANNUAL RUNOFF (INCHES)	16.33						153	(f)	(g)75				Nov 22 1964
10 PERCENT EXCEEDS	652						1.20		1.00				
50 PERCENT EXCEEDS	300						16.24		13.62				
90 PERCENT EXCEEDS	190						693		568				
							290		230				
							175		150				

(a) Does not include water year 1937.

(b) Gage height 6.90 ft.

(c) From rating curve extended above 3,800 ft³/s.

(d) Backwater from ice.

(e) Estimated.

(f) Aug. 3, 10.

(g) Result of freezeup.

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 power-plant at Shiawassee town prior to February 1953; occasional regulation at low stages since. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	223	254	255	e560	404	2190	1190	272	493	141	148	162
2	206	281	373	610	393	2290	1270	409	507	151	135	156
3	190	293	399	683	403	1950	1330	464	466	172	126	143
4	182	287	320	635	504	1710	1260	343	409	192	123	136
5	179	260	283	739	712	1550	1160	307	334	182	118	129
6	177	238	284	695	781	1400	1070	353	291	166	118	124
7	182	345	280	621	e680	1230	820	397	285	157	113	116
8	176	578	281	501	e600	1000	770	473	287	152	104	107
9	171	585	283	432	e500	734	782	595	287	187	107	117
10	163	641	276	e370	e430	755	720	669	280	183	104	154
11	159	731	269	e350	e370	941	664	672	251	154	103	164
12	154	707	276	e330	e330	866	701	649	242	137	122	287
13	148	662	352	e320	e305	795	871	595	220	124	127	261
14	143	527	434	374	e290	777	881	497	208	115	122	261
15	137	374	463	e320	e280	766	751	396	206	105	178	286
16	130	319	e400	e300	e280	716	617	388	195	96	226	230
17	115	301	e340	e290	e280	749	562	444	185	94	273	251
18	125	291	e290	e280	e280	871	545	451	179	92	214	256
19	89	311	e227	e275	e480	919	583	637	194	84	206	298
20	100	418	e190	e270	756	856	572	822	215	78	198	326
21	115	417	214	e270	2780	810	498	730	221	121	176	315
22	114	400	524	623	3040	730	429	779	239	84	172	317
23	137	353	689	1300	2130	565	403	696	227	70	181	285
24	130	276	1200	1120	1810	499	385	489	228	76	183	245
25	154	254	887	834	1690	598	374	410	226	72	193	213
26	196	223	615	710	1650	717	355	397	214	193	197	175
27	222	200	e500	627	2180	722	330	383	171	232	167	154
28	282	215	e450	512	2380	794	308	368	157	233	153	159
29	217	233	e470	466	---	1190	275	384	151	225	147	176
30	202	228	e560	442	---	1190	257	402	146	248	154	173
31	203	---	e590	426	---	1160	---	430	---	181	163	---
TOTAL	5121	11202	12974	16285	26718	32040	20733	15301	7714	4497	4851	6176
MEAN	165	373	419	525	954	1034	691	494	257	145	156	206
MAX	282	731	1200	1300	3040	2290	1330	822	507	248	273	326
MIN	89	200	190	270	280	499	257	272	146	70	103	107
CFSM	.31	.69	.78	.98	1.77	1.92	1.28	.92	.48	.27	.29	.38
IN.	.35	.77	.90	1.13	1.85	2.22	1.43	1.06	.53	.31	.34	.43

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1997, BY WATER YEAR (WY)

	197	265	322	350	453	768	727	459	279	167	123	146
MEAN	197	265	322	350	453	768	727	459	279	167	123	146
MAX	1442	985	922	1066	1728	1682	2060	1950	1051	868	578	522
(WY)	1982	1993	1976	1993	1938	1948	1947	1956	1989	1994	1992	1575
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	1571

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1931 - 1997
ANNUAL TOTAL	145494	163612	
ANNUAL MEAN	398	448	357
HIGHEST ANNUAL MEAN			629
LOWEST ANNUAL MEAN			97.7
HIGHEST DAILY MEAN	2580	3040	5920
LOWEST DAILY MEAN	61	70	2.0
ANNUAL SEVEN-DAY MINIMUM	65	84	7.7
INSTANTANEOUS PEAK FLOW		3600	6240
INSTANTANEOUS PEAK STAGE		8.00	10.35
INSTANTANEOUS LOW FLOW			.20
ANNUAL RUNOFF (CFSM)	.74	.83	.66
ANNUAL RUNOFF (INCHES)	10.06	11.31	9.01
10 PERCENT EXCEEDS	895	843	800
50 PERCENT EXCEEDS	281	291	201
90 PERCENT EXCEEDS	97	130	65

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04146000 FARMERS CREEK NEAR LAPEER, MI

LOCATION.--Lat 43°02'41", long 83°20'14", in sec.6, T.7 N., R.10 E., Lapeer County, Hydrologic Unit 04080204, on left bank on grounds of Oakdale Regional Center for Developmental Disabilities, 2.0 mi west of Lapeer.

DRAINAGE AREA.--55.3 mi².

PERIOD OF RECORD.--October 1932 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1940. WSP 1084: 1942(M), 1943. WSP 1337: 1934-38, 1940(M), 1944(M), 1945, 1946(M), 1948-5' (M). WSP 1727: 1952(M). WDR MI-78-1: Drainage area.

GAGE.--Water-stage recorder. Concrete control since Oct. 12, 1938. Datum of gage is 805.79 ft above sea level. Prior to May 25, 1954, nonrecording gage at same site and datum.

REMARKS.--Records good except for estimated daily discharges, which are poor. Prior to 1941, occasional regulation caused by dam upstream from station. Several measurements of water temperature were made during the year.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	48	36	91	e40	195	119	14	40	9.8	5.9	8.7
2	33	48	37	82	e39	201	121	14	39	14	5.6	8.8
3	27	46	40	83	e38	179	113	18	38	23	4.3	8.9
4	24	40	42	82	e39	156	101	16	37	27	4.0	8.3
5	20	36	43	86	e43	133	92	16	34	33	3.8	8.4
6	15	48	43	83	e54	116	85	19	32	23	3.4	8.3
7	12	56	43	e78	62	103	79	30	33	16	3.3	7.1
8	15	69	41	e68	61	93	74	48	37	13	3.3	6.6
9	15	82	41	e43	53	85	68	63	34	13	3.1	6.5
10	18	101	39	e35	e45	81	63	77	27	16	3.0	32
11	18	104	38	e40	e38	81	60	77	22	20	2.9	50
12	17	92	40	e43	e34	79	61	70	19	19	2.7	77
13	16	78	50	e46	e32	77	62	63	20	16	5.3	87
14	11	65	53	e46	e29	84	64	57	20	14	8.8	83
15	9.4	55	62	e45	e28	85	67	56	18	13	14	73
16	11	49	68	e40	e26	91	67	58	16	13	16	51
17	18	44	e66	e32	e25	89	65	87	14	12	20	37
18	24	39	e60	e29	e26	86	62	95	13	10	22	33
19	26	37	e44	e33	e41	81	58	105	12	9.0	20	45
20	29	35	e40	e37	62	77	54	92	11	8.2	18	45
21	41	33	e36	e45	142	73	51	91	12	8.4	19	40
22	45	31	e34	e53	171	69	44	86	17	8.9	21	38
23	43	30	e40	e56	281	66	32	77	24	9.4	22	33
24	53	31	e56	e63	288	62	29	61	27	9.4	21	28
25	57	33	84	e68	236	65	28	48	27	8.9	19	23
26	52	33	123	e77	187	66	28	40	23	9.0	18	20
27	53	34	161	e66	169	72	24	37	19	9.2	16	16
28	51	34	132	e58	163	79	21	34	15	8.8	13	12
29	45	33	115	e52	---	87	21	35	12	7.4	10	11
30	51	33	101	e47	---	93	17	37	10	6.9	9.5	15
31	47	---	93	e43	---	108	---	39	---	6.4	8.9	---
TOTAL	934.4	1497	1901	1750	2452	3012	1830	1660	702	414.7	346.8	920.6
MEAN	30.1	49.9	61.3	56.5	87.6	97.2	61.0	53.5	23.4	13.4	11.2	30.7
MAX	57	104	161	91	288	201	121	105	40	33	22	87
MIN	9.4	30	34	29	25	62	17	14	10	6.4	2.7	6.5
CFSM	.55	.90	1.11	1.02	1.58	1.76	1.10	.97	.42	.24	.20	.55
IN.	.63	1.01	1.28	1.18	1.65	2.03	1.23	1.12	.47	.28	.23	.62

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1933 - 1997, BY WATER YEAR (WY)

MEAN	19.0	25.8	29.3	31.8	42.6	74.4	70.4	39.8	23.3	11.1	9.24	15.6
MAX	134	101	93.3	132	174	154	226	188	127	48.8	49.8	226
(WY)	1987	1986	1951	1973	1938	1948	1947	1956	1943	1994	1937	1985
MIN	2.36	3.84	3.99	3.58	5.62	14.2	19.2	7.49	2.12	1.60	1.48	.89
(WY)	1939	1939	1964	1940	1940	1964	1946	1988	1988	1941	1944	1941

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1933 - 1997

ANNUAL TOTAL	14953.1	17420.5	
ANNUAL MEAN	40.9	47.7	(a)32.6
HIGHEST ANNUAL MEAN			71.7
LOWEST ANNUAL MEAN			9.05
HIGHEST DAILY MEAN	224	Jun 21	1300
LOWEST DAILY MEAN	2.9	Aug 2	.26
ANNUAL SEVEN-DAY MINIMUM	3.3	Aug 15	.50
INSTANTANEOUS PEAK FLOW			322
INSTANTANEOUS PEAK STAGE			17.75
INSTANTANEOUS LOW FLOW			1.9
ANNUAL RUNOFF (CFSM)	.74		.86
ANNUAL RUNOFF (INCHES)	10.06		11.72
10 PERCENT EXCEEDS	81		91
50 PERCENT EXCEEDS	35		39
90 PERCENT EXCEEDS	6.9		9.4
			3.8
			17
			8.01
			74
			1.4
			1.5
			1.6
			1.7
			1.8
			1.9
			2.0
			2.1
			2.2
			2.3
			2.4
			2.5
			2.6
			2.7
			2.8
			2.9
			3.0
			3.1
			3.2
			3.3
			3.4
			3.5
			3.6
			3.7
			3.8
			3.9
			4.0
			4.1
			4.2
			4.3
			4.4
			4.5
			4.6
			4.7
			4.8
			4.9
			5.0
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			5.7
			5.8
			5.9
			6.0
			6.1
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			6.8
			6.9
			7.0
			7.1
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			7.7
			7.8
			7.9
			8.0
			8.1
			8.2
			8.3
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			8.5
			8.6
			8.7
			8.8
			8.9
			9.0
			9.1
			9.2
			9.3
			9.4
			9.5
			9.6
			9.7
			9.8
			9.9
			10.0

(a) Does not include water year 1933.

(b) From floodmark.

(c) Sept. 16, 18, 1970.

(e) Estimated.

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, 1996 to Jan. 15, 1997, 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. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e180	e225	e86	e175	e170	858	685	e140	192	81	48	60
2	e145	e240	e120	e230	e170	834	614	e145	188	100	46	57
3	e120	e180	e180	e340	e170	798	516	160	183	130	46	55
4	e100	e150	e180	e330	e210	658	429	231	181	133	45	52
5	e86	e130	e205	e380	e286	556	377	225	169	137	44	50
6	e80	e115	e190	e330	e270	484	368	236	148	128	42	51
7	e74	e180	e180	e290	e250	414	343	249	133	100	41	49
8	e72	e450	e180	e250	e220	362	309	261	125	89	41	46
9	e80	e350	e180	e225	e200	335	276	284	112	97	40	47
10	e96	e300	e178	e200	e180	323	242	286	111	103	39	167
11	e90	e270	e165	e180	e160	374	220	274	102	98	39	388
12	e86	e240	e160	e180	e150	396	227	253	94	89	42	346
13	e80	e210	e280	e155	e138	347	273	224	95	82	67	335
14	e74	e180	e250	e150	e130	338	320	200	92	76	70	301
15	e68	e150	e240	e160	e125	416	312	225	87	90	70	240
16	e63	e130	e240	e195	e121	389	286	307	82	83	87	177
17	e60	e120	e240	e170	e120	355	270	358	83	73	97	143
18	e58	e110	e210	e145	e120	365	249	375	78	65	91	140
19	e64	e112	e180	e130	e230	336	228	436	76	60	81	128
20	e85	e116	e155	e128	372	307	210	566	76	56	76	231
21	e105	e130	e150	e127	585	292	194	464	89	58	99	224
22	e119	e145	e145	e158	1280	280	183	372	196	86	106	182
23	e105	e100	e140	e343	1370	264	169	308	188	90	109	152
24	e118	e80	e880	e374	1060	249	158	259	179	77	98	126
25	e130	e84	e640	e294	899	265	154	219	154	68	87	107
26	e120	e88	e500	e245	712	356	151	192	120	65	80	94
27	e110	e92	e360	e220	626	351	146	173	96	63	74	85
28	e100	e96	e270	e205	886	338	145	156	83	63	68	78
29	e94	e99	e230	e195	---	440	148	153	75	58	62	82
30	e150	e95	e205	e185	---	565	143	197	69	53	58	75
31	e250	---	e185	e175	---	637	---	202	---	50	56	---
TOTAL	3162	4947	7484	6844	11210	13272	8345	8140	3656	2601	2049	4268
MEAN	102	165	241	221	400	428	278	263	122	83.9	66.1	142
MAX	250	450	880	380	1370	858	685	566	196	137	109	388
MIN	58	80	86	127	120	249	143	140	69	50	39	46
CFSM.	46	.75	1.09	1.00	1.81	1.94	1.26	1.19	.55	.38	.30	.64
IN.	.53	.83	1.26	1.15	1.89	2.23	1.40	1.37	.62	.44	.34	.72

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1980 - 1997, BY WATER YEAR (WY)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
MEAN	160	195	191	176	223	354	334	176	136	80.7	70.3	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1980 - 1997

ANNUAL TOTAL	67237	75978	
ANNUAL MEAN	184	208	185
HIGHEST ANNUAL MEAN			295
LOWEST ANNUAL MEAN			126
HIGHEST DAILY MEAN	940	Jun 21	2950
LOWEST DAILY MEAN	20	Sep 6	14
ANNUAL SEVEN-DAY MINIMUM	23	Aug 15	16
INSTANTANEOUS PEAK FLOW			1590
INSTANTANEOUS PEAK STAGE			6.73
INSTANTANEOUS LOW FLOW			38
ANNUAL RUNOFF (CFSM)	.83	.94	.84
ANNUAL RUNOFF (INCHES)	11.32	12.79	11.38
10 PERCENT EXCEEDS	365	374	370
50 PERCENT EXCEEDS	140	158	127
90 PERCENT EXCEEDS	56	65	50

(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 Dr., 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. City of Flint gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	330	741	272	909	503	2100	1580	398	519	194	142	179
2	310	801	320	817	488	2180	1550	414	514	200	142	146
3	283	724	379	814	474	2190	1400	425	497	240	142	142
4	242	704	400	866	541	2110	1230	446	463	397	140	177
5	212	685	416	959	695	1890	1090	500	443	637	140	171
6	188	662	408	1150	677	1640	986	560	424	698	139	128
7	191	654	402	1290	676	1340	821	586	396	646	139	128
8	212	780	403	1010	688	1090	742	624	352	544	139	125
9	202	1020	415	483	688	1030	750	641	312	507	141	125
10	210	1020	413	430	552	972	671	658	291	467	139	279
11	210	1140	419	477	397	987	610	637	274	449	138	727
12	208	1380	402	462	441	1030	630	610	267	430	136	970
13	205	1260	465	452	434	1150	638	589	256	322	136	1220
14	204	857	612	458	377	1190	681	550	243	249	135	1270
15	194	834	745	467	361	1130	643	559	222	233	134	1120
16	176	751	860	468	374	1080	597	656	214	221	134	976
17	173	538	913	449	357	1020	513	800	219	208	135	877
18	174	488	833	405	347	894	248	977	208	265	133	674
19	179	445	721	401	450	818	154	1220	203	238	134	477
20	190	397	564	390	759	826	155	1570	199	226	136	470
21	199	365	487	377	1590	814	154	1890	223	225	149	879
22	216	336	487	401	2360	799	161	1680	364	176	167	1370
23	236	313	514	595	3310	721	255	1290	408	142	194	1470
24	239	304	685	847	3220	656	366	982	421	141	217	1170
25	267	291	936	852	2460	682	425	869	406	141	222	979
26	280	280	1090	881	2080	738	450	728	374	142	215	878
27	274	276	1040	853	1920	820	449	645	317	144	207	570
28	269	271	966	785	1920	899	435	566	267	144	196	572
29	273	262	1090	605	---	1070	419	307	232	142	180	476
30	318	260	1130	487	---	1240	419	423	207	142	168	170
31	497	---	1070	510	---	1450	---	494	---	142	159	---
TOTAL	7361	18839	19857	20350	29139	36556	19222	23294	9735	9052	4828	18377
MEAN	237	628	641	656	1041	1179	641	751	325	292	156	678
MAX	497	1380	1130	1290	3310	2190	1680	1890	519	698	222	1470
MIN	173	260	272	377	347	656	154	307	199	141	133	176

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1953 - 1997, BY WATER YEAR (WY)

	MEAN	220	280	314	295	383	807	663	387	265	170	134	279
MAX	1688	911	900	1153	1123	1984	1549	1789	1668	839	369	1577	
(WY)	1987	1993	1988	1973	1968	1976	1960	1956	1996	1994	1994	1976	
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	1977	1974

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1953 - 1997
ANNUAL TOTAL	198213	216620	
ANNUAL MEAN	542	593	344
HIGHEST ANNUAL MEAN			638
LOWEST ANNUAL MEAN			82.7
HIGHEST DAILY MEAN	7240	Jun 24	7240
LOWEST DAILY MEAN	89	Aug 17	2.1
ANNUAL SEVEN-DAY MINIMUM	100	Aug 14	3.6
INSTANTANEOUS PEAK FLOW			7470
INSTANTANEOUS PEAK STAGE			15.73
INSTANTANEOUS LOW FLOW			2.1
10 PERCENT EXCEEDS	1000	1150	794
50 PERCENT EXCEEDS	332	449	183
90 PERCENT EXCEEDS	121	145	65

(a) 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. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	54	87	54	e88	e81	414	315	47	82	17	8.5	14
2	43	87	87	142	e80	440	315	59	80	20	7.3	14
3	36	61	75	167	e82	361	256	81	76	27	6.9	14
4	28	50	85	158	e105	276	191	84	73	40	9.0	13
5	14	45	81	178	e140	216	172	90	69	58	7.1	14
6	7.9	42	76	161	e125	190	172	116	62	56	6.1	14
7	8.9	104	78	138	e113	162	150	124	54	39	5.8	13
8	24	207	77	121	e100	148	139	168	49	32	5.3	13
9	23	163	73	e105	e90	136	132	157	43	35	5.4	18
10	25	159	69	e95	e80	137	117	133	36	38	5.2	186
11	24	155	65	e84	e72	161	104	127	21	33	5.9	193
12	24	138	66	e76	e66	147	112	116	19	26	7.8	191
13	24	123	125	e72	e82	136	134	103	26	21	24	217
14	22	99	116	e66	e60	191	139	90	30	22	18	187
15	20	80	e98	e64	e58	203	130	109	31	24	39	127
16	19	65	e80	e62	e56	167	126	146	31	19	30	87
17	18	55	e67	e60	e56	169	119	176	29	16	33	100
18	23	52	e55	e58	e56	163	111	171	26	13	39	88
19	24	48	e45	e56	e100	148	102	315	25	11	33	70
20	23	49	e42	e55	177	140	92	251	27	9.0	32	98
21	28	69	e39	e62	585	129	84	212	40	17	31	86
22	32	62	e50	e110	655	117	75	197	71	19	28	191
23	35	36	103	e198	504	110	65	142	75	18	32	72
24	34	29	407	e160	458	105	62	108	90	16	34	54
25	32	36	299	e135	403	147	59	93	80	13	28	43
26	37	38	e200	e120	319	169	56	86	50	13	21	36
27	40	38	e140	e110	483	153	55	78	34	13	18	31
28	35	42	e112	e100	471	160	56	70	27	12	16	29
29	32	42	e98	e94	---	291	54	75	22	11	14	31
30	85	40	e92	e88	---	276	48	96	19	12	13	30
31	81	---	e85	e83	---	299	---	83	---	10	14	---
TOTAL	958.8	2301	3119	3266	5637	6061	3742	3901	1397	710.0	577.3	2165
MEAN	30.9	76.7	101	105	201	196	125	126	46.6	22.9	18.6	72.2
MAX	85	207	407	198	655	440	315	315	90	58	39	217
MIN	7.9	29	39	55	56	105	48	47	19	9.0	5.2	13
CFSM	.31	.77	1.01	1.06	2.03	1.97	1.25	1.27	.47	.23	.19	.73
IN.	.36	.86	1.17	1.22	2.11	2.27	1.40	1.46	.52	.27	.22	.81

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 1997, BY WATER YEAR (WY)

	MEAN	44.2	63.8	77.3	71.7	94.4	170	161	80.7	51.0	28.0	21.7	45.5
MAX	236	181	213	192	294	317	350	200	159	93.2	107	314	314
(WY)	1982	1986	1976	1973	1976	1973	1975	1974	1996	1994	1975	1985	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	7.06
(WY)	1967	1966	1970	1970	1970	1969	1966	1977	1988	1966	1966	1966	1966

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1966 - 1997

ANNUAL TOTAL	29388.2	33835.1	
ANNUAL MEAN	80.3	92.7	75.5
HIGHEST ANNUAL MEAN			122
LOWEST ANNUAL MEAN			35.3
HIGHEST DAILY MEAN	662	May 21	1370
LOWEST DAILY MEAN	4.1	Sep 6	2.1
ANNUAL SEVEN-DAY MINIMUM	5.5	Aug 14	2.3
INSTANTANEOUS PEAK FLOW			1500
INSTANTANEOUS PEAK STAGE			(a)11.85
INSTANTANEOUS LOW FLOW			1.6
ANNUAL RUNOFF (CFSM)	.81		.76
ANNUAL RUNOFF (INCHES)	11.00		10.33
10 PERCENT EXCEEDS	197	186	172
50 PERCENT EXCEEDS	50	69	41
90 PERCENT EXCEEDS	12	15	11

(a) From floodmark.

(e) Estimated.

STREAMS TRIBUTARY TO LAKE HURON

04148500 FLINT RIVER NEAR FLINT, MI

LOCATION.--Lat 43°02'20", long 83°46'18", in SW1/4 sec.4, T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on left bank on grounds of sewage-treatment plant, 1.2 mi upstream from Pirnie Creek, and 5.0 mi downstream from Swartz Creek.

DRAINAGE AREA.--956 mi².

PERIOD OF RECORD.--September 1903 to March 1904 (gage heights only), August 1932 to current year. Gage-height records for flood seasons collected in this vicinity 1911-32, are contained in reports of the National Weather Service.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1933-34(M), 1935-37. WDR MI-78-1: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 678.80 ft above sea level (levels by the National Weather Service and City of Flint).

REMARKS.--Records good except for estimated daily discharges, which are fair. Some regulation by small reservoirs upstream from station and by Holloway Reservoir. From 1954 to 1991 annual mean discharge and runoff figures adjusted for change in contents in Holloway Reservoir. Occasional diversion for industrial use. Since Dec. 17, 1967, flow contains up to 50 ft³/s as sewage effluent which originates outside the basin. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	477	865	511	1580	817	4050	2510	598	832	291	162	e240
2	464	1010	546	1330	770	4140	2390	610	833	341	166	e210
3	433	932	611	1450	747	3750	2260	750	821	368	180	e195
4	388	879	662	1510	1010	3460	1860	705	746	406	168	187
5	347	852	666	1670	1630	2990	1840	771	697	655	171	179
6	284	825	692	1690	1500	2660	1800	993	660	881	154	177
7	363	1480	672	1680	1340	2210	1590	1030	607	859	154	182
8	444	1900	673	1680	1190	1910	1210	1170	549	758	155	179
9	374	1660	676	1000	1140	1560	1240	1170	498	760	155	371
10	367	1230	663	499	1010	1570	1100	1150	472	624	150	1870
11	335	1390	661	682	719	1750	947	1080	438	729	163	1540
12	324	1610	682	656	705	1720	1170	1010	426	494	197	1390
13	312	1650	854	654	663	1680	1290	963	406	413	386	1580
14	316	1320	953	707	630	2080	1340	917	369	331	214	1660
15	302	1050	1070	711	550	2110	1240	1160	337	322	347	1510
16	284	1090	1220	724	546	1810	1090	e1450	363	304	309	1290
17	275	901	1360	611	538	1710	1070	e1800	341	290	283	1430
18	357	672	1280	583	593	1680	759	e2200	291	281	246	1080
19	305	635	1070	557	1070	1440	524	e2700	281	282	219	856
20	285	614	868	574	1560	1370	460	e2460	376	261	288	747
21	293	567	764	542	5530	1340	440	2490	513	359	336	893
22	306	530	709	1200	6030	1310	429	2530	824	333	285	1480
23	535	500	1000	2020	5050	1230	436	2080	697	237	286	1650
24	410	476	2230	1790	5140	972	541	1450	642	190	313	1450
25	398	466	2140	1630	4390	1320	612	1330	625	181	331	1170
26	398	409	1900	1470	3820	1530	646	1180	571	235	324	954
27	403	396	1770	1320	4700	1460	650	1030	474	197	310	757
28	394	402	1700	1260	4340	1640	654	916	389	188	298	693
29	524	400	1830	1080	---	2590	614	796	339	176	276	669
30	946	416	1890	782	---	2410	613	778	308	156	250	364
31	626	---	1610	825	---	2490	---	823	---	163	250	---
TOTAL	12269	27127	34133	34467	57728	63942	33315	40070	15725	12065	7506	24953
MEAN	396	904	1101	1112	2062	2063	1111	1293	524	389	242	898
MAX	946	1900	2230	2020	6030	4140	2510	2700	833	681	386	1870
MIN	275	396	511	499	538	972	429	598	281	156	150	177

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1932 - 1997, BY WATER YEAR (WY)

	MEAN	351	474	557	589	782	1520	1329	773	494	275	236	349
MAX	2764	1734	1739	2008	2867	3514	4209	3575	2512	1294	868	2635	
(WY)	1987	1993	1976	1973	1938	1985	1947	1956	1996	1994	1975	1986	
MIN	60.6	69.9	70.8	84.8	87.6	187	335	110	81.3	56.1	31.3	45.9	
(WY)	1936	1965	1964	1940	1940	1964	1946	1958	1934	1936	1936	1941	

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1932 - 1997

ANNUAL TOTAL	338961												
ANNUAL MEAN	926												
HIGHEST ANNUAL MEAN										643			
LOWEST ANNUAL MEAN										1258			1985
HIGHEST DAILY MEAN	7900									163			1964
LOWEST DAILY MEAN	142									14500			Apr 6 1947
ANNUAL SEVEN-DAY MINIMUM	155									14			Aug 7 1934
INSTANTANEOUS PEAK FLOW										23			Aug 14 1936
INSTANTANEOUS PEAK STAGE										14900			Apr 6 1947
INSTANTANEOUS LOW FLOW										16.95			Sep 6 1985
10 PERCENT EXCEEDS	1800									9.0			Aug 7 1934
50 PERCENT EXCEEDS	613									1500			
90 PERCENT EXCEEDS	216									341			
										100			

(e) Estimated.

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 September 1997 (discontinued). 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. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	477	495	166	e310	e220	1780	797	133	232	63	19	30
2	342	381	382	330	e210	3340	593	133	209	793	18	28
3	251	288	324	1160	e200	1970	486	149	191	925	19	28
4	192	235	288	1230	e210	1320	418	220	177	566	43	25
5	154	210	284	1970	e300	1070	372	209	166	210	34	24
6	133	195	295	1520	e600	960	407	223	153	123	25	22
7	121	288	331	825	e470	732	383	254	141	142	21	21
8	142	2660	389	e400	e400	617	318	214	129	157	17	22
9	164	1760	353	e300	e340	501	265	293	119	156	15	23
10	175	959	307	e220	e290	508	236	291	109	113	14	275
11	169	664	296	e190	e250	1280	216	238	97	76	16	1250
12	155	480	320	e170	e220	1160	212	220	88	54	18	773
13	141	366	1530	e160	e200	762	265	202	85	41	24	511
14	128	297	1320	e150	e180	553	407	182	76	35	36	357
15	117	246	837	e140	e170	e400	353	243	62	32	35	234
16	110	226	714	e130	e160	e350	315	922	53	30	50	163
17	102	221	705	e125	e150	e450	316	863	52	27	69	121
18	104	227	1250	e120	e150	1010	296	665	50	27	43	116
19	244	231	e600	e115	e500	681	256	1370	44	24	37	98
20	265	226	e420	e115	1730	635	225	1320	41	22	32	730
21	242	210	e360	e115	4560	707	200	658	52	20	42	1310
22	214	192	e320	e200	7270	790	231	457	201	20	145	553
23	e190	180	271	e1200	3680	627	252	344	194	19	166	305
24	e220	173	858	1080	2310	484	212	282	114	16	136	209
25	e210	163	e500	698	1260	609	187	247	78	19	94	155
26	198	156	e400	e500	831	1260	163	220	55	23	70	125
27	191	132	e360	e420	1290	854	147	189	42	29	49	98
28	176	e110	e340	e360	2660	736	144	168	36	30	39	80
29	160	e120	e330	e310	---	1710	143	166	31	28	39	78
30	567	141	e320	e270	---	1440	135	231	28	24	36	79
31	918	---	e310	e240	---	1190	---	254	---	21	33	---
TOTAL	6972	12232	15480	15073	30811	30486	8950	11560	3105	3867	1434	7843
MEAN	225	408	499	486	1100	983	298	373	104	125	46.3	261
MAX	918	2660	1530	1970	7270	3340	797	1370	232	925	166	1310
MIN	102	110	166	115	150	350	135	133	28	18	14	21
CFSM	63	1.14	1.39	1.35	3.07	2.74	.83	1.04	.29	.35	.13	.73
IN.	.72	1.27	1.80	1.56	3.19	3.16	.93	1.20	.32	.40	.15	.81

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1948 - 1997, BY WATER YEAR (WY)

MEAN	87.9	149	199	188	287	755	524	241	133	70.4	35.7	105
MAX	952	683	653	840	1100	2260	1297	1157	1087	629	201	2799
(WY)	1987	1993	1985	1952	1997	1985	1960	1996	1996	1994	1953	1996
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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1948 - 1997
ANNUAL TOTAL	160613	147813	(a)231
ANNUAL MEAN	439	405	471
HIGHEST ANNUAL MEAN			27.6
LOWEST ANNUAL MEAN			1985
HIGHEST DAILY MEAN	6770	7270	11800
LOWEST DAILY MEAN	12	14	50
ANNUAL SEVEN-DAY MINIMUM	16	18	.76
INSTANTANEOUS PEAK FLOW		8450	12500
INSTANTANEOUS PEAK FLOW		15.81	(b)19.82
INSTANTANEOUS LOW FLOW		13	.50
ANNUAL RUNOFF (CFSM)	1.22	1.13	.64
ANNUAL RUNOFF (INCHES)	16.64	15.32	8.73
10 PERCENT EXCEEDS	949	959	558
50 PERCENT EXCEEDS	220	214	64
90 PERCENT EXCEEDS	36	30	8.0

(a) Does not include water year 1948.

(b) From floodmark.

(c) 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	869	1370	376	e950	e660	5330	2210	463	765	169	83	126
2	690	947	503	e940	e600	6000	1690	463	655	295	75	119
3	534	762	776	1370	e560	6400	1390	529	563	1390	72	112
4	389	667	718	2630	e540	3620	1210	644	486	1350	73	106
5	365	548	650	2670	e650	2560	1100	694	422	870	100	97
6	342	490	654	3350	e1200	2250	1230	757	376	481	106	91
7	322	552	701	2030	1860	1960	1210	826	328	354	94	87
8	319	1590	780	1270	1550	1690	1030	775	292	329	77	86
9	350	3930	835	e900	1240	1460	873	755	265	472	68	90
10	422	2440	759	e750	e950	1450	761	857	248	385	63	396
11	388	1600	694	e580	e750	1900	695	780	231	307	66	2130
12	366	1220	699	e520	e600	2620	700	681	224	239	72	2660
13	354	965	1100	e460	e540	2030	872	620	217	197	88	1880
14	311	796	2600	e420	e500	1620	1230	561	206	167	104	1330
15	293	668	1980	e400	e470	e1200	1280	647	192	151	125	933
16	272	576	1630	e380	e450	e1050	1110	1610	189	144	180	659
17	257	537	1510	e360	e430	e1000	1060	2380	195	120	156	522
18	254	553	1610	e340	e470	1570	996	1950	176	108	162	503
19	279	583	1710	e330	e1000	1810	888	2080	167	100	145	524
20	441	571	1060	e320	e3600	1490	776	3140	119	92	131	1490
21	505	524	875	e310	e7300	1450	683	2220	204	86	171	2420
22	459	479	919	e310	12600	1560	664	1480	410	68	189	2210
23	445	443	881	e1200	13100	1520	843	1130	485	80	264	1280
24	520	425	1630	2930	e8000	1270	884	917	417	80	309	841
25	567	408	2450	2520	e4300	1230	728	786	299	76	322	615
26	527	395	1800	e1600	2650	1900	621	720	234	87	249	472
27	464	376	1250	e1300	2760	2100	539	631	189	107	204	387
28	425	344	e1100	e1100	5070	1690	506	537	157	139	173	329
29	394	320	e1050	e950	---	2130	494	496	141	122	149	293
30	595	338	e990	e820	---	3330	471	700	128	108	136	278
31	1290	---	e970	e740	---	2770	---	844	---	95	135	---
TOTAL	14008	25417	35260	34750	74400	69960	28744	31673	8980	8768	4341	73066
MEAN	452	847	1137	1121	2657	2257	958	1022	299	283	140	769
MAX	1290	3930	2600	3350	13100	6400	2210	3140	765	1390	322	2660
MIN	254	320	376	310	430	1000	471	463	119	68	63	86
CFSM	.54	1.01	1.35	1.33	3.16	2.68	1.14	1.21	.36	.34	.17	.91
IN.	.62	1.12	1.56	1.54	3.29	3.09	1.27	1.40	.40	.39	.19	1.02

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1908 - 1997, BY WATER YEAR (WY)

MEAN	230	340	435	449	644	1671	1183	667	387	193	106	237
MAX	2637	1374	1335	2185	2657	4943	3122	2715	3217	1884	523	5000
(WY)	1987	1993	1985	1973	1997	1976	1947	1996	1996	1994	1953	1986
MIN	31.7	43.1	50.7	45.1	55.6	179	202	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1908 - 1997

ANNUAL TOTAL	390086	359367	541
ANNUAL MEAN	1066	985	1063
HIGHEST ANNUAL MEAN			96.6
LOWEST ANNUAL MEAN			1985
HIGHEST DAILY MEAN	13500	13100	21700
LOWEST DAILY MEAN	68	63	(a)1.5
ANNUAL SEVEN-DAY MINIMUM	77	75	4.4
INSTANTANEOUS PEAK FLOW		14300	22200
INSTANTANEOUS PEAK STAGE		23.28	27.52
INSTANTANEOUS LOW FLOW		37	
ANNUAL RUNOFF (CFSM)	1.27	1.17	.64
ANNUAL RUNOFF (INCHES)	17.25	15.90	8.74
10 PERCENT EXCEEDS	2020	2110	1280
50 PERCENT EXCEEDS	551	595	189
90 PERCENT EXCEEDS	120	121	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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e100	211	140	e110	e140	e240	298	141	111	131	53	70
2	e92	160	357	e120	e135	e300	260	196	103	133	53	69
3	e86	140	274	e140	e130	e400	245	183	96	88	53	65
4	e82	127	196	e200	e130	e290	239	182	90	78	59	61
5	e78	119	161	e300	e130	e240	242	150	84	74	65	59
6	e74	114	148	e250	e130	e220	329	148	82	70	58	59
7	e82	106	146	e220	e130	e200	332	140	80	67	55	59
8	e86	129	143	e200	e125	e190	245	137	78	72	54	61
9	e90	124	134	e180	e125	e180	190	262	77	110	53	62
10	e94	112	127	e160	e120	e170	178	269	77	97	53	62
11	e86	104	123	e150	e120	e200	169	192	74	78	58	65
12	e80	100	122	e140	e115	e240	168	165	74	70	62	70
13	e76	98	135	e130	e115	e200	181	148	73	64	118	70
14	e74	96	150	e120	e110	e180	215	136	69	62	128	66
15	e74	e92	160	e115	e110	e170	197	216	65	61	91	65
16	e72	e88	185	e110	e110	e165	182	335	63	57	92	64
17	e72	88	183	e105	e110	e160	186	296	65	55	83	77
18	e86	100	164	e100	e110	e180	167	251	65	55	97	108
19	e105	105	e150	e100	e150	e210	151	201	63	57	89	92
20	e100	99	e135	e100	e250	261	144	178	66	54	78	167
21	e95	95	e120	e100	e350	378	138	152	82	55	118	163
22	e92	92	e110	e170	e550	492	153	134	102	57	143	117
23	e90	91	e100	e330	e400	425	162	123	97	56	104	98
24	e160	94	e140	e270	e330	308	150	118	81	55	90	87
25	135	92	e180	e230	e300	306	142	119	77	54	181	81
26	117	88	e160	e200	e280	425	135	123	76	69	144	77
27	108	e84	e145	e180	e260	416	127	113	70	83	106	73
28	104	e82	e135	e170	e250	495	125	104	68	71	88	71
29	100	81	e125	e160	---	559	120	100	64	71	74	72
30	173	86	e120	e150	---	517	116	110	62	62	74	74
31	293	---	e115	e145	---	404	---	118	---	56	70	---
TOTAL	3156	3197	4783	5155	5315	9121	5686	5240	2334	2222	2644	2384
MEAN	102	107	154	166	190	294	190	169	77.8	71.7	85.3	79.5
MAX	293	211	357	330	550	569	332	335	111	133	181	167
MIN	72	81	100	100	110	160	116	100	62	54	53	59
CFSM	.64	.67	.96	1.04	1.19	1.84	1.18	1.06	.49	.45	.53	.50
IN.	.73	.74	1.11	1.20	1.24	2.12	1.32	1.22	.54	.52	.61	.55

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 1997, BY WATER YEAR (WY)

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
MEAN	114	167	138	114	118	224	236	141	125	75.0	77.3
MAX	202	364	253	176	190	296	478	219	283	92.3	86.6
(WY)	1991	1993	1992	1993	1997	1991	1991	1996	1996	1992	1996
MIN	67.6	82.3	61.2	67.6	74.4	138	115	87.2	57.2	49.5	55.3
(WY)	1995	1990	1990	1994	1993	1996	1987	1988	1988	1988	1988

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1987 - 1997

ANNUAL TOTAL	52764	51237	
ANNUAL MEAN	144	140	
HIGHEST ANNUAL MEAN			136
LOWEST ANNUAL MEAN			184
HIGHEST DAILY MEAN	872	Jun 23	1340
LOWEST DAILY MEAN	54	Aug 17	39
ANNUAL SEVEN-DAY MINIMUM	56	Aug 13	40
INSTANTANEOUS PEAK FLOW			(a)566
INSTANTANEOUS PEAK STAGE			(c)10.46
INSTANTANEOUS LOW FLOW			52
ANNUAL RUNOFF (CFSM)	.90	.88	(d)
ANNUAL RUNOFF (INCHES)	12.27	11.91	
10 PERCENT EXCEEDS	244	255	
50 PERCENT EXCEEDS	110	116	
90 PERCENT EXCEEDS	68	64	

(a) Gage height 7.89 ft.

(b) Gage height 10.74 ft.

(c) Backwater from ice.

(d) Aug. 3, 10.

(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. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	271	e500	e400	e290	e290	675	811	421	402	248	164	267
2	253	e440	e600	e290	e280	958	732	461	385	258	156	250
3	239	e380	e520	e290	e270	969	674	513	361	e230	148	233
4	226	e330	e450	444	e260	849	635	520	334	e215	148	212
5	215	e310	e430	770	e260	e700	636	496	315	205	140	199
6	210	e300	e420	726	e260	e600	690	543	296	201	132	196
7	236	e340	411	e500	e260	e540	700	516	279	198	129	190
8	248	e350	404	e400	e250	e500	653	526	265	230	126	188
9	258	e330	394	e350	e240	e480	616	618	250	267	123	184
10	245	e310	386	e320	e240	e500	572	598	239	269	123	185
11	232	e300	385	e300	e230	715	536	588	224	262	153	188
12	222	e290	386	e280	e230	740	527	546	216	237	157	207
13	215	e280	397	e280	e220	666	543	503	217	219	179	208
14	211	e270	409	e250	e220	e550	599	476	217	211	211	203
15	205	e260	427	e240	e220	e500	570	545	209	226	244	197
16	202	e250	456	e230	e220	e450	546	591	212	186	232	193
17	196	e260	437	e220	e220	e420	534	636	211	175	232	248
18	259	e280	418	e210	e220	e450	517	618	198	172	236	287
19	285	e300	e380	e210	e350	551	492	588	194	163	236	311
20	273	e290	e300	e200	572	590	469	552	229	155	232	417
21	265	e280	e270	e200	894	675	451	516	310	154	269	472
22	258	e270	e250	e300	1410	739	447	486	353	154	262	478
23	286	e270	e240	e600	958	730	455	461	374	148	244	436
24	e330	e260	e350	e500	765	709	451	443	362	145	309	381
25	e310	e260	e400	e450	676	731	445	431	338	144	431	338
26	e300	e260	e380	e400	615	873	433	427	311	144	511	295
27	e290	e260	e360	e370	644	796	422	420	278	148	511	267
28	e280	e260	e340	e350	703	819	411	405	258	209	439	258
29	e290	e260	e320	e330	---	897	399	398	238	234	376	266
30	e350	e280	e310	e310	---	916	388	411	224	201	326	257
31	e600	---	e300	e300	---	884	---	408	---	181	292	---
TOTAL	8260	9030	11930	10890	11977	21172	16354	15661	8299	6189	7471	8011
MEAN	266	301	385	351	428	683	545	505	277	200	241	267
MAX	600	500	600	770	1410	969	811	636	402	269	511	478
MIN	196	250	240	200	220	420	388	398	194	144	123	184
CFSM	.64	.72	.93	.84	1.03	1.64	1.31	1.21	.66	.48	.58	.64
IN.	.74	.81	1.07	.97	1.07	1.89	1.46	1.40	.74	.55	.67	.72

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1997, BY WATER YEAR (WY)

	MEAN	252	306	305	280	332	575	590	386	283	195	175	228
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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1931 - 1997
ANNUAL TOTAL	130589	135244	
ANNUAL MEAN	357	371	325
HIGHEST ANNUAL MEAN			585
LOWEST ANNUAL MEAN			163
HIGHEST DAILY MEAN	1080	May 11	6210
LOWEST DAILY MEAN	146	Aug 18	19
ANNUAL SEVEN-DAY MINIMUM	152	Aug 13	49
INSTANTANEOUS PEAK FLOW			6660
INSTANTANEOUS PEAK STAGE			(a)15.58
INSTANTANEOUS LOW FLOW			12
ANNUAL RUNOFF (CFSM)	.86	.89	.78
ANNUAL RUNOFF (INCHES)	11.68	12.09	10.63
10 PERCENT EXCEEDS	572	635	592
50 PERCENT EXCEEDS	310	300	244
90 PERCENT EXCEEDS	188	198	133

(a) From floodmark.

(b) Aug. 9, 10.

(c) 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. Approximately 2.2 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 1996 TO SEPTEMBER 1997

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	155	425	266	296	e280	1060	585	285	278	115	50	68
2	129	480	418	302	e270	1450	548	290	259	112	50	72
3	117	449	443	374	e270	1140	503	359	228	110	54	83
4	112	359	498	458	e260	1040	450	377	199	102	62	97
5	108	274	483	643	e260	1010	448	405	179	94	70	107
6	105	241	403	e500	e250	879	498	419	170	86	79	103
7	111	246	331	e420	e250	745	480	361	164	81	92	94
8	126	309	295	e360	e230	691	500	381	158	118	85	95
9	171	323	283	e310	e220	624	492	409	152	140	72	97
10	212	303	277	e270	e210	600	445	431	147	184	71	127
11	211	292	278	e250	e200	660	389	447	158	165	78	139
12	185	254	285	e240	e195	648	385	419	165	123	102	111
13	159	229	301	e230	e190	651	407	350	158	96	128	116
14	141	e205	343	e220	e190	644	482	325	140	104	137	139
15	142	e190	358	e215	e190	558	483	345	131	99	150	123
16	136	e185	362	e210	e190	480	508	365	128	100	117	102
17	129	206	362	e210	e200	507	505	432	128	97	119	125
18	149	203	354	e205	e210	510	464	463	134	95	122	147
19	167	215	295	e205	e300	496	419	465	136	89	123	170
20	216	227	204	e200	461	514	384	433	163	85	132	146
21	232	218	154	e200	1680	534	351	386	202	92	129	147
22	211	204	187	470	1940	515	326	331	272	117	128	214
23	201	184	280	653	1610	522	315	291	316	141	128	173
24	191	181	383	e520	1470	540	309	276	317	120	116	124
25	207	181	366	e450	1250	600	298	262	248	97	101	94
26	236	181	307	e410	926	643	302	246	168	92	104	91
27	236	177	269	e380	960	618	307	239	155	90	107	97
28	200	178	222	e350	1060	678	303	236	146	87	91	105
29	191	178	260	e330	---	699	292	234	129	75	80	104
30	380	183	311	e310	---	659	277	248	118	64	84	97
31	382	---	305	e290	---	567	---	268	---	55	87	---
TOTAL	5648	7480	9883	10481	15722	21482	12455	10778	5446	3225	3048	3507
MEAN	182	249	319	338	562	693	415	348	182	104	98.3	117
MAX	382	480	498	653	1940	1450	585	465	317	184	150	214
MIN	105	177	154	200	190	480	277	234	118	55	50	68
CFSM	.63	.87	1.11	1.17	1.95	2.41	1.44	1.21	.63	.36	.34	.41
IN.	.73	.97	1.28	1.35	2.03	2.77	1.61	1.39	.70	.42	.39	.46

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1997, BY WATER YEAR (WY)

MEAN	165	212	216	198	241	475	437	282	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR.

WATER YEARS 1931 - 1997

ANNUAL TOTAL	102538		109155		
ANNUAL MEAN	280		299		230
HIGHEST ANNUAL MEAN					398
LOWEST ANNUAL MEAN					97.8
HIGHEST DAILY MEAN	1180	May 21	1940	Feb 22	4960
LOWEST DAILY MEAN	88	Sep 7	50	Aug 1	.40
ANNUAL SEVEN-DAY MINIMUM	96	Sep 5	58	Jul 30	10
INSTANTANEOUS PEAK FLOW			2740	Feb 21	5160
INSTANTANEOUS PEAK STAGE			9.27	Feb 21	(a)12.82
INSTANTANEOUS LOW FLOW			48	(b)	(c).40
ANNUAL RUNOFF (CFSM)	.97		1.04		.80
ANNUAL RUNOFF (INCHES)	13.24		14.10		10.86
10 PERCENT EXCEEDS	481		527		476
50 PERCENT EXCEEDS	236		230		154
90 PERCENT EXCEEDS	120		97		69

(a) From floodmark.

(b) Aug. 1, 2.

(c) 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 September 1997 (discontinued).

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	269	434	233	e400	e400	1620	659	325	288	154	92	234
2	238	431	421	e390	e380	2220	703	320	295	148	79	125
3	201	537	514	e390	e370	1950	573	342	286	142	56	80
4	162	468	497	e600	e360	1450	613	453	266	141	56	79
5	161	394	578	1050	e350	1370	532	412	236	144	52	88
6	159	273	536	928	e340	1300	553	446	194	144	52	110
7	153	293	446	e560	e340	1030	629	485	174	143	51	127
8	150	324	424	e460	e320	870	530	448	173	101	70	114
9	160	409	348	e410	e300	848	523	493	173	143	100	112
10	186	425	344	e370	e290	858	519	478	174	164	84	118
11	273	289	314	e340	e280	907	498	510	131	204	85	114
12	268	322	335	e330	e270	1020	453	496	136	212	86	188
13	252	305	415	e320	e270	847	473	478	162	192	134	150
14	208	e250	464	e310	e260	844	544	341	173	142	164	95
15	169	e200	526	e300	e260	e650	672	408	159	131	171	142
16	169	e160	529	e290	e260	e560	577	438	142	137	231	152
17	168	190	515	e280	e260	514	579	477	139	138	179	151
18	178	234	485	e270	e260	745	566	550	139	99	151	132
19	168	222	e400	e270	e300	648	540	565	138	117	150	166
20	177	223	e320	e260	e600	646	459	544	159	114	157	297
21	235	246	e250	e260	e1500	666	436	491	281	94	188	268
22	250	229	232	e260	e3000	727	413	443	347	86	192	156
23	258	220	205	e500	e2500	631	377	371	367	85	185	271
24	236	215	408	e1000	e2100	605	376	288	384	148	205	229
25	229	204	580	e750	e1700	763	370	303	365	151	197	209
26	224	e175	560	e640	e1500	992	302	296	347	137	186	131
27	224	e160	e430	e560	1280	813	308	250	196	119	184	111
28	254	e150	e360	e520	1610	767	330	244	163	130	180	109
29	252	e145	e300	e480	---	883	325	252	171	116	180	126
30	316	174	e350	e450	---	854	320	262	166	113	124	128
31	572	---	e410	e420	---	761	---	261	---	104	98	---
TOTAL	6919	8321	12729	14368	21660	29359	14752	12470	6524	4193	4119	4512
MEAN	223	277	411	463	774	947	492	402	217	135	133	150
MAX	572	537	580	1050	3000	2220	703	565	384	212	231	297
MIN	150	145	205	260	260	514	302	244	131	85	51	79
CFSM	.57	.71	1.05	1.19	1.98	2.43	1.26	1.03	.56	.35	.34	.39
IN.	.66	.79	1.21	1.37	2.07	2.80	1.41	1.19	.62	.40	.39	.43

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1934 - 1997, BY WATER YEAR (WY)

	MEAN	228	276	300	266	350	690	621	364	251	150	134	198
	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	212	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1934 - 1997

ANNUAL TOTAL	134701		139926										
ANNUAL MEAN	368		383										
HIGHEST ANNUAL MEAN										319			
LOWEST ANNUAL MEAN										541			1986
HIGHEST DAILY MEAN	2420		May 21		3000		Feb 22		8750		Sep 12		1986
LOWEST DAILY MEAN	84		Aug 14		51		Aug 7		7.8		Jul 2		1988
ANNUAL SEVEN-DAY MINIMUM	107		Sep 3		59		Aug 2		17		Aug 13		1936
INSTANTANEOUS PEAK FLOW									(a)9360		Sep 12		1986
INSTANTANEOUS PEAK STAGE					(b)13.81		Feb 22		(b)13.81		Feb 22		1997
INSTANTANEOUS LOW FLOW					51		(c)		(d)7.6		(f)		
ANNUAL RUNOFF (CFSM)	.94				.98				.82				
ANNUAL RUNOFF (INCHES)	12.85				13.35				11.12				
10 PERCENT EXCEEDS	655				684				661				
50 PERCENT EXCEEDS	291				281				200				
90 PERCENT EXCEEDS	133				125				84				

(a) Gage height 11.74 ft.

(b) Backwater from ice.

(c) Aug. 5, 6, 7.

(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 8.6 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. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1230	2520	857	1190	e2000	7260	5530	2060	1290	880	484	477
2	944	2290	2140	1760	e1600	8600	4440	2220	1810	899	337	811
3	891	1600	3780	2440	e2300	10200	3850	1660	1730	894	291	752
4	806	1570	3510	3040	e2800	9470	3660	2310	1540	522	443	882
5	483	1720	3390	5320	e2700	7710	3850	2580	1420	464	735	520
6	407	1720	3280	8270	e2800	7180	4240	2670	1230	457	317	361
7	769	1660	1700	e5000	e3000	5750	4580	2790	760	605	586	362
8	948	1830	1250	e3800	e2000	5000	3910	2660	669	893	470	670
9	1110	1400	1860	e3400	e1400	4620	3690	3130	970	858	311	730
10	877	1050	2150	e2200	e1700	4610	3190	3980	1170	1100	286	752
11	951	1350	2890	e1600	e2500	5160	2960	3500	985	1250	619	941
12	629	1850	2730	e1600	e2400	5830	2810	2370	929	766	719	813
13	529	1610	2450	e2400	e2300	5410	2730	2420	1060	505	878	538
14	813	1460	2690	e3000	e2200	4790	3200	2220	624	785	788	376
15	885	1310	2180	e2600	e1700	3520	3350	2710	550	833	1270	715
16	1020	736	2580	e2700	1320	2670	3120	4270	851	633	1230	847
17	767	622	3050	e2900	1330	2800	3090	4420	899	591	484	991
18	789	998	3730	e1900	2220	3830	2950	4540	1060	564	724	1030
19	555	1150	2970	e1500	4350	4580	2690	4010	783	542	804	983
20	825	1570	3160	e2000	5680	4400	1870	3610	857	542	1020	1350
21	1060	1420	1580	e2400	9320	4820	2180	3300	705	655	1020	1040
22	1320	1490	1320	e2900	15600	5460	2430	2420	935	491	1430	1310
23	1390	973	1630	e5200	15100	5160	2100	2090	1630	326	741	1620
24	1830	713	2180	e6000	11300	5110	2170	1510	1630	482	597	1210
25	1240	1180	1610	e5400	8360	5630	2010	1850	1330	558	1030	850
26	920	1480	2130	e2900	7270	7640	1920	1870	968	469	1330	849
27	663	1400	3490	e2300	6660	7310	1190	1850	1000	344	1180	508
28	1090	808	2540	e3000	6940	6810	1870	1960	591	679	1430	440
29	1950	1320	1710	e2900	---	8540	2090	1600	528	758	1230	781
30	2020	898	2050	e2700	---	8680	1630	1760	846	764	738	1000
31	2700	---	2180	e2600	---	7670	---	1150	---	751	472	---
TOTAL	32411	41698	74767	96920	128850	186220	89300	81490	31350	20860	23994	24509
MEAN	1046	1390	2412	3126	4602	6007	2977	2629	1045	673	774	817
MAX	2700	2520	3780	8270	15600	10200	5530	4540	1810	1250	1430	1620
MIN	407	622	857	1190	1320	2670	1190	1150	528	326	286	361
CFSM	.44	.58	1.00	1.30	1.92	2.50	1.24	1.10	.44	.28	.32	.34
IN.	.50	.65	1.16	1.50	2.00	2.89	1.38	1.26	.49	.32	.37	.38

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1936 - 1997, BY WATER YEAR (WY)

	MEAN	1078	1492	1553	1418	1748	3941	3722	2156	1408	739	602	924
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1936 - 1997

ANNUAL TOTAL	809893		832369										
ANNUAL MEAN	2213		2280										
HIGHEST ANNUAL MEAN										1737			
LOWEST ANNUAL MEAN										3318			1986
HIGHEST DAILY MEAN	18200									699			1964
LOWEST DAILY MEAN	279									36200			Sep 13 1986
ANNUAL SEVEN-DAY MINIMUM	522									111			Aug 21 1949
INSTANTANEOUS PEAK FLOW										126			Aug 11 1936
INSTANTANEOUS PEAK STAGE										38700			Sep 13 1986
INSTANTANEOUS LOW FLOW										23.72			Sep 13 1986
ANNUAL RUNOFF (CFSM)	.92									255			Oct 1 1942
ANNUAL RUNOFF (INCHES)	12.55									Aug 7			
10 PERCENT EXCEEDS	4150									.95			
50 PERCENT EXCEEDS	1600									12.90			
90 PERCENT EXCEEDS	630									9.84			
										3980			
										954			
										375			

(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 September 1996, 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, and October 1996 to September 1997. 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 good except for discharges less than 3,000 ft³/s, which are fair and 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. Gage-height telemeter at station.

COOPERATION.--Auxiliary gage-height record at Alpin Beach furnished by National Oceanic Atmospheric Administration.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3310	4660	3880	6170	e5200	25900	15300	5190	3380	2910	2080	2570
2	1720	4950	4590	4200	e4800	26800	13000	3340	3810	3860	e1000	e2970
3	3650	3790	6100	5080	e4500	27800	10600	4260	3580	745	2630	3310
4	3250	3010	6170	6580	e5000	27500	9480	4950	e5600	2970	81	3170
5	2330	3590	5800	8770	e6000	24900	8870	3800	e5200	2460	3720	1870
6	518	3030	5600	11200	e7000	22200	10300	4900	e4900	174	1890	e1170
7	3220	3410	4720	10500	e8000	18900	7600	5760	e4500	4340	284	677
8	3880	5200	4340	9490	9090	15900	7460	4630	e4100	2630	641	2970
9	3170	6360	4150	e7500	7380	13500	8150	4790	e3600	5000	e1000	1970
10	3860	6140	4620	e6000	6230	11100	7040	6920	2630	3820	e1500	2670
11	2590	5250	5870	e5000	6370	11700	6140	7190	2970	2620	e1900	4970
12	1020	5100	4920	e4300	5730	12600	6040	3900	2910	2630	e2500	4170
13	1660	4820	4740	e4000	2950	12800	7510	3500	3130	2160	e2000	4670
14	3110	5030	5170	e4800	5170	12900	7600	5470	4040	2080	e2700	3670
15	2510	4640	5020	e5600	4170	10200	7890	3860	2900	150	e3500	2270
16	2260	4200	5160	e5000	3650	9000	7270	7630	419	2010	e2000	2970
17	1470	2680	5500	e5200	4070	7200	7280	8880	3670	138	2770	1970
18	2300	3870	5390	e5400	3140	8750	6910	9260	3990	1630	3790	1470
19	3230	3890	4320	e4000	7410	10200	6280	9950	3500	2430	2320	1270
20	3900	4230	2700	e3300	10800	9560	5060	10200	2460	2090	186	4870
21	3380	4430	3640	e3800	16700	9150	4950	10700	921	2680	3940	5970
22	3020	4060	2820	e4500	28800	10100	5580	9230	2630	3340	2830	4270
23	3190	4570	2750	e6000	36700	10000	6000	7950	3780	3270	2500	3670
24	3030	4120	4910	e10000	37200	9120	5610	5370	2550	3090	2070	6170
25	3440	3920	7720	e15000	34500	9490	4910	5670	374	2350	3120	779
26	2450	5260	7470	e12000	29700	10200	4630	7260	3400	869	2620	4270
27	e1800	3640	5930	e9000	25800	11800	4260	6140	3290	e1530	1130	2410
28	e2300	3310	6270	e8000	25300	11900	3500	5660	2330	341	2970	1410
29	2830	2960	6540	e7000	---	12400	2680	4760	2550	4380	3630	1170
30	3530	3600	6580	e6200	---	14500	507	3320	2430	2700	2160	e970
31	4540	---	6940	e5600	---	15800	---	4120	---	3290	1580	---
TOTAL	86468	127720	160330	209190	351360	443670	208407	188560	95544	74687	66942	86276
MEAN	2789	4257	5172	6748	12550	14310	6947	6083	3185	2409	2159	2874
MAX	4540	6360	7720	15000	37200	27600	15300	10700	5600	5000	3940	6170
MIN	518	2680	2700	3300	2950	7200	507	3320	374	138	81	677
CFSM	.46	.70	.85	1.11	2.07	2.36	1.15	1.00	.53	.40	.36	.47
IN.	.53	.78	.98	1.28	2.16	2.72	1.28	1.16	.59	.46	.41	.53

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1991 - 1997, BY WATER YEAR (WY)

MEAN	4662	7056	6420	6456	6707	11590	12900	6436	4055	3963	2936	3470
MAX	8165	11430	10060	10950	12550	14310	18470	9685	5792	7758	4133	5273
(WY)	1991	1993	1991	1993	1997	1997	1991	1991	1993	1994	1992	1972
MIN	2789	3129	3133	2087	3311	9328	6947	4834	2526	2385	2159	2770
(WY)	1997	1994	1994	1994	1993	1993	1997	1994	1992	1993	1997	1971

SUMMARY STATISTICS

FOR 1997 WATER YEAR

WATER YEARS 1991 - 1977

ANNUAL TOTAL	2099104		
ANNUAL MEAN	5751		
HIGHEST ANNUAL MEAN		6716	
LOWEST ANNUAL MEAN		8170	1971
HIGHEST DAILY MEAN		5751	1977
LOWEST DAILY MEAN	37200	(a)67800	Feb 24 1977
ANNUAL SEVEN-DAY MINIMUM	81	-1980	Jun 19 1972
INSTANTANEOUS PEAK FLOW	1300	943	Jun 14 1972
INSTANTANEOUS PEAK STAGE	21.05	(a)68000	Mar 30 1974
ANNUAL RUNOFF (CFSM)	.95	(a)24.90	Mar 30 1974
ANNUAL RUNOFF (INCHES)	12.89	1.11	
10 PERCENT EXCEEDS	10400	15.06	
50 PERCENT EXCEEDS	4260	5010	
90 PERCENT EXCEEDS	1880	2010	

(a) Includes water years 1904-1990.
(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 periods.

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

DATE	TIME	DIS-CHARGE, INST. CUBIC FEET PER SECOND (00061)	SPECIFIC CONDUCTANCE (US/CM) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)	TEMPERATURE WATER (DEG C) (00010)	TURBIDITY (NTU) (00076)	OXYGEN, DISSOLVED (MG/L) (00300)	OXYGEN, DISSOLVED (PERCENT SATURATION) (00301)	COLIFORM, FECAL, 0.7 UM-MF (COLS/100 ML) (31625)	STREPTOCOCCI, FECAL, KF AGAR (COLS. PER 100 ML) (31673)
OCT 30...	1130	6810	620	8.2	10.0	58	9.4	87	330	260
APR 17...	1230	7110	553	8.2	8.5	7.0	10.4	91	K27	K20
JUN 24...	1130	3790	723	8.2	25.5	27	7.3	92	K58	K36
AUG 06...	1400	556	707	8.5	24.5	10	10.7	131	K3	K7

DATE	HARDNESS TOTAL (MG/L AS CaCO3) (00900)	HARDNESS NONCARB DISSOLV FLD. AS CaCO3 (MG/L) (00904)	CALCIUM DISSOLVED (MG/L AS Ca) (00915)	MAGNESIUM, DISSOLVED (MG/L AS Mg) (00925)	SODIUM, DISSOLVED (MG/L AS Na) (00930)	POTASSIUM, DISSOLVED (MG/L AS K) (00935)	BICARBONATE WATER DIS IT FIELD (MG/L AS HCO3) (00453)	CARBONATE WATER DIS IT FIELD (MG/L AS CO3) (00452)	ALKALINITY WAT DIS TOT IT FIELD (MG/L AS CaCO3) (39086)	SULFATE DISSOLVED (MG/L AS SO4) (00945)
OCT 30...	240	--	63	20	29	4.0	--	--	--	39
APR 17...	230	49	63	17	21	2.6	219	--	180	36
JUN 24...	250	61	66	19	34	3.8	224	--	184	37
AUG 06...	230	67	59	20	49	3.7	194	2	163	36

DATE	CHLORIDE, DISSOLVED (MG/L AS CL) (00940)	FLUORIDE, DISSOLVED (MG/L AS F) (00950)	SILICA, DISSOLVED (MG/L AS SiO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L) (70300)	SOLIDS, DISSOLVED (TONS PER AC-FT) (70303)	SOLIDS, DISSOLVED (TONS PER DAY) (70302)	NITROGEN, NITRITE DIS-SOLVED (MG/L AS N) (00613)	NITROGEN, NO2+NO3 DIS-SOLVED (MG/L AS N) (00631)	NITROGEN, AMMONIA DIS-SOLVED (MG/L AS N) (00608)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N) (00625)
OCT 30...	59	0.20	4.7	372	0.51	6840	0.020	0.780	0.040	1.0
APR 17...	47	0.18	3.0	336	0.46	6450	0.020	1.60	0.060	0.60
JUN 24...	78	0.25	4.2	434	0.59	4440	0.092	2.24	0.034	0.97
AUG 06...	90	0.37	2.6	442	0.80	664	0.035	0.620	0.032	1.1

STREAMS TRIBUTARY TO LAKE HURON

04157000 SAGINAW RIVER AT SAGINAW, MI--Continued

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

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) (01156)
OCT 30...	0.170	<0.010	0.020	<5.0	43	<3.0	28	<4	8.0
APR 17...	0.050	<0.010	<0.010	11	36	<3.0	47	<4	15
JUN 24...	0.095	<0.010	0.016	6.5	46	<3.0	4.5	6	1.4
AUG 06...	0.063	<0.010	<0.010	<5.0	44	<3.0	<3.0	6	1.7

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 D'AM. % FINER T'AN .063 MM (70331)
OCT 30...	10	1.0	<1	<1.0	240	<6	237	360	97
APR 17...	<10	<1.0	<1	<1.0	203	<6	22	422	74
JUN 24...	<10	1.1	<1	<1.0	309	<6	25	256	93
AUG 06...	<10	2.4	<1	<1.0	300	<6	15	23	86

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	388	e700	201	409	e210	1850	1040	159	244	100	44	64
2	267	e450	560	372	e190	3650	727	160	211	359	44	59
3	199	e290	489	1380	e180	2000	595	467	214	857	46	56
4	154	e220	422	1610	179	1110	509	1020	199	537	55	53
5	125	e190	405	2570	429	1000	452	581	167	282	76	51
6	108	179	411	2190	1040	1030	497	720	143	167	59	50
7	100	403	485	743	855	784	500	592	125	118	49	49
8	114	4650	558	394	633	646	404	407	113	108	46	48
9	168	3670	471	285	492	505	328	388	103	96	43	46
10	189	1330	362	205	369	584	287	396	97	90	43	147
11	183	752	336	e170	266	1900	261	330	97	77	42	1010
12	150	522	356	e155	e205	1500	262	285	104	69	44	666
13	122	399	1440	e140	e170	838	397	263	104	64	58	404
14	106	320	1660	e130	e145	928	629	209	104	e59	94	288
15	102	257	856	e120	137	1140	531	267	92	e55	86	203
16	92	216	652	e115	e120	656	417	1000	81	e50	158	154
17	88	202	1110	e110	118	535	409	994	80	e56	159	134
18	101	208	2250	e105	e112	963	390	696	80	e54	104	113
19	460	220	1010	e102	1640	717	330	3970	75	e45	90	107
20	498	207	431	e98	2270	565	279	2820	73	e39	72	1150
21	331	181	314	e96	5550	653	243	938	79	e36	89	1750
22	245	158	289	e450	9430	783	222	600	142	40	185	858
23	e202	143	300	1670	5150	624	217	454	298	43	304	476
24	e235	138	e1250	1810	2270	460	218	371	178	44	215	312
25	e220	133	e1500	1190	1320	802	197	323	118	44	132	220
26	e205	128	537	e760	889	1970	179	293	94	54	100	169
27	e190	121	339	e510	2100	1030	165	243	80	65	85	133
28	e170	110	411	e370	3810	775	168	206	72	64	90	109
29	e155	104	493	e310	---	4630	180	190	66	54	84	93
30	e400	112	583	e260	---	4290	168	224	62	47	78	83
31	e1000	---	511	e230	---	1870	---	270	---	45	69	---
TOTAL	7067	16713	20992	19059	40279	40788	11201	19836	3695	3818	2841	9055
MEAN	228	557	677	615	1439	1316	373	640	123	123	91.6	302
MAX	1000	4650	2250	2570	9430	4630	1040	3970	298	857	304	1750
MIN	88	104	201	96	112	460	165	159	62	36	42	46
CFSM	.49	1.20	1.46	1.33	3.10	2.84	.80	1.38	.27	.27	.20	.65
IN.	.57	1.34	1.68	1.53	3.23	3.27	.90	1.59	.30	.31	.23	.73

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 1997, BY WATER YEAR (WY)

MEAN	116	178	261	261	437	1018	661	309	188	80.1	60.2	118
MAX	1316	973	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1944 - 1997

ANNUAL TOTAL	198113	195344	308
ANNUAL MEAN	541	535	705
HIGHEST ANNUAL MEAN			1985
LOWEST ANNUAL MEAN			28.6
HIGHEST DAILY MEAN	7780	9430	10100
LOWEST DAILY MEAN	33	36	2.0
ANNUAL SEVEN-DAY MINIMUM	34	42	2.7
INSTANTANEOUS PEAK FLOW		10900	(a)14400
INSTANTANEOUS PEAK STAGE		16.72	(b)16.72
INSTANTANEOUS LOW FLOW			(c)1.8
ANNUAL RUNOFF (CFSM)	1.17	1.15	.66
ANNUAL RUNOFF (INCHES)	15.88	15.66	9.02
10 PERCENT EXCEEDS	1290	1170	692
50 PERCENT EXCEEDS	219	220	65
90 PERCENT EXCEEDS	47	61	16

(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.--Water years 1996 to current year.

REMARKS.--Samples were collected at or near bridge on Jeddo Road.

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

		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)	CALCIUM DIS-SOLVED (MG/L AS CA) (00915)	
NOV											
01...	1200	45	631	8.2	5.0	11.2	91	--	>800	73	
27...	1245	120	1080	8.2	1.0	17.2	122	K28	K18	100	
DEC											
19...	1225	916	--	8.1	0.5	10.2	--	K55	K700	67	
JAN											
22...	1550	--	774	8.1	0.0	11.8	84	77	41	100	
FEB											
21...	1215	5470	244	8.1	0.0	12.5	89	--	420	27	
MAR											
28...	1130	727	634	8.1	6.0	--	--	K28	48	77	
APR											
09...	1350	302	730	8.3	4.5	12.9	101	110	160	87	
23...	1130	193	673	8.4	9.5	14.2	128	K10	K13	84	
MAY											
09...	1130	367	647	8.3	10.5	12.8	118	86	50	80	
22...	1130	567	598	8.1	10.5	10.5	95	560	200	73	
JUN											
19...	1200	68	785	8.3	19.0	8.8	97	43	K6	97	
26...	1150	91	660	8.2	24.5	7.1	87	K160	K69	77	
JUL											
10...	1120	88	636	8.2	19.5	8.6	95	K570	--	75	
31...	1210	46	717	8.3	22.0	12.4	143	K38	76	78	
AUG											
07...	1250	47	733	8.3	19.5	10.6	117	79	94	78	
21...	1120	88	516	8.1	18.0	7.8	86	--	--	57	
SEP											
12...	1300	633	438	8.0	--	7.8	--	K15000	K3000	59	
DATE		MAGNE-SIUM, DIS-SOLVED (MG/L AS MG) (00925)	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)	SILICA, DIS-SOLVED (MG/L AS SiO2) (00955)	SOLIDS, RESIDUE AT 18C DEG. C DIS-SOLVED (MG/L) (70300)
NOV											
01...	20	8.5	202	--	166	61	38	0.20	5.7	368	
27...	30	5.3	317	--	260	100	53	0.20	6.0	542	
DEC											
19...	19	5.7	188	--	154	62	47	0.20	5.4	372	
JAN											
22...	27	3.2	305	--	250	96	46	0.22	7.0	513	
FEB											
21...	7.0	4.4	117	--	96	20	14	0.20	2.8	149	
MAR											
28...	22	4.1	205	--	168	68	34	0.20	3.7	375	
APR											
09...	26	4.8	242	--	198	78	41	0.22	2.9	435	
23...	27	3.2	261	2	214	82	43	0.24	0.60	438	
MAY											
09...	23	4.0	244	--	200	62	34	0.22	2.9	396	
22...	21	4.1	224	--	184	58	31	0.22	4.2	394	
JUN											
19...	30	3.5	307	--	252	91	53	0.29	2.9	504	
26...	23	5.8	220	--	180	64	41	0.31	5.7	435	
JUL											
10...	23	6.0	239	--	196	69	39	0.25	6.8	422	
31...	27	3.7	256	--	210	83	49	0.35	5.6	462	
AUG											
07...	28	3.7	254	--	208	82	57	0.32	5.2	461	
21...	17	5.3	176	--	144	52	37	0.27	5.5	325	
SEP											
12...	15	6.8	148	--	122	38	28	0.22	6.1	280	

STREAMS TRIBUTARY TO ST. CLAIR RIVER

04159492 BLACK RIVER NEAR JEDDO, MI--Continued

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

DATE	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA 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)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)
NOV 01...	0.050	5.50	0.070	1.5	1.0	0.200	0.070	0.080	83	18
27...	0.020	3.70	0.120	0.70	0.60	0.060	<0.010	0.010	69	62
DEC 19...	0.030	5.50	0.110	1.2	0.80	0.140	0.070	0.070	52	14
JAN 22...	0.050	3.30	0.170	0.80	0.60	0.080	<0.010	<0.010	37	72
FEB 21...	0.045	1.50	0.155	1.2	0.84	0.232	0.049	0.042	83	44
MAR 28...	0.020	4.70	0.070	1.0	0.80	0.110	0.030	0.020	37	18
APR 09...	0.030	3.10	0.090	0.90	0.80	0.110	0.070	0.060	60	48
23...	0.012	2.01	0.020	0.66	0.51	0.023	<0.010	<0.010	81	45
MAY 09...	0.024	2.10	0.018	0.79	0.74	0.046	0.015	0.015	64	29
22...	0.038	4.40	0.037	1.2	0.88	0.095	0.015	0.025	45	26
JUN 19...	0.032	1.14	<0.015	0.69	0.51	<0.010	0.016	<0.010	12	33
26...	0.318	7.20	0.161	1.2	0.88	0.055	0.028	0.029	8.2	21
JUL 10...	0.094	4.49	0.040	1.4	0.86	0.125	0.041	0.039	8.2	29
31...	<0.010	0.276	<0.015	0.46	0.35	0.023	<0.010	<0.010	3.5	24
AUG 07...	<0.010	0.126	<0.015	0.73	0.36	0.110	<0.010	<0.010	<3.0	22
21...	0.051	1.98	0.098	0.86	0.63	0.109	0.029	0.030	8.6	19
SEP 12...	0.048	4.65	0.090	1.4	0.90	0.272	0.103	0.095	37	7.6
DATE	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C) (00689)	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)	BEN- FLUR- ALIN WAT FLD 0.7 U GF, REC (UG/L) (82673)	BUTYL- ATE, WATER, DISS, REC (UG/L) (04028)	
NOV 01...	12	3.1	0.035	0.029	0.217	E0.108	<0.001	<0.002	<0.002	
27...	9.6	0.30	<0.002	E0.002	0.038	E0.008	<0.001	<0.002	<0.002	
DEC 19...	9.7	1.6	0.015	0.017	0.112	E0.065	<0.001	<0.002	<0.002	
JAN 22...	7.6	--	<0.002	E0.004	0.034	E0.020	<0.001	<0.002	<0.002	
FEB 21...	6.2	>4.0	<0.002	0.017	0.098	E0.014	<0.001	<0.002	<0.002	
MAR 28...	8.2	0.90	<0.002	0.020	0.070	E0.038	<0.001	<0.002	<0.002	
APR 09...	10	0.70	--	--	--	--	--	--	--	
23...	8.7	0.80	<0.002	0.005	0.034	E0.006	<0.001	<0.002	<0.002	
MAY 09...	9.7	1.3	0.513	0.029	1.03	E0.054	<0.001	<0.002	<0.002	
22...	10	1.3	0.416	0.109	1.44	E0.047	<0.001	<0.002	<0.002	
JUN 19...	7.4	0.80	0.127	0.024	0.257	E0.038	<0.001	<0.002	<0.002	
26...	8.0	0.90	1.49	1.32	7.32	E0.622	<0.001	<0.002	<0.002	
JUL 10...	9.4	1.5	0.526	0.442	5.00	E0.445	<0.001	<0.002	<0.002	
31...	4.9	0.60	0.042	0.051	0.752	E0.104	<0.001	<0.002	<0.002	
AUG 07...	4.9	0.90	0.025	0.031	0.481	E0.025	<0.001	<0.002	<0.002	
21...	6.2	1.1	0.037	0.035	0.721	E0.029	<0.001	<0.002	<0.010	
SEP 12...	8.1	2.5	0.051	0.050	0.422	E0.051	<0.030	<0.002	<0.002	

STREAMS TRIBUTARY TO ST. CLAIR RIVER

04159492 BLACK RIVER NEAR JEDDO, MI--Continued

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

DATE	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)	2,6-DI- ETHYL ANILINE WAT FLT 0.7 U GF, REC (UG/L) (82660)	DI-SUL- FOTON WATER FLTRD 0.7 U GF, REC (UG/L) (82777)
NOV										
01...	<0.003	<0.003	<0.004	0.038	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
27...	<0.003	<0.003	<0.004	0.006	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
DEC										
19...	<0.003	<0.003	<0.004	0.021	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
JAN										
22...	<0.003	<0.003	<0.004	0.012	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
FEB										
21...	<0.003	<0.003	<0.004	0.018	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
MAR										
28...	<0.003	<0.003	<0.004	0.017	-	E0.001	<0.002	<0.001	<0.003	<0.017
APR										
23...	<0.003	<0.003	<0.004	0.010	E0.001	<0.006	<0.002	<0.001	<0.003	<0.017
MAY										
09...	<0.003	<0.003	<0.004	0.129	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
22...	<0.003	<0.003	<0.004	0.423	<0.002	E0.002	<0.002	<0.001	<0.003	<0.017
JUN										
19...	<0.003	<0.003	<0.004	0.084	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
26...	<0.003	<0.003	<0.020	3.39	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
JUL										
10...	<0.003	<0.003	<0.004	0.563	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
31...	<0.003	<0.003	<0.004	0.093	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
AUG										
07...	<0.003	<0.003	<0.004	0.089	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
21...	E0.013	<0.003	<0.004	0.147	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
SEP										
12...	<0.003	<0.003	<0.004	0.083	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017

DATE	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)	METO- LACHLOR WATER DISSOLV (UG/L) (39415)	METRI- BUTIN SENSOR WATER DISSOLV (UG/L) (82630)
NOV										
01...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.449	0.053
27...	E0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.088	0.004
DEC										
19...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	0.004	<0.005	0.251	0.017
JAN										
22...	E0.003	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.044	0.010
FEB										
21...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.220	0.022
MAR										
28...	E0.003	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.141	0.009
APR										
23...	E0.003	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.036	<0.004
MAY										
09...	E0.004	<0.004	<0.003	<0.003	<0.002	<0.004	0.008	<0.005	1.04	0.018
22...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	1.37	0.051
JUN										
19...	0.034	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.647	0.026
26...	0.176	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	E37.3	0.866
JUL										
10...	0.007	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	9.00	0.321
31...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.769	0.055
AUG										
07...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.541	0.026
21...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.960	0.038
SEP										
12...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.012	<0.005	1.11	0.066

STREAMS TRIBUTARY TO ST. CLAIR RIVER

04159492 BLACK RIVER NEAR JEDDO, MI--Continued

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

DATE	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)	PBB- ULATE WATER FLTRD 0.7 U GF, REC (UG/L) (82669)	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) (82678)
NOV 01...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	<0.018	<0.003
NOV 27...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	<0.018	<0.003
DEC 19...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	E0.010	<0.003
JAN 22...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	<0.018	<0.003
FEB 21...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	<0.018	<0.003
MAR 28...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	E0.006	<0.003
APR 23...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	E0.003	<0.003
MAY 09...	<0.004	<0.003	<0.004	<0.006	<0.004	0.012	<0.005	<0.002	E0.009	<0.003
MAY 22...	<0.004	<0.003	<0.004	<0.006	<0.004	0.056	<0.005	<0.002	<0.018	<0.003
JUN 19...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	E0.015	<0.003
JUN 26...	<0.004	<0.010	<0.004	<0.008	<0.004	0.071	<0.005	<0.002	<0.018	<0.003
JUL 10...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.040	<0.005	<0.002	E0.009	<0.003
JUL 31...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	E0.013	<0.003
AUG 07...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	0.018	<0.003
AUG 21...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	E0.008	<0.003
SEP 12...	<0.004	<0.003	<0.004	<0.006	<0.004	0.011	<0.005	<0.002	E0.010	<0.003

DATE	PROP- CHLOR, WATER, DISS, REC (UG/L) (04024)	PRO- PANIL WATER FLTRD 0.7 U GF, REC (UG/L) (82679)	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) (82881)	TRIA- LATE WATER FLTRD 0.7 U GF, REC (UG/L) (82678)	TRI- FLUR- ALIN WAT FLT 0.7 U GF, REC (UG/L) (82661)
NOV 01...	<0.007	<0.004	<0.013	0.009	<0.010	<0.007	<0.013	<0.002	<0.001	0.005
NOV 27...	<0.007	<0.004	<0.013	0.005	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
DEC 19...	<0.007	<0.004	<0.013	0.006	<0.010	<0.007	<0.013	<0.002	<0.001	E0.004
JAN 22...	<0.007	<0.004	<0.013	0.009	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
FEB 21...	<0.007	<0.004	<0.013	E0.005	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
MAR 28...	<0.007	<0.004	<0.013	0.005	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
APR 23...	<0.007	<0.004	<0.013	E0.004	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
MAY 09...	<0.007	<0.004	<0.013	0.025	E0.004	<0.007	<0.013	<0.002	<0.001	<0.002
MAY 22...	<0.007	<0.004	<0.013	0.024	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUN 19...	<0.007	<0.004	<0.013	0.019	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUN 26...	<0.007	<0.004	<0.013	0.049	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUL 10...	<0.007	<0.004	<0.013	0.027	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUL 31...	<0.007	<0.004	<0.013	0.011	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
AUG 07...	<0.007	<0.004	<0.013	0.007	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
AUG 21...	<0.007	<0.004	<0.013	0.060	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
SEP 12...	<0.007	<0.004	<0.013	0.060	E0.005	<0.007	<0.013	<0.002	<0.001	<0.002

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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	66	192	58	207	e109	791	676	71	98	20	12	17
2	48	126	126	167	e100	862	495	71	92	47	11	17
3	38	88	133	311	e94	715	377	170	91	129	11	17
4	32	65	111	419	130	533	279	383	88	101	11	16
5	29	54	101	608	e210	433	214	270	77	61	13	16
6	27	47	96	567	e390	375	220	320	67	40	12	16
7	24	129	103	299	e340	297	209	286	58	30	12	15
8	23	733	121	187	e280	250	176	207	49	25	11	15
9	27	699	121	e130	e230	216	147	192	44	22	10	15
10	31	457	103	e105	e190	237	128	172	39	21	9.6	66
11	29	319	95	e90	e150	480	117	145	33	20	11	117
12	29	228	99	e80	e125	486	122	128	30	18	13	134
13	26	158	320	e74	e100	347	168	117	30	16	17	115
14	24	117	435	e70	e90	426	242	105	28	17	15	106
15	23	95	309	e67	e83	531	212	125	26	19	24	84
16	22	72	238	65	e78	390	177	351	25	18	21	64
17	22	62	317	e60	e74	310	194	387	24	16	20	50
18	26	62	456	e58	e72	272	172	310	23	14	22	41
19	36	65	317	e56	e250	228	143	972	23	13	19	42
20	39	62	190	e54	621	193	123	899	22	12	18	169
21	37	54	156	e52	1340	191	108	574	29	15	27	301
22	32	48	137	116	1940	195	98	388	54	14	27	206
23	32	44	91	e250	1200	175	89	273	53	23	32	134
24	40	42	533	e500	816	148	83	194	63	24	30	95
25	47	41	713	e380	593	269	81	155	45	18	29	69
26	40	39	414	e290	453	536	76	135	34	17	30	e52
27	36	38	286	e230	821	414	71	116	28	15	29	e40
28	32	36	e230	e180	976	307	73	102	23	16	26	e34
29	32	e34	e250	e150	---	1010	78	95	20	16	21	e29
30	152	e34	e260	e130	---	1160	76	98	18	15	19	e26
31	261	---	246	e120	---	932	---	107	---	14	18	---
TOTAL	1362	4240	7165	6072	11855	13709	5424	7918	1364	846	580.6	2118
MEAN	43.9	141	231	196	423	442	181	255	45.5	27.3	18.7	70.6
MAX	261	733	713	608	1940	1160	676	972	98	129	32	301
MIN	22	34	58	52	72	148	71	71	18	12	9.6	15
CFSM	.26	.84	1.37	1.16	2.51	2.62	1.07	1.51	.27	.16	.11	.42
IN.	.30	.93	1.58	1.34	2.61	3.02	1.19	1.74	.30	.19	.13	.47

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1963 - 1997, BY WATER YEAR (WY)

	MEAN	20.3	60.6	93.0	110	146	287	242	102	80.8	22.8	14.8	16.0
MAX	67.4	261	266	404	423	664	715	328	659	78.1	57.3	95.9	
(WY)	1991	1993	1988	1974	1997	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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1963 - 1997
ANNUAL TOTAL	61304.8	62653.6	
ANNUAL MEAN	167	172	101
HIGHEST ANNUAL MEAN			174
LOWEST ANNUAL MEAN			7.84
HIGHEST DAILY MEAN			3940
LOWEST DAILY MEAN	2760	Jun 22	1940
ANNUAL SEVEN-DAY MINIMUM	7.6	Sep 2	9.6
INSTANTANEOUS PEAK FLOW	7.8	Aug 31	11
INSTANTANEOUS PEAK STAGE			2910
INSTANTANEOUS LOW FLOW			8.32
ANNUAL RUNOFF (CFSM)	.99		9.4
ANNUAL RUNOFF (INCHES)	13.49		1.02
10 PERCENT EXCEEDS	385		13.79
50 PERCENT EXCEEDS	54		429
90 PERCENT EXCEEDS	12		90
			17
			5.3

(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 Foltz, 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.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.8	15	17	e17	e9.2	59	49	14	21	6.4	2.4	4.6
2	8.6	11	20	19	e8.7	67	39	14	23	6.8	2.3	4.5
3	7.9	9.7	14	38	e8.1	44	33	46	26	5.9	2.4	4.4
4	7.7	9.2	14	35	14	35	28	40	23	4.8	2.5	4.0
5	7.3	8.9	14	56	36	31	30	28	21	4.7	2.4	3.9
6	7.1	8.7	14	32	26	30	33	33	19	4.1	2.3	3.8
7	7.0	29	15	23	20	24	28	24	17	4.0	2.1	3.3
8	7.1	87	17	17	17	22	23	25	15	4.6	2.3	3.3
9	7.7	42	15	e15	17	19	20	26	14	6.0	2.2	4.7
10	7.9	27	14	e14	12	26	18	22	14	4.7	2.0	6.0
11	7.4	20	13	13	e10	47	18	19	13	4.1	2.8	4.1
12	7.3	16	17	e12	e9.2	31	22	18	13	3.8	4.1	3.6
13	7.3	13	55	e12	e8.0	24	33	16	14	3.4	8.7	3.2
14	7.3	11	32	12	e7.4	50	32	15	13	5.3	6.0	1.9
15	7.3	9.7	24	12	e6.8	41	25	30	11	4.2	7.8	1.3
16	7.3	9.6	21	12	e6.4	29	23	52	11	3.3	1.1	9.3
17	6.7	9.8	26	e12	e6.2	25	22	41	12	2.9	9.2	8.3
18	8.1	11	34	e12	13	27	19	32	11	2.8	7.5	8.0
19	9.0	11	29	e12	38	23	18	110	8.7	2.3	6.1	9.6
20	8.3	10	16	e12	32	22	17	54	10	2.1	6.9	2.9
21	7.9	10	e10	14	168	23	16	37	20	8.8	1.2	2.0
22	7.8	10	e9.6	35	93	23	15	29	38	7.9	1.0	1.3
23	9.5	10	19	52	51	21	15	23	15	4.8	9.1	9.8
24	10	9.8	103	32	37	19	15	21	11	4.0	7.4	8.3
25	9.2	9.7	41	24	30	51	14	19	8.7	3.7	6.9	7.3
26	8.2	e9.4	e29	e19	25	47	14	18	7.0	4.5	6.4	6.6
27	7.9	e9.3	e23	e16	117	33	14	19	6.1	4.2	5.8	6.0
28	7.8	e9.2	e17	e14	67	34	17	20	5.1	3.5	5.0	5.8
29	8.7	e9.2	e21	e12	---	143	16	21	4.5	3.0	4.6	5.7
30	40	e9.2	e22	e11	---	98	15	24	4.4	2.7	4.6	5.6
31	25	---	e18	e10	---	73	---	21	---	2.6	4.6	---
TOTAL	296.1	464.4	733.6	626	893.0	1241	681	911	429.5	135.9	169.4	389.8
MEAN	9.55	15.5	23.7	20.2	31.9	40.0	22.7	29.4	14.3	4.38	5.46	13.0
MAX	40	87	103	56	168	143	49	110	38	8.8	12	60
MIN	6.7	8.7	9.6	10	6.2	19	14	14	4.4	2.1	2.0	3.3
CFSM	.53	.86	1.31	1.12	1.77	2.22	1.26	1.63	.80	.24	.30	.72
IN.	.61	.96	1.52	1.29	1.85	2.56	1.41	1.88	.89	.28	.35	.81

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 1997, BY WATER YEAR (WY)

MEAN	7.73	10.7	12.3	11.2	16.6	29.7	24.0	12.2	11.0	4.99	3.66	6.33
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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1965 - 1997
ANNUAL TOTAL	6892.7	6970.7	
ANNUAL MEAN	18.8	19.1	12.5
HIGHEST ANNUAL MEAN			20.6
LOWEST ANNUAL MEAN			5.13
HIGHEST DAILY MEAN	158	168	307
LOWEST DAILY MEAN	2.8	2.0	.01
ANNUAL SEVEN-DAY MINIMUM	3.1	2.3	.14
INSTANTANEOUS PEAK FLOW		210	(a)354
INSTANTANEOUS PEAK STAGE		5.77	(b)7.33
INSTANTANEOUS LOW FLOW		1.9	.00
ANNUAL RUNOFF (CFSM)	1.05	1.06	.70
ANNUAL RUNOFF (INCHES)	14.24	14.41	9.45
10 PERCENT EXCEEDS	41	38	28
50 PERCENT EXCEEDS	9.9	14	6.4
90 PERCENT EXCEEDS	3.7	4.4	1.9

(a) From rating curve extended above 100 ft³/s.

(b) Present datum.

(c) Part of each day July 21, Aug. 7-11.

(d) 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.

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	42	108	86	e150	e95	665	558	61	89	22	14	18
2	33	78	167	134	e88	685	360	55	90	24	15	17
3	31	59	137	226	e84	543	278	147	94	44	14	17
4	30	48	102	325	e82	360	226	370	91	52	14	17
5	27	40	94	456	e220	295	200	274	73	39	13	16
6	25	37	90	477	474	266	217	439	69	31	12	16
7	24	113	111	235	423	217	211	368	61	66	13	16
8	24	403	130	155	320	191	178	231	54	45	11	15
9	26	461	115	121	236	167	140	237	51	64	11	15
10	26	254	97	e96	176	197	118	204	46	54	11	30
11	28	161	94	e82	133	401	108	157	40	38	13	170
12	25	106	102	e75	112	394	112	121	35	29	16	143
13	21	82	306	e67	90	242	156	96	30	24	18	124
14	20	71	398	e62	e80	424	204	88	26	24	26	92
15	19	64	244	e59	e72	699	184	124	23	28	25	59
16	19	54	181	e56	e68	406	149	330	22	27	34	46
17	19	51	293	e54	e65	244	138	368	22	23	36	40
18	21	53	423	e51	e63	241	123	282	20	20	30	36
19	28	55	251	e49	e210	217	106	472	20	16	25	36
20	30	54	121	e47	419	187	95	645	20	14	22	67
21	27	50	e105	e46	923	174	78	327	55	17	26	121
22	25	45	e99	e110	1450	156	65	209	220	30	40	92
23	25	41	99	341	824	145	68	144	217	34	38	64
24	34	e37	331	540	379	130	70	118	114	27	32	49
25	41	e35	544	e400	264	223	69	105	63	23	28	40
26	36	e34	303	e285	224	519	65	100	49	21	25	34
27	32	e32	221	e210	774	356	61	84	40	21	23	31
28	27	e31	e160	e160	1150	263	62	71	33	19	21	29
29	27	e30	e180	e135	---	991	70	76	28	17	19	27
30	61	e30	e170	e115	---	1570	69	91	22	15	19	25
31	144	---	e160	e105	---	964	---	98	---	14	20	---
TOTAL	997	2717	5914	5424	9498	12532	4538	6492	1817	922	664	1502
MEAN	32.2	90.6	191	175	339	404	151	209	60.6	29.7	21.4	50.1
MAX	144	461	544	540	1450	1570	558	645	220	66	40	170
MIN	19	30	86	46	63	130	61	55	20	14	11	15
CFSM	.21	.60	1.26	1.16	2.25	2.68	1.00	1.39	.40	.20	.14	.33
IN.	.25	.67	1.46	1.34	2.34	3.09	1.12	1.60	.45	.23	.16	.37

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1963 - 1997, BY WATER YEAR (WY)

	MEAN	42.4	70.6	95.6	87.2	140	264	208	92.6	59.6	26.5	19.5	32.3
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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1963 - 1997.
ANNUAL TOTAL	42972	53017	
ANNUAL MEAN	117	145	94.5
HIGHEST ANNUAL MEAN			168
LOWEST ANNUAL MEAN			11.3
HIGHEST DAILY MEAN	1430	1570	3320
LOWEST DAILY MEAN	12	11	2.4
ANNUAL SEVEN-DAY MINIMUM	12	12	2.6
INSTANTANEOUS PEAK FLOW		1770	4520
INSTANTANEOUS PEAK STAGE		7.31	8.96
INSTANTANEOUS LOW FLOW		10	2.3
ANNUAL RUNOFF (CFSM)	.78	.96	.63
ANNUAL RUNOFF (INCHES)	10.59	13.06	8.51
10 PERCENT EXCEEDS	267	368	226
50 PERCENT EXCEEDS	52	71	32
90 PERCENT EXCEEDS	18	20	9.2

(a) Part of each day Aug. 8-11.

(b) 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.4	6.8	14	18	e13	46	48	17	22	9.0	5.1	3.4
2	5.2	5.9	15	18	e14	46	42	17	24	11	4.0	3.5
3	4.8	5.3	13	21	15	42	39	28	25	11	3.8	3.2
4	4.2	5.0	13	21	17	38	37	33	23	10	5.0	2.5
5	4.1	5.2	13	25	22	36	37	29	20	8.6	4.2	2.1
6	3.7	5.7	13	24	21	36	40	35	18	7.6	3.7	2.1
7	3.5	15	14	21	19	34	37	31	16	7.1	3.4	2.3
8	3.2	28	14	18	e18	35	34	30	16	7.3	3.1	2.4
9	3.4	22	13	e15	17	35	33	33	16	10	2.8	2.5
10	3.7	20	13	e14	16	35	32	29	16	9.3	2.7	1.7
11	3.4	18	13	e14	16	35	31	26	15	9.1	3.1	1.6
12	3.2	15	16	e13	15	32	31	25	14	8.0	3.9	1.3
13	2.9	13	24	e13	e14	30	33	23	14	7.2	6.5	1.2
14	2.8	12	21	e13	13	39	31	22	13	6.6	5.4	1.1
15	2.7	12	20	e12	13	42	30	29	12	6.2	6.4	9.9
16	2.6	12	20	e13	13	e36	28	30	12	5.8	8.4	8.3
17	2.4	12	21	e12	e12	34	27	32	12	5.4	6.6	8.7
18	3.8	12	21	e12	e13	34	26	29	11	5.2	5.5	9.8
19	5.2	12	18	e12	e15	32	24	34	11	4.7	3.5	9.3
20	4.1	11	e16	e11	e22	31	23	32	13	4.4	3.1	9.7
21	3.7	12	e14	14	52	30	21	29	15	5.0	5.0	8.5
22	3.5	11	13	18	e52	30	20	26	19	5.3	5.1	10
23	5.6	10	14	23	e40	28	19	24	15	4.7	4.5	8.1
24	6.8	9.8	32	e17	e35	27	19	22	14	4.4	4.3	6.7
25	5.3	9.6	28	e16	e30	30	18	22	13	4.1	4.4	5.9
26	5.3	9.5	23	e15	28	32	18	21	12	5.5	4.5	5.3
27	5.1	9.8	e22	e14	51	30	17	19	11	6.1	4.1	5.1
28	4.4	9.9	21	e13	49	29	18	17	9.9	5.0	3.9	5.0
29	5.7	8.7	22	e12	---	67	17	21	9.2	5.2	3.8	5.2
30	15	10	21	e12	---	67	17	26	8.9	5.8	3.7	5.0
31	9.7	---	20	e12	---	59	---	23	---	5.8	3.8	---
TOTAL	145.4	348.2	555	486	655	1157	847	814	450.0	210.4	137.3	213.5
MEAN	4.69	11.6	17.9	15.7	23.4	37.3	28.2	26.3	15.0	6.79	4.43	7.12
MAX	15	28	32	25	52	67	48	35	25	11	8.4	17
MIN	2.4	5.0	13	11	12	27	17	17	8.9	4.1	2.7	2.1
CFSM	.22	.56	.86	.75	1.12	1.79	1.35	1.26	.72	.32	.21	.34
IN.	.26	.62	.99	.87	1.17	2.06	1.51	1.45	.80	.37	.24	.38

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 1997, BY WATER YEAR (WY)

	MEAN	6.86	10.8	13.1	12.8	14.6	26.5	29.1	18.5	11.7	5.95	4.51	5.74
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1960 - 1997

ANNUAL TOTAL	5530.2	6018.8	
ANNUAL MEAN	15.1	16.5	13.3
HIGHEST ANNUAL MEAN			21.5
LOWEST ANNUAL MEAN			4.12
HIGHEST DAILY MEAN	100	67	146
LOWEST DAILY MEAN	1.2	2.1	.04
ANNUAL SEVEN-DAY MINIMUM	1.5	2.4	.04
INSTANTANEOUS PEAK FLOW		88	181
INSTANTANEOUS PEAK STAGE		3.81	4.53
INSTANTANEOUS LOW FLOW		1.9	.03
ANNUAL RUNOFF (CFSM)	.72	.79	.64
ANNUAL RUNOFF (INCHES)	9.84	10.71	8.67
10 PERCENT EXCEEDS	32	33	30
50 PERCENT EXCEEDS	11	13	9.5
90 PERCENT EXCEEDS	3.0	3.9	1.7

(a) 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	76	74	67	88	67	137	137	38	102	27	16	21
2	61	72	64	88	66	143	138	40	102	28	14	23
3	45	71	62	88	65	144	141	73	101	35	12	22
4	40	80	60	87	70	142	141	104	97	41	13	17
5	25	83	61	89	71	141	145	105	81	27	13	13
6	21	66	63	87	71	141	147	107	65	26	12	12
7	20	45	64	86	72	138	145	106	65	26	13	12
8	18	42	64	e86	71	136	142	108	64	26	13	13
9	14	43	65	86	71	134	138	108	63	26	12	13
10	14	46	65	86	70	133	134	108	53	26	11	72
11	18	48	68	e85	70	133	130	107	43	26	11	109
12	24	49	71	e84	70	131	132	105	39	27	13	108
13	24	45	73	e83	e69	128	130	100	35	26	13	111
14	25	70	72	82	68	126	126	96	34	25	12	113
15	24	82	72	80	66	122	123	99	33	24	21	112
16	22	79	72	80	65	122	121	105	33	20	41	109
17	22	81	76	e80	64	122	116	106	32	17	39	105
18	30	80	77	e79	64	122	98	104	29	39	39	74
19	42	78	77	e76	64	120	79	111	24	10	45	43
20	41	76	e77	e71	67	118	77	108	26	9.2	41	43
21	41	86	e76	e66	87	117	76	108	37	11	39	43
22	41	88	74	72	89	115	75	93	58	9.7	40	43
23	43	85	80	70	100	113	75	79	78	9.8	46	44
24	41	81	87	69	109	110	74	79	79	11	46	44
25	40	78	84	69	113	111	73	81	75	11	38	44
26	40	76	85	69	117	108	72	80	62	14	21	43
27	39	74	86	69	129	108	71	79	33	14	21	41
28	42	73	89	68	126	110	59	78	31	15	20	38
29	60	71	89	e68	---	123	33	96	29	16	21	36
30	86	68	89	68	---	127	36	109	27	16	20	30
31	76	---	88	68	---	133	---	104	---	16	20	---
TOTAL	1155	2090	2297	2427	2231	3908	3184	2924	1630	654.7	736	1551
MEAN	37.3	69.7	74.1	78.3	79.7	126	106	94.3	54.3	21.1	23.7	51.7
MAX	86	88	89	89	129	144	147	111	102	41	46	113
MIN	14	42	60	66	64	108	33	38	24	9.2	11	12
CFSM	.47	.88	.94	.99	1.01	1.59	1.34	1.19	.69	.27	.30	.65
IN.	.54	.98	1.08	1.14	1.05	1.84	1.50	1.37	.77	.31	.35	.73

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 1997, BY WATER YEAR (WY)

	MEAN	38.3	52.1	61.7	57.2	58.2	83.3	93.2	63.0	46.3	29.8	25.3	30.4
MAX	114	107	109	114	115	188	168	137	115	82.0	68.5	129	129
(WY)	1982	1986	1986	1973	1974	1976	1974	1974	1996	1968	1968	1975	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	4.80
(WY)	1965	1965	1964	1964	1964	1964	1987	1988	1988	1988	1963	1963	1963

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1960 - 1997
ANNUAL TOTAL	22895	24787.7	
ANNUAL MEAN	62.6	67.9	53.2
HIGHEST ANNUAL MEAN			87.9
LOWEST ANNUAL MEAN			20.0
HIGHEST DAILY MEAN	177	Jun 22	274
LOWEST DAILY MEAN	10	Aug 19	3.1
ANNUAL SEVEN-DAY MINIMUM	11	Aug 18	3.5
INSTANTANEOUS PEAK FLOW			276
INSTANTANEOUS PEAK STAGE			4.25
INSTANTANEOUS LOW FLOW			8.9
ANNUAL RUNOFF (CFSM)	.79	.86	.67
ANNUAL RUNOFF (INCHES)	10.75	11.64	9.12
10 PERCENT EXCEEDS	125	122	103
50 PERCENT EXCEEDS	61	70	47
90 PERCENT EXCEEDS	13	18	11

(a) July 20, 21.

(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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	43	56	81	75	61	177	204	47	77	43	17	25
2	40	52	71	77	59	180	195	46	91	39	16	26
3	38	48	62	87	59	160	181	114	97	43	17	33
4	35	45	60	83	84	149	166	97	81	43	20	35
5	32	43	57	105	113	139	162	89	74	43	17	38
6	30	42	59	80	86	136	172	123	68	42	16	36
7	29	131	60	e75	77	124	152	97	62	40	15	31
8	27	163	58	e68	72	117	132	101	57	44	14	29
9	28	93	56	e69	e70	108	119	113	54	54	14	47
10	29	76	54	e70	67	109	111	104	49	41	16	230
11	27	66	56	e67	64	109	105	98	45	37	19	126
12	27	60	75	e64	62	101	113	96	41	35	27	89
13	28	56	113	e61	e60	95	116	84	38	32	41	70
14	27	53	80	e58	e58	206	104	82	35	30	25	55
15	27	51	71	e55	56	159	97	115	33	29	56	47
16	27	51	71	e58	54	122	95	117	37	26	49	62
17	27	54	85	e54	e52	117	91	124	35	23	40	72
18	27	58	87	e51	59	114	89	115	33	22	34	70
19	38	55	e90	e50	92	108	78	168	33	21	31	69
20	33	54	e70	e49	93	106	72	134	77	19	40	76
21	32	55	e60	e57	300	102	69	119	66	40	47	63
22	34	54	e70	e120	212	101	65	110	88	29	37	59
23	62	54	84	e110	150	99	63	102	58	23	33	57
24	59	54	188	76	e130	96	60	93	54	22	33	54
25	48	53	96	72	e120	e143	57	94	47	21	31	52
26	43	52	e87	68	e115	118	55	83	42	35	29	50
27	41	49	e83	e62	295	106	55	72	37	26	29	48
28	42	48	81	e58	214	109	61	65	34	23	28	45
29	59	47	87	e55	---	292	56	96	32	21	25	44
30	106	53	83	e58	---	248	55	98	40	19	24	42
31	69	---	79	e60	---	228	---	83	---	18	24	---
TOTAL	1224	1826	2404	2152	2934	4278	3150	3079	1615	983	864	1780
MEAN	39.5	60.9	77.5	69.4	105	138	105	99.3	53.8	31.7	27.9	59.3
MAX	106	163	188	120	300	292	204	168	97	54	56	230
MIN	27	42	54	49	52	95	55	46	32	18	14	25
CFSM	.56	.86	1.09	.98	1.48	1.95	1.48	1.40	.76	.45	.39	.84
IN.	.64	.96	1.26	1.13	1.54	2.24	1.65	1.62	.85	.52	.45	.93

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 1997, BY WATER YEAR (WY)

	MEAN	38.8	46.3	52.5	51.3	59.8	96.9	99.4	64.0	47.5	29.1	25.8	34.9
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1960 - 1997

	ANNUAL TOTAL	23221	26289	
ANNUAL MEAN	63.4	72.0	53.8	
HIGHEST ANNUAL MEAN			86.7	1976
LOWEST ANNUAL MEAN			20.4	1964
HIGHEST DAILY MEAN	500	Jun 18	660	Feb 2 1968
LOWEST DAILY MEAN	16	Aug 10	6.8	Aug 15 1988
ANNUAL SEVEN-DAY MINIMUM	17	Aug 6	7.9	Oct 4 1963
INSTANTANEOUS PEAK FLOW			(a)918	Feb 1 1968
INSTANTANEOUS PEAK STAGE			(b)5.95	Feb 10 1965
INSTANTANEOUS LOW FLOW			(c)1.2	Aug 19 1974
ANNUAL RUNOFF (CFSM)	.89		.76	
ANNUAL RUNOFF (INCHES)	12.13		10.31	
10 PERCENT EXCEEDS	111		104	
50 PERCENT EXCEEDS	52		40	
90 PERCENT EXCEEDS	26		16	

(a) Gage height 5.22 ft.

(b) Backwater from ice.

(c) Result of regulation due to bridge construction.

(e) Estimated.

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	23	25	e20	e16	84	86	14	22	11	4.7	7.6
2	14	23	24	e21	e16	85	76	13	25	16	4.0	7.2
3	12	21	24	e24	e17	70	67	33	28	33	3.8	7.5
4	11	20	23	e23	e19	59	62	46	24	29	4.6	5.7
5	8.0	19	21	e28	e26	53	66	38	21	18	4.1	4.9
6	7.5	19	22	e21	e24	48	68	51	16	15	3.8	4.8
7	7.5	40	23	e20	e20	e40	59	42	15	16	3.6	4.7
8	7.7	60	22	e18	e18	35	51	41	14	13	3.5	5.3
9	8.2	44	20	e19	e18	30	43	42	12	13	5.7	8.6
10	8.6	32	19	e19	e17	33	38	36	11	11	4.1	3.2
11	8.5	27	19	e18	e16	37	35	32	11	9.4	4.5	2.9
12	8.2	24	24	e17	e16	33	40	29	10	8.7	6.4	2.2
13	8.4	23	e34	e16	e15	29	45	27	9.9	8.6	8.5	1.8
14	8.3	21	e21	e15	e15	52	40	25	9.5	7.7	6.1	1.3
15	8.2	19	e19	e15	e14	e55	36	35	8.7	6.7	8.6	9.9
16	8.5	19	e20	e16	e14	e46	33	46	9.1	6.4	1.1	1.1
17	8.9	19	e22	e14	e14	42	32	47	9.3	6.0	8.0	1.2
18	14	21	e24	e14	e16	42	29	41	8.6	5.9	9.2	1.8
19	20	19	e21	e13	e19	34	25	53	9.0	5.5	1.0	1.6
20	16	16	e18	e13	e25	30	21	50	14	6.4	8.3	1.8
21	13	15	e16	e20	e50	28	19	40	14	6.1	1.1	9.9
22	15	14	e18	e30	e85	29	15	33	25	6.6	9.6	9.1
23	20	15	e25	e25	e75	22	15	27	18	6.3	8.3	1.1
24	20	15	e54	e20	e50	22	15	22	19	6.3	7.2	8.1
25	17	15	e35	e19	e40	39	15	21	16	6.3	8.0	1.0
26	16	14	e24	e18	e32	43	14	20	13	6.5	1.1	7.6
27	15	11	e22	e17	e50	37	13	17	12	6.5	9.8	6.8
28	14	11	e21	e15	91	38	16	14	8.6	7.6	9.0	6.0
29	15	11	e24	e15	---	103	14	20	8.1	5.6	8.6	6.2
30	30	13	e23	e16	---	115	14	24	8.8	4.9	8.1	6.3
31	22	---	e21	e16	---	108	---	23	---	5.2	7.2	---
TOTAL	405.5	643	728	575	828	1521	1102	1002	429.6	314.2	220.5	337.2
MEAN	13.1	21.4	23.5	18.5	29.6	49.1	36.7	32.3	14.3	10.1	7.11	11.2
MAX	30	60	54	30	91	115	86	53	28	33	11	32
MIN	7.5	11	16	13	14	22	13	13	8.1	4.9	3.5	4.7
CFSM	.51	.84	.92	.72	1.16	1.92	1.43	1.26	.56	.40	.28	.44
IN.	.59	.93	1.06	.84	1.20	2.21	1.60	1.46	.62	.46	.32	.49

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 1997, BY WATER YEAR (WY)

	MEAN	10.6	15.9	18.0	16.8	20.8	35.7	35.4	18.9	14.2	8.28	7.02	8.80
MAX	25.1	46.2	41.3	47.7	62.9	79.7	75.1	67.1	49.5	20.0	48.5	41.2	
(WY)	1982	1986	1976	1973	1976	1978	1975	1974	1996	1969	1975	1975	
MIN	1.79	2.06	3.56	5.26	7.22	14.6	18.3	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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1965 - 1997
ANNUAL TOTAL	7921.2	8105.0	
ANNUAL MEAN	21.6	22.2	17.5
HIGHEST ANNUAL MEAN			31.5
LOWEST ANNUAL MEAN			9.38
HIGHEST DAILY MEAN	196	Jun 20	245
LOWEST DAILY MEAN	3.9	Sep 2	.92
ANNUAL SEVEN-DAY MINIMUM	4.0	Aug 29	1.2
INSTANTANEOUS PEAK FLOW		128	290
INSTANTANEOUS PEAK STAGE		3.60	5.19
INSTANTANEOUS LOW FLOW		3.2	.92
ANNUAL RUNOFF (CFSM)	.85	.87	.68
ANNUAL RUNOFF (INCHES)	11.51	11.78	9.29
10 PERCENT EXCEEDS	43	43	37
50 PERCENT EXCEEDS	16	18	12
90 PERCENT EXCEEDS	5.3	6.7	3.4

(a) Aug. 8, 9.

(b) Oct. 5, 9, 1966.

(c) 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. Prior to October 1996 monthend elevations and contents only.

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).

REMARKS.--Lake is formed by an earthfill dam with concrete spillway completed in 1962. The spillway section includes a drum gate and 2 sluices, one on each side, with valve controls capable of draining lake. The lake began filling February 1963 and is used for recreational purposes.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 13.65 ft, Apr. 20, 1975; minimum recorded, 4.71 ft, Nov. 21, 1967.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 12.97 ft, Mar. 30, 31; minimum, 7.74 ft, Oct. 17, 18.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.05	8.23	9.86	10.84	10.44	12.52	12.74	12.17	12.35	12.06	11.97	12.07
2	9.03	8.28	9.98	10.79	10.39	12.50	12.61	12.16	12.35	12.11	11.97	12.07
3	8.96	8.31	10.09	10.77	10.35	12.46	12.51	12.25	12.39	12.10	11.97	12.06
4	8.87	8.34	10.17	10.76	10.34	12.38	12.43	12.42	12.41	12.10	11.97	12.04
5	8.79	8.36	10.24	10.80	10.46	12.31	12.39	12.47	12.39	12.12	11.96	12.03
6	8.69	8.40	10.32	10.84	10.55	12.26	12.44	12.53	12.34	12.12	11.95	12.03
7	8.59	8.58	10.39	10.83	10.60	12.20	12.41	12.55	12.28	12.11	11.95	12.03
8	8.48	9.07	10.42	10.74	10.63	12.15	12.34	12.54	12.23	12.11	11.97	12.03
9	8.36	9.46	10.45	10.64	10.61	12.11	12.26	12.56	12.19	12.15	11.97	12.04
10	8.26	9.73	10.44	10.55	10.57	12.07	12.19	12.55	12.14	12.14	11.97	12.23
11	8.14	9.91	10.45	10.41	10.52	12.06	12.14	12.50	12.11	12.11	11.99	12.34
12	8.07	9.99	10.50	10.26	10.46	12.05	12.11	12.46	12.08	12.09	11.99	12.36
13	8.00	10.04	10.61	10.14	10.37	12.04	12.13	12.42	12.06	12.06	12.01	12.32
14	7.93	10.08	10.73	10.14	10.28	12.26	12.16	12.39	12.03	12.05	12.01	12.26
15	7.86	10.09	10.82	10.15	10.27	12.39	12.21	12.41	11.99	12.04	12.05	12.22
16	7.80	10.09	10.86	10.19	10.26	12.34	12.30	12.46	11.97	12.02	12.12	12.18
17	7.76	10.09	10.93	10.19	10.24	12.29	12.36	12.52	11.98	12.01	12.14	12.17
18	7.76	10.10	10.97	10.17	10.23	12.24	12.36	12.52	11.98	12.00	12.12	12.16
19	7.79	10.10	10.93	---	10.32	12.21	12.34	12.57	11.97	11.99	12.10	12.15
20	7.82	10.10	10.84	---	10.45	12.16	12.32	12.62	12.06	11.97	12.10	12.19
21	7.86	10.07	10.73	---	10.98	12.12	12.29	12.59	12.10	11.98	12.13	12.18
22	7.89	10.03	10.61	10.18	11.69	12.07	12.27	12.54	12.15	12.02	12.13	12.15
23	7.95	9.99	10.51	10.31	12.09	12.04	12.24	12.49	12.18	12.03	12.12	12.13
24	8.03	9.96	10.64	10.43	12.23	12.00	12.22	12.44	12.16	12.03	12.11	12.11
25	8.09	9.95	10.81	10.53	12.23	11.99	12.20	12.39	12.12	12.03	12.10	12.09
26	8.13	9.92	10.88	10.58	12.21	12.11	12.19	12.35	12.09	12.03	12.09	12.09
27	8.14	9.86	10.88	10.62	12.39	12.17	12.19	12.30	12.07	12.03	12.08	12.08
28	8.13	9.84	10.88	10.62	12.52	12.18	12.20	12.26	12.04	12.03	12.08	12.08
29	8.05	9.81	10.88	10.58	---	12.55	12.19	12.25	12.02	12.00	12.08	12.08
30	8.13	9.80	10.88	10.52	---	12.84	12.19	12.32	12.01	11.99	12.07	12.08
31	8.18	---	10.87	10.48	---	12.90	---	12.35	---	11.98	12.07	---
MEAN	8.21	9.55	10.60	---	10.88	12.26	12.30	12.43	12.14	12.05	12.04	12.13
MAX	9.05	10.10	10.97	---	12.52	12.90	12.74	12.62	12.41	12.15	12.14	12.36
MIN	7.76	8.23	9.86	---	10.23	11.99	12.11	12.16	11.97	11.97	11.95	12.03

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 except for estimated daily discharges, which are fair. 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SE
1	51	33	32	70	54	e160	211	45	73	40	7.6	1 ^a
2	50	33	32	70	54	e160	182	44	72	44	7.4	1 ^a
3	51	32	32	75	54	e157	160	67	75	41	7.7	1 ^a
4	50	32	32	79	54	143	146	91	74	43	8.8	1 ^a
5	49	28	32	79	57	127	142	100	68	43	9.6	1 ^a
6	48	27	32	78	59	118	144	115	61	40	4.5	1 ^a
7	47	28	39	78	59	104	136	111	53	36	4.2	1 ^a
8	47	28	44	78	59	97	122	112	47	34	4.5	1 ^a
9	46	29	45	78	60	90	111	112	42	43	4.9	1 ^a
10	46	29	45	78	60	86	101	106	38	37	5.0	5 ^a
11	36	41	45	78	60	85	94	93	34	32	12	7 ^a
12	34	44	51	78	60	84	93	85	30	27	21	7 ^a
13	30	44	56	53	60	82	94	79	29	24	16	6 ^a
14	28	44	56	39	50	102	78	74	25	21	11	5 ^a
15	23	44	59	39	40	124	58	84	19	19	17	4 ^a
16	22	43	62	39	40	122	64	94	19	18	27	3 ^a
17	23	43	65	39	40	115	72	105	22	16	31	3 ^a
18	23	43	71	39	39	109	72	102	20	15	26	3 ^a
19	23	43	71	39	51	100	70	117	23	14	22	3 ^a
20	23	43	71	39	65	93	64	114	42	10	23	4 ^a
21	e23	43	71	35	70	88	60	109	48	15	26	3 ^a
22	e23	43	70	36	72	83	56	99	57	18	26	3 ^a
23	e23	43	70	43	98	80	52	87	60	15	24	2 ^a
24	e24	43	70	43	120	75	48	78	52	12	22	2 ^a
25	e24	43	70	44	e130	76	47	76	45	12	21	2 ^a
26	e25	43	70	44	e130	83	47	66	41	14	20	2 ^a
27	e25	36	70	49	e140	89	46	57	35	15	19	1 ^a
28	e25	32	70	55	e160	92	48	50	30	15	21	1 ^a
29	e46	32	70	55	---	142	47	55	26	12	20	1 ^a
30	49	32	70	55	---	218	46	69	27	9.4	19	2 ^a
31	43	---	70	55	---	239	---	73	---	8.4	19	---
TOTAL	1080	1121	1743	1759	1995	3523	2711	2668	1287	742.8	507.2	905
MEAN	34.8	37.4	56.2	56.7	71.3	114	90.4	86.1	42.9	24.0	16.4	30.2
MAX	51	44	71	79	160	239	211	117	75	44	31	7 ^a
MIN	22	27	32	35	39	75	46	44	19	8.4	4.2	1 ^a

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 1997, BY WATER YEAR (WY)

	MEAN	31.3	43.4	46.4	42.3	49.2	77.8	78.5	50.6	37.1	21.6	19.3	23.9
MAX	85.8	105	94.0	115	144	199	142	132	120	50.7	76.0	97.7	97.7
(WY)	1982	1986	1976	1973	1976	1976	1975	1974	1989	1969	1975	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	4.7 ^a	4.7 ^a
(WY)	1963	1964	1964	1963	1963	1964	1963	1963	1964	1988	1964	1964	1964

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1958 - 1997
ANNUAL TOTAL	18809.3	20042.0	
ANNUAL MEAN	51.4	54.9	43.5
HIGHEST ANNUAL MEAN			79.1
LOWEST ANNUAL MEAN			12.0
HIGHEST DAILY MEAN	287	239	407
LOWEST DAILY MEAN	5.4	4.2	1.3
ANNUAL SEVEN-DAY MINIMUM	6.8	5.9	2.2
INSTANTANEOUS PEAK FLOW		252	(b)552
INSTANTANEOUS PEAK STAGE		4.63	(c)6.71
INSTANTANEOUS LOW FLOW		4.0	(d)
10 PERCENT EXCEEDS	88	104	87
50 PERCENT EXCEEDS	43	45	32
90 PERCENT EXCEEDS	17	18	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.

(d) Aug. 5, 6, 7.

(e) Estimated.

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, on right bank at upstream side of bridge on Riverland Road in Sterling Heights.

DRAINAGE AREA.--309 mi².

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1978 to December 1982, March 1996 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 625 ft above sea level, from topographic map.

REMARKS.--Water-discharge records fair for 1996 water year, poor for 1997 water 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	---	---	---	---	---	297	266	518	154	340	195	88
2	---	---	---	---	---	292	248	470	165	271	152	75
3	---	---	---	---	---	e280	249	434	180	263	137	127
4	---	---	---	---	---	e280	e255	408	263	173	227	132
5	---	---	---	---	---	252	e250	385	277	147	138	130
6	---	---	---	---	---	242	241	359	281	137	116	133
7	---	---	---	---	---	219	236	323	345	139	100	155
8	---	---	---	---	---	e210	230	305	305	226	90	367
9	---	---	---	---	---	e205	221	373	377	259	86	199
10	---	---	---	---	---	e200	217	688	418	208	81	189
11	---	---	---	---	---	203	218	e705	432	170	67	182
12	---	---	---	---	---	228	202	526	531	164	63	177
13	---	---	---	---	---	241	881	463	614	158	73	160
14	---	---	---	---	---	260	e760	393	424	175	95	146
15	---	---	---	---	---	278	e600	408	330	226	69	148
16	---	---	---	---	---	245	592	392	247	221	65	140
17	---	---	---	---	---	232	529	367	238	182	63	139
18	---	---	---	---	---	233	481	293	726	167	58	137
19	---	---	---	---	---	237	473	270	1580	175	55	119
20	---	---	---	---	---	277	698	273	1180	168	92	104
21	---	---	---	---	---	257	580	1040	993	154	141	106
22	---	---	---	---	---	256	561	834	903	151	72	225
23	---	---	---	---	---	260	e565	618	775	119	204	e220
24	---	---	---	---	---	285	e480	576	736	103	216	e310
25	---	---	---	---	---	e460	456	530	625	104	188	e350
26	---	---	---	---	---	e420	470	439	545	97	167	e300
27	---	---	---	---	---	e300	463	384	475	105	149	e375
28	---	---	---	---	---	283	408	341	436	102	123	e450
29	---	---	---	---	---	280	399	255	403	103	109	e400
30	---	---	---	---	---	276	e630	206	373	139	103	e375
31	---	---	---	---	---	275	---	174	---	188	95	---
TOTAL	---	---	---	---	---	8243	12859	13750	15335	5332	3589	6158
MEAN	---	---	---	---	---	266	429	444	511	172	116	205
MAX	---	---	---	---	---	460	881	1040	1580	340	227	450
MIN	---	---	---	---	---	200	202	174	154	97	55	75
CFSM	---	---	---	---	---	.88	1.39	1.44	1.65	.56	.37	.66
IN.	---	---	---	---	---	.99	1.55	1.66	1.85	.64	.43	.74

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1979 - 1996, BY WATER YEAR (WY)

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
MEAN	256	228	260	205	238	392	505	318	270	157	153	195						
MAX	574	345	318	261	437	672	619	444	511	177	268	317						
(WY)	1982	1982	1983	1982	1981	1982	1982	1996	1996	1982	1980	1981						
MIN	145	159	187	155	141	266	361	233	164	113	111	83.0						
(WY)	1983	1979	1979	1981	1979	1996	1981	1982	1981	1981	1982	1979						

SUMMARY STATISTICS

ANNUAL MEAN
HIGHEST ANNUAL MEAN
LOWEST ANNUAL MEAN
HIGHEST DAILY MEAN
LOWEST DAILY MEAN
ANNUAL SEVEN-DAY MINIMUM
ANNUAL RUNOFF (CFSM)
ANNUAL RUNOFF (INCHES)
10 PERCENT EXCEEDS
50 PERCENT EXCEEDS
90 PERCENT EXCEEDS

WATER YEARS 1979 - 1996

262
327
212
1580
55
68
11.54
470
215
119

Jun 19 1996
Aug 19 1996
Aug 13 1996

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SF ²
1	e310	e250	e400	e310	275	e850	795	238	e350	e400	e80	102
2	e270	e210	e400	e340	270	e700	721	231	e560	e900	e79	100
3	e220	e200	e290	e350	281	e600	670	495	e620	e1500	e90	118
4	e180	e200	e260	e350	378	e550	634	534	e490	e350	e250	118
5	e160	e190	e250	e470	551	e540	688	382	e420	e250	e100	131
6	e150	e180	e310	e380	373	e580	754	579	e370	e220	e84	124
7	e140	e700	e280	e330	326	e540	635	421	e330	e210	e76	111
8	e150	e1200	e260	e300	e300	e470	e540	438	e290	e220	e74	106
9	e160	e500	e250	e310	e290	e480	e480	497	e260	e400	e70	127
10	e150	e320	e250	e310	e280	e500	e450	421	e220	e200	e68	6 ⁷⁹
11	e110	e270	e330	e290	e270	e470	e420	390	e190	e160	e130	6 ⁷⁹
12	e110	e260	e400	e280	e260	e440	e450	387	e180	e150	e180	4 ⁷⁸
13	e100	e230	e680	e260	e250	e430	e460	365	e180	e130	e230	3 ⁷¹
14	e99	e200	e400	e240	e250	e1900	e440	356	e180	e120	e120	3 ⁷⁴
15	e95	e190	e330	e240	e230	e1200	e390	471	e150	e160	e250	2 ⁷¹
16	e93	e190	e300	e250	e220	e700	e390	460	e240	e130	275	2 ⁷⁷
17	e100	e200	e500	e240	e220	e565	e400	511	e220	e110	225	2 ⁷⁵
18	e210	e230	e550	e220	e250	e550	e360	442	e190	e105	179	2 ⁷⁹
19	e180	e210	e350	e210	e320	e500	e340	779	e200	e95	161	2 ⁷⁰
20	e140	e210	e300	e210	e450	e460	e330	600	e290	e86	167	377
21	e130	e220	e270	e300	e2000	e440	e320	507	e400	e230	240	371
22	e130	e230	e300	e500	e1200	e430	e300	455	e880	e240	161	2 ⁷⁰
23	e320	e220	e350	e700	e800	e420	e297	422	e450	e110	140	2 ⁷⁹
24	e250	e230	e820	e450	e600	e450	e289	333	e300	e105	142	273
25	e190	e240	e500	e330	e540	e500	e278	373	e250	e100	141	172
26	e190	e250	e350	e300	e500	e540	e271	350	e210	e230	135	174
27	e200	e240	e320	e270	e1600	e470	e265	305	e180	e180	136	1 ⁷⁰
28	e200	e220	e340	e260	e1100	e460	e301	281	e140	e140	126	146
29	e230	e220	e360	e250	---	951	e263	422	e130	e120	114	1 ⁷⁹
30	e720	e300	e350	e260	---	1040	e245	535	e250	e98	105	147
31	e360	---	e330	e270	---	944	---	e400	---	e90	104	---
TOTAL	6047	8510	11480	9780	14384	19670	13178	13380	9120	7539	4432	72 ⁷⁹
MEAN	195	284	370	315	514	635	439	432	304	243	143	2 ⁷¹
MAX	720	1200	820	700	2000	1900	795	779	880	1500	275	6 ⁷⁹
MIN	93	180	250	210	220	420	245	231	130	86	68	170
CFSM	.63	.92	1.20	1.02	1.66	2.05	1.42	1.40	.98	.79	.46	.78
IN.	.73	1.02	1.38	1.18	1.73	2.37	1.59	1.61	1.10	.91	.53	.87

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1979 - 1997, BY WATER YEAR (WY)

MEAN	246	237	278	227	292	433	494	337	276	172	151	273
MAX	574	345	370	315	514	672	619	444	511	243	268	317
(WY)	1982	1982	1997	1997	1997	1982	1982	1996	1996	1997	1980	19 ⁷¹
MIN	145	159	187	155	141	266	361	233	164	113	111	8 ⁷⁰
(WY)	1983	1979	1979	1981	1979	1996	1981	1982	1981	1981	1982	1979

SUMMARY STATISTICS

FOR 1997 WATER YEAR

WATER YEARS 1979 - 19⁷⁷

ANNUAL TOTAL	124756		
ANNUAL MEAN	342	278	
HIGHEST ANNUAL MEAN		342	19 ⁷⁷
LOWEST ANNUAL MEAN		212	1979
HIGHEST DAILY MEAN	2000	Feb 21	2000
LOWEST DAILY MEAN	68	Aug 10	55
ANNUAL SEVEN-DAY MINIMUM	86	Aug 5	68
ANNUAL RUNOFF (CFSM)	1.11		.90
ANNUAL RUNOFF (INCHES)	15.02		12.24
10 PERCENT EXCEEDS	600		500
50 PERCENT EXCEEDS	278		225
90 PERCENT EXCEEDS	120		120

(e) Estimated.

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1996 to current year.

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

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

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)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
OCT										
31...	1157	576	696	8.3	7.5	11.4	98	--	K360	56
NOV										
26...	1340	258	1420	8.3	2.0	13.5	99	160	360	63
DEC										
18...	1405	389	1240	8.3	1.0	13.7	99	120	170	65
JAN										
09...	1130	338	846	8.2	0.5	13.2	96	140	50	67
23...	1445	E700	1380	8.1	0.0	13.3	93	170	69	67
FEB										
07...	1152	323	1050	8.3	2.0	13.5	99	K75	80	81
20...	1055	334	1080	8.2	1.5	14.5	105	30	44	66
22...	1410	976	950	8.2	2.0	12.8	95	K48	190	59
MAR										
18...	1115	541	796	8.3	3.0	--	--	48	34	66
27...	1040	463	880	8.2	4.5	--	--	K28	32	69
APR										
08...	1450	593	750	8.2	6.0	12.9	106	60	69	66
16...	1225	381	768	8.2	9.5	12.0	108	150	55	68
22...	1400	306	804	8.4	9.0	11.3	101	100	K33	70
MAY										
01...	1225	234	810	8.3	12.0	10.2	99	K17	91	73
08...	1050	387	742	8.3	11.0	11.0	102	K41	90	70
14...	1320	348	763	8.2	11.0	12.4	116	K37	K23	70
21...	1120	506	750	8.2	11.5	10.6	99	52	47	64
29...	1200	357	760	8.2	15.0	8.9	90	250	K200	65
JUN										
18...	1050	182	784	8.2	18.0	7.8	85	K78	150	71
25...	1240	254	732	8.3	24.0	7.1	87	230	280	62
JUL										
02...	1130	361	670	8.1	23.5	7.2	88	--	--	53
09...	1050	193	888	8.5	19.0	8.2	90	K900	570	69
17...	1150	110	833	8.4	--	6.4	--	300	K190	67
30...	1340	99	784	8.4	22.5	7.1	83	250	180	64
AUG										
06...	1200	68	927	8.2	19.0	8.2	90	210	240	72
20...	1200	149	773	8.2	19.0	8.4	93	840	260	61
SEP										
04...	1220	120	804	8.2	15.5	9.7	99	210	250	65
10...	1415	897	401	7.9	18.0	7.0	77	--	>8000	36

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	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)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)
OCT 31...	19	3.3	207	--	170	30	94	0.20	4.9	381
NOV 26...	20	3.8	234	--	192	34	300	0.20	4.6	758
DEC 18...	19	3.8	232	--	190	38	260	0.20	5.5	688
JAN 09...	21	2.9	244	--	200	35	110	0.20	5.3	451
23...	18	4.1	205	--	168	40	300	0.30	5.6	749
FEB 07...	22	3.2	--	--	--	39	180	0.20	6.4	583
20...	20	3.3	229	--	188	38	200	0.20	4.9	610
22...	14	3.6	203	--	166	33	180	0.20	5.3	517
MAR 18...	18	2.7	227	--	186	33	140	0.20	4.2	490
27...	19	2.7	233	--	191	35	140	0.20	4.2	486
APR 08...	19	2.8	--	--	--	31	110	0.20	4.1	427
16...	20	2.7	237	--	194	35	120	0.23	2.5	456
22...	21	2.8	224	2	188	35	110	0.25	2.1	466
MAY 01...	22	3.0	249	--	204	38	130	0.28	1.3	484
08...	19	2.8	239	--	196	34	100	0.20	2.3	448
14...	20	2.6	232	--	190	32	110	0.20	1.9	442
21...	19	2.4	244	--	200	31	97	0.21	2.9	446
29...	19	2.6	215	--	176	31	110	0.21	2.2	425
JUN 18...	20	3.7	246	--	202	37	130	0.29	3.9	511
25...	20	2.8	224	--	184	28	100	0.22	4.1	449
JUL 02...	16	3.3	195	--	160	26	96	0.19	4.4	400
09...	21	3.9	232	2	194	38	130	0.30	5.3	518
17...	22	3.7	217	2	182	34	120	0.32	3.4	488
30...	21	3.5	--	--	--	31	110	0.32	4.9	468
AUG 06...	23	4.4	--	--	--	39	140	0.43	5.9	535
20...	21	3.4	--	--	--	32	100	0.30	5.2	454
SEP 04...	21	3.6	242	--	198	35	120	0.31	5.0	489
10...	8.3	4.1	108	--	89	21	51	0.18	4.0	219

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO ₂ +NO ₃ 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)
OCT 31...	0.030	0.580	0.100	0.50	0.40	0.050
NOV 26...	0.010	1.00	0.120	0.50	0.50	0.060
DEC 18...	0.030	1.00	0.150	0.60	0.50	0.070
JAN 09...	0.020	1.10	0.150	0.50	0.50	0.020
23...	0.040	1.10	0.290	0.70	0.90	0.040
FEB 07...	<0.010	1.23	0.228	0.73	0.63	0.034
20...	0.040	1.10	0.170	0.60	0.50	0.030
22...	0.040	0.977	0.120	0.88	0.61	0.233
MAR 18...	0.021	0.930	0.103	0.54	0.42	<0.010
27...	<0.010	0.920	0.150	0.60	0.40	0.020
APR 08...	0.010	0.740	0.100	0.60	0.40	0.040
16...	0.010	0.850	0.120	0.50	0.40	0.020
22...	0.013	1.07	0.094	0.63	0.39	0.033
MAY 01...	0.024	1.44	0.111	0.65	0.48	0.022
08...	0.012	0.952	0.102	0.57	0.40	0.028
14...	0.015	0.737	0.082	0.61	0.33	0.017
21...	0.014	0.603	<0.015	0.56	0.43	0.022
29...	0.025	1.15	0.132	0.76	0.63	0.067
JUN 18...	0.045	2.16	0.156	0.63	0.56	0.059
25...	0.036	1.01	0.104	0.70	0.45	0.091
JUL 02...	0.042	1.13	0.077	1.1	0.50	0.236
09...	0.048	3.46	0.092	0.81	0.68	0.105
17...	0.056	1.91	0.083	0.60	0.50	0.061
30...	0.044	1.34	0.129	0.67	0.54	0.078
AUG 06...	0.049	2.02	0.166	0.68	0.65	0.064
20...	0.031	1.42	0.099	0.63	0.51	0.085
SEP 04...	0.025	1.92	0.079	0.52	0.59	0.051
10...	0.029	0.960	0.549	2.0	1.2	0.233

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	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)	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)
OCT 31...	0.020	0.030	24	16	6.1	1.2
NOV 26...	0.040	0.040	46	25	5.3	0.60
DEC 18...	0.010	0.020	22	31	5.1	0.70
JAN 09...	<0.010	0.010	30	24	5.1	0.50
23...	0.060	0.040	20	45	4.9	3.1
FEB 07...	<0.010	<0.010	30	50	4.7	0.50
20...	<0.010	<0.010	25	46	5.0	0.50
22...	0.069	0.013	20	35	4.6	1.3
MAR 18...	<0.010	<0.010	20	23	--	--
27...	<0.010	<0.010	32	29	4.7	0.50
APR 08...	0.010	<0.010	26	21	5.5	0.80
16...	0.020	<0.010	48	28	5.2	0.60
22...	<0.010	<0.010	65	32	5.4	1.0
MAY 01...	<0.010	<0.010	83	40	5.5	0.60
08...	0.021	<0.010	36	26	5.8	1.0
14...	<0.010	<0.010	48	21	5.4	0.80
21...	<0.010	<0.010	24	18	5.2	0.60
29...	<0.010	0.015	13	27	5.8	0.60
JUN 18...	0.046	0.036	63	21	5.8	0.70
JUL 02...	0.037	0.043	26	4.9	6.5	3.8
09...	0.056	0.044	20	10	5.3	1.8
17...	0.017	0.021	37	21	5.3	0.50
30...	0.052	0.051	31	22	5.1	1.0
AUG 06...	0.036	0.044	28	24	5.3	0.30
20...	0.025	<0.010	20	15	5.4	1.3
SEP 04...	0.050	0.035	26	11	4.8	0.40
10...	0.044	0.044	24	11	4.3	>4.2

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	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)	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)
OCT 31...	<0.002	<0.002	0.026	E0.012	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
NOV 26...	<0.002	<0.002	0.023	E0.002	<0.001	<0.002	<0.002	E0.008	<0.003	<0.004
DEC 18...	<0.002	<0.002	0.019	E0.011	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
JAN 09...	<0.002	<0.002	0.025	E0.014	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
23...	<0.002	<0.002	0.018	E0.009	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
FEB 07...	<0.002	<0.002	0.021	E0.008	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
22...	<0.002	<0.002	0.015	E0.004	<0.001	<0.002	<0.002	E0.014	<0.003	<0.004
MAR 18...	<0.002	<0.002	0.017	E0.004	<0.001	<0.002	<0.002	<0.003	<0.003	E0.004
27...	<0.002	<0.002	0.017	E0.010	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
APR 08...	<0.002	<0.002	0.016	E0.009	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
16...	<0.002	<0.002	0.019	E0.008	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
22...	<0.002	<0.002	0.012	E0.004	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
MAY 08...	0.019	0.005	0.032	E0.011	<0.001	E0.004	<0.002	E0.013	<0.003	<0.004
14...	0.012	0.005	0.031	E0.012	<0.001	E0.003	<0.002	E0.004	<0.003	<0.004
21...	0.020	0.007	0.044	E0.006	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
29...	0.020	0.006	0.041	E0.007	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
JUN 18...	<0.002	0.004	0.036	E0.005	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
25...	0.009	0.019	0.083	E0.022	<0.001	<0.002	<0.002	<0.003	<0.003	0.007
JUL 02...	<0.002	0.007	0.051	E0.015	<0.001	<0.002	<0.002	E0.014	<0.003	<0.004
09...	<0.002	<0.002	0.040	E0.008	<0.001	<0.002	<0.002	<0.010	<0.003	<0.004
17...	<0.002	<0.002	0.034	E0.008	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
30...	<0.002	<0.002	0.031	E0.014	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
AUG 06...	<0.002	<0.002	0.026	E0.005	<0.001	<0.002	<0.002	E0.017	<0.003	<0.004
20...	<0.002	<0.002	0.028	E0.005	<0.001	<0.002	<0.002	<0.003	<0.003	<0.004
SEP 10...	<0.002	<0.002	0.008	<0.002	<0.001	<0.002	<0.002	E0.080	<0.003	0.011

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	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)	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)
OCT 31...	0.015	<0.002	<0.006	0.011	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
NOV 26...	0.006	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
DEC 18...	0.008	<0.002	<0.006	0.006	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
JAN 09...	<0.004	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
23...	<0.004	<0.002	<0.006	0.015	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
FEB 07...	<0.004	<0.002	<0.006	0.007	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
22...	<0.004	EO.001	<0.006	<0.002	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
MAR 18...	<0.004	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
27...	<0.004	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
APR 08...	<0.004	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
16...	<0.004	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
22...	<0.004	EO.001	<0.006	<0.002	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
MAY 08...	0.013	<0.002	<0.006	0.030	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
14...	0.012	EO.001	<0.006	0.011	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
21...	<0.004	<0.002	<0.006	0.015	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
29...	<0.004	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
JUN 18...	<0.004	<0.002	<0.006	0.017	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
25...	0.010	<0.002	<0.006	0.012	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
JUL 02...	<0.004	<0.002	<0.006	0.033	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
09...	<0.004	<0.002	<0.006	0.029	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
17...	<0.004	<0.002	<0.006	0.016	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
30...	<0.004	EO.001	<0.006	0.016	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
AUG 06...	<0.004	<0.002	<0.006	0.110	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
20...	<0.004	<0.002	<0.006	0.018	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003
SEP 10...	<0.004	<0.002	<0.006	0.152	<0.001	<0.003	<0.017	<0.002	<0.004	<0.003

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	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)	METO- LACHLOR WATER DISSOLV (UG/L) (39415)	METRI- BUZIN SENCOR 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)
OCT 31...	<0.003	<0.002	<0.004	<0.002	<0.005	0.012	<0.004	<0.004	<0.003	<0.004
NOV 26...	<0.003	<0.002	<0.004	<0.002	<0.005	0.007	0.007	<0.004	<0.003	<0.004
DEC 18...	<0.003	<0.002	<0.004	<0.002	<0.005	0.007	0.017	<0.004	<0.003	<0.004
JAN 09...	<0.003	<0.002	<0.004	<0.002	<0.005	0.007	<0.004	<0.004	<0.003	<0.004
23...	<0.003	<0.002	<0.004	<0.002	<0.005	0.005	0.035	<0.004	<0.003	<0.004
FEB 07...	<0.003	<0.002	<0.004	<0.002	<0.005	0.007	<0.009	<0.004	<0.003	<0.004
22...	<0.003	<0.002	<0.004	<0.002	<0.005	0.005	<0.004	<0.004	<0.003	<0.004
MAR 18...	<0.003	<0.002	<0.004	<0.002	<0.005	0.007	<0.004	<0.004	<0.003	<0.004
27...	<0.003	<0.002	<0.004	<0.002	<0.005	0.006	<0.004	<0.004	<0.003	<0.004
APR 08...	<0.003	<0.002	<0.004	<0.002	<0.005	0.005	<0.004	<0.004	<0.003	<0.004
16...	<0.003	<0.002	<0.004	<0.002	<0.005	0.010	<0.004	<0.004	<0.003	<0.004
22...	<0.003	<0.002	<0.004	<0.002	<0.005	0.005	<0.004	<0.004	<0.003	<0.004
MAY 08...	<0.003	<0.002	<0.004	<0.002	<0.005	0.017	<0.004	<0.004	<0.003	<0.004
14...	<0.003	<0.002	<0.004	<0.002	<0.005	0.011	<0.004	<0.004	<0.003	<0.004
21...	<0.003	<0.002	<0.004	<0.002	<0.005	0.020	<0.004	<0.004	<0.003	<0.004
29...	<0.003	<0.002	<0.004	<0.002	<0.005	0.058	<0.004	<0.004	<0.003	<0.004
JUN 18...	<0.003	<0.002	<0.004	<0.002	<0.005	0.024	<0.020	<0.004	<0.003	<0.004
25...	<0.003	<0.002	<0.004	<0.002	<0.005	0.029	<0.004	<0.004	<0.003	<0.004
JUL 02...	<0.003	<0.002	<0.004	<0.002	<0.005	0.021	<0.040	<0.004	<0.003	<0.004
09...	<0.003	<0.002	<0.004	<0.002	<0.005	0.016	<0.004	<0.004	<0.003	<0.004
17...	<0.003	<0.002	<0.004	<0.002	<0.005	0.014	<0.004	<0.004	<0.003	<0.004
30...	<0.003	<0.002	<0.004	<0.002	<0.005	0.015	<0.004	<0.004	<0.003	<0.004
AUG 06...	<0.003	<0.002	<0.004	<0.002	<0.005	0.009	<0.004	<0.004	<0.003	<0.004
20...	<0.003	<0.002	<0.004	<0.002	<0.005	0.010	<0.004	<0.004	<0.003	<0.004
SEP 10...	<0.003	<0.002	<0.004	<0.002	<0.010	0.005	<0.050	<0.004	<0.003	<0.004

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	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)	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)	PRO- PARGITE WATER FLTRD 0.7 U GF, REC (UG/L) (82685)
OCT 31...	<0.006	<0.004	<0.004	<0.005	<0.002	0.048	<0.003	<0.007	<0.004	<0.013
NOV 26...	<0.006	<0.004	<0.004	<0.005	<0.002	E0.012	<0.003	<0.007	<0.004	<0.013
DEC 18...	<0.006	<0.004	<0.004	<0.005	<0.002	0.097	<0.003	<0.007	<0.004	<0.013
JAN 09...	<0.006	<0.004	<0.004	<0.005	<0.002	E0.014	<0.003	<0.007	<0.004	<0.013
23...	<0.006	<0.004	<0.004	<0.005	<0.002	0.029	<0.003	<0.007	<0.004	<0.013
FEB 07...	<0.006	<0.004	<0.004	<0.005	<0.002	E0.014	<0.003	<0.007	<0.004	<0.013
22...	<0.006	<0.004	<0.004	<0.005	<0.002	0.052	<0.003	<0.007	<0.004	<0.013
MAR 18...	<0.006	<0.004	<0.004	<0.005	<0.002	E0.015	<0.003	<0.007	<0.004	<0.013
27...	<0.006	<0.004	<0.004	<0.005	<0.002	E0.012	<0.003	<0.007	<0.004	<0.013
APR 08...	<0.006	<0.004	<0.004	<0.005	<0.002	E0.011	<0.003	<0.007	<0.004	<0.013
16...	<0.006	<0.004	0.007	<0.005	<0.002	E0.011	<0.003	<0.007	<0.004	<0.013
22...	<0.006	<0.004	<0.004	<0.005	<0.002	E0.007	<0.003	<0.007	<0.004	<0.013
MAY 08...	<0.006	<0.004	0.012	<0.005	<0.002	E0.015	<0.003	<0.007	<0.004	<0.013
14...	<0.006	<0.004	0.008	<0.005	<0.002	E0.012	<0.003	<0.007	<0.004	<0.013
21...	<0.006	<0.004	0.015	<0.005	<0.002	E0.009	<0.003	<0.007	<0.004	<0.013
29...	<0.006	<0.004	<0.004	<0.005	<0.002	E0.017	<0.003	<0.007	<0.004	<0.013
JUN 18...	<0.006	<0.004	<0.004	<0.005	<0.002	E0.010	<0.003	<0.007	<0.004	<0.013
25...	<0.006	<0.004	<0.004	<0.005	<0.002	0.019	<0.003	<0.007	<0.004	<0.013
JUL 02...	<0.006	<0.004	<0.004	<0.005	<0.002	0.033	<0.003	<0.007	<0.004	<0.013
09...	<0.006	<0.004	<0.004	<0.005	<0.002	E0.016	<0.003	<0.007	<0.004	<0.013
17...	<0.006	<0.004	<0.004	<0.005	<0.002	E0.016	<0.003	<0.007	<0.004	<0.013
30...	<0.006	<0.004	<0.004	<0.005	<0.002	E0.015	<0.003	<0.007	<0.004	<0.013
AUG 06...	<0.006	<0.004	<0.004	<0.005	<0.002	0.020	<0.003	<0.007	<0.004	<0.013
20...	<0.006	<0.004	<0.004	<0.005	<0.002	E0.016	<0.003	<0.007	<0.004	<0.013
SEP 10...	<0.006	<0.004	0.144	<0.005	<0.002	0.091	<0.003	<0.007	<0.004	<0.013

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	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)
OCT 31...	0.018	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
NOV 26...	0.010	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
DEC 18...	0.016	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JAN 09...	0.014	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
23...	0.013	<0.010	<0.007	<0.013	<0.002	<0.001	E0.003
FEB 07...	0.012	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
22...	0.009	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
MAR 18...	0.009	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
27...	0.009	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
APR 08...	0.011	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
16...	0.016	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
22...	0.011	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
MAY 08...	0.014	E0.005	<0.007	<0.013	<0.002	<0.001	E0.004
14...	0.013	E0.003	<0.007	<0.013	<0.002	<0.001	E0.003
21...	0.009	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
29...	0.014	<0.010	<0.007	<0.013	<0.002	<0.001	E0.002
JUN 18...	0.020	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
25...	0.041	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUL 02...	0.035	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
09...	0.039	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
17...	0.026	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
30...	0.030	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
AUG 06...	0.034	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
20...	0.031	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
SEP 10...	0.031	<0.010	<0.007	<0.013	<0.002	<0.001	E0.002

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	1-NAPH THOL, WATER, FLTRD, GF 0.7U REC (UG/L) (49295)	SILVEX, DIS- SOLVED (UG/L) (39762)	2,4,5-T DIS- SOLVED (UG/L) (39742)	2,4-D, DIS- SOLVED (UG/L) (39732)	2,4-DB WATER, FLTRD, GF 0.7U REC (UG/L) (38746)	3HYDRXY CARBO- FURAN WAT,FLT GF 0.7U REC (UG/L) (49308)	DNOC WAT,FLT GF 0.7U REC (UG/L) (49299)	ACIFL- UORFEN WATER, FLTRD, GF 0.7U REC (UG/L) (49315)	ALDI- CARB, WATER, FLTRD, GF 0.7U REC (UG/L) (49312)
OCT 31...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
DEC 18...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
JAN 09...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
23...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
FEB 07...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
22...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
MAR 18...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
27...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
APR 08...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
15...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
22...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
MAY 08...	<0.007	<0.021	<0.035	0.300	<0.035	<0.014	<0.035	<0.035	<0.016
14...	<0.007	<0.021	<0.035	0.040	<0.035	<0.014	<0.035	<0.035	<0.016
21...	<0.007	<0.021	<0.035	0.320	<0.035	<0.014	<0.035	<0.035	<0.016
29...	<0.007	<0.021	<0.035	0.050	<0.035	<0.014	<0.035	<0.035	<0.016
JUN 18...	<0.007	<0.021	<0.035	0.290	<0.035	<0.014	<0.035	<0.035	<0.016
25...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
JUL 02...	<0.007	<0.021	<0.035	0.770	<0.035	<0.014	<0.035	<0.035	<0.016
09...	<0.007	<0.021	<0.035	0.290	<0.035	<0.014	<0.035	<0.035	<0.016
17...	<0.007	<0.021	<0.035	0.240	<0.035	<0.014	<0.035	<0.035	<0.016
30...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
AUG 06...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
20...	<0.007	<0.021	<0.035	<0.035	<0.035	<0.014	<0.035	<0.035	<0.016
SEP 10...	<0.007	<0.021	<0.035	E1.17	<0.035	<0.014	<0.035	<0.035	<0.016

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	ALDI-CARB SULFONE WAT.FLT GF 0.7U REC (UG/L) (49313)	ALDICA- RB SUL- FOXIDE, WAT.FLT GF 0.7U REC (UG/L) (49314)	BENTA- ZON, WATER, FLTRD, GF 0.7U REC (UG/L) (38711)	BRO- MACIL, WATER, DISS, REC (UG/L) (04029)	BRO- MOXYNIL WATER, FLTRD, GF 0.7U REC (UG/L) (49311)	CAR- BARYL, WATER, FLTRD, GF 0.7U REC (UG/L) (49310)	CARBO- FURAN, WATER, FLTRD, GF 0.7U REC (UG/L) (49309)	CHLOR- AMBEN, WATER, FLTRD, GF 0.7U REC (UG/L) (49307)	CHLORO- THALO- NIL, WAT.FLT GF 0.7U REC (UG/L) (49306)
OCT 31...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
DEC 18...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
JAN 09...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
23...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
FEB 07...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
22...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
MAR 18...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
27...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
APR 08...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
16...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
22...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
MAY 08...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
14...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
21...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
29...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
JUN 18...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
25...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
JUL 02...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
09...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
17...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
30...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
AUG 06...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
20...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035
SEP 10...	<0.016	<0.021	<0.014	<0.035	<0.035	<0.008	<0.028	<0.011	<0.035

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	CLOPYR- ALID, WATER, FLTRD, GF 0.7U REC (UG/L) (49305)	DACTHAL MONO- ACID, WAT.FLT GF 0.7U REC (UG/L) (49304)	DICAMBA WATER, FLTRD, GF 0.7U REC (UG/L) (38442)	DICHLOR- BENIL, WATER, FLTRD, GF 0.7U REC (UG/L) (49303)	DICHLOR PROP, WATER, FLTRD, GF 0.7U REC (UG/L) (49302)	DINOSEB WATER, FLTRD, GF 0.7U REC (UG/L) (49301)	DIURON, WATER, FLTRD, GF 0.7U REC (UG/L) (49300)	ESFEN- VAL- ERATE, WAT.FLT GF 0.7U REC (UG/L) (49298)	FEN- URON, WATER, FLTRD, GF 0.7U REC (UG/L) (49297)
OCT 31...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013
DEC 18...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013
JAN 09...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013
23...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013
FEB 07...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013
22...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013
MAR 18...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013
27...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013
APR 08...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013
16...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013
22...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	E0.030	<0.019	<0.013
MAY 08...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013
14...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	0.050	<0.019	<0.013
21...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013
29...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013
JUN 18...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013
25...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	0.080	<0.019	<0.013
JUL 02...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	0.090	<0.019	<0.013
09...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	E0.180	<0.019	<0.013
17...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	0.110	<0.019	<0.013
30...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	0.110	<0.019	<0.030
AUG 06...	<0.050	<0.017	<0.035	--	<0.032	<0.035	--	<0.019	<0.013
20...	<0.050	<0.017	<0.035	--	<0.032	<0.035	--	<0.019	<0.013
SEP 10...	<0.050	<0.017	<0.035	<0.020	<0.032	<0.035	<0.020	<0.019	<0.013

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	FLUO- METURON WATER, FLTRD, GF 0.7U REC (UG/L) (38811)	LINURON WATER, FLTRD, GF 0.7U REC (UG/L) (38478)	MCPA, WATER, FLTRD, GF 0.7U REC (UG/L) (38482)	MCPB, WATER, FLTRD, GF 0.7U REC (UG/L) (38487)	METHIO- CARB, WATER, FLTRD, GF 0.7U REC (UG/L) (38501)	METH- OMYL, WATER, FLTRD, GF 0.7U REC (UG/L) (49296)	NEB- URON, WATER, FLTRD, GF 0.7U REC (UG/L) (49294)	NORFLUR AZON, WATER, FLTRD, GF 0.7U REC (UG/L) (49293)	ORY- ZALIN, WATER, FLTRD, GF 0.7U REC (UG/L) (49292)
OCT 31...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
DEC 18...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
JAN 09...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
23...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
FEB 07...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
22...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
MAR 18...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
27...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
APR 08...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
16...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
22...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
MAY 08...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
14...	<0.035	<0.018	<0.050	0.050	<0.026	<0.017	<0.015	<0.024	<0.019
21...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
29...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
JUN 18...	<0.035	<0.018	<0.050	0.060	<0.026	<0.017	<0.015	<0.024	<0.019
25...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
JUL 02...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
09...	<0.035	<0.018	0.070	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
17...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
30...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019
AUG 06...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	--
20...	<0.035	<0.018	<0.050	<0.035	<0.026	<0.017	<0.015	<0.024	--
SEP 10...	<0.035	<0.018	E18.6	<0.035	<0.026	<0.017	<0.015	<0.024	<0.019

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	OXAMYL, WATER, FLTRD, GF 0.7U REC (UG/L) (38866)	PIC- LORAM, WATER, FLTRD, GF 0.7U REC (UG/L) (49291)	PRO- PHAM, WATER, FLTRD, GF 0.7U REC (UG/L) (49236)	PRO- POXUR, WATER, FLTRD, GF 0.7U REC (UG/L) (38538)	TRI- CLOPYR, WATER, FLTRD, GF 0.7U REC (UG/L) (49235)
OCT 31...	<0.018	<0.050	<0.035	<0.035	<0.050
DEC 18...	<0.018	<0.050	<0.035	<0.035	<0.050
JAN 09...	<0.018	<0.050	<0.035	<0.035	<0.050
23...	<0.018	<0.050	<0.035	<0.035	<0.050
FEB 07...	<0.018	<0.050	<0.035	<0.035	<0.050
22...	<0.018	<0.050	<0.035	<0.035	<0.050
MAR 18...	<0.018	<0.050	<0.035	<0.035	<0.050
27...	<0.018	<0.050	<0.035	<0.035	<0.050
APR 08...	<0.018	<0.050	<0.035	<0.035	<0.050
16...	<0.018	<0.050	<0.035	<0.035	<0.050
22...	<0.018	E0.010	<0.035	<0.035	<0.050
MAY 08...	<0.018	<0.050	<0.035	<0.035	<0.050
14...	<0.018	<0.050	<0.035	<0.035	<0.050
21...	<0.018	<0.050	<0.035	<0.035	<0.050
29...	<0.018	<0.050	<0.035	<0.035	<0.050
JUN 18...	<0.018	<0.050	<0.035	<0.035	<0.050
25...	<0.018	<0.050	<0.035	<0.035	<0.050
JUL 02...	<0.018	<0.050	<0.035	<0.035	<0.050
09...	<0.018	<0.050	<0.035	<0.035	<0.050
17...	<0.018	<0.050	<0.035	<0.035	<0.050
30...	<0.018	<0.050	<0.035	<0.035	<0.050
AUG 06...	<0.018	<0.050	<0.035	<0.035	<0.050
20...	<0.018	<0.050	<0.035	<0.035	<0.050
SEP 10...	<0.018	<0.050	<0.035	<0.035	<0.050

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	ETHANE, 1,1,2- TETRA- CHLORO- WAT UNF REC (UG/L) (77662)	1,1,1- TRI- CHLORO- ETHANE TOTAL (UG/L) (34506)	ETHANE, 1,1,2,2- TETRA- CHLORO- WAT UNF REC (UG/L) (34516)	1,1,2- TRI- CHLORO- ETHANE TOTAL (UG/L) (34511)	FREON- 113 WATER UNFLTRD REC (UG/L) (77652)	1,1-DI- CHLORO- ETHANE TOTAL (UG/L) (34496)	1,1-DI- CHLORO- ETHYL- ENE TOTAL (UG/L) (34501)	1,1-DI- CHLORO- PRO- PENE WAT. WH TOTAL (UG/L) (77168)	PREH- NITENE WATER UNFLTRD RECOVER (UG/L) (49999)	ISO- DURENE WATER UNFLTRD RECOVER (UG/L) (50000)
OCT 31...	<0.100	<0.100	<0.200	<0.200	<0.100	E0.010	<0.200	<0.100	<0.100	<0.100
NOV 26...	<0.100	<0.100	<0.200	<0.200	<0.100	<0.100	<0.200	<0.100	<0.100	<0.100
DEC 18...	<0.100	<0.100	<0.200	<0.200	<0.100	<0.100	<0.200	<0.100	<0.100	<0.100
JAN 09...	<0.050	<0.050	<0.100	<0.100	<0.050	E0.010	<0.100	<0.050	<0.050	<0.050
23...	<0.100	E0.008	<0.200	<0.200	<0.100	<0.100	<0.200	<0.100	E0.020	<0.100
FEB 07...	<0.100	<0.100	<0.200	<0.200	<0.100	<0.100	<0.200	<0.100	<0.100	<0.100
20...	<0.100	<0.100	<0.200	<0.200	<0.100	<0.100	<0.200	<0.100	<0.100	<0.100
22...	<0.100	<0.100	<0.200	<0.200	<0.100	<0.100	<0.200	<0.100	<0.100	<0.100
MAR 18...	<0.100	<0.100	<0.200	<0.200	<0.100	<0.100	<0.200	<0.100	<0.100	<0.100
27...	<0.050	E0.010	<0.100	<0.100	<0.050	E0.010	<0.100	<0.050	<0.050	<0.050
APR 08...	<0.050	E0.010	<0.100	<0.100	<0.050	E0.008	<0.100	<0.050	<0.050	<0.050
16...	<0.100	<0.100	<0.200	<0.200	<0.100	<0.100	<0.200	<0.100	<0.100	<0.100
22...	<0.100	<0.100	<0.200	<0.200	<0.100	<0.100	<0.200	<0.100	<0.100	<0.100
MAY 01...	<0.100	<0.100	<0.200	<0.200	<0.100	<0.100	<0.200	<0.100	<0.100	<0.100
08...	<0.100	<0.100	<0.200	<0.200	<0.100	<0.100	<0.200	<0.100	<0.100	<0.100
14...	<0.100	<0.100	<0.200	<0.200	<0.100	<0.100	<0.200	<0.100	<0.100	<0.100
21...	<0.100	<0.100	<0.200	<0.200	<0.100	<0.100	<0.200	<0.100	<0.100	<0.100
29...	<0.100	<0.100	<0.200	<0.200	<0.100	<0.100	<0.200	<0.100	<0.100	<0.100
JUN 25...	<0.088	<0.064	<0.264	<0.128	<0.064	<0.132	<0.088	<0.052	<0.460	<0.480
JUL 02...	<0.088	<0.064	<0.264	<0.128	<0.064	<0.132	<0.088	<0.052	<0.460	<0.480
09...	<0.088	<0.064	<0.264	<0.128	<0.064	<0.132	<0.088	<0.052	<0.460	<0.480
17...	<0.088	<0.064	<0.264	<0.128	<0.064	<0.132	<0.088	<0.052	<0.460	<0.480
30...	<0.088	<0.064	<0.264	<0.128	<0.064	<0.132	<0.088	<0.052	<0.460	<0.480
AUG 06...	<0.088	<0.064	<0.264	<0.128	<0.064	<0.132	<0.088	<0.052	<0.460	<0.480
20...	<0.088	<0.064	<0.264	<0.128	<0.064	<0.132	<0.088	<0.052	<0.460	<0.480
SEP 10...	<0.088	<0.064	<0.264	<0.128	<0.064	<0.132	<0.088	<0.052	<0.460	<0.480

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	1,2,3- TRI- CHLORO- BENZENE WAT. WH REC (UG/L) (77613)	123-TRI- CHLORO- PROPANE WATER WHOLE TOTAL (UG/L) (77443)	BENZENE 123-TRI- METHYL- WATER UNFLTRD RECOVER (UG/L) (77221)	BENZENE 1,2,4- TRI- CHLORO- WAT UNF REC (UG/L) (34551)	BENZENE 124-TRI- METHYL UNFLTR RECOVER (UG/L) (77222)	DIBROMO CHLORO- PROPANE WATER WHOLE TOT REC (UG/L) (82625)	1,2- DIBROMO ETHANE WATER WHOLE TOTAL (UG/L) (77651)	BENZENE O-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34536)	1,2-DI- CHLORO- ETHANE TOTAL (UG/L) (32103)	1,2-DI- CHLORO- PROPANE TOTAL (UG/L) (34541)
OCT 31...	<0.400	<0.400	<0.100	<0.400	<0.100	<1.00	<0.200	<0.100	<0.100	<0.100
NOV 26...	<0.400	<0.400	<0.100	<0.400	<0.100	<1.00	<0.200	<0.100	<0.100	<0.100
DEC 18...	<0.400	<0.400	<0.100	<0.400	<0.100	<1.00	<0.200	<0.100	<0.100	<0.100
JAN 09...	<0.200	<0.200	<0.050	<0.200	E0.008	<0.500	<0.100	<0.050	<0.050	<0.050
23...	<0.400	<0.400	E0.008	<0.400	E0.010	<1.00	<0.200	<0.100	<0.100	<0.100
FEB 07...	<0.400	<0.400	<0.100	<0.400	E0.010	<1.00	<0.200	<0.100	<0.100	<0.100
20...	<0.400	<0.400	<0.100	<0.400	E0.020	<1.00	<0.200	<0.100	<0.100	<0.100
22...	<0.400	<0.400	<0.100	<0.400	E0.020	<1.00	<0.200	<0.100	<0.100	<0.100
MAR 18...	<0.400	<0.400	<0.100	<0.400	<0.100	<1.00	<0.200	<0.100	<0.100	<0.100
27...	<0.200	<0.200	<0.050	<0.200	E0.010	<0.500	<0.100	<0.050	<0.050	<0.050
APR 08...	<0.200	<0.200	<0.050	<0.200	<0.050	<0.500	<0.100	<0.050	<0.050	<0.050
16...	<0.400	<0.400	<0.100	<0.400	<0.100	<1.00	<0.200	<0.100	<0.100	<0.100
22...	<0.400	<0.400	<0.100	<0.400	<0.100	<1.00	<0.200	<0.100	<0.100	<0.100
MAY 01...	<0.400	<0.400	<0.100	<0.400	<0.100	<1.00	<0.200	<0.100	<0.100	<0.100
08...	<0.400	<0.400	<0.100	<0.400	<0.100	<1.00	<0.200	<0.100	<0.100	<0.100
14...	<0.400	<0.400	<0.100	<0.400	<0.100	<1.00	<0.200	<0.100	<0.100	<0.100
21...	<0.400	<0.400	<0.100	<0.400	<0.100	<1.00	<0.200	<0.100	<0.100	<0.100
29...	<0.400	<0.400	<0.100	<0.400	<0.100	<1.00	<0.200	<0.100	<0.100	<0.100
JUN 25...	<0.532	<0.140	<0.248	<0.376	<0.112	<0.428	<0.072	<0.096	<0.268	<0.136
JUL 02...	<0.532	<0.140	<0.248	<0.376	<0.112	<0.428	<0.072	<0.096	<0.268	<0.136
09...	<0.532	<0.140	<0.248	<0.376	<0.112	<0.428	<0.072	<0.096	<0.268	<0.136
17...	<0.532	<0.140	<0.248	<0.376	<0.112	<0.428	<0.072	<0.096	<0.268	<0.136
30...	<0.532	<0.140	<0.248	<0.376	<0.112	<0.428	<0.072	<0.096	<0.268	<0.136
AUG 06...	<0.532	<0.140	<0.248	<0.376	<0.112	<0.428	<0.072	<0.096	<0.268	<0.136
20...	<0.532	<0.140	<0.248	<0.376	<0.112	<0.428	<0.072	<0.096	<0.268	<0.136
SEP 10...	<0.532	<0.140	<0.248	<0.376	E0.080	<0.428	<0.072	<0.096	<0.268	<0.136

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	BENZENE 135-TRI METHYL WATER UNFLTRD REC (UG/L) (77226)	BENZENE 1,3-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34566)	1,3-DI- CHLORO- PROPANE WAT. WH TOTAL (UG/L) (77173)	BENZENE 1,4-DI- CHLORO- WATER UNFLTRD REC (UG/L) (34571)	2,2-DI- CHLORO- PRO- PANE WAT. WH TOTAL (UG/L) (77170)	METHYL- ETHYL- KETONE WATER WHOLE TOTAL (UG/L) (81595)	O- CHLORO- TOLUENE WATER WHOLE TOTAL (UG/L) (77275)	2-HEXA- NONE WATER WHOLE TOTAL (UG/L) (77103)	PROPENE 3- CHLORO- WATER UNFLTRD RECOVER (UG/L) (78109)	TOLUENE P-CHLOR WATER UNFLTRD REC (UG/L) (77277)
OCT 31...	<0.100	<0.100	<0.100	<0.100	<0.100	<10.0	<0.100	<10.0	<0.200	<0.100
NOV 26...	<0.100	<0.100	<0.100	<0.100	<0.100	E3.40	<0.100	<10.0	<0.200	<0.100
DEC 18...	<0.100	<0.100	<0.100	<0.100	<0.100	E1.20	<0.100	<10.0	<0.200	<0.100
JAN 09...	<0.050	<0.050	<0.050	<0.050	<0.050	<5.00	<0.050	<5.00	<0.100	<0.050
23...	<0.100	<0.100	<0.100	<0.100	<0.100	<10.0	<0.100	<10.0	<0.200	<0.100
FEB 07...	<0.100	<0.100	<0.100	<0.100	<0.100	<10.0	<0.100	<10.0	<0.200	<0.100
20...	<0.100	<0.100	<0.100	<0.100	<0.100	E1.00	<0.100	<10.0	<0.200	<0.100
22...	<0.100	<0.100	<0.100	<0.100	<0.100	<10.0	<0.100	<10.0	<0.200	<0.100
MAR 18...	<0.100	<0.100	<0.100	<0.100	<0.100	<10.0	<0.100	<10.0	<0.200	<0.100
27...	<0.050	<0.050	<0.050	<0.050	<0.050	E0.500	<0.050	<5.00	<0.100	<0.050
APR 08...	<0.050	<0.050	<0.050	<0.050	<0.050	<5.00	<0.050	<5.00	<0.100	<0.050
16...	<0.100	<0.100	<0.100	E0.010	<0.100	<10.0	<0.100	<10.0	<0.200	<0.100
22...	<0.100	<0.100	<0.100	E0.009	<0.100	<10.0	<0.100	<10.0	<0.200	<0.100
MAY 01...	<0.100	<0.100	<0.100	<0.100	<0.100	<10.0	<0.100	<10.0	<0.200	<0.100
08...	<0.100	<0.100	<0.100	<0.100	<0.100	<10.0	<0.100	<10.0	<0.200	<0.100
14...	<0.100	<0.100	<0.100	<0.100	<0.100	<10.0	<0.100	<10.0	<0.200	<0.100
21...	<0.100	<0.100	<0.100	<0.100	<0.100	<10.0	<0.100	<10.0	<0.200	<0.100
29...	<0.100	<0.100	<0.100	<0.100	<0.100	<10.0	<0.100	<10.0	<0.200	<0.100
JUN 25...	<0.088	<0.108	<0.232	<0.100	<0.156	E1.00	<0.084	<1.49	<0.392	<0.112
JUL 02...	<0.088	<0.108	<0.232	E0.010	<0.156	E1.00	<0.084	<1.49	<0.392	<0.112
09...	<0.088	<0.108	<0.232	<0.100	<0.156	<3.30	<0.084	<1.49	<0.392	<0.112
17...	<0.088	<0.108	<0.232	<0.100	<0.156	<3.30	<0.084	<1.49	<0.392	<0.112
30...	<0.088	<0.108	<0.232	<0.100	<0.156	<3.30	<0.084	<1.49	<0.392	<0.112
AUG 06...	<0.088	<0.108	<0.232	<0.100	<0.156	<3.30	<0.084	<1.49	<0.392	<0.112
20...	<0.088	<0.108	<0.232	<0.100	<0.156	<3.30	<0.084	<1.49	<0.392	<0.112
SEP 10...	<0.088	<0.108	<0.232	<0.100	<0.156	<3.30	<0.084	<1.49	<0.392	<0.112

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	P-ISO- PROPYL- TOLUENE WATER WHOLE REC (UG/L) (77356)	METHYL- ISO- BUTYL- KETONE WAT.WH. TOTAL (UG/L) (78133)	ACETONE WATER WHOLE TOTAL (UG/L) (81552)	ACRO- LEIN TOTAL (UG/L) (34210)	ACRYLO- NITRILE TOTAL (UG/L) (34215)	BENZENE TOTAL (UG/L) (34030)	BROMO- BENZENE WATER, WHOLE, TOTAL (UG/L) (81555)	METHANE BROMO- CHLORO- WAT UNFLTRD REC (UG/L) (77297)	DI- CHLORO- BROMO- METHANE TOTAL (UG/L) (32101)	BROMO- FORM TOTAL (UG/L) (32104)
OCT 31...	<0.100	<10.0	E2.20	<4.00	<4.00	<0.100	<0.100	<0.200	E0.010	<0.400
NOV 26...	<0.100	<10.0	<10.0	<4.00	<4.00	<0.100	<0.100	<0.200	<0.200	<0.400
DEC 18...	<0.100	<10.0	<10.0	<4.00	<4.00	<0.100	<0.100	<0.200	E0.010	<0.400
JAN 09...	<0.050	<5.00	<5.00	<2.00	<2.00	<0.050	<0.050	<0.100	E0.010	<0.200
23...	<0.100	<10.0	E2.00	<4.00	<4.00	<0.100	<0.100	<0.200	E0.010	<0.400
FEB 07...	<0.100	<10.0	E1.80	<4.00	<4.00	<0.100	<0.100	<0.200	<0.200	<0.400
20...	<0.100	<10.0	E2.00	<4.00	<4.00	<0.100	<0.100	<0.200	<0.200	<0.400
22...	<0.100	E0.100	4.20	<4.00	<4.00	E0.030	<0.100	<0.200	<0.200	<0.400
MAR 18...	<0.100	<10.0	<10.0	<4.00	<4.00	<0.100	<0.100	<0.200	E0.020	<0.400
27...	<0.050	E0.050	1.82	<2.00	<2.00	<0.050	<0.050	<0.100	E0.020	<0.200
APR 08...	<0.050	<5.00	1.58	<2.00	<2.00	<0.050	<0.050	<0.100	E0.020	<0.200
16...	<0.100	<10.0	<10.0	<4.00	<4.00	<0.100	<0.100	<0.200	<0.200	<0.400
22...	<0.100	<10.0	<10.0	<4.00	<4.00	<0.100	<0.100	<0.200	<0.200	<0.400
MAY 01...	<0.100	<10.0	E2.00	<4.00	<4.00	<0.100	<0.100	<0.200	<0.200	<0.400
08...	<0.100	<10.0	E2.00	<4.00	<4.00	<0.100	<0.100	<0.200	<0.200	<0.400
14...	<0.100	<10.0	E1.00	<4.00	<4.00	E0.030	<0.100	<0.200	<0.200	<0.400
21...	<0.100	<10.0	<10.0	<4.00	<4.00	<0.100	<0.100	<0.200	<0.200	<0.400
29...	<0.100	<10.0	E2.00	<4.00	<4.00	E0.030	<0.100	<0.200	<0.200	<0.400
JUN 25...	<0.220	<0.748	<9.81	<2.86	<2.45	E0.050	<0.072	<0.088	<0.096	<0.208
JUL 02...	<0.220	<0.748	E4.00	<2.86	<2.45	E0.050	<0.072	<0.088	<0.096	<0.208
09...	<0.220	<0.748	E4.00	<2.86	<2.45	<0.064	<0.072	<0.088	<0.096	<0.208
17...	<0.220	<0.748	E4.00	<2.86	<2.45	<0.064	<0.072	<0.088	<0.096	<0.208
30...	<0.220	<0.748	E5.00	<2.86	<2.45	<0.064	<0.072	<0.088	<0.096	<0.208
AUG 06...	<0.220	<0.748	<9.81	<2.86	<2.45	E0.040	<0.072	<0.088	<0.096	<0.208
20...	<0.220	<0.748	<9.81	<2.86	<2.45	<0.064	<0.072	<0.088	<0.096	<0.208
SEP 10...	<0.220	<0.748	8.02	<2.86	<2.45	E0.070	<0.072	<0.088	<0.096	<0.208

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	METHYL- BROMIDE TOTAL (UG/L) (34413)	BENZENE N-BUTYL WATER UNFLTRD REC (UG/L) (77342)	CARBON DI- SULFIDE WATER WHOLE TOTAL (UG/L) (77041)	CHLORO- BENZENE TOTAL (UG/L) (34301)	CHLORO- ETHANE TOTAL (UG/L) (34311)	CHLORO- FORM TOTAL (UG/L) (32106)	METHYL- CHLO- RIDE TOTAL (UG/L) (34418)	CIS-1,2- DI- CHLORO- ETHENE WATER TOTAL (UG/L) (77093)	CIS 1,3-DI- CHLORO- PROPENE TOTAL (UG/L) (34704)	CHLORO- DI- BROMO- METHANE TOTAL (UG/L) (32105)
OCT 31...	<0.200	<0.100	<0.100	<0.100	<0.200	E0.020	<0.400	E0.030	<0.200	<0.200
NOV 26...	<0.200	<0.100	<0.100	<0.100	<0.200	<0.100	<0.400	E0.030	<0.200	<0.200
DEC 18...	<0.200	<0.100	E0.010	<0.100	<0.200	E0.030	E0.030	E0.040	<0.200	<0.200
JAN 09...	<0.100	<0.050	E0.009	<0.050	<0.100	E0.020	E0.040	E0.050	<0.100	<0.100
23...	<0.200	<0.100	E0.010	<0.100	<0.200	E0.020	E0.070	E0.040	<0.200	<0.200
FEB 07...	<0.200	<0.100	<0.100	<0.100	<0.200	E0.010	<0.400	E0.050	<0.200	<0.200
20...	<0.200	<0.100	E0.007	<0.100	<0.200	E0.020	<0.400	E0.030	<0.200	<0.200
22...	<0.200	<0.100	E0.020	<0.100	<0.200	E0.050	<0.400	E0.020	<0.200	<0.200
MAR 18...	<0.200	<0.100	E0.020	<0.100	<0.200	E0.030	<0.400	E0.040	<0.200	<0.200
27...	<0.100	<0.050	E0.010	<0.050	<0.100	E0.040	E0.030	E0.060	<0.100	<0.100
APR 08...	<0.100	<0.050	E0.010	<0.050	<0.100	E0.030	E0.030	E0.050	<0.100	E0.020
16...	<0.200	<0.100	<0.100	<0.100	<0.200	E0.010	<0.400	E0.050	<0.200	<0.200
22...	<0.200	<0.100	<0.100	<0.100	<0.200	E0.040	<0.400	E0.030	<0.200	<0.200
MAY 01...	<0.200	<0.100	<0.100	<0.100	<0.200	<0.100	<0.400	E0.040	<0.200	<0.200
08...	<0.200	<0.100	<0.100	<0.100	<0.200	E0.010	<0.400	E0.040	<0.200	<0.200
14...	<0.200	<0.100	E0.020	<0.100	<0.200	E0.030	E0.060	E0.040	<0.200	<0.200
21...	<0.200	<0.100	E0.010	<0.100	<0.200	E0.020	E0.080	E0.040	<0.200	<0.200
29...	<0.200	<0.100	<0.100	<0.100	<0.200	<0.100	<0.400	E0.030	<0.200	<0.200
JUN 25...	<0.296	<0.372	<0.160	<0.056	<0.240	E0.010	E0.040	E0.030	<0.184	<0.364
JUL 02...	<0.296	<0.372	<0.160	<0.056	E0.040	E0.030	E0.100	E0.050	<0.184	<0.364
09...	<0.296	<0.372	E0.030	<0.056	<0.240	E0.030	<0.508	E0.040	<0.184	<0.364
17...	<0.296	<0.372	<0.160	<0.056	<0.240	<0.104	<0.508	E0.010	<0.184	<0.364
30...	<0.296	<0.372	<0.160	<0.056	<0.240	<0.104	<0.508	<0.076	<0.184	<0.364
AUG 06...	<0.296	<0.372	<0.160	<0.056	<0.240	E0.010	<0.508	<0.076	<0.184	<0.364
20...	<0.296	<0.372	<0.160	<0.056	<0.240	<0.104	E0.050	<0.076	<0.184	<0.364
SEP 10...	<0.296	<0.372	E0.080	<0.056	<0.240	E0.040	<0.508	E0.060	<0.184	<0.364

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	DI-BROMO-METHANE WATER WHOLE RECOVER (UG/L) (30217)	DI-CHLORO-DI-FLUORO-METHANE TOTAL (UG/L) (34668)	METHYL-ENE-CHLORIDE TOTAL (UG/L) (34423)	ETHER-ETHYL-WATER UNFLTRD RECOVER (UG/L) (81576)	DI-ISO-PROPYL-ETHER WATER UNFLTRD RECOVER (UG/L) (81577)	METHACRYLATE-ETHYL-WATER UNFLTRD RECOVER (UG/L) (73570)	ETHER-TERT-BUTYL-ETHYL-WATER UNFLTRD RECOVER (UG/L) (50004)	ETHYL-BENZENE TOTAL (UG/L) (34371)	HEXA-CHLORO-BUTADIENE TOTAL (UG/L) (39702)	ETHANE-HEXA-CHLORO-WATER UNFLTRD RECOVER (UG/L) (84396)
OCT 31...	<0.200	<0.400	<0.390	<0.200	<0.200	<2.00	<0.200	<0.100	<0.400	<0.100
NOV 26...	<0.200	<0.400	<0.200	<0.200	<0.200	<2.00	<0.200	<0.100	<0.400	<0.100
DEC 18...	<0.200	<0.400	<0.200	<0.200	<0.200	<2.00	<0.200	<0.100	<0.400	<0.100
JAN 09...	<0.100	<0.200	<0.100	<0.100	<0.100	<1.00	<0.100	E0.005	<0.200	<0.050
23...	<0.200	<0.400	<0.200	<0.200	<0.200	<2.00	<0.200	E0.009	<0.400	<0.100
FEB 07...	<0.200	<0.400	<0.200	<0.200	<0.200	<2.00	<0.200	<0.100	<0.400	<0.100
20...	<0.200	<0.400	<0.200	<0.200	<0.200	<2.00	<0.200	<0.100	<0.400	<0.100
22...	<0.200	<0.400	<0.200	<0.200	<0.200	<2.00	<0.200	<0.100	<0.400	<0.100
MAR 18...	<0.200	<0.400	<0.200	<0.200	<0.200	<2.00	<0.200	<0.100	<0.400	<0.100
27...	<0.100	<0.200	<0.100	<0.100	<0.100	<1.00	<0.100	E0.010	<0.200	<0.050
APR 08...	<0.100	<0.200	<0.100	<0.100	<0.100	<1.00	<0.100	E0.010	<0.200	<0.050
16...	<0.200	<0.400	<0.200	<0.200	<0.200	<2.00	<0.200	E0.010	<0.400	<0.100
22...	<0.200	<0.400	<0.200	E0.020	<0.200	<2.00	<0.200	<0.100	<0.400	<0.100
MAY 01...	<0.200	<0.400	<0.200	<0.200	<0.200	<2.00	<0.200	<0.100	<0.400	<0.100
08...	<0.200	<0.400	E0.040	<0.200	<0.200	<2.00	<0.200	E0.020	<0.400	<0.100
14...	<0.200	<0.400	<0.200	<0.200	<0.200	<2.00	<0.200	E0.010	<0.400	<0.100
21...	<0.200	<0.400	<0.215	E0.060	<0.200	<2.00	<0.200	<0.100	<0.400	<0.100
29...	<0.200	<0.400	<0.314	<0.200	<0.200	<2.00	<0.200	<0.100	<0.400	<0.100
JUN 25...	<0.100	<0.192	<0.764	E0.080	<0.196	<0.556	<0.108	E0.010	<0.284	<0.724
JUL 02...	<0.100	<0.192	E0.700	<0.340	<0.196	<0.556	<0.108	E0.030	<0.284	<0.724
09...	<0.100	<0.192	<0.764	<0.340	<0.196	<0.556	<0.108	E0.030	<0.284	<0.724
17...	<0.100	<0.192	<0.764	E0.040	<0.196	<0.556	<0.108	<0.060	<0.284	<0.724
30...	<0.100	<0.192	<0.764	<0.340	<0.196	<0.556	<0.108	<0.060	<0.284	<0.724
AUG 06...	<0.100	<0.192	<0.764	E0.100	<0.196	<0.556	<0.108	<0.060	<0.284	<0.724
20...	<0.100	<0.192	<0.764	<0.340	<0.196	<0.556	<0.108	<0.060	<0.284	<0.724
SEP 10...	<0.100	<0.192	1.36	<0.340	<0.196	<0.556	<0.108	E0.070	<0.284	<0.724

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	ISO- PROPYL- BENZENE WATER WHOLE REC (UG/L) (77223)	META/ PARA- XYLENE WATER UNFLTRD REC (UG/L) (85795)	METHYL ACRY- LATE WATER UNFLTRD RECOVER (UG/L) (49991)	METH- ACRYLO- NITRILE WATER UNFLTRD RECOVER (UG/L) (81593)	METHYL IODIDE WATER UNFLTRD RECOVER (UG/L) (77424)	METHAC- RYLATE METHYL WATER UNFLTRD RECOVER (UG/L) (81597)	NAPHTH- ALENE TOTAL (UG/L) (34696)	TOLUENE O-ETHYL WATER UNFLTRD RECOVER (UG/L) (77220)	BENZENE N-PROPY WATER UNFLTRD REC (UG/L) (77224)
OCT 31...	<0.100	<0.100	<4.00	<4.00	<0.100	<2.00	<0.400	<0.100	<0.100
NOV 26...	<0.100	<0.100	<4.00	<4.00	<0.100	<2.00	<0.400	<0.100	<0.100
DEC 18...	<0.100	E0.020	<4.00	<4.00	<0.100	<2.00	<0.400	<0.100	<0.100
JAN 09...	<0.050	E0.010	<2.00	<2.00	<0.050	<1.00	<0.200	<0.050	<0.050
23...	<0.100	E0.020	<4.00	<4.00	<0.100	<2.00	<0.400	<0.100	<0.100
FEB 07...	<0.100	E0.020	<4.00	<4.00	<0.100	<2.00	<0.400	<0.100	<0.100
20...	<0.100	E0.040	<4.00	<4.00	<0.100	<2.00	E0.020	<0.100	<0.100
22...	<0.100	E0.040	<4.00	<4.00	<0.100	<2.00	E0.060	<0.100	<0.100
MAR 18...	<0.100	<0.100	<4.00	<4.00	<0.100	<2.00	<0.400	<0.100	<0.100
27...	<0.050	E0.030	<2.00	<2.00	<0.050	<1.00	<0.200	E0.003	<0.050
APR 08...	<0.050	E0.040	<2.00	<2.00	<0.050	<1.00	<0.200	<0.050	<0.050
16...	<0.100	E0.050	<4.00	<4.00	<0.100	<2.00	<0.400	<0.100	<0.100
22...	<0.100	E0.080	<4.00	<4.00	<0.100	<2.00	<0.400	<0.100	<0.100
MAY 01...	<0.100	E0.050	<4.00	<4.00	<0.100	<2.00	<0.400	<0.100	<0.100
08...	<0.100	E0.070	<4.00	<4.00	<0.100	<2.00	<0.400	<0.100	<0.100
14...	<0.100	E0.020	<4.00	<4.00	<0.100	<2.00	<0.400	<0.100	<0.100
21...	<0.100	E0.040	<4.00	<4.00	<0.100	<2.00	<0.400	<0.100	<0.100
29...	<0.100	E0.030	<4.00	<4.00	<0.100	<2.00	<0.400	<0.100	<0.100
JUN 25...	<0.064	E0.070	<1.22	<1.14	<0.152	<0.700	<0.500	<0.200	<0.084
JUL 02...	<0.064	E0.100	<1.22	<1.14	<0.152	<0.700	<0.500	<0.200	<0.084
09...	<0.064	E0.100	<1.22	<1.14	<0.152	<0.700	<0.500	<0.200	<0.084
17...	<0.064	E0.080	<1.22	<1.14	<0.152	<0.700	<0.500	<0.200	<0.084
30...	<0.064	E0.080	<1.22	<1.14	<0.152	<0.700	<0.500	<0.200	<0.084
AUG 06...	<0.064	E0.100	<1.22	<1.14	<0.152	<0.700	<0.500	<0.200	<0.084
20...	<0.064	E0.060	<1.22	<1.14	<0.152	<0.700	<0.500	<0.200	<0.084
SEP 10...	<0.064	E0.100	<1.22	<1.14	<0.152	<0.700	<0.500	<0.200	<0.084

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	BENZENE SEC BUTYL- WATER UNFLTRD REC (UG/L) (77350)	STYRENE TOTAL (UG/L) (77128)	METHYL TERT- BUTYL ETHER WAT UNF REC (UG/L) (78032)	BENZENE TERT- BUTYL- WATER UNFLTRD REC (UG/L) (77353)	ETHER TERT- PENTYL METHYL- UNFLTRD RECOVER (UG/L) (50005)	TETRA- CHLORO- ETHYL- ENE TOTAL (UG/L) (34475)	CARBON- TETRA- CHLO- RIDE TOTAL (UG/L) (32102)	FURAN TETRA- HYDRO- WATER UNFLTRD RECOVER (UG/L) (81607)	TOLUENE TOTAL (UG/L) (34010)	1,2- TRANSDI CHLORO- ETHENE TOTAL (UG/L) (34546)
OCT 31...	<0.100	<0.100	<0.200	<0.100	<0.200	<0.100	<0.100	<10.0	<0.100	<0.100
NOV 26...	<0.100	<0.100	0.370	<0.100	<0.200	<0.100	<0.100	<10.0	<0.100	<0.100
DEC 18...	<0.100	<0.100	<0.200	<0.100	<0.200	E0.006	<0.100	E0.200	<0.100	<0.100
JAN 09...	<0.050	<0.050	<0.100	<0.050	<0.100	E0.007	<0.050	E0.200	E0.040	<0.050
23...	<0.100	<0.100	<0.200	<0.100	<0.200	E0.010	<0.100	<10.0	<0.100	<0.100
FEB 07...	<0.100	<0.100	<0.200	<0.100	<0.200	<0.100	<0.100	E0.200	E0.040	<0.100
20...	<0.100	<0.100	E0.090	<0.100	<0.200	<0.100	<0.100	E0.400	E0.090	<0.100
22...	<0.100	<0.100	<0.200	<0.100	<0.200	E0.010	<0.100	E0.300	E0.090	<0.100
MAR 18...	<0.100	<0.100	<0.200	<0.100	<0.200	<0.100	<0.100	E0.100	E0.030	<0.100
27...	<0.050	<0.050	E0.050	<0.050	<0.100	E0.010	<0.050	E0.200	E0.040	<0.050
APR 08...	<0.050	<0.050	<0.100	<0.050	<0.100	E0.008	<0.050	E0.100	<0.050	<0.050
16...	<0.100	<0.100	<0.200	<0.100	<0.200	<0.100	<0.100	<10.0	<0.100	<0.100
22...	<0.100	<0.100	<0.200	<0.100	<0.200	<0.100	<0.100	E0.200	E0.100	<0.100
MAY 01...	<0.100	<0.100	<0.200	<0.100	<0.200	<0.100	<0.100	<10.0	<0.100	<0.100
08...	<0.100	<0.100	<0.200	<0.100	<0.200	<0.100	<0.100	<10.0	<0.100	<0.100
14...	<0.100	<0.100	<0.200	<0.100	<0.200	<0.100	<0.100	<10.0	E0.090	<0.100
21...	<0.100	<0.100	<0.200	<0.100	<0.200	<0.100	<0.100	<10.0	<0.100	<0.100
29...	<0.100	<0.100	<0.200	<0.100	<0.200	<0.100	<0.100	<10.0	E0.100	<0.100
JUN 25...	<0.096	<0.084	<0.224	<0.192	<0.224	<0.076	<0.176	E0.300	<0.076	<0.064
JUL 02...	<0.096	<0.084	<0.224	<0.192	<0.224	<0.076	<0.176	<2.30	0.424	<0.064
09...	<0.096	<0.084	<0.224	<0.192	<0.224	<0.076	<0.176	E0.200	E0.100	<0.064
17...	<0.096	<0.084	<0.224	<0.192	<0.224	<0.076	<0.176	E0.400	<0.080	<0.064
30...	<0.096	<0.084	<0.224	<0.192	<0.224	<0.076	<0.176	E0.400	E0.080	<0.064
AUG 06...	<0.096	<0.084	E0.070	<0.192	<0.224	<0.076	<0.176	E0.400	E0.090	<0.064
20...	<0.096	<0.084	<0.224	<0.192	<0.224	<0.076	<0.176	<2.30	<0.076	<0.064
SEP 10...	<0.096	E0.008	<0.224	<0.192	<0.224	<0.076	<0.176	<2.30	0.319	<0.064

STREAMS TRIBUTARY TO LAKE ST. CLAIR

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI--Continued

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

DATE	TRANS- 1,3-DI- CHLORO- PROPENE TOTAL (UG/L) (34699)	2BUTENE TRANS-1 4-DI- CHLORO UNFLTRD RECOVER (UG/L) (73547)	TRI- CHLORO- ETHYL- ENE TOTAL (UG/L) (39180)	TRI- CHLORO- FLUORO- METHANE TOTAL (UG/L) (34488)	BROMO- ETHENE WATER UNFLTRD RECOVER (UG/L) (50002)	VINYL CHLO- RIDE TOTAL (UG/L) (39175)
OCT 31...	<0.200	<10.0	E0.100	<0.200	<0.200	<0.200
NOV 26...	<0.200	<10.0	E0.100	<0.200	<0.200	<0.200
DEC 18...	<0.200	<10.0	E0.100	<0.200	<0.200	<0.200
JAN 09...	<0.100	<5.00	0.170	<0.100	<0.100	<0.100
23...	<0.200	<10.0	E0.100	<0.200	<0.200	<0.200
FEB 07...	<0.200	<10.0	E0.100	<0.200	<0.200	<0.200
20...	<0.200	<10.0	E0.100	<0.200	<0.200	<0.200
22...	<0.200	<10.0	E0.090	<0.200	<0.200	<0.200
MAR 18...	<0.200	<10.0	E0.100	<0.200	<0.200	<0.200
27...	<0.100	<5.00	0.199	<0.100	<0.100	<0.100
APR 08...	<0.100	<5.00	0.170	<0.100	<0.100	<0.100
16...	<0.200	<10.0	E0.100	<0.200	<0.200	<0.200
22...	<0.200	<10.0	E0.100	<0.200	<0.200	<0.200
MAY 01...	<0.200	<10.0	E0.100	<0.200	<0.200	<0.200
08...	<0.200	<10.0	E0.100	<0.200	<0.200	<0.200
14...	<0.200	<10.0	E0.100	<0.200	<0.200	<0.200
21...	<0.200	<10.0	E0.100	<0.200	<0.200	<0.200
29...	<0.200	<10.0	E0.090	<0.200	<0.200	<0.200
JUN 25...	<0.268	<1.38	E0.060	<0.184	<0.200	<0.224
JUL 02...	<0.268	<1.38	E0.100	<0.184	<0.200	<0.224
09...	<0.268	<1.38	E0.090	<0.184	<0.200	<0.224
17...	<0.268	<1.38	E0.030	<0.184	<0.200	<0.224
30...	<0.268	<1.38	E0.040	<0.184	<0.200	<0.224
AUG 06...	<0.268	<1.38	E0.060	<0.184	<0.200	<0.224
20...	<0.268	<1.38	E0.050	<0.184	<0.200	<0.224
SEP 10...	<0.268	<1.38	E0.100	<0.184	<0.200	<0.224

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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.4	7.7	33	12	e9.5	54	37	6.9	17	e17	2.3	3.0
2	6.2	5.5	23	18	e10	43	27	5.5	45	e30	2.3	3.0
3	4.5	4.6	13	19	e12	31	20	87	52	e75	3.5	3.3
4	3.9	4.8	11	15	61	24	18	55	22	e40	14	2.7
5	3.5	4.6	11	41	104	20	41	33	15	e27	5.5	2.0
6	3.1	4.2	14	22	40	29	50	92	12	e17	3.5	2.4
7	3.1	82	14	e13	22	19	24	32	10	e13	2.6	2.0
8	3.2	106	11	e9.5	e15	17	16	36	9.2	e8.0	2.3	2.0
9	4.8	24	11	e8.0	e13	16	14	37	8.4	e18	2.4	2.2
10	6.8	14	9.8	e7.5	e11	23	13	21	7.0	e8.5	2.1	97
11	5.1	11	12	e7.0	e10	17	12	15	5.9	e6.9	4.2	26
12	3.7	10	27	e6.8	e9.0	16	15	16	7.0	5.6	8.6	13
13	3.2	9.4	63	e6.2	e8.5	14	16	13	7.0	4.9	13	9.0
14	3.2	8.4	21	e6.0	e8.0	197	13	13	6.6	4.9	5.9	6.2
15	3.2	6.7	14	e5.9	e7.5	98	11	28	5.1	4.4	32	5.3
16	3.0	5.9	14	e5.8	e7.5	42	11	22	9.9	3.8	32	4.4
17	3.1	5.9	64	e5.8	e8.0	32	13	32	12	3.5	18	7.4
18	8.9	7.7	48	e5.7	10	28	11	17	6.8	3.3	8.3	8.3
19	10	6.3	20	e5.7	16	19	9.6	226	5.4	3.2	5.1	7.1
20	5.7	6.1	e13	e5.6	25	17	8.6	61	13	2.9	8.6	25
21	4.1	5.3	9.1	e8.0	273	16	7.9	32	16	7.5	33	8.6
22	3.7	5.0	8.6	e40	146	14	7.5	20	70	13	9.4	5.2
23	19	4.9	26	e62	65	14	7.4	16	14	6.7	5.7	4.1
24	13	5.1	107	e20	40	14	7.2	14	9.5	4.6	4.8	3.5
25	7.3	6.6	33	e16	27	30	6.6	18	e7.1	3.8	5.3	3.1
26	5.1	7.8	e14	e11	26	31	6.0	15	e5.5	9.3	4.3	2.8
27	4.6	6.1	e12	e10	191	17	6.0	12	e5.2	8.6	3.5	2.7
28	4.6	5.5	e15	e9.5	88	24	8.7	10	e4.8	5.2	3.0	2.5
29	5.9	5.3	21	e8.8	---	144	7.6	50	e4.6	3.3	2.7	2.7
30	60	10	16	e8.5	---	98	6.4	59	e19	3.1	2.2	2.3
31	15	---	13	e9.0	---	72	---	23	---	2.5	2.5	---
TOTAL	237.9	396.4	721.5	428.3	1263.0	1230	451.5	1117.4	432.0	364.5	252.6	268.8
MEAN	7.67	13.2	23.3	13.8	45.1	39.7	15.1	36.0	14.4	11.8	8.15	8.96
MAX	60	106	107	62	273	197	50	226	70	75	33	97
MIN	3.0	4.2	8.6	5.6	7.5	14	6.0	5.5	4.6	2.5	2.1	2.0
CFSM	.47	.80	1.41	.84	2.73	2.40	.91	2.18	.87	.71	.49	.54
IN.	.54	.89	1.63	.97	2.85	2.77	1.02	2.52	.97	.82	.57	.61

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1965 - 1997, BY WATER YEAR (WY)

	MEAN	7.49	12.1	15.3	12.6	18.5	30.9	25.0	15.3	11.3	7.05	5.52	5.97
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	
(WY)	1982	1986	1973	1993	1976	1982	1979	1968	1996	1969	1972	1986	
MIN	.82	1.45	1.99	1.23	2.62	10.1	8.30	3.46	1.51	.29	.43	.44	
(WY)	1967	1966	1977	1977	1980	1981	1971	1971	1988	1965	1965	1969	

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1965 - 1997
ANNUAL TOTAL	6619.34	7163.9	
ANNUAL MEAN	18.1	19.6	13.9
HIGHEST ANNUAL MEAN			20.5
LOWEST ANNUAL MEAN			6.67
HIGHEST DAILY MEAN	406	273	707
LOWEST DAILY MEAN	.52	2.0	.04
ANNUAL SEVEN-DAY MINIMUM	.84	2.4	.09
INSTANTANEOUS PEAK FLOW		400	(a)1290
INSTANTANEOUS PEAK STAGE		8.04	10.62
INSTANTANEOUS LOW FLOW		1.6	.00
ANNUAL RUNOFF (CFSM)	1.10	1.19	.84
ANNUAL RUNOFF (INCHES)	14.92	16.15	11.48
10 PERCENT EXCEEDS	38	41	30
50 PERCENT EXCEEDS	10	10	6.0
90 PERCENT EXCEEDS	2.8	3.3	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. 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 approximately 9,000 ft³/s.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	353	400	571	442	423	1230	1150	317	609	601	113	146
2	322	291	578	477	401	1020	969	296	909	1170	111	259
3	290	286	414	499	431	897	871	1300	921	2160	137	298
4	265	273	372	487	872	817	813	1190	692	479	367	163
5	232	269	359	679	1410	758	998	690	593	347	150	162
6	209	250	456	578	674	843	1110	1040	521	304	120	156
7	202	893	406	479	526	740	855	711	454	322	107	138
8	206	1640	359	415	475	692	745	728	421	318	100	136
9	220	744	351	433	431	667	686	785	385	573	98	156
10	215	464	346	445	416	705	644	652	325	265	95	1780
11	163	393	442	418	389	660	597	577	257	222	160	1260
12	150	367	586	406	383	630	643	655	262	195	256	745
13	146	333	977	383	362	601	673	537	255	182	344	574
14	140	272	591	352	369	2750	612	501	266	174	176	491
15	135	268	457	336	336	1900	548	753	202	254	385	410
16	132	267	425	367	315	1070	542	665	423	188	565	387
17	132	265	957	e340	310	831	578	786	373	174	696	390
18	303	321	789	e320	341	774	497	649	273	155	292	413
19	291	302	509	e310	474	708	480	3190	277	138	227	349
20	197	290	404	e300	509	669	459	1410	467	124	315	739
21	181	315	372	e325	2830	643	440	850	605	325	704	465
22	177	327	411	794	2440	611	407	719	1220	350	283	352
23	452	306	489	1010	1350	603	381	649	590	166	220	321
24	366	296	1160	612	882	603	369	562	459	147	203	293
25	263	326	814	495	752	703	350	612	374	143	223	233
26	259	355	509	421	722	779	333	591	324	340	186	222
27	271	337	453	383	2370	645	323	488	247	269	178	201
28	277	306	482	378	1740	638	397	447	202	204	169	183
29	317	301	529	347	---	1450	351	913	192	184	158	203
30	1010	406	481	363	---	1650	312	1180	367	158	141	187
31	583	---	459	381	---	1530	---	705	---	130	209	---
TOTAL	8459	11863	16508	13975	22933	28817	18133	25148	13465	10761	7488	11812
MEAN	273	395	533	451	819	930	604	811	449	347	242	394
MAX	1010	1640	1160	1010	2830	2750	1150	3190	1220	2160	704	1780
MIN	132	250	346	300	310	601	312	296	192	124	95	136
CFSM	.61	.89	1.20	1.02	1.84	2.09	1.36	1.83	1.01	.78	.54	.89
IN.	.71	.99	1.38	1.17	1.92	2.41	1.52	2.11	1.13	.90	.63	.99

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1947 - 1997, BY WATER YEAR (WY)

MEAN	270	336	393	385	455	668	655	465	361	265	223	241
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1947 - 1997

ANNUAL TOTAL	167797	189362	392
ANNUAL MEAN	458	519	595
HIGHEST ANNUAL MEAN			1976
LOWEST ANNUAL MEAN			189
HIGHEST DAILY MEAN	4220	3190	6930
LOWEST DAILY MEAN	101	95	49
ANNUAL SEVEN-DAY MINIMUM	124	119	59
INSTANTANEOUS PEAK FLOW		4900	8840
INSTANTANEOUS PEAK STAGE		16.91	19.56
INSTANTANEOUS LOW FLOW		88	47
ANNUAL RUNOFF (CFSM)	1.03	1.17	.88
ANNUAL RUNOFF (INCHES)	14.06	15.87	11.99
10 PERCENT EXCEEDS	881	916	749
50 PERCENT EXCEEDS	352	401	284
90 PERCENT EXCEEDS	155	174	116

(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 Van Dyke Road, 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	15	19	e20	e15	66	94	22	26	25	7.1	9.3
2	11	14	19	e19	e16	67	82	21	27	33	8.1	9.2
3	12	14	17	e21	e16	53	66	36	29	48	8.0	9.1
4	12	14	16	23	20	45	53	38	26	29	8.0	8.6
5	12	13	15	27	27	41	50	32	23	e24	6.9	8.1
6	11	13	16	25	24	39	51	44	21	e23	8.0	7.7
7	10	26	17	23	22	34	41	38	19	e22	8.0	7.0
8	10	55	16	e20	21	32	36	40	18	e21	8.1	7.1
9	10	31	16	e19	e20	29	33	43	17	23	7.3	8.1
10	10	24	15	e18	19	28	32	40	16	22	6.6	32
11	9.7	22	15	e17	18	29	30	36	15	20	6.8	27
12	9.5	21	18	e16	18	28	32	34	15	18	9.0	17
13	9.3	20	26	e16	e17	26	35	31	15	16	10	14
14	9.3	19	23	e15	17	55	32	29	15	14	9.6	13
15	9.2	18	20	e15	16	53	30	37	14	13	12	12
16	9.2	18	20	e16	e15	39	28	39	14	12	13	11
17	9.1	18	22	e15	e14	37	28	39	14	11	11	12
18	11	18	23	e14	e15	36	27	35	14	9.8	10	12
19	11	17	e21	e14	e17	32	26	46	14	9.1	9.1	13
20	11	16	e19	e13	e22	31	24	42	17	8.5	8.5	20
21	11	15	e17	e18	79	29	23	39	19	9.0	9.2	17
22	11	15	e16	e23	79	28	23	34	28	10	9.5	13
23	13	14	18	e27	58	26	22	30	22	10	9.6	13
24	13	14	40	e23	e50	25	22	28	19	10	9.5	12
25	13	14	29	e19	e45	33	22	26	17	9.9	9.7	11
26	12	13	e23	e18	42	37	22	25	16	9.7	9.5	10
27	12	13	e21	e17	96	32	22	23	15	9.7	10	9.6
28	12	13	e20	e16	80	32	23	22	13	9.1	10	9.1
29	12	12	e22	e14	---	104	22	26	13	8.5	9.5	9.1
30	22	14	e21	e15	---	119	22	30	14	8.0	9.1	8.7
31	18	---	e20	e15	---	104	---	27	---	7.6	9.1	---
TOTAL	356.3	543	620	571	898	1369	1053	1032	545	502.9	279.8	369.7
MEAN	11.5	18.1	20.0	18.4	32.1	44.2	35.1	33.3	18.2	16.2	9.03	12.5
MAX	22	55	40	27	96	119	94	46	29	48	13	32
MIN	9.1	12	15	13	14	25	22	21	13	7.6	6.6	7.0
CFSM	.53	.83	.92	.84	1.47	2.03	1.61	1.53	.83	.74	.41	.57
IN.	.61	.93	1.06	.97	1.53	2.34	1.80	1.76	.93	.86	.48	.65

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 1997, BY WATER YEAR (WY)

	MEAN	10.3	14.1	15.4	14.8	18.9	32.8	31.7	19.4	14.3	9.04	7.20	8.75
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1958 - 1997

ANNUAL TOTAL	7214.2						8139.7						
ANNUAL MEAN	19.7						22.3				16.4		
HIGHEST ANNUAL MEAN											29.0		1977
LOWEST ANNUAL MEAN											4.99		1964
HIGHEST DAILY MEAN	182						119		Mar 30	302		Feb 1	1968
LOWEST DAILY MEAN	4.1						6.6		Aug 10	.90		Jul 29	1964
ANNUAL SEVEN-DAY MINIMUM	4.2						7.4		Aug 5	.99		Jul 27	1964
INSTANTANEOUS PEAK FLOW							140		Mar 29	(a)358		Feb 10	1965
INSTANTANEOUS PEAK STAGE							2.95		Mar 29	(b)4.56		Mar 12	1967
INSTANTANEOUS LOW FLOW							5.3		Aug 10	.80		(c)	
ANNUAL RUNOFF (CFSM)	.90						1.02			.75			
ANNUAL RUNOFF (INCHES)	12.31						13.89			10.21			
10 PERCENT EXCEEDS	33						39			33			
50 PERCENT EXCEEDS	16						18			11			
90 PERCENT EXCEEDS	5.6						9.2			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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.1	6.1	19	7.0	e5.0	59	31	2.8	5.0	1.1	.22	.16
2	1.5	3.9	26	8.3	e8.0	77	18	2.7	5.9	3.4	.21	.18
3	1.2	2.8	12	28	e14	35	13	21	6.4	8.0	.22	.29
4	1.1	2.5	9.1	30	e22	24	11	27	4.8	7.8	.27	.31
5	.95	2.1	7.1	68	e40	23	13	15	3.7	2.7	.32	.31
6	.90	1.8	8.9	31	e25	23	19	61	3.0	1.6	.42	.38
7	.92	30	19	11	e15	16	13	26	2.5	1.7	.46	.42
8	1.1	123	16	e5.0	e10	13	8.0	20	2.3	2.7	.54	.43
9	1.2	36	10	e3.5	e5.0	10	6.1	22	2.0	7.4	.55	.52
10	1.1	16	7.8	e2.0	e3.5	20	5.1	15	1.8	6.5	.57	.43
11	1.1	9.1	8.9	e1.8	e3.0	44	4.9	9.9	1.6	2.3	.61	2.6
12	1.1	5.9	15	e1.7	e2.5	23	6.9	8.1	1.5	1.4	.58	3.0
13	1.1	4.3	64	e1.6	e2.4	13	12	6.5	1.4	1.1	.42	2.7
14	1.1	3.3	29	e1.5	e2.3	98	10	5.8	1.2	.91	.34	2.1
15	1.1	2.6	16	e1.5	e2.2	e65	7.6	19	.99	1.4	1.7	1.7
16	1.0	2.4	13	e1.4	e2.1	e22	6.7	33	.94	1.2	.83	1.3
17	1.1	2.5	57	e1.4	e2.0	16	6.2	24	.91	.77	.50	1.2
18	2.2	2.7	59	e1.4	e2.1	19	5.5	16	.75	.64	.26	.92
19	2.7	2.5	e17	e1.4	e2.2	13	4.7	64	.68	.49	.19	2.0
20	3.0	2.3	e8.0	e1.4	e2.5	11	4.3	33	.68	.36	.23	1.8
21	2.3	2.0	5.5	1.4	e200	11	3.8	17	2.5	1.2	.24	1.6
22	2.0	1.8	4.1	10	e120	10	3.8	11	.27	.83	.33	1.3
23	2.9	1.7	10	21	e70	7.9	3.6	8.1	.13	.65	.28	.79
24	5.0	1.7	52	e27	e45	6.4	3.2	6.5	4.9	.57	.27	.49
25	3.9	1.7	e14	e18	e25	24	3.0	5.8	2.8	.55	.23	.36
26	3.0	1.7	e7.8	e10	12	39	2.9	5.1	1.9	.54	.25	.28
27	2.5	1.5	e6.3	e7.0	168	19	2.6	4.1	1.5	.45	.16	.20
28	2.5	1.4	8.0	e4.5	78	18	3.4	3.4	1.2	.36	.14	.18
29	2.8	1.4	15	e3.0	---	236	3.2	4.9	1.0	.28	.13	.25
30	21	2.5	15	e2.5	---	107	2.9	7.4	.92	.22	.13	.35
31	11	---	11	e2.5	---	61	---	5.8	---	.22	.21	---
TOTAL	86.47	279.2	570.5	315.8	911.3	1163.3	238.4	510.9	104.77	59.34	11.81	32.42
MEAN	2.79	9.31	18.4	10.2	32.5	37.5	7.95	16.5	3.49	1.91	.38	1.08
MAX	21	123	64	68	200	236	31	64	27	8.0	1.7	4.3
MIN	.90	1.4	4.1	1.4	2.0	6.4	2.6	2.7	.68	.22	.13	.16
CFSM	.21	.72	1.42	.78	2.50	2.89	.61	1.27	.27	.15	.03	.08
IN.	.25	.80	1.63	.90	2.61	3.33	.68	1.46	.30	.17	.03	.09

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1959 - 1997, BY WATER YEAR (WY)

	MEAN	2.28	5.38	8.45	6.45	11.1	24.8	15.9	5.76	4.47	1.63	1.22	2.01
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1959 - 1997

ANNUAL TOTAL	3799.38	4284.21	7.44
ANNUAL MEAN	10.4	11.7	14.9
HIGHEST ANNUAL MEAN			1985
LOWEST ANNUAL MEAN			1964
HIGHEST DAILY MEAN	235	236	497
LOWEST DAILY MEAN	.04	.13	.00
ANNUAL SEVEN-DAY MINIMUM	.08	.16	.00
INSTANTANEOUS PEAK FLOW		382	910
INSTANTANEOUS PEAK STAGE		4.88	6.69
INSTANTANEOUS LOW FLOW		.13	.00
ANNUAL RUNOFF (CFSM)	.80	.90	.57
ANNUAL RUNOFF (INCHES)	10.87	12.26	7.77
10 PERCENT EXCEEDS	27	27	15
50 PERCENT EXCEEDS	2.3	3.0	1.0
90 PERCENT EXCEEDS	.25	.37	.10

(a) Jan. 25 to Feb. 9, 1961, result of freezeup.

(b) Aug. 28, 29, 30, 31.

(c) 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 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	59	127	90	187	e95	1480	1090	93	170	30	8.0	18
2	42	70	242	163	e90	835	620	87	159	94	8.1	19
3	33	54	286	224	e85	828	416	187	261	215	8.0	18
4	30	47	200	347	e110	603	313	651	223	280	10	17
5	29	44	158	417	e200	408	268	657	145	190	11	15
6	28	42	168	e540	e450	349	333	453	109	92	10	14
7	26	59	213	e460	e300	328	378	606	91	60	7.8	12
8	25	373	236	e170	e220	270	281	550	77	55	7.6	13
9	24	630	190	e130	e140	237	197	449	67	59	6.7	13
10	24	634	149	e110	e120	222	153	466	60	73	6.9	34
11	23	318	131	e99	e105	288	136	324	53	65	8.8	114
12	23	186	142	e90	e95	385	133	230	47	45	9.5	175
13	22	134	323	e80	e85	302	178	191	45	34	16	79
14	21	106	527	e75	e82	631	234	153	41	30	23	56
15	20	87	487	e68	e78	1620	206	187	39	33	23	40
16	19	79	276	e66	e76	1410	163	359	38	28	40	32
17	19	75	307	e64	e75	663	146	477	41	21	54	29
18	20	75	602	e61	e76	385	142	436	40	19	34	27
19	23	81	681	e58	e140	315	129	590	37	16	25	31
20	34	78	342	e56	e250	252	116	654	38	14	23	36
21	37	71	e220	e54	1160	224	107	564	40	21	26	88
22	31	64	e160	e53	2750	207	101	300	105	22	26	91
23	29	59	123	e120	1880	182	98	195	138	31	27	63
24	32	56	288	e200	851	154	96	147	114	25	24	42
25	41	57	572	e300	434	158	94	128	64	21	23	33
26	41	59	647	e220	307	323	97	119	42	21	21	30
27	35	58	379	e190	645	439	97	110	33	19	21	25
28	31	56	e220	e160	1890	326	95	98	27	19	20	21
29	30	52	e240	e130	---	695	105	98	22	14	19	e70
30	45	56	277	e120	---	2820	101	222	23	11	18	e72
31	123	---	240	e110	---	2020	---	244	---	9.4	18	---
TOTAL	1019	3887	9116	5122	12789	19259	6623	10025	2389	1666.4	583.4	1177
MEAN	32.9	130	294	165	457	621	221	323	79.6	53.8	18.8	35.2
MAX	123	634	681	540	2750	2820	1090	657	261	280	54	125
MIN	19	42	90	53	75	154	94	87	22	9.4	6.7	12
CFSM	.17	.65	1.48	.83	2.30	3.12	1.11	1.63	.40	.27	.09	.20
IN.	.19	.73	1.70	.96	2.39	3.60	1.24	1.87	.45	.31	.11	.22

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1947 - 1997, BY WATER YEAR (WY)

	MEAN	51.0	92.6	138	131	201	362	272	141	81.6	33.4	25.0	35.4
MAX	479	595	460	507	766	928	560	790	448	127	247	494	
(WY)	1982	1986	1968	1974	1976	1982	1975	1956	1996	1992	1975	1975	1975
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	1975	1975

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1947 - 1997

ANNUAL TOTAL	64486.7	73655.8	130
ANNUAL MEAN	176	202	230
HIGHEST ANNUAL MEAN			25.4
LOWEST ANNUAL MEAN			5040
HIGHEST DAILY MEAN	2710	2820	Mar 30
LOWEST DAILY MEAN	4.6	6.7	Aug 9
ANNUAL SEVEN-DAY MINIMUM	5.8	8.2	Aug 6
INSTANTANEOUS PEAK FLOW		3180	Mar 30
INSTANTANEOUS PEAK STAGE		15.01	Mar 30
INSTANTANEOUS LOW FLOW		5.6	Aug 9
ANNUAL RUNOFF (CFSM)	.89	1.01	.65
ANNUAL RUNOFF (INCHES)	12.05	13.77	8.87
10 PERCENT EXCEEDS	371	470	315
50 PERCENT EXCEEDS	77	94	42
90 PERCENT EXCEEDS	18	20	7.4

(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. V/SP 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 fair except for estimated daily discharges, which are poor. National Weather Service gage-height telemeter at station.

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

DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e470	500	902	766	572	3380	2820	e460	e1000	e700	e140	236
2	e420	e400	1100	815	554	2330	1860	e440	e740	e1500	e130	e180
3	e380	e380	807	942	597	1980	1440	1540	e1300	e2900	e130	346
4	e340	e360	675	1060	1250	1600	1220	2000	e1100	e1500	342	240
5	e300	e350	608	1590	2910	1300	1410	1270	e900	e800	e200	e200
6	e270	e340	805	1590	1790	1460	1820	1910	e720	e500	e150	e190
7	e250	1060	789	1280	1450	1240	1520	e1500	e620	e440	e130	e180
8	e260	2880	760	672	1160	1100	1190	e1400	e600	e420	e120	e170
9	e270	1740	691	646	872	1010	950	e1300	e520	e700	e120	e200
10	e270	1440	602	e640	708	1070	e870	e1200	e490	e500	e110	2100
11	e220	909	742	e570	631	1070	e820	e1100	e400	e320	e190	1720
12	e200	658	1000	e550	584	1130	e870	e1000	e350	e280	305	933
13	e190	545	2060	e520	524	945	e950	e900	e320	e270	342	630
14	e180	435	1540	e480	501	4170	e910	e800	e300	e230	262	507
15	e175	393	1250	e450	491	5040	e850	e1000	e280	286	409	437
16	e170	397	930	e430	445	2910	e800	e1150	e400	244	624	406
17	e180	393	1950	e410	434	1790	e820	e1400	e520	e210	670	405
18	e360	465	2100	e390	497	1330	e750	e1100	e390	e190	330	430
19	e350	440	1580	e390	934	1120	e700	e5600	e350	e180	276	377
20	e260	417	e800	e380	1210	1000	e660	e3500	e500	e160	315	761
21	e250	433	e700	e400	5430	925	e620	e2000	e550	382	757	494
22	e240	437	678	e1150	6790	862	e580	e1300	e1600	364	330	413
23	e540	412	773	1730	4300	807	e540	e1000	e1000	239	279	377
24	e450	393	2220	1070	2170	788	e520	e800	e700	e200	255	347
25	e350	436	1840	879	1360	959	e500	e800	e600	e180	283	309
26	e340	489	1240	698	1170	1320	e490	e790	e430	321	e250	e280
27	e330	453	863	572	4150	1200	e480	e720	e320	292	e230	e250
28	e340	406	e800	540	4760	1030	e560	e620	e270	244	e220	e230
29	e380	399	e800	e530	---	2950	e520	e1000	e230	230	e210	e250
30	1230	574	e850	516	---	5570	e480	e1700	e350	e190	e180	e240
31	704	---	e820	507	---	4820	---	e1300	---	e160	e200	---
TOTAL	10679	18934	33275	23163	48244	58206	28520	42600	17850	15132	8489	13838
MEAN	344	631	1073	747	1723	1878	951	1374	595	488	274	461
MAX	1230	2880	2220	1730	6790	5570	2820	5600	1600	2900	757	2100
MIN	170	340	602	380	434	788	480	440	230	160	110	170
CFSM	.47	.86	1.46	1.02	2.35	2.56	1.30	1.87	.81	.67	.37	.63
IN.	.54	.96	1.69	1.17	2.45	2.95	1.45	2.16	.90	.77	.43	.70

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1934 - 1997, BY WATER YEAR (WY)

MEAN	313	422	540	551	747	1146	1057	693	483	297	246	271
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1934 - 1997

ANNUAL TOTAL	273022	318930	565
ANNUAL MEAN	746	874	929
HIGHEST ANNUAL MEAN			1974
LOWEST ANNUAL MEAN			1964
HIGHEST DAILY MEAN	7120	6790	19200
LOWEST DAILY MEAN	130	110	25
ANNUAL SEVEN-DAY MINIMUM	160	146	28
INSTANTANEOUS PEAK FLOW		7280	21200
INSTANTANEOUS PEAK STAGE		13.35	(a)23.55
ANNUAL RUNOFF (CFSM)	1.02	1.19	.77
ANNUAL RUNOFF (INCHES)	13.84	16.16	10.45
10 PERCENT EXCEEDS	1550	1720	1200
50 PERCENT EXCEEDS	490	574	330
90 PERCENT EXCEEDS	195	230	120

(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. Occasional regulation by Quarton Lake 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SE ^a
1	13	13	47	28	24	64	52	21	37	50	8.5	12
2	12	12	35	30	23	58	45	22	55	85	8.3	15
3	9.7	11	23	32	25	47	41	89	60	58	9.8	14
4	9.0	10	19	30	74	42	40	54	39	28	18	12
5	8.5	9.5	19	54	84	40	73	45	33	24	11	9.7
6	8.3	9.3	22	34	42	44	69	104	30	22	9.6	9.6
7	8.0	119	23	27	33	37	43	43	27	22	9.1	9.2
8	8.2	135	20	24	30	36	37	51	23	28	8.2	9.2
9	9.8	36	20	24	27	35	34	51	21	40	8.1	11
10	12	23	21	24	25	39	33	40	20	20	8.2	24.3
11	9.4	18	26	22	23	36	34	35	19	16	12	62
12	8.5	17	43	20	23	32	40	36	18	14	20	31
13	8.4	15	73	19	21	30	40	32	19	13	25	23
14	7.7	14	36	19	22	253	34	32	20	12	15	18
15	7.8	13	29	19	21	102	31	49	15	12	49	17
16	7.9	12	28	20	20	52	34	41	23	10	49	17
17	7.8	13	55	19	19	45	37	50	24	9.7	30	25
18	17	16	47	19	24	42	32	39	17	9.5	17	25
19	17	14	29	18	36	37	33	371	14	8.8	14	30
20	11	12	23	17	48	36	31	85	21	8.6	28	62
21	9.0	12	22	16	370	35	29	56	31	16	49	27
22	8.5	11	24	74	177	33	28	47	73	19	21	22
23	30	11	52	68	71	33	28	42	26	13	16	21
24	23	11	128	35	52	32	28	38	19	11	14	19
25	13	13	44	31	42	51	27	42	16	10	15	19
26	11	14	33	25	43	47	25	38	14	30	15	17
27	10	12	30	24	280	35	21	33	12	19	13	16
28	9.5	11	32	23	99	38	25	31	12	12	12	16
29	14	11	35	20	---	221	22	75	14	11	11	17
30	70	19	30	21	---	101	20	61	54	9.3	11	15
31	24	---	29	22	---	71	---	41	---	9.6	11	---
TOTAL	423.0	646.8	1097	858	1778	1804	1066	1794	806	650.5	545.8	885.7
MEAN	13.6	21.6	35.4	27.7	63.5	58.2	35.5	57.9	26.9	21.0	17.6	25.5
MAX	70	135	128	74	370	253	73	371	73	85	49	273
MIN	7.7	9.3	19	16	19	30	20	21	12	8.6	8.1	9.2
CFSM	.41	.65	1.06	.83	1.91	1.75	1.07	1.74	.81	.63	.53	.88
IN.	.47	.72	1.23	.96	1.99	2.02	1.19	2.00	.90	.73	.61	.99

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1950 - 1997, BY WATER YEAR (WY)

	MEAN	12.1	16.7	20.3	19.7	24.4	39.4	36.1	26.5	19.9	12.9	10.2	11.0
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	1966	1989	1968	1968	1976	1976
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	1973	1973

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1950 - 1977

ANNUAL TOTAL	10281.1	12352.8	
ANNUAL MEAN	28.1	33.8	(a)20.8
HIGHEST ANNUAL MEAN			35.6
LOWEST ANNUAL MEAN			4.55
HIGHEST DAILY MEAN	437	371	902
LOWEST DAILY MEAN	5.4	7.7	.20
ANNUAL SEVEN-DAY MINIMUM	6.0	8.2	.34
INSTANTANEOUS PEAK FLOW		626	1390
INSTANTANEOUS PEAK STAGE		5.45	8.70
INSTANTANEOUS LOW FLOW		7.2	.10
ANNUAL RUNOFF (CFSM)	.84	1.02	.62
ANNUAL RUNOFF (INCHES)	11.49	13.80	8.48
10 PERCENT EXCEEDS	52	57	43
50 PERCENT EXCEEDS	20	24	12
90 PERCENT EXCEEDS	8.6	9.8	3.2

(a) Annual mean, water years 1951-70, 15.3 ft³/s, 5.63 in/yr; water years 1971-97, 24.8 ft³/s, 10.11 in/yr.

(b) Oct. 7, 14.

(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. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	48	198	e75	e64	213	131	49	98	119	22	28
2	e34	38	118	e80	e60	180	109	48	154	258	22	27
3	e31	35	63	e84	e72	137	96	323	176	776	31	55
4	e28	33	49	e82	e200	119	96	198	105	113	83	30
5	e27	31	43	e150	457	108	221	118	84	74	33	25
6	e26	30	60	e90	160	131	225	273	75	72	26	24
7	e25	298	62	e70	96	104	118	127	67	74	24	23
8	e25	618	48	e64	83	97	93	173	58	55	22	27
9	38	152	44	e64	e70	91	81	149	53	81	21	30
10	43	83	43	e64	e62	109	77	105	49	49	21	698
11	34	59	70	e58	59	98	75	88	46	39	38	316
12	e30	49	127	e52	58	84	89	111	50	35	55	99
13	e28	42	291	e50	e56	76	95	e81	51	32	70	69
14	e26	37	111	e50	e55	804	79	e80	48	30	38	52
15	e25	34	77	e50	53	497	71	129	41	30	83	44
16	e24	34	72	e52	e52	164	77	98	72	26	131	40
17	e23	37	207	e50	e50	132	120	136	69	25	89	66
18	e80	48	151	e50	60	118	79	90	54	24	47	67
19	63	39	e66	e47	96	99	71	1030	45	23	34	e80
20	37	34	e60	e45	119	93	67	408	55	22	67	e170
21	30	31	e58	e43	1200	87	63	179	83	64	137	e70
22	28	30	e65	e200	794	80	61	136	204	55	62	e56
23	121	29	125	e180	255	82	60	114	73	33	41	e49
24	82	30	468	e90	162	81	61	101	53	28	35	45
25	45	41	e130	e80	121	123	57	109	44	26	37	43
26	34	45	e82	e65	119	129	54	98	40	137	34	39
27	31	35	e80	e63	893	91	49	81	35	61	30	36
28	30	32	e85	e60	441	83	60	73	33	35	28	35
29	57	32	e92	e54	---	576	53	237	32	28	27	39
30	266	73	e80	e56	---	363	48	201	135	24	25	35
31	87	---	e79	e58	---	203	---	112	---	23	35	---
TOTAL	1495	2157	3304	2276	5967	5352	2636	5255	2182	2471	1448	2417
MEAN	48.2	71.9	107	73.4	213	173	87.9	170	72.7	79.7	46.7	80.6
MAX	266	618	468	200	1200	804	225	1030	204	776	137	698
MIN	23	29	43	43	50	76	48	48	32	22	21	23
CFSM	.55	.82	1.21	.84	2.42	1.96	1.00	1.93	.83	.91	.53	.92
IN.	.63	.91	1.40	.96	2.53	2.27	1.12	2.22	.92	1.05	.61	1.02

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 1997, BY WATER YEAR (WY)

	MEAN	42.7	59.1	68.8	64.1	80.1	133	118	79.8	66.6	40.0	35.6	39.1
MAX	207	164	178	203	254	327	225	191	241	118	142	147	146
(WY)	1982	1993	1988	1993	1976	1982	1977	1983	1989	1968	1995	1986	1987
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1958 - 1997

ANNUAL TOTAL	33612	36960	69.3	1993
ANNUAL MEAN	91.8	101	20.4	1964
HIGHEST ANNUAL MEAN			105	1993
LOWEST ANNUAL MEAN			20.4	1964
HIGHEST DAILY MEAN	1650	1200	3210	Jun 26 1968
LOWEST DAILY MEAN	18	21	.30	Jul 31 1964
ANNUAL SEVEN-DAY MINIMUM	19	26	.66	Jul 26 1964
INSTANTANEOUS PEAK FLOW		1550	4900	Jun 26 1968
INSTANTANEOUS PEAK STAGE		12.36	19.04	Jun 26 1968
INSTANTANEOUS LOW FLOW			.10	Aug 2 1964
ANNUAL RUNOFF (CFSM)	1.04	1.15	.79	
ANNUAL RUNOFF (INCHES)	14.22	15.64	10.71	
10 PERCENT EXCEEDS	185	180	134	
50 PERCENT EXCEEDS	57	64	39	
90 PERCENT EXCEEDS	25	28	11	

(a) Aug. 9, 10.

(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. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SF ^P
1	2.0	2.1	14	6.3	6.0	18	9.1	4.0	8.7	8.6	1.5	2.1
2	e1.9	1.9	5.0	7.1	6.2	14	7.6	3.1	35	160	1.5	2.3
3	e1.9	1.8	3.5	6.6	6.3	10	6.9	98	16	56	10	2.4
4	e1.8	1.7	3.0	8.2	76	9.1	8.2	12	7.9	5.9	9.5	1.9
5	e1.8	1.8	3.5	22	27	9.9	47	19	6.0	4.2	1.9	1.7
6	e1.7	1.8	6.7	6.3	11	14	15	18	4.9	12	1.5	1.7
7	e1.7	141	5.0	4.8	8.3	7.8	8.7	7.3	4.4	4.8	1.4	1.6
8	e1.7	17	3.3	4.0	7.3	7.4	6.7	23	3.8	16	1.4	5.9
9	e5.0	4.6	3.3	e3.7	6.1	8.9	5.6	10	3.3	5.6	1.4	6.6
10	2.5	3.1	2.8	e3.4	5.2	9.0	5.3	7.3	3.0	2.7	1.4	208
11	1.9	2.7	9.5	e3.2	4.9	8.0	5.1	5.9	3.0	2.4	17	7.9
12	1.8	2.5	20	e3.0	e4.6	5.8	10	14	7.0	2.2	3.7	6.1
13	1.8	2.4	18	e2.9	e4.4	5.6	7.0	5.6	3.9	2.1	8.6	4.1
14	e1.8	2.2	6.3	e2.8	e4.2	227	5.3	12	3.0	2.1	2.4	3.5
15	e1.8	2.2	5.0	e2.7	e4.1	25	4.7	17	2.5	3.3	17	3.3
16	e1.7	2.2	5.4	e2.7	e4.1	13	9.7	10	27	2.1	6.2	3.2
17	e1.7	3.4	41	e2.7	e4.0	11	15	14	4.1	1.9	16	12
18	17	3.3	10	2.7	6.5	9.0	6.0	7.7	4.0	1.9	2.4	3.8
19	2.4	2.1	5.0	2.7	9.1	8.0	5.1	158	2.9	1.5	1.9	46
20	1.6	2.0	3.7	2.9	38	7.8	4.6	13	7.7	1.4	66	13
21	1.7	2.0	3.5	3.9	204	7.1	4.0	8.7	59	48	9.6	4.2
22	1.5	1.9	3.7	57	71	6.0	4.6	7.0	24	3.5	3.3	3.7
23	35	1.9	20	14	20	8.9	4.0	6.1	4.2	1.9	2.3	3.5
24	2.8	2.1	29	6.9	12	6.6	3.9	5.3	3.4	1.8	2.7	3.2
25	2.0	3.7	7.1	e5.0	8.6	16	3.5	11	2.9	1.7	3.2	3.0
26	1.6	4.2	5.7	e4.3	17	8.3	3.3	5.3	2.6	35	2.3	2.8
27	1.8	2.8	5.0	e3.9	170	6.6	3.3	5.0	2.4	3.2	2.1	2.9
28	2.3	2.5	7.8	e3.8	21	14	5.9	4.1	2.2	1.9	1.9	3.0
29	34	2.5	7.3	e3.7	---	68	3.4	107	2.3	1.8	1.8	4.1
30	48	7.4	5.9	3.6	---	23	3.3	19	19	1.6	1.7	3.3
31	2.7	---	5.3	5.2	---	14	---	8.8	---	1.6	8.0	---
TOTAL	188.9	232.8	274.3	212.0	766.9	606.8	231.8	646.2	280.1	398.7	211.6	370.8
MEAN	6.09	7.76	8.85	6.84	27.4	19.6	7.73	20.8	9.34	12.9	6.83	12.4
MAX	48	141	41	57	204	227	47	158	59	160	66	209
MIN	1.5	1.7	2.8	2.7	4.0	5.6	3.3	3.1	2.2	1.4	1.4	1.6
CFSM	.64	.82	.93	.72	2.89	2.06	.81	2.20	.98	1.36	.72	1.30
IN.	.74	.91	1.08	.83	3.01	2.38	.91	2.53	1.10	1.56	.83	1.45

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 1997, BY WATER YEAR (WY)

	MEAN	5.93	7.94	8.94	7.31	9.56	14.3	13.3	9.33	9.57	7.12	6.83	6.53
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 1996 CALENDAR YEAR FOR 1997 WATER YEAR WATER YEARS 1958 - 1997

	ANNUAL TOTAL	3558.0	4420.9	8.89	1968
ANNUAL MEAN		9.72	12.1	16.9	1963
HIGHEST ANNUAL MEAN				3.12	1963
LOWEST ANNUAL MEAN				.00	(b)
HIGHEST DAILY MEAN	201	Jun 18	227	442	Oct 1 1961
LOWEST DAILY MEAN	1.0	Sep 4	1.4	.27	Dec 15 1963
ANNUAL SEVEN-DAY MINIMUM	1.1	Aug 31	1.8	(c)1200	Oct 1 1961
INSTANTANEOUS PEAK FLOW			828	(d)15.03	Oct 1 1961
INSTANTANEOUS PEAK STAGE			12.10	.94	
ANNUAL RUNOFF (CFSM)	1.02		1.28	12.72	
ANNUAL RUNOFF (INCHES)	13.95		17.33	18	
10 PERCENT EXCEEDS	19		20	3.4	
50 PERCENT EXCEEDS	3.7		4.7	1.1	
90 PERCENT EXCEEDS	1.6		1.8		

(a) July 20, Aug. 7-10.

(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 870 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.3	13	45	15	e12	49	32	11	23	22	6.7	8.1
2	8.3	10	30	17	e13	41	24	11	32	80	6.8	9.0
3	7.0	9.3	18	20	e14	32	21	55	34	119	14	9.1
4	6.6	8.6	14	20	e40	27	20	42	23	42	25	7.3
5	6.5	8.2	12	33	63	24	47	33	18	21	13	6.6
6	6.3	8.4	14	22	35	25	46	52	15	18	9.2	6.6
7	5.9	8.9	14	14	22	22	27	31	13	14	7.8	6.4
8	5.8	102	12	e12	17	20	21	41	11	12	6.9	7.2
9	8.6	40	11	11	e13	18	17	34	10	11	6.7	8.6
10	7.9	26	10	11	e11	20	16	24	9.8	9.8	6.7	127
11	6.8	18	14	9.9	e10	21	14	20	9.5	8.6	14	55
12	6.3	14	27	e9.8	e9.5	17	19	24	11	8.1	16	27
13	6.1	11	51	e9.7	e9.0	15	19	17	11	7.3	22	19
14	6.5	9.7	27	e9.7	e8.8	156	16	16	9.8	7.4	13	24
15	6.4	8.7	19	e9.6	e8.5	83	14	26	9.7	7.9	54	19
16	6.2	8.3	15	e9.6	e8.1	43	15	22	18	6.6	42	16
17	6.4	9.1	30	e9.6	e8.0	34	21	30	14	6.5	38	28
18	21	9.9	26	e9.7	12	29	15	22	13	6.1	19	19
19	15	8.6	15	e9.7	23	23	14	198	11	6.0	12	36
20	9.6	7.8	e12	e9.8	37	21	12	87	12	6.0	15	78
21	7.9	7.3	e10	e10	251	19	11	45	26	21	26	31
22	7.1	7.0	9.7	e30	159	17	11	32	27	16	18	17
23	25	6.9	34	e50	60	18	12	24	14	9.8	13	13
24	19	7.0	106	e27	e35	17	12	20	11	8.3	11	10
25	12	8.2	42	e17	e27	30	11	25	9.3	7.7	10	9.0
26	9.7	8.3	e25	e15	31	30	10	21	8.3	72	9.6	8.6
27	8.4	7.4	20	e14	177	22	10	16	7.2	37	9.0	9.5
28	7.8	e7.0	21	e13	75	21	13	15	6.8	17	8.2	8.5
29	18	7.0	22	e12	---	115	12	48	6.7	11	7.5	8.7
30	51	13	18	e11	---	72	11	47	8.8	8.5	7.1	7.7
31	21	---	16	e11	---	47	---	28	---	7.4	10	---
TOTAL	349.4	498.7	739.7	482.1	1188.9	1128	543	1117	432.9	635.0	477.2	639.9
MEAN	11.3	16.6	23.9	15.6	42.5	36.4	18.1	36.0	14.4	20.5	15.4	21.3
MAX	51	102	106	50	251	156	47	198	34	119	54	127
MIN	5.8	6.9	9.7	9.6	8.0	15	10	11	6.7	6.0	6.7	6.4
CFSM	.64	.95	1.36	.89	2.43	2.08	1.03	2.06	.82	1.17	.88	1.22
IN.	.74	1.06	1.57	1.02	2.53	2.40	1.15	2.37	.92	1.35	1.01	1.36

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1958 - 1997, BY WATER YEAR (WY)

	MEAN	7.95	11.3	12.7	12.7	16.5	27.2	23.8	16.3	13.3	7.53	6.84	7.50
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	1974	

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1958 - 1977

ANNUAL TOTAL	7061.3	8231.8	
ANNUAL MEAN	19.3	22.6	13.7
HIGHEST ANNUAL MEAN			22.6
LOWEST ANNUAL MEAN			4.54
HIGHEST DAILY MEAN	286	Jun 19	653
LOWEST DAILY MEAN	3.5	Sep 6	.32
ANNUAL SEVEN-DAY MINIMUM	3.7	Aug 31	.61
INSTANTANEOUS PEAK FLOW			1500
INSTANTANEOUS PEAK STAGE			8.70
INSTANTANEOUS LOW FLOW			(c).07
ANNUAL RUNOFF (CFSM)	1.10	1.29	.78
ANNUAL RUNOFF (INCHES)	15.01	17.50	10.64
10 PERCENT EXCEEDS	41	42	29
50 PERCENT EXCEEDS	12	14	7.4
90 PERCENT EXCEEDS	5.2	7.2	2.2

(a) Aug. 10, 1964, Aug. 29, 1966.

(b) Feb. 21, July 2.

(c) Result of regulation.

(e) 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. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	62	105	262	118	e110	430	277	81	198	238	45	61
2	52	72	285	140	e100	353	210	84	305	448	45	83
3	47	59	133	151	e140	272	178	782	367	2130	77	121
4	43	54	95	146	344	228	168	458	e220	558	254	60
5	43	51	82	311	737	205	377	265	168	198	93	45
6	39	48	114	200	326	259	545	502	144	149	61	39
7	37	362	119	125	195	205	266	247	128	199	50	38
8	37	997	95	82	161	181	180	378	114	130	45	54
9	50	366	80	e100	128	168	150	320	104	248	42	55
10	85	161	74	e95	123	205	137	204	93	122	42	936
11	50	113	120	e90	110	181	130	164	85	88	80	846
12	41	88	216	e84	e95	164	160	e250	180	76	188	232
13	40	72	516	e78	e85	142	185	165	174	69	177	e150
14	41	63	226	e74	e83	1320	150	144	106	67	98	109
15	36	53	141	e73	e80	1500	126	281	80	67	111	e84
16	36	52	125	e76	e78	428	134	194	190	59	310	e80
17	37	56	356	e70	e76	287	283	289	202	53	298	e120
18	135	81	364	e66	102	251	158	191	103	51	122	174
19	180	63	e140	e67	160	211	130	1240	104	49	74	133
20	76	53	e110	e70	204	191	117	1190	159	46	107	512
21	53	48	e100	e76	1770	179	107	381	235	202	308	220
22	47	44	e95	342	1950	164	101	263	499	209	140	129
23	229	42	154	667	733	165	97	214	163	83	82	98
24	212	43	725	e240	338	177	98	187	106	62	73	84
25	106	58	351	e150	232	219	91	229	81	54	70	74
26	69	85	e140	e120	229	294	83	203	67	500	63	71
27	56	62	e130	e105	1300	200	77	157	55	266	55	61
28	57	50	151	e95	1180	180	107	140	48	105	49	60
29	115	50	178	e90	---	676	96	434	47	70	45	67
30	553	94	148	e95	---	825	76	573	112	58	42	62
31	225	---	126	e100	---	456	---	244	---	50	88	---
TOTAL	2889	3545	5951	4296	11169	10716	4994	10444	4637	6704	3334	4858
MEAN	93.2	118	192	139	399	346	166	337	155	216	108	162
MAX	553	997	725	667	1950	1500	545	1240	499	2130	310	936
MIN	36	42	74	66	76	142	76	81	47	46	42	38
CFSM	.50	.63	1.03	.74	2.13	1.85	.89	1.80	.83	1.16	.58	.87
IN.	.57	.71	1.18	.85	2.22	2.13	.99	2.08	.92	1.33	.66	.97

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1997, BY WATER YEAR (WY)

	MEAN	67.3	91.7	114	120	167	237	231	169	114	69.7	58.3	59.5
MAX	450	322	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	18.3	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1931 - 1997

ANNUAL TOTAL	62011	73537	125
ANNUAL MEAN	169	201	222
HIGHEST ANNUAL MEAN			1968
LOWEST ANNUAL MEAN			25.7
HIGHEST DAILY MEAN	2090	Jun 19	7380
LOWEST DAILY MEAN	26	Sep 6	1.8
ANNUAL SEVEN-DAY MINIMUM	28	Aug 31	2.7
INSTANTANEOUS PEAK FLOW		2720	13000
INSTANTANEOUS PEAK STAGE		16.58	21.40
INSTANTANEOUS LOW FLOW		34	1.8
ANNUAL RUNOFF (CFSM)	.91	1.08	.67
ANNUAL RUNOFF (INCHES)	12.34	14.63	9.05
10 PERCENT EXCEEDS	363	377	266
50 PERCENT EXCEEDS	108	122	62
90 PERCENT EXCEEDS	41	50	16

(a) Oct. 15, 18.

(b) Aug. 1, 2, 1964.

(c) 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. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	68	143	89	78	360	211	65	e140	108	38	45
2	34	51	136	92	79	257	163	60	e150	219	38	71
3	29	42	84	97	84	204	138	371	e220	767	43	48
4	26	37	65	107	219	169	127	281	e170	405	72	43
5	26	34	60	177	323	148	233	169	e120	165	52	36
6	25	33	78	129	199	163	231	358	e90	120	38	35
7	24	270	72	95	139	131	175	175	e75	110	36	33
8	24	476	62	69	108	121	136	212	e68	90	33	35
9	46	193	57	68	89	119	115	192	e63	152	32	41
10	43	107	52	68	78	125	98	136	e58	82	39	457
11	31	78	87	e63	69	116	94	110	55	60	71	212
12	26	64	132	e58	69	107	112	162	75	53	111	107
13	24	56	219	e54	64	98	107	112	78	50	91	65
14	24	50	125	e50	60	739	105	97	70	47	57	55
15	24	45	87	e52	60	629	125	135	54	46	53	50
16	24	43	78	e54	60	319	141	112	146	43	107	45
17	23	47	208	e52	54	219	130	149	113	40	177	79
18	98	52	148	e51	63	180	142	119	66	64	84	75
19	71	46	95	e50	87	157	125	443	58	42	55	98
20	43	42	75	e50	154	140	115	330	110	37	65	235
21	31	39	59	57	887	129	97	e210	176	165	83	127
22	28	37	59	220	967	119	76	e170	161	125	65	82
23	129	36	113	254	556	120	72	e140	79	60	49	64
24	91	36	346	142	285	116	78	e120	65	47	49	59
25	61	48	235	115	189	138	89	e150	55	42	48	55
26	44	54	134	87	174	147	59	e120	46	265	43	51
27	36	44	109	77	720	133	59	e100	41	160	40	48
28	33	39	103	73	607	131	89	e90	38	74	38	46
29	90	38	110	e67	---	364	69	e200	36	54	37	51
30	278	77	106	e62	---	440	63	e450	93	45	36	46
31	115	---	97	e64	---	314	---	e200	---	41	51	---
TOTAL	1640	2282	3534	2743	6521	6652	3574	5738	2769	3778	1831	2494
MEAN	52.9	76.1	114	88.5	233	215	119	185	92.3	122	59.1	83.1
MAX	278	476	346	254	967	739	233	450	220	767	177	457
MIN	23	33	52	50	54	98	59	60	36	37	32	33
CFSM	.53	.76	1.14	.89	2.33	2.15	1.19	1.85	.92	1.22	.59	.83
IN.	.61	.85	1.32	1.02	2.43	2.48	1.33	2.14	1.03	1.41	.68	.93

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 1997, BY WATER YEAR (WY)

	MEAN	40.6	58.7	74.7	81.2	106	149	133	94.3	66.3	44.1	36.4	42.4
MAX	124	178	177	269	324	313	313	310	225	179	90.6	171	171
(WY)	1955	1993	1988	1952	1976	1976	1950	1966	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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1931 - 1997
ANNUAL TOTAL	35616	43556	
ANNUAL MEAN	97.3	119	76.9
HIGHEST ANNUAL MEAN			133
LOWEST ANNUAL MEAN			20.8
HIGHEST DAILY MEAN	832	May 10	2060
LOWEST DAILY MEAN	19	Sep 2	1.4
ANNUAL SEVEN-DAY MINIMUM	20	Aug 31	3.0
INSTANTANEOUS PEAK FLOW		1140	(a)2330
INSTANTANEOUS PEAK STAGE		8.98	(b)10.50
INSTANTANEOUS LOW FLOW		22	(c)
ANNUAL RUNOFF (CFSM)	.97	1.19	.77
ANNUAL RUNOFF (INCHES)	13.26	16.22	10.46
10 PERCENT EXCEEDS	192	219	164
50 PERCENT EXCEEDS	70	79	43
90 PERCENT EXCEEDS	27	38	14

(a) Gage height 9.96 ft.

(b) From floodmark.

(c) Oct. 16, 17.

(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. Since 1995, flow contains effluent, from sewage-treatment plant, which originates outside the basin. Several measurements of water temperature were made during the year. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	47	120	72	65	319	134	55	147	73	34	35
2	39	44	132	74	68	266	107	50	174	130	36	39
3	37	38	78	104	80	180	88	326	237	276	38	36
4	35	39	66	110	204	143	94	319	151	83	73	34
5	32	35	60	190	413	125	204	179	100	58	46	34
6	35	37	71	141	247	137	330	306	80	53	36	32
7	35	186	77	80	152	107	160	188	69	55	33	31
8	35	360	66	65	121	104	106	180	61	48	34	35
9	40	121	59	62	96	85	85	193	58	92	33	39
10	40	71	56	59	82	101	75	142	55	54	34	358
11	35	55	65	53	72	96	75	107	54	43	55	108
12	33	51	104	51	67	82	86	148	51	41	81	60
13	33	49	218	47	58	77	80	121	46	40	47	45
14	30	44	124	44	58	868	72	94	49	38	40	42
15	31	43	82	45	56	1200	63	108	44	37	75	40
16	34	42	72	49	52	269	66	93	105	39	59	39
17	35	43	170	47	52	183	73	116	89	36	162	61
18	70	45	189	e45	58	152	57	102	69	45	68	52
19	56	40	103	e44	132	124	57	426	53	34	60	53
20	39	39	72	e44	186	109	56	239	96	32	55	140
21	40	40	54	44	1020	98	51	133	158	54	60	67
22	37	40	48	187	1450	81	49	97	367	58	52	45
23	85	39	83	267	532	83	48	79	126	43	39	45
24	63	25	340	123	217	78	49	71	127	40	42	40
25	48	34	196	100	154	91	53	109	85	27	42	37
26	40	33	98	73	142	101	51	98	62	200	39	37
27	41	42	81	68	854	87	45	75	52	121	37	36
28	31	42	76	65	861	96	56	68	49	55	35	37
29	70	40	84	59	---	264	53	252	45	44	36	39
30	188	69	84	54	---	333	50	419	56	43	32	34
31	83	---	78	57	---	200	---	205	---	40	43	---
TOTAL	1485	1833	3206	2523	7548	6260	2573	5098	2907	2031	1546	1730
MEAN	47.9	61.1	103	81.4	270	202	85.8	164	96.9	65.5	49.9	57.7
MAX	188	360	340	267	1450	1200	330	426	367	276	162	358
MIN	30	25	48	44	52	77	45	50	44	27	32	31

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1947 - 1997, BY WATER YEAR (WY)

	MEAN	21.4	38.4	61.7	58.3	89.3	134	112	60.4	37.2	20.9	15.4	21.3
MAX	110	176	179	294	307	301	280	183	221	95.8	65.7	99.5	99.5
(WY)	1982	1986	1968	1952	1976	1982	1960	1983	1968	1969	1975	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	1.86
(WY)	1949	1964	1964	1961	1964	1964	1958	1958	1949	1948	1950	1952	1952

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1947 - 1997

ANNUAL TOTAL	30687		38730										
ANNUAL MEAN	83.8		106										
HIGHEST ANNUAL MEAN										55.7			
LOWEST ANNUAL MEAN										106			1997
HIGHEST DAILY MEAN	964	May 10	1450	Feb 22	2520	Jun 26	1968			15.9			1964
LOWEST DAILY MEAN	25	Nov 24	25	Nov 24	.30	Sep 13	1955						
ANNUAL SEVEN-DAY MINIMUM	30	Aug 27	33	Oct 11	.53	Aug 2	1950						
INSTANTANEOUS PEAK FLOW			1820	Feb 22	3600	Jun 26	1968						
INSTANTANEOUS PEAK STAGE			11.35	Feb 22	13.62	Jun 26	1968						
INSTANTANEOUS LOW FLOW			23	(a)	.20		(b)						
10 PERCENT EXCEEDS	158		198		124								
50 PERCENT EXCEEDS	53		62		18								
90 PERCENT EXCEEDS	33		36		2.7								

(a) Nov. 24, 25.

(b) Sept. 13, 1955, Jan. 23, 1961.

(c) 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	83	98	167	154	106	294	284	81	168	83	66	63
2	81	93	176	155	105	275	250	82	166	90	62	63
3	81	93	169	163	105	259	226	108	170	133	58	71
4	81	93	162	166	113	242	213	134	164	143	66	68
5	79	96	162	173	138	235	221	133	157	132	66	64
6	77	99	159	170	138	225	231	160	153	110	64	62
7	77	145	157	159	134	217	216	161	148	100	61	61
8	76	214	154	147	135	207	201	159	139	89	59	62
9	75	225	149	141	134	200	182	162	129	86	56	68
10	72	200	145	137	134	194	172	161	117	76	53	117
11	68	178	149	126	132	190	169	157	106	71	56	155
12	65	161	159	127	132	187	175	149	101	71	67	156
13	61	149	177	122	129	183	179	143	98	69	85	139
14	63	137	176	118	124	220	177	130	67	64	79	129
15	61	138	166	116	120	254	171	130	72	59	78	125
16	59	137	161	118	117	250	165	132	65	57	84	120
17	59	142	163	115	114	222	163	137	71	55	87	128
18	66	150	164	112	114	212	156	140	69	55	88	137
19	72	152	155	109	128	199	146	203	70	52	79	144
20	65	155	146	108	137	192	133	264	74	47	80	189
21	63	154	138	107	213	188	123	266	85	57	95	200
22	62	157	134	129	286	189	114	228	107	71	96	185
23	78	159	151	150	288	187	106	198	111	61	98	165
24	86	158	204	138	246	181	101	179	109	55	98	162
25	76	159	204	128	208	184	94	177	116	54	93	144
26	70	155	184	123	192	191	89	174	121	83	90	135
27	68	152	171	119	241	185	86	162	115	105	87	125
28	67	150	164	116	293	182	90	150	106	96	83	115
29	71	147	164	110	---	262	89	153	86	78	78	114
30	114	151	162	108	---	315	85	177	77	70	72	107
31	113	---	158	107	---	316	---	178	---	66	67	---
TOTAL	2289	4397	5050	4071	4456	6837	4807	4968	3357	2438	2351	3563
MEAN	73.8	147	163	131	159	221	160	160	112	78.6	75.8	119
MAX	114	225	204	173	293	316	284	266	170	143	98	200
MIN	59	93	134	107	105	181	85	81	65	47	53	61
CFSM	.56	1.11	1.23	.99	1.21	1.67	1.21	1.21	.86	.60	.57	.90
IN.	.65	1.24	1.42	1.15	1.26	1.93	1.35	1.40	.95	.69	.66	1.00

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1948 - 1997, BY WATER YEAR (WY)

	MEAN	80.8	97.4	109	106	113	156	163	117	89.2	67.2	54.5	65.8
MAX	283	179	218	211	226	337	389	340	197	233	142	247	247
(WY)	1982	1993	1951	1993	1951	1976	1950	1956	1996	1968	1968	1975	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	27.2
(WY)	1965	1964	1964	1964	1963	1964	1963	1988	1988	1988	1971	1964	1964

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1948 - 1997

ANNUAL TOTAL	42596					48584							
ANNUAL MEAN	116					133							
HIGHEST ANNUAL MEAN										102			
LOWEST ANNUAL MEAN										157			1974
HIGHEST DAILY MEAN										44.6			1964
LOWEST DAILY MEAN										632			Oct 3 1981
ANNUAL SEVEN-DAY MINIMUM	419				Jun 20	316		Mar 31					Oct 21 1971
INSTANTANEOUS PEAK FLOW	36				Sep 5	47		Jul 20		5.2			Jul 9 1988
INSTANTANEOUS PEAK STAGE	37				Aug 31	55		Jul 15		11			Oct 3 1981
INSTANTANEOUS LOW FLOW						329		Mar 30		(a)648			Jun 28 1968
ANNUAL RUNOFF (CFSM)						6.80		Mar 30		8.26			
ANNUAL RUNOFF (INCHES)						45		(b)					
10 PERCENT EXCEEDS	.88					1.01				.77			
50 PERCENT EXCEEDS	12.00					13.69				10.46			
90 PERCENT EXCEEDS	176					204				185			
	113					132				86			
	54					66				38			

(a) Gage height 7.87 ft.

(b) July 20, 21.

(c) Estimated.

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 good. 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, 16.09 ft, May 21; minimum 12.67 ft, Feb. 4.

GAGE HEIGHT, FEET, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.65	15.53	12.85	12.84	12.69	13.14	15.46	15.59	15.97	15.69	15.61	15.62
2	15.64	15.44	12.87	12.84	12.69	13.14	15.43	15.63	15.96	15.72	15.59	15.63
3	15.63	15.39	12.88	12.85	12.68	13.12	15.40	15.70	15.95	15.84	15.60	15.63
4	15.61	15.33	12.86	12.86	12.70	13.09	15.38	15.75	15.92	15.84	15.61	15.61
5	15.61	15.12	12.85	12.87	12.75	13.07	15.38	15.78	15.89	15.83	15.60	15.60
6	15.61	14.84	12.84	12.88	12.77	13.06	15.35	15.85	15.87	15.81	15.59	15.59
7	15.62	14.81	12.83	12.87	12.78	13.04	15.35	15.86	15.85	15.79	15.58	15.60
8	15.61	14.88	12.82	12.84	12.77	13.03	15.35	15.87	15.84	15.75	15.57	15.59
9	15.62	14.89	12.81	12.82	12.77	13.00	15.32	15.88	15.81	15.74	15.56	15.61
10	15.61	14.87	12.80	12.81	12.77	12.98	15.30	15.89	15.79	15.69	15.56	15.75
11	15.60	14.83	12.81	12.77	12.76	12.96	15.43	15.87	15.77	15.66	15.57	15.81
12	15.59	14.73	12.81	12.76	12.77	12.97	15.53	15.86	15.76	15.64	15.60	15.86
13	15.58	14.52	12.85	12.75	12.76	13.15	15.57	15.84	15.76	15.63	15.66	15.87
14	15.59	14.40	12.87	12.73	12.75	13.36	15.58	15.82	15.72	15.61	15.66	15.85
15	15.57	14.20	12.86	12.72	12.74	13.63	15.58	15.81	15.67	15.60	15.65	15.83
16	15.56	14.12	12.86	12.73	12.73	13.78	15.59	15.81	15.65	15.58	15.67	15.81
17	15.56	14.12	12.87	12.71	12.72	13.87	15.58	15.82	15.65	15.57	15.70	15.83
18	15.59	14.08	12.85	12.71	12.71	14.10	15.56	15.83	15.64	15.57	15.68	15.85
19	15.60	13.93	12.84	12.70	12.73	14.23	15.54	15.99	15.63	15.56	15.67	15.86
20	15.59	13.86	12.81	12.69	12.76	14.41	15.51	16.04	15.64	15.54	15.66	15.00
21	15.59	13.82	12.78	12.69	12.92	14.50	15.49	16.08	15.66	15.56	15.68	15.01
22	15.58	13.75	12.77	12.72	13.05	14.55	15.46	16.07	15.71	15.60	15.69	15.00
23	15.61	13.60	12.79	12.77	13.11	14.58	15.44	16.03	15.73	15.59	15.69	15.97
24	15.63	13.55	12.91	12.79	13.10	14.62	15.42	16.00	15.74	15.58	15.70	15.92
25	15.64	13.49	12.95	12.78	13.06	14.82	15.40	15.99	15.75	15.56	15.71	15.88
26	15.63	13.33	12.95	12.76	13.02	14.95	15.38	15.97	15.76	15.65	15.69	15.86
27	15.61	13.19	12.93	12.75	13.06	15.10	15.37	15.93	15.76	15.70	15.68	15.83
28	15.61	12.99	12.90	12.74	13.11	15.19	15.40	15.89	15.75	15.72	15.68	15.80
29	15.63	12.89	12.88	12.71	---	15.33	15.50	15.90	15.73	15.68	15.66	15.78
30	15.68	12.85	12.86	12.70	---	15.43	15.57	15.93	15.70	15.65	15.64	15.77
31	15.68	---	12.85	12.70	---	15.47	---	15.96	---	15.62	15.64	---
MEAN	15.61	14.24	12.85	12.77	12.83	13.92	15.45	15.88	15.77	15.66	15.64	15.79
MAX	15.68	15.53	12.95	12.88	13.11	15.47	15.59	16.08	15.97	15.84	15.71	16.01
MIN	15.56	12.85	12.77	12.69	12.68	12.96	15.30	15.59	15.63	15.54	15.56	15.59

WTR YR 1997 MEAN 14.71 MAX 16.08 MIN 12.68

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 fair. 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	92	168	180	178	128	280	278	85	209	112	e68	72
2	88	139	188	177	126	280	266	96	204	122	e67	74
3	84	121	189	179	125	273	252	116	206	163	e62	76
4	79	163	184	183	131	259	242	133	201	165	e68	69
5	78	232	181	188	146	252	242	144	189	162	e67	64
6	76	208	179	191	154	247	234	170	183	154	e65	61
7	79	193	176	187	155	238	233	174	177	147	e63	64
8	79	219	175	178	154	232	231	179	171	134	e61	63
9	79	224	173	173	153	224	218	173	161	129	e59	67
10	79	218	167	168	153	223	160	178	154	115	e57	112
11	73	203	171	158	152	221	132	179	141	105	e60	139
12	69	254	171	154	152	160	166	175	142	99	e70	157
13	67	226	182	149	150	138	179	171	145	e95	e88	158
14	68	220	188	143	148	149	185	164	131	e88	e84	151
15	63	212	186	142	144	150	185	161	109	e80	e82	144
16	62	164	184	144	143	198	186	160	101	e72	e85	139
17	61	151	187	137	139	161	185	164	102	e66	e88	145
18	67	211	183	136	136	178	162	99	99	e61	e90	150
19	71	211	180	133	142	137	171	227	96	e57	e85	154
20	68	186	171	128	154	132	163	252	99	e54	e85	206
21	66	175	163	127	204	163	154	267	107	e66	e91	210
22	65	218	157	137	249	182	145	261	120	e80	96	204
23	75	213	164	153	269	191	138	249	127	e70	95	193
24	82	193	200	158	265	124	131	221	130	e63	99	175
25	83	216	214	157	247	119	123	225	131	e60	100	163
26	80	221	214	151	233	133	117	213	136	e95	95	154
27	75	237	207	147	252	143	111	200	136	e110	92	143
28	74	227	195	144	268	170	66	186	133	e100	91	133
29	78	193	189	138	---	222	58	188	125	e85	85	128
30	98	180	186	135	---	268	77	201	115	e75	80	122
31	160	---	182	131	---	286	---	206	---	e70	77	---
TOTAL	2418	5996	5666	4804	4872	6091	5206	5680	4280	3054	2455	3890
MEAN	78.0	200	183	155	174	196	174	183	143	98.5	79.2	130
MAX	160	254	214	191	269	286	278	267	209	165	100	210
MIN	61	121	157	127	125	119	58	85	96	54	57	61

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1948 - 1997, BY WATER YEAR (WY)

	MEAN	96.7	152	135	124	130	166	143	124	103	75.3	64.0	76.4
MAX	262	234	248	236	252	315	357	379	228	219	147	231	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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1948 - 1997

ANNUAL TOTAL	46316	54412	116	
ANNUAL MEAN	127	149	181	1974
HIGHEST ANNUAL MEAN			52.3	1964
LOWEST ANNUAL MEAN			582	Apr 6 1950
HIGHEST DAILY MEAN	419	Jun 21	6.4	May 7 1963
LOWEST DAILY MEAN	38	Apr 20	12	Jul 10 1988
ANNUAL SEVEN-DAY MINIMUM	42	Sep 1	12	Dec 29 1950
INSTANTANEOUS PEAK FLOW		62	Aug 5	Dec 29 1950
INSTANTANEOUS PEAK STAGE		317	Nov 12	May 27 1963
INSTANTANEOUS LOW FLOW		2.75	Nov 12	
10 PERCENT EXCEEDS	207	224	204	
50 PERCENT EXCEEDS	110	151	103	
90 PERCENT EXCEEDS	59	70	44	

(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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	195	225	307	347	e240	582	625	206	394	206	175	173
2	178	257	307	340	e235	622	645	212	406	207	162	162
3	161	237	306	342	e235	630	628	248	411	277	155	154
4	147	204	307	345	242	610	592	300	407	318	167	151
5	137	213	303	361	272	578	563	318	399	329	168	145
6	130	258	297	364	291	544	550	348	384	327	160	139
7	125	326	292	e350	301	507	546	358	364	321	150	133
8	121	366	286	e335	302	476	524	370	344	305	143	129
9	120	375	278	e320	297	446	506	377	323	288	137	132
10	121	380	270	e310	289	424	483	377	301	266	130	192
11	117	377	269	e300	281	413	443	373	276	239	128	274
12	112	365	278	e290	274	407	404	372	253	215	139	318
13	107	351	298	e280	264	392	397	367	272	196	171	337
14	104	354	308	e275	e250	389	394	360	268	180	194	340
15	102	329	315	e270	e240	394	393	359	240	166	202	328
16	101	323	323	e265	e230	395	393	353	211	152	212	310
17	101	294	330	e260	e225	407	391	351	196	142	235	310
18	105	257	330	e255	223	416	388	349	186	137	243	328
19	113	268	318	e250	239	405	383	395	175	130	238	338
20	114	299	e300	e245	262	396	377	457	179	120	230	394
21	111	296	e290	e240	348	386	371	517	191	121	234	434
22	108	279	e280	e255	389	386	362	549	214	140	238	467
23	116	283	e300	e275	426	390	346	550	232	150	238	475
24	130	306	e340	e300	514	393	329	528	247	151	234	458
25	136	310	e360	e295	550	387	314	496	246	145	230	429
26	135	307	e370	e285	530	373	297	464	242	170	227	390
27	131	314	e385	e275	537	369	280	434	235	211	219	354
28	126	318	379	e265	545	368	272	404	229	231	212	323
29	125	325	372	e255	---	391	223	386	223	230	200	302
30	169	313	365	e250	---	440	200	381	215	213	188	281
31	191	---	358	e245	---	547	---	385	---	193	181	---
TOTAL	3989	9109	9821	9044	9031	13863	12619	11944	8263	6476	5940	8700
MEAN	129	304	317	292	323	447	421	385	275	209	192	290
MAX	195	380	385	364	550	630	645	550	411	329	243	475
MIN	101	204	269	240	223	368	200	206	175	120	128	129
CFSM	.42	.99	1.03	.95	1.05	1.45	1.37	1.25	.89	.68	.62	.94
IN.	.48	1.10	1.19	1.09	1.09	1.67	1.52	1.44	1.00	.78	.72	1.05

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1997, BY WATER YEAR (WY)

	MEAN	162	241	231	225	237	350	333	268	206	153	127	135
MAX	490	425	355	499	457	705	626	895	406	534	297	424	
(WY)	1982	1993	1976	1993	1968	1974	1974	1956	1989	1968	1968	1975	
MIN	52.0	100	102	84.5	89.5	122	144	92.3	82.0	41.9	49.6	53.8	
(WY)	1965	1964	1961	1961	1964	1964	1964	1958	1965	1965	1965	1964	

SUMMARY STATISTICS	FOR 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1952 - 1997
ANNUAL TOTAL	87804	108799	
ANNUAL MEAN	240	298	
HIGHEST ANNUAL MEAN			222
LOWEST ANNUAL MEAN			337
HIGHEST DAILY MEAN	634	645	1974
LOWEST DAILY MEAN	85	101	1964
ANNUAL SEVEN-DAY MINIMUM	89	105	1560
INSTANTANEOUS PEAK FLOW		651	27
INSTANTANEOUS PEAK STAGE		6.17	28
INSTANTANEOUS LOW FLOW			1560
ANNUAL RUNOFF (CFSM)	.78	.97	8.46
ANNUAL RUNOFF (INCHES)	10.60	13.14	26
10 PERCENT EXCEEDS	374	441	.72
50 PERCENT EXCEEDS	240	296	9.80
90 PERCENT EXCEEDS	110	139	392
			194
			85

(a) Oct. 16, 17.

(b) Gage height 8.35 ft.

(c) July 15, 16, 1988.

(e) 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	57	92	96	73	486	303	75	107	48	31	36
2	33	49	111	98	72	401	242	74	127	42	30	34
3	31	45	89	119	e125	303	195	124	168	39	30	33
4	28	43	79	121	e210	243	171	172	139	38	30	31
5	28	41	75	150	e190	209	179	137	108	36	29	30
6	27	41	73	137	160	191	233	158	90	35	27	29
7	27	79	73	106	131	167	201	136	78	36	26	29
8	27	213	74	e90	112	163	165	136	69	35	26	28
9	30	160	71	e76	95	153	141	149	61	49	25	29
10	32	119	68	e71	88	161	127	128	56	42	24	47
11	30	91	70	e68	80	160	120	110	52	36	27	50
12	30	76	93	e66	e74	146	122	123	52	33	35	42
13	29	66	133	e64	e70	134	131	118	55	31	44	38
14	29	58	121	e62	e66	324	126	104	69	30	37	36
15	28	51	102	e61	e62	467	116	118	57	29	35	35
16	29	51	97	e60	e58	302	109	114	57	28	38	33
17	29	52	96	e59	e59	243	106	110	71	29	54	56
18	35	62	90	e58	e63	226	102	101	62	31	49	81
19	40	59	e82	e58	125	193	96	154	56	28	42	63
20	35	53	e75	e57	146	170	91	156	55	26	40	102
21	33	50	e66	e58	609	159	86	125	69	49	52	89
22	32	49	59	103	805	151	84	104	88	94	48	70
23	42	48	68	193	652	140	83	91	72	74	43	61
24	48	48	239	e150	419	130	81	84	61	62	42	55
25	41	50	e190	e100	273	141	79	106	54	47	53	50
26	38	49	e135	e90	218	162	75	130	50	49	47	47
27	36	46	106	e85	539	149	72	105	45	44	41	44
28	35	46	97	e80	663	138	79	86	41	39	37	42
29	35	45	110	e77	---	278	79	93	39	36	35	46
30	83	53	112	e75	---	434	74	131	45	33	34	44
31	74	---	104	74	---	374	---	115	---	31	36	---
TOTAL	1111	1950	3050	2762	6237	7098	3868	3667	2153	1259	1147	1410
MEAN	35.8	65.0	98.4	89.1	223	229	129	118	71.8	40.6	37.0	47.0
MAX	83	213	239	193	805	486	303	172	168	94	54	102
MIN	27	41	59	57	58	130	72	74	39	26	24	28
CFSM	.28	.51	.77	.70	1.74	1.79	1.01	.92	.56	.32	.29	.37
IN.	.32	.57	.89	.80	1.81	2.06	1.12	1.07	.63	.37	.33	.41

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 1997, BY WATER YEAR (WY)

	MEAN	41.2	60.8	83.4	74.1	102	182	157	100	65.8	40.8	35.2	34.5
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1952 - 1997

ANNUAL TOTAL	30676	35712	80.9
ANNUAL MEAN	83.8	97.8	1974
HIGHEST ANNUAL MEAN			142
LOWEST ANNUAL MEAN			29.9
HIGHEST DAILY MEAN	462	805	1380
LOWEST DAILY MEAN	21	24	9.5
ANNUAL SEVEN-DAY MINIMUM	22	26	9.9
INSTANTANEOUS PEAK FLOW		818	1500
INSTANTANEOUS PEAK STAGE		10.85	12.95
INSTANTANEOUS LOW FLOW		24	7.3
ANNUAL RUNOFF (CFSM)	.65	.76	.63
ANNUAL RUNOFF (INCHES)	8.92	10.38	8.59
10 PERCENT EXCEEDS	160	171	173
50 PERCENT EXCEEDS	66	71	47
90 PERCENT EXCEEDS	26	31	19

(a) Aug. 9, 10, 11.

(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 19⁵². 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	273	377	579	715	520	1840	1430	520	780	384	280	261
2	282	380	598	697	522	1760	1390	507	877	391	268	284
3	278	429	573	704	528	1650	1340	530	955	519	298	266
4	298	440	552	723	588	1530	1350	659	882	388	309	261
5	286	467	550	773	682	1450	1400	768	780	396	285	256
6	285	482	544	786	694	1380	1440	745	738	425	270	242
7	229	688	540	741	653	1290	1330	715	709	448	210	235
8	205	775	536	668	631	1220	1190	724	681	481	206	233
9	236	786	523	666	610	1160	1200	812	605	461	198	259
10	230	843	509	644	605	1110	959	833	480	432	198	393
11	228	790	520	612	583	1070	769	843	517	403	246	330
12	221	735	557	591	570	1020	939	798	496	313	252	336
13	221	688	604	544	519	967	985	782	475	300	298	366
14	222	644	612	530	553	1310	961	795	438	290	284	405
15	222	618	594	514	525	1470	919	796	420	264	353	505
16	202	596	591	e510	509	1300	899	782	469	229	361	477
17	209	588	616	e500	481	1160	768	751	510	225	618	542
18	239	578	603	e500	508	1110	793	764	459	169	500	559
19	239	557	547	e495	541	1070	745	998	358	176	462	562
20	233	547	519	e490	710	1020	602	1070	369	160	457	845
21	256	563	516	485	1300	982	580	1090	471	277	467	674
22	251	513	501	554	1720	940	651	1060	490	379	442	652
23	317	493	558	627	1730	905	729	1050	514	325	415	815
24	291	488	782	616	1480	869	704	1080	487	292	412	621
25	283	467	842	612	1320	881	635	1110	437	257	303	624
26	280	474	765	587	1280	905	586	1000	379	480	314	613
27	280	469	745	574	1750	874	508	950	380	331	314	597
28	271	478	737	e560	2000	857	485	759	376	335	307	586
29	308	479	756	e550	---	1200	492	934	406	319	368	471
30	393	510	755	e540	---	1490	513	948	377	302	460	464
31	387	---	947	528	---	1490	---	848	---	289	163	---
TOTAL	8155	16942	19171	18636	24112	37280	27292	26021	16315	10440	10318	13734
MEAN	263	565	618	601	861	1203	910	839	544	337	333	458
MAX	393	843	947	786	2000	1840	1440	1110	955	519	618	845
MIN	202	377	501	485	481	857	485	507	358	160	163	233

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1915 - 1997, BY WATER YEAR (WY)

	MEAN	268	386	425	449	543	865	866	606	403	243	183	216
MAX	904	1018	1080	1257	1431	2310	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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1915 - 1997
ANNUAL TOTAL	180425	228416	
ANNUAL MEAN	493	626	(a)454
HIGHEST ANNUAL MEAN			824
LOWEST ANNUAL MEAN			171
HIGHEST DAILY MEAN	1430	2000	5840
LOWEST DAILY MEAN	89	160	(b)4.0
ANNUAL SEVEN-DAY MINIMUM	99	214	13
INSTANTANEOUS PEAK FLOW		2640	17.50
INSTANTANEOUS PEAK STAGE		15.36	17.50
10 PERCENT EXCEEDS	916	1100	930
50 PERCENT EXCEEDS	490	544	331
90 PERCENT EXCEEDS	163	263	120

(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 September 1997 (discontinued). Seasonal records only, April to September.

GAGE.--Water-stage recorder. Elevation of gage is 670 ft above sea level, from topographic map.

REMARKS.--Records fair. 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	19	9.7	17	9.2	11	8.0
2	---	---	---	---	---	---	16	8.8	21	5.5	11	8.7
3	---	---	---	---	---	---	13	37	24	11	15	8.5
4	---	---	---	---	---	---	21	15	17	11	20	6.6
5	---	---	---	---	---	---	34	21	15	8.9	15	5.3
6	---	---	---	---	---	---	21	21	14	8.1	12	9.8
7	---	---	---	---	---	---	17	16	12	6.6	10	7.3
8	---	---	---	---	---	---	15	20	11	6.7	11	8.2
9	---	---	---	---	---	---	14	15	12	14	12	8.8
10	---	---	---	---	---	---	14	13	11	9.6	8.5	24
11	---	---	---	---	---	---	15	13	10	11	11	15
12	---	---	---	---	---	---	14	16	10	9.6	21	11
13	---	---	---	---	---	---	13	12	12	9.3	12	10
14	---	---	---	---	---	---	13	12	12	11	11	9.4
15	---	---	---	---	---	---	12	13	12	11	13	8.5
16	---	---	---	---	---	---	13	13	21	9.0	22	8.9
17	---	---	---	---	---	---	12	13	16	13	28	9.2
18	---	---	---	---	---	---	11	14	11	23	15	7.8
19	---	---	---	---	---	---	12	36	12	13	13	13
20	---	---	---	---	---	---	11	13	15	12	12	17
21	---	---	---	---	---	---	10	11	46	26	13	12
22	---	---	---	---	---	---	11	10	55	14	12	11
23	---	---	---	---	---	---	10	10	29	11	9.8	8.7
24	---	---	---	---	---	---	10	9.6	16	9.8	8.5	8.7
25	---	---	---	---	---	---	9.9	21	14	8.7	8.5	9.4
26	---	---	---	---	---	---	9.5	15	15	88	8.3	8.8
27	---	---	---	---	---	---	9.3	26	12	26	10	8.5
28	---	---	---	---	---	---	10	35	11	39	9.0	8.3
29	---	---	---	---	---	---	9.4	46	9.6	24	8.6	8.7
30	---	---	---	---	---	---	9.6	39	9.9	16	7.9	8.5
31	---	---	---	---	---	---	---	19	---	9.4	10	---
TOTAL	---	---	---	---	---	---	408.7	573.1	502.5	484.4	389.1	297.6
MEAN	---	---	---	---	---	---	13.6	18.5	16.8	15.6	12.6	9.92
MAX	---	---	---	---	---	---	34	46	55	88	28	24
MIN	---	---	---	---	---	---	9.3	8.8	9.6	5.5	7.9	5.3

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1986 - 1997, BY WATER YEAR (WY)

MEAN	---	---	---	---	---	---	35.1	31.3	31.6	27.0	28.3	27.0
MAX	---	---	---	---	---	---	49.3	39.8	46.7	33.1	39.0	43.1
(WY)	---	---	---	---	---	---	1993	1990	1995	1992	1990	1990
MIN	---	---	---	---	---	---	13.6	15.8	13.6	10.4	9.60	9.92
(WY)	---	---	---	---	---	---	1997	1996	1996	1996	1996	1997

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. Gage-height telemeter at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47	83	105	115	e98	375	256	111	121	85	23	45
2	42	70	120	117	e98	364	233	104	133	70	23	43
3	38	66	107	126	e105	338	215	127	171	64	23	41
4	34	58	100	128	115	319	208	171	190	59	23	38
5	34	55	95	147	145	306	216	159	184	53	23	36
6	30	54	96	145	139	298	242	162	169	47	22	34
7	29	86	97	125	126	281	250	150	155	45	21	34
8	29	173	96	103	118	270	221	148	144	45	20	33
9	31	162	92	e115	e110	259	199	157	136	57	20	35
10	36	140	89	e105	e105	259	182	150	126	53	21	51
11	36	126	93	e100	e98	260	173	139	119	46	21	60
12	37	112	107	e97	e95	237	169	151	115	42	26	53
13	34	101	121	e94	e93	220	177	147	111	37	28	48
14	33	94	118	e90	e90	290	176	140	102	37	27	44
15	31	85	111	e86	e87	350	169	145	94	37	27	42
16	31	81	111	e84	e85	324	164	141	94	36	40	41
17	31	82	113	e82	e86	309	158	134	102	34	64	e90
18	40	89	114	e81	e90	292	152	128	97	33	68	e98
19	54	84	95	e80	e80	124	146	144	91	32	62	e90
20	50	78	e100	e80	138	259	138	145	89	29	57	e140
21	45	72	e95	e100	340	247	130	135	126	32	64	e170
22	43	69	e85	129	407	240	128	124	163	37	60	e110
23	53	68	96	171	361	232	124	114	152	38	55	e90
24	70	69	170	153	323	223	121	108	136	36	59	84
25	64	72	162	e135	305	225	118	121	127	33	67	78
26	58	74	e130	e125	280	238	114	131	112	32	63	70
27	52	e70	e125	e120	372	232	110	123	98	32	58	63
28	51	69	121	e115	396	217	110	112	90	29	53	60
29	51	e67	126	e105	---	256	110	115	78	28	49	64
30	94	75	125	e100	---	297	96	127	76	25	46	61
31	100	---	120	e99	---	281	---	122	---	24	46	---
TOTAL	1408	2584	3435	3452	4929	8570	5005	4185	3701	1287	1259	1846
MEAN	45.4	86.1	111	111	176	276	167	135	123	41.5	40.6	8.5
MAX	100	173	170	171	407	375	256	171	190	85	68	140
MIN	29	54	85	80	85	217	96	104	76	24	20	33
CFSM	34	65	84	84	1.33	2.09	1.26	1.02	.93	.31	.31	.47
IN.	.40	.73	.97	.97	1.39	2.42	1.41	1.18	1.04	.36	.35	.52

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1970 - 1997, BY WATER YEAR (WY)

	MEAN	65.7	95.2	111	111	123	202	189	122	92.0	54.4	48.3	55.8
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	1971	
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 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1970 - 1977

ANNUAL TOTAL	34252		41661									
ANNUAL MEAN	93.6		114									
HIGHEST ANNUAL MEAN												
LOWEST ANNUAL MEAN												
HIGHEST DAILY MEAN	279	Jun 19	407	Feb 22								
LOWEST DAILY MEAN	14	Sep 6	20	Aug 8								
ANNUAL SEVEN-DAY MINIMUM	15	Sep 1	21	Aug 5								
INSTANTANEOUS PEAK FLOW			415	(a)								
INSTANTANEOUS PEAK STAGE			5.64	(a)								
INSTANTANEOUS LOW FLOW			18	(b)								
ANNUAL RUNOFF (CFSM)	.71		.86									
ANNUAL RUNOFF (INCHES)	9.65		11.74									
10 PERCENT EXCEEDS	173		235									
50 PERCENT EXCEEDS	89		98									
90 PERCENT EXCEEDS	24		34									

(a) Feb. 22, 27.

(b) Aug. 10, 11.

(c) Estimated.

STREAMS TRIBUTARY TO LAKE ERIE

04175600 RIVER RAISIN NEAR MANCHESTER, MI--Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1970-71, 1996 to current year.

REMARKS.--Samples were collected at or near bridge at Sharon Valley Road.

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

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)	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)
OCT										
30...	1242	99	519	8.2	9.0	9.6	87	>240	>160	65
NOV										
25...	1125	72	521	8.3	1.0	18.2	131	29	K23	61
DEC										
17...	1315	114	418	8.0	1.0	13.3	98	23	K9	57
JAN										
24...	1150	153	534	8.1	0.0	15.2	108	17	220	63
FEB										
19...	1135	124	492	8.2	2.0	12.8	96	K21	16	59
MAR										
26...	1210	242	476	8.3	3.5	13.4	104	K11	15	60
APR										
07...	1310	259	480	8.2	8.0	10.1	88	60	K140	61
21...	1315	129	470	8.4	11.0	10.4	98	K16	K28	61
MAY										
07...	1225	150	507	8.2	10.5	11.4	104	21	K7	65
20...	1210	144	462	8.3	12.5	9.8	95	--	--	57
JUN										
17...	1140	102	482	8.1	19.0	6.7	75	K62	120	64
24...	1140	135	462	8.1	24.0	5.9	72	120	83	58
JUL										
08...	1200	43	489	8.2	--	6.9	--	77	100	60
29...	1140	28	520	8.2	23.0	6.8	81	66	68	61
AUG										
05...	1030	23	520	8.1	20.0	7.2	82	73	67	64
19...	1100	62	498	8.0	19.0	7.2	80	86	--	58
SEP										
18...	1040	87	501	8.0	16.5	7.5	79	--	300	70
DATE		MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	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)	SOLIDS, RESIDUE AT 180 DEG C DIS- SOLVED (MG/L) (70300)
OCT										
30...	19	2.0	254	208	31	23	0.20	7.3	302	
NOV										
25...	19	1.8	232	190	34	24	0.20	6.1	300	
DEC										
17...	18	1.7	210	172	33	21	0.20	6.1	285	
JAN										
24...	18	1.7	242	198	32	23	0.17	7.6	305	
FEB										
19...	18	1.5	227	186	30	20	0.20	6.7	291	
MAR										
26...	17	1.5	217	178	28	20	0.20	4.6	276	
APR										
07...	17	1.8	220	180	27	21	0.18	4.1	278	
21...	18	1.5	220	180	29	22	0.21	3.4	288	
MAY										
07...	17	1.4	229	188	26	20	0.16	3.9	287	
20...	18	1.2	220	180	25	20	0.18	2.5	284	
JUN										
17...	18	1.4	251	206	23	21	0.17	3.8	287	
24...	17	1.6	234	192	19	19	0.22	6.0	286	
JUL										
08...	19	1.4	239	196	24	22	0.16	7.1	303	
29...	20	1.5	--	--	23	22	0.21	11	307	
AUG										
05...	21	1.5	--	--	25	21	0.20	11	313	
19...	21	1.6	244	200	26	26	0.19	11	303	
SEP										
18...	19	2.0	247	203	25	25	0.18	9.3	300	

STREAMS TRIBUTARY TO LAKE ERIE

04175600 RIVER RAISIN NEAR MANCHESTER, MI--Continued

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

DATE	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N) (00613)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N) (00625)	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)	IRON, DIS- SOLVED (UG/L AS FE) (01046)	MANGA- NESE, DIS- SOLVED (UG/L AS MN) (01056)
OCT 30...	0.020	0.370	0.070	0.50	0.30	0.030	<0.010	<0.010	52	38
NOV 25...	<0.010	0.460	0.040	0.40	0.40	<0.010	<0.010	<0.010	50	18
DEC 17...	0.020	0.570	0.040	0.40	0.40	0.010	<0.010	<0.010	36	14
JAN 24...	0.010	0.600	0.070	0.60	0.50	0.020	<0.010	<0.010	32	26
FEB 19...	0.040	0.600	0.030	0.40	0.30	<0.010	<0.010	<0.010	33	24
MAR 26...	<0.010	0.400	0.040	0.40	0.30	<0.010	<0.010	<0.010	32	18
APR 07...	0.010	0.290	0.040	0.60	0.40	0.020	<0.010	<0.010	43	32
21...	<0.010	0.402	0.016	0.53	0.38	0.022	<0.010	<0.010	72	40
MAY 07...	<0.010	0.284	<0.015	0.50	0.40	0.013	<0.010	<0.010	68	37
20...	<0.010	0.182	<0.015	0.52	0.26	<0.010	<0.010	<0.010	72	34
JUN 17...	<0.010	0.204	0.044	0.53	0.51	<0.010	<0.010	<0.010	59	29
24...	0.022	0.300	0.064	0.67	0.48	0.012	<0.010	0.016	47	22
JUL 08...	0.017	0.401	0.048	0.52	0.58	<0.010	0.016	<0.010	68	27
29...	0.016	0.477	0.039	0.51	0.42	<0.010	<0.010	<0.010	58	37
AUG 05...	0.022	0.618	0.057	0.40	0.48	0.014	<0.010	0.013	49	36
19...	0.011	0.282	0.030	0.46	0.41	<0.010	<0.010	<0.010	35	27
SEP 18...	<0.010	0.237	0.019	0.56	0.42	0.032	<0.010	<0.010	29	36
DATE	CARBON, ORGANIC DIS- SOLVED (MG/L AS C) (00681)	CARBON, ORGANIC SUS- PENDED TOTAL (MG/L AS C) (00689)	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)	BEN- FLUR- ALIN WAT FLD 0.7 U GF, REC (UG/L) (82673)	BUTYL- ATE, WATER, DISS, REC (UG/L) (04028)	
OCT 30...	5.3	0.70	<0.002	<0.002	0.015	E0.009	<0.001	<0.002	<0.002	
NOV 25...	5.4	0.50	<0.002	<0.002	0.018	E0.003	<0.001	<0.002	<0.002	
DEC 17...	5.6	0.50	<0.002	<0.002	0.022	E0.012	<0.001	<0.002	<0.002	
JAN 24...	5.0	0.40	<0.002	<0.002	0.028	E0.016	<0.001	<0.002	<0.002	
FEB 19...	4.8	0.40	<0.002	<0.002	0.023	E0.007	<0.001	<0.002	<0.002	
MAR 26...	5.4	0.20	<0.002	<0.002	0.022	E0.011	<0.001	<0.002	<0.002	
APR 07...	5.8	0.90	--	--	--	--	--	--	--	
21...	5.8	0.90	<0.002	<0.002	0.015	E0.004	<0.001	<0.002	<0.002	
MAY 07...	6.6	0.70	--	--	--	--	--	--	--	
20...	5.5	0.30	0.045	0.017	0.076	E0.007	<0.001	<0.002	<0.002	
JUN 17...	6.8	0.60	0.011	0.009	0.067	E0.004	<0.001	<0.002	<0.002	
24...	8.0	0.70	0.028	0.011	0.200	E0.045	<0.001	<0.002	<0.002	
JUL 08...	5.8	0.70	<0.002	<0.002	0.051	E0.016	<0.001	<0.002	<0.002	
29...	4.8	0.30	<0.002	<0.002	0.026	E0.012	<0.001	<0.002	<0.002	
AUG 05...	4.8	<0.20	<0.002	<0.002	0.021	E0.004	<0.001	<0.002	<0.002	
19...	5.2	0.80	<0.002	<0.002	0.015	E0.003	<0.001	<0.002	<0.002	
SEP 18...	6.2	0.90	<0.002	<0.002	0.015	E0.002	<0.001	<0.002	<0.002	

STREAMS TRIBUTARY TO LAKE ERIE

04175600 RIVER RAISIN NEAR MANCHESTER, MI--Continued

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

DATE	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)	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)
OCT										
30...	<0.003	<0.003	<0.004	<0.004	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
NOV										
25...	<0.003	<0.003	<0.004	0.005	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
DEC										
17...	<0.003	<0.003	<0.004	0.008	<0.002	<0.006	0.004	<0.001	<0.003	<0.017
JAN										
24...	<0.003	<0.003	<0.004	0.009	<0.002	<0.006	0.005	<0.001	<0.003	<0.017
FEB										
19...	<0.003	<0.003	<0.004	0.008	<0.002	E0.002	<0.002	<0.001	<0.003	<0.017
MAR										
26...	<0.003	<0.003	<0.004	0.008	--	<0.006	<0.002	<0.001	<0.003	<0.017
APR										
21...	<0.003	<0.003	<0.004	0.007	E0.001	<0.006	<0.002	<0.001	<0.003	<0.017
MAY										
20...	<0.003	<0.003	<0.004	0.014	<0.002	<0.006	0.009	<0.001	<0.003	<0.017
JUN										
17...	<0.003	<0.003	<0.004	0.014	<0.002	<0.006	E0.003	<0.001	<0.003	<0.017
24...	<0.003	<0.003	<0.004	0.152	<0.002	<0.006	0.006	<0.001	<0.003	<0.017
JUL										
08...	<0.003	<0.003	<0.004	0.021	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
29...	<0.003	<0.003	<0.004	0.011	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
AUG										
05...	<0.003	<0.003	<0.004	<0.004	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
19...	<0.003	<0.003	<0.004	0.007	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
SEP										
18...	<0.003	<0.003	<0.004	<0.004	<0.002	<0.006	<0.002	<0.001	<0.003	<0.017
DATE	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)	METO- LACHLOR WATER DISSOLV (UG/L) (39415)	METRI- BUZIN SENCOR WATER DISSOLV (UG/L) (82630)
OCT										
30...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.012	<0.004
NOV										
25...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.005	0.023
DEC										
17...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.006	0.012
JAN										
24...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.007	<0.004
FEB										
19...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.006	<0.004
MAR										
26...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.005	<0.004
APR										
21...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.005	<0.004
MAY										
20...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.030	<0.004
JUN										
17...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.020	<0.004
24...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.038	<0.004
JUL										
08...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.017	<0.004
29...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	<0.015	<0.004
AUG										
05...	<0.002	<0.004	<0.003	E0.003	<0.002	<0.004	<0.002	<0.005	0.015	<0.004
19...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	0.017	<0.004
SEP										
18...	<0.002	<0.004	<0.003	<0.003	<0.002	<0.004	<0.002	<0.005	<0.010	<0.004

STREAMS TRIBUTARY TO LAKE ERIE

04175600 RIVER RAISIN NEAR MANCHESTER, MI--Continued

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

DATE	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)	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)
OCT 30...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	E0.017	<0.003
NOV 25...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	E0.010	<0.003
DEC 17...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	E0.008	<0.003
JAN 24...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	E0.005	<0.003
FEB 19...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	<0.018	<0.003
MAR 26...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	E0.006	<0.003
APR 21...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	<0.018	<0.003
MAY 20...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	<0.018	<0.003
JUN 17...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	<0.018	<0.003
JUN 24...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	E0.008	<0.003
JUL 08...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	<0.018	<0.003
JUL 29...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	E0.005	<0.003
AUG 05...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	<0.018	<0.003
AUG 19...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	<0.018	<0.003
SEP 18...	<0.004	<0.003	<0.004	<0.006	<0.004	<0.004	<0.005	<0.002	<0.018	<0.003

DATE	PROP- CHLOR, WATER, DISS, REC (UG/L) (04024)	PRO- PANIL WATER FLTRD 0.7 U GF REC (UG/L) (82679)	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)
OCT 30...	<0.007	<0.004	<0.013	0.023	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
NOV 25...	<0.007	<0.004	<0.013	0.025	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
DEC 17...	<0.007	<0.004	<0.013	0.033	E0.002	<0.007	<0.013	<0.002	<0.001	<0.002
JAN 24...	<0.007	<0.004	<0.013	0.039	E0.004	<0.007	<0.013	<0.002	<0.001	<0.002
FEB 19...	<0.007	<0.004	<0.013	0.033	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
MAR 26...	<0.007	<0.004	<0.013	0.036	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
APR 21...	<0.007	<0.004	<0.013	0.026	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
MAY 20...	<0.007	<0.004	<0.013	0.028	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUN 17...	<0.007	<0.004	<0.013	0.042	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUN 24...	<0.007	<0.004	<0.013	0.076	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUL 08...	<0.007	<0.004	<0.013	1.63	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
JUL 29...	<0.007	<0.004	<0.013	0.226	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
AUG 05...	<0.007	<0.004	<0.013	0.173	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
AUG 19...	<0.007	<0.004	<0.013	0.267	<0.010	<0.007	<0.013	<0.002	<0.001	<0.002
SEP 18...	<0.007	<0.004	<0.013	0.064	<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-recrd 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.

REVISED 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	176	260	322	496	e390	2570	737	279	436	238	48	e145
2	152	245	487	466	371	2160	639	275	678	221	53	e140
3	138	221	508	485	349	1920	592	388	1710	213	54	e130
4	123	202	405	491	436	1570	551	470	1760	177	127	122
5	187	195	355	596	895	1250	564	487	1360	183	66	114
6	123	187	335	757	1180	1120	681	498	931	172	57	107
7	105	271	319	638	986	995	758	478	706	166	53	99
8	155	513	306	404	662	889	664	459	564	136	49	95
9	121	591	299	e375	500	828	584	447	460	149	44	101
10	180	541	290	e350	e400	844	529	443	412	149	44	181
11	117	451	313	e330	e350	871	487	417	375	150	90	168
12	122	379	486	e320	e320	801	475	403	340	140	119	173
13	122	334	773	e340	e300	728	476	390	282	130	91	168
14	121	301	790	e360	e295	1220	466	387	286	121	78	156
15	117	273	602	e345	e285	2380	443	385	270	117	77	147
16	114	255	481	e330	e275	e2500	419	365	280	98	211	138
17	115	242	452	e310	e265	e1950	407	355	309	90	531	196
18	131	239	434	e295	301	1190	404	327	300	87	355	198
19	140	238	392	e280	435	995	386	360	282	82	246	208
20	145	236	e370	e270	626	864	368	364	262	76	236	576
21	158	226	e350	e310	1390	767	348	359	440	115	216	580
22	156	186	e330	427	2960	691	325	333	855	131	202	476
23	184	177	370	e800	3510	641	328	305	979	106	191	372
24	199	199	960	e950	2500	600	322	283	726	109	201	308
25	190	206	1560	e940	1800	583	314	293	506	104	215	273
26	194	214	e1750	e750	1340	582	302	301	433	95	214	246
27	185	209	e1100	e600	1830	573	292	315	367	86	203	224
28	174	205	704	e500	2730	559	293	301	316	82	e185	209
29	172	203	595	e470	---	573	289	355	278	76	e170	211
30	278	229	580	e440	---	664	285	445	255	70	e160	195
31	223	---	551	e410	---	779	---	465	---	61	e150	---
TOTAL	4817	8228	17569	14835	27681	34657	13728	11732	17158	3930	4736	6456
MEAN	155	274	567	479	989	1118	458	378	572	127	153	215
MAX	278	591	1750	950	3510	2570	758	498	1760	238	531	580
MIN	105	177	290	270	265	559	285	275	255	61	44	95
CFSM	.34	.59	1.22	1.03	2.14	2.41	.99	.82	1.24	.27	.33	.46
IN.	.39	.66	1.41	1.19	2.22	2.78	1.10	.94	1.38	.32	.38	.52

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1954 - 1997, BY WATER YEAR (WY)

	MEAN	181	282	365	382	475	722	619	380	285	177	135	136
MAX	576	941	871	1271	1176	1517	1115	939	1025	609	520	420	420
(WY)	1991	1993	1988	1993	1976	1986	1978	1956	1989	1968	1995	1992	1992
MIN	52.1	57.9	66.6	65.6	74.1	179	239	144	69.7	46.1	47.5	46.0	46.0
(WY)	1964	1965	1964	1963	1964	1964	1963	1964	1988	1988	1963	1955	1955

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1954 - 1997

ANNUAL TOTAL	142854	165527	
ANNUAL MEAN	390	453	344
HIGHEST ANNUAL MEAN			605
LOWEST ANNUAL MEAN			99.8
HIGHEST DAILY MEAN	2500	3510	5350
LOWEST DAILY MEAN	52	44	25
ANNUAL SEVEN-DAY MINIMUM	54	58	27
INSTANTANEOUS PEAK FLOW		3690	6660
INSTANTANEOUS PEAK STAGE		12.91	15.77
INSTANTANEOUS LOW FLOW			18
ANNUAL RUNOFF (CFSM)	.84	.98	.74
ANNUAL RUNOFF (INCHES)	11.48	13.30	10.10
10 PERCENT EXCEEDS	830	878	730
50 PERCENT EXCEEDS	272	320	220
90 PERCENT EXCEEDS	84	116	77

(a) Aug. 9, 10.
(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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	219	253	334	1070	632	5270	1430	476	1880	664	126	214
2	215	270	520	982	609	5750	1320	470	2820	597	117	209
3	193	261	618	1050	577	4980	1190	764	5150	499	107	195
4	177	266	711	1000	624	4040	1070	1680	4960	418	103	186
5	159	249	648	1310	1380	3210	1020	1810	4800	367	117	180
6	153	229	540	1340	1850	2680	1270	1900	3970	319	151	171
7	156	245	474	1320	e1950	2180	1240	1650	3040	303	145	161
8	167	370	449	1170	e1950	1830	1240	1390	2200	285	120	157
9	145	540	429	850	e1750	1620	1160	1230	1480	277	107	159
10	137	710	409	e580	e1400	1570	1020	1090	1060	259	101	187
11	166	715	405	e440	e1000	1530	892	968	848	242	102	202
12	171	627	464	e470	e850	1460	832	890	744	232	110	232
13	168	519	742	e510	e750	1350	806	820	668	226	124	240
14	139	429	1070	e550	e650	3430	793	767	587	219	174	228
15	139	372	1200	e520	e550	5560	767	727	516	210	174	224
16	139	338	1110	e480	e520	5190	730	693	504	194	181	214
17	136	312	941	e460	e500	5640	686	661	523	187	242	215
18	138	290	938	e440	e480	4820	656	637	546	173	586	220
19	130	276	763	e430	e800	3650	631	649	546	161	794	265
20	130	267	e580	e430	e1150	2760	601	660	512	148	584	409
21	139	263	e540	e460	3750	2170	571	706	505	150	417	879
22	148	259	512	e550	5300	1750	554	717	928	159	351	1360
23	165	250	601	e950	5720	1450	526	679	1490	175	302	1400
24	195	226	1530	e1000	5470	1230	520	630	1630	204	284	1010
25	203	216	1820	e1400	5120	1120	509	609	1570	194	274	634
26	212	234	e1900	e1600	4160	1090	488	607	1250	209	292	465
27	218	234	e2000	e1400	4890	1060	471	690	981	192	329	386
28	208	233	2050	e1050	5210	1020	482	743	950	185	312	337
29	213	e230	1740	e900	---	1080	477	784	790	156	276	299
30	231	242	1320	e750	---	1320	477	1600	669	150	250	278
31	229	---	1140	e660	---	1370	---	1750	---	137	231	---
TOTAL	5338	9925	28498	26122	59592	83180	24429	29447	48117	7891	7583	11316
MEAN	172	331	919	843	2128	2683	814	950	1604	255	245	377
MAX	231	715	2050	1600	5720	5750	1430	1900	5150	664	794	1400
MIN	130	216	334	430	480	1020	471	470	504	137	101	157
CFSM	.17	.32	.88	.81	2.04	2.58	.78	.91	1.54	.24	.23	.36
IN.	.19	.35	1.02	.93	2.13	2.97	.87	1.05	1.72	.28	.27	.40

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1937 - 1997, BY WATER YEAR (WY)

	MEAN	298	498	741	805	1076	1690	1465	925	635	352	225	244
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 1996 CALENDAR YEAR	FOR 1997 WATER YEAR	WATER YEARS 1937 - 1997
ANNUAL TOTAL	268229	341438	
ANNUAL MEAN	733	935	744
HIGHEST ANNUAL MEAN			1374
LOWEST ANNUAL MEAN			178
HIGHEST DAILY MEAN	5220	Jun 21	14600
LOWEST DAILY MEAN	71	Sep 5	9.0
ANNUAL SEVEN-DAY MINIMUM	76	Aug 31	18
INSTANTANEOUS PEAK FLOW			6030
INSTANTANEOUS PEAK STAGE			7.83
INSTANTANEOUS LOW FLOW			95
ANNUAL RUNOFF (CFSM)	.70	.90	(a)15300
ANNUAL RUNOFF (INCHES)	9.58	12.19	(b)11.16
10 PERCENT EXCEEDS	1790	1890	(c)2.0
50 PERCENT EXCEEDS	407	550	.71
90 PERCENT EXCEEDS	111	161	9.71

(a) Gage height 10.4 ft.

(b) Backwater from ice.

(c) Approximately, site then in use.

(d) Sept. 4, 1938, Sept. 19, 20, 1941.

(e) Estimated.

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 fair 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 1996 TO SEPTEMBER 1997
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.45	2.5	12	38	e18	262	50	19	300	159	1.6	3.8
2	.24	1.9	11	40	e18	214	43	17	1520	72	1.6	3.5
3	.14	1.5	8.7	45	e25	135	40	157	2330	41	1.4	3.1
4	.07	1.3	7.3	40	e100	102	37	323	864	27	1.8	2.6
5	.04	1.8	6.6	145	e300	86	56	140	422	21	1.7	2.3
6	.03	4.7	6.7	86	e150	123	104	160	246	16	1.1	2.2
7	.02	9.6	7.1	e35	e70	94	64	102	163	14	.80	1.8
8	.02	24	7.3	e24	e45	82	44	85	114	13	.68	1.7
9	.03	16	6.7	e17	e27	72	35	88	86	11	.61	1.9
10	.09	11	6.0	e13	e22	89	31	67	69	9.4	.55	6.5
11	.29	6.9	7.2	e11	e18	74	29	51	57	9.1	.87	8.0
12	.42	4.8	18	e10	e15	56	36	48	50	8.0	2.4	6.4
13	.39	3.7	32	e9.6	e13	49	55	39	46	6.3	3.4	5.0
14	.34	3.0	26	e9.2	e12	840	49	34	38	5.8	3.1	4.2
15	.33	2.6	19	e8.8	e11	633	40	36	31	5.4	3.1	3.7
16	.45	2.8	17	e8.6	e10	242	36	35	31	4.6	1.7	3.3
17	.45	3.1	57	e8.4	e10	180	34	32	55	4.0	.66	4.5
18	.59	3.1	88	e8.3	e22	150	30	28	48	4.0	44	7.9
19	.92	2.9	e33	e8.2	e80	109	27	37	39	3.4	23	6.4
20	1.2	2.3	e25	e8.1	114	92	24	40	32	2.3	14	100
21	1.4	2.6	e17	e8.0	765	77	22	30	32	3.5	12	70
22	1.3	2.6	e15	e50	589	63	21	25	88	4.9	9.7	34
23	1.5	2.3	e50	e190	275	52	20	22	66	4.9	7.8	21
24	2.2	2.3	e200	e100	161	47	20	21	43	4.4	8.0	16
25	2.3	e2.3	94	e50	103	55	20	25	34	3.8	13	12
26	1.9	e2.2	55	e40	81	64	18	37	68	24	12	9.9
27	1.6	e2.3	35	e30	666	53	17	28	46	17	9.1	7.8
28	1.5	e2.4	31	e24	430	47	20	22	30	7.9	6.8	7.0
29	1.5	e2.4	44	e22	---	56	21	58	23	4.2	5.3	6.1
30	3.9	4.4	49	e20	---	69	19	201	39	2.7	4.5	5.4
31	3.2	---	45	e19	---	66	---	135	---	2.0	4.2	---
TOTAL	28.81	135.3	1036.6	1126.2	4150	4333	1062	2142	7010	515.6	281.11	368.0
MEAN	.93	4.51	33.4	36.3	148	140	35.4	69.1	234	16.6	9.07	12.3
MAX	3.9	24	200	190	765	840	104	323	2330	159	.66	100
MIN	.02	1.3	6.0	8.0	10	47	17	17	23	2.0	.55	1.7
CFSM	.02	.09	.66	.71	2.91	2.74	.69	1.35	4.58	.33	.18	.24
IN.	.02	.10	.76	.82	3.03	3.16	.77	1.56	5.11	.38	.21	.27

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 1997, BY WATER YEAR (WY)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
MEAN	15.9	39.3	54.0	61.0	67.4	92.7	91.4	53.8	63.8	12.4
MAX	53.3	144	168	181	187	199	152	130	234	55.1
(WY)	1993	1993	1991	1993	1990	1993	1993	1991	1997	1988
MIN	.33	3.14	5.69	17.6	16.6	24.7	35.4	9.47	.58	.17
(WY)	1995	1995	1990	1994	1989	1989	1997	1988	1988	1988

SUMMARY STATISTICS

FOR 1996 CALENDAR YEAR

FOR 1997 WATER YEAR

WATER YEARS 1988 - 1997

ANNUAL TOTAL	15009.14	22188.62	
ANNUAL MEAN	41.0	60.8	47.0
HIGHEST ANNUAL MEAN			74.9
LOWEST ANNUAL MEAN			27.5
HIGHEST DAILY MEAN	971	2330	2330
LOWEST DAILY MEAN	.00	.02	.00
ANNUAL SEVEN-DAY MINIMUM	.00	.04	.00
INSTANTANEOUS PEAK FLOW		(c)3010	(c)3010
INSTANTANEOUS PEAK STAGE		11.60	11.60
ANNUAL RUNOFF (CFSM)	.80	1.19	.92
ANNUAL RUNOFF (INCHES)	10.95	16.18	12.52
10 PERCENT EXCEEDS	94	111	108
50 PERCENT EXCEEDS	10	19	18
90 PERCENT EXCEEDS	.10	1.6	.80

(a) Oct. 7, 8.

(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	Water year 1997 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 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 .	1973-97	04-26-97	9.78	1,030	04-25-85	a8.42	3,210
West Branch Waitska 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 .	1973-97	04-16-97	b6.65	342	04-18-74	c9.19	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, 1.0 mi northwest of Perron- ville, and 11.5 mi upstream from Ford River. Drainage area is 38.4 mi ² .	1971-77†, 1978-97	04-07-97	d5.44	e500	04-24-75	f5.42	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 1997 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								
Paint River at Crystal Falls, MI (04061500)	Lat 46°06'21", long 88°20'05", in SE1/4 sec.20, T.43 N., R.32 W., Iron County, Hy- drologic Unit 04030106, on right bank 150 ft down- stream from municipal pow- erplant, 0.9 mi upstream from State Highway 69 in Crystal Falls. Datum of gage is 1,306.1 ft above sea level. Drainage area is 597 mi ² .	1944-96†, 1997	04-07-97	6.37	4,800	04-25-60	9.82	10,900
Michigamme River near Witch Lake, MI (04062400)	Lat 46°14'48", long 88°00'45", in NW1/4 NW1/4 sec.1, T.44 N., R.30 W., Dickinson County, Hydrologic Unit 04030107, on left bank 20 ft upstream from bridge on un- named county road, 800 ft downstream from State Highway 95, and 2.0 mi south of Witch Lake. Datum of gage is 1,384.25 ft above sea level. Drainage area is 316 mi ² .	1964-80†, 1997	05-03-97	8.27	2,420	05-11-65	11.60	4,360
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†, 1980-97	02-22-97	4.97	179	06-02-89	g5.81	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 .	1979-97	06-21-97	h21.60	12,000	06-21-97	h21.60	12,000
SycamoreCreek 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 .	1975-97	02-21-97	9.68	344	04-19-75	12.53	1,080

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 1997 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								
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‡, 1993-97	02-23-97	16.36	1,930	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, Hydrologic Unit 04050007, on right bank 200 ft downstream 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‡, 1995-97	02-22-97	110.6	5,820	02-27-85	11.43	6,700
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 .	1974-97	02-22-97	13.43	2,300	02-22-97	13.43	2,300
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 .	1974-97	02-22-97	9.99	1,500	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 .	1975-97	02-23-97	3.05	229	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 .	1975-97	04-06-97	3.70	632	03-28-89	5.46	983

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 1997 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								
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†, 1983-97	02-22-97	4.19	984	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 .	1987-97	02-23-97	d17.22	e2,260	06-21-96	20.25	4,800
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†, 1991-97	02-21-97	7.70	1,610	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†, 1991-97	02-23-97	5.37	331	04-19-75	h7.65	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 .	1974-97	02-23-97	18.64	2,500	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 .	1965-97	02-21-97	2.95	105	04-19-75	j4.42	470

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 1997 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 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‡, 1969-97	03-29-97	5.62	411	09-06-85	k8.60	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‡, 1970-97	03-29-97	4.00	851	04-19-75	m5.44	3,500
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‡, 1973-97	03-29-97	7.14	1,110	04-19-75	n7.76	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‡, 1971-97	03-29-97	5.86	230	04-19-75	o6.25	460
Highbank Creek near Armada, MI (04164350)	Lat 42°48'24", 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‡, 1971-97	03-29-97	16.04	848	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 SW1/4 sec.18, T.4 N., R.14 E., Macomb County, Hydro- logic Unit 04090003, at 29 Mile Road, 3.4 mi northwest of New Haven. Drainage area is 36.1 mi ² .	1959-67, 1968-72‡, 1973-97	03-29-97	8.31	1,040	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‡, 1966-97	02-21-97	7.49	478	09-06-85	8.90	651

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 1997 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								
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‡, 1965-97	02-21-97	7.15	130	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‡, 1971-97	05-19-97	12.15	773	06-26-68	r12.17	1,400
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 .	1972-97	02-21-97	8.25	300	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‡, 1978-97	02-21-97	11.51	1,680	06-26-68	13.37	3,990

‡ Operated as a continuous-record gaging station.

a Maximum gage height, 12.36 ft, Apr. 9, 1991, present site and datum.

b Maximum gage height, 6.96 ft, Apr. 6, backwater from ice.

c Maximum gage height, 9.84 ft, Apr. 6, 1988.

d Backwater from ice.

e Estimated.

f Maximum gage height, 8.94 ft, Mar. 30, 1977, backwater from ice.

g Maximum gage height, 5.86 ft, Dec. 31, 1988, backwater from ice.

h From floodmark.

i Maximum gage height, 7.72 ft, Jan. 16, backwater from ice.

j Maximum gage height, 5.93 ft, Jan. 27, 1974, backwater from ice.

k Maximum gage height, 8.62 ft, Apr. 19, 1975.

m Maximum gage height, 7.1 ft, Mar. 12 or 13, 1962, backwater from ice, site and datum then in use.

n Maximum gage height, 7.85 ft, Mar. 12, 1962, backwater from ice.

o Maximum gage height, 6.95 ft, Sept. 6, 1985.

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 1997

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	1969-96	10-25-96	4.47
					04-24-97	1.84
					05-22-97	2.01
					08-22-97	1.19
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.	--	1981-96	10-08-96	2 ^a .8
					11-19-96	a68.1
					03-25-97	14 ^a
					04-30-97	84.4

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 1997

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							
04032915	Bonifas Creek	Middle Branch Ontonagon River	Lat 46°17'53", long 89°10'21", in SE1/4 NW1/4 sec.15, T.45 N., R.39 W., Gogebic County, Hydrologic Unit 04020102, at Bass Lake Outlet, 2.0 mi north of Watersmeet.	--	--	08-27-97	*0.50
						09-25-97	*1.61
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, 1987-96	06-11-97	a43.0
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.	--	1996	11-20-96	2.57
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†, 1993-96	06-04-97	a81.0
						07-24-97	a32.5
						09-05-97	a25.4
						09-17-97	a24.6
04044528	Silver Lead Creek	West Branch Chocolay River	Lat 46°19'36", long 87°23'02", in SW1/4 NW1/4 sec.1, T.45 N., R.25 W., Marquette County, Hydrologic Unit 04020201, 20 ft downstream from outlet of Little Trout Lake, 4.2 mi northeast of Gwinn.	--	--	07-01-97	5.68
						07-16-97	*5.71
						07-22-97	4.84
						08-13-97	*4.59
						08-26-97	*4.33
						09-10-97	4.77
						09-24-97	3.76
04044531	Silver Lead Creek	West Branch Chocolay River	Lat 46°19'47", long 87°22'52", in NE1/4 NW1/4 sec.1, T.45 N., R.25 W., Marquette County, Hydrologic Unit 04020201, upstream from sewage treatment plant, at abandoned crossing on unnamed road, 4.5 mi north-east of Gwinn.	1.87	1965, 1970, 1985-86	05-01-97	5.45
						05-30-97	5.69
						06-05-97	*4.73
						06-12-97	*5.39
						06-19-97	*4.97
						07-01-97	6.75
						07-16-97	*5.90
						07-22-97	5.76
						08-13-97	*5.71
						08-26-97	*5.61
						09-10-97	5.64
						09-24-97	5.35

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 1997--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							
04057005	Manistique River	Lake Michigan	Lat 45°57'06", long 86°14'54", in SE1/4 SW1/4 sec.12, T.41 N., R.16 W., Schoolcraft County, Hydrologic Unit 04060106, 0.5 mi upstream from mouth, at Manistique.	c1,450	1950 1974-75	11-08-96	a2,580
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†, 1993-96	07-22-97 08-20-97 09-04-97 09-17-97	a4.31 a2.28 a2.64 a2.68
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, 2.5 mi upstream from mouth, and 2.0 mi northwest of Wells.	c920	1981-92†, 1993-96	06-16-97 07-14-97 08-19-97 09-12-97	a714 a397 a635 a386
04105788	Gull Creek	Kalamazoo River	Lat 42°20'42", long 85°24'25", in NE1/4 NW1/4 sec.31, T.1 S., R.9 W., Kalamazoo County, Hydrologic Unit 04050003, near Greer Drive, 0.7 mi north of Howlandsburg.	--	--	11-21-96	*41.1
04105790	Gull Creek	Kalamazoo River	Lat 42°20'08", long 85°24'06", in SE1/4 sec.31, T.1 S., R.9 W., Kalamazoo County, Hydrologic Unit 04050003, at G Avenue, at Howlandsburg.	35.7	1964, 1966-67	11-06-96	*34.4
041088048	North Branch Macatawa River	Macatawa River	Lat 42°46'46", long 86°02'44", in NW1/4 SW1/4 NE1/4 sec.35, T.5 N., R.15 W., Ottawa County, Hydrologic Unit 04050002, 2.2 mi southwest of Zeeland.	--	--	12-17-96 02-24-97 03-28-97 06-23-97	b9.90 b41.5 b7.70 b28.2
04108814	Bosch and Hulst Drain	Macatawa River	Lat 42°47'57", long 86°02'44", in SW1/4 SE1/4 sec.23, T.5 N., R.15 W., Ottawa County, Hydrologic Unit 04050002, at Perry Road, 1.0 mi southwest of Zeeland.	--	--	12-17-96 02-24-97 03-28-97 06-23-97	*b19.6 b87.3 b21.3 b91.6
04108831	Unnamed Tributary	Macatawa River	Lat 42°48'12", long 86°04'59", in NW1/4 SE1/4 sec.21, T.5 N., R.15 W., Ottawa County, Hydrologic Unit 04050002, at Chesapeake and Ohio Railway bridge, 0.5 mi north of Holland.	--	--	12-17-96 02-24-97 03-28-97 06-23-97	b9.93 b36.8 b12.1 b42.7

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 1997--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							
04108834	Unnamed Tributary	Macatawa River	Lat 42°47'32", long 86°05'25", in SE1/4 NW1/4 sec.28, T.5 N., R.15 W., Ottawa County, Hydrologic Unit 04050002, at 6th Avenue, 0.5 mi northeast of Holland.	--	--	12-17-96	*b2.80
						02-24-97	b6.49
						03-28-97	b3.17
						06-23-97	b4.35
04108841	Pine Creek	Lake Macatawa	Lat 42°48'16", long 86°08'33", in NW1/4 SE1/4 sec.24, T.5 N., R.16 W., Ottawa County, Hydrologic Unit 04050002, at Lakewood Boulevard, 0.7 mi east of Tazmas Corners.	--	--	12-17-96	b15.6
						02-24-97	b97.8
						06-23-97	b124
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.	--	1990-96	02-22-97	b14.6
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.	--	1990-96	02-21-97	b9.44
						02-28-97	b3.68
						05-06-97	b3.09
						05-19-97	b3.31
						08-04-97	b0.98
04112673	Unnamed Tributary	Willow Creek	Lat 42°32'33", long 84°27'45", in NW1/4 SW1/4 sec.20, T.2 N., R.1 W., Ingham County, Hydrologic Unit 04050004, at Tuttle Road, 0.2 mi south of Lyon Road, and 2.7 mi southwest of Mason.	--	1990-94, 1995	02-28-97	b1.53
						05-06-97	b0.25
						05-19-97	b1.16
						05-19-97	b0.98
04119238	Sand Creek	Grand River	Lat 43°04'05", long 85°51'15", in SW1/4 NE1/4 sec.21, T.8 N., R.13 W., Ottawa County, Hydrologic Unit 04050006, 2.5 mi northwest of Marne.	--	--	11-08-96	*b3.17
						09-25-97	*b3.19
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†, 1993-96	10-15-96	52.3
						02-26-97	59.3
						06-06-97	10.4
						09-09-97	8.06
						09-09-97	8.18
04123020	Big Sable River	Hamlin Lake	Lat 44°06'09", long 86°19'49", in NW1/4 SE1/4 sec.27, T.20 N., R.17 W., Mason County, Hydrologic Unit 04060101, at Quarterline Road, 4.5 mi northwest of Kings Corner.	--	--	02-25-97	b368
						03-25-97	b293

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 1997--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							
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.	--	1996	04-03-97	3.33
						05-01-97	3.63
						05-13-97	3.71
						06-30-97	4.14
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.	--	1996	04-03-97	1.58
						05-01-97	3.36
						05-13-97	1.03
						06-30-97	0.76
04127558	Cedar River	Blair Lake	Lat 44°56'35", long 85°07'20", in NW1/4 NE1/4 sec.2, T.29 N., R.7 W., Antrim County, Hydrologic Unit 04060105, 3.6 mi northwest of Mancelona.	--	1978	06-19-97	*b60.3
04127562	Cedar River	Blair Lake	Lat 44°58'10", long 85°08'20", in SW1/4 NW1/4 sec.27, T.30 N., R.7 W., Antrim County, Hydrologic Unit 04060105, 3.0 mi east of Bellaire.	--	1978	06-19-97	*b70.8
STREAMS TRIBUTARY TO LAKE HURON							
04132167	Swan River	Lake Huron	Lat 45°24'07", long 83°43'55", in NE1/4 NW1/4 sec.29, T.35 N., R.6 E., Presque Isle County, Hydrologic Unit 04070003, near bridge 0.25 mi downstream from Swan Lake near Rogers City.	--	--	11-11-96	87.1
04143460	Kawkawlin River	Saginaw Bay	Lat 43°38'21", long 84°03'57", in NW1/4 NW1/4 sec.12, T.14 N., R.3 E., Bay County, Hydrologic Unit 04080206, at Wheeler Road, 2.8 mi south- east of Willard.	--	--	06-24-97	b7.31
						08-26-97	b8.69
						09-10-97	b3.09
04143500	North Branch Kawkawlin River	Kawkawlin River	Lat 43°40'05", long 85°58'13", in SE1/4 SE1/4 sec.27, T.15 N., R.4 E., Bay County, Hydrologic Unit 04080102, at former gaging station on Bea- ver Road, 1.7 mi northwest of Kawkawlin.	101	1951-82†, 1988, 1991-92	08-20-97	b0.42
						09-10-97	b0.25

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 1997--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							
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	1994-96	10-23-96 05-14-97 06-03-97 06-25-97 09-09-97 09-10-97	29.2 *8.77 17.8 *5.68 *3.51 194
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.	--	1994-96	10-23-96 11-08-96 05-14-97 06-03-97 06-25-97 09-09-97 09-10-97	49.1 155 *37.5 75.2 *20.5 *12.8 344
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 Redford.	100	1994-96	10-23-96 11-08-96	217 553
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.	--	1995-96	10-23-96	97.0
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, 1994-96	10-23-96 11-08-96 05-14-97 06-03-97 06-25-97 09-09-97 09-10-97	157 304 *40.0 105 *24.3 *15.2 607
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.	--	1994-96	09-09-97	*5.51
04166700	Johnson Creek	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	1994-96	11-08-96	54.9
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	1994-96	10-23-96 05-14-97 06-03-97 06-25-97 07-03-97 09-09-97 09-10-97	154 *95.3 199 *65.8 739 *30.1 628

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 1997--Continued

Station No.	Stream	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Measurements	
						Date	Dis- charge (f. ³ /s)
STREAMS TRIBUTARY TO DETROIT RIVER--Continued							
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, Hydro- logic Unit 04090004, at Wayne Road in Wayne.	71.2	1994-96	11-07-96	211
						05-14-97	*76.2
						06-03-97	241
						06-25-97	*76.7
						09-09-97	*28.8
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, 1994-96	10-23-96	85.0
						11-08-96	359
						05-14-97	*89.1
						05-30-97	463
						06-03-97	263
						06-25-97	*87.0
						09-09-97	*37.4

* 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 10 sites in 1996 to determine concentrations of trace elements and hydrophobic organic compounds. Where more than one sample was collected on the same day, the letter after the date denotes multiple samples in the reach.

Bed sediments samples were collected from the top 1 to 2 centimeters of material taken 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 USGS Iowa City, Iowa sediment laboratory for particle-size analysis, and the results are reported at the end of this table. In addition, subsamples from the composite were: (1) processed using a 2.0-millimeter stainless-steel mesh wet sieve for preparation of material for organic contaminant analysis, and (2) processed using a 63-micrometer nylon-cloth wet sieve 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).

Bed sediment constituent concentrations are provided on a percent (percent of dry weight) or a dry-weight (DW) basis, based on a 25 gram sample. Constituent names are abbreviated as follows: DDD, dichlorodiphenyldichloroethane; DDE, dichlorodiphenyldichloroethene; DCPA, dimethyl tetrachloroterephthalate; DDT, dichlorodiphenyltrichloroethane; HCH, hexachlorocyclohexane; PCB, polychlorinated biphenyls. (BED SED = bottom sediment, <63U WS = less than 63-micrometer wet sieve, WS <2MM = wet sieve, less than 2.0-millimeter, REC = recoverable, UG/G = micrograms per gram, UG/KG = microgram per kilogram, G/KG = gram per kilogram, MM = millimeter, (34790) = the USGS National Water Quality Laboratory parameter code, e = Estimated). Additional surface-water and water-quality data for these sampling sites can be found in the continuous-record station sections of the Indiana, Michigan, New York, and Ohio Water Data Reports.

CALENDAR YEAR 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
04178000	ST JOSEPH RIVER NEAR NEWVILLE, IN	41° 23' 08" N	084° 48' 06" W	610	07-09-96	1500
04183000	MAUMEE RIVER AT NEW HAVEN, IN	41° 05' 06" N	085° 01' 20" W	1,967	07-09-96	1030
04186500	AUGLAIZE RIVER NEAR FORT JENNINGS, OH	40° 56' 55" N	084° 15' 58" W	332	07-08-96	1530
04193500	MAUMEE RIVER AT WATERVILLE, OH	41° 30' 00" N	083° 42' 46" W	6,330	07-10-96	0930
04208504	CUYAHOGA RIVER AT LTV STEEL AT CLEVELAND, OH	41° 27' 54" N	082° 22' 50" W	788	08-20-96 ^A	1030
04208504	CUYAHOGA RIVER AT LTV STEEL AT CLEVELAND, OH	41° 27' 54" N	082° 22' 50" W	788	08-20-96 ^B	1045
04208504	CUYAHOGA RIVER AT LTV STEEL AT CLEVELAND, OH	41° 27' 54" N	082° 22' 50" W	788	08-20-96 ^C	1100
04211820	GRAND RIVER AT HARPERSFIELD, OH	41° 45' 19" N	080° 56' 55" W	552	08-21-96	0945
04213500	CATTARAUGUS CREEK AT GOWANDA, NY	42° 27' 50" N	078° 56' 07" W	436	08-22-96	1030

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	SPE- CIFIC CON- DUCT- ANCE, (US/CM)	PH, WATER WHOLE (STAND- ARD UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE, WATER (DEG C)	TEMPER- ATURE, SEDI- MENT (DEG C)	BARO- METRIC PRES- SURE, (MM OF HG)	OXYGEN, DIS- SOLVED (MG/L)	ALUM- INUM, BED SED <63U WS PERCENT (34790)	CALCIUM, BED SED <63U WS PERCENT (34830)	IRON, BED SED <63U WS PERCENT (34880)
04159492	07-11-96	784	8.35	28.0	19.6	20.0	753	8.57	5.7	6.6	3.2
04161820	07-12-96	832	7.90	19.5	18.8	19.0	752	8.59	4.9	7.6	3.1
04175600	07-10-96	500	7.78	21.0	20.7	20.0	752	9.47	4.6	7.2	3.3
04178000	07-09-96	591	7.80	22.5	20.9	20.5	742	6.93	7.0	3.4	3.8
04183000	07-09-96	708	7.85	25.5	22.7	22.0	742	7.80	6.5	4.5	3.6
04186500	07-08-96	815	8.22	25.5	25.5	25.5	740	9.18	6.9	2.7	3.7
04193500	07-10-96	493	8.60	17.0	23.3	22.0	752	14.3	5.9	6.5	3.0
04208504	08-20-96 ^A	1050	7.63	26.0	23.1	--	755	7.60	6.8	2.0	4.4
04208504	08-20-96 ^B	1050	7.63	26.0	23.1	--	755	7.60	6.8	2.0	4.3
04208504	08-20-96 ^C	1050	7.63	26.0	23.1	--	755	7.60	6.8	2.0	4.4
04211820	08-21-96	346	8.15	23.5	24.6	--	750	8.51	6.5	0.48	3.6
04213500	08-22-96	327	8.17	22.0	21.3	--	748	8.66	5.7	4.2	3.3
STATION NUMBER	DATE	MAGNE- SIUM, BED SED <63U WS PERCENT (34900)	SODIUM, BED SED <63U WS PERCENT (34960)	POTAS- SIUM, BED SED <63U WS PERCENT (34940)	PHOS- PHORUS, BED SED <63U WS PERCENT (34935)	TITA- NIUM, BED SED <63U WS PERCENT (49274)	ANTI- MONY, BED SED <63U WS (UG/G) (34795)	ARSENIC, BED SED <63U WS (UG/G) (34800)	BARIUM, BED SED <63U WS (UG/G) (34805)	BERYL- LIUM, BED SED <63U WS (UG/G) (34810)	BISMUTH, BED SED <63U WS (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
04178000	07-09-96	1.8	0.54	2.0	0.11	0.350	0.9	9.5	510	2	<10
04183000	07-09-96	2.0	0.64	2.0	0.12	0.300	1.0	9.7	500	2	<10
04186500	07-08-96	1.4	0.59	2.0	0.12	0.300	0.9	10	490	2	<10
04193500	07-10-96	2.2	0.80	1.8	0.11	0.290	0.7	7.2	460	1	<10
04208504	08-20-96 ^A	1.1	0.53	2.1	0.11	0.350	3.0	21	420	2	<10
04208504	08-20-96 ^B	1.1	0.55	2.2	0.11	0.320	3.0	19	420	2	<10
04208504	08-20-96 ^C	1.1	0.54	2.2	0.11	0.330	2.0	20	430	2	<10
04211820	08-21-96	0.81	0.62	2.0	0.07	0.330	0.7	15	410	2	<10
04213500	08-22-96	1.3	0.67	1.9	0.07	0.290	0.6	11	390	2	<10
STATION NUMBER	DATE	CAD- MIUM, BED SED <63U WS (UG/G) (34825)	CERIUM, BED SED <63U WS (UG/G) (34835)	CHRO- MIUM, BED SED <63U WS (UG/G) (34840)	COBALT, BED SED <63U WS (UG/G) (34845)	COPPER, BED SED <63U WS (UG/G) (34850)	EURO- PIUM, BED SED <63U WS (UG/G) (34855)	GALLIUM, BED SED <63U WS (UG/G) (34860)	GOLD, BED SED <63U WS (UG/G) (34870)	HOL- MIUM, BED SED <63U WS (UG/G) (34875)	LANTHA- NIUM, BED SED <63U WS (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
04178000	07-09-96	0.6	67	84	17	36	<2	18	<8	<4	37
04183000	07-09-96	2.3	66	84	15	56	<2	17	<8	<4	37
04186500	07-08-96	0.7	67	81	16	33	<2	19	<8	<4	38
04193500	07-10-96	0.6	59	62	13	24	<2	16	<8	<4	32
04208504	08-20-96 ^A	1.3	65	83	18	65	<2	16	<8	<4	33
04208504	08-20-96 ^B	1.3	64	80	18	66	<2	15	<8	<4	33
04208504	08-20-96 ^C	1.3	66	81	18	65	<2	15	<8	<4	34
04211820	08-21-96	0.4	67	67	17	19	<2	15	<8	<4	34
04213500	08-22-96	0.3	55	52	15	25	<2	13	<8	<4	28

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	LEAD, BED SED <63U WS (UG/G) (34890)	LITHIUM, BED SED <63U WS (UG/G) (34895)	MANGA- NESE, BED SED <63U WS (UG/G) (34905)	MERCURY, BED SED <63U WS (UG/G) (34910)	MOLYB- DENUM, BED SED <63U WS (UG/G) (34915)	NEODYM- IUM, BED SED <63U WS (UG/G) (34920)	NICKEL, BED SED <63U WS (UG/G) (34925)	NIOBIUM, BED SED <63U WS (UG/G) (34930)	SCAN- DIUM, BED SED <63U WS (UG/G) (34945)	SELE- NIUM, BED SED <63U WS (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
04178000	07-09-96	26	49	710	0.05	<2	39	41	14	13	0.7
04183000	07-09-96	60	50	670	0.46	<2	39	41	13	12	0.7
04186500	07-08-96	30	50	590	0.09	<2	39	45	14	13	0.8
04193500	07-10-96	27	40	610	0.11	<2	42	31	12	11	0.6
04208504	08-20-96 ^A	63	50	910	0.11	<2	29	49	15	13	0.6
04208504	08-20-96 ^B	65	50	900	0.13	<2	28	50	14	13	0.6
04208504	08-20-96 ^C	62	50	930	0.13	<2	29	50	13	13	0.6
04211820	08-21-96	25	50	1100	0.03	<2	29	33	12	12	0.3
04213500	08-22-96	21	40	750	0.02	<2	26	30	11	11	0.2
STATION NUMBER	DATE	SILVER, BED SED <63U WS (UG/G) (34955)	STRON- TIUM, BED SED <63U WS (UG/G) (34965)	SULFUR, BED SED <63U WS (UG/G) (34970)	TANTA- LUM, BED SED <63U WS (UG/G) (34975)	THORIUM, BED SED <63U WS (UG/G) (34980)	TIN, BED SED <63U WS (UG/G) (34985)	URANIUM, BED SED <63U WS (UG/G) (35000)	VANA- DIUM, BED SED <63U WS (UG/G) (35005)	YTTR- IUM, BED SED <63U WS (UG/G) (35010)	YTTER- BIUM, BED SED <63U WS (UG/G) (35015)
04159492	07-11-96	0.1	150	0.07	<40	10	<5	3.0	91	19	2
04161820	07-12-96	1.0	170	0.16	<40	6	<5	2.6	73	17	2
04175600	07-10-96	0.2	180	0.24	<40	7	<5	3.2	74	15	2
04178000	07-09-96	0.2	160	0.11	<40	8	<5	4.4	120	22	2
04183000	07-09-96	1.0	190	0.08	<40	10	<5	4.2	110	22	3
04186500	07-08-96	0.2	330	0.11	<40	9	<5	4.6	110	23	2
04193500	07-10-96	0.2	240	0.11	<40	10	<5	3.6	89	22	2
04208504	08-20-96 ^A	0.6	110	0.24	<40	13	<5	3.8	100	23	3
04208504	08-20-96 ^B	0.6	110	0.24	<40	9	<5	3.8	100	24	2
04208504	08-20-96 ^C	0.7	110	0.24	<40	11	<5	4.0	110	22	2
04211820	08-21-96	0.1	93	0.18	<40	12	<5	3.7	92	22	3
04213500	08-22-96	0.1	130	0.31	<40	9	<5	3.2	78	22	2
STATION NUMBER	DATE	ZINC, BED SED <63U WS (UG/G) (35020)	CARBON ORG + INORG, BED SED WS, <63U DW, REC PERCENT (49267)	CARBON ORGANIC, BED SED WS, <63U DW, REC PERCENT (49266)	CARBON INORG, BED SED WS, <63U DW, REC PERCENT (49269)	CARBON ORG + INORG, BED SED WS, <2MM DW, REC (G/KG) (49272)	CARBON ORGANIC, BED SED WS, <2MM DW, REC (G/KG) (49271)	CARBON INORG, BED SED WS, <2MM DW, REC (G/KG) (49270)	PCB, BED SED WS, <2MM DW, REC (UG/KG) (49459)	ACENAPH THYLENE, BED SED WS, <2MM DW, REC (UG/KG) (49428)	ACENAPH THENE, BED SED 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
04178000	07-09-96	150	3.57	2.37	1.20	30.0	21.0	8.70	<50	e23	<50
04183000	07-09-96	190	3.87	2.20	1.67	21.0	10.0	11.0	400	77	98
04186500	07-08-96	150	3.16	2.31	0.85	31.0	12.0	19.0	<50	<50	<50
04193500	07-10-96	110	4.23	1.90	2.33	18.0	6.00	12.0	<50	e21	e16
04208504	08-20-96 ^A	270	2.46	1.84	0.62	12.0	10.0	1.80	120	55	58
04208504	08-20-96 ^B	270	2.43	1.80	0.63	15.0	13.0	2.20	120	100	75
04208504	08-20-96 ^C	270	2.45	1.82	0.63	18.0	15.0	2.80	100	79	61
04211820	08-21-96	110	1.53	1.44	0.09	11.0	11.0	0.400	<50	<50	<50
04213500	08-22-96	86	2.35	1.01	1.34	22.0	12.0	9.70	<50	e13	<50

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	ACRIDINE, BED SED, WS <2MM DW, REC (UG/KG) (49430)	ALDRIN, BED SED, WS <2MM DW, REC (UG/KG) (49319)	CS-ALKYL PHENOL, BED SED, WS <2MM DW, REC (UG/KG) (49424)	ANTHRACENE, BED SED, WS <2MM DW, REC (UG/KG) (49434)	9,10 ANTHRA- QUINONE, BED SED, WS <2MM DW, REC (UG/KG) (49437)	AZO- BENZENE, BED SED, WS <2MM DW, REC (UG/KG) (49443)	BENZO (A) ANTHACENE, BED SED, WS <2MM DW, REC (UG/KG) (49436)
04159492	07-11-96	<50	<1.00	<50	<50	<50	<50	e16
04161820	07-12-96	e45	<1.00	<50	89	160	<50	320
04175600	07-10-96	<50	<1.00	<50	e17	<50	<50	e20
04178000	07-09-96	<50	<1.00	<50	e21	e25	<50	e34
04183000	07-09-96	e47	<1.00	<50	260	190	<50	740
04186500	07-08-96	<50	<1.00	<50	e20	e33	<50	e28
04193500	07-10-96	<50	<1.00	<50	e32	e27	<50	67
04208504	08-20-96 ^A	65	<1.00	<50	240	270	<50	650
04208504	08-20-96 ^B	83	<1.00	<50	360	290	<50	900
04208504	08-20-96 ^C	e46	<1.00	<50	260	260	<50	600
04211820	08-21-96	<50	<1.00	<50	e11	e23	<50	e49
04213500	08-22-96	<50	<1.00	<50	e9.0	e21	<50	55
STATION NUMBER	DATE	BENZO- CINNOLINE, BED SED, WS <2MM DW, REC (UG/KG) (49468)	BENZO (B) FLUOR- ANTHENE, BED SED, WS <2MM DW, REC (UG/KG) (49458)	BENZO (K) FLUOR- ANTHENE, BED SED, WS <2MM DW, REC (UG/KG) (49397)	BENZO (G,H,I) PERYLENE, BED SED, WS <2MM DW, REC (UG/KG) (49408)	BENZO (A) PYRENE, BED SED, WS <2MM DW, REC (UG/KG) (49389)	2, 2'- BIQUINOLINE, BED SED, WS <2MM DW, REC (UG/KG) (49391)	4-BROMO PHENYLPHENY LETTER, BED SED, WS <2MM DW, REC (UG/KG) (49454)
04159492	07-11-96	<50	<50	<50	<50	<50	<50	<50
04161820	07-12-96	<50	540	340	230	500	<50	<50
04175600	07-10-96	<50	e33	e10	<50	e35	<50	<50
04178000	07-09-96	<50	e46	e38	e35	62	<50	<50
04183000	07-09-96	e41	630	500	370	710	<50	<50
04186500	07-08-96	<50	e38	e13	e34	e37	<50	<50
04193500	07-10-96	<50	71	e43	e42	76	<50	<50
04208504	08-20-96 ^A	<50	980	790	380	830	<50	<50
04208504	08-20-96 ^B	<50	1100	1300	490	1100	<50	<50
04208504	08-20-96 ^C	<50	990	880	380	780	<50	<50
04211820	08-21-96	<50	56	e25	e35	e47	<50	<50
04213500	08-22-96	<50	67	e45	e40	58	<50	<50
STATION NUMBER	DATE	BUTYL BENZYL- PHTHALATE, BED SED, WS <2MM DW, REC (UG/KG) (49427)	CARBAZOLE, BED SED, WS <2MM DW, REC (UG/KG) (49449)	CIS- CHLORDANE, BED SED, WS <2MM DW, REC (UG/KG) (49320)	TRANS- CHLORDANE, BED SED, WS <2MM DW, REC (UG/KG) (49321)	BIS 2-CHLORO- ETHOXY METHANE, BED SED, WS <2MM DW, REC (UG/KG) (49401)	4-CHLORO 3-METHYL- PHENOL, BED SED, WS <2MM DW, REC (UG/KG) (49422)	2-CHLORO- NAPH- THALENE, BED SED, WS <2MM DW, REC (UG/KG) (49407)
04159492	07-11-96	e35	<50	<1.00	<1.00	<50	<50	<50
04161820	07-12-96	93	82	<1.00	<1.00	<50	<50	<50
04175600	07-10-96	e39	e18	<1.00	<1.00	<50	<50	<50
04178000	07-09-96	51	<50	<1.00	<1.00	<50	<50	<50
04183000	07-09-96	60	130	<1.00	<1.00	<50	<50	<50
04186500	07-08-96	50	<50	<1.00	<1.00	<50	<50	<50
04193500	07-10-96	e49	e21	<1.00	<1.00	<50	<50	<50
04208504	08-20-96 ^A	120	150	2.80	2.90	<50	<50	<50
04208504	08-20-96 ^B	92	160	2.80	2.90	<50	<50	<50
04208504	08-20-96 ^C	130	170	2.00	2.00	<50	<50	<50
04211820	08-21-96	e40	<50	<1.00	<1.00	<50	<50	<50
04213500	08-22-96	e42	<50	<1.00	<1.00	<50	<50	<50

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	CHLORONEB, BED SED, WS <2MM DW, REC (UG/KG) (49322)	2- CHLORO- PHENOL, BED SED, WS <2MM DW REC (UG/KG) (49467)	4-CHLORO- PHENYL ETHER, BED SED, WS <2MM DW, REC (UG/KG) (49455)	CHRYSENE, BED SED, WS <2MM DW, REC (UG/KG) (49450)	P- CRESOL, BED SED, WS <2MM DW, REC (UG/KG) (49451)	DCPA, BED SED, WS <2MM DW, REC (UG/KG) (49324)	O, P'- DDD, BED SED, WS <2MM DW, REC (UG/KG) (49325)
04159492	07-11-96	<5.00	<50	<50	e14	e20	<5.00	<1.00
04161820	07-12-96	<5.00	<50	<50	470	240	<5.00	<1.00
04175600	07-10-96	<5.00	<50	<50	e22	170	<5.00	<1.00
04178000	07-09-96	<5.00	<50	<50	e48	320	<5.00	<1.00
04183000	07-09-96	<5.00	<50	<50	740	100	<5.00	<1.00
04186500	07-08-96	<5.00	<50	<50	e40	130	<5.00	<1.00
04193500	07-10-96	<5.00	<50	<50	81	200	<5.00	<1.00
04208504	08-20-96 ^A	<5.00	<50	<50	940	790	<5.00	<1.40
04208504	08-20-96 ^B	<5.00	<50	<50	1200	900	<5.00	<1.10
04208504	08-20-96 ^C	<5.00	<50	<50	1100	700	<5.00	<2.00
04211820	08-21-96	<5.00	<50	<50	65	280	<5.00	<1.00
04213500	08-22-96	<5.00	<50	<50	85	140	<5.00	<1.00
STATION NUMBER	DATE	P, P'- DDD, BED SED, WS <2MM DW, REC (UG/KG) (49326)	O, P'- DDE, BED SED, WS <2MM DW, REC (UG/KG) (49327)	P, P'- DDE, BED SED, WS <2MM DW, REC (UG/KG) (49328)	O, P'- DDT, BED SED, WS <2MM DW, REC (UG/KG) (49329)	P, P'- DDT, BED SED, WS <2MM DW, REC (UG/KG) (49330)	DIBENZ (A,H) ANTHRACENE, BED SED, WS <2MM DW, REC (UG/KG) (49461)	D'BENZO- THIOPHENE, BED SED, WS <2MM DW, REC (UG/KG) (49452)
04159492	07-11-96	<1.00	<1.00	<1.00	<2.00	<2.00	<50	<50
04161820	07-12-96	2.70	<1.00	3.70	3.30	<2.00	130	e41
04175600	07-10-96	<1.00	<1.00	<1.00	<2.00	<2.00	e28	e20
04178000	07-09-96	2.10	<1.00	1.20	<2.00	<2.00	e33	<50
04183000	07-09-96	4.50	<1.00	2.10	<2.00	<2.00	<50	74
04186500	07-08-96	<1.00	<1.00	<1.00	<2.00	<2.00	e29	e2 ^o
04193500	07-10-96	1.30	<1.00	<1.00	<2.00	<2.00	<50	e2 ^o
04208504	08-20-96 ^A	e2.20	<5.00	6.50	<2.00	e8.70	170	58
04208504	08-20-96 ^B	e2.10	<5.00	8.10	<2.00	e8.40	220	81
04208504	08-20-96 ^C	e3.50	<1.00	6.40	<2.00	6.00	210	6 ^o
04211820	08-21-96	<1.00	<1.00	1.20	<2.00	<2.00	e28	<5 ^o
04213500	08-22-96	<1.00	<1.00	<1.00	<2.00	<2.00	<50	<5 ^o
STATION NUMBER	DATE	DI-N BUTYL PHTHALATE, BED SED, WS <2MM DW, REC (UG/KG) (49381)	1,2- DICHLORO- BENZENE, BED SED, WS <2MM DW, REC (UG/KG) (49439)	1,3- DICHLORO- BENZENE, BED SED, WS <2MM DW, REC (UG/KG) (49441)	1,4- DICHLORO- BENZENE, BED SED, WS <2MM DW, REC (UG/KG) (49442)	DIELDRIN, BED SED, WS <2MM DW, REC (UG/KG) (49331)	DIETHYL PHTHALATE, BED SED, WS <2MM DW, REC (UG/KG) (49383)	1,2-DIMETHYL- NAPHTHALENE, BED SED, WS <2MM DW, REC (UG/KG) (49403)
04159492	07-11-96	e49	<50	<50	<50	<1.00	e22	<50
04161820	07-12-96	61	<50	<50	e6.0	<1.00	e26	<50
04175600	07-10-96	61	<50	<50	<50	<1.00	e22	<50
04178000	07-09-96	62	<50	<50	<50	1.40	e24	<50
04183000	07-09-96	75	<50	<50	e10	<1.00	e25	e22
04186500	07-08-96	61	<50	<50	<50	4.60	e34	e9.0
04193500	07-10-96	53	<50	<50	<50	1.00	e24	<50
04208504	08-20-96 ^A	68	<50	<50	e13	1.70	e32	e11
04208504	08-20-96 ^B	67	<50	<50	e15	2.00	e44	e11
04208504	08-20-96 ^C	82	<50	<50	<50	<1.00	e25	e29
04211820	08-21-96	e46	<50	<50	<50	<1.00	e39	<50
04213500	08-22-96	61	<50	<50	<50	<1.00	e41	<50

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	4,5-METHYLENE-PHEN-ANTHRENE, 9H-FLUORENE, 1-METHYL-9H-FLUORENE, BED SED, WS <2MM DW, REC (UG/KG)						
		ISOPHORONE, BED SED, WS <2MM DW, REC (UG/KG) (49400)	ISOQUINO-LINE, BED SED, WS <2MM DW, REC (UG/KG) (49394)	O,P- METHOXY- CHLOR, BED SED, WS <2MM DW, REC (UG/KG) (49347)	PP- METHOXY- CHLOR, BED SED, WS <2MM DW, REC (UG/KG) (49346)	2-METHYL- ANTHRACENE, BED SED, WS <2MM DW, REC (UG/KG) (49435)	METHYLENE-PHEN-ANTHRENE, BED SED, WS <2MM DW, REC (UG/KG) (49411)	1-METHYL-9H-FLUORENE, BED SED, WS <2MM DW, REC (UG/KG) (49398)
04159492	07-11-96	<50	<50	<5.00	<5.00	<50	<50	<50
04161820	07-12-96	<50	<50	<5.00	<5.00	e34	78	<50
04175600	07-10-96	<50	<50	<5.00	<5.00	e21	e21	<50
04178000	07-09-96	<50	<50	<5.00	<5.00	e23	e25	<50
04183000	07-09-96	<50	<50	<5.00	<5.00	88	170	e41
04186500	07-08-96	<50	<50	<5.00	<5.00	e23	e29	e21
04193500	07-10-96	<50	<50	<5.00	<5.00	e27	e35	e27
04208504	08-20-96 ^A	<50	<50	<5.00	<5.00	e47	160	e28
04208504	08-20-96 ^B	<50	e12	<5.00	<5.00	65	230	e28
04208504	08-20-96 ^C	<50	<50	<5.00	<5.00	52	170	e33
04211820	08-21-96	<50	<50	<5.00	<5.00	<50	<50	<50
04213500	08-22-96	<50	<50	<5.00	<5.00	<50	e9.0	<50
STATION NUMBER	DATE	1-METHYL-PHEN-ANTHRENE, 1-METHYL-PYRENE, MIREX, NAPHTHALENE, NITRO-BENZENE, N-NITRO-SODIPHENYLAMINE, N-NITRO-N-ISO-PROPYLAMINE, BED SED, WS <2MM DW, REC (UG/KG)						
		1-METHYL-PHEN-ANTHRENE, BED SED, WS <2MM DW, REC (UG/KG) (49410)	1-METHYL-PYRENE, BED SED, WS <2MM DW, REC (UG/KG) (49388)	MIREX, BED SED, WS <2MM DW, REC (UG/KG) (49348)	NAPHTHALENE, BED SED, WS <2MM DW, REC (UG/KG) (49402)	NITRO-BENZENE, BED SED, WS <2MM DW, REC (UG/KG) (49444)	N-NITRO-SODIPHENYLAMINE, BED SED, WS <2MM DW, REC (UG/KG) (49433)	N-NITRO-N-ISO-PROPYLAMINE, BED SED, WS <2MM DW, REC (UG/KG) (49431)
04159492	07-11-96	e19	e18	<1.00	<50	<50	<50	<50
04161820	07-12-96	e43	50	<1.00	e12	<50	<50	<50
04175600	07-10-96	e19	e19	<1.00	<50	<50	<50	<50
04178000	07-09-96	e24	e23	<1.00	<50	<50	<50	<50
04183000	07-09-96	110	120	<1.00	62	<50	<50	<50
04186500	07-08-96	e30	e22	<1.00	<50	<50	e32	<50
04193500	07-10-96	e34	e27	<1.00	<50	<50	<50	<50
04208504	08-20-96 ^A	93	110	<1.00	67	<50	<50	<50
04208504	08-20-96 ^B	110	87	<1.00	71	<50	<50	<50
04208504	08-20-96 ^C	140	110	<1.00	75	<50	56	<50
04211820	08-21-96	e12	e12	<1.00	e17	<50	<50	<50
04213500	08-22-96	e10	e15	<1.00	<5.0	<50	<50	<50
STATION NUMBER	DATE	CIS-NONACHLOR, TRANS-NONACHLOR, OXY-CHLORDANE, PENTA-CHLORO ANISOLE, PENTA-CHLORO-NITRO-BENZENE, CIS-PERMETHRIN, TRANS-PERMETHRIN, BED SED, WS <2MM DW, REC (UG/KG)						
		CIS-NONACHLOR, BED SED, WS <2MM DW, REC (UG/KG) (49316)	TRANS-NONACHLOR, BED SED, WS <2MM DW, REC (UG/KG) (49317)	OXY-CHLORDANE, BED SED, WS <2MM DW, REC (UG/KG) (49318)	PENTA-CHLORO ANISOLE, BED SED, WS <2MM DW, REC (UG/KG) (49460)	PENTA-CHLORO-NITRO-BENZENE, BED SED, WS <2MM DW, REC (UG/KG) (49446)	CIS-PERMETHRIN, BED SED, WS <2MM DW, REC (UG/KG) (49349)	TRANS-PERMETHRIN, BED SED, WS <2MM DW, REC (UG/KG) (49350)
04159492	07-11-96	<1.00	<1.00	<1.00	<1.0	<50	<5.00	<5.00
04161820	07-12-96	<1.00	<1.00	<1.00	<1.0	<50	<5.00	<5.00
04175600	07-10-96	<1.00	<1.00	<1.00	<1.0	<50	<5.00	<5.00
04178000	07-09-96	<1.00	<1.00	<1.00	<1.0	<50	<5.00	<5.00
04183000	07-09-96	<1.00	<1.00	<1.00	<1.0	<50	<7.00	<11.0
04186500	07-08-96	<1.00	<1.00	<1.00	<1.0	<50	<5.00	<5.00
04193500	07-10-96	<1.00	<1.00	<1.00	<1.0	<50	<5.00	<5.00
04208504	08-20-96 ^A	<1.00	4.20	<1.00	<1.0	<50	<10.0	<6.20
04208504	08-20-96 ^B	<1.00	4.20	<1.00	<1.0	<50	<13.0	<12.0
04208504	08-20-96 ^C	<1.00	2.40	<1.00	<1.0	<50	<5.00	<12.0
04211820	08-21-96	<1.00	<1.00	<1.00	<1.0	<50	<5.00	<5.00
04213500	08-22-96	<1.00	<1.00	<1.00	<1.0	<50	<5.00	<5.00

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	PHEN- ANTHRENE, BED SED, WS <2MM DW, REC (UG/KG) (49409)	PHEN- ANTHRIDINE, BED SED, WS <2MM DW, REC (UG/KG) (49393)	PHENOL, BED SED, WS <2MM DW, REC (UG/KG) (49413)	PYRENE, BED SED, WS <2MM DW, REC (UG/KG) (49387)	QUINOLINE, BED SED, WS <2MM DW, REC (UG/KG) (49392)	TOXAPHENE, BED SED, WS <2MM DW, REC (UG/KG) (49351)	1,2,4-TRI- CHLORO BENZENE, BED SED, WS <2MM DW, REC (UG/KG) (49438)
04159492	07-11-96	e11	<50	e10	e21	<50	<200	<50
04161820	07-12-96	380	e31	e25	740	<50	<200	<50
04175600	07-10-96	e16	<50	e15	e32	<50	<200	<50
04178000	07-09-96	e33	<50	e23	62	<50	<200	<50
04183000	07-09-96	970	e48	e21	1400	<50	<200	<50
04186500	07-08-96	e37	<50	e16	63	<50	<200	<50
04193500	07-10-96	62	<50	e26	120	<50	<200	<50
04208504	08-20-96 ^A	950	e40	61	1500	<50	<200	<50
04208504	08-20-96 ^B	1300	e44	67	2000	<50	<200	<50
04208504	08-20-96 ^C	990	e25	75	1400	<50	<200	<50
04211820	08-21-96	e46	<50	e13	79	<50	<200	<50
04213500	08-22-96	e44	<50	<50	84	<50	<200	<50

STATION NUMBER	DATE	2,3,6 TRIMETHYL- NAPH- THALENE, BED SED, WS <2MM DW, REC (UG/KG) (49405)	% SAND BED MAT. <2 MM AND >.062 MM	% SILT BED MAT. <.062 MM AND >.004 MM	% CLAY BED MAT. <.004 MM
04159492	07-11-96	<50	90.2	6.3	3.5
04161820	07-12-96	e7.0	69.3	22.8	7.9
04175600	07-10-96	<50	78.5	12.2	9.3
04178000	07-09-96	<5.0	57.7	22.3	20.0
04183000	07-09-96	e22	92.2	4.5	3.3
04186500	07-08-96	e13	62.0	30.2	7.8
04193500	07-10-96	e8.0	79.4	13.6	7.0
04208504	08-20-96 ^A	e22	50.4	30.3	19.3
04208504	08-20-96 ^B	e25	53.0	27.8	19.2
04208504	08-20-96 ^C	e39	47.8	32.3	19.9
04211820	08-21-96	<50	55.9	31.7	12.4
04213500	08-22-96	<50	21.0	53.9	25.1

REFERENCES CITED:

Shelton, L.R., and Capel, P.D., 1994, *Guidelines for collecting and processing samples of stream bed sediment for analysis of trace elements and organic contaminants for the National Water-Quality Assessment Program*: U.S. Geological Survey Open-File Report 94-458, 20 p.

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 elements and organochlorine compounds in fish tissue. The following species were collected: common carp (*Cyprinus carpio*), and rock bass (*Ambloplites rupestris*). Where more than one sample was collected at a particular site and date, the letter after the species distinguishes each sample. Information regarding methods can be found in Crawford and Luoma, 1994.

Each sample for trace element analyses consists of a composite of liver tissue taken from 1 to 10 fish. Sexually-mature fish were sought. Laboratory procedures include (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 (DRY WGT) basis. Concentrations are corrected for percent water. (MM = Millimeters, SDEV = Standard deviation, MIN = Minimum, MAX = Maximum, F = Female, M = Male, REC = Recoverable, UG/G = micrograms per gram, (49273) = USGS National Water Quality Laboratory parameter code).

CALENDAR YEAR 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
04178000	ST JOSEPH RIVER NEAR NEWVILLE, IN	07-22-96	1300	COMMON CARP	4	4	8
04183000	MAUMEE RIVER AT NEW HAVEN, IN	09-05-96	1130	COMMON CARP	5	3	8
04186500	AUGLAIZE RIVER NEAR FORT JENNINGS, OH	07-26-96	0950	COMMON CARP	3	5	8
04193500	MAUMEE RIVER AT WATERVILLE, OH	08-08-96	1400	COMMON CARP ^A	2	6	8
04193500	MAUMEE RIVER AT WATERVILLE, OH	08-08-96	1600	COMMON CARP ^B	6	2	8
04208504	CUYAHOGA RIVER AT LTV STEEL AT CLEVELAND, OH	10-08-96	1200	COMMON CARP	3	5	8
04211820	GRAND RIVER AT HARPERSFIELD, OH	08-06-96	1000	ROCK BASS	5	5	10

STATION NUMBER	SPECIES	TOTAL LENGTH OF FISH (MM)				WEIGHT OF FISH (GRAMS)				AGE OF FISH (YEARS)			
		MEAN	SDEV	MIN	MAX	MEAN	SDEV	MIN	MAX	MEAN	SDEV	MIN	MAX
04159492	COMMON CARP	429	100	285	515	1180	712	300	2041	5.8	1.3	4	7
04161820	COMMON CARP	591	--	591	591	2812	--	2812	2812	10	--	10	10
04175600	ROCK BASS	163	59	79	240	133	65	80	260	4.1	1.0	3	6
04178000	COMMON CARP	501	75	410	650	1843	959	907	3856	8.1	2.3	6	13
04183000	COMMON CARP	509	72	405	593	1891	760	816	2926	8.9	1.8	6	11
04186500	COMMON CARP	482	70	345	600	1616	691	680	2948	8.2	1.3	6	10
04193500	COMMON CARP ^A	490	35	453	563	1531	297	1361	2155	7.2	1.2	5	9
04193500	COMMON CARP ^B	444	32	387	482	1043	169	794	1247	6.9	1.0	5	8
04208504	COMMON CARP	665	56	568	735	4695	1367	3062	6804	11	2.2	8	15
04211820	ROCK BASS	140	29	110	197	58	38	26	142	2.4	0.7	2	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 -- Continued

STATION NUMBER	SPECIES	WATER PRESENT, BIOTA, TISSUE, DRY WGT REC (49273)	ALUMI- NUM, BIOTA, TISSUE, DRY WGT REC (49237)	ANTI- MONY, BIOTA, TISSUE, DRY WGT REC (49246)	ARSENIC, BIOTA, TISSUE, DRY WGT REC (49247)	BARIUM, BIOTA, TISSUE, DRY WGT REC (49238)	BERYL- LIUM, BIOTA, TISSUE, DRY WGT REC (49248)	BORON, BIOTA, TISSUE, DRY WGT REC (49239)	CADMIUM, BIOTA, TISSUE, DRY WGT REC (49249)
04159492	COMMON CARP	74	1.7	<0.2	0.6	<0.1	<0.2	0.3	3.2
04161820	COMMON CARP	69	13	<0.2	0.2	<0.1	<0.2	<0.2	1.7
04175600	ROCK BASS	79	<1.0	<0.3	0.6	0.5	<0.3	1.1	2.0
04178000	COMMON CARP	61	1.4	<0.1	0.1	<0.1	<0.1	0.2	2.9
04183000	COMMON CARP	73	28	<0.2	0.2	0.3	<0.2	0.3	16
04186500	COMMON CARP	71	<1.0	<0.2	<0.2	<0.1	<0.2	0.4	4.0
04193500	COMMON CARP ^A	76	9.3	<0.2	0.5	<0.1	<0.2	0.3	58
04193500	COMMON CARP ^B	72	12	<0.2	0.8	0.1	<0.2	<0.2	39
04208504	COMMON CARP	73	9.8	<0.2	1.0	<0.1	<0.2	0.2	15
04211820	ROCK BASS	78	<1.0	<0.3	0.8	0.2	<0.3	4.0	1.8
STATION NUMBER	SPECIES	CHROM- IUM, BIOTA, TISSUE, DRY WGT REC (49240)	COBALT, BIOTA, TISSUE, DRY WGT REC (49250)	COPPER, BIOTA, TISSUE, DRY WGT REC (49241)	IRON, BIOTA, TISSUE, DRY WGT REC (49242)	LEAD, BIOTA, TISSUE, DRY WGT REC (49251)	MANGA- NESE, BIOTA, TISSUE, DRY WGT REC (49243)	MER- CURY, BIOTA, TISSUE, DRY WGT REC (49258)	MOLYB- DENUM, BIOTA, TISSUE, DRY WGT REC (49252)
04159492	COMMON CARP	<0.5	<0.2	95	620	<0.2	6.0	0.9	1.1
04161820	COMMON CARP	<0.5	<0.2	93	1300	0.6	3.4	0.2	0.7
04175600	ROCK BASS	0.7	0.5	8.5	300	<0.3	7.6	0.3	1.1
04178000	COMMON CARP	<0.5	<0.1	38	340	<0.1	2.9	0.2	0.7
04183000	COMMON CARP	0.5	<0.2	90	690	0.4	4.8	0.3	1.3
04186500	COMMON CARP	<0.5	<0.2	58	310	<0.2	2.7	0.1	0.7
04193500	COMMON CARP ^A	<0.5	<0.2	200	710	0.3	3.5	1.0	1.7
04193500	COMMON CARP ^B	<0.5	<0.2	120	860	0.3	2.8	0.3	1.3
04208504	COMMON CARP	<0.5	<0.2	82	580	0.4	4.0	0.2	0.8
04211820	ROCK BASS	0.7	0.5	10	300	<0.3	7.3	0.3	0.9
STATION NUMBER	SPECIES	NICKEL, BIOTA, TISSUE, DRY WGT REC (49253)	SELEN- IUM, BIOTA, TISSUE, DRY WGT REC (49254)	SILVER, BIOTA, TISSUE, DRY WGT REC (49255)	STRON- TIUM, BIOTA, TISSUE, DRY WGT REC (49244)	URANIUM, BIOTA, TISSUE, DRY WGT REC (49257)	VANA- DIUM, BIOTA, TISSUE, DRY WGT REC (49465)	ZINC, BIOTA, TISSUE, DRY WGT REC (49245)	
04159492	COMMON CARP	<0.2	5.3	0.8	0.2	<0.2	0.4	670	
04161820	COMMON CARP	<0.2	6.1	0.6	0.3	<0.2	0.6	1500	
04175600	ROCK BASS	<0.3	8.3	<0.3	1.1	<0.3	<0.3	88	
04178000	COMMON CARP	<0.1	1.8	0.2	0.4	<0.1	<0.1	310	
04183000	COMMON CARP	<0.2	7.7	0.8	1.7	<0.2	0.6	980	
04186500	COMMON CARP	<0.2	5.1	0.3	1.0	<0.2	<0.2	250	
04193500	COMMON CARP ^A	<0.2	7.2	2.1	1.1	<0.2	0.8	900	
04193500	COMMON CARP ^B	<0.2	5.6	1.1	0.9	<0.2	0.7	910	
04208504	COMMON CARP	<0.2	5.5	0.9	0.3	<0.2	0.7	890	
04211820	ROCK BASS	<0.3	6.7	<0.3	0.7	<0.3	<0.3	89	

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

Each sample for organochlorine analyses consists of a composite of 3 to 8 whole fish. Sexually-mature fish were sought. Where more than one sample was collected at a particular site and date, the letter after the species distinguishes each sample. Laboratory procedures include (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 and are not corrected for percent lipids. Constituent names are abbreviated as follows: DDD, dichlorodiphenyldichloroethane; DDE, dichlorodiphenyldichloroethene; DCPA, dimethyl tetrachloroterephthalate; DDT, dichlorodiphenyltrichloroethane; HCH, hexachlorocyclohexane; PCB, polychlorinated biphenyls. (MM = Millimeters, SDEV = Standard deviation, MIN = Minimum, MAX = Maximum, F = Female, M = Male, REC = Recoverable, WH ORG = Whole organic analysis fish, UG/KG = micrograms per kilogram, (49289) = the USGS National Water Quality Laboratory parameter code, e = Estimated, -- = No data).

CALENDAR YEAR 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	2	3	5
04161820	CLINTON RIVER AT STERLING HEIGHTS, MI	09-04-96	1400	ROCK BASS	2	1	3
04175600	RIVER RAISIN NEAR MANCHESTER, MI	07-23-96	1300	ROCK BASS	3	5	8
04178000	ST JOSEPH RIVER NEAR NEWVILLE, IN	07-22-96	1300	COMMON CARP	3	5	8
04183000	MAUMEE RIVER AT NEW HAVEN, IN	09-05-96	1130	COMMON CARP	6	2	8
04186500	AUGLAIZE RIVER NEAR FORT JENNINGS, OH	07-26-96	0950	COMMON CARP	4	4	8
04193500	MAUMEE RIVER AT WATERVILLE, OH	08-08-96	1400	COMMON CARP ^A	3	5	8
04193500	MAUMEE RIVER AT WATERVILLE, OH	08-08-96	1600	COMMON CARP ^B	7	1	8
04208504	CUYAHOGA RIVER AT LTV STEEL AT CLEVELAND, OH	10-08-96	1200	COMMON CARP	7	1	8
04211820	GRAND RIVER AT HARPERSFIELD, OH	08-06-96	1000	ROCK BASS	3	5	8

STATION NUMBER	SPECIES	TOTAL LENGTH OF FISH (MM)				WEIGHT OF FISH (GRAMS)				AGE OF FISH (YEARS)			
		MEAN	SDEV	MIN	MAX	MEAN	SDEV	MIN	MAX	MEAN	SDEV	MIN	MAX
04159492	COMMON CARP	428	86	305	533	1072	585	454	1928	5.6	1.5	3	7
04161820	ROCK BASS	195	48	164	250	164	100	105	280	5	1.0	4	6
04175600	ROCK BASS	186	30	138	223	135	60	56	214	4.2	1.0	3	6
04178000	COMMON CARP	492	42	435	560	1740	435	1247	2608	7.8	0.9	6	9
04183000	COMMON CARP	454	37	385	502	1264	286	771	1633	7.5	0.7	6	8
04186500	COMMON CARP	456	106	257	582	1387	767	210	2495	7.1	2.4	3	9
04193500	COMMON CARP ^A	468	47	432	576	1233	350	907	2041	7.4	0.9	6	9
04193500	COMMON CARP ^B	416	45	375	515	950	373	680	1814	6.1	0.6	5	7
04208504	COMMON CARP	566	42	512	622	2882	682	1701	3683	9.4	1.4	7	12
04211820	ROCK BASS	159	23	126	197	82	40	35	160	2.9	0.6	2	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 -- Continued

STATION NUMBER	SPECIES	PP- METHOXY CHLOR, BIOTA, WH ORG WW, REC (UG/KG) (49361)	MIREX, BIOTA, WH ORG WW, REC (UG/KG) (49360)	CIS- NONA- CHLOR, BIOTA, WH ORG WW, REC (UG/KG) (49359)	TRANS- NONA- CHLOR, BIOTA, WH ORG WW, REC (UG/KG) (49358)	OXY- CHLOR- DANE, BIOTA, WH ORG WW, REC (UG/KG) (49357)	PENTA- CHLORO- ANISOLE, BIOTA, WH ORG WW, REC (UG/KG) (49356)	PCB, BIOTA, WH ORG WW, REC (UG/KG) (49354)
04159492	COMMON CARP	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<50.0
04161820	ROCK BASS	<5.00	<5.00	<5.00	6.00	<5.00	<5.00	110
04175600	ROCK BASS	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<50.0
04178000	COMMON CARP	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	67
04183000	COMMON CARP	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	270
04186500	COMMON CARP	<5.00	<5.00	<5.00	16.0	<5.00	<5.00	210
04193500	COMMON CARP ^A	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	670
04193500	COMMON CARP ^B	<5.00	<5.00	<5.00	11.0	<5.00	<5.00	870
04208504	COMMON CARP	<10.0	<5.00	e12.0	e51.0	e6.20	<5.00	3200
04211820	ROCK BASS	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<50.0

STATION NUMBER	SPECIES	TOXA- PHENE, BIOTA, WH ORG WW, REC (UG/KG) (49355)
04159492	COMMON CARP	<200
04161820	ROCK BASS	<200
04175600	ROCK BASS	<200
04178000	COMMON CARP	<200
04183000	COMMON CARP	<200
04186500	COMMON CARP	<200
04193500	COMMON CARP ^A	<200
04193500	COMMON CARP ^B	<200
04208504	COMMON CARP	<200
04211820	ROCK BASS	<200

REFERENCES CITED:

Crawford, J.K. and Luoma, S.N., 1994, *Guidelines for studies of contaminants in biological tissues for the National Water-Quality Assessment Program*: U.S. Geological Survey, Open-File Report 92-494, 69 p.

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 elements and organochlorine compounds in fish tissue. The following species were collected: common carp (*Cyprinus carpio*), and northern hog sucker (*Hypentelium nigricans*). Information regarding methods can be found in Crawford and Luoma, 1994.

Each sample for trace element analyses consists of a composite of liver tissue taken from 6 to 12 fish. Sexually-mature fish were sought. Laboratory procedures include (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 (DRY WGT) basis. Concentrations are corrected for percent water. (MM = Millimeters, SDEV = Standard deviation, MIN = Minimum, MAX = Maximum, F = Female, M = Male, REC = Recoverable, UG/G = micrograms per gram, (49273) = the USGS National Water Quality Laboratory parameter code).

CALENDAR YEAR 1997

STATION NUMBER	STATION NAME	DATE	TIME	SPECIES	NUMBER IN COMPOSITE		
					M	F	TOTAL
04161820	CLINTON RIVER AT STERLING HEIGHTS, MI	07/29/97	2100	COMMON CARP	2	4	6
413101084521301	FISH CREEK NEAR HAMILTON, IN	08/12/97	1600	COMMON CARP	5	3	8
04211820	GRAND RIVER AT HARPERSFIELD, OH	07/22/97	0930	COMMON CARP	2	6	8
04213500	CATTARAUGUS CREEK AT GOWANDA, NY	09/24/97	1330	HOG SUCKER	6	6	12

STATION NUMBER	SPECIES	TOTAL LENGTH OF FISH (MM)				WEIGHT OF FISH (GRAMS)				AGE OF FISH (YEARS)			
		MEAN	SDEV	MIN	MAX	MEAN	SDEV	MIN	MAX	MEAN	SDEV	MIN	MAX
04161820	COMMON CARP	539	80	401	648	2816	1582	1134	5783	10	2.3	7	14
413101084521301	COMMON CARP	601	50	492	662	3226	769	1701	4264	10.9	1.6	9	14
04211820	COMMON CARP	699	89	578	860	5713	2909	2495	11567	13.6	2.6	10	18
04213500	HOG SUCKER	238	34	202	298	165	67	95	283	3.2	1.4	1	5

STATION NUMBER	SPECIES	WATER PRESENT, BIOTA, TISSUE, DRY WGT REC PERCENT (49273)	ALUMI- NUM, BIOTA, TISSUE, DRY WGT REC (UG/G) (49237)	ANTI- MONY, BIOTA, TISSUE, DRY WGT REC (UG/G) (49246)	ARSENIC, BIOTA, TISSUE, DRY WGT REC (UG/G) (49247)	BARIUM, BIOTA, TISSUE, DRY WGT REC (UG/G) (49238)	BERYL- LIUM, BIOTA, TISSUE, DRY WGT REC (UG/G) (49248)	BORON, BIOTA, TISSUE, DRY WGT REC (UG/G) (49239)
04161820	COMMON CARP	67	11.4	<0.15	0.41	0.27	<0.15	0.40
413101084521301	COMMON CARP	73	5.4	<0.20	0.28	0.37	<0.20	<0.04
04211820	COMMON CARP	69	4.5	<0.14	0.82	<0.10	<0.14	0.53
04213500	HOG SUCKER	77	<0.1	<0.27	0.63	0.16	<0.27	0.40

STATION NUMBER	SPECIES	CADMIUM, BIOTA, TISSUE, DRY WGT REC (UG/G) (49249)	CHROM- IUM, BIOTA, TISSUE, DRY WGT REC (UG/G) (49240)	COBALT, BIOTA, TISSUE, DRY WGT REC (UG/G) (49250)	COPPER, BIOTA, TISSUE, DRY WGT REC (UG/G) (49241)	IRON, BIOTA, TISSUE, DRY WGT REC (UG/G) (49242)	LEAD, BIOTA, TISSUE, DRY WGT REC (UG/G) (49251)	MANGA- NESE, BIOTA, TISSUE, DRY WGT REC (UG/G) (49243)	MER- CURY, BIOTA, TISSUE, DRY WGT REC (UG/G) (49258)
04161820	COMMON CARP	6.0	<0.5	<0.15	69.4	511	0.35	4.22	0.56
413101084521301	COMMON CARP	6.2	<0.5	<0.20	193	839	<0.20	6.86	0.12
04211820	COMMON CARP	24.2	<0.5	0.17	98.6	660	<0.14	6.16	0.23
04213500	HOG SUCKER	1.1	0.6	0.27	22.9	149	<0.27	5.61	0.08

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

STATION NUMBER	SPECIES	MOLYB- DENUM, BIOTA, TISSUE, DRY WGT REC (UG/G) (49252)	NICKEL, BIOTA, TISSUE, DRY WGT REC (UG/G) (49253)	SELE- NIUM, BIOTA, TISSUE, DRY WGT REC (UG/G) (49254)	SILVER, BIOTA, TISSUE, DRY WGT REC (UG/G) (49255)	STRON- TIUM, BIOTA, TISSUE, DRY WGT REC (UG/G) (49244)	URANIUM, BIOTA, TISSUE, DRY WGT REC (UG/G) (49257)	VANA- DIUM, BIOTA, TISSUE, DRY WGT REC (UG/G) (49465)	ZINC, BIOTA, TISSUE, DRY WGT REC (UG/G) (49245)
04161820	COMMON CARP	0.89	0.18	6.66	0.58	0.34	<0.15	0.47	553
413101084521301	COMMON CARP	2.13	<0.20	8.52	0.87	1.66	<0.20	0.52	849
04211820	COMMON CARP	1.07	<0.14	4.64	0.72	0.61	<0.14	0.65	734
04213500	HOG SUCKER	1.94	<0.27	4.49	<0.27	0.24	<0.27	<0.27	89

Each sample for organochlorine analyses consists of a composite of 6 to 8 whole fish. Sexually-mature fish were sought. Laboratory procedures include (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 and are not corrected for percent lipids. Constituent names are abbreviated as follows: DDD, dichlorodiphenyldichloroethane; DDE, dichlorodiphenyldichloroethene; DCPA, dimethyl tetrachloroterephthalate; DDT, dichlorodiphenyltrichloroethane; HCH, hexachlorocyclohexane; PCB, polychlorinated biphenyls. (MM = Millimeters, SDEV = Standard deviation, MIN = Minimum, MAX = Maximum, F = Female, M = Male, REC = Recoverable, WH ORG = Whole organic analysis fish, UG/KG = micrograms per kilogram, (49289) = the USGS National Water Quality Laboratory parameter code, e = Estimated, -- = No data).

CALENDAR YEAR 1997

STATION NUMBER	STATION NAME	DATE	TIME	SPECIES	NUMBER IN COMPOSITE		
					M	F	TOTAL
04161820	CLINTON RIVER. AT STERLING HEIGHTS, MI	07/29/97	2100	COMMON CARP	1	5	6
413101084521301	FISH CREEK NEAR HAMILTON, IN	08/12/97	1600	COMMON CARP	3	5	8
04211820	GRAND RIVER. AT HARPERSFIELD, OH	07/22/97	0930	COMMON CARP	7	1	8
04213500	CATTARAUGUS CREEK. AT GOWANDA, NY	09/24/97	1330	HOG SUCKER	5	3	8

STATION NUMBER	SPECIES	TOTAL LENGTH OF FISH (MM)				WEIGHT OF FISH (GRAMS)				AGE OF FISH (YEARS)			
		MEAN	SDEV	MIN	MAX	MEAN	SDEV	MIN	MAX	MEAN	SDEV	MIN	MAX
04161820	COMMON CARP	489	65	378	541	2192	854	907	3175	8.7	1.6	5	10
413101084521301	COMMON CARP	487	55	412	553	1738	601	1043	2495	8.4	0.5	8	9
04211820	COMMON CARP	547	97	402	650	2310	1050	907	3629	10	2.6	7	14
04213500	HOG SUCKER	245	17	220	276	167	36	120	230	3	1.2	2	5

STATION NUMBER	SPECIES	LIPIDS, BIOTA, WH ORG WW, REC PERCENT (49289)	ALDRIN, BIOTA, WH ORG WW, REC (UG/KG) (49353)	CIS- CHLOR- DANE, BIOTA, WH ORG WW, REC (UG/KG) (49380)	TRANS- CHLOR- DANE, BIOTA, WH ORG WW, REC (UG/KG) (49379)	DCPA, BIOTA, WH ORG WW, REC (UG/KG) (49378)	O,P'- DDD, BIOTA, WH ORG WW, REC (UG/KG) (49374)	P,P'- DDD, BIOTA, WH ORG WW, REC (UG/KG) (49375)
04161820	COMMON CARP	12.0	<5.0	18.0	7.6	<5.0	6.7	e32.0
413101084521301	COMMON CARP	e10.0	<5.0	e4.0	e1.9	<5.0	<5.0	e5.4
04211820	COMMON CARP	18.0	<5.0	20.0	13.0	<5.0	<5.0	e22.0
04213500	HOG SUCKER	3.2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

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

STATION NUMBER	SPECIES	O,P'- DDE, BIOTA, WH ORG WW, REC (UG/KG) (49373)	P,P'- DDE, BIOTA, WH ORG WW, REC (UG/KG) (49372)	O,P'- DDT, BIOTA, WH ORG WW, REC (UG/KG) (49377)	P,P'- DDT, BIOTA, WH ORG WW, REC (UG/KG) (49376)	DIELDRIN, BIOTA, WH ORG WW, REC (UG/KG) (49371)	ENDRIN, BIOTA, WH ORG WW, REC (UG/KG) (49370)	ALPHA- HCH, BIOTA, WH ORG WW, REC (UG/KG) (49366)
04161820	COMMON CARP	35.0	370	<5.0	6.5	<5.0	<5.0	<5.0
413101084521301	COMMON CARP	<5.0	41	<5.0	<5.0	5.7	<5.0	<5.0
04211820	COMMON CARP	<5.0	100	<5.0	<5.0	6.9	<5.0	<5.0
04213500	HOG SUCKER	<5.0	e4.6	<5.0	<5.0	<5.0	<5.0	<5.0

STATION NUMBER	SPECIES	BETA- HCH, BIOTA, WH ORG WW, REC (UG/KG) (49365)	DELTA- HCH, BIOTA, WH ORG WW, REC (UG/KG) (49364)	LINDANE, BIOTA, WH ORG WW, REC (UG/KG) (49363)	HEPTA- CHLOR, BIOTA, WH ORG WW, REC (UG/KG) (49369)	HEPTA- CHLOR, EPOXIDE, BIOTA, WH ORG WW, REC (UG/KG) (49368)	HEXA- CHLORO- BENZENE, BIOTA, WH ORG WW, REC (UG/KG) (49367)	O,P'- METHOXY CHLOR, BIOTA, WH ORG WW, REC (UG/KG) (49362)
04161820	COMMON CARP	<5.0	<5.0	<5.0	<5.0	<5.0	e3.4	<5.0
413101084521301	COMMON CARP	<5.0	<5.0	<5.0	<5.0	<5.0	e1.1	<5.0
04211820	COMMON CARP	<5.0	<5.0	<5.0	<5.0	<5.0	e3.2	<7.0
04213500	HOG SUCKER	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

STATION NUMBER	SPECIES	P,P'- METHOXY CHLOR, BIOTA, WH ORG WW, REC (UG/KG) (49361)	MIREX, BIOTA, WH ORG WW, REC (UG/KG) (49360)	CIS- NONA- CHLOR, BIOTA, WH ORG WW, REC (UG/KG) (49359)	TRANS- NONA- CHLOR, BIOTA, WH ORG WW, REC (UG/KG) (49358)	OXY- CHLOR- DANE, BIOTA, WH ORG WW, REC (UG/KG) (49357)	PENTA- CHLORO- ANISOLE, BIOTA, WH ORG WW, REC (UG/KG) (49356)	PCB, BIOTA, WH ORG WW, REC (UG/KG) (49354)
04161820	COMMON CARP	<5.0	<5.0	e4.2	16.0	<5.0	<5.0	670
413101084521301	COMMON CARP	<5.0	<5.0	<5.0	9.9	<5.0	e2.0	120
04211820	COMMON CARP	<5.0	<5.0	7.0	21.0	<5.0	e3.2	1400
04213500	HOG SUCKER	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<50

STATION NUMBER	SPECIES	TOXA- PHENE, BIOTA, WH ORG WW, REC (UG/KG) (49355)
04161820	COMMON CARP	<200
413101084521301	COMMON CARP	<200
04211820	COMMON CARP	<200
04213500	HOG SUCKER	<200

REFERENCES CITED:

Crawford, J.K. and Luoma, S.N., 1994, *Guidelines for studies of contaminants in biological tissues for the National Water-Quality Assessment Program*: U.S. Geological Survey, Open-File Report 92-494, 69 p.

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Fish community results from selected sites in the Lake Erie - Lake St. Clair Basin
(National Water-Quality Assessment Program)

Fish community surveys were conducted at 10 stream sites in the Lake Erie - Lake St. Clair basin in 1996. Fish were collected by electrofishing with pulsed-DC current in a mapped reach at each stream site. Two electrofishing passes were conducted at each reach on the same day. Kick seining was done briefly in riffles after completion of electrofishing. One-quarter inch mesh was used for the kick seine and the dip nets. Fish were identified, measured, weighed, and checked for external anomalies such as parasites, lesions, and skeletal deformities. Individuals were returned to the stream after processing. More details regarding collection methods can be found in Meador and others, 1993. Individual fish data (including length, weight, and anomalies) are available from the USGS, Lansing, Michigan. Additional surface-water and/or water-quality data for these sites can be found in the continuous-record sections of the Indiana, Michigan, New York and Ohio data reports.

Family names are in uppercase, scientific names are in italics, and common names are in parentheses. Common names follow American Fisheries Society (Robins and others, 1991). Undetermined and hybridized fish are located at the end of the table (— = unknown value, * = site sampled and fish identified by Ohio Environmental Protection Agency).

CALENDAR YEAR 1996

STATION NUMBER	STATION NAME	DATE	DRAINAGE AREA (mi ²)	REACH - A LENGTH (meters)	CATOSTOMIDAE		
					<i>Carpoides cyprinus</i> (quillback)		
					Number of Fish	Batch Weight (grams)	Fish with Anomalies
04159492	BLACK RIVER NEAR JEDDO, MI	07-24-96	464	466	0	0	0
04161820	CLINTON RIVER AT STERLING HEIGHTS, MI	07-25-96	309	286	0	0	0
04175600	RIVER RAISIN NEAR MANCHESTER, MI	07-23-96	132	247	0	0	0
04178000	ST JOSEPH RIVER NEAR NEWVILLE, IN	07-22-96	610	300	0	0	0
04183000*	MAUMEE RIVER AT NEW HAVEN, IN	09-05-96	1,967	352	1	542	0
04186500	AUGLAIZE RIVER NEAR FORT JENNINGS, OH	07-26-96	332	241	0	0	0
04193500	MAUMEE RIVER AT WATERVILLE, OH	08-08-96	6,330	500	2	910	0
04208504	CUYAHOGA RIVER AT LTV STEEL AT CLEVELAND, OH	10-08-96	788	313	0	0	0
04211820	GRAND RIVER AT HARPERSFIELD, OH	08-06-96	552	509	0	0	0
04213500	CATTARAUGUS CREEK AT GOWANDA, NY	08-07-96	436	368	0	0	0

CATOSTOMIDAE -- Continued

STATION NUMBER	<i>Catostomus commersoni</i> (white sucker)			<i>Hypentelium nigricans</i> (northern hog sucker)			<i>Minytrema melanops</i> (spotted sucker)			<i>Moxostoma anisurum</i> (silver redhorse)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04159492	0	0	0	36	1730	0	0	0	0	0	0	0
04161820	0	0	0	2	130	0	0	0	0	0	0	0
04175600	2	1	0	13	834	0	0	0	0	0	0	0
04178000	0	0	0	2	183	0	1	50	1	0	0	0
04183000*	0	0	0	0	0	0	0	0	0	2	2750	1
04186500	2	172	0	9	1070	0	2	340	0	0	0	0
04193500	0	0	0	2	754	0	0	0	0	0	0	0
04208504	11	4790	5	3	392	0	0	0	0	0	0	0
04211820	0	0	0	36	3560	0	0	0	0	1	23	0
04213500	10	60.5	0	20	597	0	0	0	0	0	0	0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Fish community results from selected sites in the Lake Erie - Lake St. Clair Basin -- Continued

CATOSTOMIDAE -- Continued

STATION NUMBER	<i>Moxostoma duquesnei</i> (black redhorse)			<i>Moxostoma erythrurum</i> (golden redhorse)			<i>Moxostoma macrolepidotum</i> (shorthead redhorse)			<i>Ambloplites rupestris</i> (rock bass)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04159492	0	0	0	20	2570	0	0	0	0	5	232	0
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04175600	0	0	0	9	2780	0	0	0	0	18	2190	6
04178000	0	0	0	0	0	0	0	0	0	7	454	2
04183000*	0	0	0	2	114	2	1	--	1	1	64	0
04186500	3	1590	0	0	0	0	0	0	0	2	115	0
04193500	0	0	0	0	0	0	5	1080	0	11	797	1
04208504	0	0	0	0	0	0	0	0	0	0	0	0
04211820	0	0	0	71	12600	0	0	0	0	70	2410	23
04213500	0	0	0	2	379	1	0	0	0	0	0	0

CENTRARCHIDAE -- Continued

STATION NUMBER	<i>Lepomis cyanellus</i> (green sunfish)			<i>Lepomis gibbosus</i> (pumpkinseed)			<i>Lepomis humilis</i> (orangespotted sunfish)			<i>Lepomis macrochirus</i> (bluegill)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04159492	6	27.1	0	1	6.8	0	0	0	0	0	0	0
04161820	0	0	0	0	0	0	0	0	0	1	16.5	0
04175600	0	0	0	0	0	0	0	0	0	0	0	0
04178000	16	131	0	0	0	0	0	0	0	8	26.4	0
04183000*	40	95	0	0	0	0	4	38	0	73	329	2
04186500	6	180	0	1	20	0	0	0	0	2	7.3	0
04193500	2	11.5	0	0	0	0	2	10.5	0	0	0	0
04208504	0	0	0	0	0	0	0	0	0	0	0	0
04211820	2	39	0	24	161	0	0	0	0	12	304	0
04213500	0	0	0	0	0	0	0	0	0	0	0	0

CENTRARCHIDAE -- Continued

STATION NUMBER	<i>Lepomis megalotis</i> (longear sunfish)			<i>Micropterus dolomieu</i> (smallmouth bass)			<i>Micropterus salmoides</i> (largemouth bass)			<i>Pomoxis annularis</i> (white crappie)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04159492	0	0	0	2	68	0	0	0	0	0	0	0
04161820	0	0	0	0	0	0	6	22.5	0	0	0	0
04175600	0	0	0	15	834	0	0	0	0	0	0	0
04178000	0	0	0	0	0	0	2	246	0	0	0	0
04183000*	0	0	0	2	320	0	0	0	0	0	0	0
04186500	6	113	0	1	340	0	0	0	0	0	0	0
04193500	0	0	0	12	1860	0	1	120	0	1	75	0
04208504	0	0	0	1	380	0	0	0	0	0	0	0
04211820	0	0	0	10	763	1	8	21.1	0	6	768	3
04213500	0	0	0	6	25.4	0	0	0	0	0	0	0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Fish community results from selected sites in the Lake Erie - Lake St. Clair Basin -- Continued

CENTRARCHIDAE -- Continued

CLUPEIDAE

CYPRINIDAE

STATION NUMBER	<i>Pomoxis nigromaculatus</i> (black crappie)			<i>Dorosoma cepedianum</i> (gizzard shad)			<i>Camptostoma anomalum</i> (central stoneroller)			<i>Carassius auratus</i> (goldfish)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04159492	0	0	0	0	0	0	3	27.2	0	0	0	0
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04175600	0	0	0	0	0	0	0	0	0	0	0	0
04178000	2	46	0	0	0	0	0	0	0	0	0	0
04183000*	0	0	0	7	14	0	0	0	0	1	8	0
04186500	0	0	0	0	0	0	0	0	0	0	0	0
04193500	1	125	0	10	64.5	0	0	0	0	0	0	0
04208504	0	0	0	130	2600	0	0	0	0	0	0	0
04211820	0	0	0	0	0	0	7	53.2	0	0	0	0
04213500	0	0	0	0	0	0	4	10.3	0	0	0	0

CYPRINIDAE -- Continued

STATION NUMBER	<i>Cyprinella spiloptera</i> (spotfin shiner)			<i>Cyprinus carpio</i> (common carp)			<i>Luxilus chrysocephalus</i> (striped shiner)			<i>Luxilus cornutus</i> (common shiner)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04159492	14	46.8	0	9	10100	0	1	7.6	0	30	198	0
04161820	1	85	0	1	4310	0	0	0	0	1	12.5	0
04175600	5	182	0	0	0	0	106	592	1	0	0	0
04178000	1	16	0	21	25800	2	0	0	0	0	0	0
04183000*	20	48	0	13	23000	1	0	0	0	0	0	0
04186500	25	59.8	0	17	28400	0	9	8	0	0	0	0
04193500	9	11.5	0	43	50300	0	6	3.5	0	0	0	0
04208504	0	0	0	16	60600	8	0	0	0	0	0	0
04211820	2	9.5	0	3	8620	0	21	157	0	0	0	0
04213500	0	0	0	0	0	0	12	143	0	0	0	0

CYPRINIDAE -- Continued

STATION NUMBER	<i>Nocomis biguttatus</i> (hornyhead chub)			<i>Nocomis micropogon</i> (river chub)			<i>Notropis atherinoides</i> (emerald shiner)			<i>Notropis hudsonius</i> (spottail shiner)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04159492	0	0	0	0	0	0	0	0	0	0	0	0
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04175600	20	516	0	1	51.5	0	0	0	0	1	10	0
04178000	1	21	0	0	0	0	0	0	0	0	0	0
04183000*	0	0	0	0	0	0	0	0	0	0	0	0
04186500	0	0	0	0	0	0	0	0	0	0	0	0
04193500	0	0	0	0	0	0	1	1	0	0	0	0
04208504	0	0	0	0	0	0	1	1.6	0	0	0	0
04211820	26	647	0	1	90	0	1	2.3	0	0	0	0
04213500	0	0	0	14	250	0	0	0	0	0	0	0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Fish community results from selected sites in the Lake Erie - Lake St. Clair Basin -- Continued

ICTALURIDAE – Continued

LEPISOSTEIDAE

PERCICHTHYIDAE

[illegible]

PERCIDAE

[illegible]

PERCIDAE -- Continued

[illegible]

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Fish community results from selected sites in the Lake Erie - Lake St. Clair Basin -- Continued

STATION NUMBER	PERCOPSIDAE			PETROMYZONTIDAE			SCIAENIDAE			UNDETERMINED FISH		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
	<i>Percopsis omiscomaycus</i> (trout-perch)			<i>Ichthyomyzon fossor</i> (northern brook lamprey)			<i>Aplodinotus grunniens</i> (freshwater drum)			(undetermined clatter)		
04159492	0	0	0	0	0	0	0	0	0	0	0	0
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04175600	0	0	0	1	1.9	0	0	0	0	1	--	0
04178000	0	0	0	0	0	0	0	0	0	0	0	0
04183000*	0	0	0	0	0	0	2	814	0	0	0	0
04186500	0	0	0	0	0	0	2	1020	0	0	0	0
04193500	0	0	0	0	0	0	19	790	0	0	0	0
04208504	0	0	0	0	0	0	0	0	0	0	0	0
04211820	4	9.9	0	0	0	0	0	0	0	0	0	0
04213500	0	0	0	0	0	0	0	0	0	1	0.2	0

HYBRIDIZED FISH

STATION NUMBER	(hybrid sunfish)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04159492	3	33.6	0
04161820	3	50.5	0
04175600	0	0	0
04178000	1	14	0
04183000*	0	0	0
04186500	1	6	0
04193500	2	38	0
04208504	0	0	0
04211820	7	55.5	0
04213500	0	0	0

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Meador, M.R., Cuffney, T.R., and Gurtz, M.E., 1993, *Methods for collecting samples of fish communities as part of the National Water-Quality Assessment Program*: U.S. Geological Survey Open-File Report 93-104, 40 p.

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Fish community results from selected sites in the Lake Erie - Lake St. Clair Basin
(National Water-Quality Assessment Program)

Fish community surveys were conducted at 4 stream sites in the Lake Erie - Lake St. Clair basin in 1997. Fish were collected by electrofishing with pulsed-DC current in mapped reaches at each stream site. Two electrofishing passes were conducted at each reach on the same day. Kick seining was done briefly in riffles after completion of electrofishing. One-quarter inch mesh was used for the kick seine and the dip nets. Fish were identified, measured, weighed, and checked for external anomalies such as parasites, lesions, and skeletal deformities. Individuals were returned to the stream after processing. More details regarding collection methods can be found in Meador and others, 1993. Individual fish data (including length, weight, and anomalies) are available from the USGS, Lansing, Michigan. Additional surface-water and/or water-quality data for these sites can be found in the continuous-record sections of the Indiana, Michigan, New York and Ohio data reports.

Family names are in uppercase, scientific names are in italics, and common names are in parentheses. Common names follow American Fisheries Society (Robins and others, 1991). Hybridized fish are located at the end of the table (-- = unknown value).

CALENDAR YEAR 1997

CATOSTOMIDAE

Carpodes cyprinus
(quillback)

STATION NUMBER	STATION NAME	DATE	DRAINAGE AREA (mi ²)	REACH	REACH LENGTH (meters)	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	CLINTON RIVER AT STERLING HEIGHTS, MI	07/29/97	309	A	286	0	0	0
04161820	CLINTON RIVER AT STERLING HEIGHTS, MI	07/29/97	309	B	308	0	0	0
04161820	CLINTON RIVER AT STERLING HEIGHTS, MI	07/29/97	309	C	298	0	0	0
04183000	MAUMEE RIVER AT NEW HAVEN, IN	10/18/97	1,967	A	352	2	1630	0
04193500	MAUMEE RIVER AT WATERVILLE, OH	07/30/97	6,330	A	500	3	1800	1
04193500	MAUMEE RIVER AT WATERVILLE, OH	07/31/97	6,330	B	400	4	1670	0
04193500	MAUMEE RIVER AT WATERVILLE, OH	07/31/97	6,330	C	400	7	3440	0
04211820	GRAND RIVER AT HARPERSFIELD, OH	07/22/97	552	A	509	1	536	0
04211820	GRAND RIVER AT HARPERSFIELD, OH	07/22/97	552	B	267	2	1700	0
04211820	GRAND RIVER AT HARPERSFIELD, OH	07/23/97	552	C	291	0	0	0

CATOSTOMIDAE -- Continued

STATION NUMBER	<i>Carpodes velifer</i> (highfin carpsucker)			<i>Catostomus commersoni</i> (white sucker)			<i>Hypentelium nigricans</i> (northern hog sucker)			<i>Moxostoma anisurum</i> (silver redbhorse)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	0	0	0	1	278	0	22	1490	0	0	0	0
04161820	0	0	0	13	1690	1	21	2560	3	0	0	0
04161820	0	0	0	1	456	0	11	766	0	0	0	0
04183000	0	0	0	0	0	0	0	0	0	0	0	0
04193500	3	730	0	1	0.6	0	8	2720	1	0	0	0
04193500	0	0	0	0	0	0	3	1210	0	0	0	0
04193500	0	0	0	0	0	0	8	2660	0	0	0	0
04211820	0	0	0	2	214	0	55	5510	0	17	12900	0
04211820	0	0	0	7	25	0	86	7630	0	8	5930	1
04211820	0	0	0	1	30	0	89	7020	0	19	7080	0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Fish community results from selected sites in the Lake Erie - Lake St. Clair Basin -- Continued

CATOSTOMIDAE -- Continued

STATION NUMBER	<i>Moxostoma carinatum</i> (river redhorse)			<i>Moxostoma duquesnei</i> (black redhorse)			<i>Moxostoma erythrurum</i> (golden redhorse)			<i>Moxostoma macrolepidotum</i> (shorthead redhorse)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04161820	0	0	0	2	1470	0	0	0	0	0	0	0
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04183000	1	2450	1	0	0	0	5	5450	0	7	1510	0
04193500	0	0	0	0	0	0	0	0	0	22	6840	1
04193500	0	0	0	4	2020	0	0	0	0	6	1600	0
04193500	0	0	0	1	256	0	0	0	0	16	4630	2
04211820	0	0	0	108	28000	0	57	11700	1	0	0	0
04211820	1	2490	0	83	16700	0	63	15900	0	0	0	0
04211820	0	0	0	137	21200	0	81	12600	0	0	0	0

CENTRARCHIDAE

STATION NUMBER	<i>Ambloplites rupestris</i> (rock bass)			<i>Lepomis cyanellus</i> (green sunfish)			<i>Lepomis gibbosus</i> (pumpkinseed)			<i>Lepomis humilis</i> (orangespotted sunfish)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	0	0	0	0	0	0	9	145	0	0	0	0
04161820	6	745	0	1	3	0	6	101	0	0	0	0
04161820	0	0	0	1	60	0	0	0	0	0	0	0
04183000	0	0	0	0	0	0	0	0	0	1	3	0
04193500	6	390	1	5	22	0	0	0	0	8	37	0
04193500	3	320	0	6	138	0	1	12	0	3	21	0
04193500	2	207	0	1	16	0	0	0	0	2	8	0
04211820	57	3330	11	1	--	1	9	222	0	0	0	0
04211820	53	3370	13	0	0	0	0	0	0	0	0	0
04211820	64	4110	2	0	0	0	0	0	0	0	0	0

CENTRARCHIDAE -- Continued

STATION NUMBER	<i>Lepomis macrochirus</i> (bluegill)			<i>Lepomis megalotis</i> (longear sunfish)			<i>Micropterus dolomieu</i> (smallmouth bass)			<i>Micropterus salmoides</i> (largemouth bass)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	6	45	0	0	0	0	0	0	0	7	27.2	0
04161820	9	159	0	0	0	0	0	0	0	4	24.3	0
04161820	5	43	0	0	0	0	0	0	0	0	0	0
04183000	2	2	0	0	0	0	1	340	0	0	0	0
04193500	3	159	0	0	0	0	19	3030	0	0	0	0
04193500	3	10	0	0	0	0	19	2580	1	1	2	0
04193500	1	17	0	0	0	0	16	2450	2	0	0	0
04211820	17	1050	4	12	385	1	40	1470	0	3	282	0
04211820	2	178	1	3	55.1	1	29	779	0	0	0	0
04211820	9	78.3	0	1	60	0	43	2700	2	5	1050	0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Fish community results from selected sites in the Lake Erie - Lake St. Clair Basin -- Continued

CENTRARCHIDAE -- Continued

CLUPEIDAE

CYPRINIDAE

STATION NUMBER	<i>Pomoxis annularis</i> (white crappie)			<i>Pomoxis nigromaculatus</i> (black crappie)			<i>Dorosoma cepedianum</i> (gizzard shad)			<i>Camptostoma anomalum</i> (central stoneroller)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04183000	0	0	0	0	0	0	5	308	0	0	0	0
04193500	0	0	0	1	160	0	0	0	0	0	0	0
04193500	1	277	0	0	0	0	1	65	0	0	0	0
04193500	0	0	0	0	0	0	0	0	0	0	0	0
04211820	0	0	0	7	380	0	18	938	0	9	15	0
04211820	0	0	0	4	101	0	0	0	0	16	47.2	0
04211820	0	0	0	4	91.4	0	5	244	0	42	567	0

CYPRINIDAE -- Continued

STATION NUMBER	<i>Carassius auratus</i> (goldfish)			<i>Cyprinella spiloptera</i> (spotfin shiner)			<i>Cyprinus carpio</i> (common carp)			<i>Luxilus chrysocephalus</i> (striped shiner)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04161820	0	0	0	1	6	0	2	8160	0	1	33	0
04161820	0	0	0	1	3	0	6	13000	1	0	0	0
04183000	0	0	0	13	97	0	4	12100	0	0	0	0
04193500	0	0	0	7	23.8	0	33	36400	5	2	2	0
04193500	0	0	0	15	30	0	61	68600	0	7	7	0
04193500	1	196	0	2	5	0	25	27600	4	0	0	0
04211820	0	0	0	3	13.7	0	35	100000	8	10	125	0
04211820	0	0	0	2	3	0	22	81500	5	25	206	1
04211820	0	0	0	3	10	0	5	7030	0	30	325	3

CYPRINIDAE -- Continued

STATION NUMBER	<i>Nocomis micropogon</i> (river chub)			<i>Notropis atherinoides</i> (emerald shiner)			<i>Notropis photogenis</i> (silver shiner)			<i>Notropis stramineus</i> (sand shiner)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	1	76	0	0	0	0	0	0	0	0	0	0
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04183000	0	0	0	20	75	0	0	0	0	3	3	0
04193500	0	0	0	9	11.2	1	0	0	0	0	0	0
04193500	0	0	0	3	5	0	0	0	0	0	0	0
04193500	0	0	0	2	3	0	0	0	0	0	0	0
04211820	52	885	0	3	5	0	2	5	0	0	0	0
04211820	160	1430	1	8	11	0	1	2	0	0	0	0
04211820	186	4270	1	46	85.6	0	0	0	0	2	4.1	0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Fish community results from selected sites in the Lake Erie - Lake St. Clair Basin -- Continued

CYPRINIDAE -- Continued

CYPRINODONTIDAE

STATION NUMBER	<i>Notropis volucellus</i> (mimic shiner)			<i>Pimephales notatus</i> (bluntnose minnow)			<i>Semotilus atromaculatus</i> (creek chub)			<i>Fundulus notatus</i> (blackstripe topminnow)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04161820	0	0	0	1	3	0	0	0	0	0	0	0
04183000	0	0	0	11	17	0	0	0	0	2	2	0
04193500	0	0	0	23	37	0	0	0	0	0	0	0
04193500	1	1	0	81	76	0	0	0	0	0	0	0
04193500	1	1	0	42	55	0	0	0	0	0	0	0
04211820	11	12	0	24	53.8	0	1	1	0	0	0	0
04211820	26	31	0	72	207	0	0	0	0	0	0	0
04211820	68	542	0	104	387	0	0	0	0	0	0	0

ESOCIDAE

ICTALURIDAE

STATION NUMBER	<i>Esox lucius</i> (northern pike)			<i>Esox americanus vermiculatus</i> (grass pickerel)			<i>Ameiurus melas</i> (black bullhead)			<i>Ameiurus natalis</i> (yellow bullhead)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04161820	1	680	0	0	0	0	0	0	0	0	0	0
04161820	3	1960	0	0	0	0	0	0	0	0	0	0
04183000	0	0	0	0	0	0	0	0	0	0	0	0
04193500	0	0	0	0	0	0	0	0	0	1	130	0
04193500	0	0	0	0	0	0	0	0	0	1	212	0
04193500	0	0	0	0	0	0	0	0	0	0	0	0
04211820	0	0	0	1	7	0	1	110	0	0	0	0
04211820	0	0	0	0	0	0	0	0	0	1	168	0
04211820	0	0	0	0	0	0	0	0	0	0	0	0

ICTALURIDAE -- Continued

STATION NUMBER	<i>Ictalurus punctatus</i> (channel catfish)			<i>Noturus flavus</i> (stonecat)			<i>Noturus miurus</i> (brindled madtom)			<i>Pylodictis olivaris</i> (flathead catfish)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04161820	1	1470	0	0	0	0	0	0	0	0	0	0
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04183000	0	0	0	0	0	0	0	0	0	0	0	0
04193500	6	1960	0	3	42	0	0	0	0	2	658	0
04193500	2	1330	1	1	5	0	0	0	0	1	44	0
04193500	1	240	1	2	38	0	0	0	0	0	0	0
04211820	1	567	0	22	447	0	0	0	0	0	0	0
04211820	0	0	0	14	223	0	0	0	0	0	0	0
04211820	0	0	0	32	603	0	1	7.5	0	0	0	0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Fish community results from selected sites in the Lake Erie - Lake St. Clair Basin -- Continued

STATION NUMBER	LEPISOSTEIDAE			PERCICHTHYIDAE			PERCIDAE					
	<i>Lepisosteus osseus</i> (longnose gar)			<i>Morone chrysops</i> (white bass)			<i>Ammocrypta pellucida</i> (eastern sand darter)			<i>Etheostoma blennioides</i> (greenside darter)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	0	0	0	0	0	0	0	0	0	1	4.1	0
04161820	0	0	0	0	0	0	0	0	0	2	4.7	0
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04183000	0	0	0	0	0	0	0	0	0	0	0	0
04193500	8	3410	0	1	262	0	0	0	0	0	0	0
04193500	7	3630	2	1	229	0	0	0	0	0	0	0
04193500	7	3500	0	0	0	0	0	0	0	1	9	0
04211820	0	0	0	0	0	0	0	0	0	42	129	0
04211820	0	0	0	0	0	0	1	1	0	11	47.2	0
04211820	0	0	0	0	0	0	0	0	0	66	197	0

PERCIDAE -- Continued

STATION NUMBER	<i>Etheostoma caeruleum</i> (rainbow darter)			<i>Etheostoma flabellare</i> (fantail darter)			<i>Etheostoma nigrum</i> (johnny darter)			<i>Etheostoma zonale</i> (banded darter)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04161820	0	0	0	0	0	0	1	1.7	0	0	0	0
04183000	0	0	0	0	0	0	0	0	0	0	0	0
04193500	0	0	0	0	0	0	0	0	0	0	0	0
04193500	0	0	0	0	0	0	0	0	0	0	0	0
04193500	0	0	0	0	0	0	0	0	0	0	0	0
04211820	6	13	0	5	10	0	0	0	0	1	5	0
04211820	5	13.7	0	5	9.3	0	2	2.6	0	0	0	0
04211820	8	14	0	19	28	0	0	0	0	0	0	0

PERCIDAE -- Continued

STATION NUMBER	<i>Perca flavescens</i> (yellow perch)			<i>Percina caprodes</i> (logperch)			<i>Percina maculata</i> (blackside darter)			<i>Stizostedion vitreum</i> (walleye)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	1	26	0	0	0	0	0	0	0	0	0	0
04161820	1	29	0	2	24	0	0	0	0	0	0	0
04161820	1	36	0	2	24	0	1	4	0	0	0	0
04183000	0	0	0	0	0	0	2	6	0	1	9	0
04193500	0	0	0	0	0	0	0	0	0	0	0	0
04193500	0	0	0	0	0	0	0	0	0	0	0	0
04193500	0	0	0	1	79	0	0	0	0	0	0	0
04211820	0	0	0	9	85.1	0	5	39	0	2	888	0
04211820	0	0	0	18	171	1	27	81.5	1	4	3500	0
04211820	0	0	0	29	263	0	30	64	0	1	516	0

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Fish community results from selected sites in the Lake Erie - Lake St. Clair Basin -- Continued

STATION NUMBER	PERCOPSIDAE			SALMONIDAE			SCIAENIDAE			HYBRIDIZED FISH		
	<i>Percopsis omiscomaycus</i> (trout-perch)			<i>Oncorhynchus mykiss</i> (rainbow trout)			<i>Aplodinotus grunniens</i> (freshwater drum)			(hybrid carp)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	0	0	0	1	98	0	0	0	0	0	0	0
04161820	0	0	0	2	160	1	0	0	0	0	0	0
04161820	0	0	0	0	0	0	0	0	0	0	0	0
04183000	0	0	0	0	0	0	3	1360	0	0	0	0
04193500	0	0	0	0	0	0	23	2510	0	0	0	0
04193500	0	0	0	0	0	0	35	2020	1	0	0	0
04193500	0	0	0	0	0	0	17	1340	0	1	227	0
04211820	3	14	0	0	0	0	3	802	0	0	0	0
04211820	2	9.9	0	0	0	0	2	1480	0	0	0	0
04211820	9	30.2	0	0	0	0	0	0	0	0	0	0

HYBRIDIZED FISH -- Continued

STATION NUMBER	(hybrid sunfish)			(hybrid redbreast)			(hybrid walleye)		
	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies	Number of Fish	Batch Weight (grams)	Fish with Anomalies
04161820	9	118	0	0	0	0	0	0	0
04161820	24	353	2	0	0	0	0	0	0
04161820	10	126	0	0	0	0	0	0	0
04183000	1	12	0	0	0	0	4	3600	0
04193500	2	64	0	0	0	0	0	0	0
04193500	5	72	0	0	0	0	0	0	0
04193500	1	4	0	0	0	0	0	0	0
04211820	1	44	0	1	1	0	0	0	0
04211820	4	60	0	3	3	0	0	0	0
04211820	0	0	0	0	0	0	0	0	0

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ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Freshwater mussel and clam species results from selected sites in the Lake Erie - Lake St. Clair Basin
(National Water-Quality Assessment Program)

Mussel and clam surveys were conducted at 10 stream sites in the Lake Erie - Lake St. Clair basin in 1996-97 during low-flow conditions. U.S. Geological Survey (USGS) personnel from the Biological Resources Division (BRD) and the Water Resources Division (WRD) conducted viewing-bucket and systematic quadrat searches. Live individuals were returned to the stream after identification (species list are subject to change upon further taxonomic review). Additional biological, surface-water and (or) water-quality data for these sites can be found in the continuous-record sections of the Indiana, Michigan, New York and Ohio data reports.

Mussels and clams found are indicated as follows:

- L Live species found at site
- D Only shells found, but presumed to be living at site
- R Only relic shells found
- None found

Sub-family names are in uppercase, scientific names are in italics, and common names are in parentheses. Common names follow Cummings and Mayer (1992) and Watters (1988).

STATION NUMBER	STATION NAME	AMBLEMINAE			
		<i>Amblema plicata</i> (three-ridge)	<i>Cyclonaias tuberculata</i> (purple wartback)	<i>Elliptio dilatata</i> (spike)	<i>Fasconia flava</i> (wash pigtoe)
04159492	BLACK RIVER NEAR JEDDO, MI	--	--	--	L
04161820	CLINTON RIVER AT STERLING HEIGHTS, MI	R	--	R	R
04175600	RIVER RAISIN NEAR MANCHESTER, MI	--	L	L	L
04178000	ST JOSEPH RIVER NEAR NEWVILLE, IN	D	D	L	L
04183000	MAUMEE RIVER NEAR NEW HAVEN, IN	D	D	R	D
04186500	AUGLAIZE RIVER NEAR FORT JENNINGS, OH	D	R	R	L
04193500	MAUMEE RIVER AT WATERVILLE, OH	D	R	R	R
04208504	CUYAHOGA RIVER AT LTV STEEL AT CLEVELAND, OH	--	--	--	--
04211820	GRAND RIVER AT HARPERSFIELD, OH	D	--	L	L
04213500	CATTARAUGUS CREEK AT GOWANDA, NY	--	--	--	--

STATION NUMBER	AMBLEMINAE -- Continued					ANODONTINAE	
	<i>Pleurobema clava</i> (clubshell)	<i>Pleurobema sintoxia</i> (round pigtoe)	<i>Quadrula cylindrica</i> (rabbitsfoot)	<i>Quadrula pustulosa</i> (pimpleback)	<i>Quadrula quadrula</i> (mapleleaf)	<i>Alasmodonta marginata</i> (elktoe)	<i>Alasmodonta viridis</i> (slippershell mussel)
04159492	--	--	--	--	--	L	--
04161820	--	--	--	--	--	R	--
04175600	--	D	--	--	--	L	D
04178000	D	D	R	--	--	--	--
04183000	R	D	--	L	L	L	--
04186500	--	--	--	L	L	L	--
04193500	--	--	--	L	L	D	--
04208504	--	--	--	--	--	--	--
04211820	--	D	--	--	--	L	--
04213500	--	--	--	--	--	--	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Freshwater mussel and clam species results from selected sites in the Lake Erie - Lake St. Clair Basin -- Continued

ANODONTINAE -- Continued

STATION NUMBER	<i>Anodontoides ferussacianus</i> (cylindrical papershell)	<i>Lasmigona complanata</i> (white heelsplitter)	<i>Lasmigona compressa</i> (creek heelsplitter)	<i>Lasmigona costata</i> (fluted shell)	<i>Pyganodon grandis</i> (giant floater)	<i>Strophitus undulatus</i> (squawfoot)	<i>Umbosia imbecillis</i> (paper pondshell)
04159492	L	L	--	D	L	L	--
04161820	--	R	--	R	R	--	--
04175600	--	--	L	--	D	L	--
04178000	--	D	--	--	L	--	--
04183000	--	L	--	D	D	--	--
04186500	--	L	--	L	L	L	--
04193500	--	D	--	R	D	D	D
04208504	--	--	--	--	--	--	--
04211820	--	--	--	L	D	L	--
04213500	--	--	--	--	--	--	--

CORBICULIDAE

DREISSENIDAE

LAMPSILINAE

STATION NUMBER	<i>Corbicula fluminea</i> (asian clam)	<i>Dreissena polymorpha</i> (zebra mussel)	<i>Actinonaias ligamentina</i> (mucket)	<i>Epioblasma obliquata</i> (white catpaw)	<i>Lampsilis cardium</i> (plain pocketbook)	<i>Lampsilis fasciola</i> (wavy-rayed lampmussel)	<i>Lampsilis radiata siliquioidea</i> (fat mucket)	<i>Leptodea fragilis</i> (fragile papershell)
04159492	--	--	D	--	--	--	L	--
04161820	--	L	R	--	R	--	R	--
04175600	--	--	D	--	L	L	L	--
04178000	--	--	L	R	L	--	D	--
04183000	D	--	D	--	--	--	D	L
04186500	L	--	--	--	L	--	L	L
04193500	D	--	--	--	--	--	D	L
04208504	--	--	--	--	--	--	--	--
04211820	--	--	L	--	L	--	L	D
04213500	--	--	--	--	--	--	--	--

LAMPSILINAE - Continued

STATION NUMBER	<i>Ligumia recta</i> (black sandshell)	<i>Obovaria olivaria</i> (hickorynut)	<i>Obovaria subrotunda</i> (round hickorynut)	<i>Potamilus alatus</i> (pink heelsplitter)	<i>Ptychobranhus fasciolaris</i> (kidneyshell)	<i>Truncilla truncata</i> (deertoe)	<i>Villosa iris</i> (rainbow)
04159492	--	--	--	--	--	--	--
04161820	R	--	--	--	--	--	--
04175600	--	D	--	--	--	--	L
04178000	--	--	D	--	--	--	--
04183000	R	--	D	L	--	L	L
04186500	--	--	--	L	--	L	--
04193500	R	--	--	L	R	L	--
04208504	--	--	--	--	--	--	--
04211820	--	--	--	L	--	D	L
04213500	--	--	--	--	--	--	--

REFERENCES CITED:

Cummings, K.S., and Mayer, C.A., 1992, *Field guide to freshwater mussels of the midwest*: Illinois Natural History Survey, Manual 5, 194 p.

Watters, G.T., 1988, *A field guide to the freshwater mussels of Ohio*: Division of Wildlife, Ohio Department of Natural Resources, 105 p.

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

Streambed and streambank material characterizations from selected sites in the Lake Erie - Lake St. Clair Basin
(National Water-Quality Assessment Program)

The composition of the streambed and streambank are an important facet of stream character, influencing channel form and hydraulics, erosion rates, sediment supply, and other characteristics (Rosgen, 1994). A quantitative description of the size of the coarse streambed material was obtained at all fixed sites using the Wolman Pebble Count (Wolman, 1954) technique. Stream bed and bank cores were sieved by the USGS Iowa City, Iowa Sediment Laboratory. Particle sizes are tallied by using Wentworth size classes in which the size doubles with each class (2,4,8,16,32 mm.). A minimum of 50 attempts were made at three transects to obtain a Wolman Pebble Count. Streambed and streambank core samples were collected at the same three transects and the composite results are found below.

Percent size and type of coarse material found on the streambed
by Wolman Pebble Count Method (size in millimeters)

STATION NUMBER	STATION NAME	Date	% Boulders	% Cobbles		% Pebbles		% Gravel		
			>256 (mm)	≤256 and >128 (mm)	≤128 and >64 (mm)	≤64 and >32 (mm)	≤32 and >16 (mm)	≤16 and >8 (mm)	≤8 and >4 (mm)	≤4 and >2 (mm)
04159492	BLACK R. NEAR JEDDO, MI	07/07/97	0	10.7	45.0	24.2	6.7	8.3	4.2	0.8
04161820	CLINTON R. AT STERLING HEIGHTS, MI	07/30/97	0	0	0	0.8	42.7	51.0	5.5	0
04175600	RIVER RAISIN NEAR MANCHESTER, MI	07/31/97	0	0.7	7.8	21.7	36.4	27.9	5.5	0
04178000	ST JOSEPH R. NEAR NEWVILLE, IN	08/08/97	0	1.5	12.1	27.1	30.8	22.5	6.0	0
04183000	MAUMEE R. AT NEW HAVEN, IN	08/07/97	0	2.8	7.7	27.4	34.6	26.1	1.4	0
04186500	AUGLAIZE R. NEAR FORT JENNINGS, OH	08/06/97	0	0.8	16.1	36.5	20.4	17.5	7.3	1.4
04193500	MAUMEE R. AT WATERVILLE, OH	08/04/97	0	11.4	22.9	24.0	28.1	7.3	6.3	0
04208504	CUYAHOGA R. AT LTV STEEL AT CLEVELAND, OH	07/17/97	0	5.0	24.0	41.0	26.0	4.0	0	0
04211820	GRAND R. AT HARPERSFIELD, OH	06/24/97	1.1	14.9	26.6	31.8	16.9	7.5	1.1	0
04213500	CATTARAUGUS CR. AT GOWANDA, NY	07/15/97	0.7	13.6	20.7	25.1	27.7	10.3	1.9	0

Percent size and type of streambed material found in streambed cores (size in millimeters)

STATION NUMBER	% Pebble	% Gravel				% Sand					% Silt/Clay
	≤32->16 (mm)	≤16->8 (mm)	≤8->4 (mm)	≤4->2 (mm)	≤2->1 (mm)	≤1->0.5 (mm)	≤0.5->0.25 (mm)	≤0.25->0.125 (mm)	≤0.125->0.062 (mm)	≤0.062 (mm)	
04159492	0	7.7	14.0	12.0	10.9	9.1	21.1	11.4	2.1	11.6	
04161820	0.4	12.2	15.0	10.0	7.7	12.5	30.0	10.5	1.2	0.4	
04175600	0	6.4	8.1	7.8	6.1	13.2	34.6	16.0	1.4	6.3	
04178000	0	10.7	11.3	10.9	12.9	16.8	19.4	7.1	3.3	7.5	
04183000	0	10.7	17.6	13.7	9.0	8.1	19.2	10.4	3.5	7.8	
04186500	1.0	19.2	16.8	13.6	12.8	12.7	11.4	4.7	1.7	6.1	
04193500				No streambed sample collected, bedrock bottom							
04208504	1.8	3.1	5.7	8.0	14.5	21.9	33.3	8.4	1.8	1.5	
04211820				No streambed sample collected, bedrock bottom							
04213500	0	18.8	22.3	17.0	14.0	11.6	12.3	2.9	0.6	0.5	

Percent size and type of bank material found in streambank cores (size in millimeters)

STATION NUMBER	% Pebble	% Gravel				% Sand					% Silt/Clay
	≤32->16 (mm)	≤16->8 (mm)	≤8->4 (mm)	≤4->2 (mm)	≤2->1 (mm)	≤1->0.5 (mm)	≤0.5->0.25 (mm)	≤0.25->0.125 (mm)	≤0.125->0.062 (mm)	≤0.062 (mm)	
04159492	0	1.4	0.5	0.6	1.0	2.4	18.0	38.8	16.4	20.7	
04161820	0	7.8	11.6	7.4	3.8	2.1	12.9	32.7	13.9	7.8	
04175600	0	0.1	0.7	1.0	2.6	4.8	16.5	33.1	13.0	28.2	
04178000	0	0	0.7	3.4	5.4	5.2	7.2	13.0	10.9	54.2	
04183000	0	0.2	0.3	1.2	3.0	3.4	9.2	22.6	16.3	43.9	
04186500	0	0.6	2.4	3.3	5.0	4.7	7.7	13.0	11.0	52.3	
04193500	0	0	1.2	1.4	2.3	3.6	12.9	24.1	21.6	33.0	
04208504	0	0	0.2	0.4	1.0	2.0	10.7	28.6	20.3	36.7	
04211820	0	1.3	3.4	4.2	4.8	9.4	20.8	16.1	11.9	28.1	
04213500	0	0.3	0.3	0.6	0.9	1.8	11.3	24.9	22.9	37.1	

References Cited:

Rosgen, D.L., 1994, A classification of natural rivers: Catena, V. 22, p. 169-199.

Wolman, M.G., 1954, A method of sampling coarse river-bed material: Trans. Am. Geophys. Union, V. 35, p. 951-956.

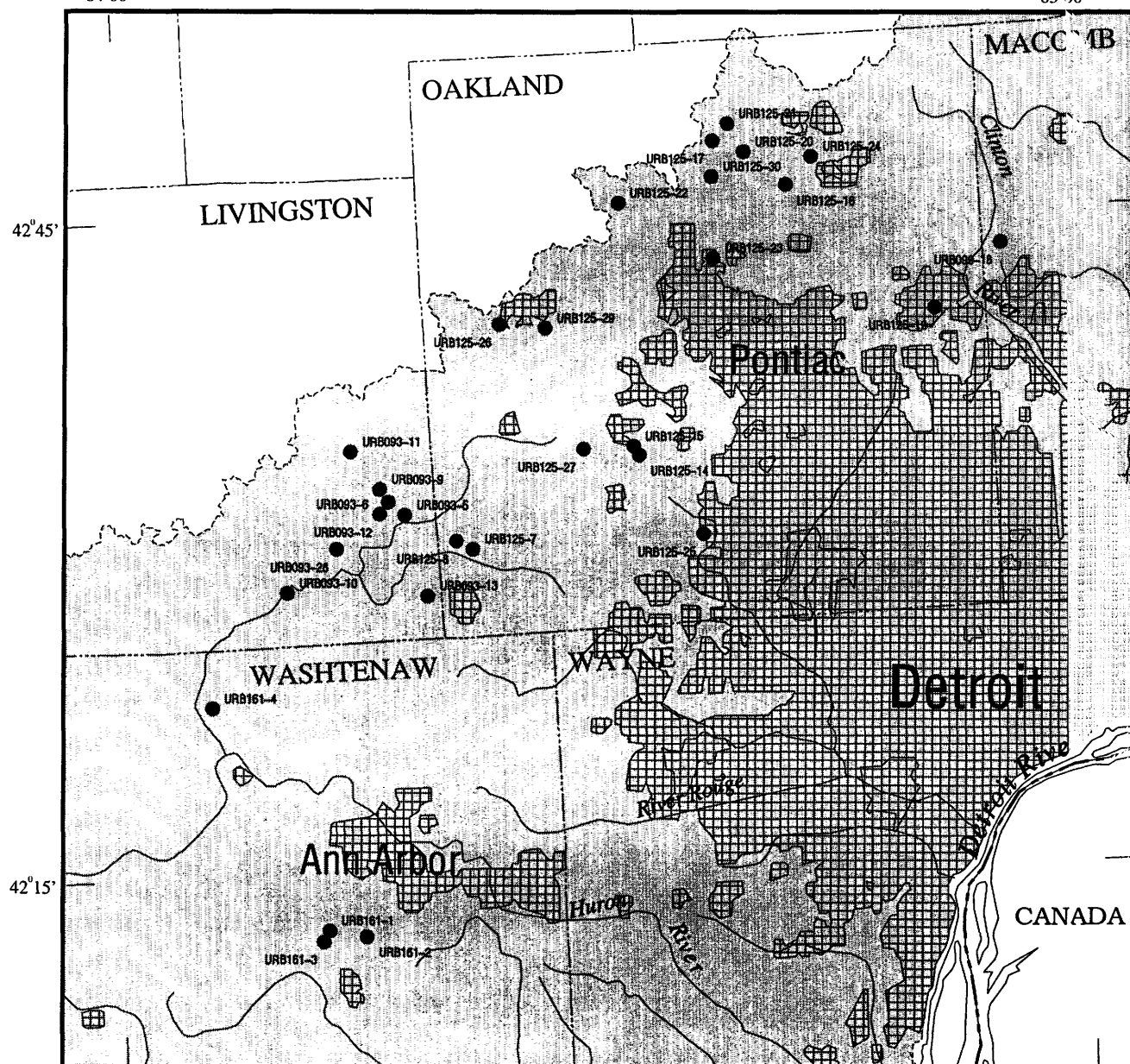
**GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES
LAKE ERIE-LAKE ST. CLAIR BASIN NAWQA PROJECT**

The following tables contain water-level and water-quality records from a network of 30 monitoring wells installed by the U.S. Geological Survey. The network was established as part of the National Water-Quality Assessment (NAWQA) program in the Lake Erie-Lake St. Clair Drainage Basin.

The network represents a subarea of the Lake Erie-Lake St. Clair Drainage Basin in the Central Lowlands Physiographic Province. The subarea is limited to areas underlain by interbedded sandstone and shale bedrock with surficial materials composed of Pleistocene outwash. The well network represents a residential land-use setting. Waters from the wells were sampled to assess the status of ground-water quality and the effects of residential land-use on shallow ground-water quality. The sampling is termed an Urban Land-Use Study for the NAWQA program.

Samples were tested for physical characteristics, nutrients, major and minor elements, 88 pesticides (pesticide schedule A and B), and 87 volatile organic chemicals (VOCs). Many of the pesticide and VOC constituents were not detected in water from any of the 30 wells. Tables listing all of the pesticide and VOC analytes and their detection levels precede their listing in the water-quality table. The concentrations of pesticides and VOCs detected in one or more of the wells are included in the water-quality table. Only those compounds with detectable concentrations are listed after the listing of pesticide and VOC analytes in the water-quality data. Water-level records are presented first followed by the water-quality data.

The shaded portion of figure 9 shows the sampling subarea in the sandstone and shale bedrock areas of the Central Lowlands Physiographic Province.



Base from U.S. Geological Survey digital data, 1:2,000,000, 1972
 Albers Equal - Area Conic Projection
 Standard parallels 29° 30' and 45° 30', central meridian 96°

0 5 10 15 MILES
 0 5 10 15 KILOMETERS

EXPLANATION

- Lake Erie - Lake St. Clair Basin
- Metropolitan Areas
- Well Location
- Major Rivers
- County Boundaries
- International Boundary

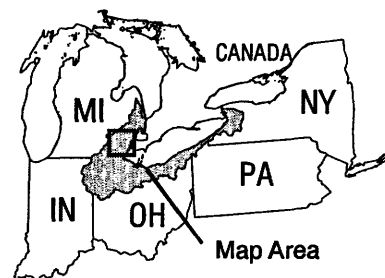


Figure 9. Location and local well number of wells sampled in the Lake Erie-Lake St. Clair Basin NAWQA project urban land-use study.

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water levels in wells in residential areas in the Lake Erie-Lake St. Clair Basin
(National Water Quality Assessment Program)

Explanation of Column Headings--SITE IDENTIFIER: 15-digit unique identifier based on site latitude (first six digits), longitude (digits seven through thirteen), and a 2-digit sequence number suffix. AQUIFER CODE: 112OTSH, Pleistocene outwash. ELEVATION OF LAND SURFACE: land-surface at well site, in feet above sea level, from topographic map. SOURCE OF DEPTH DATA: S, U.S. Geological Survey. WATER-LEVEL METHOD: T, electric tape.

SITE IDENTIFIER	LOCAL WELL NUMBER	LOCATION	ELEV. OF LAND SURFACE DATUM (FEET ABOVE NGVD) (72000)	DEPTH OF WELL (TOTAL FEET) (72008)	SOURCE OF DEPTH DATA	AQUIFER CODE	DATE	DEPTH BELOW LAND SURFACE (WATER LEVEL FEET) (72019)	WATER-LEVEL METHOD
LIVINGSTON COUNTY									
423133083421200	URB093-5	Kent Lake	935	41	S	112OTSH	10-09-96	38.80	T
							01-07-97	39.05	T
423209083431300	URB093-6	Kent Lake	930	16	S	112OTSH	10-03-96	8.23	T
							11-15-96	8.89	T
423244083434400	URB093-9	Kent Lake	995	30	S	112OTSH	10-10-96	17.58	T
							11-14-96	17.91	T
422806083493700	URB093-10	Hamburg	880	27	S	112OTSH	08-21-96	14.41	T
							10-24-96	15.13	T
							11-19-96	14.83	T
423429083453000	URB093-11	Brighton	1000	68	S	112OTSH	10-03-96	57.88	T
							11-12-96	57.83	T
423137083434500	URB093-12	Kent Lake	935	21	S	112OTSH	10-10-96	16.41	T
							10-25-96	16.41	T
							10-28-96	16.39	T
							12-17-96	16.05	T
422751083405200	URB093-13	South Lyon	910	15	S	112OTSH	10-08-96	5.72	T
							11-19-96	5.31	T
423004083463000	URB093-28	Brighton	895	24	S	112OTSH	10-04-96	12.23	T
							11-12-96	12.43	T
MACOMB COUNTY									
424321083043500	URB099-18	Utica	825	18	S	112OTSH	10-17-96	8.69	T
							12-13-96	8.65	T
OAKLAND COUNTY									
422956083380000	URB125-7	South Lyon	925	14	S	112OTSH	10-09-96	5.51	T
							11-20-96	5.12	T
423020083390100	URB125-8	Kent Lake	915	10	S	112OTSH	10-09-96	2.96	T
							11-21-96	2.67	T
423402083272700	URB125-14	Walled Lake	945	27	S	112OTSH	10-11-96	17.67	T
							10-22-96	18.04	T
							10-28-96	18.14	T
							12-17-96	18.98	T
423427083274700	URB125-15	Walled Lake	935	20	S	112OTSH	10-22-96	7.13	T
							11-27-96	6.82	T
424614083175300	URB125-16	Oxford	995	17	S	112OTSH	10-16-96	2.64	T
							12-11-96	2.16	T
424819083222500	URB125-17	Oxford	1055	34	S	112OTSH	10-22-96	11.96	T
							12-05-96	11.62	T
424026083084600	URB125-19	Rochester	782	26	S	112OTSH	10-17-96	15.63	T
							10-23-96	19.21	T
							10-29-96	19.05	T
							12-18-96	18.93	T
424747083202900	URB125-20	Oxford	1040	18	S	112OTSH	10-18-96	5.59	T
							12-04-96	4.40	T
424905083212700	URB125-21	Oxford	1045	17	S	112OTSH	10-18-96	4.15	T
							12-04-96	3.15	T
424536083282300	URB125-22	Ortonville	1035	42	S	112OTSH	10-23-96	29.03	T
							12-03-96	29.31	T
424258083223300	URB125-23	Clarkston	990	40	S	112OTSH	10-16-96	12.34	T
							12-03-96	12.37	T
424729083161600	URB125-24	Oxford	1025	39	S	112OTSH	10-16-96	33.36	T
							12-06-96	33.44	T
423022083233300	URB125-25	Walled Lake	865	14	S	112OTSH	10-15-96	4.82	T
							11-21-96	5.72	T
							12-12-96	4.78	T

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water levels in wells in residential areas in the Lake Erie-Lake St. Clair Basin--Continued

SITE IDENTIFIER	LOCAL WELL NUMBER	LOCATION	ELEV. OF LAND SURFACE DATUM (FEET ABOVE NGVD) (72000)	DEPTH OF WELL (TOTAL FEET) (72008)	SOURCE OF DEPTH DATA	AQUIFER CODE	DATE	DEPTH BELOW LAND SURFACE (WATER LEVEL FEET) (72019)	WATER-LEVEL METHOD
OAKLAND COUNTY--Continued									
424010083360200	URB125-26	Highland	1025	22	S	112OTSH	10-10-96	13.29	T
							11-26-96	13.25	T
423422083305600	URB125-27	Milford	920	32	S	112OTSH	10-22-96	11.68	T
							11-22-96	11.65	T
423958083331000	URB125-29	Highland	1035	32	S	112OTSH	10-10-96	19.86	T
							11-26-96	19.87	T
424641083223200	URB125-30	Ortonville	1052	26	S	112OTSH	10-16-96	15.05	T
							12-05-96	12.68	T
WASHTENAW COUNTY									
421240083472200	URB161-1	Saline	855	31	S	112OTSH	08-20-96	22.40	T
							11-13-96	22.30	T
421222083450500	URB161-2	Saline	835	22	S	112OTSH	08-21-96	12.18	T
							11-13-96	12.05	T
421210083474500	URB161-3	Saline	845	27	S	112OTSH	08-09-96	19.05	T
							08-21-96	19.32	T
							11-14-96	19.94	T
422256083542100	URB161-4	Pinckney	875	10	S	112OTSH	10-02-96	2.60	T
							12-10-96	2.23	T

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water quality in wells in residential areas in the Lake Erie-Lake St. Clair Basin

REMARKS.--Explanation of Column Headings--SITE IDENTIFIER: 15-digit unique identifier based on site latitude (first six digits), longitude (digits seven through thirteen), and a 2-digit sequence number suffix; ELEVATION OF LAND SURFACE: land-surface at well site in feet above sea level from topographic map; µS/cm: microsiemens per centimeter at 25 degrees Celsius; DEG C: degrees Celsius; mg/L: milligrams per liter; µg/L: micrograms per liter; PC/L: picocuries per liter; --, no data.

SITE IDENTIFIER	LOCAL WELL NUMBER	LOCATION	DATE	TIME	DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET) (72019)	DEPTH OF WELL, TOTAL (FEET) (72008)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE NGVD) (72000)	SPECIFIC CONDUCTANCE (µS/cm) (00095)	PH WATER WHOLE FIELD (STANDARD UNITS) (00400)
LIVINGSTON COUNTY									
423133083421200	URB093-5	Kent Lake	01-07-97	1200	39.05	41	935	1040	7.1
423209083431300	URB093-6	Kent Lake	11-15-96	1000	8.89	16	930	2720	7.0
423244083434400	URB093-9	Kent Lake	11-14-96	1600	17.91	30	995	1090	6.6
422806083493700	URB093-10	Hamburg	11-19-96	1600	14.83	27	880	446	7.5
423429083453000	URB093-11	Brighton	11-12-96	1500	57.83	68	1000	783	7.1
423137083434500	URB093-12	Kent Lake	12-17-96	0900	16.05	21	935	1980	7.2
422751083405200	URB093-13	South Lyon	11-19-96	1000	5.31	15	910	1590	6.5
423004083463000	URB093-28	Brighton	11-12-96	1000	12.43	24	895	730	7.3
MACOMB COUNTY									
424321083043500	URB099-18	Utica	12-13-96	1200	8.65	18	825	196	7.8
OAKLAND COUNTY									
422956083380000	URB125-7	South Lyon	11-20-96	1100	5.12	14	925	600	7.1
423020083390100	URB125-8	Kent Lake	11-21-96	1000	2.67	10	915	1570	7.0
423402083272700	URB125-14	Walled Lake	12-17-96	1400	18.98	27	945	765	7.3
423427083274700	URB125-15	Walled Lake	11-27-96	1000	6.82	20	935	760	7.0
424614083175300	URB125-16	Oxford	12-11-96	1200	2.16	17	995	448	7.3
424819083222500	URB125-17	Oxford	12-05-96	1000	11.62	34	1055	1440	6.9
424026083084600	URB125-19	Rochester	12-18-96	1000	18.93	26	782	1050	7.0
424747083202900	URB125-20	Oxford	12-04-96	1000	5.59	18	1040	637	7.0
424905083212700	URB125-21	Oxford	12-04-96	1600	3.15	17	1045	137	8.5
424536083282300	URB125-22	Ortonville	12-03-96	1600	29.31	42	1035	795	7.1
424258083223300	URB125-23	Clarkston	12-03-96	1200	12.37	40	990	861	7.1
424729083161600	URB125-24	Oxford	12-06-96	1100	33.44	39	1025	677	7.0
423022083233300	URB125-25	Walled Lake	12-12-96	1200	4.78	14	865	1030	7.0
424010083360200	URB125-26	Highland	11-26-96	1500	13.25	22	1025	881	7.2
423422083305600	URB125-27	Milford	11-22-96	1100	11.65	32	920	518	7.4
423958083331000	URB125-29	Highland	11-26-96	1100	19.87	32	1035	3150	6.8
424641083223200	URB125-30	Ortonville	12-05-96	1500	12.68	26	1052	880	7.1
WASHTENAW COUNTY									
421240083472200	URB161-1	Saline	11-13-96	1000	22.30	31	855	834	7.0
421222083450500	URB161-2	Saline	11-13-96	1500	12.05	22	835	836	7.1
421210083474500	URB161-3	Saline	11-14-96	1000	19.94	27	845	1140	7.0
422256083542100	URB161-4	Pinckney	12-10-96	1000	2.23	10	875	831	6.9

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water quality in wells in residential areas in the Lake Erie-Lake St. Clair Basin--Continued

LOCAL WELL NUMBER	TEMPER- ATURE WATER (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (mg/L) (00300)	HARD- NESS TOTAL (mg/L AS CACO3) (00900)	CALCIUM DIS- SOLVED (mg/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (mg/L AS mg) (00925)	SODIUM, DIS- SOLVED (mg/L AS NA) (00930)	POTAS- SIUM, DIS- SOLVED (mg/L AS K) (00935)	BICAR- BONATE WATER DIS IT FIELD mg/L AS HCO3 (00453)	ALKA- LITY WAT DIS TOT IT FIELD mg/L AS CACO3 (39086)
LIVINGSTON COUNTY										
URB093-5	10.0	0.0	6.6	380	110	26	70	1.8	473	390
URB093-6	12.0	4.0	4.5	450	130	31	380	3.9	359	290
URB093-9	10.0	4.1	1.1	480	160	19	37	6.9	520	430
URB093-10	11.5	2.0	0.2	220	60	17	4.2	1.2	254	210
URB093-11	11.5	2.0	3.7	350	100	25	27	2.1	361	300
URB093-12	11.5	41	8.6	390	110	29	190	3.4	421	350
URB093-13	13.0	2.0	0.1	750	230	43	13	6.8	1070	880
URB093-28	6.5	2.5	2.2	250	73	17	49	1.4	268	220
MACOMB COUNTY										
URB099-18	13.5	49	3.5	73	21	5.0	8.9	1.0	81	66
OAKLAND COUNTY										
URB125-7	12.5	0.0	0.1	290	85	20	7.0	1.3	342	280
URB125-8	11.0	1.0	0.2	330	100	19	170	4.7	316	260
URB125-14	12.5	12	8.4	310	87	22	25	2.7	302	250
URB125-15	13.0	0.0	0.1	370	100	28	20	1.7	332	270
URB125-16	9.0	0.0	0.5	240	60	22	10	1.1	302	250
URB125-17	11.5	1.0	0.9	510	140	40	93	2.3	387	320
URB125-19	11.5	600	6.0	420	120	28	68	1.5	432	360
URB125-20	10.5	0.80	0.1	340	94	25	4.0	1.2	357	292
URB125-21	12.0	1.0	5.7	60	17	4.2	1.4	3.6	67	55
URB125-22	12.0	0.0	3.0	310	81	25	40	1.5	333	270
URB125-23	13.0	1.0	0.2	370	98	30	26	1.9	318	260
URB125-24	11.5	0.0	3.5	320	96	19	20	1.2	373	310
URB125-25	7.5	0.0	1.2	340	100	22	57	1.7	367	300
URB125-26	11.0	0.0	5.1	290	86	19	67	1.8	310	250
URB125-27	11.0	4.0	0.1	270	77	19	3.1	1.1	245	200
URB125-29	11.5	5.0	3.2	730	220	43	360	11	483	400
URB125-30	12.0	1.0	8.5	270	84	15	76	2.3	317	260
WASHTENAW COUNTY										
URB161-1	10.5	2.2	0.2	370	100	27	37	1.6	398	330
URB161-2	12.5	2.0	3.8	290	88	18	52	1.4	360	300
URB161-3	12.0	4.0	0.7	370	100	30	86	3.9	332	270
URB161-4	8.0	0.70	0.2	350	99	24	29	1.8	339	280

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water quality in wells in residential areas in the Lake Erie-Lake St. Clair Basin--Continued

LOCAL WELL NUMBER	SULFATE DIS- SOLVED (mg/L AS SO ₄) (00945)	CHLO- RIDE, DIS- SOLVED (mg/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (mg/L AS F) (00950)	BROMIDE DIS- SOLVED (mg/L AS BR) (71870)	SILICA, DIS- SOLVED (mg/L AS SIO ₂) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (mg/L) (70300)	NITRO- GEN, NITRITE DIS- SOLVED (mg/L AS N) (00613)	NITRO- GEN, NO ₂ +NO ₃ DIS- SOLVED (mg/L AS N) (00631)	NITRO- GEN, AMMONIA DIS- SOLVED (mg/L AS N) (00608)	NITRO- GEN,AM- MONIA + ORGANIC DIS. (mg/L AS N) (00623)
LIVINGSTON COUNTY										
URB093-5	33	120	0.2	0.040	14	591	<0.01	2.4	0.04	<0.2
URB093-6	40	640	0.1	0.10	12	1490	0.08	18	<0.02	<0.2
URB093-9	13	72	<0.1	0.090	10	618	0.03	1.1	0.04	<0.2
URB093-10	28	9.9	0.2	0.020	9.1	250	0.01	<0.05	0.05	<0.2
URB093-11	31	55	0.1	0.030	15	440	0.01	0.56	0.02	<0.2
URB093-12	24	320	0.1	0.060	10	902	0.02	5.2	0.03	<0.2
URB093-13	0.30	36	0.1	--	13	1010	0.02	<0.05	5.1	7.0
URB093-28	16	85	0.1	0.03	12	348	0.01	1.5	0.03	<0.2
MACOMB COUNTY										
URB099-18	13	10	0.1	<0.010	6.2	107	0.01	0.33	0.04	<0.2
OAKLAND COUNTY										
URB125-7	41	13	0.1	0.020	8.0	348	0.03	0.43	<0.02	<0.2
URB125-8	16	320	0.1	0.080	8.6	852	0.01	<0.05	0.04	<0.2
URB125-14	52	59	0.1	<0.010	11	447	0.07	4.5	0.14	0.2
URB125-15	40	58	<0.1	0.030	11	432	0.01	0.26	0.04	<0.2
URB125-16	9.9	6.1	0.5	0.060	17	250	<0.01	<0.05	<0.02	0.2
URB125-17	30	240	<0.1	0.080	12	744	0.02	6.7	0.05	<0.2
URB125-19	35	120	0.1	0.10	11	611	0.01	4.4	<0.02	<0.2
URB125-20	48	8.2	0.1	--	10	400	<0.01	<0.05	0.03	0.4
URB125-21	10	1.9	<0.1	<0.010	8.1	82	<0.01	0.43	0.02	<0.2
URB125-22	33	74	0.1	0.070	11	443	0.01	2.2	0.02	<0.2
URB125-23	38	97	0.2	0.090	12	468	0.01	<0.05	0.06	<0.2
URB125-24	18	42	<0.1	0.22	9.6	381	0.02	0.60	<0.02	<0.2
URB125-25	33	89	0.1	0.050	11	508	0.06	5.3	0.02	<0.2
URB125-26	18	110	<0.1	0.050	11	494	0.02	5.9	0.02	<0.2
URB125-27	36	22	0.1	0.050	13	305	0.02	<0.05	0.04	<0.2
URB125-29	37	800	<0.1	2.0	12	1840	0.02	7.8	0.15	<0.2
URB125-30	16	110	0.2	0.15	11	481	0.02	0.87	<0.02	<0.2
WASHTENAW COUNTY										
URB161-1	44	55	<0.1	0.11	10	418	0.03	0.51	0.03	<0.2
URB161-2	45	62	0.1	0.040	11	468	0.04	3.9	0.04	<0.2
URB161-3	60	150	0.5	0.18	16	641	0.01	2.2	0.03	<0.2
URB161-4	37	68	0.2	0.10	12	446	0.01	<0.05	0.02	<0.2

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water quality in wells in residential areas in the Lake Erie-Lake St. Clair Basin--Continued

LOCAL WELL NUMBER	PHOS- PHORUS DIS- SOLVED (mg/L AS P) (00666)	PHOS- PHORUS ORTHO, DIS- SOLVED (mg/L AS P) (00671)	ALUM- INUM, DIS- SOLVED (µg/L AS AL) (01106)	ANTI- MONY, DIS- SOLVED (µg/L AS SB) (01095)	ARSENIC DIS- SOLVED (µg/L AS AS) (01000)	BARIUM, DIS- SOLVED (µg/L AS BA) (01005)	BERYL- LIUM, DIS- SOLVED (µg/L AS BE) (01010)	CADMIUM DIS- SOLVED (µg/L AS CD) (01025)	CHRO- MIUM, DIS- SOLVED (µg/L AS CR) (01030)	COBALT, DIS- SOLVED (µg/L AS CO) (01035)
LIVINGSTON COUNTY										
URB093-5	0.03	0.01	4.0	<1.0	<1	73	<1.0	<1.0	5.0	<1.0
URB093-6	<0.01	<0.01	--	--	<1	--	--	--	--	--
URB093-9	<0.01	<0.01	3.0	<1.0	<1	39	<1.0	<1.0	3.0	<1.0
URB093-10	<0.01	<0.01	3.0	<1.0	<1	13	<1.0	<1.0	2.0	2.0
URB093-11	<0.01	<0.01	3.0	<1.0	<1	89	<1.0	<1.0	3.0	<1.0
URB093-12	<0.01	<0.01	5.0	<1.0	<1	48	<1.0	<1.0	5.0	3.0
URB093-13	<0.01	<0.01	13	<1.0	6	212	<1.0	<1.0	5.0	5.0
URB093-28	<0.01	<0.01	3.0	<1.0	<1	15	<1.0	<1.0	2.0	<1.0
MACOMB COUNTY										
URB099-18	<0.01	<0.01	11	<1.0	<1	6.0	<1.0	<1.0	2.0	<1.0
OAKLAND COUNTY										
URB125-7	<0.01	<0.01	3.0	<1.0	1	67	<1.0	<1.0	2.0	<1.0
URB125-8	<0.01	<0.01	4.0	<1.0	<1	79	<1.0	<1.0	3.0	<1.0
URB125-14	<0.01	<0.01	5.0	<1.0	<1	30	<1.0	<1.0	4.0	4.0
URB125-15	<0.01	<0.01	3.0	<1.0	<1	16	<1.0	<1.0	2.0	<1.0
URB125-16	<0.01	0.01	4.0	<1.0	17	118	<1.0	<1.0	4.0	<1.0
URB125-17	<0.01	<0.01	3.0	<1.0	<1	39	<1.0	<1.0	5.0	1.0
URB125-19	<0.01	<0.01	4.0	<1.0	<1	37	<1.0	<1.0	6.0	<1.0
URB125-20	<0.01	<0.01	10	<1.0	1	29	<1.0	<1.0	5.0	<1.0
URB125-21	<0.01	0.02	7.0	<1.0	2	6.0	<1.0	<1.0	1.0	<1.0
URB125-22	<0.01	0.01	3.0	<1.0	<1	44	<1.0	<1.0	5.0	<1.0
URB125-23	<0.01	<0.01	4.0	<1.0	<1	66	<1.0	<1.0	4.0	1.0
URB125-24	<0.01	<0.01	3.0	<1.0	<1	52	<1.0	<1.0	5.0	<1.0
URB125-25	<0.01	0.02	3.0	<1.0	<1	106	<1.0	<1.0	4.0	<1.0
URB125-26	<0.01	<0.01	<1.0	<1.0	<1	17	<1.0	<1.0	7.0	<1.0
URB125-27	<0.01	<0.01	4.0	<1.0	2	66	<1.0	<1.0	2.0	<1.0
URB125-29	<0.01	<0.01	4.0	<2.0	<1	171	<2.0	<2.0	5.0	<2.0
URB125-30	<0.01	<0.01	4.0	<1.0	<1	26	<1.0	<1.0	5.0	<1.0
WASHTENAW COUNTY										
URB161-1	<0.01	<0.01	2.0	<1.0	<1	39	<1.0	<1.0	2.0	<1.0
URB161-2	<0.01	<0.01	3.0	<1.0	<1	41	<1.0	<1.0	3.0	<1.0
URB161-3	<0.01	<0.01	3.0	<1.0	<1	178	<1.0	<1.0	4.0	1.0
URB161-4	<0.01	<0.01	3.0	<1.0	1	71	<1.0	<1.0	4.0	2.0

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water quality in wells in residential areas in the Lake Erie-Lake St. Clair Basin--Continued

LOCAL WELL NUMBER	COPPER, DIS- SOLVED (µg/L AS CU) (01040)	IRON, DIS- SOLVED (µg/L AS FE) (01046)	LEAD, DIS- SOLVED (µg/L AS PB) (01049)	MANGA- NESE, DIS- SOLVED (µg/L AS MN) (01056)	MOLYB- DENUM, DIS- SOLVED (µg/L AS MO) (01060)	NICKEL, DIS- SOLVED (µg/L AS NI) (01065)	SELE- NIUM, DIS- SOLVED (µg/L AS SE) (01145)	SILVER, DIS- SOLVED (µg/L AS AG) (01075)	ZINC, DIS- SOLVED (µg/L AS ZN) (01090)
LIVINGSTON COUNTY									
URB093-5	<1.0	<3	<1.0	<1.0	3.0	1.0	<1	<1.0	<1.0
URB093-6	--	10	--	21	--	--	<1	--	--
URB093-9	<1.0	7	<1.0	46	<1.0	2.0	<1	<1.0	<1.0
URB093-10	<1.0	<3	<1.0	220	3.0	<1.0	<1	<1.0	3.0
URB093-11	<1.0	7	<1.0	2.0	3.0	1.0	<1	<1.0	<1.0
URB093-12	<1.0	<3	<1.0	6.0	2.0	2.0	<1	<1.0	39
URB093-13	1.0	28000	<1.0	990	4.0	8.0	<1	<1.0	15
URB093-28	<1.0	<3	<1.0	<1.0	2.0	<1.0	<1	<1.0	<1.0
MACOMB COUNTY									
URB099-18	<1.0	6	<1.0	62	3.0	4.0	<1	<1.0	<1.0
OAKLAND COUNTY									
URB125-7	<1.0	50	<1.0	460	6.0	2.0	<1	<1.0	2.0
URB125-8	<1.0	60	<1.0	290	3.0	2.0	<1	<1.0	7.0
URB125-14	<1.0	<3	<1.0	190	11	8.0	<1	<1.0	29
URB125-15	<1.0	6	<1.0	5.0	<1.0	1.0	<1	<1.0	3.0
URB125-16	<1.0	720	<1.0	35	8.0	1.0	<1	<1.0	<1.0
URB125-17	<1.0	<3	<1.0	<1.0	<1.0	1.0	<1	<1.0	3.0
URB125-19	<1.0	<3	<1.0	<1.0	<1.0	1.0	2	<1.0	1.0
URB125-20	<1.0	920	<1.0	74	4.0	1.0	<1	<1.0	23
URB125-21	<1.0	<3	<1.0	<1.0	<1.0	<1.0	<1	<1.0	<1.0
URB125-22	<1.0	3	<1.0	<1.0	1.0	1.0	<1	<1.0	<1.0
URB125-23	<1.0	480	2.0	43	5.0	<1.0	<1	<1.0	2.0
URB125-24	<1.0	<3	<1.0	<1.0	<1.0	2.0	<1	<1.0	3.0
URB125-25	<1.0	9	<1.0	54	2.0	3.0	1	<1.0	1.0
URB125-26	<1.0	<3	<1.0	<1.0	<1.0	<1.0	<1	<1.0	<1.0
URB125-27	<1.0	730	<1.0	25	4.0	1.0	<1	<1.0	<1.0
URB125-29	<2.0	<9	<2.0	72	<2.0	3.0	<1	<2.0	<2.0
URB125-30	<1.0	5	<1.0	3.0	<1.0	<1.0	<1	<1.0	2.0
WASHTENAW COUNTY									
URB161-1	<1.0	3	<1.0	43	2.0	4.0	<1	<1.0	<1.0
URB161-2	<1.0	8	<1.0	2.0	3.0	4.0	<1	<1.0	2.0
URB161-3	<1.0	10	<1.0	54	14	5.0	<1	<1.0	1.0
URB161-4	<1.0	120	<1.0	170	3.0	1.0	<1	<1.0	3.0

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water quality in wells in residential areas in the Lake Erie-Lake St. Clair Basin--Continued

LOCAL WELL NUMBER	RADON- 222 TOTAL (PCI/L) (82303)	RADON- 222 2 SIGMA TOTAL (PCI/L) (76002)	URANIUM NATURAL DIS- SOLVED (µg/L AS U) (22703)	CARBON, ORGANIC DIS- SOLVED (mg/L AS C) (00681)	TRITIUM TOTAL (PCI/L) (07000)	TRITIUM 2 SIGMA TOTAL (PCI/L) (75985)
LIVINGSTON COUNTY						
URB093-5	--	--	<1.0	1.5	41	3
URB093-6	--	--	--	1.5	52	3
URB093-9	410	22	<1.0	1.4	31	2
URB093-10	170	18	<1.0	--	80	5
URB093-11	520	23	<1.0	0.6	55	3
URB093-12	--	--	<1.0	0.8	42	3
URB093-13	93	17	7.0	34	41	3
URB093-28	370	21	<1.0	0.7	46	3
MACOMB COUNTY						
URB099-18	--	--	<1.0	0.7	70	5
OAKLAND COUNTY						
URB125-7	160	18	4.0	1.3	54	3
URB125-8	230	20	7.0	2.0	51	3
URB125-14	--	--	1.0	1.3	64	4
URB125-15	--	--	<1.0	0.9	64	4
URB125-16	140	18	<1.0	0.7	3	1
URB125-17	310	33	<1.0	1.0	53	3
URB125-19	--	--	1.0	1.4	57	4
URB125-20	140	18	<1.0	8.9	65	4
URB125-21	220	19	<1.0	0.6	60	4
URB125-22	380	22	<1.0	0.7	50	3
URB125-23	140	18	1.0	0.7	56	4
URB125-24	--	--	<1.0	1.5	44	3
URB125-25	370	32	1.0	1.1	81	5
URB125-26	330	21	<1.0	1.0	55	3
URB125-27	--	--	<1.0	0.5	80	5
URB125-29	690	27	<2.0	1.5	48	3
URB125-30	370	33	<1.0	1.5	52	3
WASHTENAW COUNTY						
URB161-1	230	20	<1.0	1.0	43	3
URB161-2	450	23	<1.0	0.8	48	3
URB161-3	530	24	1.0	1.0	35	3
URB161-4	280	22	<1.0	0.9	51	3

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water pesticide schedule A detection levels and quality in wells in residential areas in the Lake Erie-Lake St. Clair Basin
(National Water Quality Assessment Program)

REMARKS.--Water from each of the 30 wells in this study was tested for pesticide schedule A. The table below lists the 47 pesticides on this schedule, the unit of measure (micrograms per liter, µg/L), the U.S. Geological Survey National Water Information System parameter code, and the method detection level. Explanation of footnotes: E = estimated. Pesticide schedule A includes selected pesticides and metabolites that are efficiently partitioned from a water sample by solid-phase extraction and are sufficiently volatile and thermally stable for analysis by gas chromatography. Samples are filtered through a glass-fiber membrane filter with openings that are 0.7 microns in size to remove sediment and microorganisms. Therefore, this schedule is suitable for compounds dissolved in water. Each sample was analyzed for all of the compounds in this schedule. **Only pesticide compounds with detectable levels in one or more wells are listed in the water-quality table following the schedule list.**

ACETOCHLOR (µg/L) (49260)	ALACHLOR (µg/L) (46342)	ATRAZINE (µg/L) (39632)	DESETHYL- ATRAZINE (µg/L) (04040)	METHYL- AZINPHOS (µg/L) (82686)	BENFLURALIN (µg/L) (82673)
<0.002	<0.002	<0.001	<0.002	<0.001	<0.002
BUTYLATE (µg/L) (04028)	CARBARYL (µg/L) (82680)	CARBOFURAN (µg/L) (82674)	CHLORPYRIFOS (µg/L) (38933)	CYANAZINE (µg/L) (04041)	DCPA (µg/L) (82682)
<0.002	<0.003	<0.003	<0.004	<0.004	<0.002
DDE, p,p'- (µg/L) (34653)	DIAZINON (µg/L) (39572)	DIELDRIN (µg/L) (39381)	2,6-DIETHYL- ANILINE (µg/L) (82660)	DISULFOTON (µg/L) (82677)	EPTC (µg/L) (82668)
<0.006	<0.002	<0.001	<0.003	<0.017	<0.002
ETHAL- FLURALIN (µg/L) (82663)	ETHOPROP (µg/L) (82672)	FONOFOS (µg/L) (04095)	ALPHA BHC (µg/L) (34253)	LINDANE (µg/L) (39341)	LINURON (µg/L) (82666)
<0.004	<0.003	<0.003	<0.002	<0.004	<0.002
MALATHION (µg/L) (39532)	METOLACHLOR (µg/L) (39415)	METRIBUZIN SENCOR (µg/L) (82630)	MOLINATE (µg/L) (82671)	NAPROPAMIDE (µg/L) (82684)	PARATHION (µg/L) (39542)
<0.005	<0.002	<0.004	<0.004	<0.003	<0.004
METHYL PARATHION (µg/L) (82667)	PEBULATE (µg/L) (82669)	PENDI- METHALIN (µg/L) (82683)	PERMETHRIN (µg/L) (82687)	PHORATE (µg/L) (82664)	PRONAMIDE (µg/L) (82676)
<0.006	<0.004	<0.004	<0.005	<0.002	<0.003
PROMETON (µg/L) (04037)	PROPACHLOR (µg/L) (04024)	PROPANIL (µg/L) (82679)	PROPARGITE (µg/L) (82685)	SIMAZINE (µg/L) (04035)	THIOBENCARB (µg/L) (82681)
<0.018	<0.007	<0.004	<0.013	<0.005	<0.002
TEBUTHIURON (µg/L) (82670)	TERBACIL (µg/L) (82665)	TERBUFOS (µg/L) (82675)	TRIALATE (µg/L) (82678)	TRIFLURALIN (µg/L) (82661)	
<0.010	<0.007	<0.013	<0.001	<0.002	

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water pesticide schedule A detection levels and quality in wells in residential areas in the Lake Erie-Lake St. Clair Basin--Continued

LOCAL WELL NUMBER (µg/L) (04035)	SIMAZINE (µg/L) (04040)	DESETHYL ATRAZINE
LIVINGSTON COUNTY		
URB093-5	<0.005	<0.002
URB093-6	<0.005	<0.002
URB093-9	<0.005	E0.002
URB093-10	<0.005	<0.002
URB093-11	<0.005	<0.002
URB093-12	<0.005	<0.002
URB093-13	<0.005	<0.002
URB093-28	<0.005	<0.002
MACOMB COUNTY		
URB099-18	0.007	<0.002
OAKLAND COUNTY		
URB125-7	<0.005	<0.002
URB125-8	<0.005	<0.002
URB125-14	<0.005	<0.002
URB125-15	<0.005	<0.002
URB125-16	<0.005	<0.002
URB125-17	<0.005	<0.002
URB125-19	<0.005	<0.002
URB125-20	<0.005	<0.002
URB125-21	<0.005	<0.002
URB125-22	<0.005	<0.002
URB125-23	<0.005	<0.002
URB125-24	<0.005	<0.002
URB125-25	<0.005	<0.002
URB125-26	<0.005	<0.002
URB125-27	<0.005	<0.002
URB125-29	<0.005	<0.002
URB125-30	<0.005	<0.002
WASHTENAW COUNTY		
URB161-1	<0.005	<0.002
URB161-2	<0.005	<0.002
URB161-3	<0.005	<0.002
URB161-4	<0.005	<0.002

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water pesticide schedule B detection levels and quality in wells in residential areas in the Lake Erie-Lake St. Clair Basin

REMARKS.--Water from each of the 30 wells in this study was tested for pesticide schedule B. The table below lists the 41 pesticides on this schedule, the unit of measure (micrograms per liter, µg/L), the U.S. Geological Survey National Water Information System parameter code, and the method detection level. Pesticide schedule B includes selected pesticides and metabolites that are efficiently partitioned from a water sample by solid-phase extraction and are sufficiently volatile and thermally stable for analysis by high pressure liquid chromatography. Samples are filtered through a glass-fiber membrane filter with openings that are 0.7 microns in size to remove sediment and microorganisms. Therefore, this schedule is suitable for compounds dissolved in water. Each sample was analyzed for all of the compounds in this schedule. **Pesticide compounds from schedule B were not detected in any wells.**

2,4,5-T (µg/L) (39742)	2,4-D (µg/L) (39732)	2,4-DB (µg/L) (38746)	ACIFLUORFEN (µg/L) (49315)	ALDICARB (µg/L) (49312)	ALDICARB SULFONE (µg/L) (49313)
<0.035	<0.035	<0.035	<0.035	<0.016	<0.016
ALDICARB SULFOXIDE (µg/L) (49314)	BENTAZON (µg/L) (38711)	BROMACIL (µg/L) (04029)	BROMOXYNIL (µg/L) (49311)	CARBARYL (µg/L) (49310)	CARBOFURAN (µg/L) (49309)
<0.021	<0.014	<0.035	<0.035	<0.008	<0.028
3HYDROXY- CARBOFURAN (µg/L) (49308)	CHLORAMBEN (µg/L) (49307)	CHLORO- THALONIL (µg/L) (49306)	CLOPYRALID (µg/L) (49305)	DACTHAL MONO-ACID (µg/L) (49304)	DICAMBA (µg/L) (38442)
<0.014	<0.011	<0.035	<0.050	<0.017	<0.035
DICHLORBENIL (µg/L) (49303)	DICHLORPROP (µg/L) (49302)	DINOSEB (µg/L) (49301)	DIURON (µg/L) (49300)	DNOC (µg/L) (49299)	ESFENVALERATE (µg/L) (49298)
<0.020	<0.032	<0.035	<0.020	<0.035	<0.019
FENURON (µg/L) (49297)	FLUOMETURON (µg/L) (38811)	LINURON (µg/L) (38478)	MCPA (µg/L) (38482)	MCPB (µg/L) (38487)	METHIOCARB (µg/L) (38501)
<0.013	<0.035	<0.018	<0.050	<0.035	<0.026
METHOMYL (µg/L) (49296)	1-NAPHTHOL (µg/L) (49295)	NEBURON (µg/L) (49294)	NORFLURAZON (µg/L) (49293)	ORYZALIN (µg/L) (49292)	OXAMYL (µg/L) (38866)
<0.017	<0.007	<0.015	<0.024	<0.019	<0.018
PICLORAM (µg/L) (49291)	PROPHAM (µg/L) (49236)	PROPOXUR (µg/L) (38538)	SILVEX (µg/L) (39762)	TRICLOPYR (µg/L) (49235)	
<0.050	<0.035	<0.035	<0.021	<0.050	

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water volatile organic chemical schedule detection levels and quality in wells in residential areas in the Lake Erie-Lake St. Clair Basin
(National Water Quality Assessment Program)

REMARKS.--Water from each of the 30 wells in this study was tested for a schedule of 87 Volatile Organic Chemicals. The table below lists the compounds on the schedule, the unit of measure (micrograms per liter, µg/L), the U.S. Geological Survey National Water Information System parameter code, and the reporting level. Explanation of footnotes: E = estimated, V = Contaminant may have been introduced into the sample as the result of well installation, sampling, handling, sample preservation, or shipping. Each sample was analyzed for all of the compounds in this schedule. Only volatile organic chemicals with detectable levels for one or more wells are listed in the water-quality table following the schedule list.

ACETATE, VINYL (µg/L) (77057)	ACETONE (µg/L) (81552)	ACROLEIN (µg/L) (34210)	ACRYLONITRILE (µg/L) (34215)	BENZENE (µg/L) (34030)	BENZENE, 1,3-DICHLORO (µg/L) (34566)
<5.00	<5.00	<2.00	<2.00	<0.050	<0.050
BENZENE, 1,4-DICHLORO (µg/L) (34571)	BENZENE, N-BUTYL (µg/L) (77342)	BENZENE, N-PROPYL (µg/L) (77224)	BENZENE, O-DICHLORO (µg/L) (34536)	BENZENE, SEC-BUTYL (µg/L) (77350)	BENZENE, TERT-BUTYL (µg/L) (77353)
<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
BENZENE, 1,2,4-TRICHLORO (µg/L) (34551)	BENZENE, 1,2,3-TRIMETHYL (µg/L) (77221)	BENZENE, 1,2,4-TRIMETHYL (µg/L) (77222)	BENZENE, 1,3,5-TRIMETHYL (µg/L) (77226)	BROMO- BENZENE (µg/L) (81555)	BROMO- ETHENE (µg/L) (50002)
<0.200	<0.050	<0.050	<0.050	<0.050	<0.100
BROMOFORM (µg/L) (32104)	2BUTENE TRANS- 1,4-DICHLORO (µg/L) (73547)	CARBON DISULFIDE (µg/L) (77041)	CARBON TETRACHLORIDE (µg/L) (32102)	CHLORO- BENZENE (µg/L) (34301)	CHLORO- DIBROMO- METHANE (µg/L) (32105)
<0.200	<5.00	<0.050	<0.050	<0.050	<0.100
CHLORO- ETHANE (µg/L) (34311)	CHLOROFORM (µg/L) (32106)	CIS-1,2- DICHLORO- ETHENE (µg/L) (77093)	CIS-1,3- DICHLORO- PROPENE (µg/L) (34704)	DIBROMO- CHLORO- PROPANE (µg/L) (82625)	1,2-DIBROMO ETHANE (µg/L) (77651)
<0.100	<0.050	<0.050	<0.100	<0.500	<0.100
DIBROMO- METHANE (µg/L) (30217)	DICHLORO- BROMO- METHANE (µg/L) (32101)	DICHLORO- DIFLUORO- METHANE (µg/L) (34668)	1,1-DICHLORO- ETHANE (µg/L) (34496)	1,2-DICHLORO- ETHANE (µg/L) (32103)	1,1-DICHLORO- ETHYLENE (µg/L) (34501)
<0.100	<0.100	<0.200	<0.050	<0.050	<0.100
1,2-DICHLORO- PROPANE (µg/L) (34541)	1,3-DICHLORO- PROPANE (µg/L) (77173)	2,2-DICHLORO- PROPANE (µg/L) (77170)	1,1-DICHLORO- PROPENE (µg/L) (77168)	DIISOPROPYL- ETHER (µg/L) (81577)	ETHANE, HEXACHLORO (µg/L) (34396)
<0.050	<0.050	<0.050	<0.050	<0.100	<0.050
ETHANE, 1,1,1,2-TETRA- CHLORO (µg/L) (77562)	ETHANE, 1,1,2,2-TETRA- CHLORO (µg/L) (34516)	ETHER, ETHYL (µg/L) (81576)	ETHER, TERT-BUTYL- ETHYL (µg/L) (50004)	ETHER, TERT-PENTYL- METHYL (µg/L) (50005)	ETHYLBENZENE (µg/L) (34371)
<0.050	<0.100	<0.100	<0.100	<0.100	<0.050

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water volatile organic chemical schedule detection levels and quality in wells
in residential areas in the Lake Erie-Lake St. Clair Basin--Continued

FREON 113 (µg/L) (77652)	FURAN, TETRAHYDRO (µg/L) (81607)	HEXACHLORO- BUTADIENE (µg/L) (39702)	2-HEXANONE (µg/L) (77103)	ISODURENE (µg/L) (50000)	ISOPROPYL- BENZENE (µg/L) (77223)
<0.050	<5.00	<0.200	<5.00	<0.050	<0.050
METHACRYLATE, ETHYL (µg/L) (73570)	METHACRYLATE, METHYL (µg/L) (81597)	METHACRYLO- NITRITE (µg/L) (81593)	METHANE, BROMOCHLORO (µg/L) (77297)	METHYL- ACRYLATE (µg/L) (49991)	METHYL- BROMIDE (µg/L) (34413)
<1.00	<1.00	<2.00	<0.100	<2.00	<0.100
METHYL- CHLORIDE (µg/L) (34418)	METHYLENE CHLORIDE (µg/L) (34423)	METHYLETHYL- KETONE (µg/L) (81595)	METHYL- IODIDE (µg/L) (77424)	METHYL- ISOBUTYL- KETONE (µg/L) (78133)	METHYL- TERT-BUTYL- ETHER (µg/L) (78032)
<0.200	<0.100	<5.00	<0.050	<5.00	<0.100
NAPHTHALENE (µg/L) (34696)	PREHNITENE (µg/L) (49999)	PROPENE, 3-CHLORO (µg/L) (78109)	STYRENE (µg/L) (77128)	TETRACHLORO- ETHYLENE (µg/L) (34475)	TOLUENE (µg/L) (34010)
<0.200	<0.050	<0.100	<0.050	<0.050	<0.050
O-CHLORO- TOLUENE (µg/L) (77275)	O-ETHYL- TOLUENE (µg/L) (77220)	P-CHLORO- TOLUENE (µg/L) (77277)	P-ISOPROPYL- TOLUENE (µg/L) (77356)	1,2-TRANS- DICHLORO- ETHENE (µg/L) (34546)	TRANS-1,3- DICHLORO- PROPENE (µg/L) (34699)
<0.050	<0.050	<0.050	<0.050	<0.050	<0.100
1,2,3-TRICHLORO- BENZENE (µg/L) (77613)	1,1,1-TRICHLORO- ETHANE (µg/L) (34506)	1,1,2-TRICHLORO- ETHANE (µg/L) (34511)	TRICHLORO- ETHYLENE (µg/L) (39180)	TRICHLORO- FLUORO- METHANE (µg/L) (34488)	1,2,3-TRICHLORO- PROPANE (µg/L) (77443)
<0.200	<0.050	<0.100	<0.050	<0.100	<0.200
VINYL CHLORIDE (µg/L) (39175)	META/PARA- XYLENE (µg/L) (85795)	O- XYLENE (µg/L) (77135)			
<0.100	<0.050	<0.050			

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water volatile organic chemical schedule detection levels and quality in wells
in residential areas in the Lake Erie-Lake St. Clair Basin--Continued

LOCAL WELL NUMBER	ACETONE (µg/L) (81552)	BENZENE (µg/L) (34030)	BENZENE, 1,4-DI- CHLORO (µg/L) (34571)	BENZENE, 1,2,4-TRI- METHYL (µg/L) (77222)	CARBON DI- SULFIDE (µg/L) (77041)	CHLORO- DI- BROMO- METHANE (µg/L) (32105)	CHLORO- FORM (µg/L) (32106)	DI- CHLORO- BROMO- METHANE (µg/L) (32101)	ETHYL- BENZENE (µg/L) (34371)
LIVINGSTON COUNTY									
URB093-5	<5.00	<0.050	E0.004	<0.050	<0.050	<0.100	<0.050	<0.100	E0.070
URB093-6	<5.00	<0.050	<0.050	E0.007	E0.020	<0.100	E0.020	<0.100	0.100
URB093-9	<5.00	<0.050	<0.050	<0.050	<0.050	E0.020	E0.010	E0.010	E0.020
URB093-10	<5.00	<0.050	<0.050	<0.050	E0.010	<0.100	E0.010	<0.100	<0.050
URB093-11	<5.00	<0.050	<0.050	<0.050	E0.010	<0.100	<0.050	<0.100	E0.050
URB093-12	<5.00	<0.050	<0.050	<0.050	E0.009	E0.030	0.450	E0.090	<0.050
URB093-13	4.60	<0.050	<0.050	<0.050	E0.030	<0.100	E0.005	<0.100	E0.020
URB093-28	<5.00	<0.050	<0.050	<0.050	<0.050	<0.100	<0.050	<0.100	E0.050
MACOMB COUNTY									
URB099-18	<5.00	<0.050	<0.050	<0.050	E0.180	<0.100	<0.050	<0.100	<0.050
OAKLAND COUNTY									
URB125-7	<5.00	<0.050	<0.050	<0.050	<0.050	<0.100	<0.050	<0.100	<0.050
URB125-8	<5.00	<0.050	<0.050	<0.050	E0.009	<0.100	<0.050	<0.100	E0.050
URB125-14	<5.00	E0.060	<0.050	E0.004	E0.090	<0.100	<0.050	<0.100	<0.050
URB125-15	<5.00	<0.050	<0.050	<0.050	<0.050	<0.100	<0.050	<0.100	<0.050
URB125-16	<5.00	<0.050	<0.050	<0.050	E0.040	<0.100	<0.050	<0.100	<0.050
URB125-17	<5.00	<0.050	<0.050	<0.050	<0.050	<0.100	E0.040	<0.100	<0.050
URB125-19	<5.00	<0.050	<0.050	E0.009	E0.007	<0.100	E0.020	<0.100	E0.050
URB125-20	<5.00	<0.050	<0.050	<0.050	E0.020	<0.100	<0.050	<0.100	E0.050
URB125-21	<5.00	<0.050	<0.050	<0.050	E0.010	<0.100	<0.050	<0.100	<0.050
URB125-22	<5.00	<0.050	<0.050	<0.050	<0.050	<0.100	E0.040	<0.100	<0.050
URB125-23	<5.00	<0.050	<0.050	<0.050	0.180	<0.100	<0.050	<0.100	E0.050
URB125-24	<5.00	<0.050	<0.050	<0.050	<0.050	<0.100	<0.050	<0.100	<0.050
URB125-25	<5.00	<0.050	<0.050	<0.050	E0.020	<0.100	0.100	<0.100	<0.050
URB125-26	<5.00	<0.050	<0.050	<0.050	<0.050	<0.100	<0.050	<0.100	<0.050
URB125-27	<5.00	<0.050	<0.050	<0.050	E0.010	<0.100	<0.050	<0.100	<0.050
URB125-29	<5.00	<0.050	<0.050	<0.050	<0.050	<0.100	E0.020	<0.100	<0.050
URB125-30	<5.00	<0.050	<0.050	<0.050	<0.050	<0.100	<0.050	<0.100	<0.050
WASHTENAW COUNTY									
URB161-1	<5.00	<0.050	<0.050	<0.050	E0.005	<0.100	<0.050	<0.100	E0.050
URB161-2	<5.00	<0.050	<0.050	<0.050	<0.050	<0.100	<0.050	<0.100	E0.020
URB161-3	<5.00	<0.050	<0.050	<0.050	<0.050	<0.100	<0.050	<0.100	E0.005
URB161-4	<5.00	<0.050	<0.050	<0.050	<0.050	<0.100	<0.050	<0.100	<0.050

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water volatile organic chemical schedule detection levels and quality in wells
in residential areas in the Lake Erie-Lake St. Clair Basin--Continued

LOCAL WELL NUMBER	FURAN, TETRA- HYDRO- (µg/L) (81607)	METHYL- CHLO- RIDE (µg/L) (34418)	METHYL- ENE CHLO- RIDE (µg/L) (34423)	METHYL- ETHYL- KETONE (µg/L) (81595)	METHYL- IODIDE (µg/L) (77424)	STYRENE (µg/L) (77128)	TETRA- CHLORO- ETHYL- ENE (µg/L) (34475)	TOLUENE (µg/L) (34010)	1,1,1- TRI- CHLORO- ETHANE (µg/L) (34506)
LIVINGSTON COUNTY									
URB093-5	<5.00	<0.200	VE0.010	<5.00	<0.050	<0.050	<0.050	E0.140	E0.010
URB093-6	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	0.160	<0.050
URB093-9	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	E0.040	E0.003
URB093-10	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	<0.050	<0.050
URB093-11	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	E0.050	<0.050
URB093-12	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	E0.020	<0.050
URB093-13	<5.00	V0.050	<0.100	E0.300	E0.020	<0.050	<0.050	E0.080	<0.050
URB093-28	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	0.230	<0.050
MACOMB COUNTY									
URB099-18	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	V0.050	E0.080	<0.050
OAKLAND COUNTY									
URB125-7	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	<0.050	<0.050
URB125-8	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	<0.050	<0.050
URB125-14	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	E0.040	<0.050
URB125-15	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	E0.050	<0.050
URB125-16	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	V0.009	E0.100	<0.050
URB125-17	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	E0.020	E0.020
URB125-19	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	V0.080	E0.050	<0.050
URB125-20	<5.00	V0.010	<0.100	E0.100	<0.050	<0.050	<0.050	0.140	<0.050
URB125-21	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	<0.050	<0.050
URB125-22	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	<0.050	0.220
URB125-23	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	4.80	<0.050
URB125-24	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	0.110	<0.050
URB125-25	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	E0.080	E0.008
URB125-26	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	E0.040	E0.070
URB125-27	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	0.680	<0.050
URB125-29	<5.00	V0.020	<0.100	<5.00	<0.050	<0.050	V0.008	E0.050	0.190
URB125-30	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	V0.020	E0.050	E0.010
WASHTENAW COUNTY									
URB161-1	E0.200	<0.200	<0.100	<5.00	<0.050	E0.004	<0.050	0.100	E0.008
URB161-2	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	<0.050	<0.050
URB161-3	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	<0.050	<0.050
URB161-4	<5.00	<0.200	<0.100	<5.00	<0.050	<0.050	<0.050	0.140	<0.050

GROUND-WATER DATA COLLECTED AT SPECIAL-STUDY SITES

Urban land-use study of ground-water volatile organic chemical schedule detection levels and quality in wells
in residential areas in the Lake Erie-Lake St. Clair Basin--Continued

LOCAL WELL NUMBER	META/ PARA- XYLENE (µg/L) (85795)	O- XYLENE (µg/L) (77135)
LIVINGSTON COUNTY		
URB093-5	E0.290	E0.080
URB093-6	0.440	E0.080
URB093-9	E0.100	E0.020
URB93-10	<0.050	<0.050
URB093-11	E0.100	E0.030
URB093-12	<0.050	<0.050
URB093-13	E0.100	E0.020
URB093-28	E0.100	E0.020
MACOMB COUNTY		
URB099-18	<0.050	<0.050
OAKLAND COUNTY		
URB125-7	<0.050	<0.050
URB125-8	E0.100	E0.020
URB125-14	E0.010	<0.050
URB125-15	<0.050	<0.050
URB125-16	<0.050	<0.050
URB125-17	<0.050	<0.050
URB125-19	E0.010	<0.050
URB125-20	E0.010	E0.003
URB125-21	<0.050	<0.050
URB125-22	<0.050	<0.050
URB125-23	E0.010	<0.050
URB125-24	<0.050	<0.050
URB125-25	<0.050	<0.050
URB125-26	<0.050	<0.050
URB125-27	E0.010	<0.050
URB125-29	E0.010	<0.050
URB125-30	<0.050	<0.050
WASHTENAW COUNTY		
URB161-1	0.270	E0.050
URB161-2	E0.090	E0.020
URB161-3	E0.040	E0.008
URB161-4	<0.050	<0.050

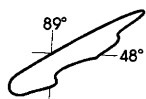


Figure 10. Location of ground-water wells published in this report.

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.

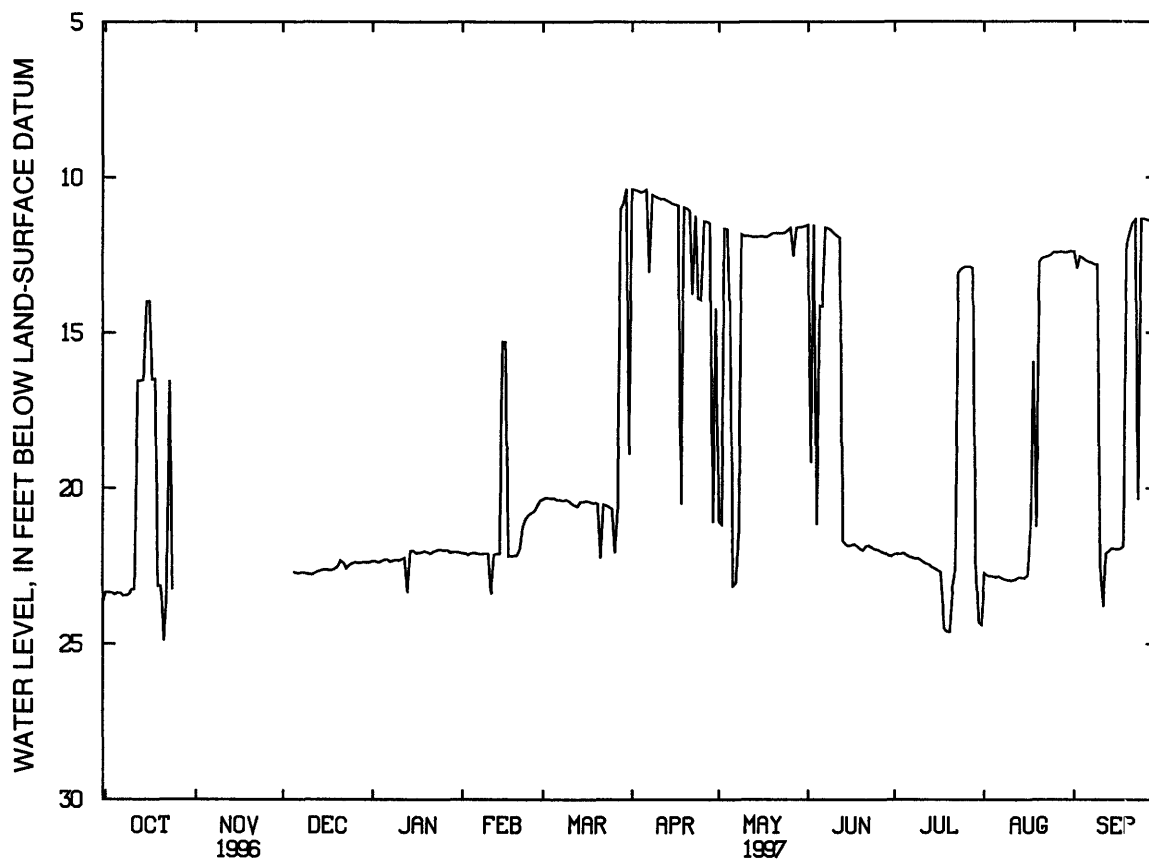
REMARKS.--Water levels affected by nearby pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	23.37	---	22.72	22.31	22.09	20.33	10.46	14.34	14.14	22.14	22.87	12.69
10	23.26	---	22.77	22.33	22.12	20.42	10.67	11.90	11.81	22.31	22.98	22.33
15	14.01	---	22.63	22.02	15.29	20.45	10.86	11.92	21.86	22.59	22.89	21.96
20	23.16	---	22.53	22.07	22.17	20.51	11.01	11.81	22.00	24.61	12.73	11.79
25	---	---	22.43	22.00	20.80	20.67	13.95	11.72	21.98	12.90	12.41	11.34
EOM	---	---	22.40	22.07	20.41	18.90	14.22	11.58	22.18	24.38	12.39	11.48
WTR YR 1997	HIGHEST		9.75	MAR 31		LOWEST		24.90	OCT 21			



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 in 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.

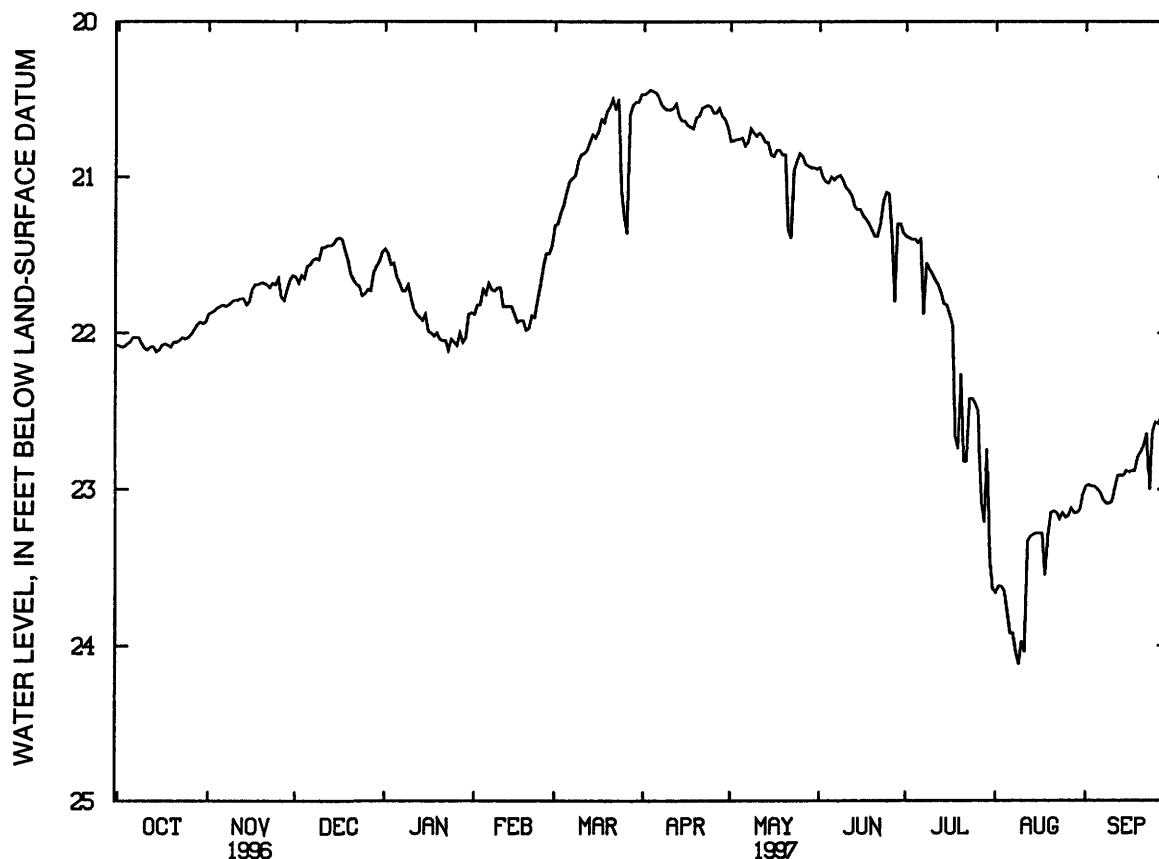
REMARKS.--Water levels affected by nearby pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	22.06	21.83	21.57	21.64	21.75	21.10	20.46	20.75	21.00	21.42	23.78	23.0 ^h
10	22.10	21.79	21.45	21.78	21.71	20.86	20.57	20.74	21.07	21.62	23.97	23.0 ^h
15	22.11	21.80	21.40	21.88	21.88	20.75	20.64	20.86	21.21	21.82	23.28	22.8 ^h
20	22.06	21.68	21.62	22.04	21.97	20.55	20.61	20.86	21.38	22.26	23.15	22.7 ^h
25	22.03	21.65	21.75	22.06	21.57	21.25	20.59	20.85	21.11	22.45	23.18	22.57
EOM	21.93	21.63	21.48	21.87	21.44	20.47	20.68	20.95	21.36	23.64	23.03	22.5 ^h
WTR YR 1997	HIGHEST		20.35	APR 5	LOWEST		24.12	AUG 9				



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.

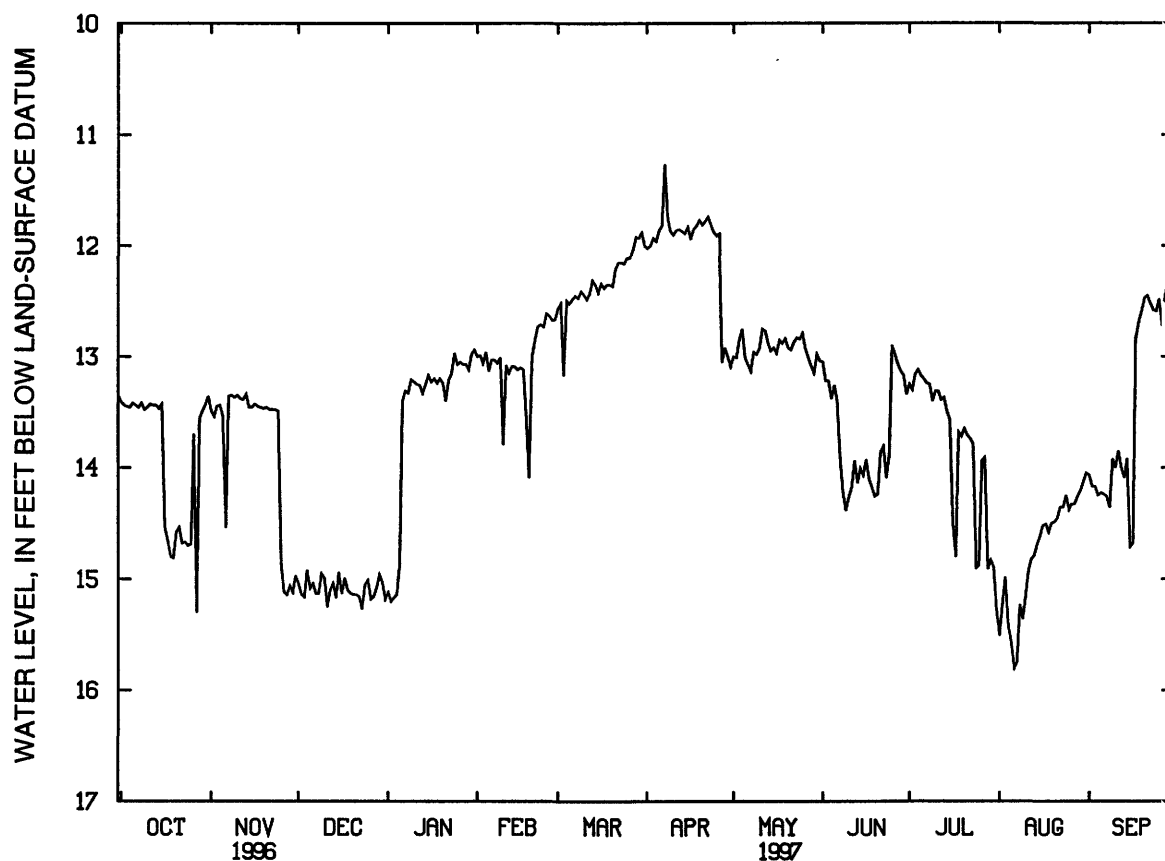
REMARKS.--Levels affected by nearby pumping.

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 1996 TO SEPTEMBER 1997

DAY	LOWEST VALUES											
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	13.42	13.54	15.08	14.87	13.13	12.52	11.86	13.01	13.26	13.17	15.57	14.23
10	13.46	13.35	14.99	13.23	13.79	12.44	11.90	12.93	14.27	13.31	15.16	14.00
15	13.43	13.46	14.94	13.17	13.12	12.42	11.83	12.92	14.07	13.57	14.62	14.71
20	14.58	13.46	15.14	13.24	13.01	12.36	11.81	12.92	14.24	13.65	14.49	12.47
25	14.69	14.86	15.01	13.07	12.61	12.11	11.91	12.79	12.90	14.88	14.38	12.48
EOM	13.36	14.97	15.18	12.94	12.66	12.00	13.09	13.04	13.34	15.29	14.05	12.34
WTR YR 1997	HIGHEST		10.47	APR 8		LOWEST		15.80	AUG 6			



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.

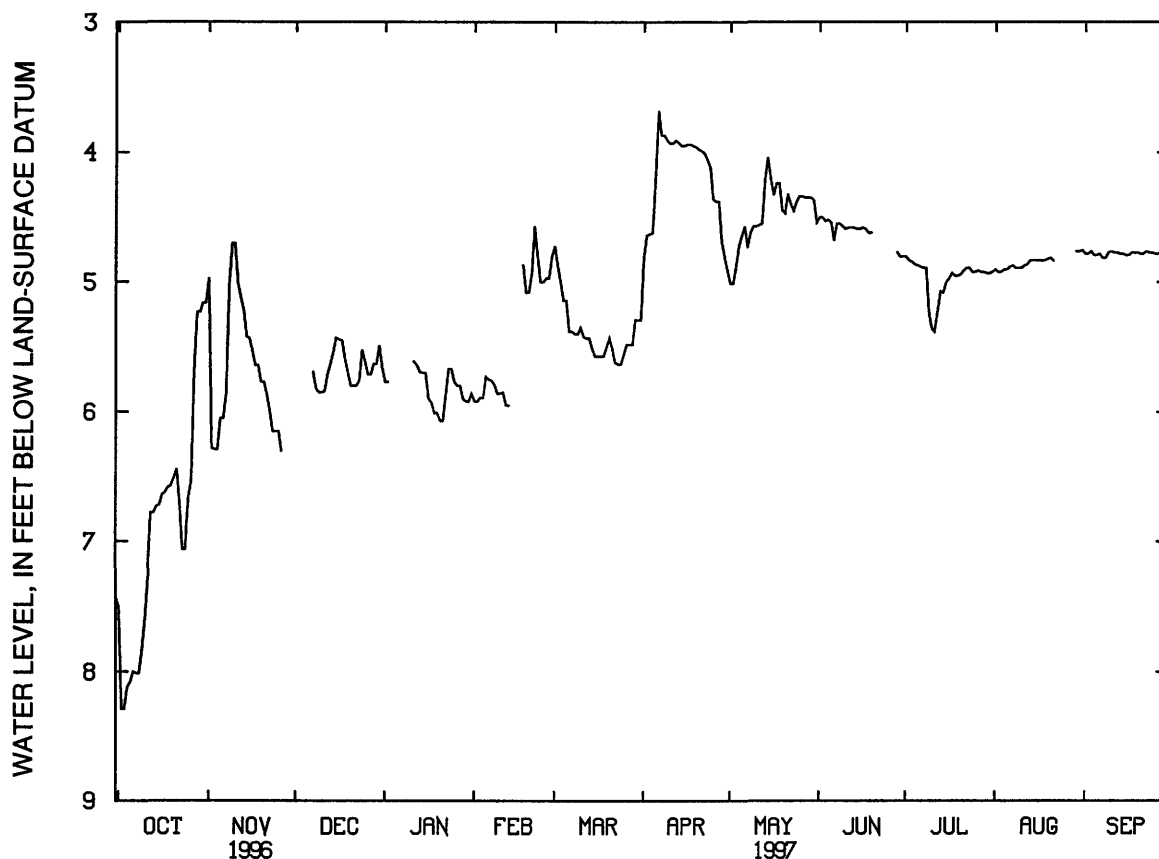
REMARKS.--Water levels affected by pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	8.08	6.05	---	---	5.73	5.14	4.19	4.64	4.54	4.87	4.90	4.79
10	7.60	4.70	5.85	---	5.86	5.35	3.93	4.57	4.59	5.36	4.89	4.76
15	6.72	5.43	5.43	5.70	---	5.57	3.95	4.21	4.59	5.00	4.83	4.79
20	6.51	5.77	5.80	6.07	5.08	5.43	3.98	4.47	---	4.94	4.81	4.78
25	6.67	6.15	5.61	5.77	5.00	5.56	4.36	4.34	---	4.92	---	4.78
EOM	5.16	---	5.66	5.86	4.80	5.29	4.91	4.54	4.80	4.92	4.75	4.83
WTR YR 1997	HIGHEST		3.37	APR 5		LOWEST		8.29	OCT 2			



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.

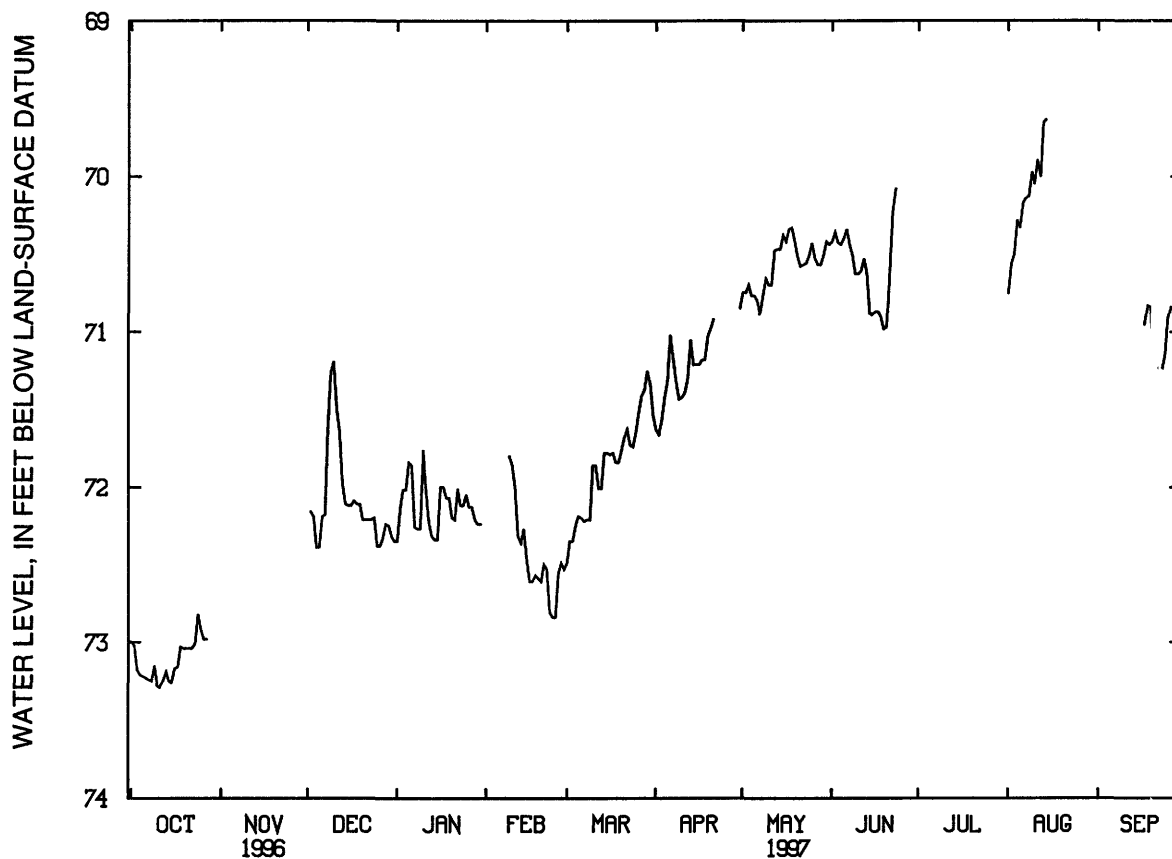
REMARKS.--Water levels affected by pumping.

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, 25, 26, 1996; lowest recorded, 103.6 ft below land-surface datum, Aug. 28, 1969.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	73.22	---	72.39	71.84	---	72.19	71.31	70.77	70.40	---	70.33	---
10	73.28	---	71.19	71.76	71.86	71.86	71.42	70.70	70.63	---	70.05	---
15	73.26	---	72.12	72.34	72.46	71.78	71.21	70.38	70.89	---	---	---
20	73.04	---	72.21	72.20	72.61	71.76	70.98	70.52	70.97	---	---	71.10
25	72.92	---	72.38	72.05	72.84	71.65	---	70.43	---	---	---	70.91
EOM	---	---	72.35	---	72.53	71.54	70.85	70.44	---	---	---	---
WTR YR 1997	HIGHEST		69.38	SEP 29, 30		LOWEST		73.29	OCT 11			



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.

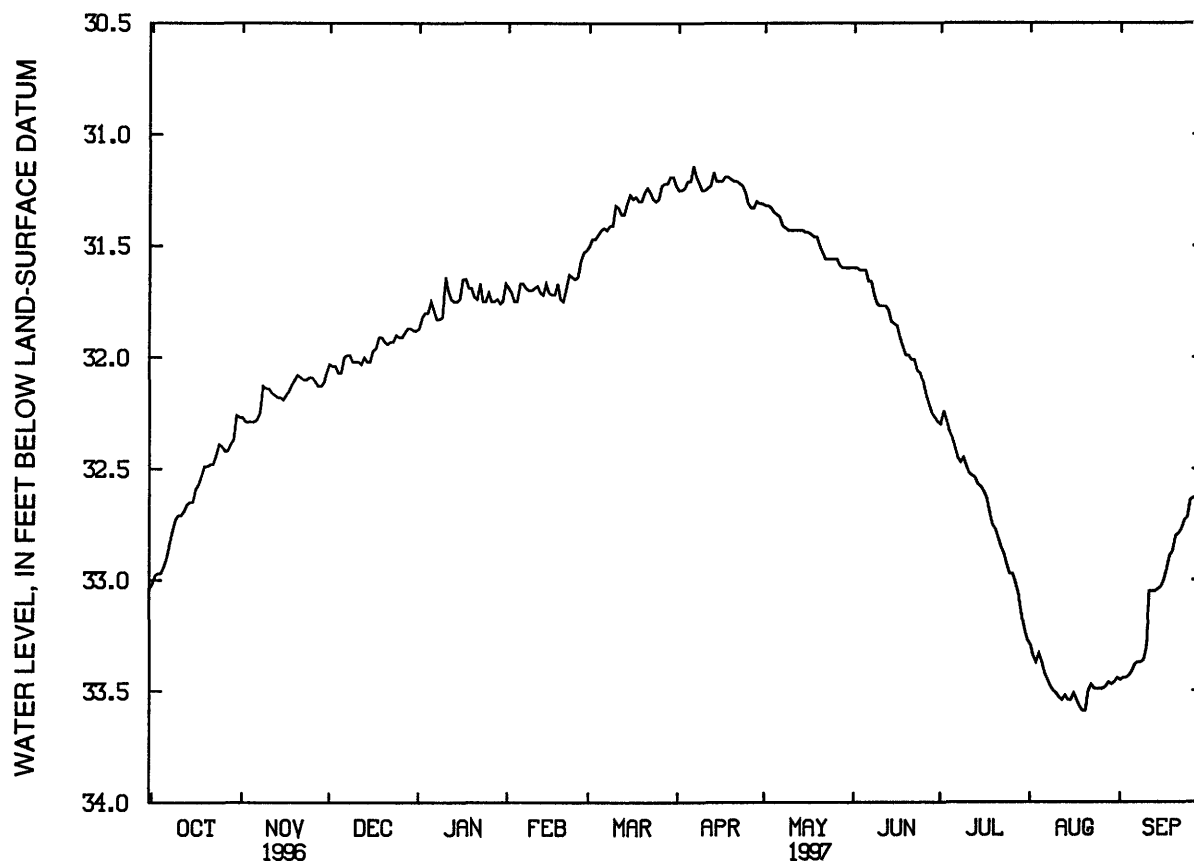
PERIOD OF RECORD.--February 1991 to current year.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	32.94	32.29	32.07	31.75	31.67	31.43	31.21	31.36	31.61	32.36	33.37	33.41
10	32.71	32.14	32.02	31.64	31.69	31.32	31.25	31.43	31.77	32.49	33.51	33.30
15	32.65	32.19	32.02	31.74	31.71	31.27	31.21	31.44	31.85	32.58	33.54	33.03
20	32.49	32.08	31.93	31.73	31.75	31.26	31.21	31.50	31.99	32.77	33.59	32.80
25	32.40	32.09	31.91	31.71	31.64	31.29	31.31	31.56	32.11	32.97	33.49	32.64
EOM	32.27	32.07	31.88	31.67	31.52	31.23	31.31	31.60	32.29	33.27	33.44	32.51
WTR YR 1997	HIGHEST			31.10	APR 6			LOWEST	33.59	AUG 19		



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 Uby. 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.

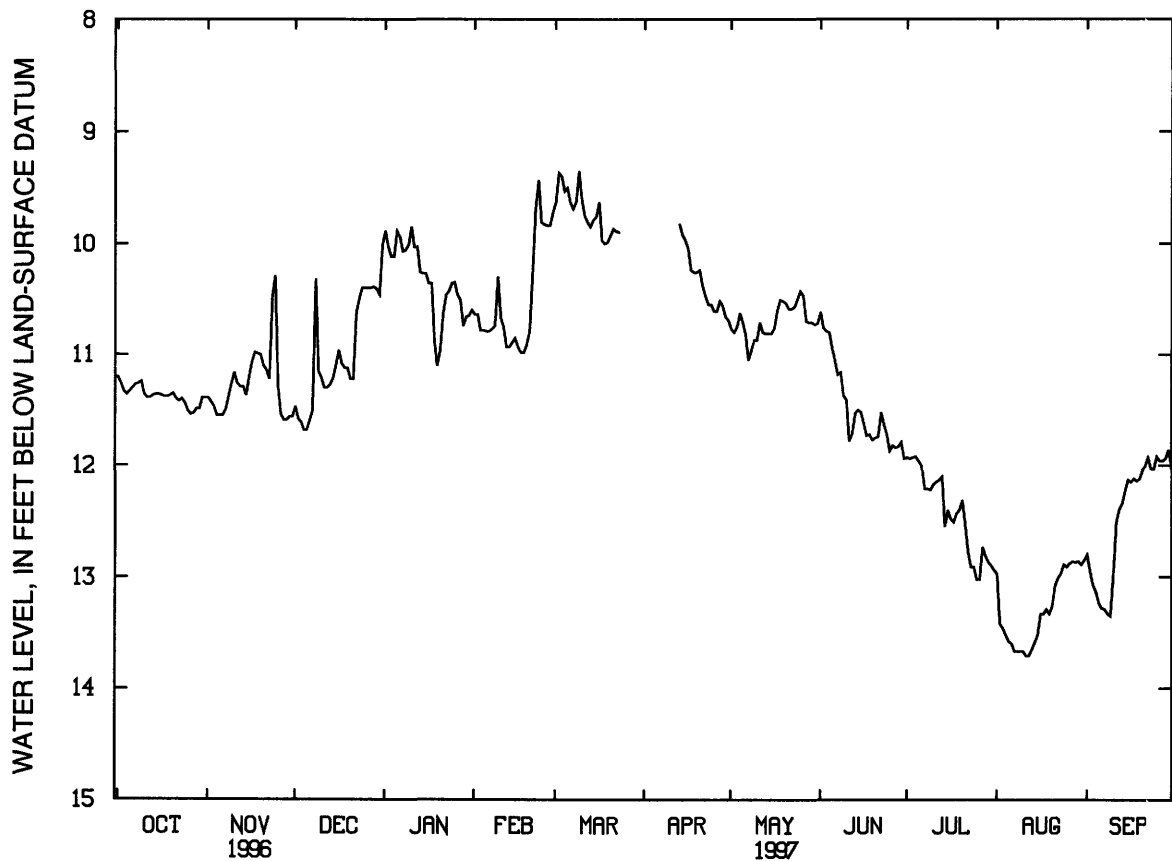
DATUM.--Elevation of land-surface datum is 795 ft above sea level, from topographic map. Measuring point: Top of casing, 2.81 f. above land-surface datum.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	11.33	11.55	11.68	9.89	10.79	9.50	---	10.71	10.94	11.96	13.58	13.23
10	11.36	11.16	11.21	9.85	10.67	9.60	---	10.87	11.41	12.17	13.67	13.00
15	11.36	11.21	11.10	10.27	10.85	9.76	9.97	10.81	11.52	12.40	13.52	12.13
20	11.35	11.10	11.22	10.96	10.79	9.93	10.24	10.54	11.75	12.31	13.26	12.04
25	11.51	11.29	10.40	10.35	9.83	---	10.61	10.43	11.87	13.02	12.91	11.92
EOM	11.39	11.56	10.01	10.60	9.72	---	10.69	10.72	11.94	12.94	12.85	12.00
WTR YR 1997	HIGHEST		9.11	MAR 2		LOWEST		13.71	AUG 11			



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.

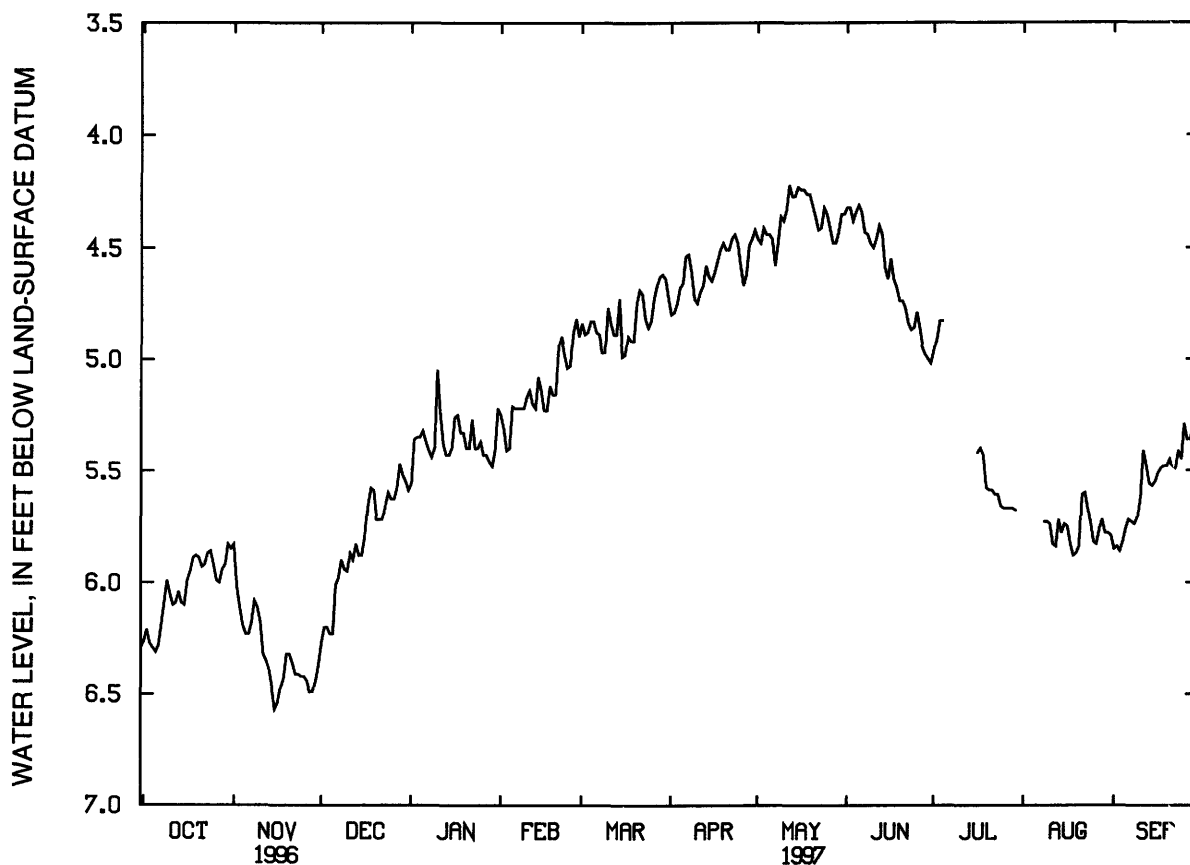
PERIOD OF RECORD.--February 1991 to current year.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	6.31	6.23	6.23	5.32	5.21	4.83	4.66	4.44	4.31	---	---	£.76
10	6.05	6.17	5.95	5.05	5.17	4.77	4.75	4.38	4.50	---	5.74	£.62
15	6.10	6.57	5.88	5.40	5.14	4.99	4.65	4.23	4.64	---	5.74	£.55
20	5.89	6.32	5.72	5.40	5.16	4.75	4.51	4.31	4.74	5.59	5.84	£.45
25	5.92	6.42	5.63	5.37	5.03	4.83	4.58	4.35	4.79	5.67	5.82	£.29
EOM	5.85	6.37	5.59	5.22	4.90	4.73	4.42	4.35	5.02	---	5.79	£.13
WTR YR 1997	HIGHEST			4.16	MAY 15			LOWEST	6.57	NOV 15		



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.

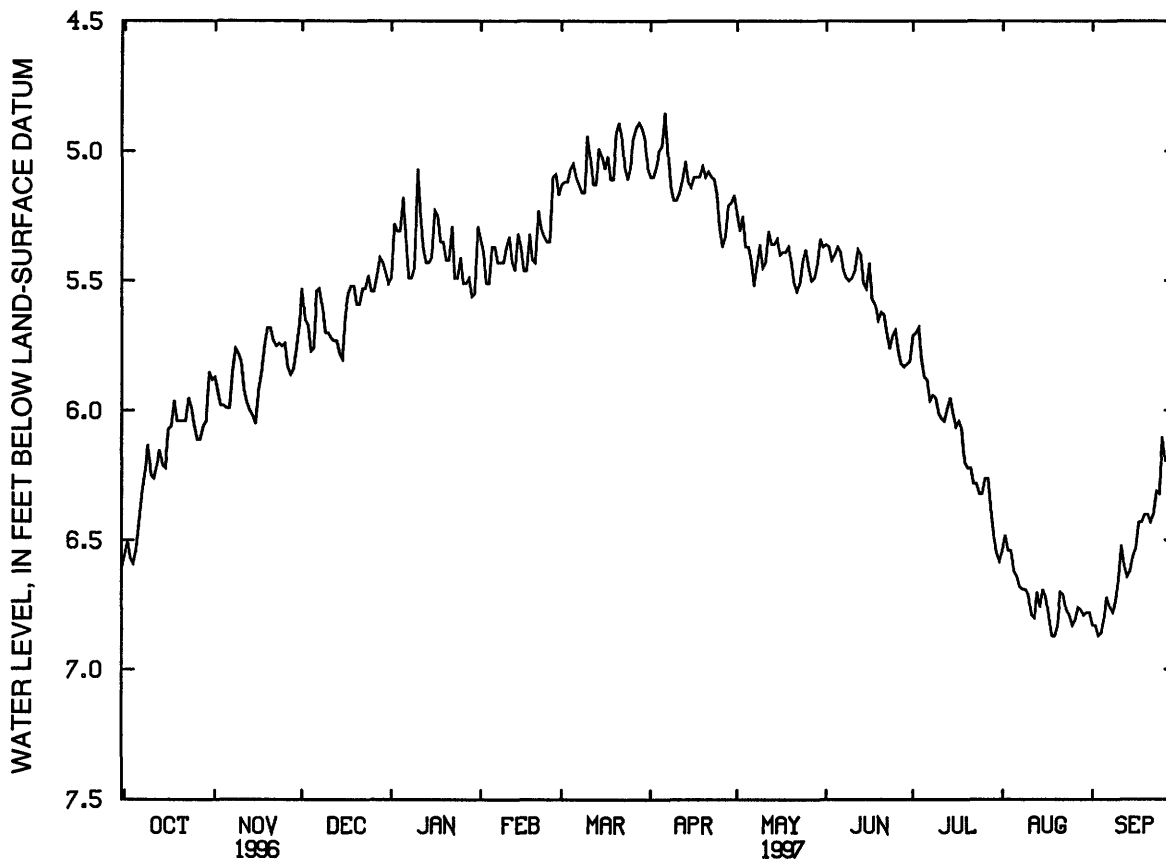
DATUM.--Elevation of land-surface datum is 600 ft above sea level, from topographic map. Measuring Point: Top of casing, 4.03 ft above land-surface datum.

PERIOD OF RECORD.--October 1988 to August 1989, December 1992 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 4.71 ft below land-surface datum, Mar. 21, 1997; lowest recorded 8.62 ft below land-surface datum, Aug. 16, 1989.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	6.53	5.99	5.76	5.18	5.37	5.05	4.98	5.37	5.37	5.87	6.62	6.87
10	6.25	5.81	5.70	5.07	5.37	4.94	5.19	5.45	5.49	6.01	6.71	6.67
15	6.22	6.05	5.80	5.41	5.37	5.02	5.14	5.34	5.53	6.01	6.69	6.59
20	6.04	5.68	5.59	5.42	5.43	4.93	5.10	5.43	5.62	6.22	6.83	6.47
25	6.06	5.74	5.54	5.41	5.35	5.06	5.30	5.38	5.69	6.32	6.83	6.10
EOM	5.88	5.67	5.51	5.29	5.17	5.07	5.17	5.37	5.81	6.58	6.78	6.07
WTR YR 1997	HIGHEST		4.71	MAR 21		LOWEST		6.87	AUG 18, 19, SEP 3			



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, 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.

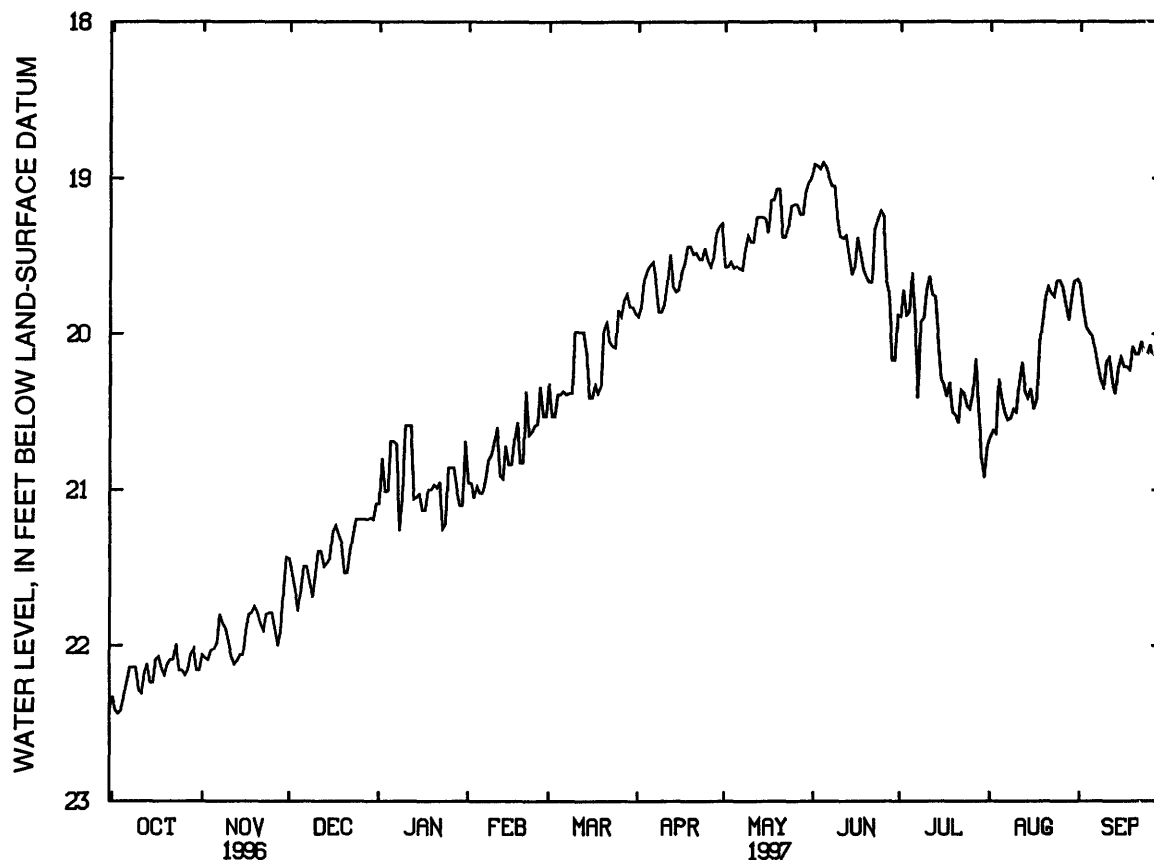
PERIOD OF RECORD.--September 1945 to current year.

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 1996 TO SEPTEMBER 1997

LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	22.31	22.02	21.64	20.69	21.02	20.39	19.56	19.57	18.93	19.61	20.41	20 01
10	22.29	21.98	21.54	20.59	20.70	19.99	19.81	19.41	19.38	19.72	20.50	20 18
15	22.24	22.06	21.44	21.03	20.84	20.41	19.72	19.26	19.57	20.29	20.35	20 15
20	22.12	21.79	21.53	20.97	20.83	19.97	19.49	19.07	19.67	20.52	19.76	20 13
25	22.16	21.79	21.19	20.86	20.58	19.85	19.53	19.17	19.24	20.48	19.66	20 07
EOM	22.16	21.43	21.09	20.69	20.53	19.87	19.29	19.00	19.88	20.73	19.65	20 32
WTR YR 1997	HIGHEST		18.83	JUN 2		LOWEST		22.44	OCT 3			



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, 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.

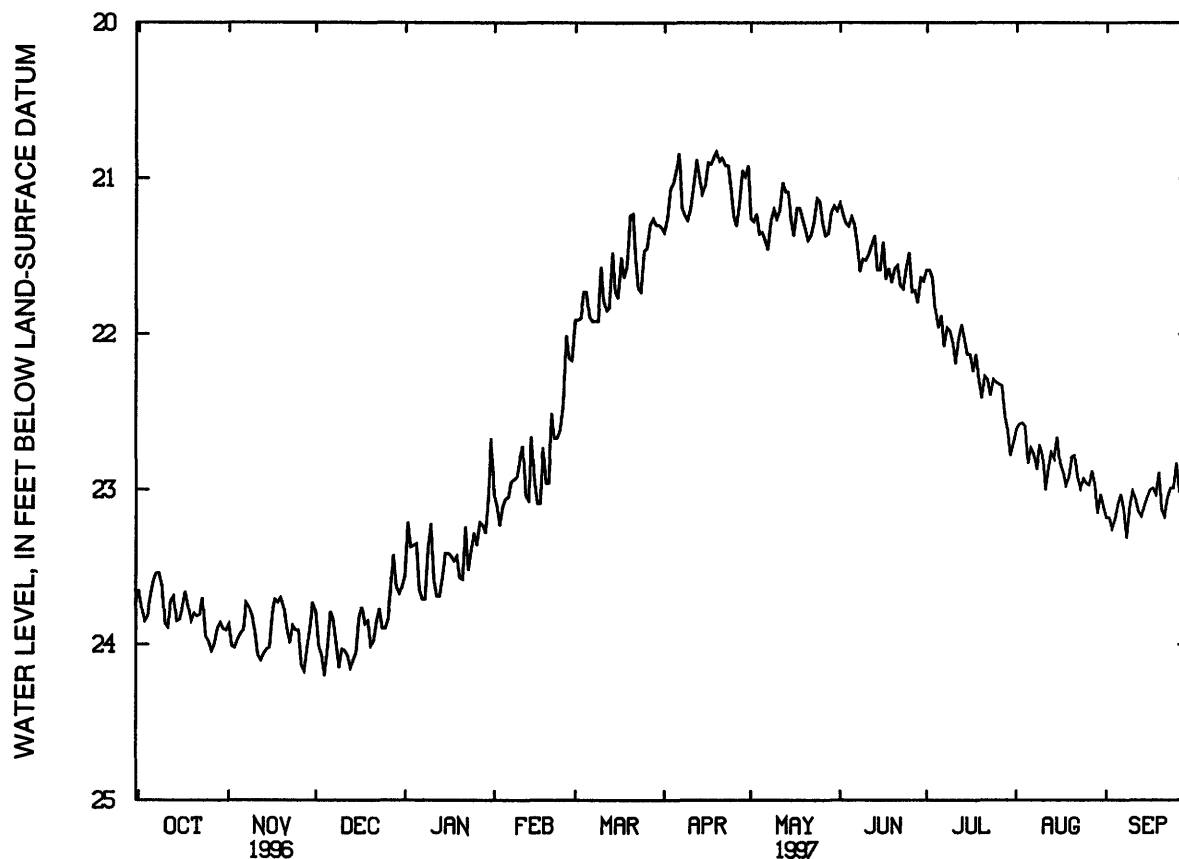
REMARKS.--Water levels affected by regional pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	23.69	23.93	24.03	23.35	23.06	21.73	20.94	21.35	21.25	21.96	22.83	23.09
10	23.87	23.92	24.03	23.22	22.80	21.57	21.20	21.26	21.53	22.06	22.78	23.01
15	23.84	24.02	24.05	23.41	22.94	21.73	21.05	21.27	21.59	22.13	22.66	23.05
20	23.80	23.76	24.01	23.57	22.96	21.24	20.89	21.33	21.58	22.41	22.79	23.13
25	23.98	23.91	23.90	23.28	22.46	21.47	21.24	21.15	21.48	22.31	22.96	22.83
EOM	23.91	23.73	23.63	22.67	22.17	21.32	20.92	21.21	21.66	22.70	23.11	23.12
WTR YR 1997	HIGHEST		20.54	APR 30		LOWEST		24.20	DEC 4			



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.

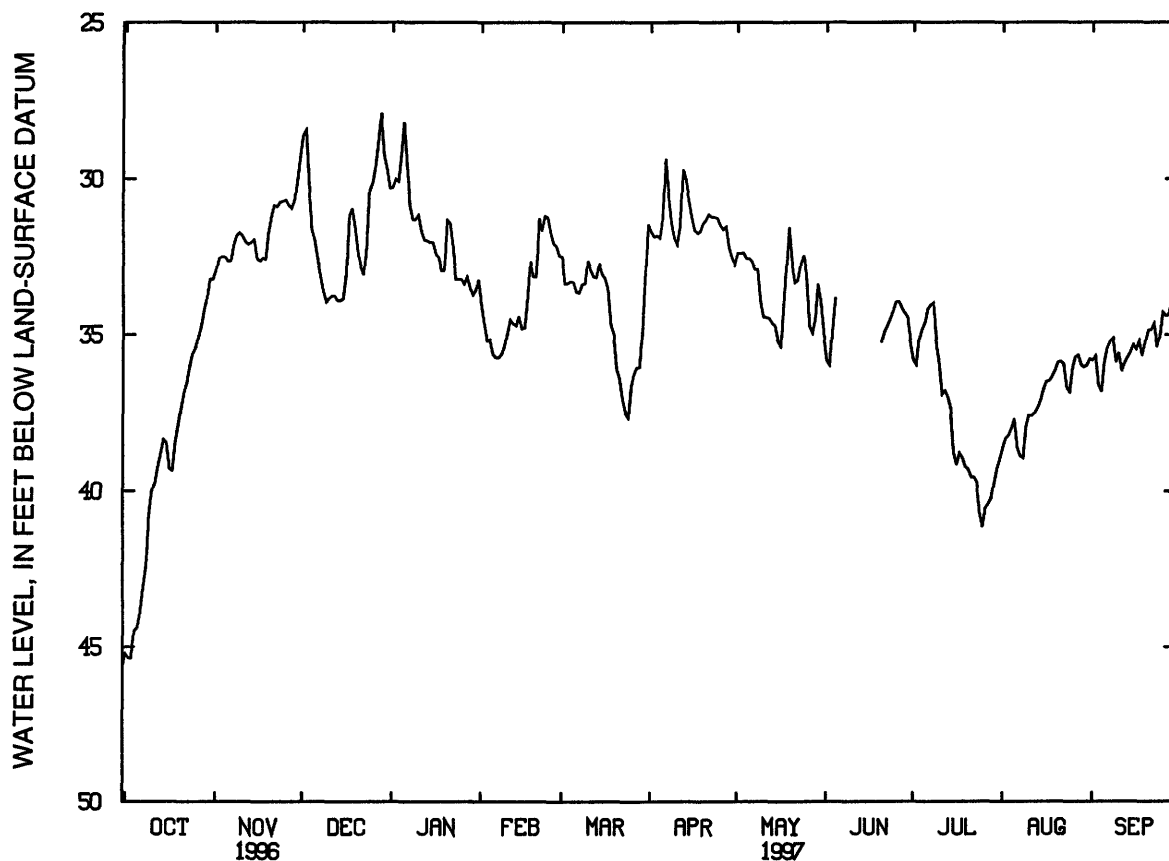
REMARKS.--Water levels affected by regional pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	44.39	32.66	31.99	28.19	35.62	33.32	31.25	32.56	--	34.60	37.69	35.87
10	39.99	31.83	33.84	31.17	34.94	32.64	32.11	34.44	--	35.92	37.58	35.57
15	38.45	32.57	33.86	32.04	34.81	33.06	31.20	35.20	--	38.77	36.73	35.31
20	37.35	31.23	32.40	31.33	33.15	36.10	31.32	32.75	35.21	39.29	35.87	34.87
25	35.43	30.68	30.14	33.24	31.74	36.66	31.49	33.04	33.96	41.15	36.05	34.27
EOM	33.23	29.27	30.30	33.25	32.48	31.46	32.75	35.00	35.23	38.96	35.77	34.97
WTR YR 1997	HIGHEST			27.24	JAN 5	LOWEST			45.36	OCT 2		



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.

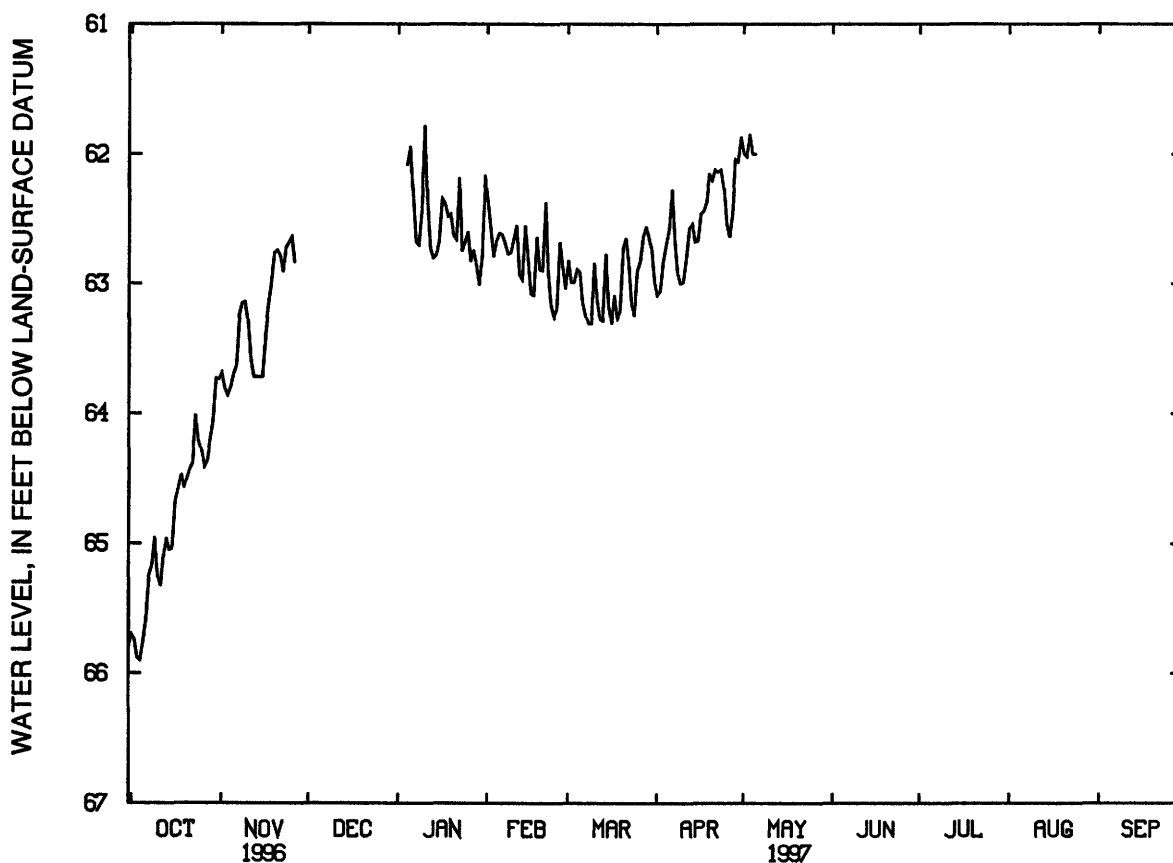
REMARKS.--Water levels affected by regional pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	65.76	63.70	--	61.94	62.61	62.91	62.58	62.00	--	--	--	--
10	65.26	63.30	--	61.78	62.65	62.84	62.99	--	--	--	--	--
15	65.04	63.72	--	62.68	62.81	63.17	62.67	--	--	--	--	--
20	64.50	62.74	--	62.63	62.90	62.72	62.20	--	--	--	--	--
25	64.28	62.64	--	62.60	63.20	62.90	62.54	--	--	--	--	--
EOM	63.74	--	--	62.16	63.04	62.99	61.87	--	--	--	--	--
WTR YR 1997	HIGHEST			61.19	MAY 1		LOWEST	65.90	OCT 4			



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, 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.

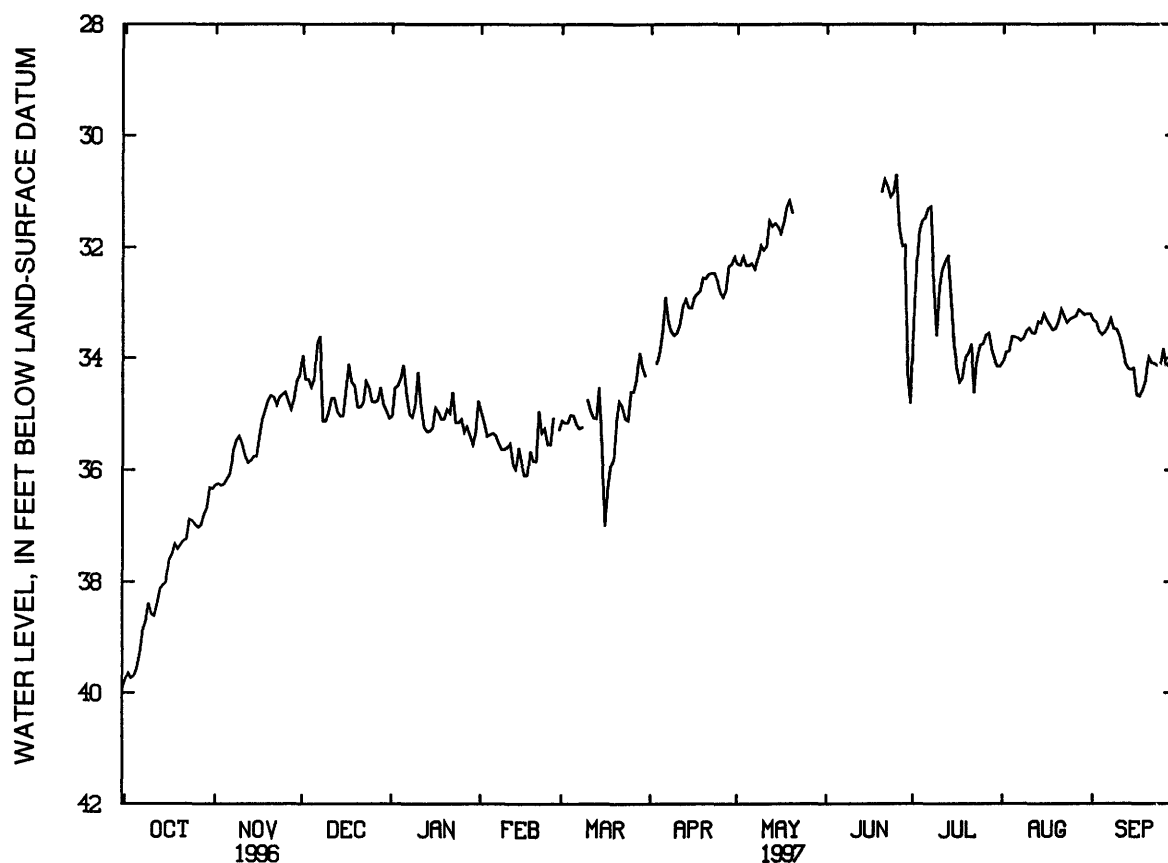
REMARKS.--Water levels affected by regional pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SF ^o
5	39.53	36.16	34.37	34.13	35.35	35.03	33.51	32.33	---	31.48	33.62	33.53
10	38.58	35.53	34.96	34.25	35.60	34.75	33.55	32.05	---	32.73	33.46	33.60
15	38.02	35.76	35.04	35.25	35.88	35.69	33.09	31.63	---	33.75	33.20	34.18
20	37.34	34.67	34.88	34.92	35.85	35.11	32.57	31.38	31.01	33.91	33.34	33.98
25	36.98	34.61	34.78	35.10	35.55	34.60	32.82	---	30.70	33.75	33.27	33.83
EOM	36.34	34.31	35.08	34.77	35.28	---	32.18	---	34.81	34.15	33.20	33.80
WTR YR 1997	HIGHEST			30.52	JUN 25		LOWEST		39.77	OCT 1		



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, 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.

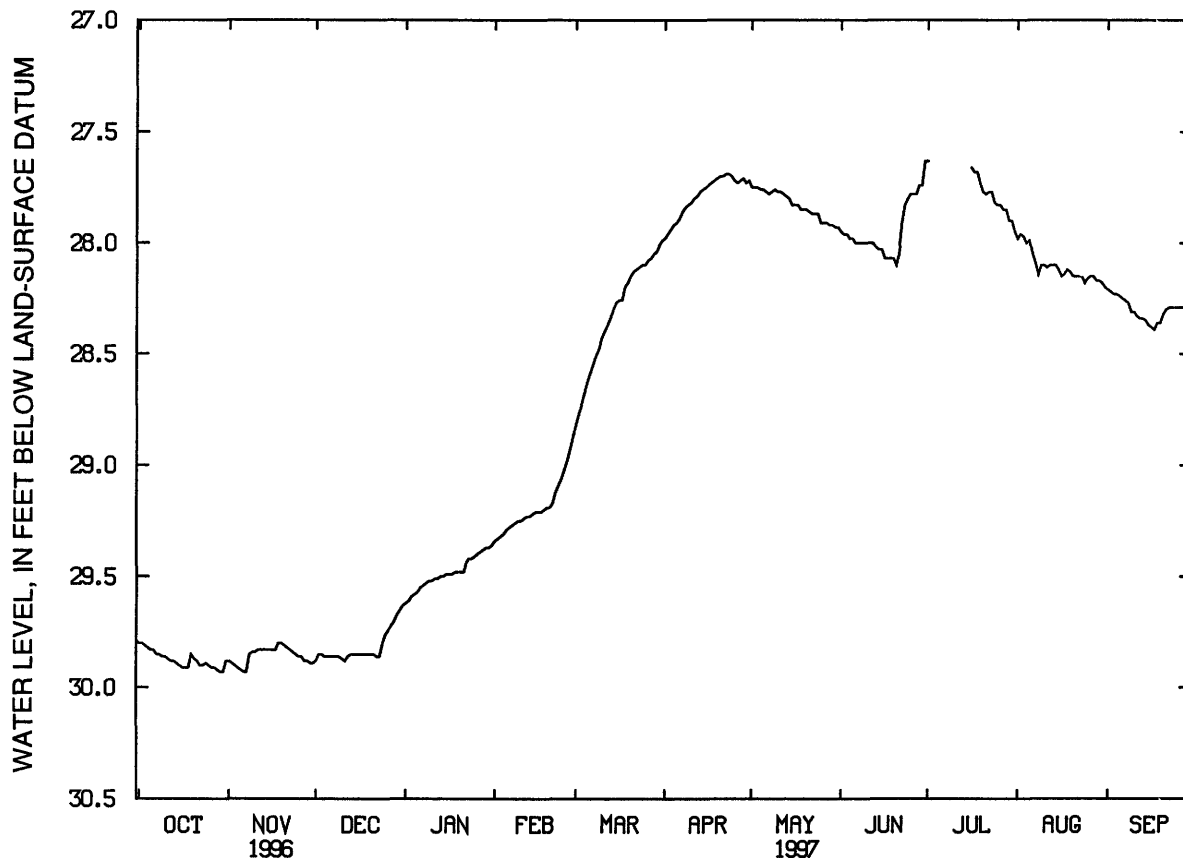
REMARKS.--Water levels affected by pumping.

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, 29.93 ft below land-surface datum, Oct. 29, 30, Nov. 6, 7, 1996.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	29.83	29.92	29.86	29.57	29.29	28.63	27.91	27.76	27.98	---	27.99	28.24
10	29.86	29.84	29.87	29.52	29.25	28.43	27.82	27.77	28.00	---	28.10	28.31
15	29.90	29.83	29.85	29.49	29.21	28.27	27.75	27.83	28.03	---	28.12	28.37
20	29.87	29.81	29.85	29.48	29.19	28.15	27.70	27.85	28.10	27.77	28.15	28.32
25	29.90	29.86	29.76	29.41	29.02	28.10	27.72	27.91	27.78	27.83	28.16	28.29
EOM	29.88	29.89	29.63	29.36	28.87	27.99	27.72	27.93	27.63	27.95	28.20	28.34
WTR YR 1997	HIGHEST			27.62	JUL 1			LOWEST	29.93	OCT 29, 30, NOV 6, 7		



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.

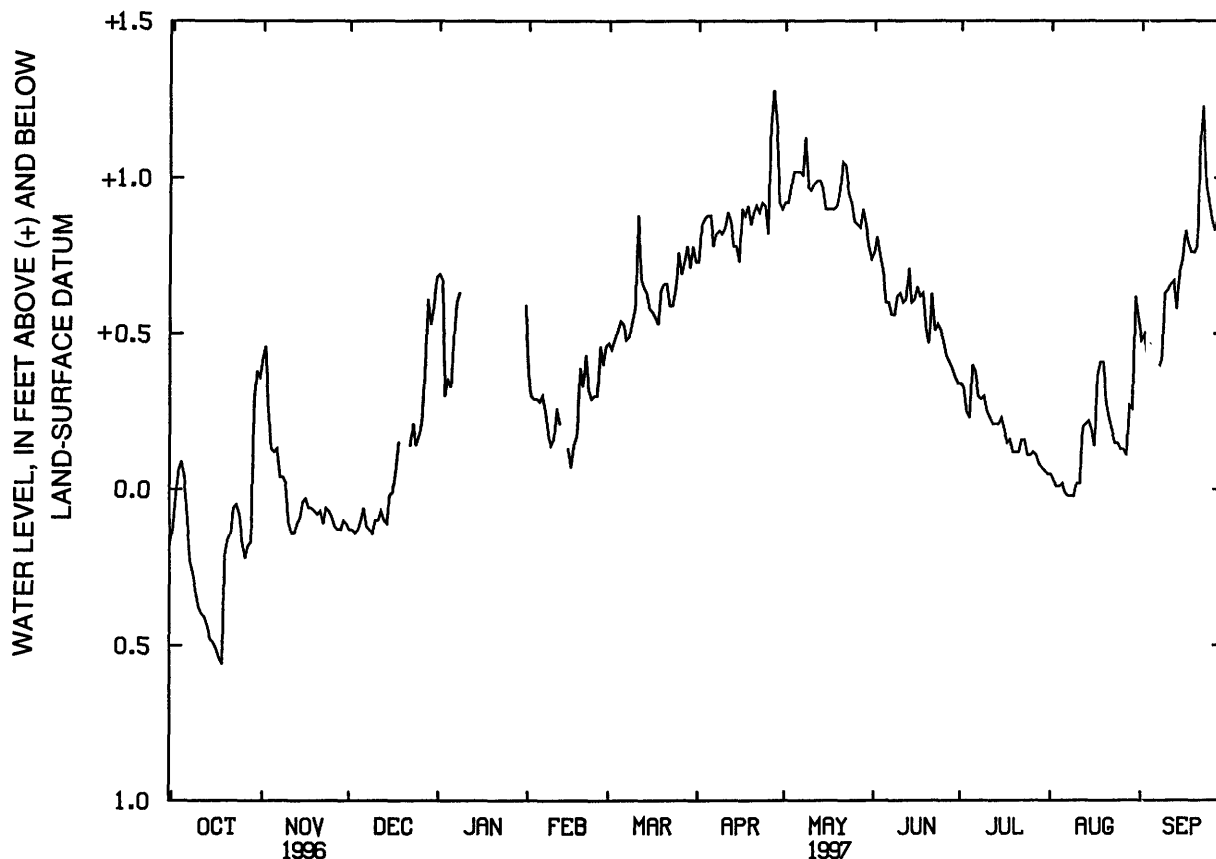
DATUM.--Elevation of land-surface datum is 880 ft above sea level, from topographic map. Measuring point: Top of shelter base, 3.5 ft above land-surface datum.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	+.04	+.12	.10	+.33	+.28	+.54	+.88	+1.02	+.60	+.40	+.02	+.42
10	.38	.11	.10	---	+.16	+.58	+.84	+.96	+.63	+.25	+.02	+.64
15	.49	.04	.02	---	+.13	+.58	+.73	+.90	+.61	+.23	+.19	+.74
20	.16	.08	---	---	+.33	+.66	+.89	+.96	+.47	+.12	+.28	+.78
25	.17	.09	+.17	---	+.30	+.76	+.82	+.86	+.48	+.11	+.13	+.87
EOM	+.36	.11	+.68	+.59	+.46	+.73	+.90	+.74	+.34	+.05	+.55	+.76
WTR YR 1997	HIGHEST			+1.42	MAY 8			LOWEST	0.56	OCT 18		



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.

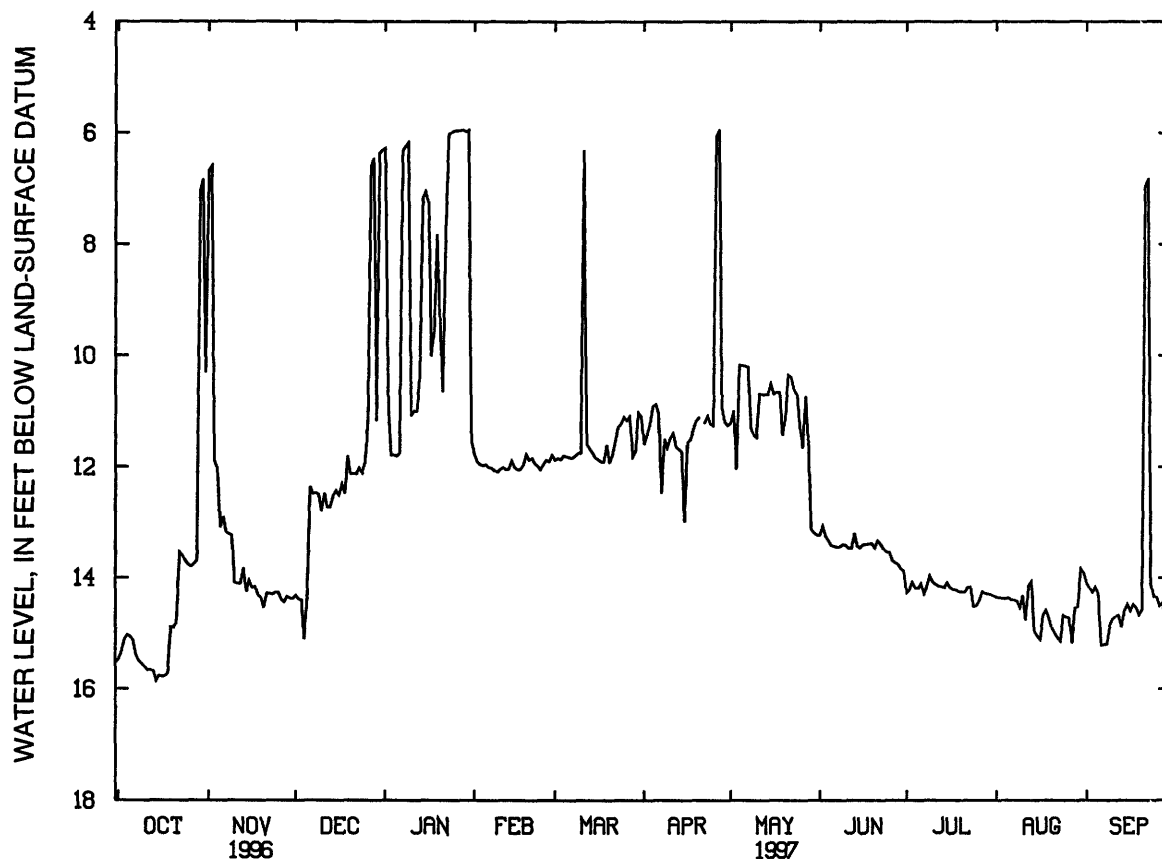
PERIOD OF RECORD.--December 1972 to current year.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	15.06	13.09	14.39	11.81	11.96	11.82	10.88	10.18	13.42	14.19	14.36	14.30
10	15.60	14.09	12.80	11.09	12.05	11.76	11.48	11.47	13.42	14.08	14.32	14.74
15	15.76	14.05	12.43	7.05	12.01	11.84	12.99	10.51	13.46	14.09	15.05	14.48
20	14.90	14.54	12.13	9.39	11.88	11.93	11.12	11.13	13.46	14.26	14.91	14.58
25	13.77	14.27	11.93	5.97	11.96	11.11	11.26	11.25	13.54	14.51	14.71	14.35
EOM	10.31	14.38	6.31	11.53	11.79	11.10	11.26	13.23	13.88	14.33	13.91	14.64

WTR YR 1997 HIGHEST 5.80 APR 28 LOWEST 15.86 OCT 14



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.

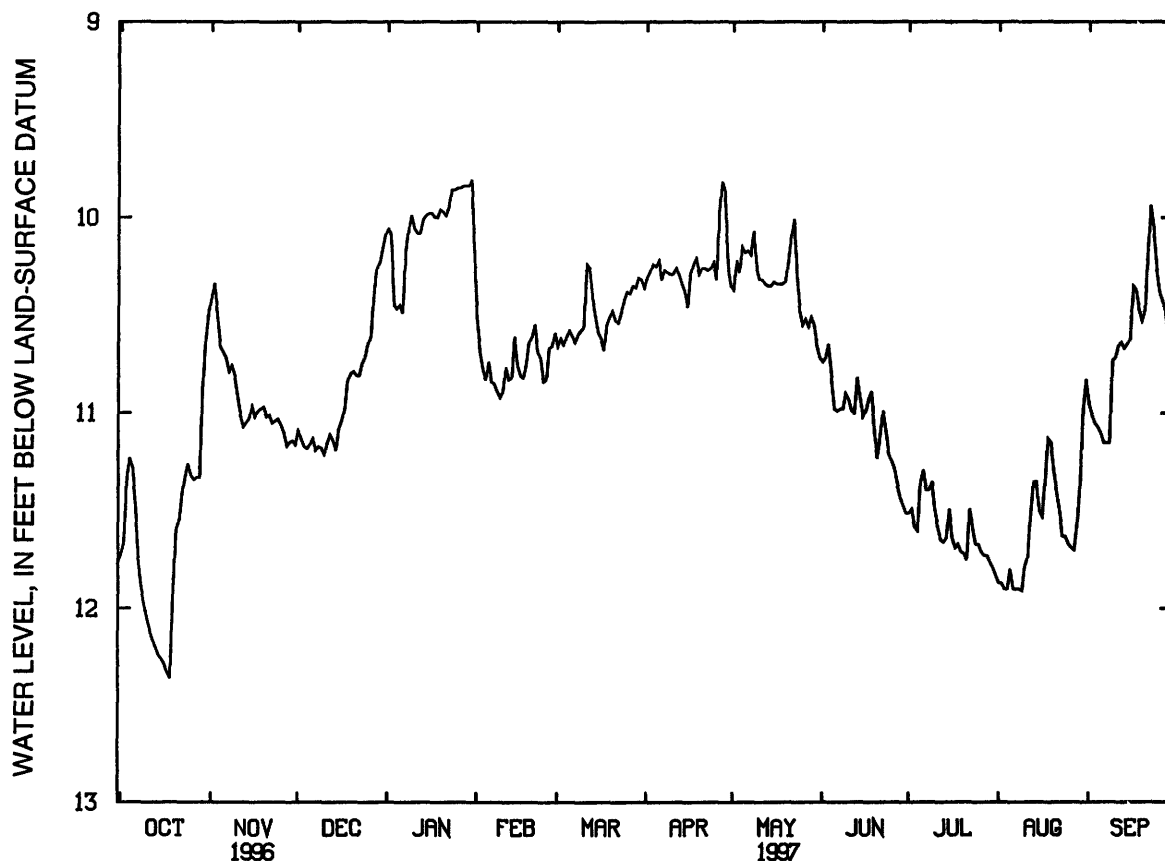
REMARKS.--Water levels affected by pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	11.28	10.69	11.16	10.45	10.74	10.58	10.22	10.18	10.98	11.35	11.80	11.10
10	12.05	10.91	11.21	10.06	10.89	10.56	10.29	10.32	10.93	11.50	11.79	10.72
15	12.26	10.97	11.08	9.98	10.76	10.59	10.46	10.33	11.02	11.49	11.50	10.62
20	11.60	11.02	10.79	9.97	10.61	10.48	10.26	10.22	11.23	11.72	11.30	10.48
25	11.32	11.06	10.65	9.85	10.83	10.38	10.32	10.55	11.24	11.67	11.67	10.38
EOM	10.49	11.16	10.09	10.20	10.59	10.36	10.35	10.72	11.51	11.83	10.83	10.59
WTR YR 1997	HIGHEST		9.69	APR 28		LOWEST		12.36	OCT 18			



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, from topographic map. Measuring point: Plywood instrument shelf, 3.0 ft above land-surface datum.

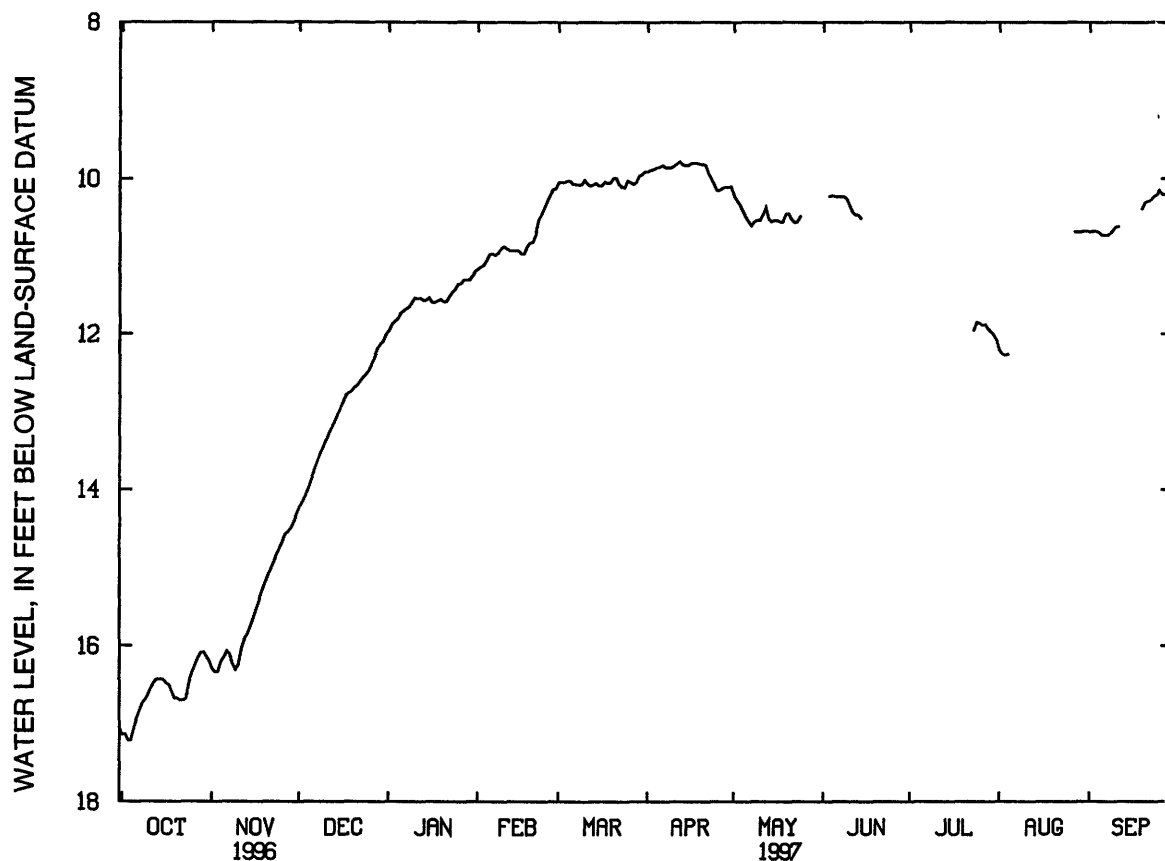
REMARKS.--Water levels affected by pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	17.05	16.15	13.88	11.74	10.98	10.03	9.85	10.50	10.23	---	---	10.73
10	16.61	16.25	13.37	11.54	10.88	10.02	9.84	10.54	10.34	---	---	10.63
15	16.43	15.66	12.97	11.54	10.93	10.09	9.83	10.54	---	---	---	---
20	16.67	15.12	12.69	11.59	10.82	9.99	9.82	10.46	---	---	---	10.31
25	16.35	14.68	12.47	11.36	10.29	10.03	10.15	---	---	11.86	---	10.15
EOM	16.20	14.32	12.01	11.20	10.13	9.91	10.10	---	---	12.08	10.68	10.19
WTR YR 1997	HIGHEST		9.75	APR 12		LOWEST		17.21	OCT 3, 4			



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421435085353702. Local number, 3S 11W 4BAD2.

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, from topographic map. Measuring point: Plywood instrument at elf, 3.0 ft above land-surface datum.

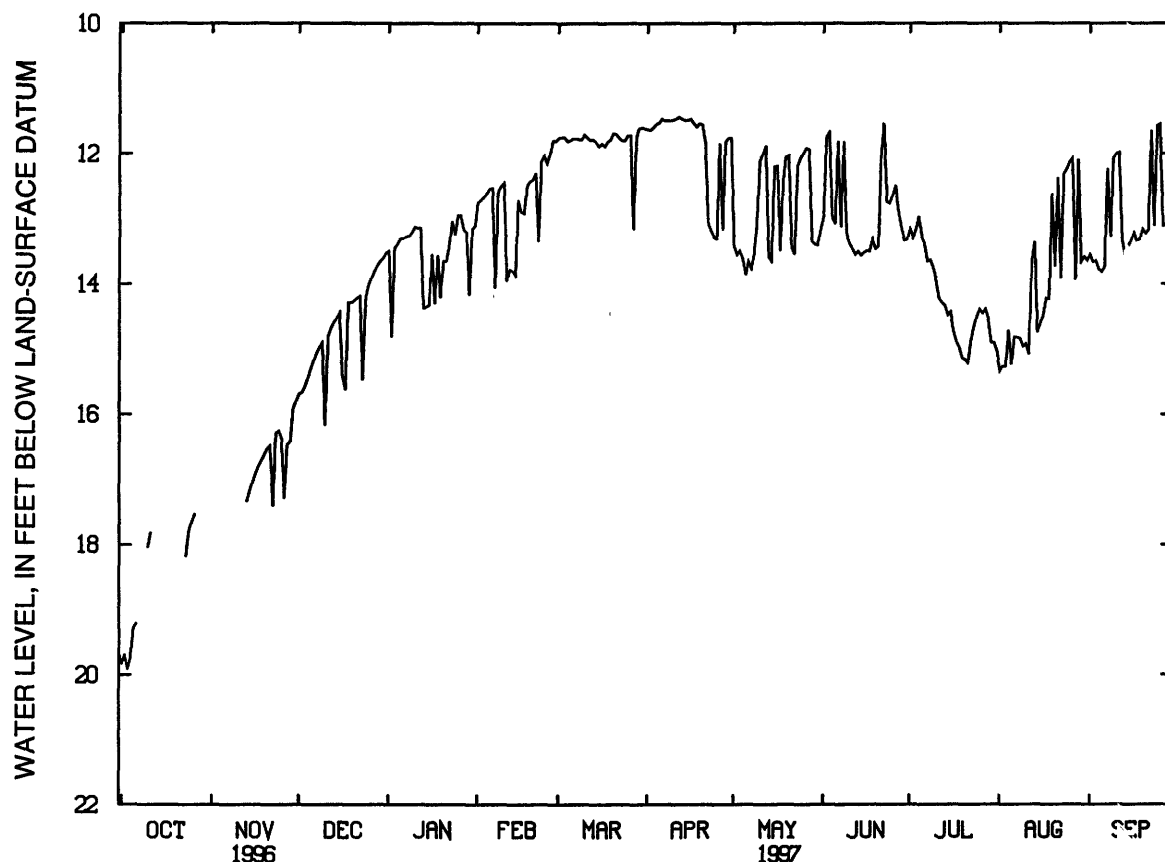
REMARKS.--Water levels affected by pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	19.29	---	15.32	13.31	12.54	11.80	11.53	13.86	13.08	13.28	15.23	13.81
10	18.03	17.79	16.17	13.13	12.45	11.71	11.49	12.12	13.37	13.96	14.92	12.00
15	---	17.04	14.45	14.33	12.71	11.89	11.49	12.20	13.52	14.43	14.62	13.35
20	---	16.53	14.26	13.65	12.40	11.69	11.56	12.03	13.43	15.16	13.73	13.23
25	17.65	16.38	14.02	12.95	12.15	11.73	13.31	12.00	12.64	14.39	12.13	11.55
EOM	---	15.81	13.53	13.11	11.81	11.62	11.76	13.16	13.32	15.03	13.64	11.63
WTR YR 1997	HIGHEST			11.28	JUN 26			LOWEST	19.92	OCT 3		



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.

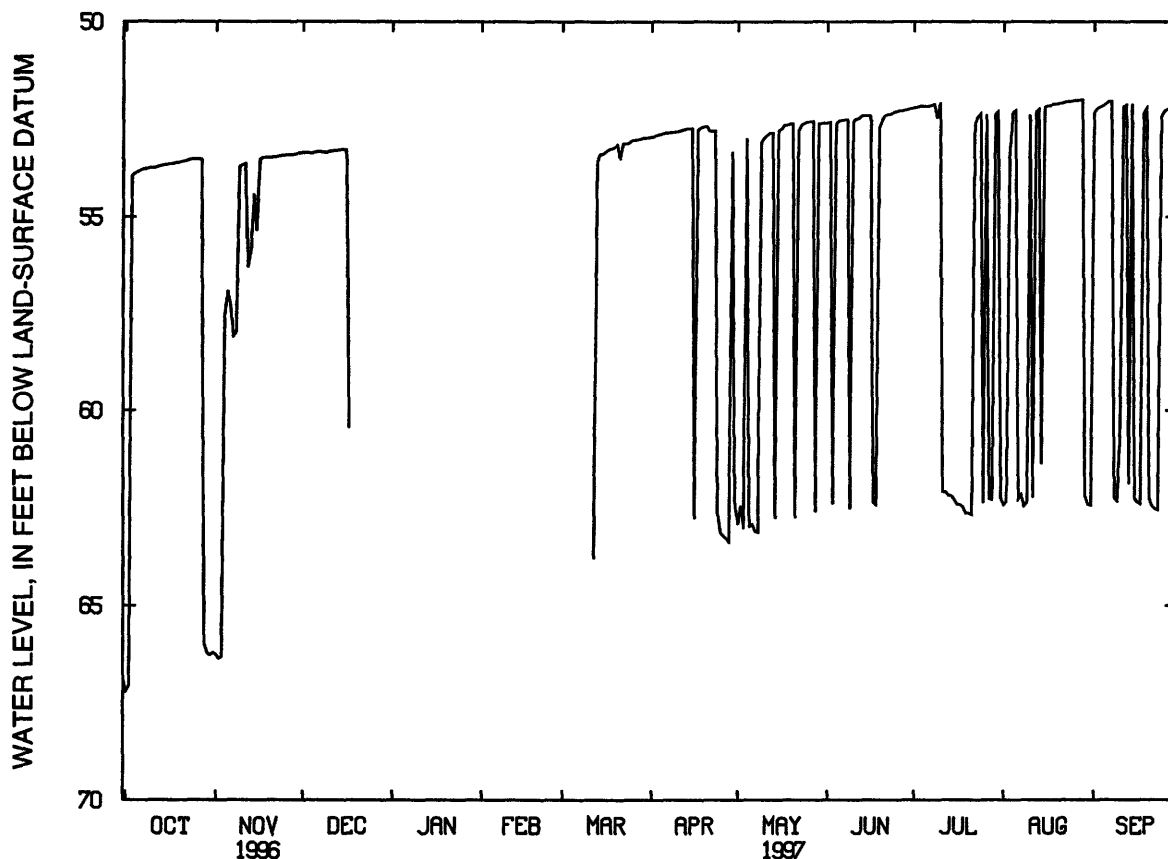
REMARKS.--Water levels affected by pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	53.83	56.91	53.33	--	--	--	52.85	62.97	52.53	52.16	52.28	52.09
10	53.74	53.66	53.30	--	--	--	52.80	52.97	52.54	52.08	52.38	60.62
15	53.65	55.35	53.27	--	--	53.38	52.72	52.79	52.40	62.28	52.18	62.26
20	53.59	53.47	--	--	--	53.15	52.67	52.61	52.50	62.62	52.09	62.24
25	53.51	53.40	--	--	--	53.03	63.14	52.56	52.31	62.37	52.01	52.29
EOM	66.21	53.36	--	65.59	--	52.95	62.33	52.59	52.22	62.25	62.42	62.57
WTR YR 1997	HIGHEST		51.99	AUG 28, 29		LOWEST		67.20	OCT 1			



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.

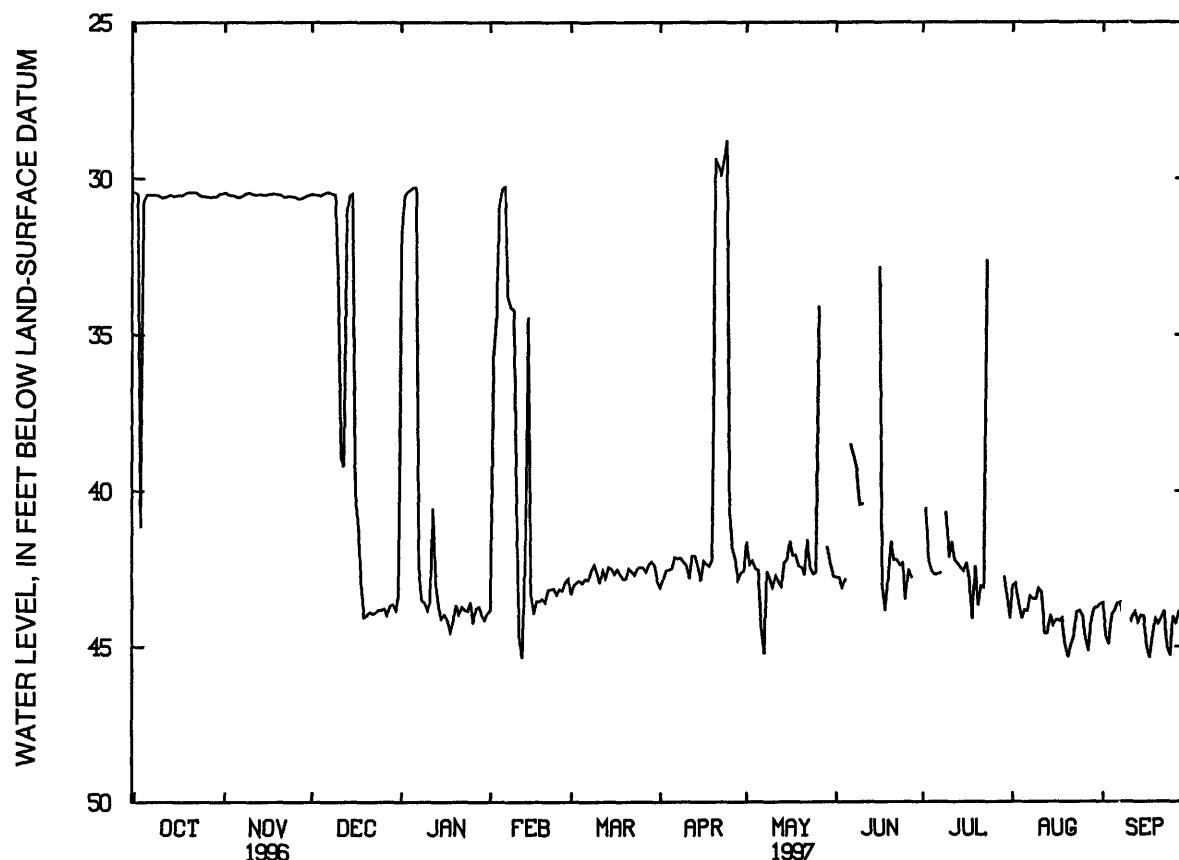
REMARKS.--Water levels affected by pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	30.53	30.60	30.48	30.29	30.33	42.95	42.48	42.53	--	42.67	43.82	43.83
10	30.61	30.48	33.22	43.83	40.54	42.64	42.37	43.08	40.41	42.11	43.12	44.35
15	30.56	30.53	30.49	44.09	43.28	42.50	42.87	42.20	--	42.56	44.31	44.02
20	30.44	30.52	44.00	43.66	43.57	42.81	29.37	42.43	41.61	43.67	45.34	44.26
25	30.58	30.59	43.82	43.56	43.14	42.43	40.51	42.60	43.48	--	44.02	44.03
EOM	30.49	30.53	43.32	43.92	42.81	42.91	42.56	42.75	--	44.09	43.63	44.88
WTR YR 1997	HIGHEST			28.76	APR 24			LOWEST	45.36	SEP 17		



GROUND-WATER LEVELS

KALAMAZOO COUNTY

421614085270801. Local number, 2S 10W 26BBCC.

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.

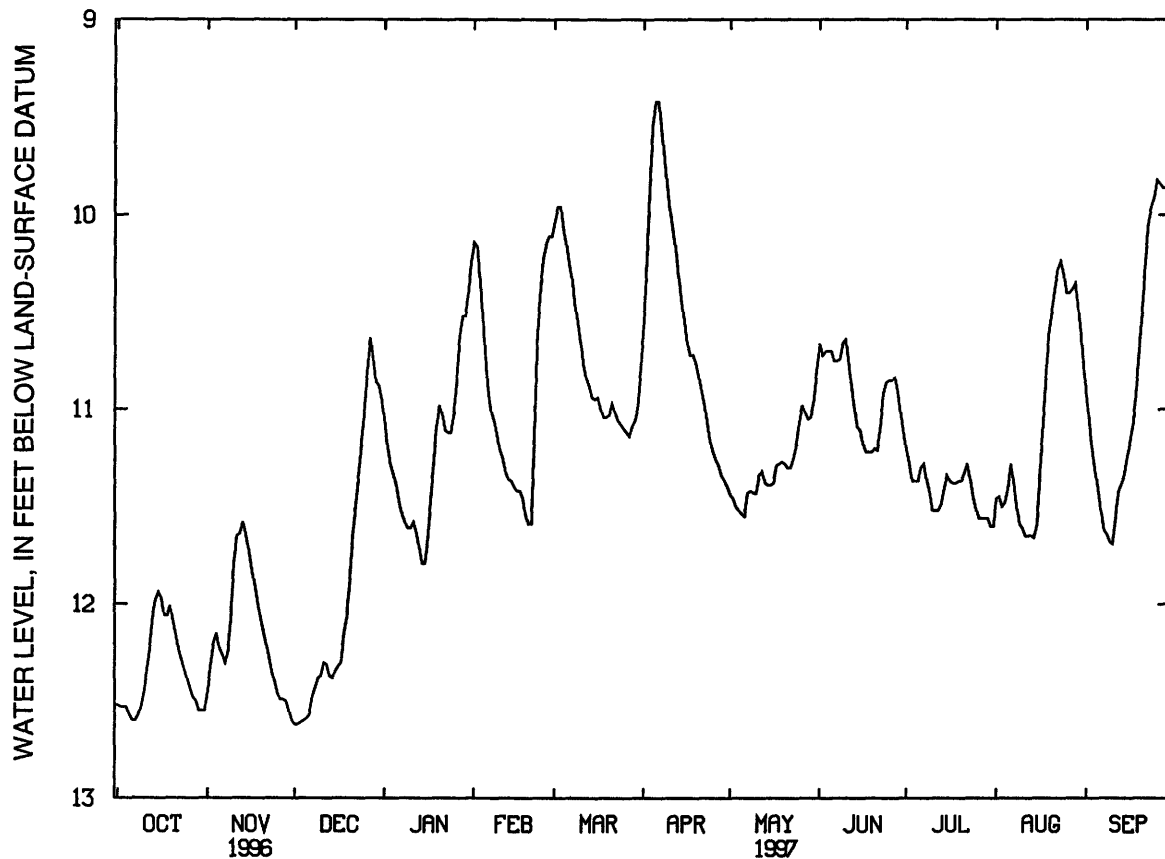
REMARKS.--Water levels affected by pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	12.57	12.23	12.59	11.39	10.73	10.15	9.42	11.54	10.70	11.37	11.40	11.42
10	12.46	11.78	12.37	11.61	11.21	10.65	9.98	11.43	10.64	11.52	11.61	11.62
15	11.94	11.72	12.35	11.79	11.40	10.95	10.54	11.39	11.11	11.34	11.59	11.24
20	12.09	12.13	11.88	10.98	11.59	11.03	10.83	11.28	11.20	11.37	10.50	10.51
25	12.39	12.46	11.01	11.02	10.22	11.10	11.22	11.07	10.85	11.51	10.40	9.82
EOM	12.55	12.60	10.95	10.24	10.11	10.78	11.40	10.80	11.12	11.60	10.77	10.01
WTR YR 1997	HIGHEST			9.33	APR 5, 6		LOWEST		12.62	DEC 1, 2		



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.

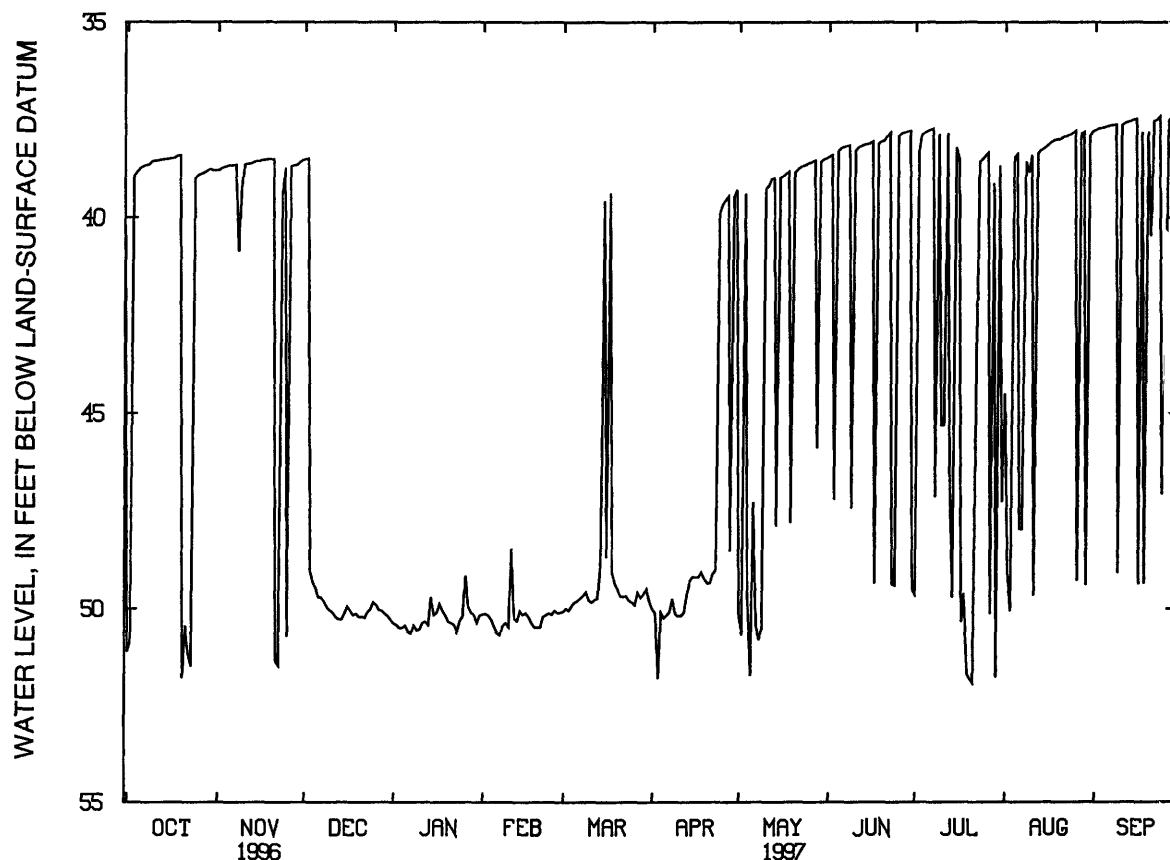
REMARKS.--Water levels affected by pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	38.75	38.68	49.49	50.43	50.47	49.83	50.23	51.71	38.23	37.79	38.38	37.66
10	38.55	38.65	50.04	50.53	50.47	49.78	50.19	39.27	38.29	45.29	38.40	37.63
15	38.50	38.56	50.13	50.15	50.15	39.57	49.18	38.98	38.10	38.21	38.18	37.48
20	51.79	38.51	50.21	50.33	50.47	49.52	49.34	38.84	38.03	51.81	37.98	40.46
25	38.92	50.70	49.83	50.19	50.15	49.83	39.67	38.61	37.92	38.42	37.78	44.08
EOM	38.80	38.54	50.29	50.17	50.09	49.79	39.29	38.48	49.51	47.27	37.80	37.38
WTR YR 1997	HIGHEST		37.35	SEP 29		LOWEST		51.91	JUL 21			



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.

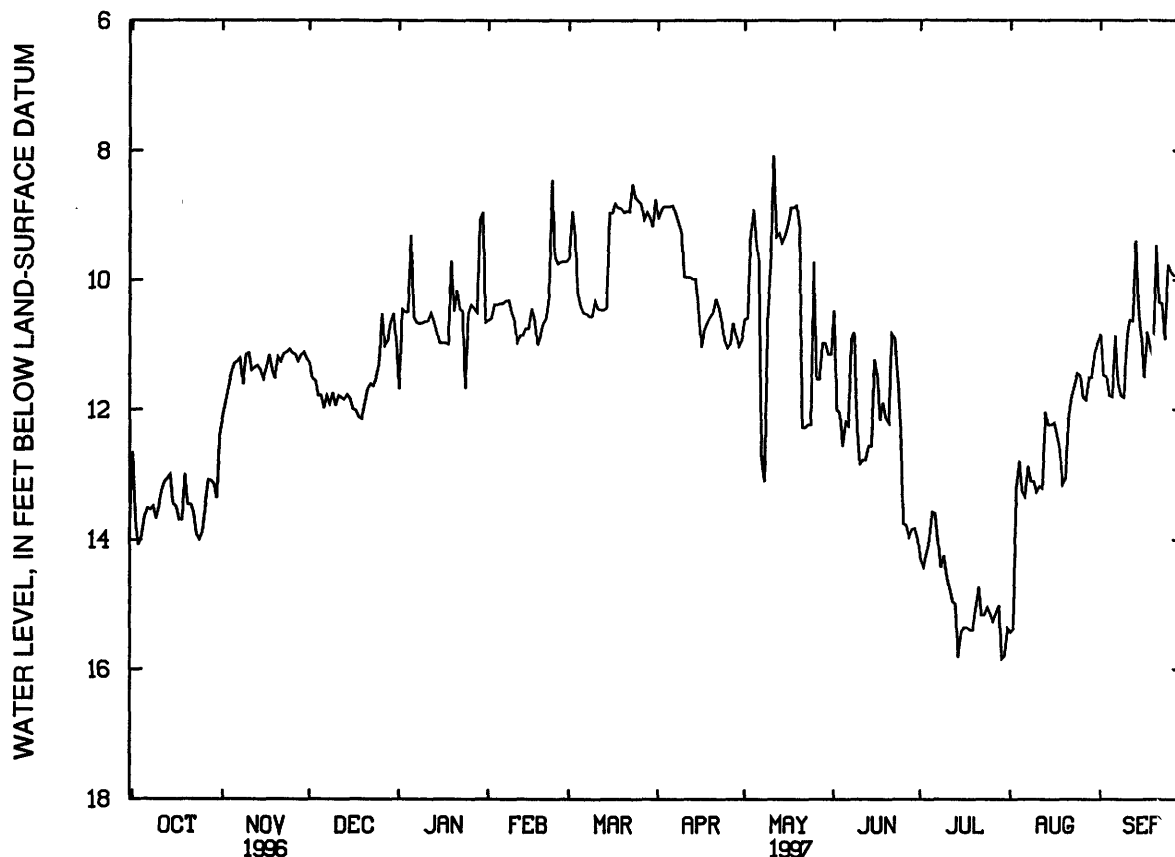
REMARKS.--Water levels affected by pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	13.64	11.29	11.78	9.31	10.36	10.40	8.86	9.41	12.19	13.57	13.25	11.80
10	13.47	11.13	11.94	10.64	10.63	10.33	9.95	9.79	12.82	14.55	13.25	10.93
15	13.44	11.53	11.83	10.97	10.75	8.96	10.51	9.32	11.23	15.41	12.23	10.90
20	13.45	11.19	11.92	10.48	10.67	8.95	10.50	9.17	12.21	15.06	13.05	9.46
25	13.88	11.13	11.29	10.51	9.75	8.78	11.05	9.72	13.75	15.13	11.47	9.87
EOM	12.36	11.22	10.98	10.65	9.71	8.75	10.93	11.15	13.98	15.36	10.96	10.63
WTR YR 1997	HIGHEST 5.70			MAR 16			LOWEST 15.83			JUL 29		



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.

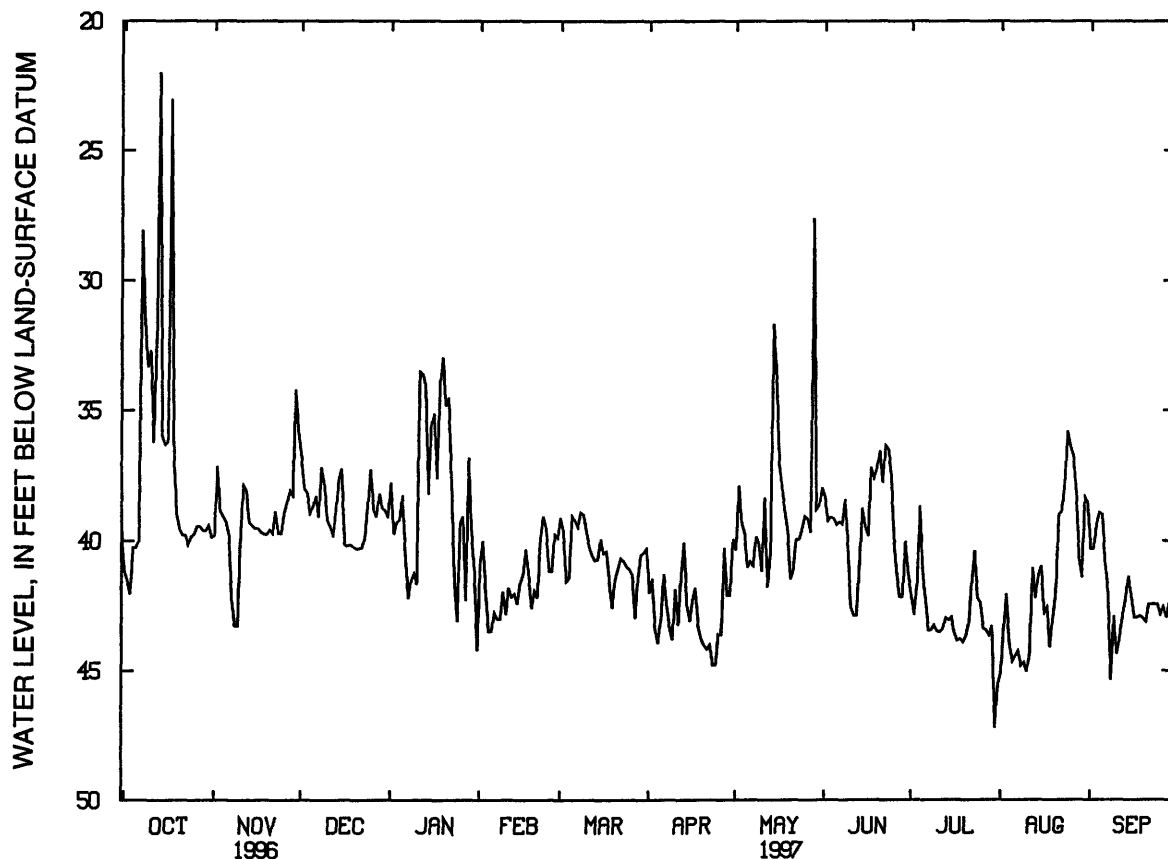
REMARKS.--Water levels affected by pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	40.26	39.30	38.70	38.25	43.47	39.04	42.95	41.01	39.38	41.32	44.62	38.98
10	32.71	39.95	39.23	41.65	42.81	39.64	41.86	41.15	42.50	43.45	45.03	44.34
15	36.32	39.52	37.23	35.60	41.62	39.93	43.07	33.66	39.48	42.92	40.97	42.05
20	39.57	39.59	40.29	34.83	41.91	41.43	44.00	41.45	36.55	43.65	41.99	43.08
25	39.73	38.97	37.27	39.31	41.16	41.09	43.57	39.05	39.94	42.35	36.41	42.80
EOM	39.86	35.79	39.10	44.20	39.88	40.30	39.93	37.95	41.28	45.56	38.54	43.60
WTR YR 1997	HIGHEST		20.27	OCT 13, 14	LOWEST		47.21	JUL 30				



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.

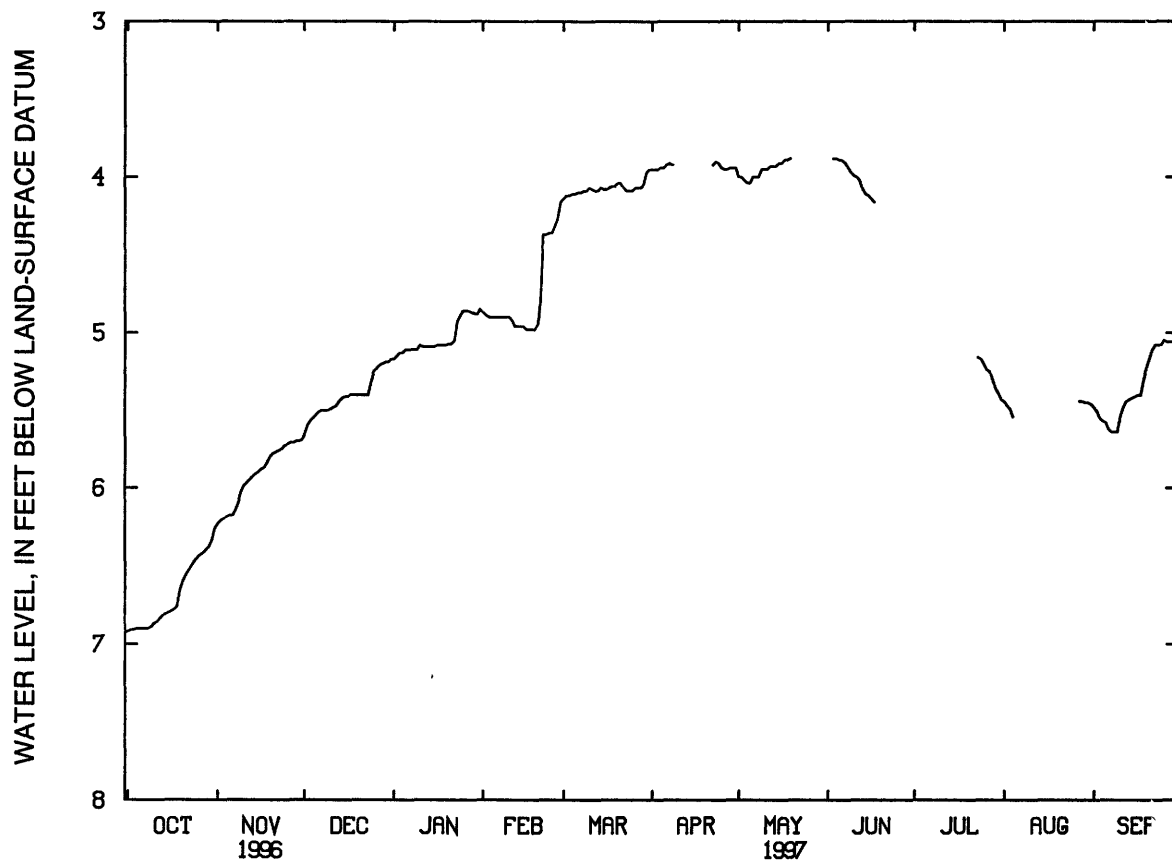
REMARKS.--Water levels affected by pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	6.90	6.18	5.53	5.11	4.90	4.11	3.94	4.04	3.89	---	---	5.58
10	6.87	5.99	5.49	5.08	4.90	4.07	---	3.95	3.99	---	---	5.54
15	6.80	5.90	5.41	5.09	4.96	4.08	---	3.91	4.12	---	---	5.41
20	6.60	5.78	5.40	5.07	4.95	4.04	---	---	---	---	---	5.17
25	6.45	5.72	5.25	4.86	4.36	4.09	3.94	---	---	5.20	---	5.05
EOM	6.26	5.69	5.17	4.85	4.16	3.95	3.94	---	---	5.43	5.46	5.12
WTR YR 1997	HIGHEST		3.86	MAY 19		LOWEST		6.92	OCT 1			



GROUND-WATER LEVELS

MARQUETTE COUNTY

461946087230701. Local number, 45N 25W 01BBCD

LOCATION.--Lat 46°19'46", long 87°23'07", Hydrologic Unit 04030110, near Red Fox Inn, former K.I. Sawyer Air Force Base, 5.3 mi northeast of Gwinn. Owner: Air Force Base Conversion Agency.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled observation well, diameter 4 in., depth 78 ft, screened 68 to 78 ft.

INSTRUMENTATION.--Water-level recorder.

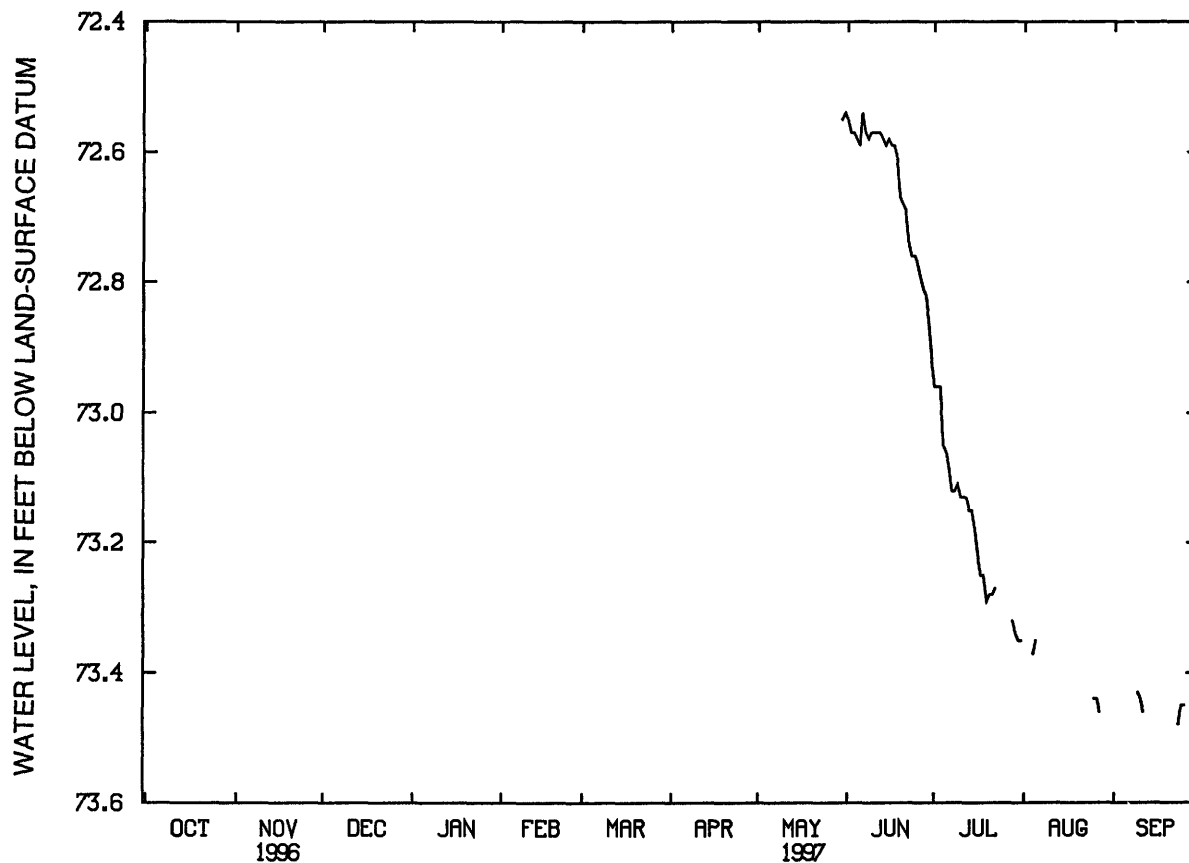
DATUM.--Elevation of land-surface datum is 1,174.38 ft above sea level. Measuring point: Top of well casing, 2.8 ft above land-surface datum.

PERIOD OF RECORD.--May to September 1997 (discontinued).

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 72.53 ft below land-surface datum, May 31, June 6, 1997; lowest recorded, 73.48 ft below land-surface datum, Aug. 21, Sept. 23, 1997.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	---	---	---	---	---	---	---	---	72.59	73.06	73.35	73.36
10	---	---	---	---	---	---	---	---	72.57	73.13	---	73.44
15	---	---	---	---	---	---	---	---	72.58	73.18	73.42	---
20	---	---	---	---	---	---	---	---	72.68	73.28	---	---
25	---	---	---	---	---	---	---	---	72.77	---	73.44	73.45
EOM	---	---	---	---	---	---	---	72.54	72.92	73.35	---	---
WTR YR 1997	HIGHEST		72.53	MAY 31, JUN 6			LOWEST	73.48	AUG 21, SEP 23			



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 at former K.I. Sawyer Air Force Base, 5.3 mi northeast of Gwinn. Owner: Air Force Base Conversion Agency.

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 1,170.38 ft (revised) above sea level. Measuring point: Top of well casing, 3.0 ft above land-surface datum.

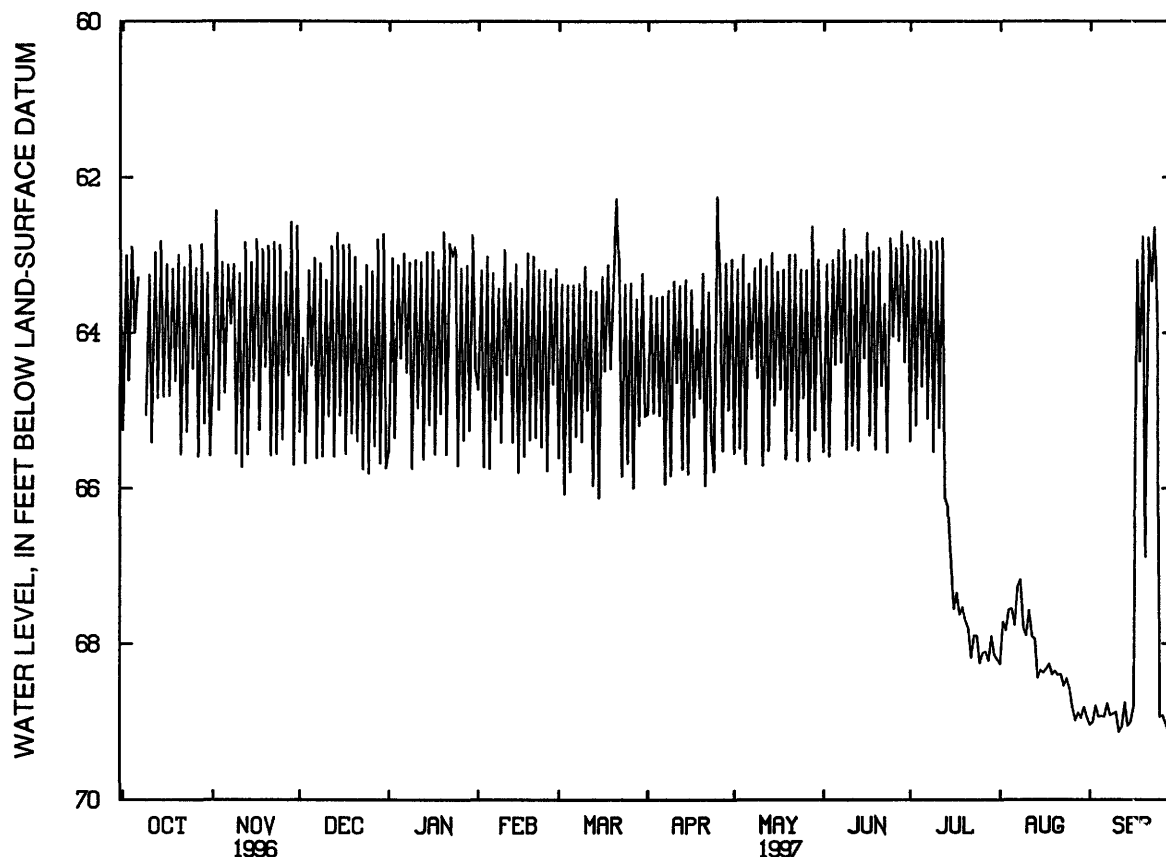
REMARKS.--Water levels affected by nearby pumping.

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

EXTREMES FOR PERIOD OF RECORD.--Highest water level recorded, 61.70 ft below land-surface datum, July 2, 1997; lowest recorded, 74.56 ft below land-surface datum, Aug. 26, 1994.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	64.00	64.77	64.42	64.33	65.75	65.79	65.06	65.69	64.41	64.69	67.55	68.93
10	63.24	63.23	63.31	63.05	62.93	63.14	63.33	63.05	63.06	62.82	67.90	68.88
15	64.82	64.62	65.06	65.18	65.80	66.13	65.82	64.93	64.33	66.91	68.34	68.01
20	62.99	62.88	63.02	62.70	63.01	63.30	63.23	62.99	62.90	67.71	68.35	68.89
25	64.46	65.37	65.81	65.71	65.78	65.68	62.25	64.84	64.05	68.25	68.58	68.94
EOM	65.58	62.62	65.74	64.46	63.17	65.06	63.05	64.44	62.86	68.20	68.95	68.94
WTR YR 1997	HIGHEST		61.70	JUL 2		LOWEST		69.15	SEP 28			



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.

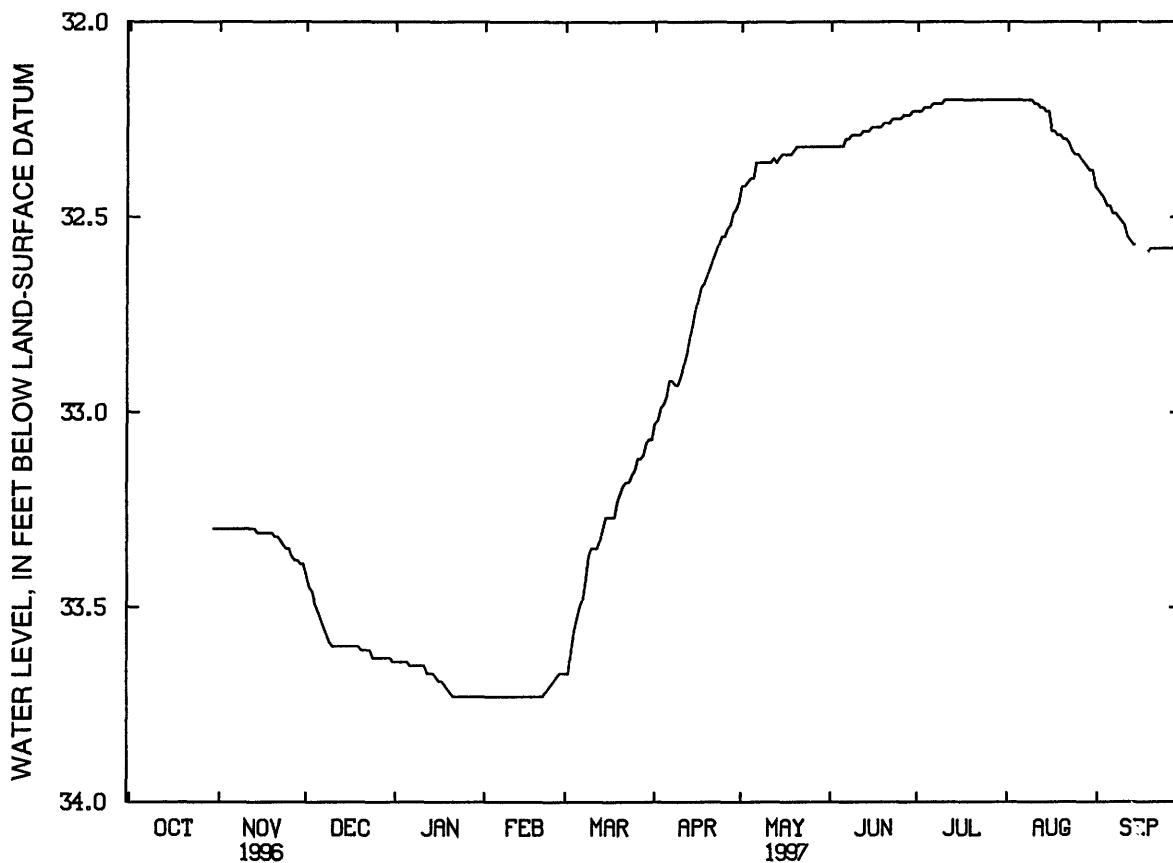
DATUM.--Elevation of land-surface datum is 1,055 ft above sea level, from topographic map. Measuring point: Top of flange, 3.0 ft above land-surface datum.

PERIOD OF RECORD.--April 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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	---	33.30	33.51	33.64	33.73	33.53	32.96	32.40	32.32	32.22	32.20	32.47
10	---	33.30	33.60	33.65	33.73	33.35	32.91	32.36	32.29	32.20	32.21	32.52
15	---	33.31	33.60	33.68	33.73	33.27	32.74	32.34	32.27	32.20	32.23	32.58
20	---	33.32	33.61	33.72	33.73	33.21	32.63	32.32	32.26	32.20	32.30	32.58
25	---	33.35	33.63	33.73	33.69	33.15	32.55	32.32	32.25	32.20	32.34	32.58
EOM	33.30	33.39	33.64	33.73	33.67	33.07	32.46	32.32	32.23	32.20	32.42	32.58
WTR YR 1997	HIGHEST			32.20	JUL 9- AUG 10			LOWEST	33.73	JAN 21- FEB 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.

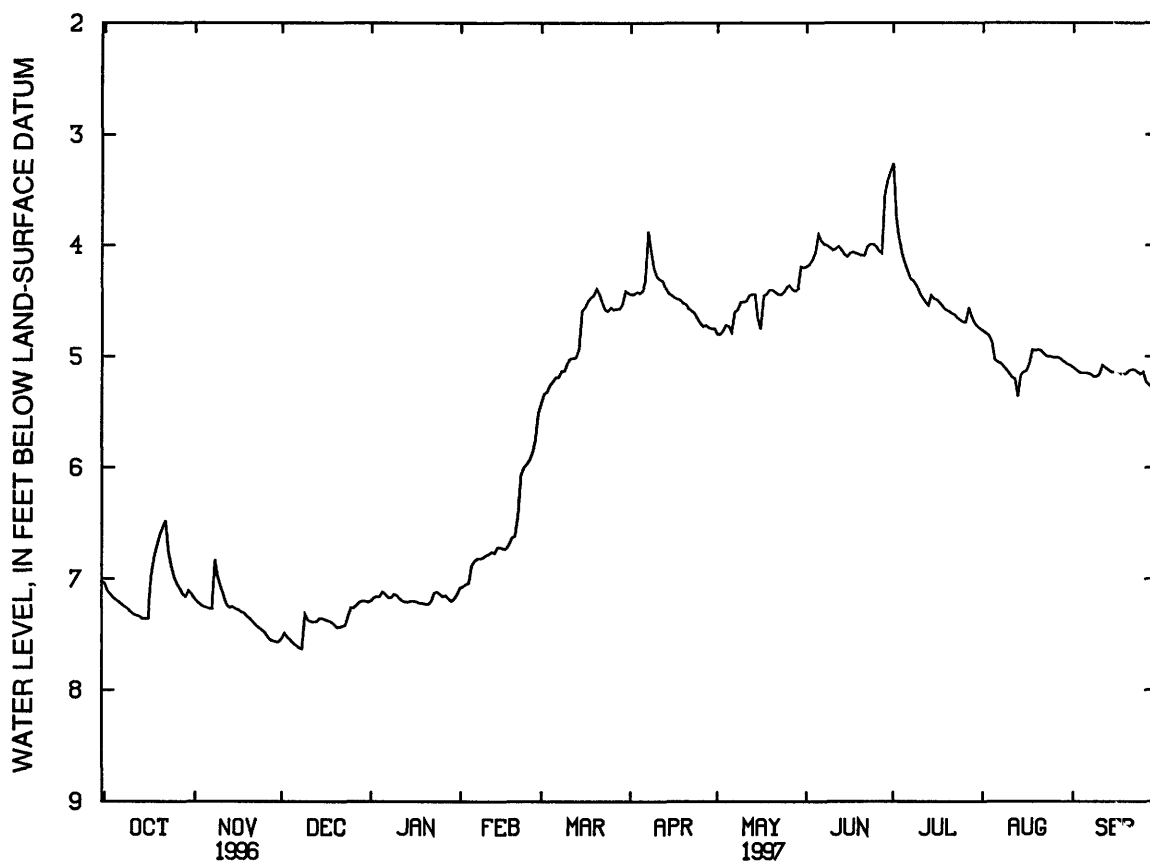
REMARKS.--Water levels affected by pumping.

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 1996 TO SEPTEMBER 1997
LOWEST VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	7.19	7.26	7.58	7.12	6.88	5.23	4.41	4.73	3.90	4.16	5.03	5.15
10	7.30	7.07	7.37	7.15	6.79	5.06	4.28	4.51	4.04	4.43	5.15	5.16
15	7.36	7.27	7.36	7.20	6.72	4.59	4.45	4.66	4.10	4.48	5.14	5.14
20	6.61	7.36	7.44	7.23	6.62	4.39	4.53	4.40	4.09	4.59	4.94	5.13
25	6.99	7.48	7.26	7.14	5.93	4.56	4.70	4.38	4.01	4.69	5.01	5.14
EOM	7.14	7.57	7.21	7.14	5.51	4.43	4.75	4.20	3.33	4.75	5.08	5.37
WTR YR 1997	HIGHEST		3.18	JUL 2		LOWEST		7.63	DEC 8			



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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
