Illinois State Water Survey Division
SURFACE WATER SECTION

SWS Contract Report 440

7-DAY 10-YEAR LOW FLOWS OF STREAMS IN THE ROCK, SPOON, LA MOINE, AND KASKASKIA REGIONS

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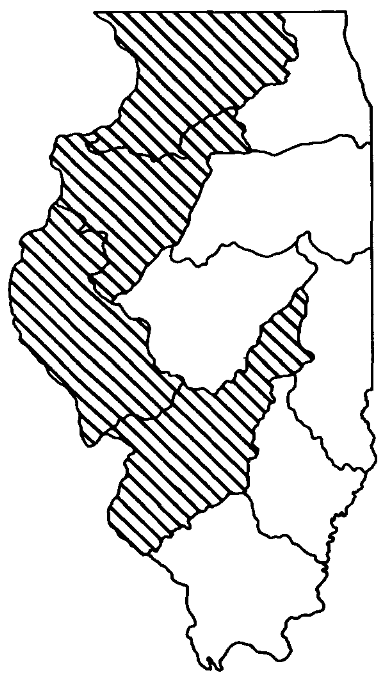

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CONTENTS

INTRODUCTION

State and federal agencies that regulate stream pollution have based their stream water quality standards on a flow condition in a stream specified as the 7-day 10-year low flow. This is defined as the lowest average flow that occurs for a consecutive 7-day period at an average recurrence interval of 10 years. That is, over a long period of years, the average time interval between 7-day low flows of this severity will be 10 years. The 7-day 10-year low flow ($Q_{7,10}$) maps for all streams in Illinois and the interstate rivers were first developed by Singh and Stall (1973) and included in State Water Survey Bulletin 57. The following steps are used in preparing a $Q_{7,10}$ map for a river basin or region:

1. The drainage area associated with the streams or river system in a particular region is marked on the 2-degree maps of the U.S. Geological Survey. The maps have a scale of 1 to 250,000 or about 1 inch = 4 miles. Where the elevation contours are not defined well enough to draw the drainage boundary accurately, 15-minute and 7-1/2-minute USGS quadrangle maps are used that have a scale of 1 to 62,500 and 1 to 24,000, respectively. A base map is then prepared showing the drainage boundary, the stream network, all towns that have wastewater treatment plants and lagoons, and county lines. The USGS stream gaging stations on Illinois streams and any bordering rivers are located on the base map from the detailed descriptions of their locations published in U.S. Geological Survey *Water-Supply Papers* and *Water Resources Data for Illinois*.

2. The locations of wastewater effluent outfalls to streams were obtained from the USGS 7-1/2-minute and 15-minute quadrangle maps, from the Illinois Environmental Protection Agency offices, or from direct telephone inquiries to the wastewater treatment plants. Locations are given in terms of latitude and longitude, or section, township, and range. Arrows are drawn on the base map to indicate the locations of effluent discharges to a stream. The magnitudes of 7-day low effluents (which may occur during the months of 7-day 10-year low flows in the streams) from municipal and industrial wastewater treatment plants and lagoons are determined from the 2 to 3 years of most recent data available. The amounts of wastewater effluents indicated on the maps represent the 1984 condition of effluents entering the receiving stream during the 7-day 10-year low-flow condition.

3. Dams, regulating structures, and lakes (those large enough to be accurately represented on the map) are also located on the base map. Dams, fords, and in-channel impoundments for municipal water supply are located on the various streams from the available information in USGS maps, county plat books, river basin reports, and similar references. All large and medium lakes, and some small ones (natural or man-made) are shown on the maps because of their significant effect on the 7-day 10-year low flows.

4. Streams with zero 7-day 10-year low flow are defined first From graphs of the natural (excluding the effect of effluents and regulation) low flow versus drainage area, the streams with zero 7-day 10-year low flow are determined and shown as dot-dash lines on the map. Any wastewater plant effluents entering these intermittent-flow streams are then considered. If the effluent is lost in the dry streambed before reaching the perennial stream, the zero 7-day 10-year low-flow stream remains as such. But if the effluent is not lost, the stream starts with a 7-day 10-year low flow at the outfall equal to the magnitude of the effluent, and this flow is

reduced downstream to the point where the natural 7-day 10-year low flow begins. Downstream, the 7-day 10-year low flow equals the reduced effluent flow plus the natural flow.

5. Streams with non-zero 7-day 10-year low flows are mapped next. To natural 7-year 10-year low flows along such streams are added the effluents from wastewater plants and lagoons to obtain the 7-day 10-year low flow for 1984 conditions. Any withdrawal of water from a stream for a municipal supply or industrial use is shown by a decrease in the 7-day 10-year low-flow value.

The state was divided into 10 regions as shown in Figure 1. For Bulletin 57 (Singh and Stall, 1973), one 7-day 10-year low-flow map was prepared for each region. An extra map provided the information for the Illinois River and the main stems of the Mississippi, Wabash, and Ohio Rivers along the Illinois boundary. Descriptions of these eleven maps are given below.

Map 1. Rock River Region -- Rock River and Mississippi River drainage upstream of Rock Island

Map 2. Northeast Region -- Chicago Sanitary and Ship Canal and Chicago, Des Plaines, DuPage, and Fox Rivers

Map 3. Kankakee Region -- Kankakee, Mazon, Vermilion, and Mackinaw Rivers, and Illinois River drainage from the east upstream of the Sangamon River

Map 4. Spoon River Region -- Bureau Creek, Spoon River, and Mississippi River drainage north of Henderson Creek

Map 5. Sangamon Region - Sangamon River with Salt Creek and other tributaries

Map 6. La Moine River Region -- La Moine River, Macoupin Creek, and Mississippi River drainage upstream of the mouth of the Illinois River

Map 7. Kaskaskia Region -- Kaskaskia River and Mississippi River drainage between the Illinois and Kaskaskia Rivers

Map 8. Embarras Region -- Vermilion and Embarras Rivers, and Wabash River drainage above the Embarras River

Map 9. Little Wabash Region - Little Wabash River and Wabash River drainage between the Embarras and Little Wabash Rivers

Map 10. Southern Region - Saline, Big Muddy, and Cache Rivers, plus direct drainage into the Wabash, Ohio, and Mississippi Rivers

Map 11. Border Rivers -- The Illinois River and the main stems of the Mississippi, Wabash, and Ohio Rivers along the Illinois boundary

The objective of this study was to develop 7-day 10-year low-flow maps for the Rock, Spoon, La Moine, and Kaskaskia Rivers for the 1984 conditions of effluent discharges, water withdrawals, and flow regulation. The corresponding map numbers are 1, 4, 6, and 7. Maps 2, 3, 5, 8, 9, 10, and 11 covering the rest of the state have also been developed. Map 2 covering northeastern Illinois is given in SWS Contract Report 307 (Singh, 1983). The other six maps are given in SWS Contract Report 441 (Singh et al., 1988).

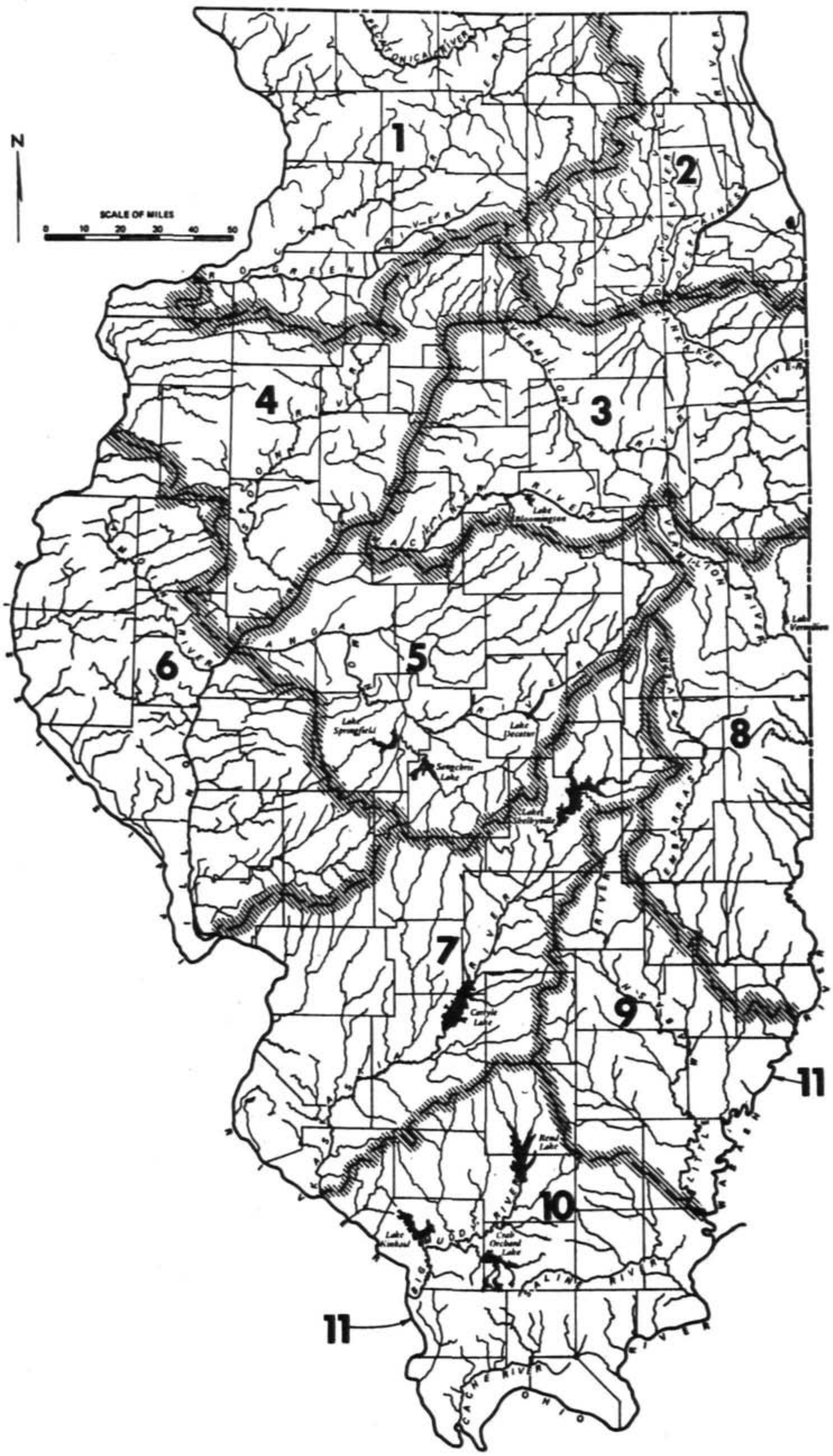

Figure 1. Rivers and other drainage areas included in the 11 separate maps

Acknowledgments

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METHODOLOGY

General procedures for developing the 7-day 10-year low flows along Illinois streams are described briefly. Any special features applicable to a particular region are noted under the relevant map description.

Flows at Stream Gaging Stations

The primary data used in this study are the measured flows at the USGS gaging stations on streams in Illinois and the border rivers. These stations are shown on the 7-day 10-year low-flow maps. The flow data were brought up-to-date to the year 1984 and stored on computer disk for quick computer processing. Low flows in Illinois streams occur most often during August to November and do not occur in March or April, which are the months of high spring flows, snowmelt, and high water table. Therefore the water year selected for low-flow analysis was taken to begin April 1 and end March 31 of the following year.

A computer program was written to compute the lowest 7-day flow each year of the available record for each station, and to print the year, the flow value, and the beginning day of the 7-day period. The computer program also ranked these 7-day low flows in ascending order of magnitude and computed the corresponding probability of nonexceedance and recurrence interval in years from

$$p_m = \frac{m}{n+1} \times 100$$

$$T_m = \frac{n+1}{m}$$

in which m is the rank of 7-day low flow, m = 1,2, ..., n; n denotes the total number of years; pm represents percent probability of the low flow being equal to or less than the mth low flow; and T_m is the average recurrence interval in years, for the mth flow. If there are no wastewater treatment plants upstream that discharge effluents that affect the low flow at the gage under consideration, the 7-day low flow corresponding to the 10-year recurrence interval yields the 7-day 10-year low flow at the gage. The 7-day low-flow values at some stations do indicate a trend for increases in low flow when the drainage area upstream of the gaging station is slowly or rapidly urbanizing and thus is discharging more and more wastewater effluents to the stream. By properly keeping track of the effluent discharges for the years with small 7-day low flows, the 7-

day 10-year low flows are developed for the natural condition (without any effluent discharges, water withdrawals, or regulation) as well as for the 1984 condition of effluent discharges, water withdrawals, and/or regulation.

Flows along the Streams

The 7-day 10-year low flows at the gaging stations serve as benchmarks for estimating these low-flow values along the streams and tributaries. Another type of pertinent information is the location of wastewater treatment plant effluents entering the stream and their low-flow effluents during the months in which 7-day 10-year low flow may occur in the receiving stream. For maximum utility, 7-day 10-year low-flow values need to be estimated at locations near towns, at junctions with medium and major tributaries, at sizeable inflows from wastewater treatment plants, and at regulation or control works. The 7-day 10-year low-flow values were estimated at these various points along the streams, but not all of them are shown on the low-flow maps to avoid overcrowding the maps.

The 7-day 10-year low flows along the streams were derived with the use of the following tools, singly or in combination, as dictated by the prevailing conditions in each general area.

Low Flow vs Area Curves

The curve for natural 7-day 10-year low flow versus drainage area, applicable to the area under consideration, indicates the drainage area A_O for which the natural 7-day 10-year low flow is zero. The creeks, streams, and tributaries with drainage area less than A_O are shown by dot-dash lines on the low-flow maps. When the drainage area equals A_O, the low-flow value is shown as 0.00 and the stream is drawn as a solid line downstream, which means it is then a perennial-flow stream.

Wastewater Treatment Plant Effluents

The wastewater effluents entering the streams pose some problems in estimations of low flows. If these effluents enter streams that have drainage area less than A_O, an estimate has to be made of the losses occurring in the intermittent streams to determine whether these effluents would be absorbed before reaching the natural perennial-flow stream. If the effluent additions are small and enter the stream in the upper reach, generally they are lost in the dry streambed. However, if the effluent additions are considerable, they may contribute to some flow at the stream point with drainage area A_O. The larger the effluent is and the closer it is to the point of entrance to the A_O point, the larger the flow contribution will be. Once the stream has non-zero natural 7-day 10-year low flow, any effluent additions simply increase the 7-day 10-year low flow by the amount of effluent addition.

Water Withdrawals for Municipal and Industrial Uses

Generally any town or industry pumping water from a stream returns it to the stream after use in the form of effluents from its wastewater plant. Such use does cause reduction in the 7-day 10-year low flow because the amount of return water is always less, though the deficit varies. Adjustments in 7-day 10-year low-flow values are made for these losses where necessary.

Timing of Low Flows in Two Major Branches

When two major branches drain sufficiently large areas before joining together, the curves for 7-day 10-year low flow versus area that are applicable to these branches may be quite different because of hydrologic, geologic, and soil factors. Further, the low flows may not occur during the same month. Under such conditions, the 7-day 10-year flow below the junction will be higher than a simple addition of the 7-day 10-year low flows in the two branches.

Modification of Low Flows because of Lakes and Pools

Instream lakes and pools generally reduce the 7-day 10-year low flow unless a significant minimum flow release is provided in the project design. Lakes and pools expose considerable water surface areas to evaporation. If the water levels are regulated for recreational or other purposes, the flow needed to maintain lake level combined with evaporation loss may reduce the 7-day 10-year low flow at the lake outlet to zero. If no water is released from lakes in order to hold water for municipal or industrial use during critical dry periods, the 7-day 10-year low flow below the impounding structure is zero. However, in large multipurpose reservoirs (e.g., Shelbyville, Carlyle, and Rend Lake), some minimum flow release is stipulated downstream of the dam, and this can be taken as the 7-day 10-year low flow at the outlet

Flow Regulation for Navigation

Flows in the Illinois River are regulated through a series of locks and dams for navigation purposes. On the Illinois River there are five locks and dams near Dresden, Marseilles, Starved Rock, Peoria, and La Grange, creating pools with very little slope during 7-day 10-year low-flow conditions. There are three USGS gaging stations on the Illinois River, at Marseilles, Kingston Mines, and Meredosia. The observed losses are attributed to evaporation and storage as needed for satisfactory flow regulation. These are proportional to water-surface area. Therefore the distribution of losses along the river is found by determining the use of the lake, river, and backwater surface areas at different points along the river.

Ground-Water Accretion to Low Flow

A stream becomes a gaining stream when ground water flows into the stream. The amount of this accretion has been shown (Singh, 1968) to be related to the depth of streambed incision or entrenchment The amount of this gain is estimated from the low-flow data at gaging stations along a major stream, streambed conditions, existence of permeable deposits, and other pertinent factors.

Flow Data from Gaging Stations in Adjoining States

For determining 7-day 10-year low flows in the Mississippi River bordering Illinois, the daily-flow data at some USGS gaging stations in the neighboring states of Wisconsin, Iowa, and Missouri, as well as at stations along the Mississippi itself, were used. The multi-station computer program provided the information on concurrent flows. With the exception of the timing problem for low flows in the Missouri-Mississippi Rivers at their confluence, the period of low flows was decided primarily by low flows in the Mississippi River.

Other Considerations

Some other assumptions have been made in deriving 7-day 10-year low flows along the streams and showing them on the low-flow maps.

1) Effluents from wastewater treatment plants serving schools have not been considered because these would be practically zero during school closure in July and August, the usual months of low flow in streams.

2) Effluents from wastewater treatment plants serving trailer parks and recreation areas (and some small towns) are not considered if such effluents are very small -- say, 0.01 cfs or less.

3) Many wastewater polishing lagoons have no or negligible outflow during July to September, though they may have flow in many other months. The effluent flow from such lagoons under the 7-day 10-year low-flow conditions in the receiving stream is taken as zero.

4) Any local conditions that are atypical of the general area were not considered. For example, flow from a local spring was not considered unless springs were distributed over the general area.

5) The 7-day 10-year low flows for the 1984 condition of effluents may need adjustment in later years with increases in effluent flows because of increased population. The impact of such increases may be greater in streams having small natural low flows.

MAP 1. ROCK RIVER REGION

The Rock River region includes the Rock River basin in Illinois and areas drained by streams directly entering the Mississippi River upstream of Rock Island. The major tributaries to the Rock River are the Pecatonica, Kishwaukee, and Green River. The Sinsinawa, Galena, Apple, and Plum Rivers drain directly to the Mississippi River. The entire region, with the exception of Jo Daviess County and the northwest comer of Carroll County, is covered with Illinoian glacial drift Streams in the northern part of the region have much more flow during low-flow conditions than do streams in the southern part

The Rock River is navigable for a distance of 15 miles upstream of its confluence with the Mississippi River. There are seven dams on the Rock River, and the average head lies between 7 and 11 feet. These dams (ISPC, 1938) are: Milan (Sears plant), Sterling (lower plant), Sterling (government dam), Dixon, Oregon, Rockford, and Rockton.

$Q_{7,10}$ at Gaging Stations

U.S. Geological Survey daily-flow records for 28 gaging stations were analyzed to determine the consecutive 7-day lowest flow for each year of record at each of the stations. The 7-day 10-year low-flow, $Q_{7,10,}$ values at each gaging station were determined by following the procedures outlined by Singh and Stall (1973). The gaging station, USGS number, drainage area, and 7-day 10-year low-flow information is given in Table 1-1. The $Q_{7,10}$ values at the gaging stations serve as benchmarks for estimating these low-flow values along the streams and tributaries.

Wastewater Plants and Effluents

The locations of municipal and industrial wastewater plants and monthly (minimum, average, and maximum) effluent discharges from them for the years 1982 to 1984 were compiled from the discharge monitoring reports available from the regional offices of the Illinois Environmental Protection Agency. The magnitude of the consecutive 7-day lowest effluent flow was estimated by using the ratio of the 7-day lowest effluent to mean monthly effluent from a previous study conducted in 1971-1972, along with information from telephone conversations with the wastewater plant managers. Some small towns with lagoon systems have practically no effluent discharge during very dry weather conditions. Industrial plants with 7-day low effluent flow less than 0.01 mgd were not considered. The municipal and industrial plants and their effluents during dry conditions (applicable to $Q_{7,10}$ flow conditions in the receiving stream) are listed in Table 2-1 together with the counties in which they are located. The effluent from Commonwealth Edison Byron Station in Ogle County is shown as -51 cfs. The plant withdraws water from the Rock River for cooling purposes and returns it after use. In this exchange, a loss of 51 cfs takes place as per communication from Commonwealth Edison.

Illinois and Mississippi Canal

As completed in 1907, the canal was 52 feet wide at its bottom, was 80 feet wide at the water line, and had a water depth of 7 feet (Yeater, 1978). It was operated by the U.S. Army Corps of Engineers as a navigable waterway from 1907 to 1951. The navigation was discontinued because of excessive maintenance costs. The State of Illinois assumed full ownership in 1970, and the Illinois Department of Conservation is operating a recreation corridor along the canal, affording a variety of water- and trail-related outdoor recreational opportunities.

A feeder canal diverts water from the Rock River near Sterling in Whiteside County. It flows south about 29 miles where it bifurcates into two branches. The west branch runs about 47 miles to the navigable Rock River and Mississippi River, and the east branch travels 28 miles to the Illinois River near the town of Hennepin. At present, about SO cfs is diverted from the Rock River, and this amount is divided nearly equally between the two branches below the point of bifurcation.

Changes in $Q_{7,10}$: An Example

The 7-day 10-year low flow in the Kyte River near Flagg Center was calculated as 3.3 cfs under the 1970 effluent flow conditions (Singh and Stall, 1973). The flow of 3.3 cfs comprised 2.1 cfs natural flow, 1.1 cfs effluent flow from Rochelle, and 0.1 cfs effluent from Ashton. In 1984, the effluent from Rochelle increased to 3.7 cfs and that from Ashton increased to 0.2 cfs, a net increase of 2.7 cfs over that in 1970. Thus the $Q_{7,10}$ for the 1984 effluent flow condition becomes 6.0 cfs.

Table 1-1. Map 1: Gaging Stations, Drainage Areas, and $Q_{7,10}$

USGS number	*Station*	*Drainage area, mi²*	*$Q_{7,10}$, cfs*
05414820	Sinsinawa River near Menominee	39.6	5.0
05415000	Galena River at Buncombe, WI	125	14.0
05415500	East Fork Galena River at Council Hill	17.6	2.3
05419000	Apple River near Hanover	247	20.1
05420000	Plum River below Carroll Creek near Savanna	230	11.2
05420500	Mississippi River at Clinton, IA	85,600	13,990
05434500	Pecatonica River at Martintown, WI	1,034	153
05435000	Cedar Creek near Winslow	1.31	0.0
05435500	Pecatonica River at Freeport	1326	181
05437000	Pecatonica River at Shirland	2,550	408
05437500	Rock River at Rockton	6,363	859
05437695	Keith Creek at Eighth St at Rockford	13.4	0.30
05438250	Coon Creek at Riley	85.1	*25*
05438500	Kishwaukee River at Belvidere	538	35.6
05439000	South Branch Kishwaukee River at DeKalb	77.7	0.20
05439500	South Branch Kishwaukee River near Fairdale	387	12.7
05440000	Kishwaukee River near Perryville	1,099	69.1
05440500	Killbuck Creek near Monroe Center	117	3.1
05441000	Leaf River at Leaf River	103	8.6
05441500	Rock River at Oregon	8,203	1,148
05442000	Kyte River near Flagg Center	116	6.0
05443500	Rock River at Como	8,753	1,167
05444000	Elkhorn Creek near Penrose	146	15.0
05445500	Rock Creek near Morrison	158	14.0
05446500	Rock River near Joslin	9,549	1,376
05447000	Green River at Amboy	201	5.9
05447500	Green River near Geneseo	1,003	50.0
05448000	Mill Creek at Milan	62.4	0.30

Table 2-1. Map 1: Wastewater Plants and Effluents for $Q_{7,10}$ Conditions

County	*Wastewater plant*	*Effluent, cfs*
Municipal		
Boone	Belvidere	3.5
	Capron	0.09
	Cherry Valley	0.34
	Poplar Grove	0.04
Bureau	Ohio	-
	Walnut	0.17
Carroll	Chadwick	0.08
	Milledgeville	0.19
	Mount Carroll	0.22
	Savanna	0.61
	Shannon	0.12
	Thomson	-
DeKalb	DeKalb	5.2
	Genoa	0.41
	Kirkland	0.05
	Sycamore	1.4
Henry	Annawan	-
	Atkinson	0.08
	Cambridge	0.11
	Geneseo	0.81
	Green Rock	0.33
	Kewanee	-
	Orion	0.19
Jo Daviess	Apple River	0.02
	East Dubuque	0.26
	Elizabeth	0.09
	Galena	0.43
	Hanover	0.04
	Scales Mound	-
	Stockton	0.09
	Warren	0.13
Kane	Hampshire	0.13
Lee	Amboy	0.23
	Ashton	0.26
	Dixon, #1	0.23
	Dixon, #2	2.8
	Franklin Grove	0.1 0
McHenry	Harvard	0.88
	Huntley	0.19
	Marengo	0.35
	Woodstock	0.58

Table 2-1. Map 1: Wastewater Plants and Effluents for $Q_{7,10}$ Conditions (Continued)

County	*Wastewater plant*	*Effluent, cfs*
Ogle	Byron	0.26
	Forreston	0.06
	Leaf River	0.05
	Mount Morris	0.36
	Oregon	0.29
	Polo	0.21
	Rochelle	3.7
	Stillman Valley	0.08
Rock Island	Coal Valley	0.35
	Cordova	-
	East Moline	4.3
	Hillsdale	0.09
	Milan	0.85
	Moline	6.3
	Port Byron	0.10
	Quad City Airport	0.05
	Rock Island, Main	8.6
	Rock Island, SW	0.80
	Silvis	0.56
	South Moline	2.7
Stephenson	Cedarville	-
	Dakota	0.04
	Davis	-
	Freeport	4.4
	German Valley	0.03
	Lena	0.29
	Orangeville	0.06
	Pearl City	-
	Rock City	-
	Winslow	0.02
Whiteside	Albany	0.07
	Erie	0.15
	Fulton	0.40
	Morrison	0.67
	Prophetstown	0.19
	Rock Falls	2.0
	Sterling	2.4
	Tampico	0.06
Winnebago	Beloit	2.2
	Durand	0.13
	Pecatonica	0.35
	Rockford	39.4
	Rockton	0.22
	Winnebago	0.16

MAP 4: SPOON RIVER REGION

The Spoon River region includes the areas drained by the Spoon River, Big Bureau Creek, the Edwards River, Pope Creek, and Henderson Creek. Also included are the areas drained by small- to medium-sized streams entering the Illinois River from the west between Ottawa and Beardstown and by streams entering the Mississippi River directly from the east between Rock Island and Lock and Dam No. 18.

The *Spoon River* is located in west-central Illinois. It is 164 miles long and has a drainage area of 18SS square miles. The river flows in a southwesterly direction up to London Mills, then south up to Seville, and turns southeast thereafter to join the Illinois River near Havana. Except near its confluence with the Illinois River, the river bottom consists mainly of sand and gravel (Evans and Schnepper, 1977).

Physiographically, this river basin is located within the Galesburg Plain (Leighton et al., 1948). It includes the western segment of the Illinoian drift sheet The plain is level to undulatory with a few morainic ridges and is in a late youthful stage of erosion. The larger valleys are steep-walled, alluviated, and terraced.

Big Bureau Creek is located in the northwest portion of the region. It is 75 miles long and has a drainage area of 486 square miles. The river flows in a southeasterly direction to join the Illinois River near Bureau Junction.

The *Edwards River* enters the Mississippi River near New Boston. It has a drainage area of 451 square miles and is 75 miles long.

Pope Creek is an elongated stream 59 miles long, with a drainage area of 200 square miles. It flows in an almost westerly direction to enter the Mississippi River near Keithsburg.

Henderson Creek flows in a generally southwesterly direction to join the Mississippi River near Gladstone. It is 68 miles long and has a drainage area of 604 square miles.

$Q_{7,10}$ at Gaging Stations

U.S. Geological Survey daily-flow records for 20 gaging stations were analyzed to determine the 7-day 10-year low-flow, $Q_{7,10}$, values at each gaging station by following the procedures outlined by Singh and Stall (1973). The gaging station, USGS number, drainage area, and 7-day 10-year low-flow information is given in Table 1-4.

Wastewater Plants and Effluents

The municipal and industrial plants and their effluents during dry conditions (applicable to $Q_{7,10}$ flow conditions in the receiving stream) are listed in Table 2-4 together with the counties in which they are located. Effluents from the Mobil Chemical Corp. in Bureau County, Libbey Owens Ford Co. in La Salle County, and Illinois Power Co. in Putnam County are shown as negative. These plants withdraw water from the Illinois River and return it after use. In this exchange, some losses take place.

Illinois and Mississippi Canal

The region includes some portion of the east branch of the Illinois and Mississippi Canal in Bureau County. At the present time, 25 cfs flows in this branch from the point of bifurcation to a lock upstream of the junction with Bureau Creek. The canal reach from the lock to the confluence with the Illinois River is not in use. Construction is in progress for connecting the canal directly to the Illinois River.

Table 1-4. Map 4: Gaging Stations, Drainage Areas, and $Q_{7,10}$

USGS number	*Station*	*Drainage area, mi²*	*$Q_{7,10}$, cfs*
05466000	Edwards River near Orion	155	1.8
05466500	Edwards River near New Boston	445	6.9
05467000	Pope Creek near Keithsburg	174	2.0
05467500	Henderson Creek near Little York	151	0.03
05468000	North Henderson Creek near Seaton	67.1	0.0
05468500	Cedar Creek at Little York	130	7.7
05469000	Henderson Creek near Oquawka	432	8.1
05469500	South Henderson Creek at Biggsville	82.9	0.0
05556500	Bureau Creek at Princeton	196	0.90
05557000	West Bureau Creek at Wyanet	86.7	0.0
05557500	East Bureau Creek near Bureau	99.0	0.0
05558000	Bureau Creek at Bureau	485	31.0
05558500	Crow Creek near Henry	56.2	0.0
05559000	Gimlet Creek at Sparland	5.70	0.0
05563000	Kickapoo Creek at Kickapoo	119	0.53
05563500	Kickapoo Creek at Peoria	297	1.1
05568500	Illinois River at Kingston Mines	15,819	3,050
05568800	Indian Creek near Wyoming	62.7	0.20
05569500	Spoon River at London Mills	1,072	10.4
05570000	Spoon River at Seville	1,636	22.0

Table 2-4. Map 4: Wastewater Plants and Effluents for $Q_{7,10}$ Conditions

County	*Wastewater plant*	*Effluent, cfs*
Municipal		
Bureau	Bureau Junction	0.02
	Cherry	-
	Dalzell	0.03
	DePue	0.29
	Ladd	0.23
	La Moille	-
	Maiden	0.03
	Ohio	0.02
	Princeton	0.95
	Spring Valley	0.88
	Tiskilwa	0.04
	Wyanet	0.13
Fulton	Astoria	0.02
	Avon	0.11
	Banner	-
	Canton, West	13
	East	0.08
	Cuba	0.15
	Fairview	0.04
	Farmington	0.28
	Ipava	0.10
	Lewistown	0.20
	London Mills	0.07
	St. David	0.05
	Table Grove	0.01
	Vermont	0.01
Henderson	Oquawka	-
Henry	Alpha	0.03
	Cambridge	0.19
	Galva, NE	0.24
	Galva, SW	0.14
	Kewanee	1.8
	Woodhull	-
Knox	Abingdon	036
	Altona	0.01
	Galesburg	*12*
	Knoxville	0.25
	Maquon	0.02
	Oneida, South	0.04
	Oneida, North	0.04
	Victoria	0.01
	Wataga	0.01
	Williamsfield	0.02
	Yates City, NW	0.05
	Yates City, SE	0.03

Table 2-4. Map 4: Wastewater Plants and Effluents for $Q_{7,10}$ Conditions (Continued)

County	*Wastewater plant*	*Effluent, cfs*
La Salle	La Salle	1.3
	Mendota	0.99
	Ottawa	2.7
	Peru	1.7
McDonough	Bushnell	-
	Prairie City	-
Marshall	Henry	-
	Lacon	0.24
	Sparland	-
Mercer	Aledo, North	0.13
	South	0.10
	Joy	0.04
	Keithsburg	0.11
	Matherville	0.07
	New Boston	0.04
	New Windsor	-
	Sherrard	-
	Viola	0.11
Peoria	Bartonville	-
	Bellevue	-
	Brimfield	0.10
	Charter Oak	0.15
	Chillicothe	0.64
	Deerbrook	0.03
	Dunlap	0.08
	Elmwood	0.26
	Glasford	0.19
	Hanna City	0.02
	Oakbrook	0.02
	Peoria	20.4
	Princeville	0.18
Putnam	Hennepin	0.22
Rock Island	Andalusia	0.08
	Reynolds	-
Stark	Bradford	0.06
	Toulon	0.17
	Wyoming	0.15
Tazewell	East Peoria	2.3
	Marquette Heights	0.29
	Pekin	2.5
Warren	Alexis	0.09
	Kirkwood	0.08
	Monmouth, Main	2.1
	Monmouth, North	1.2
	Roseville	0.13

Table 2-4. Map 4: Wastewater Plants and Effluents for $Q_{7,10}$ Conditions (Concluded)

County	*Wastewater plant*	*Effluent, cfs*
Industrial and others		
Bureau	Mobil Chemical Corp. (M.C.C.)	-0.75
	New Jersey Zinc Co. (N.J.Z.C.)	0.09
Knox	Spoon Lake Subdivision	0.10
LaSalle	American Hoechst Corp. (A.H.C.)	1.8
	American Nickeloid Co. (A.N.C.)	0.07
	Carus Chemical Co. (C.C.C.)	031
	Libbey Owens Ford Co. (L.O.F.C.)	-0.70
	Motor Wheel Co. (M.W.C.)	0.28
	Troy Grove Stone Quarry (T.G.S.Q.)	032
Marshall	B.F. Goodrich Co. (B.F.G.C.)	0.91
	W.R. Grace & Co. (W.R.G.C.)	0.20
Peoria	Cedar Bluff Utilities (C.B.U.)	0.04
	Central Illinois Light Co. (C.I.L.C.)	13
	Caterpillar Tractor Co. (C.T.C.), #1	1.7
	Caterpillar Tractor Co. (C.T.C.), #2	1.2
	Keystone Steel & Wire Co. (K.S.W.C.)	5.3
	Medina Utilities (M.U.), #1	0.13
	Medina Utilities (M.U.), #2	0.10
	Pinewood Mobile Home Park (P.M.H.P.)	0.02
	Peoria Water Co. (P.W.C.)	0.12
Putnam	Illinois Power Co. (I.P.C.)	-1.5
	Jones & Laughlin Steel Co. (J.L.S.C.)	0.46
Tazewell	Midwest Grain Products (M.G.P.)	2.5
	Pekin Energy Co. (P.E.C.)	0.46

MAP 6: LA MOINE RIVER REGION

The La Moine River region includes the La Moine River, Macoupin Creek, the area drained by streams directly entering the Mississippi River between Lock and Dam No. 18 and the confluence with the Illinois River, and the area drained by streams directly entering the Illinois River between Beardstown and Grafton, Illinois.

The *La Moine River* basin is located in western Illinois. The river drains a total area of 13S0 square miles that includes nearly all of McDonough County, approximately the western half of Schuyler County, northern Brown County, eastern Hancock County, and small portions of Henderson, Warren, and Adams Counties. The river flows southeasterly along a meandering course approximately 100 miles in length, starting from the extreme southeast comer of Henderson County and joining the Illinois River about 5 miles below Beardstown. The average slope of the La Moine is slightly more than 3 feet per mile, but some reaches along the channel have slopes as low as 1 to 1.5 feet per mile. Channel widths are about 100 feet along the middle course of the river and as much as 250 feet near the mouth.

The uppermost surface deposits consist of a layer of Wisconsinan loess ranging from 5 to 20 feet in thickness. The loess is underlain by Illinoian drift which in turn overlies Kansan drift or, more commonly, the bedrock.

Macoupin Creek flows in a generally southwest direction to enter the Illinois River near East Hardin. It is 99 miles long and has a drainage area of 961 square miles.

$Q_{7,10}$ at Gaging Stations

U.S. Geological Survey daily-flow records for 14 gaging stations were analyzed to determine the consecutive 7-day lowest flow for each year of record at each of the stations. The 7-day 10-year low-flow, $Q_{7,10}$, values at each gaging station were determined by following the procedures outlined by Singh and Stall (1973). The gaging station, USGS number, drainage area, and 7-day 10-year low-flow information is given in Table 1-6.

Wastewater Plants and Effluents

The municipal and industrial plants and their effluents during dry conditions (applicable to $Q_{7,10}$ flow conditions in the receiving stream) are listed in Table 2-6 together with the counties in which they are located. Effluents from the Central Illinois Public Service Company in Morgan County and the Western Illinois Power Company in Pike County are shown as negative. These plants withdraw water from the Illinois River and return it after use, and in this exchange there are some losses.

Table 1-6. Map 6: Gaging Stations, Drainage Areas, and $Q_{7,10}$

USGS number	*Station*	*Drainage area, mi²*	*$Q_{7,10}$, cfs*
05474500	Mississippi River at Keokuk, IA	119,000	15,260
05495500	Bear Creek near Marcelline	349	0.05
05502020	Hadley Creek near Barry	40.9	0.0
05502040	Hadley Creek at Kinderhook	72.7	0.0
05512500	Bay Creek at Pittsfield	39.4	0.0
05513000	Bay Creek at Nebo	161	0.20
05584400	Drowning Fork at Bushnell	26.3	0.0
05584500	La Moine River at Colmar	655	2.0
05585000	La Moine River at Ripley	1,293	11.0
05585500	Illinois River at Meredosia	26,028	3,700
05586000	North Fork Mauvaise Terre Creek near Jacksonville	29.1	0.0
05586500	Hurricane Creek near Roodhouse	2.30	0.0
05586800	Otter Creek near Palmyra	61.1	0.0
05587000	Macoupin Creek near Kane	868	2.4

Table 2-6. Map 6: Wastewater Plants and Effluents for $Q_{7,10}$ Conditions

County	*Wastewater plant*	*Effluent, cfs*
Municipal		
Adams	Camp Point	0.05
	Clayton	0.02
	Golden	0.03
	Liberty	0.01
	Mendon	0.09
	Payson	0.01
	Plainville	-
	Quincy	8.7
Brown	Mount Sterling	0.23
	Versailles	0.01
Calhoun	Hardin	0.17
	Kampsville	0.02
Cass	Arenzville	0.04
	Ashland	0.09
	Beardstown	1.1
	Virginia	0.19
Greene	Carrollton	0.28
	Greenfield	0.10
	Roodhouse	0.19
	White Hall	0.25
Hancock	Augusta	0.01
	Bowen	-
	Carthage	0.17
	Dallas City	0.06
	Hamilton	0.31
	La Harpe	0.14
	Nauvoo	0.14
	Plymouth	-
	Warsaw	0.08
Henderson	Stronghurst	-
Jersey	Grafton	0.09
	Jerseyville, South	0.50
	Jerseyville, North	0.50
Macoupin	Carlinville	034
	Girard	0.17
	Palmyra	0.06
	Shipman	0.02
	South Standard	-
McDonough	Bardolph	-
	Blandinsville	-
	Bushnell	0.31
	Colchester	0.08
	Good Hope	0.01
	Industry	0.01
	Macomb, Main	1.4
	Macomb, North	0.01

Table 2-6. Map 6: Wastewater Plants and Effluents for $Q_{7,10}$ Conditions (Concluded)

County	*Wastewater plant*	*Effluent, cfs*
Montgomery	Farmersville	-
	Waggoner	-
Morgan	Chapin	0.03
	Franklin	-
	Jacksonville	5.7
	Meredosia	-
	Murrayville	-
	South Jacksonville	0.39
	Waverly	0.11
	Woodson	-
Pike	Barry	0.04
	Griggsville	0.17
	Hull	0.08
	Ncbo	-
	New Canton	-
	Perry	0.04
	Pleasant Hill	-
	Pittsfield	0.50
Schuyler	Rushville	0.45
Scott	Bluffs	0.03
	Winchester	0.26
Industrial and others		
Adams	Can Am Industries (C.A.I.)	0.09
	Celotex Corp. (C.C.)	2.0
	Harris Corp. (H.C.)	0.20
	Quincy Soybean Co. (Q.S.C.)	5.3
Montgomery	Freeman Coal Mining Corp. (F.C.M.C.)	0.90
Morgan	Central Illinois Public Service Co. (C.I.P.S.C.)	-2.0
	National Starch & Chemical Corp. (N.S.C.C.)	43
Pike	Western Illinois Power Co. (W.I.P.C.)	-2.0
Schuyler	Bartlow Brothers (B.B.)	0.02

MAP 7: KASKASKIA REGION

The Kaskaskia region includes the Kaskaskia River and the areas drained by other streams directly entering the Mississippi River between its confluences with the Illinois River and the Kaskaskia River.

The *Kaskaskia River* starts from west Champaign, flows in a generally southwesterly direction, and joins the Mississippi River about 8 miles upstream of Chester. Its length is 295 miles, and the total drainage area is 5801 square miles. This area is rough and hilly in the southwest, but the northeastern part is comparatively level and exceptionally well suited for agriculture.

The 295-mile course of the Kaskaskia is extremely winding and irregular, and the river has a total fall of only about 390 feet The land on both sides of the river is generally very flat The soils are deep gray loam, though sandy soils are not uncommon. It has numerous tributaries, of which the principal ones are the West Okaw River, East Fork Kaskaskia River, Crooked Creek, Hurricane Creek, Shoal Creek, Sugar Creek, Silver Creek, and Richland Creek. These streams are fairly evenly distributed throughout the basin.

$Q_{7,10}$ at Gaging Stations

U.S. Geological Survey daily-flow records for 34 gaging stations were analyzed to determine the 7-day 10-year low-flow, $Q_{7,10}$, values at each gaging station by following the procedure outlined by Singh and Stall (1973). The gaging station, USGS number, drainage area, and 7-day 10-year low-flow information is given in Table 1-7.

Wastewater Plants and Effluents

The municipal and industrial plants and their effluents during dry conditions (applicable to $Q_{7,10}$ flow conditions in the receiving stream) are listed in Table 2-7 together with the counties in which they are located. Effluents from the Illinois Power Company in Randolph County and the U.S. Industrial Chemical Company in Douglas County are shown as negative. These plants withdraw water from the Kaskaskia River for cooling purposes and return it after use. Water loss occurs in this exchange. Net loss also takes place in Shoal Creek near Breese because of water withdrawal for water supply and reduced return flow from the municipal wastewater treatment plant

Carlyle Lake

This multipurpose reservoir was completed by the U.S. Army Corps of Engineers in 1967 by construction of a dam across the Kaskaskia River at mile *942* upstream of its confluence with the Mississippi River. The gross storage at normal pool level is 283,000 acre-feet and the surface area is 24,600 acres. The reservoir serves many purposes such as flood control, water supply, navigation, and recreation. The mandatory low-flow release is 50 cfs, which is more than the natural 7-day 10-year low flow.

Lake Shelbyville

Lake Shelbyville was completed in 1969 by construction of a dam at river mile 197.9. The Shelbyville dam is located at the edge of the Shelbyville Moraine, which forms the southern boundary of the most recent Wisconsinan glaciation. The valleys are deep, narrow, and steep-sided where the river cuts through the moraine. Thus, Lake Shelbyville is a fairly deep lake in a region where topographic relief is generally small. Its gross storage at normal pool is 210,000 acre-feet, and its surface area is 11,100 acres. This is also a multipurpose reservoir, serving flood control, water supply, navigation, and recreation. A low-flow release of 10 cfs is mandated.

U.S. Industrial Chemical Company

Water is pumped from four wells near Bondville into the Kaskaskia River and later withdrawn from the river about 20 miles downstream for cooling and other purposes. Water is returned to the river after use; the return flow is 3 cfs less than the flow withdrawn. Here the river channel is used to provide an economical means of transporting ground water from near Bondville (where the high-yield Mahomet aquifer exists) to the plant site.

Kaskaskia Navigation Canal

This canal was authorized by the River and Harbor Act of 1962, Public Law 87-874. In 196S, the Illinois Department of Transportation was authorized to provide non-federal sponsorship requirements for the navigation project, restrict water withdrawals, and sell water from the system. The navigation project provides a channel 225 feet wide for barges loaded to a 9-foot draft from the Mississippi River to Fayetteville, 36.2 miles upstream. Traffic in 1984 consisted of 3.2 million tons of coal shipped in S60 tows averaging 4.7 barges per tow. The lock is 84 by 600 feet and can accommodate six barges in **a** single lockage or ten barges in a double lockage.

Horseshoe Lake

Granite City Steel Company has reduced its discharge to Horseshoe Lake by recycling the cooling water. The annual average discharge is 20 to 22 mgd. The treatment plant is shut down twice a year for cleanup and repairs, and this shutdown lasts a week each time. During this shutdown no discharge is made to Horseshoe Lake.

Horseshoe Lake is managed by the Metro East Sanitary and Levee District During high-flow stages in the Mississippi River, the water flows up the Cahokia Canal and enters the lake. There is a low weir to manage flows from the lake to the Cahokia Canal during dry weather conditions. There are 7-day periods during which no flow is released from the lake. The inflow to and outflow from the lake can both be taken as zero under 7-day 10-year low flow conditions.

Baldwin Lake

This lake is owned by the Illinois Power Company. Water is pumped into the lake from the Kaskaskia River for cooling and other purposes. The average withdrawal is about 30 mgd in September and October, the low-flow period in the Kaskaskia Navigation Canal. The amount of water returned to the canal is about 6.6 mgd. Thus loss to the low flow in the canal approximates 23.4 mgd or 36.2 cfs.

Chain of Rocks Canal

Shipping goes through this canal to avoid dangerous conditions in the portion of the Mississippi River from river mile 184.2 to 194.2 (with river mile zero at the confluence of the Mississippi and Ohio Rivers near Cairo, IL). Lock 27 in this canal has two locks: the main lock is 1200 by 110 feet, and the auxiliary lock is 600 by 110 feet

Small Lakes

Lake Lou Yaeger, Coffeen Lake, Raccoon Lake, and other small lakes are used primarily for water supply purposes. There are no mandatory low-flow releases from these small lakes during dry periods.

Table 1-7. Map 7: Gaging Stations, Drainage Areas, and $Q_{7,10}$

USGS number	*Station*	*Drainage area, mi²*	*$Q_{7,10}$, cfs*
05587500	Mississippi River at Alton	171,500	21,490
05587900	Cahokia Creek at Edwardsville	212	0.47
05588000	Indian Creek at Wanda	36.7	0.0
05589500	Canteen Creek at Caseyville	22.6	0.0
05590000	Kaskaskia Ditch at Bondville	12.4	0.05
05590400	Kaskaskia River near Pesotum	109	13.0
05590800	Lake Fork at Atwood	149	0.0
05591200	Kaskaskia River at Cooks Mills	473	10.3
05591500	Asa Creek at Sullivan	8.05	0.0
05591550	Whitley Creek near Allenville	34.6	0.0
05591700	West Okaw River near Lovington	112	0.0
05592000	Kaskaskia River at Shelbyville	1,054	10.0
05592050	Robinson Creek near Shelbyville	93.1	0.0
05592100	Kaskaskia River near Cowden	1,330	17.0
05592300	Wolf Creek near Beecher City	47.9	0.0
05592500	Kaskaskia River at Vandalia	1,940	39.0
05592800	Hurricane Creek near Mulberry Grove	152	0.20
05592900	East Fork Kaskaskia River near Sandoval	113	0.0
05593000	Kaskaskia River at Carlyle	2,719	50.0
05593520	Crooked Creek near Hoffman	254	2.0
05593575	Little Crooked Creek near New Minden	84.3	0.0
05593600	Blue Grass Creek near Raymond	17.3	0.0
05593900	East Fork Shoal Creek near Coffeen	55.5	0.0
05594000	Shoal Creek near Breese	735	1.9
05594090	Sugar Creek at Albers	124	0.21
05594100	Kaskaskia River near Venedy Station	4393	68.0
05594330	Mud Creek near Marissa	72.4	0.0
05594450	Silver Creek near Troy	154	0.10
05594800	Silver Creek near Freeburg	464	1.0
05595000	Kaskaskia River at New Athens	5,181	99.0
05595200	Richland Creek near Hecker	129	5.0
05595270	Plum Creek Tributary near Tilden	0.59	0.0
07010000	Mississippi River at St. Louis, MO	697,000	46,500
07020500	Mississippi River at Chester	708,600	47,600

Table 2-7. Map 7: Wastewater Plants and Effluents for $Q_{7,10}$ Conditions

County	*Wastewater plant*	*Effluent, cfs*
Municipal		
Bond	Greenville	0.54
	Keyesport	0.06
	Mulberry Grove	0.02
	Pocahontas	0.06
	Sorento	0.03
Champaign	Champaign	3.4
	Ivesdale	-
	Tolono	-
Christian	Pana	0.41
Clinton	Albers	0.02
	Aviston	0.04
	Bartelso	0.02
	Beckemeyer	0.08
	Breese, STP	0.37
	Breese, withdrawal for water supply	-0.70
	Carlyle	0.10
	Germantown	0.08
	New Baden	0.08
	Trenton	0.17
Coles	Humboldt	0.02
Douglas	Arthur	0.32
Effingham	Beecher City	0.05
Fayette	Brownstown	0.07
	Farina	0.03
	Ramsey	0.09
	St. Elmo	0.22
	St. Peter	-
	Vandalia	1.5
Macoupin	Benld	0.06
	Brighton	0.22
	Bunker Hill	0.13
	Gillespie	0.22
	Mount Olive, North	0.19
	Mount Olive, South	0.06
	Staunton	-
	Wilsonville	-
Madison	Alhambra	0.01
	Alton	5.1
	Bethalto	-
	Collinsville	2.8
	East Alton	0.67
	Edwardsville	1.3
	Glen Carbon	026
	Godfrey	0.42
	Granite City	12.7
	Hamel	0.04
	Hartford	0.30
	Highland	0.94

Table 2-7. Map 7: Wastewater Plants and Effluents for $Q_{7,10}$ Conditions (Continued)

County	*Wastewater plant*	*Effluent, cfs*
	Livingston	0.07
	Madison	-
	Marine	0.11
	Maryville	0.03
	Meadowbiook	-
	St. Jacob	0.07
	South Roxanna	-
	Troy	0.43
	Wood River	1.2
	Worden	0.05
Marion	Central City	0.19
	Centralia, Main	1.9
	Centralia, North	0.08
	Kinmundy	0.05
	Odin	0.09
	Patoka	-
	Salem	0.93
	Sandoval	0.19
	Wamac	0.09
Monroe	Columbia	0.56
	Hecker	0.03
	Valmeyer	0.06
	Waterloo	0.40
Montgomery	Coalton	-
	Coffeen	0.08
	Donnellson	-
	Fillmore	-
	Hillsboro	0.73
	Irving	0.04
	Litchfield	0.85
	Nokomis	0.14
	Raymond	0.07
	Taylor Springs	0.05
	Witt	0.09
Moultrie	Bethany	0.09
	Dalton	0.03
	Lovington	0.11
	Sullivan	0.42
Piatt	Atwood	0.09
	Bement	0.12
	Cerro Gordo	-
	Hammond	0.04
Randolph	Baldwin	0.02
	Coulterville	-
	Ellis Grove	-
	Evansville	-
	Prairie du Rocher	0.07
	Red Bud	0.43
	Ruma	0.03

Table 2-7. Map 7: Wastewater Plants and Effluents for $Q_{7,10}$ Conditions (Continued)

County	*Wastewater plant*	*Effluent, cfs*
	Sparta	-
	Tilden	0.08
St. Clair	Belleville, #1	6.0
	Belleville, #2	0.19
	Belleville Hospital	0.22
	Caseyville, East	0.85
	Caseyville, West	0.34
	Cahokia Plant	2.8
	Dupo	0.31
	East St. Louis	7.6
	Fayetteville	0.03
	Freeburg	0.14
	Lebanon	0.26
	Lenzburg	0.04
	Landsdowne Plant	2.8
	Marissa	0.20
	Mascoutah	0.32
	Millstadt	0.26
	New Athens	0.25
	O'Fallon	0.57
	Sauget	12.4
	Smithton	0.15
	Stookey TWP, #1	0.51
	StookeyTWP,#2	0.12
	Swansea	0.50
Shelby	Cowden	0.03
	Findlay	0.04
	Henick	-
	Shelbyville	0.79
	Stewardson	0.05
	Strasburg	0.02
	Tower Hill	-
	Windsor	0.09
Washington	Addieville	-
	Hoffman	0.03
	Hoyleton	0.02
	Irvington	0.01
	Nashville	0.15
	Okawville	0.07
Industrial and others		
Champaign	From Wells	10.0
	Kraft Inc. (K.I.)	0.18
Douglas	U.S. Industrial Chemical Co. (U.S.I.C.C.)	-3.0
Madison	Alton Package Co. (A.P.C.)	3.0
	Alton State Hospital (A.S.H.)	0.37
	Clark Oil Corp. (C.O.C.)	0.77
	Granite City Steel Co. (G.C.S.C.)	23.2
	Laclede Steel Co. (L.S.C.)	4.0

Table 2-7. Map 7: Wastewater Plants and Effluents for $Q_{7,10}$ Conditions (Concluded)

County	*Wastewater plant*	*Effluent, cfs*
	O1in Corp.(O.C.)	3.9
	Southern Ill. Univ. (S.I.U.)	0.34
	Shell Oil Co. (S.O.C.)	9.9
Moultrie	Masonic Home (M.H.)	0.03
Randolph	Illinois Power Co. (I.P.C.)	-36.2
St. Clair	Pfizer Inc. (P.I.)	*22*
	Scott Air Force Base (S.A.F.B.)	1.5
Shelby	C.F. Industries (C.F.I.)	0.37
	Westside Mobile Home Park (W.M.H.P.)	0.02

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