Areawide Water Quality Management Plan

CHAPTER 15 - 24

(Excl. Chapter 22)

VOLUME 2

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CHAPTER 15

Hickory Creek

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CHAPTER 15
HICKORY CREEK

15.01 DESCRIPTION OF THE BASIN

a. Physical Characteristics

(1) Geography: Hickory Creek flows in a westerly direction from its headwaters in southwestern Cook County and eastern Will County to its confluence with the Des Plaines River near Joliet. The watershed is approximately 19 miles long and 9 miles wide at its widest point. It drains an area of approximately 70,675 acres, the majority of which are located in Will County.

Figure 15-1 depicts the basin as described in the 208 water quality simulation modeling process. (Note: The natural drainage basin is actually slightly larger than that shown in Figure 15-1, extending approximately 2 river miles southwestward to Hickory Creek's confluence with the Des Plaines River in Joliet.)

Environmentally sensitive areas in the basin are limited to four wetland areas and two forested areas: Pilcher Park and Messenger Woods.

(2) Waterways: The stream network of the basin is relatively simple, consisting of Hickory Creek and three tributary streams. These waters are described in Table 15-1.

(3) Geology and Soils: Unconsolidated glacial deposits range in thickness from 25 to 200 feet above bedrock. The dominant deposit is till, which is found throughout the basin with the exception of some areas in the stream valley of Hickory Creek. Till is relatively impermeable; groundwater recharge capability is limited, and there is some risk of pollutant runoff to surface waters in the application of wastes, fertilizers, or agrichemicals.

Sand and gravel deposits are limited to the stream valley of Hickory Creek. Their high permeability can cause pollution of surficial and bedrock aquifers in areas where septic tanks, landfills, and surface waste applications are present. Since glacial sands and gravels are limited to lowland areas, their recharge potential is small. However, these materials do make good surficial aquifers.

Glacial lake and wind blown deposits are quite thin (less than 6 feet) and overlie till in the eastern portions of the basin. These deposits are predominantly fine silts and clays with low permeability and may present runoff problems. Recent deposits are limited to stream valleys and occasional small patches. These deposits are too limited to have a significant effect on a basin scale. Bedrock is composed of Silurian Dolomite, which also serves as an important regional aquifer.

TABLE 15-1: STREAM INVENTORY — HICKORY CREEK BASIN

STREAM NAME	LENGTH (MILES)	AVG. WIDTH (FT.)	WATER SURFACE (ACRES)	GRADIENT (FT/MILE)	DRAINAGE AREA (SQ. MILES)	COMMENTS
HICKORY CREEK	18.0	50.8	9.7	110.8	109	
MARLEY CREEK	6.7	10.0	4.4	8.1	22.4	
SPRING CREEK	8.5	20.0	19.6	20.6	19.9	
UNION DITCH	2.2	N/A	N/A	N/A	18.3	

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Geologic conditions indicate potential limitations for waste disposal and the application of agrichemicals throughout the basin. Stream valleys are generally unsuitable for all types of waste disposal and surface waste applications because of the relatively thin, highly permeable deposits overlying either sand and gravel or bedrock aquifers. In the extensive till area, groundwater supplies are not subject to pollution hazards and few limitations exist for sanitary landfills or for the land burial of wastes. However, surface applications of wastes, fertilizers, and agrichemicals are often problematic due to rapid surface runoff from the tight till areas. Septic tank usage is also subject to limitations because of low permeability.

Soils vary in the basin by type and in properties that indicate the potential for impacts on water quality under certain conditions. Predominant soils in northeastern Illinois are described in Chapter Four. Soils occurring in the basin are identified in Table 15-2.

(4) Fish and Wildlife: Wildlife populations in the Hickory Creek watershed are typical of those found elsewhere in northeastern Illinois where there are relatively large areas of vacant, agricultural, and forested land. Numerous species of mammals and songbirds are present in varying numbers. Waterfowl species are less common due to the relative lack of suitable wetland habitat on Hickory Creek and its tributaries.

Fish habitat in the watershed is considerably better than that of most other streams in the region. Smallmouth, largemouth, and rock bass are present, as well as various minnow and darter species, carp, suckers, sunfish, and bullheads. There are also a number of fish species present which are unique in the region. Fish populations and habitat conditions in the watershed are discussed in greater detail in Section 15.03.

Figure 15 .. BASIN LOCATION

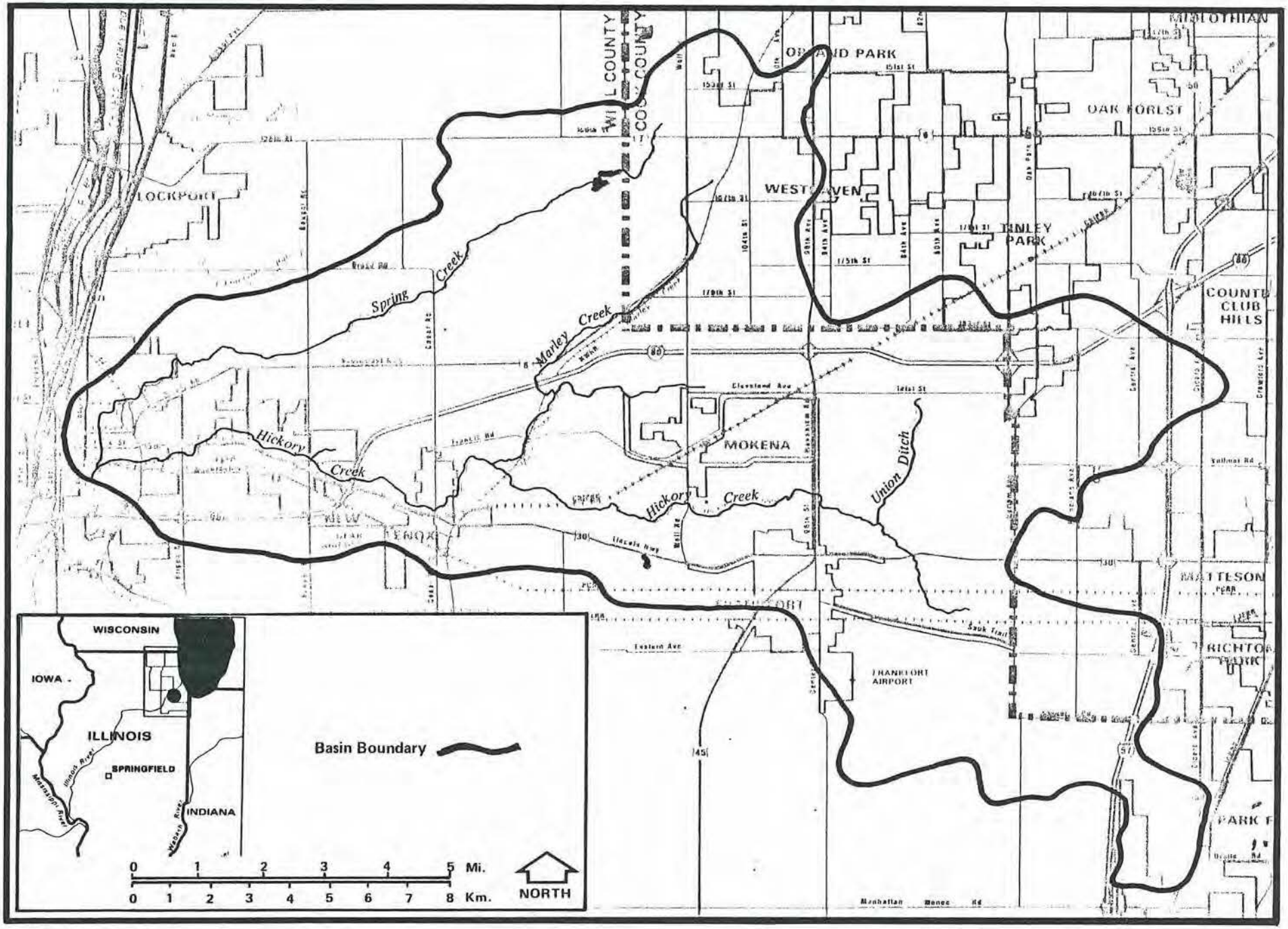


TABLE 15-2: PREDOMINANT SOIL UNIT CHARACTERISTICS FOR NORTHEASTERN ILLINOIS

Unit In Basin	Soil Unit	Soil Color	Soil Texture	Permeability	Drainage	Subsoil Texture	Underlying Materials	Agricultural Usage Limitations	Approximate Percentage of Prime Agri. Land	Development Usage Limitations
	Fox-Dresden-Casco	brown	loam	mod-rapid	well	loam	sand and gravel	E, D, LF	12	S, E, ST
	Warsaw-Rodman-Lorenzo	brown	loam	moderate	well	loam	sand and gravel	E, D	50	S, E, ST
Yes	Volinia-Selma-Lomax	brown	loam	moderate	excessive	loam	sand	WE, D, W	80	W, S, P
	Maumee-Watseka Plainfield	black	loamy sand	rapid	excessive	sand	sand	W, WE, D	30	S, W
	Zurich-Grays-Wauconda	gray	silt loam	moderate	moderate	clay loam	silt loam	W, E, LF	90	S, W, ST
	Drummer-Brenton-Proctor	brown	silt loam	moderate	moderate	clay loam	loam	W, E	100	W, S, P
	Miami-Kidder-McHenry	gray-brown	loam	moderate	well	clay loam	loam	E, ST, LF	40	ST, S, SS
	Drummer-Saybrook-Lisbon	dark gray	silt loam	moderate	moderate	clay loam	loam	W, E	80	W, S, SP, SS
	Ringwood-Griswold	brown	loam	moderate	well	clay loam	sandy loam	E, W	85	S, W, ST
Yes	Morley-Markham-Ashkum	gray	loam	slow	moderate	silty clay	clay loam	E, W, LF	60	ST, SP, SS, W, HC
Yes	Elliot-Ashkum-Beecher	dark gray	silt loam	slow	moderate	silt loam	clay loam	W, E	85	W, SP, CS, SS
Yes	Milford-Martinton	black	silt loam	mod. slow	poor	silty clay	calcareous sediment	W	95	W, HC, P, SP, SS
	Symerton-Andres-Ashkum	black	silt loam	moderate	moderate	clay loam	clay loam	E, W	95	W, SP, SS
	Nappanee-Peotone-Del Rey	dark gray	silt loam	slow	well	silt loam	calcareous sediment	W, T, LF, E	50	W, SP, HC, P
Yes	Frankfort-Bryce-Montgomery	dark brown	silt loam	slow	poor	silty clay	calcareous sediment	W, T, LF, E	5	W, SP, HC, P
Yes	Romeo-Joliet	black	loam	moderate	poor	loam	limestone	W,STN, FL	60	W, SH, FL, SS
Yes	Otter-Huntsville-Millington	black	loam	moderate	moderate	loam	loam	FL, W	95	W, FL
	Fox-Wauconda-Sawmill	dark gray	silt loam	moderate	poor	loam	sand	W, FL, E	75	W, FL
	Houghton-Lena	black	muck/peat	rapid	poor	muck/peat	sand/silt	HWT, W	0	W, P, S, HWT, LS

USAGE LIMITATION CODES

CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
CS	Clayey Subsoil	D	Drouthiness	E	Erosion	FL	Flooding
HC	Heavy Clayey Subsoil	HWT	High Water Table	LF	Low Fertility	LS	Low Strength
P	Ponding	S	Seepage	SH	Shallowness to Bedrock	SP	Slow Percolation
SS	Shrink-Swell	ST	Steepness	STN	Stoniness	T	Soil Tilth
W	Wetness	WE	Wind Erosion				

TABLE 15-3: POPULATION CHANGE 1975-2000

FACILITY PLANNING AREAS	1975	1980	1985	1990	1995	2000	% Change 1975-2000
Frankfort-Mokena FPA (1)	14,000	18,000	23,800	29,500	33,900	38,200	172.9
New Lenox FPA (1)	10,700	12,700	16,000	19,300	23,400	27,600	157.9
Joliet FPA (1)	102,100	115,800	140,900	160,200	176,100	191,700	87.6
Basin FPA Area Total	126,800	146,500	180,200	209,000	233,400	257,500	103.1
Basin Total	65,420	76,336	93,930	111,525	126,194	140,863	115.3

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(1) Facility Planning area is located in more than one basin
Source: Northeastern Illinois Planning Commission

b. Socio-Economic Characteristics

(1) Population: The estimated 1975 population of the basin was 65,420. Population density (592 persons per square mile) is among the lowest for areas in northeastern Illincis. Density is highest near Joliet and in the Cook County headwaters.

Table 15-3 provides population forecasts for the basin and for the 201 facilities planning areas (FPA's) in the basin. Projected wasteloads for the basin and for the facilities planning areas, which are discussed later in this chapter, are based in part on these population forecasts.

(2) Land Use: As indicated by the figures in Table 15-4, the basin's dominant land use category is vacant, agricultural, and forest areas, which accounts for about

three-fourths of total acreage. The largest portion of the 6.4 percent of the watershed which is in public or quasi-public open space is county forest preserves.

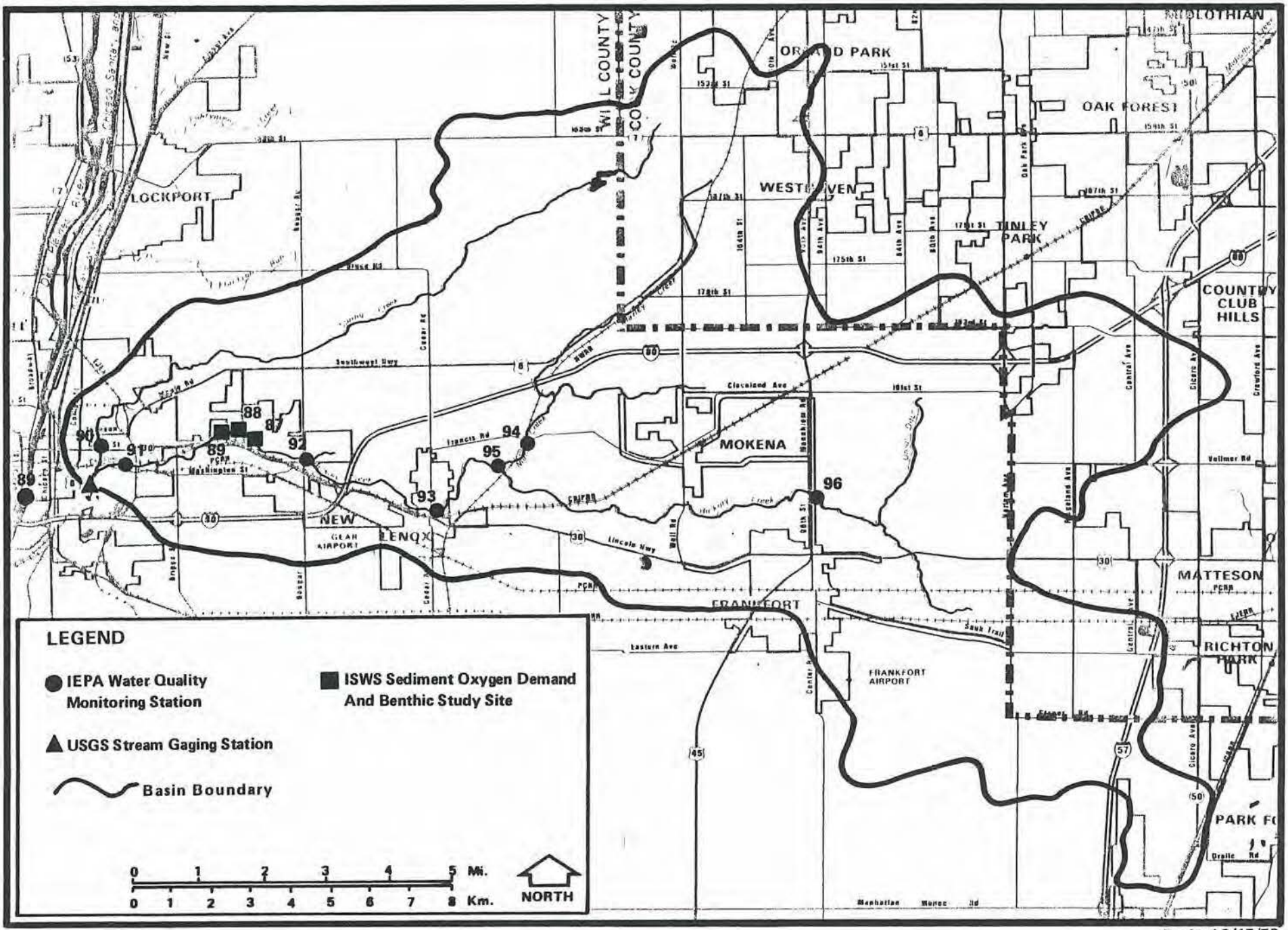
Mining is limited to a limestone quarry near Joliet. Commercial and manufacturing activities are found in New Lenox, Frankfort, and Mokena; along U.S. 30; and in the vicinity of Joliet.

NIPC land use forecasts anticipate increased urbanization in the basin with accompanying changes in land use, as indicated in Table 15-5. The largest proportionate increases are forecast for non-residential land uses, particularly manufacturing and commercial uses. The amount of undeveloped land is forecast to decrease by 18 percent by the year 2000. Urbanization is forecast to be most rapid in the Cook County and northeastern Will County portions of the watershed.

TABLE 15-4: 1970 LAND USE

Land Use Category	Total Acres	% of Total
Single Family Residential	5,741	8.1
Multi Family Residential	71.8	0.1
Mobile Home Parks	15	0
Manufacturing and Processing	268.1	0.4
Transportation, Communications, & Utilities	1,079.2	1.5
Railroad Rights-of-way	781.8	1.1
Airports	113.9	0.2
Streets & Parking	2,963.7	4.2
Trade	169.3	0.2
Services-Private	85.7	0.1
Services-Institutional	876.4	1.2
Military Services	331.6	0.5
Cemetaries	229	0.3
Entertainment Assembly	12.9	0
Public Buildings	0	0
Public and Quasi-Public Open Space	4,545.2	6.4
Mining and Quarries	89.8	0.1
Vacant, Agricultural & Forest Areas	52,608	74.4
Vacant-Under Development	162.1	0.23
Water	406.6	0.6
Warehousing	104.5	0.1
Shopping Centers	16.8	0
Hotels-Motels	2.3	0
Parking Lots	0	0
Total	70,674.7	100

Figure 15-2: WATER SAMPLING STATIONS



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TABLE 15-5: LAND USE FORECASTS (ACRES)

Land Use Category	1980	1985	1990	1995	2000
Residential	6,884	7,778	8,671	9,248	9,826
Manufacturing	1,075	1,760	2,444	2,890	3,336
Commercial	962	1,610	2,257	2,683	3,109
Transportation/Communication, etc.	4,441	5,351	6,261	6,841	7,421
Open Space, Vacant Agriculture, etc.	57,313	54,176	51,042	49,013	46,983
Total	70,675	70,675	70,675	70,675	70,675

SOURCE: Northeastern Illinois Planning Commission, 1976

TABLE 15-6: EMPLOYMENT FORECAST

CATEGORY	1970	1980	1985	1990	1995	2000	1970-2000 % Increase
Manufacturing	3,120	4,150	4,709	5,268	6,498	7,727	147.7
Local Retail	1,724	3,270	3,534	3,797	4,027	4,202	143.7
Other	8,440	12,913	15,839	18,674	22,872	27,070	220.7
Total	13,284	20,333	24,082	27,739	33,397	38,999	193.6

(3) Employment: Total employment in the basin was 13,284 in 1970 (Table 15-6). In recent years, manufacturing has become the largest single employment category.

Manufacturing employment in the basin is forecast to increase substantially by the year 2000. Total employment for the basin is forecast to increase to 39,000, an increase of 193 percent between 1970 and 2000.

(4) Water Supply: With the exception of a small portion of the Village of Tinley Park, groundwater is the sole source of water supply in the basin. (Tinley Park's other water supply source is Lake Michigan.) Wells from shallow sand and gravel aquifers account for 13.2 percent of groundwater pumpage; shallow dolomite wells account for 76.3 percent; deep sandstone wells, for 10.5 percent.

(5) Government: Included in the basin are parts of 10 townships, all or portions of 10 municipalities, and parts

of 21 special districts having some control over water resources. The counties of Cook and Will have jurisdiction in unincorporated areas of the watershed.

(6) Recreation: Public recreational facilities in the basin include a number of forest preserves and a large park located northwest of the Village of New Lenox. These areas offer facilities for hiking, picnicking, and sports. Streams in the basin are heavily fished in certain areas and are also used for canoeing. Hunting is generally limited to small game on private lands. Some private clubs in the area maintain facilities for camping and swimming.

15.02 IMPACTS OF OTHER PROJECTS

In many basins in northeastern Illinois, there are studies or projects underway which may directly or indirectly affect surface and/or groundwater quality. Projects include flood control features (reservoirs, stream channelization), road and highway construction, urban and agricultural storm drainage, utility crossings, and others.

Floods on Hickory Creek have occupied local and state officials for over 75 years. Extensive downstream reaches of the main stem and Spring Creek have been channelized, and vertical retaining walls have been installed. The latter are in a state of disrepair; the former require periodic maintenance for the removal of trees, brush, and other materials. Some dredging has been done in the past near the stream's mouth. During the 1957 flood, extensive residential and industrial areas were under water, including the main marshaling yards of the EJ&E Railroad. Periodic flooding continues.

This section discusses a proposed project of the Illinois Division of Water Resources (IDWR) for Hickory Creek and its tributaries.

Legislation enacted in 1970 (PA 76-2479) directed IDWR to prepare a report on Hickory Creek. The IDWR decided to limit the report to consideration of urban drainage improvement and flood protection measures. Two reports resulted, identified as "First Phase Report on Flood Control" (1972) and "Second and Third Phase Report on Flood Control" (1973). Initially, the area of concern on the main stem was the area downstream from Pilcher Dam, which is located about 1,000 feet upstream of the crossing by U.S. Highway 30, near Pilcher Park. On Spring Creek, the study was initially restricted to the area downstream from the EJ&E Railroad yard.

The two reports recommended channel improvements from the mouth of Hickory Creek upstream to Pilcher Dam on the main stem. On Spring Creek, the proposed improvements called for the construction of retaining walls along the channel between gaps in the existing walls, and for the repair of existing walls which were in various stages of

disrepair. Three flood control reservoirs were also recommended: two on Hickory Creek and one on Spring Creek. Details are noted below, together with other recommended improvements.

a. Channel Improvements - Main Stem

Proposals call for channel excavation and some widening, together with the initial construction, repair, or replacement of retaining walls extending from the mouth of Hickory Creek upstream for a distance of about 2 3/4 miles. For the balance of the distance to Pilcher Dam (a reach of about 1.5 miles), an earth channel would be provided. Channel excavation is involved, but this would be restricted because of the presence of rock at or near the bottom of the stream bed in a number of places. Where the lowering of the channel bed would be too expensive because of rock outcrops, it is recommended that retaining walls be raised 1 foot. Some paving of the channel bed also is called for.

b. Spring Creek Channel Improvements

Improvements in this tributary call for the construction of concrete retaining walls where they are missing and for the repair of existing deteriorated walls, all taking place over a distance of slightly less than 1.5 miles upstream from its confluence with Hickory Creek.

c. Lincoln Estates Channel Improvements

Located approximately midway between Frankfort and Matteson is an unincorporated area known as Lincoln Estates, which includes all of the floodplain between the U.S. Highway 30 bridge over Hickory Creek and the Sauk Trail bridge. Channel improvements are proposed between the Penn Central railroad tracks and the U.S. Highway 30 bridge. In addition, a tributary channel is proposed, extending from Hickory Creek to Highway 30, designed to improve drainage north of that highway.

d. Sauk Trail Dam

A reservoir is proposed in the vicinity of Lincoln Estates, near the headwaters of the main stem. The dam itself would be the base of Sauk Trail at that point. The maximum elevation to accommodate the 100-year flood would be 728 feet mean sea level (msl), at which time an emergency spillway would go into operation. However, being an in-stream detention facility with no permanent pool, it was recommended that a low flow outlet at the stream bed be

designed to pass normal and low flows. Its maximum rate of discharge would be 35 cubic feet per second (cfs). A 6-foot by 6-foot vertical riser would be installed, having its elevation at 726 feet, the height of flood flows of the 25-year storm. Water elevations in excess of that would be discharged through the riser, with the maximum rate of discharge through the stream bed outlet and the riser being 200 cfs. The lower outlet is designed to dewater the reservcir in 14 days. The reservoir surface for the 100-year flood is not given.

e. Hickory Dam

A second reservoir is proposed on the main stem at a point due south of Mckena. This reservoir is proposed to store a 40-year flood. It would not have a permanent pcol, since all low and normal flows would pass through a 3-foot by 3-foot culvert installed at the stream bed elevation. The size was determined on the basis of not requiring more than 14 days to dewater the stored floodwaters. The emergency spillway is proposed to have an elevation of 676 feet. The facility is designed to protect New Lenox and Joliet.

f. Spring Creek Dam

This reservoir is proposed on Spring Creek, with the dam at Gengas Road having an elevation of 657 feet. This is the only one of the three dams which would have a permanent pool. The dam would create a water surface of between 90 and 100 acres. Normal flows would pass through a 30-inch pipe. Protection is intended for Joliet.

15.03 WATER QUALITY IN THE BASIN

a. Applicable State Standards and Designations

All waterways in the Hickory Creek basin are designated as "General Use," and are subject to state standards for waterways with such designation. A full discussion on General Use standards and other standards applicable to water quality is given in Chapter Four.

Under the IEPA's segment classification system, the Hickory Creek watershed is part of segment B-4, which is one of 20 segments in the Des Plaines/Lake Michigan hydrclogic unit utilized by IEPA. This segment, like all others in the state, has been designated "water quality limited." This means that water quality does not currently meet applicable water quality standards and/or is not expected to meet those standards even after the minimum statutory limitations have been applied to effluents discharged to the water body.

b. Existing Water Quality Conditions

Assessment of current water quality conditions in Hickory Creek and its tributaries is based on information developed from this Commission's water quality sampling program as well as other sampling programs (principally those of the IEPA). Simulation modeling of existing conditions also has provided a description of current water quality.

(1) Commission In-stream Sampling: One in-stream sampling station was located on Hickory Creek, on a downstream reach at Second Street in Joliet. Data were collected seasonally over a 12-month period (May 1976-April 1977), primarily for use in calibrating the water quality model. Results are shown in Table 15-7. Of the 19 characteristics evaluated, four have applicable state standards: pH, temperature, dissolved oxygen, and ammonia nitrogen. As the tabular data indicate, mean values for all parameters with standards were within allowable limits. Excursions below the minimum dissolved oxygen standard did occur, however, during three of the four sampling periods. A violation of the ammonia nitrogen standard also was recorded during the August 1976 sampling period.

(2) SOD Measurements: Sediment oxygen demand (SOD) measurements were conducted at three sites in the watershed (see Figure 15-2). The overall purpose was to estimate the oxygen demand exerted upon the overlying water by bottom-dwelling (benthic) organisms. Conditions were classified under one of the following: clean, moderately clean, slightly degraded, moderately polluted, polluted, heavily polluted, or sewage sludge-like. On the basis of this evaluation, conditions (noted in Table 15-8) ranged from "slightly degraded" (two sites) to "moderately clean" (one site).

(3) Biological Classification: As part of the SOD study, benthic macroinvertebrate communities were analyzed, and mathematical Shannon-Weaver indices were developed reflecting the nature and diversity of these communities. Indices above 3.0 are indicative of generally clean water; values between 1.0 and 3.0 are indicative of moderately polluted water; and values below 1.0 are indicative of severe pollution.

Shannon-Weaver indices and their relevant classifications for the three Hickory Creek stations are shown in Table 15-9. Two sites are classified "moderately polluted" and one site "semi-polluted" on the basis of this index. On the basis of the IEPA's classification system (also shown in Table 15-9), conditions at the stations were categorized as "semi-polluted" and "polluted."

TABLE 15-7: IN-STREAM WATER QUALITY ANALYSES - SUMMARY DATA

HICKORY CREEK BASIN

STATION NO. 20

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		pH (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
MAY 3 - 12 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.3	249	195	549	844	69	17	14	6	11			2.3	1.4	6.6	0.33	52	391	34	
	Minimum	7.4	64	11	11	386	4	5	4	1	3			0.3	0.0	2.3	0.04	7	355	8	
	Mean	7.9	174	55	103	586	15	11	11	3	6			0.8	0.4	4.5	0.16	18	373	17	
AUGUST 2 - 11 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.3	241	245	694	994	69	23	11	4	12			2.1	1.6	3.0	0.42	24	406	32	
	Minimum	7.9	104	9	15	492	3	18	3	1	3			0.5	0.1	1.8	0.07	11	369	10	
	Mean	8.1	191	69	124	660	14	20	8	2	5			0.9	0.4	2.3	0.25	17	388	17	
NOVEMBER 3 - 12 1976	No. of Analyses	14	14	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	8.6	315	24	73	1076	17	7	17	13	20			1.4	0.1	1.2	0.49	5	588	246	
	Minimum	8.1	298	3	4	894	2	1	6	3	4			0.4	0.1	0.7	0.28	2	513	17	
	Mean	8.4	308	7	18	954	6	4	14	5	9			0.8	0.1	0.93	0.38	4	536	76	
JANUARY 31 FEBRUARY 7 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0
	Maximum																				
	Minimum																				
	Mean																				
APRIL 25 - 30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	8.5	283	15	46	942	10	17	16	4	18			0.8	0.1	1.9	0.28	2	527	42	24
	Minimum	7.8	246	2	5	764	1	11	2	2	7			0.4	0.1	1.4	0.08	2	519	25	22
	Mean	8.2	264	6	19	840	5	14	9	3	10			0.6	0.1	1.6	0.22	2	523	33	24

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited

(3) Analyses by Hach

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TABLE 15-8: GENERALIZED BENTHIC SEDIMENT CONDITIONS

Hickory Creek BASIN

STATION NUMBER	STREAM NAME	BENTHIC CONDITION*
87	Hickory Creek	Slightly Degraded
88	Hickory Creek	Slightly Degraded
89	Hickory Creek	Moderately Clean

*Based on SOD value

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TABLE 15-9: BIOLOGICAL STREAM SITE CLASSIFICATIONS

Hickory Creek BASIN

Station Number	Stream Name	IEPA Classification[1]	Shannon-Weaver	
			Index	Classification[2]
87	Hickory Creek	SP	1.19	MP
88	Hickory Creek	P	0.96	SeP
89	Hickory Creek	SP	1.24	MP

(1) Polluted (P); Semi-polluted (SP); Unbalanced (U); Balanced (B).

(2) Severe pollution (Se P); Moderately polluted (MP); Clean (C).

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(4) Fish Species and Habitat: The Metropolitan Sanitary District of Greater Chicago (MSDGC) collected fishes at 13 sites along Hickory Creek and its tributaries in 1976 as part of the 208 fish sampling program. Eight of the sites were located on Hickory Creek, and the remaining five were on tributaries. Thirty-one species and three hybrids were collected. Half of the species collected are considered tolerant to habitat abuse. Almost 30 percent of the species are sensitive to detrimental changes, while the remaining 20 percent are only moderately sensitive. Green sunfish (a tolerant species), stonerollers (a moderately tolerant species), and striped shiners (a moderately tolerant species) were taken at most of the sites and represented 51 percent of the total number of fishes collected. The intolerant species represented 6 percent of the total number of fishes collected.

An evaluation of Hickory Creek headwaters was possible only by considering the qualitative data in the records of the Illinois Natural History Survey (INHS) regarding species' presence. Fishery quality was high in the headwaters since the area contains little urban development. Downstream in Hickory Creek, the quality of habitat dropped, possibly due to the influence of small residential developments. Marley Creek and an unnamed tributary further degraded the habitat. Collections secured from these areas were low in abundance of species, and those which were taken were tolerant types. Fishery quality improved as Hickory Creek flowed through the Pilcher Park area and remained high in the vicinity of the confluence of Spring Creek. Spring Creek diversity and equitability indices indicated the quality of this creek remained high throughout most of its length. However, the influence of the City of Joliet and the Des Plaines River dominated at the confluence of Hickory and Spring creeks and fishery quality was reduced.

Follow-on work by the Illinois Natural History Survey involved computation of a "toxicity index" relating water quality to fish habitat suitability. Included in the parameters for computing the toxicity index (using bluegills as the target species) are cadmium, nickel, arsenic, chromium, boron, mercury, silver, cyanide, ammonia, and copper, among others. On the basis of its analysis, the INHS determined that at only one of eight water quality sampling sites would the calculated "bluegill toxicity index" be in excess of the theoretical maximum level above which a diverse fishery cannot be maintained. The only parameter found to have a significant effect on the high index calculation was silver. Significantly, while silver was found to be the major contributor to the toxicity index, the state in-stream standard for that parameter was never violated in 1976. Conversely, some parameters (copper, ammonia nitrogen, and total iron) often exceeded in-stream standards, yet did not contribute significantly to the toxicity index.

Overall, the Illinois Natural History Survey concluded that fish habitat (as measured by water quality) ranged from high to fair in the watershed. Spring Creek was rated high throughout its length.

(5) IEPA Water Quality Sampling: The IEPA maintains eight sampling stations in the Hickory Creek watershed (Figure 15-2). Selected sampling results from the agency's 1976 water quality monitoring program are presented in Table 15-10. Ammonia, nitrogen, fecal coliform, iron, and copper were the parameters for which violations were most frequently recorded. Of 71 analyses made for fecal coliform, 52 apparent violations of the standard were recorded. Violations for iron were recorded for 20 percent of the samples, and violations for ammonia nitrogen were recorded for 15 percent of the samples.

No violations occurred with respect to dissolved oxygen or for a range of other parameters routinely sampled.

c. Results of Water Quality Modeling

The model simulation of existing conditions provides a more comprehensive picture of water quality in the basin than the results of sampling programs. Not only can pollutant concentrations be determined and related to state standards, but the relative amounts of pollutants contributed by various sources also can be quantified.

As shown in Figure 15-3, the basin was divided into 14 reaches. Each reach is comprised of a segment of Hickory Creek proper, other streams that are tributary to that segment, and the land areas drained by those water bodies. To reduce the mass of data to a more manageable size, critical segments were identified, for which modeling results were reported. Four such reaches were selected in Hickory Creek, and Table 15-11 describes the most downstream point in each reach.

Each reach is a direct tributary to the reach immediately downstream from it and an indirect tributary to other downstream reaches. Reach 121 is the farthest downstream point for which water quality in the basin has been simulated. Since water from all other reaches eventually flows into Reach 121, it represents a "summary" of pollutant loadings in the basin. In general, the discussion in this section focuses on conditions in Reaches 33, 73, 113, and 121. Conditions in all four reaches also are described in preliminary reports issued by the Commission during the basin planning process.

To ensure that the model is an accurate representation of the Hickory Creek basin, its behavior has been balanced against measurements and observations of actual water quality conditions existing during 1976 and 1977.

Sources of pollutants are categorized in the modeling process as follows:

--Point sources: treatment plants and other discrete discharges.

--Nonpoint sources: surface runoff and groundwater seepage from developed and undeveloped areas.

--Combined sewer overflows.

--Boundary conditions: the amount of pollution flowing into a basin from another basin or another state. (Boundary conditions are not a factor in Hickory Creek.)

(1) Pollutant Concentrations: Table 15-12 summarizes pollutant levels for four parameters simulated for four reaches of Hickory Creek under existing conditions. It will be noted from the table that while simulated mean values for ammonia were all well within the state standard, maximum values exceeded the standard in all four reaches. The phosphate standard of .05 milligrams per liter (mg/l) (although it does not officially apply to Hickory Creek) was at least theoretically violated in all reaches.

Dissolved oxygen (DO) has been used by the Commission as a summary indicator of water quality. Conditions with respect to DO in Hickory Creek are described in Table 15-13. Mean values for DO are in compliance with the proposed Commission standard in all reaches, although minimum value excursions of the proposed standard are reported for all reaches except 113 (Spring Creek). The high quality of Spring Creek is underscored by the absence of simulated DO violations. Overall, on the basis of simulated DO levels, conditions in the basin range from good to excellent. These ratings were based on the following classification schedule:

Excellent	= no dissolved oxygen concentrations below 5 mg/l.
Good	= dissolved oxygen remains above 5 mg/l 95 percent of the time or more.
Fair	= dissolved oxygen remains above 5 mg/l 85 percent of the time or more.
Poor	= dissolved oxygen remains above 5 mg/l 70 percent of the time or more.
Bad	= dissolved oxygen remains above 5 mg/l less than 70 percent of the time.

If, in any reach, the dissolved oxygen drops to zero, the qualitative state of the reach is lowered by one category.

(2) Pollutant Loadings and Sources: Table 15-14 is a summary of pollutant loads by source, as simulated in Reach 121 (the most downstream reach modeled).

Table 15-15 presents percentages of selected pollutants contributed to Reaches 113 and 121 from various sources.

TABLE 15-10: VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

HICKORY CREEK BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen	Fecal[2] Coliform (per 100 ml.)	Iron	Copper	Dissolved Oxygen	Lead	Silver	Chloride	Fluoride	PH (Units)	Boron	Sulfate	Cyanide	Hexavalent Chromium	Total Phosphorus	Manganese	Phenol	Total Dissolved Solids	Temp. (°F)
			1.50	200	1.0	0.02	(4)	0.10	0.005	500	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
89	Hickory Creek	No. of Analyses	9	8	3	3		3	3	3											
		No. of Violations	1	8	0	1		1	0	0											
GG 01		Maximum	2.70	49000		0.09		0.15													
		Minimum	0.00	400		0.02		0.01													
		Mean[3]	0.51	5064		0.04		0.07													
91	Hickory Creek	No. of Analyses	9	9	3	3		3	3	3											
		No. of Violations	1	9	1	2		0	0	0											
GG 02		Maximum	3.60	26000	2.8	0.09															
		Minimum	0.03	600	0.2	0.01															
		Mean[3]	0.66	3854	1.3	0.06															
92	Hickory Creek	No. of Analyses	9	9	3	3		3	3	3											
		No. of Violations	1	7	1	2		0	0	0											
GG 04		Maximum	4.30	4100	4.6	0.12															
		Minimum	0.00	100	0.4	0.01															
		Mean[3]	0.75	560	2.0	0.06															
93	Hickory Creek	No. of Analyses	9	9	3	3		3	3	3											
		No. of Violations	2	8	1	1		0	1	0											
GG 05		Maximum	3.80	7300	1.6	0.28			0.010												
		Minimum	0.00	100	0.4	0.00			0.000												
		Mean[3]	0.82	1369	0.8	0.09			0.003												
95	Hickory Creek	No. of Analyses	9	9	3	3		3	3	3											
		No. of Violations	1	3	1	3		1	0	0											
GG 06		Maximum	5.00	2900	2.1	0.06		0.13													
		Minimum	0.00	100	0.2	0.03		0.00													
		Mean[3]	0.83	216	1.1	0.04		0.04													
96	Hickory Creek	No. of Analyses	9	9	3	3		3	3	3											
		No. of Violations	3	8	1	2		1	0	1											
GG 07		Maximum	11.00	3700	4.8	0.06		0.19		510											
		Minimum	0.02	200	0.5	0.02		0.01		41											
		Mean[3]	2.00	843	2.0	0.04		0.07		243											
90	Spring Creek	No. of Analyses	9	9	3	3		3	3	3											
		No. of Violations	0	5	0	2		0	0	0											
GGA 01		Maximum		26,000		0.09															
		Minimum		100		0.00															
		Mean[3]		895		0.04															
94	Marley Creek	No. of Analyses	9	9	3	3		3	3	3											
		No. of Violations	2	4	0	2		0	0	0											
GGB 01		Maximum	6.20	900		0.06															
		Minimum	0.02	100		0.02															
		Mean[3]	1.24	210		0.03															
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

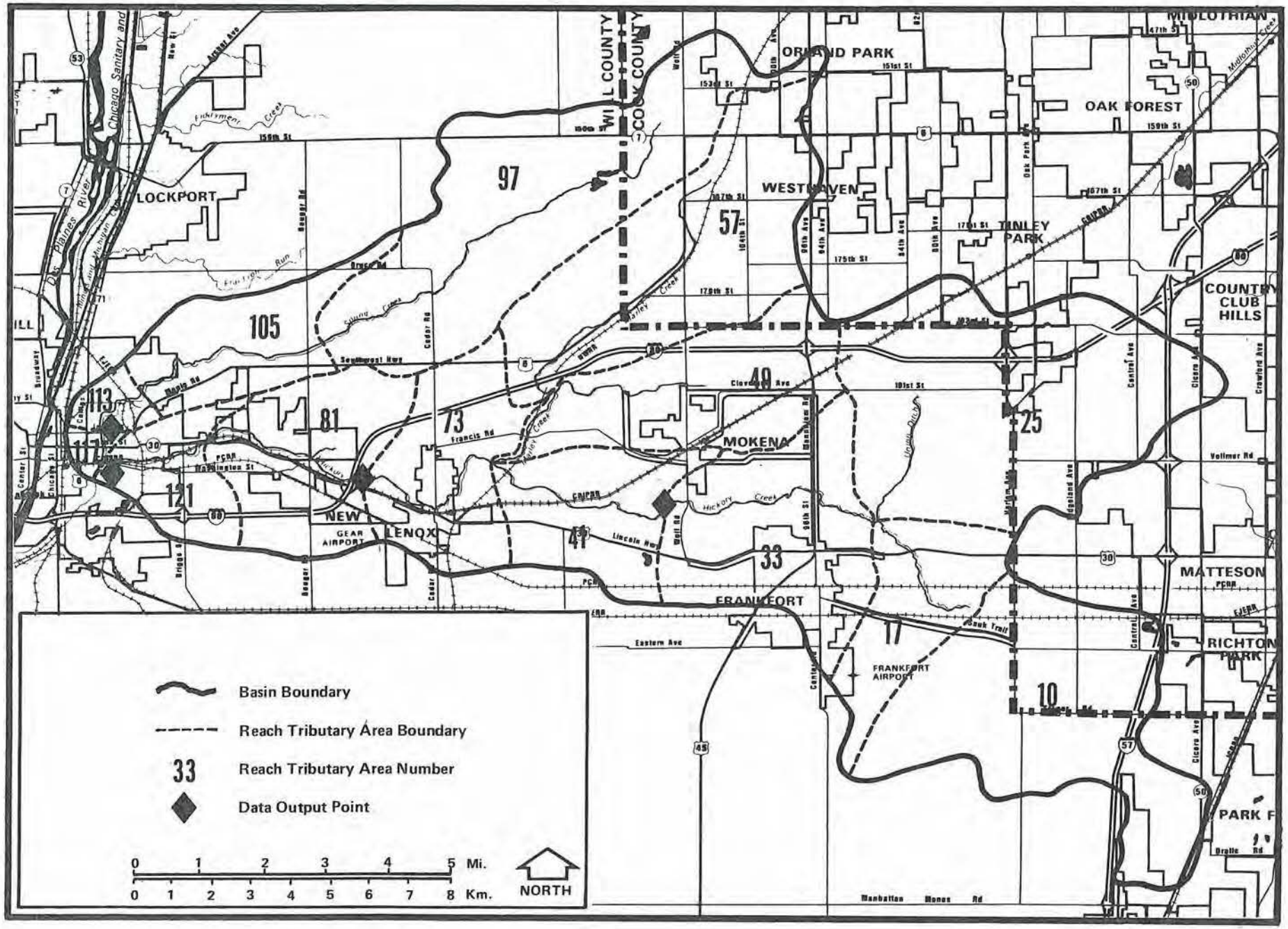
TABLE 15-11: MOST DOWNSTREAM POINTS, SELECTED IMPORTANT REACHES

Reach 33 Hickory Creek at Wolf Road in Mokena	Reach 73 Hickory Creek at Cedar Road in New Lenox, including Marley Creek
Reach 113 Spring Creek, where it joins Hickory Creek in Joliet	Reach 121 Hickory Creek at Third Avenue in Joliet, including Spring Creek

TABLE 15-12: STATISTICAL SUMMARY OF CURRENT WATER QUALITY

Parameter (Standard) (All data in mg/l)	REACHES				
	33	73	113	121	
BOD (No Standard) Maximum	45.5	51.6	45.7	48.5	
Minimum	1.0	.94	.99	.94	
Mean	6.92	7.48	5.80	8.09	
AMMONIA (1.5 mg/l) Maximum	4.97	3.52	4.09	3.20	
Minimum	.08	.02	.04	.02	
Mean	1.02	.45	.29	.44	
No. Violations	182	50	91	75	
Avg. Duration Viol.	25	16	7	6	
NITRATE (No Standard) Maximum	6.12	6.14	5.62	6.74	
Minimum	0.0	0.0	.17	0.0	
Mean	3.07	3.05	3.01	2.94	
PHOSPHATE (.05 mg/l) Maximum	.96	.79	.83	1.15	
Minimum	0.0	0.0	0.0	0.0	
Mean	.22	.18	.13	.18	
No. Violations	121	190	153	195	
Avg. Duration Viol.	211	121	131	113	

Figure 15-3: BASIN MODELING SEGMENTS



Further details may be found in the Commission's report, Existing Water Quality Conditions for the Hickory Creek Basin, dated August 1977.

(a) Overview: Current water quality in the Hickory Creek system is relatively good as simulated for existing conditions. This judgment is made with respect to the constituents being modeled, particularly dissolved oxygen, ammonia, phosphate, nitrate, algae levels, and water temperature. Constituents such as pesticides, toxic substances, and turbidity have not been modeled, and their impacts on water quality have not been assessed.

In general, pollutant loads in the Hickory Creek basin, as defined for modeling purposes, are relatively low. The basin is largely undeveloped and thus avoids much of the severe pollution load normally associated with urbanization. The major types of land cover in the basin, in decreasing order of predominance, are grassland, cropland, lowland, and impervious areas. Pollutant contributions by sources are similar for both Reach 113 and Reach 121, with the notable exception that there are no point source contributions in Reach 113 (Spring Creek). As noted previously, emphasis will be placed on Reach 121, since it reflects all of the loads entering the basin as modeled.

(b) Point Sources: From Table 15-15 it can be seen that point sources contribute a relatively small portion (four percent) of the total flow in Hickory Creek, but they account for 27 percent of the ammonia. Point sources were not found to cause dissolved oxygen problems in Hickory Creek. There were few if any violations of the 5.0 mg/l dissolved oxygen standard during low flow conditions when point sources contributed the major oxygen demanding load. There were no DO violations at all in Spring Creek, where there are no point sources. However, point source loads do exert a stress on the system, which may result in greater DO depletions during certain runoff events. Spring Creek may have greater than normal assimilative capacity for oxygen demanding loads, thus avoiding severe DO depletion. But, since flow-through time is very short in Spring Creek, the wastes that enter do not have much time to be degraded and to exert their peak oxygen demands.

Point sources are responsible for some violations of the 1.5 mg/l ammonia standard during dry weather periods (when there is little dilution in the stream). Ammonia violations occurred occasionally throughout the basin, including Spring Creek. In addition, point sources contributed significant amounts of phosphate, which promotes algae growth.

In summary, point source impacts of concern are the ammonia contributions under low-flow conditions and the phosphate load, which serves as an algae nutrient. Point source biochemical oxygen demand (BOD) loads are insignificant; typical effluent BOD concentrations are quite low throughout the basin.

TABLE 15-13: STATISTICAL SUMMARY OF CURRENT DISSOLVED OXYGEN LEVELS

SIMULATED DO CHARACTERISTICS (Expressed in mg/l)	REACH				
	33	73	113	121	
Maximum	12.6	13.5	14.3	14.1	
Minimum	2.9	2.7	5.0	3.8	
Mean	8.18	8.34	10.1	9.54	
*No. of Violations	27	38	0	8	
Avg. Duration	15	13	0	8	
**Overall Assessment	Good	Good	Excellent	Good	

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time DO levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

TABLE 15-14: POLLUTANT CONTRIBUTIONS BY SOURCE CATEGORY, EXISTING CONDITIONS
REACH 121

PARAMETER	POINT SOURCES			NON-POINT SOURCES			Total Loads
	Comb Sewers	Treatment Plants	Boundary Conditions	Pervious Surfaces		Impervious	
				Surface	Ground	Surface	
BOD Load (tons/year)	53.7	30.5	N/A	176	54.2	202	516
% Total Load	10	6	N/A	34	10	39	100
AMMONIA Load (tons/year)	4.59	31.0	N/A	51.6	2.71	26.9	117
% Total Load	4	27	N/A	44	2	23	100
NITRATE Load (tons/year),	2.74	8.03	N/A	84.2	246	6.72	348
% Total Load	1	2	N/A	24	71	2	100
PHOSPHATE Load (tons/year)	1.36	4.02	N/A	5.83	3.54	3.36	18.1
% Total Load	7	22	N/A	32	20	19	100

(c) Pervious Sources: Surface runoff and groundwater flows from pervious land cover comprise the majority of flow in Hickory Creek--about 73 percent of the total. However, pervious cover pollutant contributions are disproportionately lower for BOD (45 percent), ammonia (47 percent), and phosphate (52 percent). There also is a sharp contrast between the relative pollutant contributions from surface water runoff and groundwater runoff. Approximately 81 percent of the runoff from pervious surfaces is groundwater discharge; the remaining 19 percent is surface runoff. Major portions of the pollutant loads of BOD, ammonia, and phosphate enter as surface runoff, whereas the major nitrate load entering Hickory Creek is contained in groundwater (see Table 15-15).

Groundwater discharge is generally insignificant with regard to its total pollution impact on Hickory Creek. However, it does contain nitrate and phosphate which contribute to algae growth (phosphate being the limiting nutrient). Algae levels are relatively high throughout the Hickory system under low-flow conditions. No major problems are attributed to this situation, since Hickory Creek is essentially a free flowing system, except for Pilcher Dam. Any algae which would accumulate during low-flow periods would be flushed out to downstream reaches, which are all free flowing. If any major impoundments existed on Hickory Creek, it is likely that the high nutrient levels would lead to nuisance algae blooms.

Surface runoff from pervious surfaces is partially responsible for the occasional DO violations simulated for existing conditions. Large portions of the total BOD and ammonia loads are attributable to this source. It is important to note that DO vioations are not considered a severe problem, since they occur less than two percent of the time in the most stressed of the observed reaches. Surface loadings of pollutants are typically associated with accumulated organic matter, (including malfunctioning septic tank installations), air pollutant fallout, and fertilizer applications on croplands.

(d) Impervious Sources: Impervious surface runoff comprises a relatively small portion of total streamflow, but its pollutant contribution is disproportionately large, particularly for BOD. Thus, impervious surface runoff is also partially responsible for causing the short term DO violations observed occasionally during stormwater runoff events.

(e) Combined Sewer Overflows: Combined sewers contribute several pollutants to Hickory Creek. However, the impact is small within the study area, since the overflows enter upstream from the final reach and contain pollutants which have not had time to exert their oxygen demands. The impact of these overflows further downstream is much more significant and adverse.

TABLE 15-15 : SOURCES OF POLLUTANTS, EXISTING CONDITIONS

REACH/SOURCE	PERCENTAGES					
	AREA	STREAM FLOW	POLLUTANTS			
			BOD	NH_3	NO_3	PO_4
1. Hickory Creek						
(REACH NO. 121)						
BOUNDARY CONDITIONS						
POINT SOURCES	-	4	6	27	2	22
COMBINED SEWERS	2	1	10	3	1	7
PERVIOUS COVER	89					
Surface Runoff		14	35	45	24	32
Groundwater		59	10	2	71	20
IMPERVIOUS COVER	9	22	39	23	2	19
2. Spring Creek						
(REACH NO. 113)						
BOUNDARY CONDITIONS						
POINT SOURCES						
COMBINED SEWERS						
PERVIOUS COVER	90					
Surface Runoff		12	33	55	23	38
Groundwater		61	12	3	75	28
IMPERVIOUS COVER	10	27	55	42	2	34

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15.04 POINT SOURCES: EXISTING CONDITIONS

a. Municipal Type Wastewater Treatment Plants

There are seven municipal type wastewater treatment facilities in the Hickory Creek basin. These plants are listed in Table 15-16 (A, B, C, and D) and are shown along with other point source discharges on Figure 15-4.

All the treatment plants are relatively small in size, with the largest being Frankfort. The Frankfort and Mokena plants are required to meet state standards of 4 mg/l BOD and 5 mg/l TSS. No facility plans have been completed for the FPA's within the Hickory Creek basin, except the MSDGC plan for the Cook County portion of the basin.

b. Industrial Wastewater Treatment Plants

There are no industrial plants in the basin treating their own process wastes.

c. Miscellaneous Wastewater Treatment Plants

There are eight miscellaneous wastewater treatment facilities currently discharging within the basin. All are very small in size, and most serve mobile home parks and institutions. Data for these plants are given in Table 15-17(A and B). Given the small capacities, impacts on water quality are minimal, particularly when effluents meet NPDES requirements. The feasibility of phasing out some of these facilities will depend on the extension of municipal sewer service to where connections are economically feasible.

d. Other Point Source Discharges

A number of private firms have NPDES permits for stormwater and cooling water discharges to the Hickory Creek basin. These are described in Table 15-18(A and B).

e. Combined Sewer Overflows

Of significance are the combined sewer overflows from the City of Joliet which are now discharging into Hickory and Spring creeks.

The Joliet portion of the Hickory Creek drainage basin consists of 1,121 acres. The existing interceptor, with nine overflow points, served an estimated 1975 population of 7,500.

The Spring Creek drainage basin contains 6,856 acres. However, only 1,500 acres are served by Joliet interceptor sewers, which have seven overflow points. The 1976

TABLE 15-16 A: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS Hickory Creek BASIN

MAP CODE	FACILITY NAME	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	RECEIVING STREAM NAME	RECEIVING STREAM 7 DAY 10 YR. LOW FLOW (MGD) 1970	RECEIVING STREAM 7 DAY 10 YR. LOW FLOW (MGD) 2000	PUBLICLY OWNED TREATMENT WORKS NO	PUBLICLY OWNED TREATMENT WORKS YES	IEPA FY 78 PRIORITY NO.
W8	Citizens U.C. Arbury Hills	Mokena-Frankfort / Mokena	Frankfort	Hickory Creek	0		X		
W18	Frankfort	Mokena-Frankfort / Mokena	Frankfort	Hickory Creek	0.19			X	455
W25	Mokena	Mokena-Frankfort / Mokena	Mokena	Marley Creek	0			X	455
W27	New Lenox #1	New Lenox / New Lenox	New Lenox	Hickory Creek	1.16			X	1013
W29	Oak Highlands Ingalls Park S.D.	Joliet / Joliet	Joliet	Hickory Creek	0.84			X	728
W33	Prestwick U.C. No. Frankfort Square	Mokena-Frankfort / Mokena	Frankfort	Ditch to Union Ditch	0		X		
W34	Prestwick U.C. So. Sauk Trails	Mokena-Frankfort / Mokena	Frankfort	Hickory Creek	0		X		

TABLE 15-16 B: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS HICKORY CREEK BASIN

MAP CODE	NPDES PERMIT NUMBER	NPDES PERMIT DATE ISSUED	NPDES PERMIT DATE EXPIRES	EFFLUENT REQUIREMENTS (mg/l) INTERIM (A) BOD_5	INTERIM (A) TSS	INTERIM (A) P	INTERIM (A) NH_3N	FINAL (A) EFFECTIVE DATE	FINAL (A) BOD_5	FINAL (A) TSS	FINAL (A) P	FINAL (A) NH_3N	YEAR 2000 (B) BOD_5	YEAR 2000 (B) TSS	YEAR 2000 (B) P	YEAR 2000 (B) NH_3N	COMMENTS
W8	0032778	6/18/75	12/31/79						10	12			10	12		(a)	(a) 1.5 mg/l instream after mixing. (b) IPCB variance assumed. (c) From NIPC 201 Assessment.
W18	0020532	2/21/75	6/30/79						4	5			(b)(c) 10	(b)(c) 12		(a)	
W25	0024201	2/13/75	12/31/78						4	5			(b)(c) 10	(b)(c) 12		(a)	
W27	0020559	10/15/73	10/14/78						10	12			(c) 10	(c) 12		(a)	
W29	0024422	6/30/75	6/30/79						10	12			(c) 10	(c) 12		(a)	
W33	0045403	6/9/75	12/31/79						10	12			10	12		(a)	
W34	0045390	6/9/75	6/30/79						10	12			10	12		(a)	

(A) From NPDES Permits (B) From Facility Plans

TABLE 15-16 C: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS HICKORY CREEK BASIN

MAP CODE	STATUS OF TREATMENT PLANT INTERIM YES	INTERIM PHASE OUT DATE	PERMANENT EXISTING	PROPOSED NEW YES	PROPOSED NEW EST. DATE IN SERVICE	WASTEWATER TREATMENT PLANT (MGD) AVERAGE FLOWS (a) 1975	1980	1985	1990	1995	2000	DESIGN CAPACITIES 1975	1985	OTHER YEAR	2000	COMMENTS
W8			X			0.21	0.21	0.21	0.21	0.21	(b) 0.21	0.24	0.24		(d)	(a) Flows are from Facility Plans on needs analysis documents unless otherwise noted. (b) Private utility year 2000 flows assumed to be the same as 1975 flows due to lack of information. (c) NIPC estimate. (d) Capacity to be determined.
W18			X			0.57	0.72	0.91	1.10	1.24	1.40	0.7	1.4		1.4	
W25			X			0.23	0.52	0.81	1.10	1.39	1.70	0.35	1.7		1.7	
W27			X			0.4	0.63	0.86	1.09	1.32	(c) 1.54	0.75	2.0		2.0	
W29			X			0.20	0.28	0.36	0.44	0.52	(c) 0.61	0.25	(d)		(d)	
W33			X			0.20	0.20	0.20	0.20	0.20	(b) 0.20	0.4	0.4		(d)	
W34			X			0.11	0.11	0.11	0.11	0.11	(b) 0.11	0.15	0.15		(d)	

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TABLE 15-16 D: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS — HICKORY CREEK BASIN

MAP CODE	POPULATION SERVED (1000's)						PROPOSED PROJECTS (C)								CAPITAL COSTS (million $)		
							PLANT				SEWERS						
	1975	1980	1985	1990	1995	2000	Exp.	UpG	New	Out	I/I	SSE	New	Reh	Initial	Future	Total
W8	2.2	2.2	2.2	2.2	2.2	2.2									PRIVATE COSTS		
W18	3.5	5.0	6.9	8.8	10.2	11.6	X	X			X	X			1.7	-	1.7
W25	2.4	3.6	6.5	9.0	11.6	14.1	X	X			X	X			3.2	-	3.2
W27	2.8	4.8	6.7	9.3	11.9	14.4	X				X	X			3.0	-	3.0
W29	2.6	3.4	4.3	5.2	6.1	6.7	X				X	X			1.5	-	1.5
W33	2.2	3.0	3.9	4.7	5.5	6.4									PRIVATE COSTS		
W34	1.2	2.0	2.8	3.6	4.4	5.2									PRIVATE COSTS		

(C) PROPOSED PROJECTS

SEWER(S): I/I - Infiltration/Inflow Study; SSE - Sewer System Evaluation; New - New Sewer Construction; Reh - Rehabilitation of Existing Sewers

PLANT: Exp - Expansion; UpG - Upgrading; New - New plant; Out - Phase out

TABLE 15-16 E: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS — Hickory Creek BASIN

MAP CODE	FACILITY PLANS													COMMENTS
	TYPE		STATUS			REVIEWS / APPROVALS								
						NIPC			IEPA					
	NEEDS ANALYSIS	STEP ONE STUDY	COMPLETED	UNDER WAY	LOCAL ISSUES	NUMBER	ENDORSED	UNDER REVIEW	NUMBER	APPROVED	UNDER REVIEW	UNRESOLVED ISSUES		
W8		(a)												(a) Private Costs
W18		X		X					C17-2136					
W25		X		X					C17-2136					
W27		X		X					C17-0584					
W29		X		X					C17-1583					
W33		(a)												
W34		(a)												

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Figure 15-4: POINT SOURCE DISCHARGES

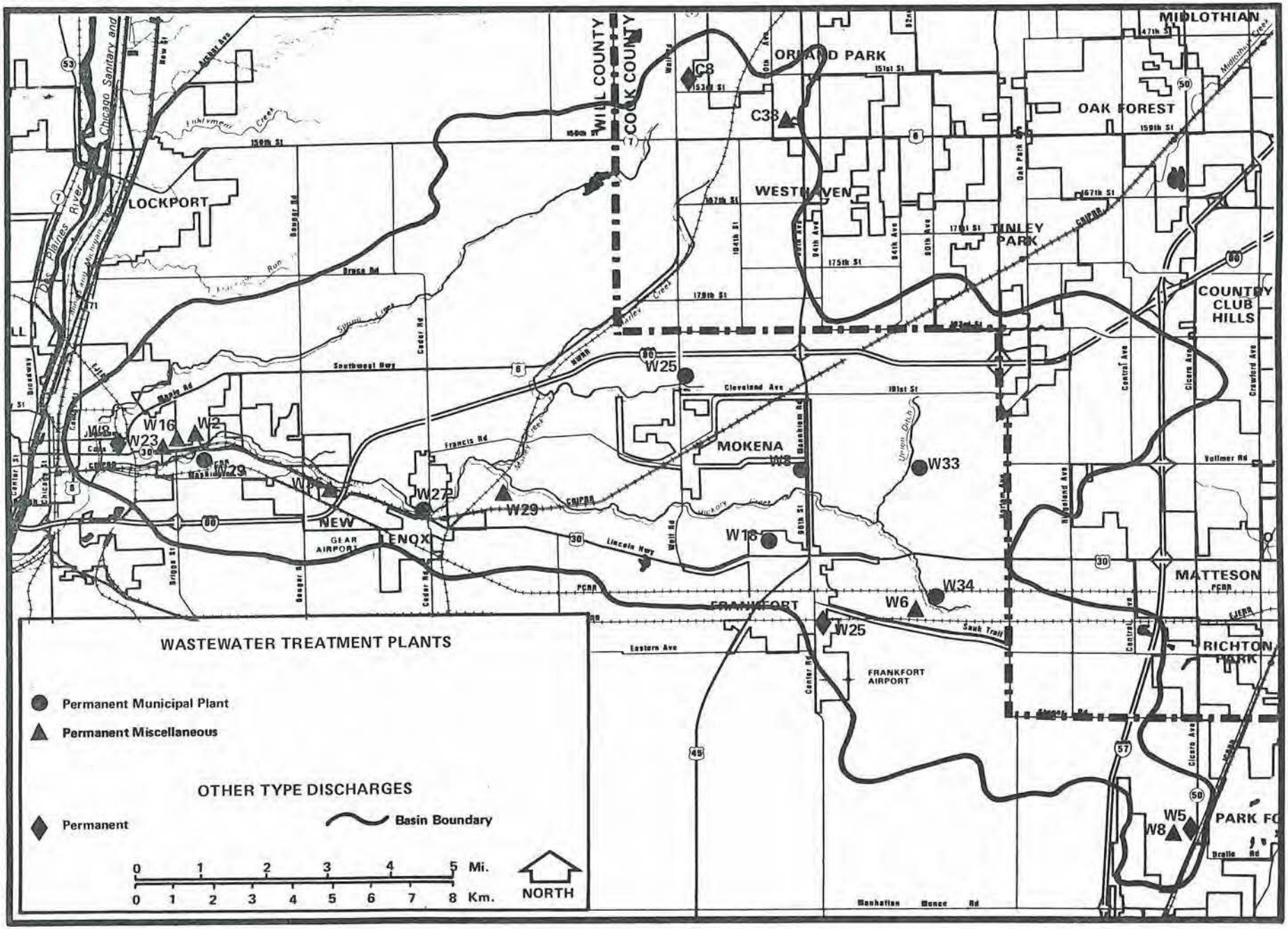


TABLE 15-17 A: MISCELLANEOUS WASTEWATER TREATMENT PLANTS Hickory Creek BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
W2	Bajt's Mobile Home Park	0050644	Joliet/Joliet	Joliet	S		0.010	-	0.010
W6	Camp Manitoqua	0033910	Mokena-Frankfort/Mokena	Frankfort	IM, F, E	0.013		-	
W8	Chemetron Cardox Div.001	0037664	Bloom Bloom Twsp./ Twsp.SD	Monee	IM, F, E		0.003	-	0.003
W16	Hillside Trailer Court	0050199	Joliet/Joliet	Joliet	S, E	0.0015	0.0015	-	0.0015
W23	King's Mobile Home Park	0050113	Joliet/Joliet	Joliet	S, E	0.010	0.010	-	0.010
W29	Lincolnway Comm. H.S.	0047856	New Lenox/ New Lenox	New Lenox	A, L, E	0.050		-	
W36	Providence H.S	0032140	New Lenox/ New Lenox	New Lenox	A, E	0.015		-	
C38	U.S. Army Main. Shop No. 45	0032999	MSDGC/MSDGC	Orland Park		0.001		-	

(1): Activated Sludge (A); Chlorination (E); Tertiary Filter (F); Imhoff Tank (IM); Tertiary Lagoon (L); Septic (S).

TABLE 15-17 B: MISCELLANEOUS WASTEWATER TREATMENT PLANTS Hickory Creek BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD)		NPDES PERMIT DATES		EFFLUENT REQUIREMENTS (mg/l)								COMMENTS
						1976(1)				2000				
		1970	2000	ISSUED	EXPIRES	BOD	TSS	P	NH_3-N	BOD	TSS	P	NH_3-N	
W2	Hickory Ck.	0.84		9-6-77	2-1-81	30	30							
W6	ditch to Hickory Ck.	0		6-9-75	12-31-79	4	5							
W8	Tile to Hickory Ck.	0		6-30-75	3-31-80	4	5							
W16	Hickory Ck	0.84		Draft	4-1-81	30	30							
W23	Hickory Ck.	0.84		9-23-77	6-1-81	30	30							
W29	ditch to Hickory Ck.	0		6-18-75	3-31-80	10	12							
W36	ditch to Hickory Ck.	0		6-9-75	12-31-79	4	5							
C38	ditch to Marley Ck.	0		11-21-77	10-31-82	30	30							

(1) From NPDES Permits

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TABLE 15-18 A: OTHER POINT SOURCE DISCHARGES

Hickory Creek BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
C8	Andrew Corp. Orland Park	004952	MSDGC/MSDGC	Orland Park	0.070	1-2-74	8-1-78
W5	Chemetron Cardox Corp.#002	0037664	Bloom Bloom Twsp./ Twsp. S.D.	Monee	0.005	6-30-75	3-31-80
W8	Chic. Rock Island & Pacific R.R.	0033928	Joliet/Joliet	Joliet	0.0015	1-27-75	1-31-79
W25	Mobil Oil-Frankfort	0001511	Mokena Frankfort/ Mokena	Frankfort	0.006	4-16-74	12-31-78

TABLE 15-18 B: OTHER POINT SOURCE DISCHARGES

Hickory Creek BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	7 DAY-10 YR. LOW FLOW (MGD) 2000	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
C8	Spring Creek	0		Temperature	Cooling Water
W5	tile ditch to Hickory Creek	0		Daily Max.; 15 TSS, 15 oil and grease (O/G)	Intermittent discharge of recirculated waters
W8	storm sewer to Hickory Creek	0		Daily Max; 15 TSS, 15 O/G, 1.0 Cr^{+3}, 0.3 Cr^{+6}	Cooling and storm water
W25	ditch to Hickory Creek	0		15 TSS	Cooling Water

(1) From NPDES Permits

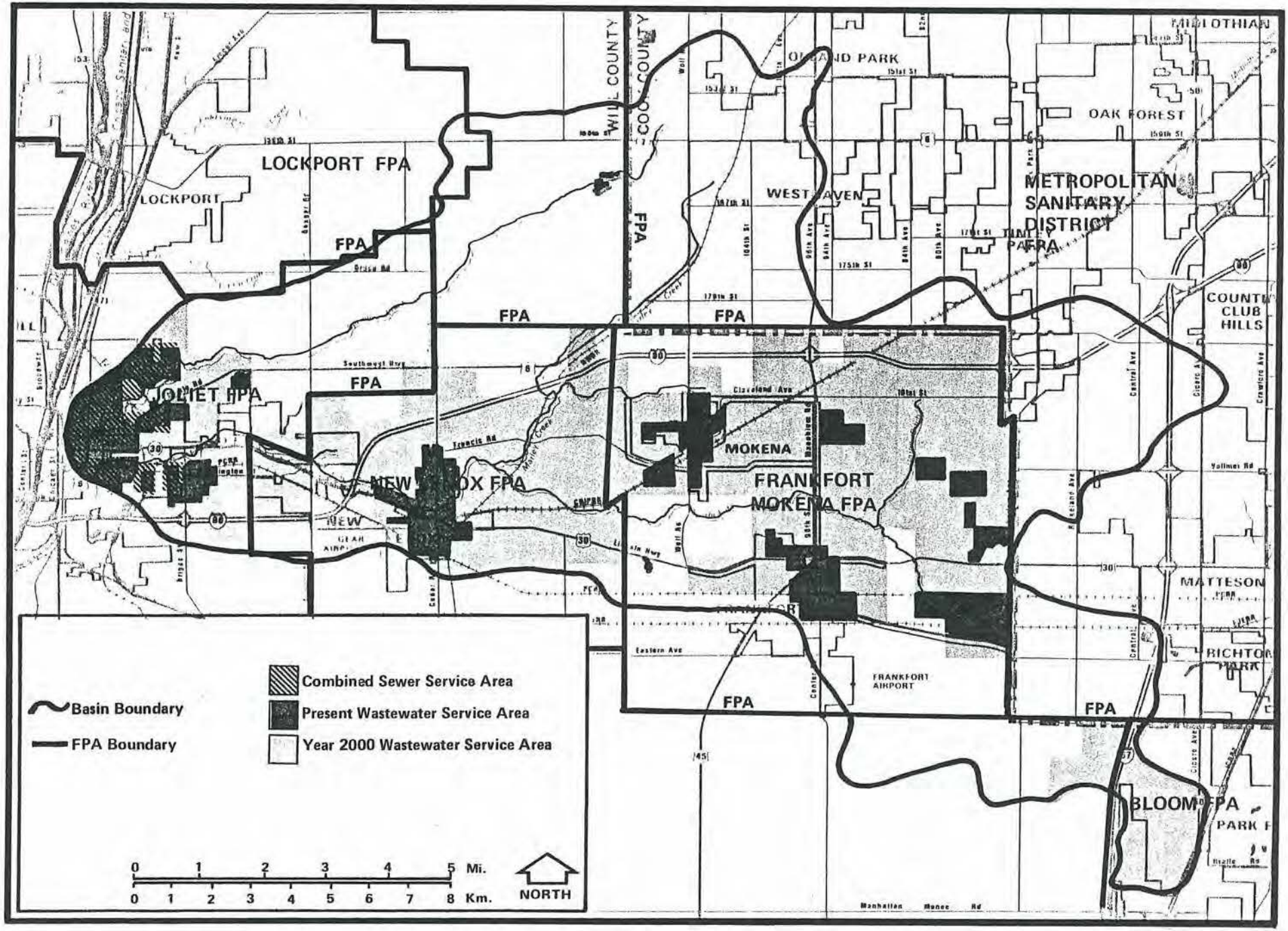
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population was about 11,000, with approximately 80 percent of the population being served by combined sewers and 20 percent, by separate sewers. 713

f. Local Facilities Planning 716

Water quality in the basin is influenced by a number of studies being developed in several facility planning areas, as well as by plans for areas which are outside established FPA boundaries. As can be determined by Figure 15-5, the basin is impacted by portions of the Sanitary District of Bloom Township FPA and that of the MSDGC, both in the extreme eastern portion. More directly within the basin are the Mokena-Frankfort and New Lenox FPAs, both of which extend south beyond the southern limits of the basin. In the extreme western end, a portion of the Joliet FPA is within the Hickory Creek basin boundary. In the north central portion, there is an area which is not in an FPA. Two other areas are within the MSDGC service area. This discussion will be limited to the plans of the Mckena-Frankfort, New Lenox, and Joliet FPAs. 718 720 721 722 723 725 727 729 730

Figure 15-5: WASTEWATER SERVICE AREAS



(1) Mckena-Frankfort FPA: The two publicly owned treatment plants in this FPA are Mokena (No. W-25) and Frankfort (W-18). Facility plans are under preparation for the two communities under an intergovernmental agreement, with Mokena being the lead agency. Also located in the FPA are three private utility plants: Citizens-Arbury Hills (W-8), Prestwick-Frankfort Square (W-33) and Prestwick-Sauk Trail (W-34).

In its 201 plan assessments of this FPA, the Commission forecasted year 2000 wastewater loads for the two municipal plants based on the assumption that the private utility plants would be phased out of service by the year 2000. However, the political and economic feasibility of this occurring will need to be confirmed by the facility plans. For mcdeling purposes, all of these plants were retained as independent entities and were assigned the wastewater flows from present and urbanizing areas naturally tributary to them.

(2) New Lenox FPA: New Lenox operates two wastewater treatment plants. However, only one is located within the Hickory Creek basin (W-27), with the other bein located on Jackson Creek, a tributary to the Des Plaines river. Facility plans are currently underway in New Lenox, but the expected completion date is not known. The Commission staff has fcrecast the year 2000 wasteloads for the FPA and has assumed that the Jackson Creek plant will be phased out by that time, with all wastes being conveyed to the New Lenox W-27 plant noted above. This assumption, if realized, would have a critical impact on water quality in Hickory Creek.

(3) Jcliet FPA: The portion of the Joliet FPA within the Hickory Creek basin has only one municipal plant, the Oak Highlands-Ingalls Park Sanitary District plant (W-29). Joliet is preparing a facility plan for its FPA, but the plan is not expected to be completed until late 1979. For modeling purposes, the sanitary district plant was assumed to remain independent and was assigned wastewater flows from existng and urbanizing areas in unincorporated lands naturally tributary to that facility. Joliet has two other treatment plants, but neither is located in the Hickory Creek basin.

(4) Other FPAs: Wastewaters generated within the Bloom Township Sanitary District and MSDGC FPAs will all be conveyed from the Hickory Creek basin to wastewater treatment plants which discharge into other basins. No growth is forecast for the upper reaches of Spring Creek in Will County, which are not covered by an FPA.

(5) Wastewater Volumes and Loads: Commission estimates of the future wastewater loads of the publicly owned treatment works are contained in Table 15-16. Similar information on volumes and pollutant loads, aggregated by point sources in the various reaches of the basin, are shown in reports relating to water quality modeling, extracts of which appear as Tables 15-14 and 15-15.

15.05 NONPOINT SOURCES: EXISTING CONDITIONS

a. Urban Stormwater Systems

Within the Hickory Creek basin, separate storm sewer systems serve all or portions of three municipalities and numerous unincorporated areas. It is estimated that 1.5 square miles (one percent of the basin area) are served by separate storm sewers. These systems follow natural drainage courses and discharge either directly into Hickory Creek or indirectly via tributary ditches or streams. Combined sewers exist in Joliet and were discussed previously.

Those areas not served by separate storm sewer systems are estimated to comprise 107 square miles, or 98 percent of the basin area. Stormwater falling upon these areas enters Hickory Creek by overland flow via ditches or other small watercourses.

b. Construction Activities

As discussed in Chapter Six, construction operations with resultant stormwater runoff and soil erosion can contribute sediments, chemicals, and other pollutants. However, none of these activities is known to be causing water pollution problems.

The potential for damage to water quality as a result of construction activities will not diminish in future years in the basin. Forecasted changes in population and land use will generate substantial residential and commercial construction, accompanied by surface disturbances for those developments, as well as for related roads and utilities.

c. Air Pollution

As also discussed in Chapter Six, the impacts of air pollution fallout on water quality vary in response to several factors. Critical among these is the area-volume ratio of the water body. In general, fallout is a greater concern with respect to large water bodies, like Lake Michigan. The relative importance of air pollution is not likely to be great until more apparent sources of water pollution have been eliminated.

d. Agricultural Runoff

Agriculture is extensively conducted in the watershed and has some impact on water quality. General problems of agriculturally related pollution were discussed in detail in Chapter Six.

Croplands in the basin currently amount to about 14,500 acres. The number is expected to decrease to about 11,800 acres by the year 2000 due to increased urbanization. Because of anticipated shifts to greater row crop production and concentrated livestock feeding, pastureland acreages are expected to be less significant than croplands. Greater use of conservation tillage, contouring, and terracing are among the proposals which were considered in controlling water quality problems related to agricultural runoff in the basin.

e. Septic Systems

Septic systems are used widely in the basin. Presently there are an estimated 4,887 residential septic systems serving about 17,611 people. In addition, the basin has 46 non-residential septic systems serving a population equivalent of 261 persons (see Table 15-19).

Approximately 93 percent of the septic systems are located in Will County and the remaining 7 percent in Cook County. Serving 12,350 persons are about 3,690 systems which are considered to be located in areas having limitations, where there are unsatisfactory soil conditions, small lots, high water tables, or a combination of these factors. The largest septic problem area in the basin is an unincorporated area (Ridgewood) which contains 878 residential systems. Septic areas having limitations are listed in Table 15-20 and shown on Figure 15-6.

f. Surface Waste Disposal Sites

There are no active surface waste disposal sites in the basin.

g. Hydrologic Modifications

Streams in the basin have been periodically ditched, straightened, or channelized. Hickory Creek, Marley Creek, and Spring Creek all have undergone some modifications. The Union Ditch tributary is primarily an artificially constructed drainage channel. This type of channel modification is expected to continue in the basin, although where it will occur and what impact it will have on water quality is unknown.

15.06 DISPOSAL OF RESIDUALS

The areawide aspects of residuals waste management were discussed in Chapter Seven, which included a summary of current practices in the region, residual waste characteristics, and alternative methods for utilization and disposal.

At the present time, there are no known problems associated with residuals management in the basin. However, as sludge volumes increase in the future as a result of increased wasteloads and higher levels of wastewater treatment, individual treatment plants may encounter difficulties and higher costs in processing, removing, disposing of, or utilizing sludge material. Increased urbanization in the basin also will affect the availability of land for sludge disposal or for application as fertilizer.

The current predominant mode of disposing of wastewater treatment plant sludge in the basin is land application, with some portion of the sludge being made available to local residents for landscaping. This disposal method has proved workable; sludge volumes are relatively low, and adequate agricultural lands are proximately located to the treatment plants. There are no industrial treatment plants in the basin, so the disposal of hazardous and toxic wastes does not present a problem. Additional details on sludge volumes and disposal practices appears in the Commission's 208 Staff Paper No. 30 "Regional Sludge Management Report". Since there are no sanitary landfills located in the basin, there is no threat to ground or surface water quality posed by the disposal of solid wastes and other residual

TABLE 15-19 : SUMMARY OF SEPTIC TANK INSTALLATIONS

Hickory Creek BASIN

COUNTY	NUMBER OF SEPTIC SYSTEMS			POPULATION SERVED		
	RESIDENTIAL	NON RESIDENTIAL	TOTAL	RESIDENTIAL	NON RESIDENTIAL (PE)	TOTAL
Cook	341	20	361	1,400	92	1,492
Will	4,546	26	4,572	15,950	169	16,119
Total	4,887	46	4,933	17,350	261	17,611

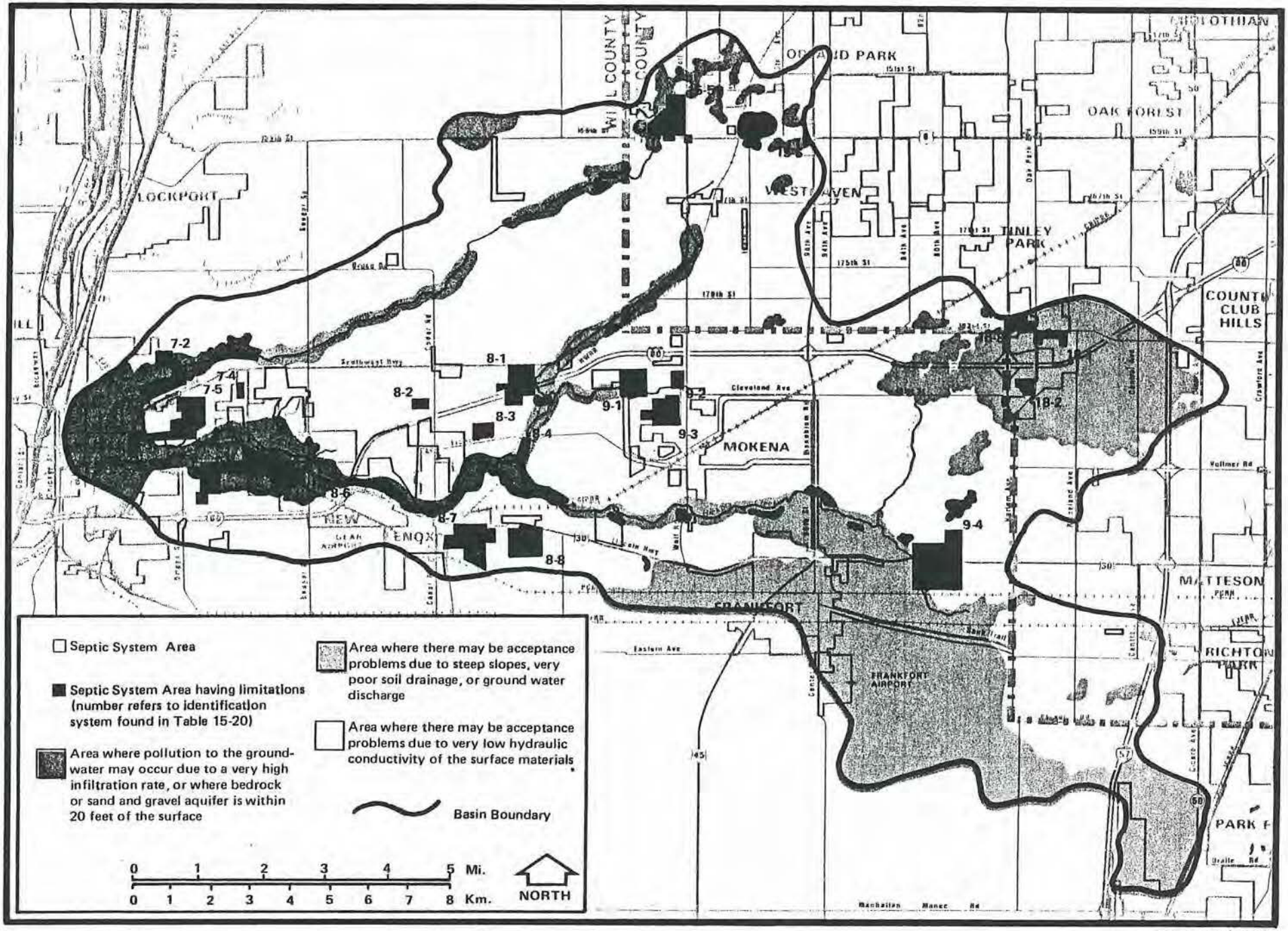
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TABLE 15-20: SEPTIC SYSTEM AREAS HAVING LIMITATIONS

HICKORY CREEK BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Cook	Orland		80	342	15-5
Cook	Orland		9	30	15-6
Cook	Bremen		69	276	16-7*
Cook	Bremen		96	386	16-8
Cook	Bremen		45	185	16-9
Cook	Rich		16	64	18-1
Cook	Rich		1	20	18-2
Will	Joliet		100	350	7-2
Will	Joliet		139	487	7-3
Will	Joliet		23	81	7-4
Will	Joliet	Ridgewood	878	3,073	7-5
Will	Joliet	Joliet	17	60	7-6
Will	Joliet	partially in Joliet	56	196	7-7
Will	Joliet	Joliet	512	1,792	7-8
Will	New Lenox		92	322	8-1
Will	New Lenox		90	315	8-2
Will	New Lenox		40	140	8-3
Will	New Lenox		30	105	8-4
Will	New Lenox	Cherry Hill	380	1,330	8-5
Will	New Lenox		85	298	8-6
Will	New Lenox		210	735	8-7
Will	New Lenox	Windemere Subd.	200	700	8-8
Will	Frankfort		71	249	9-1
Will	Frankfort		39	137	9-2
Will	Frankfort		128	448	9-3
Will	Frankfort	Lincoln Estates	142	497	9-4

Figure 15-6: LOCATION OF SEPTIC AREAS



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materials. Due to the rural nature of much of the basin, however, there is the possibility that sanitary landfills may be proposed in the future. Existing regulations on landfill sites and permits are felt to be sufficient to afford protection in that eventuality.

Despite the fact that there are substantial septic systems in the basin, septage disposal has not been identified as a particular problem. Again, the availability of adequate agricultural lands allows for the application of septage with no apparent difficulties.

15.07 EXISTING MANAGEMENT PROGRAMS

The major features of the existing water quality management system in northeastern Illinois have already been discussed in the areawide chapters of this report. In this section, management programs within the basin are presented, but only to the extent necessary to clarify the previous areawide discussions.

Table 15-21 is a list of the public agencies in the basin which are currently involved in water quality related activities. Variations in programs responsibilities between these agencies are indicated by a numerical code.

15.08 MODELING PROCESSES: FUTURE CONDITIONS

As noted previously, the first major use of the computer model in the process of simulation was to develop data on existing water quality. The statistics that were produced for the Hickory Creek basin showed that water quality was adequate.

State standards, which generally call for at least 5 mg/l of dissolved oxygen, are rarely violated. The amount of BOD present is at acceptable levels. The basin is not in as good a condition with respect to ammonia, with more than 117 tons entering Hickory Creek every year.

The sources of these pollutants are overflows from combined sewers (which account for 10 percent of the BOD and 4 percent of the ammonia in the basin), discharges from wastewater treatment plants (6 percent of the BOD and 26 percent of the ammonia), and stormwater runoff (83 percent of the BOD and 69 percent of the ammonia).

These three sources--combined sewers, treatment plants, and stormwater runoff--were the focus of efforts to develop a first test plan for the basin. The results of those efforts that grew out of staff work and public discussion are described below.

TABLE 15-21: EXISTING LOCAL WATER QUALITY MANAGEMENT AGENCIES AND PROGRAMS HICKORY CREEK BASIN*

MUNICIPALITIES			
Country Club Hills (Little Calumet, Sanitary & Ship Canal)	1,5 +	New Lenox (Des Plaines)	1,2,3,4 +
Frankfort (Des Plaines)	1,2,4	Orland Park (Sanitary & Ship, Des Plaines)	1,5
Joliet (Des Plaines, DuPage)	1,2,4	Park Forest South (Little Calumet, Kankakee)	1
Matteson (Little Calumet)	1,5	Richton Park (Little Calumet)	1,5
Mokena	1,2	Tinley Park (Sanitary & Ship Canal)	1,3,5
COUNTIES			
Cook	4	Will	
SANITARY DISTRICTS			
Kimberly Heights	1	Metropolitan Sanitary District of Greater Chicago	2
		Oak Highlands-Ingalls Park	1,2
SOIL AND WATER CONSERVATION DISTRICTS			
Will-South Cook			

* Additional basins shown in parentheses for those municipalities which cross basin boundaries.
+ Numbers indicate existing water quality activities as follows:

1. Wastewater collection agency
2. Wastewater treatment agency
3. Has enacted erosion and sedimentation control regulations
4. Has enacted stormwater detention regulations
5. MSDGC stormwater detention regulations apply

a. First Test Plan Assumptions

During the first round of meetings in August 1977 on the development of a Hickory Creek basin plan, Commission staff and consultants identified existing water quality conditions and the major sources of water pollution. Basin residents at those meetings suggested water pollution control strategies for the year 2000. These suggestions were reviewed by the Local Steering Committees in the basin. The Commission's 208 Steering Committee, in turn, reviewed the recommendations of the Local Steering Committees and formulated a first test plan to be evaluated.

In addition to local recommendations, the first test plan was shaped by assumptions made to reflect the following: forecasted population increases; land cover changes; improvements in wastewater and stormwater treatment; flood control projects; and changes in agricultural practices. These assumptions are described below.

(1) Population and Land Use The Commission's 1976 forecasts for the year 2000 were used to determine population, land use, and wastewater loads for the basin. For the entire basin, a 115 percent increase in population was forecast by the year 2000, as discussed in Section 15.01.

Present land use in the basin was determined by satellite photography and field surveys. This information was divided into these four categories: (1) lowlands - marshes, swamps, and forests lying close to rivers and streams; (2) grasslands - open to the infiltration of rainwater and snowmelt, but not tilled regularly, including pastures, parks, golf courses, and upland forests; (3) croplands - regularly tilled for agricultural purposes (there is some exchange between cropland and grasslands due to crop rotation); and (4) impervious surfaces - covered with buildings, roads, and parking lots. For the first test plan, estimates of land cover changes were made using population forecasts and their attendant housing and employment assumptions. Land required for new urbanization in the basin was first taken from the grassland and cropland categories. When this category of land was largely depleted, land from the lowland category was taken for urban purposes. Table 15-22 shows the assumptions in land cover that resulted from this process (combined sewer areas are not included).

(2) Local Facilities Plans: In general, it was assumed that all planned improvements in municipal wastewater treatment plants (201 facilities plans) would be in operation and that other treatment plants would meet NPDES requirements.

(3) Phosphate Reductions: The City of Chicago and several suburbs have enacted ordinances limiting the phosphate content of home laundry detergents. Because a substantial

TABLE 15-22: CHANGES IN LAND COVER, 1976-2000 *

Category	1976 Land Cover Estimates	Year 2000 Land Cover Forecast	% Change
Lowlands	19.2	19.2	0
Grasslands	50.1	50.2	0
Croplands	22.8	18.5	-19.4%
Impervious	9.7	13.9	+43.4%
TOTAL	101.8	101.8	

* Land cover areas exclusive of combined sewer areas.

portion of the market in the metropolitan area has enacted such limitations, most distributors have withdrawn high phosphate detergents from the area. Over three-fourths of the detergents sold for domestic purposes in the metropolitan area are now phosphate-free. In considering changes in wastewater treatment practices for the year 2000, it was assumed that regulations limiting the amount of phosphate in domestic laundry detergents would continue. Based upon studies of the effect of detergent phosphate reductions on wastewater treatment plant operations, it was assumed that phosphate concentrations in plant effluents for the year 2000 will be two-thirds that of existing levels.

(4) Combined Sewer Overflows: It was assumed that combined sewer overflows in the basin would be eliminated by the year 2000, most probably through the separation of storm and sanitary flows.

(5) Urban Stormwater Runoff: The conditions set for the year 2000 in simulating future water quality assumed that 25 percent of the pollutants causing biological oxygen demand in urban stormwater runoff will be removed through vacuum sweeping of streets and parking lots in existing, separately sewered urban areas. In newly urbanizing areas, stormwater detention, vacuum sweeping, catch basin cleaning, planned unit developments, soil erosion controls, and other techniques would reduce BOD loads by 50 percent over current loading rates. (In computing costs, street vacuuming alone was used to obtain an order or magnitude of expenditures involved.)

(6) Air Deposition of Pollutants: In the first test plan for the year 2000, it was not possible to make an adjustment for a change in the amount of pollutants that fall out or are washed out of the air. Pollution wash-off from rural grasslands, for example, is assumed to derive from decaying organic matter, animal grazing and feeding, and air deposition. However, at this stage in planning technology, we do not know enough about the nutrient cycle to enable us to isolate the individual water quality impacts of airborne sources.

(7) Septic Systems: The impact of septic systems on water quality was also considered in the simulation of conditions in the year 2000. In the first test plan it was assumed that the effect of septic systems on water quality would be eliminated--either by the phase-out of these systems through sewage collection and treatment facilities, or by improvements and control of the remaining septic systems themselves.

(8) Soil Conservation: The impact of increased agricultural land conservation practices is included in the calculation of future water quality in the Hickory Creek basin. The U.S. Soil Conservation Service aided the Commission staff in estimating how much land would be brought under conservation programs. The practices which would be used were selected on the basis of the greatest impact on water quality. Those were contour plowing, terracing, conservation tillage, a combination of these techniques, and conversion of croplands to grasslands. In the first test plan, 10.86 square miles of land were forecast to have these conservation measures practiced by the year 2000, of which 1.28 square miles would be converted to grassland.

(9) Animal Populations: The change in animal populations associated with food production was calculated for each township in the region. However, these changes could not be reflected in the first test plan because not enough is known about the impact of animal pasturing and feedlot operations to reflect their influence separately in the water quality model.

(10) Fertilizer Applications: Studies of fertilizer applications revealed a high degree of efficiency in the present practices and use of fertilizer in agricultural areas. No change in rates of application were forecast in simulating year 2000 water quality conditions.

(11) Stream flow Changes: No construction of reservoirs or channel improvements were assumed to take place on Hickory Creek between now and the year 2000.

(12) Sading of Streams: No changes were made in the factors used tc represent the shading of waterways by trees and bushes.

b. First Test Plan Simulated Results

If a water quality program that contained all the features of the first test plan were implemented, overall water quality of the basin would remain essentially the same--relatively clean but with some pollution problems. Water quality in Spring Creek would remain excellent.

The simulation showed the interaction of two competing trends. Efforts to clean the water (through improved wastewater treatment, the elimination of combined sewer overflows, street sweeping and vacuuming, cropland conservation practices, and the elimination of problem septic systems would have beneficial results that would compete against the expected increase in pollution caused by increased urbanization.

The impact of future urbanization in the watershed is highlighted by the fact that simulated year 2000 conditions in Reach 121 show increases in ton-per-year inputs of BOD, nitrate, and phosphorus, despite the counteracting effects of pollutiCn control measures. Table 15-23 provides a comparison of sources and volumes of pollutants for existing conditions and under year 2000 first test plan conditions for Reach 121.

Table 15-24 compares existing conditions with year 2000 first test plan conditions in terms of maximum, minimum, and mean water quality parameter concentrations expected in each reach. The expected frequencies and durations of standards violations are also listed, when appropriate.

The expected impact of the first test plan with respect to dissolved oxygen levels in the watershed is given in Table 15-25. Standard violations would still occur occasicnally in most reaches (except Reach 113), although their frequency and duration would be reduced.

Cne objective in developing alternate plan strategies has been 95 percent attainment of the Commission's proposed 5 mg/l DO standard for General Use water bodies. Table 15-26 illustrates the effect that the first test plan would have on standards compliance in the varicus reaches.

c. Second Test Plan Assumptions and Results

The second test plan was developed through much the same process as the first. Simulation results for the first test plan were publicized and discussed at a series of public meetings in the basin. Local recommendations were developed, reviewed and screened by the Cook County and Will County Local Steering Committees and by the Commission's 208 Steering Committee.

TABLE 15-23: COMPARISON OF SOURCES AND VOLUMES OF POLLUTANTS

REACH 121

Pollutant Indicator and Source	Existing Conditions				First Test Plan							
	Surface		Ground		Surface		Ground		Surface		Ground	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
BOD (tons/yr.) Boundary Cond.												
Treatment Plants	30.5	6			193	30						
Comb. Sewer Over.	53.7	10										
Lowland	16.3	3	5.05	1	17.2	3	5.34	1				
Cropland	18.2	4	13.9	3	11.3	2	11.9	2				
Grassland	142	27	35.2	7	145	23	35.9	6				
Impervious	202	39			221	35						
TOTAL	462	90	54.1	10	587	92	53.1	8				
Ammonia (tons/yr.) Boundary Cond.												
Treatment Plants	31.0	27			28.7	26						
Comb. Sewet Over.	4.59	3										
Lowland	3.36	3	.25	0	3.45	3	.26	0				
Cropland	5.48	5	.69	1	3.38	3	.59	1				
Grassland	42.8	37	1.77	2	43.6	39	1.80	2				
Impervious	26.9	23			29.7	27						
TOTAL	114	98	2.71	2	109	98	2.65	2				

TABLE 15-23: COMPARISON OF SOURCES AND VOLUMES OF POLLUTANTS (Continued)

REACH 121

Pollutant Indicator and Source	Existing Conditions				First Test Plan							
	Surface		Ground		Surface		Ground		Surface		Ground	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Nitrate (tons/yr.) Boundary Cond.												
Treatment Plants	8.03	2			103	24						
Comb. Sewer Over.	2.74	1										
Lowland	1.25	0	16.2	5	1.28	0	17.1	4				
Cropland	20.5	6	54.2	16	12.6	3	46.7	11				
Grassland	62.4	18	176	51	63.9	15	181	42				
Impervious	6.72	2			7.51	2						
TOTAL	102	29	246	71	188	43	244	57				
Phosphorous (tons/yr.) Boundary Cond.												
Treatment Plants	4.02	22			8.45	40						
Comb. Sewer Over.	1.36	7										
Lowland	.34	2	.61	3	.35	2	.65	3				
Cropland	1.81	10	.83	5	1.12	5	.71	3				
Grassland	3.68	20	2.10	12	3.74	18	2.14	10				
Impervious	3.36	19			3.80	18						
TOTAL	14.6	80	3.54	20	17.5	83	3.51	17				

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Six suggestions, or "specifications," emerged from the screening process and are listed below. The results which are also shown, in most cases, are described as percentage changes from the first test plan. They are shown this way because the second test plan is essentially a series of six modifications to the first test plan. The percentage figures measure the changes in the amount of pollutants entering the streams of the Hickory Creek watershed.

TABLE 15-24: COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS - FIRST TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 33			REACH 73		
		Existing	1st		Existing	1st	
BOD (mg/l) Maximum	None	45.5	46.4		51.6	47.5	
Minimum		1.0	1.35		.94	1.25	
Mean		6.92	8.89		7.48	8.88	
Ammonia (mg/l) Maximum		4.97	3.29		3.52	2.85	
Minimum		.08	.06		.02	.05	
Mean		1.02	.43		.45	.30	
Frequency of Violation	1.5[1]	182	71		50	25	
Average Duration of Violations (hours)	1.5[1]	25	6		16	9	
Nitrate (mg/l) Maximum	None	6.12	9.78		6.14	8.96	
Minimum		0.0	.67		0.0	.26	
Mean		3.07	4.69		3.05	3.92	
Frequency of Violation	10.0	0	0		0	0	
Average Duration of Violations (hours)	10.0	0	0		0	0	
Phosphate (mg/l) Maximum		.96	1.06		.79	.83	
Minimum		0.0	0.0		0.0	0.0	
Mean		.22	.24		.18	.19	
Frequency of Violation	.05	121	107		190	198	
	.20	295	306		166	136	
Average Duration of Violations (hours)	.05	211	241		121	122	
	.20	41	51		46	78	

(1) Illinois Pollution Control Board Standard

TABLE 15-24: COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS - FIRST TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 113			REACH 121		
		Existing	1st		Existing	1st	
BOD (mg/l) Maximum	None	45.7	40.8		48.5	44.8	
Minimum		.99	.99		.94	1.46	
Mean		5.80	5.2		8.09	9.52	
Ammonia (mg/l) Maximum		4.09	3.69		3.20	2.79	
Minimum		.04	.04		.02	.07	
Mean		.29	.27		.44	.43	
Frequency of Violation	1.5[1]	91	67		75	20	
Average Duration of Violations (hours)	1.5[1]	7	6		6	8	
Nitrate (mg/l) Maximum	None	5.62	4.42		6.74	8.68	
Minimum		.17	.27		0.0	.22	
Mean		3.01	2.89		2.94	3.89	
Frequency of Violation	10.0	0	0		0	0	
Average Duration of Violations (hours)	10.0	0	0		0	0	
Phosphate (mg/l) Maximum		.83	.85		1.15	.70	
Minimum		0.0	0.0		0.0	0.0	
Mean		.13	.12		.18	.20	
Frequency of Violation	.05	153	162		195	215	
	.20	153	106		183	122	
Average Duration of Violations (hours)	.05	131	144		113	111	
	.20	27	29		43	101	

(1) Illinois Pollution Control Board Standard

(1) Test the effect of a 20 percent reduction in waste loads (due to lower growth rates in the basin). At each reporting reach, the contributions of treatment plants reported in the first test plan were reduced 20 percent, and the loads were recalculated.

(2) Test the effect of using development patterns that maximize open (pervious) land and minimize impervious surfaces. This specification was represented by the assumption that all population growth would be accommodated by performance zoning, rather than the conventional zoning called for in the first test plan. A density of 1.34 dwelling units per acre was assumed for both types of zoning. It was further assumed that conventional zoning would provide no open space, while performance zoning would provide for 50 percent open space.

Under performance zoning, new growth would increase the impervious surfaces in the basin 15 percent less than would conventional zoning. Correspondingly, more grassland would be preserved under performance zoning.

(3) Test the effect of retaining all present septic systems, rather than assuming all septics will be phased out as a result of sewer service.

(4) Test the effect of a less optimistic implementation of agricultural land management practices--say 50 percent of the acreage assumed to be under best management practices in the first test plan. Cropland is represented either as standard or as under best management practices. The area in the standard crop segment was increased by 50 percent and the best management practices segment reduced 50 percent. Proportional loads were calculated.

(5) Test the effects of constructing the three proposed IDWR flood control reservoirs and associated stream channel changes. These structures are to be detention basins, and only one will contain a permanent pool. Consequently, they would have a very small influence on in-stream water quality. The impact that would occur would be positive on downstream water quality because some pollutants would settle out of the water as the detention basins were filled and emptied. Adverse impacts on local fish and wildlife habitat may be expected during construction and operation of the reservoirs.

(6) Examine ammonia from a toxicity standpoint.

If the second test plan were implemented, water quality conditions in the Hickory Creek basin would improve over

TABLE 15-25: CHANGES IN DISSOLVED OXYGEN LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

(All data in mg/l)	REACH 33			REACH 73		
	Existing	1st		Existing	1st	
Maximum	12.6	12.9		13.5	13.3	
Minimum	2.9	3.38		2.7	3.20	
Mean	8.18	8.46		8.34	8.50	
* Violations	27	20		38	31	
Average Duration	15	12		13	10	
** Overall Assessment	Good	Good		Good	Good	

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time D O levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

(All data in mg/l)	REACH 113			REACH 121		
	Existing	1st		Existing	1st	
Maximum	14.1	14.3		14.1	14.1	
Minimum	5.0	5.15		3.8	4.05	
Mean	10.1	10.1		9.54	9.45	
* Violations	0	0		8	5	
Average Duration	0	0		8	7	
** Overall Assessment	Excellent	Excellent		Good	Good	

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time D O levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

TABLE 15-26: WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

REACH 33

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan	
Temperature °C	32.2	0	0		0	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	27	20		15	12		2	1	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	182	71		25	6		17	2	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	121	107		211	241		97	98	

REACH 73

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan	
Temperature °C	32.2	0	0		0	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	38	31		13	10		2	1	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	50	25		16	9		3	1	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	190	198		121	122		87	92	

TABLE 15-26: WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS (Continued)

REACH 113

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan	
Temperature °C	32.2	15	15		4	4		0	0	
Dissolved Oxygen as O, mg/l	5.0	0	0		0	0		0	0	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	91	67		7	6		2	2	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	153	162		131	144		76	89	

REACH 121

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan	
Temperature °C	32.2	0	0		0	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	8	5		8	7		0	0	
BOD_{20} Carbonaceous as O, mg/l	10	110	62		68	119		28	28	
Ammonia as N, mg/l	1.5	75	20		6	8		2	1	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	195	215		113	111		84	91	

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those under the first test plan. Assuming that only changes greater than 10 percent are significant, it can be seen from Table 15-27 that the second test plan would significantly reduce BOD in two of the four reaches. In addition, it would significantly reduce phosphate in three reaches.

TABLE 15-27: PERCENTAGE CHANGES IN POLLUTANT LOADS, SECOND TEST PLAN

Reach	Flow	BOD	NH_3	NO_3	PO_4
33	-5	-12	-7	-7	-11
73	-3	- 6	-5	-4	-12
113	-1	- 1	-1	+1	0
121	-5	-11	-9	-7	-14

15.09 PROBLEM ASSESSMENT

Overall, water quality in the Hickory Creek basin is quite good. There are a few problems, however. Dissolved oxygen violations, which are associated with surface wash-off of pollutants during storm events, occur occasionally throughout the basin. There are also some violations of the ammonia standard. Nitrate and phosphate levels contributed by groundwater discharges and point sources in particular, are quite low relative to most streams in northeastern Illinois. However, concentrations of these nutrients are more than adequate to support algae growths. Violations of the summer water temperature standard have been observed only in Spring Creek (where the stabilizing influence of point sources is absent).

In the future, the principal challenge will be to maintain the relatively high level of water quality in the basin in the face of increased future population growth and urbanization. Efforts should be directed toward improvement of conditions to the extent feasible.

Point sources have been found to be less problematical in Hickory Creek than in other basins. Point source impacts of concern have been identified as ammonia contributions during low-flow conditions, and phosphorus, which serves as an algae nutrient. Point source loads presently do not have a significant effect on dissolved oxygen levels.

There is a need to complete facilities planning studies for the Frankfort-Mokena, New Lenox, and Joliet FPAs. The conclusions and recommended actions set forth in these plans, when implemented, will have the principal point source impact. In the interim, overall water quality management planning for the basin remains somewhat uncertain.

Other miscellaneous point source discharges in the basin are not expected to present a problem (given their

small capacities and minimal water quality impacts), provided NPDES requirements are met.

Combined sewer overflows from the City of Joliet's system continue to have an adverse water quality impact on the most downstream portions of Hickory Creek. The overflows also may contribute to degraded conditions in the lower Des Plaines River. Plans for control of the overflow problem will have to be deferred until the Joliet facilities plan has been completed.

It should be noted that in order to qualify for construction grants related to wastewater system improvements, regulations issued after the enactment of PL 92-500 require applicants to follow certain procedures. Among these, 40 CFR 35.927 requires evidence that the treatment works for which grant assistance is sought will not be subject to excessive infiltration or inflow. An infiltration/inflow (I/I) analysis must be performed to demonstrate the existence or nonexistence of excessive wastewater flows in each sewer system. If excessive flows are found, the next step is a sewer system evaluation survey (SSES). If corrective measures are justified to remedy in whole or in part the identified problems, a sewer rehabilitation project may be authorized as part of the facilities planning project.

Within the MDSGC area, the initial I/I study was performed by the District, and excessive flows were found to exist. However, because of the large number of individual SSES studies that had to be made in each municipal and sanitary district sewer system, it was determined that the work would be done by local governments. Grants for 75 percent of allowable costs covering work in the separate sewer areas are available upon the submission and approval of applications.

To date, only 79 applications for SSES grants have been received from the 130 municipal governments and sanitary districts located within the MSDGC's jurisdiction. In the Hickory Creek watershed, Country Club Hills and Orland Park had not applied as of December 1978.

Nonpoint sources have been implicated as significant contributors of BOD, ammonia, and, to a lesser extent, phosphorus. If conditions are to be improved in the watershed, greater controls on urban and agriculture-derived runoff will be necessary. There also are a number of areas served by individual septic systems which have existing or potential limitations. While their water quality impact is difficult to evaluate, gross visual pollutants have been observed. The problems need to be addressed by local agencies as to their health and nuisance aspects, as well as their water quality implications.

The largest septic area with limitations is the unincorporated area of Ridgewood located immediately east and north of Joliet. This area contains 878 residential septics serving 3,073 people. Limitations here are due to small lots, poor soil, and old systems. Some homes have

neither septic tanks nor absorption fields and dispose of wastewater via illegal tile hookups to nearby creeks or ravines. Warnings of serious health hazards have been issued by the Illinois Environmental Protection Agency.

Local homeowners have been actively seeking a solution to this serious situation. Efforts in the past to annex to Joliet have yielded no results. Insufficient plant capacity to process such a large projected wastewater load have been cited by Joliet officials as the primary deterrent. Preliminary studies of alternative solutions, however (such as the formation of a special service district), indicate that the most economical solution lies in the provision of sewer and water service by the City of Joliet. It is expected that solutions to the septic problems will be developed in the facility plans that are currently under preparation.

15.10 BASIN RECOMMENDATIONS

Recommended actions for improving and protecting water quality in the Hickory Creek basin are derived from the information set forth in Chapters Five through Eight and from the preceding sections of this chapter. Principal elements of the recommended basin plan are set forth in

a. Point Sources

(1) Publicly Owned Wastewater Systems

(a) The villages of Frankfort, Mokena, and New Lenox, the City of Joliet, the MSDGC and the Oak Highlands-Ingalls Park Sanitary District should implement their respective portions of their 201 plans as they may have been or may be approved by the Illinois and/or U.S. Environmental Protection Agencies. A Summary of the current status of these plans appears in Section 15.04f and suggested changes thereto or features to be included are noted below. In the absence of completed and/or approved facility plans, certain assumptions had to be made as to the expected locations and/or sizes of treatment plants, their estimated costs and designated management agencies. This information must not be construed as binding in the Areawide Plan until the 201 facility plans have been finalized.

(b) Facility plans for the Joliet, New Lenox, and Mckena-Frankfort facility planning areas should be completed by the respective lead agencies by December 31, 1979.

(c) By June 30, 1979, Country Club Hills and Orland Park should seek federal grants and initiate and

complete by July 1, 1981, sewer system evaluation studies as required by 40 CFR 35.927.

(d) All municipalities and the counties of Cook and Will should seek to achieve continued reductions in water use to conserve water resources and to reduce wastewater flows at all publicly owned treatment plants. This should be accomplished through the modification of building codes to require water conserving plumbing fixtures and the metering of all new developments. Pricing policies and public education to reduce consumption are also recommended.

(e) By July 1, 1983, all treatment plants whose 7-day, 10-year low-flow dilution ratio is 10 to 1 or less should provide or continue to provide not less than 80 percent oxygen saturation in their effluents. Monitoring of wastewater quality after aeration should be conducted. However, during the continuing planning program, studies should be undertaken to determine where this requirement may be waived without detriment to instream water quality.

(f) Municipal sewer service required to serve future growth within service areas identified for the year 2000 should be provided only by treatment authorities listed in 2. above, except where this is impractical or not cost-effective.

(g) Projected 5-year service areas should be identified in the NPDES permit issued by IEPA. No NPDES permit should be issued for municipal type wastewater service within the 5-year service area other than to a treatment authority, except on a finding by IEPA that the proposed facility is the most cost-effective means of providing service, is an interim facility pending extension of service by the treatment auhority, or is intended to serve an isolated location.

(h) The treatment plant operators should assure the very high standards of performance for wastewater treatment plants which 201 plans assume. The IEPA should monitor treatment plant operation and performance and its effect on in-stream water quality. IEPA should establish a technical assistance program to aid operators and laboratory technicians of public and private treatment plants in dealing with technical problems and assuring a consistent high level of performance in treatment operations.

(i) Recommendations for the control of combined sewer overflows will be forthcoming in the 201 facilities plan to be completed by the City of Joliet by December 31, 1979.

(2) Private Utilities

(a) The Prestwick and Citizens Utility Companies should continue in operation, but their service areas should be extended only in cases where service cannot be provided by an existing municipal type wastewater treatment authority.

(b) NPDES permits issued by IEPA to private utility companies should identify projected five year service areas. No other NPDES permits should be issued for municipal type wastewater service within these five year service areas to other treatment authorities except upon a finding by the IEPA that the proposed facility is the most cost effective means of providing service; is an interim facility pending extension of service by another established treatment authority; or is intended to serve an isolated location.

(3) Miscellaneous Wastewater Treatment Plants

(a) Miscellaneous publicly and privately owned wastewater treatment plants should continue in operation until such time as wastewater service can be provided by publicly owned, municipal type wastewater systems on a cost-effective basis. Service areas of privately owned treatment systems should not be expanded or their treatment capacities increased when service can be provided on a cost-effective basis by publicly owned municipal type wastewater systems. The IEPA should continue to enforce all requirements of NPDES permits and assure that treatment plant operators achieve required standards of plant performance.

(4) Other Point Source Discharges

(a) The IEPA should continue to enforce all requirements of NPDES permits for other point source discharges in the basin. This can be achieved through frequent sampling and analysis of discharge flows by the IEPA for the purpose of monitoring compliance with NPDES permits.

b. Nonpoint Sources

(1) Urban Stormwater Runoff

(a) By July 1, 1983, Cook and Will counties and all municipalities should implement measures to work toward a target reduction of BOD in stormwater runoff from separately sewered impervious areas by 25 percent, and

in newly urbanizing areas by 50 percent of 1976 surface loadings are recommended. In attempting to meet the above targets, implementing agencies should work through the countywide water quality committees to develop plans and standards for the implementation of appropriate measures such as catch basin cleaning, performance zoning, street cleaning, use of porous pavement surfaces, increased vegetative cover, grass waterways, wetland storage of stormwaters, stormwater detention, sedimentation and erosion controls, and other measures to achieve the desired pollutant reductions.

(b) Township, county and state highway organizations, the Illinois State Toll Highway Authority, and facility engineering departments at state and federal installation should participate in the programs described above by implementing accelerated and/or improved street sweeping programs for streets, roads and highways that are hydraulically connected to perennial streams or permanent lakes via stormwater conveyance systems.

(c) During the period up to July 1, 1983 agencies should utilize voluntary exploratory programs, implementing techniques to control pollutants from urban nonpoint sources.

(d) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should adopt and enforce adequate stormwater detention ordinances. These ordinances should include provisions which clearly establish long-term responsibilities for maintenance of detention facilities. All such local ordinances also should be consistent with minimal areawide standards set forth in the model ordinance.

(e) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should develop and enforce adequate erosion and sedimentation control ordinances. All such local ordinances should be consistent with minimal areawide standards set forth in the model ordinance.

(f) Within one year following the preparation by NIPC of a model ordinance, Cook and Will counties and all municipalities in the basin should adopt measures to control surface runoff from open storage yards containing industrial stockpiles and other materials which may go into solution or which may be carried away by stormwater runoffs and pollute streams and other water bodies.

(g) Municipalities, townships, counties, and state and county highway departments responsible for de-icing streets and highways should develop programs to control the application of de-icing materials, to train personnel in proper application methods, and to use proper equipment in order to minimize any negative water quality impacts. The impact of de-icing agents on water quality should be given further study by the Commission in the continuing planning program.

(2) Agricultural Runoff

(a) By July 1, 1980, the Will-South Cook Soil and Water Conservation District, in conjunction with agencies of the United States and Illinois Departments of Agriculture and the countywide water quality committees, should identify the best management practices necessary to implement the agricultural aspects of the 208 plan, including conservation tillage, contour plowing, terracing, and conversion of cropland to grassland.

(b) By July 1, 1981, agricultural lands on which BMP's should be applied should be identified by the soil and water conservation district. Agencies of the U.S. Department of Agriculture and countywide water quality committees should be consulted.

(c) By July 1, 1985, a comprehensive conservation plan should be prepared for each farm in the basin which has soil erosion losses in excess of standards set by the Illinois Department of Agriculture and soil and water conservation districts under House Bill 818.

(d) Using available cost sharing and technical assistance programs, the soil and water conservation district should ensure implementation of the BMP program according to the following schedule on approximately 7,800 acres of agricultural lands:

By 1985 - 30% of the identified land.
By 1995 - 70% of the identified land.
By 2000 - 100% of the identified land.

(e) The IEPA and NIPC should provide the results of their instream water quality monitoring to the soil and water conservation district and to the Departments of Agriculture so that priority can be given to the areas most sensitive from a water quality standpoint in order to maximize the impact of the best management practices.

(f) The IEPA should enforce the IPCB regulations which require permits for feedlots and should use the IEPA draft technical policy WPC-2 "Design Criteria for Field Application of Livestock Wastes" as a guide.

(g) Illinois Department of Agriculture, Illinois Department of Public Health, and USEPA regulations on the use of pesticides and disposal of containers, and Illinois Department of Agriculture regulations on the training and licensing of pesticide applicators and operators should be continued.

(h) Farmers should implement good pasture management practices, utilize grass waterways, vegetative filter strips, and field borders, and make wise use of fertilizers wherever possible in accordance with the Illinois Agronomy Handbook to reduce the dangers of pollution. The U.S. Department of Agriculture agencies should assist farmers in recognizing the water quality problems posed by improper practices, and assist them in the use of proper practices.

(3) On-site Disposal Systems

(a) Individual malfunctioning on-site disposal systems outside the 5-year service areas should be repaired wherever possible upon complaint to the appropriate county authorities or be replaced with a new system if necessary.

(b) By July 1, 1983, special service areas should be established under the initial sponsorship of municipal governments (for sites located within corporate limits) and by the counties in unincorporated areas, where necessary to aid in the financing of any innovative-type systems or other on-site improvements necessary to correct or replace malfunctioning systems in areas outside the 5-year projected service areas.

(c) The minimum requirements of the Illinois Private Sewage Disposal Code should be upgraded to require more innovative site analysis techniques, and the Cook and Will County Health Departments should require a construction permit to regulate the design, location, and installation of every new on-site system in both incorporated and unincorporated areas.

(d) Local officials should inspect all septic systems known to be failing, threatening public health or causing nuisance conditions. The inspection should result in the issuance of a repair permit for corrective measures which are to be undertaken and paid for by the septic system owner.

(e) Septic systems also should be inspected by local officials prior to the transfer of ownership of properties where such systems are installed. The results of the inspections should be made known to the lending institutions which are furnishing the mortgages.

(4) Air Pollution

(a) As part of the continuing planning program, the IEPA in cooperation with the Illinois Institute for Natural Resources, the Illinois State Water Survey, and local air quality management agencies should analyze the relationships between air pollution and water quality in all of its aspects. The IEPA should cooperate with NIPC in devising strategies for correcting present negative effects and preventing future problems through the 208 continuing planning program.

(5) Sanitary Landfills

(a) The IEPA should ensure that every sanitary landfill complies with all regulations of the IPCB for its siting, design, construction, and operation. As a substitute for existing state regulations, the IEPA and IPCB should consider certification of local solid waste disposal programs which comply with areawide plans to be prepared under the Federal resource Conservation and Recovery Act. Alternatives to land disposal of solid wastes, including recycling, should be considered and utilized wherever feasible.

(6) Waterways

(a) The possible negative impacts on water quality of proposed dredging projects should be assessed against the flood control or other benefits of any proposed dredging project.

(b) NIPC, in conjunction with the countywide water quality committees in the continuing planning program, should develop recommendations to simplify the fragmented system for channel maintenance in the Hickory Creek basin. Present responsibilities for such maintenance functions as debris removal, streambank stabilization, public access, dredging, disposal of dredge spoil, protection and augmentation of habitat, tree shading, and vegetation are shared between a host of federal, state, and local authorities.

(c) Will County is encouraged to develop an organization similar to the Cook County and Lake County Clean Streams Committees, consisting of volunteers and

organizational representatives who maintain surveillance over water bodies for activities adverse to water quality, flood control, recreation, fish, wildlife, and/or nagivation.

(d) In-stream water quality data collected by local treatment plant operators should be periodically published by the IEPA.

c. Residuals

(1) As regulated by the IEPA, present methods for the disposal of sludge from treatment plants are adequate to handle present and anticipated future volumes and should continue to be administered by the IEPA.

(2) Highest priority should be given to the use of sludge as a soil conditioner and efforts to utilize sludge for that purpose should be expanded. The IEPA should assure proper practices in the utilization of sludge on agricultural lands through implementation of the draft standards in IEPA Technical Policy WPC-3 "Design Criteria for Municipal Sludge Utilization on Agricultural Land."

(3) The preferred method for the disposal of domestic septage is through land application, and this method should be encouraged and used whenever possible. Recognizing a continuing need for the disposal of large volumes of septage at wastewater treatment plants, specific facilities should be designated by the IEPA to receive domestic septage on recommendation by NIPC through the continuing planning process.

(4) The USEPA standards and the IPCB regulations for permits for disposal of hazardous or toxic substances should continue to be enforced by the IEPA.

d. Groundwater

(1) By July 1, 1980, the Illinois State Water Survey and the Illinois State Geological Survey should undertake a coordinated well sampling program to monitor groundwater quality in areas where a potential for infiltration by pollutants exists or might exist in the future.

e. Mining

(1) The present IPCB regulations for the control of pollution from aggregate producing activities are

considered generally satisfactory. However, the IEPA should continue to study the types and volumes of pollutants associated with these activities and their potential effects on surface and groundwater quality. Any needed changes in present regulations should be identified by July 1, 1980.

15.11 COSTS OF RECOMMENDED PLAN

a. Facility Plans

(1) General: Table 15-28 shows pertinent capacities in the year 2000 for publicly owned treatment plants expected to remain in operation, their effluent standards, and construction costs. Local collector sewer projects are shown, if they have been processed for federal or state grants. Also shown are total MSDGC costs allocated to this basin.

Cost data were assembled from various sources as noted below and in the tables that follows. The processing of this information and its allocation to the Hickory Creek basin are described, where applicable.

Except for the MSDGC area, the "initial" costs of facility plans listed in Table 15-28 refer to the first phase of any project which is to be followed at some future date by programmed expansions or extensions. Under this definition, the total cost of works currently under construction fall under the classification "initial," even though the project has not yet been completed. Except for the MSDGC area, "future" costs in Table 15-28 cover phased work scheduled at later dates.

(2) MSDGC Area: Special procedures were followed in depicting MSDGC costs because of the costs' magnitude and complexity.

Total costs of MSDGC improvements and related locally funded improvements were taken from Table U7-IX-1 and from page 229 in the MSDGC's 1977 Facilities Plan Update Supplement, dated March 1978. They were revised and brought up to date in a conference with MSDGC staff representatives in March, 1978.

The cost of all MSDGC improvements was assumed to be spread throughout the MSDGC service area on an ad valorem basis. Thus, each basin's share of the cost was assumed to be proportional to the share of total district assessed valuation in that basin.

For locally funded improvements, the estimates for local sewer upgrading are 1977 values taken from page 229 of the MSDGC 1977 Facilities Plan Update Supplement. For other local improvements, the estimates in pages XI-18 and XI-19 of the MSDGC Overview Report are as of January 1, 1975, also updated as noted above. Where applicable, costs were also

updated at 6 percent compounded for the intervening period to January 1977 levels.

For local sewer improvements in the MSDGC portion of the Hickory Creek basin (which is outside the TARP area) the costs were allocated to communities in accordance with their share of the total assessed valuation for all non-TARP areas.

(3) Summary of Future Costs Table 15-29 distributes capital costs within 5-year time frames. Annual operating and maintenance costs are also shown, which are based on data furnished by operating agencies. In the absence of agency data, operating and maintenance costs were estimated based on information in 208 Staff Paper No. 20, "Wastewater Treatment Processes and Cost Estimating Data." The cost for bonded indebtedness of previous system improvements are not included in the operation and maintenance costs listed in Table 15-29. Construction costs do not differentiate between grant eligible and local shares.

(4) Local Costs Table 15-30 shows projected annualized local costs.

(5) Increased Costs Tables 15-31 and 15-32 show the estimated annual increases in wastewater charges per household for Will County residents in the basin and for the basin as a whole, respectively, for the previously described improvements and/or expansions.

b. Urban Stormwater

Methods for controlling pollution in urban stormwater runoff include street sweeping, catch basin cleaning, performance zoning, use of porous pavements, increased vegetation, grass waterways, wetland storage of stormwater, stormwater detention, and erosion and sediment controls. The goals of a 25 percent decrease of BOD loads on existing (1976), separately sewered impervious areas and a 50 percent decrease of BOD loads on impervious areas built between 1976 and 2000 are to be achieved by combinations of the above practices. The cost of the mix of specific practices which would meet these goals is dependent upon the methods selected and the intensity of their individual use.

An estimate of the total cost based solely on street cleaning utilizing vacuum sweepers is $5.87 million through the year 2000, increasing from $173,200 per year in 1978 to $338,000 per year in the final year. The frequency of cleaning streets with vacuum sweepers was assumed to be an average of about once every 12 days in 1976. The frequency was assumed to increase to about once every 9.5 days by the year 2000, excluding the three winter months of December, January, and February.

TABLE 15-28: RECOMMENDED PLANS, PUBLICLY OWNED TREATMENT SYSTEMS

HICKORY CREEK BASIN

MAP CODE	FACILITY NAME	DESIGN CAPACITIES (MGD)		EFFLUENT STANDARDS (Year 2000) (mg/l)				CAPITAL COSTS (million $)			COMMENTS
		1975	2000	BOD_5	TSS	P	NH_3N	INITIAL	FUTURE	TOTAL	
W18	Frankfort	0.7	1.4	10	12		(1) 1.5	(2) (3) 1.7	-	1.7	
W25	Mokena	0.35	1.7	10	12		(1) 1.5	(2) (3) 3.2	-	3.2	
W27	New Lenox Plant 1	0.75	2.0	10	12		(1) 1.5	(2) (3) 3.0	-	3.0	
W29	Oak Highlands-Ingalls Park S.D. (4)	0.25	0.80	10	12		(1) 1.5	(2) (3) 1.5	-	1.5	
N/A	Joliet East Side Combined Sewer Project (5)	-	-	-	-	-	-	(6)	-	-	
N/A	MSDGC							(7) 14.6	0.1	14.7	
N/A	Local Projects, MSDGC related							(7) 19.0	3.0	22.0	

(1) In-stream, after mixing.

(2) Facilities plan not completed. Costs estimated by NIPC.

(3) Costs to meet in-stream NH_3-N requirements not included because of impending change in State standards.

(4) Located in Joliet FPA, but discharges to Hickory Creek.

(5) Costs and other details included in Lower Des Plaines Basin report as treatment plant is located in that basin.

(6) Facility plan not completed.

(7) Total cost shown, whether or not under construction, because of the method used in distributing costs to each basin.

N/A Not applicable.

The above costs did not include street cleaning in combined sewer areas where the stormwater runoffs would be treated. Naturally, some street cleaning activities would be required in those areas for sanitary, public relations, or other reasons.

c. Agricultural Runoff

Agricultural croplands presently amount to 14,500 acres in the basin and are projected to decrease to 11,800 acres by the year 2000. In order to reduce agricultural pollution from croplands, best management practices are targeted for implementation by the year 2000 on 7,800 acres at a total cost of $905,700 over the years.

Although a comprehensive farm plan would include a wide range of BMPs, the following four practices and several combinations are recommended for implementation: conservation tillage, contouring, terracing, and cropland conversion to pastureland. These BMPs were selected because of their direct effects on water quality as well as their ability to reduce soil erosion. Many other practices which would be contained in a farm plan, but not considered by the Commission, are either too localized or too difficult to evaluate for their effects on water quality.

Of the above total costs, $132,000 represent initial installation (or capital) expenditures for which grants may be available from the federal government. The cost-sharing ratios are on the order of 50 percent. The balance of $773,700 represents operating and maintenance costs.

For estimating purposes, it was assumed that 30 percent of the BMPs will be installed by 1985, 70 percent by 1995, and 100 percent by the year 2000.

15.12 WATER QUALITY CONDITIONS IN 1983

a. Introduction

Public Law 92-500 includes the statement "Wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water be achieved by July 1, 1983." The water quality standards of the Illinois Pollution Control Board for General Use streams such as Hickory Creek were adopted to "protect the State's waters for aquatic life,...primary and secondary contact use,..." This Commission is using the Illinois standards, as modified by this plan, to judge compliance with the 1983 national goal. This chapter assesses the feasibility of compliance with the dissolved oxygen and ammonia standards in 1983 in the Hickory Creek watershed.

TABLE 15-29: SUMMARY OF FUTURE COSTS (All data in 1977 dollars in millions)

Jurisdiction	Capital Costs						Annual Operations & Maintenance Expense				
	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	Total	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)
Frankfort	1.70					1.70	0.01	0.02	0.03	0.04	0.05
Mokena	3.20					3.20	0.01	0.03	0.06	0.08	0.09
New Lenox #1	3.00					3.00	0.02	0.04	0.07	0.10	0.12
Oak Highlands/Ingalls Park	1.50					1.50	0.01	0.02	0.04	0.06	0.07
MSDGC	14.60	0.10				14.70	0.03	0.13	0.13	0.13	0.13
Local Improvements Related to MSDGC	19.00	3.00				22.00					
Agricultural BMPs							0.01	0.02	0.03	0.04	0.05
Urban Stormwater Management Expense							0.21	0.24	0.27	0.30	0.33
TOTAL	43.00	3.10				46.10	0.30	0.50	0.63	0.75	0.84

TABLE 15-30: PROJECT ANNUALIZED LOCAL COSTS (All data in 1977 dollars in millions)

Jurisdiction	CAPITAL COSTS			LOCAL CAPITAL PLUS O & M ANNUALIZED Costs (Mil./yr.)*					Comments
	Cost Total Through Yr. 2000	Est. Fed'l. Share	Est. Local Share	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	
Frankfort	1.70	1.27	0.43	0.05	0.06	0.07	0.08	0.05	
Mokena	3.20	2.40	0.80	0.09	0.11	0.14	0.16	0.09	
New Lenox #1	3.00	2.25	0.75	0.09	0.11	0.14	0.17	0.12	
Oak Highlands/Ingalls Park	1.50	1.12	0.38	0.05	0.06	0.08	0.10	0.07	
MSDGC	14.70	11.00	3.70	0.38	0.48	0.48	0.48	0.13	
Local Improvements Related to MSDGC	22.00	16.50	5.50	0.45	0.52	0.52	0.52	0.07	
Agricultural BMPs				0.01	0.02	0.03	0.04	0.05	
Urban Stormwater Management Expense				0.21	0.24	0.27	0.30	0.33	
TOT AL	46.1	34.54	11.56	1.33	1.60	1.73	1.85	0.91	

*Local Capital Amortized @ 7% for 20 yrs.

Revised 2/15/79

TABLE 15-31: PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST

Will County

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	253.3	294.5	348.2	395.7	433.2	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.091	.078	.066	.058		
O & M Related	.073	.092	.111	.124	.130	
Total Rate:	.164	.170	.177	.182	.130	
Additional Cost per Home of $45,000 FMV ($/yr.)	24.60	25.50	26.55	27.30	19.50	
Existing Av. Annual WW Cost ($/Household yr.)	81.43					
Total Av. Annual WW Cost ($ / Household yr.)	106.03	106.93	107.98	108.73	100.93	
Percent Av. Increase* in WW Costs per Household (%)	30.2	31.3	32.6	33.5	23.9	

*Total Rate Used

TABLE 15-32: PROJECT AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST

Basin Total

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	409.5	476.1	563.0	639.8	700.4	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.252	.231	.195	.172	.010	
O & M Related	.073	.105	.112	.117	.120	
Total Rate:	.325	.336	.307	.289	.130	
Additional Cost per Home of $45,000 FMV ($/yr.)	48.75	50.40	46.05	43.35	19.50	
Existing Av. Annual WW Cost ($/Household yr.)	81.43					
Total Av. Annual WW Cost ($ / Household yr.)	130.18	131.83	127.48	124.78	100.93	
Percent Av. Increase* in WW Costs per Household (%)	59.9	61.9	56.6	53.2	23.29	

*Total Rate Used

Revised 2/15/79

b. Assumptions of Changes in the Basin

(1) Land Cover: Land cover estimates for the years 1976, 1983, and 2000 are summarized in Table 15-33. It should be noted that impervious area is forecast to increase by 43 percent from 1976 to 2000, while croplands are expected to decline. The cropland areas listed under "conservation" indicate those lands where additional soil conservation practices are expected to be implemented.

TABLE 15-33: LAND COVER CHANGES

	Area in Square Miles		
Cover Type	1976	1983	2000
Lowland	19.2	19.2	19.2
Cropland	22.8	21.4	18.38
Conservation	(0)	(1.96)	(10.9)
Grassland	54.6	54.33	54.36
Impervious	9.7	11.02	13.91

Revised 2/15/79

(2) Urban Runoff Control: Management measures are to be implemented with the objective of reducing runoff-related BOD from existing urbanized areas by 25 percent of loadings found to be present in 1976. The BOD loadings from areas urbanized after that year are to be reduced by 50 percent of 1976 loads. This will result in an overall 28 percent reduction in urban runoff pollution loads by 1983.

(3) Point Sources: Effluent characteristics of point sources are given for 1976 and 1983 in Table 15-34.

TABLE 15-34: POINT SOURCES IN THE HICKORY CREEK BASIN

		EFFLUENT CHARACTERISTICS					
		Flow (cfs)		BOD_5 (mg/l)		Ammonia (mg/l)	
Plant Name	Reach	1976	1983	1976	1983	1976	1983
Arbury Hills	33	0.47	0.56	11.8	10	9.6	9.6
Frankfort	33	0.87	1.24	2.5	10	11	11
Mokena	73	0.46	0.76	5.5	10	4.5	4.5
New Lenox	121	0.83	2.21	3.5	10	6.9	6.9
Prestwick (No.)	33	0.37	0.61	3.2	10	10	10
Prestwick (So.)	33	0.26	0.38	10.8	10	8.2	8.2
Oak Highlands	121	0.37	0.55	8.4	10	10.5	10.5

Revised 2/15/79

c. Expected Water Quality in 1983

The water quality model was used indirectly to estimate 1983 water quality conditions. Results of 1976 and year 2000 simulations served as the basis for estimating 1983 values. In the process, pollution loads to the watershed were calculated for each of these three years. These loads are reported in Table 15-35 for four reaches, along with the water quality ratings for dissolved oxygen and ammonia associated with the loads. The ratings for 1976 and 2000 are from previous water quality modeling results. The 1983 ratings are informed judgments.

The goal (expressed in terms of achievement of water quality standards) is considered to be met satisfactorily when a rating of "good" or "excellent" is achieved. Assignment of these adjective ratings was based on the following criteria:

Excellent= no dissolved oxygen concentrations below 5 mg/l; no violations of 1.5 mg/l ammonia standard

Good = dissolved oxygen remains above 5 mg/l 95 percent of the time or more; ammonia standard is met 95 percent or more of the time

Fair = dissolved oxygen remains above 5 mg/l 85 percent of the time or more; the ammonia standard is met 85 percent or more of the time

TABLE 15-35: WATER QUALITY RATINGS IN 1983

Reach 33-Hickory Creek at Mokena

Loads & Ratings	1976	1983	2000
BOD,tons/yr	189	201	250
Ammonia,tons/yr	53	59	41
Dissolved oxygen	Good	Good	Good
Ammonia	Poor	Poor	Good

Reach 73 - Hickory Creek at New Lenox

Loads & Ratings	1976	1983	2000
BOD,tons/yr	317	326	402
Ammonia,tons/yr	77	83	66
Dissolved oxygen	Good	Good	Good
Ammonia	Good	Good	Good

Reach 113 - Spring Creek

Loads & Ratings	1976	1983	2000
BOD, Tons/yr	70	67	76
Ammonia, tons/yr	12	13	14
Dissolved oxygen	Exc.	Exc.	Exc.
Ammonia	Good	Good	Good

Reach 121 - Hickory Creek at Joliet

Loads & Ratings	1976	1983	2000
BOD, tons/yr	517	603	640
Ammonia,tons/yr	117	139	111
Dissolved oxygen	Good	Good	Good
Ammonia	Good	Good	Good

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Poor = dissolved oxygen remains above 5 mg/l 70 percent of the time or more; the ammonia standard is met 70 percent of the time or more

Bad = dissolved oxygen remains above 5 mg/l less than 70 percent of the time; the ammonia standard is met less than 70 percent of the time.

If, in any reach, the dissolved oxygen level dropped to zero, the qualitative state of the reach would be lowered by one category.

Adjective ratings for dissolved oxygen and ammonia in 1983 are noted in Table 15-36:

TABLE 15-36: AMMONIA AND DISSOLVED OXYGEN RATINGS IN 1983

Stream	Reach	Dissolved Oxygen	Ammonia
Hickory Creek	33	Good	Poor
HIckory Creek	73	Good	Good
Spring Creek	113	Excellent	Good
Hickory Creek	121	Good	Good

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The "Poor" ammonia rating for Reach 33 is largely attributable to the effluents from the four point sources which are tributary to that reach: Prestwick Utility Plants (north and south), Frankfort and Citizens Arbury Hills. These treatment plants account for approximately 37 percent of the total current ammonia load to Reach 33. This plan calls for ammonia not to exceed 1.5 mg/l after mixing in the receiving stream. However, ammonia control facilities are not expected to be on-line until after 1983. With the addition of these facilities, conditions are expected to improve to "good" during the period 1983-2000.

d. Evaluation

On the basis of this evaluation, it appears that the 1983 goal will be met in all reporting reaches except Reach 33, where substandard ammonia concentrations will exist.

As noted in Section 15.03 (b)(4), the Natural History Survey has classified fish habitat (as measured by water quality) as ranging from "high" to "fair" in the overall watershed. The excellent conditions found in Spring Creek are reflected by the high habitat classification assigned to that stream by the Survey. Significantly, ammonia nitrogen was not found to exert an influence on the toxicity index calculations made by the survey for the watershed. The implementation of the 208 plan will enable fish and aquatic life habitat conditions to be maintained and improved in future years.

Based on toxicity indices for bluegills, the Illinois Natural History Survey has classified present stream water quality in the portion of the basin essentially represented by Reach 33 as being "high" in the Will County portion of the headwaters and "good" for the balance of the reach. Considering proposed point and non-point source pollutant controls which will be implemented by 1983, the judgment is made that the 1983 goal will be met.

CHAPTER 16

Du Page River

CHAPTER SIXTEEN
DU PAGE RIVER

16.01 DESCRIPTION OF THE BASIN

a. Physical Characteristics

(1) Geography: The Du Page River Basin drains approximately 376 square miles in Du Page, Will, Kane, Cook, and Kendall counties. The drainage basin extends roughly from Hanover Park in Cook County southward through Du Page County to Channahon in Will County. The basin is approximately 40 miles long in the north-south direction and 14 miles wide at its broadest point (see Figure 16-1).

For water quality modeling purposes (discussed later in Section 16.03), the basin extended only down to Shorewood, where the drainage area amounted to 324 square miles.

The Du Page River tributary area considered in this chapter totals 330 square miles. This area excludes a small portion of the basin located outside the NIPC region in Kendall County and also excludes areas tributary to Rock Run and the Illinois and Michigan (I&M) Canal. Drainage in the Rock Run and I&M Canal watersheds is somewhat undefined, and during certain conditions there is actually interbasin flow between the Du-Page and Des Plaines River Basins. This area is included in the discussion of the Lower Des Plaines River Basin (Chapter Twenty One).

(2) Waterways: The Du Page River System begins as two branches. The East Branch originates in north-central Du Page County in Bloomingdale, and flows south and then west to join the West Branch in Will County south of Naperville. The West Branch flows south from its source in Hanover Park to its confluence with the East Branch. The mainstem originates at the confluence of the East and West Branches and flows southward through Will County to its confluence with the Des Plaines River near Channahon.

Several low-head dams impound flow on the Du Page. Included are the Warrenville and McDowell Grove dams on the West Branch, the Churchill Woods dam on the East Branch, and the Hammel Woods and Channahon dams on the mainstem Du Page.

There are numerous tributaries to the Du Page and its branches (Table 16-1). The largest is Lily Cache Creek which drains approximately 44 square miles in Will County. The drainage pattern near the southern tip of the basin is not well established. It has been noted that there is interbasin flow involving Rock Run and the Illinois and Michigan Canal between the Du Page and Des Plaines Rivers.

Twenty lakes and lagoons over 10 acres in size are also found in the basin. These are listed and described in Table 16-2.

(3) Geology and Soils: Unconsolidated glacial drift ranges up to 200 feet in thickness above bedrock. Till, the major

TABLE 16-1: STREAM INVENTORY, DU PAGE RIVER BASIN

STREAM NAME	LENGTH (MILES)	AVG. WIDTH (FT.)	WATER SURFACE (ACRES)	GRADIENT (FT/MILE)	DRAINAGE AREA (SQ. MILES)	COMMENTS
DU PAGE RIVER	27.7	157	540.9	3.7	376	
EAST BR. DUPAGE RIVER	24.0	32.2	60.5	3.9	84.0	
FERRY CREEK	3.5	6.0	2.5	1.0	10.8	
KLEIN CREEK	2.3	8.0	2.2	15.2	12.5	
KRESS CREEK	7.5	10.0	9.1	6.6	18.5	
LILY CACHE CREEK	15.0	49.0	59.5	6.0	44.1	
ST. JOSEPH CREEK	5.0	8.0	2.9	10.0	12.0	
SPRING BROOK	7.0	8.0	3.8	6.2	12.9	
SPRING BROOK CREEK (WHEATON)	5.8	10.0	7.0	6.8	7.0	
WEST BR. DUPAGE RIVER	31.0	63.1	198.3	5.1	125.0	
WINFIELD CREEK	4.0	6.0	2.9	7.5	9.0	

component of glacial drift, is the dominant surficial deposit in the basin. It is relatively impermeable, thus, limiting the water recharge capability. There is risk of pollutant runoff to surface waters in applications of wastes, fertilizers or agrichemicals.

Sand and gravel deposits are found in valley trains (particularly in the East Branch valley), in broad outwash plains, and in mounds, knobs, and ridges. These deposits are highly permeable and, where thick enough, make good aquifers.

Scattered patches of fine-grained lacustrine deposits are found in the basin, usually 10 to 20 feet in thickness and overlying till. The materials are good natural attenuators of wastes, but have low permeability, making runoff a potential hazard.

Bedrock composed of Silurian Dolomite is exposed directly at the surface in the mainstem Du Page valley, and is within 20 feet of the surface in the upper reaches. Dolomite forms a regional aquifer and must be protected from pollution where it is directly exposed or overlain by thin, highly permeable materials.

Figure 16-1: BASIN LOCATION

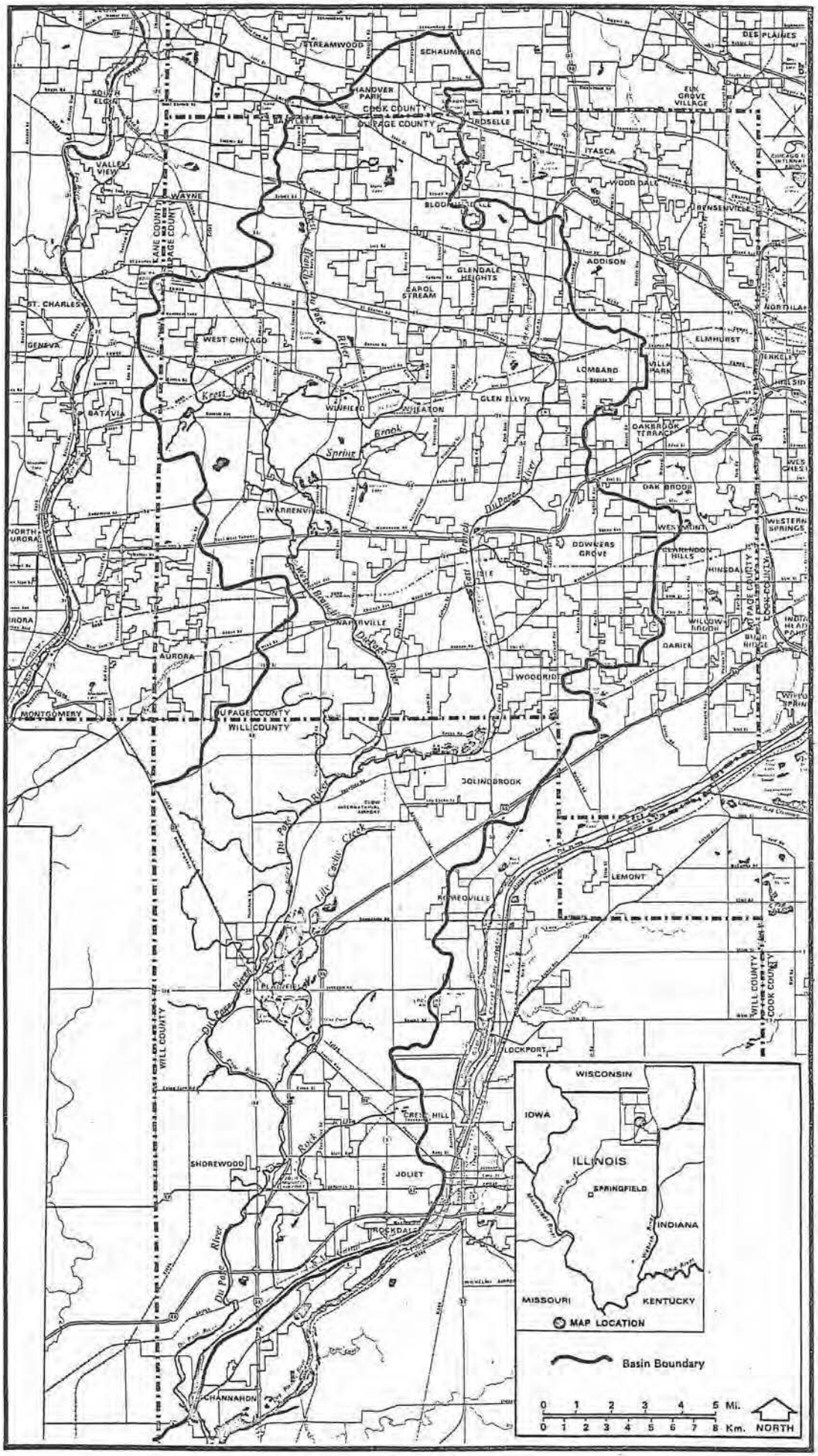


TABLE 16-2: LAKE AND POND INVENTORY, DU PAGE RIVER BASIN

NAME	LOCATION			SURFACE AREA (ACRES)	SHORE-LINE (MILES)	MAXIMUM DEPTH (FT)	WATER-SHED (ACRES)	DATE CON-STRUCTED	OWNER-SHIP	ACCESSIBILITY
	TWP N	RNGE E	SECT							
ARBOR LAKE	38	10	3	16.4	0.7	24	NA	1957	Org.	Employees Only
BASS & GILL CLUB LAKE	36	9	2	35.5	4.0	10	NA	1930	Org.	Members & Guests
ROY C. BLACKWELL LAKE	39	9	26	33.0	1.3	15	NA	1965-68	Public	Closed to Public
CHURCHILL WOODS FOREST PRESERVE LAKE	39	10	12	21.0	3.7	8	NA	1930	Public	Through Forest Preserve
ELMHURST CHICAGO STONE COMPANY LAKE #3	38	9	2	10.4	0.5	19	NA	1960-61	Org.	Executives Only
FOUR LAKES VILLAGE APARTMENT LAKE	38	10	15	23.5	2.2	13	NA	1930	Org.	Residents & Guests
HERBOTH LAKE	39	10	35	10.0	0.8	25	NA	1965	Private	NA
HERRICK LAKE	39	10	30,31	19.1	1.1	10	NA	Natural	Public	Through Forest Preserve
JOLIET JUNIOR COLLEGE LAKE	35	9	14	11.0	0.8	8	NA	NA	Org.	Open to Public
LAKE ELLYN	39	10	11	11.0	0.6	4	NA	1890	Public	By Permit
LILY CACHE ROD & GUN CLUB	36	9	11	23.0	NA	NA	NA	NA	Org.	Members & Guests
McDOWELL BORROW PITLAKE	38	9	2	12.0	0.6	9	NA	1957	Private	Closed to Public
MALLARD LAKE	40	10	18	46.0	2.1	8	NA	1951-63	Public	Through Forest Preserve
MASS LAKE	38	10	36	12.5	0.8	4	NA	Natural	Private	NA
MINUS 300 CLUB	37	9	35	116.0	2.1	17	NA	1950	Org.	Members Only
PLAINFIELD FISHING RESORT	36	9	14	135.0	NA	NA	NA	NA	Private	Fee Only
PURE ROD & GUN CLUB	36	9	10	70.0	8.5	15	NA	1930	Org.	Members & Guests
LAMBERT LAKE	39	10	22	10.0	0.6	6	NA	Natural	Public	Limited
WEST DU PAGE PARK FOREST PRESERVE LAKE	36	9	11	13.5	0.5	3	NA	Natural	Public	Through Forest Preserve
WHEATON NORTHSIDE PARK LAGOON	39	10	8	10.5	1.0	7	NA	1927	Public	Through Park

Throughout the basin, geological conditions represent impediments to effective use of septic systems. In areas of surface sand and gravel deposits, usage would be hampered by high infiltration rates and the proximity of surficial aquifers. In most other areas, the inability of septic wastes to infiltrate the impermeable soils could create surface runoff problems, particularly where there are steep slopes.

Predominant soils in northeastern illinois are described in Chapter Three. Soils occuring in this basin are identified in Table 16-3.

(4) Fish and Wildlife: Under natural, pre-urbanization conditions, the Du Page River watershed offered a prairie-marsh habitat with some forests, typical of most of northeastern Illincis. However, urban development (particularly since World War II) has adversely affected habitat quality and species population and diversity in much of the basin. Portions of Will and western Du Page counties remain relatively undeveloped, but intensive agriculture has eliminated much natural habitat. Numerous species of mammals, birds, and waterfowl are still observed, even on the fringes of urban areas, such as in forest preserves.

Fish habitat in the watershed is severely degraded in relation to what it once was, as well as in relation to a number of other streams in the region where the effects of urbanization and resultant water quality deterioration have not been as severe. Fish populations and habitat conditions are discussed in greater detail in Section 16.03.

b. Socic-Economic Characteristics

(1) Population: All or parts of 33 communities are located within this basin. The basin's population density is lower than the average in the region. The estimated 1976 population was 373,522. Some of the larger communities are Wheaton, Lombard, Glen Ellyn, Naperville and Downers Grove.

As shown in Table 16-4, the population of the basin is forecasted to increase to 764,500 by the year 2000, an increase of 105 percent over 1976. Projected growth is a major factor in the future water quality of the Du Page and its tributaries.

(2) Land Use: There is a wide variety of land uses in the basin, as indicated in Table 16-5. Much of the basin remains undeveloped, especially those portions in Will and western Du Page counties. About two-thirds of the basin remained in the category of vacant, agricultural and forested land in 1970. The second largest category of land use, single family residential, reflects heavy suburban development in the eastern portions of the basin. Extensive urbanization is also found in the vicinity of Naperville, in southwestern Du Page County.

TABLE 16-3: PREDOMINANT SOIL UNIT CHARACTERISTICS FOR NORTHEASTERN ILLINOIS

Unit In Basin	Soil Unit	Soil Color	Soil Texture	Permeability	Drainage	Subsoil Texture	Underlying Materials	Agricultural Usage Limitations	Approximate Percentage of Prime Agri. Land	Development Usage Limitations
	Fox-Dresden-Casco	brown	loam	mod-rapid	well	loam	sand and gravel	E, D, LF	12	S, E, ST
Yes	Warsaw-Rodman-Lorenzo	brown	loam	moderate	well	loam	sand and gravel	E, D	50	S, E, ST
	Volinia-Selma-Lomax	brown	loam	moderate	excessive	loam	sand	WE, D, W	80	W, S, P
	Maumee-Watseka-Plainfield	black	loamy sand	rapid	excessive	sand	sand	W, WE, D	30	S, W
	Zurich-Grays-Wauconda	gray	silt loam	moderate	moderate	clay loam	silt loam	W, E, LF	90	S, W, ST
Yes	Drummer-Brenton-Proctor	brown	silt loam	moderate	moderate	clay loam	loam	W, E	100	W, S, P
Yes	Miami-Kidder-McHenry	gray-brown	loam	moderate	well	clay loam	loam	E, ST, LF	40	ST, S, SS
Yes	Drummer-Saybrook-Lisbon	dark gray	silt loam	moderate	moderate	clay loam	loam	W, E	80	W, S, SP, SS
	Ringwood-Griswold	brown	loam	moderate	well	clay loam	sandy loam	E, W	85	S, W, ST
Yes	Morley-Markham-Ashkum	gray	loam	slow	moderate	silty clay	clay loam	E, W, LF	60	ST, SP, SS, W, HC
Yes	Elliot-Ashkum-Beecher	dark gray	silt loam	slow	moderate	silt loam	clay loam	W, E	85	W, SP, CS, SS
	Milford-Martinton	black	silt loam	mod. slow	poor	silty clay	calcareous sediment	W	95	W, HC, P, SP, SS
Yes	Symerton-Andres-Ashkum	black	silt loam	moderate	moderate	clay loam	clay loam	E, W	95	W, SP, SS
	Nappanee-Peotone-Del Rey	dark gray	silt loam	slow	well	silt loam	calcareous sediment	W, T, LF, E	50	W, SP, HC, P
Yes	Frankfort-Bryce-Montgomery	dark brown	silt loam	slow	poor	silty clay	calcareous sediment	W, T, LF, E	5	W, SP, HC, P
Yes	Romeo-Joliet	black	loam	moderate	poor	loam	limestone	W, STN, FL	60	W, SH, FL, SS
Yes	Otter-Huntsville-Millington	black	loam	moderate	moderate	loam	loam	FL, W	95	W, FL
Yes	Fox-Wauconda-Sawmill	dark gray	silt loam	moderate	poor	loam	sand	W, FL, E	75	W, FL
	Houghton-Lena	black	muck/peat	rapid	poor	muck/peat	sand/silt	HWT, W	0	W, P, S, HWT, LS

USAGE LIMITATION CODES

CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
CS	Clayey Subsoil	D	Drouthiness	E	Erosion	FL	Flooding
HC	Heavy Clayey Subsoil	HWT	High Water Table	LF	Low Fertility	LS	Low Strength
P	Ponding	S	Seepage	SH	Shallowness to Bedrock	SP	Slow Percolation
SS	Shrink-Swell	ST	Steepness	STN	Stoniness	T	Soil Tilth
W	Wetness	WE	Wind Erosion				

TABLE 16-4: POPULATION CHANGE 1975-2000

FACILITY PLANNING AREAS	1975	1980	1985	1990	1995	2000	% Change 1975-2000
Chicago MSD Hanover FPA	41,000	53,000	60,000	67,000	74,000	80,000	95.1
Bartlett FPA	7,500	11,600	15,700	19,800	24,000	28,000	273.3
Glendale Heights FPA	40,600	54,000	65,500	77,100	82,300	87,900	116.5
Carol Stream FPA	4,300	9,100	13,300	17,400	23,700	30,000	597.7
Downers Grove FPA	62,400	69,200	73,000	76,900	81,600	86,500	38.6
Glenbard FPA	80,000	83,400	92,200	100,600	103,500	106,500	33.1
West Chicago FPA	26,700	27,300	32,620	38,640	44,310	51,000	53.6
Wheaton FPA	46,870	47,800	53,700	59,610	63,920	68,230	45.5
Woodridge FPA	38,200	42,800	46,700	51,300	58,800	67,100	75.7
Naperville FPA	38,900	51,900	68,200	84,400	97,600	110,700	184.6
Bolingbrook FPA	28,200	41,150	48,600	56,060	63,000	70,600	150.4
Plainfield FPA	5,920	7,800	9,200	10,800	12,400	14,000	136.5
Basin Area TOTAL	373,522	457,004	533,257	609,510	687,006	764,502	104.7
FPA = Facility Planning Area.		NOTE:Some FPA's are located in more than one basin.					
Source: NIPC							
Not listed above are the Joliet and Channahon FPA's which are tributary to both the DuPage and Des PlainesRivers. They are included in the Des Plaines River basin, Chapter 21.							

Only about six percent of the basin is categorized as public or quasi-public open space. Most of this open space is in the form of county forest preserves in western Du Page County. A number of sand and gravel pits, are located in the basin, concentrated principally in the Plainfield area.

TABLE 16-5: 1970 LAND USE

Land Use Category	Total Acres	% of Total
Single Family Residential	27,709	12.7
Multi Family Residential	1,246	.6
Mobile Home Parks	27	.1
Manufacturing and Processing	1,165	.6
Transportation, Communications, & Utilities	2,870	1.4
Railroad Rights-of-way	1,367	.7
Airports	497	.2
Streets & Parking	13,289	6.3
Trade	821	.4
Services-Private	870	.4
Services-Institutional	7,144	3.4
Military Services	311	.2
Cemetaries	314	.2
Entertainment Assembly	62	.1
Public Buildings	504	.2
Public and Quasi-Public Open Space	10,504	5.0
Mining and Quarries	2,493	1.2
Vacant, Agricultural & Forest Areas	138,776	65.7
Vacant-Under Development	884	.4
Water	1,083	.5
Warehousing	68	.1
Shopping Centers	92	.1
Hotels-Motels	40	.1
Parking Lots	45	.1
Total	211,179	100.0

Note: Rock Run and I & M Canal tributary areas are not included in the above breakdown. These areas are included in Chapter 21, the lower Des Plaines basin report.

NIPC land use forecasts anticipate increasing urbanization of the basin and accompanying changes in land use, as indicated in Table 16-6. The largest increases, proportionately, are forecasted in non-residential land use categories, particularly manufacturing and transportation/communication. The amount of undeveloped land is expected to decrease by about 35 percent by the year 2000. New suburban development is expected to be most extensive in the Cook County, southwestern Du Page County and northeastern Will County portions of the basin.

(3) Economy: In recent years manufacturing employment in the region has increased only slightly, while employment in wholesale trade, finance, insurance, real estate, and government has increased substantially. These trends are evident in the Du-Page River Basin to a certain extent, though manufacturing is less dominant as a source of

employment than in the region as a whole. Total employment in 1970 was 70,000.

Employment in the basin is forecast to increase by 149 percent, to 174,000 employees, between 1970 and 2000, (See Table 16-7). Increases in all categories of employment are forecast, though manufacturing employment will increase at a rate considerably below that of the industries mentioned above.

(4) Water Supply: At the present time, groundwater is the sole source of water supply for the basin. Shallow sand and gravel aquifer wells account for three percent of groundwater pumpage, shallow dolomite wells for 86 percent, and the deep sandstone aquifer wells for 11 percent.

(5) Government: The Du Page River Basin is located in Cook, Du Page, Kane, Kendall and Will counties. Included in the basin are all or parts of 33 municipalities, 19 townships, 4 sanitary districts, 11 drainage districts and 10 other special districts.

(6) Recreation: Most of the public recreation facilities in the basin are in the form of forest preserves, many of which are found along the East and West Branches of the Du Page River. In addition, there are numerous small parks scattered throughout the area. Boats, canoes, and small sailboats may be used in the lakes, lagoons, and streams. Swimming facilities, other than public pools, are limited to private lakes and one public beach in Naperville. Horseback riding, cross-country skiing, and hiking are other popular activities. Sport fishing is quite limited, due to either overfishing or excessive pollution in the streams.

TABLE 16-6: LAND USE FORECASTS (ACRES)

Land Use Category	1980	1985	1990	1995	2000
Residential	38,067	45,076	52,085	56,759	61,433
Manufacturing	6,182	7,582	8,981	10,140	11,299
Commercial	17,512	19,027	20,542	21,712	22,881
Transportation/Communication, etc.	18,631	21,458	24,285	27,449	30,613
Open Space, Vacant Agriculture, etc.	130,787	118,036	105,286	95,119	84,953
Total	211,179	211,179	211,179	211,179	211,179

SOURCE: Northeastern Illinois Planning Commission, 1976

TABLE 16-7: EMPLOYMENT FORECAST

CATEGORY	1970	1980	1985	1990	1995	2000	1970-2000 % Increase
Manufacturing	14,070	27,171	28,364	28,557	30,851	32,145	128.5
Local Retail	12,898	28,849	33,070	37,291	39,984	42,676	230.9
Other	43,050	50,945	64,814	78,682	89,243	99,804	131.8
Total	70,018	106,965	126,248	145,530	160,078	174,625	149.4

16.02 IMPACTS OF OTHER PROJECTS 193

a. Introduction 195

In many river basins there are studies or projects 197
underway which may impact directly or indirectly on both 198
surface and groundwater quality. Most of these will have 200
indirect effects since they usually pertain to water
quantity or hydrologic modifications. Included in these 202
classifications are the flood control activities of the U.S.
Soil Conservation Service, the U.S. Army Corps of Engineers, 203
and the Illinois Division of Water Resources.

Perhaps the most significant projects involve the 204
construction or improvement of roads and highways. In those 205
instances, drainage patterns are altered, local farm tiles
may be interrupted, silt is introduced during construction, 206
and vehicular pollutants are conveyed to local water bodies
thereafter. Stream crossings by highway projects and 207
similar crossings by various public and private utilities 208
also affect water quality to varying degrees and for various
lengths of time. Not to be overlooked are public and 209
private storm sewer outlets which may be authorized in the
future.

A wide variety of other projects also impact on water 210
quality, but in this section, attention will be given only 211
to those of significant size, or impact.

b. U.S. Army Corps of Engineers 214

The U.S. Army Corps of Engineers has a variety of 216
responsibilities relating primarily to navigation and flood 218
control, as well as ancillary activities related to water
quality.

(1) C-Selm Studies: Pursuant to Section 206 of the Flood 221
Control Act of 1959 and Resolutions adopted by Congress in 222

1971, the Corps was involved in a planning study on alternative wastewater management systems for the Chicago-South End of Lake Michigan (C-SELM) area, which covered portions of northeastern Illinois and northwestern Indiana. Specifically, the study was directed at the evaluation of various regional wastewater management systems, including plans which would result in the elimination of pollution discharges to water bodies. An initial pilot study was completed in 1974. However, since this was only a planning study, the report contained no recommendations for federal action with respect to any of the specific wastewater management systems evaluated. The intent of Congress was for these studies to be presented to local units of government for their consideration and adoption, as desired. Wastewater planning is now covered by PL 92-500.

(2) TARP Study: The Corps is also involved in an investigation as to the appropriate "Federal interest" in the Tunnel and Reservoir Plan (TARP) proposed by the (MSDGC) Metropolitan Sanitary District of Greater Chicago. In its Interim Report No. 1, the Corps confirmed that supplemental sewers, tunnels and reservoirs (such as proposed in the TARP) were the optimal means for controlling runoff on both a community and an areawide basis.

Implementation of the TARP plan will have little direct impact on the Du Page River Basin since the basin is located outside the TARP study area.

(3) Permits for Dredged and Fill Materials: Under Section 404 of PL 92-500, the Corps is authorized to issue permits for the placement of dredged or fill material into navigable waters or on adjacent land sites. Permits may be withheld if it is determined that the discharge of materials will have adverse effects on water supplies, fish and wildlife, or recreation. Under current guidelines, Corps' authority extends to all navigable waters and tributaries thereto, up to points where the average annual flow is 5 cfs or more.

(4) Flood Control: The Corps traditionally has been the principal federal agency involved in flood control matters, particularly on larger rivers. Authority for Corps activity is granted in general legislation as well as in a series of flood control acts, the first of which was enacted in 1936.

Du Page River flooding problems are currently being investigated by the Corps in its "C-SELM Interim Report No. 2", the purpose of which is to determine the feasibility of preventing flood damages in the basin. An initial plan of study has been completed, as have field surveys of river channels and bridges. Contracts have been awarded for hydrologic and hydraulic studies, and an environmental inventory has been initiated. The entire feasibility report, including recommendations for possible federal project construction is expected to be completed in 1981.

c. U.S. Department of Agriculture

(1) PL-566 Projects: The small watershed program of the SCS, authorized by the Watershed Protection and Flood Prevention Act of 1954 (PL 83-566), provides a framework through which federal, state, and local governments can deal with local water resource problems on a cooperative basis. The program is principally oriented toward the prevention of soil erosion and the control of flooding and sedimentation damage. Projects typically include the construction of small reservoirs, stream channelization, grade stabilization, and bank protection. These projects are sponsored by and coordinated through local soil and water conservation districts and other interested agencies. There are no such projects in this basin at the present time.

(2) Conservation Programs: The Agricultural Stabilization and Construction Service (ASCS) and the Soil Conservation Service (SCS) are two units of the U.S. Department of Agriculture directly involved in the conservation of land and water resources.

The SCS and ASCS provide a variety of other functions and services related to soil and water conservation. The SCS, for example, offers extensive technical assistance to individual local soil and water conservation districts, and other interested parties. The ASCS gives assistance through cost-sharing to farmers to help control erosion and agriculturally related water pollution. Various site specific control techniques are available for implementation under this program, depending upon the nature of local problems.

d. Illinois Department of Transportation

(1) DOWR: The DOWR has statutory responsibility for navigation and flood control projects on water bodies throughout the state, as well as permit authority for private and public projects which enter or cross over or under such waters. The DOWR also has statutory authority to issue regulations controlling the use of flood plains.

(2) DOH: Two divisions of this department have responsibilities related to water quality management: the Division of Water Resources (DOWR) and the Division of Highways (DOH). The Division of Highways is responsible for the construction and maintenance of state highways. Highways have associated water quality impacts both during their construction (e.g., erosion and sedimentation, disruption of drainage, etc.) as well as when placed in use (e.g., road salt usage, roadway drainage). Long-range transportation plans call for the construction of three multi-lane freeways which would be partially located in the

basin: (1) Elgin-O'Hare, (2) Fox Valley, and (3) Lake-Will (paralleling Route 53).

e. Local Units of Government

Municipalities, Cook, Du Page, and Will counties, and special purpose districts are involved in a number of local projects which have direct or indirect water quality impacts. The general purpose units are empowered to adopt regulations such as floodplain ordinances, on-site stormwater detention ordinances, and soil erosion and sedimentation control ordinances. All of these have the potential to impact on water quality.

Zoning ordinances, building codes, and health regulations also may have beneficial impacts through their adoption and enforcement. Still other effects result from more routine activities such as street sweeping, sewer and catch basin cleaning, and solid waste management.

Special purpose districts also are involved. Du Page County Forest Preserve District acquisitions have been extensive (particularly along the West Branch) and these will have a bearing on future development in the basin. Local soil and water conservation districts also have been active for several years in promoting soil erosion control measures.

16.03 WATER QUALITY IN THE BASIN

a. Applicable State Standards and Designations

All waterways in the basin are designated as "General Use, Protected for Public and Food Processing Water Supply", and are subject to state standards for waterways with such a designation. A full discussion on General Use standards and other standards applicable to water quality is given in Chapter Four.

b. IEPA Segment Classification

The IEPA has divided the state into hydrologic units that coincide with major river basins. These units have been further divided into segments on the basis of common characteristics. The Du Page River Basin is made up of IEPA segments A-8, A-9 and A-10, which are three of 20 segments in the Des Plaines/Lake Michigan hydrologic unit as defined by the IEPA. These segments, like all others in the state, have been designated "water quality limited". This means that water quality in the waterways of the basin will be below state standards even when minimal statutory effluent standards are being met in all wastewater discharges.

c. Sources of Information

Assessment of current water quality conditions in the basin is based on information developed in the Commission's water quality sampling program as well as data collected by other public agencies, principally, the IEPA. A brief description of the sampling programs is provided below. The water quality model was also used to develope detailed information on present (and future) water quality conditions.

(1) Commission In-Stream Sampling: The sampling and analysis programs conducted by the Commission involved 48 instream sampling stations established for areawide planning (See Chapter Four). Five of these stations were within the Du Page River Basin. Their locations were:

Station 13: West Branch Du Page River at North Avenue in West Chicago
Station 22: Du Page River at Illinois 59 in Shorewood
Station 24: East Branch Du Page River at Naperville Road
Station 25: West Branch Du Page River at Naperville Road
Station 26: East Branch Du Page River at Maple Avenue in Lisle

Data were collected at seasonal intervals over a 13-month period (April, 1976 - April, 1977) at each of these stations. Sampling results were used in calibrating the water quality model but they also represent important information on the characteristics of streams in the basin. Samples were analyzed for 19 constituents or characteristics, which are referred to in this plan as "parameters".

(2) Land Use Stormwater Sampling: The Commission conducted stormwater runoff sampling and analysis at 16 sites, representing a cross-section of land use in the region, and two ravines tributary to Lake Michigan.

Three of the stormwater runoff sites were located within the Du Page River Basin. These were:

Station 12: Single Family residential area on Armitage Creek in Glendale Heights.

Station 14: Single family residential area on Springinsguth Road in Schaumburg.

Station 15: High density residential area, Winston Village in Bolingbrook.

However, the data from the stormwater runoffs are not intended to be basin-specific; rather, they indicate

characteristics of runoff from particular kinds of land uses, wherever they are found in the region. Results of the sampling effort were discussed in Chapter Six.

(3) SOD Measurements: The Commission conducted sediment oxygen demand (SOD) measurements from bottom deposits at 110 stations. Fifteen of the sites at which SOD was measured are in this basin. (See Figure 16-2).

(4) Benthic Sampling: The Commission conducted benthic community (macroinvertebrate) sampling from bottom deposits at 116 stations. In addition to measuring the oxygen demands of various organisms, bottom sediment samples were collected, analyzed, and described as being representative of one of the following generalized conditions: clean, moderately clean, slightly degraded, moderately polluted, polluted, heavily polluted, or sewage sludge-like. Ratings developed for the 15 sites in this basin are discussed below. (See Table 16-8). At these same 15 sites, benthic communities were analyzed, and mathematical Shannon-Weaver indices reflecting the nature and diversity of these communities were developed according to standard formulas. Indexes about 3.0 are indicative of generally clean water; values between 1.0 and 3.0 are indicative of moderately polluted water; and values below 1.0 are indicative of seriously polluted water. Values developed for the 15 sites in this basin are provided in Table 16-9. Ratings based on the IEPA's classification system also are shown.

(5) Other Commission Studies: In addition to the foregoing, the Commision conducted dam aeration/deaeration measurement at 48 structures and fish population surveys at 60 sites.

(6) IEPA Sampling: The IEPA water quality sampling network consists of about 190 sampling stations in the six-county region, 30 of which are in the Du Page Basin. Sampling results from these 30 sites are discussed below and are from the IEPA's sampling of chemical parameters in 1976. Sites where IEPA samples were collected are shown in Figure 16-2.

(7) Computer Simulation of Existing Conditions: As shown in Figure 16-3, for modeling purposes the basin was divided into fifty areas called "reaches". Each reach is composed of a segment of a major stream, the waterways that are tributary to that segment, and the land area drained by the major stream segment and its tributaries. Each is a direct tributary to the reach immediately downstream from it, and an indirect tributary to other downstream reaches. Reach 290 is the farthest downstream point for which water quality conditions in the basin have been simulated. Since water from all other Du Page River reaches eventually flows into Reach 290, it represents a "summary" of pollutant loads in the basin. Water quality conditions and pollutant loads are

TABLE 16-8: GENERALIZED BENTHIC SEDIMENT CONDITIONS

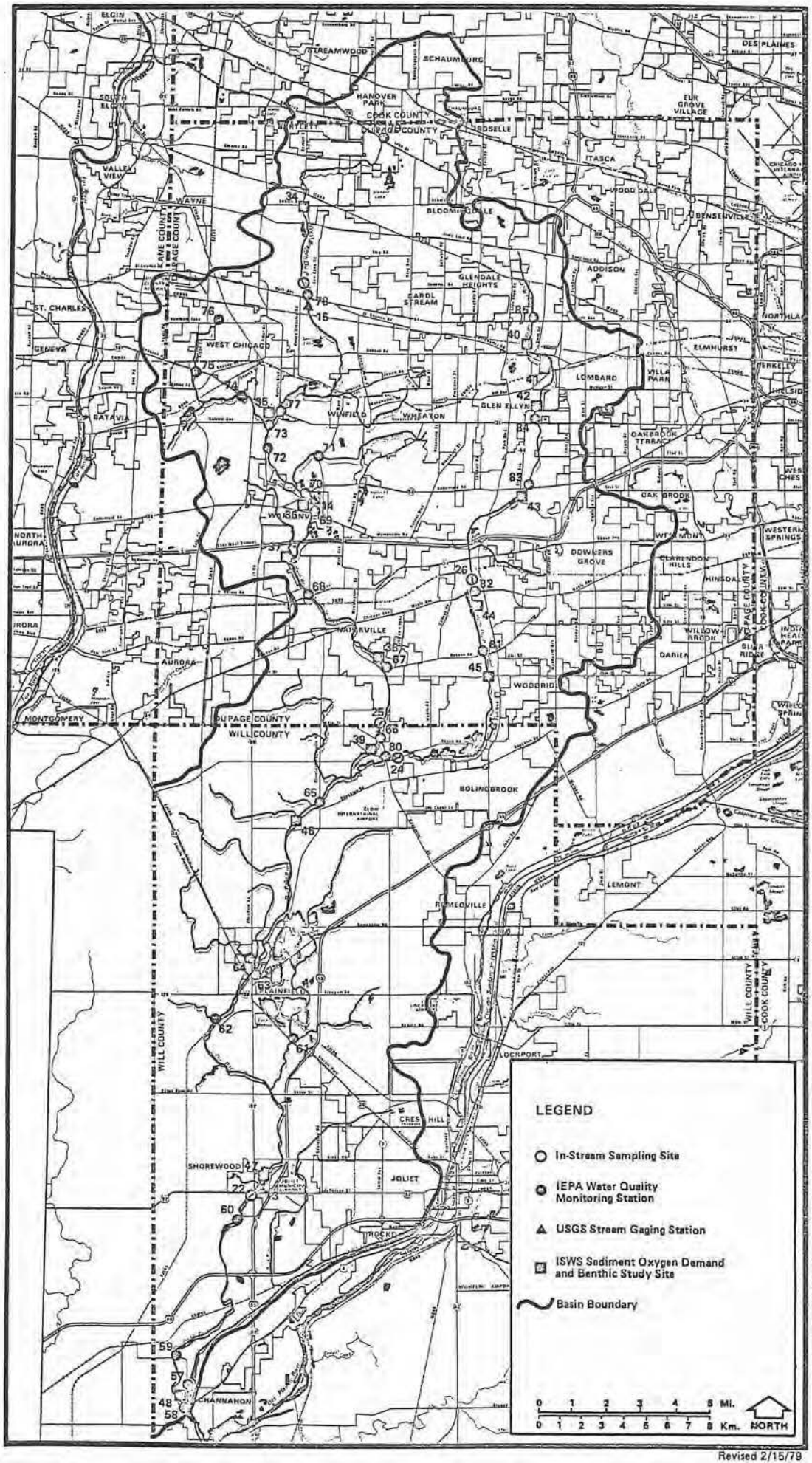
Du Page River BASIN

STATION NUMBER	STREAM NAME	BENTHIC CONDITION*
34	West Branch	Slightly Degraded
35	West Branch	Slightly Degraded
36	West Branch	Slightly Degraded
37	West Branch	Moderately Polluted
38	West Branch	Slightly Degraded
39	West Branch	Polluted
40	East Branch	Polluted
41	East Branch	Moderately Polluted
42	East Branch	Heavily Polluted
43	East Branch	Moderately Polluted
44	East Branch	Moderately Polluted
45	East Branch	Slightly Degraded
46	Du Page River	Polluted
47	Du Page River	Slightly Degraded
48	Du Page River	Polluted

*Based on SOD value

summarized for 11 reporting reaches throughout the basin. Table 16-10 describes each reporting reach.

Figure 16-2: WATER SAMPLING STATIONS



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Figure 16-3: BASIN MODELING SEGMENTS



TABLE 16-9: BIOLOGICAL STREAM SITE CLASSIFICATIONS

Du Page River BASIN

Station Number	Stream Name	IEPA Classification(1)	Shannon-Weaver	
			Index	Classification(2)
34	West Branch	P.	0.00	SeP
35	West Branch	P.	0.38	SeP
36	West Branch	P.	0.14	SeP
37	West Branch	P.	0.00	SeP
38	West Branch	SP	1.22	MP
39	West Branch	SP	2.18	MP
40	East Branch	SP	1.15	MP
41	East Branch	SP	1.75	MP
42	East Branch	P	0.58	SeP
43	East Branch	SP	1.01	MP
44	East Branch	P	0.97	SeP
45	East Branch	P	0.81	SeP
46	DuPage River	SP	2.19	MP
47	Du Page River	SP	1.85	MP
48	Du Page River	P	0.60	SeP

(1) Polluted (P); Semi-polluted (SP); Unbalanced (U); Balanced (B).

(2) Severe pollution (Se P); Moderately polluted (MP); Clean (C).

d. Current Water Quality 475

Results of Sampling and Analysis 477

(1) Commission In-Stream Sampling: Results of the 480
Commission's sampling program are shown in Table 16-11. Of 481
the 19 parameters evaluated, the State of Illinois has
established standards for four: pH, temperature, dissolved 483

oxygen (DO), and ammonia. Violations of State standards have been used in this study as a measure of the relative water quality of rivers and streams. The ammonia nitrogen standard was violated frequently at Stations 24 and 26 on the East Branch, and occasionally at Stations 13 and 25 on the West Branch. The DO standard is violated at all five stations, with the highest frequency violations being at Stations 24 and 26 on the East Branch.

(2) IEPA Sampling: Ammonia violations also were common in the samples collected by IEPA at 30 sites in the basin (see Table 16-12). The standard for ammonia was violated in 45 percent of the samples, and in many cases, the concentrations were far in excess of the standard. Again, violations were most severe in the East Branch.

Violations of standards for fecal coliform, iron, copper, and dissolved oxygen were also noted frequently in the IEPA samples. Out of 200 analyses for fecal coliform, 105 apparent (the IEPA varies from preferred methodology for sampling fecal coliform) violations were recorded. Of 64 analyses for iron, 30 violations were noted. Violations of the copper standard were noted in 47 of 64 samples. The DO standard was violated in 25 of 198 samples.

(3) Benthic and SOD analyses: Based on biological analyses, eight sites were considered severely polluted and seven were considered moderately polluted (see Table 16-9). Based on SOD measurements, one site was described as heavily polluted, four were polluted and four were moderately polluted (see Table 16-8). (Note that these conflicting classifications of the same stream sites result from the use of different parameters and/or criteria).

(4) Fish Species and Habitat: Fish samples were collected at 15 sites in the basin in 1976 as part of the 208 sampling program. Seven of the sites were on the Du Page mainstem, with the remainder on the East and West Branches. Thirty-seven species and four hybrids were collected in this survey. The most abundant species were green sunfish, bluntnose minnows, and spotfin shiners, which together represented 56 percent of the total number of fishes collected. Throughout its length, the East Branch contained a few species of fish in small numbers. The headwaters of the West Branch also contained a poor quality fishery, but, immediately upstream of the confluence of the two branches, the West Branch contained more species and numbers, indicative of improved environmental conditions. Fish populations continued to improve in the mainstem.

Follow-on work by the Illinois Natural History Survey (INHS) involved computation of a "toxicity index" relating water quality to fish habitat suitability. Included in the parameters for computing the toxicity index (using bluegills as the target species) are cadmium, nickel, arsenic, chromium, boron, mercury, cyanide, ammonia, and copper,

among others. On the basis of its analysis, the INHS determined that the calculated "Bluegill Toxicity Index" at ten of thirty IEPA water quality sampling sites in this watershed was in excess of the theoretical maximum level above which a diverse fishery cannot be maintained. The water quality parameters found to have the most significant effect on the high index calculations were ammonia, silver and cyanide.

Overall, the Natural History Survey concluded that fish habitat in the basin (as measured by water quality) was poor in the East and West Branches, but improved with distance downstream on the mainstem.

(5) Results of Water Quality Modeling: As described in Chapter Four, the model is a computerized system that uses mathematical formulas to replicate the drainage basin of the Du Page River. This process is called "simulation".

To ensure that the model is an accurate representation of the basin, the behavior of the model has been balanced carefully against hundreds of measurements and observations of conditions and actual water samples collected and analyzed in the basin during 1976 and 1977.

Sources of pollutants were categorized in the modeling process as follows:

--Point Sources: treatment plants and other discrete discharges.

--Nonpoint Sources: surface runoff and groundwater seepage from developed and undeveloped areas.

--Combined Sewer Overflows.

--Boundary Conditions: the amount of pollution flowing into a basin from another basin or another state. Boundary conditions are not a factor in the Du Page Basin.

The simulation of existing conditions provides a more comprehensive picture of water quality in the basin than do the results of periodic sampling programs. Water quality conditions were simulated on an hourly basis. In addition, not only were pollutant concentrations determined and related to state standards, but also the relative amounts of pollutants contributed by various sources were described.

(a) Pollutant Concentrations: Although the Commission analyzed 19 parameters simulation reports on existing conditions were prepared only for eight: stream flow, temperature, chlorophyll a, dissolved oxygen (DO), 20-day biochemical oxygen demand (BOD_{20}), ammonia (NH_3), nitrate (NO_3), and phosphate (PO_4). The last four of these represent pollutants that can be quantified and

TABLE 16-10: MODEL REPORTING REACHES

Reach 5 Area Drained by the headwaters of the West Branch above Lake Street including the MSD-Hanover Park Treatment Plant	Reach 120 Area drained by the upper East Branch above the Glenbard Treatment Plant.
Reach 20 Area drained by the West Branch above Geneva Road including the Bartlett Treatment Plant	Reach 150 Area drained by the East Branch above Maple Avenue including the Downers Grove Treatment Plant
Reach 25 Area drained by Klein Creek above its confluence with the West Branch, including the Carol Stream Treatment Plant	Reach 175 Area drained by the East Branch and its tributaries above Naperville Rd, just above the confluence of the East and West Branches.
Reach 85 Area drained by the West Branch and its tributaries above Naperville Road, just above the confluence of the East and West Branches	Reach 230 Area drained by the mainstem DuPage above Lockport Road in the town of Plainfield, including the Naperville Springbrook Treatment Plant
Reach 110 Area drained by the headwaters of the East branch above St. Charles Road including the Glendale Heights Treatment Plant	Reach 275 Area drained by Lily Cache Creek above its confluence with the mainstem
	Reach 290 Area drained by the mainstem DuPage and its tributaries above Highway 52 in the town of Shorewood

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TABLE 16-11: IN-STREAM WATER QUALITY ANALYSES–SUMMARY DATA

DU PAGE RIVER BASIN

STATION NO. 13

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
MAY 3 – 12 1976	No. of Analyses	30	10	30	30	30	30	30	29	10	10			30	30	30	30	10	2	10	
	Maximum	8.0	246	180	264	872	44	14	10	15	34			2.3	1.9	4.2	0.83	39	423	24	
	Minimum	7.2	95	18	40	380	5	5	7	2	4			0.6	0.4	2.3	0.19	13	366	8	
	Mean	7.6	190	54	92	604	15	10	9	6	10			1.2	0.7	3.4	0.50	17	394	14	
AUGUST 2 – 11 1976	No. of Analyses	30	10	30	30	30	30	30	29	10	10			30	30	30	30	10	2	10	
	Maximum	8.2	299	220	395	1186	36	27	10	4	21			1.4	1.0	4.4	2.00	17	522	28	
	Minimum	7.7	184	21	34	510	4	17	3	1	2			0.3	0.1	1.7	0.56	11	515	8	
	Mean	8.0	264	43	80	961	10	20	8	2	6			0.8	0.3	2.9	1.38	15	518	14	
NOVEMBER 3 – 12 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	9	
	Maximum	8.0	345	10	19	1010	6	7	15	9	7			1.2	0.2	2.4	1.28	15	623	20	
	Minimum	7.6	310	3	5	744	1	2	8	2	1			0.2	0.1	0.9	0.56	9	601	5	
	Mean	7.9	319	5	9	953	3	5	13	4	4			0.6	0.1	1.3	0.75	13	612	11	
JANUARY 31 FEBRUARY 7 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
APRIL 25 – 30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	5	10
	Maximum	8.0	284	37	88	1012	13	15	10	6	12			1.9	0.8	5.9	1.80	15	485	19	40
	Minimum	7.3	221	22	48	770	8	10	6	2	3			0.7	0.1	3.2	0.74	9	471	12	31
	Mean	7.7	266	30	66	934	11	12	8	4	8			1.2	0.4	4.4	1.21	12	478	16	34

STATION NO. 22

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
MAY 3 – 12 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.1	226	99	264	742	33	18	12	12	16			3.8	0.8	6.7	0.58	16	401	39	
	Minimum	7.5	100	13	33	464	6	7	7	1	3			0.4	0.1	4.4	0.18	9	360	17	
	Mean	7.7	181	40	94	630	15	12	9	4	7			1.0	0.4	5.6	0.37	11	380	24	
AUGUST 2 – 11 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.8	291	30	131	1078	14	26	17	6	11			1.1	0.4	4.8	1.54	9	457	71	
	Minimum	8.1	175	6	4	514	1	19	3	2	4			0.5	0	3.0	0.90	4	415	13	
	Mean	8.4	255	13	34	943	7	23	10	3	6			0.8	0.1	3.8	1.18	6	436	29	
NOVEMBER 3 – 12 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	8.6	305	12	27	1178	8	8	19	6	12			2.3	0.9	6.5	3.24	6	508	64	
	Minimum	8.0	281	4	6	1072	1	0	5	3	4			0.7	0.1	5.6	1.97	4	491	23	
	Mean	8.3	291	7	14	1121	4	3	13	4	9			1.5	0.4	6.0	2.66	5	500	37	
JANUARY 31 FEBRUARY 7 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
APRIL 25 – 30 1976	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	10	10
	Maximum	8.0	255	37	126	924	22	16	10	6	10			1.0	0.2	6.5	0.93	9	425	42	291
	Minimum	7.6	220	7	57	828	9	10	5	1	5			0.7	0.1	5.1	0.60	7	411	27	186
	Mean	7.8	238	24	82	875	14	13	8	4	8			0.9	0.2	5.9	0.76	8	418	35	242

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

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TABLE 16-11: IN-STREAM WATER QUALITY ANALYSES–SUMMARY DATA

DU PAGE RIVER BASIN

STATION NO. 24

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
MAY 3 – 12 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.0	282	120	253	940	33	16	12	6	19			3.5	2.5	3.6	1.18	23	436	22	
	Minimum	7.0	128	14	24	424	4	7	5	2	5			0.8	0.6	1.7	0.18	11	426	10	
	Mean	7.6	213	34	73	695	13	12	7	4	9			2.0	1.4	2.8	0.63	13	431	15	
AUGUST 2 – 11 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.0	307	58	144	1370	22	24	13	8	24			5.1	4.1	6.3	3.92	18	481	25	
	Minimum	7.6	178	23	42	934	7	18	3	2	8			2.5	0.0	1.9	1.41	14	471	12	
	Mean	7.8	276	37	88	1236	14	21	6	4	12			3.5	2.43	4.6	2.56	16	476	19	
NOVEMBER 3 – 12 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	8.0	345	36	131	1360	15	9	19	5	12			7.0	5.5	7.2	4.36	19	503	13	
	Minimum	7.3	300	6	9	916	2	4	4	1	4			4.4	3.8	5.9	3.24	16	479	7	
	Mean	7.8	321	13	32	1272	7	7	11	3	8			5.8	4.6	6.5	3.90	17	491	9	
JANUARY 31 FEBRUARY 7 1977	No. of Analyses	4	4	4	4	4	4	4	3	4	4			4	4	4	4	4	0	4	
	Maximum	7.7	385	28	72	1380	50	2	8	17	44			14.6	12.8	1.9	4.60	18		7	
	Minimum	7.1	348	7	11	1246	8	0	7	6	15			13.3	12.0	1.5	3.68	16		2	
	Mean	7.4	364	16	32	1320	21	1	7	11	25			13.9	12.4	1.7	4.27	17		4	
APRIL 25 – 30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	8.2	277	23	60	1188	14	17	9	15	48			5.3	4.1	3.3	2.24	15	482	43	71
	Minimum	7.4	247	13	36	988	9	11	6	4	10			3.9	2.9	2.5	1.34	8	465	14	55
	Mean	7.7	266	19	50	1089	11	13	7	9	18			4.4	3.5	3.1	1.73	12	473	27	61

STATION NO. 25

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
MAY 3 – 12 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.1	260	190	457	898	55	16	11	6	16			2.5	2.5	1.3	0.55	23	383	42	
	Minimum	7.4	115	12	22	402	6	6	7	2	4			0.5	0.5	0.1	0.18	9	345	18	
	Mean	7.8	190	50	107	629	17	11	9	4	7			1.1	1.1	0.6	0.38	14	364	25	
AUGUST 2–11 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.6	305	54	129	1166	18	26	15	3	16			1.4	1.4	2.7	1.65	11	493	41	
	Minimum	7.8	186	6	9	730	2	19	4	1	3			0.4	0.4	0.0	0.83	7	447	15	
	Mean	8.3	256	18	35	955	6	22	10	2	7			0.8	0.8	0.2	1.23	10	470	27	
NOVEMBER 3 – 12 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	8.4	314	10	25	1162	10	7	16	8	14			3.6	3.6	1.7	2.44	8	529	34	
	Minimum	8.0	278	5	4	992	1	0	6	3	4			1.4	1.4	0.4	1.53	6	501	16	
	Mean	8.2	301	7	14	1086	5	4	12	5	9			2.1	2.1	1.0	1.90	7	515	24	
JANUARY 31 FEBRUARY 7 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
APRIL 25 – 30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	8.0	241	34	92	872	20	16	12	8	11			1.6	0.8	4.7	0.86	12	428	52	85
	Minimum	7.6	221	17	46	762	9	11	7	2	6			0.9	0.2	3.6	0.50	7	392	24	55
	Mean	7.8	231	25	69	833	13	13	8	5	9			1.1	0.3	4.2	0.65	8	410	32	70

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by

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TABLE 16-11: IN-STREAM WATER QUALITY ANALYSES–SUMMARY DATA

DU PAGE RIVER BASIN

STATION NO. 26

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
MAY 3 – 12 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	7.9	302	120	179	982	33	17	10	6	26			3.8	3.0	4.4	1.31	22	440	18	
	Minimum	7.2	122	11	17	444	3	7	6	2	6			0.7	0.5	1.6	0.26	12	424	9	
	Mean	7.6	218	32	60	714	12	12	8	4	11			2.1	1.5	3.0	0.69	13	432	12	
AUGUST 2 – 11 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.1	323	22	53	1366	12	25	10	7	24			5.2	4.6	7.9	5.40	17	487	41	
	Minimum	7.7	242	7	8	824	2	19	3	2	7			3.1	0.1	3.6	1.60	13	449	9	
	Mean	7.9	286	12	21	1159	6	22	6	4	11			4.0	2.9	5.2	4.16	15	468	21	
NOVEMBER 3 – 12 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	8.0	351	15	31	1416	7	11	17	4	12			9.3	7.6	8.9	6.00	19	480	10	
	Minimum	7.7	270	7	11	1288	2	7	4	2	3			7.0	5.5	6.9	4.36	17	462	6	
	Mean	7.9	332	10	19	1349	5	9	10	3	9			7.9	6.5	7.6	5.27	18	471	7	
JANUARY 31 FEBRUARY 7 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
APRIL 25 – 30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	7.9	298	65	250	1284	45	18	11	9	55			5.9	4.9	3.7	2.70	14	472	43	87
	Minimum	7.5	217	6	11	914	3	11	6	2	7			4.5	3.5	2.1	1.60	10	442	11	26
	Mean	7.7	272	19	54	1033	12	14	8	6	18			5.2	4.1	3.1	2.11	12	457	22	41

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco

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TABLE 16-12: VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

DU PAGE RIVER BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																			
			Ammonia Nitrogen	Fecal[2] Coliform (per 100 ml)	Iron	Copper	Dissolved Oxygen	Lead	Silver	Chloride	Fluoride	PH (Units)	Boron	Sulfate	Cyanide	Hexavalent Chromium	Total Phosphorus	Manganese	Phenol	Total Dissolved Solids	Temp. (°F)
			1.50	200	1.0	0.02	5.0	0.10	0.005	(4)	1.4	(4)	1.0	(4)	(4)	(4)	(4)	1.0	(4)	(4)	(4)
56	DuPage River	No. of Analyses	5	5	1	1	5	1	1		1		1					1			
		No. of Violations	0	1	1	1	0	0	0		0		0					0			
GB 01		Maximum		400	1.1	0.06															
		Minimum		100	1.1	0.06															
		Mean[3]		151	1.1	0.06															
58	DuPage River	No. of Analyses	5	5	2	2	5	2	2		2		2					2			
		No. of Violations	0	1	0	1	0	0	0		0		0					0			
GB 02		Maximum		500		0.03															
		Minimum		100		0.01															
		Mean[3]		181		0.02															
59	Du Page River	No. of Analyses	5	5	2	2	5	2	2		2		2					2			
		No. of Violations	0	3	1	2	0	0	0		0		0					0			
GB 03		Maximum		400	1.3	0.06															
		Minimum		100	0.6	0.05															
		Mean[3]		204	0.9	0.05															
60	DuPage River	No. of Analyses	5	5	1	1	5	1	1		1		1					1			
		No. of Violations	0	3	0	1	0	0	0		0		0					0			
GB 04		Maximum		800		0.04															
		Minimum		100		0.04															
		Mean[3]		328		0.04															
62	DuPage River	No. of Analyses	5	5	2	2	5	2	2		2		2					2			
		No. of Violations	1	4	0	2	0	0	0		0		0					0			
GB 08		Maximum	4.60	1000		0.22															
		Minimum	0.01	100		0.03															
		Mean[3]	1.10	535		0.12															
63	DuPage River	No. of Analyses	4	4	2	2	4	2	2		2		2					2			
		No. of Violations	0	2	1	1	0	0	0		0		0					0			
GB 09		Maximum		600	1.4	0.10															
		Minimum		100	0.6	0.02															
		Mean[3]		244	1.0	0.06															
65	DuPage River	No. of Analyses	7	7	4	4	7	4	4		4		4					4			
		No. of Violations	3	3	2	3	0	0	0		0		0					0			
GB 10		Maximum	7.0	1900	1.4	0.19															
		Minimum	0.45	100	0.4	0.00															
		Mean[3]	2.57	208	0.8	0.07															
57	I & M Canal	No. of Analyses	5	5	2	2	5	2	2		2		2					2			
		No. of Violations	0	1	0	1	0	0	0		0		0					0			
GBA 02		Maximum		700		0.07															
		Minimum		100		0.00															
		Mean[3]		169		0.03															
61	Lily Cache Creek	No. of Analyses	5	5	2	2	5	2	2		2		2					2			
		No. of Violations	0	4	1	1	0	0	0		0		0					0			
GBE 01		Maximum		1900	1.2	0.06															
		Minimum		100	0.5	0.02															
		Mean[3]		490	0.8	0.04															

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

TABLE 16-12: VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

DU PAGE RIVER BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen	Fecal[2] Coliform (per 100 ml.)	Iron	Copper	Dissolved Oxygen	Lead	Silver	Chloride	Fluoride	PH (Units)	Boron	Sulfate	Cyanide	Hexavalent Chromium	Total Phosphorus	Manganese	Phenol	Total Dissolved Solids	Temp. (°F)
			1.50	200	1.0	0.02	5.0	0.10	0.005	(4)	1.4	(4)	1.0	(4)	(4)	(4)	(4)	1.0	(4)	(4)	(4)
64	Norman Drain	No. of Analyses	4	4	0	0	4	0	0		0		0					0			
		No. of Violations	0	2			0														
GBH 01		Maximum		400																	
		Minimum		100																	
		Mean[3]		237																	
66	West Branch Du Page River	No. of Analyses	8	8	3	3	8	3	3		3		3					3			
		No. of Violations	2	3	0	2	0	0	0		0		0					0			
GBK 02		Maximum	6.4	1100		0.06															
		Minimum	0.02	100		0.01															
		Mean[3]	1.40	250		0.04															
67	West Branch DuPage River	No. of Analyses	8	8	0	0	8	0	0		0		0					0			
		No. of Violations	2	7			0														
GBK 01		Maximum	7.20	4500																	
		Minimum	0.06	100																	
		Mean[3]	1.32	650																	
68	West Branch Du Page River	No. of Analyses	8	8	5	5	8	5	5		5		5					5			
		No. of Violations	2	3	3	4	0	0	0		0		0					0			
GBK 03		Maximum	8.0	2000	1.5	0.11															
		Minimum	0.35	100	0.4	0.01															
		Mean[3]	1.89	224	1.0	0.04															
69	West Branch Du Page River	No. of Analyses	8	8	0	0	8	0	0		0		0					0			
		No. of Violations	6	6			3														
GBK 04		Maximum	9.0	2500			11.6														
		Minimum	0.65	100			4.4														
		Mean[3]	3.05	472			7.9														
70	West Branch Du Page River	No. of Analyses	7	7	3	3	7	3	3		3		3					3			
		No. of Violations	5	6	1	2	3	0	0		0		0					0			
GBK 05		Maximum	6.40	4,700	1.4	0.05	10.1														
		Minimum	0.72	100	0.5	0.00	2.8														
		Mean[3]	3.05	982	0.9	0.03	6.3														
72	West Branch Du Page River	No. of Analyses	7	7	3	3	7	3	3		4		3					3			
		No. of Violations	1	5	0	3	0	1	0		0		0					0			
GBK 06		Maximum	3.50	6,600		0.35		0.68													
		Minimum	0.30	100		0.03		0.02													
		Mean[3]	1.12	739		0.13		0.24													
77	West Branch Du Page River	No. of Analyses	8	8	0	0	7	0	0		0		0					0			
		No. of Violations	4	5			0														
GBK 07		Maximum	5.10	37000																	
		Minimum	0.42	100																	
		Mean[3]	2.13	1187																	
78	West Branch Du Page River	No. of Analyses	8	8	3	3	8	3	3		3		3					3			
		No. of Violations	0	5	2	2	0	0	0		0		0					1			
GBK 09		Maximum		1500	2.1	0.03												2.10			
		Minimum		100	0.5	0.00												0.12			
		Mean[3]		321	1.3	0.02												0.79			

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported

TABLE 16-12: VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

DU PAGE RIVER BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen	Fecal[2] Coliform (per 100 ml.)	Iron	Copper	Dissolved Oxygen	Lead	Silver	Chloride	Fluoride	PH (Units)	Boron	Sulfate	Cyanide	Hexavalent Chromium	Total Phosphorus	Manganese	Phenol	Total Dissolved Solids	Temp. (°F)
			1.50	200	1.0	0.02	5.0	0.10	0.005	(4)	1.4	(4)	1.0	(4)	(4)	(4)	(4)	1.0	(4)	(4)	(4)
79	West Branch Du Page River	No. of Analyses	9	9	6	6	9	6	6		6		6					6			
		No. of Violations	4	5	3	4	2	1	0		1		2					0			
GBK 10		Maximum	13.00	84,000	7.0	0.16	10.6	0.16			1.7		1.3								
		Minimum	0.12	100	0.5	0.02	2.3	0.00			0.5		0.2								
		Mean[3]	3.95	448	2.0	0.05	6.8	0.04			0.9		0.7								
71	Spring Brook	No. of Analyses	8	8	0	0	8	0	0		0		0					0			
		No. of Violations	8	3			3														
GBKA 01		Maximum	18.0	1500			11.0														
		Minimum	4.2	100			3.7														
		Mean[3]	9.25	262			6.8														
73	Kress Creek	No. of Analyses	7	7	3	3	7	3	3		3		3					3			
		No. of Violations	1	5	2	3	0	0	0		2		0					0			
GBKB 01		Maximum	2.50	800	2.1	0.08					4.8										
		Minimum	0.06	100	0.6	0.03					0.6										
		Mean[3]	0.69	303	1.4	0.05					2.4										
74	Kress Creek	No. of Analyses	6	6	3	3	6	3	3		3		3					3			
		No. of Violations	1	3	0	1	0	0	0		0		0					0			
GBKB 03		Maximum	3.20	800		0.05															
		Minimum	0.01	100		0.00															
		Mean[3]	0.91	249		0.02															
75	Kress Creek	No. of Analyses	7	7	0	0	7	0	0		0		0					0			
		No. of Violations	4	4			1														
GBKB 04		Maximum	3.30	1,500			17.4														
		Minimum	0.76	100			4.1														
		Mean[3]	1.77	266			10.5														
76	Kress Creek	No. of Analyses	8	8	3	3	8	3	3		3		3					3			
		No. of Violations	8	3	1	3	0	0	0		0		0					0			
GBKB 05		Maximum	26.0	2,000	1.5	0.09															
		Minimum	2.6	100	0.6	0.04															
		Mean[3]	9.43	295	0.9	0.06															
80	East Branch Du Page River	No. of Analyses	8	8	0	0	7	0	0		0		0					0			
		No. of Violations	6	4			2														
GBL 02		Maximum	10.0	49,000			10.8														
		Minimum	0.76	100			3.2														
		Mean[3]	3.43	588			7.1														
81	East Branch Du Page River	No. of Analyses	8	8	5	5	8	5	5		5		5					5			
		No. of Violations	7	4	3	4	2	0	0		1		0					0			
GBL 01		Maximum	13.0	33,000	12.0	0.12	9.6				1.5										
		Minimum	1.4	100	0.5	0.02	2.8				0.4										
		Mean[3]	5.51	631	3.1	0.06	6.3				0.8										
82	East Branch Du Page River	No. of Analyses	8	8	3	3	8	3	3		3		3					3			
		No. of Violations	7	2	1	2	0	0	1		0		0					0			
GBL 05		Maximum	12.0	17,000	1.3	0.05			0.020												
		Minimum	1.5	90	0.4	0.01			0.000												
		Mean[3]	4.97	215	0.7	0.03			0.007												

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(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

TABLE 16-12. VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS — DU PAGE RIVER BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen	Fecal[2] Coliform (per 100 ml.)	Iron	Copper	Dissolved Oxygen	Lead	Silver	Chlorids	Fluoride	PH (Units)	Boron	Sulfate	Cyanide	Hexavalent Chromium	Total Phosphorus	Manganese	Phenol	Total Dissolved Solids	Temp. (°F)
			1.50	200	1.0	0.02	5.0	0.10	0.005	(4)	1.4	(4)	1.0	(4)	(4)	(4)	(4)	1.0	(4)	(4)	(4)
83	East Branch Du Page River	No. of Analyses	7	7	5	5	7	5	5		5		5					5			
		No. of Violations	7	2	0	3	3	1	0		1		2					0			
GBL 07		Maximum	16.0	2700		0.14	8.1	1.0			1.8		1.4								
		Minimum	2.8	40		0.00	1.5	0.0			0.5		0.5								
		Mean[3]	7.2	189		0.06	5.2	0.21			1.0		0.9								
84	East Branch Du Page River	No. of Analyses	6	6	0	0	6	0	0		0		0					0			
		No. of Violations	6	4			4														
GBL 08		Maximum	17.0	16000			8.3														
		Minimum	4.10	100			1.8														
		Mean[3]	8.43	1042			4.3														
85	East Branch Du Page River	No. of Analyses	6	6	1	1	6	1	1		1		1					1			
		No. of Violations	6	2	0	1	2	0	0		0		1					0			
GBL 09		Maximum	13.0	4000		0.03	9.0						1.1								
		Minimum	2.2	100		0.03	4.3						1.1								
		Mean[3]	6.23	380		0.03	6.3						1.1								

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

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associated with specific categories of sources using the model.

Assessments of conditions with respect to each parameter or pollutant are based on state instream standards, where there are standards that can be applied. Statistical values express the minimum, maximum and average concentrations of pollutants. Values also describe the number of times that simulated concentrations violated state standards, and the average durations of the violations.

The simulation was continuous, with hourly outputs over a three-year period. Therefore, if a standard for a particular pollutant was constantly violated over the entire simulation period, that would be reflected in the statistics for number and frequency of violations, as follows:

--number of violations: one (because there was only one violation, even though it was of three years' duration),

--average duration: 26,304 hours (the total number of hours in the three-year period).

Table 16-13 summarizes pollutant levels simulated for the Du Page under existing conditions. As indicated by the results of the instream sampling programs discussed above, modeling reflected problems with respect to ammonia. Simulated maximum levels exceeded the standard of 1.5 mg/l in all eleven of the reaches reported in Table 16-13.

Throughout the East Branch, the mean concentration of ammonia also exceeded the standard. The maximum level modeled for the basin was in Reach 120, 11.6 mg/l, more than seven times the concentration allowed under the standard.

The phosphate standard of 0.05 mg/l, although it does not apply to rivers and streams in this basin, was violated almost continually in all eleven reaches.

Levels of BOD are variable, but in many reaches were considered excessive. This is particularly true in the East Branch where mean BOD concentrations ranged from 7.2 to 11.8 mg/l in the more polluted reaches.

The Commission has used dissolved oxygen (DO) as a general indicator of water quality. DO conditions in the Du Page are described in Table 16-14. Two particular statistics, the minimum DO levels of less than 1 mg/l in Reaches 120 and 175, indicate the severity of the worst DO problems in the basin. Elsewhere, the 5.0 mg/l standard was violated at least occasionally in each of the eleven reaches.

(b) Pollutant Loadings and Sources: Relative pollutant contributions by source vary for different parts of the basin. In general, pollutant loads in the Du Page Basin are high. The basin contains significant urbanization, particularly in the East and West Branches. It also contains large amounts of cropland, particularly in the

mainstem area. The major land cover types are cropland and grassland, followed by lowland and forest and impervious cover. An analysis of pollutant loads and water quality is presented below for reaches on each of the three major elements of the system. These are: Reach 85 on the West Branch, Reach 175 on the East Branch, and Reach 290 on the mainstem Du Page.

Reach 290 encompasses all of the pollutant loads entering the basin as modeled. Table 16-15 is a summary of

TABLE 16--13: STATISTICAL SUMMARY OF CURRENT QUALITY

Parameter (Standard) (All data in mg/l)	REACHES										
	5	20	25	85	110	120	150	175	230	275	290
BOD (No Standard) Maximum	51.4	28.3	75.0	31.1	72.3	43.0	41.9	32.5	51.3	25.1	42.7
Minimum	2.96	2.36	.40	2.02	.44	3.80	2.65	2.74	2.56	1.68	2.06
Mean	9.36	6.08	4.69	5.42	4.30	11.8	8.02	7.22	5.81	5.38	5.35
AMMONIA (1.5 mg/l) Maximum	3.73	2.54	3.90	3.15	7.14	11.6	9.68	7.38	3.55	7.51	3.99
Minimum	.09	.04	0	.02	.41	.48	.3	.20	0	.11	0
Mean	.58	.48	.55	1.00	3.43	4.79	3.36	2.58	1.05	.90	.71
No. Violations	127	19	122	51	142	13	64	123	40	51	16
Avg. Duration Viol.	13	8	4	123	177	2,017	402.6	189	161	50	166
NITRATE (No Standard) Maximum	7.91	11.7	11.4	9.40	17.6	8.59	8.25	8.40	15.1	11.4	12.7
Minimum	.75	1.37	.24	1.32	.45	1.05	1.00	1.28	.32	.80	0
Mean	6.14	4.8	3.57	4.10	4.97	5.19	4.67	4.68	4.71	3.51	4.68
PHOSPHATE (.05 mg/l) Maximum	3.07	3.32	1.77	2.97	6.87	6.87	5.53	4.55	3.63	2.85	3.53
Minimum	.12	.20	.04	.18	.20	.22	.18	.22	.14	.14	.18
Mean	1.7	1.35	.43	1.07	3.87	4.38	2.70	2.30	1.59	.64	1.43
No. Violations	1	1	2	1	1	1	1	1	1	1	1
Avg. Duration Viol.	26,304	26,304	13,152	26,304	26,304	26,304	26,304	26,304	26,304	26,304	26,304

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pollutant loads, by source, simulated for Reach 290. While the data are more meaningful when combined with data on area and flow, Table 16-15 does give an accurate, general picture of the significance of various pollutant sources in the basin.

In Table 16-16, information on flow and area are combined with statistics showing the percentage of each pollutant coming from various sources in Reaches 85, 175, and 290.

(c) Point Sources: Point sources contribute a significant portion of the total flow in the Du Page, and account for an even greater portion of the pollutant load due to their relatively high pollutant concentrations. Point source loads are particularly high in the East Branch where they account for 47 percent of the biochemical oxygen demand (BOD) and 88 percent of the ammonia (NH_3) that enters the stream. The result is that there are severe violations of the 5.0 mg/l dissolved oxygen (DO) standard in the East Branch (Table 16-16). Many of these violations occur during

low flow conditions when point source flow comprises the major portion of stream flow. There are periods when point source flow accounts for nearly all of the stream flow. At these times there is virtually no natural dilution and the stream does not have the assimilative capacity to oxidize the point source pollutants and maintain safe DO levels. Similar situations, where point source flows comprise nearly all of the stream flow, also occur in the West Branch. However, there are few, if any, low-flow DO violations throughout most of the West Branch. There are several factors to explain this situation. First, the stream gradient is significantly steeper in the West Branch than in the East Branch. The relatively sluggish flow in the East Branch, thus, has less potential for natural aeration. The result is that instream oxidation of BOD and ammonia in the East Branch frequently depresses DO concentrations below the 5 mg/l level, particularly in warm-weather periods when oxidation rates are high. Another factor explaining the ability of the West Branch to maintain safe DO levels is the impact of the high volume of effluent discharged by the MSDGC Hanover Park wastewater treatment plant. This relatively high quality effluent flows into the uppermost reach of the West Branch and helps to dilute the poorer quality point source effluents entering downstream. Another factor impacting on water quality in the East and West Branches is the physical nature of the stream channels. The West Branch is typically a natural flowing "pool and riffle" stream while the East Branch is channelized in many sections.

There are only occasional DO violations in the West Branch and mainstem, and these generally occur during wet-weather periods when nonpoint source loads predominate.

In addition to DO violations, there are numerous violations of the 1.5 mg/l ammonia standard as simulated for existing conditions. These are typically attributable to point source effluents which supply about 78 percent of all the ammonia entering the Du Page system. Finally, point sources contribute very large amounts of nitrate and phosphate to the Du Page. (PO_4) to the Du Page. These contributions have their major impact as nutrients for algae and other plant life. Relatively high levels of algae (measured as Chlorophyll a) have been simulated.

(d) Pervious Sources: Surface and groundwater runoffs from pervious land cover comprise the major portion of stream flow throughout most of the basin. Overall, about 65 percent of the stream flow comes from these sources (Table 16-16). Of this amount, about 85 percent is groundwater runoff and the remaining 15 percent is surface runoff. However, a disproportionately large amount of the pollutant load associated with this source is contained in the surface runoff. This is due to the highly concentrated nature of

TABLE 16-14: STATISTICAL SUMMARY OF CURRENT DISSOLVED OXYGEN LEVELS

SIMULATED DO CHARACTERISTICS (Expressed in mg/l)	REACH				
	5	20	25	85	110
Maximum	13.2	16.4	26.6	14.5	13.2
Minimum	3.3	3.04	2.98	3.13	2.58
Mean	9.0	8.75	9.89	9.00	7.18
*No. of Violations	5	24	13	17	41
Avg. Duration	3	11	3	12	5
**Overall Assessment	Good	Good	Good	Good	Good

SIMULATED DO CHARACTERISTICS (Expressed in mg/l)	REACH				
	120	150	175	230	275
Maximum	16.8	15.8	28.0	24.4	13.9
Minimum	.78	1.57	.52	2.36	1.67
Mean	3.98	6.01	5.34	9.11	9.70
*No. of Violations	209	429	535	11	14
Avg. Duration	91	15	24	20	10
**Overall Assessment	Bad	Poor	Bad	Good	Good

SIMULATED DO CHARACTERISTICS (Expressed in mg/l)	REACH				
	290				
Maximum	27.8				
Minimum	1.91				
Mean	9.08				
*No. of Violations	34				
Avg. Duration	12				
**Overall Assessment	Good				

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time DO levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

TABLE 16-15: POLLUTANT CONTRIBUTIONS BY SOURCE CATEGORY, EXISTING CONDITIONS
REACH: 290

PARAMETER	POINT SOURCES			NON-POINT SOURCES			Total Loads
	Comb Sewers	Treatment Plants	Boundary Conditions	Pervious Surfaces		Impervious	
				Surface	Ground	Surface	
BOD Load (tons/year)	62.8	1140	N/A	734	464	631.5	3032
% Total Load	2.1	37.6	N/A	24.2	15.3	20.8	100
AMMONIA Load (tons/year)	5.06	801	N/A	92.3	92.5	31.7	1023
% Total Load	.5	78.3	N/A	9	9.1	3.1	100
NITRATE Load (tons/year).	2.00	414	N/A	235	556	26.4	1233
% Total Load	.2	33.6	N/A	19.1	45.1	2.1	100
PHOSPHATE Load (tons/year)	1.31	239	N/A	16.6	33.9	5.38	296
% Total Load	.4	80.7	N/A	5.6	11.4	1.8	100

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pollutants in the surface runoff relative to groundwater contributions. This is particularly true for BOD, ammonia, and phosphate.

Modeling results have shown that there are rather frequent wet-weather violations of the DO standard in most reaches. These are associated with surface washoff of oxygen-demanding pollutants (BOD and ammonia), and are typically short-term in nature.

While groundwater runoff from pervious surfaces, contributes 45 percent of the nitrate, it is not a major factor in the water quality problems simulated for the Du Page Basin. In fact, since groundwater contains lower concentrations of most pollutants than surface runoff or point source discharges, it tends to dilute the pollutants originating from other sources. However, the fact remains that significant pollutant loads are associated with groundwater runoff. Even in the absence of point source flow, some minor water quality problems would likely remain. Specifically, nutrient concentrations in groundwater runoff are adequate to support algal blooms.

(e) Impervious Sources: Runoff from impervious surfaces comprises a modest portion of the total stream flow in the Du Page, about nine percent overall. Associated with this source are relatively high concentrations of BOD. Shock loads of BOD contained in impervious washoff are largely responsible for the wet weather DO violations simulated for the more urbanized portions of the basin.

(f) Combined Sewer Overflows: Combined sewers, located in Lombard on the East Branch, are relatively insignificant with regard to their pollutant loadings on the overall Du Page River System. However, their local impact on the water quality of the polluted East Branch is quite adverse. The combined sewers frequently overflow during wet-weather conditions and dump their load of mixed raw sewage and stormwater into the river. The result is a very high rate of violation of the DO standard in the reaches in the vicinity of the overflow points.

(g) Summary: A wide range of water quality conditions exists in the Du Page which reflect the degrees of urbanization in different parts of the basin. Significant problems have been identified with regard to dissolved oxygen and ammonia levels. In general, the poorest water quality exists in the relatively highly urbanized East Branch. The best overall water quality exists in the typically rural mainstem Du Page. Severe dry-weather DO violations were simulated for the East Branch and are associated with heavy point source loads of BOD and ammonia. Compounding these problems is the relatively sluggish flow.

Wet-weather DO problems were simulated throughout the basin and are associated with surface washoff from both pervious and impervious land covers. Violations of the ammonia standard, particularly severe during low-flow conditions, occur throughout the basin. These are associated with very large point source ammonia loads. In the mainstem Du Page, violations of the ammonia standard are less severe due to dilution and partial nitrification of the upstream ammonia loads.

Nitrate and phosphate levels are generally high enough to support algal blooms throughout the basin. Also, contributing to algal blooms, are the small impoundments and sluggish flows in various parts of the basin. These same conditions contribute to the retention of sludge deposits in the stream bed which, in turn, contribute to DO problems during low flow due to their inherent sediment oxygen demand (SCD). Violation of the summer water temperature standard (32.2° C) is of concern only in isolated reaches in the basin.

16.04 POINT SOURCES: EXISTING CONDITIONS

a. Municipal-Type Wastewater Treatment Plants

Within the Du Page River Basin there are 33 municipal-type wastewater treatment facilities. (See Table 16-17, Parts A, B, C, D, E, and Figure 16-4). Eighteen plants treat less than one million gallons per day (mgd), and a number of these smaller plants are expected to be phased out in the future. The remaining plants are larger, ranging up to nearly 10 mgd. Some of the existing plants are proposed to become, or already are, regional plants which treat wastewater flows from areas originally served by separate smaller plants. The Naperville Springbrook plant treats wastes originally treated at the Naperville North, Naperville Central, Naperville South, and Warrenville plants. Several of the regionalization issues in the basin are currently unresolved. These include the Glendale Heights, Bartlett, West Chicago, and Bolingbrook Facility Planning Areas (FPAs). FPAs where regionalization is taking place are Glenbard and Woodridge.

Overall, major growth expected in the Du Page Basin will require upgrading and expansion of many plants. A number of the smaller plants will be phased out to regional plants.

b. Industrial Wastewater Treatment Plants

There are several small industrial plants in the basin treating their own process wastes. Current information available for these facilities is presented in Table 16-18 (A and B).

c. Miscellaneous Wastewater Treatment Plants

There are numerous miscellaneous wastewater treatment facilities currently discharging in the DuPage Basin. Current information available for these facilities, including treatment units, flows and effluent limitations is presented in Table 16-19 (A and B).

d. Other Point Source Discharges

A number of industries have NPDES permits for discharging cooling water and stormwater. These are described in Table 16-20.

e. Combined Sewer Overflows

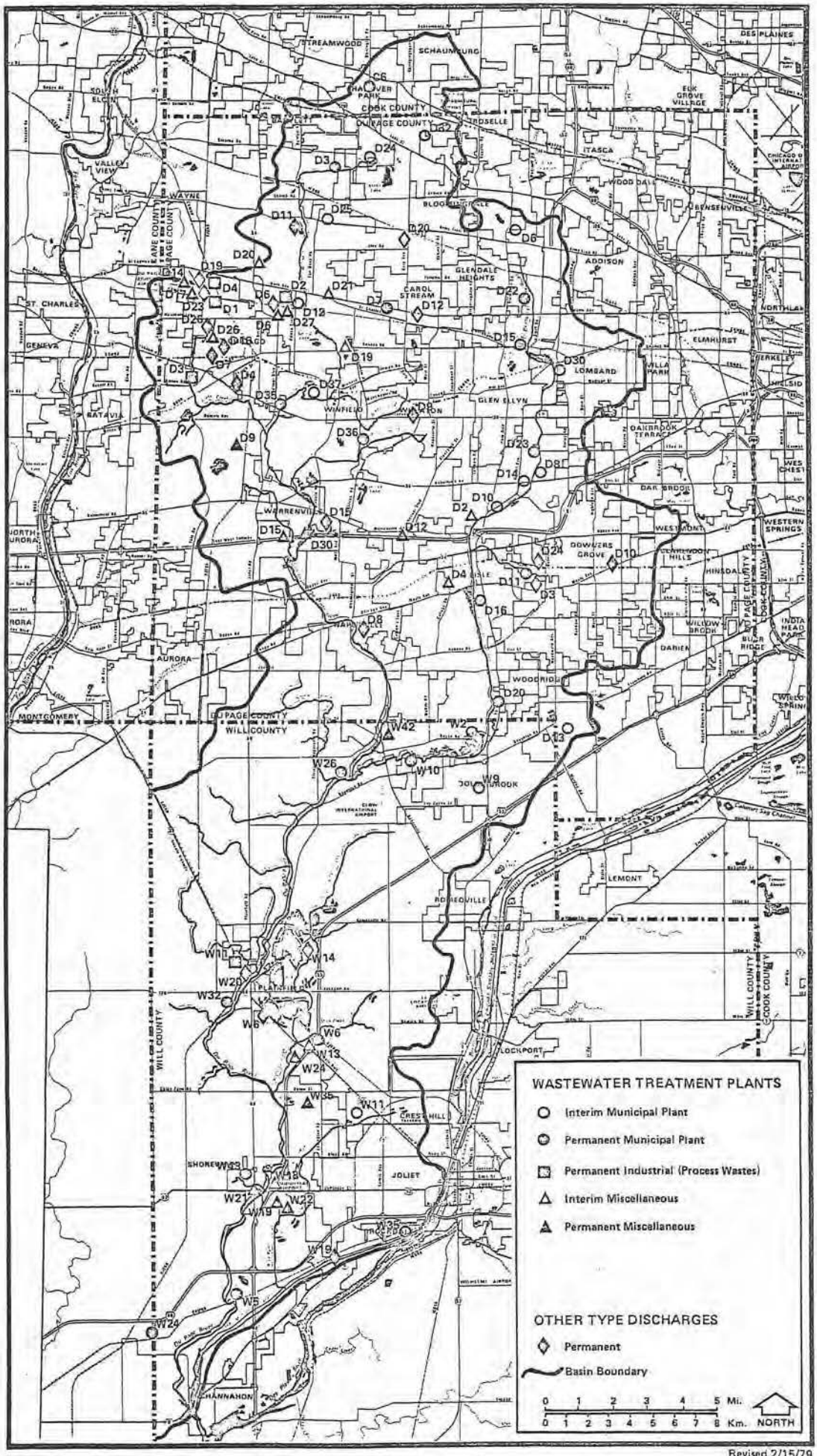
Combined sewers are found in the Village of Lombard in Du Page County. It is estimated that about 2.75 square miles have combined sewers.

f. Local Facilities Planning

Water quality in the Du Page River Basin is influenced by facilities planning activities in the Bartlett, Glendale Heights, Bolingbrook, Carol Stream, Joliet, Downers Grove, Glenbard, Woodridge, MSDGC, Plainfield, Channahon, Naperville, West Chicago, and Wheaton FPAs (see Figure 16-5). In addition, portions of the Romeoville and Eastern Kane FPAs are in the Du Page River Basin. However, these latter areas are expected to be tributary to different basins and will not impact the Du Page Basin. There are extensive non-FPA areas west of the Plainfield and Joliet FPAs but they are largely undeveloped and have little impact on the Basin.

(1) Bartlett FPA: Within the Bartlett FPA there are three publicly owned treatment facilities: Bartlett, Hanover Park No. 1, and Hanover Park No. 2. An Infiltration/Inflow study and a Regionalization Analysis have been prepared which recommend the 1985 phase out of the Hanover Park No. 1 Plant and the 1990 phase out of the Hanover Park No. 2 Plant, both to Bartlett. The interim upgrading of the Hanover Park plants and the upgrading and expansion of the Bartlett plant from 2.28 MGD to 3.0 MGD by 1980 and to 4.4 MGD by 1990 are recommended. However, Hanover Park has been active in pursuing state grant monies to expand and upgrade its plants. Since a facilities plan has not yet been prepared, it is possible that these facilities could remain independent. No definite conclusions can be reached until the facilities plan has been completed and approved.

Figure 16-4: POINT SOURCE DISCHARGES



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TABLE 16-16: SOURCES OF POLLUTANTS, EXISTING CONDITIONS

REACH/SOURCE	PERCENTAGES					
	AREA	STREAM FLOW	POLLUTANTS			
			BOD	NH_3	NO_3	PO_4
1. West Branch						
(REACH NO. 85)						
BOUNDARY CONDITIONS						
POINT SOURCES		23	36	75	32	75
COMBINED SEWERS						
PERVIOUS COVER	95					
Surface Runoff		10	23	11	22	7
Groundwater		56	17	10	43	16
IMPERVIOUS COVER	5	11	24	4	3	3
2. East Branch						
(REACH NO. 175)						
BOUNDARY CONDITIONS						
POINT SOURCES		41	47	88	57	90
COMBINED SEWERS	3	1	6	1	<1	1
PERVIOUS COVER	90					
Surface Runoff		7	16	5	13	2
Groundwater		40	10	4	26	6
IMPERVIOUS COVER	7	11	22	2	3	1
3. Mainstem DuPage						
(REACH NO. 290)						
BOUNDARY CONDITIONS						
POINT SOURCES		26	38	78	34	81
COMBINED SEWERS	1	<1	2	<1	<1	<1
PERVIOUS COVER	95					
Surface Runoff		10	24	9	19	6
Groundwater		55	15	9	45	11
IMPERVIOUS COVER	4	9	21	3	2	2

TABLE 16-17 A: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

DU PAGE RIVER BASIN

MAP CODE	FACILITY NAME	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	RECEIVING STREAM			PUBLICLY OWNED TREATMENT WORKS		
				NAME	7 DAY 10 YR. LOW FLOW (MGD)				
					1970	2000	NO	YES	IEPA FY 78 PRIORITY NO.
D3	Bartlett Sterns Road	Bartlett /Bartlett	Bartlett	West Branch of the DuPage	7.62			X	143
D6	Bloomingdale South	Glendale /Glendale Heights / Heights	Bloomingdale	East Branch of the DuPage	0			X	718
W2	Bolingbrook	Bolingbrook/ /Bolingbrook	Bolingbrook	East Branch of the DuPage	10.3			X	
W5	Camelot U.C.	Channahon/Channahon	Joliet	DuPage	29.1		X		
D7	Carol Stream	Carol Stream/ /Carol Stream	Carol Stream	Klein Creek	0			X	900
W6	Central States U.C.	Plainfield/Plainfield	Plainfield	Mink Creek	0		X		
D8	Citizens U.C. Butterfield	Glenbard / Glen Ellyn	Wheaton	East Branch of the DuPage	5.68		X		120
D10	Citizens U.C. Valley View	/ Glenbard / Glen Ellyn	Addison	East Branch of the DuPage	5.88		X		120
W9	Citizens U.C. West Sub #1	Bolingbrook/ /Bolingbrook	Bolingbrook	Lily Cache Crk.	0		X		
W10	Citizens U.C. West Sub. #2	Bolingbrook/ /Bolingbrook	Bolingbrook	East Branch of the DuPage	15.5		X		
W11	Crest Hill	Joliet / Joliet	Crest Hill	Rock Run Crk.	0			X	728
D11	Downers Grove S.D.	Downers /Downers Grove / Grove S.D.	Downers Grove	East Branch	6.0			X	434
D12	DPCDPW Cascade	West Chicago/ /West Chicago	West Chicago	West Branch of the DuPage	6.46			X	132
D13	DPCDPW Farmingdale	Marionbrook/DPCDPW	Bolingbrook	Lily Cache Ck.	0			X	18
D14	DPCDPW Glen Briar	Glenbard/Glen Ellyn	Glen Ellyn	East Branch of the DuPage	6.20			X	120
D15	DPCDPW Glen Ellyn Heights	Glenbard/Glen Ellyn	Glen Ellyn Hts.	East Branch of the DuPage	3.36			X	120
D16	DPCDPW Lisle	Woodridge/DPCDPW	Lisle	East Branch of the DuPage	8.0			X	18

TABLE 16-17 A: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

DU PAGE RIVER BASIN

MAP CODE	FACILITY NAME	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	RECEIVING STREAM			PUBLICLY OWNED TREATMENT WORKS		
				NAME	7 DAY 10 YR. LOW FLOW (MGD)				
					1970	2000	NO	YES	IEPA FY 78 PRIORITY NO.
D20	DPCDPW Woodridge	Woodridge/DPCDPW	Woodridge	Trib. to East Br. of DuPage	0			X	18
D22	Glendale Heights	Glendale/ Glendale Heights/ Heights	Glendale Heights	Armitage Ave. Ditch	0			X	718
D23	Glenbard	Glenbard/Glen Ellen	Glen Ellyn	East Br. of DuPage River	3.36			X	120
D24	Hanover Park #1	Bartlett/Bartlett	Hanover Park	West Br. of DuPage River	5.56			X	143
D25	Hanover Park #2	Bartlett/Bartlett	Hanover Park	West Br. of DuPage River	6.14			X	143
D30	Lombard	Glenbard/Glen Ellyn	Lombard	East Br. of DuPage River	0.84			X	120
C6	MSDGC Hanover Park	MSDGC/MSDGC	Hanover Park	West Br. of DuPage River	0			X	177
W24	(a) Minooka	Minooka/Minooka	Minooka	DuPage	29.1			X	
W26	Naperville-Springbrook	Naperville/Naperville	Naperville	DuPage	22.9			X	189
W32	Plainfield	Plainfield/Plainfield	Plainfield	DuPage	26.6			X	
W35	Rockdale	Joliet/Joliet	Rockdale	Illinois and Michigan Canal				X	715
D32	Roselle Waterbury	Glendale/ Glendale Heights/ Heights	Roselle	West Br. of DuPage River	6.01			X	718
D35	West Chicago	West / West Chicago/ Chicago	West Chicago	West Br. of DuPage River	3.94			X	132
D36	Wheaton S.D.	Wheaton/Wheaton S.D.	Wheaton	ditch to Springbrook Ck.	0			X	144
D37	Winfield	West / West Chicago/ Chicago	Winfield	Slough to West Br. of DuPage	0			X	132
W43	Will County Water Co.	Joliet/Joliet	Shorewood	DuPage	29.3		X		
	(a) Located in Grundy County.								

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TABLE 16-17 B: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

DU PAGE RIVER BASIN

MAP CODE	NPDES PERMIT			EFFLUENT REQUIREMENTS (mg/l)														COMMENTS
	NUMBER	DATE		INTERIM (A)				FINAL (A)					YEAR 2000 (B)					
		ISSUED	EXPIRES	BOD_5	TSS	P	NH_3N	EFFECTIVE DATE	BOD_5	TSS	P	NH_3N	BOD_5	TSS	P	NH_3N		
D3	0027618	6-9-75	6-1-79						10	12			10	12		(a)		(a) 1.5 mg/l in-stream after mixing. (b) Variance assumed.
D6	0021130	12-18-73	12-6-78						4	5			(b) 10	(b) 12		(a)		
W2	0032689	6-19-75	7-31-79						10	12			10	12		(a)		
W5	0045381	6-7-77	6-30-79						30	30			30	30		(a)		
D7	0026352	5-18-77	8-31-81						4	5			(b) 10	(b) 12		(a)		
W6	0049166	Draft							4	5			–	–				
D8	0045331	6-23-76	12-31-79						20	25			–	–				
D10	0032743	6-23-75	12-31-79						30	30			–	–				
W9	0032727	6-30-75	6-1-79						10	12			10	12		(a)		
W10	0032735	6-30-75	12-31-79						20	25			20	25		(a)		
W11	0021121	6-27-77	12-31-81						4	5			–	–				
D11	0028380	7-1-77	1-1-82						10	12			10	12		(a)		
D12	0028428	6-29-75	6-1-79						30	30			–	–				
D13	0036129	4-30-75	6-1-79						4	5			–	–				
D14	0028509	6-9-75	6-1-79						30	30			–	–				
D15	0028444	12-10-74	11-1-79						4	5			–	–				
D16	0028452	6-20-75	6-1-79						10	12			–	–				
													–	–				

(A) From NPDES Permits (B) From Facility Plans

TABLE 16-17 B: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

DU PAGE RIVER BASIN

MAP CODE	NPDES PERMIT NUMBER	NPDES PERMIT DATE ISSUED	NPDES PERMIT DATE EXPIRES	EFFLUENT REQUIREMENTS (mg/l) INTERIM (A) BOD_5	INTERIM (A) TSS	INTERIM (A) P	INTERIM (A) NH_3N	FINAL (A) EFFECTIVE DATE	FINAL (A) BOD_5	FINAL (A) TSS	FINAL (A) P	FINAL (A) NH_3N	YEAR 2000 (B) BOD_5	YEAR 2000 (B) TSS	YEAR 2000 (B) P	YEAR 2000 (B) NH_3N	COMMENTS
D20	0031844	10-21-77	7-31-82						10	12		(b) 1.5	10	12		(a)	
D22	0028967	3-24-77	9-1-79						4	5			(e) 10	(e) 12		(a)	
D23	0021547	12-10-74	11-1-79						10	12			10	12		(a)	
D24	0034479	6-1-75	6-1-79						10	12			-	-	-	-	
D25	0034487	6-18-75	6-1-79						10	12							
D30	0022471	6-16-77	2-28-82						20	25			(f) 30	(f) 30	-	-	
C6	0036137	12-30-74	6-30-79						4	5			4	5		(a)	
W24	0029404	3-11-75	7-3-77						30	30			30	30			
W26	0034061	11-17-75	6-1-79						10	12		(b) 3.5	10	12		(a)	
W32	0020508	6-30-77	5-31-82						10	12			30	30		(a)	
W35	0030775	6-30-77	9-30-81						10	12			-	-	-	-	
D32	0048721	9-14-76	6-30-80						20	25			10	12		(a)	
D35	0023469	6-30-77	4-30-82	20	25			(c) 4-30-82	10	12		(d) 2.5	10	12		(a)	
D36	0031739	7-1-77	5-1-82						4	5			(e) 10	(e) 12		(a)	
D37	0023442	7-1-77	5-31-82						4	5			-	-	-	-	
W43	0022781	6-9-75	12-31-79						30	30			30	30		(a)	

(a) 1.5 mg/l in-stream after mixing.

(b) Daily Max.; and (a) also applies.

(c) Or three months after completion of construction.

(d) 7-day avg.; and (a) also applies.

(e) Variance assumed.

(f) Secondary treatment for excess flows.

(A) From NPDES Permits (B) From Facility Plans

TABLE 16-17 C: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

DU PAGE RIVER BASIN

MAP CODE	STATUS OF TREATMENT PLANT					WASTEWATER TREATMENT PLANT (MGD)										COMMENTS
	INTERIM		PERMANENT			AVERAGE FLOWS (f)						DESIGN CAPACITIES				
	YES	PHASE OUT DATE	EXIST-ING	PROPOSED NEW YES	PROPOSED NEW EST. DATE IN SERVICE	1975	1980	1985	1990	1995	2000	1975	1985	OTHER YEAR	2000	
D3			X			0.26	0.48	1.81	2.82	3.54	4.27	2.3	3.0	1990 4.4	4.4	(a) Not in operation
D6			X			1.77	2.34	2.91	3.48	4.05	4.60	1.7	4.6		4.6	(b) Phased out to Glen Ellyn-Glenbard
W2			X			1.10	1.56	2.02	2.48	2.94	3.40	1.5	3.4		3.4	
W5			X			0.04	0.04	0.04	0.04	0.04	(g) 0.04	0.04	0.04		0.04	(c) Phased out to DPCDPW-Woodridge
D7			X			0.70	1.44	2.18	2.92	3.66	4.42	2.5	2.5	1990 4.5	4.5	
W6			X			(a) –	–	–	–	–	–	0.4	0.4	0.4	0.4	(d) Phased out to West Chicago
D8	X	12-78 (b)				0.65	–	–	–	–	–	0.75	–		–	(e) Phased out to Joliet-West
D10	X	12-78 (b)				0.56	–	–	–	–	–	0.25	–		–	
W9			X			1.30	1.60	1.90	2.20	2.50	2.80	1.3	2.8		2.8	(f) Flows are from facility plans on needs analysis documents.
W10			X			1.30	2.12	2.94	3.76	4.58	5.40	3.0	5.4		5.4	
W11	X	1-85 (e)				0.50	0.73	–	–	–	–	1.25	1.25		–	(g) Utility flows assumed to be the same as 1975.
D11			X			8.61	6.62	7.26	7.77	8.18	8.62	9.60	9.60		9.60	
D12	X	1-90 (d)				0.01	0.01	(g) 0.01	–	–	–	0.01	0.01		–	
D13	X	12-78 (c)				0.01	–	–	–	–	–	0.25	–		–	
D14	X	12-78 (b)				0.01	–	–	–	–	–	0.01	–		–	
D15	X	12-94 (b)				0.17	0.17	0.17	0.17	–	–	0.20	0.20		–	
D16	X	12-78 (c)				2.75	–	–	–	–	–	2.90	–		–	

TABLE 16-17 C: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

DU PAGE RIVER BASIN

MAP CODE	STATUS OF TREATMENT PLANT					WASTEWATER TREATMENT PLANT (MGD)										COMMENTS
	INTERIM		PERMANENT			AVERAGE FLOWS						DESIGN CAPACITIES				
	YES	PHASE OUT DATE	EXIST-ING	PROPOSED NEW YES	PROPOSED NEW EST. DATE IN SERVICE	1975	1980	1985	1990	1995	2000	1975	1985	OTHER YEAR	2000	
D20			x			2.21	3.77	5.33	6.89	8.45	10.00 (c)	4.0	10.0		10.0	(a) Phased out to Bartlett
D22			X			2.06	2.86	3.66	4.46	5.26	6.06	3.0	6.1		6.1	(b) Phased out to Glen Ellyn; to be used for excess flow treatment
D23			X			4.51	7.01	9.51	12.01	14.51	17.00	6.75	17.0		17.0	
D24	X	12-84 (a)				0.26	0.62	-	-	-	-	1.2	-		-	
D25	X	12-89 (a)				-	0.10	0.20				0.4	0.4		-	(c) Includes excess flows from Marionbrook
D30	X	12-78 (b)	X (b)			4.70	Excess	flow	treatment	only		4.4	58.0		58.0	
C6			X			5.70	6.70	7.90	8.90	10.0	11.0	6.0	12.0		12.0	(d) Phased out to Joliet-West
W24			X													(e) Phased out to West Chicago
W26			X			5.28	7.85	9.60	11.35	12.77	14.18 (f)	10.0	10.0		10.0	(f) NIPC estimate
W32			X			0.56	0.57	0.68	0.81	0.91	1.06	0.90	0.90	1995 1.40	1.40	
W35	X	1-85 (d)				0,40	0.45					0.50	0.50			
D32			X			0.01	0.42	0.84	1.26	1.68	2.10	0.80	2.10		2.10	
D35			X			2.30	3.71	5.12	6.53	7.94	9.36	2.44	9.40		9.40	
D36			X			5.90	6.50	7.10	7.70	8.30	8.90	6.90	8.90		8.90	
D37	X	12-82 (e)				0.67	0.86					0.50				
W43			X			0.20	0.42	0.42	0.42	0.42	0.42	0.42	0.42		0.42	

TABLE 16-17 D: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

DU PAGE RIVER BASIN

MAP CODE	POPULATION SERVED (1000's)						PROPOSED PROJECTS (C)								CAPITAL COSTS (million $)		
							PLANT				SEWERS						
	1975	1980	1985	1990	1995	2000	Exp.	UpG	New	Out	I/I	SSE	New	Reh	Initial	Future	Total
D3	1.9	4.1	14.2	18.0	23.4	33.1	X	X			X	X		X	3.0	1.7	4.7
D6	7.1	11.3	15.6	19.8	24.1	28.3	X	X		X	X	X			-	7.5	7.5
W2	7.4	10.1	12.7	15.4	18.0	20.7	X	X							-	3.8	3.8
W5																	
D7	4.3	9.1	13.3	17.4	23.7	30.0	X	X			X	X		X	-	11.1	11.1
W6	0	0	0	0	0	0											
D8	6.7									X					See D23		
D10	0.3									X					See D23		
W9	9.3	10.8	12.4	13.9	15.5	17.0	X	X							-	5.3	5.3
W10	11.5	15.8	20.1	24.3	28.6	32.9	X	X							-	6.6	6.6
W11	8.5									X	X	X		X	See Joliet-West Des Plaines R. Basin		
D11	50.0	55.2	61.4	65.8	70.0	74.1		X			X	X		X	16.0	-	16.0
D12										X			X		See D35		
D13	0.1									X			X		See D20		
D14	Variable									X					See D23		
D15	1.2	1.4	1.6	1.8	2.0					X					See D23		
D16	22.5									X	X	X	X	X	See D20		

(C) PROPOSED PROJECTS

SEWER(S): I/I - Infiltration/Inflow Study; SSE - Sewer System Evaluation; New - New Sewer Construction; Reh - Rehabilitation of Existing Sewers

PLANT: Exp - Expansion; UpG - Upgrading; New - New plant; Out - Phase out

TABLE 16-17 D: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

DU PAGE RIVER BASIN

MAP CODE	POPULATION SERVED (1000's)						PROPOSED PROJECTS (C)								CAPITAL COSTS (million $)		
							PLANT				SEWERS						
	1975	1980	1985	1990	1995	2000	Exp.	UpG	New	Out	I/I	SSE	New	Reh	Initial	Future	Total
D20	16.0	42.8	46.7	51.3	58.8	67.1	X	X			X	X	X	X	12.6	-	12.6
D22	15.5	19.9	24.3	28.7	33.1	37.5	X				X	X	X	X	-	9.4	9.4
D23	28.7	77.1	85.9	94.3	97.2	100.2	X	X			X	X	X	X	48.9	-	48.9
D24	4.2	7.0	-	-	-	-		X		X	X	X		X	0.7	0.7	1.4
D25	0.1	0.5	1.5	-	-	-		X		X	X	X		X	0.2	0.3	0.5
D30	36.6	-	-	-	-	-	X				X	X	X	X	See D23		
C6	41.0	53.0	60.0	67.0	74.0	80.0	X	X							-	-	-
W24																	
W26	30.9	51.9	68.2	84.4	97.6	110.7									-	-	-
W32	3.2	4.8	6.3	7.8	9.3	11.3	X								-	3.7	3.7
W35	2.0	2.1	-	-	-					X	X	X		X	See Joliet-West Lower Des Plaines		
D32	0.1	2.5	4.9	7.2	9.6	12.0	X			X	X	X			-	5.2	5.2
D35	12.7	15.8	27.9	38.6	44.3	51.0	X	X			X	X	X		13.9	-	13.9
D36	49.8	50.8	52.7	58.6	63.4	68.2	X	X			X	X		X	14.3	-	14.3
D37	4.8	6.2	-	-	-	-				X	X	X	X	X	3.8	-	3.8
W43	4.1	4.2	4.2	4.2	4.2	4.2									Unknown		

(C) PROPOSED PROJECTS

SEWER(S): I/I - Infiltration/Inflow Study; SSE - Sewer System Evaluation; New - New Sewer Construction; Reh - Rehabilitation of Existing Sewers

PLANT: Exp - Expansion; UpG - Upgrading; New - New plant; Out - Phase out

TABLE 16-17 E: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

DU PAGE RIVER BASIN

MAP CODE	FACILITY PLANS												COMMENTS
	TYPE		STATUS			REVIEWS / APPROVALS							
						NIPC			IEPA				
	NEEDS ANAL-YSIS	STEP ONE STUDY	COM-PLETED	UNDER WAY	LOCAL ISSUES	NUMBER	ENDORSED	UNDER REVIEW	NUMBER	APPROVED	UNDER REVIEW	UN-RESOLVED ISSUES	
D3		X		X	X				C17-1638		X		(a) Private plant
D6		X		X	X	77-401	X (b)		C17-1791		X	X	(b) Conditional
W2	X				X	77-A-006	X		None	X		X	
W5		(a)											
D7		X		X		77-626	X		C17-2135		X		
W6		(a)											
D8		X	X			76-282	X		C17-1694	X			
D10		X	X			76-282	X		C17-1694	X			
W9	X				X	77-A-006	X		None	X		X	
W10	X				X	77-A-006	X		None	X		X	
W11		X		X	X				C17-1583		X		
D11		X		X					C17-2177		X		
D12		X		X		75-746	X		C17-1864			X	
D13		X	X			76-458	X		C17-1644	X			
D14		X	X			76-282	X		C17-1694	X			
D15		X	X			76-282	X		C17-1694	X			
D16		X	X			76-458	X		C17-1644	X			

TABLE 16-17 E: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

DU PAGE RIVER BASIN

MAP CODE	FACILITY PLANS												COMMENTS
	TYPE		STATUS			REVIEWS / APPROVALS							
						NIPC			IEPA				
	NEEDS ANALYSIS	STEP ONE STUDY	COMPLETED	UNDER WAY	LOCAL ISSUES	NUMBER	ENDORSED	UNDER REVIEW	NUMBER	APPROVED	UNDER REVIEW	UNRESOLVED ISSUES	
D20		X	X			76-458	X		C17-1644	X			(a) Conditional
D22		X		X	X	77-401	X (a)		C17-1791		X	X	
D23		X	X			76-282	X		C17-1694	X			
D24		X		X	X	77-A-021	X		C17-1638		X	X	
D25		X		X	X	77-A-021	X		C17-1638		X	X	
D30		X	X			76-282	X		C17-1694	X			
C6		X	X			75-360 75-071	X		C17-5416	X			
W24													
W26			X			75-593			C17-1686	X			
W32	X					77-A-071	X		None	X			
W35		X		X	X				C17-1583		X		
D32		X		X	X	77-401	X (a)		C17-1791		X	X	
D35		X		X	X	75-746	X		C17-1864		X	X	
D36		X	X			74-686	X		C17-1840	X			
D37		X		X	X	75-746			C17-1864		X	X	
W43													

TABLE 16-18 A: INDUSTRIAL WASTEWATER TREATMENT PLANTS

DU PAGE RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
D1	Amax Aluminum Extrusion Prod.	0037681	West Chicago/ West Chgo.	St. Charles	H, LO		0.018	-	0.018
D2	Campbell Soup	0001597	West Chicago/ West Chgo.	West Chicago	IM, L		0.014	-	0.014
D3	High Lake Poultry Co.	0032221	West Chicago/ West Chgo.	West Chicago	AC, L	0.003	0.002	-	0.002
D4	Masonite Research Center #001	0003744	West Chicago/ West Chgo.	St. Charles		0.003			
W11	Standard Brands Fleischman Div.	0035149	Plainfield/ Plainfield	Plainfield	L		0.025	-	0.025
	(1):Contact stabilization (AC); holding tank or pond (H); Imhoff Tank (IM); Tertiary Lagoon (L);								
	Stabilization Lagoon (LO).								

TABLE 16-18 B: INDUSTRIAL WASTEWATER TREATMENT PLANTS

DU PAGE RIVER BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD)		NPDES PERMIT DATES		SIC CODE	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
		1970	2000	ISSUED	EXPIRES			
D1	Kress Creek	0.02		6-20-75	5-31-80	72-3352	Daily Maximum (DM):15 TSS, 750 TDS	
D2	Stream to West Br. of DuPage	0		7-16-74	6-30-78	-	30 BOD, 30 TSS	
D3	Kress Creek	0.11		6-30-75	12-31-78	72-0259	10 BOD, 15 TSS, 15 (DM) oil/ grease (o/g)	
D4	Kress Creek	0.01		1-8-74	8-1-74	-	10 BOD, 12 TSS, 2 (tot) Fe, 2.5 (DM) Fluoride, 1 Ni, 10 o/g	
W11	Norman Drain	0		6-18-75	9-30-79	72-2084	4 BOD, 5 TSS, 750 TDS Daily Max.: 2 Ba, 2 Fe	
	(1): From NPDES Permits							

TABLE 16-19 A: MISCELLANEOUS WASTEWATER TREATMENT PLANTS

DU PAGE RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
D2	Arbordale Morton Arboretum	0049981	Woodridge/ /DPCDPW	Lisle	AD, L, E	0.015	0.0035	-	0.0035
D4	Benet Academy	0021164	Woodridge/ /DPCDPW	Lisle	A	0.024	0.160	-	0.160
D6	Campbell Soup	0055409	West /West Chicago/ Chgo.	West Chicago	IM, FB, E	P.E.150	0.0025	-	0.0025
W13	Crossroads USA	0034703	Plainfield/ Plainfield	Plainfield	A, F, E	0.010	0.008	-	0.008
D9	Fermi Nat'l Acc'l Lab	0025941	Nat'l / Nat'l Acc'l / Acc'l Lab Lab	Batavia	L, E		0.020	-	0.020
W18	Holiday Inn-Joliet	0027146	Joliet /Joliet	Joliet	AD, L, E	0.028	0.020	-	0.020
W19	Howard Johnsons Rt. 52	(a)	Joliet /Joliet	Joliet	AD, L, E	0.021	0.007	-	0.007
D12	Ill. State Toll Hwy. Auth.	0048941	Woodridge/ /DPCDPW	Naperville	LO	0.004	0.0005	-	0.0005
W21	Imperial Trailer Court	0055239	Joliet /Joliet	Shorewood	AD, E	0.050	0.040	-	0.040
W22	Joliet Civic Ctr. Elks Club	0055298	Joliet/ Joliet	Joliet	A, L, E	0.025	0.020	-	0.020
W24	Koren Motor Sales	0047791	Plainfield/ Plainfield	Plainfield	A, F, E	0.0004	0.0002	-	0.0002
D14	Masonite Research #001	0003744	West /West Chicago/ Chgo.	West Chicago	AD, F, E	0.003	0.004	-	0.004
D15	Northern Ill. Gas. Co.	0051985	Naperville/ Naperville	Warrenville	IM, FT, E	0.018	0.012	-	0.012
D17	Owens Ill, Inc.	0033979	West /West Chicago/ Chgo.	St. Charles	AD, E	0.015		-	
W35	Plainfield School District #202	0038342	Joliet/ Joliet	Plainfield	AD, F, E	0.011		-	
D19	Pleasant Ridge Mobile Homes	0037028	West /West Chicago/ Chgo.	West Chicago	AC, E	0.027	0.01	-	0.01
D20	St. Andrews Country Club	0051179	West /West Chicago/ Chgo.	West Chicago	S, A, F, E	0.028	0.050	-	0.050
D21	Sidwell Co.	0052043	Carol /Carol Stream/ Stream	West Chicago	AD, E	0.004	0.002	-	0.002
D26	Western Electric #002	0002402	West /West Chicago/ Chgo.	West Chicago	FT, E		0.070	-	0.070
D27	Wheaton Christian H.S.	0024112	West /West Chicago/ Chgo.	Wheaton	IM, FB		0.057	-	0.057
D30	Bower Jr. H.S.	0050733	Naperville/ Naperville	Naperville	AD	0.05	0.005	-	-
W42	Hoffman Rosner-Oak Grove Farms	0052701	Naperville/ Naperville	Naperville		0.050			

(1): Activated sludge (A); contact stabilization (AC); extended aeration (AD); chlorination (E); tertiary filter (F); buried sand filter (FB); trickling filter (FT); Imhoff Tank (IM); tertiary lagoon (L); septic (S).

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TABLE 16-19 B: MISCELLANEOUS WASTEWATER TREATMENT PLANTS

DU PAGE RIVER BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	7 DAY-10 YR. LOW FLOW (MGD) 2000	NPDES PERMIT DATES ISSUED	NPDES PERMIT DATES EXPIRES	EFFLUENT REQUIREMENTS (mg/l) 1976(1) BOD	1976(1) TSS	1976(1) P	1976(1) NH_3-N	2000 BOD	2000 TSS	2000 P	2000 NH_3-N	COMMENTS
D2	East Branch of the DuPage	5.68		3-4-77	6-30-80									
D4	East Branch of the DuPage	7.75		6-9-75	12-31-79	20	15							
D6	Ditch to West Br. of DuPage	0												Domestic plant
W13	DuPage	0		6-9-75	12-31-79	4	5							
D9	Ferry Creek	0		1-21-74	1-10-79	30	30							
W13	DuPage	28.4		6-9-75	12-31-79									
W19	Rock Run	0		(a)	(a)									(a) Permit not issued
D12	Ditch to East Br. of DuPage	0		5-13-76	9-30-80	4	5							
W21	DuPage	28.4		10-21-77	9-1-80	30	30							
W22	stream to Rock Run	0		10-21-77	5-31-81	30	30							
W24	Lily Cache Ck	0		6-19-75	3-31-80	30	30							
D14	Kress Creek	0.01		1-8-74	8-1-81	10	12							
D15	Ferry Creek	0.20		5-11-77	7-31-81	4	5							
D17	Kress Creek	0.28		3-10-77	12-31-81	20	20							Domestic plant
D35	DuPage	0		6-19-75	12-31-79									
D19	Klein Creek	0.58		6-18-75	12-31-79	30	30							
D20	Marsh to West Br. of DuPage	0		Draft	9-30-82	4	5							
D21	Trib. to West Br. of DuPage	0		Draft	10-31-81	4	5							(1): From NPDES Permits
D26	Kress Creek	0.01		6-28-75	7-1-78	30	25							
D27	Trib. to West Br. of DuPage	0		6-18-65	5-1-80	4	5							
D 30	West Branch of the DuPage	16.9												
W42	Ditch to West Br. of DuPage	0		Draft	9-30-82	4	5							

(1) From NPDES Permits

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TABLE 16-20 A. OTHER POINT SOURCE DISCHARGES

DU PAGE RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
D3	Arrow Gear Co.	0038016	Downers/ Downers Grove / Grove S.D.	Downers Grove	0.02	5-16-75	6-30-79
D4	Ball, Geo.J.Inc.	0054712	West /West Chicago/ Chicago	West Chicago		12-7-76	1-31-81
D6	Campbell Soup Company #001	0055409	West /West Chicago/ Chicago	West Chicago		7-16-74	6-30-78
W6	Chicago Gravel Company	0032018	Plainfield/Plainfield	Plainfield	0.1	6-12-75	9-1-79
D7	Chgo. & N.W. Trans. Company	0046451	West /West Chicago/ Chicago	West Chicago	0.001	6-17-75	12-31-79
D8	Cock Robin Ice Cream	0032107	Naperville/Naperville	Naperville	0.040	3-13-75	8-28-79
D9	Culligan-DuPage Soft Water Service	0032115	Wheaton/Wheaton	Wheaton	0.005	6-30-75	3-31-79
D10	Dresser Ind. Inc. Foot Jones	0005266	Downers/Downers Grove / Grove S.D.	Downers Grove	0.050	3-24-75	10-1-79
D11	East Riverdale Gravel	0049450	West /West Chicago/ Chicago	Bartlett	1.400	4-1-76	9-30-80
D12	Eaton Corp. Admin. Bldg.	0004910	Carol / Carol Stream/ Stream	Carol Stream		4-15-75	9-30-79
D15	Elmhurst-Chicago Stone	0053171	Naperville/Naperville	Warrenville		1-24-77	3-31-80
W14	Elmhurst-Chicago Stone	0053163	Plainfield/Plainfield	Plainfield	2.000	1-20-77	3-31-81
D16	Griffen Wheel	0052809	West /West Chicago/ Chicago	West Chicago	0.0035	1-18-77	3-31-81
W19	Kaluzny Bros.	0033936	Joliet/Joliet	Rockdale		5-16-74	12-31-81
W20	Kerr Glass Co.	0004122	Plainfield/Plainfield	Plainfield	0.055	4-15-75	12-31-76
D19	Masonite Research Center #002	0003744	West /West Chicago/ Chicago	St. Charles		1-8-74	8-1-81
D20	Material Services Yd.#45	0022284	West /West Chicago/ Chicago	Bartlett		6-30-75	6-30-79
D23	Owens Illinois Inc.#001-002	0033979	West /West Chicago/ Chicago	St. Charles		7-20-75	5-31-80
D24	Rexnord Chainbelt, Inc.	0002461	Downers /Downers Grove / Grove S.D.	Downers Grove		7-20-75	5-31-80
D26	Western Electric	0002402	West /West Chicago/ Chicago	West Chicago	0.009	6-28-75	7-1-78

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TABLE 16-20 B: OTHER POINT SOURCE DISCHARGES

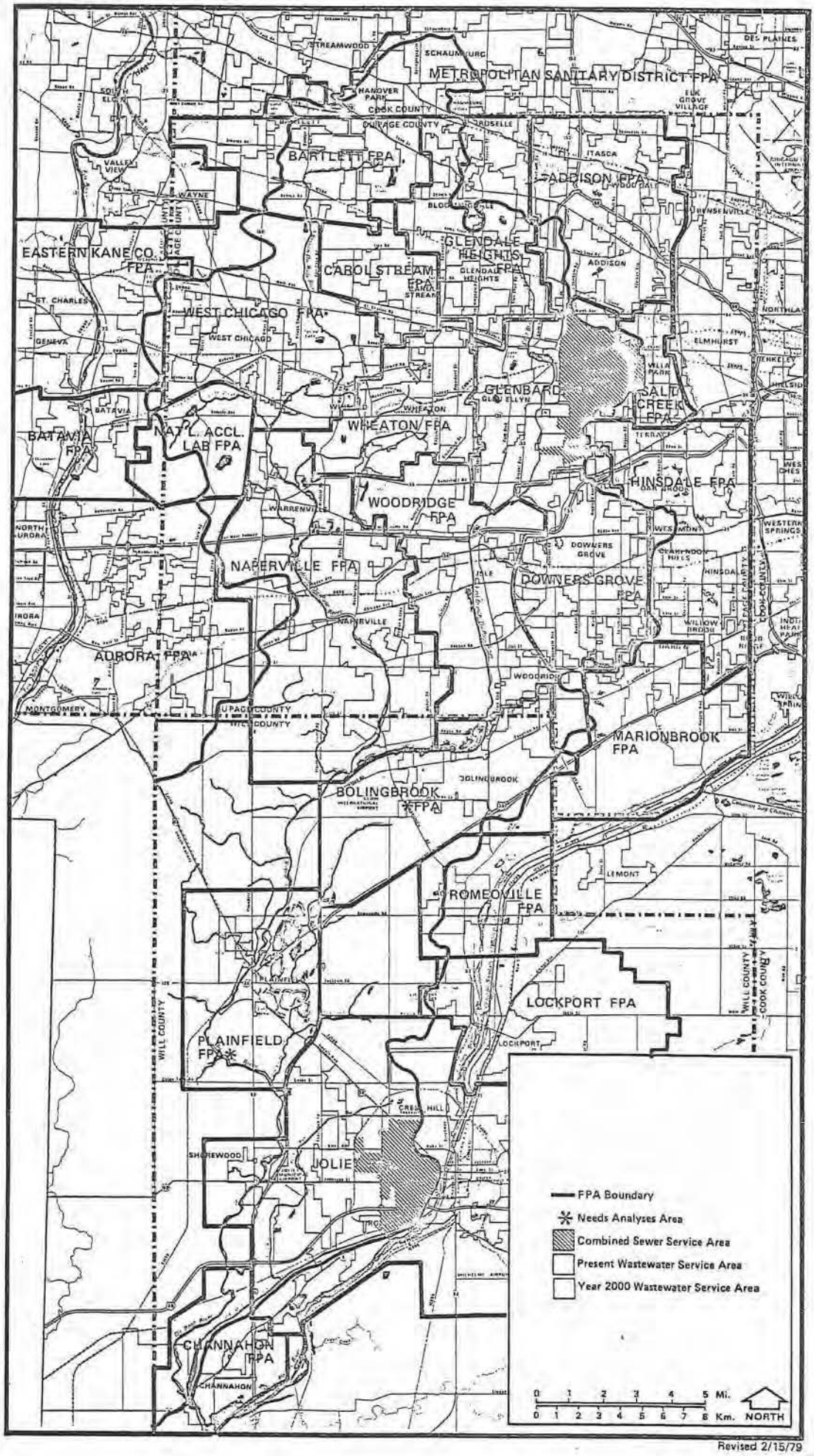
DU PAGE RIVER BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	7 DAY-10 YR. LOW FLOW (MGD) 2000	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
D3	St.Joseph Ck.	0		Temperature	Cooling water
D4	ditch to Kress Creek	0		4 BOD, 5 TSS	
D6	West Branch of the DuPage				Compost lagoon; recirculated or periodic discharge
W6	Lily Cache Ck	0		15 TSS	
D7	Kress Creek	0		Daily Maximum (DM); 0.3 $Cr^{+}6$, 15 oil/ grease (o/g)	
D8	West Branch of the DuPage			Temperature	Cooling water
D9	Storm sewer to Winfield Ck	0		15 TSS, 750 TDS, 2 (tot) Fe, 0.5 (dis) Fe, 1 Mn, 1 Zn	Cooling water and softener regenerant
D10	St.Joseph Ck	0		Monitor: TSS, Temperature	Cooling water
D11	ditch to West Br. of DuPage	0		20 TSS, 30 (DM) TSS	
D12	ditch to Klein Creek	0			
D15	West Branch of the DuPage			20 TSS	
W14	Lily Cache Ck	0		20 TSS, 30 (DM) TSS	
D16	Kress Creek	0		750 TDS, Temperature	
W19	Trib. to Ill. Mich. Canal			4 BOD, 5 TSS	Periodic wet weather discharge
W20	Norman Drain	0			
D19	Kress Creek	0.01		Temperature	Cooling water
D20	ditch to Klein Creek	0		15 (DM) TSS	Dewatering waste
D23	Kress Creek	0		10 TSS, 10 o/g, temperature	Cooling water
D24	ditch to Joseph Ck.	0			Cooling and stormwater
D26	Kress Creek	0.05		15 (DM) TSS, 15 o/g [illegible]mp, 1 $Cr^{+}3$, .3 $Cr^{+}6$	Cooling water

(1) From NPDES Permits

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Figure 16-5: WASTEWATER SERVICE AREAS



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(2) Glendale Heights FPA: There are four municipally owned wastewater treatment facilities in the Glendale Heights FPA: Glendale Heights, Bloomingdale South, Roselle-Waterbury, and Roselle-Main. The Roselle-Main plant discharges to the Salt Creek Basin. The other three plants discharge to the Du Page River Basin. The original facilities plan called for immediate phase out of the Bloomingdale and Roselle Main plants to Glendale Heights with phase out of the Roselle-Waterbury plant by 1995. The Glendale Heights plant would be expanded from 3.0 MGD to 14.3 MGD. A revised facility plan has also been prepared which calls for the retention of individual facilities. Under this plan, Glendale Heights would be expanded to 6.1 MGD, Bloomingdale to 4.6 MGD, Roselle-Waterbury to 2.1 MGD and Roselle-Main would remain at 1.5 MGD. (Note: the expansion of the Roselle-Waterbury plant has recently been lowered to 1.2 MGD). The key issue from an economic standpoint is the requirement for advanced treatment. If ammonia removal is required, the regional facility would apparently be more cost effective. Without ammonia removal, separate facililties apparently would be cheaper. Since neither facilities plan has been approved or accepted the future of the wastewater treatment facilities in the Glendale Heights FPA remains unsettled.

(3) Bolingbrook FPA: The Bolingbrook FPA contains three municipal-type plants. The Village of Bolingbrook owns and operates the only public wastewater treatment facility (W-2). Citizens Utilities Co. owns and operates two private collection and treatment systems: West Suburban No. 1 (W-9) and West Suburban No. 2 (W-10). A needs analysis report has been prepared for the Bolingbrook FPA which recommends a two-phase plan. Under Phase I of the plan, Citizens Utility Plant No. 1 would be phased out to Citizens Utility Plant No. 2 which would be expanded to 7.8 MGD, and the Bolingbrook plant would be upgraded as necessary. Phase I work would be completed by 1980. Phase II construction would consist of further expansion of the Citizens Utility Regional Plant from 7.8 MGD to 11.6 MGD. The Bolingbrook Plant would be phased out and a regional interceptor would be constructed from the Bolingbrook plant to the regional treatment plant. Phase II work would be completed by 1990.

It is important to note that the implementation of any regional plan for the Bolingbrook FPA is dependent upon the purchase of the Citizens Utility treatment and conveyance systems by the Village of Bolingbrook. If this is not possible at the outset of the planning period, an interim expansion of the Bolingbrook Plant may be required to meet the immediate needs of the expanding service area. To date, Bolingbrook has not agreed to purchase the Citizens Utility plants.

(4) Carol Stream FPA: The Carol Stream wastewater treatment plant (D-7) is the only municipal-type facility in the FPA. A facilities plan has been prepared which calls for the

addition of nitrification facilities by 1980 and the expansion of the plant from 2.50 MGD to 4.50 MGD by 1990.

(5) Joliet FPA: Three municipal-type wastewater treatment plants in the Joliet FPA discharge to the Du Page River Basin. The Crest Hill (W-11) and Rockdale (W-35) plants are publicly owned and operated. The Will County Water Co. Plant (W-43), located in Shorewood, is privately owned and operated. Facilities planning is currently underway in the Joliet FPA. A decision on the future existence of the wastewater treatment facilities in that FPA has not been reached. In the absence of these conclusions it has been assumed that the configuration of wastewater service depicted in NIPC's "Regional Wastewater Plan" would be attained by the year 2000. This calls for the phase cut of the Crest Hill and Rockdale plants to the Joliet Westside Plant (W-20), probably by 1980. The Will County Water Co. Plant is expected to remain at 0.42 MGD capacity through the year 2000. All new sewer service in Shorewood would probably be by Joliet. This assumption could be superceded by the more detailed results of the Joliet FPA Facilities Plan. However, until that document is completed, approved, and accepted, this assumption is the best information available.

(6) Downers Grove FPA: The Downers Grove Sanitary District Plant (D-11) is the only municipal-type wastewater treatment facility in the Downers Grove FPA. (Part of the Downers Grove FPA is served by the Marionbrook Plant, but the discharge is out of the basin). A facilities plan has been drafted for this area calling for plant upgrading to include nitrification and excess flow treatment facilities. A completed I/I study has indicated that it would be economical to reduce infiltration and inflow to a degree. The scheduling of facilities has not yet been determined.

(7) Glenbard FPA: There are six municipal-type plants in the Glenbard FPA. The Glenbard (D-23) plant is jointly owned by Glen Ellyn and Lombard. The Lombard (D-30) plant is owned and operated by that municipality. The Du Page County Department of Public Works (DCDPW) operates the Glen Ellyn Heights (D-15) and Glen Briar (D-14) plants which service only domestic-type wastes. Citizens Utility Co. operates two private municipal-type plants, the Butterfield (D-8) and Valley View (D-10) facilities, which also service residential customers. This FPA also contains the only combined sewer area in the basin. The sewers are tributary to the Lombard plant. The Glenbard Facilities Plan recommends that the Glenbard plant be expanded from 6.75 MGD to 17.0 MGD as a regional facility to enable the phase cut of the Lombard, Glen Briar, Butterfield and Valley View plants by 1980. The Glen Ellyn Heights plant would remain in service to the end of its design life, which would be 1995. The expanded Glenbard plant should be sufficient to

handle wastewater flows through the year 2000. The Lombard plant would continue to function to retain and release at a later time, or to treat and discharge excessive wet-weather flows. Additional treatment facilities for overflows are planned at Lombard.

(8) Woodridge FPA: The DCDPW owns and operates the Woodridge (D-20) and Lisle (D-16) plants which are the only municipal-type wastewater treatment facilities in the Woodridge FPA. A facilities plan has been completed for this FPA which recommends the upgrading and expansion of the Woodridge plant from 4.0 MGD to 10.0 MGD as a regional facility to allow the phase out of the Lisle plant. In addition, the Woodridge plant is expected to receive flows in excess of the capacity of the Marionbrook plant (D-17) and to accept flows from the phase out of the DCDPW Farmingdale plant (D-13). The proposed Woodridge expansion is expected to be sufficient through the year 2000.

(9) MSDGC Hanover Park Service Area: The Hanover Water Reclamation Plant (C-6) is the only municipal-type plant within the MSDGC Hanover Park Service Area. The Hanover facility is currently being expanded and upgraded from 6.0 MGD to 12.0 MGD as called for in the approved Facilities Plan. Further expansion of this facility before the year 2000 is not anticipated.

(10) Naperville FPA: The City of Naperville Springbrook plant (W-26) is the only municipal-type plant in this FPA. Construction of this facility, which began operation in early 1976, was completed under a facilities planning exception from the IEPA. Current plans call for the construction of an interceptor north to Warrenville. This interceptor will allow the complete phase out of the Warrenville plant which presently is used only for flow metering.

(11) Plainfield FPA: There are two municipal-type plants in the Plainfield FPA. The Village of Plainfield owns and operates one (W-32) and the other is the dormant Central States Utility Co. plant (W-6). A Needs Analysis report has been completed for the Plainfield FPA, and calls for the expansion of the existing Plainfield plant from 0.90 MGD to 1.40 MGD by 1995.

(12) West Chicago FPA: There are three municipal-type plants in the West Chicago FPA. The City of West Chicago (D-35) and the Village of Winfield (D-37) each own and operate a public wastewater treatment facility. The DCDPW also operates a plant at the Cascade Drive-In Theatre (D-12). The original facilities plan for this FPA recommended a phased regionalization of wastewater treatment service. Phase I, to be implemented by 1985, calls for the phase out of the Winfield plant to West Chicago and the expansion of

the West Chicago plant from 3.4 MGD to 9.4 MGD. Phase II calls for the further expansion of the West Chicago plant to 12.0 MGD to serve the rest of the FPA. The date of Phase II is dependent on Phase I progress and the need for new sewer service. The Facilities Plan is to be revised but to date, no conclusions have been reached.

(13) Wheaton FPA: The Wheaton Sanitary District owns and operates the only municipal-type wastewater treatment facility (D-36) in the Wheaton FPA. The Wheaton plant is currently undergoing expansion from 6.9 MGD to 8.9 MGD under a facilities planning exception from IEPA. The plant is also being upgraded for nitrification.

Future plans call for the addition of tertiary filters which will also function to treat excess flows during wet weather. Wheaton recently received a 10/12 variance from the previously required 4/5 effluent limitations for BOD and suspended solids.

(14) Channahon FPA: There is currently one municipal-type plant in the Channahon FPA. The Camelot Utility Company owns and operates the plant which discharges into the mainstem Du Page River. A proposed Channahon municipal plant would discharge into the Des Plaines River.

(15) Summary: Table 16-17 contains information summarizing the status of facilities planning in the Du Page River Basin and delineating which plants will probably remain in service through the year 2000. Since a majority of the FPAs in the Du Page Basin do not have and accepted facilities plans, this assumed future configuration of municipal-type point sources in the basin is tenuous.

16.05 NONPOINT SOURCES: EXISTING CONDITIONS

a. Urban Stormwater Systems

In the Du Page Basin separate storm sewer systems serve all or portions of 26 municipalities and numerous unincorporated areas. It is estimated that 50 square miles, 13 percent of the basin area, are served by separate storm sewers. These systems generally follow natural drainage courses and discharge either directly into the Du Page or indirectly via overland flow, tributary ditches or streams.

Combined sewer systems serve only the community of Lombard. It is estimated that 2.75 square miles, less than one percent of the basin, are tributary to combined sewer overflows.

These areas within the basin not served by separate storm sewers are estimated to comprise 323 square miles or 85 percent of the basin area. Stormwater falling upon these areas enters the Du Page by overland flow via ditches or other small water courses.

b. Construction Activities

As discussed in Chapter Six, construction activities, coupled with stormwater runoff and resultant erosion, can contribute sediments, chemicals and biological organisms to rivers and streams.

Construction activities are known to be contributing to localized water pollution problems at present, but their impacts are difficult to quantify. The potential for damage to water quality will exist in the future. Changes in population and land use will generate substantial residential and commercial construction, accompanied by surface disturbances for roads, utilities, and other facilities.

c. Septic Systems

Septic systems are used widely in the basin. As inventoried by county agencies, 18,530 residential septic systems serve about 68,650 persons (See Table 16-21). In addition, the basin has 188 nonresidential septic systems serving a population equivalent of 2,141 persons.

Figure 16-6 shows the locations of all septic systems and Table 16-22 provides a general description of systems located in areas having existing or potential limitations for conventional on-site disposal methods.

d. Hydrologic Modifications

Many rivers in northeastern Illinois contain dams, weirs, and other structures which significantly influence and control DO concentrations and other water Proper consideration was given to these structures in the water quality model. The influence of a channel dam on water quality can often be dramatic. Weirs and dams create pools which may have DO levels below or above those normally expected if the stream is free flowing. Forty-eight dams were analyzed in the region of which six are located in the Du Page Basin.

In addition, many streams in the basin have been ditched, straightened, or channelized. The Illinois Department of Conservation has identified six streams which have undergone some modification: the East Branch of the Du Page River, Ferry Creek, Kress Creek, St. Joseph Creek, Winfield Creek, and Lily Cache Creek. This type of activity likely will continue in the basin, although where, and when, and what impact it will have on stream quality is unknown.

TABLE 16-21: SUMMARY OF SEPTIC TANK INSTALATIONS

Du Page River BASIN

COUNTY	NUMBER OF SEPTIC SYSTEMS			POPULATION SERVED		
	RESIDENTIAL	NON RESIDENTIAL	TOTAL	RESIDENTIAL	NON RESIDENTIAL (PE)	TOTAL
Cook	236	1	237	997	27	1,024
Du Page	12,940	130	13,070	48,976	1,344 (1)	50,320
Kane	41	-0-	41	143	-0-	143
Will	5,314	57	5,371	18,533	770	19,303
Total	18,531	188	18,719	68,649	2,141	70,790

(1) Non-residential population served provided only for septic systems with PE of 35 or greater.

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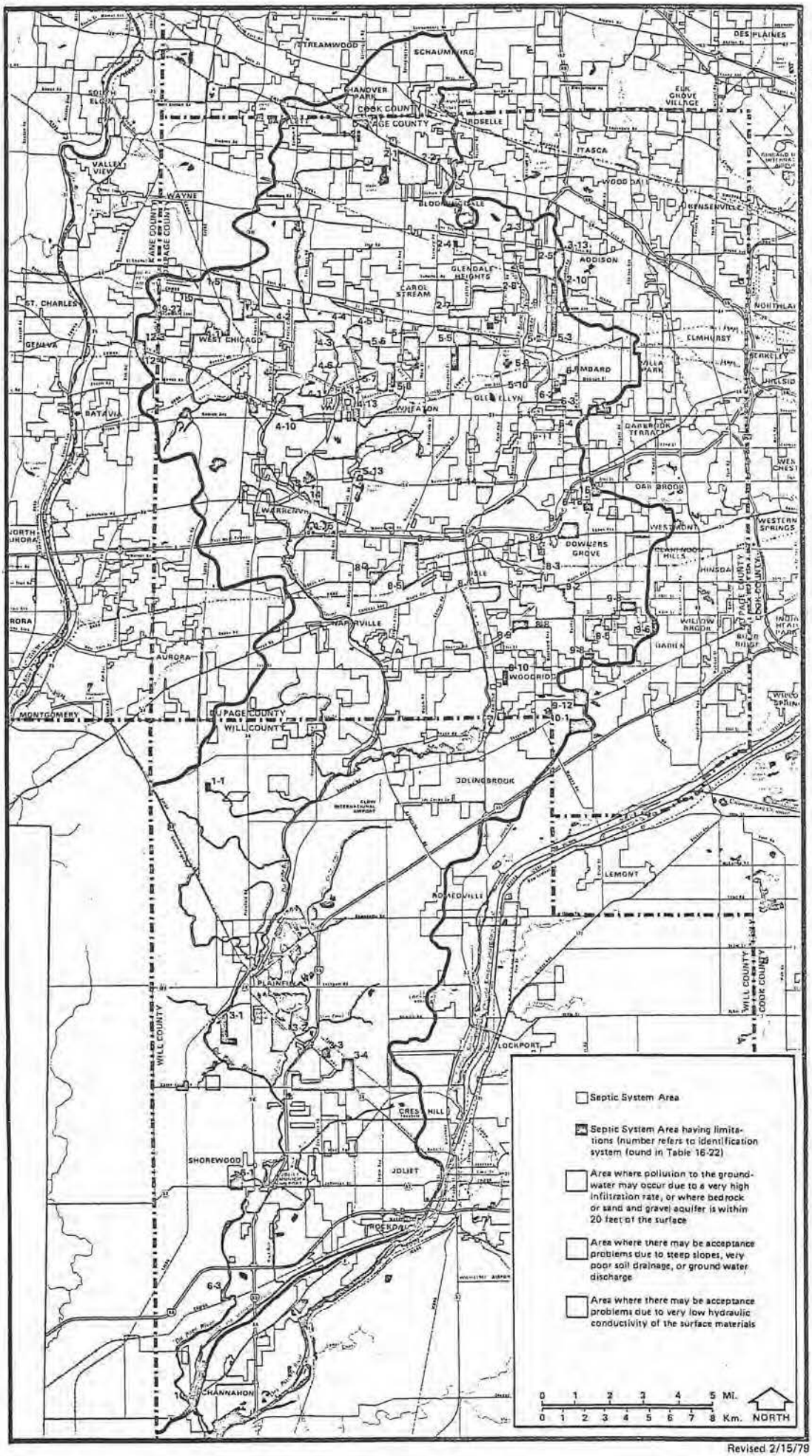
e. Agricultural Runoff

Approximately 66 percent of the basin falls into the category of "vacant, agricultural, and forest" areas. During storm events, agricultural pollutants enter the Du Page by direct overland flow and through various tributary streams. Agricultural pollutants of particular concern include sediments, pesticides, and nutrients (nitrogen and phosphorous).

f. Air Pollution

As discussed in Part I, the impact of air pollution fallout on water quality varies in response to several factors. Among these factors is the area-volume ratio of the water body. In general, fallout is a source of greater concern with respect to large water bodies like Lake Michigan. Air deposition is a significant component of surface loadings of pollutants on the land surface also. These pollutants may eventually reach the water body via stormwater runoff. However, it is difficult to quantify the magnitude of this impact.

Figure 16-6: LOCATION OF SEPTIC AREAS



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TABLE 16-22: SEPTIC SYSTEM AREAS HAVING LIMITATIONS

DuPage River BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Cook	Schaumburg	St. John's School	1	137	7-1
DuPage	Wayne		29	99	1-1
DuPage	Wayne		7	27	1-2
DuPage	Wayne		7	27	1-5
DuPage	Wayne	West Chicago	33	125	1-6
DuPage	Wayne	West Chicago	22	83	1-7
DuPage	Bloomingdale		67	269	2-1
DuPage	Bloomingdale		123	494	2-2
DuPage	Bloomingdale		29	117	2-3*
DuPage	Bloomingdale		3	12	2-4
DuPage	Bloomingdale		34	137	2-5*
DuPage	Bloomingdale		42	169	2-6
DuPage	Bloomingdale		84	338	2-7
DuPage	Bloomingdale		581	2336	2-8
DuPage	Bloomingdale	partly in Addison	22	88	2-9
DuPage	Bloomingdale	partly in Addison	134	539	2-10
DuPage	Addison		137	515	3-13
DuPage	Winfield		31	123	4-1
DuPage	Winfield		214	850	4-2
DuPage	Winfield		77	305	4-3
DuPage	Winfield		103	409	4-4
DuPage	Winfield		78	310	4-5
DuPage	Winfield		146	580	4-6
DuPage	Winfield		125	496	4-7
DuPage	Winfield	Cress Creek Splits	75	298	4-8
DuPage	Winfield		47	187	4-9

TABLE 16-22: SEPTIC SYSTEM AREAS HAVING LIMITATIONS

DuPage River BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
DuPage	Winfield		11	44	4-10
DuPage	Winfield	Village of Winfield	11	44	4-11
DuPage	Winfield	Village of Winfield	32	127	4-12
DuPage	Winfield	Village of Winfield	6	24	4-13
DuPage	Winfield	City of Warrenville	225	893	4-14
DuPage	Winfield		165	655	4-15
DuPage	Milton		57	203	5-1
DuPage	Milton		63	225	5-2
DuPage	Milton		47	168	5-3
DuPage	Milton		158	564	5-4
DuPage	Milton		141	503	5-5
DuPage	Milton		451	1610	5-6
DuPage	Milton		67	239	5-7
DuPage	Milton		11	39	5-8
DuPage	Milton		53	189	5-9
DuPage	Milton		53	189	5-10
DuPage	Milton		14	50	5-11
DuPage	Milton		101	361	5-12
DuPage	Milton		19	68	5-13
DuPage	Milton		199	710	5-14
DuPage	York	partly in Lombard	32	122	6-1
DuPage	York	partly in Lombard	4	15	6-2
DuPage	York		74	282	6-3
DuPage	York	Lombard	173	659	6-4

TABLE 16-22: SEPTIC SYSTEM AREAS HAVING LIMITATIONS

DuPage River BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
DuPage	York		61	232	6-16*
DuPage	York	partly in Downers Grove	12	46	6-18
DuPage	Lisle		150	569	8-1
DuPage	Lisle		108	409	8-2
DuPage	Lisle	partly in Downers Grove	80	303	8-3
DuPage	Lisle		94	356	8-4
DuPage	Lisle		150	569	8-5
DuPage	Lisle		152	567	8-6
DuPage	Lisle		368	1395	8-7
DuPage	Lisle		278	1054	8-8
DuPage	Lisle		98	371	8-9
DuPage	Lisle		25	95	8-10
DuPage	Downers Grove North	Downers Grove	245	882	9-1
DuPage	Downers Grove North		388	1397	9-2
DuPage	Downers Grove North		96	346	9-3
DuPage	Downers Grove North		170	612	9-5
DuPage	Downers Grove North	partly in Village of Westmont	84	302	9-6*
DuPage	Downers Grove North	partly in Downers Grove	89	320	9-8*
DuPage	Downers Grove North		60	216	9-12*
DuPage	Downers Grove South		81	292	10-1*
Will	Wheatland	Pheasant Ridge	15	53	1-1
Will	Plainfield		140	490	3-1
Will	Plainfield	Lily Cache Acres Subdivision	414	1449	3-2
Will	Plainfield		90	315	3-3
Will	Plainfield	Crystal Lawns/ Sunnyland	1000	3500	3-4
Will	Troy	Robin Hill Subdivision	89	312	6-1

TABLE 16-22: SEPTIC SYSTEM AREAS HAVING LIMITATIONS

DuPage River BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Will	Troy	Shorewood	534	1809	6-2
Will	Troy	River Meadows	10	35	6-3
Will	Channahon	partly in Village of Channahon	274	959	10-2*
Kane	St. Charles		15	52	9-27
Kane	Geneva-Batavia		26	91	12-3
Kane	Geneva-Batavia		50	175	12-4*

*Located partially in this basin

g. Mining

Nine gravel pits with a total area of 656 acres have been identified in the Du Page County portion of the basin. Two sites are active at the present time. The Will County portion of the basin contains numerous gravel pits totaling approximately 1,262 acres. Some of these are active intermittently, depending on market demand. Several quarries are operating in the vicinity of Plainfield. No specific water quality problems have been linked to these activities. However, the potential for pollution has been recognized by both counties. No information is available on mining activities in the Cook County part of the basin.

h. Surface Waste Disposal Sites

Runoff from active and inactive refuse dumps, sanitary landfills, and junkyards can contribute to ground and surface water pollution. Some sanitary landfills (and old dumps of the past) are located in topographically low areas. In these locations, the refuse is found very close to or even below the water table. In some instances, surface runoff of pollutants from these sites enters adjacent streams. Present sanitary landfill regulations enforced by the IEPA are much more restrictive and prohibit disposal at sites and elevations where water pollution may result.

The Du Page Basin contains approximately 11 surface waste disposal sites. These include active and inactive landfills (including sanitary landfills) and dumps.

The majority of the disposal sites are inactive: four landfills are completed and their sites are at final grade; two dumps, where solid waste was disposed illegally, are now in active; and one landfill (Barrett's) was recently closed by the Will County Health Department due to its poor operating record. Four active landfills are located in the basin.

The areas mentioned above have the potential to contribute to surface and subsurface water quality problems. However, there is no evidence that directly links any specific water quality problems to these areas.

16.06 DISPOSAL OF RESIDUALS

Chapter Seven discusses the areawide aspects of residuals waste management and summarizes the current practices in the region, residual waste characteristics, and alternative methods for utilization and disposal.

At the present time, there are no known problems associated with residuals management in the Du Page Basin. However, as sludge volumes increase in the future due to increased wasteloads and higher levels of treatment, individual treatment plants may encounter difficulties and higher costs in processing, removing, and disposing or utilizing sludges. Increased urbanization in the basin also will impact on the availability of potential lands for disposal or land application.

The predominant current modes of sludge disposal in the basin are land application, land filling, and removal by local residents. As sludge volumes increase significantly in the future and local landfill sites exhaust their capacities, more pressure may be placed on land application and other disposal methods.

Despite the fact that there are a large number of septic systems in the basin, septage disposal has not been identified as a particular problem. The availability of sanitary landfills owned by Du Page County but operated by private firms may account for this.

16.07 EXISTING MANAGEMENT PROGRAMS

The major features of the existing water quality management system in northeastern Illinois have already been discussed in Part I of this report. In this chapter, management programs in the Du Page Basin are presented, but only to the extent that it is necessary to clarify the previous discussion.

Table 16-23 is a list of the public agencies and private utilities in the Du Page Basin which are currently involved in water quality related activities. Variations in programs and responsibilities between these agencies are indicated by a numerical code.

16.08 MODELING PROCESSES: FUTURE CONDITIONS

As described previously, the first major use of the computer model in the process of simulation was to develop a summary of existing water quality conditions. The statistics that resulted showed water quality to range from good to poor in various parts in the basin. State standards, which generally call for at least 5 mg/l of DO were being violated to a degree in all reaches.

The amount of BOD in the streams in this basin also is generally in excess of acceptable levels. About 3,030 tons of BOD are entering the streams in the basin each year.

This loading would have to be cut significantly in the East Branch, in particular, before BOD levels would be low enough to indicate good water quality.

Overflows from combined sewers account for 2.1 percent of the BOD in the basin; discharges from wastewater treatment plants, 38 percent; and nonpoint source runoff, 60 percent.

The basin is also stressed by another serious pollutant, ammonia, as more than 1,020 tons of which enter the basin annually.

Three sources: combined sewers, treatment plants and stormwater runoff, became the focus of efforts to develop the first and second test plans, and, finally, a recommended plan for the basin. The results of those efforts, and test plans that grew out of staff work and public discussion, are described below.

a. First Test Plan: Assumptions

Beginning in July 1977, the Commission held a series of meetings in the Du Page Basin. The purpose was to explain the water quality conditions in the basin to residents and local officials, and to allow them to participate in the development of the basin's component of the areawide plan.

At the initial meetings, the Commission staff reported on existing water quality conditions, identified sources of pollution, and assisted participants in developing appropriate strategies for testing future proposals. The suggestions that were developed were reviewed by Local Steering Committees from Du Page and Will counties.

These Committees, in turn, made recommendations to the Commission on strategies to be evaluated using the water quality model and other techniques. The Commission's 208 Steering Committee reviewed the recommendations and formulated a "first test plan" to be evaluated.

In addition to the recommendations developed through this process, the first test plan was shaped by assumptions made to reflect forecasted population increases; land cover changes; improvements in wastewater and stormwater treatment; flood control and channel improvements; and changes in agricultural acreages and practices. These assumptions are described below:

(1) Population and Land Use: The Commission's 1976 forecasts for the year 2000 were used to determine future changes in land cover and wastewater loads. These forecasts were applied in each reach. Overall, a 104.7 percent increase in population was forecast.

Present land cover in the basin was determined by satellite photography. This information was divided into four categories: lowlands--marshes, swamps, and forested areas; grasslands--open to the infiltration of rainwater and snowmelt, but not tilled regularly, including pastures, parks, and golf courses; croplands--regularly tilled for agricultural purposes (there is some exchange between cropland and grasslands due to crop rotation); and impervious surfaces--covered with buildings, roads and parking lots. For the first test plan, estimates of land

TABLE 16-23 : EXISTING LOCAL WATER QUALITY MANAGEMENT AGENCIES AND PROGRAMS: DU PAGE RIVER BASIN

MUNICIPALITIES *			
Addison (Salt Creek)	1,2,4 +	Oakbrook (Salt Creek)	4 +
Bartlett (Fox)	1,2,4	Oakbrook Terrace (Salt Creek)	1
Batavia (Fox)	1,2,4	Plainfield	1,2,3,4
Bloomingdale (Salt Creek)	1,2,4	Romeoville (Des Plaines)	1,2
Bolingbrook (Des Plaines)	1,2,4	Roselle (Salt Creek)	1,2,4
Carol Stream	1,2,4	Schaumburg (Fox, Salt Creek)	1,3,4
Crest Hill (Des Plaines)	1,2	Shorewood	1,2
Downers Grove	4	St. Charles (Fox)	1,2,3,4
Glendale Heights	1,2,4	Streamwood (Fox)	1,2,4
Glen Ellyn	1,2,4	Villa Park (Salt Creek)	1,4
Hanover Park (Fox)	1,2,3,4	Warrenville	1
Lisle	1	West Chicago	1,2,4
Lockport (Des Plaines)	1,2	Westmont (Salt Creek, Des Plaines)	1,4
Lombard (Salt Creek)	1,2,4	Wheaton	1,3,4
Joliet (Hickory Creek, Des Plaines)	1,2,4	Winfield	1,2
Naperville (Fox)	1,2,4	Woodridge (Des Plaines)	1
SANITARY DISTRICTS			
Downers Grove S.D.	1,2	Metropolitan S.D. of Greater Chicago	2
Glen Ellyn Heights S,D,	1,2	Wheaton S.D.	2
COUNTIES			
Cook	4	Kane	3.4
DuPage	1,2	Will	
SOIL AND WATER CONSERVATION DISTRICTS			
Kane - DuPage North Cook Will - South Cook			

* Additional basins shown in parentheses for those municipalities which cross basin boundaries.

\+ Numbers indicate existing water quality related activities as follows:

1. Wastewater collection agency
2. Wastewater treatment agency
3. Has enacted erosion and sediment control regulations
4. Has enacted stormwater detention regulations or equivalent sanitary district regulations apply

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(It should be noted that this list is based on information gathered from a variety of sources over a period of many months. An attempt has been made to compile the most complete and current information available. However, due to the number and variety of local programs in the region, as well as the constantly evolving nature of these programs, this list may well be incomplete. The 208 staff expects it will be necessary to periodically revise or correct the list; they would appreciate any assistance that local agencies or individuals can provide.)

cover changes by the year 2000 were made using population forecasts and their attendant housing and employment assumptions. Land required for new urbanization in the basin was taken from the grassland and cropland categories first. When this land was largely depleted, land from the lowland category was taken for urban purposes. Table 16-14 shows the results of this process.

(2) Local Facilities Plans: Extensive planning has been conducted in recent years for the improvement of existing wastewater treatment facilities, both public and private, and the creation of new facilities to serve developing areas. These plans were included in the forecast of water quality conditions for the year 2000. Table 16-17 shows the assumptions that were made about municipal type treatment plants under year 2000 conditions.

In general, it was assumed that all planned improvements in municipal wastewater treatment plants (per local facilities plans) would be in operation, and that industrial treatment plants would meet required water quality standards established in their effluent permits. No changes in the capacities of miscellaneous treatment plants were estimated, given the many imponderables associated with such forecasts for small areas and individual enterprises.

(3) Phosphate Reduction: The City of Chicago and several suburbs have ordinances limiting the phosphate content of home laundry detergents. Because a substantial portion of the metropolitan area market has limitations on phosphate in home laundry detergents, most distributors have withdrawn high phosphate products from the entire area. In considering changes in wastewater treatment practices for the year 2000, it was assumed that regulations limiting the amount of phosphate in domestic laundry detergents would be expanded to cover all communities. Based upon studies of the effect of detergent phosphate reductions on wastewater treatment plant operations, it was assumed that phosphate concentrations in plant influents for the year 2000 would be two-thirds of existing levels.

(4) Combined Sewer Overflows: It was assumed that combined sewer overflows from Lombard would be significantly reduced by the year 2000. Normal flows (up to 14.5 MGD) from the Lombard service area would be diverted to Glenbard for treatment. Excess flows, up to an additional ten times dry-weather flow (58 MGD), would be given secondary (30/30) treatment at Lombard and discharged.

(5) Urban Stormwater Runoff: The conditions set for the year 2000 in simulating future water quality assumed that 25 percent of the materials constituting BOD in urban stormwater runoff would be removed from the existing impervious areas (largely through street sweeping and vacuuming) and prevented from entering the waters of the Du Page. In newly developing urban areas, it was assumed that 50 percent of the BOD materials would be captured by a variety of techniques, including street vacuuming, stormwater detention basins, planned unit developments and other measures.

(6) Septic Systems: The impact of septic systems on water quality was also considered in the simulation of conditions in the year 2000. In the first test plan, it was assumed that adverse effects of septic systems on water quality would be eliminated by the year 2000, either by connecting these systems to sewage collection and treatment systems, or by eliminating problems in the remaining systems.

(7) Soil Conservation: Agricultural "Best Management Practices," recommended by local U.S. Department of Agricultural officials, were included in the calculations of future water quality. In the Du Page Basin, 18.2 square miles of land were forecast to be under conservation practices in the year 2000, employing contouring, terracing, or combinations of these. (Note that conservation tillage was not tested in the first test plan).

(8) Stream Flow Changes: Two MSDGC flood detention reservoirs on the Upper West Branch were assumed to be in place by the year 2000.

(9) Benthic Conditions: In several reaches, particularly in the East Branch, it was assumed that significant reductions in pollutant loads, both point and nonpoint, would result in improved benthic conditions. Thus, sediment oxygen demand (SOD) rates and benthic pollutant release rates were lowered somewhat in response to lower pollutant loads in the appropriate reaches.

b. First Test Plan Simulated Results

If a water quality program that contained all the features of the "first test plan" actually were implemented, the overall water quality of the Du Page Basin would generally be improved, especially in the middle and lower reaches of the East Branch. The major improvement would be greatly reduced ammonia concentrations. However, several individual reaches in the basin would actually experience a slight water qualtiy deterioration with regard to DO. Despite overall improvement, sections of the Du Page River, primarily in the East Branch, would contain less than desirable water quality.

The simulation showed the interaction of two competing trends. Efforts to clean the water, including improved wastewater treatment at many plants, the treatment of combined sewer overflows and street sweeping and vacuuming, would compete against the expected increase in the loads of pollutants caused by increased population and urban runoff.

The results of the year 2000 simulation for Reach 290 (Table 16-25) show that the first test plan would produce

TABLE 16-24: CHANGES IN LAND COVER, 1976-2000

Category	1976 Land Cover Estimates	Year 2000 Land Cover Forecast	% Change
Lowlands	25.44 sq. mi.	23.50 sq. mi.	- 7.6
Grasslands	129.02 sq. mi.	180.30 sq. mi.	+39.7
Croplands	155.21 sq. mi.	93.70 sq. mi.	-39.6
Impervious	14.33 sq. mi.	26.50 sq. mi.	+84.9
TOTAL	324.00 sq.mi.	324.00 sq. mi.	

significant changes in the loads of BOD and ammonia. The current BOD load to Reach 290 was about 3,030 tons per year. In the year 2000, under the simulated first test plan conditions, the load would be 3,960 tons per year. This increase, however, is largely offset by an increase in flows. The ammonia load to Reach 290 would be 519 tons per year in the year 2000, down from 1,020 tons per year under existing conditions, an impressive reduction. Table 16-25 illustrates the effect the first test plan would have on total pollutant loads from various sources in the basin. Table 16-26 summarizes the water quality conditions of the first test plan in various reaches and compares them to existing conditions.

As described in Table 16-27, the first test plan also would produce DO improvements in most areas of the East Branch. For esample, in Reach 150 on the East Branch, the 5.0 mg/l proposed standard is now violated about 24 percent of the time (according to the model). It would be violated only two percent of the time in the year 2000.

DO levels in most other areas of the East Branch would also improve. However, violations of the DO standard would still be undesirably frequent and for extended periods in several areas, due mainly to point sources discharges and to the high sediment oxygen demand values which were assumed in the simulation. All of the reported reaches in the West Branch and mainstem Du Page showed DO violations less than two percent of the time, with most violations occurring during wet-weather conditions. In general, DO levels changed very little between existing and first alternative conditions in the West Branch and mainstem, reflecting the impact of stringent pollution controls.

Under the first test plan, some of the upstream reaches (including 5, 20, 25 and 110) reported relatively high ammonia standard violation rates (Table 16-26). These violations were asscciated with point source discharges which were assumed to meet an annual average concentration of 1.5 mg/l. However, these point source concentrations were allowed to vary in the simulation in accordance with historical patterns such that in certain months,

TABLE 16-25: COMPARISON OF SOURCES AND VOLUMES OF POLLUTANTS

REACH 290

Pollutant Indicator and Source	Existing Conditions				First Test Plan			
	Surface		Ground		Surface		Ground	
	Amount	%	Amount	%	Amount	%	Amount	%
BOD (tons/yr.) Boundary Cond.								
Treatment Plants	1140	37.6			2190	55.3		
Comb. Sewer Over.	62.8	2.1			53.3	1.4		
Lowland	82.8	2.7	11.5	.4	80.5	2.0	10.6	.3
Cropland	319.3	10.5	157	5.2	180	4.6	97.6	2.5
Grassland	332	10.9	295	9.7	468	11.8	118	3.0
Impervious	631.5	20.8			759	19.2		
TOTAL	2568	84.6	464	153	3731	94.3	226	5.8
Ammonia (tons/yr.) Boundary Cond.								
Treatment Plants	801	78.3			309	59.5		
Comb. Sewer Over.	5.06	.5			3.47	.7		
Lowland	4.98	.5	4.04	.4	4.85	.9	3.72	.7
Cropland	31.9	3.1	36.7	3.6	18.0	3.5	22.8	4.4
Grassland	55.4	5.4	51.8	5.1	78.2	15.1	41.5	8
Impervious	31.7	3.1			37.9	7.3		
TOTAL	930	90.9	92.5	9.1	451	87	68.0	13.1

*Data are from the first simulation of the 2nd Test Plan

REACH 290 (Continued)

Pollutant Indicator and Source	Existing Conditions				First Test Plan			
	Surface		Ground		Surface		Ground	
	Amount	%	Amount	%	Amount	%	Amount	%
Nitrate (tons/yr.) Boundary Cond.								
Treatment Plants	414	33.6			1548	69.4		
Comb. Sewer Over.	2.00	.2			1.73	.1		
Lowland	5.8	.5	18.1	1.5	5.64	.2	16.7	.8
Cropland	157	12.7	365	29.6	87.5	3.9	248	11.1
Grassland	71.9	5.8	173	14.0	102	4.6	187	8.4
Impervious	26.4	2.1			31.9	1.4		
TOTAL	677	54.9	556	45.1	1777	79.6	452	20.3
Phosphorous (tons/yr.) Boundary Cond.								
Treatment Plants	239	80.7			268	94.7		
Comb. Sewer Over.	1.31	.4			1.16	.4		
Lowland	.26	.1	.92	.3	.25	.1	.85	.3
Cropland	9.70	3.3	8.40	2.8	1.8	.6	1.7	.6
Grassland	6.69	2.3	24.6	8.3	3.1	1.1	3.1	1.1
Impervious	5.38	1.8			2.2	.8		
TOTAL	262	88.6	33.9	11.4	277	97.7	5.65	2.0

*Data are from the first simulation of the 2nd Test Plan

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TABLE 16-26: COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS – FIRST TEST PLAN – SECOND TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 5			REACH 20		
		Existing	1st	*2nd	Existing	1st	*2nd
BOD (mg/l) Maximum	None	51.4	50.0		28.3	22.6	
Minimum		2.96	.92		2.36	1.55	
Mean		9.36	5.59		6.08	5.44	
Ammonia (mg/l) Maximum		3.73	5.34		2.54	3.50	
Minimum		.09	.04		.04	.10	
Mean		.58	1.08		.48	.65	
Frequency of Violation	1.5[1]	127	53		19	30	
Average Duration of Violations (hours)	1.5[1]	13	82		8	124	
Nitrate (mg/l) Maximum	None	7.91	6.97		11.7	8.41	
Minimum		.75	.43		1.37	.92	
Mean		6.14	5.10		4.8	5.68	
Frequency of Violation	10.0	0	0		1	0	
Average Duration of Violations (hours)	10.0	0	0		6	0	
Phosphate (mg/l) Maximum		3.07	2.06		3.32	2.06	
Minimum		.12	.09		.20	.15	
Mean		1.7	1.23		1.35	1.02	
Frequency of Violation	.05	1	1		1	1	
	.20	4	27		1	4	
Average Duration of Violations (hours)	.05	26,304	26,304		26,304	26,304	
	.20	6,574	973		26,304	6,565	

(1) Illinois Pollution Control Board Standard

*Data are from the first simulation of the 2nd Test Plan

TABLE 16-26: COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS – FIRST TEST PLAN – SECOND TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 25			REACH 85		
		Existing	1st	*2nd	Existing	1st	*2nd
BOD (mg/l) Maximum	None	75.0	50.2		31.1	26.6	26.7
Minimum		.40	.40		2.02	1.57	1.72
Mean		4.69	8.12		5.42	4.52	4.94
Ammonia (mg/l) Maximum		3.90	5.06		3.15	2.03	2.11
Minimum		0	.03		.02	.06	.06
Mean		.55	.79		1.00	.38	.38
Frequency of Violation	1.5[1]	122	103		51	7	7
Average Duration of Violations (hours)	1.5[1]	4	36		123	10	10
Nitrate (mg/l) Maximum	None	11.4	6.77		9.40	9.82	9.83
Minimum		.24	.17		1.32	1.05	1.04
Mean		3.57	3.72		4.10	5.93	5.94
Frequency of Violation	10.0	2	0		0	0	0
Average Duration of Violations (hours)	10.0	2	0		0	0	0
Phosphate (mg/l) Maximum		1.77	1.68		2.97	1.98	1.98
Minimum		.04	.02		.18	.14	.14
Mean		.43	.38		1.07	.81	.81
Frequency of Violation	.05	2	9		1	1	1
	.20	53	193		2	7	7
Average Duration of Violations (hours)	.05	13,152	2,921		26,304	26,304	26,304
	.20	492	125		13,151	3,746	3,746

(1) Illinois Pollution Control Board Standard

*Data are from the first simulation of the 2nd Test Plan

TABLE 16-26: COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS – FIRST TEST PLAN – SECOND TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 110			REACH 120		
		Existing	1st	*2nd	Existing	1st	*2nd
BOD (mg/l) Maximum	None	72.3	46.5	46.7	43.0	27.8	27.0
Minimum		.44	1.56	1.25	3.80	1.80	2.74
Mean		4.30	10.9	10.1	11.8	8.77	8.00
Ammonia (mg/l) Maximum		7.14	3.71	3.71	11.6	2.80	2.80
Minimum		.41	.15	.12	.48	.26	.20
Mean		3.43	1.07	.95	4.79	.61	.54
Frequency of Violation	1.5[1]	142	179	122	13	25	26
Average Duration of Violations (hours)	1.5[1]	177	14	5	2,017	5	5
Nitrate (mg/l) Maximum	None	17.6	8.52	8.58	8.59	8.97	9.01
Minimum		.45	.51	.48	1.05	1.07	.95
Mean		4.97	6.37	6.05	5.19	6.04	5.65
Frequency of Violation	10.0	2	0	0	0	0	0
Average Duration of Violations (hours)	10.0	40	0	0	0	0	0
Phosphate (mg/l) Maximum		6.87	2.42	2.43	6.87	2.44	2.44
Minimum		.20	.10	.13	.22	.27	.26
Mean		3.87	1.72	1.60	4.38	1.58	1.44
Frequency of Violation	.05	1	1	1	1	1	1
	.20	1	9	10	1	1	1
Average Duration of Violations (hours)	.05	26,304	26,304	26,304	26,304	26,304	26,304
	.20	26,304	2,921	2,628	26,304	26,304	26,304

(1) Illinois Pollution Control Board Standard

*Data are from the first simulation of the 2nd Test Plan

TABLE 16-26: COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS – FIRST TEST PLAN – SECOND TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 150			REACH 175		
		Existing	1st	*2nd	Existing	1st	*2nd
BOD (mg/l) Maximum	None	41.9	27.6	28.7	32.5	19.6	20.2
Minimum		2.65	3.47	3.86	2.74	2.92	3.16
Mean		8.02	7.95	9.98	7.22	8.09	9.74
Ammonia (mg/l) Maximum		9.68	2.85	2.86	7.39	2.06	2.06
Minimum		.30	.30	.30	.20	.17	.17
Mean		3.36	.84	.84	2.58	.66	.65
Frequency of Violation	1.5[1]	64	65	65	123	4	5
Average Duration of Violations (hours)	1.5[1]	402.6	10	11	189	7	6
Nitrate (mg/l) Maximum	None	8.25	10.8	10.9	8.40	10.5	10.7
Minimum		1.00	1.26	1.23	1.28	1.54	1.45
Mean		4.67	7.54	7.50	4.68	7.59	7.62
Frequency of Violation	10.0	0	177	160	0	94	110
Average Duration of Violations (hours)	10.0	0	10	13	0	10	18
Phosphate (mg/l) Maximum		5.53	2.19	2.16	4.55	2.14	2.13
Minimum		.18	.16	.16	.22	.19	.19
Mean		2.70	1.25	1.20	2.30	1.21	1.17
Frequency of Violation	.05	1	1	1	1	1	1
	.20	2	3	3	1	2	2
Average Duration of Violations (hours)	.05	26,304	26,304	26,304	26,304	26,304	26,304
	.20	13,149	8,765	8,765	26,304	13,148	13,148

(1) Illinois Pollution Control Board Standard

*Data are from the first simulation of the 2nd Test Plan

TABLE 16-26: COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS – FIRST TEST PLAN – SECOND TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 230			REACH 275		
		Existing	1st	*2nd	Existing	1st	*2nd
BOD (mg/l) Maximum	None	51.3	18.2		25.1	24.6	
Minimum		2.56	2.22		1.68	.66	
Mean		5.81	5.90		5.38	3.57	
Ammonia (mg/l) Maximum		3.55	2.46		7.53	2.37	
Minimum		0	.09		.11	0	
Mean		1.05	.54		.90	.29	
Frequency of Violation	1.5[1]	40	41		51	20	
Average Duration of Violations (hours)	1.5[1]	161	38		50	4	
Nitrate (mg/l) Maximum	None	15.1	13.7		11.4	8.73	
Minimum		.32	1.65		.80	0	
Mean		4.71	6.34		3.51	2.18	
Frequency of Violation	10.0	4	2		5	0	
Average Duration of Violations (hours)	10.0	4	2		6	0	
Phosphate (mg/l) Maximum		3.63	2.08		2.85	1.99	
Minimum		.14	.13		.14	.01	
Mean		1.59	1.01		.64	.15	
Frequency of Violation	.05	1	1		1	61	
	.20	2	2		38	120	
Average Duration of Violations (hours)	.05	26,304	26,304		26,304	427	
	.20	13,148	13,139		664	35	

(1) Illinois Pollution Control Board Standard

*Data are from the first simulation of the 2nd Test Plan

TABLE 16-26: COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS – FIRST TEST PLAN – SECOND TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 290		
		Existing	1st	*2nd
BOD (mg/l) Maximum	None	42.7	14.7	
Minimum		2.06	1.96	
Mean		5.35	5.02	
Ammonia (mg/l) Maximum		2.99	1.79	
Minimum		0	.05	
Mean		.71	.40	
Frequency of Violation	1.5[1]	16	10	
Average Duration of Violations (hours)	1.5[1]	166	19	
Nitrate (mg/l) Maximum	None	12.7	10.8	
Minimum		0	1.63	
Mean		4.68	6.03	
Frequency of Violation	10.0	3	1	
Average Duration of Violations (hours)	10.0	4	3	
Phosphate (mg/l) Maximum		3.53	2.06	
Minimum		.18	.16	
Mean		1.43	.93	
Frequency of Violation	.05	1	1	
	.20	2	2	
Average Duration of Violations (hours)	.05	26,304	26,304	
	.20	13,149	13,140	

(1) Illinois Pollution Control Board Standard

*Data are from the first simulation of the 2nd Test Plan

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concentrations were significantly higher than the 1.5 mg/l average, often resulting in stream concentrations above the 1.5 mg/l standard. In actuality, if treatment plants are nitrifying to produce 1.5 mg/l ammonia, one might expect less variability in effluent concentrations than was simulated, thus, resulting in fewer violations.

The assessment of the plans tested in each basin is based on the extent to which a given plan reduces the total time that instream water quality standards are violated.

In the formulation of strategies in the initial areawide plan, an attempt was made to develop concepts that would allow all streams to meet the 5 mg/l dissolved oxygen level at least 95 percent of the time. Table 16-28 illustrates the effect that the first test plan would have on violations of various quality levels in the eleven reported reaches of the Du Page Basin. The final columns in each table show the percent of time that standards for each pollutant indicator would be violated in each reach. The objective was to have all figures in this column below five percent.

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c. The Second Test Plan Assumptions and Results

The second test plan was developed through much the same process described earlier for the first test plan. Simulation results for the first test plan were publicized and discussed at a series of public meetings in the basin. Through the areawide planning committee structure, a second test plan evolved out of suggestions for improvements.

Because of the format of the suggestions made and later approved by the 208 Steering Committee, many of the individual strategies had to be tested separately. In most cases, changes in pollutant loads were calculated to reflect the relative impact of a particular strategy on overall pollution loads, but a model simulation was not run to assess the water quality impact. However, a water quality simulation was run on the East Branch to assess the impact of several changes from the first test branch. A partial simulation run was also made on the West Branch to assess the impact of a point source change. The items tested and their results are described below.

(1) Specification: Test Ammonia at 1.5 mg/l in summer, and 4.0 mg/l in winter in West Branch Du Page.

(a) Interpretation: The current instream ammonia standard for general use waters is 1.5 mg/l. The IPCB is currently processing a change which will establish 4.0 mg/l during the winter months. This test involved relaxing the standard for ammonia in wastewater treatment plant effluents from 1.5 mg/l to 4.0 mg/l in the winter (November thru March). Ammonia is an important pollutant from both toxicity and oxygen demand perspectives.

(b) Results: Using data from the USEPA's manual "Quality Criteria for Water" it was determined that Du Page River waters would frequently be toxic to aquatic life with this new standard, given the pH and temperature ranges. However, it is recognized that this USEPA data is probably not directly applicable to the Du Page because of differences in both water chemistry and in the tolerance of the types of aquatic species found in northeastern Illinois. Further study is needed to assess the question of ammonia toxicity.

The oxygen demand of ammonia at 1.5 mg/l is not a major problem under simulated conditions. Allowing an increase to 4.0 mg/l in the wintertime is not likely to have a major impact on DO conditions for several reasons. DO concentrations are typically quite high in colder months, relative to the State standard. Further, ammonia oxidation rates, being a function of temperature, are relatively low in the winter.

TABLE 16-27: CHANGES IN DISSOLVED OXYGEN LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

(All data in mg/l)	REACH 5			REACH 20		
	Existing	1st	2nd	Existing	1st	2nd
Maximum	13.2	13.1		16.4	12.1	
Minimum	3.3	2.7		3.04	2.80	
Mean	9.0	7.9		8.75	8.16	
* Violations	5	28		24	22	
Average Duration	3	5		11	12	
** Overall Assessment	Good	Good		Good	Good	

(All data in mg/l)	REACH 25			REACH 85		
	Existing	1st	2nd	Existing	1st	2nd
Maximum	26.6	13.5		14.5	13.5	
Minimum	2.98	3.81		3.13	3.23	
Mean	9.89	9.22		9.00	9.33	
* Violations	13	16		17	9	
Average Duration	3	7		12	17	
** Overall Assessment	Good	Good		Good	Good	

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time D O levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

TABLE 16-27: CHANGES IN DISSOLVED OXYGEN LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

(All data in mg/l)	REACH 110			REACH 120		
	Existing	1st	2nd	Existing	1st	2nd
Maximum	13.2	13.0	13.2	16.8	10.9	11.2
Minimum	2.58	2.98	3.10	.78	1.33	1.81
Mean	7.18	6.04	7	3.98	5.23	6.68
* Violations	41	227	41	209	562	259
Average Duration	5	7	10	91	20	10
** Overall Assessment	Good	Fair	Good	Bad	Bad	Fair

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time D O levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

(All data in mg/l)	REACH 150			REACH 175		
	Existing	1st	2nd	Existing	1st	2nd
Maximum	15.8	12.4	12.4	28.0	11.0	11.2
Minimum	1.57	1.74	1.91	.52	.26	.32
Mean	6.01	7.36	7.70	5.34	6.70	6.92
* Violations	429	49	38	535	209	244
Average Duration	15	11	10	24	10	10
** Overall Assessment	Poor	Good	Good	Bad	Fair	Fair

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time D O levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

TABLE 16-27: CHANGES IN DISSOLVED OXYGEN LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

(All data in mg/l)	REACH 230			REACH 275		
	Existing	1st	2nd	Existing	1st	2nd
Maximum	24.4	12.9		13.9	18.8	
Minimum	2.36	2.20		1.67	2.26	
Mean	9.11	8.99		9.70	10.2	
* Violations	11	10		14	9	
Average Duration	20	18		10	7	
** Overall Assessment	Good	Good		Good	Good	

(All data in mg/l)	REACH 290		
	Existing	1st	2nd
Maximum	27.8	12.8	
Minimum	1.91	2.27	
Mean	9.08	8.92	
* Violations	34	18	
Average Duration	12	14	
** Overall Assessment	Good	Good	

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*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time D O levels were above 5.0 mg/l.

Possible ratings are: Excellent, Good, Fair, Poor, and Bad

(2) Specification: Reduce per capita water consumption by 15 percent. 1623

(a) Interpretation: None 1626

(b) Results: Treatment plants contribute large portions of the flows and pollutant loads in the Du Page Basin, particularly during dry weather and low flow periods. It might be expected that a 15% reduction in flow would impact 1629 1631

TABLE 16-28: WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

REACH 5

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	*2nd Test Plan	Existing Conditions	1st Test Plan	*2nd Test Plan	Existing Conditions	1st Test Plan	*2nd Test Plan
Temperature °C	32.2	0	0		0	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	5	28		3	5		0	1	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	127	53		13	82		6	17	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	1	1		26304	26304		100	100	

REACH 20

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan
Temperature °C	32.2	2	0		2	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	24	22		11	12		1	1	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	19	30		8	124		1	14	
Nitrate as N, mg/l	10	1	0		6	0		0	0	
Phosphorus Soluble as P, mg/l	.05	1	1		26304	26304		100	100	

*Data are from the first simulation of the 2nd Test Plan

TABLE . .8: WATER QUALITY EVENTS IN VIOLATION OF DESIRE. _EVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS (.ontinued)

REACH 25

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan
Temperature °C	32.2	0	0		0	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	13	16		3	7		0	0	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	122	103		4	36		2	14	
Nitrate as N, mg/l	10	2	0		2	0		0	0	
Phosphorus Soluble as P, mg/l	.05	2	9		13152	2921		100	100	

REACH 85

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan
Temperature °C	32.2	2	0	0	2	0	0	0	0	0
Dissolved Oxygen as O, mg/l	5.0	17	9	11	12	17	15	1	1	1
BOD_{20} Carbonaceous as O, mg/l	10	129	122		15	6		7	3	
Ammonia as N, mg/l	1.5	51	7	7	123	10	10	24	0	0
Nitrate as N, mg/l	10	0	0	0	0	0	0	0	0	0
Phosphorus Soluble as P, mg/l	.05	1	1	1	26304	26304	26304	100	100	100

REACH 110

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	*2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan
Temperature °C	32.2	1	0	0	1	0	0	0	0	0
Dissolved Oxygen as O, mg/l	5.0	41	227	41	5	7	10	1	6	2
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	142	179	122	177	14	5	96	10	2
Nitrate as N, mg/l	10	2	0	0	40	0	0	0	0	0
Phosphorus Soluble as P, mg/l	.05	1	1	1	26304	26304	26304	100	100	100

*Data are from the first simulation of the 2nd Test Plan

TABLE 16-28: WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS (Continued)

REACH 120

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan
Temperature °C	32.2	0	0	0	0	0	0	0	0	0
Dissolved Oxygen as O, mg/l	5.0	209	562	259	91	20	10	72	43	10
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	13	25	26	2017	5	5	100	0	0
Nitrate as N, mg/l	10	0	0	0	0	0	0	0	0	0
Phosphorus Soluble as P, mg/l	.05	1	1	1	26304	26304	26304	100	100	100

REACH 150

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan
Temperature °C	32.2	0	0	0	0	0	0	0	0	0
Dissolved Oxygen as O, mg/l	5.0	429	49	38	15	11	10	24	2	1
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	64	65	65	403	10	11	98	2	2
Nitrate as N, mg/l	10	0	177	160	0	10	13	0	7	8
Phosphorus Soluble as P, mg/l	.05	1	1	1	26304	26304	26304	100	100	100

REACH 175

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan
Temperature °C	32.2	0	0	0	0	0	0	0	0	0
Dissolved Oxygen as O, mg/l	5.0	535	209	244	24	10	10	49	8	9
BOD_{20} Carbonaceous as O, mg/l	10	171	288		19	17		12	19	
Ammonia as N, mg/l	1.5	123	4	5	189	7	6	88	0	0
Nitrate as N, mg/l	10	0	94	118	0	10	18	0	4	8
Phosphorus Soluble as P, mg/l	.05	1	1	1	26304	26304	26304	100	100	10

*Data ar[illegible] n the first simulation of the 2nd Test Plan

TABLE 16-28: WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS (Continued)

REACH 230

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan
Temperature °C	32.2	12	3		4	2		0	0	
Dissolved Oxygen as O, mg/l	5.0	11	10		20	18		1	1	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	40	41		161	38		24	6	
Nitrate as N, mg/l	10	4	2		4	2		0	0	
Phosphorus Soluble as P, mg/l	.05	1	1		26304	26304		100	100	

REACH 275

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan
Temperature °C	32.2	25	33		5	5		0	1	
Dissolved Oxygen as O, mg/l	5.0	14	9		10	7		1	0	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	51	20		50	40		10	3	
Nitrate as N, mg/l	10	5	0		6	0		0	0	
Phosphorus Soluble as P, mg/l	0.5	1	61		26304	427		100	99	

REACH 290

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan
Temperature °C	32.2	4	1		4	3		0	0	
Dissolved Oxygen as O, mg/l	5.0	34	18		12	14		2	1	
BOD_{20} Carbonaceous as O, mg/l	10	63	27		29	10		7	1	
Ammonia as N, mg/l	1.5	16	10		166	19		10	1	
Nitrate as N, mg/l	10	3	1		4	3		0	0	
Phosphorus Soluble as P, mg/l	.05	1	1		26304	26304		100	100	

*Data are from the first simulation of the 2nd Test Plan

on in-stream water quality as well as on the collection and treatment systems.

Systems initially designed for the reduced flows can readily handle the changed parameters. For existing systems, problems will arise that must be accommodated. It first should be emphasized that the reduced volumes of flow do not automatically result in reduced quantities of pollutants. In fact, there probably will be no change in the latter. Thus, more concentrated wastewaters must be collected and treated.

The reduced flows in existing sewers will cause lower velocities in the pipes. These, in turn, may result in the deposition of more solids in the sewer inverts, thus promoting anaerobic conditions and their concurrent odors. The wastewaters will take longer time to reach the treatment plants. The anaerobic sewers and increased concentrations of organic matter will create local odor problems and adversely affect the treatment processes which are based on aerobic systems. Chemicals may have to be added at the front end of the systems to control these problems.

Treatment systems reduce pollutants so as to meet prescribed effluent concentrations. With the effluent volume being reduced by 15%, correspondingly higher amounts of pollutants must be removed in the treatment process so as to meet the limiting concentrations in the effluents. Biological treatment units, final settling tanks and solid handling facilities would all be affected by the increased strength and the higher reductions required. Pumping facilities and related operating costs would be lower.

In passing, it should be noted that treatment plants are designed to accommodate loads which vary widely, both diurnally and seasonally. Thus, except for the anaerobic sewage, the 15% reduction could be readily handled in existing and new systems as well.

Since the concentration of pollutants in the effluents would be the same, the reduced volumes of wastewater would result in lower total loads of pollutants discharged to the streams. Also, there would be reduced stream flows to dilute downstream discharges.

(3) Specification: Use in-stream aeration in the East Branch.

(a) Interpretation: Conditions in the East Branch are generally not suitable for conventional instream aeration, primarily due to shallow stream depths. However, if a feasible method of instream aeration were available, it would be a potential solution to the depressed DO levels in both the upper East Branch, in the vicinity of Churchill Woods, and in the lower East Branch, in the vicinity of Bolingbrook.

(b) Results: Required oxygen-supply rates were estimated for four locations in the East Branch. Approximately 10

pounds of oxygen per hour would be required to eliminate dry-weather dissolved oxygen violations at the locations mentioned above.

(4) Specification: Operate East Branch treatment plants at 4 mg/l BOD_5 and 5 mg/l suspended solids.

(a) Interpretation: None

(b) Results: This change would result in greatly reduced BOD and suspended solids loads in the East Branch. Since most East Branch treatment plants were assumed to be discharging effluents at 10/12 BOD and suspended solids in the first test plan, it was recognized that problems associated with 4/5 treatment, particularly cost and technical difficulties, make it unlikely that the concept would be implemented throughout the East Branch. Furthermore, it does not appear necessary to go to 4/5 at all plants in the East Branch to attain compliance with the DO standard during dry-weather conditions. Areas where simulated dry-weather DO violations occur and, thus, where 4/5 treatment could be an effective alternative, include the upper East Branch below Bloomingdale and Glendale Heights, and the lower East Branch near Bolingbrock.

(5) Specification: Use conservation tillage in agricultural areas.

(a) Interpretation: None

(b) Results: Conservation tillage was not included as a cropland best management practice (BMP) in the first test plan simulation. The addition of conservation tillage to the simulation would result in very minor reductions in pollutant loads in the Du Page Basin, due primarily to the relatively small pollutant contribution associated with croplands. However, beyond its beneficial impact on water quality, conservation tillage is an important soil conservation practice.

(6) Specification: Use the most up-to-date data on treatment plants. Deregionalize wastewater treatment for Bloomingdale, Roselle, Glendale Heights and Bolingbrook.

(a) Interpretation: The following changes were assessed:

- Separate plants at Roselle-Waterbury, Roselle-Main Bloomingdale South, Glendale Heights rather than a regional plant at Glendale Heights.

- Separate plants at Citizens Utility Company No. 1, Citizens Utility Company No. 2, and Bolingbrook rather than a regional plant at Citizens utility Company No. 2.

--20/25 effluent at Citizens Utility No. 2, rather than 10/12.

--10/12 effluent at Downers Grove, rather than 4/5.

(6) Results: These changes shifted pollutant loads significantly in the East Branch. The deregionalization changes would be expected to have relatively minor impact. However, the relaxation of the effluent assumptions at Downers Grove and Citizens Utility Company No. 2 resulted in significant increases in BOD loads in downstream reaches. (The water quality impact of these changes is discussed under second test plan simulation results).

(7) Specification: Use "performance zoning" and planned unit developments in new developments.

(a) Interpretation: None

(b) Results: Planned unit developments would result in less impervious areas in new developments. This would, in turn, result in less pollutant runoffs from these developments. Though the overall reduction in pollutant loads would be relatively small, the impact during wet-weather runoff periods would be significant.

(8) Specification: Test land treatment of wastewater treatment plant effluent in the West Branch.

(a) Interpretation: The Commission contracted with an outside consultant to study the concept of land treatment of wastewater for the Winfield/West Chicago area. The consultant assumed that wastewater would be pumped by force main to the land treatment site and treated biologically in a series of lagoons before being applied to the land. The method of application assumed was center pivot irrigation. Irrigated land would be substantially improved as to its drainage capability by means of an extensive agricultural drainage system. Based on an application rate of 42" per year and an average flow rate of 7.5 MGD, approximately 3,040 acres would be required. It was assumed that 2,560 acres could be leased from the National Accelerator Facility at $2,000 per acre and 480 acres could be purchased at $10,000 per acre.

(b) Results: The total local cost, assuming 75 percent federal grants, was estimated to be 37.6 cents per thousand gallons. Claiming credit from crop sales and groundwater recharge, the net cost appears to be competitive with a conventional treatment approach. The consultant, therefore, recommended that land treatment of wastewater at Winfield/West Chicago be given serious consideration.

(9) Specification: Test the effect of planned Forest Preserve District Reservoirs.

(a) Interpretation: Four locations in the Du Page Basin were identified as potential reservoir sites by the Du Page County Forest Preserve District. The locations are:

- -Spring Brook, south of Naperville
- -Upper West Branch, north of ICG Railroad
- -Upper West Branch, north of North Avenue
- -Upper East Branch, east of Glendale Heights

Firm design information is not available for these reservoirs, as they are currently only in the preliminary study or planning phases. However, certain conclusions were made as to their likely impacts based on simulated results from several existing reservoirs.

(b) Results: The three reservoirs on the East and West Branches are proposed to be multipurpose flood control/recreation facilities. Thus, they would maintain low-flow pools in addition to their floodwater detention capabilities. It is likely that potentially serious water quality problems would result if these reservoirs are constructed and retain significant low flow pools. First, oxygen-demanding pollutant loads entering the reservoirs would be relatively high. This would encourage oxygen depletion in the relatively stagnant reservoir waters. In addition, the high nutrient levels in the water would encourage major algal blooms if detention times were long enough.

The Spring Brook Reservoir is intended primarily as a recreation facility. It would not encounter the heavy pollutant loads associated with the East and West Branch reservoirs. However, the potential of eutrophication problems would remain due to nutrient contributions from nonpoint sources, particularly croplands.

(10) Specification: Test increased storage for combined sewer overflows at Lombard.

(a) Interpretation: Normal flows from Lombard are to be diverted to the Glenbard plant for treatment with excess flows, up to 10 times average flow, being given secondary treatment. Beyond this, combined sewer overflows would be discharged untreated. However, the untreated overflows would be fairly dilute.

(b) Results: It was concluded that providing additional storage for these overflows would not result in a major water quality improvement.

Further details on the second test plan items are contained in a Commission publication dated February 16, 1978 "Report for the Du Page River Basin."

d. Second Test Plan: - Computer Simulation Runs

Limited computer simulation runs were made on the Du Page for the second test plan. Primary attention was focused on the East Branch where simulated water quality ranged from "fair" to "bad" in certain reaches in the first test plan. The remaining reporting reaches in the basin all indicated "good" water quality in the first test plan. One partial computer simulation of the West Branch was done to assess the impact of a major point source change.

(1) East Branch Simulation Conditions: All conditions were retained from the first test plan, except for the following changes:

(a) Point source changes as described in section c(6) above were incorporated as follows:

--deregionalization of Glendale Heights and Citizens No. 2 plants.

--Downers Grove effluent BOD_5 to 10 mg/l; Citizens No. 2 BOD_5 to 20 mg/l.

(b) Post-treatment aeration was provided all point source effluents to achieve at least 80 percent oxygen saturation. This change affected the Glendale Heights, Bloomingdale South and Bolingbrook-Citizens No. 2 treatment plant representations.

(c) The variability of Glendale Heights and Bloomingdale South effluent BOD_5 concentrations was eliminated and BOD was represented as a constant value at 10 mg/l.

(d) The sediment oxygen demand values were reduced to represent the reduction in sediment entering the stream (i.e. stabilization) due to upgrading of treatment plants and control of combined sewer and surface runoffs. A maximum value of 1.5 grams per square meter per day was used for free flowing reaches.

This set of changes was arrived at partially in response to suggestions that 201 Plans be correctly represented. In addition, more thorough analysis of the first alternative results revealed that low-flow conditions were responsible for numerous DO problems and that poor low-flow conditions contributed to more severe wet-weather problems.

Specifically, low DO concentrations in several point source effluents contributed to instream DO problems. This prompted the post treatment aeration recommendation. Periods of high BOD concentrations from the Glendale Heights treatment plant, were responsible for low instream DO levels.

This prompted the suggestion to reduce the variability in BOD_5 that was represented in the Glendale Heights effluent by representing it at a constant 10 mg/l, thus eliminating extremes. This brought up the issue of general modeling assumptions regarding point source representations. For BOD and ammonia, the variabilities contained in the existing conditions point source records were retained in the first test plan. However, the annual average concentrations were adjusted to represent the 201 effluent requirements. For example, a treatment plant designed for 10 mg/l BOD_5 was represented in the first test plan simulation with a mean annual concentration of 10 mg/l and with monthly concentrations varying about this mean. Thus, certain monthly concentrations may have been as high as 10 or 20 mg/l. Although the first test plan representation of variability may be realistic, it is not in compliance with State standards.

State specifications require compliance with the standard (i.e. 10 mg/l BOD_5) for all 30-day averages. Low variability is desirable in a situation such as Glendale Heights, where dilution is often very low and it is critical that consistently good effluent quality be maintained. A reduction in variability may require higher operation and maintenance costs, or higher levels of treatment. Considering the requirements of the State effluent standards, it was deemed reasonable to represent reduced variability in effluent quality.

Another observation from the first test plan simulation was that sediment oxygen demand (SOD) was a major cause of low DO levels. In Reach 120 on the East Branch, for example, sediment oxygen demand comprised nearly 50 percent of the total oxygen demand during low-flow conditions. High SOD conditions existed in most other reaches in the upper and middle East Branch in the first test plan. These values were generally reduced somewhat from existing conditions, reflecting the implementation of improved pollution control strategies. However, they were not reflective of "stabilized" conditions.

It is very difficult to predict future sediment conditions due to the complicated relationships between sources, channel hydraulics, and instream reactions. Experts at the Illinois State Water Survey suggested SOD values representative of "stabilized" conditions, and indicated that that attainment of these levels might be reasonably expected. Thus, in the second test plan, SOD values were reduced in many free-flowing reaches to represent "stabilized" sediments.

(2) West Branch Simulation Conditions: A limited simulation run was made for the lower West Branch to test the impact of a change in effluent quality at the Wheaton Sanitary District treatment plant. The District has a 4 mg/l BOD effluent standard and has applied for a variance to 10 mg/l. The Illinois Environmental Protection Agency was interested

in the impact of this proposed change. For the simulation, the Wheaton effluent BOD was represented at 10 mg/l BOD_5 and the simulation was run holding all other conditions from the first test plan constant.

(3) East Branch Simulation Results: Simulated water quality conditions improved significantly overall from the first test plan results. The major impact was seen in DO concentrations. DO violations were reduced significantly in Reaches 110 and 120 in the upper East Branch. This resulted in a shift from FAIR to GOOD water quality in Reach 110 and from BAD to FAIR water quality in Reach 120. Low flow conditions showed the most improvement, due mainly to the post treatment aeration assumed for treatment plants and to reduced sediment oxygen demands.

DO conditions improved only slightly in Reach 150. In Reach 175, violations of the 5.0 mg/l DO standard increased somewhat. This resulted from higher effluent BOD levels from the Downers Grove and Citizens Utility No. 2 treatment plants.

Detailed statistical results of this simulation are presented in Tables 16-26 through 16-28 for the East Branch Reaches 110, 120, 150 and 175.

(4) West Branch Simulation Results: Simulated water quality conditions showed only a slight degradation as a result of the increase in effluent BOD concentrations at Wheaton Sanitary District. These slightly higher BOD levels, resulting from the change from 4/5 to 10/12, BOD/suspended solids (SS) in the effluent, resulted in a higher rate of violation of the 5.0 mg/l DO standard. The greatest impact was seen in the reservoir at Warrenville where the DO violation rate increased from 3.1 percent in the first test plan (Wheaton at 4/5) to 4.6 percent in the new simulation (Wheaton at 10/12).

Most violations of the DO standard continued to be wet-weather occurrences, as in the first test plan. However, low-flow violations did increase, somewhat. Statistical results of this simulation for Reach 85 are presented in Tables 16-26 through 16-28.

(5) Recommendations: All of the results achieved in the simulation of the second test plan proposals were reviewed at additional public meetings in the Du Page River Basin. Comments and suggestions from the public were solicited and recorded. The Commission staff, considering all available simulation results and other information, then prepared the recommended basin plan described in Section 16.10.

16.09 PROBLEM ASSESSMENT

In Part I a number of general problems were identified and solutions recommended. Those findings are applicable to

all basins. Noted below are certain problems specifically associated with the Du Page River Basin.

a. Unresolved Facility Plans

In several Facility Planning Areas local officials have not reached final agreement with IEPA on the Facility Plans prepared for their areas or responsibility. These areas include Bolingbrook, Glendale Heights, and West Chicago. In Bolingbrook, the unresolved issue involves possible regionalization of the Citizens Utility Company's two plants and Bolingbrook's treatment plant, with the purchase of the Citizens Utility Company plants by Bolingbrook. In the Glendale Heights FPA, the issue is regional or separate plants. In addition, effluent requirements are also unresolved. Communities involved are Glendale Heights, Bloomingdale, and Roselle. In the West Chicago FPA, the apparent issue is regional versus separate treatment plants. The principal parties involved are West Chicago and Winfield.

b. Excessive Infiltration/Inflow (MSDGC)

In the MSDGC area, communities are required to complete sewer system evaluation studies (SSES's) to determine the advisability of correcting excess flow problems. The communities of Schaumburg and Hanover Park have not yet completed their SSES's.

c. Water Quality Simulation Results

As discussed in Section 16.03, some severe water quality problems were simulated for existing conditions in much of the Du Page Basin. Overall, the poorest water quality exists in the relatively urbanized East Branch watershed with much better water quality being found in the more rural mainstem Du Page watershed in Will County. DO concentrations exceeded 5 mg/l at least 95 percent of the time at all seven of the reported reaches in the West Branch and mainstem Du Page watersheds, and at one of the four reported reaches in the East Branch. Problems in the East Branch are associated with excessive treatment plant pollutant loads and untreated combined sewer overflows in combination with urban stormwater runoff pollutants. Violations of the 5 mg/l DO standard occurred during both wet and dry weather in the East Branch, and were quite severe in many reaches. In the remainder of the basin, simulation results showed few dry-weather DO violations. Stormwater runoff was the major contributor to the simulated violations which occurred during wet-weather conditions.

Another problem simulated under existing conditions was the frequent violation of the 1.5 mg/l ammonia standard. Again, violations were most severe in the East Branch and least severe in the mainstem Du Page. High ammonia levels are generally associated with point source discharges.

Algal concentrations are significant in the downstream reaches of the basin. Algal growth is generally limited by light penetration since an excess of nutrients is available. Major sources of nutrients (phosphate and nitrate) are point sources.

In addition to the pollutant loads entering the basin, the hydraulic configuration of the streams is a contributing factor to some of the water quality problems simulated. There are numerous man-made alterations in the Du Page, including channelized stream sections and dams. Several low head dams have significant impacts on water quality in their vicinity. The dams slow down the natural flow velocities of the stream and allow solids to settle out and form sediment deposits. These sediments exert an oxygen demand (SOD) and release nutrients and other pollutants to the overlying waters. The relatively stagnant waters behind dams may, with sufficient detention time, develop algal blooms. In addition, the long detention times combined with inherently poor aeration may result in severe oxygen sags. Existing dam sites in the Du Page include Churchill Woods on the East Branch, Warrenville Grove and McDowell Grove on the West Branch, and Hammel Woods and Channahon on the mainstem Du Page. In addition, there are numerous small dams on many of the tributaries throughout the basin. In general, the severity of the impact of these dams on water quality is a function of the detention time in the pool behind the dam and the relative concentrations of pollutants entering from upstream. It was noted in the simulation that DO levels in impounded reaches were generally lower than those in free flowing reaches in the vicinity.

The impact of channelization on water quality is somewhat uncertain. Channelization generally provides a narrower, better defined and deeper watercourse. Thus, there is a smaller water surface area in contact with the air which tends to reduce reaeration. However, flow velocities may be greater in a channelized reach, which tends to improve reaeration. Channelization may also destroy the natural habitat of many aquatic organisms by eliminating shallow riffle areas. Significant areas of the East Branch and several tributaries have been channelized.

Another factor impacting on the assimilative capacity of a stream is the steepness of the channel gradient. Higher flow velocities are associated with steeper gradients. Higher flow velocities allow for better natural reaeration and also tend to keep suspended particles from settling out and forming unwanted bottom deposits. In the Du Page Basin, as in most natural river systems, tributary and upstream reaches tend to have steeper gradients overall than downstream reaches. A particular situation in the Du

Page highlights the importance of channel gradient. The West Branch is significantly steeper than the East Branch and would be expected to have a greater capacity to assimilate oxygen-demanding pollutants. Measured sediment oxygen demands are generally much higher in the East Branch than in the West Branch, reflective of the differences in flow velocities. The difference in assimilative capacity combined with the larger pollutant loads entering the East Branch results in far poorer water quality in the East Branch than in the West Branch. Channel gradient, which strongly influences stream assimilative capacity should be considered when allocating wasteloads.

Simulations of future conditions that assumed various control strategies to be in place (first and second test plans) failed to eliminate all of the problems identified under existing conditions. However, major improvements resulted from the following strategies: implementation of 201 plans, particularly ammonia removal facilities; reductions in urban runoff pollutant loads; implementation of best management practices on croplands; elimination of problem septic systems; treatment of combined sewer overflows; and implementation of post-treatment aeration at treatment plants which discharged low DO effluents under existing conditions.

In addition, it was assumed that benthic deposits would "stabilize" in the future, resulting in much lower maximum SODs and benthic release rates. This last mentioned item resulted from the assumption that sediment loads to many reaches would be reduced by the control strategies mentioned above, and that existing benthic deposits would be gradually degraded to a less offensive level.

In the final simulation, two of the reported reaches (120 and 175) in the East Branch continued to violate the 5 mg/l dissolved oxygen level more than five percent of the time. Conditions in Reach 120 in the upper East Branch reflected the impact of the Bloomingdale and Glendale Heights treatment plants and the Churchill Woods Forest Preserve lagoon, all located in other upstream reaches. A DO sag occcurs in the sluggish waters of the lagoon (Reach 115) and undesirable DO levels frequently carry over to Reach 120 (which is the next downstream reach) in the simulation. Thus, tc improve conditions in these reaches to acceptable levels, a combination of the following alternatives may be required: instream aeration in the lagoon; modification of the dam (which would eliminate the lagoon pool during low-flow conditions); and more stringent effluent requirements at the upstream treatment plants.

Reach 175 in the lower East Branch reflects the severe pollutant loads entering the entire upstream watershed, from both point and nonpoint sources. DO levels are depressed below the 5 mg/l standard during both dry-weather and wet-weather conditions. The relatively low mean DO level in Reach 175 is indicative of excess point source loads. All upstream point sources, except the Citizens Utility Company

No. 2 plant, are assumed to discharge at 20/25. Water quality conditions indicate that this plant should provide a better level of treatment consistent with the other treatment plants on the East Branch. In addition, instream aeration has potential for improving base DO levels in the lower East Branch, although conventional instream aeration may be impractical due to hydraulic limitations.

d. Benthic Conditions

Physical, chemical, and biological conditions of stream bottoms in the Du Page watershed are generally unacceptable under existing conditions. Thick organic sludges exist in many reaches. Measured sediment oxygen demands are unacceptably high in many reaches, particularly in the East Branch. Biologically, benthic conditions are relatively poor throughout the basin.

Species diversities are generally low and reflect severe to moderate pollution. A healthy benthic community is critical to maintaining a healthy fish community. In addition, good benthic conditions are necessary to provide an adequate habitat for the more sensitive, desirable aquatic organisms, including gamefish and the organisms on which they feed.

Recommended pollution control measures should improve existing benthic conditions significantly. The primary improvement would result from limiting the sources which presently contribute to benthic deposits. Pollutant sources are urban stormwater runoff, agricultural runoff, combined sewer overflows, and treatment plant effluents (and bypasses). However, very little information exists which would allow one to confidently predict future benthic conditions based on expected changes in pollutant loads. Important unknowns are the impact of stream hydraulics on solids deposition and the future rate of decomposition of existing deposits.

e. Fish Species and Habitats

Fish surveys conducted in the Du Page Basin indicate rather poor conditions. Many desirable species which were originally present in the Du Page are no longer found. In general, fish population diversity is reflective of polluted conditions. However, conditions are significantly better in the mainstem Du Page watershed than in the more polluted East and West Branches. Surveyed fish populations correspond fairly well with ratings of stream habitat based on toxicity. Constituents found to be most significant to fish toxicity in the Du Page are ammonia, silver and cyanide. Ammonia conditions should be vastly improved in the future with the ammonia removal recommendation for most treatment plants. However, it is somewhat uncertain that

other toxic constituents, including silver and cyanide, will be eliminated in the future. More sampling is needed to monitor changes in in-stream concentrations of these toxics and also to determine their sources.

f. Water Quality Standards Violations

In addition to the problems identified by modeling results (including DO, ammonia and water temperature) there have been water quality standards violations based on actual sampling. Included were somewhat frequent violations of the iron, copper, and fecal coliform standards. Infrequent violations occurred for lead, silver, fluoride, boron, and manganese. The significance of these violations is uncertain. Continued monitoring and study is needed to assess their importance and, in some cases, to determine the pollutant sources.

g. Water-Based Recreation

Though physical conditions such as stream depth are generally not conducive to swimming in the Du Page, the question of the safety of body contact recreation is still relevant. The fecal coliform standard is violated quite frequently. This parameter is an indicator of the presence of pathogenic organisms which, in turn, indicate the acceptability of a water body for human contact. The fecal coliform standard is presently in disfavor with the IEPA because of the uncertainty that fecal coliforms actually indicate the potential for disease transmittal. IEPA is also considering eliminating the disinfection requirement for treatment plants. Chlorination of treatment plan effluent, while it may kill many pathogenic organisms, may have an adverse impact on aquatic organisms because chlorine, and byproducts such as chloramines, are toxic. Thus, the entire issue of "swimmability", as it relates to chlorination and fecal coliform, is unresolved.

16.10 BASIN RECOMMENDATIONS

a. Overview

Recommended measures for improving and protecting water quality in the Du Page River Basin are derived from the recommendations in Chapters Four through Eight of the areawide plan and from problems identified in the preceding sections of this chapter. Of particular importance are the serious impacts of treatment plant discharges, the water quality handicap posed by inherent hydraulic conditions, by channel modifications such as dams, and by the wet-weather pollution from pervious and impervious surfaces. The

adverse effects of combined sewer overflows in the East Branch also must be eliminated.

Implementation of the local facilities plans of the publicly-owned treatment authorities should reduce most problems from treatment plant effluents and eliminate untreated combined sewer overflows. It is imperative, however, that actual performance be consistent with plan provisions.

Additional areawide measures, such as reduction of wastewater flows and post treatment aeration are recommended in this basin. Aeration should help correct the extremely low DO levels experienced in some reaches.

Recommendations with respect to nonpoint sources are basically the same as the overall program outlined in Chapter Six. Control of stormwater runoff pollution from present and future urban areas is of critical importance in this basin, particularly because of the extensive development forecast for much of the basin.

It is recommended that special consideration be given to the East Branch, where unacceptable water quality has been simulated by the water quality model in both the upstream and downstream ends. Further study is being recommended for the problems in the vicinity of the Churchill Woods Forest Preserve Lagoon before a final recommendation is submitted. Specific recommendations have been made to deal with the problem identified in the lower East Branch. Principal elements of the recommended plan for the Du Page River Basin are noted below:

b. Point Sources

(1) Publicly Owned Wastewater Treatment Systems

(a) Municipal-type wastewater treatment authorities in the basin will implement their respective portions of their 201 plans as they have been or may be approved by the Illinois and/or U.S. Environmental Protection Agencies. A Summary of the current status of these plans appears in Section 16.04f and suggested changes thereto or features to be included are noted below. In the absence of completed and/or approved facility plans, certain assumptions had to be made as to the expected locations and of sizes of treatment plants, their estimated costs and designated management agencies. This information must not be construed as binding in the Areawide Plan until the 201 facility plans have been finalized.

(b) The NIPC 201 Assessment for the Glendale Heights Facility Planning Areas was based on an early version of the Glendale Heights Facility Plan which called for the phase-out of the Roselle and Bloomingdale plants to a regional facility at Glendale Heights. A revised

facility plan calls for the Glendale Heights, Bloomingdale South, Roselle Main and Roselle Waterbury wastewater treatment plants to be retained as independent facilities. The Glendale Heights plant should be expanded from 3.0 to 6.1 MGD; the Bloomingdale South plant from 1.7 to 4.6 MGD; and the Roselle Waterbury plant from 0.8 to 1.2 MGD. The Roselle Main plant should remain at 1.5 MGD and should continue to discharge to Salt Creek. In addition, all of these plants should meet 10 mg/l BOD_5, 12 mg/l suspended solids and 1.5 mg/l instream ammonia nitrogen effluent standards.

(c) The Downers Grove Sanitary District wastewater treatment plant should produce an effluent meeting 10 mg/l BOD and 12 mg/l suspended solids instead of the 4/5 standards shown in the NIPC 201 Assessment.

(d) The NIPC 201 Assessment for the Bolingbrook Facility Planning Area FPA recommended the phase-out of the Bolingbrook and Citizen's Utility No. 1 plants to an expanded Citizen's Utility No. 2 plant. This plan was contingent upon the acquisition of the Citizen's Utility plants by the Village of Bolingbrook. Since this purchase is unlikely, all three wastewater treatment plants should be retained as independent facilities. Bolingbrook should expand its plant from 1.5 to 3.4 MGD; Citizen's Utility should retain its No. 1 plant at its present capacity and expand its No. 2 plant from 3.0 to 5.6 MGD. Bolingbrook and Citizen's Utility No. 1 should meet 10/12 effluent standards and Citizen's Utility No. 2 also meet 10/12 standards when the plant is expanded instead of the 20/25 requirement shown in its NPDES permit. All plants should produce an effluent which will not exceed 1.5 mg/l ammonia nitrogen in the receiving streams after mixing.

(e) The Plainfield wastewater treatment plant should produce an effluent which meets the instream ammonia nitrogen standard of 1.5 mg/l after mixing, instead of the 1.5 mg/l effluent concentration shown in NIPC's 201 Assessment.

(f) The Wheaton Sanitary District wastewater treatment plant should produce an effluent containing 10 mg/l BOD_5 and 12 mg/l suspended solids instead of the 4/5 effluent indicated in NIPC's 201 Assessment.

(g) The Woodridge wastewater treatment plant should produce an effluent containing 10 mg/l BOD_5 and 12 mg/l suspended solids.

(h) The effluent from the regional West Chicago/Winfield plant should meet the instream 1.5

mg/l ammonia standard. (The current West Chicago NPDES Permit calls for 2.5 mg/l in the effluent).

(i) The Carol Stream wastewater treatment plant should produce an effluent containing 10 mg/l BOD_5 and 12 mg/l suspended solids.

(j) All municipalities and the counties of Cook, Du Page, Kane and Will should seek to achieve continued reductions in water use in order to conserve water resources and to reduce wastewater flows at all publicly owned treatment plants. This should be accomplished through the modification of building codes to require water conserving plumbing fixtures, metering of all new development, pricing policies and public education to reduce consumption in already developed areas.

(k) By July 1, 1983, all treatment plants whose seven-day ten-year low flow dilution ratio is 10 to 1 or less should provide or continue to provide not less than 80 percent oxygen saturation in their effluents. Monitoring of wastewater quality after aeration should be conducted. However, during the continuing planning program, studies should be undertaken to determine where this requirement may be waived without detriment to instream water quality.

(l) Municipal sewer service required to serve future growth within service areas identified for the year 2000 should be provided only by treatment authorities listed in this section, except where this is impractical or not cost-effective.

(m) Projected five-year service areas should be identified in the NPDES permit issued by IEPA. No NPDES permit should be issued for municipal-type wastewater service within the five-year service area, other than to the treatment authority, except on a finding by IEPA that the proposed facility is the most cost-effective means of providing service, is an interim facility pending extension of service by the treatment authority, or is intended to serve an isolated location.

(n) Treatment plant operators should assure the very high standard of performance for wastewater treatment plants which the 201 plans assume. The IEPA should monitor treatment plant operation and performance and its effect on instream water quality. IEPA should establish a technical assistance program to aid plant operators and laboratory technicians in dealing with technical problems and assuring a consistently high level of performance in treatment operations.

(c) By July 1, 1979, the Bolingbrook, Glendale Heights, and West Chicago Facility Planning Areas should resolve issues of their Step I Plans in a manner mutually agreeable to local officials and the IEPA.

(e) The communities of Hanover Park and Schaumburg should complete sewer system evaluation studies by July 1, 1981.

(2) Private Utilities

(a) All private utility company plants except Citizens Utility Company Plants No. 1 and No. 2 should extend their service areas only in cases where service cannot be provided by an existing municipal-type wastewater treatment authority. These other plants should be phased-out when wastewater service can be provided by the designated treatment authority on a cost-effective basis and under mutually agreeable terms.

(b) NPDES permits issued by IEPA to private utility companies should identify projected five year service areas. No other NPDES permits should be issued for municipal type wastewater service within those five year service areas to other treatment authorities except upon a finding by the IEPA that the proposed facility is the most cost effective means of providing service; is an interim facility pending extension of service by another established treatment authority; or is intended to serve an isolated location.

(3) Industrial Wastewater Treatment Plants

(a) The IEPA should continue to enforce all requirements of NPDES permits for all industries in the basin and assure that treatment plants achieve and maintain required standards of plant performance. This can be achieved through IEPA standards for treatment plant personnel and through frequent sampling and analysis of treatment plant effluents by the IEPA for the purpose of monitoring compliance with NPDES permits.

(4) Miscellaneous Wastewater Treatment Plants

(a) Miscellaneous publicly and privately owned watewater treatment plants should continue in operation until such time as wastewater service can be provided by publicly owned municipal type wastewater systems on a cost effective basis. Service areas of privately owned treatment systems should not be expanded or their

treatment capacities increased when service can be provided on a cost effective basis by publicly owned municipal-type wastewater systems.

(b) The IEPA should continue to enforce all requirements of NPDES permits and assure that treatment plant operators achieve required standards of plant performance.

(5) Combined Sewer Overflows

(a) Secondary (30/30) treatment and disinfection for overflows up to ten times dry-weather flows should be provided by Lombard.

c. Nonpoint Sources

(1) Urban Stormwater Runoff

(a) By July 1, 1983, all municipalities and counties should implement measures to work toward a reduction of BOD in urban stormwater runoffs from separately sewered areas. Reductions of 25 percent of 1976 surface loadings on impervious surfaces are recommended as a target. From areas to be urbanized in the future, target reductions of 50 percent of 1976 surface loadings are recommended.

(b) In attempting to meet the above targets, the implementing agencies should work through the countywide water quality committees to develop plans and standard for the implementation of appropriate measures such as street cleaning and catch basin cleaning, performance zoning, use of porous pavement surfaces, increased vegetative cover, grassed waterways, wetland storage of stormwater, stormwater detention, sedimentation and erosion controls, and other measures to achieve the desired pollutant reductions.

(c) Township, county and state highway organizations, the Illinois State Toll Highway Authority, and facility engineering departments at state and federal installation should participate in the programs described above by implementing accelerated and/or improved street sweeping programs for streets, roads and highways that are hydraulically connected to perennial streams or permanent lakes via stormwater conveyance systems.

(d) During the period up to July 1, 1983 agencies should utilize voluntary exploratory programs,

implementing techniques to control pollutants from urban non point sources.

(e) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should adopt and enforce adequate stormwater detention ordinances. These ordinances should include provisions which clearly establish long-term responsibilities for maintenance of detention facilities. All such local ordinances also should be consistent with minimal areawide standards set forth in the model ordinance.

(f) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should develop and enforce adequate erosion and sedimentation control ordinances. All such local ordinances should be consistent with minimal areawide standards set forth in the model ordinance.

(g) Within one year following the preparation by NIPC of a model ordinance, Du Page, Kane, Cook, and Will Counties and all municipalities in the basin should adopt measures to control surface runoff from open storage yards containing industrial stockpiles and other materials which may go into solution or which may be carried away by stormwater runoffs and pollute streams and other water bodies.

(h) Municipal, township, county, and state highway departments responsible for de-icing streets and highways should develop programs to control the application of de-icing materials, to train personnel in proper application methods, and to use proper equipment in order to minimize any negative water quality impacts. The impact of de-icing agents on water quality should be given further study by NIPC in the continuing planning program.

(2) Agricultural Runoff

(a) By July 1, 1980, the North-Cook, Kane-DuPage, and Will-South Cook Soil and Water Conservation Districts, in conjunction with agencies of the United States and Illinois Departments of Agriculture and the countywide water quality committees, should identify the best management practices necessary to implement the agricultural aspects of the 208 plan, including conservation tillage, contour plowing, terracing, and conversion of cropland to grassland.

(b) By July 1, 1981, agricultural lands on which BMP's should be applied should be identified by appropriate

soil and water conservation districts. Agencies of the U.S. Department of Agriculture and countywide water quality committees should be consulted.

(c) By July 1, 1985, a comprehensive conservation plan should be prepared for each farm in the basin which has soil erosion losses in excess of standards set by the Illinois Department of Agriculture and soil and water conservation districts under House Bill 818.

(d) Using available cost sharing and technical assistance programs, the soil and water conservation districts should ensure implementation of the BMP program according to the following schedule on approximately 34,100 acres of agricultural lands:

By 1985 - 30% of the identified land.
By 1995 - 70% of the identified land.
By 2000 - 100% of the identified land.

(e) The IEPA, NIPC, and local governments should provide the results of their instream water quality monitoring to the soil and water conservation districts and to the Departments of Agriculture so that priority can be given to the areas most sensitive from a water quality standpoint in order to maximize the impact of the best management practices.

(f) The IEPA should enforce the IPCB regulations which require permits for feedlots and should use the IEPA draft technical policy WPC-2 "Design Criteria for Field Application of Livestock Wastes" as a guide.

(g) Illinois Department of Agriculture, Illinois Department of Public Health, and USEPA regulations on the use of pesticides and disposal of containers, and Illinois Department of Agriculture regulations on the training and licensing of pesticide applicators and operators should be continued.

(h) Farmers should implement good pasture management practices, utilize grass waterways, vegetative filter strips, and field borders, and make wise use of fertilizers wherever possible in accordance with the Illinois Agronomy Handbook to reduce the dangers of pollution. The U.S. Department of Agriculture agencies should assist farmers in recognizing the water quality problems posed by improper practices, and assist them in the use of proper practices.

(3) On-Site Disposal Systems

(a) Individual malfunctioning on-site disposal systems outside of the five-year service areas should be repaired wherever possible upon complaint to the appropriate county authorities or replaced with a new system, if necessary.

(b) By July 1, 1983, special service areas should be established under the initial sponsorship of municipal governments (for sites located within corporate limits) and by the counties (in unincorporated areas) where necessary to facilitate the financing of any innovative-type systems or other on-site improvements necessary to correct or replace malfunctioning systems in areas outside the five-year projected service areas.

(c) The minimum requirements of the Illinois Private Sewage Disposal Code should be upgraded to require more innovative site analysis techniques, and Cook, Du Page, and Will County Health Departments and the Environmental Division of the Kane County Planning Department should require a construction permit to regulate the design, location, and installation of every new on-site system in incorporated as well as unincorporated areas.

(d) Local officials should inspect all septic systems known to be failing, threatening public health or causing nuisance conditions. The inspection should result in the issuance of a repair permit for corrective measures which are to be undertaken and paid for by the septic system owner.

(e) Septic systems also should be inspected by local officials prior to the transfer of ownership of properties where such systems are installed. The results of the inspections should be made known to the lending institutions which are furnishing the mortgages.

(4) Air Pollution

(a) As part of the continuing planning program the IEPA in cooperation with the Illinois Institute for Natural Resources, the Illinois State Water Survey, and local air quality management agencies should analyze the relationship between air pollution and water quality in all of its aspects. The IEPA should cooperate with NIPC in devising strategies for correcting present negative effects and preventing future problems through the 208 continuing planning program.

(5) Sanitary Landfills

(a) The IEPA should ensure that every sanitary landfill complies with all regulations of the IPCB for its siting, design, construction and operation. As a substitute for existing state regulations, the IEPA and IPCB should consider certification of local solid waste disposal programs which comply with areawide plans to be prepared under the Federal Resource Conservation and Recovery Act. Alternatives to land disposal of solid wastes, including recycling, should be considered and utilized wherever feasible.

(6) Waterways

(a) Given computer modeling results for the upper East Branch in the vicinity of the Churchill Woods Forest Preserve Lagoon which indicate the inability to maintain DO levels at 5 mg/l or higher at least 95 percent of the time with the recommended plan in place, this area will require special attention in the continuing planning program. Potential solutions to the low DO conditions would include instream aeration, slotting or modification of the dam, and more stringent effluent standards at upstream treatment plants.

(b) Given computer modeling results from the second test plan for the lower East Branch in the vicinity of Reach 175 which indicate the inability to maintain DO levels at 5 mg/l or higher at least 95 percent of the time, instream aeration should be studied as a means of raising DO levels in the lower East Branch such that dry-weather DO levels are maintained above 5 mg/l.

(c) The feasibility of modifying dams on the Du Page River to improve water quality (and provide flood control benefits) should be examined by the Commission in the continuing study of the water resources of the Du Page River.

(d) The Commission, in conjunction with the countywide water quality committees, in the continuing planning program, should develop recommendations to simplify the fragmented system for channel maintenance and improvement in the Du Page River Basin. Present responsibilities for such maintenance functions as debris removal, streambank stabilization, public access, dredging, disposal of dredge spoil, protection and augmentation of habitat, tree shading and vegetation are shared between a host of federal, state and local authorities.

(e) Du Page, Kane, and Will counties are encouraged to develop organizations similar to the Cook County and Lake County Clean Streams Committees consisting of volunteers and organizational representatives who maintain surveillance over water bodies for activities adverse to water quality, flood control, recreation, fish, wildlife, and/or navigation.

(f) Instream water quality data collected by local treatment plant operators should be periodically published by the IEPA.

d. Residuals

(1) As regulated by the IEPA, present methods for the disposal of sludge from treatment plants are adequate to handle present and anticipated future volumes, and should continue to be administered by the IEPA.

(2) Highest priority should be given to the use of sludge as a soil conditioner and efforts to utilize sludge for that purpose should be expanded. The IEPA should assure proper practices in the utilization of sludge on agricultural lands through implementation of the draft standards in IEPA Technical Policy WCP-3 "Design Criteria for Municipal Sludge Utilization on Agricultural Land."

(3) The preferred method for the disposal of domestic septage is through land application, and this method should be encouraged and used whenever possible. Recognizing a continuing need for the disposal of large volumes of septage at wastewater treatment plants, specific facilities should be designated by the IEPA to receive domestic septage on recommendation by the Commission through the continuing planning process.

(4) The USEPA standards and the IPCB regulations for permits for the disposal of hazardous or toxic substances should continue to be enforced by the IEPA.

e. Groundwater

(1) By July 1, 1980, the Illinois State Water Survey and the Illinois State Geological Survey should undertake a coordinated well sampling program to monitor groundwater quality in areas where a potential for infiltration by pollutants now exists or might exist in the future.

f. Inland Lakes

(1) By July 1, 1979, and in accordance with Section 314 of PL 92-500, the IEPA should undertake an expanded lake sampling program to identify eutrophic conditions and, in conjunction with the Commission and the ccuntywide water quality committees, develop plans to control sources of pollution and restore water quality.

g. Mining

(1) The present IPCB regulations for the control of pollution from aggregate producing activities are considered generally satisfactory. However, the IEPA should continue to study the types and volumes of pollutants associated with their activities and their potential effects on surface and groundwater quality. Any needed changes in present regulations should be identified by July 1, 1980.

16.11 CCSTS OF THE RECOMMENDED PLAN

a. Facility Plans

(1) General: Table 16-29 shows pertinent capacities in the year 2000 for wastewater treatment plants, their effluent standards and construction costs. (Surviving treatment plants in the Rock Run and I&M Canal portion of the basin are included in Chapter Twenty One, the Lower Des Plaines Basin plan). Costs of local collector sewer projects are included, if they have been processed for federal or state grants. Also shown are total MSDGC costs allocated to this basin.

Cost data were assembled from varicus sources as noted below and in the tables that follow. The processing of this information and its allocation to the Du Page River Basin are described, where applicable.

Except for the MSDGC area, "Initial" costs of facility plans listed in Table 16-29 apply to the first phase of any project which is to be followed at scme future date by programmed expansions or extensions. Under this definition, the total cost of works currently under construction fall within the classification "Initial" even though the project has not yet been completed and future payments to contractors will be made. Except for the MSDGC area, "future" costs in Table 16-29 cover phased work scheduled at later dates.

(2) Wastewater Facilities: In the recommended plan there are several differences from information contained in facilities plans or needs analyses. Included is the issue of ammonia removal at treatment plants. In several

instances, ammonia removal was not discussed in facilities plans or needs analyses and, thus, costs do not include this item. This situation is noted under the "Comments" column in the Table 16-30.

Regarding the Roselle-Waterbury treatment plant, a revision was made to adjust future capacity from 2.1 MGD to 1.2 MGD with 10/12 effluent quality assumed. An adjustment was made to the costs presented in the facility plan based on estimates using NIPC Staff Paper No. 20.

Regarding the Citizens West Suburban No. 2 plant, the recommendation calls for 10/12 effluent quality rather than the 20/25 level called for in the Bolingbrook Needs Analysis. Again, costs were estimated based on Staff Paper No. 20.

(3) MSDGC Area: Because of their magnitude and complexity, special procedures were followed in depicting MSDGC costs.

Total costs of MSDGC improvements and locally funded improvements were taken from Table U7-IX-1 and from page 229 of the MSDGC's 1977 Facilities Plan Update Supplement. They were revised and brought up to date in a conference with MSDGC staff.

The costs of all MSDGC improvements were assumed to be spread throughout the MSDGC service area on an ad valorem basis. Thus, each basin's share of the cost was assumed to be proportional to the share of total District assessed valuation in that basin.

For locally funded improvements, the estimates for Local Sewer Upgrading are 1977 values from page 229 of the MSDGC 1977 Plan Update Supplement, updated as noted above. For other local improvements, the estimates in pages XI-18 and XI-19 of the MSDGC Overview Report are as of January 1, 1975, also updated as noted above. Where applicable, costs were also updated at six percent compounded for the intervening period to January, 1977 levels.

The costs of local improvements were allocated differently, depending upon the particular type of project. Local sewer upgradings required as supplements to the TARP apply only to the 49 communities in the TARP area. A basin's share of the total cost of these upgradings was assumed to be equal to the percentage share of the total TARP area assessed valuation in TARP communities in that basin.

For local sewer improvements outside the TARP area, the costs were allocated to non-TARP communities in each basin in accordance with their share of the total assessed valuation for all non-TARP areas.

(4) Summary of Future Costs: Table 16-30 distributes capital costs within five-year time frames. Annual O&M costs are also shown, which are based on data included in current reports, where available, or from data furnished by operating agencies. In their absence, estimates were based on information in Staff Paper No. 20, "Wastewater Treatment

Processes and Cost Estimating Data." (Again, costs associated with the Rock Run and I&M Canal portion of the basin are included in Chapter Twenty One, the Lower Des Plaines Basin plan).

(5) Annualized Local Costs: Table 16-31 shows annualized local costs.

(6) Increased Annual Costs: Tables 16-32, 16-33, and 16-34 show the estimated annual increases in wastewater charges per household: for Du Page County residents in the basin; for residents in Will County; and for the basin as a whole, respectively, for the previously described improvements and/or expansions.

b. Urban Stormwater

Methods for controlling pollution in urban stormwater runoff include: street sweeping, catch basin cleaning, performance zoning, use of porous pavements, increased vegetation, grassed waterways, wetland storage of stormwater, stormwater detention, and erosion and sediment controls. The target objectives of a 25 percent decrease in BOD loads from existing (1976) impervious areas and a 50 percent decrease in ECD loads from impervious areas built between 1976 and 2000 are to be achieved by combinations of the above practices. The cost of the mix of specific practices which would meet these goals is dependent upon the options selected and the intensity of their individual use.

An estimate of the total cost based solely on street cleaning utilizing vacuum sweepers is $38,227,000 through the year 2000, increasing from $704,100/year in 1978 to $2,620,000/year in the final year. The frequency of cleaning streets with vacuum sweepers averaged about once every 12 days in 1976 and was assumed to increase to once every 6.25 days during the year 2000, excluding the three winter months of December through February.

The above costs did not include street cleaning in combined sewer areas where the stormwater runoffs would be treated. Naturally, some street cleaning activities would be required in those areas for sanitary, public relations or other reasons. Costs for that cleaning are not included in the above figures.

c. Agricultural Runoff

Agricultural croplands presently amount to 105,000 acres in the basin, and are projected to decrease to 65,200 acres by the year 2000. In order to reduce agricultural pollution from croplands, Best Management Practices (BMPs) are targeted for implementation by the year 2000 on 34,100 acres at a total cost over the years of $4,024,000.

Although a comprehensive farm plan would include a wide range of BMPs, the following four practices and several combinations thereof have been recommended for implementation: conservation tillage, contouring, terracing, and cropland conversion to pastureland. These BMPs were selected because of their direct effects on water quality as well as their ability to reduce soil erosion. Many other practices which would be contained in a farm plan, but not considered by the Commission, are either too localized or difficult to evaluate for their effects on water quality.

Of the above total costs, $1,918,000 represent initial installation (or capital) expenditures for which grants may be available from the federal government. The cost-sharing ratios are not yet defined, but will probably be on the order of 50 percent. The balance of $2,106,000 represents local operating and maintenance costs.

For estimating purposes, it was assumed that 30 percent of the BMPs will be installed by 1985, 70 percent by 1995, and 100 percent by the year 2000.

16.12 WATER QUALITY CONDITIONS IN 1983

a. Introduction

Public Law 92-500 includes the statement "Wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water be achieved by July 1, 1983." The water quality standards of the Illinois Pollution Control Board for General Use streams, such as the Du Page, were adopted to "protect the State's waters for aquatic life,...primary and secondary contact use,..." This Commission is using the Illinois standards, as modified by this plan, to judge compliance with the 1983 national goal. This chapter assesses the feasibility of compliance with the dissolved oxygen and ammonia standards by 1983 in the Du Page River Basin.

b. Assumptions of Changes in the Basin

(1) Land Cover: Land cover estimates for the years 1976, 1983, and 2000 are summarized in Table 16-35. It should be noted that impervious area is forecast to increase by over 85 percent from 1976 to 2000. Also forecast is some shifting from lowland and cropland to grassland. The cropland areas listed under "conservation" indicate those lands where additional soil conservation practices are expected to be implemented.

(2) Urban Runoff Control: Management measures are assumed with the objective of reducing runoff-related BOD from existing urbanized areas by 25 percent of loadings found to

TABLE 16-29: RECOMMENDED PLANS, PUBLICLY OWNED TREATMENT SYSTEMS

DU PAGE RIVER BASIN

MAP CODE	FACILITY NAME	DESIGN CAPACITIES (MGD)		EFFLUENT STANDARDS (Year 2000) (mg/l)				CAPITAL COSTS (million $)			COMMENTS
		1975	2000	BOD_5	TSS	P	NH_3N	INITIAL	FUTURE	TOTAL	
D3	Bartlett-Stearns Rd.	2.28	4.40	10	12		(1)	3.0 (2)	1.7	4.7 (3)	(1) 1.5 mg/l in-stream, after mixing.
D6	Bloomingdale South	1.70	4.60	10 (4)	12 (4)		(1)	-	7.5	7.5 (5)	(2) Ammonia removal costs included.
W2	Bolingbrook	1.50	3.40	10	12		(1)	-	3.8 (2)	3.8	(3) Do not include costs to phase out Hanover Pk. No. 1 and No. 2 plants in 1985 and 1990 respectively. See Tables 16-17 and 16-30.
D7	Carol Stream	2.50	4.50	10 (4)	12 (4)		(1)	-	11.1 (2)	11.1	
D11	Downers Grove S.D.	9.60	9.60	10	12		(1)	16.0 (6)	-	16.0	
D20	DCDPW Woodridge	4.00	10.00	10	12		(1)	12.6 (2) (7)	-	12.6	(4) Variance from 4/5 BOD/SS.
D22	Glendale Heights	3.00	6.10	10 (4)	12 (4)		(1)	-	9.4 (5)	9.4	(5) Ammonia removal costs not included.
D23	Glenbard	6.75	17.00	10	12		(1)	48.9 (2)	-	48.9	(6) Include ammonia removal, excess flow treatment and sewer rehabilitation. Source: Draft facility plan and I/I study.
D30	Lombard	4.40	58.00 (8)	30	30			SEE D 23			
W26	Naperville-Springbrook	10.00	10.00	10	12		3.5	-	-	-	(7) Do not include costs to phase out Lisle, Farmingdale and other small plants.
W32	Plainfield	0.90	1.40	30	30		(1)	-	3.7 (5)	3.7	
D32	Roselle Waterbury	0.80	1.20	10	12		(1)	-	2.5 (5)	2.5	(8) Treats excess wet weather flows.
D35	West Chicago	2.44	9.40	10	12		(1)	13.9 (2) (9)	-	13.9	(9) Do not include costs to phase out Winfield plant.
D36	Wheaton S.D.	6.90	8.90	10 (4)	12 (4)		(1)	14.3 (2)	-	14.3	
C6	MSDGC Hanover Park	6.00	12.00	4	5		(1)	11.8 (10)	-	11.8	(10) Basin share of total MSDGC capital costs for treatment, collection, sludge disposal and TARP. Costs not specific to Hanover Plant.
N/A	Local Improvements MSDGC Area	-	-	-	-		-	5.9	-	5.9	

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TABLE 16-30: SUMMARY OF FUTURE COSTS (All data in 1977 dollars in millions)

Jurisdiction	Capital Costs						Annual Operations & Maintenance Expense				
	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	Total	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)
Bolingbrook FPA:											
Bolingbrook			3.80			3.80				0.22	0.22
Citizens Utility Co.			13.40			13.40				0.77	0.77
Plainfield FPA				3.70		3.70					0.05
DCDPW Woodridge	12.60					12.60		0.57	0.57	0.57	0.57
Glenbard FPA:											
Glen Ellyn	12.13					12.13		0.19	0.19	0.19	0.19
Lombard	31.00					31.00		0.48	0.48	0.48	0.48
Citizens Utility Co.	4.65					4.65		0.07	0.07	0.07	0.07
DCDPW	1.12					1.12		0.02	0.02	0.02	0.02
West Chicago FPA											
West Chicago	13.90					13.90		0.23	0.23	0.23	0.23
Winfield	3.80					3.80		0.07	0.07	0.07	0.07
Wheaton S. D.	14.30					14.30		0.44	0.44	0.44	0.44
Bartlett FPA:											
Bartlett	3.00		1.70			4.70	0.22	0.25	0.32	0.38	0.38
Hanover Park	0.90	0.70	0.30			1.90	0.19	0.16	0.09	0.03	0.03

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TABLE 16-30: SUMMARY OF FUTURE COSTS (All data in 1977 dollars in millions)

Jurisdiction	Capital Costs						Annual Operations & Maintenance Expense				
	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	Total	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)
Glendale Heights FPA:											
Bloomingdale		7.50				7.50	0.30	0.30	0.30	0.30	0.30
Glendale Heights		9.40				9.40	0.40	0.40	0.40	0.40	0.40
Roselle		2.50				2.50	0.28	0.28	0.28	0.28	0.28
Carol Stream FPA	3.80		7.30			11.10	0.16	0.16	0.16	0.20	0.20
Downers Grove S.D.	16.00					16.00		0.31	0.31	0.31	0.31
MSDGC	11.70	.10				11.80	0.03	0.10	0.11	0.11	0.11
Local Improvements Related to MSDGC	5.10	.80				5.90					
Agricultural BMP's							0.04	0.09	0.12	0.18	0.22
Urban Stormwater Management Expense							1.09	1.47	1.85	2.24	2.54
Total	134.00	21.00	26.50	3.70		185.2	2.71	5.59	6.01	7.49	7.88

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TABLE 16-31: PROJECTED ANNUALIZED LOCAL COSTS (All data in 1977 dollars in millions)

Jurisdiction	CAPITAL COSTS			LOCAL CAPITAL PLUS O & M ANNUALIZED Costs (Mil./yr.)*					Comments
	Cost Total Through Yr. 2000	Est. Fed'l. Share	Est. Local Share	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	
Bolingbrook FPA									
Bolingbrook	3.80	2.85	0.95			.09	.31	.31	
Citizens Utility Co.	13.40	10.05	3.35			.32	1.09	1.09	
Plainfield FPA	3.70	2.78	0.92				.09	.14	
DCDPW Woodridge	12.60	9.45	3.15	.30	.87	.87	.87	.57	
Glenbard FPA:									
Glen Ellyn	12.13	9.10	3.03	.29	.48	.48	.48	.19	
Lombard	31.00	23.25	7.75	.73	1.21	1.21	1.21	.48	
Citizens Utility Co.	4.65	3.49	1.16	.11	.18	.18	.18	.07	
DCDPW	1.12	.84	0.28	.03	.05	.05	.05	.02	
West Chicago FPA:									
West Chicago	13.90	10.42	3.48	.33	.56	.56	.56	.23	
Winfield	3.80	2.85	0.95	.09	.16	.16	.16	.07	
Wheaton S. D.	14.30	10.72	3.58	.78	.78	.78	.78	.78	
Bartlett FPA:									
Bartlett	4.70	3.52	1.18	.29	.32	.43	.49	.42	
Hanover Park	1.90	1.42	0.48	.21	.18	.13	.07	.05	

*Local Capital Amortized @ 7% for 20 yrs.

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TABLE 16-31. PROJECTED ANNUALIZED LOCAL COSTS (All data in 1977 dollars in millions)

Jurisdiction	CAPITAL COSTS			LOCAL CAPITAL PLUS O & M ANNUALIZED Costs (Mil./yr.)*					Comments
	Cost Total Through Yr. 2000	Est. Fed'l. Share	Est. Local Share	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	
Glendale Heights FPA;									
Bloomingdale	7.50	5.62	1.88	0.30	0.48	0.48	0.48	0.48	
Glendale Heights	9.40	7.05	2.35	0.40	0.62	0.62	0.62	0.62	
Roselle	2.50	1.88	0.62	0.28	0.34	0.34	0.34	0.34	
Carol Stream FPA	11.10	8.32	2.78	0.25	0.25	0.42	0.46	0.37	
Downers Grove S. D.	16.00	12.00	4.00	0.38	0.69	0.69	0.69	0.31	
MSDGC	11.80	8.85	2.95	0.31	0.38	0.39	0.39	0.11	
Local Improvements Related to MSDGC	5.90	4.42	1.48	0.12	0.14	0.14	0.14	0.02	
Agricultural BMP's				0.04	0.09	0.12	0.18	0.22	
Urban Stormwater Management Expense				1.09	1.47	1.85	2.24	2.54	
Total	185.2	138.88	46.32	6.33	9.25	10.31	11.88	9.43	

*Local Capital Amortized @ 7% for 20 yrs.

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TABLE 16-32: PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST (DU PAGE COUNTY)

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	1999.3	2367.2	2729.5	3092.6	3880.7	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.138	.136	.128	.112	.018	
O & M Related	.123	.218	.200	.190	.158	
Total Rate:	.261	.354	.328	.302	.176	
Additional Cost per Home of $45,000 FMV ($/yr.)	39.15	53.10	49.20	45.3	26.40	
Existing Av. Annual WW Cost ($/Household yr.)	84.85					
Total Av. Annual WW Cost ($ / Household yr.)	124.00	137.95	134.05	130.15	111.25	
Percent Av. Increase* in WW Costs per Household (%)	46.1	62.6	58.0	53.4	31.1	

*Total Rate Used

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TABLE 16-33: PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST (Will County)

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	424,8	502,9	579,9	657,1	718,3	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related			.071	,077	,069	
O & M Related	,044	,051	.057	,211	,209	
Total Rate:	,044	,051	,128	,288	,278	
Additional Cost per Home of $45,000 FMV ($/yr.)	6,60	7,65	19,20	43,20	41,70	
Existing Av. Annual WW Cost ($/Household yr.)	51,32					
Total Av. Annual WW Cost ($ / Household yr.)	57,92	58,97	70,52	94,52	93,02	
Percent Av. Increase* in WW Costs per Household (%)	12,9	14,9	37,4	84,2	83,5	

*Total Ra

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TABLE 16-34: PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST (Basin Total)

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	2564,6	3036,5	3501,3	3967,0	4336,6	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	,124	,121	,122	,111	,028	
O & M Related	,106	,184	,172	,189	,182	
Total Rate:	,230	,305	,294	,300	,210	
Additional Cost per Home of $45,000 FMV ($/yr.)	34,50	45,75	44,10	45,00	31,50	
Existing Av. Annual WW Cost ($/Household yr.)	83,84					
Total Av. Annual WW Cost ($ / Household yr.)	118,34	129,59	127,94	128,84	115,34	
Percent Av. Increase* in WW Costs per Household (%)	41,1	54,6	52,6	53,7	37,6	

*Total Rate Used

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TABLE 16-35: LAND COVER CHANGES*

Cover Type	1976	1983	2000
Lowland	25.4	24.9	23.5
Cropland	155.0	136.0	93.7
Conservation	(0)	(7.92)	(44.0)
Grassland	129.0	145.0	180.0
Impervious	14.3	17.5	26.6

*Modeled portion of basin only

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be present in 1976. BOD loadings from areas urbanized after that year are reduced by 50 percent of 1976 loads. This will result in an overall 30 percent reduction in urban runoff pollution loading rates by 1983.

(3) Point Sources: Effluent characteristics of the municipal type point sources are given for 1976 and 1983 in Table 16-36. The flows and concentrations reported for 1976 are the values which were used in the simulation of "existing conditions." The 1983 concentrations are generally less than 1976 concentrations in the cases where treatment plant upgrading is expected in the interim. In other cases, concentrations are assumed to increase to the plant design level by 1983 if 1976 concentrations are actually lower than the design level. (Note that this is a conservative assumption.)

c. Expected Water Quality in 1983

The water quality model was used indirectly to estimate 1983 water quality conditions. Results of 1976 and year 2000 simulations served as the basis for estimating 1983 values. In the process, pollution loads to the river were calculated for each of those three years. Ammonia and BOD loads are reported in Table 16-37 for the basin. The loadings for 1976 and 2000 are from previous water quality modeling results of Existing Conditions and First Test Plan simulations.

Water quality goals have been established to compare water quality conditions under different test plans and in different time periods. The goal (expressed in terms of achievement of water quality standards) is considered to be met satisfactorily when a rating of "good" or "excellent" is

TABLE 16-36: POINT SOURCES IN THE DUPAGE BASIN

Plant Name	Reach	Effluent Characteristics					
		Flow, cfs		BOD5 (mg/l)		Ammonia (mg/l)	
		1976	1983	1976	1983	1976	1983
Bartlett	20	.34	1.09	3.1	10	.6	1.5
Bloomingdale South	110	2.63	3.42	2.4	10	7.2	7.2
Bolingbrook	175	2.97	3.56	8.6	10	7.2	7.2
Carol Stream	25	1.41	2.43	1.4	10	.6	1.5
Citizens U.C. Valley View	150	.67	0	24.2	--	14.2	---
Citizens W.Sub. Plant #1	275	3.18	3.82	24.4	30	11.1	11.1
Citizens W.Sub. Plant #2	175	2.34	2.81	12.0	20	11.1	11.1
Downers Grove	150	15.5	17.5	4.7	10	11.1	3.0
DPCDPW - Butterfield	150	.78	0	9.8	--	14.2	---
DPCDPW - Farmingdale	275	.23	0	12.0	--	.6	---
DPCDPW - Glen Ellyn Hts.	120	.28	0.4	15.9	10	11.1	11.1
DPCDPW - Lisle	175	3.25	0	7.3	--	11.1	---
DPCDPW - Woodridge	175	8.58	12.9	4.6	10	9.8	1.5
Glendale Heights	110	4.98	5.84	1.2	10	7.2	7.2
Glen Ellyn - Glenbard	150	6.96	18.0	3.8	10	8.3	1.5
Hanover Park #1	20	0.46	1.19	7.3	10	7.2	1.5
Hanover Park #2	20	0.02	0.10	15.0	10	7.2	1.5
Lombard	120	8.02	0	16.4	--	15.7	---
MSDGC - Hanover Park	5	11.5	14.1	7.4	4	.6	1.5
Naperville Springbrook	230	12.8	16.3	4.4	10	.9	2.5
Plainfield	290	1.25	1.6	6.6	30	.6	3.5
Roselle Waterbury	5	0.015	0.27	4	20	7.2	7.2
West Chicago	85	3.88	7.73	17.6	10	15.7	2.5
Wheaton	85	10.2	10.7	9.4	10	15.7	1.5
Winfield	85	2.43	0	5.9	--	15.7	---
Combined Kress Creek	85	0.35	0.35	4	4	.6	1.5

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achieved. Assignment of these adjective ratings was based on the following criteria:

Excellent- no dissolved oxygen concentrations below 5 mg/l.

Good - dissolved oxygen remains above 5 mg/l 85 percent of the time or more.

Fair - dissolved oxygen remains above 5 mg/l 85 percent of the time or more.

Poor - dissolved oxygen remains above 5 mg/l 70 percent of the time or more.

Bad - dissolved oxygen remains above 5 mg/l less than 70 percent of the time.

TABLE 16-37: POLLUTANT LOADINGS

2877

Reach 290 Mainstem DuPage			
Cumulative Pollutant Loading	1976	1983	2000
BOD, tons/year	3030	3525	3960
Ammonia, tons/year	1020	569	519

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2903

In any reach where the dissolved oxygen drops to zero, the 2906
qualitative state of the reach is lowered by one category. 2907
The ammonia rating is determined in the same manner, 2908
using a standard of 1.5 mg/l. Adjective ratings for 2909
dissolved oxygen and ammonia in 1983 are noted in Table 16-38. The
table indicates several problem areas in the basin. These 2917
generally relate back to point sources, many of which are
not expected to improve their effluent quality before 1983. 2918
Specifically, a number of plants are not expected to have 2919
ammonia removal facilities on line by 1983. The result will 2921
be frequent occurrences of instream ammonia levels above the 2922
1.5 mg/l standard.

TABLE 16-38: AMMONIA AND DISSOLVED OXYGEN RATINGS IN 1983

Stream	Reach	Dissolved Oxygen	Ammonia
West Branch	5	Good	Good
West Branch	20	Good	Good
Klein Creek	25	Good	Good
West Branch	85	Good	Good
East Branch	110	Good	Bad
East Branch	120	Fair	Bad
East Branch	150	Good	Bad
East Branch	175	Fair	Poor
Mainstem	230	Good	Fair
Lily Cache Creek	275	Good	Fair
Mainstem	290	Good	Fair

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d. Evaluation

On the basis of the preceding evaluation, it appears that the 1983 goal of achieving "GOOD" water quality with respect to dissolved oxygen and ammonia will not be met in much of the basin. Dissolved oxygen conditions will be GOOD except for certain areas in the East Branch. However, ammonia conditions will not meet desired standards in the East Branch and mainstem Du Page. Despite these apparent problems, it should be noted that data compiled by the Illinois Natural History Survey indicate that some desirable fish species exist in the river and its tributaries, primarily in the mainstem. Presumably, fish conditions can be improved by 1983, since overall water quality conditions are expected to remain static or improve in most Reaches.

As was discussed in Chapter Four, the viability of indigenous fish is dependent on a number of factors, other than dissolved oxygen and ammonia concentrations. The contradictory information merely reinforces the earlier findings that much more research is needed at the national level in order to properly evaluate aquatic ecology.

CHAPTER 17

Upper Des Plaines River

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CHAPTER SEVENTEEN: UPPER DES PLAINES

17.01 DESCRIPTION OF THE BASIN

a. Physical Characteristics

(1) Geography: The Des Plaines River Basin drains portions of both Wisconsin and Illinois. In Illinois, the basin covers a large portion of central Lake County, Cook County, and northwest Will County as well as a small portion of DuPage County. In this plan, the Upper Des Plaines Basin is that portion of the Des Plaines River Basin lying between the Wisconsin border on the north and the confluence of the Des Plaines River and Salt Creek in Cook County in the south. The river flows in a southerly direction, and drains a modeled basin area of approximately 324 square miles. (See Figure 17-1).

Certain areas in the basin are environmentally sensitive and deserve special attention in clean water planning. Most of these areas are in the relatively undeveloped Lake County portion of the basin. Especially sensitive natural areas include two prairies in Cook County and eight areas in Lake County. These are: Antioch Bog, an important habitat for tamarack and fern; MacArthur Wood; one prairie area; and five other forested areas. Of the 160 wetland areas in the basin larger than ten acres in size, all but 10 are in Lake County.

(2) Waterways: The waterway network of the basin contains 15 important tributaries, 63 lakes, several sloughs, and other impoundments of more than 10 acres. The drainage system is most complex in Lake County, where most of the basin's lakes and morainal areas are located. Twelve of the important tributary streams flow directly into the Des Plaines River, two are tributary to Mill Creek, one is tributary to Indian Creek, and one is tributary to Willow Creek. The streams and lakes in the basin are described in Tables 17-1 and 17-2, respectively.

(3) Geology and Soils: Unconsolidated glacial drift ranges from fifty to almost 300 feet in thickness above bedrock in the Basin. The dominant deposit is till, which is thickest in the upland moraine areas and widespread over the basin. Till is relatively impermeable; groundwater recharge capability is limited and there is risk of pollutant runoff to surface waters from applications of wastes, fertilizers, and agri-chemicals.

Glacial sand and gravel deposits are found in three major forms: valley trains, outwash, and ice contact materials. Infiltration is rapid in these highly permeable materials. Thus, pollutants may enter groundwater as a result of leachate flow from landfills, discharges from septic tanks, and surface application of wastes,

TABLE 17-1 : STREAM INVENTORY, UPPER DES PLAINES RIVER BASIN

STREAM NAME	LENGTH (MILES)	AVG. WIDTH (FT.)	WATER SURFACE (ACRES)	GRADIENT (FT/MILE)	DRAINAGE AREA (SQ. MILES)	COMMENTS
APTAKISTIC CREEK	8.2	8.0	6.3	10.0	6.0	
BUFFALO CREEK	16.6	4.0	8.0	16.2	27.0	
BULL CREEK	6.8	6.0	4.9	19.8	8.8	
CRYSTAL CREEK	2.4	8.0	2.3	10.4	5.3	
DES PLAINES RIVER	70.1	97.2	826.1	1.7	478	(1)
DUTCH GAP CANAL	1.0	15.0	1.8	5.7	7.5	
HAWTHORNE DRAINAGE DITCH	4.4	8.0	0.5	15.9	6.0	
HIGGINS CREEK	4.7	10.0	5.6	10.2	7.3	
INDIAN CREEK	13.0	12.0	18.0	16.5	39.2	
McDONALD CREEK	5.9	12.5	8.9	11.4	10.3	
MILL CREEK	13.0	15.0	15.0	10.8	26.1	
NORTH MILL CREEK	6.5	10.0	7.8	9.2	17.5	
SILVER CREEK	4.7	10.0	5.6	7.4	11.6	
WELLER CREEK DRAIN. DITCH	7.8	21.4	20.2	5.7	16.6	
(WHEELING BUFFALO CREEK DRN. DTICH)	2.2	30.0	8.0	18.1	27.0	
WILLOW CREEK	3.9	68.3	12.5	5.1	21.0	
(1) Drainage area upstream from Brookfield, Illinois (including the Wisconsin portion of the basin)						

TABLE 17-2 : LAKE AND POND INVENTORY, UPPER DES PLAINES RIVER BASIN

NAME	LOCATION			SURFACE AREA (ACRES)	SHORE-LINE (MILES)	MAXIMUM DEPTH (FT)	WATER-SHED (ACRES)	DATE CON-STRUCTED	OWNER-SHIP	ACCESSIBILITY
	TWP N	RNGE E	SECT							
AXEHEAD LAKE	41	12	33	17.0	0.6	33	NA	1958	Public	NA
BECK LAKE	42	12	31	38.0	1.0	23	NA	1958	Public	Open to Public
BELLEAU LAKE	41	12	21	11.5	0.7	37	NA	1958	Public	Open to Public
BIG BEND LAKE	41	12	16	22.0	1.1	25	NA	1958	Public	Open to Public
BISHOP LAKE	43	10	28	12.4	0.5	12	150	1926	Private	Permission
BRESEN LAKE	43	10	3	27.0	1.3	15	100	1963	Private	Owners & Friends
BRIARWOOD LAKE	41	11	22	22.0	0.9	10.5	NA	1958	Org.	Landowners & Guests
BROOKS SLOUGH	40	10	26	12.0	0.9	6	150	Natural	Private	Controlled by Owners/Permission
BURNETTS LAKE LEO	43	10	9	15.5	0.9	21	200	1965	Private	Permission
BURNETTS LAKE MAOMI	43	10	9	12.5	0.6	15	215	1948	Private	Permission
BUTLER LAKE	44	11	7,16	65.0	0.8	12	1500	1940	Public	Permit for Nonresi-dents
CITATION LAKE	42	12	18	10.5	0.9	18	NA	1958	Org.	NA
COSMOPOLITAN PIT	45	11	27	20.0	0.8	30	Ground-water	1957	Private	Restricted
COUNTRYSIDE LAKE	44	10	27,34 35	140.0	3.2	12	1084	1926	Org.	Association Members
CROOKED LAKE	46	10	34	130.0	2.1	32	220	Natural	Org.	Permission or Fee
DEER LAKE	46	10	11	42.0	1.5	6	1000	Natural	Org.	Club Members and Friends
DIAMOND LAKE	44	10	36	149.0	2.1	24	400	Natural	Public	Through Park Dis-trict or Fee
DRVEE LAKE	45	10	24	79.0	1.4	34	200	Natural	Org.	Permission or Fee
FOREST LAKE	43	10	10,15	60.0	1.3	9	430	1934	Org.	Members & Friends
FOURTH LAKE	45	10	10,11	310.0	4.7	6	840	Natural	Org.	Fee
GAGES LAKE	45	11	30	139.0	3.1	48	1,280	Natural	Public	Via a Resort
GRANDWOOD PARK LAKE	45	11	7	12.0	0.7	9	15,000	1941	Public	Free via Park
HASTINGS LAKE	46	10	35	65.0	1.6	31	300	Natural	Org.	Boat Livert
HENDRICKS LAKE	46	10	27	28.5	1.2	10	550	1960's	Public	Restricted
HILLCREST LAKE	42	11	22	13.0	0.6	7	NA	1955	Org.	NA
KEMPER LAKES	43	10	14	85.5	4.1	15	630	1970-71	Org.	Employees
LAKE CHARLES	44	11	28,29	45.0	2.1	12	1,000	1925	Org.	Permission
LAKE LINDEN	46	10	35	27.5	1.3	12	80	1960	Public	Open to Public
LAKE LOCH LOMOND	44	10	24	74.0	2.1	10	500	1953	Org.	Members & Guests
LAKE MARY ANNE	41	12	10	17.5	0.9	12	NA	1950	Org.	Homeowners
LAKE ST. MARY'S	44	11	19	100.5	3.1	15	1,000	1920	Org.	Permission
McDONALDS LAKES	46	10	36	19.0	1.2	NA	300	1947	Private	Restricted
McGREAL LAKE	46	10	10	15.0	0.7	8	350	1955	Private	Restricted
MAYWOOD SPORTSMENS CLUB LAKE	40	11	25	23.6	0.7	15	NA	1958	Org.	NA
MILLMORE LAKE	45	10	10,11	80.0	1.4	21.0	260	Natural	Org.	Lot Owners
MINEAR LAKE	44	11	15,16	75.0	1.9	24.0	10 Grawtr.	1920	Org.	Club Members
MURPHY LAKE	41	12	27	14.8	0.7	8.5	NA	1942	Org.	NA
O'HARE OFFICE PLAZA LAKE	41	12	33	11.0	0.6	52	NA	1958	Org.	Employees Only

TABLE 17-2 : LAKE AND POND INVENTORY, UPPER DES PLAINES RIVER BASIN

NAME	LOCATION			SURFACE AREA (ACRES)	SHORE-LINE (MILES)	MAXIMUM DEPTH (FT)	WATER-SHED (ACRES)	DATE CON-STRUCTED	OWNER-SHIP	ACCESSIBILITY
	TWP N	RNGE E	SECT							
OPEICA LAKE	41	12	29	40.5	1.1	26	NA	1957	Public	Fee
POND-A-RUDY	43	10	3	21.2	0.7	9	100	1946	Private	Restricted
QUEEN-PEDERSON SLOUGH	46	10	13	12.0	0.9	10	600	Natural	Org.	Restricted
RASMUSSEN LAKE	46	11	19	37.4	2.4	16	No.Mill.C Hastgs.Cr	1957	Private	Restricted
RED ROCK LAKE	46	10	35	80.0	NA	30	100	1969	Org.	Restricted
RED WING SLOUGH	46	10	10,11	153.0	4.4	10	380	1957	Org.	Restricted
REGENT PARK LAKE	42	11	28	11.0	0.5	7	NA	1953	Org.	Residents,Employees
SAND LAKE	45	10	2,3	115.0	1.6	33	237.9	1960	Org.	Through Resort
SEXTON LAKE	40	12	21	13.0	0.6	40	NA	1958	Org.	None
SLOUGH LAKE	45	10	3	30.0	0.6	20	300	Natural	Org.	Restricted
STOCKTON LAKE	44	10	27	14.0	0.8	13	150	1960	Private	Controlled
SYLVAN LAKE	44	10	34	31.0	1.5	15	150	1936	Org.	Homeowners
TEMPLE FARMS LAKE #1	45	11	5	17.0	0.4	8	330	NA	Private	Restricted
TEMPLE FARMS LAKE #2	45	11	5	52.0	2.3	10	Miller	NA	Private	Controlled
TEMPLE FARMS LAKE #4	45	11	5	10.0	0.3	4	Miller	Natural	Private	Controlled
THIRD LAKE	45	10	13,24	157.0	2.0	71	1000	Natural	Org.	Fee Resort
TIMBER LAKE/VALLEY LK.	46	10	23	25.0	1.2	35	200	Natural	Org.	Resort
VALLEY LAKE	45	11	29	15.0	0.6	11	70	1952	Org.	Property Owners
VULCAN MATERIALS PIT #1	46	11	10	35.0	0.7	40	grdwtr.	1939	Private	Permission
VULCAN MATERIALS PIT #2	46	11	10	72.0	1.3	50	Ground Water	1939	Private	Controlled
WERHAN LAKE	43	11	1	14.8	0.7	13	6	1957	Private	Controlled
H. WHITE LAKE	46	10	23	35.0	0.4	11	200	1954	Private	Permission
H. WHITE SLOUGH	46	10	23	25.0	0.5	6	150	Natural	Private	Permission
WINDWARD LAKE	43	10	162	19.0	1.8	12	NA	1920	Org.	Restricted
YOPP SLOUGH	46	10	25	15.0	0.6	5	30	Natural	Private	Controlled

Figure 17-1: BASIN LOCATION



fertilizers, and agri-chemicals. Coarse- and fine-grained glacial lake and windblown deposits are also found in the basin. The coarse deposits behave hydrologically much like the sand and gravel deposits, while the more common fine-grained deposits behave much like till. Recent deposits are limited in the basin and generally are of minor importance, though they may be of extreme importance at a particular site. Bedrock, composed of Silurian dolomite, lies directly under unconsolidated deposits and is an important regional aquifer.

Outside of the river valley most areas in the basin are excellent sites for the land burial of wastes, except where soil drainage is unsatisfactory. Surface spreading of wastes, fertilizers and other chemicals is limited in all areas of the basin except for till areas without surface runoff problems. All basin materials are limited for waste disposal by septic tanks, either because of high permeability, poor soil drainage, groundwater discharge, low hydraulic conductivity, or steep slopes.

Predominant soils in northeastern Illinois are described in Chapter Three. Soils occurring in this basin are identified in Table 17-3.

(4) Fish Inventory: Fish population surveys were conducted at 44 locations in the basin in 1976 as part of the 208 sampling program. Thirty-nine species and four hybrid crosses were collected in the survey, almost all of which are considered to be tolerant of habitat abuse. Only one percent of the total number of fish collected are considered to be intolerant of degradation. Sixty-seven percent of the total collected was comprised of green sunfish, carp, bluegills, sand shiners, and bluntnose minnows - all tolerant species.

b. Socio-Economic Characteristics

(1) Population The estimated 1975 population of the basin was 723,632. Population density (2,235 persons per square mile) is among the highest in northeastern Illinois outside of Chicago. Density is highest in the Cook County portion of the basin, particularly in its southernmost portion.

Population forecasts are shown in Table 17-4. Projected wasteloads, which are discussed later in this chapter, are based in part on these forecasts. Population is expected to increase most rapidly in the Lake County and northern Cook County portions of the basin.

(2) Land Use: There is a wide range of land use in the basin, from the heavily urbanized, older suburbs in the southern portion to the relatively undeveloped agricultural and resort areas in the north. As shown by the figures in Table 17-5, over half of the basin remains undeveloped (vacant, agricultural or forested). Along most of its

TABLE 17-3: PREDOMINANT SOIL UNIT CHARACTERISTICS FOR NORTHEASTERN ILLINOIS

Unit In Basin	Soil Unit	Soil Color	Soil Texture	Permeability	Drainage	Subsoil Texture	Underlying Materials	Agricultural Usage Limitations	Approximate Percentage of Prime Agri. Land	Development Usage Limitations
	Fox-Dresden-Casco	brown	loam	mod-rapid	well	loam	sand and gravel	E, D, LF	12	S, E, ST
	Warsaw-Rodman-Lorenzo	brown	loam	moderate	well	loam	sand and gravel	E, D	50	S, E, ST
YES	Volinia-Selma-Lomax	brown	loam	moderate	excessive	loam	sand	WE, D, W	80	W, S, P
YES	Maumee-Watseka-Plainfield	black	loamy sand	rapid	excessive	sand	sand	W, WE, D	30	S, W
YES	Zurich-Grays-Wauconda	gray	silt loam	moderate	moderate	clay loam	silt loam	W, E, LF	90	S, W, ST
YES	Drummer-Brenton-Proctor	brown	silt loam	moderate	moderate	clay loam	loam	W, E	100	W, S, P
YES	Miami-Kidder-McHenry	gray-brown	loam	moderate	well	clay loam	loam	E, ST, LF	40	ST, S, SS
YES	Drummer-Saybrook-Lisbon	dark gray	silt loam	moderate	moderate	clay loam	loam	W, E	80	W, S, SP, SS
	Ringwood-Griswold	brown	loam	moderate	well	clay loam	sandy loam	E, W	85	S, W, ST
YES	Morley-Markham-Ashkum	gray	loam	slow	moderate	silty clay	clay loam	E, W, LF	60	ST, SP, SS, W, HC
YES	Elliot-Ashkum-Beecher	dark gray	silt loam	slow	moderate	silt loam	clay loam	W, E	85	W, SP, CS, SS
YES	Milford-Martinton	black	silt loam	mod. slow	poor	silty clay	calcareous sediment	W	95	W, HC, P, SP, SS
	Symerton-Andres-Ashkum	black	silt loam	moderate	moderate	clay loam	clay loam	E, W	95	W, SP, SS
YES	Nappanee-Peotone-Del Rey	dark gray	silt loam	slow	well	silt loam	calcareous sediment	W, T, LF, E	50	W, SP, HC, P
YES	Frankfort-Bryce-Montgomery	dark brown	silt loam	slow	poor	silty clay	calcareous sediment	W, T, LF, E	5	W, SP, HC, P
	Romeo-Joliet	black	loam	moderate	poor	loam	limestone	W, STN, FL	60	W, SH, FL, SS
	Otter-Huntsville-Millington	black	loam	moderate	moderate	loam	loam	FL, W	95	W, FL
YES	Fox-Wauconda-Sawmill	dark gray	silt loam	moderate	poor	loam	sand	W, FL, E	75	W, FL
	Houghton-Lena	black	muck/peat	rapid	poor	muck/peat	sand/silt	HWT, W	0	W, P, S, HWT, LS

USAGE LIMITATION CODES

CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
CS	Clayey Subsoil	D	Drouthiness	E	Erosion	FL	Flooding
HC	Heavy Clayey Subsoil	HWT	High Water Table	LF	Low Fertility	LS	Low Strength
P	Ponding	S	Seepage	SH	Shallowness to Bedrock	SP	Slow Percolation
SS	Shrink-Swell	ST	Steepness	STN	Stoniness	T	Soil Tilth
W	Wetness	WE	Wind Erosion				

TABLE 17-4 : POPULATION CHANGE 1975-2000

FACILITY PLANNING AREAS	1975	1980	1985	1990	1995	2000	% Change 1975-2000
BANNOCKBURN	1,800	1,960	2,090	2,230	2,380	2,420	34.4.
DEERFIELD	20,560	21,330	22,360	23,380	23,560	23,740	15.5
LAKE ZURICH (1)	6,800	10,600	13,600	16,600	19,800	23,000	238.2
NORTHEAST CENTRAL LAKE FPA (1)	19,000	22,790	28,720	34,650	39,480	44,320	133.3
NORTHEAST LAKE (1)	15,410	17,060	18,670	20,280	23,720	27,150	76.2
NORTH SHORE SANITARY DISTRICT FPA (1)	222,260	230,950	250,400	269,850	288,580	307,310	38.3
CHICAGO MSD NORTHSIDE FPA (1)	1623000	1374000	1381000	1387000	1387000	1388000	1 (2)
CHICAGO MSD O'HARE FPA (1)	240,000	257,000	267,000	277,000	289,000	300,000	25.0
SOUTHEAST CENTRAL LAKE FPA (1)	46,460	53,570	64,710	75,840	82,860	89,880	93.5
SOUTHEAST LAKE (1)	19,780	26,420	31,200	35,980	38,450	40,900	106.8
MSD CENTRAL (1)	2549000	2431000	2441000	2450000	2461000	2472000	
BASIN TOTAL	723,632	734,283	840,483	946,683	898,807	850,931	17.6
FPA TOTAL	4524070	4446680	4520750	4592810	4655830	4718720	
(1) FPA located in more than one basin							
(2) Percentage change 1980-2000 period							

Source: Northeastern Illinois Planning Commission

length in Cook County, and much of its length in Lake County, the Des Plaines River is lined by relatively narrow forest preserves; most of the public or quasi-public open space in the basin is in these preserves.

Land use forecasts anticipate increasing urbanization of the basin and accompanying changes in land use, as indicated in Table 17-6. Largest increases, proportionately, are forecasted in nonresidential land use categories, particularly in manufacturing and commercial. The amount of undeveloped land is forecasted to decrease by more than 20 percent by the year 2000.

(3) Economy: Economic activity in the basin in recent years reflects regional trends: manufacturing employment has grown more slowly than in the past, while wholesale trade, finance, insurance, real estate, and government employment have increased their rates of growth. However, manufacturing remains the dominant source of employment, followed by retail trade.

Total employment is forecasted to increase by 21 percent, to 376,000 employees, by the year 2000. Table 17-7 indicates continuing increases in all categories, though the rate of growth in manufacturing will be low compared with the rates of the other two categories of employment.

(4) Water Supply: Lake Michigan is the source of water for 22 of the basin's communities in Cook County and one of the basin's communities in Lake County. These communities contain about half of the population of the basin. Groundwater is the sole source of water supply for the remaining municipalities and unincorporated areas. Shallow sand and gravel wells account for 4 percent of public groundwater pumpage, shallow dolomite aquifer wells for 11 percent, and deep sandstone aquifer wells for 85 percent.

(5) Government: The Illinois portion of the Upper Des Plaines River Basin lies within Cook, Du Page and Lake counties. Included in the basin are all or portions of 25 townships, 52 municipalities, 16 sanitary districts, and 10 other special districts whose actions affect water quality.

(6) Recreation: Numerous lakes, extensive forest preserve areas along the river, and the river itself provide recreational opportunities. Fishing pressure ranges from light to heavy. The Des Plaines River is probably the most heavily fished stream in the region as a result of extensive public access provided by adjacent forest preserves. Most lakes have facilities for boat rentals. Canoeing on the Des Plaines River is also quite popular. Camping is limited to a few private-fee campgrounds. No public swimming areas exist at the present time. Hunting is limited to birds and small game.

TABLE 17-5 :1970 LAND USE

Land Use Category	Total Acres	% of Total
Single Family Residential	34,560	16.7
Multi Family Residential	1,815	0.9
Mobile Home Parks	238	0.1
Manufacturing and Processing	4,200	2.0
Transportation, Communications, & Utilities	1,648	0.8
Railroad Rights-of-way	1,931	0.9
Airports	5,596	2.7
Streets & Parking	16,258	7.8
Trade	2,181	1.0
Services-Private	936	0.4
Services-Institutional	3,504	1.7
Military Services	358	0.2
Cemetaries	1,903	0.9
Entertainment Assembly	390	0.2
Public Buildings	48	0.1
Public and Quasi-Public Open Space	12,596	6.1
Mining and Quarries	852	0.4
Vacant, Agricultural & Forest Areas	110,493	53.3
Vacant-Under Development	1,450	0.7
Water	4,302	2.1
Warehousing	1,285	0.6
Shopping Centers	451	0.2
Hotels-Motels	162	0.1
Parking Lots	66	0.1
Total	207,223	100

TABLE 17-6 : LAND USE FORECASTS (ACRES)

Land Use Category	1980	1985	1990	1995	2000
Residential	40,672	42,506	44,340	45,414	46,489
Manufacturing	8,738	10,462	12,187	13,664	15,140
Commercial	7,148	8,690	10,231	11,676	13,121
Transportation/Communication, etc.	20,701	22,926	25,150	27,036	28,922
Open Space, Vacant Agriculture, etc.	129,964	122,639	115,315	109,433	103,551
Total	207,223	207,223	207,223	207,223	207,223

SOURCE: Northeastern Illinois Planning Commission, 1976

TABLE 17-7 : EMPLOYMENT FORECAST

CATEGORY	1970	1980	1985	1990	1995	2000	1970-2000 % Increase
Manufacturing	83,268	83,573	85,263	86,954	89,769	92,584	11.2
Local Retail	31,891	36,035	37,944	39,862	41,265	42,677	33.8
Other	159,528	190,884	201,963	213,032	226,932	240,824	51.0
Total	274,687	310,492	325,170	339,848	357,966	376,085	27.0

Source: Northeastern Illinois Planning Commission

17.02 IMPACTS OF CTHER PROJECTS 210

a. Introduction 212

In many basins there are studies or projects underway 214
which may directly or indirectly affect surface water and/or 215
groundwater quality. Most will have indirect effects since 216
they usually relate to water quantity or hydrologic modifications. These include the flood control activities 217
of the U.S. Soil Conservation Service (SCS), the U.S. Army 218
Corps of Engineers, and the Illinois Division of Water Resources. Also of direct impact are SCS soil conservation 219
programs.

Many local, county, state, and federal public works 221
projects also indirectly affect water quality. Perhaps the 222
most significant project of this type involves the construction cr improvement of roads and highways. As a 224
result of these projects, drainage patterns are altered, local farm tiles may be interrupted, silt is introduced 225
during construction, and vehicular pollutants are conveyed 226
to rivers and streams thereafter. Waterway crossings by 227
highway projects and various public and private utilities all affect water quality to varying degrees and for varicus 228
lengths of time. Not to be overlooked are public and 229
private storm sewer cutlets.

Discussion of this section will serve as check list to 231
assure consideration of significant projects in the 232
evaluation of initial plan alternatives, and in future plan revisicns.

b. U.S. Army Corps of Engineers 234

Ccrps responsibilities are related primarily to navigation and flood control. However, it also has other duties, several of which are described below.

(1) Wastewater Studies: Pursuant to Section 206 of the Flood Control Act of 1958 and resolutions adopted by Congress in 1971, the Corps was involved in a planning study on alternative wastewater management systems for the Chicagc-South End cf Lake Michigan (C-SELM) area, which covered portions of northeastern Illinois and northwestern Indiana. Specifically, the study evaluated various regional wastewater management systems, including plans which would result in the elimination of pollution discharges to water bodies. An initial pilot study was completed in 1974. However, since this was only a planning study, the report contained no recommendations for Federal action. Congress intended for the findings to be presented to local units of government for their consideration and adoption, as desired. Some information developed in the report served as points of reference in the current studies under PL 92-500.

(2) TARP Study: As part of the overall C-SELM study, the Corps is also involved in an investigation as to the appropriate "federal interest" in the Tunnel and Reservoir Plan (TARP) proposed by the Metropolitan Sanitary District of Greater Chicago (MSDGC). In its Interim Report No. 1, the Corps confirmed that supplemental sewers, tunnels and reservoirs (such as proposed in the TARP) were the optimal means for controlling runoff on both a community and an areawide basis.

The report noted that the flood damage reduction aspects of the plan appeared to fall within the purview of the federal flood control program, thus establishing the federal interest in that component. Follow-on studies concluded that the tunnel, reservoir, and channel-widening components of the plan (related to flocd control) were appropriate for implementation under the regular flood control program administered by the Corps. Subsequently, the Water Resources Development Act of 1976 authorized the prepareation of Phase I General Design Memoranda which will evaluate federal interest in the flood control aspects of certain tunnels and reservoirs called for by the so-called "TARP II" phase of the MSDGC plan. Details of the TARP plan and its impact on the Upper Des Plaines Basin are discussed elsewhere in this chapter.

(3) Dredge and Fill Permits: Under Section 404 of PL 92-500, the Corps is authorized to issue permits for the placement of dredged or fill materials into navigable waters or on adjacent land sites. Permits may be withheld if it is determined that the placement of these materials will have adverse effects on water supplies, fish and wildlife, or recreation. Under current guidelines, Corps authority for these permits extends to all navigable waters and

tributaries thereto, up to points where the average annual flow is 5 cfs or more. Thus, much of the Upper Des Plaines Basin is included under the 404 permit program.

c. U.S. Department of Agriculture

The Agricultural Stabilization and Conservation Service (ASCS) and the Soil Conservation Service (SCS) are the two principal units of the U.S. Department of Agriculture with programs related to water quality management.

(1) Conservation Program: The SCS and ASCS provide a variety of services directed at the reduction of soil erosion. The SCS offers extensive technical assistance in developing erosion control plans. The ASCS gives assistance through cost-sharing to farmers in order to control erosion and agriculturally related water pollution. Various site-specific control techniques are available for implementation under this program, depending upon the nature of local problems.

(2) PL-566 Projects: The small watershed program of the SCS, authorized by the Watershed Protection and Flood Prevention Act of 1954 (PL 83-566) provides a framework through which federal, state, and local units of government can solve local water resources problems on a cooperative basis. The program is principally oriented toward the prevention of soil erosion and the control of flooding and sedimentation damages. Works typically include the construction of small reservoirs, stream channelization, grade stabilization, and bank protection. Projects are sponsored by and coordinated through local soil and water conservation districts and other interested agencies.

(a) Chicago Area River Basin Study: The Chicago Area River Basin Study was initiated by the SCS in 1971 under PL-566 authority. Work was undertaken in six watersheds in Cook and Lake counties, under the local sponsorship of the MSD. The principal objective of the study is to develop comprehensive plans to reduce floodwater damage.

(b) Upper Des Plaines River Plans: The Upper Des Plaines River was included in the Chicago Area River Basin Study, and in 1975, a floodwater management plan was completed. The plan calls for the construction of 11 flood-control reservoirs, stream channel improvements, expanded flood plain and land use regulations, structural floodproofing, and improved erosion-control programs and measures.

d. Illinois Department of Transportation

Two divisions of this department have duties and responsibilities related to water quality management: the Illinois Division of Water Resources (IDOWR) and the Division of Highways (DOH).

(1) IDWR: The IDWR has statutory responsibility for navigation and flood control projects on water bodies throughout the State, as well as permit authority for private and public projects which enter or cross over or under such waters. The IDWR also has underway a number of flood control projects in the region. None, however, currently are proposed for the Upper Des Plaines Basin.

IDWR also has been charged with surveillance over the diversion of Lake Michigan waters by all parties in Illinois. A long series of hearings have been held during the past few years which culminated in the current allocation of waters. This will be a continuing responsibility with the actual quantities of water available within the 3200 cfs Supreme Court limitations being influenced by such on-going activities as: the determination of a revised method for computing natural diversions of storm and ground waters (a proposal currently being negotiated with other Lake Michigan states), and the effect of TARP on the MSDGC's need for dilution water from the lake. Given the declining water supplies of many communities now using well waters, the availability of Lake Michigan water will strongly influence the potential for growth of those communities. If relief is not forthcoming, the question will not be growth, but rather maintenance of established standards. Impacts on wastewater quality and quantity are self-evident.

(2) DOH: The Division of Highways is responsible for the construction and maintenance of state highways. These have associated water quality impacts both during their construction (e.g. erosion and sedimentation, disruption of drainage, etc.), as well as when placed in use (e.g. road salt usage, roadway drainage, etc.). Long-range plans call for the construction of Illinois Route 53 as a multi-lane freeway connecting the Northwest Tollway with the proposed Richmond-Waukegan Freeway.

e. Local Units of Government

Municipalities, Cook and Lake counties, and special purpose districts are involved in a number of local projects that have direct or indirect water quality impacts. The general purpose units are empowered to adopt regulations such as flood plain ordinances, on-site stormwater detention ordinances, and soil erosion and sedimentation control ordinances. All of these have the potential for at least peripheral impact on local water quality. Still other effects result from more routine activities such as street

sweeping, sewer and catch basin cleaning, and solid waste management. Of paramount impact on water quality are building permits that involve stormwater drainage systems that discharge into local streams.

Special purpose districts also are involved. The Cook and Lake County Forest Preserve Districts have been particularly active in acquiring land along the Des Plaines River and preserving it in a natural state. The Lake County and North Cook County Soil and Water Conservation Districts have been active in promoting soil erosion control measures. The Cook and Lake County Clean Streams Committees also serve as focal points for citizen reporting of pollution incidents. These committees of volunteers seeks to identify pollutant sources and have corrective measures taken.

17.03 WATER QUALITY IN THE BASIN

a. Stream Classifications and Applicable Standards

All waterways in the basin are designated by the State as "General Use, Protected for Public and Food Processing Water Supply," and are subject to state standards for waterways with that designation. A full discussion on General Use standards and other standards applicable to water quality is included in Chapter Four.

b. IEPA Stream Segment Classifications

The Illinois EPA has divided the State into hydrologic units that coincide with major river basins. These units have been further divided into segments on the basis of common characteristics. The Upper Des Plaines River Basin includes parts of segments B-1 and B-2, two of the 20 segments in the Des Plaines/Lake Michigan hydrologic unit as defined by the Illinois EPA. These segments, like all others in the state, have been designated "water quality limited." This means that water quality does not currently meet standards and/or is not expected to meet these standards even after the minimum statutory limitations have been applied to effluents discharging into the water body.

c. Existing Water Quality Conditions

Assessment of current water quality conditions in the Upper Des Plaines River Basin and its tributaries is based partly on information developed in the Commission's water quality sampling program and partly on programs conducted by other public agencies, principally, the IEPA. The results of these sampling programs are described below. The simulation of existing conditions using the water quality model also provides a comprehensive picture of water quality in the basin.

(1) Commission In-Stream Sampling: The in-stream sampling program conducted by this Commission included five sites in the Upper Des Plaines Basin:

- Station 9: Des Plaines River at Russell Road in Russell
- Station 10: Des Plaines River at Half Day Road in Half Day
- Station 11: Des Plaines River at Central Road in Des Plaines
- Station 15: Des Plaines River at Grand Avenue in River Grove
- Station 17: Des Plaines River at Foot Bridge in Riverside

Data were collected at seasonal intervals over a 12-month period (May 1976-April 1977) at each of the stations. Results of the sampling are shown in Table 17-8.

Of the 19 parameters evaluated, the State of Illinois has established standards for these four: pH, temperature, dissolved oxygen, and ammonia. Violations of state standards have been used in this study as a measure of the relative water quality of rivers and streams. The ammonia nitrogen standard is the one violated most frequently in the basin. Samples from stations 10 and 11 produced the greatest number of violations of the ammonia standard. Standards for DO and ammonia were violated at all five stations; however, no violations of the pH and temperature standards were reported at any of the stations.

(2) IEPA In-Stream Sampling: The IEPA operates 16 sampling stations in the Upper Des Plaines Basin. (See Figure 17-2).

Ammonia standard violations were common in the samples collected by IEPA at the sites in 1976 (See Table 17-9). The standard for ammonia was violated in 29 percent of the samples, and in some cases, the concentration of ammonia was far in excess of the standard.

Violations of standards for DO, iron, copper and fecal coliform also were noted frequently in the IEPA samples. Out of 177 analyses for fecal coliform, 71 apparent violations were recorded. Out of 43 analyses for copper, 27 violations were noted. Violations of the DO standard were noted in 13 percent of the samples, and in several instances the violations were far in excess of standards. Violations of the iron standard were noted in 30 percent of the 44 samples.

(3) SCD Measurements: Sediment oxygen demand measurements were conducted at 14 sites in the basin (See Figure 17-2). The overall purpose was to estimate the oxygen demand exerted upon the overlying water by bottom-dwelling (benthic) organisms. Conditions (based on SOD values) were classified as one of the following: clean, moderately clean, slightly degraded, moderately polluted, polluted, heavily polluted, or sewage sludge-like. On the basis of this classification system, conditions (noted in Table 17-10) ranged from "slightly degraded" (3 sites) to "sewage sludge-like" (1 site).

(4) Biological Classifications: As part of the SOD study, benthic macroinvertebrate communities also were analyzed, and mathematical Shannon-Weaver Indices reflecting the nature and diversity of these communities were developed. Indices above 3.0 are indicative of generally clean water, values between 1.0 and 3.0 are indicative of moderately polluted water, and values below 1.0 are indicative of severe pollution.

Shannon-Weaver Indices and their relevant classifications for the 14 Upper Des Plaines stations are shown in Table 17-11. Seven sites are classified "severely polluted" on the basis of this index, with the remaining sites being "moderately polluted." On the basis of the IEPA's classification system (also shown in Table 17-11), conditions at the stations were categorized as "semi-polluted" and "polluted."

(5) Fish Species and Habitat: Follow-on analysis of the 1976 fish inventory data by the Illinois Natural History Survey (INHS) involved calculation of a toxicity index relating water quality to fish habitat suitability. Included in the parameters for computing the toxicity index (using bluegills as the target species) are cadmium, chromium, nickel, arsenic, silver, boron, ammonia nitrogen, mercury, cyanide, and copper, among others. On the basis of its analysis, the INHS determined that at five of the sixteen IEPA water quality sampling stations in the basin, the toxicity index was in excess of the theoretical maximum level above which a diverse fishery cannot be maintained. Those parameters contributing to the high index values were ammonia nitrogen, silver, cyanide, and MBAS. State standards for copper, total iron, and lead were frequently exceeded, but the values did not significantly contribute to high indices.

Overall, the INHS classified habitat quality in the Upper Des Plaines basin as ranging from good to poor. A good quality environment exists at and immediately downstream of the Illinois-Wisconsin line. Mill Creek, the first monitored tributary to the river, is slightly degraded in its southern branches and at a tributary entering the North Branch. Yet, when Mill Creek converges with the river, it is also a good quality habitat. The river and its

Figure 17-2. WATER SAMPLING STATIONS

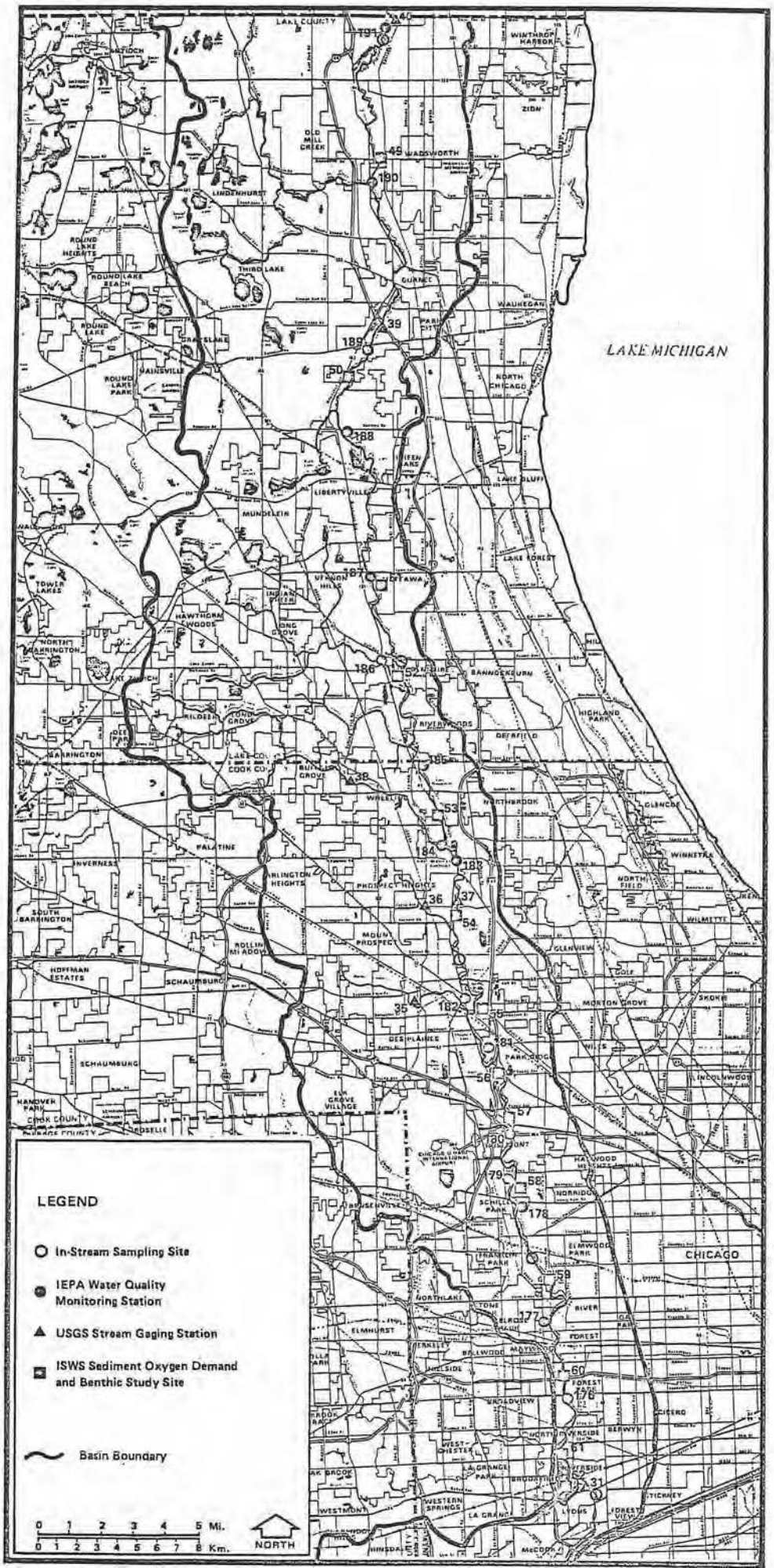


TABLE 17-8 IN-STREAM WATER QUALITY ANALYSES – SUMMARY DATA

Upper Des Plaines River BASIN

STATION NO. 9

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
MAY 3-12 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.1	188	69	157	546	20	15	12	7	11			1.2	0.7	5.0	0.24	15	294	20	
	Minimum	7.0	138	15	12	386	2	3	3	1	3			0.4	0.0	2.7	0.03	5	282	8	
	Mean	7.6	161	29	45	476	9	10	9	4	7			0.9	0.3	3.9	0.12	10	288	12	
AUGUST 2-11 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.5	256	130	467	1262	68	30	14	11	20			2.1	1.6	0.1	0.34	14	488	124	
	Minimum	7.6	195	18	41	664	11	18	4	4	8			0.1	0.0	0	0.04	6	395	55	
	Mean	8.2	235	61	151	890	26	24	8	6	13			3.3	0.3	0.01	0.17	9	442	86	
NOVEMBER 3-12 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	8.3	350	32	78	696	14	6	15	6	8			0.9	0.1	0.1	0.19	16	485	7	
	Minimum	7.9	260	5	9	564	2	0	10	2	1			0.1	0.1	0.1	0.07	13	446	1	
	Mean	8.0	280	11	22	608	5	2	13	3	5			0.4	0.1	0.1	0.14	14	466	2	
JAN. 31 - FEB 7, 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
APRIL 25-30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	8.2	246	46	100	1130	17	18	12	4	6			1.1	0.1	1.4	0.10	11	522	26	15
	Minimum	7.2	221	16	35	840	7	10	6	2	6			0.5	0.1	0.2	0.03	3	516	19	13
	Mean	7.8	233	34	73	991	13	12	9	3	6			0.9	0.1	0.4	0.06	6	519	21	14

STATION NO. 10

MAY 3-12 1976	No. of Analyses	30	10	30	30	30	30	30	29	10	10			30	30	30	30	10	2	10	
	Maximum	8.0	168	86	216	582	34	16	11	6	13			1.9	1.1	4.5	0.23	17	303	16	
	Minimum	7.0	127	24	25	380	3	5	7	2	4			0.5	0.2	2.0	0.01	6	244	11	
	Mean	7.7	158	37	63	472	11	10	9	4	7			1.1	0.5	2.8	0.14	11	274	13	
AUGUST 2-11 1976	No. of Analyses	30	30	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.1	261	58	122	1042	22	28	15	8	24			11.8	10.8	3.2	4.00	11	433	104	
	Minimum	7.6	215	19	27	858	9	19	4	5	11			7.1	5.6	0.5	1.50	7	380	54	
	Mean	7.8	233	41	85	955	16	23	7	6	14			9.5	8.1	2.3	2.00	9	406	73	
NOVEMBER 3-12 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	7.9	214	13	43	848	7	7	15	6	11			3.9	1.9	7.4	2.84	11	386	7	
	Minimum	7.5	193	4	2	708	1	1	7	2	4			2.2	1.3	5.5	2.00	7	386	2	
	Mean	7.8	206	7	13	778	4	4	11	4	8			3.9	1.6	6.7	2.37	9	386	4	
JAN. 31 - FEB. 7, 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
APRIL 25-30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	8.1	241	31	81	930	20	16	9	9	14			7.6	5.8	2.0	1.28	9	449	55	105
	Minimum	7.1	186	16	44	758	10	10	6	3	4			3.0	1.6	1.2	0.42	4	388	30	55
	Mean	7.6	215	23	55	861	14	13	7	6	9			6.0	4.5	1.5	0.91	6	418	37	78

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

TABLE 17-8 IN-STREAM WATER QUALITY ANALYSES – SUMMARY DATA

UPPER DES PLAINES RIVER BASIN

STATION NO. 11

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
MAY 3 – 12 1976	No. of Analyses	30	10	30	30	30	30	30	29	10	10			30	30	30	30	10	2	10	
	Maximum	7.9	182	82	216	766	30	16	10	6	13			1.9	1.0	4.2	0.22	17	288	26	
	Minimum	7.2	124	27	45	400	5	4	0	2	4			0.5	0.2	1.8	0.01	8	249	11	
	Mean	7.7	160	42	82	506	13	10	9	4	7			1.0	0.4	2.7	0.14	12	268	14	
AUGUST 2 – 11 1976	No. of Analyses	30	10	30	30	30	30	30	29	10	10			30	30	30	30	10	2	10	
	Maximum	9.0	230	140	420	1244	59	27	17	15	68			5.1	2.5	4.4	1.20	7	378	529	
	Minimum	7.7	147	28	40	578	10	21	6	6	17			2.2	0.5	1.3	0.48	1	364	203	
	Mean	8.3	191	51	126	891	27	23	10	10	32			3.6	1.3	3.0	0.91	4	371	330	
NOVEMBER 3 – 12 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	8.0	225	23	47	830	12	7	15	5	10			3.3	1.5	6.4	2.20	11	415	19	
	Minimum	7.3	195	5	7	642	2	1	9	3	5			2.0	1.2	5.2	1.37	7	385	4	
	Mean	7.8	215	13	20	797	5	4	12	4	8			2.5	1.3	5.8	1.84	9	400	11	
JANUARY 31– FEBRUARY 7, 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
APRIL 25 – 30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	8.0	229	49	132	954	26	16	13	10	15			5.7	4.3	1.7	0.98	13	431	112	145
	Minimum	7.3	188	28	66	844	14	11	4	3	6			3.8	2.4	1.2	0.54	2	370	62	88
	Mean	7.7	211	40	94	907	19	13	8	7	10			4.5	3.0	1.5	0.76	7	400	79	105

STATION NO. 15

MAY 3 – 12 1977	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.0	194	90	200	670	29	17	9	16	50			2.7	1.0	4.0	0.30	26	288	18	
	Minimum	7.2	113	29	48	396	4	4	7	3	5			0.6	0.1	1.6	0.05	6	252	9	
	Mean	7.7	158	40	72	497	12	10	8	6	12			1.1	0.5	2.6	0.18	12	270	13	
AUGUST 2 – 11 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.1	211	64	123	1058	22	26	10	11	25			3.2	1.6	1.9	1.10	3	323	144	
	Minimum	7.5	118	7	9	394	2	20	2	3	7			1.6	0.3	1.2	0.40	1	316	22	
	Mean	7.8	161	17	31	705	8	22	6	5	12			2.2	0.8	1.5	0.77	1	320	72	
NOVEMBER 3 – 12 1976	No. of Analyses	14	10	14	14	13	14	14	14	9	9			14	14	14	14	10	2	10	
	Maximum	8.0	225	13	19	1396	8	17	11	6	10			6.2	5.3	7.2	3.00	9	413	17	
	Minimum	7.6	198	6	9	702	1	2	7	2	4			1.6	0.8	3.1	1.02	7	369	10	
	Mean	7.8	214	10	15	897	4	5	9	4	8			2.4	1.3	4.3	1.51	8	391	13	
JANUARY 31 FEBRUARY 7 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
APRIL 25 – 30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	7.9	218	35	99	992	30	16	11	12	22			4.6	3.0	2.5	0.83	9	425	106	290
	Minimum	7.3	177	16	32	750	10	11	4	3	9			1.9	0.7	1.7	0.40	4	390	63	113
	Mean	7.6	200	23	58	875	15	13	7	7	12			3.1	1.6	1.9	0.60	6	408	87	162

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

TABLE 17-8 IN-STREAM WATER QUALITY ANALYSES – SUMMARY DATA

UPPER DES PLAINES RIVER BASIN

STATION NO. 17

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
MAY 3 – 12 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	7.9	188	77	206	684	67	17	11	10	19			1.7	1.1	3.8	0.34	13	332	18	
	Minimum	7.2	107	28	15	402	1	4	7	3	5			0.6	0.2	1.5	0.12	8	254	7	
	Mean	7.6	155	42	70	508	13	10	9	5	9			1.1	0.5	2.4	0.23	10	293	13	
AUGUST 2 – 11 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.1	220	18	32	962	12	25	10	6	26			3.0	1.7	4.0	1.55	6	358	66	
	Minimum	7.7	149	7	6	484	1	20	4	2	4			1.2	0.5	1.6	0.59	3	310	25	
	Mean	7.9	187	10	19	751	7	22	7	4	11			2.0	0.9	2.9	1.17	5	334	46	
NOVEMBER 3 – 12 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	8.1	255	26	42	988	13	17	18	5	11			5.0	3.2	6.5	3.00	14	441	12	
	Minimum	7.0	209	8	15	824	1	3	8	3	6			2.2	1.4	4.7	1.53	11	374	7	
	Mean	7.8	234	16	23	887	6	6	11	4	9			3.4	2.2	5.5	2.02	12	408	10	
JANUARY 31	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
FEBRUARY 7 1977	Minimum																				
	Mean																				
APRIL 25 – 30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	8.0	218	16	38	974	15	16	10	14	25			3.8	2.4	2.9	0.84	7	404	112	437
	Minimum	7.3	178	7	17	800	5	12	6	5	11			1.5	0.3	2.2	0.59	4	370	52	212
	Mean	7.6	197	13	27	896	9	14	8	8	15			2.3	1.0	2.5	0.67	5	387	91	290

TABLE 17-9 : VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

UPPER DES PLAINES RIVER BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen	Fecal[2] Coliform (per 100 ml.)	Iron	Copper	Dissolved Oxygen	Lead	Silver	Chloride	Fluoride	PH (Units)	Boron	Sulfate	Cyanide	Hexavalent Chromium	Total Phosphorus	Manganese	Phenol	Total Dissolved Solids	Temp. (°F)
			1.50	200	1.0	0.02	5.0	0.10	0.005	500	1.4	(4)	(4)	500	0.025	(4)	(4)	1.0	(4)	(4)	(4)
176	Des Plaines River	No. of Analyses	7	7	3	3	7	3	3	3	3			3	3			3			
		No. of Violations	1	6	1	3	3	0	0	0	0			0	0			0			
G 16		Maximum	1.8	60,000	2.1	0.05	9.2														
		Minimum	0.12	200	0.3	0.03	1.0														
		Mean[3]	0.74	12835	0.9	0.04	5.7														
178	Des Plaines River	No. of Analyses	8	8	2	2	8	2	2	2	2			2	2			2			
		No. of Violations	4	8	0	0	3	0	0	0	0			0	0			0			
G 15		Maximum	4.2	72,000			10.2														
		Minimum	0.16	1,000			2.4														
		Mean[3]	1.60	5733			7.1														
181	Des Plaines River	No. of Analyses	8	8	3	3	8	3	3	3	3			3	3			3			
		No. of Violations	4	8	1	2	1	0	0	0	1			0	0			0			
G 14		Maximum	3.90	76,000	1.4	0.09	13.7				2.3										
		Minimum	0.14	600	0.6	0.01	4.5				0.3										
		Mean[3]	1.69	5324	0.8	0.04	8.8				1.3										
183	Des Plaines River	No. of Analyses	9	9	3	3	7	3	3	3	3			3	3			3			
		No. of Violations	4	5	1	1	0	1	1	0	1			0	1			0			
G 13		Maximum	4.30	1200	2.0	0.16		0.24	0.010		2.5				0.060						
		Minimum	0.09	100	0.2	0.00		0.01	0.000		0.3				0.000						
		Mean[3]	1.69	315	0.9	0.05		0.09	0.003		1.1				0.020						
185	Des Plaines River	No. of Analyses	8	8	3	3	7	3	3	3	3			3	3			3			
		No. of Violations	4	5	1	0	0	0	0	0	1			0	0			0			
G 10		Maximum	7.80	1400	2.0						2.4										
		Minimum	0.08	100	0.2						0.3										
		Mean[3]	2.45	358	0.9						1.1										
187	Des Plaines River	No. of Analyses	9	9	3	3	9	3	3	3	3			3	3			3			
		No. of Violations	5	7	1	2	0	1	0	0	1			0	0			0			
G 20		Maximum	15.00	23,000	2.0	0.07		0.11			1.7										
		Minimum	0.09	100	0.2	0.00		0.01			0.3										
		Mean[3]	2.90	622	0.9	0.03		0.04			0.8										
188	Des Plaines River	No. of Analyses	9	8	3	3	9	3	3	3	3			3	3			3			
		No. of Violations	1	5	1	3	0	0	0	0	0			0	0			0			
G 09		Maximum	22.00	1600	1.1	0.07															
		Minimum	0.04	100	0.4	0.03															
		Mean[3]	2.90	431	0.6	0.05															
189	Des Plaines River	No. of Analyses	9	9	3	3	9	3	3	3	3			3	3			3			
		No. of Violations	2	1	1	2	0	1	1	0	1			0	0			0			
G 07		Maximum	27.00	500	3.6	0.79		1.17	0.070		1.7										
		Minimum	0.00	100	0.2	0.00		0.01	0.000		0.3										
		Mean[3]	3.47	119	1.4	0.28		0.40	0.023		0.8										
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

TABLE 17-9 : VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

UPPER DES PLAINES RIVER BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen 1.50	Fecal[2] Coliform (per 100 ml.) 200	Iron 1.0	Copper 0.02	Dissolved Oxygen 5.0	Lead 0.10	Silver 0.005	Chloride 500	Fluoride 1.4	PH (Units) (4)	Boron (4)	Sulfate 500	Cyanide 0.025	Hexavalent Chromium (4)	Total Phosphorus (4)	Manganese 1.0	Phenol (4)	Total Dissolved Solids (4)	Temp. (°F) (4)
191	Des Plaines River	No. of Analyses	9	9	3	3	9	3	3	3	3			3	3			3			
		No. of Violations	0	2	1	3	1	0	0	0	0			0	0			0			
G 08		Maximum		800	1.1	0.03	13.3														
		Minimum		100	0.8	0.03	4.8														
		Mean[3]		146	0.9	0.03	9.0														
177	Silver Creek	No. of Analyses	5	5	1	0	9	1	1	1	1			1	1			1			
		No. of Violations	1	4	0		1	1	0	0	0			0	1			0			
GM 01		Maximum	1.7	130,000			15.6	0.28							0.130						
		Minimum	0.02	100			0.0	0.28							0.130						
		Mean[3]	0.44	3956			7.3	0.28							0.130						
179	Crystal Creek	No. of Analyses	8	7	3	3	8	3	3	3	2			3	3			2			
		No. of Violations	3	4	1	1	0	1	0	1	0			0	0			1			
GN 01		Maximum	6.10	98000	1.9	0.14		0.20		1600								1.12			
		Minimum	0.25	100	0.5	0.01		0.00		140								0.06			
		Mean[3]	2.07	1533	1.1	0.05		0.07		630								0.60			
180	Willow Creek	No. of Analyses	8	8	2	2	8	2	2	2	2			2	2			2			
		No. of Violations	1	3	0	2	1	0	0	0	0			0	0			0			
GO 01		Maximum	5.50	16000		0.06	17.7														
		Minimum	0.08	100		0.04	4.6														
		Mean[3]	1.08	1606		0.05	11.2														
182	Wellers Drainage Ditch	No. of Analyses	8	8	3	3	6	3	2	3	3			3	3			3			
		No. of Violations	7	8	2	3	6	0	1	0	0			0	2			0			
GP 01		Maximum	22.00	830,000	1.7	0.05	4.9		0.150						0.280						
		Minimum	1.40	4500	0.8	0.03	0.0		0.000						0.020						
		Mean[3]	5.53	64601	1.3	0.04	1.7		0.075						0.120						
184	Wheeling Ditch	No. of Analyses	8	8	3	3	8	3	3	3	3			3	3			3			
		No. of Violations	0	3	1	2	0	1	0	0	0			0	0			0			
GS 01		Maximum		400	1.1	0.07		0.14													
		Minimum		100	0.6	0.02		0.00													
		Mean[3]		176	0.7	0.04		0.04													
186	Indian Creek	No. of Analyses	8	9	3	3	9	3	3	3	3			3	3			3			
		No. of Violations	0	2	0	1	0	0	0	0	0			0	0			0			
GU 01		Maximum		2100		0.04															
		Minimum		100		0.01															
		Mean[3]		184		0.02															
190	Mill Creek	No. of Analyses	7	7	3	3	6	3	3	3	3			3	3			3			
		No. of Violations	0	0	1	2	0	1	1	0	0			0	0			0			
GW 01		Maximum			2.6	0.44		1.81	0.040												
		Minimum			0.5	0.01		0.00	0.000												
		Mean[3]			1.2	0.16		0.60	0.013												
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

TABLE 17-10 : GENERALIZED BENTHIC SEDIMENT CONDITIONS

Upper Des Plaines River BASIN

STATION NUMBER	STREAM NAME	BENTHIC CONDITION*
49	Des Plaines River	Polluted
50	Des Plaines River	Heavily Polluted
51	Des Plaines River	Slightly Degraded
52	Des Plaines River	Slightly Degraded
53	Des Plaines River	Slightly Degraded
54	Des Plaines River	Moderately Polluted
55	Des Plaines River	Polluted
56	Des Plaines River	Polluted
57	Des Plaines River	Moderately Polluted
58	Des Plaines River	Sewage Sludge Like
59	Des Plaines River	Heavily Polluted
60	Des Plaines River	Heavily Polluted
61	Des Plaines River	Heavily Polluted
62	Des Plaines River	Moderately Polluted

*Based on SOD value

TABLE 17-11 : BIOLOGICAL STREAM SITE CLASSIFICATIONS

Upper Des Plaines River

BASIN

Station Number	Stream Name	IEPA Classification[1]	Shannon-Weaver	
			Index	Classification[2]
49	Des Plaines River	SP	1.33	MP
50	Des Plaines River	P	0.42	SeP
51	Des Plaines River	P	0.95	SeP
52	Des Plaines River	P	o.85	SeP
53	Des Plaines River	P	0.33	SeP
54	Des Plaines River	SP	1.42	MP
55	Des Plaines River	P	o.73	SeP
56	Des Plaines River	P	0.47	SeP
57	Des Plaines River	SP	1.26	MP
58	Des Plaines River	SP	1.55	MP
59	Des Plaines River	SP	1.85	MP
60	Des Plaines River	SP	2.48	MP
61	Des Plaines River	SP	0.56	SeP
62	Des Plaines River	SP	2.07	MP

(1) Polluted (P); Semi-polluted (SP); Unbalanced (U); Balanced (B).

(2) Severe pollution (Se P); Moderately polluted (MP); Clean (C).

tributaries continue to be of good quality to the convergence of Wheeling Drainage Ditch. At this point, urban development becomes more extensive along the river. The remaining river segment and its associated tributaries contain degraded aquatic habitat. Especially poor conditions are prevalent in the Feehanville Ditch, Weller's Ditch, and Silver Creek.

(6) Land Use Runoff Sampling: Two of the land use stormwater runoff sampling sites (light industry and residential) are located within the Upper Des Plaines Basin. However, the data from the stormwater samples were not

intended to be basin-specific; rather, they indicated characteristics of runoff from particular types of land uses, wherever they are found in the region. Results of the sampling efforts are discussed in Chapter Six.

(7) Computer Simulation of Existing Conditions: As shown in Figure 17-3, the basin was divided into a number of areas that are called "reaches." Each reach is composed of a segment of a major stream, the waterways that are tributary to that segment, and the land area drained by the major stream segment and its tributaries. Each is a direct tributary to the next downstream reach.

Water quality conditions are presented for eight reaches, the most downstream points of which are described in Table 17-12. Reach 170 is the farthest downstream point for which water quality has been simulated by the model for this basin.

To ensure that the model is an accurate representation of the Upper Des Plaines Basin, its behavior was balanced carefully to hundreds of measurements and observations of actual conditions in the basin and to actual water samples collected and analyzed in the basin during 1976 and 1977.

TABLE 17-12 : DATA OUTPUT POINTS

Reach 24 Mill Creek at the point where it flows into the Des Plaines River	Reach 27 Indian Creek at the point where it flows into the Des Plaines River
Reach 28 Des Plaines River north of Gurnee, one-half mile below Mill Creek	Reach 84 Des Plaines River at Dam No. 1 near Lake-Cook Road
Reach 48 Des Plaines River at Route 120	Reach 130 Des Plaines River at the Touhy Avenue Dam in Park Ridge
Reach 60 Des Plaines River near Town Line Road (Route 60)	Reach 170 Des Plaines River at Hoffman Dam in Riverside

Figure 17-3: BASIN MODELING SEGMENTS



Sources of pollutants are categorized in the modeling process as follows:

- Point Sources: treatment plants and other discrete discharges
- Nonpoint Sources: surface runoff and groundwater seepage from developed and undeveloped areas
- Combined Sewer Overflows
- Boundary Conditions: the amount of pollution flowing into a basin from another basin or another state.

The model's simulation of existing conditions provides a more comprehensive picture of water quality in the basin than do the results of sampling programs. Not only are pollutant concentrations determined and related to state standards, but the relative amounts of pollutants contributed by various sources also can be described.

(a) Pollutant Concentrations: Although the Commission sampled for 19 pollutant parameters, simulation reports on existing conditions were prepared only for eight parameters: stream flow, temperature, chlorophyll a, dissolved oxygen (DO), biochemical oxygen demand (BOD), ammonia (NH_3), nitrate (NO_3), and phosphate (PO_4). The last four of these represent pollutants that can be quantified by the model and related to specific categories of sources.

Assessments of conditions with respect to each parameter or pollutant are based on state instream standards, where these can be applied. Statistical values express the minimum, maximum and average concentrations of pollutants. Values also describe the number of times that simulated concentrations violated state standards, and the average duration of the periods of violation.

The simulation readings were taken hourly over a three-year period. Therefore, if a standard for a particular pollutant was constantly violated over the entire simulation period, that would be reflected in the statistics for number and frequency of violations as follows:

- Number of violations: one (because there was only one violation, even though it was of three years' duration),
- Average duration: 26,304 hours (approximate total number of hours in the three-year period).

Table 17-13 summarizes pollutant levels simulated for the Upper Des Plaines under existing conditions. As was indicated by the results of the instream sampling programs discussed above, problems are apparent with respect to ammonia. Maximum levels were far above the 1.5 mg/l

standard in all eight of the reaches covered in the table. The highest level encountered was in Reach 48, 17.5 mg/l, more than 11 times the concentration allowable under the standard. In Reaches 24, 48, 60, 84, and 130 the mean concentrations of ammonia also exceeded the standard.

There are no standards for in-stream BOD concentrations. Data on BOD are included in this report to give a relative measure of their presence in various stream reaches. This information then serves as clues to possible causes of low DO conditions. Put another way, there exists a cause-effect relationship between BOD and DO: high BOD concentrations cause low DO. However, the DO in a water body is also affected by many other factors, including: sediment oxygen demand (SOD); nitrogenous oxygen demand (oxygen lost when ammonia is converted to nitrates); the daily and seasonal cycles of algae (which give up oxygen during daylight hours, and consume up during the night, and when they die); temperature; and, aeration by natural or man-made features.

Dissolved oxygen has been used by the Commission as a general indicator of water quality. Conditions with respect to DC in the Upper Des Plaines are described by the statistics in Table 17-14. One particular statistic, the minimum DO level of zero in Reaches 24, 28, 60, 130 and 170 indicates the seriousness of the worst DO problems in the basin. Elsewhere, the 5.0 mg/l standard is violated frequently in all reaches except for Reach 72.

The phosphate standard of 0.05 mg/l, (expressed as P) which applies only to reservoirs and lakes and to streams at the points where they enter reservoirs or lakes, was exceeded continuously in the basin. Water temperatures occasionally exceed standards, although violations do not appear to be critical.

(b) Pollutant Loadings and Sources: In general, pollutant loads in the Upper Des Plaines Basin are relatively high. The basin contains large areas of urbanized land and is thus subject to the severe pollutional impacts associated with urbanization. However, the major land cover type in the basin is grassland, followed by cropland, lowland, and impervious cover respectively. An analysis of pollutant loads is presented in Table 17-15 for two important reaches on the Des Plaines River. These are Reach 84 at Dam No. 1 (near Lake-Cook Road) and Reach 170, at Hoffman Dam, Riverside. Table 17-16 is a summary of pollutant loads, by source, simulated in Reach 170. While the data are more meaningful when combined with information on area and flows, Table 17-16 does give a general overview of all the pollutant loads impacting on the entire basin. Subsequent paragraphs present an explanation of these data.

TABLE 17-13 : STATISTICAL SUMMARY OF CURRENT WATER QUALITY

Parameter (Standard) (All data in mg/l)	REACHES				
	24	28	48	60	72
BOD (No Standard) Maximum	33.3	29.4	24.9	54.2	35
Minimum	.7	.5	.5	.5	1.0
Mean	6.3	6.2	7.5	10.1	6.3
AMMONIA (1.5 mg/l) Maximum	9.7	8.0	17.5	14.7	6.3
Minimum	.5	.2	.6	.28	.2
Mean	2.2	1.3	4.6	2.57	1.1
No. Violations	99	57	44	47	38
Avg. Duration Viol.	185	141	445	440	137
NITRATE (No Standard) Maximum	6.8	4.7	7.8	9.57	7.6
Minimum	.4	.3	.4	0.0	.5
Mean	2.5	2.0	3.0	3.03	5.9
PHOSPHATE (.05 mg/l) * Maximum	1.9	2.0	4.6	3.91	1.6
Minimum	.1	.1	.1	.11	.1
Mean	.5	.3	1.2	.96	.5
No. Violations	1	1	1	1	1
Avg. Duration Viol.	26304	26304	26304	26304	26304

*Only in lakes and reservoirs, and in streams at the point where they enter lakes or reservoirs

TABLE 17-13: STATISTICAL SUMMARY OF CURRENT WATER QUALITY

Parameter (Standard) (All data in mg/l)	REACHES				
	84	130	170		
BOD (No Standard) Maximum	58.8	30.0	23.4		
Minimum	.4	.4	1.2		
Mean	10.0	9.3	9.1		
AMMONIA (1.5 mg/l) Maximum	10.1	8.77	3.35		
Minimum	0.0	0.0	0.0		
Mean	2.45	1.83	0.90		
No. Violations	83	91	35		
Avg. Duration Viol.	213	156	53		
NITRATE (No Standard) Maximum	11.1	11.1	9.88		
Minimum	0	0.0	0.0		
Mean	3.07	2.97	2.86		
PHOSPHATE (.05 mg/l)* Maximum	3.58	3.29	2.54		
Minimum	0	0.0	.09		
Mean	.77	.66	.68		
No. Violations	NA	NA	1		
Avg. Duration Viol.	NA	NA	26304		

*Only in lakes and reservoirs, and in streams at the point where they enter lakes or reservoirs

TABLE 17-14 : STATISTICAL SUMMARY OF CURRENT DISSOLVED OXYGEN LEVELS

SIMULATED DO CHARACTERISTICS (Expressed in mg/l)	REACH				
	24	28	48	60	72
Maximum	13.5	13.5	13.1	13.0	13.7
Minimum	0	0	.1	0.0	2.7
Mean	7.3	7.1	6.1	6.5	8.5
*No. of Violations	86	134	96	189	22
Avg. Duration	15	35	104	52	15
**Overall Assessment	Poor	Bad	Bad	Bad	Good

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time DO levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

TABLE 17-14 : STATISTICAL SUMMARY OF CURRENT DISSOLVED OXYGEN LEVELS

SIMULATED DO CHARACTERISTICS (Expressed in mg/l)	REACH				
	84	130	170		
Maximum	13.0	11.9	11.5		
Minimum	.7	0	0		
Mean	7.6	5.9	6.3		
*No. of Violations	152	197	114		
Avg. Duration	48	54	40		
**Overall Assessment	Poor	Bad	Bad		

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time DO levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

(c) Point Sources: Table 17-15 shows that in Reach 170, point sources contribute a relatively small portion (4 percent) of the total flow in the Upper Des Plaines, but account for a disproportionate amount (10 percent) of the BOD and 39 percent of the ammonia). This is due to their relatively high pollutant concentrations. Point source loads in Reach 170 are less than in Reach 84 because much of the area below Reach 84 is served by the MSDGC, and wastewater is diverted to the Chicago Sanitary and Ship Canal Basin for treatment and discharge.

Point sources appear to be responsible for the numerous violations of the 5 mg/l DO standard that were simulated during dry-weather conditions. This conclusion is based on the fact that point sources are the major contributors of BOD during low-flow conditions. Overall, the 5 mg/l standard was violated about 28 percent of the time in Reach 84 and 17 percent of the time in Reach 170. Minimum DO levels of near zero have been simulated for many reaches in the system, indicating that the survival of desirable fish populations is unlikely.

Point sources are also responsible for numerous violations of the 1.5 mg/l ammonia standard. These are most severe during low-flow conditions when dilution is minimal. In the basin as modeled (excluding boundary conditions), point sources contribute 52 percent of the total ammonia load entering the stream. In addition to the toxicity of ammonia with respect to aquatic life, it also exerts a significant oxygen demand on the stream. Finally, point sources are a major source of phosphate and nitrate which serve as nutrients for algal growth.

However, there are several factors in addition to the actual point source pollutant loads that are important in determining the severity of DO violations in the basin.

(d) Stream Gradient: First of all, the Des Plaines is a low-gradient stream with numerous low head dams impeding its flow. Flow-through velocities are very low and result in long residence times, permitting the biodegradation of pollutants with a concurrent loss of oxygen. A very low potential for natural reaeration exists because of the flat gradient. Thus, the Des Plaines has a relatively low assimilative capacity for oxygen demanding wastes.

The impact of stream gradient on water quality may be seen by comparing conditions in certain tributaries of the Des Plaines to conditions in the Des Plaines itself. Typical channel slopes in tributaries are about 5 feet per mile as compared to about 1 foot per mile in the Des Plaines main stem. However, with similar pollutant loads, there are typically fewer DO violations in the tributaries than in the main stem, reflecting the relatively greater assimilative capacity of the tributaries.

The sluggish flow is also conducive to the accumulation of sediment deposits in the river bottom. These benthic deposits exert a sediment oxygen demand on the stream and, when disturbed, release quantities of oxygen-demanding pollutants and algal nutrients. As with point sources, the impacts of sediment demands and releases are the most significant during low-flow conditions when dilution is minimal.

(e) Algal Growths: The low stream velocities and the presence of dams are conducive to the growth of large algal populations. Nutrients for algal growth (nitrate and phosphate) are supplied, to a large extent, by point sources. The impact of algae on DO is variable. Algal photosynthesis supplies large quantities of DO to the stream during daylight hours and helps to maintain safe DO levels, particularly during summer months when algal populations are highest. However, there is a diurnal cycle involved, with the plants consuming oxygen at night. Severe low-flow DO violations may be more likely to occur during spring or fall months, when algal populations are low, than during summer months. The problem is most severe when the algae and other aquatic plants die, with the decomposition of their organic matter exerting severe demands on available oxygen.

(f) Pervious Sources: Runoff from pervious land surfaces comprises the largest portion of streamflow. Table 17-15 shows that for the basin as a whole, as represented by Reach 170, 22 percent is groundwater runoff and 11 percent is from surface runoff. However, the majority of the pervicus cover pollutant loads of BOD and ammonia are associated with the surface runoff, reflecting its highly polluted nature.

Modeling results have shown that there also are numerous violations of the DO standard during wet-weather periods throughout the basin. These are associated with the surface washoff of oxygen-demanding pollutants (BOD and ammonia). The duration of violations is quite variable. However, the Upper Des Plaines is somewhat unusual in that stormwater runoff sometimes improves in-stream water quality conditions. This is because in-stream conditions are often so degraded during sluggish, dry-weather conditions that an increase in flow rate may be beneficial. More typically, the initial stormwater runoff is of such poor quality as to cause DO levels to drop until cleaner runoff reaches the stream.

Subsurface runoff from pervious areas generally has a beneficial effect on water quality. Being of better quality than the other components of streamflow, it provides a diluting effect. However, associated with this groundwater runoff are significant loads of nitrate and phosphate which, again, serve as nutrients for algal growth.

TABLE 17-15 : SOURCES OF POLLUTANTS, EXISTING CONDITIONS

REACH/SOURCE	PERCENTAGES					
	AREA	STREAM FLOW	POLLUTANTS			
			BOD	NH_3	NO_3	PO_4
1. Des Plaines						
(REACH NO. 84)						
BOUNDARY CONDITIONS	38	34	29	6	25	8
POINT SOURCES		7(11)	22(31)	65(69)	22(29)	65(71)
COMBINED SEWERS						
PERVIOUS COVER	55(90)					
Surface Runoff		17(26)	28(39)	25(27)	22(29)	7(8)
Groundwater		30(45)	4(6)	3(3)	31(41)	15(16)
IMPERVIOUS COVER	6(10)	12(18)	17(24)	2(2)	1(1)	5(5)
2. Des Plaines River						
(REACH NO. 170)						
BOUNDARY CONDITIONS	44	46	34	26	43	47
POINT SOURCES		4(7)	10(15)	39(52)	12(23)	28(53)
COMBINED SEWERS	9(16)	6(11)	26(39)	12(16)	2(4)	9(17)
PERVIOUS COVER	42(75)					
Surface Runoff		11(20)	14(21)	18(24)	16(28)	4(7)
Groundwater		22(41)	3(5)	3(4)	25(44)	9(17)
IMPERVIOUS COVER	5(9)	12(22)	13(20	3(4)	1(2)	4(7)

NOTE: Values in parentheses represent the relative contributions from the modeled portion of the basin and exclude consideration of the boundary conditions.

TABLE 17-16: POLLUTANT CONTRIBUTIONS BY SOURCE CATEGORY, EXISTING CONDITIONS
REACH: 170

PARAMETER	POINT SOURCES			NON-POINT SOURCES			Total Loads
	Comb Sewers	Treatment Plants	Boundary Conditions	Pervious Surfaces		Impervious	
				Surface	Ground	Surface	
BOD Load (tons/year)	1622	604	2114	879	157	824	6200
% Total Load	26	10	34	14	3	13	100
AMMONIA Load (tons/year)	121	427	279	198	31.5	27.5	1084
% Total Load	11	39	26	18	3	3	100
NITRATE Load (tons/year).	22.3	182	592	210	346	13.7	1366
% Total Load	2	13	43	15	25	1	100
PHOSPHATE Load (tons/year)	32.3	97.1	166	13.0	31.5	13.7	354
% Total Load	9	27	47	4	9	4	100

(g) Impervious Sources: Runoff from impervious surfaces accounts for moderate portions of the streamflow and BOD load in the Upper Des Plaines River. The BOD load from impervious surfaces is particularly significant in its impact on water quality, due to its shock load effect. Runoff from impervious areas reaches the stream rather rapidly, resulting in sudden increases in streamflow and in concentrations of certain pollutants, particularly BOD. As a result, the stream's assimilative capacity is often exceeded and DO levels may be severely depressed.

(h) Combined Sewer Overflows: Overflows from combined sewer areas exert a greater load of BOD at Reach 170 than do point sources. (There are no combined sewers of any consequence above Reach 84, and those existing in the lower reaches of the basin are, for the most part, elements of the MSD system.) The impact of combined sewer overflows is similar to the impact of surface stormwater runoff, except that the overflows contain a raw sanitary sewage component mixed with stormwater. Combined sewer overflows, along with

stormwater runoff, are responsible for many of the observed wet-weather DO violations.

(i) Boundary Conditions: A substantial portion of the total pollution load to the river is derived from Wisconsin. At Reach 28 (at Gurnee in Lake County), 54 percent of the BOD, 21 percent of the ammonia, 50 percent of the nitrate, and 32 percent of the phosphorus is attributable to flows from Wisconsin.

(8) Summary: Water quality in the Upper Des Plaines is generally quite poor due to several major contributing factors. The basin contains significant urbanization. As a result, there are significant pollutant loads associated with point sources, combined sewer overflows, and stormwater runoff from impervious areas. Numerous dry-weather violations of the DO and ammonia standards are associated with point source loads and polluted sediments. Severe violations of these standards in wet weather are correlated with combined sewer overflows and surface washoff of pollutants from both pervious and impervious surfaces. Nitrate and phosphate levels are relatively high also, due to the contributions from point sources and groundwater, in particular. The concentrations of these nutrients are capable of supporting large algal populations.

Simulated water quality in the Upper Des Plaines is considerably worse than in certain other basins. The apparent reason for the relatively poor assimilative capacity is the sluggish flow of the stream. The gradient is very flat and there are numerous low dam impoundments on the stream. The result is very low stream velocities which allow long residence times for the oxidation of pollutants. At the same time, the potential for natural reaeration is reduced. Other conditions associated with the sluggish flow are the attainment of large algal populations and the deposition of organically enriched sediments in the stream bottom, both of which have significant impacts on the simulated water quality of the stream, particularly with regard to DO.

17.04 POINT SOURCES: EXISTING CONDITIONS

a. Municipal-Type Wastewater Treatment Plants

There are 21 municipal-type plants in operation or under construction in the Basin (See Figure 17-4). Eight of these are operated by the Lake County Department of Public Works (LCDPW), two by the North Shore Sanitary District (NSSD), one by the Metropolitan Sanitary District of Greater Chicago (MSDGC), and the balance by individual municipalities. As part of the LCDPW regionalization efforts, five of its own and four other plants are to be phased out by 1980. A description of these plants is

presented in Table 17-17 (A,B,C,D,E) and a discussion of the treatment plants in each of the Facility Planning Areas is presented below in subsection "f".

b. Industrial Wastewater Treatment Plants

There is one industrial waste process discharger: Spinney Run Farm Corporation (See Table 17-18). Presently, the design capacity is only 9,000 gallons per day and its effluent requirements are 4 mg/l BOD and 5 mg/l SS. However, current flows range from 15,000 to 32,000 gallons per day. Sewer construction is currently underway which will connect the plant to the NSSD Gurnee plant. After completion of the sewer, this facility will be used for the pre-treatment of industrial process wastes and plant domestic wastes, with discharge to the NSSD Gurnee plant.

c. Miscellaneous Wastewater Treatment Plants

There are 21 miscellaneous wastewater treatment facilities currently discharging in the Upper Des Plaines Basin. Current information available for these facilities, including treatment units, flows and effluent limitations is presented in Table 17-19 (A,B).

d. Other Point Source Discharges

As described in Table 17-20 (A,B) there are 23 other point source discharges in the basin which are covered by NPDES permits. Twenty of these involve cooling water discharges or stormwater flows. Two pertain to the backwashes from water treatment plants, and one, agricultural effluents.

e. Combined Sewer Overflows

Combined sewers are found in 16 municipalities, all in Cook County within the MSDGC. It is estimated that about 54.3 square miles of the Upper Des Plaines Basin are tributary to combined sewer overflows.

f. Local Facilities Planning

Water quality in the basin is influenced by planning activities in several Facilities Planning Areas (FPA's). These areas are depicted in Figure 17-5, and current plans and activities in each are discussed below.

(1) Northeast Lake FPA: The Village of Lindenhurst (L-25) and the LCDPW Grandwood Park (L-15) wastewater treatment facilities are the only municipal-type plants in the Northeast Lake FPA. A formal facilities plan has not been prepared for the FPA because planning was initiated prior to May 1, 1974 and the previous submittal policies apply,

except for certain statutory requirements (infiltration/inflow studies and environmental review) covered by 40 CFR 35.917(c). In early 1978, the Grayslake, Gages Lake Sanitary District and LCDPW Heather Ridge plants connected to a new LCDPW interceptor sewer which conveys their wastewaters to the NSSD Gurnee plant for treatment. After connection, those three plants were abandoned. The handling of the wastewaters is governed by intergovernmental agreements between the Village of Grayslake and the Gages Lake Sanitary District and the LCDPW, and between the LCDPW and the NSSD.

(2) Southeast Central Lake FPA: The following municipal-type wastewater treatment plants are located in the Southeast Central lake FPA: LCDPW Countryside (L-12); LCDPW New Century Town (L-16); LCDPW Diamond Lake-Sylvan Lake (L-17); LCDPW Terra Fair (L-18); Libertyville (L-23); and Mundelein (L-26). A formal facilities plan has not been prepared for the FPA under an exception covered by 40 CFR 35.917(c).

The Village of Libertyville has recently completed an expansion of its wastewater treatment plant from 2.0 MGD to 4.0 MGD. The LCDPW Terra Fair plant was also recently completed and put into operation at 0.04 MGD capacity. In September, 1977 the LCDPW began construction of an interceptor to serve communities north of Libertyville. This sewer is expected to be completed in 1979, at which time the LCDPW Countryside Manor and Terra Fair plants will be phased out. The LCDPW Vernon Hills 0.25 MGD plant was phased out to LCDPW New Century Town in late 1977.

The Village of Mundelein does not have any plans to expand its plant before the year 2000. The future of the LCDPW Diamond-Sylvan Lake plant is uncertain at this time. The plant is on the IEPA's "critical review" list. The LCDPW has indicated that is is likely the plant will be phased out to the LCDPW New Century Town plant by 1980, but a definite decision has not been made.

(3) Southeast Lake FPA: The following four municipal-type plants are all located in the Southeast Lake FPA: Chevy Chase Utility Co. (L-3); LCDPW Des Plaines (L-13); LCDPW Ela Township (L-14); and Lincolnshire (L-24). A formal facilities plan has not been prepared for the FPA since the IEPA has determined that previous wastewater planning and engineering documents were sufficient to satisfy Step I requirements.

The LCDPW Des Plaines River plant is currently being expanded from 2.0 to 8.0 MGD. This expansion is expected to be completed by 1980. It will allow the immediate phase-cut of the Lincolnshire plant and the 1985 phase-out of the Chevy Chase Utility Co. and LCDPW Ela plants. Construction of an interceptor to serve the Villages of Kildeer and Hawthorn Woods is still in the planning stage. The expansion of the LCDPW Des Plaines plant will also be

TABLE 17-17 A: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

UPPER DES PLAINES RIVER BASIN

MAP CODE	FACILITY NAME	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	RECEIVING STREAM NAME	7 DAY 10 YR. LOW FLOW (MGD) 1970	2000	PUBLICLY OWNED TREATMENT WORKS NO	YES	IEPA FY 78 PRIORITY NO.
D5	Bensenville #2	Bensenville/ /Bensenville	Bensenville	Willow Creek	0	0		X	7
L3	Chevy Chase U.C.	S.E.LAKE / LCDPW	Wheeling	ditch to Des Plaines R.	0	0	X		41
L7	Gages Lake S.D.	N.E. Central Lake/ LCDPW	Gages Lake	ditch to Des Plaines R.	0	0		X	87
L8	Grayslake	N.E. Central Lake/ LCDPW	Grayslake	Avon-Fremont ditch to Third Lake	0	0		X	87
L9	Heather Ridge	N.E. Central Lake/ LCDPW	Gurnee	Creek to Des Plaines River	0	0	X		None
L12	LCDPW Countryside Manor	S.E. Central Lake/ LCDPW	Libertyville	ditch to Des Plaines R.	0	0			76
L13	LCDPW Des Plaines	S.E.Lake / LCDPW	Lincolnshire	Aptakisic Ck	0	0		X	41
L14	LCDPW Ela Township	S.E.Lake / LCDPW	Ela	ditch to Buffalo Ck	0	0		X	41
L15	LCDPW Grandwood Pk	N.E.Lake / LCDPW	Grandwood Pk	Mill Creek	0	0		X	79
L16	LCDPW New Century Town	S.E.Central Lake/ LCDPW	Vernon Hills	Des Plaines R.	1.67			X	None
L17	LCDPW Sylvan-Diamond Lake	S.E.Central Lake/ LCDPW	Mundelein	Indian Creek	0	0		X	None
L18	LCDPW Terre Fair	S.E.Central Lake/ LCDPW	Green Oaks	Des Plaines R.	0.23			X	76
L19	LCDPW Vernon Hills	S.E.Central Lake/ LCDPW	Vernon Hills	Seavey ditch to Indian Creek	0	0		X	None
L22	Lake Zurich (SE) Ferguson-Harkness	Lake Zurich/ /Lake Zurich	Lake Zurich	Buffalo Creek	0	0		X	576
L23	Libertyville	S.E.Central Lake/ Libertyville	Libertyville	Des Plaines R.	0.23			X	75
L24	Lincolnshire	S.E.LAKE / LCDPW	Lincolnshire	Des Plaines R.	3.47			X	126
L25	Lindenhurst	N.E.LAKE / LCDPW	Lindenhurst	Hastings Ck	0	0		X	NONE
C9	MSDGC-O'Hare	MSDGC / MSDGC	Chicago	Willow-Higgins Ck	0	0		X	31
L26	Mundelein	S.E. Central Lake/ Mundelein	Mundelein	Des Plaines R.	1.73			X	(a) 898
L28	NSSD-Gurnee	NSSD / NSSD	Gurnee	Des Plaines R.	0	0		X	None
L30	NSSD-Waukegan	NSSD / NSSD	Waukegan	Des Plaines R.	0	0		X	305

(a) Grant for Sewer Rehabilitation - Facility Planning completed. *As of 5-1-78.

TABLE 17-17 B: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS UPPER DES PLAINES RIVER BASIN

MAP CODE	NPDES PERMIT NUMBER	DATE ISSUED	DATE EXPIRES	EFFLUENT REQUIREMENTS (mg/l) INTERIM (A) BOD_5	TSS	P	NH_3N	FINAL (A) EFFECTIVE DATE	BOD_5	TSS	P	NH_3N	YEAR 2000 (B) BOD_5	TSS	P	NH_3N	COMMENTS
D5	0021831	2-28-75	6-1-79						4	5							(a) 1.5 mg/l instream after mixing.
L3	0047805	5-30-75	12-31-79						4	5							
L7	0020362	6-27-77	3-31-82						4	5							(b) 24 hour mean is 3 mg/l.
L8	0020931	4-22-76	9-30-77						10	12							
L9	0048101	6-30-75	12-31-79						4	5							
L12	0022063	6-30-77	6-30-78						20	25							
L13	0022055	5-20-77	11-30-81						10	12			10	12		(a)	
L14	0022039	2-11-75	6-1-79						4	5							
L15	0020478	2-11-75	6-1-79						4	5			4	5		(a)	
L16	0022071	2-11-75	6-1-79						10	12			10	12		(a)	
L17	0022080	2-11-75	10-1-78						4	5							
L18	0045853	6-18-75	12-31-78						30	30							
L19	0022098	6-15-77	12-31-77						10	12							
L22	0023230	12-10-73	10-29-78						10	12			10	12		(a)	
L23	0029530	10-18-74	6-1-79						10	12			10	12		(a)	
L24	0029572	5-1-75	8-1-79						10	12							
L25	0020796	4-30-75	8-1-79						4	5			4	5		(a)	
C9	0047741	6-30-75	6-30-79						4	5			4	5		(a)	
L26	0022501	10-18-74	7-1-79						10	12			10	12		(a)	
L28	0035092	12-24-74	10-1-79						10	12		(a)(b)	10	12		(a)	
L30	0030244	12-24-74	10-1-79	20	25	1		7-1-77	10	12		(a)(b)	10	12		(a)	

(A) From NPDES Permits (B) From Facility Plans

TABLE 17-17C: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

UPPER DES PLAINES RIVER BASIN

MAP CODE	STATUS OF TREATMENT PLANT					WASTEWATER TREATMENT PLANT (MGD)										COMMENTS
	INTERIM		PERMANENT			AVERAGE FLOWS (f)						DESIGN CAPACITIES				
	YES	PHASE OUT DATE	EXIST-ING	PROPOSED NEW		1975	1980	1985	1990	1995	2000	1975	1985	OTHER YEAR	2000	
				YES	EST. DATE IN SERVICE											
D5	X	(a) 12-89				0.11	0.37	0.45	-	-	-	0.40	0.40		-	(a) Phased out to Bensenville #1.
L3	X	(b) 12-79				0.05	-	-	-	-	-	0.18	-		-	(b) Phased out to L13.
L7	X	(c) 6-78				0.34	-	-	-	-	-	0.60	-		-	
L8	X	(c) 6-78				0.88	-	-	-	-	-	0.90	-		-	(c) Phased out to L28.
L9	X	(c) 12-79				0.02	-	-	-	-	-	0.02	-		-	
L12	X	(d) 12-79				0.08	-	-	-	-	-	0.10	-		-	(d) Phased out to L23.
L13			X			1.29	(h) 2.47	2.89	3.34	3.66	(g) 3.99	2.00	8.00		8.00	(e) Phased out to L16.
L14	X	(b) 12-79				0.04	-	-	-	-	-	0.10	-		-	(f) From Facility Plans on needs analysis documents unless otherwise noted.
L15			X			0.27	0.32	0.37	0.42	0.47	0.50	0.50	0.50		0.50	
L16			X			0.28	1.06	1.76	2.22	2.56	(g) 2.89	2.00	2.00		2.00	
L17	X	(e) 12-79				0.03	-	-	-	-	-	0.30	-		-	(g) NIPC estimate.
L18	X	(d) 12-79				0.04	-	-	-	-	-	0.04	-		-	(h) Excess flows from NSSD Clavey Rd. are not included.
L19	X	(e) 12-77				0.19	-	-	-	-	-	0.30	-		-	
L22			X			0.44	0.60	0.76	0.92	1.08	1.25	0.50	1.25		1.25	
L23			X			2.16	2.58	2.86	3.13	3.47	3.80	4.00	4.00		4.00	
L24	X	(b) 12-79				0.39	-	-	-	-	-	0.52	-		-	
L25			X			0.51	0.61	0.71	0.81	0.91	1.00	0.50	1.00		1.00	(a) Includes TARP flows.
C9				X	12-79	-	49.0	54.4	(a) 59.7	65.3	70.8	-	72.00		72.00	
L26			X			2.62	2.86	3.15	3.43	3.60	(d) 3.77	3.00	3.00		3.00	(b) Plant not in service in 1975.
L28			X			(b)	10.34	13.80	17.25	17.59	17.93	17.25	17.25		17.25	
L30			X			(c)	18.88	22.15	25.41	26.13	26.84	19.90	19.90		19.90	(c) Effluent to Lake Michigan in 1975.
																(d) NIPC estimate.

TABLE 17-17 D: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANT

UPPER DES PLAINES RIVER BASIN

MAP CODE	POPULATION SERVED (1000's)						PROPOSED PROJECTS (C)								CAPITAL COSTS (million $)		
							PLANT				SEWERS						
	1975	1980	1985	1990	1995	2000	Exp.	UpG	New	Out	I/I	SSE	New	Reh	Initial	Future	Total
D5	INDUSTRY ONLY									X			X		See Bensenville #1 Salt Creek Basin		
L3	1.0	-	-	-	-	-				X			X		See L13		
L7	3.8	-	-	-	-	-				X			X		-	-	-
L8	9.8	-	-	-	-	-				X			X		-	-	-
L9		-	-	-	-	-				X			X		PRIVATE COSTS		
L12	1.3	-	-	-	-	-				X			X		2.4	-	2.4
L13	17.4	25.5	29.8	34.4	37.7	41.1	X	X			X	X	X	X	10.3	-	10.3
L14	1.0	-	-	-	-	-				X	X		X		See	L13	
L15	2.0	2.2	2.4	2.5	2.6	2.7									NONE		
L16	2.5	9.6	15.9	20.1	23.2	26.1							X		-	-	-
L17	2.5	-	-	-	-	-				X			X		-	-	-
L18	0.4	-	-	-	-	-				X			X		See	L12	
L19	1.5	-	-	-	-	-				X			X		-	-	-
L22	3.2	5.0	6.4	7.8	9.3	10.8	X	X			X	X			0.8	-	0.8
L23	15.5	23.9	26.6	29.2	32.0	34.7									-	-	-
L24	4.0	-	-	-	-	-				X	X		X		0.5	-	0.5
L25	4.4	5.2	6.2	7.2	7.7	8.1	X	X							0.6	-	0.6
C9	-	257.0	267.0	277.0	289.0	300.0			X				X		See Table 17-31		
L26	18.6	21.0	23.8	26.5	28.2	29.8									-	-	-
L28	59.1	79.5	90.3	97.8	105.6	113.2							X		27.5	-	27.5
L30	96.9	106.6	120.8	134.8	146.0	157.2		X					X		23.5	-	23.5

(C) PROPOSED PROJECTS

SEWER(S): I/I - Infiltration/Inflow Study; SSE - Sewer System Evaluation; New - New Sewer Construction; Reh - Rehabilitation of Existing Sewers

PLANT: Exp - Expansion; UpG - Upgrading; New - New plant; Out - Phase out

TABLE 17-17 E. MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

UPPER DES PLAINES RIVER BASIN

MAP CODE	FACILITY PLANS												COMMENTS
	TYPE		STATUS			REVIEWS / APPROVALS							
						NIPC			IEPA				
	NEEDS ANALYSIS	STEP ONE STUDY	COMPLETED	UNDER WAY	LOCAL ISSUES	NUMBER	ENDORSED	UNDER REVIEW	NUMBER	APPROVED	UNDER REVIEW	UNRESOLVED ISSUES	
D5		X	X			77-586	X		C17-1218	X			(a) Private Funds
L3		X	X			75-599	X		C17-1640	X			(b) No application for grant funds.
L7		X	X			72-073			C17-1404	X			
L8		X	X			72-073			C17-1404	X			
L9													
L12		X	X			73-083			C17-1721	X			
L13		X	X			75-599			C17-1640	X			
L14		X	X			75-599			C17-1640	X			
L15		X	X			73-286			C17-1639	X			
L16		X	X			(a)				X			
L17		X	X			(b)				X			
L18		X	X			73-083	X		C17-1721	X			
L19		X	X			(a)				X			
L22		X		X	X	-			C17-1419		X	X	
L23		X	X			73-031	X		C17-1584	X			
L24		X	X			75-599	X		C17-1809 C17-1640	X			
L25		(a)											
C9		X	X			75-360 75-067	X		C17-5416	X			
L26		X	X			71-177	X		C17-0963	X			
L28		X	X			71-105	X		C17-1890	X			
L30		X	X			71-105	X		C17-1890	X			

TABLE 17-18 A: INDUSTRIAL WASTEWATER TREATMENT PLANTS

UPPER DES PLAINES RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
Ll	Spinney Run Farm Corp.	0032298	N.E. Central Lake/ LCDPW	Libertyville	A,E	0.009	0.020	-	0.020
	(1) Activated Sludge (A); Chlorination (E).								

TABLE 17-18 B: INDUSTRIAL WASTEWATER TREATMENT PLANTS

UPPER DES PLAINES RIVER BASIN

MAP CODE	RECEIVING STREAM			NPDES PERMIT DATES		SIC CODE	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
	NAME	7 DAY-10 YR. LOW FLOW (MGD)						
		1970	2000	ISSUED	EXPIRES			
Ll	Des Plaines	0.23		6-27-75	6-1-80	72-0241	4 BOD, 5 TSS	
	(1) Current, from NPDES permits							

TABLE 17-19: MISCELLANEOUS WASTEWATER TREATMENT PLANTS

UPPER DES PLAINES RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
L2	Willian Anest Restaurant	0049000	NSSD/ NSSD	Gurnee		0.005	0.005	-	0.005
C1	Camp Reinberg	0048542	MSDGC/ MSDGC	Palatine	S, FB	0.004	0.003	-	0.003
L8	Country Squire Restaurant	0050270	N.E. Central Lake / LCDPW	Grayslake	IM, F, E	0.015	0.005	-	-
C7	Devon-O'Hare Industrial Pk	0025674	MSDGC/ MSDGC	Elk Grove Village		0.050	0.010	-	-
D8	Elk Grove Industrial Pk	0025721	Bensenville/ /Bensenville	Elk Grove Village	A, E	0.050	0.040	-	-
D11	Flick-Reedy Corp.	0027138	Bensenville/ /Bensenville	Bensenville	L	0.018	0.013	-	-
L15	Holiday Inn	0022047	N.E. Central Lake / LCDPW	Gurnee	AD,F,E	0.019	0.035	-	0.035
L17	Ill. St. Toll Hwy.Auth.#4	0048950	NSSD/ NSSD	Gurnee	AD,E	0.003		-	
L18	Ill. St. Toll Hwy. Auth	0048968	N.E.Lake/ /LCDPW	Wadsworth				-	
L19	Ill. St. Toll Hwy. Auth	0048976	S.E.Lake/ /LCDPW	Riverwoods				-	
L20	Jerry's Service	0047619	N.E.Lake/ /LCDPW	Old Mill Creek	IM,F,E	0.004	0.004	-	0.004
C19	Lehman Trailer Park	0054160	MSDGC/MSDGC	Des Plaines	A,F,E	0.050	0.030	-	0.030
L25	Maple Hill Nursing Home	0051934	S.E.Lake/ /LCDPW	Long Grove	L	0.015		-	0.020
L28	North River-woods Ctr.	0055123	S.E.Central Lake/	Vernon Hills		0.015	0.020	-	0.020
C42	Oasis Mobil Home Pk.	0049841	MSDGC/ MSDGC	Des Plaines		0.150	0.150	-	0.150
L31	St.Mary of the Lk Seminary	0024350	S.E.Central Lake/LCDPW	Mundelein	IM,FT,E		0.011	-	0.011
C34	Touhy Ave. Mobil Home Pk.	0049859	MSDGC/ MSDGC	Des Plaines	IM,AC,E	0.080		-	
C35	Trailer Ranch Inc.	0049930	MSDGC/ MSDGC	Wheeling	A,E	0.008	0.005	-	0.005
L33	Vernon Oaks Day School	0051187	S.E.Lake/ /LCDPW	Riverwoods	S,FB,E	0.001		-	
L34	Vickery Manor Service Corp.	0032239	S.E.Central Lake/	Mundelein	A,L,E	0.100	0.055	-	0.055
C41	Williams Pipe Line Co.	0045209	MSDGC/ MSDGC	Franklin Park		0.0056		-	

(1): Activated Sludge (A); Contact Stabilization (AC); Extended Aeration (AD); Chlorination (E); Tertiary Filler (F); Buried Sand Filter (FB); Trickling Filter (FT); Imhoff Tank (IM); Tertiary Lagoon (L); Septic (S).

(1) See key

TABLE 17-20A: OTHER POINT SOURCE DISCHARGES

UPPER DESPLAINES RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
L4	Anchor Coupling	0051942	S.E.Central Lake/ LCDPW	Libertyville		10-6-76	3-31-81
C10	Atlantic Richfield	0001775	MSDGC/ MSDGC	Des Plaines		3-7-74	11-30-78
C23	Chgo Milw St. Paul Pac. RR	0002151	MSDGC/ MSDGC	Bensenville		5-28-75	9-30-79
C25	Chgo-O'Hare Dpt of Aviation	0002283	MSDGC/ MSDGC	Chicago		6-20-75	2-28-78
C31	Cities Service Oil Company	0025461	MSDGC/ MSDGC	Des Plaines		4-15-75	6-30-79
L11	Grocery Store Prod.Foulds Div	0020656	S.E.Central Lake/ LCDPW	Libertyville		1-3-75	9-30-79
C69	Ill. Tollway Authority	0049425	MSDGC/MSDGC	Des Plaines		3-11-76	9-30-80
C70	Ill. Tollway Auth.-O'Hare	0049417	MSDGC/ MSDGC	Schiller Park		3-16-76	9-30-80
L16	International Harvester	0035751	S.E.Central Lake/ LCDPW	Libertyville	0.020	6-27-75	12-31-79
C73	International Harvester	0002046	MSDGC/ MSDGC	Melrose Park	0.280	4-29-75	8-1-79
C82	Land & Lakes	0049395	MSDGC/ MSDGC	Wheeling		4-14-76	9-30-80
C87	Maggie Bros. Oil Pennzoil	0036013	MSDGC/ MSDGC	River Grove		3-7-75	12-31-79
L21	Peterson Sand & Gravel Inc.	0005223	S.E.Central Lake/ LCDPW	Libertyville		3-15-74	9-30-78
C125	Shell Oil Co.	0046736	MSDGC/ MSDGC	Des Plaines		6-6-75	12-31-79
C130	Sunnyside Prod.	0052337	MSDGC/ MSDGC	Wheeling		11-3-76	10-1-81
C138	Trans World Airlines	0042447	MSDGC/ MSDGC	Chicago-O'Hare		6-6-75	7-31-79
C138	Trans World Airlines	0047937	MSDGC/ MSDGC	Chicago-O'Hare		6-6-75	7-31-79
C143	Union Oil of California	0042242	MSDGC/ MSDGC	Des Plaines		4-14-75	6-30-79
C145	U.S.Army Reserve Center	0032948	MSDGC/ MSDGC	Chicago		1-14-74	1-6-78
C148	Universal Oil Company	0048119	MSDGC/ MSDGC	Des Plaines	0.700	6-20-75	3-31-80
C39	Des Plaines Water Plant	0037516	MSDGC/MSDGC	Des Plaines		6-27-75	12-21-78
L12	Gurnee Water Plant	0020036	NSSD/NSSD	Gurnee		1-24-77	12-31-79
L27	Weber Duck Farm	0035955	N.E. Lake/LCDPW	SE ¼ Sec. 3, T45N, R10E Lake Villa Township-Lindenhurst		7-18-74	7-15-79

Figure 17-4: POINT SOURCE DISCHARGES



TABLE 17-20 B: OTHER POINT SOURCE DISCHARGES

UPPER DES PLAINES RIVER BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	2000	EFFLUENT REQUIREMENTS[1] (mg/l)	COMMENTS
L4	storm sewer to Des Plaines	0		Temperature	Cooling water
C10	ditch to Higgins Ck	0		15 TSS, 10 oil and grease (o/g)	Stormwater runoff #001-003
C23	Silver Creek	0			Stormwater runoff
C25	Crystal and Willow Creeks	0		4 BOD, 5 TSS	Intermittent discharge of contaminated storm runoff
C31	Willow Creek	0		15 o/g	Stormwater runoff
L11	Des Plaines			None	Non-contact cooling water
C69	ditch to Willow Creek	0		Daily Max: 15 o/g	Stormwater runoff
C70	Des Plaines				Stormwater runoff
L16	Des Plaines			Temp., Daily Max 15 TSS, 15 o/g, 1.0 Cr^{+3}, 1.0 Cr^{+6}, 0.1 (tot) Zn	Cooling water
C73	Armitage Av Storm sewer to Silver Ck	0		Daily Max: 15 TSS, 15 o/g	Stormwater, steam condensation, and cooling water discharges
C82	ditch to Aptakisic Ck	0		20 TSS, Daily Max: 30 TSS	
C87	ditch to Silver Creek	0		Daily Max: 15 TSS, 15 o/g	Contaminated stormwater
L21	Des Plaines			20 TSS, Daily Max: 30 TSS, 10 o/g, 7 Fe	Quarry yard runoff
C125	Des Plaines			15 o/g	Stormwater runoff
C130	Wheeling drain to Des Plaines	0		Daily Max: 15 TSS, 15 o/g	Stormwater runoff
C138	Willow Creek	0		750 TDS, Daily Max: 15 TSS, 15 o/g	Stormwater runoff from maintenance hanger
C138	Lake O'Hare to Higgins Ck	0		750 TDS, Daily Max: 15 TSS, 15 o/g	Stormwater runoff from Cargo Building
C143	Higgins Ck	0		Daily Max: 15 o/g	
C145	ditch to Des Plaines	0		10 TSS, Daily Max: 20 TSS, 1.5 phosphates	Wash racks
C148	Weller Ditch	0		Temperature	Periodic discharge of non-contact cooling water
C39	Weller Ditch	0		4 BOD, 5 TSS	
L12	Ditch to Des Plaines	0			
L27	Ditch to Hasting Crk.	0		Discharge limited to overflow from runoff control building during heavy storms	

(1) From NPDES Permits

sufficient to handle flows in excess of the current capacity of the NSSD Clavey Road plant. Construction of a force main to transfer these flows from Clavey Road to the Des Plaines plant is expected to be completed by late 1979.

(4) Bensenville FPA: The Bensenville No. 2 plant (D-5) is the only municipal-type plant in the Bensenville FPA discharging to the Des Plaines River. Bensenville has a completed an approved facilities plan which calls for the phase out of the Bensenville No. 2 plant to the Bensenville No. 1 plant (in the Salt Creek basin) in about the year 1990.

(5) Lake Zurich FPA: The Village of Lake Zurich operates its Northwest (L-21) and Southeast (L-22) wastewater treatment facilities which are the only two municipal-type plants in the Lake Zurich FPA. A formal facilities plan has been prepared for the Northwest plant which recommends its continued operation as an independent facility for the near future. That plant discharges to the Fox River Basin and is discussed in Chapter Nineteen. Lake Zurich plans to expand and upgrade its Southeast plant from 0.5 MGD to 1.25 MGD before 1980 under a facilities planning exemption from IEPA. Design has been completed for this work which will include ammonia removal and tertiary filtration. The design year for this expansion is 2000.

(6) NSSD FPA: The NSSD Gurnee plant (L-28) is that District's only plant physically located in the Upper Des Plaines Basin. However, the NSSD Waukegan (L-30) plant completed construction of a new effluent force main in 1978 to the Des Plaines River which eliminated the Waukegan plant's discharge to Lake Michigan.

The NSSD also operates the North Chicago plant as a pretreatment facility for wastewaters from North Chicago and Abbott Laboratories before they are conveyed to the Gurnee plant for final treatment. The NSSD North Chicago plant also functions to retain excess flows for later treatment at Gurnee, and the NSSD Waukegan plant (L-30) also has excess flow retention facilities. Both of these retention basins discharge flows in excess of their capacity to Lake Michigan and are discussed more fully in Chapter Twelve.

The NSSD had originally received a facility planning exception from the IEPA under 40 CFR 35.917(c). However, the District has since opted to prepare a formal facilities plan in order to review its present system in light of PL 92-500 requirements. This 201 planning is currently in progress.

All major treatment facilities previously planned have been completed at the NSSD Gurnee and Waukegan plants with several minor exceptions. The Northeast Central Lake interceptor tributary to the NSSD Gurnee plant was put into service in early 1978, as discussed previously.

Figure 17-5: WASTEWATER SERVICE AREAS



The NSSD has also substantially completed a new sludge transfer line from the Gurnee plant to the Waukegan plant. At Waukegan, the NSSD is completing construction of a new sludge transfer line from the Waukegan water treatment plant to the Waukegan wastewater treatment plant. Within the Waukegan service area, the NSSD is expanding the capacity of the Winthrop Harbor pumping station to eliminate wet weather overflows.

(7) MSDGC FPA: There presently are no municipal-type wastewater treatment plants in the MSDGC FPA discharging to the Upper Des Plaines Basin. However, the MSDGC is currenly constructing its new 72.0 MGD O'Hare Water Reclamation Plant (C-9) which will discharge to the basin and will service an area presently tributary to the MSDGC Northside plant. Construction is expected to be completed by 1980. This new facility will provide ammonia removal and teritary filtration in addition to secondary treatment for the wastewater it processes. The O'Hare facility will also provide complete treatment for the combined sewer overflows stored in the MSDGC's O'Hare Tunnel System, which is part of TARP.

There are 27 combined sewer overflows in the O'Hare service area. The MSDGC plans to eliminate these overflows by connecting them to the O'Hare TARP Tunnel System. The MSDGC has a completed and approved facilities plan.

17.05 NONPOINT SOURCES: EXISTING CONDITIONS

a. Urban Stormwater Systems

In the Upper Des Plaines Basin separate storm sewer systems serve all or portions of approximately 24 municipalities and numerous unincorporated areas. It is estimated that 44 square miles, or 13 percent of the basin area, are served by separate storm sewers. These systems follow natural drainage courses and discharge either directly into the Des Plaines River or indirectly via tributary ditches or streams.

Combined sewer systems serve all or portions of approximately 16 Cook County municipalities in the basin. It is estimated that 54.3 square miles of the basin are tributary to combined sewer overflows. There are no combined sewers in the Lake County part of the basin.

In the remaining 261 square miles or 76 percent of the basin area, stormwaters enter the Des Plaines River and its tributaries by overland flows, or through ditches or other small water courses.

b. Construction Activities

As discussed in Chapter Six, construction operations, coupled with stormwater runoff and resultant erosion, can contribute sediments, chemicals and biological organisms to rivers and streams. Construction activities are not known to be causing water pollution problems at present, but the potential for damage to water quality will exist in the future. Changes in population and land use, as forecasted, will generate substantial construction, accompanied by minor surface disturbances for roads and utilities.

c. Septic Systems

Septic systems are used widely in the basin. Presently, there are 10,586 residential septic systems serving about 38,290 persons. (See Table 17-21) In addition, the basin has 194 nonresidential septic systems serving a population equivalent of 1,674.

Figure 17-6 shows the location of all septic systems in the basin and Table 17-22 provides a general description of those systems having existing or potential limitations.

d. Hydrologic Modifications

Many streams and rivers in the study area contain channels, dams, weirs, and other structures which significantly influence and control DO concentrations in these water bodies. Proper consideration was given to these structures in the water quality model. The influence of a channel dam on water quality can often be dramatic. Weirs and dams create pools which have DO levels below or above those normally expected in a free flowing stream of similar water quality. Forty-eight dams were analyzed in the region, of which 11 are located in the Upper Des Plaines Basin. Further information on these structures is contained in a report prepared for the Commission by the Illinois State Water Survey, entitled "Channel Dam Effects on Dissolved Oxygen Concentrations in Northeastern Illinois Streams."

Dredging and channelization are other types of hydrologic modifications. The Illinois Department of Conservation has identified eight streams in the basin that have undergone some channel modification: Crystal Creek, the Des Plaines River, Dutch Gap Canal, Hawthorne Drainage Creek, McDonald Creek, Weller Creek Drainage Ditch, Wheeling Drainage Ditch, and Willow Creek. This type of activity is expected to continue in the basin, although where, when, and what impact it will have on water quality is unknown.

e. Agricultural Runoff

The 38,300 acres of agricultural croplands in the basin are expected to decrease to about 30,600 acres by the year 2000. About two-thirds of these lands need the application

TABLE 17-21 : SUMMARY OF SEPTIC TANK INSTALLATIONS — Upper Des Plaines River BASIN

COUNTY	NUMBER OF SEPTIC SYSTEMS			POPULATION SERVED		
	RESIDENTIAL	NON RESIDENTIAL	TOTAL	RESIDENTIAL	NON RESIDENTIAL (PE)	TOTAL
Cook	1,154	46	1,200	4,615	90	4,713
DuPage	568	6	574	2,154	56(1)	2,210
Lake	8,864	142	9,006	31,523	1,520	33,043
Total	10,586	194	10,780	38,292	1,674	39,966

(1) Non-residential population served provided only for septic systems with PE of 35 or greater.

Figure 17-6: LOCATION OF SEPTIC AREAS



of BMP's to reduce soil erosion and control pollution associated with the runoff of stormwaters.

f. Surface Waste Disposal Sites

Exclusive of Cook County, the basin contains five inactive surface waste disposal sites: three landfills in Lake County and two former dumps in Du Page County. There are two active landfills that now receive sludges and two sites where sludge is applied in connection with agricultural activities. While these areas have the potential to contribute to water quality pollution, there is no evidence that links them to any specific water quality problem.

g. Mining Activities

There are 25 active or inactive surface mining sites for construction aggregates: 24 in Lake County and one in Du Page County. Information for Cook County has not been collected. These sites may have the potential for polluting ground and/or surface waters, but none is known to be causing problems.

17.06 DISPOSAL OF RESIDUALS

a. Residual Sources

(1) Point Sources: Each of the treatment facilities produces residuals which must be safely disposed. The NSSD Gurnee Plant is estimated to pump about 15 million gallons of concentrated sludge per year to the Waukegan plant where it is stabilized along with locally produced sludge. For details on sludge generation and disposal procedures, see 208 Staff Paper No. 30, "Regional Sludge Management Report".

(2) Nonpoint Sources

(a) Septic System Residuals: It is difficult to accurately estimate the present annual volume of septic sludge produced in the basin due to the many variables involved. However, using an average annual volume of 70 gallons of septage per person, it is possible to make a rough approximation. There are 38,292 persons in the basin served by residential septic systems. Thus, about 2.7 million gallons of residential septage are produced each year. This figure would be higher if non-residential septage were included.

(b) Agricultural-Type Residuals: These types of residuals are associated with concentrated feedlot operations. There is currently one feeding operation in the basin. About 7,000 gallons of sludge per year are trucked to the LCDPW New Century Town plant for processing.

b. Residual Disposal Practices

The most common, acceptable, and economical means of sludge disposal is on land either by landfilling or by land application.

(1) Landfill: Available information for the Des Plaines Basin identifies two landfill sites. One is operated by the NSSD and is located in northeastern Lake County. The other is a private industrial site. The NSSD site accepts municipal-type sludge, water treatment plant residual backwash and septic tank sludge from within the NSSD service area, amounting to approximately 140 tons per day. Sludge disposal operations began at this site in July, 1974. The site consists of 288.8 acres and it has a projected life expectancy of 25 years.

(2) Land Application: Two land application sites have been identified within the basin. One, Fiori's Nursery, is located in Vernon Township near Lincolnshire. This site accepts municipal-type sludges from several of the LCDPW plants amounting to approximately 30 tons per day, as well as sludge from the Lincolnshire plant. The sludge is applied in a liquid form, about 5 percent solids, to a vegetated portion of the nursery and is worked into the top soil to increase fertility. The site consists of 190 acres. The operation has proven to be quite effective in reclaiming the soil.

The second land application site is the Purves Sludge Farm located in Newport Township. Two sources of sludge are being disposed at this site: industrial-type sludge generated by Travenol Labs and municipal-type sludge generated by the Antioch treatment plant.

(3) Other: A fifth sludge disposal facility that is neither a landfill nor a land application site has been identified. Lester's Materials is the ultimate disposal site for much of the septage and sludge generated throughout the basin. The site is located in Vernon Township near Vernon Hills.

Approximately 10,000 gallons a day of septic sludge, municipal-type sludge generated by the LCDPW plants, and sludge from several miscellaneous sources is delivered to the LCDPW New Century Town Plant in a liquid state (about 4 percent solids). The New Century Town plant is equipped to receive the waste and treat it by aerobic digestion. The sludge is then delivered to Lester's storage site and further dried to about 95 percent solids content. The sludge is put into a grinder and transformed into a powder. A combination of one-third sand, and one-third peat is mixed and the end product is then sold as a soil conditioner and potting soil.

17.07 EXISTING MANAGEMENT PROGRAMS

The major features of the existing water quality management system in northeastern Illinois have already been discussed in the areawide chapters of this report. In this chapter, management programs in the Upper Des Plaines Basin are presented, but only to the extent that it is necessary to clarify the previous areawide discussion.

Table 17-23 is a list of the public agencies in the Upper Des Plaines Basin which are currently involved in water quality-related activities. Variations in programs and responsibilities between these agencies are indicated by a numerical code.

17.08 MODELING PROCESS: FUTURE CONDITIONS

As described above, the first major use of the computer model and the process of simulation was to develop information on existing water quality. The statistical picture that was produced showed the waters in the basin to be of poor quality. State standards, which generally call for at least 5 mg/l of DO, were being violated in all reaches. Ammonia standards were also being violated.

Four sources: combined sewers, treatment plants, stormwater, and boundary conditions became the focus of efforts to develop first and second test plans, and finally, a recommended plan for the basin. The results of those efforts are described in the following sections.

a. The First Test Plan Assumptions

Beginning in August, 1977, the Commission held a series of meetings in the Upper Des Plaines Basin. The purpose was to explain the water quality situation in the basin to residents and local officials, and to allow them to participate in the development of components of the areawide plan.

At the initial meetings, the Commission staff reported on existing water quality conditions, identified sources of pollution, and assisted meeting participants in developing appropriate strategies. The suggestions that were developed were reviewed by Local Steering Committees from Lake and Cook counties. The DuPage County Local Steering Committee waived its interest in the Upper Des Plaines Basin early in the planning process because of limited involvement, and to focus on the DuPage River, Salt Creek, and Fox River basins. The Local Steering Committees, in turn, made recommendations on alternative strategies to be evaluated using the water quality model and other techniques. The 208 Steering Committee reviewed the recommendations and formulated a "first test plan" to be evaluated.

TABLE 17-22 : SEPTIC SYSTEM AREAS HAVING LIMITATIONS

Upper Des Plaines River BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Cook	Wheeling	Meadow Lane	10	41	3-1
Cook	Wheeling	Wheeling	9	12	3-2
Cook	Wheeling		33	134	3-4
Cook	Wheeling		42	170	3-6
Cook	Wheeling		1	1	3-7
Cook	Wheeling		16	64	3-8*
Cook	Wheeling		10	10	3-15
Cook	Wheeling		141	572	3-16
Cook	Maine		42	155	9-1
Cook	Maine		10	37	9-2
DuPage	Addison	partially in Wood Dale	367	1380	3-1*
DuPage	Addison		67	252	3-5*
Lake	Newport	Wadsworth	43	167	2-1
Lake	Lake Villa	Deep Lake	295	982	4-3*
Lake	Lake Villa	Crooked Lake	75	278	4-4
Lake	Lake Villa	Venetian Village	715	2608	4-5*
Lake	Lake Villa	Wedges Corner	34	137	4-6
Lake	Avon	Third Lake - Druce Lake	210	744	6-2
Lake	Avon	Grayslake	95	438	6-3
Lake	Warren	Countryside Subdivision	68	225	7-1
Lake	Warren	US 41 & Washington St.	50	181	7-2*
Lake	Warren	Wilson	51	182	7-3
Lake	Warren	Arbor Vista	93	331	7-4
Lake	Waukegan	Bonnie Brook	104	360	8-1*
Lake	Waukegan	Green Bay Road - Waukegan-Gurnee	915	3320	8-2*
Lake	Fremont	Ivanhoe	97	445	10-1

TABLE 17-22 : SEPTIC SYSTEM AREAS HAVING LIMITATIONS

Upper Des Plaines River BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Lake	Fremont	Countryside Lake	62	215	10-2
Lake	Libertyville	Green Oaks - Area 1	180	640	11-1
Lake	Libertyville	North Libertyville Estates	80	284	11-2
Lake	Libertyville	St. Mary's Road	900	3204	11-4
Lake	Libertyville	Forrest Haven	88	313	11-6
Lake	Ela	Hawthorne Woods- Area 1	190	684	14-2
Lake	Ela	Forest Lake	460	1300	14-6
Lake	Ela	Kildeer	231	821	14-8
Lake	Ela	Sturm Subdivision	40	175	14-9
Lake	Ela	Lake - Cook Road	148	544	14-10
Lake	Ela	Deer Park - Area 2	20	78	14-12*
Lake	Vernon	Woodbine	61	346	15-1
Lake	Vernon	Elm Road	90	339	15-2
Lake	Vernon	Prairie View	127	462	15-3
Lake	Vernon	Half Day	142	532	15-4
Lake	Vernon	Duffy Lane	70	264	15-5*
Lake	Vernon	Buffalo Grove	53	193	15-6
Lake	Vernon	Riverwoods	200	754	15-7

TABLE 17-23 : EXISTING LOCAL WATER QUALITY MANAGEMENT AGENCIES AND PROGRAMS : UPPER DES PLAINES RIVER BASIN*

MUNICIPALITIES			
Arlington Heights (Salt)	1,3,4,5,6 +	Melrose Park (Salt)	1,4,5 +
Bensenville (Salt)	1,2	Mettawa (North Branch)	1,5
Berwyn (Sanitary & Ship)	1,3,6	Mount Prosepct	1,3,5,6
Buffalo Grove	1,5	Mundelein	1,2,4,5
Chicago (Sanitary & Ship)	1,3	Norridge (Sanitary & Ship)	1,3,5,6
Cicero (Sanitary & Ship)	1,3	Northbrook (North Branch)	1,5,6
Deer Park (Fox)	4,5	Northlake (Salt)	1,6
Des Plaines	1,3,4,5,6	North Riverside (Salt)	1,3,6
Elk Grove Village (Salt)	1,5,6	Oak Park (Sanitary & Ship)	1,3,5,6
Elmwood Park	1,3,6	Old Mill Creek	
Forest Park	1,3,6	Palatine (Salt)	1,4,5,6
Forest View (Sanitary & Ship)	1,3,6	Park City (North Branch)	1,5
Franklin Park (Salt)	1,3,6	Park Ridge (Sanitary & Ship)	1,3,6
Grayslake (Fox)	1,2,5	Prospect Heights)	1,6
Green Oaks (North Branch)		River Forest	1,3,6
Gurnee (North Branch)	1,5	River Grove	1,3,6
Harwood Heights (Sanitary & Ship)	1,3,6	Riverside (Salt)	1,3,6
Hawthorn (Fox)		Riverwoods (North Branch)	1,4
Indian Creek		Rolling Meadows (Salt)	1,4,6
Kildeer	4.5	Rosemont	1,3,6
Lake Zurich (Fox)	1,2,4,5	Round Lake Beach (Fox)	1
Libertyville	1,2,5	Schiller Park	1,3,6
Lincolnshire (North Branch)	1,2,5	Stone Park (Salt)	1,6
Lindenhurst	1,2,5	Third Lake	
Long Grove	1,4,5	Vernon Hills	5
Maywood (Salt)	1,3,6	Wadsworth	
		Waukegan (Lake Michigan North)	1,5
		Wheeling	1,4,6

* Additional basins shown in parentheses for those municipalities which cross basin boundaries.

\+ Numbers indicate existing water quality related activiti-s as follows:

1. Wastewater collection agency
2. Wastewater treatment agency
3. To be included in MSDGC TARP system
4. Has enacted erosion and sediment control regulations
5. Has enacted stormwater detention regulations
6. MSDGC stormwater detention regulations apply

TABLE 17-23 : EXISTING LOCAL WATER QUALITY MANAGEMENT AGENCIES AND PROGRAMS : UPPER DES PLAINES RIVER BASIN*

SANITARY DISTRICTS

Barrington Woods	1,6 +	Norwood Park	+
Country Gardens	1,6	Oak Meadow	1,6
Forest River	1,6	Orchard Place	1,6
Gages Lake	1,2	Pine Gate	1,6
Lakes Region		Plum Grove Woodlands	1,6
Lindenhurst	1,2	Prospect Heights	1,6
Metropolitan S. D. of Greater Chicago	2	Prospect Heights - Old Town	1,6
Mission Brook	1,6	Prospect Meadows	1,6
Northfield Woods	1,6	Round Lake	2
North Shore	2	Wolf Mandel	1,6

COUNTIES

Cook	4
DuPage	1,2
Lake	1,2,4,5

SOIL AND WATER CONSERVATION DISTRICTS

Lake County
North Cook County

* Additional basins shown in parentheses for those municipalities which cross basin boundaries.

\+ Numbers indicate existing water quality related activities as follows:

1. Wastewater collection agency
2. Wastewater treatment agency
3. To be included in MSDGC TARP system
4. Has enacted erosion and sediment control regulations
5. Has enacted stormwater detention regulations
6. MSDGC stormwater detention regulations apply

(It should be noted that this list is based on information gathered from a variety of sources over a period of many months. An attempt has been made to compile the most complete and current information available. However, due to the number and variety of local programs in the region, as well as the constantly evolving nature of these programs, this list may well be incomplete. The 208 staff expects it will be necessary to periodically revise or correct the list; they would appreciate any assistance that local agencies or individuals can provide.)

In addition to the recommendations developed through the process described above, the first test plan was shaped by assumptions made to reflect forecasted population increases, land cover changes, improvements in wastewater and stormwater treatment, flood control plans, and changes in agricultural practices. These assumptions are described below.

(1) Population and Land Use: The Commission's 1976 forecasts for the year 2000 were used to determine future changes in land cover and wastewater loads in each reach. Overall, a 17.6 percent increase in population was forecast.

Present land use in the basin was determined by satellite photography and field surveys. Four categories were used: lowlands--marshes, swamps and forest lying close to rivers and streams; grasslands--open to the infiltration of rainwater and snowmelt, but not tilled regularly, including pastures, parks, golf courses and upland forest; croplands--regularly tilled for agricultural purposes (there is some exchange between cropland and grasslands due to crop rotation); and impervious surfaces--covered with buildings, roads and parking lots. Land cover estimates were later revised during model calibration to fit observed hydrologic performances.

For the first test plan, estimates of land cover changes were made using population forecasts and their attendant housing and employment assumptions. Land required for new urbanization in the basin was taken from the grassland and cropland categories first. When this land was largely depleted, lowland areas were taken for urban purposes. Table 17-24 shows the assumptions resulting from this process.

TABLE 17-24 : CHANGES IN LAND COVER, 1976-2000 (square miles)

Category	1976 Land Cover Estimates	Year 2000 Land Cover Forecast	% Change
Lowlands	32.9	32.7	-0.5
Grasslands	172.9	176.6	+2.2
Croplands	59.7	47.7	-20.0
Impervious	39.6	48.1	+21.4
TOTAL	305.1	305.1	

*Land cover areas enclusive of combined sewered areas

(2) Local Facilities Plans: Extensive planning has been conducted in this basin in recent years for the improvement of wastewater treatment facilities and the creation of new facilities to serve newly developing areas. These plans were included in the forecast of water quality conditions for the year 2000. Table 17-17 shows the assumptions made about point sources for year 2000 conditions.

It was assumed that all planned improvements in municipal wastewater treatment plants (per local facilities plans) would be in operation, and that industrial treatment plants would meet required water quality standards in their effluent discharges. Where local facilities plans had not been completed reasoned judgments were made as to expected wastewater volumes, effluent standards and pollution loads.

(3) Phosphate Reduction: The City of Chicago and several suburbs have ordinances limiting the phosphate content of home laundry detergents. A substantial portion of the metropolitan area market has limitations on phosphate in detergents, since most distributors have withdrawn high phosphate detergents from the area. In considering changes in wastewater treatment practices for the year 2000, it was assumed that regulations limiting the amount of phosphate in domestic detergents would be expanded, in part, to cover commercial and industrial uses as well. Based upon studies of the effect of detergent phosphate reductions on wastewater treatment plant operations, it was assumed that phosphate concentrations in plant effluents for the year 2000 would be two-thirds of existing levels.

(4) Combined Sewer Overflows: It was assumed that combined sewer overflows in the Cook County portion of the basin would be eliminated by the year 2000, by the diversion of these flows to the completed MSDGC TARP.

(5) Urban Stormwater Runoff: The conditions set for the year 2000 in simulating future water quality assumed that 25 percent of the materials constituting BOD in urban stormwater runoff would be removed from the existing urban land surface and prevented from entering the water. In newly developed urban areas, it was assumed that 50 percent of the BOD materials would be captured before they could be incorporated in urban runoff.

(6) Septic Systems: The impact of septic systems on water quality was also considered in the simulation of conditions in the year 2000. In the first test plan, it was assumed that adverse effects of septic systems on water quality would be eliminated, either by the installation of sewage collection and treatment systems, or by on-site improvements.

(7) Soil Conservation: The increase in agricultural land conservation practices recommended in this plan was included in the calculation of future water quality. In the Upper Des Plaines, 29.3 square miles of land were initially forecasted to be brought under conservation practices by the year 2000.

(8) Stream Flow Changes: Four reservoirs proposed for the Upper Des Plaines River are represented in the first test plan for the year 2000. These are on Willow-Higgins Creek. Two of the reservoirs are SCS flood control reservoirs; the other two are associated with TARP.

(9) Boundary Conditions: In simulating future water quality conditions it was assumed that water entering the basin from Wisconsin in the year 2000 will meet these standards:

Dissolved Oxygen	5.0 mg/l (minimum)
Ammonia	1.5 mg/l
Biochemical Oxygen Demand (BOD_5)	4.0 mg/l

b. Simulated Results of the First Test Plan

If a water quality program that contained all the features of the "first test plan" actually were implemented, the overall water quality of the Upper Des Plaines River Basin would be improved, although it would still be less than ideal. The simulation showed several major causes for improvement in water quality: the increase in flow available for dilution; correction of combined sewer overflow problems; improvement in sewage treatment discharges; and control of pollutants in stormwater runoffs. Despite these and other improvements, major obstacles to good water quality in the Des Plaines remained. These included the low-head dams which slow the velocity of the water and give ample opportunity for biological and chemical reactions that remove oxygen from the water.

The simulation also showed the interaction of two competing trends. Efforts to improve water quality would compete against the expected increase in pollution caused by more urbanization.

(1) BOD: The results of the year 2000 simulation for Reach 170 show that the first test plan would produce an increase in the amount of BOD. The current BOD load to Reach 170 is about 6,200 tons per year. In the year 2000, under test plan conditions, the load would be 7,315 tons per year. An expected increase in the volume of water flowing through the basin would offset the effect of this increase in part. However, the Upper Des Plaines could not be considered to be in acceptable condition in the year 2000.

(2) Ammonia: Under existing conditions the annual load of ammonia in Reach 170 is 1,084 tons; this would be reduced by 31 percent under the first test plan to 746 tons per year.

(3) Summary: Tables 17-25 and 17-26 summarize the water quality impacts of the first test plan and compare them to existing conditions. Table 17-27 illustrates the effect the first test plan would have on total pollutant loads from various sources in Reach 170, the farthest downstream reach.

With respect to DO, the first test plan would produce a significant improvement, if implemented. For example, whereas conditions in Reach 170 now violate the state DO standard (5.0 mg/l) about 17 percent of the time, that standard would be violated only 7 percent of the time in the year 2000.

The fish population survey at 44 locations in the basin in 1976 showed that almost all species collected were tolerant of habitat abuse. Only one percent of the total number were considered intolerant of a degraded habitat. Ammonia nitrogen was one of the parameters which contributed to toxicity indices in excess of the theoretical maximum above which a diverse fishery cannot be maintained. Improved ammonia nitrogen concentrations under this first test plan should contribute to the support of the higher quality fish species.

(4) Percent of Time Standards Are Violated: The assessment of plans tested in each basin is based on the extent to which a given plan reduces the total time that in-stream water quality standards are violated.

The Commission, in the formulation of strategies in the initial areawide plan, attempted to develop plans that would allow all streams to comply with the minimum state standard for DC at least 95 percent of the time. Table 17-28 illustrates the effect that the first test plan would have on compliance with standards in Reaches 24, 28, 48, 60, 72, 84, 130 and 170.

c. Second Test Plan: Assumptions and Results

The second test plan was developed through much the same process described earlier for the first test plan. Simulation results for the first test plan were publicized and discussed at a series of public meetings in the basin and second test plan evolved out of suggestions for improvements.

The second test plan recommendations approved by the 208 Steering Committee were regrouped by the NIPC staff into ten separate classes. The impacts of these alternatives were evaluated by calculating the percentage changes in various pollutant loads each alternate strategy would have. In several instances, alternatives were combined for evaluation purposes.

TABLE 17-25 : COMPARISON OF POLLUTANT CONCENTRATIONS,
EXISTING CONDITIONS – FIRST TEST PLAN – SECOND TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 24			REACH 28		
		Existing	1st	*2nd	Existing	1st	*2nd
BOD (mg/l) Maximum	None	33.3	25.0		29.4	22.2	
Minimum		.7	.6		.5	.8	
Mean		6.3	5.1		6.2	6.2	
Ammonia (mg/l) Maximum		9.7	7.45		8.0	7.95	
Minimum		.5	.22		.2	0.0	
Mean		2.2	.89		1.3	0.77	
Frequency of Violation	(1) 1.5	99	66		57	55	
Average Duration of Violations (hours)	(1) 1.5	185	55		141	57	
Nitrate (mg/l) Maximum	None	6.8	7.64		4.7	4.92	
Minimum		.4	.29		.3	0	
Mean		2.5	2.61		2.0	2.04	
Frequency of Violation	10.0	0	0		0	0	
Average Duration of Violations (hours)	10.0	0	0		0	0	
Phosphate (mg/l) Maximum		1.9	1.88		2.0	2.00	
Minimum		.1	.07		.1	0	
Mean		.5	.39		.3	.26	
Frequency of Violation	.05	1	1		1	62	
	.20	49	63		57	40	
Average Duration of Violations (hours)	.05	26304	26304		26304	411	
	.20	517	382		248	290	

(1) Illinois Pollution Control Board Standard

*Data are from the first simulation of the 2nd Test Plan

TABLE 17-25 : COMPARISON OF POLLUTANT CONCENTRATIONS,
EXISTING CONDITIONS – FIRST TEST PLAN – SECOND TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 48			REACH 60		
		Existing	1st	*2nd	Existing	1st	*2nd
BOD (mg/l) Maximum	None	24.9	37.2		54.2	33.4	
Minimum		.5	2.1		.5	1.7	
Mean		7.8	9.2		10.1	9.1	
Ammonia (mg/l) Maximum		17.5	7.88		14.7	7.95	
Minimum		.6	0.0		.28	0.0	
Mean		4.6	0.99		2.57	1.11	
Frequency of Violation	1.5 (1)	44	73		47	103	
Average Duration of Violations (hours)	1.5 (1)	445	66		440	54	
Nitrate (mg/l) Maximum		7.8	16.8		9.57	16.0	
Minimum		.4	1.19		0.0	.64	
Mean		3.0	7.16		3.03	6.79	
Frequency of Violation	10.0	0	52		0	43	
Average Duration of Violations (hours)	10.0	0	131		0	124	
Phosphate (mg/l) Maximum		4.6	2.20		3.91	2.06	
Minimum		.1	.05		.11	.01	
Mean		1.2	.90		.96	.84	
Frequency of Violation	.05	1	2		1	11	
	.20	24	29		21	49	
Average Duration of Violations (hours)	.05	26304	13151		26304	2388	
	.20	1060	880		1240	517	

(1) Illinois Pollution Control Board Standard

*Data are from the first simulation of the 2nd Test Plan

TABLE 17-25 : COMPARISON OF POLLUTANT CONCENTRATIONS,
EXISTING CONDITIONS – FIRST TEST PLAN – SECOND TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 72			REACH 84		
		Existing	1st	*2nd	Existing	1st	*2nd
BOD (mg/l) Maximum	None	35.0	27.2		58.8	51.0	
Minimum		1.0	.9		.4	1.5	
Mean		6.3	5.8		10.0	9.6	
Ammonia (mg/l) Maximum		6.3	2.86		10.1	4.8	
Minimum		.2	.09		0.0	0.0	
Mean		1.1	.79		2.45	1.03	
Frequency of Violation		38	30		83	65	
Average Duration of Violations (hours)	(1) 1.5	137	114		213	69	
Nitrate (mg/l) Maximum	(1) 1.5	7.6	7.88		11.1	14.80	
Minimum		.5	.17		0	.58	
Mean		5.9	2.40		3.07	6.07	
Frequency of Violation	10.0	0	0		3	27	
Average Duration of Violations (hours)	10.0	0	0		60	111	
Phosphate (mg/l) Maximum		1.6	1.22		3.58	1.98	
Minimum		.1	.04		0	.01	
Mean		.5	.35		.77	.73	
Frequency of Violation	.05	1	2			11	
	.20	33	62		42	50	
Average Duration of Violations (hours)	.05	26304	13148			2389	
	.20	780	396		611	500	

(1) Illinois Pollution Control Board Standard

*Data are from the first simulation of the 2nd Test Plan

TABLE 17-25 : COMPARISON OF POLLUTANT CONCENTRATIONS,
EXISTING CONDITIONS – FIRST TEST PLAN – SECOND TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 130			REACH 170		
		Existing	1st	*2nd	Existing	1st	*2nd
BOD (mg/l) Maximum	None	30.0	29.3		23.4	22.0	
Minimum		.4	.9		1.2	3.0	
Mean		9.3	9.6		9.1	9.3	
Ammonia (mg/l) Maximum		8.77	2.57		3.35	1.25	
Minimum		0.0	0.0		0.0	0.0	
Mean		1.83	.79		.90	.50	
Frequency of Violation	(1) 1.5	91	24		35	0	
Average Duration of Violations (hours)	(1) 1.5	156	85		53	0	
Nitrate (mg/l) Maximum	None	11.1	14.8		9.88	12.87	
Minimum		0.0	0.0		0.0	.82	
Mean		2.97	5.14		2.86	5.31	
Frequency of Violation	10.0	2	8		0	4	
Average Duration of Violations (hours)	10.0	54	206		0	5	
Phosphate (mg/l) Maximum		3.29	2.01		2.54	1.64	
Minimum		0.0	0.0		.09	.04	
Mean		.66	.60		.68	.64	
Frequency of Violation	.05		48		1	3	
	.20	44	74		19	30	
Average Duration of Violations (hours)	.05		535		26304	2620	
	.20	571	317		1370	842	

(1) Illinois Pollution Control Board Standard

*Data are from the first simulation of the 2nd Test Plan

TABLE 17-26 : CHANGES IN DISSOLVED OXYGEN LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

(All data in mg/l)	REACH			REACH		
	24			28		
	Existing	1st	2nd	Existing	1st	2nd
Maximum	13.5	13.5		13.5	13.7	
Minimum	0	.6		0	.5	
Mean	7.3	7.5		7.1	8.1	
* Violations	86	70		134	75	
Average Duration	26	21		35	16	
** Overall Assessment	Poor	Fair		Bad	Good	

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time D O levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

(All data in mg/l)	REACH			REACH		
	48			60		
	Existing	1st	2nd	Existing	1st	2nd
Maximum	13.1	12.8		13.0	12.9	
Minimum	.1	0.0		0.0	0.0	
Mean	6.1	7.21		6.5	7.0	
* Violations	96	100		189	238	
Average Duration	104	31		52	26	
** Overall Assessment	Bad	Poor		Bad	Bad	

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time D O levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

TABLE 17-27 : COMPARISON OF SOURCES AND VOLUMES OF POLLUTANTS
REACH 170

Pollutant Indicator and Source	Existing Conditions				First Test Plan				*Second Test Plan			
	Surface		Ground		Surface		Ground		Surface		Ground	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
BOD (tons/yr.) Boundary Cond.	2114	34			3755	51						
Treatment Plants	604	10			1839	25						
Comb. Sewer Over.	1622	26			0	0						
Lowland	80.6	1	14.6	0	80.0	1	14.4	0				
Cropland	105	2	42.6	1	63.3	1	37.1	1				
Grassland	693	11	100	2	710	10	103	1				
Impervious	824	13			713	10						
TOTAL	6043	97	157	3	7161	98	154	2				
Ammonia (tons/yr.) Boundary Cond.	279	26			173	23						
Treatment Plants	427	39			323	43						
Comb. Sewer Over.	121	12			0	0						
Lowland	4.03	0	2.92	0	4.00	1	2.88	0				
Cropland	21.0	2	8.53	1	12.6	2	7.42	1				
Grassland	173	16	20.0	2	178	24	20.6	3				
Impervious	27.5	3			23.8	3						
TOTAL	1053	97	31.5	3	715	96	30.9	4				

*Data are from the first simulation of the 2nd Test Plan

TABLE 17-28 : WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

REACH 24

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	3	3		6	6		*	*	
Dissolved Oxygen as O, mg/l	5.0	86	70		26	21		9	6	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	99	66		185	55		70	14	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	1	1		26304	26304		100	100	

REACH 28

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	14	14		7	7		*	*	
Dissolved Oxygen as O, mg/l	5.0	134	75		35	16		18	5	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	57	55		141	57		31	12	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	1	62		26304	411		100	97	

Revised 2/15/79

* Less than 1%

TABLE 17 _3 : WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS (Continued)

REACH 48

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	4	2		9	9		*	*	
Dissolved Oxygen as O, mg/l	5.0	96	100		104	31		38	12	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	44	73		445	66		74	18	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	1	2		26304	13151		100	100	

REACH 60

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	12	6		8	7		*	*	
Dissolved Oxygen as O, mg/l	5.0	189	238		52	26		37	24	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	47	103		440	54		79	21	
Nitrate as N, mg/l	10	0	43		0	124		0	20	
Phosphorus Soluble as P, mg/l	.05	1	11		26304	2388		100	100	

REACH 72

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	0	1		0	3		0	*	
Dissolved Oxygen as O, mg/l	5.0	22	19		15	13		1	*	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	38	30		137	114		20	13	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	1	2		26304	13148		100	100	

* Less than 1%

Revised 2/15/79

TABLE 17-28 : WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS (Continued)

REACH 84

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	14	10		7	6		0	0	
Dissolved Oxygen as O, mg/l	5.0	152	226		48	16		28	14	
BOD_{20} Carbonaceous as O, mg/l	10	56	95		153	88		32	32	
Ammonia as N, mg/l	1.5	83	65		213	69		67	17	
Nitrate as N, mg/l	10	3	27		60	111		1	11	
Phosphorus Soluble as P, mg/l	.05	1	11		26304	2389		100	100	

REACH 130

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	2	2		11	10		*	*	
Dissolved Oxygen as O, mg/l	5.0	197	244		54	20		40	19	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	91	24		156	85		54	8	
Nitrate as N, mg/l	10	2	8		54	206		*	6	
Phosphorus Soluble as P, mg/l	.05		48			535			98	

REACH 170

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	2	2		4	4		0	0	
Dissolved Oxygen as O, mg/l	5.0	114	176		40	11		17	7	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	35	0		53	0		7	0	
Nitrate as N, mg/l	10	0	4		0	5		0	0	
Phosphorus Soluble as P, mg/l	.05	1	3		26304	2620		100	30	

* Less than

R 12/15/79

(1) Urban Stormwater Strategies: Several suggestions for control or urban stormwater are grouped here so that they can be more easily compared as to the impact on year 2000 conditions.

The four strategies were tested on Reach 24, the Mill Creek watershed in north central Lake County.

(a) No Controls: Test the effect of not sweeping or vacuuming streets and no performance zoning (no urban stormwater strategy).

(b) Street Vacuuming: Test the effect of street vacuuming only. (This is identical to the first test plan.)

(c) Performance Zoning: Test the effect of performance zoning instead of street vacuuming. (Assume that 30 percent less new impervious area would be required to accommodate forecast population growth.)

(d) Vacuuming and Zoning: Test the effect of both street vacuuming and performance zoning.

The four urban stormwater strategies listed above were tested on Reach 24, Mill Creek. Impervious area in the first test plan was forecast to increase from 7.71 square miles in 1976 to 8.89 square miles in 2000 in the Mill Creek watershed.

The table below reports the tons/year of pollutants produced from impervious areas only and the percentages which they comprise of the total pollutant production in the watershed. (Strategy (b) is the first test plan, and it may be used as a base for comparisons.)

TABLE 17-29: IMPERVIOUS AREA RUNOFF LOADS, REACH 24, YEAR 2000

Strategy	BOD		Ammonia		Phosphorous	
	Tons/ Yr.	% of Total	Tons/ Yr.	% of Total	Tons/ Yr.	% of Total
a. No Control	186	41	6.2	9	3.1	20
b. Street Vacuuming	133	33	4.4	7	2.2	15
c. Performance Zoning	178	40	5.9	9	3.0	19
d. Vacuuming & Zoning	128	32	4.3	7	2.1	15

Street vacuuming has much more potential effectiveness in reducing urban stormwater pollution than performance zoning in this watershed. This is largely because 87 percent of the forecast impervious area is already in place

and would not be affected by performance zoning (planned unit development). In basins where future impervious increases are more significant, performance zoning would also be more significant. However, it should be noted that the direct money costs to local governments of the intensive street vacuuming program would be high compared to costs of performance zoning.

(2) Treatment Plant Strategies:

(a) Reduced Flows: Test the effect of reduced wastewater flows. Flows from all treatment plants were reduced from first test plan levels by 15 percent. All effluent concentrations were kept at first test plan levels.

TABLE 17-30: PERCENTAGE CHANGES IN FLOW AND POLLUTANT LOADS FROM FIRST TEST PLAN

Reach	Flow	BOD	NH_3	NO_3	PO_4
24	-1	-1	-1	- 3	- 5
28	0	0	0	- 1	- 2
48	-4	-6	-6	-12	-13
60	-4	-6	-6	-12	-13
72	-1	-1	-1	- 4	- 3
84	-4	-6	-7	-12	-13
130	-4	-6	-6	-11	-13
170	-4	-4	-7	- 9	- 9

In the main stem of the Des Plaines River, from the Waukegan and Gurnee plant discharges downstream to Riverside, (Reaches 84, 130 and 170) a small water quality benefit could be expected by reducing treatment plant discharges. (See Table 17-30). This would result from reductions of oxygen demand loads (BOD and ammonia) and nutrients (ammonia, nitrate, and phosphorous). Therefore, small increases in oxygen concentrations and reductions in algal concentrations could be expected. Such a reduction in flows would also reduce the required size of waste treatment plants. However, because more efficient treatment processes might be required to maintain effluent standards, cost savings might be small.

(b) Post Treatment Aeration: Test the effect of post-treatment aeration at Waukegan and Gurnee.

Post-treatment aeration has been included in the designs for the Waukegan and Gurnee treatment plants. The first test plan represented Gurnee effluent DO at a constant 7.0 mg/l. However, the Waukegan plant was represented in the model by a variable effluent DO, falling below 6.0 mg/l during October thru January. The Libertyville plant was represented by an average effluent DO of only 3 mg/l.

The first test plan representation of DO in the Upper Des Plaines in Lake County could be improved by increasing the October to January average DO concentrations used in the model for the Waukegan plant effluent and by requiring post treatment aeration at the Libertyville plant, rather than at the Waukegan and Gurnee plants which already had provisions for this aeration.

Therefore, some improvement could be expected in the DO in Reach 48 with no additional cost because the Waukegan plant outfall already is designed for post-treatment aeration. In Reach 60, addition of post-treatment aeration at the Libertyville plant would be beneficial.

(c) Higher Treatment Levels: Test the effect of upgrading wastewater treatment at the Waukegan and Gurnee treatment plants to 4 mg/l BOD and 5 mg/l suspended solids.

These plants were represented at 10 mg/l BOD_5 in the first test plan. A 60 percent load reduction in BOD, or 513 tons per year, was calculated for these plants if the effluent meets 4 mg/l BOD level. (See Table 17-31).

TABLE 17-3I: PERCENTAGE CHANGES IN BOD FROM FIRST TEST PLAN

Reach	48	60	84	130	170
Percent Change	-23	-19	-17	-15	-7

There is little question that upgrading the Waukegan and Gurnee plants to 4/5 effluent standards would have a favorable impact on water quality in the Des Plaines River. At that level of treatment effluents would generally be equal to or better than raw river water in terms of BOD. However, the high costs and technical problems associated with such an advanced level of treatment are serious obstacles to its adoption.

(3) In-Stream Strategies:

(a) In-stream aeration: Determine the amounts of additicnal oxygen required to meet minimal levels of DC.

The additional mass of oxygen required to maintain a minimum DC concentration of 5.0 mg/l was computed for selected reaches in the system, based on first test plan conditions. (See Table 17-32).

TABLE I7-32: ADDITIONAL OXYGEN REQUIRED TO BRING DO UP TO 5.0 mg/l

Reach	(pounds/year)
28	45,000
48	140,000
60	192,000
84	118,000
130	217,000
170	73,000

Violations of the 5.0 mg/1 DO standard occur during both wet- and dry-weather conditions. They are very sporadic, occurring over a wide range of flow conditions. A very wide range of oxygen supply rates would be required. Under low-flow conditions, relatively low rates of aeration would be needed, while very high rates would be required in wet-weather. (See Table 17-33).

TABLE I7-33: REQUIRED IN-STREAM AERATION OXYGEN SUPPLY RATES

Reach	Dry Weather	Wet Weather
28	1 lbs./hour	1200 lbs./hour
48	38 lbs./hour	1700 lbs./hour
60	78 lbs./hour	2100 lbs./hour
84	46 lbs./hour	2300 lbs./hour
130	82 lbs./hour	2800 lbs./hour
170	168 lbs./hour	3400 lbs./hour

Conditions in the Upper Des Plaines River are not conducive to conventional in-stream aeration for several reasons. Stream depths are not adequate for efficient oxygen transfer using diffused aeration. If deep pools are excavated, problems are likely to result from the accumulation of sediments around aeration equipment located in the pool bottom, unless equipment is operated continuously. A wide range of oxygen supply rates would be required and the system would have to meet these extremes.

(b) Dam Modifications: Test the effect of removing or slotting the low-head dams.

A special study was made on the effects on water quality of the low-head dams in the Upper Des Plaines River Basin. The study concentrated on the impact of removing only two dams, one at Dempster Avenue and the other at Touhy Avenue. These two dams corresponded to the lower reaches of 120 and 130 respectively.

By removing the dams, the reaches were reported as free flowing streams. While there would undoubtedly be some benefits from reduced SOD demands because of increased velocities, the only changes in assimilative capacity were generated by the different hydraulic conditions.

The reaches showed increased DO concentrations. In Reach 130 the average DO increased from 5.9 to 8.1 mg/l. The number of violations of the 5 mg/l standard was reduced from 197 to 94; the average durations, from 54 to 26 hours. The time the DO standard would be violated was reduced from 40 percent to 9 percent.

The mean ammonia concentrations in Reach 130 increased from 1.17 to 1.26 mg/l. The percentage of time that the standard was violated increased from 5 to 6 percent.

Removal or "slotting" of the lowhead dams would significantly improve DO concentrations in the reaches where they are located. The adverse effects would be slightly higher stream temperatures, and higher BOD concentrations and ammonia concentrations, which would reduce DO concentrations further downstream. Due to the slight increase in downstream oxygen demands, the benefits would seem to outweigh the disadvantages. However, if downstream dams are not removed or slotted, these increases may cause further degradation in lower reaches.

The cumulative effects of removing all lowhead dams on the Des Plaines River would result in:

--Greatly increased DO concentrations in reaches where dams currently exist.

--Slight increases in BOD and ammonia concentrations in previously dammed reaches and downstream reaches.

--Slightly higher temperatures throughout.

Slightly lower DO concentrations in downstream reaches.

--Lower water depths in reaches currently dammed.

(c) Reduced Growth: Test the effect of reduced population growth in the Lake County portion of the basin.

This strategy was not tested because small-area population forecasts based on the new, lower regional forecast from the state have not been prepared. The effect of lower population forecasts is expected to be one of the considerations in the continuing 208 planning process.

17.09 PROBLEM ASSESSMENT

Previous sections have presented information on current water quality, sources of pollution, and alternative preventive and corrective measures. This section will

assess the problems and discuss their influences in the development of recommendations to improve water quality.

a. Water Quality Sampling Data

In-stream sampling data indicated problems with respect to ammonia, fecal coliform, DO, iron, and copper, all of which were present in amounts which violated standards throughout the basin. Violations of lead, silver, chloride and fluoride were also noted in various locations. Most significant violations tended to occur at stations downstream from wastewater treatment plants.

Sampling results also indicated considerable problems with benthic sediment conditions. The most severe pollution was recorded in the lower portions of the basin, in Cook County. In northern Lake County, benthic conditions were also poor, reflecting the effect of sewage treatment plants and boundary conditions.

Biological classification based on macroinvertebrate samples indicated moderate to severe pollution at all stations. The most severe pollution was reported in the upper portion of the basin.

b. Computer Simulation of Existing Conditions

Water quality is generally quite poor due to several major contributing factors. There are considerable pollutant loads associated with Wisconsin boundary conditions, point sources, combined sewer overflows, and stormwater runoff. The numerous dry weather violations of DO and ammonia standards are associated with point source loads and polluted sediments. Severe wet weather violations of these standards are correlated with both pervious and impervious surfaces. Nitrate and phosphate levels are relatively high due to contributions from point sources and groundwater runoff, in particular. Present concentrations of these nutrients are capable of supporting large algal populations.

Simulated water quality in the Upper Des Plaines is considerably worse than in certain other basins with similar pollutant loads. The apparent reason for the relatively poor assimilative capacity of the river is its sluggish flow. The stream gradient is very flat and there are numerous shallow reservoirs on the stream created by low-head dams. The result is very low stream velocities which allow long residence times for the oxidation of pollutants. At the same time, the potential for natural reaeration is reduced. Other adverse factors include large algal populations and organically enriched sediments in the stream bottom, both of which have significant effects on the simulated water quality of the stream, particularly with regard to DO. Finally, water temperatures occasionally exceed the state standard of 32.2° C, though violations do

not appear to be critical. These, again, are partially attributable to flow conditions.

c. Point Sources

(1) Facilities Planning: Except for the Lake Zurich Southeast plant, facility planning and/or equivalent planning requirements have been completed or met for all FPA's in the Upper Des Plaines Basin. As a result, most FPA's are preparing final plans and specifications or are in the process of constructing new facilities or upgrading existing facilities.

(2) Non-Municipal Point Sources: The Chevy Chase Utility Co. and the Heather Ridge facility are the only privately owned municipal-type plants in the basin. The Chevy Chase plant will be phased out to the LCDPW Des Plaines River plant by 1985. The Heather Ridge plant, which is privately-owned but operated by the LCDPW, was recently phased out to the NSSD Gurnee plant.

(3) Combined Sewer Overflows: Combined sewer overflows are concentrated entirely in the MSDGC system's portion of the Upper Des Plaines. The MSDGC plans to eliminate these overflows by connecting them to the O'Hare Tunnel System portion of the TARP.

d. Non-Point Sources

Nonpoint pollution sources in the Upper Des Plaines Basin include storm sewer systems, construction activities, septic systems, mining, surface waste disposal sites, hydrologic modifications, and agricultural runoff.

Impervious surfaces are forecasted to increase by 21 percent causing a proportional increase in stormwater runoff and related pollutants. Grasslands are forecast to remain relatively unchanged, but cropland is expected to decrease by 20 percent.

There are approximately 10,800 septic systems, of which about 60 percent have been assessed as being in areas having limitations for their use. The impact of these systems on ground and surface waters has not been measured.

e. Boundary Conditions

Boundary conditions have been shown to be one of the major sources of pollutants, contributing 29 percent of the BOD, 6 percent of the ammonia and 25 percent of the nitrate entering the basin.

f. Excessive Infiltration/Inflow (I/I)

In order to qualify for construction grants related to wastewater system improvements, regulations require evidence that the treatment works for which grant assistance is sought will not be subject to excessive infiltration or inflow. An I/I analysis is performed to demonstrate the existence or non-existence of excessive infiltration and/or inflow in each sewer system. If excessive flows are found, the next step is a Sewer System Evaluation Survey (SSES). If corrective measures are justified, a sewer rehabilitation project may be authorized as part of the facilities planning project.

Within the MSDGC area, the initial I/I study was performed by that District and excessive flows were found to exist. Because of the large number of individual SSES studies that had to be made in each municipal and local sanitary district sewer system, that work is to be done by local governments. Grants for 75 percent of allowable costs are available upon submission of applications and their approval covering work in the separate sewer areas.

In the combined sewer areas, the grant procedures are more complicated because the sewers serve multi-purposes. In addition to pollution abatement, the sewers provide local stormwater drainage and may have some flood control implications. According to the USEPA Program Guidance Memo PG-61, dated December 16, 1976, rehabilitation and/or construction grants will be made available only for the pro rata costs allocable to pollution abatement. However, the SSES studies themselves are fundable as are any concurrent special studies necessary to determine the causes of and alternative corrective measures related to combined sewer overflows and sewer backups.

To date, 79 applications for SSES grants have been received from the 130 municipal governments and separate sanitary districts located within the MSDGC area. Local units of government in the Upper Des Plaines which had not submitted applications for grants to undertake Sewer System Evaluation Surveys as of December, 1978 include: Arlington Heights, Chicago, Cicero, Forest Park, Forest View, Harwood Heights, Oak Park, Park Ridge, River Grove, Riverside, Rosemont, and Wheeling. Also the Barrington Woods, Country Gardens, Mission Brook, Northfield Woods, Oak Meadow, Pine Gate, Plum Grove Woodlands, Prospect Heights, Prospect Heights-Old Town, Prospect Meadows, and Wolf Mandel Sanitary Districts.

g. Problems Remaining

The first test plan identified numerous problems which would likely remain after plan implementation. The primary problem was the frequent excursions below the 5 mg/l DO level, resulting in water quality ratings of "FAIR" to "BAD" in many reaches. Contributing to the poor DO conditions is the relatively sluggish flow of the river, due in part to numerous lowhead dams. Modifying these dams would

significantly improve water quality. Reaeration would be improved and algal populations reduced.

A special modeling study was conducted to compare water quality in several reaches of the Upper Des Plaines with and without the lowhead dams in place. The results indicated that significant improvement in DO levels would occur if the dams were eliminated. However, downstream BOD levels would increase somewhat since less BOD would be oxidized in the reaches where impoundments would be eliminated.

In addition to the problems resulting from lowhead dams, there were several point sources assumed to be discharging effluents with low DO concentrations in the first test plan. Providing post-treatment aeration at these plants would improve in-stream DO levels.

These two measures, elimination of lowhead dams and post-treatment aeration, would result in significant improvements over the relatively poor water quality which was simulated in the first test plan. It is possible that unacceptable water quality conditions may still prevail in some reaches because pollutant loads exceed the assimilative capacity of the river. Only at that time will more stringent preventive or corrective measures be studied in greater detail.

17.10 BASIN RECOMMENDATIONS

a. Overview

Recommended measures for improving and protecting water quality in the Upper Des Plaines River Basin are derived from the recommendations in Chapters Four through Eight and tailored to the specific problems in the basin. Of particular importance are the impacts of treatment plant discharges, the water quality handicap posed by sluggish stream flow, and the wet-weather pollution from pervious and impervious surfaces. The effects of combined sewer overflows in the lower portions of the basin also must be eliminated.

Implementation of the local facilities plans of the NSSD, the LCDPW, the MSDGC, and several communities should reduce problems from treatment plant effluents and eliminate combined sewer overflows. It is imperative, however, that actual performance be consistent with plan provisions.

Additional measures, such as reduction of wastewater flows, modification of low-head dams and post-treatment aeration are also recommended for this basin. Aeration should help correct the extremely low DO levels now experienced in some reaches.

Recommendations concerning nonpoint sources are basically the same as the overall program outlined in Chapter Six. Control of pollution in stormwater runoff from areas to be urbanized in the future is of critical importance because of the extensive development forecasted.

The principal elements of the recommended plan for the Upper Des Plaines River Basin are noted below.

b. Point Sources

(1) Publicly Owned Wastewater Systems

(a) Municipal treatment authorities, including the MSDGC, NSSD, the Gages Lake Sanitary District, the Lake County Public Works Department, and the Villages of Bensenville, Grayslake, Lake Zurich, Lincolnshire, Libertyville, Lindenhurst, and Mundelein, should implement their respective portions of their 201 plans as they have been or may be approved by the Illinois and/or U.S. Environmental Protection Agencies. A Summary of the current status of these plans appears in Section 17.04f and suggested changes thereto or features to be included are noted below. In the absence of completed and/or approved facility plans, certain assumptions had to be made as to the expected locations and/or sizes of treatment plants, their estimated costs and designated management agencies. This information must not be construed as binding in the Areawide Plan until the 201 facility plans have been finalized.

(b) All municipalities and the counties of Cook and Lake should seek to achieve continued reductions in water use in order to conserve water resources and reduce wastewater flows at all publicly owned treatment plants. This should be accomplished through modification of building codes by requiring water conserving plumbing fixtures, metering of all new developments, pricing policies and public education.

(c) By July 1, 1983, all treatment plants whose seven-day ten-year low flow dilution ration is 10 to 1 or less should provide or continue to provide not less than 80 percent oxygen saturation in their effluents. Monitoring of wastewater quality after aeration should be conducted. However, during the continuing planning program, studies should be undertaken to determine where this requirement may be waived without detriment to in-stream water quality.

(d) "Municipal sewer service required to serve future growth within service area identified for the year 2000 should be provided only by treatment authorities listed above, except where this is impractical or not cost-effective.

(e) Projected five-year service areas should be identified in the NPDES permits issued by IEPA. No NPDES permits should be issued for municipal-type wastewater service within the five-year service area, other than to the treatment authority, except on a finding by IEPA that the proposed facility is the most cost-effective means of providing service, is an interim facility pending extension of service by the treatment authority, or is intended to serve an isolated location."

(f) Treatment plant operators should assure the very high standard of performance for wastewater treatment plants which the 201 plans assume. The IEPA should monitor treatment plant operation and performance and its effect on in-stream water quality. The IEPA should establish a technical assistance program to aid plant operators and laboratory technicians in dealing with technical problems and assuring a consistent high level of performance in treatment operations.

(g) The following listed MSDGC communities and sanitary districts having separate sewers should initiate and/or complete by July 1, 1981 sewer systems evaluation studies as required by 40 CFR 35.927: Rolling Meadows, Rosemont, and Wheeling; and the Barrington Woods, County Gardens, Mission Brook, Northfield Woods, Oak Meadow Pine Gate, Plum Grove Woodlands, Prospect Heights, Prospect Heights-Old Town, Prospect Meadows, and Wolf Mandel sanitary districts.

(h) The following listed communities having combined sewers in all or portions of their corporate limits will complete the same studies by July 1, 1981 plus supplementary studies to optimize local systems in order to take advantage of TARP capacity: Arlington Heights, Chicago, Cicero, Des Plaines, Forest Park, Forest View, Harwood Heights, Oak Park, Park Ridge, River Grove and Riverside.

(2) Industrial Wastewater Treatment Plants

(a) The IEPA should continue to enforce all requirements of NPDES permits for all industries in the basin and assure that treatment plants achieve and maintain required standards of plant performance. This can be achieved through IEPA standards for treatment plant personnel and through frequent sampling and analysis of treatment plant effluent by the IEPA for the purpose of monitoring compliance with NPDES permits.

(b) The Spinney Run Farm Corporation plant should be used for pretreatment prior to discharge to the North Shore Sanitary District (NSSD) Gurnee plant.

(3) Miscellaneous Wastewater Treatment Plants 2023

(a) The County Squire Restaurant plant should be phased out to the NSSD Gurnee plant; the Devon-O'Hare and Elk Grove Industrial Park plants and the Flick Reedy Corporation plant should be phased out to the Bensenville main plant. Other privately owned treatment plants should continue in operation. 2025 2026 2027 2028

(b) The IEPA should continue to enforce all requirements of NPDES permits and assure that treatment plant operators achieve and maintain required standards of plant performance. 2030 2031

(c) NPDES permits issued by IEPA to private utility companies should identify projected five year service areas. No other NPDES permits should be issued for municipal-type wastewater service within those five year service areas to other treatment authorities except upon a finding by the IEPA that the proposed facility is the most cost effective means of providing service, is an interim facility pending extension of service by another established treatment authority; or is intended to serve an isolated location. 2033 2034 2035 2036 2037 2038 2039

(4) Combined Sewer Overflows 2041

(a) The MSDGC should control combined sewer overflows in the 36.8 square mile combined sewer area as provided by its TARP. The implementation of TARP is critical to water quality throughout the combined sewer area and in downstream rivers and canals. 2043 2044 2045 2046

c. Non-Point Sources 2049

(1) Urban Stormwater Runoff 2051

(a) By July 1, 1983, all municipalities and counties should implement measures to work toward a reduction of BOD in urban stormwater runoffs from separately sewered areas. Reductions of 25 percent of 1976 surface loadings on existing impervious surfaces are recommended as a target. From areas to be urbanized in the future, target reductions of 50 percent of 1976 surface loadings are recommended. 2053 2054 2055 2056 2057 2058

(b) In attempting to meet the above targets, the implementing agencies should work through the countywide water quality committees to develop plans and standards for the implementation of appropriate measures such as catch basin cleaning, street cleaning, performance zoning, use of pervious pavement surfaces, increased vegetation cover, grass waterways, wetland 2060 2061 2062 2063 2064

storage of stormwater, stormwater detention, sedimentation and erosion controls, and other measures to achieve the desired pollutant reductions.

(c) Township, county and state highway organizations, the Illinois State Toll Highway Authority, and federal installation should participate in the programs described above by implementing accelerated and/or improved street sweeping programs for streets, roads and highways that are hydraulically connected to perennial streams or permanent lakes via stormwater conveyance systems.

(d) During the period up to July 1, 1983 agencies should utilize voluntary exploratory programs, implementing techniques to control pollutants from urban nonpoint sources.

(e) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should adopt and enforce adequate stormwater detention ordinances. These ordinances should include provisions which clearly establish long-term responsibilities for maintenance of detention facilities. All such ordinances also should be consistent with minimal areawide standards set forth in the model ordinance.

(f) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should develop and enforce adequate erosion and sedimentation control ordinances. All such local ordinances should be consistent with minimal areawide standards set forth in the model ordinance.

(g) Within one year following the preparation by NIPC of a model ordinance, all municipal and county governments in the basin should adopt measures to control surface runoff from open storage yards containing industrial stockpiles and other materials which may go into solution or which may be carried away by stormwater runoffs and pollute streams and other water bodies.

(h) Within one year following the preparation of a model ordinance by NIPC, municipalities, townships, counties, and state and county highway departments responsible for de-icing streets and highways should develop programs to control the application of de-icing materials, to train personnel in proper application methods, and to use proper equipment in order to minimize any negative water quality impacts.

(2) Agricultural Runoff:

(a) By July 1, 1980, the Lake County, Kane-DuPage County, and North Cook County Soil and Water Conservation Districts, in conjunction with agencies of the United States and Illinois Departments of Agriculture and the countywide water quality committees, should identify the best management practices necessary to implement the agricultural aspects of the 208 plan, including conservation tillage, contour plowing, terracing, and conversion of cropland to grassland.

(b) By July 1, 1981, agricultural lands on which BMP's should be applied should be identified by appropriate soil and water conservation districts. Agencies of the U.S. Department of Agriculture and countywide water quality committees should be consulted.

(c) By July 1, 1985, a comprehensive conservation plan should be prepared for each farm in the basin which has soil erosion losses in excess of standards set by the Illinois Department of Agriculture and soil and water conservation districts under House Bill 818.

(d) Using available cost sharing and technical assistance programs, the soil and water conservation districts should ensure implementation of the BMP program according to the following schedule on approximately 21,400 acres of agricultural lands:

By 1985 - 30 percent of the identified land.
By 1995 - 70 percent of the identified land.
By 2000 - 100 percent of the identified land.

(e) The IEPA, NIPC, and local governments should provide the results of their instream water quality monitoring to the soil and water conservation districts and to the Departments of Agriculture so that priority can be given to the areas most sensitive from a water quality standpoint in order to maximize the impact of the best management practices.

(f) Illinois Department of Agriculture, Illinois Department of Public Health, and USEPA regulations on the use of pesticides and disposal of containers, and Illinois Department of Agriculture regulations on the training and licensing of pesticide applicators and operators should be continued.

(g) Farmers should implement good pasture management practices, utilize grass waterways, vegetative filter strips, and field borders, and make wise use of fertilizers wherever possible in accordance with the

Illinois Agronomy Handbook to reduce the dangers of pollution. The U.S. Department of Agriculture agencies should assist farmers in recognizing the water quality problems posed by improper practices, and assist them in the use of proper practices.

(3) On-Site Disposal Systems

(a) Individual malfunctioning on-site disposal systems outside of the five-year service areas should be repaired wherever possible upon complaint to the appropriate county authorities or replaced with a new system if necessary.

(b) By July 1, 1983 special service areas should be established under sponsorship of municipal governments (for sites located within corporate limits) and by the counties (in unincorporated areas), where necessary to facilitate the financing of any innovative-type systems or other on-site improvements necessary to correct or replace malfunctioning systems in areas outside the five-year projected service areas.

(c) The minimum requirements of the Illinois Private Sewage Disposal Code should be upgraded to require more innovative site analysis techniques. The county health departments should require a construction permit to regulate the design, location, and installation of every new on-site system in incorporated as well as unincorporated areas.

(d) Local officials should inspect all septic systems known to be failing, threatening public health or causing nuisance conditions. The inspection should result in the issuance of a repair permit for corrective measures which are to be undertaken and paid for by the septic system owner.

(e) Septic systems also should be inspected by local officials prior to the transfer of ownership of properties where such systems are installed. The results of the inspections should be made known to the lending institutions which are furnishing the mortgages.

(4) Air Pollution

(a) As part of the continuing planning program the IEPA in cooperation with the Illinois Institute for Natural Resources, the Illinois Water Survey, and local air quality management agencies should analyze the relationship between air pollution and water quality in all of its aspects. The IEPA should cooperate with the Commission in devising strategies for correcting

present negative effects and preventing future problems through the 208 continuing planning program.

(5) Sanitary Landfills:

(a) The IEPA should ensure that every sanitary landfill complies with all regulations of the IPCB for its siting, design, construction and operation. As a substitute for existing state regulations, the IEPA and IPCB should consider certification of local solid waste disposal programs which comply with areawide plans to be prepared under the Federal Resource Conservation and Recovery Act. Alternatives to land disposal of solid wastes, including recycling, should be considered and utilized wherever feasible.

(6) Waterways:

(a) The Commission, in conjunction with the countywide water quality committees, in the continuing planning program, should develop recommendations to simplify the highly fragmented system for channel maintenance and improvement in the Des Plaines River. Present responsibility for such maintenance functions such as debris removal, streambank stabilization, public access, dredging, disposal of dredge spoil, protection and augmentation of habitat, tree shading and vegetation are shared between a host of federal, state and local authorities.

(b) The feasibility of making structural changes to the low-flow impoundments on the mainstream Des Plaines River, or actual removal of the dams should be considered in the continuing planning program with the objective of conserving super-saturated DO concentrations and/or reducing the adverse water quality impacts of these dams during low flow periods. Consideration should be given to maintaining the aesthetic integrities of the sites as they relate to canoeing.

(c) In-stream water quality data collected by local treatment plant operators should be periodically published by IEPA.

(d) Because of the abnormal in-stream water quality sampling results during the Commission's 1976-1977 program caused by operating problems at the NSSD Gurnee plant, and since those data were used to balance the water quality model, additional samples should be taken during the continuing planning program and the model rebalanced as necessary.

(7) Boundary Conditions:

(a) Flows entering Illinois from Wisconsin should meet the following water quality criteria: the dissolved oxygen concentrations of 5.0 mg/l, or greater, at least 95 percent of the time; a mean concentration of BOD_5 of 4.0 mg/l; and a maximum of 1.5 mg/l of ammonia nitrogen.

d. Residuals

(1) As regulated by the IEPA, present methods for the disposal of sludge from treatment plants are adequate to handle present and anticipated future volumes, and should continue to be effectively administered by the IEPA.

(2) Highest priority should be given to the use of sludge as a soil conditioner and efforts to utilize sludge for that purpose should be expanded. The IEPA should assure proper practices in the utilization of sludge on agricultural lands through implementation of the draft standards in IEPA Technical Policy WPC-3 "Design Criteria for Municipal Sludge Utilization on Agricultural Land."

(3) The USEPA standards and the IPCB regulations for permits for the disposal of hazardous or toxic substances should continue to be enforced by the IEPA.

e. Groundwater

(4) By July 1, 1980, the Illinois State Water Survey and the Illinois State Geological Survey should undertake a coordinated well sampling program to monitor groundwater quality in areas where a potential for infiltration by pollutants now exists or might exist in the future.

f. Inland Lakes

(5) By July 1, 1979, and in accordance with Section 314 of PL 92-500, the IEPA should undertake an expanded lake sampling program to identify euthrophic conditions and, in conjunction with NIPC and the countywide water quality committees, develop plans to control sources of pollution and restore water quality.

g. Mining

(6) The present IPCB regulations for the control of pollution from aggregate-producing activities are considered generally satisfactory. However, the IEPA should continue to study the types and volumes of pollutants associated with these activities and their potential effects on surface and groundwater quality. Any needed changes in present regulations should be identified by July 1, 1980.

17.11 COSTS OF RECOMMENDED PLAN

a. Facility Plans

(1) General: Table 17-34 shows capacities in the year 2000 for surviving wastewater treatment plants, their effluent standards and construction costs. Costs of local collector sewer projects are included, if they have been processed for federal or state grants. Also shown are MSDGC costs allocated to this basin.

Cost data were assembled from various sources as noted below and in the tables that follow.

Except for the MSDGC area, "Initial" costs of facility plans listed in Table 17-34 apply to the first phase of any project which is to be followed at some future date by programmed expansions or extensions. Under this definition, the total cost of works currently under construction fall under the classification "Initial" even though the project has not yet been completed and future payments to contractors will be made. Except for the MSDGC area, "future" costs in Table 17-34 cover phased work scheduled at later dates.

(2) MSDGC Area: Because of their magnitude and complexity, special procedures were followed in depicting MSDGC costs.

The cost of all MSDGC improvements was assumed to be spread throughout the District on an ad valorem basis. Thus, each basin's share of the cost was assumed to be proportional to the share of total District assessed valuation in that basin.

For locally funded improvements, the estimates for local sewer upgradings are current 1977 values from page 229 of the MSDGC 1977 Facilities Plan Update Supplement, updated as noted above. For other local improvements, the estimates in pages XI-18 and XI-19 of the MSD Overview Report are as of January 1, 1975, also updated as noted above. Where applicable, costs were also updated at six percent compounded for the intervening period to January, 1977.

The costs of local improvements were allocated differently, depending upon the particular type of project. Local sewer upgradings required as supplements to the TARP apply only to the 49 communities in the TARP area. A

TABLE 17-34 : RECOMMENDED PLANS, PUBLICLY OWNED TREATMENT SYSTEMS UPPER DES PLAINES RIVER **BASIN**

MAP CODE	FACILITY NAME	DESIGN CAPACITIES (MGD)		EFFLUENT STANDARDS (Year 2000) (mg/l)				CAPITAL COSTS (million $)			COMMENTS
		1975	2000	BOD_5	TSS	P	NH_3N	INITIAL	FUTURE	TOTAL	
L13	LCDPW Des Plaines	2.00	8.00	10	12		(1) (3) 1.5	(2) 10.3	-	10.3	
L15	LCDPW Grandwood Park	0.50	0.50	4	5		(1) 1.5	-	-	-	
L16	LCDPW New Century Town	2.00	2.00	10	12		(1) 1.5	-	-	-	
L22	Lake Zurich S.E	0.50	1.25	10	12		(1) (3) 1.5	0.8	-	0.8	
L23	Libertyville	4.00	4.00	10	12		(1) 1.5	-	-	-	
L25	Lindenhurst	0.50	1.00	4	5		(1) 1.5	(4) 0.6	-	0.6	
L26	Mundelein	3.00	3.00	10	12		(1) 1.5	-	-	-	
L28	NSSD Gurnee	17.25	17.25	10	12		(1) (6) 1.5	27.5	-	27.5	
L30	NSSD Waukegan	19.90	19.90	10	12		(1) (6) 1.5	23.5	-	23.5	
C9	MSDGC O'Hare	-	72.00	4	5		(1) 1.5	(5) 63.8	-	63.8	

(1) In-stream standard.

(2) Includes costs for phase out of Ela and Chevy Chase plants.

(3) Ammonia removal facilities proposed or in place.

(4) Private funds; no grant money.

(5) Costs for construction of O'Hare facilities. These costs will be spread over the entire MSDGC jurisdiction.

(6) Mean of all samples in a 24 hour period not to exceed 3.0 mg/l.

basin's share of the total cost of these upgradings was assumed to be equal to the percentage share of the total TARP area assessed valuation in TARP communities in that basin.

For local sewer improvements outside the TARP area, the costs were allocated on non-TARP communities in each basin in accordance with their share of the total assessed valuation for all non-TARP areas.

(3) Future Costs: Table 17-35 distributes capital costs in five-year time increments. Annual O&M costs are also shown, which are based on data included in current reports, or furnished by operating agencies. In their absence, they were estimated from information in 208 Staff Paper No. 20, "Wastewater Treatment Processes and Cost Data." Operating and maintenance costs apply only to capital improvements shown.

(4) Local Costs: Table 17-36 shows annualized local capital costs.

(5) Increased Costs: Tables 17-37, 17-38, and 17-39, show the estimated annual increases in wastewater charges per household; for residents in Lake County, Du Page County, and for the basin as a whole, respectively, for the previously described improvements and/or expansions.

b. Urban Stormwater

Methods for controlling pollution in urban stormwater runoff include: street sweeping, catch basin cleaning, performance zoning, use of porous pavements, increased vegetation, grass waterways, wetland storage of stormwater, stormwater detention, and erosion and sediment controls. The target reductions of 25 percent in BOD loads on existing (1976) impervious areas and 50 percent in BOD loads on impervious areas built between 1976 and 2000 are to be achieved by combinations of the above practices. The cost of the mix of specific practices which would meet these goals is dependent upon the practices selected and the intensity of their individual use.

An estimate of the total cost based solely on street cleaning utilizing vacuum sweepers is $30.9 million through the year 2000, increasing from $888,900/year in 1978 to 1.8 million/year in the final year. The frequency of cleaning with vacuum sweepers averaged about once every 12 days in 1976 and increased to once every 7.5 days in 2000, excluding the three winter months of December through February.

The above costs did not include street cleaning in combined sewer areas where the stormwater runoffs would be treated. Naturally, some street cleaning activities would be required in those areas for sanitary, aesthetic or other

TABLE 17-35 : SUMMARY OF FUTURE COSTS (All data in 1977 dollars in millions)

Jurisdiction	Capital Costs						Annual Operations & Maintenance Expense				
	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	Total	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)
LCDPW Des Plaines	10.30					10.30	0.55	0.55	0.55	0.55	0.55
LCDPW Countryside Manor	2.40					2.40					
Lake Zurich S.E.	0.80					0.80		0.14	0.14	0.14	0.14
Lindenhurst	0.60					0.60		0.06	0.06	0.06	0.06
Lincolnshire	0.50					0.50					
NSSD	7.26					7.26	0.23	0.29	0.29	0.29	0.29
MSDGC	256.80	2.00				258.80	0.58	2.24	2.35	2.35	2.35
Local Improvements Related to MSDGC	99.90	15.90				115.8					
Agricultural BMPs							0.04	0.09	0.13	0.18	0.22
Urban Stormwater Management Expense							1.07	1.25	1.44	1.62	1.76
TOTAL	358.56	17.90				396.46	2.47	4.62	4.96	5.19	5.37

TABLE 17-36: PROJECTED ANNUALIZED LOCAL COSTS (All data in 1977 dollars in millions)

Jurisdiction	CAPITAL COSTS			LOCAL CAPITAL PLUS O & M ANNUALIZED Costs (Mil./yr.)*					Total Cost** 1978-2000	Comments
	Cost Total Through Yr. 2000	Est. Fed'l. Share	Est. Local Share	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000		
LCDPW Des Plaines	10.30	7.72	2.58	0.79	0.79	0.79	0.79	0.55	17.45	
LCDPW Countryside Manor	2.40	1.80	0.60	0.06	0.06	0.06	0.06		1.20	
Lake Zurich S.E.	0.80	0.60	0.20	0.02	0.16	0.16	0.16	0.14	2.92	
Lindenhurst	0.60	0.45	0.15	0.01	0.07	0.07	0.07	0.06	1.28	
Lincolnshire	~ 0.50	0.38	0.12	0.01	0.01	0.01	0.01		.20	
NSSD	7.26	5.44	1.82	0.40	0.46	0.46	0.46	0.29	9.77	
MSDGC	258.80	194.10	64.70	6.64	8.35	8.46	8.46	2.40	166.75	
Local Improvements Related to MSDGC	115.80	86.85	28.95	2.36	2.73	2.73	2.73	0.38	53.89	
Agricultural BMPs				0.04	0.09	0.13	0.18	0.22	2.86	
Urban Stormwater Management Expense				1.07	1.25	1.44	1.62	1.76	32.18	
TOTAL	396.46	297.34	99.12	11.40	13.97	14.31	14.54	5.80	288.50	
										R Sept. 20/78

*Local Capital Amortized @ 7% for 20 yrs. **Sum of Local Capital Plus O & M Annualized Costs, in million $

TABLE17-37 PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST LAKE COUNTY

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	592.1	622.3	652.2	682.4	706.4	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.086	.082	.078	.075		
O & M Related	.159	.199	.195	.191	.188	
Total Rate:	.245	.281	.273	.266	.188	
Additional Cost per Home of $45,000 FMV ($/yr.)	36.75	42.15	40.95	39.90	28.20	
Existing Av. Annual WW Cost ($/Household yr.)	95.96					
Total Av. Annual WW Cost ($ / Household yr.)	132.71	138.11	136.91	135.86	124.16	
Percent Av. Increase* in WW Costs per Household (%)	38.3	43.9	42.7	41.6	29.4	

*Total Rate Used

TABLE 17-38 PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST DUPAGE COUNTY

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	100.71	105.83	110.93	116.05	120.13	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related						
O & M Related	.028	.032	.035	.039	.041	
Total Rate:	.028	.032	.035	.039	.041	
Additional Cost per Home of $45,000 FMV ($/yr.)	4.20	4.80	5.25	5.85	6.15	
Existing Av. Annual WW Cost ($/Household yr.)	94.56					
Total Av. Annual WW Cost ($ / Household yr.)	98.76	99.36	99.81	100.41	100.71	
Percent Av. Increase* in WW Costs per Household (%)	4.4	5.1	5.6	6.2	6.5	

*Total Rate Used

TABLE17-39 PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST

BASIN TOTAL

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	4028.2	4233.2	4337.1	4642.1	4804.8	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.222	.221	.210	.201	.009	
O & M Related	.061	.109	.112	.112	.112	
Total Rate:	.283	.330	.322	.313	.121	
Additional Cost per Home of $45,000 FMV ($/yr.)	42.45	49.50	48.30	46.95	18.15	
Existing Av. Annual WW Cost ($/Household yr.)	88.18					
Total Av. Annual WW Cost ($ / Household yr.)	130.63	137.68	136.48	135.13	106.33	
Percent Av. Increase* in WW Costs per Household (%)	48.1	56.1	54.8	53.2	20.6	

*Total Rate Used

reasons. Costs for that cleaning are not included in the above figures.

c. Agricultural Runoff

Agricultural croplands total 38,300 acres and are projected to decrease to 30,600 acres by the year 2000. In order to reduce agricultural pollution from croplands, BMP's are targeted for implementation by the year 2000 on 21,400 acres at a total cost over the years of $4,090,000.

Although a comprehensive farm plan would include a wide range of BMP's, the following four practices, separate or in combination, are recommended: conservation tillage, contouring, terracing, and cropland conversion to pastureland. These BMP's were selected because of their direct effects on water quality as well as their ability to reduce soil erosion. Many other practices which would be contained in a farm plan, but were not considered, are either too localized or difficult to evaluate for their effects on water quality.

Of the above total costs, $1,001,000 represents initial installation (or capital) expenditures for which grants may be available from the federal government. The cost-sharing ratios are be on the order of 50 percent. The balance of $3,089,000 represents operating and maintenance costs.

17.12 WATER QUALITY CONDITIONS IN 1983

a. Introduction

Public Law 92-500 includes the statement "Wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water be achieved by July 1, 1983." The water quality standards of the Illinois Pollution Control Board for General Use streams, such as the DesPlaines, were adopted to "protect the State's waters for aquatic life,...primary and secondary contact use,...." The Illinois standards, as modified by this plan, are being used to judge compliance with the 1983 national goal. This chapter assesses the feasibility of compliance with the dissolved oxygen and ammonia standards by 1983 in the Upper DesPlaines River Basin.

b. Assumptions of Changes in the Basin

(1) Land Cover: Land cover estimates for the years 1976, 1983, and 2000 are summarized in Table 17-40. It should be noted that impervious area is forecast to increase by 29.3 percent from 1976 to 2000 with most of the shift from cropland. The cropland areas listed under "conservation"

indicate those lands where additional soil conservation practices are expected to be implemented.

(2) Urban Runoff Controls: Management measures are assumed with the objective of reducing runoff-related BOD from existing urbanized areas by 25 percent of loadings found to be present in 1976. BOD loadings from areas urbanized after that year are reduced by 50 percent of 1976 loads. This will result in an overall 26 percent reduction in urban runoff pollution loads by 1983.

(3) Combined Sewers: The MSDGC will have completed the first phase of TARP and combined sewer overflows will have been reduced 90 percent.

(4) Point Sources: Effluent characteristics of point sources are given for 1976 and 1983 in Table 17-41.

c. Expected Water Quality in 1983

The water quality model was used indirectly to estimate 1983 water quality conditions. Results of 1976 and year 2000 served as the basis for estimating 1983 values. In the process, pollution loads to the river were calculated for each of those three years. These loads are reported in Table 17-42 for eight reaches, along with the water quality ratings for dissolved oxygen and ammonia associated with the loads. The ratings for 1976 and 2000 are from previous water quality modeling results. The 1983 ratings are informed judgments.

TABLE 17-40 : LAND COVER CHANGES

	Area in Square Miles		
Cover Type	1976	1983	2000
Lowland	32.9	32.9	32.8
Cropland	59.7	55.9	47.3
Conservation	(0)	(5.2)	(28.8)
Grassland	172.9	172.7	172.2
Impervious	39.6	43.7	56.0

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TABLE17-4I: POINT SOURCES IN 1983

	Effluent Characteristics					
	Flow, cfs		BOD_5 (mg/l)		Ammonia (mg/l)	
Plant Name	1976	1983	1976	1983	1976	1983
Bensenville #2 (N.)	0.017	0.020	2.58	4	0.46	1.5
Chevy Chase	0.28	Phased out	3.4		0.08	
Gages Lake	1.09	Phased out	52.8		14.1	
Grayslake	1.93	Phased out	13.8		22.5	
Countryside Manor	0.15	Phased out	52.8		14.1	
DesPlaines River	1.74	3.18	6.6	4	0.08	1.5
Ela Township	0.05	Phased out	13.3		6.0	
Grandwood Park	0.43	0.43	52.8	4	14.1	1.5
New Century Town	0.40	1.24	3.4	10	0.08	7.9
Sylvan-Diamond Lake	0.18	Phased out	11.6		8.4	
Vernon Hills	0.23	Phased out	11.6		8.4	
Lake Zurich S.E.	0.90	1.57	7.0	10	6.0	6.0
Libertyville	3.97	4.63	30.0	10	15.7	2.9
Lincolnshire	0.81	Phased out	11.6		8.4	
Lindenhurst	0.67	0.89	13.3	4	6.0	1.5
MSDGC-O'Hare	0.0	80.7	-	4	-	1.5
Mundelein	4.27	4.99	9.96	10	3.77	4.4
Gurnee	9.94	14.3	23.0	10	27.0	1.5
Waukegan	0.0	44.4	-	10	-	1.5
Jerry's Service	0.006	0.006	3.4	2	0.08	0.08
International Harvester	0.036	0.036	3.1	2	0.1	0.1
Universal Oil	0.14	0.14	3.1	2	0	0
Flick Reedy	0.04	0.04	2.58	1.5	0.46	0.46

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TABLE I7-42: WATER QUALITY RATINGS IN 1983*

Reach 24: Mill Creek				Reach 28: DesPlaines River North of Gurnee			
Loads & Ratings	1976	1983	2000	Loads & Ratings	1976	1983	2000
BOD, tons/year	483	397	399	BOD, tons/year	1369	1272	1265
Ammonia, tons/year	117	65	65	Ammonia, tons/year	181	128	133
Dissolved oxygen	poor	fair	fair	Dissolved oxygen	bad	good	good
Ammonia	bad	poor	fair	Ammonia	poor	fair	fair
Reach 48: DesPlaines River at Route 120				**Reach 60: DesPlaines River at Route 60**			
Loads & Ratings	1976	1983	2000	Loads & Ratings	1976	1983	2000
BOD, tons/year	1764	2260	2252	BOD, tons/year	2234	2670	2683
Ammonia, tons/year	469	239	240	Ammonia, tons/year	602	312	324
Dissolved oxygen	bad	poor	poor	Dissolved oxygen	bad	bad	bad
Ammonia	bad	poor	poor	Ammonia	bad	poor	poor
Reach 72: Indian Creek				**Reach 84: DesPlaines River near Lake-Cook Road**			
Loads & Ratings	1976	1983	2000	Loads & Ratings	1976	1983	2000
BOD/tons/year	74	70	74	BOD/tons/year	2541	2970	3022
Ammonia, tons/year	13	10	10	Ammonia, tons/year	652	365	389
Dissolved oxygen	good	good	good	Dissolved oxygen	poor	fair	fair
Ammonia	poor	fair	fair	Ammonia	bad	poor	poor
Reach 130: DesPlaines River at Touhy Avenue				**Reach 170: DesPlaines River at Riverside**			
Loads & Ratings	1976	1983	2000	Loads & Ratings	1976	1983	2000
BOD/tons/year	3746	3373	3361	BOD/tons/year	6200	5919	7315
Ammonia, tons/year	761	425	434	Ammonia, tons/year	1085	823	746
Dissolved oxygen	bad	bad	bad	Dissolved oxygen	bad	fair	fair
Ammonia	bad	poor	fair	Ammonia	fair	good	excell-ent

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*Year 2000 conditions are reflective of first test plan results.

The goal (expressed in terms of achievement of water quality standards) is considered to be met satisfactorily when a rating of "good" or "excellent" is achieved. Assignment of these adjective ratings for dissolved oxygen was based on the following criteria:

Excellent = no dissolved oxygen concentrations below 5 mg/l.

Good = dissolved oxygen remains above 5 mg/l 95 percent of the time or more.

Fair = dissolved oxygen remains above 5 mg/l 85 percent of the time or more.

Poor = dissolved oxygen remains above 5 mg/l 70 percent of the time or more.

Bad = dissolved oxygen remains above 5 mg/l less than 70 percent of the time.

In any reach where the dissolved oxygen drops to zero, the qualitative state of the reach is lowered by one category. A similar rating system is used for ammonia. The applicable standard is 1.5 mg/l and the same percentages listed above are used to formulate the ratings.

The standards for dissolved oxygen and ammonia appear to be met or not met in 1983 as noted in Table 17-43.

TABLE 17-43: AMMONIA AND DISSOLVED OXYGEN RATINGS IN 1983

Stream	Reach	Dissolved Oxygen	Ammonia
Mill Creek	24	fair	poor
DesPlaines	28	good	fair
DesPlaines	48	poor	poor
DesPlaines	60	bad	poor
Indian Creek	7.2	good	fair
DesPlaines	84	fair	poor
DesPlaines	130	bad	poor
DesPlaines	170	fair	good

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d. Evaluations:

Problems for dissolved oxygen will still exist in Reaches 24, 48, 60, 84, 130 and 170. The "fair" rating for Reach 24 is difficult to improve as point source loadings are decreased considerably at Grandwood Park and Lindenhurst, and the Grayslake plant has been phased out. Reach 48 shows a "poor" rating. Considerable point source loads reductions will occur because of improved treatment at the Gurnee facility. Note that the Waukegan wastewater treatment plant, which originally discharged effluent to Lake Michigan, now discharges to the DesPlaines River. This partially accounts for the increased loads and flows in this reach despite improved treatment. Treatment at Waukegan and Gurnee may need additional upgrading to reach water quality goals.

Reach 60 also shows increased point source loadings. These increases will occur faster than conservation practices can reduce surface washoff and increased controls of urban stormwater can decrease impervious loadings. It should be noted that ammonia loadings are expected to decrease considerably, but do not offset the increased BOD loadings to yield improved water quality. Load conditions are very similar for Reach 84: BOD loadings increase modestly while ammonia loadings decrease substantially. An important factor in the "fair" water quality is a low head dam on the DesPlaines near the Lake County-Cook County line.

Reach 130 water quality is rated "bad" with respect to dissolved oxygen. The control of combined sewer overflows by the MSDGC has resulted in some water quality improvement. Poor quality flow from upstream is the chief culprit for the "bad" rating. Removal of the dam at this reach should improve the rating to "fair" or better.

Reach 170 water quality is rated "fair." Combined sewer overflow control by TARP has resulted in considerable improvement. The MSDGC O'Hare treatment facility will add considerable flow as it comes on line by 1983. High quality effluent is expected from the O'Hare plant and should contribute to further water quality improvements in this reach.

On the basis of this evaluation, it appears that the 1983 goal will not be met in most reaches of the basin. Point sources are major contributors of BOD and ammonia. Upgrading of treatment may be necessary at some plants as point source discharges increase due to population growth and the implementation of TARP. The TARP project is expected to effectively reduce the combined sewer overflow problem, but will increase the wastewater loads and the resultant effluents. Another major problem is the existence of low head dams which cause many slow running pools of low dissolved oxygen water. Modification of these dams may be necessary to produce a swifter moving river capable of natural reaeration.

CHAPTER 18

Salt Creek

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CHAPTER 18
SALT CREEK

18.01 DESCRIPTION OF BASIN

a. Physical Characteristics

(1) Geography: Salt Creek flows southeasterly from its headwaters in Lake and northwest Cook counties through eastern DuPage County, to its confluence with the Des Plaines River in Cook County. It drains an area of 102,136 acres in Cook and Du Page counties, plus a small portion of Lake County. The basin is approximately 28 miles long and 9 miles wide at its widest point (See Figure 18-1).

Highly urbanized, the basin has few environmentally sensitive areas other than Wolf Road Prairie, Meacham Grove Forest, and the Ned Brown Forest Preserve. More than 70 wetland areas over 10 acres in size are found in the basin, especially in the north. Such areas are important wildlife habitats and may be especially sensitive to the effects of pollution.

(2) Waterways: The waterway network of the basin is relatively simple, including only two streams tributary to Salt Creek and 12 lakes over 10 acres in size. These water bodies are described in Tables 18-1 and 18-2.

(3) Geology and Soils: Unconsolidated glacial deposits range in thickness between 25 and 200 feet above bedrock. The dominant deposit is till, which underlies all other deposits in the basin except in some areas along the mainstem of Salt Creek. Till is relatively impermeable and its groundwater recharge capability is limited. Till poses the risk of pollutant runoff to surface waters from the applications of wastes, fertilizers, and other materials.

Thin sand and gravel deposits are found in stream valleys, usually interbedded with till. Rapid infiltration of wastes restricts the use of these geologic materials as receptors of almost all types of wastes. Leachate from landfills, fertilizers and agrichemicals, the surface application of wastes, and septic tank effluents in these deposits could pollute groundwater.

Fine grained glacial lake and windblown deposits are found in inter-morainic areas in closed depressions and where ponding has occurred along drainageways. Low permeability and poor drainage makes runoff a problem in such areas. Post-glacial deposits are rare in the basin and are usually found in poorly drained depressions. These deposits are generally small and unsuitable for most land uses.

All parts of the basin are restricted for surface applications of wastes and chemicals. Most of the basin is restricted because of low permeability, with the exception of severe limitations on some shallow sand and gravel

TABLE 18-1 : STREAM INVENTORY, SALT CREEK BASIN

STREAM NAME	LENGTH (MILES)	AVG. WIDTH (FT.)	WATER SURFACE (ACRES)	GRADIENT (FT/MILE)	DRAINAGE AREA (SQ. MILES)	COMMENTS
ADDISON CREEK	10.5	10.0	107.7	5.3	23.8	
SALT CREEK	35.4	42.7	181.4	1.8	159.0	
SPRING BROOK CREEK (ITASCA)	5.5	12.0	8.0	10.0	14.3	

deposits in stream valleys. These stream valleys also present significant limitations for the land burial of wastes such as sanitary landfills.

Soils in the basin have properties that indicate the potential for impacts on water quality under certain conditions. Predominant soils in northeastern Illinois are described in Chapter Three. Soils occurring in this basin are identified in Table 18-3.

(4) Fish and Wildlife: Under natural pre-urbanized conditions, the Salt Creek watershed offered prairie marsh habitat typical of most of northeastern Illinois. Urban development (particularly since World War II) has adversely affected habitat quality and species population and diversity. However, numerous species of small mammals, birds, and waterfowl still exist, particularly in undisturbed forest preserve tracts along the creek.

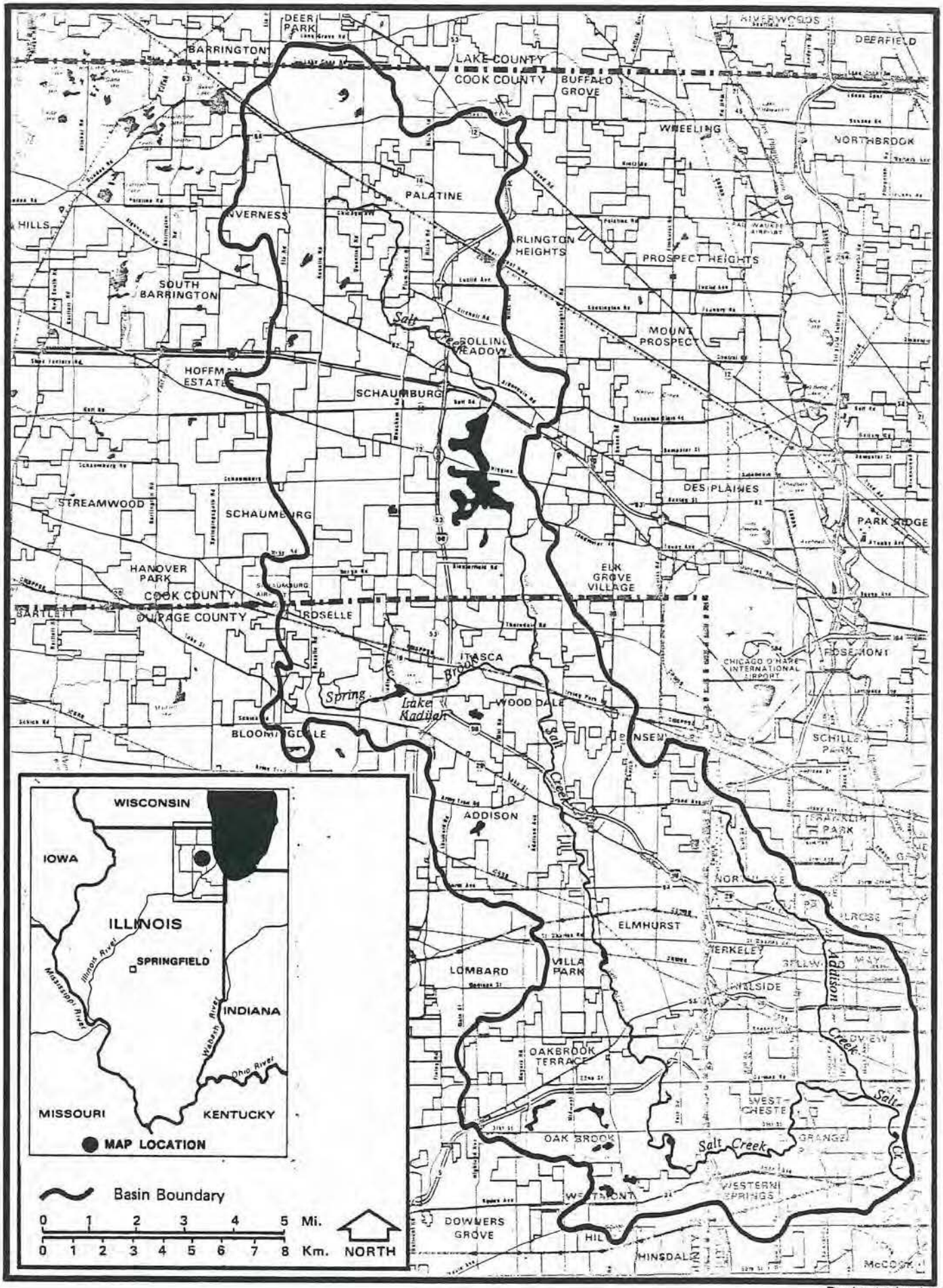
Fish habitat in the watershed is severely degraded compared to what it once was. Fish populations and habitat conditions are discussed in greater detail in Section 18.03.

b. Socio-Economic Characteristics

(1) Population: The population of the basin in 1975 was estimated to be 509,000. Population density (nearly 3,200 persons per square mile) is one of the highest in northeastern Illinois outside of Chicago, reflecting the highly urbanized character of the basin.

Table 18-4 shows population forecasts for the basin and for the facilities planning areas within the basin. Projected wasteloads, are based in part on these forecasts.

Figure 18-1: BASIN LOCATION



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TABLE 18-2 : LAKE AND POND INVENTORY

SALT CREEK BASIN

NAME	LOCATION			SURFACE AREA (ACRES)	SHORE-LINE (MILES)	MAXIMUM DEPTH (FT)	WATER-SHED (ACRES)	DATE CON-STRUCTED	OWNER-SHIP	ACCESSIBILITY
	TWP N	RNGE E	SECT							
BRANDT LAKE	42	10	24	13.0	0.9	30	NA	1965	Private	
BRIARWOOD LAKE	39	11	27	13.0	2.2	12	NA	1968	Org.	
COSMAN LAKE	41	10	29,32	28.5	2.0	15	NA	1969	Org.	
DEER LAKE	42	10	5	11.0	0.7	11	NA	1969	Public	
GINGER CREEK BASIN LAKE	39	11	28	33.7	3.0	9	NA	1959	Org.	
HIGH POINT LAKE	41	10	8	10.0	0.5	10	NA	1966	Public	
KADIJAH LAKE	40	10	12,13	40.0	2.3	5	NA	1924	Org.	
KLHEM LAKE	41	11	16	10.0	0.6	11	NA	1957	Private	
MAYS LAKE (LOWER)	39	11	35	10.5	0.6	3	NA	1913	Org.	
MEDINAH SPRING VALLEY LAKE	40	10	14	12.5	0.8	32	NA	1961-65	Org.	
WILLOW (CREEK) PARK LAKE	42	10	24	10.0	0.6	15	NA	1969	Public	
BUSSE WOODS	41	11	17,18 19,20	589	20.4	10	NA	1977	Public	

TABLE 18-3 : PREDOMINANT SOIL UNIT CHARACTERISTICS FOR NORTHEASTERN ILLINOIS

Unit In Basin	Soil Unit	Soil Color	Soil Texture	Permeability	Drainage	Subsoil Texture	Underlying Materials	Agricultural Usage Limitations	Approximate Percentage of Prime Agri. Land	Development Usage Limitations
	Fox-Dresden-Casco	brown	loam	mod-rapid	well	loam	sand and gravel	E, D, LF	12	S, E, ST
	Warsaw-Rodman-Lorenzo	brown	loam	moderate	well	loam	sand and gravel	E, D	50	S, E, ST
	Volinia-Selma-Lomax	brown	loam	moderate	excessive	loam	sand	WE, D, W	80	W, S, P
	Maumee-Watseka-Plainfield	black	loamy sand	rapid	excessive	sand	sand	W, WE, D	30	S, W
	Zurich-Grays-Wauconda	gray	silt loam	moderate	moderate	clay loam	silt loam	W, E, LF	90	S, W, ST
	Drummer-Brenton-Proctor	brown	silt loam	moderate	moderate	clay loam	loam	W, E	100	W, S, P
	Miami-Kidder-McHenry	gray-brown	loam	moderate	well	clay loam	loam	E, ST, LF	40	ST, S, SS
	Drummer-Saybrook-Lisbon	dark gray	silt loam	moderate	moderate	clay loam	loam	W, E	80	W, S, SP, SS
	Ringwood-Griswold	brown	loam	moderate	well	clay loam	sandy loam	E, W	85	S, W, ST
Yes	Morley-Markham-Ashkum	gray	loam	slow	moderate	silty clay	clay loam	E, W, LF	60	ST, SP, SS, W, HC
Yes	Elliot-Ashkum-Beecher	dark gray	silt loam	slow	moderate	silt loam	clay loam	W, E	85	W, SP, CS, SS
Yes	Milford-Martinton	black	silt loam	mod. slow	poor	silty clay	calcareous sediment	W	95	W, HC, P, SP, SS
	Symerton-Andres-Ashkum	black	silt loam	moderate	moderate	clay loam	clay loam	E, W	95	W, SP, SS
	Nappanee-Peotone-Del Rey	dark gray	silt loam	slow	well	silt loam	calcareous sediment	W, T, LF, E	50	W, SP, HC, P
Yes	Frankfort-Bryce-Montgomery	dark brown	silt loam	slow	poor	silty clay	calcareous sediment	W, T, LF, E	5	W, SP, HC, P
	Romeo-Joliet	black	loam	moderate	poor	loam	limestone	W,STN, FL	60	W, SH, FL, SS
	Otter-Huntsville-Millington	black	loam	moderate	moderate	loam	loam	FL, W	95	W, FL
Yes	Fox-Wauconda-Sawmill	dark gray	silt loam	moderate	poor	loam	sand	W, FL, E	75	W, FL
	Houghton-Lena	black	muck/peat	rapid	poor	muck/peat	sand/silt	HWT, W	0	W, P, S, HWT, LS

USAGE LIMITATION CODES

CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
CS	Clayey Subsoil	D	Drouthiness	E	Erosion	FL	Flooding
HC	Heavy Clayey Subsoil	HWT	High Water Table	LF	Low Fertility	LS	Low Strength
P	Ponding	S	Seepage	SH	Shallowness to Bedrock	SP	Slow Percolation
SS	Shrink-Swell	ST	Steepness	STN	Stoniness	T	Soil Tilth
W	Wetness	WE	Wind Erosion				

TABLE 18-4 : POPULATION CHANGE 1975-2000

FACILITY PLANNING AREAS	1975	1980	1985	1990	1995	2000	% Change 1975-2000
Addison	52,710	56,860	64,590	72,320	76,010	79,700	51.2
Bensenville	17,370	17,850	19,120	20,390	20,720	21,040	21.1
Elmhurst	51,000	53,500	55,300	57,000	58,500	60,000	17.6
MSDGC Salt Creek	99,000	118,000	139,000	160,000	175,000	189,000	90.9
Salt Creek Drainage Basin Sanitary Dst.	33,600	34,630	35,300	35,980	36,450	36,920	9.9
Hinsdale	47,440	53,490	59,090	64,670	68,450	72,130	52.0
MSDGC Central (000's)	2,549	2,431	2,441	2,450	2,461	2,472	-3.0
Basin Area Total	509,000	561,843	605,042	648,242	675,715	703,187	38.2
All FPA's are located in more than one basin.							

1/ Facility Planning area is located in more than one basin
Source: Northeastern Illinois Planning Commission

(2) Land Use: Most of the basin lies in an area which has experienced intense urban development during the past two decades. About a third of the basin was in vacant, agricultural, and forest use in 1970, with single family residential being the second largest use. About 10 percent of the basin is categorized as public or quasi-public open space, and includes parts of several forest preserves (See Table 18-5).

NIPC land use forecasts anticipate continuing urbanization, with accompanying changes in land use (Table 18-6). The largest proportionate increases are in the manufacturing and commercial categories. Undeveloped land is forecast to decrease by 45 percent by the year 2000, with residential becoming the largest category by 1990.

(3) Economy: Economic activity in recent years has been typical of overall regional trends. Employment in service related and commercial fields, such as wholesale trade, government, finance, insurance, and real estate has increased more rapidly than in industry and manufacturing. Total employment in the basin was 157,939 in 1970 (See Table

TABLE 18-5 :1970 LAND USE

Land Use Category	Total Acres	% of Total
Single Family Residential	29,893	29.3
Multi Family Residential	1,200	1.2
Mobile Home Parks	73	.1
Manufacturing and Processing	2,387	2.3
Transportation, Communications, & Utilities	1,079	1.1
Railroad Rights-of-way	1,306	1.3
Airports	157	.2
Streets & Parking	12,895	12.6
Trade	1,188	1.2
Services-Private	931	.9
Services-Institutional	2,492	2.4
Military Services	194	.2
Cemetaries	1,267	1.2
Entertainment Assembly	405	.4
Public Buildings	20	0
Public and Quasi-Public Open Space	10,003	9.8
Mining and Quarries	663	.6
Vacant, Agricultural & Forest Areas	34,668	33.9
Vacant-Under Development		
Water	402	.4
Warehousing	388	.4
Shopping Centers	383	.4
Hotels-Motels	97	.1
Parking Lots	44	.1
Total	102,136	100.0

18-7.) As indicated by the employment figures, manufacturing will continue to play a substantial role in the economy of the basin.

Employment in the basin is forecasted to increase by 83 percent, to 288,500 employees in the year 2000. Table 18-7 indicates continuing increases in all categories, though manufacturing and retail trade will not grow as fast as total employment.

(4) Water Supply: Lake Michigan is the source of water supply for 13 of the basin's communities, all in Cook County. Groundwater pumpage currently is the sole source of public water supply for the remainder of the basin. Shallow sand and gravel aquifer wells account for 9 percent of groundwater pumpage; shallow dolomite wells account for 41 percent; and the deep sandstone wells account for 50 percent.

TABLE 18-6 : LAND USE FORECASTS (ACRES)

Land Use Category	1980	1985	1990	1995	2000
Residential	35,235	37,606	39,977	40,694	41,411
Manufacturing	5,674	6,988	8,302	9,182	10,062
Commercial	4,727	5,303	5,879	7,273	8,667
Transportation/Communication, etc.	10,225	12,049	13,872	15,173	16,473
Open Space, Vacant Agriculture, etc.	46,275	40,191	34,106	29,815	25,523
Total	102,136	102,136	102,136	102,136	102,136

SOURCE: Northeastern Illinois Planning Commission, 1976

(5) Recreation: Water recreation in the basin is limited by two major factors: the excessive pollution in most streams and the lack of public access to the waterways. Lakes and streams open to the public are heavily fished despite the scarcity of good game fish. Water recreation includes outboard boating above Butler Dam on Salt Creek and some sailing and rowboating on public and private lakes. No swimming beaches are found in the basin.

Most of the basin's public open space is accounted for by the Ned Brown and Salt Creek forest preserves, which are two large forest preserve areas on Salt Creek in Cook County. These areas have facilities for picnicking, hiking, fishing, and horseback riding. Some small game hunting on private lands is also conducted.

(6) Government: The basin lies within Cook and DuPage counties and also includes a very small portion of Lake

TABLE 18-7 : EMPLOYMENT FORECAST

CATEGORY	1970	1980	1985	1990	1995	2000	1970-2000 % Increase
Manufacturing	50,550	63,963	67,600	71,237	73,438	75,640	49.6
Local Retail	26,085	26,379	28,199	30,020	30,878	31,735	21.7
Other	81,304	113,935	136,907	159,879	170,525	181,172	122.8
Total	157,939	204,277	232,706	261,136	274,841	288,547	82.7

County. The basin includes all or parts of 39 municipalities, the largest of which is Arlington Heights. Parts of 12 townships lie within the basin, as well as all or parts of seven sanitary districts, six drainage districts, three forest preserve districts, three soil and water conservation districts, two surface water protection districts, and one river conservancy district.

18.02 IMPACTS OF OTHER PROJECTS

a. Introduction

In many basins there are studies or actual projects underway which may impact directly or indirectly on surface water and/or groundwater quality. Most of the projects will have only indirect effects, since they usually pertain to water quantity or hydrologic modifications. Examples are the flood control activities of the U.S. Soil Conservation Service, the U.S. Army Corps of Engineers, and the Illinois Division of Water Resources.

There are also many local, county, state, and federal public works projects other than those directly related to water which impact on local water bodies. Perhaps the most significant projects of this type involve road construction or improvement. In those projects, drainage patterns may be altered, local farm tiles may be interrupted, silt may be introduced into waterways during construction, and vehicular pollutants may be conveyed to local water bodies. Stream crossings by highways and similar crossings by various public and private utilities also affect, to varying degrees and for various lengths of time, the quality of water in those rivers and streams. Not to be overlooked are public and private storm sewer outlets which may be authorized in the future. In this section, attention will be given only to those projects of significant size, breadth, or impact.

b. U.S. Army Corps of Engineers

(1) TARP: The U.S. Army Corps of Engineers recently was involved in a study to determine the "federal interest" in the Tunnel and Reservoir Plan (TARP) proposed by the MSDGC. In its interim report, the Corps confirmed that supplemental sewers, tunnels, and reservoirs (such as proposed in the TARP) were the optimum means for controlling runoff on both a community and an areawide basis. The report noted that the flood damage reduction aspects of the plan appeared to fall within the purview of the federal flood control program, thus establishing the federal interest in that component. Other studies concluded that the tunnel, reservoir, and channel widening components of the plan (related to flood control) were appropriate for implementation under the regular flood control program

TABLE 18-8 IN-STREAM WATER QUALITY ANALYSES – SUMMARY DATA

Salt Creek BASIN

STATION NO. 12

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
MAY 3-12 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.1	189	180	268	658	34	14	12	19	32			2.2	1.5	1.1	0.20	27	327	23	
	Minimum	7.1	106	22	20	430	4	5	8	2	3			0.4	0.1	0.3	0.00	8	306	9	
	Mean	7.8	162	52	83	537	12	10	10	6	8			0.8	0.4	0.6	0.10	12	316	12	
AUGUST 2-11 1976	No. of Analyses	30	10	30	30	30	30	30	27	10	10			30	30	30	30	10	2	10	
	Maximum	8.3	235	75	203	868	22	26	17	5	17			1.3	0.5	0.5	0.39	8	306	54	
	Minimum	7.8	58	23	42	336	4	19	5	2	4			0.4	0.0	0.0	0.07	2	268	19	
	Mean	8.1	164	46	84	600	11	22	8	3	7			0.9	0.2	0.2	0.18	6	287	29	
NOVEMBER 3-12 1976	No. of Analyses	14	10	14	14	14	14	14	14	9	9			14	14	14	14	10	2	10	
	Maximum	8.0	225	24	57	844	6	6	14	6	9			1.2	0.1	4.4	0.22	11	394	7	
	Minimum	7.4	164	6	9	566	1	2	6	3	4			0.2	0.1	0.1	0.13	4	312	2	
	Mean	7.7	190	14	20	679	4	4	9	4	8			0.7	0.1	0.5	0.17	6	353	4	
JAN. 31 – FEB. 7, 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0
	Maximum																				
	Minimum																				
	Mean																				
APRIL 25-30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	8.3	212	40	100	1050	15	13	13	5	17			1.1	0.2	0.5	0.09	11	464	44	110
	Minimum	7.4	107	9	19	540	5	10	7	2	4			0.5	0.1	0.1	0.02	1	435	10	2
	Mean	7.9	184	22	49	927	8	11	10	3	9			0.07	0.1	0.2	0.05	4	450	23	23

STATION NO. 14

MAY 3-12 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	7.9	187	100	196	746	26	15	10	12	18			1.8	1.0	3.2	0.61	17	345	16	
	Minimum	7.3	115	24	48	404	6	5	7	1	3			0.6	0.3	1.3	0.09	10	320	7	
	Mean	7.6	153	45	75	561	12	10	8	5	8			1.1	0.6	1.8	0.36	13	332	11	
AUGUST 2-11 1976	No. of Analyses	30	10	30	30	30	30	29	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.0	272	94	355	1376	51	26	10	13	25			3.8	2.7	8.5	2.72	16	441	18	
	Minimum	7.6	172	20	26	754	3	20	2	3	6			1.7	0.6	2.9	0.88	10	392	5	
	Mean	7.8	213	46	94	1066	13	22	5	6	12			2.5	1.5	5.6	1.61	13	416	10	
NOVEMBER 3-12 1976	No. of Analyses	14	10	14	14	14	14	14	13	10	10			14	14	13	14	10	2	10	
	Maximum	7.9	294	48	94	1370	19	8	10	9	15			4.3	2.8	11.9	4.2	20	528	9	
	Minimum	7.5	255	5	4	954	1	4	7	3	4			2.5	1.4	8.7	3.1	14	501	2	
	Mean	7.8	276	13	25	1268	7	6	8	6	10			3.6	2.2	10.2	3.8	18	514	4	
JAN. 31 – FEB. 7, 1977	No. of Analyses	12	8	12	12	12	12	11	10	8	8			12	12	12	12	8	2	8	
	Maximum	7.8	307	16	18	1448	10	1	12	9	61			9.5	7.7	13.3	5.06	20	549	2	
	Minimum	7.0	280	5	7	1310	2	0	9	4	11			4.4	2.7	7.1	3.48	18	547	2	
	Mean	7.4	294	10	12	1375	6	0	10	7	24			6.2	4.5	10.6	4.34	19	548	2	
APRIL 25-30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	7.9	211	40	89	1124	19	16	10	9	27			1.8	0.9	4	1.36	15	420	42	110
	Minimum	7.4	168	16	51	794	11	10	6	3	4			1.5	0.7	1.9	0.57	6	406	18	76
	Mean	7.6	196	29	67	1011	14	13	8	6	11			1.6	0.8	2.9	0.86	9	413	31	88

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco

TABLE 18.8 IN-STREAM WATER QUALITY ANALYSES – SUMMARY DATA

SALT CREEK BASIN

STATION NO. 16

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
MAY 3 – 12 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.2	210	145	385	850	130	18	10	10	19			2.3	1.5	3.1	0.63	18	315	13	
	Minimum	7.2	104	25	41	462	6	4	7	3	5			0.4	0.3	1.1	0.08	9	313	7	
	Mean	7.7	170	46	86	589	17	11	9	5	10			1.4	0.8	1.9	0.39	12	314	10	
AUGUST 2 – 11 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.1	283	57	136	1166	18	25	8	13	24			4.7	3.9	7.0	2.2	15	445	20	
	Minimum	7.4	183	12	17	484	2	20	3	1	5			2.0	0.8	1.9	1.3	10	388	8	
	Mean	7.8	238	25	48	982	9	22	6	4	10			3.4	2.4	4.8	1.7	12	416	14	
NOVEMBER 3 – 12 1976	No. of Analyses	14	10	14	14	14	14	14	13	10	10			14	14	14	14	10	2	10	
	Maximum	8.0	320	24	56	1360	16	17	13	7	15			8.7	6.5	8.8	4.92	19	488	12	
	Minimum	7.6	265	12	14	700	3	3	7	4	8			1.6	0.8	3.1	1.02	15	427	4	
	Mean	7.8	293	17	29	1133	9	6	9	5	12			6.8	5.4	7.4	3.79	17	458	6	
JAN 31 – FEB 7, 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0
	Maximum																				
	Minimum																				
	Mean																				
APRIL 25 – 30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	7.9	211	45	147	1052	30	15	13	15	15			3.7	2.4	4.2	1.62	12	414	35	111
	Minimum	7.3	197	9	25	864	8	10	5	4	8			1.7	0.8	2.1	0.72	7	376	22	79
	Mean	7.6	206	18	48	987	12	13	8	8	12			2.9	1.8	2.8	1.17	9	395	29	100

STATION NO. _____

	No. of Analyses																				
	Maximum																				
	Minimum																				
	Mean																				
	No. of Analyses																				
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	Maximum																				
	Minimum																				
	Mean																				

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

TABLE 18-9 : VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

SALT CREEK BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen 1.50	Fecal[2] Coliform (per 100 ml.) 200	Iron 1.0	Copper 0.02	Dissolved Oxygen 5.0	Lead (4)	Silver 0.005	Chloride 500	Fluoride 1.4	PH (Units) (4)	Boron (4)	Sulfate 500	Cyanide 0.025	Hexavalent Chromium 0.05	Total Phosphorus (4)	Manganese (4)	Phenol (4)	Total Dissolved Solids (4)	Temp. (°F) (4)
167	Salt Creek	No. of Analyses	6	6	2	2	6		2	2	2			2	2	2					
		No. of Violations	2	5	1	2	2		0	0	0			0	0	0					
GL 07		Maximum	5.2	450,000	1.6	0.07	14														
		Minimum	0.28	100	0.5	0.05	1.3														
		Mean[3]	1.58	10593	1.0	0.06	7.5														
169	Salt Creek	No. of Analyses	6	6	2	2	6		2	2	2			2	2	2					
		No. of Violations	2	4	2	2	2		1	0	0			0	0	0					
GL 08		Maximum	3.5	110,000	5.2	0.11	11.4		0.030												
		Minimum	0.28	100	1.9	0.05	3.9		0.000												
		Mean[3]	1.50	2117	3.5	0.08	7.7		0.015												
170	Salt Creek	No. of Analyses	7	7	3	3	6		3	3	3			3	3	3					
		No. of Violations	5	3	1	1	1		0	0	0			0	1	0					
GL 01		Maximum	8.50	5900	2.8	0.04	11.0								0.060						
		Minimum	0.52	100	0.8	0.02	4.9								0.000						
		Mean[3]	3.48	349	1.5	0.02	7.9								0.023						
171	Salt Creek	No. of Analyses	8	8	6	6	8		6	6	5			6	6	6					
		No. of Violations	6	7	4	4	2		1	1	1			1	1	0					
GL 02		Maximum	7.3	19000	1.5	0.14	10.6		0.010	1400	1.5			1500	0.03						
		Minimum	0.62	100	0.7	0.01	3.4		0.000	95	0.4			110	0.01						
		Mean[3]	3.36	1611	1.1	0.05	7.2		0.002	407	0.8			376	0.017						
172	Salt Creek	No. of Analyses	7	7	0	0	7		0	0	0			0	0	0					
		No. of Violations	2	6			2														
GL 03		Maximum	3.2	47000			10.9														
		Minimum	0.22	100			3.7														
		Mean[3]	1.19	1559			6.7														
173	Salt Creek	No. of Analyses	8	8	3	3	8		3	3	3			3	3	3					
		No. of Violations	2	5	2	2	0		0	0	0			0	0	0					
GL 05		Maximum	2.5	7200	2.4	0.03															
		Minimum	0.06	100	0.4	0.01															
		Mean[3]	0.90	570	1.5	0.02															
175	Salt Creek	No. of Analyses	8	8	5	5	8		5	5	5			5	5	5					
		No. of Violations	0	8	1	4	0		0	0	0			0	0	0					
GL 06		Maximum		53000	2.2	0.47															
		Minimum		400	0.2	0.02															
		Mean[3]		1257	0.9	0.12															
168	Addison Creek	No. of Analyses	6	6	2	2	6		2	2	2			2	2	2					
		No. of Violations	0	5	0	1	1		0	0	0			0	0	1					
GLA 01		Maximum		140000		0.03	19.2									0.23					
		Minimum		100		0.02	3.3									0.00					
		Mean[3]		5733		0.02	8.8									0.11					
174	Spring Brook	No. of Analyses	8	8	0	0	7		0	0	0			0	0	0					
		No. of Violations	5	5			2														
GLB 01		Maximum	5.10	5300			11.1														
		Minimum	0.58	100			4.3														
		Mean[3]	2.46	354			8.4														

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

administered by the Corps. Subsequently, the Water Resources Development Act of 1976 authorized the preparation of Phase One General Design Memoranda studies. These will evaluate federal interest in the flood control aspects of certain tunnels and reservoirs proposed by the so-called TARP II phase of the MSDGC plan.

(2) Permits for Dredged and Fill Materials: The Corps is also authorized under Section 404 of PL 92-500 to issue permits for the placement of dredged or fill materials into navigable waters or on adjacent land sites. Permits may be withheld if it is determined that disposal of the materials will have adverse effects on water supplies, fish, wildlife, or recreation. Under current guidelines, Corps authority extends to all navigable waters and tributaries thereto, up to points where the average annual flow is 5 cfs or more.

c. U.S. Department of Agriculture

The Agricultural Stabilization and Conservation Service (ASCS) and the Soil Conservation Service (SCS) are two units of the U.S. Department of Agriculture directly involved in the conservation of land and water resources.

(1) PL-566 Projects: The small watershed program of the SCS (authorized by PL 83-566) provides a framework through which federal, state, and local units of government can deal with local water resources problems on a cooperative basis. The program is principally oriented toward the prevention of soil erosion and the control of flooding and sedimentation damages. Works typically include the construction of small reservoirs, stream channelization, grade stabilization, and bank protection. Projects are coordinated through local soil and water conservation districts and other agencies.

In 1973, the SCS completed a PL-566 work plan for flood prevention and recreation in the upper portion of Salt Creek. The study area consisted of approximately 50 square miles, virtually all in northwestern Cook County. The plan calls for the construction of six reservoirs and for modifications of 1.8 miles of channel. According to the plan, total reservoir storage capacity is 9,554 acre-feet, which is allocated to floodwater storage, sediment capture, and recreation. The largest of the reservoirs (Busse Woods in the Ned Brown Forest Preserve) has already been constructed. The other (smaller) reservoirs are in varying stages of completion. It is expected that when the overall project is completed, Salt Creek's water quality will improve as a result of decreased erosion in the watershed.

Plans for lower Salt Creek were initiated in 1971 as part of an overall larger planning program known as the Chicago Area River Basin Study. As a result of that study, plans call for the construction of two reservoirs, one on the Spring Brook tributary and one on Salt Creek proper. Channel modification work is also proposed. As with the

upper Salt Creek project, water quality benefits are also expected in the form of decreased erosion and stream sedimentation. On-site erosion control is a required feature of the overall plan, and the reservoirs will have space alloted specifically for sediment capture. Additional, ancillary benefits should occur as a result of proposed wetland and flood plain acquisitions in the watershed.

(2) Conservation Program: The SCS and ASCS perform a variety of functions and provide several services related to soil and water conservation. The SCS, for example, offers extensive technical assistance to local soil and water conservation districts and other interested parties. The ASCS gives assistance to farmers through cost-sharing to control erosion and agriculturally related water pollution.

d. Illinois Division of Water Resources

The Division of Water Resources, a unit of the Illinois Department of Transportation, is involved in several programs directly pertaining to water and water related land resources management in the basin. The Division has statutory responsibility for navigation and flood control projects throughout the state; it also has permit authority to control public and private projects which enter or cross over or under public waters.

The Division recently completed the construction of the Busse Woods reservoir on upper Salt Creek (noted previously). It also is involved in the final stages of a flood control project near Villa Park involving land acquisitions, relocation, and diking. No other large scale projects are currently planned for the basin.

e. Local Units of Government

Various municipalities and Cook and DuPage counties are involved in a number of local projects which have direct or indirect effects on Salt Creek's water quality. The general purpose units are empowered to adopt regulations, such as flood plain ordinances, on-site stormwater detention ordinances, and soil erosion and sedimentation control ordinances. All of these have the potential for improving water quality. Zoning ordinances, building codes, and health regulations all have the potential for at least peripheral impact on local water quality. Still other effects result from more routine activities, such as street sweeping, sewer and catch basin cleaning, and solid waste management. Local management responsibilities and programs are identified in Section 18.07.

The Cook County and DuPage County Forest Preserve Districts have acquired considerable land, which may have a

bearing on future development in the basin. The North Cook County Soil and Water Conservation District, in particular, has long been active in promoting soil erosion control measures in the watershed.

A most unique organization is the Cook County Clean Streams Committee, which is a citizen watchdog group for incidents of pollution. Through a committee of volunteers, follow-up actions are taken to identify sources of pollution and to have corrective measures undertaken by responsible persons or firms.

18.03 WATER QUALITY IN THE BASIN

a. Applicable State Standards and Designations

All waters in the basin are designated as "General Use" and are subject to state standards for waterways with that designation. A full discussion on General Use standards and other standards applicable to water quality is included in Chapter Four.

b. IEPA Segment Classification

The state has been divided by the Illinois Environmental Protection Agency (IEPA) into hydrologic units that coincide with major river basins. These units have been further divided into segments on the basis of common characteristics. Salt Creek basin, as defined by the Commission for areawide planning, is identical to segment A-7, which is one of 20 segments in the Des Plaines/Lake Michigan hydrologic unit as defined by the IEPA. This segment, like all others in the state, has been designated "water quality limited." This means that water quality does not currently meet applicable water quality standards and/or is not expected to meet those standards even after the minimum statutory limitations have been applied to effluents discharged to the water body.

c. Existing Water Quality Conditions

The assessment of current water quality conditions is based partly on information developed by the Commission's water quality sampling program and partly by programs conducted by other public agencies, principally the IEPA. These sampling programs and their results are described below. The simulation of existing conditions via the water quality model also provides a comprehensive picture of water quality in the basin.

(1) Commission In-Stream Sampling: The in-stream water quality sampling program conducted by this Commission included three sites on Salt Creek. (see Figure 18-2).

Station 12: Salt Creek at Algonquin Road in Rolling Meadows.

Station 14: Salt Creek at Rt. 83 in Elmhurst.

Station 16: Salt Creek at Wolf Road in Western Springs.

Results of the sampling are shown in Table 18-8. Of the 19 parameters evaluated, Illinois has established standards for four: pH, temperature, dissolved oxygen (DO), and ammonia. Violations of state standard have been used in this study as a measure of the relative water quality of rivers and streams. Tha ammonia nitrogen standard is the one violated most frequently in the basin.

Samples from Station 14 produced violations of the ammonia standard in three of the five sampling periods, as well as the standard for DO during one sampling period. Station 16 produced violations of the ammonia standard during two sampling periods and a violation of the DO standard during another period. No violations were noted at Station 12, the most upstream station on Salt Creek.

(2) IEPA In-Stream Sampling: The IEPA maintains nine sampling stations in the Salt Creek watershed (Figure 18-2). In 1976, ammonia violations were common in the samples collected by IEPA. (See Table 18-9.). The standard for ammonia was violated in 38 percent of the samples, and in some cases the concentration of ammonia was far in excess of the standard.

Violations of standards for DO, iron, copper, and fecal coliform also were noted frequently in the IEPA samples. Of 64 analyses for fecal coliform, 48 apparent violations were recorded. (The IEPA method is different than the preferred methodology for sampling fecal coliform.) Of 23 analyses for copper, 16 violations were noted. Violations of the DO standard were noted in 19 percent of the samples, and in several instances the violations were well below minimum standards. Violations of the iron standard were noted in 48 percent of the samples.

(3) SCD Measurements: Sediment oxygen demand (SOD) measurements were conducted by the Commission at six sites in the watershed (Figure 18-2). The overall purpose was to estimate the oxygen demand exerted upon the overlying water by bottom-dwelling benthic organisms. Conditions (based on SOD values) were classified in one of the following categories: clean, moderately clean, slightly degraded, moderately polluted, polluted, heavily polluted, or sewage sludge-like. On the basis of this evaluation, conditions

(noted in Table 18-10) ranged from slightly degraded (two sites) to moderately polluted (four sites).

(4) Biological Classification: As part of the SOD study, benthic macroinvertebrate communities also were analyzed, and mathematical Shannon-Weaver indices reflecting the nature and diversity of these communities were developed according to standard formulae. Indices above 3.0 are indicative of generally clean water; values between 1.0 and 3.0 are indicative of moderately polluted water; and values below 1.0 are indicative of severe pollution. Shannon-Weaver indices and their relevant classifications for the six Salt Creek stations are shown in Table 18-11. All sites are classified severely polluted on the basis of this index. On the basis of the IEPA's biological classification system (also shown in Table 18-11), conditions at the stations were categorized as semi-polluted and polluted.

(5) Fish Species and Habitat: Fishes were collected at 13 sites along Salt Creek and its tributaries in 1976 as part of the 208 sampling program. Six of the sites were on Salt Creek proper, while the remaining sites were on tributaries. Fifteen species and two hybrids were collected in the survey. Significantly, goldfish, carp, and goldfish-carp hybrids constituted 42 percent of the total fishes collected, indicative of the degraded fishery in the watershed. Fishery quality decreased progressively with distance downstream, with little positive influence from tributary streams noted.

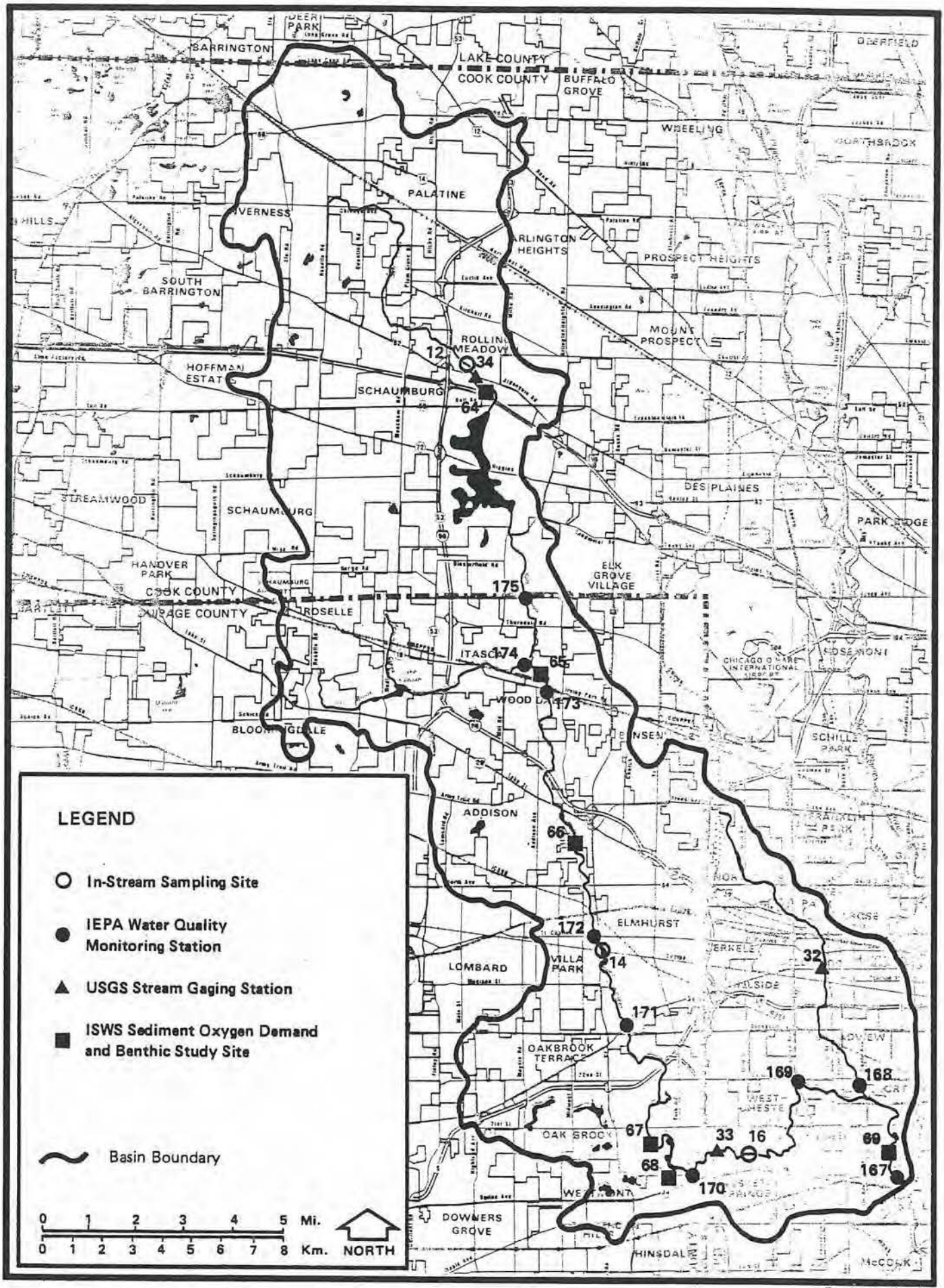
Follow-on work by the Illinois Natural History Survey (INHS) involved computation of a "toxicity index" relating water quality to fish habitat suitability. Included in the parameters for computing the toxicity index (using bluegills as the target species) are cadmium, nickel, arsenic, chromium, silver, boron, mercury, cyanide, ammonia, and copper, among others. On the basis of its analysis, the INHS determined that, at three of eight IEPA water quality sampling sites in the watershed, the calculated bluegill toxicity index was in excess of the theoretical maximum level above which a diverse fishery cannot be maintained. Water quality parameters found to have a significant effect on the high index calculations were silver, cyanide, and total iron.

Overall, the Natural History Survey concluded that fish habitat in the basin (as measured by water quality) was extremely poor.

d. Computer Simulation of Existing Conditions

As shown in Figure 18-3, the basin was divided into a number of areas called reaches. Each reach is composed of a segment of a major stream, the waterways that are tributary to that segment, and the land area drained by the major

Figure 18-2: WATER SAMPLING STATIONS



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TABLE 18-10 : GENERALIZED BENTHIC SEDIMENT CONDITIONS

Salt Creek BASIN

STATION NUMBER	STREAM NAME	BENTHIC CONDITION*
64	Salt Creek	Moderately Polluted
65	Salt Creek	Slightly Degraded
66	Salt Creek	Slightly Degraded
67	Salt Creek	Moderately Polluted
68	Salt Creek	Moderately Polluted
69	Salt Creek	Moderately Polluted

*Based on SOD value

TABLE 18-11 : BIOLOGICAL STREAM SITE CLASSIFICATIONS

Salt Creek BASIN

Station Number	Stream Name	IEPA Classification(1)	Shannon-Weaver	
			Index	Classification(2)
64	Salt Creek	SP	0.94	SeP
65	Salt Creek	SP	0.90	SeP
66	Salt Creek	P	0.29	SeP
67	Salt Creek	P	0.97	SeP
68	Salt Creek	P	0.99	SeP
69	Salt Creek	SP	0.79	SeP

(1) Polluted (P); Semi-polluted (SP); Unbalanced (U); Balanced (B).

(2) Severe pollution (Se P); Moderately polluted (MP); Clean (C).

stream segment and its tributaries. Each reach is a direct tributary to the reach immediately downstream from it along 466

the same major stream and is an indirect downstream tributary to other downstream reaches. In this chapter, water quality conditions are presented for six of those reaches, as described in Table 18-12. Reach 21 is the farthest downstream point for which water quality has been simulated in the water quality model. Conditions in all six reaches are described in preliminary reports issued by the Commission during the basin planning process.

To ensure that the water quality model is an accurate representation of the Salt Creek basin, the model was balanced using measurements of actual conditions in the basin. For example, the model's water quality routine has been balanced against the actual water samples collected and analyzed during 1976 and 1977 and reported on previously.

Sources of pollutants are categorized in the modeling process as follows:

- Point sources: treatment plants and other discrete discharges.
- Nonpoint sources: surface runoff and groundwater seepage from developed and undeveloped areas.
- Combined sewer overflows.
- Boundary conditions: the amount of pollution flowing into a basin from another basin or another state. (Boundary conditions are not a factor in the Salt Creek basin.)

The model simulation of existing conditions provides a more comprehensive picture of water quality in the basin than do the results of discrete sampling programs. Not only are pollutant concentrations determined and related to standards, but also the relative amounts of pollutants contributed by various sources are described.

(1) Pollutant Concentrations: Although the Commission sampled for 19 parameters, simulation reports on existing conditions were prepared only for eight: streamflow, temperature, chlorophyll a, dissolved oxygen, biochemical oxygen demand (BOD), ammonia (NH_3), nitrate (NO_3), and phosphate (PO_4). The last four of these represent constituents that can be quantified and tied to specific categories of pollutant sources, using the model.

Assessments of conditions with respect to each pollutant are based on state in-stream standards, where there are standards that can be applied. Statistical values express the minimum, maximum, and average concentrations of pollutants. Values also describe the number of times that standards were not met, and the average duration of the periods of violation. The model simulation was continuous over a 3-year period. Readings were hourly. Therefore, if a standard for a particular pollutant was constantly

TABLE 18-12: MOST DOWNSTREAM POINTS, DATA OUTPUT REACHES

Reach 5/6 Busse Woods Reservoir	Reach 15 Salt Creek at the Fullersburg Dam in Du Page County near the Cook County line.
Reach 7 Salt Creek above the mouth of Spring Brook in Itasca.	Reach 19 Addison Creek drainage area, immediately above its confluence with Salt Creek.
Reach 11 Salt Creek above North Avenue in Elmhurst.	Reach 21 The entire Salt Creek basin, including Addison Creek in Brookfield, immediately above its confluence with the Des Plaines River.

violated over the entire simulation period, that would be reflected in the statistics for number and frequency of violations as follows:

- Number of violations: one (because there was only one violation, even though it was of 3-year's duration.
- Average duration: 26,304 hours (the approximate total number of hours in the 3-year period).

Table 18-13 summarizes pollutant levels simulated for existing conditions. As was indicated by the results of the instream sampling programs discussed above, problems are apparent with respect to ammonia. Maximum levels were above the standard in all six reaches.

For example, in Reach 19 on Addison Creek, the mean concentration of ammonia (2.3 mg/l) exceeded the state standard of 1.5 mg/l. The maximum level encountered in Reach 19 was 5.0 mg/l--more than three times the concentration allowed by standard. Mean ammonia concentrations also approached the standard in Reaches 15 and 21 on the Salt Creek main stem. Mean ammonia concentrations were well below the standard in Reaches 5/6 and 7 on upper Salt Creek. The phosphate standard of .05

mg/l, although it applies only to Reach 5/6 (the Busse Woods Reservoir) was violated continually in all six reaches.

Levels of BOD are variable, with maximum levels relatively high in all six reaches.

Dissolved oxygen (DO) has been used by the Commission as a general indicator of water quality. DO conditions are described by the statistics in Table 18-14. One particular statistic, the minimum DO level of zero in Reach 19, indicates the seriousness of DO problems in Addison Creek. Elsewhere, the 5.0 mg/l standard is violated fairly frequently in each of the six reaches.

(2) Pollutant Loadings and Sources: Water quality in the upper reaches of Salt Creek is relatively good, but it is often quite poor in Addison Creek and the lower reaches of Salt Creek. The major type of land cover in the upper reaches is grassland, followed by lowlands, impervious cover, and croplands, respectively. An analysis of pollutant loads is presented for three of the basin's reaches in Table 18-15: Reach 7 on upper Salt Creek, Reach 19 on Addison Creek, and Reach 21 at the mouth of Salt Creek. The table contains statistics showing the percentages of flows and areas and of each pollutant coming from the various sources in each reach.

Table 18-16 is a summary of pollutant loads by source simulated in Reach 21. While the data are more meaningful when combined with data on area and flow, Table 18-16 does give an accurate, general picture of the significance of various pollutant sources in the basin.

(3) Point Sources: Treatment plants contribute about 30 percent of the total flow in Salt Creek but a disproportionate amount of the total load (35.8 percent BOD, 85.3 percent ammonia, and 74.8 percent of the phosphates). The only point source contribution to Reach 7 and above is the MSDGC John E. Egan Water Reclamation plant. Along Reach 19, the Bensenville South and Chicago and North Western Railroad plants discharge to Addison Creek. Municipal treatment plants in the lower Salt Creek basin include Roselle, Itasca, Wood Dale, Addison, the Salt Creek Sanitary District, and Elmhurst. Some small industrial treatment plants also discharge into the creek. Portions of the southeast end of the basin are served by the MSDGC, and wastewater is diverted and treated out of the basin, reducing relative point source loads.

Point sources do not appear to be the major cause of violations of the 5.0 mg/l dissolved oxygen standard. This conclusion is based on the scarcity of violations simulated during dry weather conditions when point source flows predominate. Severe DO violations are simulated for Reach 15 at Fullersburg Dam, where the standard is violated approximately 37 percent of the time, indicating the poorest conditions simulated in the system from this standpoint. Point sources are the major contributors of ammonia to

Figure 18-3: BASIN MODELING SEGMENTS

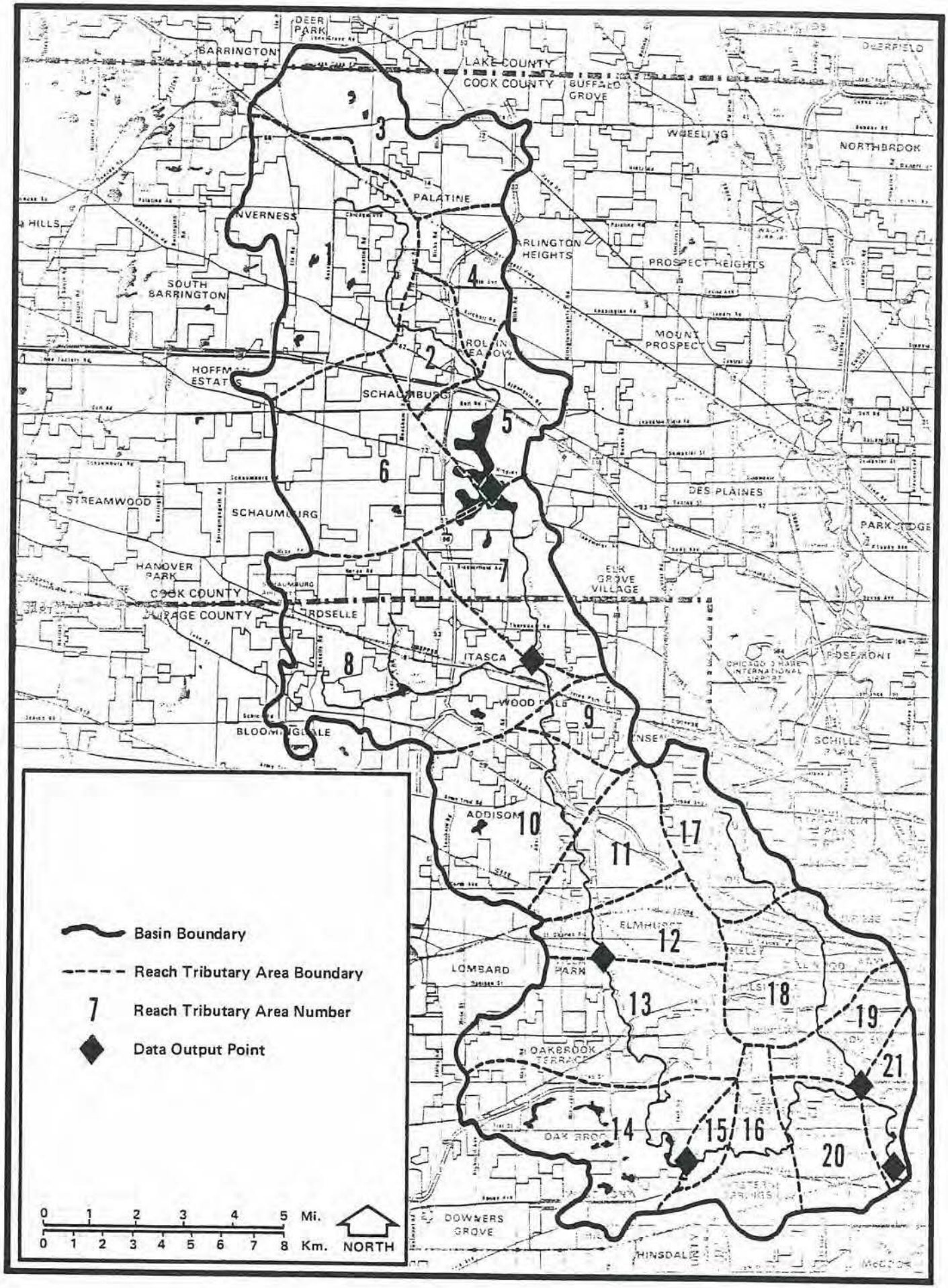


TABLE 1813 : STATISTICAL SUMMARY OF CURRENT WATER QUALITY

Parameter (Standard) (All data in mg/l)	REACHES				
	5/6	7	11	15	19
BOD (No Standard) Maximum	47.3	26.6	23.0	42	47.5
Minimum	1.49	1.66	2.08	1.9	1.7
Mean	4.58	2.46	5.13	5.6	14.6
AMMONIA (1.5 mg/l) Maximum	2.28	1.82	2.64	3.5	5.0
Minimum	0.00	.08	.27	0.0	.24
Mean	0.30	.24	1.04	1.4	2.3
No. Violations	17	8	55	84	141
Avg. Duration Viol.	7	4	43	140	146
NITRATE (No Standard) Maximum	1.82	6.55	5.33	4.3	5.4
Minimum	.14	.43	.47	.5	.39
Mean	.85	3.62	3.03	2.6	3.3
PHOSPHATE (.05 mg/l) Maximum	.83	1.98	1.92	1.9	1.8
Minimum	.08	.08	.19	.10	.13
Mean	.16	.92	.95	1.00	1.1
No. Violations	1	1	1	1	1
Avg. Duration Viol.	26304	26304	26304	26304	26304

Addison Creek (Reach 19 -- 77 percent) and lower Salt Creek (Reach 21 -- 85 percent). From other data, the 1.5 mg/l ammonia standard was shown to be violated frequently and for long durations. Ammonia loadings were particularly troublesome during low flows because of the lack of adequate dilution. Ammonia exerts a significant oxygen demand and is toxic to aquatic organisms under certain conditions.

TABLE 18-13 : STATISTICAL SUMMARY OF CURRENT WATER QUALITY

Parameter (Standard) (All data in mg/l)	REACHES				
	21				
BOD (No Standard) Maximum	63.6				
Minimum	2.0				
Mean	7.1				
AMMONIA (1.5 mg/l) Maximum	3.2				
Minimum	0.0				
Mean	1.3				
No. Violations	84				
Avg. Duration Viol.	125				
NITRATE (No Standard) Maximum	4.4				
Minimum	0.1				
Mean	2.5				
PHOSPHATE (.05 mg/l) Maximum	1.9				
Minimum	.12				
Mean	.97				
No. Violations	1				
Avg. Duration Viol.	26304				

Point sources are major contributors of nitrates and phosphates in nearly all reaches. These serve as nutrients for algal growth. Violations of the 10.0 mg/l nitrate standard for drinking water have not been simulated under existing conditions.

(4) Pervious Sources: Runoff from pervious land cover accounts for about half of the total stream flow. Of this

TABLE 18-14 : STATISTICAL SUMMARY OF CURRENT DISSOLVED OXYGEN LEVELS

SIMULATED DO CHARACTERISTICS (Expressed in mg/l)	REACH				
	5/6	7	11	15	19
Maximum	13.6	12.8	12.3	11.4	13.0
Minimum	2.33	2.25	1.88	1.04	0.0
Mean	8.63	7.45	7.02	5.87	6.6
*No. of Violations	23	39	108	85	166
Avg. Duration	10	16	25	114	33
**Overall Assessment	Good	Good	Fair	Bad	Bad

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time DO levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

TABLE 18-14 : STATISTICAL SUMMARY OF CURRENT DISSOLVED OXYGEN LEVELS

SIMULATED DO CHARACTERISTICS (Expressed in mg/l)	REACH				
	21				
Maximum	11.9				
Minimum	1.1				
Mean	7.0				
*No. of Violations	102				
Avg. Duration	38				
**Overall Assessment	Poor				

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time DO levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

TABLE 18-15 : SOURCES OF POLLUTANTS, EXISTING CONDITIONS

REACH/SOURCE	PERCENTAGES					
	AREA	STREAM FLOW	POLLUTANTS			
			BOD	NH_3	NO_3	PO_4
1. Salt Creek above Itasca						
(REACH NO. 7)						
BOUNDARY CONDITIONS	0	0	0	0	0	0
POINT SOURCES	0	25.3	11.7	20.0	42.6	75.1
COMBINED SEWERS	3.8	2.4	23.7	15.4	1.3	3.5
PERVIOUS COVER	88.0	59.4	33.3	55.7	54.2	18.7
Surface Runoff		13.9	22.7	50.7	18.3	14.7
Groundwater		45.5	0.6	5.0	35.9	4.0
IMPERVIOUS COVER	8.2	13.0	31.2	8.9	1.9	2.7
2. Addison Creek						
(REACH NO. 19)						
BOUNDARY CONDITIONS	0	0	0	0	0	0
POINT SOURCES	0	27.9	29.6	77.0	77.1	63.5
COMBINED SEWERS	27.9	18.0	54.5	16.6	5.8	23.6
PERVIOUS COVER	64.1	41.2	6.8	5.2	16.2	10.7
Surface Runoff		11.4	4.7	4.7	6.2	8.5
Groundwater		29.8	2.1	0.5	10.0	2.2
IMPERVIOUS COVER	8.0	12.8	9.0	1.1	1.0	2.2
3. Salt Creek at Brookfield						
(REACH NO. 21)						
BOUNDARY CONDITIONS	0	0	0	0	0	0
POINT SOURCES	0	31.5	35.8	85.3	60.7	74.8
COMBINED SEWERS	11.6	6.3	32.9	6.0	2.6	7.7
PERVIOUS COVER	80.1	50.1	15.4	7.3	35.4	15.4
Surface Runoff		12.7	10.7	6.6	12.2	12.2
Groundwater		37.4	4.7	0.7	23.2	3.2
IMPERVIOUS COVER	8.3	12.2	15.8	1.5	1.4	2.1

TABLE18-16:POLLUTANT CONTRIBUTIONS BY SOURCE CATEGORY, EXISTING CONDITIONS
REACH: 21

PARAMETER	POINT SOURCES			NON-POINT SOURCES			Total Loads
	Comb Sewers	Treatment Plants	Boundary Conditions	Pervious Surfaces		Impervious	
				Surface	Ground	Surface	
BOD Load (tons/year)	539	588	N/A	177	77.7	259	1641
% Total Load	32.9	35.8	N/A	10.8	4.7	15.8	100
AMMONIA Load (tons/year)	42.9	610	N/A	47.2	4.28	10.84	715
% Total Load	6.0	85.3	N/A	6.6	0.6	1.5	100
NITRATE Load (tons/year).	8.17	190	N/A	38.1	72.6	4.32	313
% Total Load	2.6	60.7	N/A	12.2	23.1	1.4	100
PHOSPHATE Load (tons/year)	12.7	123	N/A	20.0	5.19	3.46	164
% Total Load	7.7	74.8	N/A	12.2	3.1	2.1	100

portion, about 13 percent is surface runoff and 37 percent is groundwater. Two-thirds of the nitrate from pervious land cover enters the stream through groundwater, reflecting the conversion of ammonia to nitrate as the water infiltrates through the soil.

Typically, stormwater runoff is of poorer quality than stream water and causes DO levels to drop in response to the increase in BOD and ammonia levels. Groundwater contributions generally have a beneficial effect on water quality. The large amounts of nitrate in the groundwater flow do not pose a problem from the standpoint of maximum concentrations.

(5) Impervious Sources: Impervious surface runoff constitutes another portion of total stream flow. Of particular importance is the BOD load associated with that runoff -- approximately 16 percent of the total BOD load on Salt Creek. This BOD load is responsible for numerous wet weather DO violations which occur in the basin.

(6) Combined Sewer Overflows: Combined sewer overflows are a significant factor in the total pollutant load on the

basin. Approximately 33 percent of the BOD entering the basin comes from combined sewer overflows. These overflows, along with stormwater runoff, are responsible for the numerous wet weather dissolved oxygen and ammonia violations observed in Reach 21. They are also suspected in Reach 19 (Addison Creek) where certain communities connected to the MSDGC system have overflow points.

(7) Summary: Water quality in the basin is good in the upstream reaches but deteriorates significantly in the downstream area. Point sources and combined sewer loadings in Addison Creek and the lower reaches of Salt Creek are responsible for this condition. Numerous wet weather violations of DO and ammonia standards are due to shock loadings of stormwater runoff (pervious and impervious sources) and combined sewer overflows. Dry weather violations are not as common. The upper reaches of Salt Creek have relatively small loadings from point sources. Most dry weather violations in the downstream area tend to be associated with the impoundment at Fullersburg Dam. This reservoir aggravates water quality conditions downstream because of its release of water having low DO concentrations. During low flow, little reaeration takes place in the reservoir; the result is significant oxidation of pollutants. Stream temperature problems are very minor. Nitrate levels are slightly higher than expected in natural streams but do not violate the 10 mg/l standard. Phosphate levels are high enough to cause concern for the Busse Woods Reservoir. Chlorophyll a concentrations are restricted by light limitations due to turbidity and shaded banks.

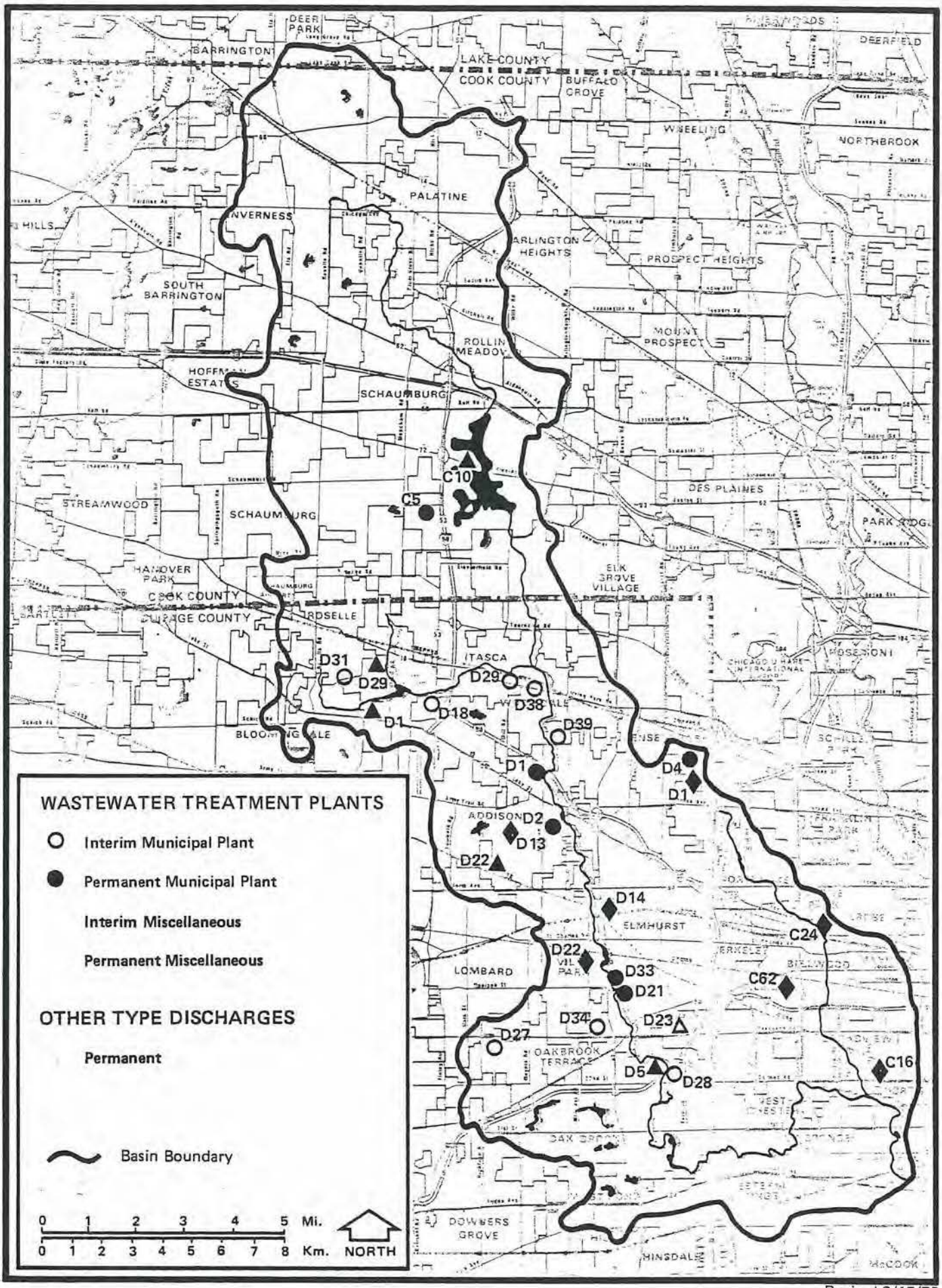
18.04 POINT SOURCES: EXISTING CONDITIONS

a. Municipal-Type Wastewater Treatment Plants

There are 13 municipal type wastewater treatment facilities discharging to Salt Creek and its tributaries. These plants are listed in Table 18-17 (A, B, C, D and E) and are shown along with other point source discharges on Figure 18-4.

Plant capacities and average flows vary considerably throughout the basin, with the MSDGC's Egan plant in the upstream reaches being the largest. Three of the 13 plants are required to meet effluent standards of 4 mg/l BOD and 5 mg/l total suspended solids. Due to streamflow and available dilution, the remaining plants have standards of either 10 mg/l BOD and 12 mg/l total suspended solids (SS) or 20 mg/l BOD and 25 mg/l SS. To date, only the MSDGC, the Salt Creek Drainage Basin Sanitary District and Bensenville have completed facilities plans which have been approved and accepted.

Figure 18-4: POINT SOURCE DISCHARGES



Revised 2/15/79

TABLE 18-17 A: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS SALT CREEK BASIN

MAP CODE	FACILITY NAME	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	RECEIVING STREAM			PUBLICLY OWNED TREATMENT WORKS		
				NAME	7 DAY 10 YR. LOW FLOW (MGD)				
					1970	2000	NO	YES	IEPA FY 78 PRIORITY NO.
D1	Addison-North	Addison/Addison	Addison	Salt Creek	1.23			X	40
D2	Addison-South	Addison/Addison	Addison	Salt Creek	1.23			X	40
D4	Bensenville No. 1	Bensenville/ Bensenville	Bensenville	ditch to Addison Ck	0			X	7
D18	DPCDPW Nordic Hills	Addison/Addison	Itasca	Springbrook Creek	0			X	16
D21	Elmhurst	Elmhurst/Elmhurst	Elmhurst	Salt Creek	6.65			X	-
D28	Hinsdale S.D. Oakbrook	Hinsdale/Hinsdale	Oakbrook	Salt Creek	11.8			X	990
D29	Itasca	Addison/Addison	Itasca	Springbrook Creek	0.34			X	40
C5	MSDGC-John Egan	MSDGC/MSDGC	Chicago	Salt Creek	3.68			X	31
D31	Roselle-Main	Glendale/Glendale Heights/ Heights	Roselle	Springbrook Creek	0			X	718
D33	Salt Creek Drainage Basin S. D.	Salt Creek/SCDB S.D.	Villa Park	Salt Creek	3.68			X	10
D34	Stonewall U.C.	Salt Creek/SCDB S.D.	Villa Park	ditch to Salt Creek	0		X		-
D38	Wood Dale-North	Addison/Addison	Wood Dale	ditch to Salt Creek	0.78			X	40
D39	Wood Dale-South	Addison/Addison	Wood Dale	ditch to Salt Creek	1.94			X	40

TABLE 18-17 B: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

SALT CREEK BASIN

MAP CODE	NPDES PERMIT			EFFLUENT REQUIREMENTS (mg/l)													COMMENTS
	NUMBER	DATE		INTERIM (A)				FINAL (A)					YEAR 2000 (B)				
		ISSUED	EXPIRES	BOD_5	TSS	P	NH_3N	EFFECTIVE DATE	BOD_5	TSS	P	NH_3N	BOD_5	TSS	P	NH_3N	
D1	0033812	8-3-77	5-31-82						20	25			20	25		(a)	(a) 1.5 mg/l in-stream after mixing.
D2	0027367	11-26-74	6-30-79						20	25			20	25		(a)	
D4	0021849	6-7-77	12-31-81						10	12			10	12		(a)	
D18	0028398	5-30-75	10-1-79						4	5			–	–		–	
D21	0028746	12-23-74	9-30-79						10	12			10	12		(a)	
D28	0022594	11-13-74	6-1-79						20	25			–	–		–	
D29	0026280	6-30-75	6-30-79						10	12			–	–		–	
C5	0036340	6-30-75	9-30-79						4	5			4	5		(a)	
D31	0030815	5-11-77	12-31-81						10	12			10	12		(a)	
D33	0030953	11-13-74	6-1-79						10	12			10	12		(a)	
D34	0052817	6-30-77	7-1-81						4	5			4	5		(a)	
D38	0020061	3-27-75	8-1-79						10	12			–	–		–	
D39	0043274	6-30-75	12-31-79						10	12			–	–		–	

(A) From NPDES Permits (B) From Facility Plans

TABLE 18-17 C: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

SALT CREEK BASIN

MAP CODE	STATUS OF TREATMENT PLANT					WASTEWATER TREATMENT PLANT (MGD)										COMMENTS
	INTERIM		PERMANENT			AVERAGE FLOWS (d)						DESIGN CAPACITIES				
	YES	PHASE OUT DATE	EXISTING	PROPOSED NEW YES	PROPOSED NEW EST. DATE IN SERVICE	1975	1980	1985	1990	1995	2000	1975	1985	OTHER YEAR	2000	
D1			X			1.76	2.35	2.94	3.53	4.12	4.70 (g)	2.0	6.5	1990 11.0	11.0	(a) Phase out to Itasca
D2			X			2.41	2.57	2.73	2.89	3.05	3.20	2.1	3.2	1990 5.5	5.5	
D4			X			3.56	4.03	4.50	4.97	5.44	5.89	2.5	4.0	1990 5.5	5.5	(b) Phase out date to be determined; model assumes phase out by 1983.
D18	X	12-79 (a)				0.21	–	–	–	–	–	0.1	–	–	–	
D21			X			5.30	6.00	6.60	7.10	7.30	7.50	6.0	6.0	1990 7.5	7.5	
D28	X	(b)				2.87	–	–	–	–	–	2.6	(b)	–	–	(c) Phase out to Addison-North
D29	X	12-89 (c)				1.28	2.06	2.84	3.62	4.40	5.20	1.5	1.8		–	(d) From Facility Plans or needs analysis documents unless noted.
C5			X			(e)	18.20	22.60	26.90	30.90	34.40	30.0	30.0	1995 35 (h)	35 (h)	
D31			X			1.20	1.26	1.32	1.38	1.44	1.50	1.5	1.5		1.5	
D33			X			3.81	4.05	4.29	4.53	4.77	5.00	4.5	5.0		5.0	(e) Not on stream in 1975.
D34			X			0.07 (f)	0.07	0.07	0.07	0.07	0.07	0.07	0.07		0.07	
D38	X	12-89 (c)				1.73	1.74	1.76	1.77	1.78	1.80	1.1	1.1		–	(f) Private utility year 2000 flows assumed to be the same as 1975 flows due to lack of information.
D39	X	12-89 (c)				0.06	0.35	0.64	0.93	1.22	1.50	1.5	1.5		–	
																(g) Flows from D29, D38, D39 are not included.
																(h) NIPC estimate.

TABLE 18-17 D: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANT

SALT CREEK BASIN

MAP CODE	POPULATION SERVED (1000's)						PROPOSED PROJECTS (C)								CAPITAL COSTS (million $)		
							PLANT				SEWERS						
	1975	1980	1985	1990	1995	2000	Exp.	UpG	New	Out	I/I	SSE	New	Reh	Initial	Future	Total
D1	17.5	19.7	22.9	57.9	61.1	64.0	X				X	X	X	X	19.7	11.3	31.0
D2	10.4	11.6	13.6	15.5	16.1	16.8	X				X	X	X	X	10.1	7.3	17.4
D4	14.0	17.6	19.1	20.4	20.7	21.0	X	X			X	X		X	9.1	1.9	11.0
D18	0.1	-	-	-	-	-				X	X	X	X		0.6	-	0.6
D21	51.0	53.5	55.3	57.0	58.5	60.0	X	X			X	X		X	0.6	11.8	12.4
D28	12.0	Date of Phase Out to be determined								X			X		-	-	-
D29	6.0	11.6	13.1	-	-	-	X			X	X	X	X		1.2	-	1.2
C5	90.0	118.0	139.0	160.0	175.0	189.0							X		See Table 18-30 -	-	-
D31	9.2	9.4	9.6	9.8	10.0	10.1					X	X			-	-	-
D33	25.3	28.7	29.3	29.9	30.3	30.6								X	13.4	-	13.4
D34	UNKNOWN														PRIVATE COSTS		
D38	10.3	10.3	10.3	-	-	-		X		X	X	X	X		1.1	-	1.1
D39	0.5	2.4	4.7	-	-	-		X		X	X	X	X		0.2	-	0.2

(C) PROPOSED PROJECTS

SEWER(S): I/I - Infiltration/Inflow Study; SSE - Sewer System Evaluation; New - New Sewer Construction; Reh - Rehabilitation of Existing Sewers

PLANT: Exp - Expansion; UpG - Upgrading; New - New plant; Out - Phase out

TABLE 18-17 E. MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

SALT CREEK BASIN

MAP CODE	FACILITY PLANS												COMMENTS
	TYPE		STATUS			REVIEWS / APPROVALS							
						NIPC			IEPA				
	NEEDS ANALYSIS	STEP ONE STUDY	COMPLETED	UNDER WAY	LOCAL ISSUES	NUMBER	ENDORSED	UNDER REVIEW	NUMBER	APPROVED	UNDER REVIEW	UNRESOLVED ISSUES	
D1		X		X	X	75-797	X		C17-1415		(b) X	X	
D2		X		X	X	75-797	X		C17-1415		(b) X	X	
D4		X	X			75-432	X		C17-1218	X			(a) Private plant
D18		X		X	X	75-797	X		C17-1415		(b) X	X	(b) Under review by IEPA; the unresolved problems prevent resolution of this Facilities Plan.
D21	X		X			77-A-011	X			X			
D28		X		X		72-345			C17-1447		X	X	
D29		X		X	X	75-797	X		C17-1415		(b) X	X	
C5		X	X			75-360 75-068			C17-5416	X			
D31		X		X	X	77-401	X		C17-1791		X	X	
D33		X	X						C17-1575-1578	X			
D34	(a)												
D38		X		X	X	75-797	X		C17-1415		(b) X	X	
D39		X		X	X	75-797	X		C17-1415		(b) X	X	

b. Industrial Wastewater Treatment Plants

There are no industrial plants treating their own process wastes; all industries discharge to municipal systems.

c. Privately Owned Municipal Type Plants:

The Stonewall Utility Company plant (D-34) is the only privately owned, municipal type facility in the basin, and it is located within the Salt Creek FPA. (Table 18-17) This facility is expected to be within the year 2000 service area of the Salt Creek Drainage Basin Sanitary District. Plans have been formulated for its phase out to the district.

d. Miscellaneous Wastewater Treatment Plants

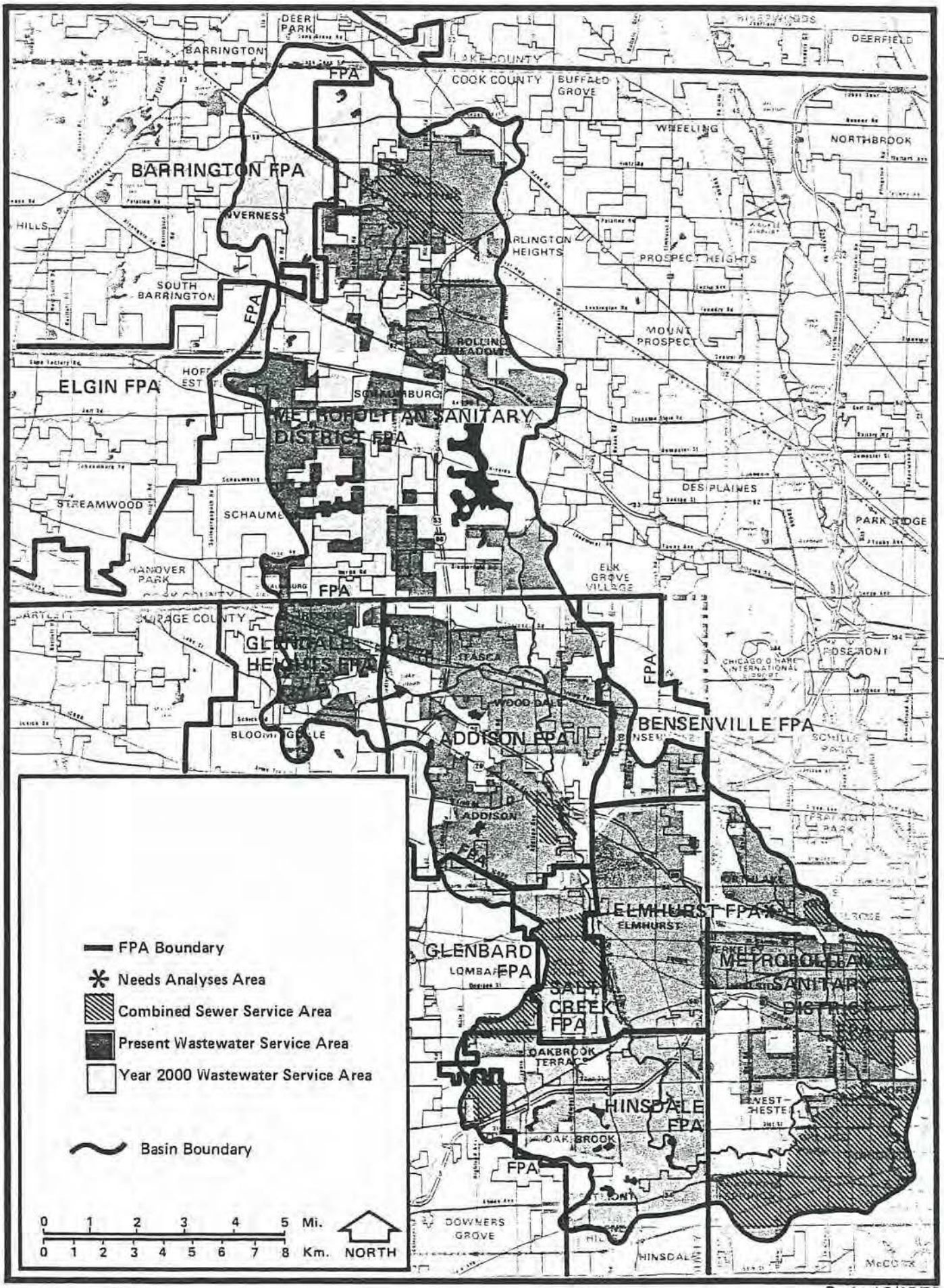
Six "miscellaneous" wastewater treatment facilities are currently discharging in the Salt Creek basin. Information on these facilities, including treatment units, flows, and effluent limitations is presented in Table 18-18 (A and B).

Adventureland Park (D-1) is in the projected Addison year 2000 service area; the Boy Scouts of America East Central Headquarters (D-5) is in the projected year 2000 Hinsdale Sanitary District service area; Wall's Trailer Park (D-23) is in the Elmhurst projected year 2000 service area; and the Medinah North School (D-29) is in the year 2000 Roselle service area. However, these projected service area extensions are based on Commission studies of population densities which could merit municipal sewer service. Actual extensions of sewer service will rest with the local service agencies. The Elk Grove Mobile Home Park (C-10) and the U.S. Army Reserve Center (D-22) are not expected to be in any proposed year 2000 sewer service area. Flows from Wall's Trailer Park are proposed to be diverted to the Elmhurst municipal plant. The future of the other five miscellaneous plants is unknown. It has been assumed they will continue to operate through the year 2000. Given their small sizes and the random type of urbanization served, no useful purpose would be served by forecasting their future growth.

e. Other Point Source Discharges

As noted in Table 18-19, seven other privately owned facilities have NPDES permits for discharging cooling water or stormwater to Salt Creek. It is assumed that these discharges will be continued in the future.

Figure 18-5: WASTEWATER SERVICE AREAS



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f. Combined Sewer Overflows

Combined sewers are found in a number of communities in Du Page and Cook counties. It is estimated that 17.5 square miles of the Salt Creek basin are tributary to combined sewer overflows.

g. Local Facilities Planning

Water quality in the basin is influenced by facilities planning activities in the Addison, Bensenville, Elmhurst, Hinsdale, Salt Creek Drainage Basin Sanitary District, MSDGC, and Glendale Heights FPAs. Minor overlaps from neighboring FPAs do occur, but these areas are not expected to have any significant point source impacts on water quality. Facilities planning areas are depicted in Figure 18-5.

(1) Addison FPA: There are six publicly owned wastewater treatment plants in the Addison FPA, two of which are owned and operated by Addison, two by Wood Dale, one by Itasca, and one by the Du Page County Department of Public Works (DCDPW). The Addison collection system also contains combined sewers serving 257 acres and discharging directly into Salt Creek during wet weather periods. The future status of these facilities is uncertain at this time. The facilities plan prepared by the Village of Addison called for expansion of the Addison North (D-1) and South (D-2) plants in two phases. Phase I, to be completed by 1980, called for expansion of Addison North from 2.0 to 6.5 mgd and expansion of Addison South from 2.1 to 3.2 mgd. The DCDPW Nordic Hills plant (D-18) would be phased out to Itasca (D-29). The Itasca and the Wood Dale North (D-38) and South (D-39) plants would be upgraded under Phase I to meet 10/12 effluent standards. The Addison South plant would also construct facilities to transport, provide primary treatment, and chlorinate combined sewer overflows up to 10 times average plant capacity. Phase II, to be completed by 1990, called for further expansion of Addison South to 5.5 mgd and Addison North to 11.0 mgd. The Itasca and Wood Dale plants both would be phased out to Addison North at that time.

The Village of Itasca has recently received permission from the IEPA to form its own sub-FPA and to prepare its own facilities plan. Wood Dale was also given permission to do the same, providing it could show a cost-effective basis on which to do so. Feasibility studies have indicated that advanced treatment of Itasca's wastewater by land application could be more cost-effective than conventional treatment at Addison. The proposed land application site is an area of Itasca known as Campbell Slough. The Village maintains the project may provide benefits of flood control, groundwater recharge, low-flow augmentation of Springbrook

TABLE 18-18 A: MISCELLANEOUS WASTEWATER TREATMENT PLANTS — SALT CREEK BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
D1	Adventureland Park	0050032	Addison/Addison	Addison		0.020			
D5	Boy Scouts of Amer. E. Centrl	0050610	Hinsdale/ /Hinsdale	Oakbrook	A		0.010	-	0.010
C10	Elk Grove MHP	None	MSDGC/MSDGC	Elk Grove	A				
D22	U.S. Army Reserve Center	0032981	Addison/Addison	Lombard	L	0.005		-	
D23	Walls Trailer Park	0050695	Elmhurst/ /Elmhurst	Elmhurst	AC,L	0.015	0.002	-	0.002
D29	Medinah North School	0050601	Glendale Hts./ /Glendale Hts.	Roselle	AD,L,E	0.0075			
	(1): Activated sludge (A); contact stabilization (AC); extended aeration (AD); chlorination (E); tertiary lagoon (L).								

TABLE 18-18 B: MISCELLANEOUS WASTEWATER TREATMENT PLANTS — SALT CREEK BASIN

MAP CODE	RECEIVING STREAM			NPDES PERMIT DATES		EFFLUENT REQUIREMENTS (mg/l)								COMMENTS
	NAME	7 DAY-10 YR. LOW FLOW (MGD)				1976(1)				2000				
		1970	2000	ISSUED	EXPIRES	BOD	TSS	P	NH_3-N	BOD	TSS	P	NH_3-N	
D1	Springbrook Ck	0		4-5-77	1-31-81	30	30							To be constructed
D5	Subsurface to Salt Creek	0		Draft	5-31-81	30	30							
C10	Addison Creek	0												
D22	Swamp to Salt Creek	0		11-21-77	10-31-82	30	30							Nike site
D23	Flagg Creek	0		8-30-77	12-31-81	4	5							
D29	ditch to Meacham Creek	0		9-7-77	7-31-81	4	5							

(1) From NPDES Permits

TABLE 18-19 : OTHER POINT SOURCE DISCHARGES — SALT CREEK BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
D1	Amsted Research Lab	0001651	Bensenville/ /Bensenville	Bensenville	0.012	7-26-74	12-31-78
C16	Bunker Ramo Amphenol Div.	0005061	MSDGC/MSDGC	Broadview	0.009	6-6-75	10-1-79
C24	Chicago & N.W. Trans. Company	0002127	MSDGC/MSDGC	Proviso	0.800	5-20-75	12-31-78
D13	Electronicast	0038474	Addison/Addison	Addison	0.001	4-17-75	6-30-79
D14	Elmhurst-Chicago Stone	0053180	Elmhurst/Elmhurst	Elmhurst	2.500	1-24-77	3-31-80
C62	Hillside Stone Corp.	0035831	MSDGC/MSDGC	Hillside		5-16-75	9-1-75
D22	Ovaltine Food Prod.	0002348	Salt Creek S.D./ Salt Creek S.D.	Villa Park	0.170	12-5-74	9-30-75

Creek, recreational areas, and wildlife habitat. Crops of hay might also be grown to produce revenue.

Until the results of the Itasca facilities planning study and any revisions to the Addison and Wood Dale study have been completed and approved, the future status of the municipal type plants in this FPA is impossible to predict.

(2) Bensenville FPA: There are two municipal type wastewater treatment facilities in the Bensenville FPA, both owned and operated by the Village of Bensenville. The Bensenville North plant (D-5) treats industrial wastes and discharges its effluent into the Upper Des Plaines River basin. The Bensenville South plant (D-4), which discharges to the Salt Creek basin, is the main wastewater treatment facility in the FPA. Bensenville is presently completing expansion and upgrading of the South plant from 2.5 mgd to 4.0 mgd. This expansion was funded under a facilities planning exception and a formal facilities plan was not prepared. Bensenville has recently completed the preparation of a formal facilities plan to concentrate on the needs of the eastern half of the FPA. The results of this study call for the phase-out of the Bensenville North plant to the Bensenville South plant in 1990 and the expansion of the Bensenville South plant to 5.5 mgd at the same time.

(3) Elmhurst FPA: The City of Elmhurst owns and operates the only municipal type wastewater treatment facility in the Elmhurst FPA. The Elmhurst plant (D-21) was recently expanded to its present capacity of 6.0 mgd. The needs analysis report for the Elmhurst FPA recommended that an infiltration-inflow analysis and, if necessary, a sewer system evaluation survey be conducted for the Elmhurst sewer system. The report also suggested that planning and administrative work be initiated for an expansion of the Elmhurst plant to 7.5 mgd, with the addition of filtration and nitrification facilities before 1985. The original Elmhurst combined sewer system was recently separated. However, certain sanitary sewer bypasses and overflows were retained to prevent basement flooding. The needs analysis report recommended an infiltration-inflow study to quantify the magnitude of overflows and to develop solutions to this problem.

(4) Hinsdale FPA: There are two publicly owned wastewater treatment facilities in the Hinsdale FPA: the Hinsdale Sanitary District's Burr Ridge plant (D-26) and its Oak Brook plant (D-28). The Burr Ridge plant is tributary to the lower Des Plaines River basin and is discussed in that chapter. The Hinsdale Sanitary District has indicated that the future status of the Oakbrook plant could depend on the results of this Commission's 208 modeling work. The Sanitary District has not completed a formal facilities plan, as its plans were completed before the enactment of PL 92-500.

(5) Salt Creek Drainage Basin Sanitary District FPA: The only public, municipal type wastewater treatment facility in the FPA is owned and operated by the Salt Creek Drainage Basin Sanitary District. The Stonewall Utility Company also operates a private municipal type plant (D-34) in the FPA. The Salt Creek Drainage Basin Sanitary District has recently expanded its facility from 4.5 mgd to 5.0 mgd under a facilities planning exemption.

The Village of Villa Park, which is responsible for the sewer system tributary to the district's plant, is proceeding with plans to separate four combined sewer sections. This project will eliminate four combined sewer overflows within the Salt Creek Drainage Basin Sanitary District FPA within about 2 years.

(6) MSDGC FPA: The Metropolitan Sanitary District of Greater Chicago operates the John E. Egan Water Reclamation plant within the Salt Creek basin. The district does not anticipate any expansions to the existing 30 mgd capacity of the Egan plant before the year 2000. The MSDGC anticipates construction of one new interceptor if the Inverness area requests annexation to the district. The plan for the elimination of combined sewer overflows in the Salt Creek basin calls for sewer separation in Palatine and connections to TARP by Brookfield, LaGrange Park, and Western Springs.

(7) Glendale Heights FPA: The Village of Roselle's Main wastewater treatment facility (D-31) is located in and discharges to the Salt Creek basin. The status of this facility is unclear at this time. The original facilities plan called for phasing out of the Roselle Main plant to a regional facility at Glendale Heights around 1980. A revised facilities plan has been recently prepared which suggests that the Roselle Main plant will remain in service and be expanded to function through the year 2000. Until one of these facilities plans has been approved and accepted, no decision on the status of the Roselle Main plant can be made. Further discussion of the issues in this FPA is contained in the Du Page River basin plan, Chapter Sixteen.

(8) Summary: The status of facility planning in the Salt Creek basin is summarized in Table 18-17. Only Bensenville, the Salt Creek Drainage Basin Sanitary District, and the MSDGC have approved and accepted facilities plans. Assumptions concerning the future configuration of municipal type facilities is also presented in Table 18-17, but due to the unfinished status of facilities planning, these assumptions must be regarded as tentative. Combined sewer overflows in the basin have been assumed to be eliminated by the year 2000.

(9) Wastewater Volumes and Loads: Commission estimates of wastewater volumes and loads of the publicly owned treatment works are contained in separate documents, Assessment of 201 Plans, prepared for facilities planning areas. Similar information, aggregated by point sources in the various reaches of the basin, is shown in Table 18-17.

18.05 NONPOINT SOURCES: EXISTING CONDITIONS

a. Urban Stormwater Systems

Separate sewer systems serve all or portions of approximately 18 municipalities and numerous unincorporated areas. It is estimated that 43 square miles, 27 percent of the basin area, are served by separate storm sewers. These systems discharge either directly into Salt Creek or indirectly via ditches or streams tributary to the creek.

Combined sewer systems are estimated to serve approximately 17.5 square miles, or 11 percent of the basin.

In the remaining areas of the basin, about 99.5 square miles, or 62 percent of the total area, stormwater enters Salt Creek via overland flow or through ditches or other small watercourses.

TABLE 18-20 : SUMMARY OF SEPTIC TANK INSTALLATIONS

SALT CREEK BASIN

COUNTY	NUMBER OF SEPTIC SYSTEMS			POPULATION SERVED		
	RESIDENTIAL	NON RESIDENTIAL	TOTAL	RESIDENTIAL	NON RESIDENTIAL (PE)	TOTAL
LAKE	68	0	68	245	0	245
COOK	2,372	6	2,378	9,607	61	9,668
DUPAGE	5,846	59	5,905	22,135	600(1)	22,735
TOTAL	8,286	65	8,351	31,987	661	32,648

(1) Inventory only accounted for systems having a PE of 35 or greater.

b. Construction Activities

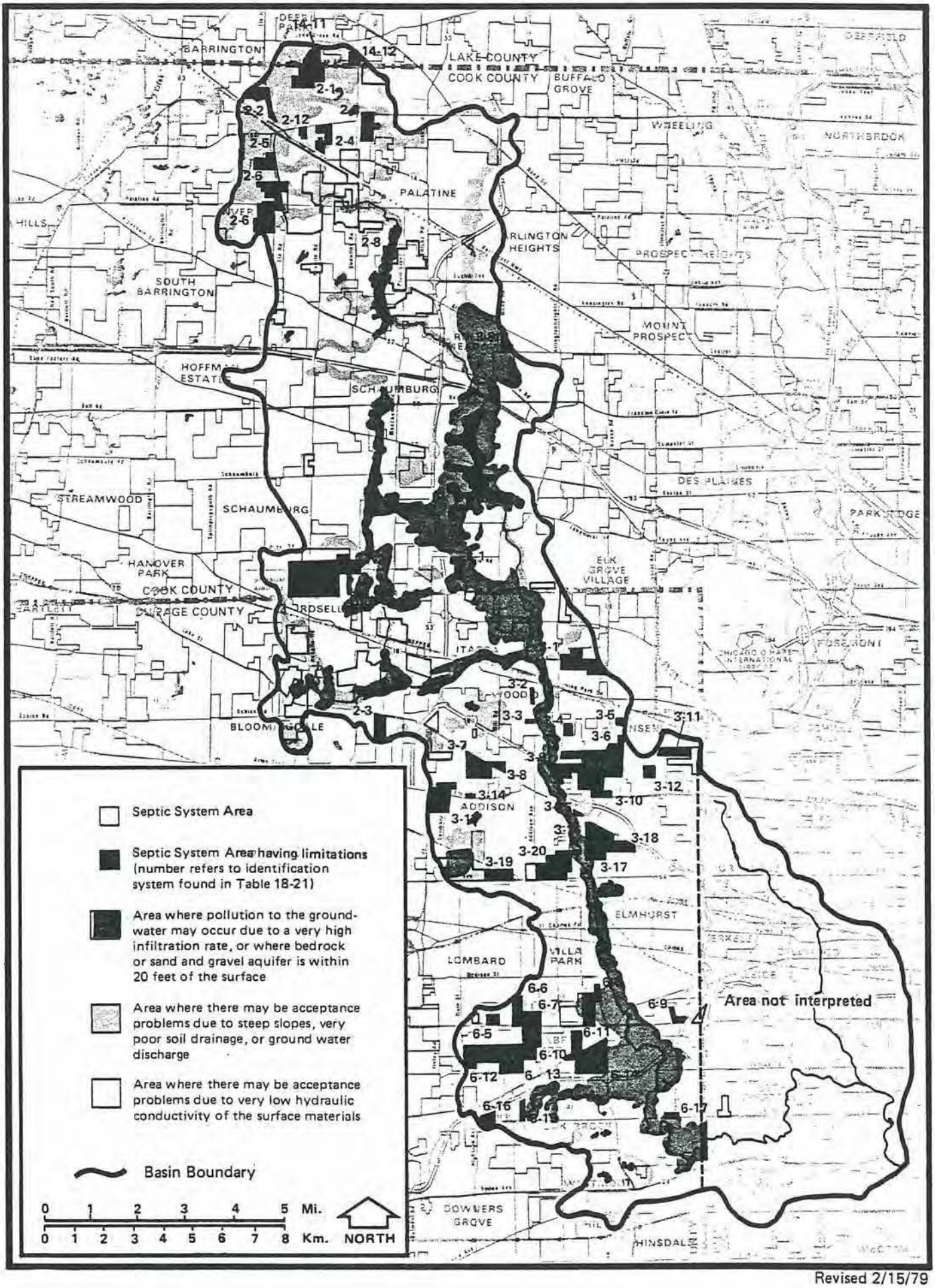
As discussed in Chapter Six, construction sites eroded by stormwater runoff can contribute sediments and other pollutants to rivers and streams. Construction activities are not known to be causing pollution problems in this basin at present, but the potential for water quality degradation does exist. Changes in population and land use, as forecasted, will generate substantial residential and commercial construction, accompanied by related surface disturbances for roads and utilities.

c. Septic Systems

Septic systems are used widely in areas not served by municipal sewers. Presently, there are an estimated 7,933 residential septic systems serving about 30,660 people (see Table 18-20). In addition, the basin has 65 nonresidential septic systems serving a population equivalent of 661.

Figure 18-6 shows the locations of all septic systems in the basin, and Table 18-21 provides a general description of systems known or suspected to have limitations relative to their usage.

Figure 18-6: LOCATION OF SEPTIC AREAS



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TABLE 18-21 : SEPTIC SYSTEM AREAS HAVING LIMITATIONS

SALT CREEK BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Lake	Ela	Deer Park	137	483	14-11
Cook	Palatine		100	400	2-1
Cook	Palatine		57	248	2-2
Cook	Palatine	Ill. 68 & Quentin Rd.	40	181	2-3
Cook	Palatine		48	192	2-4
Cook	Palatine		72	290	2-5
Cook	Palatine		216	866	2-6
Cook	Palatine		20	80	2-8
Cook	Palatine		8	32	2-12
Cook	Wheeling		16	64	3-8
Cook	Schaumburg	Taylorville and Sunset Hills Subdivision	325	1380	7-2
Cook	Elk Grove		37	150	8-1
Du Page	Bloomingdale		29	117	2-3 *
Du Page	Bloomingdale		34	137	2-5 *
Du Page	Addison	partly in Wood Dale	367	1380	3-1 *
Du Page	Addison	Wood Dale	51	192	3-2
Du Page	Addison		14	53	3-3
Du Page	Addison		6	22	3-4
Du Page	Addison		67	252	3-5 *
Du Page	Addison		54	203	3-6
Du Page	Addison		98	368	3-7
Du Page	Addison		54	203	3-8
Du Page	Addison		204	767	3-9
Du Page	Addison		234	880	3-10
Du Page	Addison	partly in Bensenville	91	342	3-11
Du Page	Addison	Bensenville	45	169	3-12

TABLE 18-21 : SEPTIC SYSTEM AREAS HAVING LIMITATIONS

SALT CREEK BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Du Page	Addison		137	515	3-13*
Du Page	Addison		6	23	3-14
Du Page	Addison		17	64	3-15
Du Page	Addison	partly in Addison	91	342	3-16
Du Page	Addison	Elmhurst	9	34	3-18
Du Page	Addison	partly in Addison	106	399	3-19
Du Page	Addison	partly in Villa Park partly in Addison	164	617	3-20
Du Page	York		47	179	6-5
Du Page	York	Lombard	81	309	6-6
Du Page	York		69	263	6-7
Du Page	York	Villa Park	171	652	6-8
Du Page	York		24	91	6-9
Du Page	York		130	495	6-10
Du Page	York		173	659	6-11
Du Page	York		72	274	6-12
Du Page	York		200	762	6-13
Du Page	York	Oakbrook Terrace	322	1227	6-14
Du Page	York		5	19	6-15
Du Page	York		61	232	6-16*
Du Page	York	Oakbrook	164	625	6-17

Revised 2/15/79

d. Hydrologic Modifications

Many streams in the study area contain channels, dams, weirs, and other structures which significantly influence and control the dissolved oxygen concentrations in those water bodies. Proper consideration was given to these structures in the water quality model. The influence of channel dams on water quality can often be dramatic. Weirs and dams create pools which have DO levels below or above those normally expected in a free flowing stream of similar water quality. Forty-eight dams were analyzed in the region, of which seven are located in the Salt Creek basin.

The flood control projects of the Soil Conservation Service, Illinois Division of Water Resources, and MSDGC relating to upper and lower Salt Creek were previously discussed in Section 18.02.

e. Agricultural Runoff

Although agriculture is declining rapidly in the watershed, it still has some impact on water quality. General problems of agriculturally related pollution are discussed in detail in Chapter Six.

Agricultural croplands in the basin currently amount to about 7,560 acres. These are expected to decrease by 50 percent to about 3,890 acres by the year 2000, due to urbanization. Because of anticipated shifts to greater row crop production, pasturelland acreages are less significant than croplands. Greater use of conservation tillage, contouring, and terracing are among the proposals considered in controlling agricultural related water quality problems in the basin, as well as reducing on-farm soil erosion.

f. Air Pollution

As discussed in Chapter Six, the impacts of air pollution on water quality vary in response to several factors. Critical among these is the area-volume ratio of the water body. In general, fallout is a greater concern with respect to large water bodies like Lake Michigan. However, the relative importance of air pollution is not likely to be great until the more apparent sources of water pollution have been controlled.

g. Surface Waste Disposal Sites

Five surface waste disposal sites were identified in the basin, including one active sanitary landfill, three inactive landfills, and one inactive open dump. While all these sites have the potential to cause surface and

subsurface water quality problems, there is no evidence that links water quality problems in the basin to the sites.

18.06 DISPOSAL OR RESIDUALS

The areawide aspects of residuals waste management are discussed in Chapter Seven. At present there are no known problems associated with residuals management in the basin. However, as sludge volumes increase in the future as a result of increased wasteloads and higher levels of treatment, individual treatment plants may encounter difficulties and higher costs in processing, removing, and disposing or utilizing sludge material. Increased urbanization also will impact on the availability of proximate acreages for land application.

The predominant current method of sludge disposal in the basin involves removal of stabilized and dewatered sludge material by local residents for landscaping purposes. Lesser quantities are disposed of in sanitary landfills. Residuals from the MSDGC Egan plant are conveyed via pipeline to the district's West-Southwest treatment plant in Cook County. There are no industrial treatment plants in the basin, so the disposal of hazardous and toxic waste residuals does not present a problem.

Septic systems in the basin produce an estimated 2.3 million gallons of septage annually. Despite this large volume, septage disposal has not been identified as a significant problem. Septage volumes are expected to decrease in the future as municipal wastewater service is extended to additional areas.

18.07 EXISTING MANAGEMENT PROBLEMS

The major features of the existing water quality management system in northeastern Illinois have already been discussed in the areawide chapters of this report. In this chapter, management programs within the Salt Creek basin are presented, but only to the extent that it is necessary to clarify the previous areawide discussion.

Table 18-22 lists the public agencies in the basin which are currently involved in water quality related activities. Variations in programs and responsibilities between these agencies are indicated by a numerical code.

18.08 MODELING PROCESSES: FUTURE CONDITIONS

As described earlier, the first major use of the computer model in the process of simulation was to portray existing water quality conditions. The statistical results that were produced showed the waters in the basin to be generally of poor quality. State standards, which call for

at least 5 mg/l of dissolved oxygen, are being violated in all reaches.

The amount of BOD in the streams also is far in excess of acceptable levels. About 1,640 tons of BOD are entering the basin each year; this volume would have to be cut substantially before BOD levels would be low enough to result in good water quality.

The basin is also stressed by ammonia, with more than 715 tons entering Salt Creek annually.

The sources of these pollutants are overflows from combined sewers (which account for 33 percent of the BOD in the basin), discharges from wastewater treatment plants (36 percent of the BOD), and stormwater runoff (also the source of large volumes of BOD).

Thus, three sources--combined sewers, treatment plants, and stormwater runoff--became the focus of efforts to develop first and second test plans, and finally, a recommended plan for the basin.

a. First Test Plan Assumptions

Beginning in August 1977, the Commission held a series of meetings in the Salt Creek basin to explain water quality conditions to residents and local officials and to allow them to participate in the development of the basin's component of the areawide plan.

At the initial meetings, the Commission staff reported on existing water quality conditions, identified sources of pollution, and assisted participants in developing appropriate strategies. The suggestions were reviewed by Local Steering Committees from Cook and Du Page counties. The Local Steering Committees, in turn, made recommendations on alternate strategies to be evaluated using the water quality model and other techniques. The Commission's 208 Steering Committee reviewed the recommendations and formulated a first test plan to be evaluated.

In addition to the recommendations developed through the process described above, the first test plan was shaped by assumptions made to reflect forecasted population increases, land cover changes, improvements in wastewater and stormwater management, flood control, and changes in agricultural practices. These assumptions are described below.

(1) Population and Land Use: The Commission's 1976 forecasts for the year 2000 were used to determine future changes in land cover and wastewater loads. These forecasts were applied in each reach. Overall, a 38 percent increase in population was forecast by the year 2000.

Present land use in the basin was determined by satellite photography and field surveys. This information was divided into four categories: (1) lowlands--marshes, swamps, and forested areas lying close to rivers and

TABLE 18-22: EXISTING LOCAL WATER QUALITY MANAGEMENT AGENCIES AND PROGRAMS: SALT CREEK BASIN*

MUNICIPALITIES			
Addison (DuPage)	1,2,5 +	Maywood (Des Plaines)	1,3,6 +
Arlington Heights (Des Plaines)	1,3,4, 5,6	Melrose Park (Des Plaines)	1,3,6
Bellwood	1,6	Northlake (Des Plaines)	1,6
Bensenville	1,2	North Riverside (Des Plaines)	1,3,6
Berkeley	1,6	Oak Brook (DuPage)	5
Bloomingdale (DuPage)	1,2,5	Oakbrook Terrace (DuPage)	1
Broadview	1,3,6	Palatine (Des Plaines)	1,4,5,6
Brookfield (Des Plaines)	1,3,6	Riverside (Des Plaines)	1,3,6
Clarendon Hills (Des Plaines)	1,5	Rolling Meadows (Des Plaines)	1,4,6
Downers Grove (DuPage)	1,5	Roselle (DuPage)	1,5,6
Elk Grove Village (Des Plaines)	1,5,6	Schaumburg (Fox, DuPage)	1,4,5,6
Elmhurst	1,2,5	Stone Park (Des Plaines)	1,6
Franklin Park (Des Plaines)	1,3,6	Villa Park (DuPage)	1,5
Hillside	1,5,6	Westchester	1,6
Hinsdale (Des Plaines)	1,5	Western Springs (Des Plaines)	1,3,6
Hoffman Estates (Fox)	1,4,5,6	Westmont (Des Plaines, DuPage)	1,5
Inverness (Fox)	4,5	Wood Dale	1,2,5
Itasca	1,2,5		
LaGrange (Des Plaines)	1,3,6		
LaGrange Park	1,3,6		
Lombard (DuPage)	1,2,5		
Lyons (Des Plaines)	1,3,6		

* Additional basins shown in parentheses for those municipalities which cross basin boundaries.

+ Numbers indicate existing water quality related activities as follows:

1. Wastewater collection agency
2. Wastewater treatment agency
3. To be included in MSDGC TARP system
4. Has enacted erosion and sediment control regulations
5. Has enacted stormwater detention regulations
6. MSDGC stormwater detention regulations apply

TABLE 18-22: EXISTING LOCAL WATER QUALITY MANAGEMENT AGENCIES AND PROGRAMS: SALT CREEK BASIN* (continued)

SANITARY DISTRICTS	
Barrington Woods	2,6 +
Downers Grove	2
Hinsdale	1,2
Metropolitan Sanitary District of Greater Chicago	2
Plum Grove Woodlands	2,6
Salt Creek	2
Timber Trails	1

COUNTIES			
Cook	4	DuPage	1,2

SOIL AND WATER CONSERVATION DISTRICTS
Kane/DuPage
North Cook
Will/South Cook

* Additional basins shown in parentheses for those municipalities which cross basin boundaries.

+ Numbers indicate existing water quality related activities as follows:

1. Wastewater collection agency
2. Wastewater treatment agency
3. To be included in MSDGC TARP system
4. Has enacted erosion and sediment control regulations
5. Has enacted stormwater detention regulations
6. MSDGC stormwater detention regulations apply

streams; (2) grasslands--open to the infiltration of rainwater and snowmelt, but not tilled regularly, including pastures, parks, golf courses, and upland forested areas; (3) cropland--regularly tilled for agricultural purposes (there is some exchange between cropland and grasslands due to crop rotation); and (4) impervious surfaces--covered with buildings, roads, and parking lots. For the first test plan, estimates of land cover changes were made using population forecasts and their attendant housing and employment assumptions. Land required for new urbanization in the basin was taken from the grassland and cropland categories first. When this land was largely depleted, land from the lowland category was taken for urban purposes. Overall, a 38 percent increase in impervious area was forecasted over the period 1976-2000.

(2) Local Facilities Plans: In general, it was assumed that all planned improvements in municipal wastewater treatment plants (per local facilities plans) would be in operation and that all treatment plants would meet required water quality standards in their effluent discharges.

(3) Phosphate Reductions: The City of Chicago and several suburbs have ordinances limiting the phosphate content of home laundry detergents. As a result, most distributors have withdrawn high phosphate home laundry detergents from the entire metropolitan area. In considering changes in wastewater treatment practices for the year 2000, it was assumed that regulations limiting the amount of phosphate in domestic detergents would be expanded to cover, in part, some commercial and industrial uses as well. Based upon studies of the effect of phosphate detergent reductions on wastewater treatment plant operations, it was assumed that phosphate concentrations in plant effluents for the year 2000 would be two-thirds of existing levels.

(4) Combined Sewer Overflows: It was assumed in the first test plan for the year 2000 that all combined sewer overflows would be eliminated, either by diversion of these flows to the completed tunnel and reservoir system of the Metropolitan Sanitary District of Greater Chicago, or by other means. The separation of combined sewers and the elimination of overflow points was assumed for Palatine, the Addison facilities planning area, and the Salt Creek Drainage Basin Sanitary District (Villa Park).

(5) Urban Stormwater Runoff: The conditions set for the year 2000 in simulating future water quality assumed that 25 percent of the BOD in urban stormwater runoff would be removed from the existing urban land surface (largely through street vacuuming) and prevented from entering Salt Creek. In newly developed urban areas, it was assumed that 50 percent of the BOD materials would be captured before they could be removed by urban runoff. A variety of

different methods could be used to effect this reduction, including street vacuuming, stormwater detention basins, planned unit developments, grassed waterways, and other techniques.

(6) Septic Systems: The impact of septic systems on water quality was also considered in the simulation of conditions in the year 2000. In the first test plan, it was assumed that the adverse effects of septic systems on water quality would be eliminated, either by the extension of sewage collection and treatment systems or by eliminating problems in the remaining systems themselves.

(7) Soil Conservation: The increases in agricultural land conservation practices are included in the calculation of future water quality in the basin. The U.S. Soil Conservation Service aided the Commission staff in estimating how much land would be brought under conservation programs. The practices which would be used were selected on the basis of the greatest impact on water quality. Those were contour plowing, terracing, conservation tillage, a combination of these techniques, and conversion to grasslands. In this basin, 915 acres of land were forecast to have these conservation measures practiced by the year 2000.

(8) Stream Flow Changes: Twelve reservoirs are assumed to be in place in the year 2000 that do not now exist in the Salt Creek basin. Only five of these were assumed to have an effect on water quality, and these are represented in the first test plan simulation.

b. First Test Plan Simulated Results

If a water quality program that contained all the features of the first test plan were implemented, overall water quality in the basin would be substantially improved, except in the highly urbanized Addison Creek area. Salt Creek would be capable of supporting a more diversified fish and aquatic life population, though water quality would still be less than ideal. These were the conclusions reached after a review of the simulated data for water quality in the year 2000.

The simulation showed the interaction of two competing trends. Efforts to improve water quality -- improved wastewater treatment, the elimination of combined sewers, and street sweeping and vacuuming -- would offset the expected increase in the volume of pollution in urban runoff caused by increased population.

The results of the year 2000 simulation for Reach 21 show that the first test plan would produce a slight increase in the amount of BOD and a significant decrease in the amount of ammonia in the basin. The current BOD load to Reach 21 is about 1,640 tons per year (Table 18-16); in the

year 2000, under simulated conditions, the load would be about 1,680 tons per year. This increase in BOD, however, would be offset because the greater flow of water expected in the basin would dilute this pollutant. The ammonia load to Reach 21 would be 197 tons per year in the year 2000, down from 715 tons per year under existing conditions.

Table 18-23 summarizes the water quality conditions of the first test plan in six reaches and compares the data to existing conditions. Table 18-24 illustrates the effect the first test plan would have on total pollutant loads in Reach 21, the farthest downstream reach.

The Commission based its assessment of alternative plans on the total time that in-stream water quality standards would be violated. In the formulation of alternative strategies, an attempt was made to develop plans that would allow streams to meet standards 95 percent of the time. For dissolved oxygen, the standard of 5.0 mg/l was used, a variation from the state standard which calls for 6 mg/l and not less than 5.0 mg/l. Table 18-25 illustrates the effect that the first test plan would have on compliance with various standards. Columns in each table show the percent of time that standards for each pollutant indicator would be violated in each reach. The objective was to have all figures in these columns below 5.

With respect to dissolved oxygen, the first test plan would produce significant improvements in implemented. For example, whereas conditions in Reach 21 now violate the DO standards about 15 percent of the time, the standard (5.0 mg/l) would be violated only 1 percent of the time in the year 2000. Violations of the DO standards in most other reaches would also be reduced significantly. Expected changes in DO levels under the first test plan are presented for all six reporting reaches in Table 18-26.

c. Second Test Plan: Assumptions and Results

The second test plan was developed through much the same process described earlier for the first test plan. Simulated results for the first test plan were publicized and discussed at a series of public meetings in the basin. Through the areawide planning committee structure, a second test plan evolved out of suggestions for improving the first test plan.

A number of suggestions, or "specifications," emerged from the screening process. These were tested or evaluated and the results (in most cases) are shown as percentage changes from the first test plan. They are shown this way because the second test plan is essentially a series of modifications to the first test plan. The percentage figures measure the change in the amount of pollutants entering the streams of the Salt Creek basin.

TABLE 18-23 : COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS – FIRST TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 5/6			REACH 7		
		Existing	1st		Existing	1st	
BOD (mg/l) Maximum	None	47.3	15.9		26.6	16.5	
Minimum		1.49	1.35		1.66	2.47	
Mean		4.58	4.60		2.46	5.72	
Ammonia (mg/l) Maximum		2.28	.91		1.82	1.57	
Minimum		0.00	0.00		.08	0.0	
Mean		.30	.24		.24	.83	
Frequency of Violation	1.5[1]	17	0		8	2	
Average Duration of Violations (hours)	1.5[1]	7	0		4	2	
Nitrate (mg/l) Maximum	None	1.82	1.40		6.55	6.90	
Minimum		.14	0.00		.43	.36	
Mean		.85	.30		3.62	4.20	
Frequency of Violation	10.0	0	0		0	0	
Average Duration of Violations (hours)	10.0	0	0		0	0	
Phosphate (mg/l) Maximum		.83	.74		1.98	1.43	
Minimum		.08	.01		.08	.18	
Mean		.16	.30		.92	.82	
Frequency of Violation	.05	1	3		1	1	
	.20	170	10		3	4	
Average Duration of Violations (hours)	.05	26,304	8,642		26,304	26,304	
	.20	34	1,937		8,750	6,570	

(1) Illinois Pollution Control Board Standard

TABLE 18-23 : COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS – FIRST TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 11			REACH 15		
		Existing	1st		Existing	1st	
BOD (mg/l) Maximum	None	23.0	21.4		42.0	33.9	
Minimum		2.08	2.62		1.9	1.69	
Mean		5.13	8.80		5.6	9.80	
Ammonia (mg/l) Maximum		2.64	1.47		3.5	1.49	
Minimum		.27	0.00		0.0	0.00	
Mean		1.04	0.71		1.4	0.63	
Frequency of Violation	1.5[1]	55	0		84	0	
Average Duration of Violations (hours)	1.5[1]	43	0		140	0	
Nitrate (mg/l) Maximum	None	5.33	8.30		4.3	9.85	
Minimum		.47	.55		.5	.52	
Mean		3.03	5.02		2.6	5.80	
Frequency of Violation	10.0	0	0		0	0	
Average Duration of Violations (hours)	10.0	0	0		0	0	
Phosphate (mg/l) Maximum		1.92	1.42		1.9	1.39	
Minimum		.19	.14		.10	.12	
Mean		.95	.78		1.0	.75	
Frequency of Violation	.05	1	1		1	1	
	.20	2	4		1	6	
Average Duration of Violations (hours)	.05	26,304	26,304		26,304	26,304	
	.20	13,100	6,561		26,304	4,374	

(1) Illinois Pollution Control Board Standard

TABLE 18-23 : COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS – FIRST TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 19			REACH 21		
		Existing	1st		Existing	1st	
BOD (mg/l) Maximum	None	47.5	26.2		63.6	62.3	
Minimum		1.7	.63		2.0	1.73	
Mean		14.6	7.16		7.1	13.1	
Ammonia (mg/l) Maximum		5.0	1.96		3.2	1.49	
Minimum		.24	.04		0.0	0.0	
Mean		2.3	.99		1.3	.56	
Frequency of Violation	1.5[1]	141	68		84	0	
Average Duration of Violations (hours)	1.5[1]	146	38		125	0	
Nitrate (mg/l) Maximum		5.4	11.7		4.4	9.80	
Minimum		.39	.38		.01	.06	
Mean		3.3	6.54		2.5	5.28	
Frequency of Violation	10.0	0	24		0	0	
Average Duration of Violations (hours)	10.0	0	133		0	0	
Phosphate (mg/l) Maximum		1.8	1.29		1.9	1.39	
Minimum		.13	.11		.12	.01	
Mean		1.1	.67		.97	.67	
Frequency of Violation	.05	1	1		1	5	
	.20	2	12		1	43	
Average Duration of Violations (hours)	.05	26,304	26,304		26,304	5,258	
	.20	13,143	2,181		26,304	602	

(1) Illinois Pollution Control Board Standard

TABLE 18-24: COMPARISON OF SOURCES AND VOLUMES OF POLLUTANTS
REACH 21

Pollutant Indicator and Source	Existing Conditions				First Test Plan							
	Surface		Ground		Surface		Ground		Surface		Ground	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
BOD (tons/yr.) Boundary Cond.	0	0			0	0						
Treatment Plants	588	35.8			1132	67.3						
Comb. Sewer Over.	539	32.9			0	0						
Lowland	21.5	1.3	10.2	.6	20.9	1.2	9.94	.6				
Cropland	15.4	.9	7.86	.5	3.88	.2	2.54	.2				
Grassland	140	8.5	59.6	3.6	156	9.3	67.3	4.0				
Impervious	259	15.8			288	17.1						
TOTAL	1563	95.3	77.7	4.7	1601	95.2	79.8	4.8				
Ammonia (tons/yr.) Boundary Cond.	0	0			0	0						
Treatment Plants	610	85.3			134	67.6						
Comb. Sewer Over.	42.9	6.0			0	0						
Lowland	2.15	.3	.55	.1	2.09	1.1	.54	.3				
Cropland	3.09	.4	.39	.1	.78	.4	.13	.1				
Grassland	42.0	5.9	3.34	.5	46.9	23.8	3.83	1.9				
Impervious	10.84	1.5			9.61	4.9						
TOTAL	711	99.4	4.28	.6	193	97.7	4.50	2.3				

TABLE 18-24: COMPARISON OF SOURCES AND VOLUMES OF POLLUTANTS (Continued)
REACH 21

Pollutant Indicator and Source	Existing Conditions				First Test Plan							
	Surface		Ground		Surface		Ground		Surface		Ground	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Nitrate (tons/yr.) Boundary Cond.	0	0			0	0						
Treatment Plants	190	60.7			941	89.1						
Comb. Sewer Over.	8.17	2.6			0	0						
Lowland	4.3	1.4	9.67	3.1	4.19	.4	9.39	.9				
Cropland	5.83	1.9	7.86	2.5	1.46	.1	2.54	.2				
Grassland	28.0	8.9	55.1	17.6	31.3	3.0	61.5	5.8				
Impervious	4.32	1.4			4.79	.5						
TOTAL	241	76.6	72.6	23.1	983	93.1	73.4	6.9				
Phosphorous (tons/yr.) Boundary Cond.	0	0			0	0						
Treatment Plants	123	74.8			109	78.5						
Comb. Sewer Over.	12.7	7.7			0	0						
Lowland	2.15	1.3	.61	.4	2.09	1.5	.59	.4				
Cropland	1.78	1.1	.47	.3	.88	.6	.15	.1				
Grassland	16.1	9.8	4.11	2.5	17.8	12.8	4.59	3.3				
Impervious	3.46	2.1			3.8	2.7						
TOTAL	159	96.9	5.19	3.1	134	96.2	5.33	3.8				

TABLE 18-25: WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

REACH 5/6

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan	
Temperature °C	32.2	1	9		2	15		0	0	
Dissolved Oxygen as O, mg/l	5.0	23	23		10	10		0	0	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	17	0		7	0		0	0	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	1	3		26,304	8,642		100	98	

REACH 7

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan	
Temperature °C	32.2	0	0		0	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	39	20		16	4		2	0	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	8	2		4	2		0	0	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	1	1		26,304	26,304		100	100	

REACH 21

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan	
Temperature °C	32.2	2	0		6	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	102	74		38	4		15	1	
BOD_{20} Carbonaceous as O, mg/l	10	0	163		0	63		0	39	
Ammonia as N, mg/l	1.5	84	0		125	0		40	0	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	1	5		26,304	5,258		100	100	

TABLE 18-5 : WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS (Continued)

REACH 11

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan	
Temperature °C	32.2	0	0		0	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	108	49		25	7		10	1	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	55	0		43	0		9	0	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	1	1		26,304	26,304		100	100	

REACH 15

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan	
Temperature °C	32.2	0	0		0	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	85	107		114	11		37	5	
BOD_{20} Carbonaceous as O, mg/l	10									
Ammonia as N, mg/l	1.5	84	0		140	0		45	0	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	1	1		26,304	26,304		100	100	

REACH 19

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan		Existing Conditions	1st Test Plan	
Temperature °C	32.2	0	0		0	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	166	116		33	22		21	10	
BOD_{20} Carbonaceous as O, mg/l	10	94	109		244	27		87	11	
Ammonia as N, mg/l	1.5	141	68		146	38		78	10	
Nitrate as N, mg/l	10	0	24		0	133		0	12	
Phosphorus Soluble as P, mg/l	.05	1	1		26,304	26,304		100	100	

TABLE 18-26 : CHANGES IN DISSOLVED OXYGEN LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

(All data in mg/l)	REACH 5/6			REACH 7		
	Existing	1st		Existing	1st	
Maximum	13.6	13.2		12.8	12.5	
Minimum	2.33	4.41		2.25	4.54	
Mean	8.63	9.13		7.45	8.38	
* Violations	23	23		39	20	
Average Duration	10	10		16	4	
** Overall Assessment	Good	Good		Good	Good	

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time D O levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

(All data in mg/l)	REACH 11			REACH 15		
	Existing	1st		Existing	1st	
Maximum	12.3	12.3		11.4	12.1	
Minimum	1.88	2.87		1.04	2.29	
Mean	7.02	8.18		5.87	7.94	
* Violations	108	49		85	107	
Average Duration	25	7		114	11	
** Overall Assessment	Fair	Good		Bad	Good	

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time D O levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

TABLE 18-26: CHANGES IN DISSOLVED OXYGEN LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

(All data in mg/l)	REACH 19			REACH 21		
	Existing	1st		Existing	1st	
Maximum	13.0	13.0		11.9	12.1	
Minimum	0.0	2.12		1.1	3.0	
Mean	6.6	6.41		7.0	8.39	
* Violations	166	116		102	74	
Average Duration	33	22		38	4	
** Overall Assessment	Bad	Fair		Poor	Good	

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time D O levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

(1) Specification: Test the Effect of a 25 Percent Reduction in Waste Loads Due to Conservation And Recycling. 1299

(a) Interpretation: At each reporting reach, the contributions of point source discharges (excluding the cooling water discharges) reported in the first test plan were reduced by 25 percent, and that total pollutant loads were recalculated. 1302 1304 1305

(b) Results: Treatment plants contribute large portions of the flows and pollutant loads in the Salt Creek Basin, particularly during dry weather periods. It might be expected that a 25 percent reduction in flow would impact on in-stream water quality as well as on the collection and treatment systems. 1308 1309 1310 1311

Systems initially designed for the reduced flows can handle the changed parameters. For existing systems, problems will arise that must be accommodated. It first should be emphasized that the reduced volumes of flow do not automatically result in reduced quantities of pollutants. In fact, there probably will be no change in the latter. Thus, more concentrated wastewaters must be collected and treated. 1312 1313 1314 1315 1316 1317

The reduced flows in existing sewers will cause lower velocities in the pipes. These, in turn, may result in the 1318 1319

deposition of more solids in the sewer inverts, thus promoting anaerobic conditions and their concurrent odors. The wastewaters will take a longer time to reach the treatment plants. The anaerobic sewage and increased concentrations of organic matter will create local odor problems at the plants and adversely affect the treatment processes which are based on aerobic systems. Chemicals may have to be added at the front end of the systems, to control these problems.

Sewage treatment systems reduce pollutants so as to meet the prescribed effluent concentrations. With the effluent volume being reduced by 25 percent, correspondingly higher amounts of pollutants must be removed in the treatment process so as to meet the limiting concentrations in the effluents. Biological treatment units, final settling tanks and solids handling facilities would all be affected by the increased strength and the higher reductions required. Pumping facilities and related operating costs would be lower.

In passing, it should be noted that treatment plants are designed to accommodate loads which vary widely, both diurnally and seasonally. Thus, except for the anaerobic sewage, the 25 percent reduction could be handled in existing and new systems as well. Another impact is that the reduced effluents which are discharged will provide less diluting waters to downstream plants.

(2) Specification: Test In-Stream Aeration.

(a) Interpretation: In Addison Creek (Reach 19), rated "fair" under first test plan conditions, the amount of oxygen required to maintain a minimum dissolved oxygen concentration of 5.0 mg/l was computed.

(b) Results: An additional 8,095 pounds of oxygen per year would be needed for Reach 19. However, it has been observed from the simulation results that nearly all violations of the 5.0 mg/l dissolved oxygen standard occur during wet weather conditions and that low-flow dissolved oxygen deficits are not a significant problem.

Conditions in Addison Creek are not conducive to conventional in-stream aeration for the following reasons:

- Stream depths are generally inadequate for efficient oxygen transfer.
- Dissolved oxygen deficits occur during high-flow conditions. Thus, large quantities of oxygen would be required over short periods of time to eliminate deficits.
- If oxygen is to be supplied by in-stream aeration, the peak demand rate would be approximately 370 pounds per hour during high-flow conditions.

(3) Specification: Test Performance Zoning and Planned Unit Developments in Urbanizing Areas.

(a) Interpretation: Performance zoning would cause a 39 percent reduction in new impervious area from the conventional zoning used in the first test plan. At selected reporting points, flows and constituent loads were recomputed having larger amounts of land as grassland, rather than as impervious surfaces.

(b) Results: A 39 percent reduction in new impervious area from the first test plan conditions resulted in minor changes in pollutant loads. The new impervious area in the first test plan was only about 4.7 square miles, or about 25 percent of the total imperviousness in the year 2000. In addition, impervious surfaces contributed only about 18 percent of the flow in the basin under first test plan conditions. Reducing the new impervious area by 39 percent would account for a change of 1.83 square miles. Compared to the 18.8 square miles of impervious area called for in the first test plan, the change will be about 10 percent. However, the reduced flow and associated pollutants from the smaller impervious area would be offset by increases in flow and associated pollutants from the expanded grassland area, resulting in a very minor change in overall pollutant loads. In fact, conversion to grassland results in a slight increase in phosphate and nitrate but a more significant decrease in BOD. Such a reduction would improve dissolved oxygen conditions during critical wet weather periods when impervious washoff is the major contributor of BOD.

Other benefits of this strategy, as compared to first test plan conditions, would include reduced flood flows, a reduction in sediment from impervious runoff, and reduced street vacuuming costs.

(4) Specification: Test the Effect of Removing Phosphorus From Wastewater. Include the Roselle Main and Hinsdale-Oak Brook Sewage Treatment Plants in the Basin, and Represent the Bensenville Plant at 4 mg/l BOD Instead of 10 mg/l, as Called for by Its NPDES Permit.

(a) Interpretation: At each of the reporting reaches, loads were recalculated based on the following:

- Treatment plants will be discharging phosphorus at a rate of 1.0 mg/l. Of that, 0.8 mg/l will be dissolved phosphorus (phosphate).
- The Roselle Main plant flow would be equal to what it would have contributed to a regional plant in the Du Page River basin under the first test plan.
- The Hinsdale-Oak Brook plant is represented at its existing flow.

The characteristics of these plants were assumed to be as follows:

	Flow (cfs)	BOD (mg/l)	NH -N (mg/l)	NO -N (mg/l)	PO -P (mg/l)
Roselle Main	1.7	10	1.5	8.5	.8
Hinsdale-Oak Brook	4.1	10	1.5	15.5	.8

- The Bensenville South plant effluent BOD is represented at 4 mg/l rather than 10 mg/l.

(b) Results: The impact of reducing phosphate loads would likely be minor. Phosphate concentrations in Salt Creek, even with the point source reductions, would generally be far in excess of the reported limiting concentration for algal blooms. The major reason for the large increase in algal populations simulated in Salt Creek between existing and first test plan conditions is the influence of the Busse Woods Reservoir. This reservoir acts as a source of algae for the downstream reaches of Salt Creek. Since there are no point sources discharging upstream of Busse Woods, the point source phosphate limitations would have no impact on the reservoir.

The impact of the Roselle Main plant on Spring Creek is likely to be quite significant. The Roselle effluent would contribute major loads of oxygen-demanding pollutants and nutrients. These would likely contribute to dissolved oxygen deficits and algal blooms in Lake Kadijah.

The impact of the Hinsdale-Oak Brook plant would be relatively minor due to the significant dilution provided by upstream flows.

Changing the Bensenville plant effluent BOD from 10 to 4 mg/l would result in a slight improvement in Addison Creek. However, there are few, if any, dry weather dissolved oxygen problems in Addison Creek under first test plan simulation conditions. Thus, it appears that going to 4 mg/l BOD would be unwarranted.

(5) Specification: Reduce Growth Forecasts by 50 Percent, Except in Du Page County.

(a) Interpretation: At each reporting point, pollutant loads and flows were recalculated to reflect point source and land cover changes associated with a 50 percent reduction in population growth for basin areas outside of Du Page County. Assumptions about Du Page County land cover and treatment plant flows were not changed from the first test plan. The MSDGC Egan plant flow increase between existing conditions and the year 2000 conditions used in the first test plan was reduced by one-half. (This was the only point source change.)

(b) Results: The major impact of this strategy would likely be an improvement in water quality during wet weather conditions due to the reduction in stormwater flows and oxygen-demanding pollutant loads from impervious surfaces. However, dry weather conditions may actually deteriorate from the first test plan conditions under this strategy. A significant reduction in flow from the MSDGC Egan plant would result in less dilution waters available to the downstream treatment plants. However, since there were no serious low-flow dissolved oxygen deficits simulated in the first test plan, a change of this magnitude probably will not significantly worsen water quality.

Other benefits of this alternative would include less pressure on water supply and lower operating and maintenance costs at the Egan plant.

(6) Specification: Deregionalization of the Addison North Treatment Plant.

(a) Interpretation: Under this scheme, flows would be represented approximately as follows:

Addison - 37 percent of the first test plan flow at Addison North.

Itasca - 33 percent of the first test plan flow at Addison North.

Wood Dale North - 18 percent of the first test plan flow at Addison North.

Wood Dale South - 12 percent of the first test plan flow at Addison North.

(b) Results: Deregionalization of the Addison North plant, with the Itasca and Wood Dale plants remaining independent, would have little impact on water quality in Salt Creek, assuming effluent concentrations remain the same as for the first test plan. Deregionalization would not affect pollutant loads but would result in the relocation of the discharges to reaches upstream from the Addison North outfall.

(7) Specification: Representation of Additional Reservoirs.

(a) Interpretation: In the first test plan only five of the twelve reservoirs were included. In this alternative, the balance of the reservoirs were added.

(b) Results: The upper Salt Creek reservoirs -- 2, 3, 4, 5, and 6 proposed by the Soil Conservation Service -- are relatively small, and their impacts would be masked by the much larger Busse Woods Reservoir. Lower Salt Creek Reservoirs 4 and 5 on Spring Brook would have only minor

impacts on the water quality of downstream reaches. Water quality has not been reported for Spring Brook. The first downstream reporting point, Reach 11, is on Salt Creek near North Avenue in Elmhurst, where impacts of Spring Brook would be slight.

In general, the expected impact of these reservoirs on water quality is uncertain. If low-flow pools are maintained, there may be problems associated with sediment accumulation and algal blooms. Wet weather impacts are likely to be positive, resulting from the settling out of sediments that would normally be transported downstream. However, dissolved oxygen problems may result if polluted wet weather flows are retained in these reservoirs for extended periods of time allowing oxygen-demanding pollutants to be oxidized. If necessary, adequate reaeration of the reservoir discharges would have to be provided.

(8) Specification: Evaluate Causes of Poor Water Quality Conditions in Addison Creek.

(a) Interpretation: None.

(b) Results: The first test plan simulation showed "fair" water quality in Addison Creek (Reach 19) while all other output reaches in the Salt Creek system reported "good" water quality. The problems in Addison Creek were determined to be wet weather violations of the dissolved oxygen standards. However, there was no obvious reason for the relatively poor conditions during dry weather. Assimilative capacity, based on hydraulic characteristics, is generally better than in other parts of the basin. It was finally concluded that the simulated dissolved oxygen problem was associated with the large off-channel flood control reservoirs located in the upper reaches of Addison Creek.

The problem also may be associated with the assumed representation of the reservoirs in the model rather than with what would be expected in actual operation. Wet weather flows detained in a reservoir consume oxygen as they stabilize pollutants. Water discharged from the reservoir may thus be seriously depleted of dissolved oxygen and may result in water quality problems in downstream reaches. If these discharges are aerated, the DO deficiencies can be overcome.

(9) Specification: Ammonia Toxicity.

(a) Interpretation: There has been concern expressed about ammonia toxicity and the requirements for ammonia removal in treatment plants. The state stream standard applicable to Salt Creek allows 1.5 mg/l ammonia. This standard is based on ammonia toxicity to aquatic life. However, the subject

of ammonia toxicity is not very well documented from a practical standpoint.

(b) Results: The USEPA's manual "Quality Criteria for Water" suggests that a water quality standard of 0.02 mg/l of un-ionized ammonia will protect aquatic life. The manual provides information for estimating safe total ammonia concentrations related to this standard as a function of water temperature and pH. Ammonia levels which would contain 0.02 mg/l of un-ionized ammonia at certain temperature and pH conditions are listed in Table 18-27.

Typical pH values observed during water quality sampling of Salt Creek ranged from 7.6 to 7.9.

Based on the USEPA toxicity information, simulated ammonia levels in Salt Creek frequently fall into the "toxic" category, primarily during warm weather. High ammonia levels in Salt Creek may occur during low-flow conditions when point sources are the major contributors, or during wet weather events when surface runoff is a major contributor.

It is important to note that the USEPA data are relatively conservative and that most fish species and other aquatic organisms now present in Salt Creek are likely to be more tolerant than indicated by the data. Another consideration is the generally high levels of dissolved solids in Salt Creek. High dissolved solids concentrations tend to reduce the toxicity of ammonia.

In general, the question of ammonia toxicity is one that will require further study involving aquatic species and conditions typical of northeastern Illinois before any firm recommendations may be made. Still, the issue is of critical importance if the goal of "fishability" is to be attained.

(10) Changes in Pollutant Loads: Overall percentage changes in pollutant loads which would occur if the second test plan were implemented are shown in Table 18-28. (Note: The "percentage changes" are intended to compare second test plan conditions with those of the first plan.)

TABLE 18-27: RELATIONSHIP OF 0.02 mg/l UNIONIZED AMMONIA TO TEMPERATURE AND pH

Temperature Degrees Celsius	pH 7.5	pH 8.0	pH 8.5
5	5.1	1.6	0.53
10	3.4	1.1	0.36
15	2.3	0.75	0.25
20	1.6	0.52	0.18
25	1.1	0.37	0.13
30	0.81	0.27	0.099

TABLE 18-28: PERCENTAGE CHANGES IN POLLUTANT LOADS, SECOND TEST PLAN

Reach	Flow	BOD	NH_3	NO_3	PO_4
5/6	-3	-12	-1	+4	+3
7	-24	-33	-39	-47	-78
11	-18	-24	-31	-35	-69
15	-15	-18	-24	-25	-61
19	-7	-48	-17	-22	-47
21	-14	-22	-23	-24	-58

18.09 PROBLEM ASSESSMENT

Water quality in the basin is generally good in the upstream reaches but deteriorates substantially with distance downstream. Point sources and combined sewer overflows in Addison Creek and the lower reaches of Salt Creek are responsible for this condition. Numerous wet weather violations of DO and ammonia standards are due to shock loadings of stormwater runoff (from both pervious and impervious sources) and combined sewer overflows. Dry weather violations are not as common. The upper reaches of Salt Creek have relatively small loadings from point sources.

Most dry weather violations in the downstream area tend to be associated with the impoundment of Fullersburg Dam. This reservoir aggravates water quality conditions downstream because of its release of water having low DO concentrations. During low flow, little reaeration takes place in the reservoir; significant oxidation of pollutants occurs, thus decreasing-available DO.

Stream temperature problems in the basin are very minor. Nitrate levels are slightly higher than expected in natural streams, but they do not violate the 10 mg/l standard. Phosphate levels are high enough to cause concern for the Busse Woods Reservoir. Chlorophyll a concentrations are restricted by light limitations due to turbidity and shaded banks. Fecal coliform counts were reported by others as being high throughout the basin.

Given the intensively urbanized nature of the Salt Creek watershed, it will be difficult to restore and then maintain high levels of water quality throughout the entire system. Streams will continue to serve as modes of waste transport. Half of the current total streamflow is comprised of treatment plant effluent, combined sewer overflows, and runoff from impervious urban surfaces.

a. Point Sources

The principal point source impact of concern is the significant ammonia contributions made to the basin. These loadings have their greatest effect on water quality during low-flow conditions. Point sources are also the primary contributors of nitrate and phosphorus to the overall watershed. These discharges do not appear to be the major cause of DO problems in the basin, however, despite their BOD and ammonia contributions.

At the present time, water quality management planning for the Salt Creek basin remains uncertain due to the lack of completed facilities planning studies for several important facilities planning areas. There is a need to complete these studies for the Addison, Elmhurst, Hinsdale, and Glendale Heights FPAs. The conclusions and recommended actions which will be set forth in those studies will have the principal point source impact in the basin.

Other issues pertaining to point sources include the following:

(1) Roselle Main Plant: The impact of 10/12 BOD - suspended solids (SS) effluent from the Roselle Main treatment plant should be studies in the 201 process. It is recognized that the 10/12 effluent from this plant may cause water quality standard violations in Spring Brook and in Lake Kadijah.

(2) Egan Plant: The MSDGC John Egan plant is scheduled to produce an effluent meeting 4 mg/l BOD and 5 mg/l suspended solids standards. This assumption favorably impacts expected downstream water quality and the degree of treatment necessary at downstream plants to ensure desired water quality. This plan is based on its assumed continued supply,notwithstanding the possibility it may be used for recharging of ground water acquifers.

(3) Addison Plants: The proposal for 20 mg/l BOD and 25 mg/l SS effluent from the two Addison plants is based on the assumption that the MSDGC Egan plant will discharge at its predicted flow and effluent quality (i.e., 44 cfs and 4:5:1.5 (BOD:SS:NH) effluent in the year 2000).

(4) SSES Studies: Another issue relates to the need to complete local sewer system evaluation surveys in the MSDGC service area. To qualify for federal grants for wastewater system improvements, applicants must follow certain procedures. Regulation 40 CFR 35.927 requires evidence that the treatment works for which grant assistance is sought will not be subject to excessive infiltration or inflow. An infiltration-inflow (I-I) analysis must be performed to demonstrate the existence or nonexistence of excessive infiltration and/or inflow in each sewer system. If excessive flows are found, the next step is a sewer system evaluation survey (SSES). If corrective measures are

justified to remedy the identified problems, a sewer rehabilitation project may be authorized as part of the facilities planning project.

Within the MSDGC area, the initial I-I study was performed by the District, and excessive flows were found to exist. However, because of the large number of individual SSES studies that had to be made in each municipal and local sanitary district sewer system, it was determined that that work would be done by local governments.

Those communities and local sanitary districts within the Salt Creek watershed that had not applied for SSES funds as of December, 1978 were Hoffman Estates, Riverside, Arlington Heights, Broadview, and the Barrington Woods and Plum Grove Woodlands Sanitary Districts.

(5) Miscellaneous Discharges: Miscellaneous point source discharges in the basin are not expected to present a problem, given their relatively small capacities, provided NPDES permit requirements are met.

b. Combined Sewer Overflows

Overflows from combined sewers adversely impact water quality throughout the basin under wet weather conditions. These overflows account for approximately 33 percent of the BOD and 8 percent of the total phsophorus input to the Salt Creek system and (along with stormwater runoff) are the cause of numerous wet weather dissolved oxygen and ammonia standards violations in downstream reaches. The impact of combined sewers is even more dramatic in Addison Creek, where nearly 55 percent of the BOD contribution is from these overflows.

Water quality improvements in Salt and Addison creeks are contingent in part upon the implementation of the MSDGC's Tunnel and Reservoir Plan, as well as local plans to control the overflow problem in areas not served by the TARP.

c. Nonpoint Sources

Nonpoint sources have been implicated as significant contributors of BOD (31 percent of the basin total load). Lesser amounts of other pollutants are also conveyed in runoff from pervious and impervious surfaces. As controls are implemented for point source and combined sewer discharges, nonpoint source pollutants will increase in relative importance unless corrective measures are instituted.

Of special interest are the large number of individual septic disposal systems in the basin which are known or suspected to have limitations on their usage. Studies conducted as part of the 208 project identified over 4,450 septic systems in the basin (approximately 55 percent of the total) as having limitations based on one or more

suitability factors (e.g., soil conditions, lot sizes, etc.). While not implicated as an adverse water quality factor in Salt Creek, malfunctioning septics do represent a problem with respect to public health and community welfare. Further investigation by local authorities will be required to better identify the nature and severity of the problem conditions and to take remedial actions as necessary and appropriate. In addition, there is a need to control the location and management of future septic systems as a preventive measure.

Agriculture is no longer a dominant land use in the watershed, and it is expected to decline further as a result of future urbanization. Nevertheless, agricultural activity is still locally important and has some impact on water quality. Potential problems with regard to controlling agriculturally derived sediment and other pollutants relate to the installation of best management practices, such as conservation tillage. Since much of the remaining agricultural land is owned by absentee landlords and operated on a lease basis, it may be difficult to institute appropriate control measures voluntarily.

d. Other Problems

Other problems in the basin relate to the degraded fish habitat and overabundance of undesirable fish species, high concentrations of nutrients and oxygen-demanding materials in reservoirs, and benthic deposits which exert high oxygen demands. Residual waste management, though not identified as a current problem, may become more difficult in the future in the face of increased sludge volumes and costs of disposal.

18.10 BASIN RECOMMENDATIONS

Recommended actions for improving and protecting water quality in this basin are derived from the information set forth in Chapters Four through Eight and from the preceding sections of this chapter. Principal elements of the recommended basin plan are set forth below.

a. Point Sources

(1) Publicly-Owned Wastewater Systems

(a) Municipal treatment authorities, including the Metropolitan Sanitary District of Greater Chicago, the villages of Addison, Roselle, Bensenville, Itasca, and Wood Dale, the City of Elmhurst, the Salt Creek Drainage Basin Sanitary District, the Hinsdale Sanitary District, and the Du Page County Department of Public works should implement their respective portions of their 201 plans as they have been or may be approved by

the Illinois and/or U.S. Environmental Protection Agencies. A summary of the current status of these plans appears in Section 18.04f and suggested changes thereto or features to be included are noted below. In the absence of completed and/or approved facility plans, certain assumptions had to be made as to the expected locations and/or sizes of treatment plants, their estimated costs and designated management agencies. This information must not be construed as binding in the Areawide Plan until the 201 facility plans have been finalized.

(b) The recommended plan for the Addison FPA calls for the retention of separate wastewater treatment facilities at Addison, Itasca, and Wood Dale. This is an interim recommendation which may be revised by facilities planning currently underway by the communities or by findings of the IEPA in its review. Details of the recommended plan are as follows:

(1) DCDPW Nordic Hills - This plant will be phased out, probably by 1980, to either Itasca or Addison North depending on which plan will be most cost-effective.

(2) Itasca - Itasca will remain an independent facility and will expand to 5.2 mgd and provide advanced waste treatment, using either tertiary filtration and nitrification or land treatment. If Itasca continues to discharge its treated effluent to Spring Brook Creek, the plant should meet 10 mg/l BOD , 12 mg/l suspended solids and 1.5 mg/l ammonia nitrogen standards. However, if Itasca chooses to discharge to Salt Creek via an extended outfall sewer, the plant will be eligible for 20/25/1.5 standards, assuming the MDSGC Egan plant's flow could be counted as dilution.

(3) Wood Dale - Both the Wood Dale North and South plants will be retained as independent facilities. Wood Dale North will be expanded to 1.8 mgd and Wood Dale South will remain at its current 1.5 mgd capacity. At these capacities both plants will need to meet 20 mg/l BOD and 25 mg/l suspended solids standards. Both plants will need to add nitrification facilities to meet the 1.5 mg/l ammonia nitrogen standard.

(4) Addison - The Addison North and South plants will continue to operate as independent facilities. The Addison North plant will be expanded to 4.7 mgd and the Addison South plant will remain at its current 3.2 mgd capacity.

Assuming that the MSDGC Egan plant's effluent can be counted for dilution, both plants will be eligible for 20 mg/l BOD and 25 mg/l suspended solids effluent standards. Both plants will have to add nitrification facilities to meet the ammonia standard of 1.5 mg/l. As noted above the DCDPW plants, Nordic Hills load could be treated by Addison. If treatment is at Addison, rather than Itasca, plant capacities and costs would need to be revised.

(c) The recommended plan from the completed Bensenville facilities plan calls for the phase-out of the Bensenville No. 2 (North) plant to the Bensenville No. 1 (South) plant by 1990. The Bensenville No. 1 plant will continue to operate as an independent facility and is planned to be expanded to 5.5 mgd in 1990. The Devon O'Hare Industrial Park and Elk Grove Industrial Park plants will be phased out to the Bensenville No. 1 plant by 1980.

(d) The Hinsdale Sanitary District Oakbrook plant should meet interim effluent limitations of 20 mg/l BOD and 25 mg/l suspended solids. Since there is no facility plan for the Hinsdale Sanitary District FPA, the district should submit an application for a federal grant to undertake such a study. If a future facility plan recommends this plant be retained, nitrification facilities will be required to meet the ammonia nitrogen standard of 1.5 mg/l. Previous concepts have been that the Oakbrook plant would be phased out of service after it had served its economic life. This plan recommends such a phase out.

(e) The Roselle Main plant will continue to operate as a separate independent system and will meet 10 mg/l BOD, 12 mg/l suspended solids, and 1.5 mg/l ammonia nitrogen standards.

(f) Facility plans for the Addison, Elmhurst, Hinsdale, and Glendale Heights facility planning areas and for the combined sewer areas in Palatine and Villa Park should be completed as soon as possible.

(g) The following listed Cook County Communities and sanitary districts having separate sewers should seek federal grants and initiate and/or complete by July 1, 1981, sewer system evaluation studies as required by 40 CFR 35.927: Broadview, Hoffman Estates, and the Barrington Woods and Plum Grove Woodlands Sanitary Districts.

(h) The following listed communities having combined sewers in all or portions of their corporate limits

should complete the same studies by July 1, 1981, plus supplementary studies to optimize local systems in order to take advantage of TARP capacity: Arlington Heights and Riverside.

(i) All municipalities and Cook and Du Page counties should seek to achieve continued reduction in water use to conserve water resources and to reduce wastewater flows at all publicly owned treatment plants. This should be accomplished through the modification of building codes to require water conserving plumbing fixtures and metering of all new developments. Pricing policies and public education to reduce consumption are also recommended.

(j) By July 1, 1983, all treatment plants whose 7-day 10-year low-flow dilution ratio is 10 to 1 or less should provide or continue to provide not less than 80 percent oxygen saturation in their effluents. Monitoring of wastewater quality after aeration should be conducted. However, during the continuing planning program, studies should be undertaken to determine where this requirement may be waived without detriment to instream water quality.

(k) Municipal type sewer service required to serve future growth within service areas identified for the year 2000 should be provided only by treatment authorities listed above, except where this is impractical or not cost-effective.

(l) Projected 5-year service areas should be identified in the NPDES permit issued by IEPA. No NPDES permit should be issued for municipal type wastewater service within the 5-year service area other than to the treatment authority, except on a finding by the IEPA that the proposed facility is the most cost-effective means of providing service, is an interim facility pending extension of service by the treatment authority, or is intended to serve an isolated location.

(m) Treatment plant operators should assure the very high standard of performance for wastewater treatment plants which the 201 plans assume. The IEPA should monitor treatment plant operation and performance and its effect on in-stream water quality. The IEPA should establish a technical assistance program to aid treatment plant operators and laboratory technicians in dealing with technical problems and assuring a consistently high level of performance in treatment operations.

(2) Private Utilities

(a) NPDES permits issued by IEPA to private utility companies should identify projected 5-year service areas. No NPDES permits should be issued for municipal type wastewater service within those 5-year service areas to other treatment authorities except upon a finding by the IEPA that the proposed facility is the most cost-effective means of providing service; is an interim facility pending extension of service by another established treatment authority; or is intended to serve an isolated location.

(3) Industrial Wastewater Treatment Plants

(a) At the present time, there are no wastewater treatment plants discharging industrial process wastewater to the Salt Creek basin. Industrial firms which have NPDES permits for other discharges are discussed in "Other Point Source Discharges" below.

(4) Miscellaneous Wastewater Treatment Plants

(a) Miscellaneous publicly and privately owned wastewater treatment plants should continue in operation until such time as wastewater service can be provided by publicly owned, municipal type wastewater systems on a cost-effective basis. Service areas of privately owned treatment systems should not be expanded or their treatment capacities increased when service can be provided on a cost-effective basis by publicly owned municipal type wastewater systems.

(5) Other Pcint Sources

(a) The IEPA should continue to enforce all requirements of NPDES permits for other point source discharges in the basin. This can be achieved through frequent sampling and analysis of discharge flows by the IEPA for the purpose of monitoring compliance with NPDES permits.

(6) Combined Sewer Overflows

(a) The MSDGC should control combined sewer overflows as provided in its Tunnel and Reservoir Plan (TARP). Combined sewer overflows in Palatine and Villa Park should be eliminated through plans currently under preparation, and in the Addison area, by the construction of supplementary sewers. The

implementation of the TARP is critical to water quality throughout the combined sewer area and in downstream rivers and waterways.

b. Nonpoint Sources

(1) Urban Stormwater Runoff

(a) By July 1, 1983, all municipalities and counties should implement measures to work toward a reduction of BOD in urban stormwater runoffs from separately sewered areas. Reductions of 25 percent of 1976 surface loadings on impervious surfaces are recommended as a target. From areas to be urbanized in the future, target reductions of 50 percent of 1976 surface loadings are recommended.

(b) In attempting to meet the above targets, the implementing agencies should work through the countywide water quality committees to develop plans and standards for the implementation of appropriate measures such as catch basin cleaning, performance zoning, street cleaning, use of porous pavement surfaces, increased vegetation cover, grass waterways, wetland storage of stormwater, stormwater detention, measures to achieve the desired pollutant reductions.

(c) Township, county and state highway organizations, the Illinois State Toll Highway Authority, and facility engineering departments at state and federal installation should participate in the programs described above by implementing accelerated and/or improved street sweeping programs for streets, roads and highways that are hydraulically connected to perennial streams or permanent lakes via stormwater conveyance systems.

(d) During the period up to July 1, 1983 agencies should utilize voluntary exploratory programs, implementing techniques to control pollutants from urban nonpoint sources.

(e) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should adopt and enforce adequate stormwater detention ordinances. These ordinances should include provisions which clearly establish long-term responsibilities for maintenance of detention facilities. All such local ordinances also should be consistent with minimal areawide standards set forth in the model ordinance.

(f) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should develop and enforce adequate erosion and sedimentation control ordiances. All such local ordinances should be consistent with minimal areawide standards set forth in the model ordinance.

(g) Within one year following the preparation by NIPC Of a model ordinance, Cook and Du Page counties and all municipalities in the Salt Creek watershed should adopt measures to control surface runoff from open storage yards containing industrial stockpiles and other materials which may go into solution when removed by stormwater runoff, and later cause water pollution.

(h) Municipalities, townships, and state and county highway departments responsible for de-icing streets, highways, and roads in the basin should develop programs to control the application of de-icing materials, to train operating personnel in proper methods of application, and to use proper equipment to minimize possible negative water quality impacts. The impact of de-icing agents on water quality should be given further study by NIPC in the continuing planning program.

(2) Agricultural Runoff

(a) By July 1, 1980, the Kane-DuPage County and North Cook Ccunty Soil and Water Conservation Districts, in conjunction with agencies of the United States and Illinois Departments of Agriculture and the countywide water quality committees, should identify the best management practices necessary to implement the agricultural aspects of the 208 plan, including conservation tillage, contour plowing, terracing, and conversion of cropland to grassland.

(b) By July 1, 1981, agricultural lands on which BMP's should be applied should be identified by appropriate soil and water conservation districts. Agencies of the U.S. Department of Agriculture and countywide water quality committees should be consulted.

(c) By July 1, 1985, a comprehensive conservation plan should be prepared for each farm in the basin which has soil erosion losses in excess of standards set by the Illinois Department of Agriculture and soil and water conservation districts under House Bill 818.

(d) Using available cost sharing and technical assistance programs, the soil and water conservation districts should ensure implementation of the BMP

program according to the following schedule on approximately 915 acres of agricultural lands:

By 1985 - 30% of the identified land.
By 1995 - 70% of the identified land.
By 2000 - 100% of the identified land.

(e) The IEPA, NIPC, and local governments should provide the results of their instream water quality monitoring to the soil and water conservation districts and to the Departments of Agriculture so that priority can be given to the areas most sensitive from a water quality standpoint in order to maximize the impact of the best management practices.

(f) The IEPA should enforce the IPCB regulations which require permits for feedlots and should use the IEPA draft technical policy WPC-2 "Design Criteria for Field Application of Livestock Wastes" as a guide.

(g) Illinois Department of Agriculture, Illinois Department of Public Health, and USEPA regulations on the use of pesticides and disposal of containers, and Illinois Department of Agriculture regulations on the training and licensing of pesticide applicators and operators should be continued.

(h) Farmers should implement good pasture management practices, utilize grass waterways, vegetative filter strips, and field borders, and make wise use of fertilizers wherever possible in accordance with the Illinois Agronomy Handbook to reduce the dangers of pollution. The U.S. Department of Agriculture agencies should assist farmers in recognizing the water quality problems posed by improper practices, and assist them in the use of proper practices.

(3) On-Site Disposal Systems

(a) Individual malfunctioning on-site disposal systems outside of the 5-year service areas should be repaired wherever possible upon complaint to the appropriate authorities or replaced with a new system if necessary.

(b) By July 1, 1983, special service areas should be established, under the initial sponsorship of municipal governments (for sites located within corporate limits) and by the counties (in unincorporated areas) where necessary to facilitate the financing of any innovative-type septic systems or other on-site improvements necessary to correct or replace malfunctioning systems in areas outside the 5-year projected service areas.

(c) The minimum requirements of the Illinois Private Sewage Disposal Code should be upgraded to require more innovative site analysis techniques, and Cook and Du Page County Health Departments should require a construction permit to regulate the design, location, and installation of every new on-site system.

(d) Local officials should inspect all septic systems known to be failing, threatening public health or causing nuisance conditions. The inspection should result in the issuance of a repair permit for corrective measures which are to be undertaken and paid for by the septic system owner.

(e) Septic systems also should be inspected by local officials prior to the transfer of ownership of properties where such systems are installed. The results of the inspections should be made known to the lending institutions which are furnishing the mortgages.

(4) Air Pollution

(a) As part of the continuing planning program, the IEPA in cooperation with the Illinois Institute for Natural Resources, the Illinois State Water Survey, and local air quality management agencies should analyze the relationship between air pollution and water quality in all of its aspects. The IEPA should cooperate with NIPC in devising strategies for correcting present negative effects and preventing future problems through the 208 continuing planning program.

(5) Sanitary Landfills

(a) The IEPA should ensure that every sanitary landfill complies with all regulations of the IPCB for its siting, design, construction, and operation. As a substitute for existing state regulations, the IEPA and IPCB should consider certification of local solid waste disposal programs which comply with areawide plans to be prepared under the Federal Resource Conservation and Recovery Act. Alternatives to land disposal of solid wastes, including recycling, should be considered and utilized whenever feasible.

(6) Waterways

(a) NIPC, in conjunction with the countywide water quality committees, in the continuing planning program should develop recommendations to simplify the fragmented system for channel maintenance and improvement in the Salt Creek basin. Present responsibilities for such maintenance functions as debris removal, streambank stabilization, public access, dredging, disposal of dredge spoil, protection and augmentation of habitat, tree shading, and vegetation are shared between a host of federal, state and local authorities.

(b) Du Page County is encouraged to develop an organization similar to the Cook County and Lake County Clean Streams Committees, consisting of volunteers and organizational representatives who maintain surveillance over water bodies for activities adverse to water quality, flood control, recreation, fish, wildlife, and/or navigation.

c. Residuals

(1) As regulated by the IEPA, current methods for the disposal of sludge from treatment plants are adequate to handle present and anticipated future volumes and should continue to be administered by the IEPA.

(2) Highest priority should be given to the use of sludge as a soil conditioner, and efforts to utilize sludge for that purpose should be expanded. The IEPA should assure proper practices in the utilization of sludge on agricultural lands through implementation of the draft standards in IEPA Technical Policy WPC-3 "Design Criteria for Municipal Sludge Utilization on Agricultural Land."

(3) The preferred method for the disposal of domestic septage is through land application, and this method should be encouraged and used whenever possible. Recognizing a continuing need for the disposal of septage at wastewater treatment plants, specific facilities should be designated by the IEPA to receive domestic septage on recommendation by NIPC through the continuing planning process.

(4) The USEPA standards and the IPCB regulations for permits for the disposal of hazardous or toxic substances should continue to be enforced by the IEPA.

d. Groundwater

(1) By July 1, 1980, the Illinois State Water Survey and the Illinois State Geological Survey should undertake a coordinated well sampling program to monitor groundwater quality in areas where a potential for infiltration by pollutants now exists or might exist in the future.

e. Inland Lakes

(1) By July 1, 1979, and in accordance with Section 314 of PL 92-500, the IEPA should undertake expanded lake sampling to identify eutrophic conditions and, in conjunction with NIPC and the county water quality committees, develop plans to control sources of pollution and restore water quality in the lakes in the basin.

f. Mining

(1) The present IPCB regulations for the control of pollution from aggregate producing activities are considered generally satisfactory. However, the IEPA should continue to study the types and volumes of pollutants associated with these activities and their potential effects on surface and groundwater quality. Any needed changes in present regulations should be identified by July 1, 1980.

18.11 COSTS OF RECOMMENDED PLAN

a. Facility Plans

(1) General: Table 18-29 shows pertinent capacities in the year 2000 for publicly owned wastewater treatment plants remaining in service, their effluent standards, and associated construction costs. Local collector sewer projects are included, if they have been processed for federal or state grants.

Cost data were assembled from various sources. Except for the MSDGC area, "initial" costs of facility plans listed in Table 18-29 apply to the first phase of any project which is to be followed at some future date by programmed expansions or extensions. Under this definition, the total cost of works currently under construction fall within the classification "initial," even though the project has not yet been completed and future payments to contractors will be made. Except for the MSDGC area, "future" costs in Table 18-29 cover phased work scheduled at later dates.

(2) MSDGC Area: Because of their magnitude and complexity, special procedures were followed in depicting the MSDGC costs. Total costs of MSDGC improvements and locally funded improvements were taken from Table U7-IX-1 and from page 229 in the MSDGC's 1977 Facilities Plan Update Supplement. They were revised and updated in a conference with MSDGC staff representatives on March 14, 1978.

The cost of all MSDGC improvements was assumed to be spread throughout the MSDGC service area on an ad valorem basis. Thus, each basin's share of the cost was assumed to be proportional to the share of total District assessed valuation in that basin.

For locally funded improvements, the estimates for local sewer upgrading are current 1977 values from page 229 of the MSDGC 1977 Facilities Plan Update Supplement. For other local improvements, the estimates in pages XI-18 and XI-19 of the MSDGC Overview Report are as of January 1, 1975. Where applicable, costs were also updated at 6 percent compounded for the intervening period to January 1977 levels.

The costs of local improvements were allocated differently, depending upon the particular type of project. Local sewer upgradings required as supplements to the TARP apply only to communities in the TARP service area. A basin's share of the total cost of these upgradings was assumed to be equal to the percentage share of the total TARP area assessed valuation in TARP communities in that basin.

For local sewer improvements within the MSDGC's jurisdiction that are outside the TARP area, the costs were allocated to non-TARP communities in each basin in accordance with their share of the total assessed valuation for all non-TARP areas.

(3) Summary of Future Costs: Table 18-30 distributes capital costs within 5-year time frames. Annual operating and maintenance costs are also shown, based on data included in current reports (where available) or from data furnished by operating agencies. In their absence, these costs were estimated based on information in Staff Paper No. 20, Wastewater Treatment Processes and Cost Estimating Data.

(4) Annualized Local Costs: Table 18-31 shows annualized local capital costs.

(5) Increased Annual Costs: Tables 18-32 and 18-33 show the estimated annual increases in wastewater charges per household for Du Page County residents in the basin, and for the basin as a whole, respectively, for the previously described improvements and/or expansions.

TABLE 18-29 : RECOMMENDED PLANS, PUBLICLY OWNED TREATMENT SYSTEMS

SALT CREEK BASIN

MAP CODE	FACILITY NAME	DESIGN CAPACITIES (MGD)		EFFLUENT STANDARDS (Year 2000) (mg/l)				CAPITAL COSTS (million $)			COMMENTS
		1975	2000	BOD_5	TSS	P	NH_3N	INITIAL	FUTURE	TOTAL	
D1	Addison-North	2.0	4.7	20	25		(1)	9.4	-	(2) 9.4	
D2	Addison-South	2.1	3.2	20	25		(1)	10.1	-	(2) 10.1	
D4	Bensenville No. 1	2.5	5.5	10	12		(1)	9.1	(3) 1.9	(2) 11.0	
D21	Elmhurst	6.0	7.5	10	12		(1)	0.6	11.8	(2) 12.4	
D28	Hinsdale S.D. Oakbrook	2.6	2.6	20	25		(1)	-	-	(4) -	
D29	Itasca	1.5	5.2	10	12		(1)	11.5	-	(2) (5) 11.5	
C5	MSDGC John Egan	30.0	30.0	4	5		(1)	-	7.1	(6) 7.1	
D31	Roselle-Main	1.5	1.5	(7) 10	(7) 12		(1)	-	-	(8) -	
D33	Salt Creek Drainage Basin S.D.	4.5	5.0	10	12		(1)	13.4	-	(8) (9) 13.4	
D38	Wood Dale-North	1.1	1.8	20	25		(1)	6.2	-	(2) 6.2	
D39	Wood Dale-South	1.5	1.5	20	25		(1)	0.7	-	(2) 0.7	

(1) Will meet instream ammonia water quality standard of 1.5 mg/l.

(2) Ammonia removal included.

(3) Future costs are for the phase-out of the Bensenville No. 2 plant.

(4) Plant to be phased-out at the end of its economic life.

(5) Costs for phase-out of the DCDPW Nordic Hills plant not included.

(6) Costs are for sewer work.

(7) Assumes variance from 4 mg/l BOD and 5 mg/l suspended solids standards.

(8) Ammonia removal not included.

(9) Costs are for elimination of combined sewer overflows from Villa Park sewer system.

b. Urban Stormwater

Methods for controlling pollution in urban stormwater runoff include street sweeping, catch basin cleaning, performance zoning, use of porous pavements, increased vegetation, grassed waterways, wetland storage of stormwater, stormwater detention, and erosion and sediment controls. The goals of a 25 percent decrease in BOD loads from existing (1976) impervious areas and a 50 percent decrease in BOD loads from impervious areas built between 1976 and 2000 are to be achieved by combinations of the above practices. The cost of the mix of specific practices which will meet these goals is dependent upon the practices selected and the intensity of their individual use.

An estimate of the total cost based solely on street cleaning utilizing vacuum sweepers is $28.98 million through the year 2000, increasing from $849,700 per year in 1978 to $1.67 million per year in the final year. The frequency of cleaning streets with vacuum sweepers was computed to average about once every 12 days in 1976, increasing to about once every 8.3 days during the year 2000, excluding the three winter months of December through February.

The above costs do not include street cleaning in combined sewer areas where the stormwater runoffs will be treated. Naturally, some street cleaning activities will be required in those areas for sanitary or public relations reasons.

c. Agricultural Runoff

Agricultural croplands presently amount to 7,560 acres in the basin and are projected to decrease to 3,890 acres by the year 2000. In order to reduce pollution stemming from croplands, best management practices are targeted for implementation by the year 2000 on 915 acres at a total cost over the years of $68,200.

Although a comprehensive farm plan would include a wide range of BMPs, the following four practices and several combinations thereof have been recommended for implementation: conservation tillage, contouring, terracing, and cropland conversion to pastureland. These BMPs were selected because of their direct effects on water quality as well as their ability to reduce soil erosion. Many other practices which would be contained in a farm plan, but not considered by the Commission, are either too localized or difficult to evaluate for their effects on water quality.

Of the above total costs, $6,100 represents initial installation (or capital) expenditures for which grants may be available from the federal government. The cost-sharing ratios are on the order of 50 percent. The balance of $62,100 represents operating and maintenance costs.

TABLE 18-30 : SUMMARY OF FUTURE COSTS (All data in 1977 dollars in millions) SALT CREEK BASIN

Jurisdiction	Capital Costs						Annual Operations & Maintenance Expense				
	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	Total	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)
Addison	19.50					19.50	1.23	1.23	1.23	1.23	1.23
Itasca	11.50					11.50	0.71	0.71	0.71	0.71	0.71
Wood Dale	6.90					6.90	0.31	0.31	0.31	0.31	0.31
DCDPW	0.65					0.65	0.01	0.01	0.01	0.01	0.01
Bensenville FPA	9.10		1.90			11.00	0.15	0.15	0.15	0.15	0.15
Elmhurst FPA	0.60	11.80				12.40		0.13	0.32	0.32	0.32
Villa Park	13.40					13.40		0.07	0.07	0.07	0.07
MSD	169.30	1.30				170.60	0.38	1.48	1.55	1.55	1.55
Local improvements related to MSD	183.70	29.30				213.00					
Agricultural BMP's							0.001	0.002	0.002	0.003	0.004
Urban Stormwater Management Expense							1.01	1.18	1.34	1.51	1.64
Total	414.65	42.40	1.90			458.95	3.80	5.27	5.69	5.86	5.99

TABLE 18-31: PROJECTED ANNUALIZED LOCAL COSTS (All data in 1977 dollars in millions)

Jurisdiction	CAPITAL COSTS			LOCAL CAPITAL PLUS O & M ANNUALIZED Costs (Mil./yr.)*					Total Cost** 1978-2000	Comments
	Cost Total Through Yr. 2000	Est. Fed'l. Share	Est. Local Share	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000		
Addison	19.50	14.62	4.88	1.69	1.69	1.69	1.69	1.23	37.49	
Itasca	11.50	8.62	2.88	0.98	0.98	0.98	0.98	0.71	21.73	
Wood Dale	6.90	5.18	1.72	0.47	0.47	0.47	0.47	0.31	10.33	
DCDPW	0.65	0.49	0.16	0.03	0.03	0.03	0.03	0.01	.63	
Bensenville FPA	11.00	8.25	2.75	0.36	0.36	0.41	0.41	0.19	8.27	
Elmhurst FPA	12.40	9.30	3.10	0.01	0.42	0.61	0.61	0.60	10.05	
Villa Park	13.40	10.05	3.35	0.32	0.39	0.39	0.39	0.39	8.62	
MSD	170.60	127.95	42.65	4.38	5.51	5.58	5.58	1.58	109.99	
Local Improvements Related to MSD	213.00	159.75	53.25	4.34	5.03	5.03	5.03	0.69	99.22	
Agricultural BMP's				0.001	0.002	0.002	0.003	0.004	.052	
Urban Stormwater Management Expense				1.01	1.18	1.34	1.51	1.64	30.12	
Total	458.95	344.21	114.74	13.59	16.06	16.53	16.70	7.35	336.50	
										R Sept. 20/78

*Local Capital Amortized @ 7% for 20 yrs. **Sum of Local Capital Plus O & M Annualized Costs, in million $

TABLE18-32:PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST DU PAGE COUNTY

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	1007.2	1084.4	1155.3	1226.3	1291.8	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.144	.159	.154	.145	.049	
O & M Related	.276	.281	.285	.274	.264	
Total Rate:	.420	.440	.439	.419	.313	
Additional Cost per Home of $45,000 FMV ($/yr.)	63.00	66.00	65.85	62.85	46.95	
Existing Av. Annual WW Cost ($/Household yr.)	71.39					
Total Av. Annual WW Cost ($ / Household yr.)	134.39	137.39	137.24	134.24	118.34	
Percent Av. Increase* in WW Costs per Household (%)	88.2	92.4	92.2	88.0	65.8	

*Total Rate Used

TABLE 18-33 PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST BASIN TOTAL

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	2717.0	2925.1	3116.4	3307.8	3484.6	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.360	.369	.347	.328	.039	
O & M Related	.140	.180	.183	.177	.172	
Total Rate:	.500	.549	.530	.505	.211	
Additional Cost per Home of $45,000 FMV ($/yr.)	75.00	82.35	79.50	75.75	31.65	
Existing Av. Annual WW Cost ($/Household yr.)	71.39					
Total Av. Annual WW Cost ($ / Household yr.)	146.39	153.74	150.89	147.14	103.04	
Percent Av. Increase* in WW Costs per Household (%)	105.1	115.4	111.4	106.1	44.3	

*Total Rate Used

For estimating purposes, it was assumed that 30 percent of the BMPs will be installed by 1985, 70 percent by 1995, and 100 percent by the year 2000.

18.12 WATER QUALITY CONDITIONS IN 1983

a. Introduction

Public Law 92-500 includes the statement "Wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water be achieved by July 1, 1983." The water quality standards of the Illinois Pollution Control Board for General Use streams such as Salt Creek were adopted to "protect the State's waters for aquatic life,...primary and secondary contact use,..." This Commission is using the Illinois standards, as modified by this plan, to judge compliance with the 1983 national goal. This chapter assesses the feasibility of compliance with the dissolved oxygen and ammonia standards in 1983 in the Salt Creek Basin.

b. Assumptions of Changes in the Basin

(1) Land Cover: Land cover estimates for the years 1976, 1983, and 2000 are summarized in Table 18-34. It should be noted that impervious area is forecast to increase by 62 percent from 1976 to 2000. Croplands are expected to decline substantially in the face of increased urbanization. The cropland areas listed as "conservation" indicate those lands where additional soil conservation practices are expected to be implemented.

(2) Urban Runoff Control: Management measures are to be implemented with the objective of reducing runoff-related pollutants from existing urbanized areas by 25 percent of BOD loadings found to be present in 1976. BOD loadings from areas urbanized after that year are to be reduced by 50 percent of 1976 loads. This will result in an overall 27 percent reduction in urban runoff pollution loads by 1983.

Combined sewer overflows in the lower part of the basin will be partially controlled in 1983 by the first phase of the TARP. Loads from those combined sewers will be reduced by 90 percent from existing conditions. Also, existing combined sewer overflows in Palatine and Villa Park will be eliminated by 1983.

(3) Point Sources: Effluent characteristics of point sources are given for 1976 and 1983 in Table 18-35.

TABLE 18-34: LAND COVER, CHANGES

Cover Type	Area in Square Miles*		
	1976	1983	2000
Lowland	27.68	27.45	26.87
Cropland	11.81	9.43	3.64
Conservation	(0)	(0.25)	(1.38)
Grassland	81.50	89.10	92.12
Impervious	12.52	17.02	20.37

*1976 land cover totals do not include combined sewer areas.

c. Expected Water Quality in 1983 2398

The water quality model was used indirectly to estimate 2400
1983 water quality conditions. Results of 1976 and the year 2401
2000 served as the basis for estimating 1983 values. In the 2403
process, pollution loads to the stream were calculated for
each of those three years. These loads are reported in 2404
Table 18-36 for six reaches, along with the water quality
ratings for dissolved oxygen and ammonia associated with the 2405
loads. The ratings for the years 1976 and 2000 are from 2406
previous water quality modeling results. The 1983 ratings 2407
are informed judgments.

The goal (expressed in terms of achievement of water 2414
quality standards) is considered to be met satisfactorily 2415
when a rating of "good" or "excellent" is achieved.
Assignment of these adjective ratings was based on the 2416
following criteria:

Excellent= no dissolved oxygen concentrations below 5 mg/l, 2419
and no violations of the 1.5 mg/l ammonia 2420
standard.

Good = dissolved oxygen remains above 5 mg/l 95 percent 2422
of the time, or more, and the ammonia standard is 2423
met 95 percent or more of the time.

Fair = dissolved oxygen remains above 5 mg/l 85 percent 2425
of the time or more, and ammonia standard is met 2426
85 percent of the time or more.

TABLE 18-35: POINT SOURCES IN THE SALT CREEK BASIN

Plant Name	Reach	Effluent Characteristics					
		Flow, cfs		BOD_5 (mg/l		Ammonia (mg/l)	
		1976	1983	1976	1983	1976	1983
Addison-North	11	4.54	5.68	2.6	20	10	10
Addison-South	11	0.16	5.23	3.3	20	15	15
Bensenville South	19	7.63	7.6	11.0	10	10	10
Nordic Hills	11	0.25	0	11.7		15	
Elmhurst	15	11.88	12.2	9.8	10	15	15
Highland Hills	15	0.34	0	6.5	0	15	0
Hinsdale (Oak Brook)	15	--	0				
Itasca	11	1.71	2.1	5.2	10	8	8
MSDGC Egan	7	18.9	26.4	1.3	4	0.4	1.5
Roselle-Main	11	1.71	1.85	3.9	10	8	8
Salt Creek DBSD	15	6.2	6.15	6.5	10	15	15
Wood Dale-North	11	4.54	1.94	11.7	10	8	8
Wood Dale-South	11	0.16	0.32	3.9	10	10	5
Electronicast	11	0.002	0.002	3.3	0	15	0
Bunker-Ramo	21	0.01	0.1	3.3	0	15	0
Ovaltine	15	0.26	0.16	11.7	0	15	0
C & NW RR	19	1..24	1.2	3.3	7.73	15	7.33

Poor = dissolved oxygen remains above 5 mg/l 70 percent of the time or more, and the ammonia standard is met 70 percent or more of the time.

Bad = dissolved oxygen remains above 5 mg/l less than 70 percent of the time, and ammonia standard is met less than 70 percent of the time.

The standards for dissolved oxygen and ammonia appear to be met or not met in 1983 as noted in Table 18-37.

d. Evaluation

On the basis of this evaluation, it appears that the 1983 goal will be met only in Reaches 5, 6 and 7 in the upstream portions of Salt Creek. The goal will not be attained in Reach 11 due to substandard ammonia levels, and in Reaches 15, 19 and 21 due to substandard levels for both DO and ammonia.

As noted in Table 18-15, 85 percent of the current ammonia load to Reach 21 (the most downstream or "summary" reach) is attributable to point source discharges and combined sewer overflows. While the plan calls for ammonia not to exceed 1.5 mg/l after mixing in the receiving stream,

TABLE 18-36: WATER QUALITY RATINGS IN 1983

Reach 5/6, in the Busse Woods Reservoir				Reach 15, Salt Creek at the Fullersburg Dam			
Loads and Ratings	1976	1983	2000	Loads and Ratings	1976	1983	2000
BOD, tons/year	238	167	178	BOD, tons/year	1003	1274	1432
Ammonia,tons/year	24	20	20	Ammonia,tons/year	579	537	163
Dissolved oxygen	Good+	Good	Good+	Dissolved oxygen	Bad	Fair	Good
Ammonia	Good+	Excell.	Excell.	Ammonia	Bad	Poor	Excell.
Reach 7, Salt Creek above the mouth of Spring Brook in Itasca				Reach 19, Addison Creek immediately above confluence with Salt Creek			
Loads and Ratings	1976	1983	2000	Loads and Ratings	1976	1983	2000
BOD, tons/year	315	357	475	BOD, tons/year	449	216	215
Ammonia, tons/year	37	63	89	Ammonia, tons/year	121	94	30
Dissolved oxygen	Good+	Good	Good+	Dissolved oxygen	Poor	Fair	Fair
Ammonia	Good+	Good	Good+	Ammonia	Bad	Poor	Fair
Reach 11, Salt Creek above North Avenue in Elmhurst				Reach 21, the entire Salt Creek Watershed			
Loads and Ratings	1976	1983	2000	Loads and Ratings	1976	1983	2000
BOD,tons/year	547	889	1017	BOD, tons/year	1641	1542	1681
Ammonia,tons/year	219	257	124	Ammonia,tons/year	715	637	198
Dissolved oxygen	Fair	Good	Good	Dissolved oxygen	Fair	Fair	Good
Ammonia	Fair	Fair	Excell.	Ammonia	Bad	Poor	Excell.

it is assumed that (except for the MSDGC Egan plant) ammonia removal facilities will not be installed until after 1983. 2457

TABLE 18-37: AMMONIA AND DISSOLVED OXYGEN RATINGS IN 1983

Stream	Reach	Dissolved Oxygen	Ammonia
Salt Creek	5/6	Good	Excellent
Salt Creek	7	Good	Good
Salt Creek	11	Good	Fair
Salt Creek	15	Fair	Poor
Addison Creek	19	Fair	Poor
Salt Creek	21	Fair	Poor

CHAPTER 19

Fox River

Areawide Water Quality
Management Plan
Chapter 19
Fox River Basin (1979)
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CHAPTER NINETEEN: FOX RIVER BASIN

19.01 DESCRIPTION OF BASIN

a. Physical Characteristics

(1) Geography: The Fox River drains an area of about 2,600 square miles in northeastern Illinois and southeastern Wisconsin. It flows in a southerly direction from its headwaters near Milwaukee, Wisconsin, to its confluence with the Illinois River in La Salle County, Illinois. Within the NIPC planning area, the basin is approximately 54 miles long and 27 miles wide at its widest point, draining an area of about 960 square miles. Included are parts of all six of the counties in northeastern Illinois. (see Figure 19-1.) Terrain is highly variable and hilly, particularly in the Fox River valley. From the Wisconsin border to McHenry Dam, the gradient is essentially flat. Between the McHenry and Algonquin Dams, the gradient is only 0.53 feet per mile. Below the Algonquin Dam the river has one of the area's steepest gradients. However, the construction of numerous dams has slowed the river's velocity considerably. Another area in the basin deserving special protection is a large groundwater recharge area in southeastern McHenry County.

(2) Waterways: The basin has a relatively complex drainage system, consisting of 32 important tributaries and 103 lakes and ponds over 10 acres in size. Located here is the Fox Chain of Lakes, a series of shallow lakes important for their recreational value. Twenty-one of the tributaries drain directly into the Fox River, three are tributary to Otter Creek, and one each drains into Ferson Creek, Blackberry Creek, Big Rock Creek, Squaw Creek, Pistakee Lake, Grass Lake, Fox Lake, and Lake Catherine. These lakes and streams are described in Tables 19-1 and 19-2. There are also 14 dams on the Fox River within the basin. These dams create still pools of considerable size and act to slow the flow of the river.

(3) Geology: Unconsolidated glacial deposits range in depth from a few feet along portions of the Fox River valley to more than 300 feet in the morainic uplands of Lake and McHenry counties. The dominant deposit is till, found throughout most of the basin but usually buried below younger deposits. Till is relatively impermeable; groundwater infiltration capability is limited and, as a result, the application of wastes, fertilizers, or agrichemicals presents the risk of polluted stormwater runoffs which, in turn, can pollute surface waters.

Deposits of sand and gravel are found in valley trains and in broad outwash plains in the northernmost portions of the basin. Infiltration is rapid in these deposits, and pollutants may enter groundwater as leachate from landfills,

TABLE 19-1 : STREAM INVENTORY, FOX RIVER BASIN

STREAM NAME	LENGTH (MILES)	AVG. WIDTH (FT.)	WATER SURFACE (ACRES)	GRADIENT (FT/MILE)	DRAINAGE AREA (SQ. MILES)	COMMENTS
BIG ROCK CRK. E. BR	9.0	12.5	12.5	15.6	NA	
BIG ROCK CRK. W. BR	8.5	35.0	36.1	9.4	NA	
BLACKBERRY CREEK	13.3	12.0	19.4	1.2	NA	
BOONE CREEK	6.0	13.0	5.1	5.6	23.0	
BOWES CREEK	4.5	5.0	2.0	29.0	NA	
BREWSTER CREEK	5.6	12.8	6.1	12.6	NA	
COTTON CREEK	6.0	6.5	3.7	11.8	11.0	
CRYSTAL LAKE DRAIN	15.0	3.0	27.1	9.4	22.0	
DUTCH CREEK	6.2	2.5	2.2	20.9	7.6	
EAGLE CREEK	4.8	3.0	1.7	7.0	3.5	
FERSON CREEK	10.0	30.0	36.4	18.0	NA	
FITCHIE CREEK	3.5	3.0	1.3	31.4	NA	
FLINT (FLYNN) CREEK	2.2	8.0	2.1	13.1	NA	
FLYNN CREEK	20.3	10.0	2.5	12.1	27	
FOX RIVER	76.1	294.0	2713.5	2.5	NA	
INDIAN CREEK	5.5	12.0	8.0	16.4	NA	
JELKES CREEK	3.8	8.5	3.9	23.1	NA	
LILY LAKE DRAIN	4.4	3.0	1.8	3.6	NA	
LITTLE ROCK CREEK	1.5	25.0	4.5	7.0	NA	
LONG RUN DITCH	5.0	5.0	3.0	6.0	NA	
MILL CREEK	10.5	20.0	25.6	21.0	NA	
NIPPERSINK CREEK	23.8	40.0	136.7	17.7	269.0	
NORTON CREEK	3.0	10.0	3.7	16.6	NA	
OTTER CREEK	4.5	25.0	14.2	1.1	NA	
POPLAR CREEK	14.4	17.5	29.6	9.7	NA	
SEQUOIT CREEK	7.0	8.0	6.3	7.2	10.9	
SPRING CREEK	9.8	18.4	16.5	8.4	27.0	
SQUAW CREEK	15.2	4.0	7.3	6.4	35.0	
STONEY CREEK	3.5	6.0	2.5	28.5	NA	
TREVOR CREEK	0.3	15.0	0.5	13.3	1.0	
TYLER CREEK	14.0	8.0	13.6	14.2	NA	
WELCH CREEK	14.0	17.8	28.8	10.7	NA	
WAUBANSEE CREEK	3.0	10.0	3.6	5.0	10.0	

TABLE 19-2 : LAKE AND POND INVENTORY, FOX RIVER BASIN

NAME	LOCATION			SURFACE AREA (ACRES)	SHORE-LINE (MILES)	MAXIMUM DEPTH (FT)	WATER-SHED (ACRES)	DATE CON-STRUCTED	OWNER-SHIP	ACCESSIBILITY
	TWP N	RNGE E	SECT							
Ackerman's Channels	46	10	18	20.0	2.2	10	150	1940-41	Private	Controlled
Antioch Lake	46	10	17,18	84.0	2.6	10	520	1960	Org.	Permission
Art Baker Lakes	44	10	18	20.0	1.2	13	60	1959	Private	Permission
Baker Lake	42	9,10	1,6	130.0	2.6	10	NA	1934	Public	NA
Bangs Lake	44	9	24 25,26	297.0	3.1	25	960	Natural	Public	Boat Liveries City Ramp
Bluff Lake	44	9	24	86.0	1.6	31	600	Natural	Org.	Fee
Bode Lake - South	41	9	14	10.0	0.7	23	NA	1958	Public	NA
Breeden Slough	44	9	13	38.0	2.1	9	340	Natural	Private	Owners & Friends
Bull Valley Hunt Club Lake	45	7	36	53.0	2.3	15	NA	1959	Org.	Members & Guests
Campton Lake	40	7	15	30.6	1.9	11	NA	1953	Org.	NA
Cedar Lake	46	10	32	285.0	3.2	40	700	Natural	Public	Resorts Village Beach
Channel Lake	46	9	1,2,11 12,14	352.0	3.6	42	3600	Natural	Public	Chain o Lakes Park
Crabtree Lake	42	9	15	45.5	1.0	9	NA	1934	Public	NA
Cranberry Lake	45	10	28	44.0	0.6	15	140	Natural	Private	Controlled
Crescent Lake	38	8	32	15.8	1.5	7	NA	1909-30	Org.	NA
Cross Lake	46	10	5	25.0	0.8	34	118	Natural	Org.	None
Crystal Lake	43	7	1-6	228.0	2.8	30	NA	Natural	Public	Resorts, City Park
Davis Lake	44	10	29	36.4	1.1	17	504	Natural	Private	None
Defiance Lake	44	9	6	47.8	1.3	25	NA	Natural	Private	Resorts & Friends
Deep Lake	46	10	33,34	200.0	2.8	52	600	Natural	Org.	Permission or Fee
Duck Lake	45	9	14,15	99.0	3.9	8	3562	Natural	Org.	Fee
Dunn's Lake	46	9	33	60.0	2.9	9	50	Natural	Org.	None
East Loon Lake	46	10	21	164.0	2.3	26	1000	Natural	Org.	Fee
Echo Lake	43	10	17	25.0	1.0	9	1480	Natural	Org.	Members Only
Elizabeth Lake	46	8	2,3	32.0	1.0	25	NA	Natural	Public	Boat Liveries
Fox - Nappersink Lake	45	9	2-4 33,34	2120.0	12.2	22	1300	1939	Public	Resorts & Marinas
Galvin Lake	42	9	17	19.5	0.9	10	NA	1934	Public	NA
Golden Oaks - Farm Lake	44	9	15,22	17.0	1.0	11	600	1965	Org.	Permission
Goose Lake	42	9	9	65.0	0.6	5	NA	Natural	Private	NA
Grass Lake	46	9	34	1360.0	8.5	6	NA	Natural	Public	Chain o'Lakes State Park or Fee
Grassy Lake	43	9	14	50.0	1.4	12	2720	Natural	Org.	Members & Friends
Grays Lake	45	10	27,34	65.0	1.9	19	400	Natural	Public	Through Park District
Griswold Lake	44	9	17,18	141.0	1.6	13	NA	Natural	Public	Two Resorts
Hawley Lake	42	9	10,11	65.8	1.8	9	NA	1930	Org.	NA
Hawthorne Lake	42	9	2,11	28.5	1.0	9	NA	NA	Org.	NA
Herrick House Lake	41	9	33,34	11.3	0.6	9	NA	Natural	Org.	NA
Highland Lake	45	10	21,22	110.0	1.5	35	700	Natural	Org.	Permission
Honey Lake	43	9	13	55	1.2	19	590	Natural	Org.	Members & Friends

Org. - Organizational

TABLE 19-2 : LAKE AND POND INVENTORY, Fox River BASIN

NAME	LOCATION			SURFACE AREA (ACRES)	SHORE-LINE (MILES)	MAXIMUM DEPTH (FT)	WATER-SHED (ACRES)	DATE CON-STRUCTED	OWNER-SHIP	ACCESSIBILITY
	TWP N	RNGE E	SECT							
INDIAN LAKE	43	9	11	85.0	2.2	19	355	1930	Private	Restricted
ISLAND LAKE	44	9	20	78.2	4.0	13	NA	1940	Org.	NA
KEENE LAKE	42	9	11	48.2	1.7	15	NA	1944	Org.	NA
LA BUYS LAKE (WEST)	42	9	14	14.2	0.9	10	NA	1948-9	Public	Closed to Public
LACEY LAKE	42	9	4	18.5	1.2	12	NA	Natural	Org.	Owners Only
LAKE CATHERINE	46	9	1,12	115.0	2.0	45	3600	1939	Public	Chain O'Lakes State Park
LAKE DUNCAN	45	9	34,35	85.0	1.7	16	6829	1935	Org.	Fee
LAKE FAIRVIEW	44	9	35	16.0	0.9	12	75	1969	Org.	Restricted
LAKE HELEN	44	9	12	17.0	0.7	9	120	1968	Org.	Restricted
LAKE IN THE HILLS	43	8	20	52.0	2.2	35	NA	1930	Org.	Home Owners
LAKE IN THE HILLS # 2	43	8	28	11.0	0.8	10	NA	1953	Org.	Association
LAKE KILLARNEY	43	8	1,2	57.7	1.8	19	NA	Natural	Org.	Association
LAKE LOUISE	43	10	31	40.0	1.4	14	850	1967	Org.	Restricted
LAKE MARIE	46	9	12,14 24	480.0	6.0	35	4200	1939	Public	8 Resorts & Marinas
LAKE OF THE COVES	42	9	26,27	81.5	2.7	12	NA	1969	Org.	Owners only
LAKE OF THE HOLLOW	45	9	21	51.0	2.4	15	400	1970	Org.	Restricted
LAKE OF THE WOODS	42	9	4	14.8	1.0	7	NA	1930	Org.	Owners Only
LAKE ZURICH	43	10	17-20	228.0	3.2	32	1240	Natural	Org.	Fee Resort
LAKEFIELD LAKE	44	10	4	19.4	0.9	12	180	1927	Private	None
LAKELAND ESTATES LAKE	44	9	34,35	15.0	0.6	15	NA	1956	Org.	Restricted
LAKEWOOD FOREST PRES. LAKES	44	10	30,31	22.5	2.2	27	300	1950	Public	Via Forest Preserves
LILY LAKE	45	9	32,35	89.0	3.8	16	NA	Natural	Org.	Fee Resort
LITTLE SILVER LAKE	46	10	9,16	41.2	1.2	21	100	1960	Org.	Fee
LITTLE WONDER LAKE	45	7	24	11.4	0.5	8	NA	1964	Private	None
LONG LAKE	45	9,10	13,24	335.0	4.4	30	26,880	1930	Org.	Fee
LOWER WEST LAKE	42	8	26	10.1	1.4	18	NA	1951	Org.	NA
LUCKY 50 CLUB LAKE	38	8	29	50.0	2.2	16	NA	1944	Org.	NA
McCOLLUM LAKE	45	8	22	245.0	2.9	10	NA	1890	Org.	No Public Access
MARIAN LAKE	42	8	11	11.6	0.9	38	NA	1949	Org.	NA
MARY LEE LAKE	44	10	27	14.0	0.8	8	150	1952	Org.	Restricted
MASTODON LAKE	38	8	26,35	22.3	2.1	9	NA	1933-4	Public	NA
MIGHELL PARK LAKE	38	7	25	25.0	1.1	26	NA	1957	Public	NA
MOOSEHEART LAKE	39	8	28	19.0	2.0	11	NA	1914	Org.	NA
NELSON LAKE	39	7	25	25.3	1.0	4	NA	Natural	Private	NA
NUTRI-SOIL LAKE	45	9	29	12.0	1.4	8	NA	1950	Org.	Restricted
PARKER'S JEWELWOOD LAKE	44	7	13	10.0	1.8	10	NA	1951	Private	Permission
PECK LAKE	39	8	18	16.0	0.8	5	NA	1964	Private	NA
PEPPER LAKE	43	9	21	10.0	1.0	40	NA	1955	Private	Fee Fishing Area

TABLE 19-2 : LAKE AND POND INVENTORY, FOX RIVER BASIN

NAME	LOCATION			SURFACE AREA (ACRES)	SHORE-LINE (MILES)	MAXIMUM DEPTH (FT)	WATER-SHED (ACRES)	DATE CON-STRUCTED	OWNER-SHIP	ACCESSIBILITY
	TWP N	RNGE E	SECT							
PETITE LAKE	46	9,10	25,30, 36	167.0	2.0	22	1000	1939	Public	Fee Resort
PISTAKEE LAKE	45	9	9,16	1700.0	11.8	31	1700	1939	Public	18 Fee Resorts & Marinas
PRATT'S WAYNE WOODS LAKE NO. 1	40	9	7	16.2	0.8	22	NA	1920	Public	Through Forest Preserve
PRESTBURY LAKE	38	7	15	18.1	0.9	13	NA	1966	Org.	NA
RAY'S LAKE	44	10	17	15.0	0.9	8	500	Natural	Private	Permission
REDHEAD LAKE	45	9	15,16, 21	45.0	1.1	7	260	1939	Public	via Channel from Pistakee
ROUND LAKE	45	10	21	215.0	2.3	35	500	1950	Public	Fee
RYANS (ORCHARD) LAKE	42	9	3	13.5	0.7	8	NA	1940	Org.	Owners Only
SHEFFIELD TOWN LAKE	41	10	18	10.5	0.7	12	NA	1970	Org.	NA
SILVER LAKE	44	8	36	36.0	1.4	14	NA	1929	Org.	Restricted
SLOCUM LAKE	44	9	28	220.0	2.7	10	3940	1900	Org.	Fee Resorts
SPRING GROVE HATCHER LK.	44	8	25	20.0	2.0	6	NA	1913	State	None
SPRING LAKE	42	9	5	32.0	0.7	9	NA	Natural	Public	Open to Public
SULLIVAN LAKE	45	9	28,33	45.0	2.0	9	200	Natural	Org.	Restricted.
SUN LAKE	46	10	28	30.8	2.3	NA	700	Natural	Private	Controlled
THUNDERBIRD LAKE	44	8	23	75.0	3.0	10	NA	1956	Org.	NA
TIMBER LAKE	44	9	36	31.2	1.1	18	450	1949	Org.	Restricted
TOWER LAKE	43	9	2	70.0	2.5	10	385	1915	Org.	Restricted
TURNER LAKE	46	9	21	34.0	1.1	10	500	Natural	State	Open to Public
WALTEN HOLLOWAY LK.	44	10	20	28.0	0.8	9	175	1940	Private	Controlled
WEST LOON LAKE	46	10	20,21	165.0	2.0	37	500	Natural	Org.	Fee Resorts
WILLOW LAKE ESTATES LAKE	41	8	1	14.0	1.3	13	NA	1900	Org.	NA
WILLOW WING LAKE	42	8	17	17.0	0.8	15	NA	1947	Private	NA
WONDER LAKE	45	7	7,13	730.0	12.0	13	NA	1925	Org.	Restricted
WOOSTER LAKE	45	9	23	100.3	1.8	32	1200	Natural	Org.	Fee Resorts
ZIEGLER LAKE	46	9	15,16	50.0	2.0	10	400	1955	State	Chain O'Lakes St.Pk.

discharges from septic tanks, and the surface applications of wastes, fertilizers, or agrichemicals.

Glacial lake and windblown deposits are found in widely scattered areas of the basin, filling depressions in till and outwash areas. Usually fine grained, these materials have low permeability, and runoff to surface waters can be a problem. For this reason, septic tanks and landfills will usually not function well in these materials.

Soil conditions limit septic tank usage in much of the basin. In the northern half, ground conditions causing septic tank problems include high infiltration capacity, low conductivity, poor surface drainage, and steep slopes. Restrictions in the southern half of the basin are generally less severe with some areas having little or no restrictions for septic tank usage. Most severely restricted are areas in which aquifers lie close to the surface, notably in some parts of the northern half of the basin and in the Kane County portion of the Fox River valley.

Predominant soils in northeastern Illinois are described in Chapter Three. Soils occurring in this basin are identified in Table 19-3.

(4) Fish Species and Habitat: The majority of the Fox River basin has good to high quality aquatic habitat. In the River proper, a diverse fish population is still being maintained. Many tributaries have undergone little modification from their natural condition, and a number of fish species, rare elsewhere in the region, are found in these streams.

Certain areas in the basin are environmentally sensitive and deserve special attention in 208 planning. The northern half of the basin in Illinois is a complex area of lakes, marshes and streams. More than 500 of the basin's 600 odd wetland areas are over 10 acres in size. Of particular importance are five bogs, four of which are in nature preserves, which are important habitats and are the last of their type in northeastern Illinois. There are 17 nature preserves, prairies, and forest preserves of special environmental concern in the basin; they are similarly concentrated in the north and are important as wildlife habitats.

b. Socio-economic Characteristics

(1) Population: The estimated 1975 population of the basin was 545,424, representing 15 percent of the combined 1975 populations of Du Page, Kane, Lake, McHenry, and suburban Cook counties. The population density (569 persons per square mile) is one of the lowest in northeastern Illinois.

The largest communities in the basin in 1975 were Aurora and Elgin, and the smallest were Hainesville and Pingree Grove. Most of the basin's communities had high rates of growth between 1950 and 1975. Table 19-4 shows

Figure 19-1: BASIN LOCATION



population forecasts for facility planning areas. A continuation of high rates of growth is forecast throughout the basin. Projected wasteloads, which are discussed later in this chapter, are based on these population forecasts.

(2) Land Use: There is a wide range of land use in the Fox River basin, though most land remains in the category of vacant, agricultural, and forest areas (Table 19-5). The northernmost part of the basin is a mixture of farms, lakes, and resort towns, while the portion south of Lake and McHenry counties is typified by cropland, old farming communities, the western edge of Chicago's suburbs, and the heavily urbanized old industrial cities on the Fox River. Some heavy concentrations of commercial and industrial lands are found in or near the cities, which are built either on the bluffs along the river or in the river valley.

Most of the public and quasi-public open space is located in large forest preserve areas in Cook County, and state holdings in the northern part of the basin. Mining includes three limestone quarries in Kane County, scattered sand and gravel pits primarily in McHenry and Kane counties, and a number of sites where peat is extracted.

NIPC land use forecasts anticipate increasing urbanization, with accompanying changes in land use, as indicated in Table 19-6. The largest relative increases are forecast in nonresidential land use categories, particularly manufacturing and commercial. The amount of undeveloped (open, vacant, agricultural) land is forecast to decrease by approximately 15 percent by the year 2000.

(3) Economy: Employment in the basin is dominated by manufacturing, although in recent years manufacturing employment has not grown as rapidly as the service industries. Employment in agriculture, finance, real estate, government, and retail trade has increased at a somewhat higher rate than in manufacturing.

The total number of people employed in the basin was 139,637 in 1970 and this number will increase by 65 percent, to 230,219 by the year 2000. Table 19-7 indicates substantial increases between 1980 and 2000 in all categories of employment.

(4) Water Supply: In the Fox River basin groundwater pumpage is the sole source of public water supply. Shallow sand and gravel wells account for 61 percent of the public groundwater pumpage, while shallow dolomite wells account for 10 percent, and deep sandstone wells, 29 percent.

(5) Government: The Fox River basin includes portions of all six counties, parts of 54 townships, all or portions of 63 incorporated municipalities, 9 sanitary districts, and 51 other special districts.

TABLE 19-3: PREDOMINANT SOIL UNIT CHARACTERISTICS FOR NORTHEASTERN ILLINOIS

Unit In Basin	Soil Unit	Soil Color	Soil Texture	Permeability	Drainage	Subsoil Texture	Underlying Materials	Agricultural Usage Limitations	Approximate Percentage of Prime Agri. Land	Development Usage Limitations
YES	Fox-Dresden-Casco	brown	loam	mod-rapid	well	loam	sand and gravel	E, D, LF	12	S, E, ST
YES	Warsaw-Rodman-Lorenzo	brown	loam	moderate	well	loam	sand and gravel	E, D	50	S, E, ST
	Volinia-Selma-Lomax	brown	loam	moderate	excessive	loam	sand	WE, D, W	80	W, S, P
	Maumee-Watseka Plainfield	black	loamy sand	rapid	excessive	sand	sand	W, WE, D	30	S, W
YES	Zurich-Grays-Wauconda	gray	silt loam	moderate	moderate	clay loam	silt loam	W, E, LF	90	S, W, ST
YES	Drummer-Brenton-Proctor	brown	silt loam	moderate	moderate	clay loam	loam	W, E	100	W, S, P
YES	Miami-Kidder-McHenry	gray-brown	loam	moderate	well	clay loam	loam	E, ST, LF	40	ST, S, SS
YES	Drummer-Saybrook-Lisbon	dark gray	silt loam	moderate	moderate	clay loam	loam	W, E	80	W, S, SP, SS
YES	Ringwood-Griswold	brown	loam	moderate	well	clay loam	sandy loam	E, W	85	S, W, ST
YES	Morley-Markham-Ashkum	gray	loam	slow	moderate	silty clay	clay loam	E, W, LF	60	ST, SP, SS, W, HC
YES	Elliot-Ashkum-Beecher	dark gray	silt loam	slow	moderate	silt loam	clay loam	W, E	85	W, SP, CS, SS
YES	Milford-Martinton	black	silt loam	mod. slow	poor	silty clay	calcareous sediment	W	95	W, HC, P, SP, SS
	Symerton-Andres-Ashkum	black	silt loam	moderate	moderate	clay loam	clay loam	E, W	95	W, SP, SS
YES	Nappanee-Peotone-Del Rey	dark gray	silt loam	slow	well	silt loam	calcareous sediment	W, T, LF, E	50	W, SP, HC, P
YES	Frankfort-Bryce-Montgomery	dark brown	silt loam	slow	poor	silty clay	calcareous sediment	W, T, LF, E	5	W, SP, HC, P
YES	Romeo-Joliet	black	loam	moderate	poor	loam	limestone	W,STN, FL	60	W, SH, FL, SS
YES	Otter-Huntsville-Millington	black	loam	moderate	moderate	loam	loam	FL, W	95	W, FL
YES	Fox-Wauconda-Sawmill	dark gray	silt loam	moderate	poor	loam	sand	W, FL, E	75	W, FL
YES	Houghton-Lena	black	muck/peat	rapid	poor	muck/peat	sand/silt	HWT, W	0	W, P, S, HWT, LS

USAGE LIMITATION CODES

CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
CS	Clayey Subsoil	D	Drouthiness	E	Erosion	FL	Flooding
HC	Heavy Clayey Subsoil	HWT	High Water Table	LF	Low Fertility	LS	Low Strength
P	Ponding	S	Seepage	SH	Shallowness to Bedrock	SP	Slow Percolation
SS	Shrink-Swell	ST	Steepness	STN	Stoniness	T	Soil Tilth
W	Wetness	WE	Wind Erosion				

TABLE 19-4 : POPULATION CHANGE 1975-2000

FACILITY PLANNING AREAS	1975	1980	1985	1990	1995	2000	% Change 1975-2000
AURORA FPA	112,200	117,610	139,980	162,350	178,200	208,800	86.1
BARRINGTON FPA	33,840	39,520	48,190	56,860	65,720	74,580	120.4
BATAVIA FPA	12,420	13,670	15,980	18,600	20,000	21,490	73
CARPENTERSVILLE FPA	24,900	31,400	35,100	38,800	40,400	42,000	68.7
EASTERN KANE FPA	31,100	36,850	44,640	52,520	57,330	62,140	99.8
ELBURN FPA	2,200	2,300	3,500	4,600	4,800	5,200	136.4
ELGIN FPA	113,200	133,800	154,000	174,100	188,500	202,900	79.2
FOX RIVER GROVE FPA	3,400	4,100	5,200	6,200	6,700	7,200	111.8
GILBERTS FPA	500	600	1,000	1,300	1,900	2,500	400
HEBRON FPA	1,000	1,000	1,100	1,100	1,200	1,300	30
ISLAND LAKE FPA	8,840	9,710	10,590	11,460	12,300	13,400	51.6
LAKE IN THE HILLS FPA	4,700	6,000	6,300	6,600	7,100	7,500	59.6
LAKE ZURICH FPA	6,800	10,600	13,600	16,600	19,800	23,000	238.2
McHENRY FPA	17,600	21,700	27,700	33,600	37,400	42,100	139.2
NORTHWEST LAKE FPA	51,100	59,000	69,000	79,000	87,000	95,000	85.9
PINGREE GROVE FPA	300	400	400	500	500	500	66.7
SOUTH DUNDEE FPA	11,000	11,400	12,800	14,200	15,300	16,400	49.1
SOUTHEAST McHENRY FPA ALGONQUIN SUB-FPA	6,500	10,000	11,500	13,000	14,500	16,000	146.2
S.E.McHENRY FPA-CRYSTAL LAKE-LAKEWOOD SUB-FPA	23,000	31,800	34,500	37,200	43,800	50,500	119.6
S.E.McHENRY FPA-CARY OAKWOOD HILLS SUB-FPA	10,600	11,400	13,500	15,500	19,600	23,600	122.6
RICHMOND FPA	1,400	1,600	1,700	1,900	2,100	2,300	64.3
SPRING GROVE FPA	1,400	1,800	2,000	2,200	2,300	2,400	71.4
SUGAR GROVE FPA	2,000	2,200	2,800	3,400	3,800	4,100	105.0
SUNNYSIDE FPA	5,900	6,300	7,100	7,900	10,000	11,100	88.1
WASCO FPA	301	331	438	545	640	735	144.2
WAUCONDA FPA	8,570	9,650	10,730	11,800	12,360	12,920	50.8
WAYNE FPA	1,250	1,300	1,550	1,790	2,500	3,360	168.8
WONDER LAKE FPA	7,600	8,400	8,900	9,300	9,900	10,000	31.6
WOODSTOCK	14,020	15,450	18,170	20,890	24,280	27,660	97.3
FPA TOTALS	517,641	599,891	701,968	803,815	889,930	990,685	91.4
BASIN TOTAL	545,424	580,226	672,526	764,827	850,834	936,300	71.7

Source: Northeastern Illinois Planning Commission

(6) Recreation: By virtue of its many lakes, the northern portion of the Fox River basin has become what is probably the major recreational area in the region. A number of lakes have facilities for boating, fishing, and swimming. Winter sports include cross-country skiing, tobogganing, and ice skating. In many of the lake communities, a high proportion of the homes are used only as summer or weekend retreats. Additional recreational opportunities are available at the Chain-O-Lakes State Park and Moraine Hills State Park.

19.02 IMPACTS OF OTHER PROJECTS

a. Introduction

In many basins there are studies or projects underway which may directly or indirectly affect surface and/or groundwater quality. Most will have indirect effects, since they usually pertain to water quantity or hydrologic modifications. Included in these classifications are the flood control activities of the U.S. Soil Conservation Service (SCS), the U.S. Army Corps of Engineers, and the Illinois Division of Water Resources. The soil conservation programs of the SCS also have an influence on water quality.

There are many local, county, state and federal public works projects which can affect water bodies. Perhaps the most significant is the construction or improvement of roads and highways. In those instances, drainage patterns may be altered, local farm tiles may be interrupted, silt may be introduced into streams, and vehicular pollutants may be conveyed to rivers and streams. Waterway crossings by highway projects and similar crossings by various public and private utilities all affect water quality to varying degrees and for various lengths of time. Not to be overlooked are public and private storm sewer outlets which may be authorized in the future.

A wide variety of projects affect water quality, however, in this section, attention will be given only to those with significant potential impact.

b. Corps of Engineers

The U.S. Army Corps of Engineers has responsibilities relating primarily to navigation and flood control.

(1) Navigation: The Corps has general jurisdiction over navigable waters of the United States. The Fox River, while extensively used for recreational navigation, does not have a federally approved navigation project under the Corps' jurisdiction.

TABLE 19-5 1970 LAND USE

Land Use Category	Total Acres	% of Total
Single Family Residential	45,620	7.4
Multi Family Residential	660	.1
Mobile Home Parks	158	0
Manufacturing and Processing	2,757	.4
Transportation, Communications, & Utilities	2,077	.3
Railroad Rights-of-way	3,390	.6
Airports	975	.2
Streets & Parking	22,642	3.7
Trade	1,776	.3
Services-Private	568	.1
Services-Institutional	5,938	1.0
Military Services	4	0
Cemetaries	755	.1
Entertainment Assembly	272	0
Public Buildings	224	0
Public and Quasi-Public Open Space	21,297	3.5
Mining and Quarries	5,870	1.0
Vacant, Agricultural & Forest Areas	476,216	77.6
Vacant-Under Development	2,477	.4
Water	19,324	3.2
Warehousing	387	.1
Shopping Centers	190	0
Hotels-Motels	133	0
Parking Lots	305	0
Total	614,015	100

TABLE 19-6: LAND USE FORECASTS (ACRES)

Land Use Category	1980	1985	1990	1995	2000
Residential	55,415	61,048	66,680	72,313	77,946
Manufacturing	10,229	14,392	18,554	22,368	26,182
Commercial	9,205	13,166	17,127	20,761	24,395
Transportation/Communication, etc.	23,899	29,849	35,798	41,172	46,546
Open Space, Vacant Agriculture, etc.	515,627	495,560	475,856	457,401	438,946
Total	614,015	614,015	614,015	614,015	614,015

SOURCE: Northeastern Illinois Planning Commission, 1976

TABLE 19-7: EMPLOYMENT FORECAST

CATEGORY	1970	1980	1985	1990	1995	2000	1970-2000 % Increase
Manufacturing	50,704	57,626	59,558	61,491	66,086	70,682	39.8
Local Retail	16,994	22,226	23,109	23,992	25,942	27,892	64.1
Other	71,939	102,704	110,069	117,432	124,539	131,645	83.0
Total	139,637	182,556	192,736	202,915	216,567	230,219	64.9

Source: Northeastern Illinois Planning Commission

(2) Wastewater Studies: Pursuant to Section 206 of the Flood Control Act of 1958 and resolutions adopted by Congress in 1971, the Corps was involved in studying alternative wastewater management systems for the Chicago-South End of Lake Michigan (C-SELM) area, which covered portions of northeastern Illinois and northwestern Indiana. (The Fox River basin was not included in the study area except as noted below.) Specifically, the study was directed at the evaluation of various regional wastewater management systems, including plans which would eliminate pollution discharges. A pilot study was completed in 1974. However, since this was only a planning study, the report contained no recommendations for federal action with respect to the wastewater management systems evaluated. The intent of Congress was that these studies be presented to local governments for their consideration. Given the widespread public opposition to the results of the study, the possibility of it being implemented is remote. Certain land treatment sites for wastewaters were proposed and were located in the Fox basin.

(3) Dredge and Fill Permits: Under Section 404 of PL 92-500, the Corps is authorized to issue permits for the placement of dredged or fill materials into navigable waters or on adjacent land sites. Permits may be withheld if it is determined that the discharge will have adverse effects on water supplies, fish, wildlife, or recreation. Under current guidelines, Corps authority extends to all navigable waters and tributaries where the average annual flow is 5 cfs or more. The entire Fox River and many of its tributaries are subject to this permit system.

(4) Flood Control: The Corps has been involved in several studies relating to flood control in the Fox basin. Recently, interest has expanded to include comprehensive studies of other water resources problems. Pursuant to a U.S. House of Representatives resolution adopted April 11, 1974, the Corps has been involved in the preparation of a report to determine the feasibility of developing a comprehensive water resources plan for the basin, including flood control, water supply, recreation, fish and wildlife management, and aesthetic enhancement. The study area includes the entire basin, including that portion in Wisconsin. Work is to be completed in 1983, at which time, select projects will be recommended for implementation.

c. U.S. Department of Agriculture

The Agricultural Stabilization and Conservation Service (ASCS) and the Soil Conservation Service (SCS) are the two principal units of the U.S. Department of Agriculture with programs related to water quality management.

(1) Conservation Program: The SCS and ASCS provide a variety of services directed at reducing soil erosion. The SCS offers technical assistance to individuals, local soil and water conservation districts, and other interested parties in developing erosion control plans. The ASCS gives assistance through cost-sharing to farmers to control erosion and related water pollution problems.

(2) PL-566 Projects: The small watershed program of the SCS, authorized by the Watershed Protection and Flood Prevention Act of 1954 (PL 83-566), provides a framework through which federal, state, and local units of government can deal with local water resources problems on a comparative basis. The program is principally oriented toward the prevention of soil erosion and the control of flooding and sedimentation damages. Works typically include the construction of small reservoirs, stream channelization, grade stabilization, and bank protection. Projects are sponsored by and coordinated through local soil and water conservation districts and other interested agencies.

In 1971, a Chicago area river basin study was initiated by the SCS under PL-566. Work was undertaken in six watersheds in Cook and Lake counties to develop comprehensive plans to reduce floodwater damage.

Poplar Creek, a tributary to the Fox River was included in the study, and in 1975, a floodwater management plan was completed calling for construction of .27 miles of earth dike and the replacement of an existing highway bridge near Elgin. Other recommended measures include an accelerated program to control soil erosion, the purchase of certain flood plain properties and wetlands for open space preservation, flood plain regulation, and channel

maintenance. As a water quality benefit, the SCS estimates that implementation of the plan would reduce the amount of sediment entering the creek to 28,100 tons per year. Thus far, implementation has centered on construction of the dike.

d. Illinois Department of Transportation

Two divisions of this department have responsibilities that impact on water quality management: the Division of Water Resources (IDWR) and the Division of Highways (DOH).

(1) IDWR: IDWR has statutory responsibility for navigation and flood control projects on water bodies throughout the state. It also has permit authority for private and public projects which enter or cross over or under such waters. The Division also operates the McHenry Lock and Dam, which is used to control upstream water levels in the Chain of Lakes.

The IDWR also has underway a number of flood control projects in the region. However, the Poplar Creek dike (noted previously) is the only flood control project currently proposed for the Fox River basin.

(2) DOH: The Division of Highways is responsible for the construction and maintenance of state highways. Highways have associated water quality impacts both during their construction (e.g. erosion and sedimentation, disruption of drainage, etc.) as well as when placed in use (e.g., road salt usage, roadway drainage). Current long range plans call for the construction of the multi-lane, Fox River Valley Freeway, which would generally parallel the river, and the Richmond-Waukegan Freeway which would cross the river north of McHenry.

e. SEWRPC

The Southeastern Wisconsin Regional Planning Commission (SEWRPC) is the regional planning agency for seven counties in southeastern Wisconsin. SEWRPC will soon complete a 208 water quality management plan for its area. NIPC and SEWRPC have coordinated their respective planning efforts because of a common interest in Lake Michigan, the Des Plaines River, the Fox River, and tributaries to the Kishwaukee River. Emphasis has been placed on the development of plans for the Wisconsin portion of shared basins which will allow the more stringent Illinois water quality standards to be met.

f. Local Units of Government 391

Municipalities, several counties, and a number of 393
special purpose districts are involved in a variety of 395
projects which have direct or indirect water quality
impacts. The general purpose units are empowered to adopt 396
regulations, such as flood plain ordinances, on-site 397
stormwater detention ordinances, and soil erosion and
sedimentation control ordinances. All of these have the 398
potential for improving water quality. Zoning ordinances, 399
building codes, and health regulations also have the
potential for at least peripheral impact on water quality. 400
Still other effects result from routine activities, such as 401
street sweeping, sewer and catch basin cleaning, and solid 402
waste management. Building permits involving stormwater 403
drainage systems which discharge into local streams can have 404
important water quality implications.

Special purpose districts also are involved. The Elgin 407
and Aurora Sanitary Districts, as well as the MSDGC, have
constructed extensive wastewater facilities. The Cook 409
County Forest Preserve District has been active in acquiring
land in its portion of the basin and preserving it in a 410
natural state. Most other large blocks of public open land 411
in the basin are held by the Illinois Department of 412
Conservation. Local soil and water conservation districts 413
have been active in promoting soil erosion control measures.

Another organization is the Chain-of-Lakes-Fox River 415
Commission which has been focusing attention on the
flooding, water quality, and recreational problems of the 416
upper portion of the basin. The Commission has attempted to 417
better define problems and their causes and has conducted
some remedial work, including limited dredging of connecting 418
channels in the Chain-of-Lakes.

19.03 WATER QUALITY IN THE BASIN 421

a. Stream Classifications and Applicable State Standards 423

All waterways in the basin are designated as "general 425
use, protected for public and food processing water supply" 427
and are subject to state standards for waterways with such
designation. A full discussion of general use and other 428
standards applicable to water quality is given in Chapter 429
Four.

b. IEPA Stream Segment Classifications 433

The state has been divided by the Illinois 435
Environmental Protection Agency (IEPA) into hydrologic units 437
that coincide with major river basins. These units have 438
been further divided into segments on the basis of common
characteristics. The Fox River basin in northeastern 439

Illinois is made up of segments B-1 and B-2, a major portion of B-3 and a portion of B-4 are in the Fox River hydrologic unit as delineated by the IEPA. These segments, like all others in the state, have been designated "water quality limited." This designation means that water quality does not currently meet applicable water quality standards and/or is not expected to meet those standards even after the minimum statutory limitations have been applied to effluent discharges.

c. Sources of Water Quality Information

Assessment of current water quality conditions of the Fox River and its tributaries has been based on information developed from water quality sampling and analysis programs undertaken by this Commission and several other public agencies, principally the IEPA. Information obtained by NIPC from computer simulation of existing conditions using the Hydrocomp water quality model was also used to evaluate current water quality.

(1) Sampling and Analysis: The water quality sampling and analysis programs conducted by the Commission included 48 in-stream sampling stations. Seven of these stations were within the Fox River basin. The IEPA sampling program is a continuing effort at 178 stations, of which 33 are in the Fox basin. (See Figure 19-2).

In addition to the in-stream sampling program, NIPC conducted several other programs, including the following:

- Land use runoff sampling and analysis at 16 sites and two Lake Michigan Ravines, one of these was located in the Fox basin.
- Sediment oxygen demand (SOD) measurements at 110 stations, 30 of which were in this basin.
- Benthic macroinvertebrate sampling at 116 stations, 36 of which were in this basin.
- Dam aeration/deaeration measurement at 48 structures, including 14 on the Fox River.
- Fish population surveys at 248 sites, 80 being in the Fox basin.

(2) Computer Simulation of Existing Conditions: As shown in Figure 19-3, the basin has been divided into 49 areas called reaches. Measurements of water quality data were reported at 13 of these reaches, which summarized the water quality conditions of the entire 49. It is possible to assemble a complete picture of the basin in this manner because data collected at a given point reflect conditions

throughout the entire drainage basin upstream of that point. Table 19-8 describes the most downstream point of the 13 summary reaches.

The concept of reaches is an important one in this areawide planning program. Water quality research done by the Commission was conducted in the basin on a reach-by-reach basis. Data of simulated existing and future conditions were prepared with the model, and presented, on a reach-by-reach basis. The data, in each case, represented simulated conditions at the "data output points" shown in Figure 19-3.

As described in Chapter Four, the water quality model is a computerized system that uses mathematical formulas to replicate a drainage basin. The model was calibrated using instream water quality data collected at 48 sites throughout the NIPC region. Intensive sampling was conducted at these sites to determine daily and diurnal variations in water quality. In the calibration process, parameters were adjusted in the model so that the model simulation results reflected the measured water quality.

Sources of pollutants are categorized in the modeling process as follows:

- Point sources: treatment plants and other discrete dischargers;
- Nonpoint sources: surface runoff and groundwater seepage from developed and undeveloped areas;
- Combined sewer overflows; and
- Boundary conditions: the amount of pollution flowing into a basin from another basin or another state. The Fox River originates in Wisconsin before entering Illinois, and boundary conditions account for much of the pollutants introduced to the Illinois portions of the basin.

d. Description of Current Water Quality

(1) In-Stream Sampling: Seven Commission in-stream sampling stations were located in the Fox River basin at the following locations:

Station 1: Fox River at County Road C in Wilmot, Wisconsin;
Station 2: Nippersink Creek at Winn Road in Spring Grove;
Station 3: Fox River at McHenry Dam;
Station 5: Fox River at Illinois 62 in Algonquin;
Station 6: Fox River at State Street in South Elgin;
Station 7: Fox River at Montgomery Road in Montgomery;
Station 8: Fox River at Illinois 47 in Yorkville.

TABLE 19-8: DATA OUTPUT POINTS

Reach Number	Location
31	Nippersink Creek, at Thompson Road just upstream from Wonder Lake,
106	Nippersink Creek, where it flows into Nippersink Lake,
113	Grass Lake outlet above Nippersink Lake,
117	Squaw Creek outlet into Fox Lake,
121	Fox River at Johnsburg,
270	Flint Creek where it flows into the Fox River in Cuba Township, Cook County,
300	Spring Creek where it flows into the Fox River at Cary,
310	Fox River at Algonquin,
340	Tyler Creek where it flows into the Fox River on the north edge of Elgin.
360	Poplar Creek where it flows into the Fox River from the east at Elgin,
370	Fox River at Valley View,
430	Otter Creek where it flows into the Fox River north of St. Charles,
480	Fox River at Montgomery dam.


ILLINOIS
In-Stream Sampling Site
Located on Fox River at
County Road C, Wilmot, Wis.
LEGEND
In-Stream Sampling Site
IEPA Water Quality
Monitoring Station
USGS Stream Gaging Station
ISWS Sediment Oxygen Demand
and Benthic Study Site
Basin Boundary
0 1 2 3 4 5 Mi.
0 1 2 3 4 5 6 7 8 Km.
NORTH
MCHENRY COUNTY
KANE COUNTY
COOK COUNTY
DUPAGE COUNTY
HEBRON
HARVARD
RICHMOND
SPRING GROVE
SUNNYSIDE
McCULLOM LAKE
WOODSTOCK
LAKEMOOR
HOLIDAY HILLS
PRAIRIE GROVE
ISLAND LAKE
CRYSTAL LAKE
LAKEWOOD
CARY
BARRINGTON HILLS
BARRINGTON
GILBERTS
CARPENTERSVILLE
HAMPSHIRE
PINGREE GROVE
BURLINGTON
ELGIN
SCHAUMBURG
HANOVER PARK
ROSELLE
BLOOMINGDALE
VALLEY VIEW
MAPLE PARK
ST CHARLES
GENEVA
ELBURN
WEST CHICAGO
BATAVIA
WHEATON
GLEN ELLYN
GLENDALE HEIGHTS
CAROL STREAM

Figure 19-3: BASIN MODELING SEGMENTS



Data were collected seasonally over a 13-month period (April, 1976 through April, 1977) at each station primarily for use in calibrating the water quality simulation model. Summary results of this program are shown in Table 19-9. Samples were analyzed for 19 constituents or characteristics, and stream flow was measured at the time of sample collections. Of the 19 parameters evaluated, the State of Illinois has established standards for four: pH, temperature, dissolved oxygen (DO), and ammonia. In general, samples obtained were in compliance with these state standards. However, the station above the Chain-of-Lakes, reflecting inputs from Wisconsin, did show violations of the phosphorous limitation of .05 mg/l. The only other violations of stream standards were low DO readings at Station 7 during April and July, and at Station 8 in October.

(2) IEPA Sampling: Thirty-three IEPA in-stream sampling stations are located in the Fox basin. The results of samples taken from these stations during 1976 are shown in Table 19-10. Overall, only one percent of the samples showed violations of the ammonia/nitrogen standard, and one percent showed violations of the DO standard. Violations of the fecal coliform and copper standards were more frequent, with a few violations of the iron, lead, silver, and pH standards also noted. The DO violations were noted on the Fox River at the Grass Lake outlet and in Indian Creek. The ammonia violations were observed at the outlet of Crystal Lake near Algonquin, and in Flint Creek. Fecal coliform and metals violations are scattered thoughout the basin.

(3) SOD Measurements: Thirty sites at which sediment oxygen demand (SOD) was measured are in the Fox basin. The purpose of these analyses was to estimate the oxygen demand exerted upon the overlying water by bottom-dwelling (benthic) organisms. Conditions were classified as one of the following: clean, moderately clean, slightly degraded, moderately polluted, polluted, heavily polluted, or sewage sludge-like. Table 19-11 shows the results of this classification process. The benthic condition of most of the basin is slightly degraded to moderately polluted. However, areas of moderate and heavy pollution were noted.

(4) Biological Classification: As part of the SOD study, benthic macroinvertebrate communities were analyzed, and mathematical Shannon-Weaver indices reflecting the nature and diversity of these communities were developed according to standard formulae. Indices above 3.0 are generally indicative of clean water; values between 1.0 and 3.0 are indicative of moderately polluted water, and valves below 1.0 are indicative of severe pollution.

TABLE 19-9 IN-STREAM WATER QUALITY ANALYSES – SUMMARY DATA

FOX RIVER BASIN

STATION NO. 1

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																		
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
APRIL 5 - 14 1976	No. of Analyses	30	11	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.9	257	36	141	612	27	14	15	12	19			2.4	0.4	1.9	0.29	6	350	106	1280.0
	Minimum	7.7	216	14	32	444	5	4	10	2	5			0.5	0.0	1.0	0.05	2	337	39	636.0
	Mean	8.2	234	20	55	504	13	8	12	5	10			1.5	0.2	1.4	0.11	4	344	66	
JULY 5 - 15 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.8	212	41	93	738	34	30	19	11	18			2.3	0.3	0.0	0.26	4	286	248	
	Minimum	6.5	184	21	38	458	9	24	7	4	11			1.4	0.0	0.0	0.06	1	269	81	
	Mean	8.1	201	29	69	511	24	27	12	8	15			1.8	0.1	0.0	0.14	1	278	182	
OCTOBER 4 - 13 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.8	406	28	74	526	19	19	18	6	14			2.3	0.1	2.7	0.17	6	322	189	
	Minimum	7.9	175	10	18	424	6	11	8	3	7			0.4	0.1	0.1	0.06	2	311	74	
	Mean	8.4	224	17	42	473	13	14	13	5	10			1.4	0.1	0.4	0.09	4	317	125	
JANUARY 4 - 11 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
APRIL 4 - 9 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	
	Maximum	8.1	216	15	68	590	15	9	13	5	10			1.7	0.1	3.2	0.08	8	397	74	
	Minimum	7.3	203	7	20	464	8	5	10	1	5			1.0	0.1	2.5	0.02	7	370	52	
	Mean	7.7	208	10	34	516	11	7	12	4	8			1.2	0.1	2.9	0.05	7	384	62	

STATION NO. 2

APRIL 5 - 14 1976	No. of Analyses	30	11	30	30	30	30	30	29	10	10			30	30	30	30	10	2	10	
	Maximum	8.9	249	30	102	554	19	16	18	10	16			1.9	0.4	2.8	0.32	7	351	90	195.0
	Minimum	8.1	233	12	31	422	10	4	10	3	7			0.2	0.0	0.9	0.05	3	335	66	110.0
	Mean	8.3	240	19	57	474	14	8	12	5	10			1.1	0.2	2.2	0.11	5	343	77	
JULY 5 - 15 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.8	212	41	93	738	34	30	19	11	18			2.3	0.3	0.0	0.26	4	286	248	
	Minimum	6.5	184	21	38	458	9	24	7	4	11			1.4	0.0	0.0	0.06	1	269	81	
	Mean	8.1	201	29	69	511	24	27	12	8	15			1.9	0.1	0.0	0.14	1	278	182	
OCTOBER 4 - 13 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.8	406	28	74	526	19	19	18	6	14			2.3	0.1	2.7	0.17	6	322	189	
	Minimum	7.9	175	10	18	424	6	11	8	3	7			0.4	0.1	0.1	0.06	2	311	74	
	Mean	8.4	224	17	42	473	13	14	13	5	10			1.4	0.1	0.4	0.09	4	317	125	
JANUARY 4 - 11 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
APRIL 4 - 9 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	
	Maximum	8.1	263	16	80	540	16	9	13	6	10			1.5	0.1	3.0	0.07	8	376	86	
	Minimum	7.2	240	8	34	338	10	5	9	3	7			0.8	0.1	2.0	0.03	6	375	63	
	Mean	7.8	248	11	45	492	13	7	11	5	9			1.0	0.1	3.0	0.05	7	376	74	

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

TABLE 19-9 IN-STREAM WATER QUALITY ANALYSES – SUMMARY DATA

FOX RIVER BASIN

STATION NO. 3

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
APRIL 5 - 14 1976	No. of Analyses	30	11	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	9.2	200	53	179	542	31	14	22	11	21			4.0	0.6	1.7	0.50	4	302	245	2040.0
	Minimum	7.8	176	19	46	346	4	4	10	7	7			0.8	0.1	0.4	0.04	1	266	168	720.0
	Mean	8.7	191	27	72	445	21	8	17	9	16			2.4	0.3	0.9	0.10	2	284	203	
JULY 5 - 15 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.7	254	42	75	550	31	29	13	7	22			2.3	0.1	0.0	0.21	5	302	97	
	Minimum	7.0	207	18	28	452	9	24	7	2	11			1.6	0.0	0.0	0.03	2	298	55	
	Mean	8.3	221	24	43	481	19	26	9	5	14			1.9	0.1	0.0	0.13	3	300	76	
OCTOBER 4 - 13 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.9	293	28	65	530	29	18	15	9	20			3.1	0.1	0.2	0.12	2	286	143	
	Minimum	7.4	165	13	22	396	9	10	7	4	9			0.8	0.1	0.1	0.07	0	285	70	
	Mean	8.5	207	20	43	444	18	14	12	7	14			1.9	0.1	0.1	0.09	1	286	115	
JANUARY 4 - 11 1977	No. of Analyses	9	6	9	9	9	9	9	9	6	6			9	9	9	9	6	2	6	
	Maximum	8.0	343	7	20	620	11	1	18	6	12			2.5	0.3	1.8	0.12	7	489	89	
	Minimum	7.5	252	3	2	542	1	0	14	2	4			1.3	0.1	1.2	0.04	5	454	63	
	Mean	7.8	306	5	10	588	6	0	16	4	9			1.7	0.2	1.6	0.07	6	472	77	
APRIL 4 - 9 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	
	Maximum	8.5	202	32	103	518	31	10	19	11	27			2.0	0.1	1.0	0.05	4	284	310	
	Minimum	7.9	173	19	60	388	21	7	10	5	15			1.3	0.1	0.4	0.01	0	283	294	
	Mean	8.3	184	24	81	447	27	8	14	8	21			1.8	0.1	0.8	0.03	2	284	301	

STATION NO. 5

APRIL 5 - 14 1976	No. of Analyses	30	11	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	9.0	212	40	127	574	30	14	19	13	23			4.5	0.4	1.9	0.40	3	311	220	2440.0
	Minimum	8.3	169	17	45	400	8	5	11	6	11			1.4	0.0	0.4	0.04	1	271	126	806.0
	Mean	8.6	200	27	78	471	20	9	15	9	16			2.2	0.2	1.1	0.11	2	291	181	
JULY 5 - 15 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.8	212	41	93	738	34	30	19	11	18			2.3	0.3	0.0	0.26	4	286	248	
	Minimum	6.5	184	21	38	458	9	24	7	4	11			1.4	0.0	0.0	0.06	1	269	81	
	Mean	8.1	201	29	69	511	24	27	12	8	15			1.8	0.1	0.0	0.14	1	278	182	
OCTOBER 4 - 13 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.9	232	33	102	514	30	19	15	8	20			2.7	0.5	0.7	0.10	2	301	109	
	Minimum	8.1	158	12	27	418	11	10	7	3	7			1.1	0.1	0.1	0.06	0	300	79	
	Mean	8.5	198	21	49	451	17	14	11	6	13			1.9	0.1	0.1	0.08	1	301	96	
JANUARY 4 - 11 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
APRIL 4 - 9 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	
	Maximum	8.5	189	26	93	570	35	11	17	12	31			2.2	0.1	0.7	0.07	3	287	397	
	Minimum	8.2	169	16	63	410	22	8	10	5	17			1.5	0.1	0.4	0.02	0	287	300	
	Mean	8.4	179	19	78	474	28	9	15	9	23			1.9	0.1	0.6	0.04	2	287	343	

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

TABLE 19-9 IN-STREAM WATER QUALITY ANALYSES – SUMMARY DATA

FOX RIVER BASIN

STATION NO. 6

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
APRIL 5 - 14 1976	No. of Analyses	30	11	30	30	30	30	29	3	10	10			30	30	30	30	10	2	10	
	Maximum	8.9	216	56	261	668	40	13	14	10	18			3.0	0.6	2.1	0.30	4	332	245	2800.0
	Minimum	8.5	188	20	62	404	11	3	10	6	5			1.1	0.1	0.5	0.04	0	270	138	1280.0
	Mean	8.7	205	31	97	500	23	9	12	8	13			2.2	0.3	1.2	0.10	2	301	197	
JULY 5 - 15 1976	No. of Analyses	30	10	30	30	30	30	29	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.7	244	41	132	668	32	29	14	9	21			2.9	0.4	0.7	0.30	2	319	178	
	Minimum	6.4	221	18	30	496	13	24	7	2	10			1.7	0.0	0.2	0.14	1	306	82	
	Mean	8.3	234	26	60	556	21	26	9	6	14			2.2	0.2	0.5	0.21	1	313	144	
OCTOBER 4 - 13 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.7	237	26	67	566	19	19	14	12	20			2.6	0.6	1.1	0.41	5	333	103	
	Minimum	8.0	199	15	22	444	7	10	8	4	5			1.5	0.1	0.6	0.08	1	316	55	
	Mean	8.3	221	20	43	491	13	14	10	6	11			2.1	0.3	0.9	0.25	2	325	72	
JANUARY 4 - 11 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	
	Maximum	8.1	326	11	24	642	13	1	14	7	14			3.4	1.3	1.8	0.50	7	464	99	
	Minimum	7.7	305	4	10	588	1	0	10	2	11			2.0	0.8	1.4	0.14	4	445	82	
	Mean	7.9	316	7	15	618	9	0	13	5	13			2.5	1.1	1.5	0.33	6	455	90	
APRIL 4 - 9 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	
	Maximum	8.7	189	25	118	592	39	11	14	13	29			2.5	0.1	0.7	0.07	3	302	376	
	Minimum	8.2	159	15	68	446	25	8	9	3	21			2.0	0.1	0.5	0.02	0	274	329	
	Mean	8.4	177	19	82	498	30	9	12	9	24			2.2	0.1	0.6	0.03	1	288	351	

STATION NO. 7

APRIL 5 - 14 1976	No. of Analyses	30	11	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	9.0	217	37	123	556	29	14	13	10	21			2.8	0.6	2.2	0.60	4	320	243	3400.0
	Minimum	8.4	178	24	45	288	5	4	2	6	6			1.2	0.0	0.5	0.05	0	274	134	1120.0
	Mean	8.6	203	32	96	496	23	9	11	8	14			2.1	0.3	1.3	0.12	2	297	185	
JULY 5 - 15 1976	No. of Analyses	30	10	30	30	30	30	29	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.7	231	33	97	654	31	30	14	12	21			3.1	0.3	0.3	0.33	1	313	190	
	Minimum	6.4	205	17	24	324	14	24	3	4	11			1.6	0.0	0.0	0.14	0	284	119	
	Mean	8.4	216	23	54	534	22	26	8	7	14			2.2	0.1	0.1	0.22	1	299	160	
OCTOBER 4 - 13 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.5	243	30	76	594	18	19	12	7	12			2.5	0.6	1.3	0.48	5	334	122	
	Minimum	8.0	207	15	23	428	3	10	7	4	8			1.1	0.1	0.8	0.16	1	315	51	
	Mean	8.3	226	19	45	515	12	14	10	5	10			1.8	0.3	1.1	0.30	3	325	85	
JANUARY 4 - 11 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
APRIL 4 - 9 1977	No. of Analyses	10	6	10	10	10	10	10	9	6	6			10	10	10	10	6	2	6	
	Maximum	8.7	186	23	114	532	49	11	13	14	33			2.8	0.1	1.2	0.10	2	309	389	
	Minimum	8.2	160	16	73	478	26	7	9	6	17			1.0	0.1	0.4	0.02	0	281	338	
	Mean	8.5	176	19	90	509	32	9	11	10	25			2.1	0.1	0.8	0.04	1	295	368	

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

TABLE 19-9 IN-STREAM WATER QUALITY ANALYSES – SUMMARY DATA

FOX RIVER BASIN

STATION NO. 8

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		pH (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
APRIL 5 – 14 1976	No. of Analyses	30	11	30	30	30	30	30	29	10	10			30	30	30	30	10	2	10	
	Maximum	9.0	226	45	156	616	71	15	17	18	28			3.2	0.7	2.2	0.40	3	311	252	3200.0
	Minimum	8.3	191	26	27	324	19	4	23	5	10			1.5	0.1	0.6	0.05	1	285	146	1790.0
	Mean	8.6	206	34	104	506	26	10	12	9	17			2.2	0.3	1.4	0.10	2	298	209	
JULY 5 – 15 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.8	212	41	93	738	34	30	19	11	18			2.3	0.3	0.0	0.30	4	286	248	
	Minimum	6.5	184	21	38	458	9	24	7	4	11			1.4	0.0	0.0	0.06	1	269	81	
	Mean	8.1	201	29	69	511	24	27	12	8	15			1.8	0.1	0.0	0.14	1	278	182	
OCTOBER 4 – 13 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.7	245	27	70	1030	20	20	12	10	18			3.5	0.4	1.5	0.60	5	345	117	
	Minimum	8.0	217	11	23	486	5	10	3	4	4			0.8	0.1	1.1	0.20	0	317	56	
	Mean	8.4	230	16	38	544	11	14	10	5	10			1.6	0.2	1.3	0.40	3	331	86	
JANUARY 4 – 11 1977	No. of Analyses	10	6	10	10	10	10	10	9	6	6			10	10	10	10	6	2	6	
	Maximum	8.0	330	7	15	664	9	2	13	6	12			3.0	1.8	1.9	0.52	7	463	55	
	Minimum	7.4	306	2	2	596	1	0	10	2	8			2.2	1.1	1.6	0.42	4	449	39	
	Mean	7.9	318	5	9	632	5	0	12	4	10			2.6	1.4	1.8	0.48	5	456	48	
APRIL 4 – 9 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	
	Maximum	9.1	195	25	113	572	45	13	15	15	37			2.5	0.1	1.2	0.10	1	297	452	
	Minimum	8.2	164	15	69	484	23	6	9	3	14			1.3	0.1	0.4	0.02	0	274	347	
	Mean	8.5	180	19	85	515	31	9	11	11	24			2.1	0.1	0.9	0.05	1	286	373	

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

There are 36 stations at which biological analyses were made. The results, shown in Table 19-12, indicate moderate to severe pollution throughout the basin.

Samples were also rated under the IEPA's classification system (also shown in Table 19-12), under which the Fox River basin was classified as semi-polluted to polluted.

(5) Fish Species and Habitat: Fishes were collected at 80 sites along the Fox River and its tributaries in 1976 as part of the 208 sampling program. Seventy-six species and six hybrids were collected in the survey. Two-thirds of the species collected are considered to have some degree of tolerance to habitat degradation, while the remaining one-third of the species are considered intolerant of habitat abuse. Spotfin shiners, green sunfish, and bluegills were the most abundant species collected, and represented 32 percent of the total number of fish collected.

Follow-on analysis by the Illinois Natural History Survey (INHS) involved computation of a toxicity index relating water quality to fish habitat suitability. Included in the parameters for computing the toxicity index (using bluegills as the target species) are cadmium, nickel, arsenic, chromium, silver, boron, mercury, cyanide, ammonia, and copper, among others. On the basis of its analysis, the INHS determined that at six of the IEPA water quality sampling sites in the basin, the calculated bluegill toxicity index was in excess of the theoretical maximum level above which a diverse fishery cannot be maintained. Silver was the only parameter contributing to the high toxicity index values calculated for the six sites. Other parameters (copper, lead, ammonia nitrogen, total iron, and mercury) were in violation of State standards in various samples from various sites, but these did not significantly influence the toxicity index.

Overall, the INHS rated the majority of the Fox River basin as having good to high quality aquatic habitat. In the River proper, a diverse fish population is still being maintained. Many tributaries have undergone little modification from their natural condition, and a number of fish species, rare elsewhere in the region, were collected from these streams. Jelkes Creek, Norton Creek, Waubonsee Creek, Blackberry Creek, Rob Roy Creek, Big Rock Creek, and Little Rock Creek were all cited as streams containing fisheries characteristic of high quality aquatic habitats.

(6) Dam Aeration-Deaeration: Dam aeration-deaeration studies for the 14 dams on the Fox River yielded the following results. It is recognized that turbulent water passing through or ones dams may have its oxygen content increased. However, these dams have created pools immediately above the dam structures where algal blooms occur because of the nutrient enriched state of the river. Algal photosynthesis produces supersaturated DO concentrations in these pools. As water from these pools

TABLE 19-10 : VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

FOX RIVER BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen 1.5	Fecal[2] Coliform (per 100 ml.) 200	Iron 1.0	Copper 0.02	Dissolved Oxygen 5.0	Lead 0.10	Silver 0.005	Chloride (4)	Fluoride (4)	PH (Units) 6.5-9	Boron (4)	Sulfate (4)	Cyanide (4)	Hexavalent Chromium (4)	Total Phosphorus (4)	Manganese (4)	Phenol (4)	Total Dissolved Solids (4)	Temp. (°F) (4)
15	Fox River	No. of Analyses	8	8	4	4	7	4	4			8									
		No. of Violations	0	3	1	3	0	1	1			0									
DT 11		Maximum		2800	1.3	0.31		0.66	0.090												
		Minimum		100	0.1	0.02		0.00	0.000												
		Mean[3]		246	0.5	0.11		0.24	0.022												
17	Fox River	No. of Analyses	8	8	3	3	8	3	3			8									
		No. of Violations	0	5	1	2	0	1	1			1									
DT 03		Maximum		4400	1.1	0.32		0.80	0.120			9.2									
		Minimum		100	0.2	0.00		0.01	0.000			8.3									
		Mean[3]		498	0.5	0.12		0.27	0.040			8.5									
18	Fox River	No. of Analyses	9	9	3	3	9	3	3			9									
		No. of Violations	0	7	0	3	0	1	0			0									
DT 38		Maximum		4800		0.12		0.26													
		Minimum		100		0.03		0.00													
		Mean[3]		837		0.06		0.10													
19	Fox River	No. of Analyses	8	7	3	3	8	3	3			8									
		No. of Violations	0	4	1	1	0	0	0			0									
DT 13		Maximum		1600	1.2	0.05															
		Minimum		100	0.2	0.00															
		Mean[3]		384	0.6	0.02															
21	Fox River	No. of Analyses	9	9	3	3	9	3	3			9									
		No. of Violations	0	1	0	3	0	1	0			0									
DT 15		Maximum		900		0.64		0.51													
		Minimum		100		0.04		0.00													
		Mean[3]		137		0.25		0.18													
23	Fox River	No. of Analyses	9	9	2	2	9	2	2			9									
		No. of Violations	0	1	0	2	0	1	0			0									
DT 04		Maximum		400		0.07		0.36													
		Minimum		100		0.06		0.02													
		Mean[3]		116		0.06		0.19													
24	Fox River	No. of Analyses	9	9	3	3	9	3	3			9									
		No. of Violations	0	1	0	2	0	1	0			0									
DT . 16		Maximum		400		0.12		0.49													
		Minimum		100		0.02		0.00													
		Mean[3]		116		0.06		0.17													
25	Fox River	No. of Analyses	9	9	3	3	8	3	3			9									
		No. of Violations	0	1	0	1	0	0	1			0									
DT 17		Maximum		300		0.03			0.020												
		Minimum		100		0.00			0.000												
		Mean[3]		131		0.01			0.007												
27	Fox River	No. of Analyses	7	7	2	2	7	2	2			7									
		No. of Violations	0	3	0	1	0	0	0			0									
DT 09		Maximum		2900		0.12															
		Minimum		100		0.01															
		Mean[3]		238		0.06															

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

TABLE 19-10 : VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

FOX RIVER BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen 1.5	Fecal[2] Coliform (per 100 ml.) 200	Iron 1.0	Copper 0.02	Dissolved Oxygen 5.0	Lead 0.10	Silver 0.005	Chloride (4)	Fluoride (4)	PH (Units) 6.5-9	Boron (4)	Sulfate (4)	Cyanide (4)	Hexavalent Chromium (4)	Total Phosphorus (4)	Manganese (4)	Phenol (4)	Total Dissolved Solids (4)	Temp. (°F) (4)
34	Spring Creek	No. of Analyses	8	7	2	2	8	2	2			8									
		No. of Violations	0	3	0	0	0	0	0			0									
DTH 01		Maximum		6100																	
		Minimum		100																	
		Mean[3]		312																	
36	Flint Creek	No. of Analyses	7	6	2	2	7	2	2			7									
		No. of Violations	2	1	0	2	0	0	0			0									
DTZS 01		Maximum	5.80	300		0.03															
		Minimum	0.16	100		0.03															
		Mean[3]	1.52	151		0.03															
40	Nippersink Creek	No. of Analyses	6	6	2	2	6	2	2			5									
		No. of Violations	0	3	1	1	0	0	0			0									
DTK 01		Maximum		900	1.1	0.03															
		Minimum		100	0.3	0.00															
		Mean[3]		208	0.7	0.01															
42	Nippersink Creek	No. of Analyses	7	7	2	2	7	2	2			7									
		No. of Violations	0	2	1	2	0	0	0			0									
DTK 02		Maximum		2500	2.2	0.05															
		Minimum		100	0.6	0.04															
		Mean[3]		204	1.4	0.04															
43	Nippersink Creek	No. of Analyses	6	6	2	2	6	2	2			6									
		No. of Violations	0	3	0	1	0	0	0			0									
DTK 03		Maximum		2300		0.03															
		Minimum		100		0.02															
		Mean[3]		272		0.02															
41	Elizabeth Lake Drain	No. of Analyses	7	7	0	0	7	0	0			7									
		No. of Violations	0	3			0					0									
DTKA 03		Maximum		1700																	
		Minimum		100																	
		Mean[3]		246																	
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric

(4) No water quality violations for this parameter were reported.

TABLE 19-10 : VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS — Fox River BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen 1.5	Fecal[2] Coliform (per 100 ml.) 200	Iron 1.0	Copper 0.02	Dissolved Oxygen 5.0	Lead 0.10	Silver 0.005	Chloride (4)	Fluoride (4)	PH (Units) 6.5-9	Boron (4)	Sulfate (4)	Cyanide (4)	Hexavalent Chromium (4)	Total Phosphorus (4)	Manganese (4)	Phenol (4)	Total Dissolved Solids (4)	Temp. (°F) (4)
46 / DT 43	Fox River	No. of Analyses	7	7	2	2	7	2	2			6									
		No. of Violations	0	0	0	2	1	0	0			0									
		Maximum				0.04	25.9														
		Minimum				0.03	2.6														
		Mean[3]				0.03	11.7														
47 / DT 35	Fox River	No. of Analyses	7	7	2	2	7	2	2			6									
		No. of Violations	0	2	0	1	0	0	0			0									
		Maximum		800		0.04															
		Minimum		100		0.00															
		Mean[3]		173		0.02															
16 / DTZJ 01	Morgan Creek	No. of Analyses	8	8	0	0	8	0	0			8									
		No. of Violations	0	5			0					0									
		Maximum		1000																	
		Minimum		50																	
		Mean[3]		251																	
20 / DTZK 01	Indian Creek	No. of Analyses	6	6	2	2	6	2	2			6									
		No. of Violations	0	2	0	2	2	1	0			0									
		Maximum		3300		0.06	16.1	0.23													
		Minimum		100		0.05	1.7	0.01													
		Mean[3]		241		0.05	8.7	0.12													
22 / DTZL 01	Mill Creek North	No. of Analyses	7	7	2	2	7	2	2			7									
		No. of Violations	0	2	0	2	0	0	0			0									
		Maximum		1500		0.03															
		Minimum		100		0.03															
		Mean[3]		190		0.03															
26 / DTF 01	Ferson Creek	No. of Analyses	7	8	3	3	8	3	3			7									
		No. of Violations	0	0	0	3	0	1	1			0									
		Maximum				0.10		0.47	0.020												
		Minimum				0.04		0.01	0.000												
		Mean[3]				0.06		0.16	0.007												
28 / DTG 01	Poplar Creek	No. of Analyses	7	7	2	2	7	2	2			7									
		No. of Violations	0	5	0	2	0	0	0			0									
		Maximum		3000		0.94															
		Minimum		200		0.04															
		Mean[3]		681		0.49															
30 / DTZP 01	Tyler Creek	No. of Analyses	7	7	3	3	7	3	3			7									
		No. of Violations	0	2	0	3	0	1	1			0									
		Maximum		600		0.08		1.43	0.020												
		Minimum		100		0.03		0.00	0.000												
		Mean[3]		151		0.06		0.48	0.007												
32 / DTZR 02	Crystal Lake Outlet	No. of Analyses	8	7	3	3	8	3	3			8									
		No. of Violations	1	1	0	1	0	0	0			0									
		Maximum	2.00	400		0.10															
		Minimum	0.00	100		0.00															
		Mean[3]	0.77	121		0.04															

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.
(2) Fecal coliform violations are apparent violations. (See narrative)
(3) All mean values are arithmetic except for fecal coliforms, which are geometric.
(4) No water quality violations for this parameter were reported

TABLE 19-10 : VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

Fox River BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																			
			Ammonia Nitrogen 1.5	Fecal[2] Coliform (per 100 ml.) 200	Iron 1.0	Copper 0.02	Dissolved Oxygen 5.0	Lead 0.10	Silver 0.005	Chloride (4)	Fluoride (4)	PH (Units) 6.5-9	Boron (4)	Sulfate (4)	Cyanide (4)	Hexavalent Chromium (4)	Total Phosphorus (4)	Manganese (4)	Phenol (4)	Total Dissolved Solids (4)	Temp. (°F) (4)
29 / DT 18	Fox River	No. of Analyses	7	7	2	2	7	2	2			7									
		No. of Violations	0	2	0	1	0	0	0			0									
		Maximum		600		0.07															
		Minimum		100		0.01															
		Mean[3]		184		0.04															
31 / DT 05	Fox River	No. of Analyses	7	7	3	3	6	3	3			6									
		No. of Violations	0	1	0	2	0	0	0			0									
		Maximum		1500		0.08															
		Minimum		100		0.02															
		Mean[3]		147		0.04															
33 / DT 06	Fox River	No. of Analyses	8	7	3	3	8	3	3			8									
		No. of Violations	0	0	0	1	0	1	1			0									
		Maximum				0.04		0.19	0.020												
		Minimum				0.02		0.01	0.000												
		Mean[3]				0.02		0.07	0.007												
35 / DT 21	Fox River	No. of Analyses	7	7	3	3	7	3	3			7									
		No. of Violations	0	0	0	1	0	0	0			0									
		Maximum				0.06															
		Minimum				0.00															
		Mean[3]				0.02															
37 / DT 26	Fox River	No. of Analyses	6	5	2	2	6	2	2			6									
		No. of Violations	0	0	0	2	0	1	0			0									
		Maximum				0.05		0.18													
		Minimum				0.03		0.00													
		Mean[3]				0.04		0.09													
38 / DT 23	Fox River	No. of Analyses	7	7	3	3	6	3	3			7									
		No. of Violations	0	1	0	1	0	0	0			0									
		Maximum		300		0.04															
		Minimum		100		0.00															
		Mean[3]		129		0.01															
39 / DT 24	Fox River	No. of Analyses	6	6	2	2	6	2	2			6									
		No. of Violations	0	1	0	2	0	0	0			0									
		Maximum		300		0.03															
		Minimum		100		0.03															
		Mean[3]		120		0.03															
44 / DT 42	Fox River	No. of Analyses	7	7	3	3	7	3	3			6									
		No. of Violations	0	1	0	0	0	1	0			0									
		Maximum		600				0.23													
		Minimum		100				0.00													
		Mean[3]		142				0.07													
45 / DT 44	Fox River	No. of Analyses	7	7	3	3	7	3	3			7									
		No. of Violations	0	0	0	2	0	0	0			0									
		Maximum				0.05															
		Minimum				0.00															
		Mean[3]				0.02															

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

TABLE 19-11 : GENERALIZED BENTHIC SEDIMENT CONDITIONS

Fox River BASIN

STATION NUMBER	STREAM NAME	BENTHIC CONDITION*
1	Fox River	Moderately Polluted
2	Fox River	Slightly Degraded
3	Fox River	Slightly Degraded
4	Fox River	Moderately Polluted
5	Fox River	Slightly Degraded
6	Fox River	Polluted
7	Fox River	Moderately Polluted
8	Fox River	Moderately Polluted
9	Fox River	Moderately Polluted
10	Fox River	Moderately Polluted
11	Fox River	Polluted
12	Fox River	Moderately Polluted
13	Fox River	Moderately Polluted
14	Fox River	Moderately Polluted
15	Fox River	Polluted
16	Fox River	Moderately Polluted
17	Fox River	Heavily Polluted
18	Fox River	Slightly Degraded
19	Fox River	Moderately Polluted
20	Fox River	Heavily Polluted
21	Fox River	Polluted
22	Fox River	Polluted
23	Fox River	Moderately Polluted
24	Fox River	Polluted
25	Nippersink Creek	Slightly Degraded
26	Silver Creek	Polluted
30	Flint Creek	Clean
31	Flint Creek	Slightly Degraded
32	Woods Creek	Slightly Degraded
33	Blackberry Creek	Slightly Degraded

*Based on SOD value

TABLE 19-12 : BIOLOGICAL STREAM SITE CLASSIFICATIONS

Fox River BASIN

Station Number	Stream Name	IEPA Classification[1]	Shannon-Weaver	
			Index	Classification[2]
1	Fox River	P	1.18	MP
1.5	Fox River	P	0.62	SeP
2	Fox River	P	0.81	SeP
3	Fox River	P	1.22	MP
4	Fox River	P	1.00	MP
5	Fox River	P	0.99	SeP
5.5	Fox River	P	0.78	SeP
6	Fox River	P	0.99	SeP
7	Fox River	SP	0.74	SeP
8	Fox River	SP	1.10	MP
9	Fox River	P	0.61	SeP
9.5	Fox River	SP	0.25	SeP
10	Fox River	P	0.99	SeP
11	Fox River	SP	0.99	SeP
12	Fox River	P	0.96	SeP
13	Fox River	P	0.92	SeP
14	Fox River	P	0.66	SeP
15	Fox River	SP	1.65	MP
15 a	Fox River	SP	2.41	MP
16	Fox River	P	0.31	SeP
17	Fox River	SP	0.83	SeP
17.5	Fox River	SP	1.09	MP
18	Fox River	SP	0.38	SeP
19	Fox River	P	0.16	SeP
20	Fox River	SP	1.99	MP

(1) Polluted (P); Semi-polluted (SP); Unbalanced (U); Balanced (B).

(2) Severe pollution (Se P); Moderately polluted (MP); Clean (C).

TABLE 19-12 : BIOLOGICAL STREAM SITE CLASSIFICATIONS

Fox River

BASIN

Station Number	Stream Name	IEPA Classification[1]	Shannon-Weaver	
			Index	Classification[2]
21	Fox River	P	0.00	SeP
22	Fox River	SP	0.25	SeP
22.5	Fox River	SP	2.70	MP
23	Fox River	P	0.00	SeP
24	Fox River	P	0.46	SeP
25	Nippersink Creek	SP	1.17	MP
26	Silver Creek	P	0.97	SeP
30	Flint Creek	SP	1.61	MP
31	Flint Creek	SP	1.11	MP
32	Woods Creek	P	0.36	SeP
33	Blackberry Creek	P	0.59	SeP

(1) Polluted (P); Semi-polluted (SP); Unbalanced (U); Balanced (B).

(2) Severe pollution (Se P); Moderately polluted (MP); Clean (C).

passes over the dam crest, oxygen is released, resulting in a deaeration or lowering of the DO concentration of the water. Because this DO may be needed downstream as a reserve for algal respiration, low DO events downstream may be experienced. Measurements of DO concentrations above and below dams on the Fox confirmed the deaeration phenomenon. This, coupled with the creation of algal blooms and the reduction in the river's ability to assimilate wastes, form the basis for the conclusion that the dams on the Fox River generally have a negative effect on water quality.

(7) Land Use Runoff: One land use runoff sampling site (general agriculture) was located in the Fox basin on Big Rock Creek at Perry Road in southwestern Kane County. The results of sampling at that station are more fully discussed in Chapter Six.

e. Computer Simulation of Existing Conditions

The simulation of existing conditions provides a more comprehensive picture of water quality than do the results of sampling programs. Not only are pollutant concentrations determined and related to state standards, the relative amounts of pollutants contributed by various sources are described.

(1) Pollutant Concentrations: The Commission analyzed for 19 parameters, and simulation reports on existing conditions were prepared for eight: streamflow, temperature, chlorophyll a, dissolved oxygen, biochemical oxygen demand, ammonia (NH_3), nitrate (NO_3), and phosphate (PO_4). The last four of these can be quantified and tied to specific categories of pollutant sources using the model. Sampling for the other 11 parameters provided background information useful in evaluating simulation results.

Assessments of conditions with respect to each pollutant are based on state in-stream standards where there are standards that apply. Statistical values express the minimum, maximum and average concentrations of pollutants. Values also describe the number of times that simulated concentrations violated state standards, and the average duration of the periods of violations.

The simulation was continuous over a 3 year period. Therefore, if a standard for a particular pollutant was constantly violated over the entire simulation period, that would be reflected in the statistics for number and frequency of violations, like this:

- Number of violations: one (because there was only one violation, even though it was of 3 years' duration);

- Average duration: 26,304 hours (the total number of hours in the 3 year period).

Table 19-13 summarizes pollutant levels simulated for selected reaches under existing conditions. The computer simulation indicates violations of the ammonia nitrogen standard for all reaches except Reach 106, Nippersink Creek, and Reaches 113 and 121, the upper Fox including the Chain-of-Lakes. The worst ammonia nitrogen violations were in Reach 117, Squaw Creek, which is the receiving stream for the effluent from the Round Lake Sanitary District plant.

Phosphate concentrations in all reaches were in excess of .05 mg/l, with concentrations continually above this level in Reach 32, upper Nippersink Creek; and Reach 270, Flint Creek.

Mean biochemical oxygen demand (BOD) was high in all reaches except Nippersink Creek.

Dissolved oxygen has been used by the Commission as the principal indicator of water quality. Conditions with respect to DO are described in Table 19-14. Violations of

the DO standard were simulated in all reaches except Reach 113, the Fox River above the Grass Lake outlet, and Reach 340, Tyler Creek. The severity of the DO violations tends to increase moving downstream along the mainstem. The poorest water quality was noted in Reaches 121, 310, 370, and 480.

(2) Pollutant Loadings and Sources: Water quality in the Fox River is typically fair to good, as simulated for existing conditions. This judgment is made with respect to the constituents being modeled, particularly dissolved oxygen, ammonia, phosphate, nitrate, algae levels, and water temperature. Constituents such as pesticides, toxic substances, and turbidity have not been modeled, and their impacts on water quality have not been assessed. Oxidizable materials and nutrients entering Illinois from Wisconsin are represented as boundary conditions. Overall, pollutant loads in the modeled portion of the Fox River basin are relatively low. The basin is largely rural with the predominant types of land cover being grassland (pasture) and cropland.

An analysis of pollutant loads and water quality is presented below for reaches in three major sections of the basin: Reach 106, which summarizes the pollutants in Nippersink Creek; Reach 121, which summarizes sources upstream of Johnsburg Road, thus, covering all tributaries to the mainstem above that point, as well as the Chain-of-Lakes and pollutants entering Illinois from Wisconsin; and Reach 480, at Montgomery Dam, which summarizes all sources of pollutants impacting on the Fox above that point, i.e. the entire Fox basin in northeastern Illinois. Table 19-15 is a summary of pollutant loads by source impacting upon Reach 480. While these data are more meaningful when combined with data on area and flow, they do give a general picture of the significance of various pollutant sources in the basin.

In Table 19-16, statistics on flow and area are combined with other data to show the percentage of each pollutant from various sources in Reaches 106, 121, and 480. These data represent the cumulative upstream contributions of the listed pollutants and do not reflect any reactions occuring within the streams. Care must be exercised in interpreting the percentage figures in Table 19-16. Notwithstanding any high percentage figures which appear in the table, consideration must be given to the total area contributing and the total amount of each pollutant.

(a) Point Sources: Point sources contribute a relatively small portion of the total flow in the Fox River but account for a disproportionate amount of the BOD, ammonia and phosphorous load due to their relatively high pollutant concentrations. In certain tributaries of the Fox, point sources supply the major pollutant loads. On the mainstem, however, dilution is more significant, thus, lessening the impact of point source effluents. In general, point source effluent quality is quite variable, with some plants producing effluent not meeting secondary standards. However, most of the larger plants are in the secondary-tertiary categories.

TABLE 19-13 STATISTICAL SUMMARY OF CURRENT WATER QUALITY

Parameter (Standard) (All data in mg/l)	REACHES				
	31	106	113	117	121
BOD (No Standard) (1) Maximum	30.8	32.0	24.3	79.4	22.4
Minimum	1.1	1.9	11.2	2.0	8.5
Mean	6.3	6.8	17.6	11.2	12.8
AMMONIA (1.5 mg/l) Maximum	4.9	.9	.3	9.3	.2
Minimum	.1	.1	0	0	0
Mean	.5	.2	.2	1.8	.1
No. Violations	42	0	0	121	0
Avg. Duration Viol.	4	0	0	95	0
NITRATE (No Standard) Maximum	5.8	4.3	5.0	5.6	6.5
Minimum	.5	.3	0	0	0
Mean	3.1	2.4	1.2	2.5	1.8
PHOSPHATE (.05 mg/l) (2) Maximum	1.2	.6	.6	1.7	.8
Minimum	.1	0	0	0	0
Mean	.3	.2	.2	.4	.2
No. Violations	1	102	102	39	133
Avg. Duration Viol.	26300	249	221	672	141

1) Illinois Pollution Control Board Standard
2) In any reservoir or lake, or in any stream at the point where it enters any reservoir or lake.

The impact of point sources is most important during low-flow conditions when dilution is relatively low. One impact of point sources is their contribution of oxygen demanding pollutants, i.e. biochemical oxygen demand and ammonia. However, there were few problems with dissolved oxygen concentrations in most of the reported reaches during low-flow conditions. Low-flow DO problems were simulated in several pool reaches, particularly on the mainstem. There were frequent violations of the 5 mg/l standard simulated during summer and fall dry weather periods in these pools.

TABLE 19-13 STATISTICAL SUMMARY OF CURRENT WATER QUALITY

Parameter (Standard) (1) (All data in mg/l)	REACHES				
	270	300	310	340	360
BOD (No Standard) Maximum	101	52.4	25.2	117	96.1
Minimum	3.1	.9	6.7	1.4	2.4
Mean	12.5	8.4	12.8	16.4	15.2
AMMONIA (1.5 mg/l) Maximum	5.1	3.6	5.6	2.7	2.8
Minimum	.2	0.0	0	.1	0.0
Mean	1.2	.3	.2	.5	.5
No. Violations	43.0	28.0	1.0	30.0	7.0
Avg. Duration Viol.	100	4.0	26.0	59.0	33.0
NITRATE (No Standard) Maximum	5.9	6.0	6.4	.1	12.7
Minimum	0	.1	0.0	.1	0.0
Mean	4.7	5.7	1.9	7.9	5.7
PHOSPHATE (.05 mg/l) (2) Maximum	2.7	2.6	4.9	1.9	4.9
Minimum	.1	0	0	0	0.0
Mean	.6	.2	.3	.4	.7
No. Violations	1	15	20	16	22
Avg. Duration Viol.	26300	1750	1250	1640	1190

1) Illinois Pollution Control Board Standard
2) In any reservoir or lake, or in any stream at the point where it enters any reservoir or lake.

It is important to note the several factors which impact on the capacity of a stream to assimilate oxygen demanding wastes. These relate to volume of and flow velocity in the stream. In the Fox, there are several low head dams which restrict flow, resulting in very low stream velocities. These conditions result in standing water, permitting the decay of pollutants, the deposition of suspended solids, and the formation of bottom deposits, all restricting the natural reaeration of the stream. These factors contribute to a reduced capacity to assimilate

TABLE 19-13: STATISTICAL SUMMARY OF CURRENT WATER QUALITY

Parameter (Standard) (1) (All data in mg/l)	REACHES				
	370	430	480		
BOD (No Standard) Maximum	29.5	114	43.7		
Minimum	6.1	2.4	6.9		
Mean	12.9	16.0	15.1		
AMMONIA (1.5 mg/l) Maximum	5.8	3.5	5.8		
Minimum	.1	0	0		
Mean	.4	.6	.3		
No. Violations	10.0	28	1		
Avg. Duration Viol.	34.0	62	34		
NITRATE (No Standard) Maximum	6.2	15.4	7.8		
Minimum	0	.5	0		
Mean	2.0	13.3	2.4		
PHOSPHATE (.05 mg/l) (2) Maximum	5.0	4.0	5		
Minimum	0	0	0		
Mean	.4	.5	.4		
No. Violations	1	59	166		
Avg. Duration Viol.	26300	440	144		

1) Illinois Pollution Control Board Standard
2) In any reservoir or lake, or in any stream at the point where it enters any reservoir or lake.

oxygen demanding wastes. Furthermore, the channel gradient throughout the Illinois portion of the mainstem Fox is reduced by the dams which results in low stream velocities and correspondingly low assimilative capacities. In contrast are the steeper sloped tributary streams which have relatively greater capacity to assimilate a given in-stream pollutant concentration. But, because of their smaller tributary areas, they also have less dilution for point source discharges.

TABLE 19-14: STATISTICAL SUMMARY OF CURRENT DISSOLVED OXYGEN LEVELS

SIMULATED DO CHARACTERISTICS (Expressed in mg/l)	REACH				
	31	106	113	117	121
Maximum	12.9	13.0	14.0	13.8	13.7
Minimum	2.1	4.0	5.7	3.3	2.7
Mean	7.4	9.69	10.8	7.6	10.0
*No. of Violations	49	3	0	16	16
Avg. Duration	25	18	0	26	113
**Overall Assessment	Good	Good	Excellent	Good	Fair

SIMULATED DO CHARACTERISTICS (Expressed in mg/l)	REACH				
	270	300	310	340	360
Maximum	11.5	13.7	13.4	14.2	13.8
Minimum	1.8	4.5	1.0	5.3	2.6
Mean	8.6	10.3	9.0	10.1	8.86
*No. of Violations	17	1	73	0	15
Avg. Duration	37	1	44	0	39
**Overall Assessment	Good	Good	Fair	Excellent	Good

SIMULATED DO CHARACTERISTICS (Expressed in mg/l)	REACH				
	370	430	480		
Maximum	13.1	13.7	13.3		
Minimum	.05	1.7	1.9		
Mean	7.90	9.2	9.4		
*No. of Violations	75	10	97		
Avg. Duration	54	27	15		
**Overall Assessment	Fair	Good	Fair		

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time DO levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

TABLE 19-15. POLLUTANT CONTRIBUTIONS BY SOURCE CATEGORY, EXISTING CONDITIONS
REACH: 480

PARAMETER	POINT SOURCES			NON-POINT SOURCES			Total Loads
	Comb Sewers	Treatment Plants	Boundary Conditions	Pervious Surfaces		Impervious	
				Surface	Ground	Surface	
BOD Load (tons/year)	311	1210	11400	643	1124	1170	15858
% Total Load	2	8	72	4	7	7	100
AMMONIA Load (tons/year)	24.4	620	126	145	103	39.5	1058
% Total Load	2	59	12	14	10	4	100
NITRATE Load (tons/year)	11.3	177	702	173	4172	19.5	5255
% Total Load	0	4	13	3	79	0	100
PHOSPHATE Load (tons/year)	6.83	66	86.8	16.7	182	19.5	378
% Total Load	2	17	23	4	48	5	100

Another factor affecting dissolved oxygen is the presence of large algal populations. Algae produce oxygen during daylight hours and consume oxygen at night. Because there is a net increase in oxygen due to algae, they generally have a positive influence on DO conditions. When algae die off, however, the decaying materials become a source of oxygen demand and will depress DO levels.

In addition to their impacts on dissolved oxygen levels, point sources contribute significant amounts of ammonia which contribute to violations of the 1.5 mg/l in-stream ammonia standard. These violations are most significant in tributary reaches where there is little dilution. Point sources also add nitrate and phosphate loads, which contribute to algal growth.

It should be noted that the major pollutant loads are represented under "boundary conditions," which describe the quality of Wisconsin waters entering Illinois. Boundary conditions contribute approximately 72 percent of the BOD load imposed on the Fox River from the Wisconsin state line to Montgomery, at the Kendall county line. However, BOD loads from Wisconsin are degraded in the Fox Chain-of-Lakes and most likely have little impact on downstream conditions.

Boundary conditions are responsible, also, for major inputs of algal nutrients, nitrate and phosphate, which contribute to the severe eutrophic problems in the Chain-of-Lakes.

(b) Pervious Sources: At Montgomery Dam runoff from pervious land cover contributes 43 percent of the streamflow, approximately 40 percent as groundwater, and 3 percent as surface runoff. Surface runoff is highly polluted compared to groundwater and, thus, accounts for a disproportionate amount of the pollutant load.

Surface loadings of pollutants are typically associated with animal excrement, decayed vegetation, and air pollution fallout. In addition, there are nonpoint source loads associated with fertilizer applications on croplands and urban grasslands, such as lawns, golf courses, and parks. Septic systems are also contributors when they malfunction.

Modeling results have shown that there are violations of the dissolved oxygen standard in the Fox River system during wet weather periods. These violations are associated with the surface wash-off of oxygen demanding pollutants (BOD and ammonia). The duration and frequency of violations is quite variable, however. In general, wet weather DO violations are of longer duration in the mainstem Fox than in tributary reaches. Also, violations are generally more frequent in tributary reaches than in mainstem reaches, particularly during the warmer months when large algal populations are found in the mainstem.

Groundwater generally has a beneficial effect on water quality. Being of better quality than the other components of streamflow, it provides a diluting effect. However, associated with groundwater are loads of nitrate and phosphate which contribute to eutrophication.

(c) Impervious Sources: In the modeled (Illinois) portion of the basin, impervious wash-off contributes approximately 7 percent of the BOD load. This is particularly significant in its impact on water quality, due to its shock load effect. Runoff from impervious areas reaches streams rapidly and produces a sudden increase in streamflow and in concentrations of certain pollutants, particularly BOD. As a result, the stream's assimilative capacity may be exceeded and DO levels severely depressed. This is more likely to be the case in Fox tributaries than in the mainstem where dilution is greater.

(d) Combined Sewer Overflows: Overflows from combined sewers exert a relatively small pollutant load on the Fox River. The impact of combined sewer overflows is similar to the impact of impervious runoff, though smaller in magnitude overall. Combined sewer impacts are, however, significant locally and are obviously undesirable from an aesthetic or public health point of view.

TABLE 19-16 : SOURCES OF POLLUTANTS, EXISTING CONDITIONS

REACH/SOURCE	PERCENTAGES					
	AREA	STREAM FLOW	POLLUTANTS			
			BOD	NH_3	NO_3	PO_4
1. Nippersink Creek						
(REACH NO. 106)						
BOUNDARY CONDITIONS						
POINT SOURCES		2	20	36	1	10
COMBINED SEWERS		-				
PERVIOUS COVER	93					
Surface Runoff		3	11	27	5	6
Groundwater		81	32	26	93	75
IMPERVIOUS COVER	7	14	36	11	1	9
2. Fox River at Johnsburg						
(REACH NO. 121)						
BOUNDARY CONDITIONS	72	69	89	36	44	46
POINT SOURCES		1	2	34	1	8
COMBINED SEWERS						
PERVIOUS COVER	27					
Surface Runoff		1	1	12	3	3
Groundwater		25	4	13	52	39
IMPERVIOUS COVER	2	4	4	5	1	4
3. Fox River at Montgomery Dam						
(REACH NO. 480)						
BOUNDARY CONDITIONS	50	46	72	12	13	23
POINT SOURCES		4	8	59	4	17
COMBINED SEWERS	-	-	2	2	-	
PERVIOUS COVER	47					
Surface Runoff		3	4	14	4	5
Groundwater		40	7	10	79	48
IMPERVIOUS COVER	3	7	7	4	-	5

f. Unmodeled Areas - Fox River Tributaries

The southwestern portion of Kane County is drained by a number of streams which are ultimately tributary to the Fox River. However, since these streams exit the region into Kendall County prior to discharging to the Fox, they were not considered in 208 modeling studies. These areas consist of Kaneville, Blackberry, Big Rock, and Sugar Grove Townships and are primarily agricultural. The villages of Elburn and Sugar Grove are the only incorporated municipalities. Big Rock Creek (with its east and west branch tributary and Welch Creek tributary) and Blackberry Creek (with its Lake Run tributary) are the streams draining the area. The only sampling results available for the area are from IEPA data.

The IEPA does not maintain any water quality sampling stations on these streams in Kane County. Two sampling stations are located farther downstream in Kendall County, however, at the following locations:

- Blackberry Creek - at River Road bridge, Yorkville.
- Big Rock Creek - at River Road bridge, near Plano.

Table 19-17 presents the results of IEPA sampling in 1975 at the two sites.

For those pollutants listed which have applicable standards, violations occurred for fecal coliform at both stations and for total iron at the Blackberry Creek station. While not set forth in Table 19-17, a single violation of the lead standard was recorded for the Blackberry Creek station, and violations of the copper standard occurred at both stations. Overall, however, water quality in the streams is considered to be relatively good.

The IEPA has developed water quality indices for all of its sampling stations, based on sampling results over time for dissolved oxygen, fecal coliform, total dissolved solids, and ammonia nitrogen. Using these indices, the IEPA classifies conditions at each station as to overall water quality.

For 1975 (the most recent year of index record) both Big Rock Creek and Blackberry Creek were rated "good or balanced," which is the highest of four ratings which can be assigned under the index system. Indeed, over the 4-year, 1972-1975 period, Big Rock Creek has consistently achieved the good or balanced rating. During that same period, Blackberry Creek has achieved a good or balanced classification for 3 of the 4 years of record (with an "average" rating being assigned in the fourth year). The index results again point to a generally high level of water quality in each stream.

Another source of data on existing water quality in these unmodeled areas was a 1975 biological survey conducted along a 4-mile reach of the East Branch of Big Rock Creek near Big Rock. Conditions were found to vary from semi-polluted to unbalanced along the reach. Similar data are not available for Blackberry Creek.

The final source of information on these watersheds was this Commission's runoff sampling program. Land use stormwater runoff samples were taken from the East Branch of Big Rock Creek at Perry Road in Kaneville Township. Stage-activated automatic samplers were used to collect 12 samples at uniform time intervals during the rise and fall of the storm hydrograph. A total of seven storm events were sampled during the late spring and summer of 1977. The overall purpose was to obtain information on the pollutional load carried off the land surface during wet weather.

A comparison of the mean sample values obtained at the Perry Road site with the composited mean values obtained at all agricultural land use runoff sites (4 sites in all, including Perry Road) is given in Table 19-18. It will be noted that the mean values for the Perry Road site exceeded the mean values for all agricultural sites for 9 of the 13 parameters reported. Of special note are the higher relative values for total solids, BOD, and nutrients.

19.04 POINT SOURCES: EXISTING CONDITIONS

a. Municipal Type Wastewater Treatment Plants

There are 38 municipal type wastewater treatment facilities in the Fox River basin. Thirty-three plants are publicly owned and five are private utilities. Most of the plants have an average capacity of between 1 and 5 mgd and serve the needs of single communities.

None of the municipal plants in the basin currently employ tertiary filtration. Crystal Lake plant Number 3 utilizes the rotating bio-disc secondary treatment process, which provides significant nitrification. None of the other plants have nitrification equipment. The facilities plans for Barrington, Sanitary District of Elgin (SDE), Aurora Sanitary District (ASD), Lake-in-the-Hills Sanitary District, Northwest Lake (Fox Lake), and Wauconda treatment plants call for nitrification through the use of rotating bio-discs or single stage activated sludge. The SDE, ASD, and Barrington FPAs also plan to add tertiary filtration equipment. Phosphorous removal is planned or is in operation at all municipal plants.

Specific information on these municipal type plants is contained in Table 19-19 (A, B, C, D and E). The locations of point sources in the basin are shown in Figure 19-4.

TABLE 19-17 : IEPA SAMPLING DATA (1975), BLACKBERRY CREEK AND BIG ROCK CREEK

	Fecal Coliform #/100 ml.	DO mg/l	Total P mg/l	Nitrate N mg/l	Ammonia N mg/l	Total Iron mg/l	TDS mg/l	pH
Blackberry Creek								
MAX.	2200	14.2	0.23	4.7	0.12	1.1	480	8.8
MIN.	100	7.6	0.05	0.6	0.0	0.3	380	8.2
MEAN.	261	11.1	0.1	2.8	0.05	0.7	420	8.4
Big Rock Creek								
MAX.	1200	13.2	0.4	8.4	0.2	0.5	450	8.8
MIN.	100	9.4	0.16	2.7	0.04	0.1	370	8.1
MEAN	266	11.3	0.29	4.9	0.11	0.2	408	8.4

TABLE 19-18 : COMPARISON OF POLLUTANTS IN STORMWATER RUNOFFS* (MEAN VALUE, FOUR AGRICULTURAL SITES vs PERRY ROAD SITE)

PARAMETER	FOUR AGRICULTURAL SITES	PERRY ROAD SITE
pH	7.6	7.6
Alkalinity	167	116
Hardness	292	256
Total Suspended Solids	421	1349
Volatile Suspended Solids	226	168
Total Solids	833	1660
BOD_5	10.8	13.6
BOD_{20}	21.7	31.7
Total Kjeldahl Nitrogen	2.1	3.4
Ammonia	0.3	0.4
Nitrate + Nitrite	3.9	4.1
Soluble Phosphorous	0.18	0.37
Silica	16.7	30.4

*All parameters in mg/l except pH

b. Industrial Wastewater Plants 1007

There are six industrial wastewater treatment plants in the basin. Current information available for these facilities, including treatment units, flows, and effluent limitations is presented in Table 19-20 (A and B). 1009 1011 1012

c. Miscellaneous Wastewater Treatment Plants 1016

Current information available on the 41 miscellaneous type wastewater treatment facilities in the basin, including treatment units, flows, and effluent limitations is shown in Table 19-21 (A and B). 1018 1020

d. Other Point Source Discharges 1024

There are 56 other sites which discharge cooling water and stormwater. Data are presented in Table 19-22 (A and B). 1026 1028

TABLE 19-19 A: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS — FOX RIVER BASIN

MAP CODE	FACILITY NAME	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	RECEIVING STREAM NAME	7 DAY 10 YR. LOW FLOW (MGD) 1970	2000	PUBLICLY OWNED TREATMENT WORKS NO	YES	IEPA FY 78 PRIORITY NO.
M1	Algonquin	S.E.McHenry/None	Algonquin	Fox River	35.3			X	-
L1	Antioch	N.W.Lake/LCDPW	Antioch	Sequoit Creek	0.40			X	932
K1	Aurora	Aurora/Aurora SD	Aurora	Fox River	68.5			X	224
L2	Barrington	Barrington/Barrington	Barrington	Flint Creek	0.10			X	35
K2	Batavia	Batavia/Batavia	Batavia	Fox River	57.5			X	158
K3	Carpentersville Kimble Hill Plant	Carpentersville/ Carpentersville	Carpentersville	Fox River	36.2			X	29
K4	Carpentersville Main Plant	Carpentersville/ Carpentersville	Carpentersville	ditch to Fox River	0			X	-
M2	Cary	S.E. McHenry/None	Cary	Fox River	32.7			X	-
M3	Crystal Lake 1 & 2	S.E. McHenry/None	Crystal Lake	Crystal Lake	0.06			X	-
M4	Crystal Lake 3	S.E. McHenry/None	Crystal Lake	Sleepy Hollow Ck	0			X	-
K5	East Dundee	South Dundee/ West Dundee	East Dundee	Fox River	39.1			X	125
K6	Elburn	Elburn/Elburn	Elburn	Welch Creek	0			X	81
K7	Elgin SD-North	Elgin/Elgin SD	Elgin	Fox River	40.7			X	102
K8	Elgin SD-Main	Elgin/Elgin SD	Elgin	Fox River	49.4			X	159
K9	Elgin SD-West	Elgin/Elgin SD	Elgin	Fox River	40.7			X	159
K10	Ferson Creek U.C.	None	St. Charles	Ferson Creek	0		X		-
L5	Fox Lake	N.W.Lake/LCDPW	Fox Lake	Myers Bay on Pistakee Lake	0			X	22
L6	Fox Lake U.C. Tall Oaks	N.W.Lake/LCDPW	Fox Lake	Nippersink Crk.	0		X		
M5	Fox River Grove	Fox River Grove/Fox River Grove	Fox River Grove	Fox River	31.7			X	33
K11	Geneva	Eastern Kane County/ St. Charles	Geneva	Fox River	53.2			X	1015
M7	Hebron	Hebron/Hebron	Hebron	ditch to North Br. Nppsk. Crk.	0			X	175
L10	Island Lake	Island Lake/Island Lk.SD	Island Lake	Fox River	29.7			X	249
L11	Lake Barrington Homeowners	Barrington/Barrington	Lake Barrington	Flint Creek			X		-
M9	Lake-in-the-Hills Sanitary District	Lake-in-the-Hills S.D./ Lake-in-the-Hills S.D.	Lake-in-the-Hills	Crystal Creek	1.74			X	135
L20	Lake Villa	N.W.Lake/LCDPW	Lake Villa	Eagle Creek	0			X	136
L21	Lake Zurich Northwest	Lake Zurich/ Lake Zurich	Lake Zurich	ditch to Grassy Lake	0			X	576
M11	McHenry	McHenry/McHenry	McHenry	Fox River	28.7			X	-
C10	MSDGC Streamwood	Elgin/Elgin S.D.	Streamwood	East Branch of Popular Creek	0			X	101
K13	Prestbury U.C.	Sugar Grove/Sugar Grove	Sugar Grove	ditch to Blackberry Creek	0		X		-
M12	Richmond	Richmond/Richmond	Richmond	North Branch of Nippersink Crk.	2.46			X	-
K14	Valley Water Co., Inc. River Grange Lake Sub.	Eastern Kane County/ St. Charles	Elgin	Private Lake to Fox River	0		X		-
K15	Rollins Sewer and Water Co.	Elgin/Elgin S.D.	Elgin	ditch to Otter Creek	0		X		-
L31	Round Lake S.D.	N.W.Lake/LCDPW	Round Lake	Long Lake to Squaw Creek	0			X	21
K16	St. Charles	Eastern Kane County/ St. Charles	St. Charles	Fox River	51.6			X	1015
K17	St. Charles Skyline Sewer & Water Co.	Elgin/Elgin S.D.	St. Charles	ditch to Norton Creek	0		X		159
L32	Wauconda	Wauconda/Wauconda	Wauconda	ditch to Fox River	0			X	208
K18	West Dundee	South Dundee/S.Dundee	West Dundee	Fox River	39.3				125
M14	Woodstock-North	Woodstock/Woodstock	Woodstock	Silver Creek	0.90				-
M16	McHenry Shores	McHenry/McHenry	McHenry Shores	Fox River	28.7				-
M18	Wonder Lake	Wonder Lake/None	McHenry	Nippersink Crk.	5.90				-
K19	Wasco S.D.	Wasco S.D./Wasco S.D.	St. Charles	Mill Creek	0				-
K20	Sugar Grove	Sugar Grove/Sugar Grove	Sugar Grove	Blackberry Crk.	0				518

TABLE 19-19 B: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS FOX RIVER BASIN

MAP CODE	NPDES PERMIT			EFFLUENT REQUIREMENTS (mg/l)													COMMENTS
	NUMBER	DATE		INTERIM (A)				FINAL (A)					YEAR 2000 (B)				
		ISSUED	EXPIRES	BOD_5	TSS	P	NH_3N	EFFECTIVE DATE	BOD_5	TSS	P	NH_3N	BOD_5	TSS	P	NH_3N	
M1	0023329	12-10-73	10-29-78						30	30	1		20	25	1	(a)	(a) 1.5 mg/l in stream after mixing.
L1	0020354	7-29-74	6-8-79						4	5	1		-	-		-	
K1	0020818	12-30-74	6-30-81						10	12	1		10	12	1	(a)	
L2	0021598	6-22-77	11-30-81						10	12	1		10	12	1	(a)	
K2	0022543	6-18-75	1-31-78						20	25	1		20	25	1	(a)	
K3	0025739	11-30-73	10-29-78						30	30	1		-	-		-	
K4	0027944	6-8-77	8-31-81						20	25	1		20	25	1	(a)	
M2	0020516	1-31-74	12-31-78						20	25	1		20	25	1	(a)	
M3	0028282	6-7-77	12-31-81						10	12	1		10	12	1	(a)	
M4	0053457	1-3-77	7-31-81						10	12	1		10	12	1	(a)	
K5	0028541	6-13-77	9-30-81						30	30	1		30	30	1	(a)	
K6	0020826	6-28-77	3-31-81						10	12	1		10	12	1	(a)	
K7	0028665	12-18-74	3-31-78						20	25	1		20	25	1	(a)	
K8	0028657	6-23-76	8-30-79						10	12	1		10	12	1	(a)	
K9	0035891	6-22-77	9-30-81						20	25	1		-	-		-	
K10	0045411	6-30-75	12-31-79						4	5	1		4	5	1	(a)	
L5	0020958	Draft	1-31-82						10	12	1		10	12	1	(a)	
L6	0045144	6-18-75	12-31-78						4	5	1		-	-	-	-	
M5	0020583	6-22-77	2-28-81						30	30	1		30	30	1	(a)	(b) Lagoon exemption assumed.
K11	0020087	10-15-73	10-14-78						20	25	1		20	25	1	(a)	
M7	0026433	7-1-77	2-28-81						10	12			(b) 30	(b) 30	-	(a)(b)	
L10	0031933	6-16-77	11-30-81						20	25	1		20	25	1		
L11	0045110	7-30-75	6-30-79						30	30			30	30		(a)	
M9	0021733	6-7-77	11-30-81						10	12	1		30	30	1	(a)	
L20	0021342	6-20-75	8-1-79						10	12	1		-	-		-	
L21	0022535	5-30-75	6-1-79						4	5	1		4	5	1	(a)	
M11	0021067	12-14-74	12-31-81						20	25	1		20	25	1	(a)	
C10	0028100	6-30-77	2-28-82						4	5	1		-	-		-	
K13	0036641	6-9-75	8-1-78						10	12	1		10	12	1	(a)	
M12	0026093	12-10-73	6-30-78						30	30	1		30	30	1	(a)	
K14	0024736	6-30-75	6-30-81						4	5	1		4	5	4	(a)	
K15	0032000	6-30-75	12-31-78						4	5	1		-	-		-	
L31	0030830	6-24-77	4-30-82						20	25	1		-	-		-	
K16	0022705	9-30-74	8-31-81						20	25	1		20	25	1	(a)	
K17	0045667	6-23-75	10-31-78						4	5	1		-	-		-	
L32	0020109	7-1-77	4-30-82						10	12	1		10	12	1	(a)	
K18	0023311	1-3-74	12-30-78						30	30	1		30	30	1	(a)	
M14	0031861	12-31-74	12-31-77						10	12	1		10	12	1	(a)	
M16	None	-	-						-	-		-	20	25	1	(a)	
M18	None	-	-						-	-		-	30	30	1	(a)	
K19	None	-	-						-	-		-	30	30	1	(a)	
K20	None	-	-						-	-		-	10	12	1	(a)	

(A) From NPDES Permits (B) From Facility Plans

TABLE 19-19 C: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS — FOX RIVER BASIN

MAP CODE	STATUS OF TREATMENT PLANT: INTERIM YES	INTERIM PHASE OUT DATE	PERMANENT EXISTING	PROPOSED NEW YES	PROPOSED NEW EST. DATE IN SERVICE	WASTEWATER TREATMENT PLANT (MGD) AVERAGE FLOWS (d) 1975	1980	1985	1990	1995	2000	DESIGN CAPACITIES 1975	1985	OTHER YEAR	2000	COMMENTS
M1			X			0.87	1.20	1.45	1.77	1.95	2.12	0.85	2.12		2.12	(a) Phase out to Fox Lake
L1	X	1-90 (a)				0.50	0.67	0.84	-	-	-	1.00	1.00		-	
K1			X			21.42	33.30	38.32	43.77	48.29	53.20	32.0	40.0		40.0	(b) Phased out to Carpentersville Main Plant.
L2			X			2.77	2.95	3.13	3.31	3.49	3.68	2.00	3.68		3.68	
K2			X			1.65	2.36	3.07	3.78	4.49	5.20	2.72	5.20		5.20	(c) Phased out to Elgin-Main.
K3	X	12-79 (b)				0.06	-	-	-	-	-	0.30				
K4			X			3.39	3.82	4.67	5.52	6.16	6.97	3.50	5.00		5.00	(d) From facility plans or needs analysis documents unless noted.
M2			X			0.56	0.71	1.16	1.57	1.98	2.42	1.26	1.26	1986 2.77	2.77	
M3			X			2.60	3.23	4.05	4.93	5.85	6.82	4.50	7.00		7.00	
M4			X			-	0.30	0.40	0.50	0.60	0.70	0.50	0.50	1990 2.00	2.00	(e) NIPC estimate.
K5			X			0.42	0.57	0.72	0.87	1.02	1.19	0.58	0.97		0.97	(f) Plant will treat only combined sewer overflows.
K6			X	X	1-80	0.12	0.35	0.58	0.81	1.04	1.27	0.11	1.27		1.27	
K7			X			2.20	3.05	3.10	3.15	3.20	3.25 (e)	3.50	3.50		3.50	(g) Private utility flows assumed to be the same as 1975 flows.
K8			X			5.81	15.63	18.90	22.16	27.33	32.49	8.60	17.00		25.00	
K9	X	12-79 (c)				0.33	(f)					1.5				
K10			X			0.03	0.03	0.03	0.03	0.03	0.03 (g)	0.05				
L5			X			0.26	3.86	4.96	7.75	10.00	12.00	0.72	6.00		12.00	
L6			X			0.03	0.03	0.03	0.03	0.03	0.03	0.03 (d)	0.5			
M5			X			0.42	0.59	0.76	0.93	1.10	1.25	0.39	1.25		1.25	
K11			X			2.44	2.75	3.06	3.37	3.68	4.00	4.00	4.00		4.00	
M7			X			0.11	0.13	0.14	0.16	0.17	0.19	0.11	0.19		0.19	
L10				X	1-79	-	0.63	0.74	0.85	0.96	1.20	-	1.20	1980 1.20	1.20	
L11			X			0.05	0.05	0.05	0.05	0.05	0.05	0.15				
M9			X			0.80	0.81	0.82	0.83	0.84	0.85	0.25	0.85		0.85	
L20	X	12-94 (a)				0.10	0.15	0.20	0.25	-	-	0.3				
L21			X			0.71	0.88	1.05	1.22	1.39	1.54	0.80	1.00		1.00	
M11			X			1.60	2.40	3.33	4.16	4.87	5.68 (e)	2.00	3.00		3.00	
C10	X	12-94 (b)				2.35	-	-	-	-	-	2.9	-		-	
K13			X			0.18	0.20	0.22	0.24	0.27	0.30	0.40	0.40		0.40	
M12			X			0.14	0.19	0.20	0.22	0.24	0.27	0.38	0.38		0.38	
K14	X		X			0.01	0.01	0.01	0.01	0.01	0.01 (d)	0.008				
K15	X	1-90 (b)				0.06	0.06	0.06 (d)	-	-	-	0.15				
L31	X	12-79 (a)				2.49	-	-	-	-	-	1.6				
K16			X			3.63	4.50	5.37	6.24	7.11	8.00	8.00	8.00		8.00	
K17	X	1-80 (a)				0.06	-	-	-	-	-	0.1				
L32			X			0.58	0.70	0.82	0.94	1.06	1.20	0.80	1.20		1.20	
K18			X			0.59	0.58	0.74	0.89	0.96	1.02	0.57	0.90		0.90	
M14			X			2.07	2.28	2.49	2.70	2.91	3.12	3.50	3.50		3.50	
M16				X	1-80	-	-	0.39	0.55	0.58	0.60	0.25	3.50 (c)		3.50	
M18				X	1-83	-	-	0.89	0.93	0.99	1.04	-	1.04		1.04	
K19				X	1-80	-	0.10	0.12	0.14	0.15	0.17	-	0.13		0.13	
K20				X	1-83	-	0.04	0.12	0.20	0.25	0.30	-	0.30		0.30	

TABLE 19-19 D: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANT FOX RIVER BASIN

MAP CODE	POPULATION SERVED (1000's)						PROPOSED PROJECTS (C)								CAPITAL COSTS (million $)		
							PLANT				SEWERS						
	1975	1980	1985	1990	1995	2000	Exp.	UpG	New	Out	I/I	SSE	New	Reh	Initial	Future	Total
M1	3.9	6.6	8.8	10.9	12.1	13.2	X								-	2.5	2.5
L1	3.7	6.0	6.8	-	-	-		X		X	X	X	X	X	0.6	See L5	0.6
K1	112.2					208.9	X	X			X	X	X	X	83.7	-	83.7
L2	10.3	12.0	14.9	17.7	19.6	21.5	X	X			X	X			4.2	-	4.2
K2	12.4	13.7	16.0	18.6	20.0	21.5	X				X	X		X	6.7	-	6.7
K3	0.5	-	-	-	-	-	-			X			X		0.8	-	0.8
K4	24.9	31.4	35.1	38.8	40.4	42.0	X				X	X				-	
M2	5.0	6.2	9.6	12.6	15.8	18.9	X				X				-	4.2	4.2
M3	18.0	18.5	25.2	29.6	34.2	39.7	X	X							-	8.6	8.6
M4	-	5.2	5.9	6.8	9.1	10.4	X								-	SEE M3	
K5	2.7	3.6	4.4	5.2	5.7	6.3	X				X	X		X	1.8	-	1.8
K6	1.2	2.3	3.5	4.6	4.8	5.2	X	X			X	X			3.1	-	3.1
K7	14.0	14.5	15.0	15.5	16.0	16.5	X				X	X				SEE K8	
K8	64.0	117.0	134.9	152.6	165.9	179.1	X	X			X	X			13.0	-	13.0
K9	0.4	-	-	-	-	-				X	X					SEE K8	
K10															PRIVATE COSTS		
L5	4.9	44.9	51.0	64.3	73.8	80.9	X	X			X	X	X	X	10.0	8.8	18.8
L6															PRIVATE COSTS		
M5	2.0	4.1	5.2	6.2	6.7	7.2	X				X	X	X	X	2.9	-	2.9
K11	12.7	14.4	16.9	19.3	21.2	23.0					X	X			UNKNOWN		
M7	0.9	0.9	1.1	1.1	1.2	1.3		X			X				0.5	0.1	0.6
L10	-	7.7	8.8	9.9	10.9	12.0			X				X		5.9	-	5.9
L11															PRIVATE COSTS		
M9	4.7	6.0	6.3	6.6	7.1	7.5	X	X			X	X			1.4	-	1.4
L20	1.2	1.7	2.1	2.4				X		X	X	X	X	X	0.5	SEE L5	0.5
L21	3.6	5.6	7.2	8.8	10.5	12.2	X	X			X	X			0.3	1.1	1.4
M11	8.5	14.0	19.7	25.4	19.8	34.2	X						X		2.2	8.4	10.6
C10	34.5	-	-	-	-	-				X					SEE TABLE 19-		
K13															PRIVATE COSTS		
M12	1.2	1.5	1.6	1.7	2.0	2.2									NONE		
K14															PRIVATE COSTS		
K15				-	-	-									PRIVATE COSTS		
L31	19.0	-	-	-	-	-				X	X	X	X	X	0.2	See L5	0.2
K16	17.3	20.8	26.9	33.2	35.6	38.0					X	X			UNKNOWN		
K17		-	-	-	-	-											
L32	6.4	7.4	8.4	9.4	10.4	11.3	X	X			X	X		X	3.0	-	3.0
K18	3.1	5.2	6.3	7.3	10.5	10.9	X				X	X		X	2.4	-	2.4
M14	10.8	10.8	11.9	14.0	16.7	20.2					X	X		X	-	1.9	-
M16	-	2.0	3.4	4.8	4.9	5.0			X				X		1.4	1.8	3.2
M18	-	-	8.9	9.3	9.9	10.0			X				X		-	3.6	3.6
K19	-	0.3	0.4	0.5	0.6	0.7			X				X		0.4	-	0.4
K20	-								X				X		1.0	-	1.0

(C) PROPOSED PROJECTS

SEWER(S): I/I - Infiltration/Inflow Study; SSE - Sewer System Evaluation; New - New Sewer Construction; Reh - Rehabilitation of Existing Sewers

PLANT: Exp - Expansion; UpG - Upgrading; New - New plant; Out - Phase out

TABLE 19-19 E. MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS — FOX RIVER BASIN

MAP CODE	FACILITY PLANS: TYPE: NEEDS ANALYSIS	TYPE: STEP ONE STUDY	STATUS: COMPLETED	STATUS: UNDER WAY	STATUS: LOCAL ISSUES	REVIEWS / APPROVALS: NIPC: NUMBER	NIPC: ENDORSED	NIPC: UNDER REVIEW	IEPA: NUMBER	IEPA: APPROVED	IEPA: UNDER REVIEW	IEPA: UNRESOLVED ISSUES	COMMENTS
M1	X		X			77-A-009	X			X			(a) Needs Analysis approved. Supplemental Step I underway.
L1		X	X			75-236	X		C17-1567	X			
K1		X	X			76-689	X		C17-1407		X		
L2		X	X			76-363	X		C17-1462				(b) Private plant.
K2		X	X						C17-1931	X			
K3		X	X						C17-1412	X			
K4		X	X						C17-1412	X			
M2	X	X (a)	X	X	X	78-022	X		C17-	X		X	
M3	X	X (a)	X	X	X	78-090	X		C17-2140	X		X	
M4	X	X (a)	X	X	X	78-090	X		C17-2140	X			
K5		X	X						C17-1395		X		
K6		X	X			76-103	X		C17-1092	X			
K7		X	X			76-487	X		C17-1765		X		
K8		X	X			76-487	X		C17-1765		X		
K9		X	X			76-487	X		C17-1765		X		
K10		(b)											
L5		X	X		X	75-326	X		C17-1567	X		X	
L6													
M5		X	X			76-233	X		C17-1435	X			
K11		X		X									
M7		X	X							X			
L10		X	X			77-056	X		C17-1510	X			
L11	(a)												
M9		X	X			76-831	X		C17-1862	X			
L20		X	X			75-326	X		C17-1567	X			
L21		X		X	X				C17-1419		X	X	
M11	X		X		X	77-A-010	X			X		X	
C10		X	X			75-360			C17-5416	X			
K13	(a)												
M12	X		X				X			X			
K14	(a)												
K15	(a)												
L31		X	X			75-326	X		C17-1567	X			
K16		X		X									
K17	(a)												
L32		X	X		X		X				X	X	
K18		X	X						C17-1395		X		
M14		X	X						C17-2093		X		
M16	X		X		X	77-A-010	X			X		X	
M18	X		X		X	77-A-007	X			X		X	
K19	X		X			77-A-013	X			X			
K20		X	X			77-463	X		C17-2319		X	X	

TABLE 19-20 A: INDUSTRIAL WASTEWATER TREATMENT PLANTS — FOX RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
M5	Dodge Trophies	0034711	S.E. McHenry/None	Cary	K,E,IS	-	-	-	-
K1	E.W.Kneip, Inc. (Elburn Packing)	0047449	Elburn/Elburn	Elburn	IS	0.400	0.500		0.500
M6	Hebron Lagoons	0026433	Hebron/Hebron	Hebron	LO	0.100	0.180	-	0.230
K2	Moline Malleable Iron Co.	0002810	Eastern Kane/ St.Charles	St. Charles	K	0.222	0.030	-	0.030
L2	Travenol Labs.	0024074	N.W.Lake/LCDPW	Round Lake	A,L,E	0.100	0.365	-	0.365
M8	Woodstock Die Cast Co.	0033863	Woodstock/ Woodstock	Woodstock	K	1.000	0.410	-	0.410
(1):	Activated sludge (A), chlorination (E), subsurface application (IS), special treatment (K), tertiary lagoon (L),								
	stabilization lagoon (LO).								

(1) See key.

TABLE 19-20 B: INDUSTRIAL WASTEWATER TREATMENT PLANTS — FOX RIVER BASIN

MAP CODE	RECEIVING STREAM			NPDES PERMIT DATES		SIC CODE	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
	NAME	7 DAY-10 YR. LOW FLOW (MGD)		ISSUED	EXPIRES			
		1970	2000					
M5	Subsurface	N/A				67-3499		
K1	Subsurface	N/A		5-30-75	3-31-78	-	4 BOD, 5 TSS, 1.5 (DM) NH_3-N, 1.0 (DM) P	
M6	ditch to N.Br. of Nippersink Creek	0		7-1-77	2-28-81	72-4952	40 BOD, 50 TSS	
K2	ditch to Fox River	0		9-30-74	12-31-77	72-3310	Temp., 750 TDS, 15 TSS, 10 o/g, 2 (tot) Fe	
L2	ditch to Lure Lake	0		3-13-75	12-31-79	67-2833	10 BOD, 12 TSS	
M8	Storm sewer to S. Br. of Nippersink Ck	0		6-30-75	3-31-78	72-3361	10 BOD, 12 TSS, 1.5 NH_3-N, 1.0 (DM) P, .025 (DM) Cn	

(1) Current, from NPDES Permits

TABLE 19-21 A: MISCELLANEOUS WASTEWATER TREATMENT PLANTS FOX RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
L1	Allendale Boys School	None	NW Lake/LCDPW	Lake Villa	IM, F,E	0.011	0.020	-	0.020
L4	Barrington Hills CC	0048097	Barrington/ Barrington	Barrington	A,E	0.050	0.025	-	0.025
K1	Broadview Coll.	0025411	None	Elburn	L	0.016	0.020	-	0.020
L5	Camp Hickory	0046043	NW Lake/LCDPW	Round Lake	IM,F,E	0.001	0.001	-	0.001
L6	Moody Youth Camp Moyota	0038334	NW Lake/LCDPW	Antioch	S,FB,E		0.002	-	0.002
M2	Catholic Charities-Chgo	0049051	Spring Grove/ Sunnyside	Sunnyside		0.0014		-	
L7	Chain-O-Lakes State Park	None	NW Lake/LCDPW	Fox Lake	AD,IS	0.0075	0.003	-	0.003
D10	Fermi Nat'l Acc'l Lab	0026123	Fermi Lab/None	Batavia	AD,F,E	0.050	0.040	-	0.040
K3	Fisherman's Inn Mercers Rest.	0048887	None	Elburn	AD,FB	0.002		-	
L11	Fremont School	0034746	NW Lake/LCDPW	Mundelein	A,L,E	0.012	0.0025	-	0.0025
M3	Fritzche Est.	None	Island Lake/ Island Lake SD	Lakemoor	AD	0.005	0.001	-	0.001
L14	Heppner Mfg.	0037168	NW Lake/LCDPW	Round Lake	IM,F,E	0.010	0.005	-	0.005
L16	Henry Horner Camp	0054615	NW Lake/LCDPW	Round Lake		0.014		-	
K5	Ill. Tollway Bldg #9	0048984	Elgin/Elgin SD	Elgin		0.0005		-	
K6	Ill. Boys Training School	0026808	None	St. Charles	AC,L,E	0.350	0.250	-	0.250
K7	Kapeland School	0026603	None	Elgurn	AC,FT,E	0.030	0.022	-	0.022
L21	Klingberg Sch.	0050661	Wauconda/ Wauconda	Wauconda	AC,F,E	0.030	0.0085	-	0.0085
L22	Koseman Sausage Co.	0038067	NW Lake/LCDPW	Volo	IM,L,E	0.014	0.015	-	0.015
D13	Lab Tek Prod. Miles Lab,Inc.	0024147	Naperville/ Naperville	Naperville	AD,F,L,E	0.0075		-	
M4	Lake Manor Motel	None	SE McHenry Co./ None	Crystal Lake	AD,L,E	0.0072	0.005	-	0.005
M5	Modine MFG.	0001279	McHenry/McHenry	Ringwood	AD,L		0.100	-	0.100
K8	Moosehart Child City	0027260	Batavia/Batavia	Moosehart	IM,FT,E	0.200	0.125	-	0.125
L26	Mt. St. Joseph Home	0027286	Lake Zurich/ Lake Zurich	Lake Zurich	IM,F,E	0.025	0.014	-	0.014
K9	National Electronics#001	0024333	None	Geneva	L,E	0.008	0.006	-	0.006
M6	National Worth Wd.	None	SE McHenry Co./ None	Cary	K,IS		0.006	-	0.006
L27	North Barrington School	0024716	Barrington/ Barrington	North Barrington	IM,F,E	0.005	0.004	-	0.004
M7	Oakbrook Estate	None	SE McHenry Co./ None	Cary	AD,L,E	0.100	0.005	-	0.005
L29	Quaker Oats	None	Barrington/ Barrington	Barrington	L,E	0.0125	0.0125	-	0.0125
K10	Riverwood Estates M.H.P.	0049280	SE McHenry Co./ None	Algonquin		0.060		-	
L30	Rosewood Apartments	0048194	NW Lake/LCDPW	Round Lake	AD,F,E				
C29	Safety Kleen Corp.	None	Elgin/Elgin SD	Elgin	IS			-	
M9	Shagbark	None	None	Hebron	AD,FB			-	
C30	Springlakes MHP	0050369	Elgin/Elgin SD	Bartlett	A,F,E	0.030	0.040	-	0.040
M10	Sun Electric	None	McHenry/McHenry	Prairie Grove	A,L,E,LM	0.025		-	
M11	Terra Cotta Realty Co.	0038202	McHenry/McHenry	Prairie Grove	AC,F,E	0.100	0.100	-	0.100
L32	Travenol Labs	0024074	NW Lake/LCDPW	Round Lake	A,L,E				
M12	Camp Algonquin	0031917	SE McHenry Co./ None	Algonquin	S,F,E	0.007		-	
M13	Valley High Nursing Home	0050326	None	Woodstock	S,L	0.100	0.080	-	0.080
M14	Wallens, Harry Subdivision	None	SE McHenry Co./ None	Crystal Lake	AD,L	0.0024	0.001	-	0.001
K11	Waubonsee Comm. College	0038229	None	Sugar Grove	A,L,E	0.062		-	
D24	Wayne Grade School	0034843	Wayne/Wayne	Wayne	AD,L,E	0.030	0.0064	-	0.0064

(1): Activated sludge (A); contact stabilization (AC); extended aeration (AD); chlorination (E); tertiary filter (F); buried sand filter (FB); trickling filter(s) (FT); Imhoff tank (M); subsurface application (IS); special treatment (K); tertiary lagoon (L); stormwater holding (LM); septic (S).

TABLE 19-21 B: MISCELLANEOUS WASTEWATER TREATMENT PLANTS FOX RIVER BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	2000	NPDES PERMIT DATES ISSUED	EXPIRES	EFFLUENT REQUIREMENTS (mg/l) 1976(1) BOD	TSS	P	NH_3-N	2000 BOD	TSS	P	NH_3-N	COMMENTS
L1	Cedar Lake	0												
L4	Flint Creek	1.55		3-22-76	12-31-79	30	30							
K1	ditch to Blackberry Ck	0		Draft	5-31-82	4	5							
L5	Squaw Creek	0		5-30-75	12-31-79	4	5	1						Summer Discharge Only
L6	Loon Lake	0		6-9-75	12-31-79	4	5							
M2	Pistakee Bay			5-28-76	12-31-79	4	5							
L7	None													Land Application
D10	Indian Creek	0		1-21-74	1-10-79	30	30							
K3	Blackberry Ck	0.13		10-6-76	12-31-79	30	30							
L11	Squaw Creek	0		6-18-75	12-31-79	4	5							
M3	Subsurface													Subsurface
L14	Squaw Creek	0		6-18-75	10-1-79	4	5							
L16	Wooster Lake	0		Draft	2-1-82	4	5							
K5	ditch to Fox River	0		Draft	9-30-80	4	5							
K6	Mill Creek	0		Draft	11-30-81	4	5							
K7	East Br. of Big Rock Creek	0		6-9-75	12-31-79	10	12							
L21	ditch to Squaw Creek	0		Draft	8-1-81	4	5							
L22	drainage tile to Fish Lake	0		5-22-75	6-30-79	4	5							
D13	Waubansee Ck	0		4-30-75	8-1-75									Will divert to Naperville
M4	Subsurface													Subsurface
M5	Ditch to Dutch Creek	0		5-21-75	5-31-79	10	12							
K8	Fox River	61.4		3-27-75	7-31-77	30	30							
L26	Flint Creek	0		6-9-75	12-31-79	4	5							
K9	drainage tile to Mill Creek	0		5-27-75	4-30-79	4	5							
M6	Subsurface													Subsurface
L27	ditch to Flint Creek	0		6-9-75	12-31-79	4	5							
M7	Pond	0												No surface discharge
L29	None													Spray Irrigation
K10	Fox River			9-27-76	12-31-78	10	12							
L30	Squaw Creek	0.10		8-8-75	12-31-78									Under construction
C29														
M9	Subsurface													Subsurface
C30														
M10	Subsurface													Subsurface
M11	Squaw Creek	0.65		6-9-75	12-31-79	4	5							
L32	ditch to Lure Lake	0		3-13-75	12-31-79	10	12							
M12	Fox River	33.3		4-2-76	12-31-79	30	30							
M13	Tile to South Br. of Nippersink Creek	0		3-14-77	9-30-81	4	5							
M14	Subsurface													Subsurface
K11	ditch to Blackberry Ck	0		6-9-75	12-31-79	10	12							
D24	tile to Norton Creek	0		6-9-75	12-31-79	4	5							

(1) From NPDES Permits

TABLE 19-22 A: OTHER POINT SOURCE DISCHARGES FOX RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
K1	All Steel Inc.	0054780	Aurora/Aurora SD	Montgomery	0.190	12-7-76	1-1-81
L2	American Can Co.	0035165	Barrington/Barrington	Barrington	0.750	6-30-75	5-31-80
K2	Armour Dial, Inc	001899	Aurora/Aurora SD	Montgomery	0.650	5-27-75	3-31-79
D5	Morse Chain Borg-Warner	0032174	Aurora/Aurora SD	Aurora	0.030	11-27-74	5-31-79
K3	Burd, Inc.	0002143	Eastern Kane/ St. Charles	St. Charles		6-19-75	12-31-78
K4	Burgess Norton #1	0036331	Eastern Kane/ St. Charles	Geneva	0.050	1-27-75	6-1-79
K5	Burgess Norton #2	0049221	Eastern Kane/ St. Charles	Geneva	0.070	4-6-76	12-31-78
K6	Burlington Northern RR	0037648	Aurora/Aurora SD	Aurora		5-28-75	7-1-79
K7	Burlington Northern #001	0037656	Aurora/Aurora SD	Eola	0.0072	4-30-75	6-1-79
K7	Burlington Northern #002	0037656	Aurora/Aurora SD	Eola	0.024	4-30-75	6-1-79
K9	Chicago Gravel Hammond-Elgin	0032166	Elgin/Elgin SD	Elgin		4-4-75	8-31-79
K10	Chgo. Milwaukee, St. Paul, Pac. RR	0035769	Elgin/Elgin SD	Elgin		5-10-77	11-30-81
K11	Chicago Rawhide	0035530	Elgin/Elgin SD	Elgin	0.150	1-22-75	5-1-79
K12	Conco-Western Stone	0026760	Aurora/Aurora SD	North Aurora		7-18-74	12-31-78
K13	Consolidated Freightways	0049999	Aurora/Aurora SD	Aurora	No current discharge	7-16-76	2-28-81
K14	Crichton's Inc.	0046531	South Dundee/ West Dundee	West Dundee	0.002	6-6-75	4-30-80
K15	Dart Container Corp.	0051381	Aurora/Aurora SD	North Aurora		5-6-77	1-31-82
K16	DuKane Corp.	0024171	Eastern Kane/ St. Charles	St. Charles		3-24-75	7-1-79
K19	Felts Sand and Gravel	0025801	Aurora/Aurora SD	North Aurora		3-24-75	9-1-79
K20	Fox River Stone	0022900	Eastern Kane/ St. Charles	Valley View		3-13-75	9-1-79
K21	Goodrich, B.F.Co.	0033995	Eastern Kane/ St. Charles	St. Charles	0.011	12-10-74	8-31-79
M1	Gordon Co.	0036650	Richmond/Richmond	Richmond	0.004	6-23-75	3-31-80
K22	Head Inc.	0047228	Elgin/Elgin SD	Elgin	0.007	4-15-75	4-30-78
K23	Hoffer Plastics North	0004979	Eastern Kane/ St. Charles	Valley View	0.100	1-4-74	10-1-78
K24	Hoffer Plastics South	0004961	Eastern Kane/ St. Charles	Valley View	0.035	2-8-74	12-31-78
L17	Jewel Co., Inc.	0005100	Barrington/ Barrington	Barrington	0.120	10-11-74	3-31-79
L18	Kendall Co. Research	0002500	Barrington/ Barrington	Barrington	0.004	5-9-74	11-30-78
K27	Lyons Metals	0001686	Aurora/Aurora SD	Montgomery	0.058	1-7-74	7-1-78

TABLE 19-22 A: OTHER POINT SOURCE DISCHARGES — FOX RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
K37	Star Mfg.Star Forge Div.	0050504	Carpentersville/ Carpentersville	Carpentersville	0.060	11-3-76	3-3-81
M9	T-C Industries East	0026816	McHenry/McHenry	Prairie Grove	0.090	1-31-75	5-31-79
M9	T-C Industries West	0026816	McHenry/McHenry	Prairie Grove	0.070	1-31-75	5-31-79
K38	Western Electric Co.	0002321	Aurora/Aurora S.D.	Montgomery	0.060	12-1-74	6-1-79
K39	Woodruff and Edwards	0035815	Elgin/Elgin S.D.	Elgin		3-31-75	12-31-78
M10	Woodstock Die Cast #002	0033863	Woodstock/Woodstock	Woodstock	0.650	6-30-75	3-31-78
K8	Carpentersville Water Plant	0046434	Carpentersville/ Carpentersville	Carpentersville		1-7-76	12-31-78
K17	Elburn Water Plt	0051594	Elburn/Elburn	Elburn		6-14-76	12-31-79
K18	Elgin Water Plt	0047538	Elgin/Elgin S.D.	Elgin		6-20-75	12-31-78
K25	State Boys Sch. Water Plt.	None	None	St. Charles			
K26	Rollins S&W Water Plant	0045322	Elgin/Elgin S.D.	Elgin			
M3	Hillview Farm	0047813	Spring Grove/ Sunnyside	Richmond Township (T46N,R8E) NE 1/4 of Sec. 15-Richmond	overflow		
K31	Muetze, William Feedlot	0035323	None	Batavia Township (T39N, R8E) W 1/2 of sec. 19-Batavia	overflow	9-11-74	10-10-79
M8	Shamrock Beef Farm	0035599	McHenry/McHenry	McHenry Township (T45N, R8E) Sec. 32 - McHenry	overflow	7-8-74	6-26-79
M4	McGraw-Edison	0035190	SE McHenry County/ None	Algonquin	0.0215	1-31-75	2-1-79
M-5	McHenry Sand & Gravel	0025640	Island Lake-Lakemoor/ Island Lake S.D.	Lakemoor		4-17-75	9-1-79
K28	McWhorter Chem#001-002	0035203	Carpentersville/ Carpentersville	Carpentersville	0.012	2-2-75	7-31-79
K29	Meyer Material Co.	0024252	None	Sugar Grove	0.100	1-31-75	4-30-79
K30	Moline Malleable Iron Co.	0002810	Eastern/Kane/ St. Charles	St. Charles	0.012	9-30-74	12-31-77
M6	Morton Chemical Co.	0001716	McHenry/McHenry	McCullom Lake	0.440	4-17-75	9-30-78
K32	National Electronics #002-003	0024333	None	Geneva	0.006	5-27-75	4-30-79
K33	Northern Ill.Gas Co.	0050067	Various	Various		7-29-76	3-31-81
K34	Purex Corp.	0001821	Eastern/Kane/ St. Charles	Geneva	0.050	1-22-75	6-1-79
L22	Quaker Ind.	0037842	NW Lake/LCDPW	Antioch	0.070	5-28-75	12-31-79
C113	Quaker Oats Research Lab	0001473	MSDGC/MSDGC	Barrington	0.265		
M7	Repco Enterprises	0034266	Richmond/Richmond	Richmond	0.006	6-27-77	5-30-82
K35	Sperry,D.R.Co.	0046442	Aurora/Aurora SD	Aurora	0.0003	6-11-75	4-30-80
K36	St.Charles Mfg	0004885	Eastern/Kane/ St. Charles	St. Charles	0.012	6-13-75	4-30-80

TABLE 19-22 B: OTHER POINT SOURCE DISCHARGES FOX RIVER BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	2000	EFFLUENT REQUIREMENTS[1] (mg/l)	COMMENTS
K1	Storm sewer to Gillette Ck	0		Temp.	
L2	Storm sewer to Jewel Lake	0		Temp. 750 TDS	Non-contact cooling water
K2	Storm sewer to Mill Ck	0		Temp. 750 TDS, 15 TSS	Cooling water
D5	ditch to Selmarton Ck	0		Temp.	Cooling water
K3	Fox River	50.4		Temp.,750 TDS, Daily Max (DM); 15 TSS, 15 oil and grease (o/g), 2 (tot) Fe	
K4	Storm sewer to Fox River	0		Temp., 15 TSS, 15 o/g	
K5	Storm sewer to Mill Ck	0		4 BOD, 5 TSS	
K6	Storm sewer to Indian Ck	0		15 (DM) TSS	
K7	ditch to Indian Ck	0		15 (DM) TSS, 15 (DM) o/g	Cooling and Storm water
K7	Indian Ck	0		Temp., 750 TDS	Cooling and Storm water
K9	Popular Ck	0.65		15 (DM) TSS	
K10	Fox River			15 o/g	
K11	Tyler Ck	0.21		Temp.,10BOD,12 TSS, 750 TDS, 15(DM) o/g	
K12	ditch to Fox River	0		20 TSS	
K13	Natural Ck	0		15 TSS, 15 o/g	
K14	ditch to Fox River	0		Temp., 15 (DM) o/g	Cooling water
K15	Springbrook Creek	0		Temp., 15 (DM) TSS, 15(DM) o/g,3500 (DM) TDS	
K16	ditch to Fox Creek	0		Temp., 15 TSS, 750 TDS	Cooling water
K19	ditch to Fox River	0		20 TSS	
K20	ditch to Fox River	0		20 TSS	
K21	ditch to Fox River	0		Temp., 750 TDS	Cooling water
M1	Swamp to No. Branch of Nippersink Ck	0		Temp., 15 TSS	
K22	Fox River			Temp.	
K23	Fox River	42.6		15 (DM) TSS, 5 o/g	Cooling water
K24	Storm sewer to Fox River	42.6		15 TSS, 15 o/g	Cooling water
L17	Jewel Lake	0.97		Temp	Cooling water
L18	Storm sewer to Jewel Lake	0		Monitoring required only	Cooling water
K27	Lower Turkey Ck	0		Monitoring requirements only	Cooling water

(1) From NPDES Permits

TABLE 19-22 B: OTHER POINT SOURCE DISCHARGES FOX RIVER BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	2000	EFFLUENT REQUIREMENTS[1] (mg/l)	COMMENTS
M4	Crystal Lake	2.2		750 (DM) TDS	Cooling water
M5	ditch to Lake Defiance	0		15 (DM) TSS	
K28	Fox River	36.5		Temp., 750 TDS	Cooling water
K29	ditch to Big Rock Ck	0		20 TSS	
K30	ditch to Fox River	0		Temp., 750 TDS, 10 o/g, 15 (DM) TSS	Cooling and process water
M6	Dutch Creek	0		15 TSS, 750 TDS, 1.5 NH_3-N	Cooling and process water
K32	Mill Creek North	0		Temp	Cooling water
K33	Waters of the State			Monitoring for iron, oil/grease,hexane solubles	Gas line testing throughout Illinois
K34	ditch to Fox River	0		Temp., TDS	Cooling water
L22	Sequoit Ck	0		Temp., Daily Max; 15 TSS, 15 o/g	Cooling water
C113	ditch to Flynn Ck	0		Temp	Cooling water
M7	Slough to No. Branch of Nippersink Ck	3.36		Daily Max; 15 TSS, 15 o/g, 1 (tot) Fe	
K35	Fox River	62.1		Temp.	Cooling water
K36	ditch to Fox River	0		Temp., 750 TDS	Cooling water
K37	Fox River			15 (DM) TSS	
M9	Squaw Creek	0		Monitoring requirements only	Cooling water
M9	Squaw Creek	0		Monitoring requirements only	Cooling water
K38	Storm sewer to Fox River	68.5			Cooling water
K39	Fox River			Temp., 15 (DM) TSS, 2 (tot) Fe	Cooling water
M10	Storm sewer to So.Branch Nippersink Ck	0		Temp.	Cooling water
K8	ditch to Fox River	0		Monitoring requirements only	
K17	ditch to Blackberry Ck	0		Monitoring requirements only	
K18	Fox River	40.7		Monitoring requirements only	
K25	Mill Creek				
K26	ditch to Fox River	0		Monitoring requirements only	
M3	Land Application			Permit not required for current operations	
K31	ditch to Lake Run	0		There can be no discharge of pesticides, hazardous substances or toxic pollutants	
M8	ditch to Boone Creek	0		There can be no discharge of pesticides, hazardous substances or toxic pollutants	

(1) From NPDES Permits

e. Combined Sewer Overflows

Combined sewer systems are located in Batavia, the Sanitary District of Elgin, and the Aurora Sanitary District. It is estimated that 11.7 square miles of the basin are served by combined sewer systems.

f. Local Facilities Planning

Future water quality in the basin will be influenced by the facilities planning efforts of 26 FPAs, as well as the MSDGC and non-FPA areas. In addition, portions of the Northeast Central Lake, Bartlett, and West Chicago FPA's are in the basin. However, these areas either discharge their wastewater effluents to other basins or are not expected to have wastewater service before the year 2000. Figure 19-5 shows the FPAs and present and projected wastewater service areas.

(1) Southeastern McHenry FPA: There are six municipal type wastewater treatment plants in the Southeastern McHenry FPA. Crystal Lake owns and operates three plants. Algonquin and Cary also own and operate their own facilities. The Turnberry Utility Company operates a facility in the FPA which discharges to the Kishwaukee River. Information on that plant may be found in Chapter Fourteen.

The wastewater Needs Analysis for the Southeastern McHenry FPA called for the FPA to be split into three sub-FPAs: Algonquin; Cary-Oakwood Hills; and Crystal Lake-Lakewood. Algonquin would expand its existing plant to 2.12 mgd by 1985 to serve future growth to the year 2000. The Cary-Oakwood Hills sub-FPA plan recommended expansion of the Cary plant to 2.77 mgd by 1986 to serve Cary's future growth. Oakwood Hills would remain on septic systems until such time as citizens wished to construct a sewer system. The consultant determined that if Oakwood Hills constructed a sewer system, it would be more economical to pump the wastewaters to Cary for treatment than to construct a separate treatment plant.

The recommended plan for the Crystal Lake-Lakewood sub-FPA suggests that Crystal Lake expand its plant No. 2 to 6 mgd in 1985, its plant No. 3 to 2 mgd in 1990, and consider phasing out plant No. 1 if a Step 1 study proves that it would be uneconomical to repair and upgrade it. The sewer system would be extended as necessary to serve future development. Lakewood would continue to be served by Crystal Lake.

(2) Northwest Lake FPA: There are five municipal type wastewater treatment plants in the Northwest Lake FPA. Facilities are owned and operated by Antioch, Fox Lake, the Fox Lake Utility Company, Lake Villa, and the Round Lake Sanitary District.

Figure 19-4: POINT SOURCE DISCHARGES



The approved facilities plan, dated April 1975, calls for a new 6 mgd regional wastewater treatment plant at Fox Lake (now under construction). A series of regional interceptors are to be constructed to phase out the Antioch, Lake Villa, and Round Lake Sanitary District plants.

Phase I of the work involves service to Fox Lake, and three sanitary districts: Round Lake, Fox Lake Hills, and Lakes Region. The latter two presently have no facilities. Adjacent unincorporated areas will also be served. Phase I interceptor sewer construction was approximately 80 percent completed as of February, 1979. Phase II involves service to Antioch and areas between Petite Lake and Grass Lake (probably by 1990) and expansion of the Fox Lake plant to 12 mgd. Phase III involves servece to Lake Villa (probably by 1995).

(3) Barrington FPA: There are two municipal type wastewater treatment plants in the Barrington FPA, one owned and operated by the Village of Barrington, the other by the Lake Barrington Homeowners Association. A facilities plan has been completed for the Barrington FPA which calls for the expansion and upgrading of the Barrington plant, from 2 mgd to 3.68 mgd by 1980. The Lake Barrington Homeowner's Association plant is expected to remain in operation.

(4) Batavia FPA: The City of Batavia owns and operates the only municipal type wastewater treatment plant in the Batavia FPA. Batavia also has three overflows from a section of combined sewers serving an area of approximately 310 acres and 4,760 people in the city. A facilities plan has been completed for the Batavia FPA and approved by the IEPA. This plan calls for expansion of the Batavia plant from 2.72 mgd to 5.2 mgd average capacity and 12.9 mgd maximum capacity. The combined sewer system would be partially separated by additional new interceptors, and another series of interceptors would be constructed to route flow from the combined sewer diversion chambers to the plant. At the plant, a 2.5-million gallon equalization basin would level peak flows so that all wastewater could be routed through the plant for secondary treatment. This system would be able to handle flows from the 5-year 24-hour rainfall event. Flows in excess of this would receive only primary treatment and disinfection.

(5) Aurora FPA: The Aurora Sanitary District wastewater treatment facility is the only municipal type plant in the Aurora FPA discharging to the Fox River basin. The Aurora Sanitary District also operates 18 potential bypasses and overflows to the Fox River from its combined sewers serving an area of 4,360 acres. A facilities plan has been completed for the Aurora FPA, but to date it has not been certified by IEPA or USEPA. The facilities plan calls for expansion of the Aurora S.D. plant in two phases.

Phase I calls for the construction of structures to increase the plant capacity from 32 mgd to 50 mgd. However, equipment for only an 8 mgd expansion would be installed, giving the plant a balanced capacity of 40 mgd. Phase II calls for the installation of the remaining 10 mgd of equipment to give the plant a total capacity of 50 mgd. Phase I work is estimated to be completed by 1980. Implementation of Phase II will be as necessary. Extension of the Waubansee interceptor and construction of an Oswego interceptor are also planned.

The Aurora Sanitary District proposes to provide flow-through treatment for combined sewer flows up to 10 times the average dry weather flow of 5.1 mgd. Primary treatment and disinfection would be provided at three sites along the Fox River.

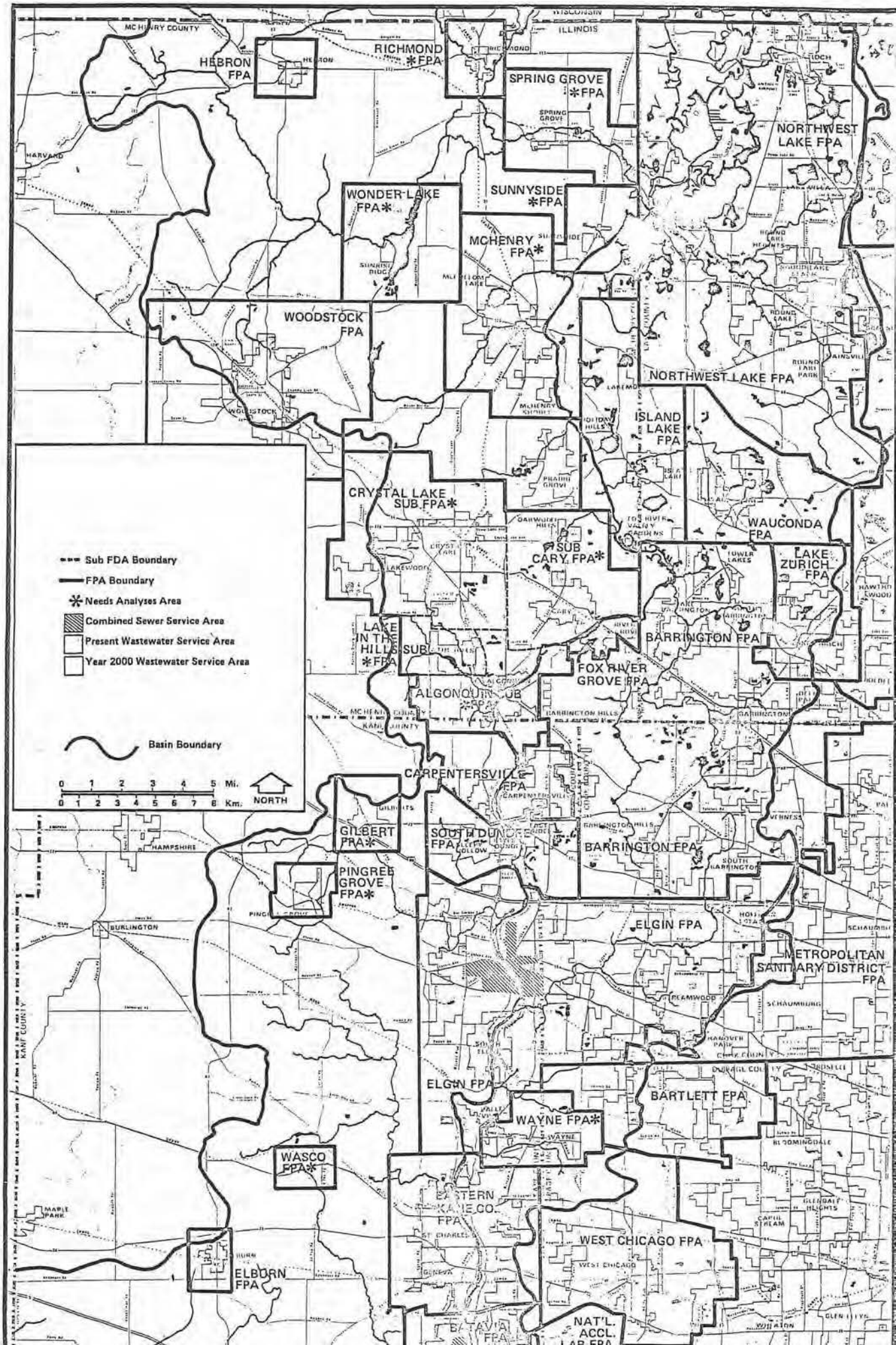
(6) Elburn FPA: The Village of Elburn's wastewater treatment facility is the only municipal type plant in the Elburn FPA. A facilities plan has been completed and approved for the Elburn FPA which calls for the construction of a new 1.27 mgd plant to replace the existing .11 mgd plant. Service would be extended to the Kaneland School and F.W. Kneip Company to phase out wastewater treatment facilities at those sites. Construction of the new plant should be completed by 1980.

(7) Sanitary District of Elgin FPA: There are six municipal type wastewater treatment facilities in the Sanitary District of Elgin (SDE) FPA. The SDE operates three facilities: a north plant, a main plant, and a west plant. The MSDGC Streamwood plant was phased-out of service to the SDE main plant in late 1977 and is now idle. The remaining two facilities are owned and operated by the St. Charles Skyline Sewer and Water Company and the Rollins Sewer and Water Company. The SDE has 13 combined sewer overflow discharge points to the Fox River. A facilities plan has been completed for the SDE FPA and the Valley View sub-FPA, but it has not yet been approved by the IEPA and USEPA. The SDE plan recommends a three-phase program for wastewater collection and treatment improvements.

Phase I, which is already under construction, calls for the expansion of the SDE main plant from 8.6 mgd to 17 mgd. Phase II calls for the 1990 construction of interceptors to allow the phase-out of the SDE west side plant and the Rollins Sewer and Water Company plant. The SDE main plant would also be expanded from 17 mgd to 25 mgd. Phase III calls for the year 2000 expansion of the SDE main plant to 35 mgd.

Plans have also been formulated for expansion of the SDE north plant from 3.5 mgd to 6 mgd and for the treatment of combined sewer overflows. The SDE has recommended that combined sewer overflows be collected for treatment at the site of the SDE west side plant. The existing plant, augmented by new facilities, would be used to provide

Figure 19-5: WASTEWATER SERVICE AREAS



primary treatment and disinfection for flows between 2 1/2 and 32 1/2 times average dry weather wastewater flows from the SDE. Flows below 2 1/2 times average dry weather flows would receive secondary treatment at the other SDE facilities: flows in excess of 32 1/2 times average dry weather flow would be discharged without treatment to the Fox River. The date of implementation of these projects is dependent upon funding.

Plans for the Valley View sub-FPA recommend the construction by 1980 of a pumping station and force main to the SDE main plant to serve the Valley View area and allow the phase-out of the St. Charles Skyline Sewer and Water Company. The station would be enlarged as necessary, probably in 1990.

(8) Fox River Grove FPA: The only municipal type wastewater treatment plant in the Fox River Grove FPA is owned and operated by the Village of Fox River Grove. A facilities plan has been completed and approved. The plan calls for the expansion of the existing Fox River Grove plant from 0.39 to 1.25 mgd by 1980.

(9) Eastern Kane County FPA: There are three municipal type plants in the Eastern Kane County FPA. The cities of Geneva and St. Charles each own and operate wastewater treatment facilities. The third plant serves the River Grange Lakes subdivision and is operated by the Valley Water Company. The recently completed facilities plan for the area states that the Geneva plant's hydraulic characteristics are adequate to meet Year 2000 loads. If the results of a sewer system evaluation survey confirm preliminary infiltration/inflow analyses, an additional 4.7 MGD wet weather flow treatment facility (pumping station and rotating sewage screen) will be needed. The facilities plan also recommends the possible expansion of the St. Charles plant from 8.0 to 9.0 mgd.

(10) Hebron FPA: The Village of Hebron owns and operates the only municipal type plant in the Hebron FPA. A facilities plan has been completed and approved for the FPA which recommends expansion and upgrading of the Hebron plant from 0.11 to 0.19 mgd by 1980. The plant would treat flows from the Kenosha Packing Company in addition to municipal wastewaters.

(11) Island Lake and Lakemoor FPAs: There presently are no municipal type wastewater treatment facilities in either the Island Lake or Lakemoor FPAs. A facilities plan has been completed and approved for the FPA which calls for the construction of a new 1.2 mgd Island Lake Sanitary District plant to serve the villages of Island Lake and Lakemoor and their surrounding unincorporated areas. Construction should be completed by 1980.

(12) Lake in the Hills FPA: The Lake in the Hills Sanitary District operates the only municipal type plant in the Lake in the Hills FPA. A facilities plan has been completed and approved which recommends expansion and upgrading of the present 0.25 mgd plant to 0.85 mgd. Construction should be completed by 1980.

(13) Lake Zurich FPA: The only municipal type plant in the Lake Zurich FPA discharging to the Fox River basin is the Lake Zurich northwest wastewater treatment facility. A facilities plan has been prepared for the service area of this northwest plant which recommends retention of the plant as a separate facility with possible expansion in 1985. Future planning activities for the service area of the Lake Zurich southeast plant may alter this conclusion and recommend a regional facility for the FPA. However, in the absence of such information, it was assumed that the northwest plant will continue in existence through the year 2000.

(14) McHenry FPA: The City of McHenry owns and operates the only municipal type wastewater treatment plant in the McHenry FPA. The McHenry FPA Needs Analysis report recommends that McCullom Lake construct a sewer collection system to be served by an interceptor extended from the McHenry sewer system, and that McHenry Shores construct a sewer collection system and a new 0.25 mgd interim sewage treatment plant. It was suggested that both of these projects be implemented as soon as possible, perhaps by 1980. The report also recommended that McHenry expand its plant to 3 mgd at the existing site, probably by 1985. The report further suggests that, in 1985, the wastewater needs of the area be reexamined to determine whether the McHenry Shores plant should be expanded to a regional facility, or whether a new regional plant should be constructed on the east side of the Fox River and the McHenry Shores plant phased out. The new regional plant, either at McHenry Shores or on the east side of the Fox River, would have a capacity of 3.5 mgd, giving the McHenry FPA a total treatment capacity of 6.5 mgd.

(15) Sugar Grove FPA: The Prestbury Utility Company wastewater treatment facility is the only municipal type plant in the FPA. The facilities plan for the Sugar Grove FPA calls for the construction of a new 0.3 mgd Sugar Grove wastewater treatment plant and the retention of the Prestbury wastewater treatment plant to treat excess flows. However, the alternatives calling for purchase and expansion of the Prestbury Utility Company plant or for service by the Aurora Sanitary District via a new interceptor are very close in terms of cost. To date a final decision on which alternative to implement has not been made.

(16) Richmond FPA: The Village of Richmond owns and operates the only municipal type wastewater treatment facility in the Richmond FPA. The Richmond plant was upgraded and expanded in 1974. The Needs Analysis report for the FPA recommends that Richmond undertake an infiltration/inflow (I/I) study on the village's sewer system. The report also states that no expansion of the Richmond plant beyond its present 0.375 mgd capacity would be needed before the year 2000.

(17) Wauconda FPA: The Village of Wauconda owns and operates the only municipal type wastewater treatment plant in the Wauconda FPA. A facilities plan has been completed for the FPA but has not yet been certified. The plan recommends upgrading and expanding the existing Wauconda plant from .8 mgd to 1.2 mgd. Wauconda has been granted a variance to discharge to Bang's Lake Creek upstream of Slocum Lake provided it submits an estimate of the cost to build an outfall sewer to a point below Slocum Lake and a cost-effectiveness analysis of that alternative as compared to building an interceptor to the new Island Lake S.D. plant. In addition ammonia removal will re required at Wauconda.

(18) Woodstock FPA: The Woodstock North wastewater treatment facility, owned and operated by the City of Woodstock, is the only municipal type plant in the Woodstock FPA discharging to the Fox River basin. A facilities plan has been completed for the Woodstock FPA but has not been certified by the IEPA or the USEPA. The plan suggests that expansion of this facility (which was remodeled in 1976) will not be necessary before the year 2000.

(19) Gilberts FPA: There are no municipal type plants in the Gilberts FPA. The Gilberts Needs Analysis report notes that the village would probably be unable to afford a sewage collection and treatment system. Unfortunately, Gilberts also faces the problem of soils unsuitable for on-site disposal by septics. The recommended plan calls for the continued decentralized treatment of wastewater within the Gilberts FPA. Treatment would be provided by septic systems in areas where they work properly. Nontraditional alternatives, such as mounded sand absorption fields, the partial sewering of problem areas to a community absorption field, or the partial sewering to holding tanks with trucking of sewage to a treatment plant would be considered in areas unsuitable for septics.

(20) Spring Grove and Sunnyside FPA's: There are no municipal type plants in either the Spring Grove or Sunnyside FPAs. The Needs Analysis report for the Spring Grove and Sunnyside FPAs suggests that the most cost-effective sewage collection and treatment alternative would be to sewer both areas to the Fox Lake regional wastewater

plant in Lake County. However, the cost of such a system would probably be out of reach of the residents of the FPAs. Therefore, the report recommends that Sunnyside and Spring Grove continue to operate septic systems where they function properly. It also suggests that Spring Grove construct partial sewer service in problem areas to a holding tank for collecting and subsequently transporting wastes to the Fox Lake plant for treatment. In areas unsuitable for septic tanks, Sunnyside could implement nontraditional alternatives, such as mounded sand absorption fields, partial sewering of problem areas to a community absorption field, or partial sewering to holding tanks with trucking of sewage to a treatment plant.

(21) Wonder Lake FPA: There are no municipal type wastewater treatment plants in the Wonder Lake FPA. At present the entire FPA is served by septic systems which the Needs Analysis consultant feels are draining to Wonder Lake, causing a health and pollution hazard. The Wonder Lake Needs Analysis report recommends that a 1.04 mgd treatment facility be constructed by 1980 with phosphorous removal and biological nitrification facilities to alleviate the hazards. The plan also calls for construction of an interceptor under the lake bed of Wonder Lake just off the east, south, and southwestern shorelines. Local collectors would also be constructed as necessary. Residents of the area have expressed a desire to remain on septics due to the financial burden of such a system, doubts about the pollutional impacts of septics on Wonder Lake, and doubts about the feasibility of the lake bed interceptor. It, therefore, appears likely that the Wonder Lake FPA will remain on septic systems. A supplemental study to determine the severity and location of septic problems around the lake should be implemented. Such a study should also evaluate nontraditional on-site disposal techniques which could be effective in solving septic pollution problems.

(22) Wasco FPA: There are no municipal type wastewater treatment facilities in the Wasco FPA. The Wasco Needs Analysis report recommends construction of a sewage collection and treatment system with a design capacity of .1 mgd. The plant would be expanded as necessary to meet future growth. This system should be started as soon as practicable and be completed by 1980.

(23) Wayne FPA: There are presently no municipal type wastewater treatment plants in the Wayne FPA. The Wayne Needs Analysis report notes that the village would probably be unable to afford a sewage treatment and collection system. The recommended plan calls for the continued noncentralized treatment of wastewater within the Wayne FPA. This would be provided by septic systems in areas where they work properly. Non-traditional alternatives, such as mounded sand absorption fields, partial sewering of problem

areas to a community absorption field, or partial sewering to holding tanks with trucking of sewage to a treatment plant would be considered in areas unsuitable for septics.

(24) Burlington FPA: There are presently no municipal type wastewater treatment plants in the Burlington FPA. The Burlington Needs Analysis report recommended that septic systems continue to be used for wastewater treatment because of the expense of a centralized collection and treatment system. In areas where septic problems were noted, drainage improvements and mounded absorption septic systems were suggested as possible solutions.

(25) Carpentersville FPA: The Village of Carpentersville owns and operates the Main and Kimball Hill wastewater treatment facilities, which are the only municipal type plants in the Carpentersville FPA. The village is presently completing expansion of the Main plant, from 3.5 mgd to 5 mgd under a facilities planning exemption. Further expansion to 7 mgd could be required by the year 2000, but no plans have been finalized. The village also plans to phase out the Kimbal Hill plant to the Main plant by 1980. An unresolved boundary dispute exists between the village of Carpentersville and the South Dundee FPA concerning wastewater service to portions of the Hill Nursery. Carpentersville intends to provide service to this area where a shopping center is planned. However, West Dundee has included it in the South Dundee Township facilities plan.

(26) Scuth Dundee Township FPA: There are two municipal type plants in the South Dundee Township FPA. Both the Village of East Dundee and the Village of West Dundee own and operate wastewater treatment facilities. A facilities plan has been completed for the Scuth Dundee Township FPA but has not been certified. The plan calls for the villages of East Dundee and West Dundee to independently expand their plants to meet 1990 design loads. The East Dundee plant would expand to .967 mgd and the West Dundee plant would expand to .903 mgd. East Dundee would truck digested sludge in excess of present drying bed capacity to West Dundee for mechanical dewatering and ultimate disposal. A sludge transfer line would be constructed when it became cost-effective.

Both East Dundee and West Dundee would rehabilitate and expand their existing sewer systems, and Sleepy Hollow would construct a collection system and interceptor to the West Dundee plant. The Sleepy Hollow system would be phased to initially serve 636 village residents, with complete village service in about 10 years.

An unresolved boundary dispute exists between the South Dundee Township FPA and the Carpentersville FPA. This dispute is discussed in the narrative about the Carpentersville FPA.

(27) Non-FPA Areas: The Ferson Creek Utility Company wastewater treatment facility is the only municipal type plant not located in an FPA in the Fox River basin. This privately owned facility is not projected to be in any other year 2000 service area.

(28) Summary: The status of facilities planning and the future configuration of municipal type wastewater treatment facilities in the Fox basin is summarized in Tables 19-19. Facilities planning efforts in this basin are nearing completion. However, there are still several FPAs with unresolved issues, and there are also many Needs Analysis reports requiring further study.

19.05 NONPOINT SOURCES: EXISTING CONDITIONS

a. Urban Stormwater Systems

In the Fox basin, separate storm sewer systems serve all or portions of approximately 30 municipalities and numerous unincorporated areas. It is estimated that 48 square miles, or 5 percent of the basin area, are served by separate storm sewers. These systems follow natural drainage courses and discharge either directly into the Fox River or its tributaries or discharge indirectly via ditches or other small watercourses.

Combined sewer systems are present only in parts of Aurora, Batavia, and Elgin. It is estimated that 11.7 square miles, or 1 percent of the basin area, are tributary to combined sewers. Areas of the basin not served by either separate storm sewers or combined sewer systems are estimated to comprise 900 square miles, or 94 percent of the basin area. Stormwater falling upon these areas enters the Fox River by overland flow via ditches or other small watercourses.

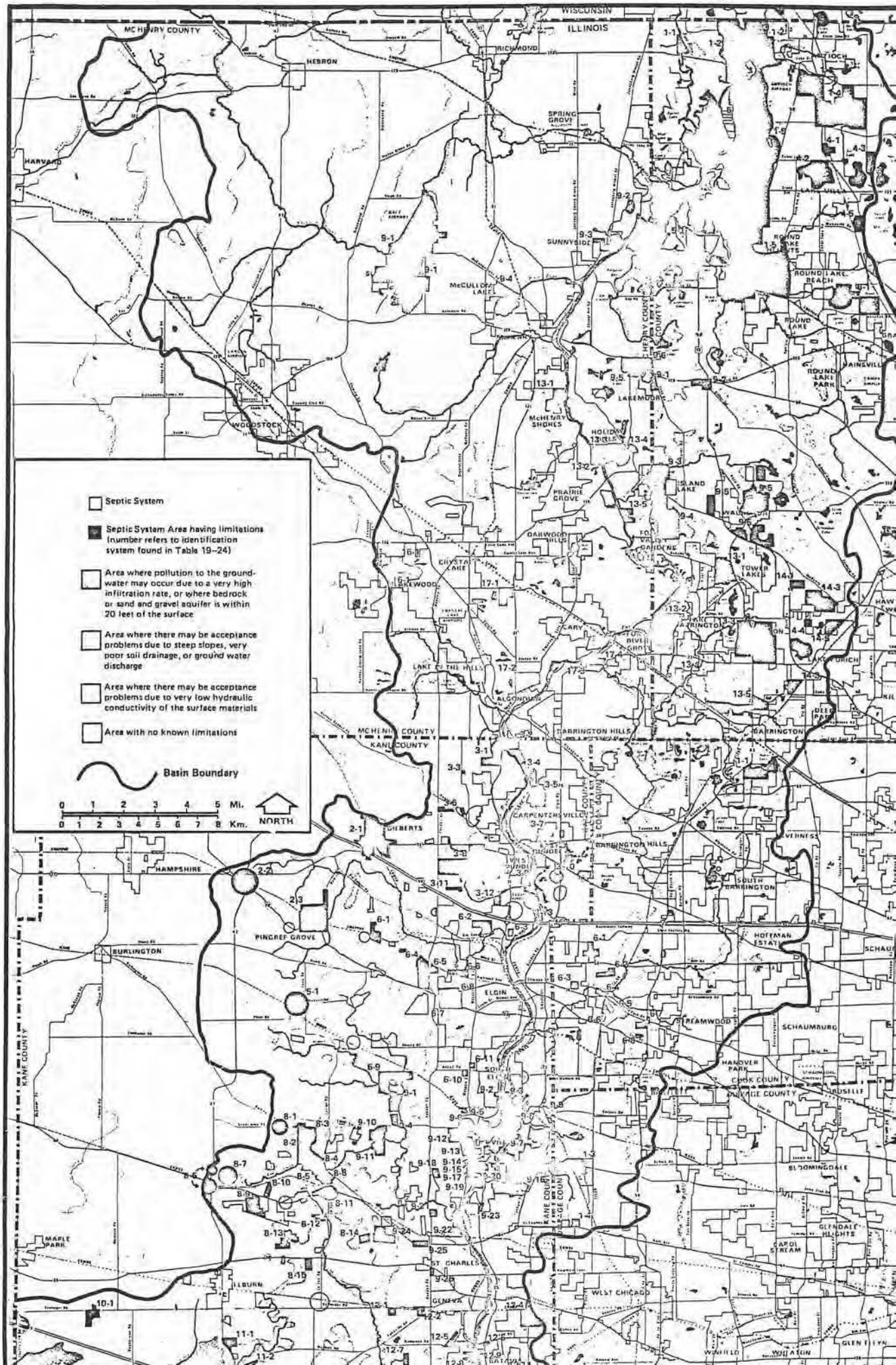
b. Construction Activities

As discussed in Chapter Six, construction activities, coupled with stormwater runoff and resultant erosion, can contribute sediments, chemicals, and biological organisms to rivers and streams.

Basin data indicate that erosion associated with construction activity is occurring (or is expected to occur) in 56 areas located wholly or partially within the Fox River basin. The number of erosion areas by county is as follows:

Du Page	8
Kane	1
Lake	18
McHenry	29
	56

Figure 19-6: LOCATION OF SEPTIC AREAS



The areas total 14.2 square miles. Those identified by McHenry County are associated with roadbed construction and road reditching projects having a total approximate length of 18 miles. Erosion problems associated with reditching are attributed in part to new construction methods which produce ditches with nearly vertical sides making them impossible to seed or sod effectively. The use of herbicides and removal of vegetation also contribute to erosion problems.

While the land area mentioned above has the potential to contribute to surface water quality problems, no evidence directly links any specific water quality problems to these areas.

No data are available on erosion areas in Cook County.

c. Septic Systems

Septic systems are widely used as on-site wastewater treatment systems in the basin. At the present time, 42,039 residential septic systems serve an estimated 143,947 people (see Table 19-23). In addition, the basin has 1,115 nonresidential septic systems serving a population equivalent of 10,703. The latter systems serve commercial, recreational, industrial, and institutional establishments. Approximately 3 percent of the septic systems are located in Cook County, 2 percent in Du Page County, 17 percent in Kane County, 38 percent in Lake County, and 40 percent in McHenry County.

Figure 19-6 shows the locations of all septic systems in the basin, and Table 19-24 provides a general description of the areas having known or potential limitations for septic system usage.

d. Mining

The Fox River basin contains 41 active and 57 inactive surface mining operations. A large majority of these are gravel pits. The number of active and inactive mining operations by county is as follows:

Du Page	2
Kane	10
Lake	12
McHenry	79
	103

TABLE 19-23 : SUMMARY OF SEPTIC TANK INSTALLATIONS — Fox River BASIN

COUNTY	NUMBER OF SEPTIC SYSTEMS			POPULATION SERVED		
	RESIDENTIAL	NON RESIDENTIAL	TOTAL	RESIDENTIAL	NON RESIDENTIAL (PE)	TOTAL
Cook	1,053	11	1,064	3,967	140	4,107
DuPage	855	9	864	3,230	96 (1)	3,326
Kane	7,185	110	7,295	25,931	1,971	27,902
Lake	16,255	285	16,540	55,159	3,158	58,317
McHenry	16,691	700	17,391	55,660	5,338	60,998
Will	0	0	0	0	0	0
Total	42,039	1,115	43,154	143,947	10,703	154,650

(1) Non-Residential population served provided only for Septic Systems with PE of 35 or greater.

TABLE 19-24: SEPTIC SYSTEM AREAS HAVING LIMITATIONS

Fox River BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Cook	Barrington		117	418	1-1
Cook	Hanover		29	118	6-1
Cook	Hanover		15	63	6-2
Cook	Hanover	Elgin	35	146	6-3
Cook	Hanover		22	90	6-4
Cook	Hanover		87	363	6-5
Cook	Hanover		1	5	6-6
Cook	Hanover		20	81	6-7
Cook	Hanover		1	20	6-8
DuPage	Wayne	Wayne	133	504	1-3
DuPage	Wayne		43	163	1-4
DuPage	Naperville		55	262	7-1
Kane	Rutland	Gilberts	96	600	2-1
Kane	Rutland	Starks Corners	7	21	2-2
Kane	Rutland	Pingree Grove	64	225	2-3
Kane	Dundee		48	168	3-1
Kane	Dundee		92	322	3-2
Kane	Dundee		3	10	3-3
Kane	Dundee		16	56	3-4
Kane	Dundee		193	675	3-5
Kane	Dundee		25	88	3-6
Kane	Dundee	East Dundee	62	223	3-7
Kane	Dundee	Sleepy Hollow	515	2500	3-8
Kane	Dundee		42	147	3-9
Kane	Dundee		12	42	3-10
Kane	Dundee		48	168	3-11

Fox River BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Kane	Dundee		15	53	3-12
Kane	Dundee		12	42	3-13
Kane	Plato	Plato Center	40	120	5-1
Kane	Elgin	Wildwood Valley Sub.	54	189	6-1
Kane	Elgin	Elgin	161	564	6-2
Kane	Elgin	Elgin	17	67	6-3
Kane	Elgin		165	578	6-4
Kane	Elgin		13	45	6-5
Kane	Elgin		15	52	6-6
Kane	Elgin		138	453	6-7
Kane	Elgin	Elgin	69	241	6-8
Kane	Elgin		147	514	6-9
Kane	Elgin		9	31	6-10
Kane	Elgin	South Elgin	1	3	6-11
Kane	Campton		20	70	8-1
Kane	Campton		55	192	8-2
Kane	Campton		2	7	8-3
Kane	Campton		7	25	8-4
Kane	Campton		70	245	8-5
Kane	Campton		46	152	8-6
Kane	Campton		12	42	8-7
Kane	Campton		24	84	8-8
Kane	Campton		17	60	8-9
Kane	Campton		11	39	8-10
Kane	Campton	Wasco	65	3	8-11
Kane	Campton		7	25	8-12

TABLE 19-24. SEPTIC SYSTEM AREAS HAVING LIMITATIONS

Fox River BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Kane	Campton		48	168	8-13
Kane	Campton		36	126	8-14
Kane	Campton		5	28	8-15
Kane	St. Charles		53	185	9-1
Kane	St. Charles		25	84	9-2
Kane	St. Charles		58	203	9-3
Kane	St. Charles		30	105	9-4
Kane	St. Charles		76	266	9-5
Kane	St. Charles	Valley View	141	493	9-6
Kane	St. Charles	Valley View	179	626	9-7
Kane	St. Charles		10	35	9-8
Kane	St. Charles		17	60	9-9
Kane	St. Charles		18	63	9-10
Kane	St. Charles		17	60	9-11
Kane	St. Charles		48	168	9-12
Kane	St. Charles		49	171	9-13
Kane	St. Charles		125	437	9-14
Kane	St. Charles		14	49	9-15
Kane	St. Charles	Wayne	147	515	9-16
Kane	St. Charles		54	199	9-17
Kane	St. Charles		26	91	9-18
Kane	St. Charles		50	175	9-19
Kane	St. Charles		92	322	9-20
Kane	St. Charles		21	74	9-21
Kane	St. Charles		18	63	9-22
Kane	St. Charles		9	32	9-23

Fox River BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Kane	St. Charles		160	560	9-24
Kane	St. Charles		16	21	9-25
Kane	St. Charles		12	42	9-26
Kane	Kaneville		11	35	10-1
Kane	Kaneville		110	350	10-2
Kane	Blackberry		23	81	11-1
Kane	Blackberry		8	28	11-2
Kane	Blackberry		8	28	11-3
Kane	Blackberry		20	70	11-4
Kane	Blackberry		4	14	11-5
Kane	Blackberry		16	56	11-6
Kane	Geneva-Batavia		1	1	12-1
Kane	Geneva-Batavia		7	21	12-2
Kane	Geneva-Batavia		50	175	12-4*
Kane	Geneva-Batavia		78	276	12-5
Kane	Geneva-Batavia		17	60	12-6
Kane	Geneva-Batavia		16	56	12-7
Kane	Geneva-Batavia		38	133	12-8
Kane	Geneva-Batavia		17	46	12-9
Kane	Geneva-Batavia		18	63	12-10
Kane	Geneva-Batavia		4	12	12-11
Kane	Geneva-Batavia		95	334	12-12
Kane	Geneva-Batavia		11	38	12-13
Kane	Geneva-Batavia		40	140	12-14

TABLE 19-24: SEPTIC SYSTEM AREAS HAVING LIMITATIONS

Fox River BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Kane	Geneva-Batavia		9	32	12-15
Kane	Geneva-Batavia		1	3	12-16
Kane	Geneva-Batavia		8	225	12-17
Kane	Geneva-Batavia	Batavia	1	3	12-18
Kane	Geneva-Batavia		67	234	12-19
Kane	Geneva-Batavia		20	70	12-20
Kane	Geneva-Batavia		58	203	12-21
Kane	Geneva-Batavia		17	60	12-22
Kane	Geneva-Batavia		19	66	12-23
Kane	Geneva-Batavia		1	3	12-24
Kane	Geneva-Batavia		76	266	12-25
Kane	Geneva-Batavia		84	164	12-26
Kane	Big Rock	Big Rock	165	575	13-1
Kane	Big Rock		2	6	13-2
Kane	Big Rock		30	105	13-3
Kane	Big Rock		44	154	13-4
Kane	Big Rock		12	42	13-5
Kane	Sugar Grove	Sugar Grove	13	46	14-1
Kane	Sugar Grove		3	9	14-2
Kane	Sugar Grove		21	73	14-3
Kane	Sugar Grove		12	42	14-4
Kane	Sugar Grove	Sugar Grove	1	3	14-5
Kane	Sugar Grove	Sugar Grove	379	1330	14-6
Kane	Sugar Grove		29	101	14-7
Kane	Sugar Grove		25	88	14-8
Kane	Sugar Grove		17	60	14-9

Fox River BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Kane	Sugar Grove		15	53	14-10
Kane	Sugar Grove		33	120	14-11
Kane	Sugar Grove		36	126	14-12
Kane	Sugar Grove		6	21	14-13
Kane	Aurora		13	45	15-1
Kane	Aurora		1	3	15-2
Kane	Aurora		2	4	15-3
Kane	Aurora		42	147	15-4
Kane	Aurora		24	84	15-5
Kane	Aurora		69	241	15-6
Kane	Aurora		23	80	15-7
Kane	Aurora		37	129	15-8
Kane	Aurora		4	12	15-9
Kane	Aurora		6	18	15-10
Kane	Aurora		24	84	15-11
Kane	Aurora		35	122	15-12
Kane	Aurora		7	18	15-13
Kane	Aurora		66	231	15-14
Kane	Aurora		8	24	15-15
Lake	Antioch	Fox River Spring	79	250	1-1
Lake	Antioch	Channel Lake - Lake Catherine	1622	5361	1-2
Lake	Antioch	Antioch Lake	227	1012	1-3
Lake	Antioch	Loon Lake	498	2081	1-4
Lake	Antioch	Lakes Region	2105	7208	1-5
Lake	Lake Villa	Larson Industrial Park	8	17	4-1
Lake	Lake Villa	Cedar Lake	221	808	4-2

TABLE 19-24. SEPTIC SYSTEM AREAS HAVING LIMITATIONS

Fox River BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Lake	Lake Villa	Deep Lake	295	982	4-3*
Lake	Lake Villa	Venetian Village	715	2608	4-5*
Lake	Grant	Fox Lake	818	2621	5-1
Lake	Avon	Round Lake-Highland Lake	239	832	6-1
Lake	Wauconda	Lilymoor	32	112	9-1
Lake	Wauconda	Volo	78	382	9-2
Lake	Wauconda	Island Lake-Mylith Park	697	2682	9-3
Lake	Wauconda	Williams Park	186	674	9-4
Lake	Wauconda	Unincorporated Wauconda	435	1564	9-5
Lake	Cuba	Tower Lake	293	1022	13-1
Lake	Cuba	Fox River	445	1561	13-2
Lake	Cuba	North Barrington	446	1583	13-3
Lake	Cuba	Lake Barrington Industrial Park	38	97	13-4
Lake	Cuba	Unincorporated Barrington	261	911	13-5
Lake	Ela	Valentine Manor	42	152	14-1
Lake	Ela	Hawthorne Woods-Area 2	77	277	14-3
Lake	Ela	Woodland Subdivision	30	108	14-4
Lake	Ela	Echo Lake	178	646	14-5
Lake	Ela	Deer Park - Area 2	20	78	14-12*
Lake	Ela	Deer Park - Area 3	32	115	14-13
McHenry	McHenry	Wonder Lake	2248	7524	9-1
McHenry	McHenry	Pistakee Highlands	89	303	9-2
McHenry	McHenry	Sunnyside Estates	605	2032	9-3
McHenry	McHenry	McCullom Lake	377	1242	9-4
McHenry	McHenry	Lilymoor	138	454	9-5
McHenry	McHenry	Lakemoor	153	502	9-6

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
McHenry	Nunda	McHenry Shores	342	1163	13-1
McHenry	Nunda	Riverside Park	124	421	13-2
McHenry	Nunda	Holiday Hills	248	841	13-3
McHenry	Nunda	Griswald Lake	102	341	13-4
McHenry	Nunda	Portens Jacoby's	147	499	13-5
McHenry	Grafton	Crystal Lake	117	398	16-1*
McHenry	Algonquin	Crystal Lake Manor	299	1067	17-1
McHenry	Algonquin	Algonquin Infiltration Gallery	384	1317	17-2
McHenry	Algonquin	Venetian Gardens	177	623	17-3
McHenry	Algonquin	Hillview Estates	132	463	17-4

The potential for water pollution from these areas is recognized. However, evidence linking these areas to specific groundwater or surface water quality problems is scan tc fourteeen gravel pits in McHenry County may be contributing to groundwater pollution, dependent on site geology and possible dumping. One active surface mining operation in Kane County has displayed evidence of sediment pollution of Blackberry Creek.

No information is available on the Cook County portion of the basin.

e. Surface Waste Disposal Sites

The Fcx River basin contains 45 active or inactive surface waste disposal sites: 3 sanitary landfills, 24 old dumps, and 7 junkyards. The distribution of waste disposal sites by county is as follows:

Kane	10
Lake	3
McHenry	32
	45

McHenry County identified four dumps operating illegally in the basin and two junkyards in the city of Woodstock which present a surface runoff hazard. Kane County identified two landfill operations known to cause surface and/or subsurface water pollution: Tri-County Landfill in St. Charles Township and an unnamed landfill located in Aurora Township.

The remaining waste disposal sites are recognized as possible sources of water pollution, but no evidence directly links them to any specific quality problems.

No information is available on the Cook County part of the basin.

f. Hydrologic Modifications

Many rivers in northeastern Illinois contain channels, dams, weirs, and other structures which significantly influence and control the dissolved cxygen concentrations in these water bodies. Consideration was given to these structures in the water quality model. The influence of a channel dam on water quality can often be dramatic. Weirs and dams create pools which have DO levels below or above those ncrmally expected if the stream is free flowing. Forty-eight dams were analyzed in the region of which 14 are in the Fcx River basin. In general, the water quality impacts of dams in the Fox River basin were found to be negative.

In addition to the influence of dams on water quality, streams in the Fox River basin are periodically ditched, straightened, or channelized. The Illinois Department of Conservation has identified the following 19 streams which have undergone some modification:

Big Rock Creek	Mill Creek
Blackberry Creek	Norton Creek
Bowes Creek	Otter Creek
Brewster Creek	Sequoit Creek
Ferson Creek	Spring Creek
Fitchie Creek	Squaw Creek
Indian Creek	Stoney Creek
Long Run Ditch	Trevor Creek
Tyler Creek	Waubansee Creek
Welch Creek	

A dredging project was recently completed in Nippersink Lake under the auspices of the Chain of Lakes-Fox River Commission. Forty-thousand cubic yards of dredge spoil was disposed on a 4-acre site located approximately a mile and a half north of the village of Fox Lake, near Grass Lake Road.

g. Agricultural Runoff

There are several agricultural sources of potential surface and groundwater pollution. Pollutants include sediment, plant nutrients, pesticides, and animal wastes, all of which interact in undefined ways as they move to surface and groundwaters. Because of the uncertainty of predicting changes in the form and location of these pollutants, the amounts of materials at or near agricultural areas are difficult to estimate. There are approximately 959 square miles in the Fox River basin; 744 square miles (78 percent) are categorized as vacant, agricultural, and forest areas. During storm events, agricultural pollutants enter the Fox River by direct overland flow and through various tributary streams. Agricultural pollutants may also enter streams through groundwater during low-flow periods.

During 1976, this Commission completed an agricultural survey of fertilizer (nutrients) and pesticide usage, as well as an inventory of livestock. Details of this survey for each county in the NIPC planning area are contained in 208 Staff Paper No. 25.

h. Marine Activities

Marine activities may affect water quality in the basin through oil or gasoline spills, sanitary sewage disposal, dumping of litter, and disturbance of sediment or benthic deposits. The Fox River is heavily used for recreational boating, and control of potential pollutants must rely on

individual boat owner's complying with the law. Boat concentrations extend from Wilmot Dam in Wisconsin through the Chain of Lakes (with its nine major interconnecting lakes) to Algonquin.

Many ancillary facilities along the shoreline have the potential to cause pollution of the river. The general impact on water quality of these facilities, as compared to actual boating activities, is unknown. Two sanitary wastewater pump-out facilities, Watts Marina (Pistakee Lake) and Fox Lake Harbor (Fox Lake), enhance the protection of water quality. Conversely, improved water quality should produce increased use of marine activities.

19.06 DISPOSAL OF RESIDUALS

a. Residual Sources

(1) Point Sources: As previously mentioned, there are 38 municipal type wastewater treatment plants, 6 industrial plants, 41 miscellaneous plants, and 56 other wastewater dischargers in the Fox River basin. Each of these facilities produces residuals which must be disposed of safely.

(2) Nonpoint Sources:

(a) Septic System Residuals: It is difficult to accurately estimate the present annual volume of septic sludge produced in the basin. However, using an average annual volume of 70 gallons of septage per person, it is possible to make a rough approximation. There are 143,947 persons in the basin served by residential septic systems. Thus, 143,947 x 70 gallons = 10,076,290, or about 10.1 million gallons of residential septage each year. This figure would be higher if nonresidential septage were included.

(b) Agricultural Type Residuals: This type of residual is associated with concentrated animal feedlot operations. There are currently three feeding operations in the basin. But, there is no available information on the amount of residual wastes generated from those facilities.

b. Residual Disposal Practices

In the Fox basin the most common means of sludge disposal is land disposal, either by landfilling or by land application.

(1) Landfills: Four landfill sites are located in the basin.

(a) Unnamed Gravel Pit: In McHenry County, northwest of Cary, there is an old gravel pit that is currently serving as a sanitary landfill. This site accepts approximately 225 tons of sludge annually from the Fox River Grove sewage treatment plant. In addition, the site accepts an undetermined amount of sludge from unidentified sources, including septic tank pumpage.

(b) Veugler's Dump: This landfill site is located on Sands Road in McHenry County, west of the above mentioned gravel pit. This site accepts unknown volumes of municipal type sludge from the Woodstock north and south plants and from Crystal Lake's plants.

(c) Midway Landfill: This site is located southeast of Geneva in Kane County. The facility is used for the disposal of approximately 8,600 cubic yards of municipal type sludge generated annually by the Batavia and St. Charles wastewater treatment plants, plus an undetermined amount of septage. The site is owned by Kane County and is leased to Midway Landfill, Inc. The operational life of the site is estimated at 10 more years.

(d) Schneider Gravel Pit: The City of Elgin's water treatment plant is currently the only known user of this gravel pit. This site has a clay bottom and is located on Highland Avenue west of Elgin. It is an IEPA approved site, which accepts an estimated 10,600 cubic yards of sludge a year from Elgin's water plant.

(e) Grayslake Gelatin Landfill: Twenty five acres of farmland owned by a private company, Grayslake Gelatin, are used for the burial of sludge. Deep trenches are excavated to be used for final disposal of industrial type sludges through the simple process of burying the sludge and covering it with a layer of soil.

(2) Land Application Sites: Fifteen land application sites currently are in operation, many of them privately owned farmlands. One site is located in Lake County, 14 sites are in McHenry County. But, there are several unidentified sites in Kane County. The inventory of sludge disposal facilities prepared by Kane County for the Commission in late 1976 did not identify any land application sites by specific name and location. However, the inventory did recognize the practice of spreading the sludge on unidentified, non-permitted agricultural lands and the disposal of sludge to individuals who pick-up the materials for use as soil conditioners on gardens and lawns.

The site in Lake County is the Barrington Hills Country Club, which applies dried sludge as a fertilizer to its golf course.

The 14 sites in McHenry County are individual private farms.

(3) Other Sites: Sludge from several facilities in the Fox basin are disposed of outside the basin. These sites include, the Lake County Public Works Department's New Century Town Wastewater Treatment plant, Lester's Materials, The Purves Sludge Farm in Lake County and Sexton's Landfill in Du Page County. Sludge from several miscellaneous plants is hauled to the LCDPW New Century Town plant. Here, it is further treated and dried, and taken to Lester's Materials where it is mixed with sand and peat and sold to the public as a soil conditioner and fertilizer.

Sexton's Landfill accepts 1,650 tons of industrial type sludge annually from the Woodstock Die Casting Company plant. Little else is known about this disposal site.

19.07 EXISTING MANAGEMENT PROGRAMS

The major features of the existing water quality management system in northeastern Illinois are discussed in Part I of this report. In this chapter, management programs in the Fox River basin are presented, but only to the extent that it is necessary to clarify the previous discussion.

Table 19-25 contains a list of the public agencies and private utilities in the basin which are currently involved in water quality related activities. Variations in programs and responsibilities between these agencies are indicated by a numerical code.

19.08 MODELING PROCESSES: FUTURE CONDITIONS

Computer simulation has indicated that water quality in the Fox River basin is generally good compared to other basins in the region. Only four output points (121, 310, 370, 480) failed to meet NIPC's water quality criteria of 5 mg/l DO concentration for at least 95 percent of the time. However, violations of the state standard of 5 mg/l DO for 100 percent of the time were simulated at 9 of the 13 output points.

Violations of the in-stream ammonia water quality standard of 1.5 mg/l were simulated at 7 of the 13 output points. With the in-stream standard for phosphorus being 0.05 mg/l, concentrations in excess of 0.02 mg/l were modeled at all output points.

TABLE 19-25: EXISTING LOCAL WATER QUALITY MANAGEMENT AGENCIES AND PROGRAMS: FOX RIVER BASIN*

MUNICIPALITIES

Algonquin	1,2,3,4	+	Lakewood (Kishwaukee)	1	+
Antioch	1,2,4		Lake Zurich (Upper Des Plaines)	1,2,3,4	
Aurora	1,4		McCullom Lake		
Barrington	1,2,3		McHenry	1,2	
Barrington Hills			McHenry Shores	4	
Bartlett (DuPage)	1,2,4		Montgomery	1,3,4	
Batavia (DuPage)	1,2,4		Naperville (DuPage)	1,2,4	
Carpentersville	1,2		North Aurora	1	
Cary	1,2		North Barrington	3	
Crystal Lake	1,2		Oakwood Hills		
Deer Park (Upper Des Plaines)	3,4		Pingree Grove		
East Dundee	1,2		Prairie Grove		
Elburn (Kishwaukee)	1,2,4		Richmond	1,2	
Elgin	1,3,4		Round Lake	1	
Fox Lake	1,2		Round Lake Beach (Upper Des Plaines)	1	
Fox River Grove	1,2		Round Lake Heights	1	
Fox River Valley Gardens			Round Lake Park	1	
Geneva	1,2,4		Schaumburg (DuPage, Salt Creek)	1,3,4	
Gilberts			Sleepy Hollow		
Grayslake (Upper Des Plaines)	1,2,4		South Barrington		
Hainesville	1		South Elgin	1,4	
Hanover Park (DuPage)	1,2,3,4		Spring Grove	4	
Hawthorn Woods (Upper Des Plaines)			St. Charles (DuPage)	1,2,3,4	
Hebron	1,2		Streamwood (DuPage)	1,2,4	
Hoffman Estates (Salt Creek)	1,3,4		Sugar Grove	1,3,4	
Holiday Hills			Sunnyside		
Inverness (Salt Creek)	3,4		Sunrise Ridge		
Island Lake	4		Tower Lakes	3	
Lake Barrington			Valley View		
Lake In The Hills			Wauconda	1,2	
Lakemoor			Wayne		
Lake Villa	1,2		West Dundee	1,2	
Bull Valley			Woodstock (Kishwaukee)	1,2,4	

* Additional basins shown in parentheses for those municipalities which cross basin boundaries.

\+ Numbers indicate existing water quality related activities as follows:

1. Wastewater collection agency
2. Wastewater treatment agency
3. Has enacted erosion and sediment control regulations
4. Has enacted stormwater detention regulations or equivalent sanitary district regulations apply

TABLE 19-25: EXISTING LOCAL WATER QUALITY MANAGEMENT AGENCIES AND PROGRAMS: FOX RIVER BASIN* (Continued)

SANITARY DISTRICTS					
Aurora	2	+	Lake In The Hills	1,2	+
Elgin	2		Lakes Region		
Fox Lake Hills			Round Lake	2	
Island Lake			Wasco		
MSDGC	1,4				

COUNTIES			
Cook	4	Lake	1,2,3,4
DuPage	1,2	McHenry	3,4
Kane	3,4	Will	3,4

SOIL AND WATER CONSERVATION DISTRICTS	
Kane--DuPage Counties	North Cook
Lake County	Will-South Cook Counties
McHenry County	

+ Numbers indicate existing water quality related activities as follows:

1. Wastewater collection agency
2. Wastewater treatment agency
3. Has enacted erosion and sediment control regulations
4. Has enacted stormwater detention regulations or equivalent sanitary district regulations apply

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(It should be noted that this list is based on information gathered from a variety of sources over a period of many months. An attempt has been made to compile the most complete and current information available. However, due to the number and variety of local programs in the region, as well as the constantly evolving nature of these programs, this list may well be incomplete. The 208 staff expects it will be necessary to periodically revise or correct the list; they would appreciate any assistance that local agencies or individuals can provide.)

As noted in Table 19-16, Reach 480, the sources of pollutants of concern were the following:

- Overflows from combined sewers (which account for 2 percent of the BOD and 2 percent of the ammonia in the basin);
- Discharges from wastewater treatment plants (8 percent of the BOD, 17 percent of the phosphorus and 59 percent of the ammonia);
- Stormwater runoff (11 percent of the BOD, 10 percent of the phosphorus and 28 percent of the ammonia);
- Pollution from Wisconsin (72 percent of the BOD, 23 percent of the phosphorus and 12 percent of the ammonia).

These four sources of pollution were the focal points of efforts to develop a first test plan for the basin.

a. First Test Plan: Assumptions

During the development of a Fox River basin plan, NIPC staff and consultants identified existing water quality conditions and major sources of water pollution. Staff members, local officials and basin residents suggested water pollution control strategies to be included in a first test plan for the year 2000. These suggestions were reviewed by 208 Local Steering Committees in the basin.

In addition to Local Steering Committee recommendations, the first test plan was shaped by assumptions made to reflect forecasted population increases, land cover changes, improvements in wastewater treatment and stormwater controls, flood control and channeling, and changes in agricultural practices.

(1) Population: NIPC population forecasts for the year 2000 were used to determine the land cover changes and wastewater loads. These forecasts were made for each of the 13 reaches of the basin. A 68.9 percent increase in population was forecast for the basin.

(2) Land Use: Land cover and land use in the basin were determined by satellite photography and field surveys. This information was divided into four categories: lowlands-marshes which include swamps and forests lying close to rivers and streams; grasslands open to the filtration of rainwater and snowmelt but not tilled regularly, including pastures, parks, golf courses, and upland forests; croplands regularly tilled for agricultural purposes (there is some exchange between croplands and grasslands due to crop rotation); and impervious surfaces covered with buildings,

roads, and parking lots. For the first test plan, estimates of land cover changes were made using population and employment forecasts. Land required for new urbanization in the basin was taken from the grassland and cropland categories first. When this land was largely depleted, land from the lowland category was taken for urban purposes. Land cover estimates are shown in Table 19-26.

(3) Local Facilities Plans: Extensive planning has been conducted in recent years for the improvement of existing wastewater treatment facilities, both public and private, and the creation of new facilities to serve newly developing areas. These plans were included in the forecast of water quality conditions for the year 2000. In summary, it was assumed that all planned improvements in municipal wastewater treatment plants (201 facilities plans) will be in operation and that industrial treatment plants will meet required water quality standards in their effluent discharges.

(4) Industrial Treatment Plants: Future industrial biodegradable and nutrient loads were assumed to be treated by industrial treatment plants the same as loads treated by municipal treatment plants.

(5) Phosphate Reductions: The City of Chicago and several suburbs have enacted ordinances limiting the phosphate content of home laundry detergents. Because such a substantial portion of the metropolitan area market has enacted limitations on phosphate in those detergents, most distributors have withdrawn high phosphate detergents from the entire area. Over three-fourths of the home laundry detergents sold in the Chicago metropolitan area are limited to 0.05 percent phosphorus. In considering changes in wastewater treatment practices for the year 2000, it was assumed that regulations limiting the amount of phosphate in domestic detergents would expand to cover, in part, commercial and industrial uses as well. Based upon studies of the effect of detergent phosphate reductions on wastewater treatment plant operations, it was assumed that phosphate concentrations in plant effluents for the year 2000 will be two-thirds those of existing levels.

No additional phosphorous removal at treatment plants was represented in the first test plan, except that "total P" would not exceed 1.0 mg/l in the effluents from the following sewage treatment plants:

TABLE 19-26: CHANGES IN LAND COVER, 1976-2000

Category	1976 Land Cover Estimates	Year 2000 Land Cover Forecast	% Change
Lowlands	175.4 sq.mi.	175.4 sq.mi.	0
Grasslands	421.8 sq.mi.	436.0 sq.mi.	+3.4
Croplands	265.5 sq.mi.	233.0 sq.mi.	-12.2
Impervious	55.4 sq.mi.	73.7 sq.mi.	+32.9
TOTAL	918.1 sq.mi.	918.1 sq.mi.	

- Hebron 1999
- Richmond 2001
- Woodstock North 2003
- Valley High Nursing Home 2005
- Fox Lake 2007

(6) Combined Sewer Overflows: It was assumed that combined sewer overflows in the Fox River basin would be eliminated by the year 2000. 2011 2012

(7) Boundary Conditions: It was assumed that the annual average (inhibited) BOD_{20} was 6.16 mg/l, annual average ammonia (NH_3 -N) concentration was 0.16 mg/l, phosphate - as soluble P - 0.11 mg/l, and nitrate, 0.89 mg/l. 2015 2016 2017

(8) Urban Stormwater Runoff: In existing urban areas, for the year 2000, in simulating future water quality, it was assumed that 25 percent of the materials constituting biochemical oxygen demand in urban stormwater runoff will be removed from the land surface (largely through street sweeping, stormwater detention, tree planting programs, catch basin cleaning, vegetative filters, and soil erosion control) and prevented from entering the water of the Fox River. In newly developed urban areas pollutant loads from runoff will be reduced to levels consistent either with loads generated by the Lake County small watershed study, or 50 percent, whichever is greater. 2020 2021 2022 2023 2024 2025 2026 2027

(9) Air Pollution: In the first test plan for the year 2000, it was not possible to make an adjustment for a change in the amount of pollutants that fall out or are washed out of the air, since there is no specific factor in the water quality model to represent the impact of air deposition of pollutants.

(10) Septic Systems: In the first test plan, it was assumed that the adverse effects of septic systems on water quality would be eliminated by the year 2000. This would be by the installation of sewage collection and treatment systems or by improved on-site disposal systems.

(11) Soil Conservation: The U.S. Soil Conservation Service aided NIPC staff in estimating how much land could be brought under conservation practices, and which practices could be used. In the Fox River basin, an additional 82.8 square miles of land were forecast to be in conservation practices by year 2000. Additionally, 13.9 square miles of cropland were assumed to have been converted to grasslands by the year 2000.

Although a comprehensive farm plan would include a wide range of BMPs, the following four practices and several combinations have been recommended for implementation: conservation tillage, contouring, terracing, and cropland conversion to pastureland. These practices were selected because of their direct effects on water quality.

(12) Animal Populations: The change in animal populations associated with food production was calculated for each township in the region. However, these changes could not be reflected in the first test plan. Not enough is known about the impact of animal pasturing and feedlot operations to identify their impacts separately in the water quality model.

(13) Stream Flow Changes: No changes from existing conditions are assumed to have occurred in the channel system, nor are new reservoirs assumed to have been constructed by the year 2000.

(14) Shading of Streams: In the simulation of year 2000 water quality conditions, no changes were made in the factors used to represent the shading of waterways by trees and bushes.

(15) Dredging In the Chain of Lakes: The Fox River Chain of Lakes Commission is sponsoring the dredging of a number of channels in the Chain of Lakes. The objective is to provide routes for pleasure boats which, among other benefits, will reduce the resuspension of bottom deposits by power boats traversing shallow waters. Permits for the placement of dredge spoil will be issued by the Corps of

Engineers and the water draining from the dredged spoil deposit areas must meet critical IEPA standards. The agitation of Lake waters during actual dredging operations will create temporary turbidity. This was not represented in the model simulation, however.

b. First Test Plan, Simulated Results

If a water quality program containing all of the features of the first test plan were implemented, water quality in the Fox River basin would hold its own against the intrcduction of additional pollution from further urbanization. In other words, water quality in the year 2000 would be essentially the same as it is today - relatively clean in most reaches but with pollution problems in others.

First test plan efforts to clean up the water included improved wastewater treatment, treatment of combined sewer overflows, street sweeping and vacuuming, cropland conservation practices, and the elimination of problem septic systems.

The single greatest improvement in water quality assumed in the first test plan was an improvement in conditions at the Wisconsin boundary. It was assumed that water flowing into Illinois from Wisconsin would meet Illinois water quality standards.

This improvement and other improvements would generally be balanced off, however, by the intrcduction of additional pollution loads. Most of this new pollution would be from increased loads on wastewater treatment facilities. These facilities, located primarily in the middle and lower parts of the basin, would discharge greater volumes of effluents with increased loads of pollutants resulting from new urbanization.

Tables 19-27 and 19-28 illustrate the changes in pollutant concentrations and violations of water quality standards as a result of the first test plan for selected reaches in the basin. As mentioned previously, BOD concentrations tend to remain at or near present levels. Mean ammonia levels also tend to remain the same, but there is a general decrease in the frequency and duration of violations. Mean nitrate levels remain constant. The mean phosphate concentration in reaches in the basin remains near present levels. Concentrations of phosphate in excess of .05 mg/l are more frequent in the basin; however, the duration of these events is shorter than those under existing conditions. With respect to DO concentrations, the general level of water quality remains good. Some deterioration was noted in Reach 113 where conditions went from excellent to good. Water quality in reaches 121 and 310 improved from fair to good. Reaches 370 and 480 continued to show the worst water quality in the basin with both remaining at fair quality.

A more specific understanding of the types of effects the first test plan would have on the Fox River basin can be gained thrcugh a comparison of year 2000 data for Reach 480 with data on existing conditions in this same reach. Reach 480 provides a summary of pollutant loads to the basin, since the water from all other reaches drains into it. The results of the year 2000 simulation for Reach 480, shown in Table 19-29, show that the role of treatment plants as pollution sources increases dramatically as a result of the improvement of boundary conditions and control of other pollution scurces. The total tons per year of BOD entering Reach 480 decreases by over 29 percent. The total tons per year of ammcnia increases by 64 percent. Nitrate and phosphate increase by 42 percent and 45 percent, respectively. These increases are due almost sclely to increased wastewater flows from treatment plants.

Table 19-30 illustrates the effect that the first test plan would have on compliance with state standards for all reporting reaches. In general, the percent of time that the DO standard is violated remained about the same, except in Reaches 310 and 370, where there is a ncticeable improvement in water quality, and in Reach 480, where there is a decline in water quality. The percentages cf time other standards are violated tend to remain steady, except in Reach 117 where ammcnia prcblems decrease, and in Reach 270 where ammonia prcblems increase.

c. The Seccnd Test Plan Assumptions and Results

The second test plan was developed through much the same process described earlier for the first test plan. Simulation results for the first test plan were publicized and discussed at a series of public meetings in the basin. A second test plan evolved cut of these discussions.

Unlike the first test plan where all suggestions were lumped together into one simulation, many of the second test plan suggestions were tested separately.

There were several reasons for the departure from the first test plan format. The most cbvious is that some second test plan suggestions were incompatible with each other. Ancther reason is that planning participants expressed a desire at this stage in the planning process to qain mcre understanding of the behavior and response of individual strategies. (It is impossible to determine the impact of an individual strategy if it is lumped together with cthers.)

The nine suggestions selected for the second test plan and their impacts cn water quality are discussed below. Tables 19-28, 19-30 and 19-31 show the impact of suggestion number five on pollutant concentrations in Reaches 31 and 340 of the Basin. Other reaches were not simulated for water quality because the changes could be evaluated by

TABLE 19-27: COMPARISON OF POLLUTANT CONCENTRATIONS,
EXISTING CONDITIONS – FIRST TEST PLAN – SECOND TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 31		REACH 106		REACH 113	
		Existing	1st	Existing	1st	Existing	1st
BOD (mg/l) Maximum	None	30.8	22.9	32.0	20.4	24.3	23.4
Minimum		1.1	.94	1.9	2.17	11.2	8.03
Mean		6.3	5.43	6.8	6.08	17.6	15.0
Ammonia (mg/l) Maximum		4.9	4.51	.9	1.07	.3	.31
Minimum		.1	.05	.1	.09	0	0
Mean		.5	.30	.2	.21	.2	.16
Frequency of Violation	1.5 (1)	42	26	0	0	0	0
Average Duration of Violations (hours)	1.5 (1)	4	3	0	0	0	0
Nitrate (mg/l) Maximum	None	5.8	7.13	4.3	4.59	5.0	4.74
Minimum		.5	.49	.3	.78	0	0
Mean		3.1	3.84	2.4	2.86	1.2	1.16
Frequency of Violation	10.0	0	0	0	0	0	0
Average Duration of Violations (hours)	10.0	0	0	0	0	0	0
Phosphate (mg/l) Maximum		1.2	1.90	.6	.40	.6	.55
Minimum		.1	.05	0	0	0	0
Mean		.3	.27	.2	.19	.2	.16
Frequency of Violation	.05	1	3	102	116	102	243
	.20	99	115	71	33	15.0	5
Average Duration of Violations (hours)	.05	26300	8770	249	217	221	60
	.20	214	184	208	359	627	1110

(1) Illinois Pollution Control Board Standard

TABLE 19-27 : COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS – FIRST TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 117		REACH 121		REACH 270	
		Existing	1st	Existing	1st	Existing	1st
BOD (mg/l) Maximum	None	79.4	27.4	22.4	20.5	101	58.9
Minimum		2.0	1.62	8.5	6.86	3.1	2.37
Mean		11.2	7.53	12.8	12.2	125	9.01
Ammonia (mg/l) Maximum		9.3	3.79	.2	.22	5.1	4.88
Minimum		0	0	0	0	.2	.33
Mean		1.8	1.8	.1	.13	1.2	1.68
Frequency of Violation	(1) 1.5	121	11	0	0	43.0	93
Average Duration of Violations (hours)	(1) 1.5	95.0	4	0	0	100	116
Nitrate (mg/l) Maximum	None	5.6	3.87	6.5	6.69	5.9	5.94
Minimum		0	.20	0	0	0.0	89
Mean		2.5	2.07	1.8	1.93	4.7	4.46
Frequency of Violation	10.0	0	0	0	0	0.0	0
Average Duration of Violations (hours)	10.0	0	0	0	0	0.0	0
Phosphate (mg/l) Maximum		1.7	.35	.8	.78	2.7	2.73
Minimum		0	0	0	0	.1	.13
Mean		0.4	.10	.2	.19	.6	.4
Frequency of Violation	.05	39	139	133	13	1.0	1
	.20	111	9	5.0	8	9.0	37
Average Duration of Violations (hours)	.05	672	66	141	1070	26300	26300
	.20	210	54	2300	1810	2920	688

(1) Illinois Pollution Control Board Standard

TABLE 19-27: COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS – FIRST TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 300		REACH 310		REACH 340	
		Existing	1st	Existing	1st	Existing	1st
BOD (mg/l) Maximum	None	52.4	38.9	25.2	22.9	117	96.2
Minimum		.9	.52	6.7	6.21	1.4	.78
Mean		8.4	8.38	12.8	13.1	16.4	13.2
Ammonia (mg/l) Maximum		3.6	3.71	5.6	5.64	2.7	2.67
Minimum		0.0	.03	0	.04	.1	.03
Mean		.3	.34	.2	.21	.5	.43
Frequency of Violation	1.5[1]	28.0	25	1.0	1	30.0	23
Average Duration of Violations (hours)	1.5[1]	4.0	4.3	26.0	26	59.0	70.7
Nitrate (mg/l) Maximum	None	6.0	6.0	6.4	6.44	.1	9.00
Minimum		.1	.09	0.0	.02	.1	.06
Mean		5.7	5.71	1.9	2.03	7.9	7.72
Frequency of Violation	10.0	0	0	0	0	0	0
Average Duration of Violations (hours)	10.0	0	0	0	0	0	0
Phosphate (mg/l) Maximum		2.6	2.64	4.9	4.92	1.9	1.85
Minimum		0	.01	0	.02	0	.02
Mean		.2	.22	.3	.24	.4	.24
Frequency of Violation	.05	15.0	21	20.0	187	16.0	16
	.20	146	172	13.0	10	86.0	143
Average Duration of Violations (hours)	.05	1750	1250	1250	111	1640	1640
	.20	158	65.1	1180	1180	296	83.2

(1) Illinois Pollution Control Board Standard

TABLE 19-27 : COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS – FIRST TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 360		REACH 370		REACH 430		REACH 480	
		Existing	1st	Existing	1st	Existing	1st	Existing	1st
BOD (mg/l) Maximum	None	96.1	65.9	29.5	29.3	114	96.6	43.7	43.4
Minimum		2.4	1.86	6.1	5.97	2.4	2.03	6.9	6.45
Mean		15.2	10.4	12.9	13.8	16.0	14.4	15.1	15.9
Ammonia (mg/l) Maximum		2.8	2.74	5.8	5.77	3.5	3.07	5.8	5.78
Minimum		0.0	.06	.1	.13	0	0	0	0
Mean		.5	.29	.4	.43	.6	.62	.3	.34
Frequency of Violation	1.5[1]	7.0	5	10.0	3	28	23	1	1
Average Duration of Violations (hours)	1.5[1]	33.0	8.2	34.0	50.0	62	70	34	35
Nitrate (mg/l) Maximum		12.7	7.28	6.2	6.05	15.4	15.5	7.8	7.89
Minimum		0.0	.27	0	.01	.5	.36	0	.01
Mean		5.7	5.49	2.0	2.05	13.3	12.9	2.4	2.42
Frequency of Violation	10.0	4.0	0	0	0	109	120	0	0
Average Duration of Violations (hours)	10.0	204	0	0	0	209	185	0	0
Phosphate (mg/l) Maximum		4.9	2.77	5.0	4.99	4.0	3.99	5	4.99
Minimum		0.0	.02	0	.03	0	0	0	.01
Mean		.7	.21	.4	.34	.5	.46	.4	.40
Frequency of Violation	.05	22.0	58	1.0	75	59	46	166	163
	.20	53.0	120	39.0	46	89	90	17	53
Average Duration of Violations (hours)	.05	1190	448	26300	343	440	567	144	147
	.20	483	77.4	494	373	279	279	1080	346

(1) Illinois Pollution Control Board Standard

TABLE 19-28: CHANGES IN DISSOLVED OXYGEN LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

(All data in mg/l)	REACH 31			REACH 106		
	Existing	1st	2nd	Existing	1st	2nd
Maximum	12.9	12.9	12.9	13.0	13.2	
Minimum	2.1	2.16	2.64	4.0	4.56	
Mean	7.4	7.56	7.56	9.69	9.41	
* Violations	49	50	50	3	1	
Average Duration	25	21	21	18	33	
** Overall Assessment	Good	Good	Good	Good	Good	

(All data in mg/l)	REACH 113			REACH 117		
	Existing	1st	2nd	Existing	1st	2nd
Maximum	14.0	14.0		13.8	13.5	
Minimum	5.7	3.75		3.3	2.8	
Mean	10.8	9.83		7.6	8.13	
* Violations	0	49		16	20	
Average Duration	0	2		26	33	
** Overall Assessment	Excellent	Good		Good	Good	

(All data in mg/l)	REACH 121			REACH 270		
	Existing	1st	2nd	Existing	1st	2nd
Maximum	13.7	13.7		11.5	11.5	
Minimum	2.7	2.91		1.8	1.86	
Mean	10.0	8.82		8.6	8.02	
* Violations	16	2		17	21	
Average Duration	113	92		37	35.3	
** Overall Assessment	Fair	Good		Good	Good	

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time D O levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

TABLE 19-28: CHANGES IN DISSOLVED OXYGEN LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

(All data in mg/l)	REACH 300			REACH 310		
	Existing	1st	2nd	Existing	1st	2nd
Maximum	13.7	13.8		13.4	13.4	
Minimum	4.5	5.00		1.0	1.86	
Mean	10.3	10.3		9.0	9.07	
* Violations	1	1		73	62	
Average Duration	1	1		44	8.3	
** Overall Assessment	Good	Good		Fair	Good	

(All data in mg/l)	REACH 340			REACH 360		
	Existing	1st	2nd	Existing	1st	2nd
Maximum	14.2	14.1	14.1	13.8	13.9	
Minimum	5.3	5.58	5.55	2.6	2.46	
Mean	10.1	9.96	9.97	8.86	8.91	
* Violations	0	0	0	15	17	
Average Duration	0	0	0	39	37.2	
** Overall Assessment	Excellent	Excellent	Excellent	Good	Good	

(All data in mg/l)	REACH 370			REACH 430		
	Existing	1st	2nd	Existing	1st	2nd
Maximum	13.1	13.2		13.7	13.7	
Minimum	.05	1.44		1.7	1.69	
Mean	7.90	8.26		9.2	9.15	
* Violations	75	135		10	10	
Average Duration	54	13.4		27	26	
** Overall Assessment	Fair	Fair		Good	Good	

(All data in mg/l)	REACH 480			REACH		
	Existing	1st	2nd	Existing	1st	2nd
Maximum	13.3	13.3				
Minimum	1.9	1.85				
Mean	9.4	8.89				
* Violations	97	192				
Average Duration	15	11				
** Overall Assessment	Fair	Fair				

*With respect to minimum state standard of 5.0 mg/l

**Based on percent of time D O levels were above 5.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor, and Bad

TABLE 19-29: COMPARISON OF SOURCES AND VOLUMES OF POLLUTANTS
REACH 480

Pollutant Indicator and Source	Existing Conditions				First Test Plan			
	Surface		Ground		Surface		Ground	
	Amount	%	Amount	%	Amount	%	Amount	%
BOD (tons/yr.) Boundary Cond.	11400	72			4860	43		
Treatment Plants	1210	8			3820	35		
Comb. Sewer Over.	311	2			148	0		
Lowland	40.8	0	107	1	40.8	0	107	1
Cropland	149	1	196	1	92.0	0	166	1
Grassland	453	3	821	5	484	4	510	5
Impervious	1170	7			1000	9		
TOTAL	14700	93	1120	7	10400	93	783	7
Ammonia (tons/yr.) Boundary Cond.	126	12			126	8		
Treatment Plants	620	59			1240	78		
Comb. Sewer Over.	24.4	2			23.2	0		
Lowland	2.60	0	5.64	1	2.6	0	5.64	0
Cropland	29.7	3	9.78	1	18.4	1	8.27	1
Grassland	113	11	87.6	8	121	7	37.5	2
Impervious	39.5	4			33.4	2		
TOTAL	956	90	103	10	1570	97	51.4	3

Pollutant Indicator and Source	Existing Conditions				First Test Plan			
	Surface		Ground		Surface		Ground	
	Amount	%	Amount	%	Amount	%	Amount	%
Nitrate (tons/yr.) Boundary Cond.	702	13			702	12		
Treatment Plants	177	4			665	12		
Comb. Sewer Over.	11.3	0			10.4	0		
Lowland	2.02	0	612	12	2.02	0	612	11
Cropland	83.8	2	1410	27	51.6	1	1230	21
Grassland	86.9	2	2150	41	90.4	2	2370	41
Impervious	19.5	0			16.7	0		
TOTAL	1080	21	4170	79	1540	27	4210	73
Phosphorous (tons/yr.) Boundary Cond.	86.8	23			86.8	22		
Treatment Plants	66	17			161	41		
Comb. Sewer Over.	6.83	2			6.50	0		
Lowland	.18	0	16.5	4	.18	0	16.5	4
Cropland	10.3	3	29.9	8	6.26	2	21.9	5
Grassland	6.19	2	135	36	7.85	2	80.1	20
Impervious	19.5	5			16.7	4		
TOTAL	196	52	181	48	285	71	119	29

inspection or were judged to be too small to significantly affect water quality.

(1) Phosphorus Reduction: Limit total phosphorous in all plant effluents below Johnsburg to 1 mg/l. Change concentrations in selected plants to the following:

(a) Results: By limiting total phosphorous to 1 mg/l at all plants below Johnsburg, a reduction of 15 percent was calculated at the outlet of the Fox River (Reach 480). By reducing the concentrations of ammonia in the effluents to approximately 1.5 mg/l in plants below Johnsburg, there was a 22 percent decrease in ammonia at the outlet of the Fox River. Nitrate increased by 7 percent.

A reduction in phosphorous may reduce the algae growth in the Fox River since phosphorous is the limiting nutrient. The magnitude of this reduction can have a beneficial effect on water quality. However, since point sources contribute less than half of the total phosphorous entering the basin, it is certain that even if all phosphorous were eliminated from point sources, severe algal blooms would still occur.

(2) Wastewater Flow Reductions: Reduce all municipal treatment plant flows by 15 percent to represent the effects of water conservation.

(a) Results: It was determined that reducing treatment plant flows by 15 percent would not significantly increase dissolved oxygen concentrations. The net flow decrease is about 1 percent. At the outlet of the Fox Basin, Reach 480, BOD, ammonia, and phosphorous would be reduced by 4, 10, and 5 percent respectively.

(3) Detergent Ban: Reduce phosphate loads at point sources by 50 percent of existing condition (1976) conditions to represent a more stringent ban on phosphate detergent.

(a) Results: The more stringent phosphate ban would reduce phosphorous by 9 percent more than the first test plan at the outlet.

(4) No Ammonia Removal: Return ammonia and nitrate to existing conditions in the effluent for the Hebron, Richmond, Woodstock North, Valley High Nursing Home, and Fox Lake treatment plants.

(a) Results: Returning ammonia concentrations to existing levels for the municipal plants above Johnsburg would have a significant effect on water quality. Ammonia would increase by 79 percent at the outlet of the Chain of Lakes. At Reach 480 ammonia would increase by 15 percent.

TABLE 19-30: WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

REACH 31

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	6	0	0	2	0	0	0	0	0
Dissolved Oxygen as O, mg/l	5.0	49	50	50	25	21	21	5	4	4
BOD_{20} Carbonaceous as O, mg/l	10		98	91		33	36		12	12
Ammonia as N, mg/l	1.5	42	26	23	4	3	3	1	0	0
Nitrate as N, mg/l	10	0	0	0	0	0	0	0	0	0
Phosphorus Soluble as P, mg/l	.05	1	3	6	26300	8770	4370	100	100	100

REACH 106

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	2	0		3	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	3	1		18	33		0	0	
BOD_{20} Carbonaceous as O, mg/l	10		17			87			6	
Ammonia as N, mg/l	1.5	0	0		0	0		0	0	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	102	116		249	217		97	96	

REACH 113

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	5	5		7	7		0	0	
Dissolved Oxygen as O, mg/l	5.0	0	49		0	2		0	0	
BOD_{20} Carbonaceous as O, mg/l	10		32			699			85	
Ammonia as N, mg/l	1.5	0	0		0	0		0	0	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	102	243		221	60		86	55	

REACH 117

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	3	4		5	4		0	0	
Dissolved Oxygen as O, mg/l	5.0	16	20		26	33		2	3	
BOD_{20} Carbonaceous as O, mg/l	10		50			119			23	
Ammonia as N, mg/l	1.5	121	11		95	4		44	0	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	39	139		672	66		100	35	

REACH 121

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	0	0		0	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	16	2		113	92		7	1	
BOD_{20} Carbonaceous as O, mg/l	10		26			621			61	
Ammonia as N, mg/l	1.5	0	0		0	0		0	0	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	133	13		141	1070		71	53	

REACH 270

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	0	0		0	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	17	21		37	35.3		2	3	
BOD_{20} Carbonaceous as O, mg/l	10	61	67		212	124		49	32	
Ammonia as N, mg/l	1.5	43	93		100	116		16	41	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	1	1		26300	26300		100	100	

TABLE 19-30 WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS (Continued)

REACH 300

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	1	1		4	4		0	0	
Dissolved Oxygen as O, mg/l	5.0	1	1		1	1		0	0	
BOD_{20} Carbonaceous as O, mg/l	10	192	158		38	45		28	27	
Ammonia as N, mg/l	1.5	28	25		4	4.3		0	0	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	15	21		1750	1250		100	100	

REACH 310

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	1	2		10	6		0	0	
Dissolved Oxygen as O, mg/l	5.0	73	62		44	8.3		12	2	
BOD_{20} Carbonaceous as O, mg/l	10	53	37		407	531		82	75	
Ammonia as N, mg/l	1.5	1	1		26	26		0	0	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	20	187		1250	111		95	79	

REACH 340

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	0	0	0	0	0	0	0	0	0
Dissolved Oxygen as O, mg/l	5.0	0	0	0	0	0	0	0	0	0
BOD_{20} Carbonaceous as O, mg/l	10	80	72	77	118	120	112	36	33	33
Ammonia as N, mg/l	1.5	30	23	23	59	70.7	71	7	6	6
Nitrate as N, mg/l	10	0	0	0	0	0	0	0	0	0
Phosphorus Soluble as P, mg/l	.05	16	16	18	1640	1640	1460	100	100	100

REACH 360

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	0	0		0	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	15	17		39	37.2		2	2	
BOD_{20} Carbonaceous as O, mg/l	10	66	61		119	108		30	25	
Ammonia as N, mg/l	1.5	7	5		33	8.2		1	0	
Nitrate as N, mg/l	10	4	0		204	0		3	0	
Phosphorus Soluble as P, mg/l	.05	22	58		1190	448		100	99	

REACH 370

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	2	1		7	10		0	0	
Dissolved Oxygen as O, mg/l	5.0	75	135		54	13.4		15	7	
BOD_{20} Carbonaceous as O, mg/l	10	72	41		246	477		67	74	
Ammonia as N, mg/l	1.5	10	3		34	50		1	1	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	1	75		26300	343		100	98	

REACH 430

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	0	0		0	0		0	0	
Dissolved Oxygen as O, mg/l	5.0	10	10		27	26		1	1	
BOD_{20} Carbonaceous as O, mg/l	10	50	49		179	179		34	34	
Ammonia as N, mg/l	1.5	28	23		62	70		7	6	
Nitrate as N, mg/l	10	109	120		209	185		87	84	
Phosphorus Soluble as P, mg/l	.05	59	46		440	567		99	99	

REACH 480

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan	Existing Conditions	1st Test Plan	2nd Test Plan
Temperature °C	32.2	25	24		6	7		1	1	
Dissolved Oxygen as O, mg/l	5.0	97	192		15	11		6	8	
BOD_{20} Carbonaceous as O, mg/l	10	47	20		449	1090		80	83	
Ammonia as N, mg/l	1.5	1	1		34	35		0	0	
Nitrate as N, mg/l	10	0	0		0	0		0	0	
Phosphorus Soluble as P, mg/l	.05	166	163		144	147		91	91	

TABLE 19-31 : COMPARISON OF POLLUTANT CONCENTRATIONS,
EXISTING CONDITIONS – FIRST TEST PLAN – SECOND TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 31			REACH 340		
		Existing	1st	**2nd	Existing	1st	**2nd
BOD (mg/l) Maximum	None	30.8	22.9	22.9	117	96.2	97.4
Minimum		1.1	.94	.94	1.4	.78	.78
Mean		6.3	5.43	5.43	16.4	13.2	13.3
Ammonia (mg/l) Maximum		4.9	4.51	3.63	2.7	2.67	2.68
Minimum		.1	.05	.05	.1	.03	.03
Mean		.5	.30	.30	.5	.43	.43
Frequency of Violation	(1) 1.5	42	26	23	30.0	23	23
Average Duration of Violations (hours)	(1) 1.5	4	3	3	59.0	70.7	71
Nitrate (mg/l) Maximum	None	5.8	7.13	7.16	.1	9.00	9.00
Minimum		.5	.49	.49	.1	.06	.06
Mean		3.1	3.84	3.84	7.9	7.72	7.71
Frequency of Violation	10.0	0	0	0	0	0	0
Average Duration of Violations (hours)	10.0	0	0	0	0	0	0
Phosphate (mg/l) Maximum		1.2	1.90	1.53	1.9	1.85	1.86
Minimum		.1	.05	.05	0	.02	.02
Mean		.3	.27	.27	.4	.24	.24
Frequency of Violation	.05	1	3	6	16.0	16	18
	.20	99	115	132	86.0	143	144
Average Duration of Violations (hours)	.05	26300	8770	4370	1640	1640	1460
	.20	214	184	76	296	83.2	83

(1) Illinois Pollution Control Board Standard

** Data are from the second simulation of the 2nd Test Plan

(5) Land Cover Changes: Model Nippersink Creek upstream of Wonder Lake and Tyler Creek with the following changes from the first test plan:

- Assign all marginal cropland to the lowland (meadow) category;
- Reduce agriculture grassland surface loadings by 25 percent.

(a) Results: There would be virtually no change in Nippersink Creek or Tyler Creek from these actions. In Nippersink Creek, there would be an increase in the minimum DO from 2.16 to 2.64 mg/l. The peak ammonia and phosphate levels would decrease. Although grassland represents 45 percent of the area upstream of Wonder Lake tributary to Nippersink Creek, the modifications would affect less than 10 percent of the loads of BOD, NH_3, NO_3, and PO_4. Therefore, little change could be expected.

(6) Dam Modifications: Remove or modify dams below McHenry Dam:

(a) Results: As seen in the report titled "Lowhead Dams and Their Effects on Water Quality" by Hydrocomp, Inc., (October, 1977), dams have a significant effect on water quality. Removal of certain dams on the Fox River would increase the amount of dissolved oxygen. In the Hydrocomp report, removal of two dams on the Des Plaines River increased mean DO from 5.9 to 8.1 mg/l. Also, the minimum and maximum levels increased. The removal of dams would increase the assimilative capacity of the river by increasing river velocity.

(7) Reduce Phosphorous from Wisconsin: Reduce phosphorous concentrations in the Fox River entering Illinois at the Wisconsin border to 0.05 mg/l:

(a) Results: Reducing phosphorous to 0.05 mg/l entering the Chain of Lakes from Wisconsin most likely will ease the algae problems in these lakes. There would be a reduction of 46.2 tons per year of phosphorous as compared to existing conditions. At the outlet of the Chain of Lakes, this reduction will represent a decrease of approximately 30 percent of all phosphorous. As stated in the 1977 report, "Fox Chain of Lakes Investigations and Water Quality Management Plan" by the State Water Survey, reduction in present nutrient contributions will be required if the waters of the Chain of Lakes are to be improved. Lack of either nitrogen or phosphorous effectively curbs algal growth.

(8) Reduce Forecasted Growth: Represent a 50 percent reduction in the population increase for the year 2000 assumed in the first test plan.

(a) Results: A 50 percent reduction in population increase in the Fox River basin will not have a major effect on flow in the watershed. Flow would be decreased by about 2 percent. However, the constituents directly or indirectly contributing to oxygen depletion are reduced by 5 percent for BOD, 7 percent for phosphorous, and 15 percent for ammonia. The decrease in loads will tend to improve water quality in the system.

19.09 PROBLEM ASSESSMENT

The previous sections have presented information on the current water quality of the Fox River basin, sources of pollution, and alternative proposals for improving water quality. This section will attempt to assess the problems noted in those sections and discuss their roles in the development of recommendations to improve water quality in the Fox basin.

a. Water Quality Sampling Data

In-stream sampling data indicated problems with respect to phosphorous, fecal coliform, and copper. Violations of the lead, iron, and silver standards were also noted. Ammonia violations were noted on Flint Creek and at the outlet of Crystal Lake near Algonquin. SOD sampling results indicated that the benthic condition of the basin was generally slightly degraded to moderately polluted. Heavy pollution was noted near Aurora. Biological classification indicated moderate to severe pollution using Shannon-Weaver indices and semi-polluted to polluted conditions using the IEPA rating system. Dam aeration-deaeration studies indicated the deleterious effect on water quality of channel dams on the Fox River.

b. Computer Simulation of Existing Conditions

Water quality in the Fox River is generally fair to good, as simulated by the model for existing conditions. Pollutant loads are relatively low overall. The major sources of pollutants in order of magnitude are boundary conditions (Wisconsin), point sources, and stormwater runoff.

The ability of the Fox River to assimilate pollutant loads is determined, to a large extent, by its hydraulic configuration. Numerous lakes (Chain of Lakes) and low-flow pools behind dams create a very long flow-through time in

the system. Flow velocities are quite low, resulting in relatively low reaeration potential and the deposition of suspended solids. Algal populations, abundant because of excess nutrients, have a strong influence on dissolved oxygen conditions. In general, dissolved oxygen problems tend to be related to low flow in the mainstem Fox and related to wet weather in the tributary reaches, with more severe violations in the mainstem reaches. Violations of the ammonia standard are infrequent in most reaches but may be severe in certain tributaries. Eutrophication is a major problem in the Chain-of-Lakes. High water temperature is also a problem in several reaches, this again being related to the hydraulic regime of the river.

Maximum concentrations of nitrate/nitrogen in excess of 10.0 mg/l were simulated for Poplar Creek (Reach 360) and Otter Creek (Reach 430). Nitrate concentrations may be a serious problem, since these concentrations exceed the allowable limit for a drinking water supply and since the City of Elgin is considering the Fox as a water supply source. This Commission's Regional Water Supply Plan also recommends the Fox as a water supply source.

c. Point Sources - Existing Conditions

(1) Facilities Planning: Facilities planning is underway but has not received final approval in the following FPA's: Aurora, South Dundee Township, Sanitary District of Elgin, Lake Zurich, Eastern Kane, Sugar Grove, and Wauconda. Needs Analysis reports were prepared for the following FPA's: Southeastern McHenry, McHenry, Richmond, Gilberts, Pingree Grove, Sunnyside/Spring Grove, Wonder Lake, Burlington, Wayne, and the Sanitary District of Wasco. The Cary and Crystal Lake FPAs (formerly part of the now defunct Southeastern McHenry FPA) have applied for funds to do supplemental step 1 planning. The other Needs Analysis areas also require further study in varying degrees of complexity. Infiltration/inflow analyses have been completed or are underway for all sewered FPAs, except Algonquin (formerly part of Southeastern McHenry), McHenry, and Richmond. Facilities planning exceptions, under Title 40 CFR 35.917(e), were granted to the Batavia, Carpentersville and Northwest Lake FPAs. It is possible these areas could apply for grant funds to complete formal facilities planning. In the MSDGC area, Hoffman Estates and Schaumburg have not completed sewer system evaluation surveys (SSES) to supplement the completed MSDGC I/I study, although the latter has applied for funds to do so. The question of which plants in the Fox River basin will require ammonia removal apparently will be resolved by the IEPA on a case by case basis.

(2) Non-Municipal Point Sources: The future status of privately owned municipal type, miscellaneous, industrial, and other facilities is unknown.

(3) Combined Sewer Overflows: Combined sewer overflows occur in the Sanitary District of Elgin, the Aurora Sanitary District and the Batavia FPA's. Plans for control of pollution from these sources are underway but, in the case of the Sanitary District of Elgin and the Aurora Sanitary District, have not yet been funded. The relatively low priorities of these projects could present a problem in funding and the attainment of desired water quality in certain reaches.

d. Non Point Sources

Potential problems related to nonpoint sources of pollution include storm sewer systems, construction activities, septic systems, mining, surface waste disposal sites, hydrologic modifications, agricultural runoff, and marine activities.

Impervious surfaces are forecasted to increase by 32 percent in the basin, causing a proportional increase in stormwater runoff. Croplands and grasslands taken together are expected to remain relatively unchanged. There are approximately 22,000 septic systems (52 percent of the basin total) which are located in areas having limitations. The impact of these systems on ground and surface waters is not precisely known. The 14 dams in the basin have a negative impact on DO concentrations and on water quality in general.

e. Boundary Conditions

Boundary conditions have been shown to be one of the major pollutant sources in the basin, contributing 72 percent of the BOD, 12 percent of the ammonia and 23 percent of the phosphate entering the basin.

f. Residuals

There is a general lack of detailed, reliable, data on the generation and disposal of residuals from point sources and septics in the basin.

g. Remaining Problems

(1) Phosphorous: The in-stream phosphorous standard of .05 mg/l will never be met by point source improvements and changes in boundary conditions in the basin. Consequently, algae problems will also never be completely eliminated.

Point sources and boundary conditicns contribute less than half of the total phosphorous reaching the basin and controls on these sources cannot sclve the phosphorous problem. For this reason, it appears that phosphorous removal at point sources below McHenry Dan which are not immediately tributary to a lake or reservoir would not be justified. Phosphorous removal to 1 mg/l at point sources tributary to the Chain of Lakes or a lake or reservoir should continue. Since it is not known at what concentrations of phosphorous algae problems would peak, it is necessary to continue to remove phcsphorous above McHenry Dam to prevent algae problems in the Chain of Lakes from becoming worse.

(2) Dissolved Oxygen: Water quality in Reaches 370 and 480 would remain cnly fair after implementation of all proposals in the first and second test plans. However, both reaches are very close to being classified as good, which requires meeting the DO standard of 5 mg/l, 95 percent of the time. Cne possible alternative not tested which could achieve the necessary improvement in water quality in these reaches would be the modification of dams to increase the Fox River's flow velccity (and thereby its assimilative capacity). Another alternative would have all municipal point sources meet stricter treatment standards, i.e.: 10 mg/l BCD_5 and 12 mg/l suspended solids. Post treatment of effluents at treatment plants to increase their dissolved oxygen contents and in-stream aeration are other techniques that should be evaluated. However, in view of recent reduced population forecasts and the fact that point sources contribute 30 percent of the BOD in Reach 370 and 35 percent of the BCD in Reach 480, it is probable that pollutant loads to these reaches will be less than those assumed in the 208 modeling work. Reductions in population will have a corresponding impact on wastewater flows. Completed municipal plants would operate at less than design capacities and would produce better quality effluents than were assumed. This would probably result in both Reaches 370 and 480 reaching desired water quality objectives. Therefore, nc additional measures are proposed at this time, except that the situation be closely monitored under the continuing planning program.

(3) Nitrates: Maximum nitrate concentrations in excess of 10.0 mg/l continue to be simulated under both test plans for tributary reaches to the Fox (340 and 430) above and below Elgin. With the greater nitrification proposed in the second test plan to meet the in-stream water quality standard of 1.5 mg/l ammonia, the concentrations of nitrate may be even higher. The prime source of nitrate in these reaches is groundwater. It enters the groundwater from fertilizer applications to cropland and from the breakdown of livestock wastes on pastures. Since nc violations of the nitrate limitation were simulated on the mainstem of the

Fox, where water supplies would be drawn, the suitability of the river as a water supply source is not affected at this time. However, the problem of high nitrate levels on tributaries should be studied further.

19.10 BASIN RECOMMENDATIONS

a. Overview

Recommended measures for improving and protecting water quality in the Fox River basin are derived from the recommendations in Part I of the areawide plan, but are tailored to the specific problems in the basin. Of particular importance are the serious impacts of treatment plant discharges and the wet weather pollution from pervious and impervious surfaces. The effects of combined sewer overflows in the Kane County portions of the basin also must be eliminated.

Implementation of local facilities plans should reduce problems from treatment plant effluents and eliminate combined sewer overflows. It is imperative, however, that actual performance be consistent with plan provisions.

Additional measures, such as reduction of wastewater flows and post-treatment aeration also are recommended in this basin. Aeration should help correct the low DO levels simulated in some reaches.

Recommendations with respect to nonpoint sources are basically the same as the overall program outlined in Chapter Six. Control of polluted runoff from urban development sites is of critical importance in this basin, because of the extensive development forecast for this area.

b. Point Sources

(1) Publicly-Owned Wastewater Systems:

(a) Municipal-type wastewater treatment authorities listed below should implement their respective portions of their 201 plans as they have been or may be approved by the Illinois and/or U.S. Environmental Protection Agencies. A Summary of the current status of these plans appears in Section 10.04f and suggested changes thereto or features to be included are noted below. In the absence of completed and/or approved facility plans, certain assumptions had to be made as to the expected locations and/or sizes of treatment plants, their estimated costs and designated management agencies. This information must not be construed as binding in the Areawide Plan until the 201 facility plans have been finalized.

Village of Algonquin City of St. Charles

Village of Antioch	Village of Sugar Grove
Village of Barrington	Village of Wauconda
City of Batavia	Village of West Dundee
City of Crystal Lake	Unincorporated Wonder Lake
Village of East Dundee	City of Woodstock
Village of Elburn	Metropolitan Sanitary District of Greater Chicago
Village of Fox Lake	Aurora Sanitary District
Village of Fox River Grove	Sanitary District of Elgin
City of Geneva	Island Lake Sanitary District
Village of Hebron	Lake County Public Works Dept.
Village of Lake Villa	Lake in the Hills Sanitary District
Village of Lake Zurich	Round Lake Sanitary District
City of McHenry	
Village of McHenry Shores	
Village of Richmond	
Wasco Sanitary District	

(b) The separately sewered municipalities of Hoffman Estates and Schaumburg should undertake and/or complete by July 1, 1981 sewer system evaluation surveys as required by 40 CFR 35.927 to supplement the completed MSDGC I/I studies.

(c) Section 407(b) in Chapter 3, "Water Pollution," of the Illinois Pollution Control Board Rules and Regulations should be modified to read as follows:

"No effluent from any point source which is tributary to the Chain of Lakes and whose untreated waste load is 1,500 or more population equivalents shall contain more than 1.0 mg/l of phosphorous as P after the date this plan goes into effect. Point sources below McHenry Dam not immediately tributary to a lake or reservoir need not provide phosphorous removal after that date."

(Note: This recommendation does not affect the state water quality standard of .05 mg/l total phosphorous for streams as they enter a lake or reservoir.)

(d) As soon as possible, the municipalities of Gilberts, Spring Grove, Sunnyside, Wayne, Burlington, Pingree Grove and the unincorporated community of Wonder Lake should submit grant applications to complete supplemental Step I studies to augment their completed Needs Analysis reports. These supplemental studies should identify any specific problems with existing septic systems and recommend financially feasible solutions to be implemented by the aforementioned communities or their individual citizens.

(e) All municipalities and counties should seek to achieve continued reductions in water use in order to conserve water resources and to reduce wastewater flows at all publicly owned treatment plants. This should be accomplished through modification of building codes to require water conserving plumbing fixtures, metering of all new development, pricing policies, and public education to reduce consumption in already developed areas.

(f) By July 1, 1983, all treatment plants whose 7-day, 10-year low-flow dilution ratio is 10 to 1 or less should provide or continue to provide not less than 80 percent oxygen saturation in their effluents. Monitoring of wastewater quality after aeration should be conducted. However, during the continuing planning program, studies should be undertaken to determine where this requirement may be waived without detriment to instream water quality.

(g) Municipal type wastewater service required to serve future growth within the service areas identified for the year 2000 should be provided only by treatment authorities designated in this plan, except where this is not practical or cost-effective.

(h) In any application for the issuance or amendment of a NPDES permit, each designated treatment authority should delineate its projected 5-year service area for which treatment capacity is in place or under construction consistent with agreed regional population forecasts.

(i) No NPDES permit should be issued for municipal type wastewater service within the 5-year service area delineated in the permit, other than to the treatment authority, except on a finding by IEPA that the proposed facility (1) is the most cost-effective means of providing service or (2) is an interim facility pending extension of service by the treatment authority.

(j) Treatment plant operators should should assure the very high standard of performance for wastewater treatment plants which the 201 plans assume. The IEPA should monitor treatment plant operation and performance and its effect on in-stream water quality. IEPA should establish a technical assistance program to aid plant operators and laboratory technicians in dealing with technical problems and assuring a consistent high level of performance in treatment operations.

(2) Private Utilities 2649

(a) NPDES permits issued by IEPA to private utility companies should identify projected 5-year service areas. No other NPDES permits should be within those 5-year service areas to other treatment authorities except upon a finding by the IEPA that the proposed facility is the most cost effective means of providing service; is an interim facility pending extension of service by another established treatment authority; or is intended to serve an isolated location. 2651 2653 2654 2655 2656 2657 2658

(3) Industrial Wastewater Treatment Plants 2661

(a) The IEPA should continue to enforce all requirements of NPDES permits for all industries in the basin and assure that treatment plants achieve and maintain required standards of plant performance. This can be achieved through IEPA standards for treatment plant personnel and through frequent sampling and analysis of treatment plant effluent by the IEPA for the purpose of monitoring compliance with NPDES permits. 2663 2665 2667 2668 2669

(4) Miscellaneous Wastewater Treatment Plants 2672

(a) Miscellaneous publicly and privately owned wastewater treatment plants should continue in operation until such time as wastewater service can be provided by publicly owned municipal type wastewater systems on a cost-effective basis. Service areas of privately owned treatment systems should not be expanded or their treatment capacities increased when service can be provided on a cost-effective basis by publicly owned municipal type wastewater systems. 2674 2676 2677 2678 2679 2680 2681

(b) The IEPA should continue to enforce all requirements of NPDES permits and assure that treatment plant operators achieve required standards of plant performance. 2683 2684

(5) Combined Sewer Overflows 2687

(a) When grant funds are offered, combined sewer overflows from the Aurora Sanitary District, the Elgin Sanitary District and Batavia should be controlled as outlined in their respective facilities plans. It is imperative that these plans be implemented if desired water quality is to be achieved. 2689 2691 2692 2693

c. Nonpoint Sources 2697

(1) Urban Stormwater Runoff: 2699

(a) By July 1, 1983, all municipalities and counties should implement measures to work toward a reduction of BOD in urban stormwater runoffs from separately sewered areas. Reductions of 25 percent of 1976 surface loadings on impervious surfaces are recommended as a target. From areas to be urbanized in the future, target reductions of 50 percent of 1976 surface loadings are recommended. 2701 2703 2704 2705 2706

(b) In attempting to meet the above targets, the implementing agencies should work through the countywide water quality committees to develop plans and standards for the implementation of appropriate measures such as catch basin cleaning, performance zoning, street cleaning, use of pervious pavement surfaces, increased vegetation cover, grass waterways, wetland storage of stormwater, stormwater detention, sedimentation and erosion controls, and other measures to achieve the desired pollutant reductions. 2708 2709 2710 2711 2712 2713 2714

(c) Township and state highway organizations, the Illinois State Toll Highway Authority, and facility engineering departments at state and federal installation should participate in the programs described above by implementing accelerated and/or improved street sweeping programs for streets, roads and highways that are hydraulically connected to perennial streams or permanent lakes via stormwater conveyance systems. 2716 2717 2718 2719 2720

(d) During the period up to July 1, 1983 agencies should utilize voluntary exploratory programs, implementing techniques to control pollutants from urban nonpoint sources. 2722 2723

(e) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should adopt and enforce adequate stormwater detention ordinances. These ordinances should include provisions which clearly establish longterm responsibilities for maintenance of detention facilities. All such local ordinances also should be consistent with minimal areawide standards set forth in the model ordinance. 2725 2726 2727 2728 2729

(f) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should develop and enforce adequate erosion and sedimentation control ordinances. All such local ordinances should be consistent with minimal areawide standards set forth in the model ordinance. 2731 2732 2734 2735

(g) Within one year following the preparation by NIPC of a model ordinance, the counties and all municipalities in the basin should adopt measures to control surface runoff from open storage yards containing industrial stockpiles and other materials which may go into solution or which may be carried away by stormwater runoffs and pollute streams and other water bodies.

(h) Municipalities, townships, counties, and state and county highway departments responsible for de-icing streets and highways should develop programs to control the application of de-icing materials, to train personnel in proper application methods, and to use proper equipment in order to minimize any negative water quality impacts. The impact of de-icing materials on water quality should be given further study by NIPC in the continuing planning program.

(2) Agricultural Runoff

(a) By July 1, 1980, the Lake County, McHenry County, North Cook County, and Kane-DuPage County Soil and Water Conservation Districts, in conjunction with agencies of the United States and Illinois Departments of Agriculture and the countywide water quality committees, should identify the best management practices necessary to implement the agricultural aspects of the 208 plan, including conservation tillage, contour plowing, terracing, and conversion of cropland to grassland.

(b) By July 1, 1981, agricultural lands on which BMP's should be applied should be identified by appropriate soil and water conservation districts. Agencies of the U.S. Department of Agriculture and countywide water quality committees should be consulted.

(c) By July 1, 1985, a comprehensive conservation plan should be prepared for each farm in the basin which has soil erosion losses in excess of standards set by the Illinois Department of Agriculture and soil and water conservation districts under House Bill 818.

(d) Using available cost sharing and technical assistance programs, the soil and water conservation districts should ensure implementation of the BMP program according to the following schedule on approximately 140,700 acres of agricultural lands:

By 1985 - 30% of the identified land
By 1995 - 70% of the identified land
By 2000 - 100% of the identified land

(e) The IEPA, NIPC, and local governments should provide the results of their instream water quality monitoring to the soil and water conservation districts and to the Departments of Agriculture so that priority can be given to the areas most sensitive from a water quality standpoint in order to maximize the impact of the best management practices.

(f) The IEPA should enforce the IPCB regulations which require permits for feedlots and should use the IEPA draft technical policy WPC-2 "Design Criteria for Field Application of Livestock Wastes" as a guide.

(g) Illinois Department of Agriculture, Illinois Department of Public Health, and USEPA regulations on the use of pesticides and disposal of containers, and Illinois Department of Agriculture regulations on the training and licensing of pesticide applicators and operators should be continued.

(h) Farmers should implement good pasture management practices, utilize grass waterways, vegetative filter strips, and field borders, and make wise use of fertilizers wherever possible in accordance with the Illinois Agronomy Handbook to reduce the dangers of pollution. The U.S. Department of Agriculture agencies should assist farmers in recognizing the water quality problems posed by improper practices, and assist them in the use of proper practices.

(3) On-site Disposal Systems:

(a) Individual malfunctioning on-site disposal systems outside the 5-year service areas should be repaired wherever possible upon complaint to the appropriate authorities or replaced with a new system if necessary.

(b) By July 1, 1983, special service areas should be established, where necessary, under sponsorship of municipal governments (for sites located within corporate limits) and by the counties (in unincorporated areas) to facilitate the financing of any innovative type systems or other on-site improvements necessary to correct or replace malfunctioning systems in areas outside the 5-year projected service areas.

(c) The minimum requirements of the Illinois Private Sewage Disposal Code should be upgraded to require more innovative site analysis techniques, and the counties and municipalities should require a construction permit to regulate the design, location, and installation of every new on-site system in incorporated as well as unincorporated areas.

(d) Local officials should inspect all septic systems known to be failing, threatening public health or causing nuisance conditions. The inspection should result in the issuance of a repair permit for corrective measures which are to be undertaken and paid for by the septic system owner.

(e) Septic systems also should be inspected by local officials prior to the transfer of ownership of properties where such systems are installed. The results of the inspections should be made known to the lending institutions which are furnishing the mortgages.

(4) Air Pollution

(a) As part of the continuing planning program, the IEPA, in cooperation with the Illinois Institute for Natural Resources, the Illinois Water Survey, and local air quality management agencies, should analyze the relationship between air pollution and water quality in all of its aspects. The IEPA should cooperate with NIPC in devising strategies for correcting present negative effects and preventing future problems through the 208 continuing planning program.

(5) Sanitary Landfills

(a) The IEPA should ensure that every sanitary landfill complies with all regulations of the IPCB for its siting, design, construction and operation. As a substitute for existing state regulations, the IEPA and IPCB should consider certification of local solid waste disposal programs which comply with areawide plans to be prepared under the Federal Resource Conservation and Recovery Act. Alternatives to land disposal of solid wastes, including recycling, should be considered and utilized wherever feasible.

(6) Waterways:

(a) NIPC, in conjunction with the countywide water quality committees in the continuing planning program, should develop recommendations to simplify the highly fragmented system for channel maintenance and improvement in the Fox River and its tributaries. Present responsibility for such maintenance functions as debris removal, streambank stabilization, public access, dredging, disposal of dredge spoil, protection and augmentation of habitat, tree shading and vegetation, is shared between a host of federal, state, and local authorities.

(b) Other counties are encouraged to develop an organization similar to the Cook County and Lake County Clean Stream Committees, consisting of volunteers and organization representatives who maintain surveillance over water bodies for activities adverse to water quality, flood control, recreation, fish, wildlife, and/or navigation.

(c) The feasibility of modifying dams on the Fox River to improve water quality and still provide flood control and recreational benefits should be examined in the continuing program in cooperation with the Corps of Engineers in their ongoing study of the water resources of the Fox River.

(d) In-stream water quality data collected by local treatment plant operators should be periodically published by IEPA.

(7) Boundary Conditions:

(a) The USEPA, the Wisconsin Department of Natural Resources, and the Southeastern Wisconsin Regional Planning Commission, should assure that the Fox River as it flows into Illinois will meet the prescribed boundary water quality standards which require a minimum dissolved oxygen concentration of 5.0 mg/l 95 percent of the time, a mean BOD_5 concentration of 4.0 mg/l, a maximum ammonia nitrogen concentration of 1.5 mg/l, and a goal for the concentration of phosphorous as P of 0.05 mg/l.

d. Residuals

(1) As regulated by the IEPA, present methods for the disposal of sludge from treatment plants are adequate to handle present and anticipated future volumes and should continue to be administered by the IEPA.

(2) Highest priority should be given to the use of sludge as a soil conditioner and to the expansion of efforts to utilize sludge for that purpose. The IEPA should assure proper practices in the utilization of sludge on agricultural lands through implementation of the draft standards in IEPA Technical Policy WPC-3 "Design Criteria for Municipal Sludge Utilization on Agricultural Land."

(3) The preferred method for the disposal of domestic septage is land application, and this method should be encouraged and used whenever possible. Recognizing a continuing need for the disposal of large volumes of septage at wastewater treatment plants, specific

facilities should be designated by the IEPA to receive domestic septage on recommendation by NIPC through the continuing planning process. 2912

(4) The USEPA standards and the IPCB regulations for permits for disposal of hazardous or toxic substances should continue to be enforced by the IEPA. 2915 2916

e. Groundwater 2920

(1) By July 1, 1980, the Illinois State Water Survey and the Illinois State Geological Survey should undertake a coordinated well sampling program to monitor groundwater quality in areas where a potential for infiltration by pollutants now exists or might exist in the future. 2923 2925 2926 2927

f. Inland Lakes 2931

(1) By July 1, 1979, in accordance with Section 314 of PL 92-500, the IEPA should undertake an expanded lake sampling program to identify eutrophic conditions and, in conjunction with NIPC and the countywide water quality committees, develop plans to control sources of pollution and restore water quality. 2934 2936 2937 2938

g. Mining 2942

(1) The present IPCB regulations for the control of pollution from aggregate producing activities are considered generally satisfactory. However, the IEPA should continue to study the types and volumes of pollutants associated with mining activities and their potential effects on surface and groundwater quality. Any needed changes in present regulations should be identified by July 1, 1980. 2945 2947 2948 2949 2950

19.11 COSTS OF RECOMMENDED PLAN 2953

a. Facility Plans 2955

(1) General: Table 19-32 shows pertinent capacities in the year 2000 of the surviving municipal-type wastewater treatment plants, their effluent standards, and construction costs. Local collector sewer projects are included, if they have been included in facility plans. 2958 2960 2961

Cost data were assembled from various sources as noted below and in the tables that follow. The processing of this information and its allocation to the Fox basin are described, where applicable. 2963 2965 2966

Initial costs of facility plans listed in Table 19-32 apply to the first phase of any project which is to be followed at some future date by programmed expansions or extensions. With this definition, the total cost of works currently under construction fall under the classification initial even though the project has not yet been completed and future payments to contractors will be made. Future costs in Table 19-32 cover phased work scheduled at later dates.

(2) Future Costs: Table 19-33 distributes capital costs within 5-year time frames. Annual operating and maintenance costs are also shown, which are based on data included in current reports, where available, or from data furnished by operating agencies. In their absence, they were estimated based on information in 208 Staff Paper No. 20, "Wastewater Treatment Processes and Cost Estimating Data."

The cost for bonded indebtedness of previous system improvements is not included in the operating and maintenance costs listed in Table 19-33.

Construction costs do not differentiate between grant eligible and local shares.

(3) MSDGC Costs: Because of their magnitude and complexity, special procedures were followed in depicting MSDGC costs.

Total costs of MSDGC improvements and locally funded improvements were taken from Table U7-IX-1 and from page 229 in the MSDGC's 1977 Facilities Plan Update Supplement. They were revised and brought up to date in a conference with MSDGC staff representatives on March 14, 1978.

The cost of all MSDGC improvements were assumed to be spread throughout the MSDGC service area on an ad valorem basis Thus, each basin's share of the cost was assumed to be proportional to the share of total district assessed valuation in that basin.

For locally funded improvements, the estimates for local sewer upgrading are current 1977 values (from page 229 of the MSDGC 1977 Plan Update Supplement). For other local improvements, the estimates in pages XI-18 and XI-19 of the MSDGC Overview report are as of January 1, 1975 (also updated). Where applicable, costs were also updated at 6 percent compounded for the intervening period to January 1977 levels.

The costs for constructing TARP II are included in Table 19-33.

The costs of local improvements were allocated differently, depending upon the particular type of project. Local sewer upgradings required as supplements to the Tunnel and Reservoir Plan (TARP) apply only to the 49 communities in the TARP area. A basin's share of the total cost of these upgradings was assumed to be equal to the percentage share of the total TARP area assessed valuation in TARP communities in that basin.

For local sewer improvements outside the TARP area, the costs were allocated to non-TARP communities in each basin in accordance with their share of the total assessed valuation for all non-TARP areas.

(4) Local Costs: Table 19-34 shows annualized local costs.

(5) Increased Costs: Tables 19-35 through 19-40 show the estimated annual increases in wastewater charges per household for residents in the basin by county and for the basin as a whole for the previously described improvements and/or expansions.

(6) Unknown Factors Affecting Future Costs: Reductions in water use could result in possible lower capital and annual operation and maintenance costs, depending upon the reductions in wastewater flows. However, it is impossible to quantify the cost savings.

The additional costs for installing and operating post-treatment aeration facilities will vary greatly, depending on the configuration of existing systems and are impossible to estimate.

Costs of sewer extensions to serve future growth are either included in existing facilities plans or will be borne by developers.

Continued in-stream sampling and monitoring is not expected to require any additional costs beyond those outlined in Chapter Ten to be incurred by the state and local governments for water quality monitoring.

A ban on the sale of high phosphate laundry detergent will have minor administrative costs and will probably slightly raise the prices of detergent, but these costs have not been estimated.

The elimination of the 1 mg/l phosphorous removal requirement for plants below McHenry Dam would result in a capital cost savings of $4.27 million and annual operating and maintenance cost savings of $2.35 million. Plants which will no longer require phosphorous removal are identified in Table 19-32. Costs in Tables 19-32 and 19-33 reflect these savings.

The additional costs for sufficient nitrification to enable plants to meet the in-stream water quality standard for ammonia of 1.5 mg/l are impossible to estimate. Secondary treatment processes vary throughout the basin, and each accomplishes a varying amount of nitrification which can be determined only by sampling. In addition, the wastewater load to a plant in relation to plant capacity affects the degree of ammonia removal. A further problem is that the plants need not discharge an effluent containing 1.5 mg/l but rather one which does not cause in-stream ammonia concentrations to exceed 1.5 mg/l beyond a specified "mixing zone". The amount of ammonia an individual plant can discharge must be determined for each facility and is dependent on existing receiving stream concentrations of

ammonia, streamflow, and plant flow. In view of these numerous uncertainties, an accurate estimation of costs was deemed impossible. It was assumed that the IEPA will enforce the ammonia standard on a case by case basis.

b. Agricultural Runoff

Agricultural croplands presently total 239,900 acres. These are expected to decrease to 210,800 acres by the year 2000. In order to reduce agricultural pollution from croplands, BMPs are targeted for implementation by the year 2000 on 140,700 acres at a total cost over the years of $23,940,000. Although a comprehensive farm plan would include a wide range of BMPs, the following four practices and several combinations have been recommended for implementation: conservation tillage, contouring, terracing, and cropland conversion to pastureland. These BMPs were selected because of their direct effects on water quality as well as their ability to reduce soil erosion.

Of the above total costs, $10,613,000 represent initial installation (or capital) expenditures for which grants may be made available from the federal government. The cost-sharing ratios are on the order of 50 percent. The balance of $13,327,000 represents operating and maintenance costs to the farmers over and above straight row plowing.

For estimating purposes, it is assumed that the BMPs will be installed to incur total expenditures of 30 percent by 1985, 70 percent by 1995, and 100 percent by the year 2000.

c. Urban Stormwater

Methods for controlling urban stormwater runoff pollution include street sweeping, catch basin cleaning, performance zoning, use of porous pavements, increased vegetation, grass waterways, wetland storage of stormwater, stormwater detention, and erosion and sediment controls. The goals of a 25 percent decrease in BOD loads on existing (1976) impervious surface and a 50 percent decrease in pollutant loads on impervious areas built between 1976 and 2000 are to be achieved by combinations of the above practices. The cost of the mix of specific practices which would meet these goals is dependent upon the practices selected and the intensity of their individual use. An estimate of the total cost based solely on street cleaning utilizing vacuum street sweepers is $56,327,000 through the year 2000, increasing from $1,338,000/year in 1978 to $3,560,000/year in the final year. The frequency of cleaning streets with vacuum sweepers was assumed to average about once every 6.25 days by the year 2000, excluding the three winter months of December, January and February. The above costs did not include street cleaning in combined

sewer areas where the stormwater runoffs would be treated. Naturally, some street cleaning activities would be required in those areas for sanitary or public relations reasons. Costs for that cleaning are not included in the above figures.

19.12 WATER QUALITY CONDITIONS IN 1983

a. Introduction

Public Law 92-500 includes the statement "Wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water be achieved by July 1 1983." The water quality standards of the Illinois Pollution Control Board for General Use streams, such as The Fox, were adopted to "protect the State's water for aquatic life,...primary and secondary contact use,....." Illinois standards, as recommended to be modified by this plan are used here to judge compliance with the 1983 national goal. This chapter assesses the feasibility of compliance with the dissolved oxygen and ammonia standards by 1983.

b. Assumptions of Changes in the Basin

(1) Land Cover: Land cover estimates for the years 1976, 1983, and 2000 are summarized in Table 19-41. It may be noted that impervious area is forecast to increase by 33 percent from 1976 to 2000. Also forecast is some shifting from cropland to grassland. The cropland areas listed under "conservation" indicate those lands where additional soil conservation practices are expected to be implemented.

(2) Urban Runoff Controls: Management measures are to be implemented with the objective of reducing runoff-related pollutants from existing urbanized areas by 25 percent of BOD loadings found to be present in 1976. BOD loadings from areas urbanized after that year are to be reduced by 50 percent of 1976 loads. This will result in an overall 27 percent reduction in urban runoff pollution loads by 1983.

(3) Point Sources: Effluent characteristics of major point sources modeled for the Fox Basin are given for 1983 in Table 19-42.

TABLE 19-32 : RECOMMENDED PLANS, PUBLICLY OWNED TREATMENT SYSTEMS

FOX BASIN

MAP CODE	FACILITY NAME	DESIGN CAPACITIES (MGD)		EFFLUENT STANDARDS (Year 2000) (mg/l)				CAPITAL COSTS (million $)			COMMENTS
		1975	2000	BOD_5	TSS	P	NH_3N	INITIAL	FUTURE	TOTAL	
M1	Algonquin	0.85	2.12	20	25		(1)	-	2.5	2.5	(1) NH_3 standard is 1.5 mg/l in-stream after mixing.
K1	Aurora	32.00	40.00	10	12		(1)	(2) 73.3	-	73.3	(2) costs include nitrification but do not include combined sewer work; or year 2000 Phase II expansion to 50.0 mgd.
L2	Barrington	2.00	3.68	10	12		(1) (3)	4.2	-	4.2	(3) Single stage activated sludge will provide nitrification.
K2	Batavia	2.72	5.20	20	25		(1)	(4) 6.7	-	6.7	(4) costs include control of combined sewer overflows.
K4	Carpentersville Main	3.50	(5) 5.00	20	25		(1)	0.8	-	0.8	(5) expansion to 5 mgd essentially complete; costs are for phase out of Kimbal Hill (K3).
M2	Cary	1.26	2.77	20	25		(1)	-	4.2	4.2	(6) plant utilizing rotating biodiscs to meet ammonia standard; phosphorous standard necessary because plant is upstream from a lake.
M3	Crystal Lake No.1,2	4.50	7.00	10	12		(1)	-	8.6	8.6	(7) costs include single stage nitrification, intercepting sewers and land; expansion to 17.0mgd assumed complete, costs not included.
M4	Crystal Lake No. 3	0.50	2.00	10	12	(6) 1	(1)	-	see M3	see M3	(8) rotating biodiscs provide nitrification; two 6.0 mgd expansions planned before year 2000.
K5	East Dundee	0.58	0.97	30	30		(1)	1.8	0	1.8	(9) only minor costs anticipated.
K6	Elburn	0.11	1.27	10	12		(1)	3.1	0.7	3.8	(10) lagoon exemption assumed.
K7	Elgin S.D.- North	3.50	3.50	20	25		(1)	-	-	-	(11) costs include sewers.
K8	Elgin S.D.-Main	8.60	25.0	10	12		(1)	(7) 13.0	-	13.0	(12) NH_3 removal facilities to be provided.
L5	Fox Lake	0.72	12.00	10	12	1	(8) (1)	10.0	8.8	18.8	(13) future costs included 3.5 mgd regional plant to serve McHenry, McCullom Lake and McHenry Shores; see M16.
M5	Fox River Grove	0.39	1.25	30	30		(1)	2.9	-	2.9	
K11	Geneva	4.00	4.00	20	25		(1)	(9)	-	-	
M7	Hebron	0.11	0.19	(10) 30	(10) 30		(1)	0.5	0.1	0.6	

TABLE 19-32 : RECOMMENDED PLANS, PUBLICLY OWNED TREATMENT SYSTEMS FOX BASIN

MAP CODE	FACILITY NAME	DESIGN CAPACITIES (MGD)		EFFLUENT STANDARDS (Year 2000) (mg/l)				CAPITAL COSTS (million $)			COMMENTS
		1975	2000	BOD_5	TSS	P	NH_3N	INITIAL	FUTURE	TOTAL	
L10	Island Lake S.D.	0	1.20	20	25		(1)	(1) 5.9	-	5.9	(14) costs are for new interceptors PO_4 removal because plant is up-stream from a lake. (15) initial costs for .25 mgd McHenry Shores plant; future costs share of 3.5 mgd regional plant; See M11.
M9	Lake in Hills S.D.	0.25	0.85	10	12		(1) (12)	1.4	-	1.4	
L21	Lake Zurich N.W.	0.80	1.00	10	12		(1)	0.3	1.1	1.4	
M11	McHenry	2.00	3.00	20	25		(1)	-	(13) 4.9	4.9	
M12	Richmond	0.38	0.38	30	30	1	(1)	-	-	-	
K16	St. Charles	8.00	8.00	20	25		(1)	(9) -	-	-	
L32	Wauconda	0.80	1.20	10	12		(1)	3.0	-	3.0	
K18	West Dundee	0.50	0.90	30	30		(1)	2.4	-	2.4	
M14	Woodstock N.	3.50	3.50	10	12	1	(1)	-	(14) 1.9	-	
M16	McHenry Shores	0	3.50	20	25		(1)	(15) 1.5	1.6	3.1	
K19	Wasco S.D.	0	0.13	(10) 30	30		(1)	0.4	-	0.4	
K20	Sugar Grove	0	0.30	10	12		(1)	1.0	-	1.0	

TABLE 19-33: SUMMARY OF FUTURE COSTS (All data in 1977 dollars in millions)

Jurisdiction	Capital Costs						Annual Operations & Maintenance Expense				
	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	Total	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)
MSDGC	37.90	0.30				38.20	0.09	0.33	0.35	0.35	0.35
Local Improvements Related to MSDGC	16.00	2.60				18.60					
Barrington	3.79					3.79	0.19	0.24	0.24	0.24	0.24
Aurora Sanitary District	72.56					72.56	1.43	1.79	1.79	1.79	1.79
Elgin Sanitary District	15.54					15.54	0.31	0.51	0.51	0.51	0.51
Batavia	6.69					6.69	0.14	0.18	0.18	0.18	0.18
Carpentersville	0.76					0.76					
East Dundee	1.65					1.65	0.04	0.21	0.21	0.21	0.21
Elburn	3.10					3.10	0.06	0.07	0.07	0.07	0.07
Geneva	0.03					0.03					
St. Charles	0.05					0.05					
Sugar Grove	0.96					0.96	0.03	0.08	0.08	0.08	0.08
West Dundee	2.93					2.93	0.26	0.32	0.32	0.32	0.32
Wasco	0.01	0.35				0.36	0.01	0.01	0.01	0.01	0.01
Antioch	0.57					0.57		0.03	0.08	0.08	0.08
Fox Lake	10.07	1.17	2.93	2.93	1.77	18.87	0.13	0.24	0.30	0.30	0.30
Lake Villa	0.50					0.50		0.01	0.01	0.01	0.01
Lake Zurich	0.30	1.02			1.32			1.10	0.26	0.26	0.26

TABLE 19-33: SUMMARY OF FUTURE COSTS (All data in 1977 dollars in millions)

Jurisdiction	Capital Costs						Annual Operations & Maintenance Expense				
	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	Total	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)
Round Lake	0.19					0.19	0.20	0.32	0.44	0.44	0.44
LCDPW	18.82	0.80	2.00	2.00	1.20	24.82					
Wauconda	2.91					2.91	0.07	0.09	0.09	0.09	0.09
Algonquin		2.23				2.23		0.07	0.17	0.17	0.17
Cary		3.90				3.90		0.13	0.32	0.32	0.32
Crystal Lake		8.24				8.24		0.16	0.40	0.40	0.40
Hebron	0.51	0.04	0.03			0.58	0.02	0.03	0.03	0.03	0.03
McHenry Shores	1.53	1.42				2.95	0.01	0.05	0.09	0.09	0.09
McHenry Village	0.13	5.13				5.26		0.05	0.12	0.12	0.12
Island Lake	7.76					7.76	0.06	0.08	0.08	0.08	0.08
Woodstock		0.25	0.63	0.64	0.38	1.90					
Lake In The Hills	1.21					1.21	0.06	0.08	0.08	0.08	0.08
Fox River Grove	2.88					2.88	0.07	0.09	0.09	0.09	0.09
Agricultural BMPs							0.23	0.54	0.74	1.07	1.29
Urban Stormwater Mgmt Exp.							1.78	2.23	2.67	3.12	3.47
TOTAL	209.35	27.45	5.59	5.57	3.35	251.31	5.19	8.04	9.73	10.51	11.08

TABLE 19-34: PROJECTED ANNUALIZED LOCAL COSTS (All data in 1977 dollars in millions)

Jurisdiction	CAPITAL COSTS			LOCAL CAPITAL PLUS O & M ANNUALIZED Costs (Mil./yr.)*					Total Cost** 1978-2000	Comments
	Cost Total Through Yr. 2000	Est. Fed'l. Share	Est. Local Share	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000		
MSDGC	38.20	28.65	9.55	0.98	1.23	1.25	1.25	0.36	24.63	
Local Improvements Related to MSDGC	18.60	13.95	4.65	0.38	.0.44	0.44	0.44	0.06	8.68	
Barrington	3.79	2.84	0.95	0.29	0.34	0.34	0.34	0.24	7.27	
Aurora Sanitary District	72.56	54.46	18.14	3.14	3.50	3.50	3.50	1.79	73.57	
Elgin Sanitary District	15.54	11.66	3.88	0.60	0.88	0.88	0.88	0.63	18.09	
Batavia	6.69	5.02	1.67	0.30	0.34	0.34	0.34	0.18	7.14	
Carpentersville	0.76	0.57	0.19	0.01	0.02	0.02	0.02	0.01	.38	
East Dundee	1.65	1.24	0.41	0.06	0.25	0.25	0.25	0.15	4.50	
Elburn	3.10	2.32	0.78	0.13	0.14	0.14	0.14	0.07	2.96	
Geneva	0.03	0.02	0.01	0.001	0.001	0.001	0.001		.02	
St. Charles	0.05	0.04	0.01	0.001	0.001	0.001	0.001		.02	
Sugar Grove	0.96	0.72	0.24	0.04	0.10	0.10	0.10	0.10	2.00	
West Dundee	2.93	2.20	0.73	0.33	0.39	0.39	0.39	0.32	8.46	
Wasco	0.36	0.27	0.09	0.01	0.02	0.02	0.02	0.02	.41	
Antioch	0.57	0.43	0.14	0.01	0.04	0.09	0.09	0.08	1.39	
Fox Lake	18.87	14.16	4.71	0.37	0.49	0.63	0.70	0.51	12.48	
Lake Zurich	1.32	0.99	0.33	0.01	0.12	0.29	0.29	0.29	4.42	
Round Lake	0.19	0.14	0.05	0.20	0.32	0.44	0.44	0.44	8.32	
										R Sept. 20/78

*Local Capital Amortized @ 7% for 20 yrs. **Sum of Local Capital Plus O & M Annualized Costs, in million $

TABLE 19-34: PROJECTED ANNUALIZED LOCAL COSTS (All data in 1977 dollars in millions)

Jurisdiction	CAPITAL COSTS			LOCAL CAPITAL PLUS O & M ANNUALIZED Costs (Mil./yr.)*					Total Cost** 1978-2000	Comments
	Cost Total Through Yr. 2000	Est. Fed'l. Share	Est. Local Share	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000		
Lake County Public Works	24.82	18.62	6.20	0.44	0.45	0.51	0.56	0.14	10.22	
Wauconda	2.91	2.18	0.73	0.14	0.16	0.16	0.16	0.09	3.37	
Algonquin	2.23	1.67	0.56		0.10	0.12	0.12	0.12	2.06	
Cary	3.90	2.92	0.98		0.19	0.41	0.41	0.41	6.28	
Crystal Lake	8.24	6.18	2.06		0.28	0.59	0.59	0.59	9.07	
Hebron	0.58	0.44	0.14	0.03	0.04	0.04	0.04	0.03	.90	
McHenry Shores	2.95	2.21	0.74	0.03	0.11	0.16	0.16	0.12	2.66	
McHenry Village	5.26	3.94	1.32	0.003	0.13	0.24	0.24	0.24	3.79	
Island Lake	7.76	5.52	1.94	0.23	0.26	0.26	0.26	0.01	5.08	
Woodstock	1.90	1.42	0.48			0.02	0.04	0.04	.42	
Lake in the Hills	1.21	0.91	0.30	0.09	0.11	0.11	0.11	0.08	2.34	
Fox River Grove	2.88	2.16	0.72	0.14	0.16	0.16	0.16	0.09	3.37	
Agricultural BMPs				0.23	0.54	0.74	1.07	1.29	16.77	
Urban Stormwater Mgmt. Exp.				1.78	2.23	2.67	3.12	3.47	59.41	
TOTAL	251.31	188.49	62.82	9.98	13.40	15.33	16.25	11.98	310.48	

*Local Capital Amortized @ 7% for 20 yrs. **Sum of Local Capital Plus O & M Annualized in million $

TABLE 19-35 : PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST

DuPAGE COUNTY

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	126.4	142.7	159.0	175.3	188.3	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.067	.060	.056	.052		
O & M Related	.127	.148	.151	.156	.159	
Total Rate:	.194	.208	.207	.208	.159	
Additional Cost per Home of $45,000 FMV ($/yr.)	29.10	31.20	31.05	31.20	23.85	
Existing Av. Annual WW Cost ($/Household yr.)	84.75					
Total Av. Annual WW Cost ($ / Household yr.)	113.85	115.95	115.80	115.95	108.60	
Percent Av. Increase* in WW Costs per Household (%)	34.3	36.8	36.6	36.8	28.1	

*Total Rate Used

TABLE 19-36 : PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST

McHENRY COUNTY

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	532.1	600.7	669.1	737.6	792.3	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.042	.085	.091	.086	.049	
O & M Related	.107	.210	.301	.292	.285	
Total Rate:	.149	.295	.392	.378	.334	
Additional Cost per Home of $45,000 FMV ($/yr.)	22.35	44.25	58.80	56.70	50.10	
Existing Av. Annual WW Cost ($/Household yr.)	59.72					
Total Av. Annual WW Cost ($ / Household yr.)	82.07	103.97	118.52	116.42	109.82	
Percent Av. Increase* in WW Costs per Household (%)	37.4	74.1	98.5	94.9	83.9	

*Total d

TABLE 19-37 : PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST

COOK COUNTY-Non MSDGC

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	182.5	205.9	229.4	252.9	271.7	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.075	.077	.071	.065	.015	
O & M Related	.173	.218	.212	.212	.210	
Total Rate:	.248	.295	.283	.277	.225	
Additional Cost per Home of $45,000 FMV ($/yr.)	37.20	44.25	42.45	41.55	33.75	
Existing Av. Annual WW Cost ($/Household yr.)	84.75					
Total Av. Annual WW Cost ($ / Household yr.)	121.95	129.00	127.20	126.30	118.50	
Percent Av. Increase* in WW Costs per Household (%)	43.9	52.2	50.1	49.0	39.8	

*Total Rate Used

TABLE 19-38 : PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST

KANE COUNTY

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	1422.4	1605.5	1788.5	1971.7	2118.0	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.153	.142	.127	.115	.008	
O & M Related	.219	.268	.259	.255	.250	
Total Rate:	.372	.410	.386	.370	.258	
Additional Cost per Home of $45,000 FMV ($/yr.)	55.80	61.50	57.90	55.50	38.70	
Existing Av. Annual WW Cost ($/Household yr.)	72.77					
Total Av. Annual WW Cost ($ / Household yr.)	128.57	134.27	130.67	128.27	111.47	
Percent Av. Increase* in WW Costs per Household (%)	76.7	84.5	79.6	76.3	53.2	

*Total F ...sed

TABLE 19-39 . PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST

LAKE COUNTY

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	425.8	480.6	535.6	590.2	634.0	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.212	.202	.203	.204	.060	
O & M Related	.189	.271	.340	.329	.319	
Total Rate:	.401	.473	.543	.533	.379	
Additional Cost per Home of $45,000 FMV ($/yr.)	60.15	70.95	81.45	79.95	56.85	
Existing Av. Annual WW Cost ($/Household yr.)	75.40					
Total Av. Annual WW Cost ($ / Household yr.)	135.55	146.35	156.85	155.35	132.35	
Percent Av. Increase* in WW Costs per Household (%)	79.8	94.1	108.0	106.0	75.4	

*Total Rate Used

TABLE 19-40 : PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST

BASIN TOTAL

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	2873.6	3243.5	3613.1	3983.2	4278.8	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.153	.166	.159	.148	.042	
O & M Related	.181	.248	.269	.264	.259	
Total Rate:	.334	.414	.428	.412	.301	
Additional Cost per Home of $45,000 FMV ($/yr.)	50.10	62.10	64.20	61.80	45.15	
Existing Av. Annual WW Cost ($/Household yr.)	84.75					
Total Av. Annual WW Cost ($ / Household yr.)	134.85	146.85	148.95	146.55	129.90	
Percent Av. Increase* in WW Costs per Household (%)	59.1	73.3	75.8	72.9	53.3	

*Total P[illegible]d

TABLE 19-41 : LAND COVER CHANGES

Cover Type	Area in Square Miles		
	1976	1983	2000
Lowland	175.4	175.4	175.4
Cropland	265.5	252.9	224.9
Conservation	(0)	(28.1)	(156.1)
Grassland	421.8	428.9	444.7
Impervious	55.5	61.1	73.7

c. Expected Water Quality in 1983

The water quality model was used indirectly to estimate 1983 water quality conditions. Results of 1976 and year 2000 First Test Plan modeling served as the basis for estimating 1983 values. In the process, pollution loads to the river were calculated for each of those three years. These loads are reported in Table 19-38 for 13 reaches, along with the water quality ratings for dissolved oxygen and ammonia associated with the loads. The ratings for 1976 and 2000 are from previous water quality modeling results. The 1983 ratings are informed judgments.

The goal (expressed in terms of achievement of water quality standards) is considered to be met satisfactorily when a rating of "good" or "excellent" is achieved. Assignment of these adjective ratings was based on the following criteria:

Excellent = no dissolved oxygen concentrations below 5 mg/l.

Good = dissolved oxygen remains above 5 mg/l 95 percent of the time or more.

Fair = dissolved oxygen remains above 5 mg/l 85 percent of the time or more.

Poor = dissolved oxygen remains above 5 mg/l 70 percent of the time or more.

Bad = dissolved oxygen remains above 5 mg/l less than 70 percent of the time.

In any reach where the dissolved oxygen drops to zero, the qualitative state of the reach is lowered by one category. Ammonia ratings are based on a maximum concentration of 1.5 mg/l for the same criteria as dissolved oxygen above.

The standards for dissolved oxygen and ammonia appear to be met or not met in 1983 as noted in Table 19-44.

The "fair" rating for ammonia in Reach 270 represents an improvement over existing conditions largely because the Barrington plant is expected to be operating ammonia removal facilities by 1983. Point sources will still account for 71 percent of the ammonia load to Reach 270 in 1983. Further improvement may be expected when the Lake Zurich Northwest plant implements ammonia removal.

The "fair" rating for ammonia in Reach 340 appears to be the result of surface runoff from cropland, grassland and impervious sources. Improved nonpoint pollution control

TABLE 19-42 : POINT SOURCE CONDITIONS IN 1983

Plant Name	Reach	Flow (cfs)	BOD_5 (mg/l)	NH_3 (mg/l)	Soluble PO_4 (mg/l)
Algonquin	370	1.65	20	7.19	1.5
Antioch	113	0.94	10	10.0	0.97
Barrington	270	4.88	10	1.5	1.5
Batavia	480	2.97	20	10.0	1.5
Carpentersville Kimble Hill	370	P H A S E D O U T			
Carpentersville Main	370	12.64	20	7.19	1.5
Cary	310	2.78	20	7.3	1.5
Crystal Lake #1 and #2	310	6.87	10	9.14	1.5
Crystal Lake #3	310	1.56	10	4.0	0.71
E & W Dundee	370	0.61	30	13.0	1.5
Elgin North	370	7.02	20	13.0	1.5
Elgin Main	370	18.0	10	4.0	1.5
Elgin West	370	P H A S E D O U T			
St. Charles	480	8.96	10	6.21	1.5
St. Charles Skyline	480	P H A S E D O U T			
Wauconda	310	1.05	10	4.0	0.80
Woodstock North	31	4.19	10	10.0	0.80
Rollins Sewer & Water	430	0.28	17	2.56	0.80
Round Lake	117	P H A S E D O U T			

TABLE 19-42 . POINT SOURCE CONDITIONS IN 1983 (Continued)

Plant Name	Reach	Flow (cfs)	BOD_5 (mg/l)	NH_3 (mg/l)	Soluble PO_4 (mg/l)
Fox Lake	121	6.30	30	4.0	0.80
Fox Lake O.C.	121	0.05	11	5.10	0.27
Fox River Grove	310	1.07	20	7.30	1.5
Geneva	480	5.01	20	10.0	1.5
Hebron	106	0.33	30	12.7	1.5
Island Lake	310	1.01	20	7.3	1.5
Lake-in-the-Hills	310	1.49	10	1.5	3.70
Lake Villa	117	0.38	20	5.10	0.80
Lake Zurich N.W.	270	2.37	12	8.51	1.5
McHenry	310	5.92	20	5.1	1.5
MSDGC Streamwood	360	P H A S E D O U T			
Richmond	106	0.24	30	5.1	0.80
Valley High Nursing	31	0.12	10	0.65	0.80
Wonder Lake	31	PLANT NOT CONSTRUCTED			
Morton Chemical	310	0.50	1	1.0	0.01
Illinois Youth Center	480	0.86	8	0.32	0.12
Fermi Laboratory	480	0.07	6	6.3	0.65

practices between 1983 and 2000 could help to improve this rating but probably will not be sufficient to achieve a "good" rating. Modeling assumptions concerning ammonia loads from nonpoint sources in this reach should be carefully evaluated.

Reaches 370 and 480, the two most downstream reaches on the mainstem of the Fox River, have both received "fair" ratings for dissolved oxygen in 1983. Although upstream reaches have good water quality about half of the oxidizable materials entering Reaches 370 and 480 comes from boundary conditions. The loads from boundary conditions keep these

TABLE 19-43 : WATER QUALITY RATINGS IN 1983

Reach 31, Nippersink Creek at Thompson Road			
Loads & Ratings	1976	1983	2000
Phosphorous, tons/year	20	19	20
BOD, tons/year	369	290	434
Ammonia, tons/yr.	50	64	50
Dissolved Oxygen	Good	Good	Good
Ammonia	Good	Good	Good

Reach 106, Nippersink Creek at Nippersink Lake			
Loads & Ratings	1976	1983	2000
Phosphorous, tons/year	56	36	38
BOD, tons/year	849	562	688
Ammonia, tons/yr.	91	89	77
Dissolved Oxygen	Good	Good	Good
Ammonia	Exc.	Exc.	Exc.

Reach 113, Grass Lake Outlet			
Loads & Ratings	1976	1983	2000
Phosphorous, tons/year	106	97	96
BOD, tons/year	11606	11553	5033
Ammonia, tons/yr.	156	148	139
Dissolved Oxygen	Exc.	Good	Good
Ammonia	Exc.	Exc.	Exc.

Reach 117, Squaw Creek Outlet			
Loads & Ratings	1976	1983	2000
Phosphorous, tons/year	18	8	7
BOD, tons/year	240	121	119
Ammonia, tons/yr.	80	12	10
Dissolved Oxygen	Good	Good	Good
Ammonia	Bad	Good	Good

Reach 121, Fox River at Johnsburg			
Loads & Ratings	1976	1983	2000
Phosphorous, tons/year	188	150	154
BOD, tons/year	12882	12610	6085
Ammonia, tons/yr.	346	278	289
Dissolved Oxygen	Fair	Good	Good
Ammonia	Exc.	Exc.	Exc.

Reach 270, Flint Creek			
Loads & Ratings	1976	1983	2000
Phosphorous, tons/year	18	16	14
BOD, tons/year	252	216	223
Ammonia, tons/yr.	66	38	105
Dissolved Oxygen	Good	Good	Good
Ammonia	Poor	Fair	Bad

Reach 300, Spring Creek			
Loads & Ratings	1976	1983	2000
Phosphorous, tons/year	4	4	4
BOD, tons/year	72	66	69
Ammonia, tons/yr.	7	8	8
Dissolved Oxygen	Good	Good	Good
Ammonia	Good	Good	Good

Reach 310, Fox River at Algonquin			
Loads & Ratings	1976	1983	2000
Phosphorous, tons/year	242	210	206
BOD, tons/year	13788		7516
Ammonia, tons/yr	504	439	582
Dissolved Oxygen	Fair	Good	Good
Ammonia	Good	Good	Good

TABLE 19-43 : WATER QUALITY RATINGS IN 1983 (Continued)

Reach 340, Tyler Creek			
Loads & Ratings	1976	1983	2000
Phosphorous, tons/year	13	7	6
BOD, tons/year	147	103	112
Ammonia, tons/yr.	15	9	8
Dissolved Oxygen	Exc.	Exc.	Exc.
Ammonia	Fair	Fair	Fair

Reach 360, Poplar Creek			
Loads & Ratings	1976	1983	2000
Phosphorous, tons/year	11	7	6
BOD, tons/year	158	117	129
Ammonia, tons/yr	31	13	13
Dissolved Oxygen	Good	Good	Good
Ammonia	Good	Good	Good

Reach 370, Fox River at Valley View			
Loads & Ratings	1976	1983	2000
Phosphorous, tons/year	320	311	351
BOD, tons/year	14880	15271	9653
Ammonia, tons/yr	891	826	1309
Dissolved Oxygen	Fair	Fair	Fair
Ammonia	Good	Good	Good

Reach 430, Otter Creek			
Loads & Ratings	1976	1983	2000
Phosphorous, tons/year	19	19	19
BOD, tons/year	196	187	201
Ammonia, tons/yr	21	21	21
Dissolved Oxygen	Good	Good	Good
Ammonia	Fair	Fair	Fair

Reach 480, Fox River at Montgomery Dam			
Loads & Ratings	1976	1983	2000
Phosphorous, tons/year	378	384	404
BOD, tons/year	15820	16384	11183
Ammonia, tons/yr	1059	1131	1621
Dissolved Oxygen	Fair	Fair	Fair
Ammonia	Good	Good	Good

reaches in a stressed state and the impacts from point and nonpoint loads within these reaches cause dissolved oxygen ratings to be "fair". Possible alternatives for improving the "fair" ratings to "good" include the modification of dams to increase flow velocity and thereby stream assimilative capacity, and the enforcement of 10/12 effluent standards to decrease point source loads. It is possible that assumptions concerning wastewater loads from point sources may have been overestimated because of recent lower population forecasts by the Illinois Bureau of the Budget. If this is true, point source loads could be lower and

TABLE 19-44 : AMMONIA AND DISSOLVED OXYGEN RATINGS IN 1983

Stream	Reach	Dissolved Oxygen	Ammonia
Nippersink Creek	31	Good	Good
Nippersink Creek	106	Good	Excellent
Grass Lake Outlet	113	Good	Excellent
Squaw Creek	117	Good	Good
Fox River: Johnsburg	121	Good	Excellent
Flint Creek	270	Good	Fair
Spring Creek	300	Good	Good
Fox River: Algonquin	310	Good	Good
Tyler Creek	340	Excellent	Fair
Poplar Creek	360	Good	Good
Fox River: Valley View	370	Fair	Good
Otter Creek	430	Good	Fair
Fox River: Montgomery	480	Fair	Good

effluent quality could be higher than assumed, resulting in a better water quality rating. Further examination of this possibility is needed.

Reach 430 received a "fair" rating for ammonia in 1983. Virtually all of the ammonia in the stream is from surface runoff. The implementation of further nonpoint pollution control alternatives should help the problem, but not enough to merit a "good" rating. As in Reach 340, modeling assumptions concerning nonpoint ammonia loads should be reevaluated in the light of site specific data if possible.

Although phosphorous has not received a rating, it is still an important pollutant since it is the limiting nutrient in the Fox basin for algal growth. Phosphorous loads from point sources below McHenry Dam will increase, but these will be offset by decreases in nonpoint loads. The impact of increased point source phosphorous contributions was discussed in Section 19.09. Assumptions concerning phosphorous loads from point sources below McHenry Dam should be reevaluated in light of site specific data.

d. Evaluation

On the basis of the preceding analysis, it appears that the 1983 goal for dissolved oxygen will not be met in Reaches 370 and 480 and the 1983 goal for ammonia will not be met in Reaches 270, 340 and 430.

CHAPTER 20

Chicago River, Sanitary Ship Canal and Calumet Sag Channel

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CHAPTER TWENTY: CHICAGO RIVER, SANITARY & SHIP CANAL AND CALUMET SAG CHANNEL BASIN

20.01 DESCRIPTION OF THE BASIN

a. Physical Characteristics

(1) Geography: The 227,238-acre drainage area identified as Chicago River/Sanitary and Ship Canal/Calumet Sag Channel Basin drains an area defined partially by the natural drainage area of the Chicago River and Little Calumet River systems, partially by the combined sewer area of the Metropolitan Sanitary District of Greater Chicago (MSDGC) and its treatment plants, and partially by the area drained directly by the Sanitary and Ship Canal and Calumet-Sag Channel, both man-made canals (See Figure 20-1). Located within Cook and Will counties, the Cook County portion of the basin is approximately 35 miles long and 20 miles wide at its widest point. In Will County, the basin amounts to little more than the banks of the Chicago Sanitary and Ship Canal as it flows southwesterly through the Lower Des Plaines River Basin to its confluence with the Des Plaines River near Joliet.

Environmentally sensitive areas in the basin are concentrated in southwestern Cook County with the exception of one forested area at the northern edge of the basin. Twenty-six wetlands over 10 acres in size and six nature preserves are located in the southwestern corner of Cook County, including four forests, one prairie and a limestone canyon. Care must be taken to protect these areas from the generally high levels of industrial and urban pollution in the Chicago metropolitan area, and from the heavily industrial Lake Calumet area to the east.

(2) Waterways: The drainage system of the basin includes 21 lakes and ponds with a surface area of at least 10 acres and 13 rivers, streams, and canals. Tables 20-1 and 20-2 describe these and other basin waterways.

Locks on the Chicago River in downtown Chicago and on the Little Calumet River, near Lake Calumet, control the flow of the Chicago and Little Calumet Rivers. Though built primarily to protect Lake Michigan from pollution by reversing the flow of these rivers, the canals also provide Chicago with two barge draft waterways to the Mississippi Valley. At times of heavy rainfall, flows may be reversed, thus polluting Lake Michigan.

(3) Geology and Soils: Unconsolidated glacial deposits range in depth from a few feet in outcrop areas to 200 feet in the northern portion of the basin. The dominant deposit is till, found throughout the basin but most extensive in the north. Till is relatively impermeable; groundwater recharge capability is limited; and there is risk of

pollutant runoff to surface waters from the surface applications of wastes, fertilizers, and agri-chemicals.

Extensive deposits of sand and gravel are found in the southern portion of the basin. Infiltration is rapid in these materials, and pollutants may enter groundwater as a result of leachate from landfills, discharges from septic tanks, or surface application of wastes, fertilizers, or agri-chemicals.

Scattered windblown and glacial lake deposits are found in the basin. These deposits are usually less than 15 feet thick and are relatively impermeable. Recent deposits found in the major stream valleys are usually thinly deposited over bedrock. These areas need careful land use restrictions to protect the underlying aquifers.

Restrictions on land burial of wastes are minimal north of Montrose Avenue extended, but become increasingly common south of that line. Surface spreading of wastes and land application of fertilizers and agri-chemicals are restricted throughout the basin, either because of bedrock lying close to the surface, high permeability of surficial materials, or, more generally, runoff problems caused by the poor drainage typical of most parts of the basin. These runoff problems are accentuated by the high level or urbanization in the basin.

Most of the Chicago River Sanitary and Ship Canal Basin is sewered; however, there is no area in the basin without some limitation on waste disposal by septic systems. Problems include low infiltration, steep slopes, poor drainage, and low attentuation of wastes.

Soils in the basin vary in type and in properties that indicate the potential for adverse impacts on water quality under certain conditions. Predominant soils in northeastern Illinois are described in Chapter Three. Soils occurring in this basin are identified in Table 20-3.

b. Socio-Economic Characteristics

(1) Population: Encompassing the City of Chicago and most of its close-in suburbs, the basin has a population density of 9,313 persons per square mile which is by far the highest in the region. The largest communities in the basin are Chicago, Evanston, Skokie, and Cicero; the smallest are Bedford Park and Forest View. The estimated 1975 population of the basin was 4,034,425.

Table 20-4 shows population forecasts for the basin and for the facilities planning areas which affect the basin. The population of the basin is forecasted to decrease slightly by the year 2000, accounted for by a continuing decline in the populations of Chicago and some of the older, adjacent suburbs. Projected wasteloads for the basin and the facilities planning areas, which are discussed later in this chapter, are based in part on these population projections.

Figure 20-1: BASIN LOCATION



Revised 2/15/79

TABLE 20-1 : STREAM INVENTORY, CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

STREAM NAME	LENGTH (MILES)	AVG. WIDTH (FT.)	WATER SURFACE (ACRES)	GRADIENT (FT/MILE)	DRAINAGE AREA (SQ. MILES)	COMMENTS
CALUMET SAG CHANNEL	15.8	225	430.9	0.3	391	
CHICAGO RIVER	1.2	215	31.2	Varies	NA	
CHICAGO SNTY & SHIP CAN.	21.4	200	518.7	0.3	740	
FLAGG CREEK	7.4	30	26.9	6.1	19.7	
GRAND CALUMET RIVER	2.5	300	90.9	Varies	6.96 (1)	
LITTLE CALUMET RIVER	19.5	187.9	441.1	0.25	291 (2)	
MILL CREEK	4.4	12.1	6.5	30.5	11.1	
NO. BRANCH CHICAGO RIV.	50.6	69.0	423.2	2.5	180	
NORTH SHORE CHANNEL	7.6	35.0	32.2	0.7	24.2	
SO. BRANCH CHICAGO RIV.	6.5	168	132.3	Varies	NA	
STONEY CREEK	11.2	34.4	46.7	0	16.0	
TINLEY CREEK	6.7	8.0	6.4	3.4	13.6	
MIDLOTHIAN CREEK	11.7	18.2	25.8	13.2	20.0	
(1) Includes 6.2 $mi.^2$ in Indiana						
(2) Includes 65.8 $mi.^2$ in Indiana						

(2) Land Use: Land uses vary widely as indicated by the figures in Table 20-5. The proportion of vacant, agricultural and forest land is relatively small, about two-thirds that of residential land, but the proportion of land in public open space is one of the highest in northeastern Illinois. Most of this public open space is in the form of county forest preserves. Chicago's prominence as a railroad and manufacturing center is reflected in the relatively high proportions of the basin's land devoted to these uses.

TABLE 20-2 : LAKE AND POND INVENTORY, CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

NAME	LOCATION			SURFACE AREA (ACRES)	SHORE-LINE (MILES)	MAXIMUM DEPTH (FT)	WATER-SHED (ACRES)	DATE CON-STRUCTED	OWNER-SHIP	ACCESSIBILITY
	TWP N	RNGE E	SECT							
BELLY DEEP SLOUGH	37	12		14.7	0.8	8	NA	1941	Public	
BULLFROG LAKE	37	12		15.2	0.8	12	NA	1958	Public	
CONSUMER'S QUARRY LAKE	37	11		38.0	1.1	40	NA	1800-1850	Public	
DOUGLAS PARK LAGOON	39	13		25.3	2.4	6	NA	1897	Public	
GARFIELD PARK LAGOON	39	13		13.7	1.4	8	NA	1872	Public	
GREAT LAKES QUARRY	37	11		25.5	1.6	27	NA	1920-1955	Public	
HOLY FAMILY VILLA LAKE	37	11		16.0	0.8	9	NA	1927	Org.	
HORSETAIL LAKE	37	12		10.8	0.5	11	NA	1938	Public	
HUMBOLDT PARK LAGOON	39	13		19.9	2.4	6.5	NA	1871	Public	
LAKE VICTORY	36	14		15.0	0.6	30	NA	Before 1920	Public	
MAPLE LAKE	37	12		57.7	1.4	21	NA	1922	Org.	
MARQUETTE PARK LAGOON	38	13		44.5	4.7	9.5	NA	1919	Public	
McGINNIS SLOUGH	36	12		313.0	5.3	4	NA	1920's	Public	
MULDER LAKE	37	13		18.0	0.6	9	NA	1920-5	Private	
PAPOOSE LAKE	37	12		18.6	0.7	9.5	NA	1957	Public	
SAG QUARRY (EAST)	37	11		13.4	1.6	18	NA	1930's	Public	
SAGANASKEE SLOUGH	37	12		325.0	6.9	9	NA	1948-49	Public	
SHERMAN PARK LAGOON	38	14		11.6	1.1	7.5	NA	1905	Public	
TOMAHAWK SLOUGH	37	12		12.1	0.6	2	NA	Natural	Public	
TURTLEHEAD LAKE	36	12		12.3	0.7	15	NA	1958		
WASHINGTON PARK LAGOON	38	14		21.7	2.3	9	NA	1883		

Land use forecasts anticipate continuing urbanization of the basin and accompanying changes in land use, as shown in Table 20-6. Largest land use increases, proportionately, are forecasted for commercial and manufacturing purposes. The amount of undeveloped (vacant, agricultural, forested) land is forecasted to decrease by more than 11 percent between 1980 and 2000.

(3) Economy: In recent years the proportion of employment in manufacturing has declined, while the proportion in wholesale trade, finance, insurance, real estate, and government has increased.

Total employment in the basin was nearly 2 million in 1970. This is forecasted to increase by 27 percent, to over 2.5 million employees, by the year 2000. Table 20-7 indicates continuing increases in all categories.

TABLE 20-3 : PREDOMINANT SOIL UNIT CHARACTERISTICS FOR NORTHEASTERN ILLINOIS

Unit In Basin	Soil Unit	Soil Color	Soil Texture	Permeability	Drainage	Subsoil Texture	Underlying Materials	Agricultural Usage Limitations	Approximate Percentage of Prime Agri. Land	Development Usage Limitations
	Fox-Dresden-Casco	brown	loam	mod-rapid	well	loam	sand and gravel	E, D, LF	12	S, E, ST
YES	Warsaw-Rodman-Lorenzo	brown	loam	moderate	well	loam	sand and gravel	E, D	50	S, E, ST
YES	Volinia-Selma-Lomax	brown	loam	moderate	excessive	loam	sand	WE, D, W	80	W, S, P
YES	Maumee-Watseka Plainfield	black	loamy sand	rapid	excessive	sand	sand	W, WE, D	30	S, W
	Zurich-Grays-Wauconda	gray	silt loam	moderate	moderate	clay loam	silt loam	W, E, LF	90	S, W, ST
YES	Drummer-Brenton-Proctor	brown	silt loam	moderate	moderate	clay loam	loam	W, E	100	W, S, P
	Miami-Kidder-McHenry	gray-brown	loam	moderate	well	clay loam	loam	E, ST, LF	40	ST, S, SS
	Drummer-Saybrook-Lisbon	dark gray	silt loam	moderate	moderate	clay loam	loam	W, E	80	W, S, SP, SS
	Ringwood-Griswold	brown	loam	moderate	well	clay loam	sandy loam	E, W	85	S, W, ST
YES	Morley-Markham-Ashkum	gray	loam	slow	moderate	silty clay	clay loam	E, W, LF	60	ST, SP, SS, W, HC
YES	Elliot-Ashkum-Beecher	dark gray	silt loam	slow	moderate	silt loam	clay loam	W, E	85	W, SP, CS, SS
YES	Milford-Martinton	black	silt loam	mod. slow	poor	silty clay	calcareous sediment	W	95	W, HC, P, SP, SS
	Symerton-Andres-Ashkum	black	silt loam	moderate	moderate	clay loam	clay loam	E, W	95	W, SP, SS
	Nappanee-Peotone-Del Rey	dark gray	silt loam	slow	well	silt loam	calcareous sediment	W, T, LF, E	50	W, SP, HC, P
YES	Frankfort-Bryce-Montgomery	dark brown	silt loam	slow	poor	silty clay	calcareous sediment	W, T, LF, E	5	W, SP, HC, P
YES	Romeo-Joliet	black	loam	moderate	poor	loam	limestone	W,STN, FL	60	W, SH, FL, SS
	Otter-Huntsville-Millington	black	loam	moderate	moderate	loam	loam	FL, W	95	W, FL
YES	Fox-Wauconda-Sawmill	dark gray	silt loam	moderate	poor	loam	sand	W, FL, E	75	W, FL
	Houghton-Lena	black	muck/peat	rapid	poor	muck/peat	sand/silt	HWT, W	0	W, P, S, HWT, LS

USAGE LIMITATION CODES

CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
CS	Clayey Subsoil	D	Drouthiness	E	Erosion	FL	Flooding
HC	Heavy Clayey Subsoil	HWT	High Water Table	LF	Low Fertility	LS	Low Strength
P	Ponding	S	Seepage	SH	Shallowness to Bedrock	SP	Slow Percolation
SS	Shrink-Swell	ST	Steepness	STN	Stoniness	T	Soil Tilth
W	Wetness	WE	Wind Erosion				

TABLE 20-4 : POPULATION CHANGE 1975-2000

FACILITY PLANNING AREAS	1975	1980	1985	1990	1995	2000	% Change 1975-2000
MSDGC Lemont Service Area(1)	10000	11000	13000	14000	19000	24000	140.0
Central Service Area(1)	2549000	2431000	2441000	2450000	2461000	2472000	-3.0
Northside Service Area(1)	1383000	1374000	13801000	1387000	1387000	1388000	0.4
South Service Area(1)	1035000	1082000	1135000	1187000	1245000	1302000	25.8
ROMEOVILLE	17000	19000	22000	24000	28000	31000	82.4
LOCKPORT	18000	19000	21000	24000	26000	28000	56.7
JOLIET	119000	129000	141000	153000	173000	193000	69.0
TOTAL FPAs & SERVICE AREAS	5127000	5065000	5154000	5239000	5339000	5438000	6.1
TOTAL BASIN	4034425	3864725	3895046	3925367	3950720	3974778	-1.5

(1)Service area is located in more than one basin

Source: Northeastern Illinois Planning Commission

(4) Water Supply: Lake Michigan is now, and will continue to be, the major source of water supply for northeastern Illinois. About 5 million people in Chicago and 89 other communities use lake water, including virtually the entire population of this Basin. Groundwater pumpage in the basin is minimal, limited to wells which provide part of the water supply for a few communities in the southern half of the basin. Groundwater serves a combined population of less than two percent of the basin total.

(5) Government: Aside from the land immediately adjacent to the Will County portion of the Sanitary and Ship Canal, the entire basin is within Cook County. Included in the basin are all or parts of 48 municipalities, 24 townships, 11 sanitary districts, and 6 other special districts with impacts on water quality.

(6) Recreation: County forest preserves and various municipal park districts provide facilities and opportunities for most types of indoor and outdoor recreation. Forest preserve facilities include hiking and cross-country ski trails, toboggan runs, bridal paths, nature centers, and a number of heavily fished ponds and lakes, as well as facilities for picnicking. Municipal park facilities include swimming pools, baseball diamonds, ice skating rinks, and fishable lagoons. Inland power boaters on the canal system system make use of extensive boating facilities. Hunting is restricted by the heavy

TABLE 20-5: 1970 LAND USE

Land Use Category	Total Acres	% of Total
Residential	82,148	29.6
Manufacturing and Processing	11,393	4.1
Transportation, Communications, & Utilities	24,262	8.8
Commercial	13,590	4.9
Streets & Parking	2,647	1.0
Public Buildings	5,589	2.0
Public and Quasi-Public Open Space	42,919	15.5
Vacant, Agricultural & Forest Areas	52,243	18.8
Warehousing	42,447	15.3
Total	277,238	100.0

TABLE 20-6 : LAND USE FORECASTS (ACRES)

Land Use Category	1980	1985	1990	1995	2000
Residential	83088	83930	84771	85684	86598
Manufacturing	14257	15249	16241	17162	18082
Commercial	16956	18060	18165	20187	21209
Transportation/Communication, etc.	26614	27588	28561	29507	30453
Open Space, Vacant Agriculture, etc.	136323	132411	129500	124698	120896
Total	277238	277238	277238	277238	277238

SOURCE: Northeastern Illinois Planning Commission, 1976

urbanization, and is generally limited to small game. A number of organizational camping grounds are found in the basin; however, no public camping facilities exist at the present time.

TABLE 20-7 : EMPLOYMENT FORECAST

CATEGORY	1970	1980	1985	1990	1995	2000	1970-2000 % Increase
Manufacturing	575,488	575,878	583,973	592,067	606,038	620,008	7.7
Local Retail	254,097	464,773	411,168	417,562	424,319	431,075	69.7
Other	1,146,567	1,280,942	1,327,106	1,373,270	1,414,845	1,456,420	27.0
Total	1,976,152	2,261,593	2,322,247	2,382,956	2,445,202	2,507,503	27.0

20.02 IMPACTS OF OTHER PROJECTS

a. Introduction

In many river basins there are studies, projects, or other activities underway by various agencies which may impact directly or indirectly on both surface and groundwater quality. Admittedly, most of these will have indirect effects since they usually pertain to water quantity or hydrologic modifications conducted in the course of navigation or flood control projects. Other potential impacts result from the construction or improvement of roads and highways. In these instances, drainage patterns are altered, local farm tiles may be interrupted, silt introduced during construction, and vehicular-related pollutants conveyed to local water bodies thereafter, all affecting water quality. Stream crossings by highways and by various public and private utilities all may affect water quality to varying degrees and for various lengths of time. Not to be overlooked are public and private storm sewer outlets which may be installed in the future.

Wide variety of projects impact on water quality, however, attention will be given here only to those of significant size, breadth, or impact. Discussion will be directed toward providing a check list so that projects will not be overlooked in the evaluation of the initial plan alternatives, and in future revisions of the plan if those projects are still viable at those times.

b. Corps of Engineers

The U.S. Army Corps of Engineers has a variety of responsibilities relating to navigation and flood control, as well as ancillary activities related to shore erosion and water quality.

(1) Flood Control: Flood control has been a traditional function of the Corps. Typical projects have involved the construction of dams and levees, as well as channel modification.

There are no active Corps' flood control projects or studies in the basin, other than its interest in the MSDGC's TARP project, discussed below. The Corps is involved, however, in a flood control project on the Little Calumet River in Indiana (discussed in Chapter Thirteen). Since the Little Calumet is tributary to this basin, the project, when implemented, will have an impact.

(2) Navigation: The Corps has general jurisdiction over navigation in the waters of the United States. Responsibilities include channel and harbor construction and maintenance, clearing and snagging of navigable waters, and control over the location and placement of structures which might impact on navigability.

A federal navigation project consisting of a 9-foot barge channel extends from Lake Calumet downstream via the Little Calumet River, the Calumet-Sag Channel, and the Sanitary and Ship Canal. The Corps is responsible for the maintenance of these channels. Polluted spoil material from maintenance dredging is currently disposed at the O'Brien Lock and Dam site, which has approximately 150,000 cu. yds. of remaining capacity. The Corps is also proposing to use an abandoned sand and gravel pit in the City of Worth to dispose of dredging from the Cal-Sag Channel. This site has a design capacity of 2 to 4 million cu. yds., depending upon material densification.

(3) Wastewater Studies: Pursuant to Section 206 of the Flood Control Act of 1958 and Congressional Resolutions adopted in 1971, the Corps was involved in a planning study on alternative wastewater management systems for the Chicago-South End of Lake Michigan (C-SELM) area, which covered portions of northeastern Illinois and northwestern Indiana. All of the Chicago River/Sanitary and Ship Canal/Calumet Sag Channel basin was included in the C-SELM study area. The study was directed at the evaluation of various regional wastewater management systems, including plans which would eliminate pollution discharges. However, since this was only a planning study, the report contained no recommendations for federal action. The intent of Congress was for these studies to be presented to local units of government for their consideration and adoption, as desired.

Given the widespread public opposition to the study, the possibility for its implementation must be regarded as extremely remote.

(4) Dredge and Fill Permits: Under Section 404 of PL 92-500, the Corps is authorized to issue permits for the placement of dredged or fill material into navigable waters or on adjacent land sites. Permits may be withheld if it is determined that the placement of these materials will have adverse effects on water supplies, fish and wildlife, or recreation. Under current guidelines, Corps authority extends to all navigable waters and tributaries thereto, up to points where the average annual flow is 5 cfs or more.

(5) TARP Study: As part of the overall C-SELM study, the Corps is also investigating the appropriate "federal interest" in the Tunnel and Reservoir Plan (TARP) proposed by the MSDGC. In its Interim Report No. 1, the Corps confirmed that supplemental sewers, tunnels and reservoirs (such as proposed in the TARP) were the optimal means for controlling runoff on both a community and an areawide basis.

The report noted that the flood damage reduction aspects of the plan appeared to fall within the purview of federal flood control program, thus establishing the federal interest in that component. Follow-on studies concluded that the tunnel, reservoir, and channel-widening components of the plan (related to flood control) were appropriate for implementation under the regular flood control program administered by the Corps. Subsequently, the Water Resources Development Act of 1976 authorized the preparation of Phase I General Design Memoranda studies, which will evaluate the federal interest in the flood control aspects of certain tunnels and reservoirs called for by the so-called "TARP II" phase of the plan. Details of the TARP plan and its impact on the Chicago River/Sanitary and Ship Canal/Cal Sag Basin are discussed elsewhere in this report.

(6) Lake Michigan Diversion Demonstration Study: The area affected by this study includes the Great Lakes-St. Lawrence drainage basin and the Illinois River portion of the Upper Mississippi River basin. During periods of high Great lakes water levels, shore property suffers erosion damage, while water quality in the Illinois Waterway decreases during periods of low river flows. The study and demonstration program is a test of the practicability of increasing Lake Michigan diversion by Illinois to alleviate shoreline damage on the Great Lakes due to high lake levels and to improve the water quality in the Illinois Waterway. The project consists of a 5-year demonstration program to evaluate the effects of increasing the average annual Lake Michigan diversion at Chicago from 3200 cfs up to 10,000 cfs. The effects of the increase diversion on Great Lakes levels, Illinois Waterway water quality and flooding problems, and St. Lawrence Seaway navigation will be investigated. A report is to be submitted to Congress at the end of October 1981 with results of the the study and demonstration,

including recommendations as to whether to continue the authority or to change the criteria.

c. U.S. Department of Agriculture

The Agricultural Stabilization and Conservation Service (ASCS) and the Soil Conservation Service (SCS) are the two principal units of the U.S. Department of Agriculture having programs related to water quality management.

(1) Conservation Program: The SCS and ASCS provide a variety of functions and services directed at the reduction of soil ercsion and maintenance of soil fertility. The SCS offers extensive technical assistance to individuals, local soil and water conservation districts, and other interested parties in developing erosion control plans. The ASCS gives assistance through cost-sharing to farmers in order to control erosion and agriculturally related water pollution. Various site-specific control techniques are available for implementation under this program, depending upon the nature of the problems locally.

(2) PL-566 Projects: The small watershed program of the SCS, authorized by the Watershed Protection and Flood Prevention Act of 1954 (PL 83-566) provides a framework through which federal, state, and local units of government can deal with water resources problems on a cooperative basis. The program is oriented toward the prevention of soil erosion and the control of flooding and sedimentation damages. Works typically include the construction of small reservoirs, stream channelization, grade stabilization, and bank projection. Projects are sponsored by and coordinated through local soil and water conservation districts and other interested agencies.

(a) Chicago Area River Basin Study: The Chicago Area River Basin Study was initiated by the SCS in 1971 under PL-566 authority. Work was undertaken in six watersheds in Cook and Lake counties, under the local sponsorship of the MSDGC. The principal objective of the study was to develop comprehensive plans to reduce flood damage.

That portion of this basin draining to the Calumet Sag Channel was included in the Chicago Area River Basin Study, and in 1975, a floodwater management plan was completed. The plan called for an accelerated program of land treatment, purchase of open land, floodplain regulation, flood proofing, channel maintenance, purchase of wetlands and natural areas, and the structural measures for the reconstruction of two bridges. Implementation of these measures will have obvious (though unquantified) water quality benefits.

d. Illinois Department of Transportation

Two divisions of this department have responsibilities related to water quality management: the Division of Water Resources (IDWR) and the Division of Highways (DOH).

(1) IDWR: The IDWR has statutory responsibility for navigation and flood control projects on water bodies throughcut the state, as well as permit authority for private and public projects which enter or cross over or under such water. The IDWR also has underway a number of flocd ccntrcl projects in the region. None, however, are active cr proposed for the basin.

(a) Water Allocation: IDWR has also been assigned responsibility for allocating Lake Michigan water to Illinois users for water supply and other purposes within the 3,200 cfs diversion limitation established by the U.S. Supreme Court. Following extensive hearings, an initial allocation was made to various units of government through the year 1980. The order sets forth the amount of water which may be allocated to each unit and the purposes for which it may be used. The order also establishes rules and regulations relative to the management of water use. Communities in this basin are affected by the initial allocation order, and will continue to be impacted by subsequent orders.

(b) Lake Diversion Accounting Procedures: The IDWR and other state agencies currently are attempting to secure a revision in the method by which the amount of water diverted from Lake Michigan is measured and accounted for. Under this proposed revision, direct diversion would be measured at the lakefront intake structures instead of at Lockport, where measurements are now made. In addition, the natural stormwater and groundwater runoff component of diversion would be assumed a constant, 550 cfs long-term average. The rationale for assigning the lower 550 cfs figure is predicated on the fact that the stormwater and groundwater runoff components of the diversion vary from year to year, with the long-term average being 550 cfs. In certain wet years the natural diversion has been 730 cfs as a maximum five year moving average. Since the Supreme Court decree specified a five year moving average of 3200 cfs total water use, it is necessary that 730 cfs be reserved each year for natural diversion in order to meet the limitations. The use of the 550 cfs long-term average as a fixed value will also facilitate accounting procedures.

In an effort to gain acceptance of this accounting method, a meeting of Great Lakes States' Attorney-Generals was held in September 1977, and the Illinois proposal was presented. If agreement can be reached among the states and if the revised accounting method is approved by the U.S. Supreme Court, an additional 180 cfs of lake water could be

made available for distribution to existing and new water supply users in the region. This would be possible even though the overall 3,200 cfs limitation would remain in effect.

(2) DOH: The Division of Highways is responsible for the construction and maintenance of state highways. Highways have associated water quality impacts both during their construction (e.g. erosion and sedimentation, disruption of drainage, etc.) as well as when placed in use (e.g. road salt usage, roadway drainage). Construction of the proposed Crosstown Expressway, and improvements to the Stevenson Expressway are significant projects. Resurfacing and road improvements are planned for many other basin roadways. Other transportation projects of importance include the proposed Franklin Street Subway and the O'Hare rapid transit extension.

e. Local Units of Government

Municipalities, the counties, and special purpose districts are involved in a number of local projects which have direct or indirect water quality impacts. The general purpose units are empowered to adopt regulations such as flood plain ordinances, on-site stormwater detention ordinances, and soil erosion and sedimentation control ordinances. All of these have the potential for improving water quality in streams and rivers. Zoning ordinances, building codes, and health regulations all have the potential for at least peripheral impact on local water quality. Still other effects result from more routine activities such as street sweeping, sewer and catch basin cleaning, and solid waste management.

Special purpose districts also are involved. The extensive wastewater management program of the MSDGC is a prime example. Cook County Forest Preserve District acquisitions also may have a bearing on future development in the basin. The North Cook and Will-South Cook Soil and Water Conservation Districts have long been active in promoting soil erosion control measures.

f. NIRPC

The Northwestern Indiana Regional Planning Commission (NIRPC) is the regional planning agency for Lake and Porter counties, Indiana. NIRPC recently completed a 208 water quality management plan for its jurisdictional area. Due to the common interest in certain water bodies of an interstate nature (Lake Michigan, Grand Calumet River, Kankakee River, and Little Calumet River), water planning activities of NIPC and NIRPC have been coordinated from their inception. The mechanism for this coordination has been the Illinois-

Indiana Bi-State Commission, which was created for the express purpose of coordinating planning programs and public construction projects of mutual concern to both northeastern Illinois and northwestern Indiana. Major has been placed on the development of plans for the Indiana portion of the Little Calumet River and other waterways which will allow the more stringent Illinois water quality standards to be met. Both the Little Calumet and grand Calumet Rivers, which originate in Indiana, impact on this basin.

20.03 WATER QUALITY IN THE BASIN

a. Stream Classifications and Applicable Standards

The Grand Calumet River, the Calumet Sag Channel, the Chicago Sanitary and Ship Canal, the Calumet River, the North Shore Channel, and portions of the Little Calumet River and the North Branch Chicago River have been designated "Secondary Contact and Indigenous Aquatic Life Waters." All other waterways in the basin are designated as "General Use, Protected for Public and Food Processing Water Supply" with the exception of the Little Calumet River and the Chicago River, which have been designated as "General Use, Not Protected for Public and Food Processing Water Supply." Applicable standards for these designations were discussed in Chapter Four.

It should be noted that the dissolved oxygen standard for "secondary contact" streams is not less than 4.0 mg/l at any time, while for "General Use" water bodies the state standard is not less than 6.0 mg/l during at least 16 hours of any 24 hour period, nor less than 5.0 mg/l at any time. Ammonia standards for "secondary contact" streams are 2.5 mg/l during April-October, and 4.0 mg/l during November-March. For "General Use" water bodies the standard is 1.5 mg/l.

b. IEPA Stream Segment Classifications

The state has been divided by the Illinois EPA into hydrologic units that coincide with major river basins. These units have been further subdivided into segments on the basis of common characteristics. The Chicago River/Sanitary and Ship Canal/Cal Sag Basin includes all or parts of segments A-2, A-3, A-4, A-6, A-12, A-13 and B-2, seven of the 20 segments in the Des Plaines/Lake Michigan hydrologic unit as defined by the IEPA. These segments, like all others in the state, have been designated "water quality limited." This designation means that water quality in the waterways does not currently meet applicable water quality standards and/or is not expected to meet those after the minimum statutory limitations have been applied to effluents discharged to the waterways.

c. Existing Water Quality Conditions

Assessment of current water conditions is based on information developed by this Commission's water quality sampling program and by other public agencies, principally the IEPA (See Figure 20-2). These sampling programs and the results they produced are described below. The simulation of existing conditions by the Commission's water quality model also provided a comprehensive picture of water quality in the basin.

(1) Commission In-Stream: The sampling and analysis program conducted for the 208 plan occurred at 48 instream sampling stations established for areawide planning (See Chapter Four). Nine of these stations were located in this basin as follows:

Station 30: North Shore Channel at Maple Street in Wilmette

Station 32: North Branch Chicago River at Chicago Avenue in Chicago

Station 33: Chicago River at the Outer Drive in Chicago

Station 34: Sanitary and Ship Canal at Cicero Avenue in Stickney

Station 37: Grand Calumet River at State Line Road

Station 42: Calumet Sag Channel at Cicero Avenue in Alsip

Station 43: Sanitary and Ship Canal at Division Street in Lockport

Station 44: Calumet Sag Channel at Illinois 83, Sag Bridge

Station 45: Sanitary and Ship Canal at Illinois 83.

Data were collected at seasonal intervals over a 13-month period (April 1976-April 1977) at each of these stations. Sampling results were used in calibrating the water quality model but they alsc provided important information on the characteristics of streams in the basin. Samples were analyzed for 19 constituents (see Table 20-8).

Of the 19 parameters evaluated, the State of Illinois has established standards for these four: pH, temperature, dissolved oxygen (DO), and ammonia. Violations of state standards have been used in this study as a measure of the relative water quality of rivers and streams. The ammonia nitrogen standard is the one violated most frequently in the

basin. It was violated at least once at all stations, and was violated during all sampling periods at Stations 32, 42, 43, and 44. Violations of the DO standard were also noted at all stations.

Ammonia violations also were common in the samples collected by IEPA at 29 sites in the basin (see Table 20-12). The standard for ammonia was violated in 52 percent of the samples, and in some cases the concentration of ammonia was far in excess of the standard.

(2) Land Use Runoff: In addition to the instream sampling program, the Commission conducted several other monitoring programs as part of the overall study. Included was: stormwater runoff sampling and analysis at 18 sites, representing a cross-section of land use in the region, and two ravines tributary to Lake Michigan.

One of the stormwater sites (forest) was located within the Chicago River/Sanitary and Ship Canal Basin. The data from the stormwater samples were not intended to be basin-specific; rather, they indicate characteristics of runoff from particular kinds of land uses, wherever they are found in the region. Results of the sampling effort were discussed in Chapter Six.

(3) SOD Measurements: Sediment oxygen demand (SOD) measurements from bottom deposits were made at 110 stations, 29 of which were located in this basin.

In addition to measuring the oxygen demands of various organisms, bottom sediment samples were collected, analyzed, and described as being representative of one of the following generalized conditions: clean, slightly degraded, moderately polluted, polluted, heavily polluted, or sewage sludge-like. Ratings developed for the sites in this basin are presented in Table 20-9.

(4) Biological Classifications: Benthic community (macroinvertebrate) samples were taken from bottom deposits at 116 stations in northeastern Illinois, 22 of which were in this basin.

Benthic macroinvertebrate communities were analyzed, and indices reflecting the nature and diversity of these communities were developed according to a classification system utilized by the IEPA. Classifications developed for the sites in this basin are presented in Table 20-10. The benthic communities analyses categorized 17 sites as being polluted and 5 sites as semi-polluted.

Another similar indexing system is known as the Shannon-Weaver Index. Data to use this system in the basin are not available. Comparison of the ratings for a particular site based on SOD values and benthic communities shows conflicting classifications; this is due to the use of different criteria and parameters in the rating systems.

Figure 20-2: WATER SAMPLING STATIONS



Revised 2/15/79

Figure 20-3: BASIN MODELING SEGMENTS



Revised 2/15/79

(5) Fish Species and Habitat: Fish population surveys were made in 1976 at 248 sites in the region, 21 of which were in this basin. Five of these sites were located on the Chicago River and its branches, three were on the North Shore Channel, three were on the Sanitary and Ship Canal, three were on the Calumet Sag Channel, one on the Grand Calumet River, and the remainder on tributary streams.

Twenty-five species and two hybrids were collected in the survey. Significantly, goldfish (a species which is extremely tolerant of poor water quality conditions and other habitat abuse) was the most abundant species collected, constituting 17 percent of the total number of fish collected. This is indicative of the degraded fishery in this watershed. In total, pollution-tolerant species made up 60 percent of the total species list. The remaining 40 percent was equally divided between moderately tolerant and intolerant species. The pollution intolerant species, which represented 16 percent of the total fish collected, were recorded primarily near the locks where Lake Michigan water is diverted into the canal system.

Follow-on work by the Illinois Natural History Survey (INHS) involved computation of a "toxicity index" relating water quality to fish habitat suitability. Included in the parameters for computing the toxicity index (using bluegills as the target species) are cadmium, nickel, arsenic, chromium, boron, mercury, cyanide, ammonia, and copper. On the basis of its analysis, the INHS determined that the calculated "Bluegill Toxicity Index" was in excess of the theoretical maximum level above which a diverse fishery cannot be maintained at 20 of 24 IEPA water quality sampling stations in the basin. The four sites that were within the maximum level were located at points of lake diversion, and on the North Branch Chicago River.

Water quality parameters found to have a significant effect on the high index calculations were ammonia, cyanide, total iron, MBAS, and silver.

Overall, with the exception of stream segments immediately downstream from the lake diversion points, fish habitat was rated poor.

(6) IEPA In-Stream Sampling: The IEPA water quality sampling network consists of about 176 sampling stations in the region, 29 of which are in this basin. Results of analyses at these sites in 1976 are shown in Table 20-11.

Violations of standards for DO, lead, and fecal coliform were noted frequently in the IEPA samples. Out of 206 analyses for fecal coliform, 132 apparent violations were recorded. (The IEPA varies from the preferred methodology for sampling fecal coliform.) Out of 69 analyses for lead, 12 violations were noted. Violations of the DO standard were noted in 21 percent of the samples, and in several instances the violations were far below the applicable standards. Some violations of these standards were recorded by the IEPA at all stations.

TABLE 20-8: IN-STREAM WATER QUALITY ANALYSES–SUMMARY DATA

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

STATION NO. 30

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
JUNE 1 - 10 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.6	115	30	44	714	14	20	12	5	7			5.9	4.6	2.1	1.45	3	154	13	
	Minimum	7.7	103	6	2	168	1	12	5	2	4			0.1	0.0	0.2	0.00	0	144	6	
	Mean	8.3	111	14	22	282	5	15	10	4	5			0.6	0.2	0.3	0.21	1	149	10	
SEPTEMBER 7 - 16 1 76	No. of Analyses	30	10	30	30	30	30	30	30	9	10			30	30	30	30	10	2	10	
	Maximum	8.5	113	21	36	228	8	24	11	4	6			1.3	0.6	0.3	0.32	3	147	9	
	Minimum	8.0	104	7	8	170	1	18	4	1	2			0.2	0.1	0.1	0.01	0	143	5	
	Mean	8.2	108	12	19	199	4	20	9	2	4			0.7	0.2	0.2	0.14	1	145	6	
DECEMBER 5 - 15 1976	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
FEBRUARY 21 - 28 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
MARCH 14 - 19 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	7.8	124	19	74	280	13	18	10	3	12			1.2	0.4	0.3	0.20	2	162	9	32
	Minimum	7.0	119	8	10	168	3	5	6	2	3			0.5	0.1	0.2	0.06	0	154	5	26
	Mean	7.4	121	11	24	220	6	9	8	3	6			0.9	0.3	0.3	0.13	1	158	7	29

STATION NO. 32

JUNE 1 - 10 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	7.8	218	17	52	726	19	22	10	4	9			8.3	8.1	2.8	1.67	7	259	5	
	Minimum	6.7	166	8	5	184	1	16	1	1	6			5.3	4.2	0.6	0.35	5	216	1	
	Mean	7.4	192	11	16	440	5	19	2	3	7			6.6	6.2	1.4	1.00	6	238	3	
SEPTEMBER 7 - 16 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	7.7	212	17	29	648	11	28	8	10	10			12.8	12.4	0.9	3.48	9	222	8	
	Minimum	7.1	135	6	7	228	2	21	1	1	4			6.2	5.4	0.1	0.55	4	217	3	
	Mean	7.4	187	9	15	429	5	23	3	3	6			9.7	9.2	0.5	1.28	6	220	5	
DECEMBER 5 - 15 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	7.7	197	18	21	814	9	8	9	10	50			10.5	10.0	3.6	3.24	7	229	1	
	Minimum	7.0	172	4	9	488	3	2	5	1	3			7.8	6.7	1.7	1.60	6	225	0	
	Mean	7.2	189	9	14	556	6	7	6	5	17			9.4	8.5	2.7	2.65	7	227	1	
FEBRUARY 21 - 28 1977	No. of Analyses	12	8	12	12	12	12	12	12	8	0			12	12	12	11	8	2	8	
	Maximum	7.5	199	10	21	734	9	7	13	7				11.0	10.0	0.5	2.08	8	207	2	
	Minimum	6.9	172	4	9	346	2	5	6	5				7.2	6.6	0.3	0.40	4	185	1	
	Mean	7.2	188	8	14	460	5	6	9	6				9.1	8.4	0.4	1.50	6	196	1	
MARCH 14 - 19 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	7.3	220	9	17	612	8	13	12	8	24			12.2	10.8	0.5	1.88	6	243	3	1050
	Minimum	7.0	156	4	4	518	2	9	4	3	2			6.8	5.7	0.3	1.16	5	207	2	430
	Mean	7.1	198	7	10	560	5	11	5	5	12			9.2	8.1	0.4	1.49	6	225	3	563

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

TABLE 20-8: IN-STREAM WATER QUALITY ANALYSES–SUMMARY DATA

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

STATION NO. 33

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
JUNE 1 - 10 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.5	119	17	20	590	19	20	10	4	6			0.9	0.5	0.5	0.75	1	146	8	
	Minimum	7.4	106	5	2	170	1	11	1	2	2			0.0	0.0	0.2	0.00	0	143	4	
	Mean	8.1	123	7	10	237	4	16	9	3	4			0.4	0.1	0.2	0.18	1	145	6	
SEPTEMBER 7 - 16 1976	No. of Analyses	30	10	30	30	30	30	30	30	8	10			30	30	30	30	10	2	10	
	Maximum	8.3	112	15	22	230	7	26	9	2	10			10.0	8.7	0.8	0.62	2	144	6	
	Minimum	7.9	104	5	5	158	1	19	1	1	1			0.2	0.0	0.1	0.01	1	143	4	
	Mean	8.1	108	7	11	198	3	21	8	2	3			0.9	0.4	0.2	0.15	1	144	5	
DECEMBER 5 - 15 1976	No. of Analyses	4	0	4	4	4	4	4	4	0	0			4	4	4	4	0	0	0	
	Maximum	7.9		7	17	208	6	0	14					0.9	0.2	0.2	0.28				
	Minimum	7.7		5	11	174	3	0	13					0.5	0.1	0.2	0.15				
	Mean	7.8		6	14	185	5	0	14					0.6	0.1	0.2	0.22				
FEBRUARY 21 - 28 1977	No. of Analyses	12	0	12	12	12	12	12	12	8	0			12	12	12	12	8	2	8	
	Maximum	8.1	125	11	34	224	6	3	15	6				0.8	0.1	0.3	0.07	2	156	5	
	Minimum	7.5	115	2	6	150	1	0	10	1				0.1	0.1	0.2	0.01	0	116	3	
	Mean	7.7	119	5	12	188	4	1	13	3				0.3	0.1	0.2	0.03	1	136	4	
MARCH 14 - 19 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	8.0	126	10	29	226	7	7	13	4	4			0.7	0.2	0.3	0.07	2	169	8	27
	Minimum	7.4	115	1	3	144	1	6	4	2	1			0.3	0.1	0.2	0.03	0	157	5	23
	Mean	7.6	121	4	10	203	4	7	11	3	3			0.4	0.2	0.3	0.05	1	163	7	25

STATION NO. 34

JUNE 1 - 10 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.0	177	22	57	806	15	28	9	4	8			6.2	5.0	1.3	0.97	4	204	8	
	Minimum	7.0	125	7	7	182	1	17	1	1	4			2.5	2.0	0.0	0.32	3	176	3	
	Mean	7.4	157	12	19	374	5	22	2	3	6			4.3	3.8	0.8	0.62	4	190	5	
SEPTEMBER 7 - 16 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	7.9	173	29	91	408	15	35	9	6	9			9.1	8.5	0.7	1.77	6	188	19	
	Minimum	7.2	134	7	10	290	2	25	2	1	3			0.5	0.1	0.1	0.44	4	188	4	
	Mean	7.5	154	11	20	341	5	28	4	3	5			5.9	5.4	0.4	0.87	4	188	9	
DECEMBER 5 - 15 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	9.6	150	24	48	372	11	9	12	4	31			4.5	3.6	1.8	1.02	4	175	5	
	Minimum	7.1	126	9	15	278	1	1	9	2	5			2.1	1.6	0.8	0.27	2	169	3	
	Mean	7.6	136	16	29	315	7	6	10	3	12			3.3	2.6	1.1	0.68	3	172	3	
FEBRUARY 21 - 28 1977	No. of Analyses	12	8	12	12	12	12	12	12	8	0			12	12	12	12	8	2	8	
	Maximum	7.7	144	20	53	370	13	8	13	6				3.1	2.3	0.4	0.49	4	167	6	
	Minimum	7.4	123	4	9	232	3	3	3	2				0.9	0.6	0.2	0.04	1	164	2	
	Mean	7.5	132	11	27	268	6	5	10	4				1.9	1.5	0.3	0.26	2	166	4	
MARCH 14 - 19 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	7.4	194	19	57	584	11	17	6	5	11			8.4	8.0	0.5	1.48	6	264	5	1200
	Minimum	7.0	159	8	13	380	4	6	0	3	8			4.4	3.8	0.4	0.62	4	206	3	495
	Mean	7.2	178	13	27	477	6	14	4	4	10			6.6	5.9	0.4	1.04	5	235	4	611

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

TABLE 20-8: IN-STREAM WATER QUALITY ANALYSES–SUMMARY DATA

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

STATION NO. 37

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
JUNE 1 – 10 1976	No. of Analyses	29	10	29	29	29	29	29	29	10	10			29	29	29	29	10	2	10	
	Maximum	8.2	229	65	214	986	136	24	8	13	24			28.6	25.2	3.4	0.99	10	376	14	
	Minimum	6.9	185	11	9	214	2	16	0	5	1			0.3	0.0	0.1	0.07	7	308	6	
	Mean	7.4	201	23	43	742	21	21	3	8	16			13.0	11.0	1.1	0.47	9	342	8	
SEPTEMBER 7 – 16 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.4	230	53	185	842	122	26	9	13	150			38.0	37.2	4.0	2.04	10	282	19	
	Minimum	7.2	134	8	18	582	11	20	0	6	13			8.6	4.3	0.1	0.37	6	254	10	
	Mean	7.6	199	20	58	704	36	23	3	10	36			23.2	21.1	1.2	0.82	8	268	14	
DECEMBER 5 – 15 1976	No. of Analyses	12	10	12	12	12	12	12	12	10	10			12	12	12	12	10	2	10	
	Maximum	7.5	236	47	208	1164	149	12	6	33	60			8.0	5.7	2.4	1.43	11	277	8	
	Minimum	7.1	193	13	31	606	21	9	3	8	2			4.0	2.0	0.1	0.47	8	276	1	
	Mean	7.3	209	25	75	830	54	10	5	16	25			5.4	3.6	0.7	0.81	10	277	3	
FEBRUARY 21 – 28 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	0			12	10	10	10	6	0	6	
	Maximum	7.5	265	54	231	872	171	12	7	37				24.8	20.8	2.1	2.10	11		7	
	Minimum	7.0	231	20	66	718	44	6	0	19				6.4	5.1	0.1	0.48	9		1	
	Mean	7.2	243	37	136	794	90	9	4	27				13.1	9.6	0.7	1.00	10		4	
MARCH 14 – 19 1977	No. of Analyses	10	6	10	10	10	10	10	9	6	6			10	10	10	10	6	2	6	10
	Maximum	7.4	262	48	452	1154	315	16	8	119	1787			16.5	12.8	1.4	2.34	11	373	0	39
	Minimum	7.0	173	16	60	598	45	10	0	5	4			7.4	5.0	0.1	0.32	5	350	0	14
	Mean	7.2	237	32	176	859	120	12	2	39	328			10.8	8.1	0.5	1.16	9	362	0	19

STATION NO. 41

JUNE 1 – 10 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	7.8	201	43	48	812	18	24	8	8	17			14.3	11.6	3.3	2.23	7	300	27	
	Minimum	7.0	176	8	6	360	2	16	1	4	4			5.1	0.0	0.1	0.42	5	285	5	
	Mean	7.4	188	13	21	658	7	20	4	5	9			10.9	9.8	0.6	0.85	6	293	12	
SEPTEMBER 7 – 16 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	7.7	189	23	54	1742	14	26	13	6	13			17.1	16.8	1.7	1.34	7	257	20	
	Minimum	7.3	155	10	14	444	5	21	1	2	6			10.0	10.0	0.1	0.28	5	243	14	
	Mean	7.5	176	15	29	592	8	23	4	3	8			14.4	13.6	1.1	0.81	6	250	17	
DECEMBER 5 – 15 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	7.9	171	34	47	614	13	5	11	12	61			12.7	11.6	0.4	2.96	6	214	6	
	Minimum	7.3	130	17	22	340	4	1	7	3	7			4.6	3.7	0.3	0.51	3	174	3	
	Mean	7.5	149	23	34	477	9	4	9	6	16			8.2	7.5	0.3	1.39	4	194	4	
FEBRUARY 21 – 28 1977	No. of Analyses	12	8	12	12	12	12	12	12	8	0			12	12	12	12	8	2	8	
	Maximum	7.9	151	18	56	394	14	6	12	10				4.8	3.8	0.7	1.16	3	182	7	
	Minimum	7.3	126	7	6	248	2	3	8	3				1.7	0.9	0.2	0.07	1	177	2	
	Mean	7.5	137	11	21	293	6	4	11	6				3.0	2.3	0.3	0.39	2	180	4	
MARCH 14 – 19 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	7.4	220	37	141	812	28	12	11	18	30			15.9	14.8	1.3	2.30	8	322	5	1200
	Minimum	7.1	165	10	19	550	9	2	1	10	19			10.2	7.6	0.1	0.72	3	255	3	280
	Mean	7.2	196	18	44	695	1	10	4	15	24			12.7	10.8	0.4	1.25	6	288	3	691

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

TABLE 20-8: IN-STREAM WATER QUALITY ANALYSES–SUMMARY DATA

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

STATION NO. 42

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
JUNE 1 – 10 1976	No. of Analyses	30	10	30	30	30	30	30	29	10	10			30	30	30	30	10	2	10	
	Maximum	7.7	208	25	50	812	12	25	4	11	21			12.6	12.0	1.6	1.31	8	319	68	
	Minimum	7.0	164	10	8	192	1	17	0	4	7			4.8	4.0	0.4	0.36	7	276	6	
	Mean	7.4	197	15	23	652	7	21	2	6	11			9.6	8.8	0.9	0.74	6	298	33	
SEPTEMBER 7 – 16 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	7.7	202	27	68	710	13	27	6	10	20			18.4	18.0	1.6	1.41	7	283	52	
	Minimum	7.3	172	8	14	462	4	21	1	2	5			7.7	5.8	0.1	0.53	5	280	29	
	Mean	7.4	188	18	33	628	8	23	3	4	8			13.6	12.8	1.0	0.90	6	282	36	
DECEMBER 5 – 15 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	7.8	176	60	173	692	30	5	10	10	55			12.7	12.0	0.4	1.56	10	229	11	
	Minimum	7.2	134	15	29	444	7	1	7	4	7			4.7	4.2	0.3	0.64	4	207	3	
	Mean	7.4	159	29	56	556	12	3	8	6	17			8.3	7.6	0.4	1.02	6	218	6	
FEBRUARY 21 – 28 1977	No. of Analyses	12	8	12	12	12	12	12	12	8	0			12	12	12	12	8	2	8	
	Maximum	7.8	155	42	90	440	17	7	11	10				5.8	4.9	0.3	1.02	11	191	6	
	Minimum	7.3	134	7	12	302	4	3	0	3				2.4	1.9	0.2	0.15	2	189	2	
	Mean	7.4	143	18	36	373	10	4	9	7				3.9	3.1	0.3	0.50	4	190	4	
MARCH 14 – 19 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	7.3	224	44	145	868	36	12	7	17	22			14.7	12.4	2.1	1.98	9	333	12	1060
	Minimum	7.0	158	15	25	664	9	9	1	9	7			7.3	5.8	0.4	0.77	6	285	5	335
	Mean	7.2	198	20	43	756	14	11	2	12	18			9.7	7.8	0.9	1.18	7	309	8	663

STATION NO. 43

JUNE 1 – 10 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	7.8	182	16	34	976	10	28	4	6	10			7.0	5.7	3.7	0.68	6	261	40	
	Minimum	6.8	136	7	6	346	1	21	1	1	4			3.1	2.5	1.1	0.14	4	252	6	
	Mean	7.4	159	10	17	560	5	24	2	3	6			4.9	4.1	2.2	0.51	5	257	19	
SEPTEMBER 7 – 16 1976	No. of Analyses	30	10	30	30	30	30	30	30	9	10			30	30	30	30	10	2	10	
	Maximum	7.6	174	18	34	588	10	30	5	5	7			11.1	9.6	4.1	1.10	7	230	22	
	Minimum	7.3	141	7	10	436	1	25	1	1	3			5.1	3.5	0.7	0.42	4	227	8	
	Mean	7.4	158	10	18	484	5	28	3	2	5			6.7	6.0	2.5	0.67	5	229	16	
DECEMBER 5 – 15 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	7.7	154	25	51	564	23	10	9	5	63			6.9	5.2	3.9	1.08	6	202	4	
	Minimum	7.2	135	11	20	412	5	7	6	2	6			3.6	2.6	2.2	0.50	4	201	2	
	Mean	7.3	147	18	33	481	9	9	7	4	14			5.0	4.0	2.7	0.75	5	202	3	
FEBRUARY 21 – 28 1977	No. of Analyses	12	8	12	12	12	12	12	12	8	0			12	12	12	12	8	2	8	
	Maximum	7.7	158	34	81	418	16	8	12	8				5.4	4.8	0.9	0.54	5	191	7	
	Minimum	7.1	138	8	19	328	4	4	8	3				2.8	2.2	0.4	0.11	2	177	1	
	Mean	7.3	146	18	44	383	9	6	9	6				4.2	3.5	0.6	0.36	4	184	3	
MARCH 14 – 19 1977	No. of Analyses	10	6	10	10	10	10	10	9	6	6			10	10	10	10	6	2	6	10
	Maximum	7.3	196	16	49	706	21	18	6	6	16			10.9	9.7	2.7	1.24	6	288	4	4245
	Minimum	6.8	178	8	14	564	5	11	1	3	8			8.4	7.1	0.4	0.66	4	286	2	1525
	Mean	7.1	188	11	22	640	8	16	2	4	11			9.7	8.5	0.7	0.96	5	287	3	1968

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

TABLE 20-8: IN-STREAM WATER QUALITY ANALYSES–SUMMARY DATA

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

STATION NO. 44

SAMPLING PERIOD	STATISTICS	PARAMETERS(1)																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5 (2)	BOD_{20} (2)	Chemical Oxygen Demand (3)	Total Organic Carbon (3)	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
JUNE 1 - 10 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	9.6	207	18	35	1680	14	29	12	7	13			11.2	9.8	1.1	0.83	6	348	166	
	Minimum	6.9	148	7	9	470	1	17	0	3	5			4.5	3.8	0.6	0.34	4	262	13	
	Mean	7.5	185	11	17	678	6	22	4	5	9			7.9	7.1	0.8	0.27	5	305	68	
SEPTEMBER 7 - 16 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	7.7	204	22	50	1348	19	28	7	5	8			18.8	16.4	4.2	1.26	8	288	118	
	Minimum	7.3	163	10	19	490	4	21	2	1	3			4.6	3.5	0.1	0.50	4	287	25	
	Mean	7.5	185	14	28	659	9	23	4	3	6			13.3	12.6	1.0	0.85	5	288	52	
DECEMBER 5 - 15 1976	No. of Analyses	11	10	11	11	11	11	11	11	10	10			11	11	11	11	10	2	10	
	Maximum	7.9	185	42	77	1102	36	9	9	22	77			12.4	12.4	0.5	2.00	12	261	6	
	Minimum	7.3	143	19	32	432	8	0	6	3	9			5.0	4.5	0.3	0.56	4	211	3	
	Mean	7.5	165	28	50	607	12	2	8	6	20			8.8	8.3	0.4	1.15	6	236	5	
FEBRUARY 21- 28 1977	No. of Analyses	12	8	12	12	12	12	12	12	8	0			12	12	12	12	8	2	8	
	Maximum	7.7	158	40	105	526	19	7	12	13				6.3	4.4	0.9	1.12	8	189	8	
	Minimum	7.2	132	5	20	318	4	2	7	5				2.5	1.9	0.2	0.05	2	175	3	
	Mean	7.4	144	21	51	386	12	4	10	8				3.8	3.0	0.3	0.42	4	182	5	
MARCH 14 - 19 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	7.3	218	48	129	894	26	15	10	9	21			15.5	14.4	0.9	2.24	8	380	16	1670
	Minimum	6.9	162	8	17	564	7	8	1	5	2			6.2	1.9	0.1	0.90	4	295	4	365
	Mean	7.2	186	19	44	702	11	11	3	7	12			9.4	7.6	0.4	1.26	6	338	8	673

STATION NO. 45

JUNE 1 - 10 1976	No. of Analyses	30	10	30	30	30	30	30	30	11	10			30	30	30	30	10	2	10	
	Maximum	7.8	171	15	79	1366	13	27	9	10	16			5.3	4.4	5.3	0.76	6	222	4	
	Minimum	6.8	133	6	5	354	1	17	1	1	4			2.2	1.5	1.6	0.23	4	210	2	
	Mean	7.3	155	10	16	542	5	22	2	4	7			3.9	3.1	2.9	0.50	5	216	3	
SEPTEMBER 7 - 16 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	9	
	Maximum	7.7	192	23	45	702	15	28	9	5	6			13.8	13.6	5.6	0.90	6	204	8	
	Minimum	7.2	135	6	8	344	1	22	1	1	3			2.5	1.3	0.7	0.39	5	200	3	
	Mean	7.3	154	9	15	440	5	26	3	2	5			4.2	3.3	3.3	0.60	5	202	4	
DECEMBER 5 - 15 1976	No. of Analyses	10	9	10	10	10	10	10	10	9	9			10	10	10	10	9	2	9	
	Maximum	7.8	143	22	56	704	15	11	10	7	52			4.0	2.9	4.6	0.71	6	192	3	
	Minimum	7.0	126	12	22	338	6	2	6	2	7			2.4	1.6	3.0	0.43	3	172	1	
	Mean	7.4	137	15	30	489	8	8	8	4	15			3.4	2.4	3.6	0.60	5	182	2	
FEBRUARY 21 - 28 1977	No. of Analyses	12	8	12	12	12	12	12	12	8	0			12	12	12	12	8	2	8	
	Maximum	7.7	162	26	86	440	18	9	14	8				5.2	4.5	1.3	1.00	5	198	4	
	Minimum	7.1	136	7	11	300	3	4	8	3				2.4	1.8	0.3	0.10	2	182	1	
	Mean	7.3	146	13	34	360	8	7	11	5				3.9	3.2	0.8	0.46	4	190	3	
MARCH 14 - 19 1977	No. of Analyses	10	6	10	10	10	10	10	9	6	6			10	10	10	10	6	2	6	10
	Maximum	7.3	200	24	102	672	21	15	9	9	24			12.7	11.6	1.0	0.88	7	250	5	3250
	Minimum	7.0	166	6	9	504	5	13	3	4	7			7.4	6.4	0.4	0.40	5	226	1	1520
	Mean	7.1	186	12	32	575	9	14	4	6	13			8.9	7.6	0.6	0.69	6	238	2	1892

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

TABLE 20-9 : GENERALIZED BENTHIC SEDIMENT CONDITIONS

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

STATION NUMBER	STREAM NAME	BENTHIC CONDITION*
1	North Shore Channel	Sewage Sludge Like
2	North Shore Channel	Sewage Sludge Like
3	North Shore Channel	Sewage Sludge Like
4	North Branch of Chicago R.	Sewage Sludge Like
5 F	North Branch of Chicago R.	Sewage Sludge Like
5 W	North Branch of Chicago R.	Heavily Polluted
6	North Branch of Chicago R.	Slightly Degraded
7 F	North Branch of Chicago R.	Moderately Polluted
7 W	North Branch of Chicago R.	Heavily Polluted
8 S	South Branch of Chicago R.	Heavily Polluted
8 W	South Branch of Chicago R.	Sewage Sludge Like
9 F	So.Fork,So.Branch,Chgo R.	Polluted
9 W	So.Fork,So.Branch,Chgo R.	Heavily Polluted
10 F	Chicago San.& Ship Canal	Heavily Polluted
10 W	Chicago San.& Ship Canal	Polluted
11	Chicago San.& Ship Canal	Polluted
12	Chicago San.& Ship Canal	Sewage Sludge Like
13	Chicago San.& Ship Canal	Polluted
14	Chicago San.& Ship Canal	Polluted
17 S	Little Calumet River	Heavily Polluted
17 W	Little Calumet River	Polluted
18 S	Little Calumet River	Heavily Polluted
18 W	Little Calumet River	Sewage Sludge Like
19 F	Cal-Sag Channel	Polluted
19 W	Cal-Sag Channel	Sewage Sludge Like
21	Cal-Sag Channel	Moderately Polluted
79	Little Calumet River	Polluted
80	Little Calumet River	Moderately Polluted
82	Midlothian Creek	Heavily Polluted

*Based on SOD value; after ISWS procedures. S – Summer F – Fall W – Winter No data for Station 20.

(7) Computer Simulation of Existing Conditions: Figure 20-3 shows the Chicago River/Sanitary and Ship Canal/Cal Sag Basin, its 11 component "reaches", and the 11 data output points which were established for water quality modeling purposes. A reach is a continuous section of a channel, the main stem, a tributary, or a lake, together with all lands draining to it. The surrounding area that drains to a reach is composed of "segments." A segment is a land area with a uniform hydrologic response based upon its land cover and use as well as its meteorological condition. A segment is the basic unit of land cover for both hydrologic and water quality simulation.

Data for output point 21 gives the simulated loads contributed to the entire Chicago Sanitary and Ship Canal portion of the basin. The Calumet Sag Channel is represented by the loads at output point 41. Points 21 and 41 are the most downstream points in their respective sub-basins. In general, the discussion in this chapter focuses on conditions at the bottom of Reaches 21 and 41. Loads for Reaches 1, 4, 9, 10, 15, 28, 29, 32, and 35 are discussed as necessary. Water quality conditions are described in more detail in reports issued by the Commission during the basin planning process. For more information on Reaches 21 and 41 see Table 20-12.

d. Results of Water Quality Modeling

As described in Chapter Four, the water quality model is a computerized system of equations that represent hydrologic and water quality systems. To ensure that the model is an accurate representation of the real-world system, the model uses thousands of measurements and observations of actual conditions in the basin. Water samples collected and analyzed at numerous sites in the basin during 1976 and 1977 form the basis for establishing the water quality routine. The model is adjusted to give a suitable fit to the actual data, a process known as calibration. Once a high degree of confidence is reached concerning the ability of the model to represent the physical system, the model can then be used to explore alternatives. This running of the model under variable or unknown conditions is referred to as simulation. The flexibility to test alternative situations is not available in the real physical system; this is precisely the value of the model.

Sources of pollutants are categorized in the modeling process as follows:

- Point Sources: treatment plants and other discrete discharges;

TABLE 20-10 : BIOLOGICAL STREAM SITE CLASSIFICATIONS

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

Station Number	Stream Name	IEPA Classification[1]	Shannon-Weaver	
			Index	Classification[2]
1	North Shore Channel	P		(3)
2	North Shore Channel	P		(3)
3	North Shore Channel	P		(3)
4	North Branch of Chicago River	P		(3)
5	North Branch of Chicago River	P		(3)
6	North Branch of Chicago River	P		(3)
7	North Branch of Chicago River	P		(3)
8	South Branch of Chicago River	SP		(3)
9	South Fork, South Branch, Chicago River	P		(3)
10	Chicago Sanitary and Ship Canal	P		(3)
11	Chicago Sanitary and Ship Canal	P		(3)
12	Chicago Sanitary and Ship Canal	P		(3)
13	Chicago Sanitary and Ship Canal	P		(3)
14	Chicago Sanitary and Ship Canal	P		(3)
17	Little Calumet River	SP		(3)
18	Little Calumet River	P		(3)
19	Cal-Sag Channel	P		(3)
20	Cal-Sag Channel	P		(3)
21	Cal-Sag Channel	P		(3)
79	Little Calumet River	SP	2.29	MP
80	Little Calumet River	SP	0.20	SeP
82	Midlothian Creek	SP	1.36	MP

(1) Polluted (P); Semi-polluted (SP); Unbalanced (U); Balanced (B).

(2) Severe pollution (Se P); Moderately polluted (MP); Clean (C).

(3) Data not available for this basin

TABLE 20-11: VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen	Fecal[2] Coliform (per 100 ml.)	Iron	Copper	Dissolved Oxygen	Lead	Silver	Chloride	Fluoride	PH (Units)	Boron	Sulfate	Cyanide	Hexavalent Chromium	Total Phosphorus	Manganese	Phenol	Total Dissolved Solids	Temp. (°F)
			4.0	1000	2.0	1.0	2.0	0.1	0.1	(4)	2.5	6-9	(4)	(4)	0.025	(4)	(4)	(4)	0.3	(4)	(4)
100	Chicago Ship Canal	No. of Analyses	7	7	2	3	7	2	3		3	6			3				2		
		No. of Violations	3	5	0	0	2	0	0		0	0			0				0		
GI 02		Maximum	8.20	70,000			6.4														
		Minimum	1.80	100			0.6														
		Mean[3]	4.42	5054			3.0														
101	Chicago Ship Canal	No. of Analyses	7	7	3	3	7	3	3		2	6			3				3		
		No. of Violations	4	6	1	0	3	0	0		0	0			0				0		
GI 01		Maximum	8.00	90,000	2.3		6.1														
		Minimum	1.60	100	0.4		0.6														
		Mean[3]	4.30	5558	1.1		2.8														
102	Chicago Ship Canal	No. of Analyses	7	7	0	0	7	0	0		0	6			0				0		
		No. of Violations	4	6			3					0									
GI 08		Maximum	7.80	75,000			6.9														
		Minimum	1.60	400			0.4														
		Mean[3]	4.42	10593			2.8														
130	Chicago Ship Canal	No. of Analyses	9	9	3	3	9	3	3		3	9			3				3		
		No. of Violations	4	5	0	0	3	2	0		0	0			0				0		
GI 07		Maximum	13.00	93000			9.9	0.39													
		Minimum	1.80	100			0.9	0.01													
		Mean[3]	5.15	1415			4.9	0.17													
131	Chicago Ship Canal	No. of Analyses	8	9	3	3	9	3	3		3	8			3				3		
		No. of Violations	1	4	0	0	3	1	0		0	0			0				0		
GI 06		Maximum	4.70	450,000			10.1	0.19													
		Minimum	2.60	100			0.3	0.02													
		Mean[3]	3.45	2558			5.0	0.09													
132	Chicago Ship Canal	No. of Analyses	9	9	3	3	9	3	3		3	8			3				3		
		No. of Violations	1	5	0	0	0	0	0		0	0			0				1		
GI 05		Maximum	5.40	150,000															0.440		
		Minimum	2.10	100															0.000		
		Mean[3]	3.17	2643															0.148		
133	Chicago Ship Canal	No. of Analyses	9	8	3	3	9	3	3		3	8			3				3		
		No. of Violations	4	5	0	0	3	1	0		0	0			0				0		
GI 04		Maximum	5.80	51000			11.5	0.11													
		Minimum	1.80	100			0.0	0.01													
		Mean[3]	3.81	3583			4.9	0.05													
134	Chicago Ship Canal	No. of Analyses	8	7	3	3	8	3	3		3	8			3				3		
		No. of Violations	3	7	0	0	2	0	0		0	0			0				0		
GI 03		Maximum	6.40	26000			12.1														
		Minimum	1.30	2200			1.2														
		Mean[3]	3.58	8070			5.3														
135	So. Fork Chicago River	No. of Analyses	7	6	2	2	7	2	2		2	6			2				2		
		No. of Violations	3	6	0	0	3	0	0		0	0			0				0		
HCA 01		Maximum	6.50	200,000			6.8														
		Minimum	2.20	5900			0.0														
		Mean[3]	4.10	33024			3.0														

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

TABLE 20-11: VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																			
			Ammonia Nitrogen 4.0	Fecal[2] Coliform (per 100 ml.) 1000	Iron 2.0	Copper 1.0	Dissolved Oxygen 2.0	Lead 0.1	Silver 0.1	Chloride (4)	Fluoride 2.5	PH (Units) 6-9	Boron (4)	Sulfate (4)	Cyanide 0.025	Hexavalent Chromium (4)	Total Phosphorus (4)	Manganese (4)	Phenol 0.3	Total Dissolved Solids (4)	Temp. (°F) (4)
136	So. Branch Chicago River	No. of Analyses	7	6	2	2	7	2	2		2	7			2				2		
		No. of Violations	3	3	0	0	1	0	0		0	0			0				0		
HC 01		Maximum	9.00	26000			11.6														
		Minimum	0.62	300			1.2														
		Mean[3]	4.20	1747			6.4														
139	No. Branch Chicago River	No. of Analyses	7	7	3	3	7	3	3		3	7			3				3		
		No. of Violations	6	6	0	0	4	0	0		0	0			0				0		
HCC 05		Maximum	10.00	59000			8.6														
		Minimum	2.60	400			0.3														
		Mean[3]	7.67	3987			2.8														
140	No. Branch Chicago River	No. of Analyses	8	8	3	3	7	3	3		3	8			3				3		
		No. of Violations	7	6	0	0	2	1	0		0	0			0				0		
HCC 04		Maximum	10.00	300,000			8.8	0.23													
		Minimum	3.00	100			0.7	0.01													
		Mean[3]	6.93	3932			4.4	0.08													
141	No. Branch Chicago River	No. of Analyses	8	8	2	2	8	2	2		2	8			2				2		
		No. of Violations	7	3	0	0	0	0	0		0	0			0				0		
HCC 03		Maximum	12.00	300,000																	
		Minimum	2.20	100																	
		Mean[3]	7.21	592																	
142	No. Branch Chicago River	No. of Analyses	8	8	3	3	8	3	3		3	8			3				3		
		No. of Violations	7	3	0	0	0	0	0		0	0			0				0		
HCC 02		Maximum	11.00	330,000																	
		Minimum	1.70	100																	
		Mean[3]	6.43	627																	
143	North Shore Channel	No. of Analyses	8	8	2	2	8	2	2		2	8			2				2		
		No. of Violations	7	0	0	0	0	0	0		0	0			0				0		
HCCA 03		Maximum	9.20																		
		Minimum	1.40																		
		Mean[3]	5.45																		
144	North Shore Channel	No. of Analyses	8	8	3	3	8	2	3		3	8			3				3		
		No. of Violations	0	8	0	0	4	0	0		0	1			0				0		
HCCA 02		Maximum		400,000			12.3					8.5									
		Minimum		3100			0.0					5.2									
		Mean[3]		32,208			4.4					7.6									
145	North Shore Channel	No. of Analyses	7	6	3	3	7	3	3		3	7			3				3		
		No. of Violations	0	0	0	0	0	1	0		0	0			0				0		
HCCA 01		Maximum						0.12													
		Minimum						0.01													
		Mean[3]						0.04													
103	Cal- Sag Channel	No. of Analyses	8	8	1	1	8	1	1		1	7			1				1		
		No. of Violations	5	6	0	0	2	0	0		0	0			0				0		
H 01		Maximum	10.0	200,000			10.2														
		Minimum	0.04	100			0.0														
		Mean[3]	4.59	4989			4.4														

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

TABLE 20-11: VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen 4.0	Fecal[2] Coliform (per 100 ml.) 1000	Iron 2.0	Copper 1.0	Dissolved Oxygen 2.0	Lead 0.1	Silver 0.1	Chloride (4)	Fluoride 2.5	PH (Units) 6-9	Boron (4)	Sulfate (4)	Cyanide 0.025	Hexavalent Chromium (4)	Total Phosphorus (4)	Manganese (4)	Phenol 0.3	Total Dissolved Solids (4)	Temp. (°F) (4)
104	Cal-Sag Channel	No. of Analyses	6	6	3	3	6	3	3	-	3	6			4				3		
		No. of Violations	5	6	1	0	2	1	0		1	0			2				0		
H 02		Maximum	12.00	85,000	2.4		10.2	6.20			3.1				0.040						
		Minimum	2.10	2500	1.3		0.5	0.02			0.8				0.010						
		Mean[3]	7.75	17,051	1.7		4.5	2.08			1.5				0.027						
105	Cal-Sag Channel	No. of Analyses	7	7	3	3	7	3	3		3	7			3				3		
		No. of Violations	6	5	1	0	0	1	0		0	0			1				0		
H 03		Maximum	12.00	52000	11.0			0.16							0.040						
		Minimum	2.00	100	0.5			0.01							0.020						
		Mean[3]	7.35	2716	4.1			0.06							0.027						
124	Little Calumet River	No. of Analyses	7	7	2	3	7	2	3		2	8			2				3		
		No. of Violations	7	4	0	0	0	0	0		0	0			2				0		
H 04		Maximum	18.60	72000											0.060						
		Minimum	4.60	100											0.030						
		Mean[3]	11.15	2635											0.045						
125	Little Calumet River	No. of Analyses	6	6	3	3	6	3	3		3	7			4				3		
		No. of Violations	2	4	0	0	0	1	0		0	0			1				0		
H 05		Maximum	9.20	38000				0.48							0.050						
		Minimum	0.73	100				0.00							0.000						
		Mean[3]	3.85	1939				0.17							0.015						
126	Little Calumet River	No. of Analyses	4	4	1	1	2	1	1		1	4			1				1		
		No. of Violations	2	2	0	0	0	0	0		0	0			0				0		
H 06		Maximum	6.0	20,000																	
		Minimum	3.5	100																	
		Mean[3]	4.4	714																	
127	Grand Calumet River	No. of Analyses	7	7	1	1	6	1	1		1	7			1				1		
		No. of Violations	7	5	1	0	2	1	0		0	0			0				0		
HA 01		Maximum	15.00	20,000	2.3		9.3	0.12													
		Minimum	5.70	100	2.3		0.8	0.12													
		Mean[3]	8.90	3793	2.3		4.5	0.12													
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

TABLE 20-11: VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen 1.50	Fecal[2] Coliform (per 100 ml.) 200	Iron 1.0	Copper 0.02	Dissolved Oxygen 5.0	Lead 0.1	Silver 0.005	Chloride (4)	Fluoride 1.4	PH (Units) (4)	Boron (4)	Sulfate (4)	Cyanide 0.025	Hexavalent Chromium 0.05	Total Phosphorus (4)	Manganese (4)	Phenol (4)	Total Dissolved Solids (4)	Temp. (°F) (4)
137	Chicago River	No. of Analyses	8	7	3	3	8	3	3		3				3	3					
		No. of Violations	1	4	0	1	1	0	1		0				0	0					
HCB 01		Maximum	3.40	32,000		0.10	13.1		0.010												
		Minimum	0.01	100		0.00	4.3		0.000												
		Mean[3]	0.70	532		0.04	9.9		0.003												
138	Chicago River	No. of Analyses	7	5	2	2	7	2	2		2				2	2					
		No. of Violations	0	2	0	1	0	0	0		0				0	0					
HCB 02		Maximum		1000		0.07															
		Minimum		100		0.00															
		Mean[3]		245		0.03															
106	Little Calumet River	No. of Analyses	7	7	2	2	7	2	2		2				2	2					
		No. of Violations	5	7	0	1	3	0	0		0				0	0					
HB 01		Maximum	13.0	41,000		0.06	10.0														
		Minimum	0.46	1000		0.01	1.1														
		Mean[3]	5.97	3,960		0.03	6.2														
107	Midlothian Creek	No. of Analyses	7	6	3	3	7	3	3		3				3	3					
		No. of Violations	0	6	1	2	0	1	0		0				0	1					
HBA 01		Maximum		16,000	5.0	0.11		0.18								0.09					
		Minimum		1,300	0.4	0.01		0.01								0.00					
		Mean[3]		2,846	1.9	0.07		0.06								0.03					
146	North Branch Chicago River	No. of Analyses	8	8	3	3	8	3	3		3				3	3					
		No. of Violations	4	7	0	2	1	1	0		0				0	0					
HCC 01		Maximum	4.20	280,000		0.06	15.5	0.34													
		Minimum	0.00	200		0.02	2.6	0.01													
		Mean[3]	1.65	1893		0.04	7.7	0.12													
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

TABLE 20-12 : KEY DATA OUTPUT POINTS **CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN**

Reach No.	Description
21	Area drained by the Chicago River and the Sanitary and Ship Canal, upstream of Route 83, vicinity of Sag Junction. Includes the North and South Branches of the Chicago River and North Shore Channel.
41	Area drained by the Calumet - Sag Channel upstream of Route 83, vicinity of Sag Junction. Includes the Little Calumet River and flow from the O'Brien Lock and Dam Diversion.

TABLE 20-13 : STATISTICAL SUMMARY OF CURRENT WATER QUALITY **CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN**

Parameter (Standard) (All data in mg/l)	REACHES										
	1	4	9	10	15	21	29	28	32	35	41
BOD (No Standard) Maximum	55.5	49.4	49.1	24.5	52.4	40.0	59.4	29.6	48.7	38.3	38.3
Minimum	0.5	4.7	4.7	1.3	3.1	2.4	1.3	2.2	2.8	2.9	2.9
Mean	6.6	19.7	15.0	3.1	10.1	9.1	7.8	7.8	12.2	11.2	11.2
AMMONIA (2.5 mg/l) Maximum	5.64	12.0	9.44	3.49	8.63	7.0	4.39	8.45	4.39	17.5	17.5
Minimum	0.02	0.95	1.22	0.01	1.05	1.00	0.00	1.34	0.00	1.48	1.48
Mean	0.56	5.71	5.12	0.46	4.13	3.09	0.82	4.08	0.82	6.85	6.85
No. Violations	15	32	26	5	45	77	11	39	11	27	27
Avg. Duration Viol.	24	772	955	80	480	226	101	590	101	902	902
NITRATE (No Standard) Maximum	2.37	14.7	8.47	1.64	6.24	7.58	1.02	6.05	1.02	3.15	3.15
Minimum	0.10	0.29	0.45	0.00	0.44	1.01	0.24	1.06	0.24	0.37	0.37
Mean	0.25	2.54	2.60	0.29	2.07	3.77	0.65	2.99	0.65	1.17	1.17
PHOSPHATE (.05 mg/l) Maximum	1.49	4.97	3.13	1.01	2.61	1.19	0.68	1.05	0.68	1.23	1.23
Minimum	0.03	0.32	0.27	0.06	0.32	0.31	0.04	0.28	0.04	0.17	0.17
Mean	0.33	1.55	1.46	0.27	1.22	0.65	0.23	0.63	0.23	0.55	0.55
No. Violations	2	1	1	1	1	1	2	1	2	1	1
Avg. Duration Viol.	13,000	26,000	26,000	26,000	26,000	26,000	13,000	26,000	13,000	26,000	26,000

- Nonpoint Sources: surface runoff and groundwater seepage from developed and undeveloped areas;

- Combined Sewer Overflows; and

- Boundary Conditions: the amount of pollution flowing into a basin from another basin or from another state.

The simulation of existing conditions may provide a more comprehensive overview of water quality in a basin than do the results of periodic sampling programs. Not only are pollutant concentrations determined and related to instream standards, but also the relative amounts of pollutants contributed by various sources can be described.

(1) Pollutant Concentrations: Although 19 pollution indicators were sampled, simulation reports on existing conditions were prepared only for eight parameters: stream flow, temperature, chlorophyll a, DO, biochemical oxygen demand (BOD), ammonia (NH_3), nitrate (NO_3), and phosphate (PO_4). The last four represent pollutants that can be quantified and tied to specific categories or sources using the model.

Assessments of conditions with respect to each parameter or pollutant are based on in-stream standards, where these have been established. Statistical values are computed to express the minimum, maximum, and average concentrations of pollutants. Values also describe the number of times that simulated concentrations violated instream standards, and the average duration of the violation.

The simulation was continuous, with hourly outputs over a three-year period. Therefore, if a standard for a particular pollutant were constantly violated over the entire simulation period, the statistics for number and frequency of violations would read as follows:

- Number of violations: one (because there was only one violation, even though it was of three years' duration);

- Average duration: 26,000 hours (the total number of hours in the three-year period).

Table 20-13 summarizes pollutant levels simulated for the Chicago River/Sanitary and Ship Canal Basin under existing conditions. As indicated in the results of the in-stream sampling programs discussed above, problems are apparent with respect to ammonia. Maximum levels were far above the standard of 2.5 mg/l in all 11 of the reaches covered in the table. The mean ammonia concentration exceeded the standard in Reach 4 of the North Shore Channel, Reach 9 of the North Branch of the Chicago River, Reaches 21

and 28 of the Chicago Sanitary and Ship Canal, and Reaches 35 and 41 of the Calumet Sag Channel.

The phosphate standard of .05 mg/l, although it does not apply to rivers and streams in this basin, was theoretically violated continually in all 11 reaches.

Levels of BOD are variable; maximum values range from about 25 to 60 mg/l, while minimum simulated values vary from about 0.5 to 5.0 mg/l. Mean levels are generally high except for Reach 10. A standard for BOD does not exist because the effects of a BOD loading to a stream are dependent upon flow and assimilative capacity. BOD is not directly toxic to stream life as is ammonia. BOD levels cannot be judged as acceptable or excessive unless the effects of other constituents such as ammonia and dissolved oxygen levels are examined.

Dissolved oxygen (DO) has been used by the Commission as a general indicator of water quality. Table 20-14 gives the DO levels at the various data output points as well as an overall water quality assessment based on DO. The seriousness of the dissolved obygen problem is demonstrated by minimum DO levels of 0.0 mg/l at Reaches 9, 15, 21, 32, 35, and 28. These same reaches show numerous violations of the 4.0 mg/l standard for extended durations.

DO standards are violated 38 percent and 22 percent of the time in Reaches 35 and 41; minimum DO levels are at or close to zero also. Again, excessive BOD and ammonia loads are significant contributors to this problem. Each output point shows violations, but Reaches 4, 10, and 29 have typically good water quality.

(2) Pollutant Loadings and Sources: Table 20-15 presents percentages of selected pollutants contributed to the Chicago River/Sanitary and Ship Canal Basin from various sources. Table 20-16 presents the same information in tons per year. The data are based on input to the water quality model for existing conditions. Values are presented for two important reaches in the system: Reach 21, representing the Chicago River and the Chicago Sanitary and Ship Canal; and Reach 41, representing the Little Calumet River and the Calumet Sag Channel. For each reach they reflect the cumulative contributions of pollutants, but not the reactions occurring within the streams. (Boundary conditions for the Chicago River/Sanitary and Ship Canal/Cal Sag Canal Basin include flows from the North Branch of the Chicago River, Lake Michigan, Little Calumet River, and Grand Calumet River.) Further details may be found in the Commission report, "Existing Water Quality Conditions for the Chicago River/Sanitary and Ship Canal Basin."

Water quality in the basin is typically quite poor as simulated for existing conditions. This judgment is made with respect to the constituents being modeled, particularly DO, ammonia, phosphate, nitrate, algae levels, and temperature. Constituents such as pesticides, toxic substances, and turbidity have not been modeled and their

impacts have not been assessed. Overall pollutant loads in the Chicago River Sanitary and Ship Canal Basin are relatively high. The basin contains large areas of urbanized land and is subject to the severe pollutional impacts associated with urbanization.

The land cover in the Chicago River and Sanitary and Ship Canal portion of the basin (Reach 21) is almost entirely tributary to combined sewers; only 1.4 percent of the land area is in a pervious cover. The Calumet Sag Channel sub-basin (Reach 41) is about 45 percent combined sewers/impervious and 55 percent pervious cover (31 percent grassland, 17 percent lowlands, and 7 percent croplands). As seen in Table 20-15, boundary conditions comprise very important components of the area in both sub-basins.

However, a cursory examination of relative areas of land cover can be misleading. Excluding boundary conditions (which are highly significant), Table 20-15 shows that almost all the stream flow is generated by point sources. Pervious and impervious land covers (and even combined sewers) do not generate large percentages of flow. Their relative percentages do increase if boundary conditions are not considered.

According to Table 20-15, pollutant contributions by source are somewhat different in Reaches 21 and 41. Conditions at Reach 21 reflect the cumulative input of all upstream loads. Loads at Reach 21 show the importance of point sources and combined sewers. Boundary conditions, pervious surfaces and impervious land cover have negligible pollutant loadings. In Reach 41 there are significant loadings from point sources and boundary conditions and an important BOD loading from combined sewers. Combined sewer loadings for other constituents are minor as are constituent loadings from pervious and impervious covers. As modeled, boundary condition flows entering Reach 41 (from the Little Calumet and Grand Calumet Rivers) are significant in terms of pollutant loadings.

Besides boundary condition flows, the Chicago River and the Sanitary and Ship Canal receive considerable loadings from combined sewer areas that lie outside the basin area. Thus, during dry and wet flow periods, greater flows enter the basin from MSDGC plants than would be expected from the basin alone.

(3) Point Sources: Table 20-15 clearly shows the dominance of point sources in the pollutant loadings to Reaches 21 and 41. In the Chicago River and Sanitary and Ship Canal portion of the basin (Reach 21) point sources comprise 71 percent of the stream flow, 60 percent of the BOD load, 88 percent of the ammonia load, 94 percent of the nitrate load, and 79 percent of the phosphate load.

Point sources are also major pollutant load contributors in the Calumet Sag Channel (Reach 41). Treatment plant flows account for about one quarter of the stream flow, but disproportionately higher pollutant

TABLE 20-14 : STATISTICAL SUMMARY OF CURRENT DISSOLVED OXYGEN LEVELS

SIMULATED DO CHARACTERISTICS (Expressed in mg/l)	REACH				
	1	4	9	10	15
Maximum	13.4	10.2	10.5	13.9	11.1
Minimum	2.3	3.2	0.0	4.8	0.0
Mean	8.8	7.1	5.5	10.1	5.9
*No. of Violations	15	7	42	0	65
Avg. Duration	115	27	193	0	88
**Overall Assessment	fair	good	bad	excellent	poor

SIMULATED DO CHARACTERISTICS (Expressed in mg/l)	REACH				
	21	29	32	35	41
Maximum	9.3	12.9	10.8	10.4	12.0
Minimum	0.0	0.7	0.0	0.0	0.1
Mean	4.5	8.5	5.7	4.5	5.8
*No. of Violations	31	11	115	115	183
Avg. Duration	347	10	30	86	32
**Overall Assessment	bad	good	poor	bad	poor

SIMULATED DO CHARACTERISTICS (Expressed in mg/l)	REACH				
	28				
Maximum	9.6				
Minimum	0.0				
Mean	4.6				
*No. of Violations	42				
Avg. Duration	251				
**Overall Assessment	bad				

* With respect to minimum standard of 4.0 mg/l

** Based on percent of time DO levels were above 4.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor and Bad

TABLE 20-15 : SOURCES OF POLLUTANTS, EXISTING CONDITIONS

REACH/SOURCE	PERCENTAGES					
	AREA	STREAM FLOW	POLLUTANTS			
			BOD	NH_3	NO_3	PO_4
1. Chicago River & San. & Ship Canal						
(REACH NO. 21)						
BOUNDARY CONDITIONS	30	23	7	3	5	11
POINT SOURCES	--	71	60	88	94	79
COMBINED SEWERS	69	6	33	9	1	10
PERVIOUS COVER	1	0	0	0	0	0
Surface Runoff						
Groundwater						
IMPERVIOUS COVER	0	0	0	0	0	0
2. Calumet-Sag Channel						
(REACH NO. 41)						
BOUNDARY CONDITIONS	54	63	32	18	50	67
POINT SOURCES	--	26	39	78	39	25
COMBINED SEWERS	19	4	28	4	1	5
PERVIOUS COVER	25	5			9	2
Surface Runoff		1			1	1
Groundwater		4			8	1
IMPERVIOUS COVER	2	2	1		1	1

loadings: 39 percent of the BOD load, 78 percent of the ammonia load, 39 percent of the nitrate load, and 25 percent of the phosphate load.

In addition to point source pollutant loads, several other factors are important in determining the severity of DO violations in this basin. One is the flow characteristics of the streams and canals themselves. Gradients of these water bodies are such that flows are reversed on occasion in many reaches in the basin. Low gradients result in low-flow velocities and, therefore, low natural reaeration. Barge traffic also resuspends bottom deposits, further contributing to poor water quality.

Benthic deposits exert high Sediment Oxygen Demand (SOD) in this basin. Table 20-9 shows that SOD values were those associated with polluted and sewage sludge-like conditions. The sluggish flow is conducive to the accumulation of bottom sediments. When disturbed by dredging or barge traffic, oxygen-demanding pollutants and algal nutrients are released. As with point sources, the impact of SOD is probably most significant during low flow periods, when dilution is minimal.

Nutrients for algal growth, particularly nitrates and phosphates, are mainly supplied by point sources, as shown in Table 20-15. However, due to light limitations caused by high turbidity in this basin, algal populations do not contribute to low DO levels. Algae release oxygen during active photosynthesis in daylight hours and absorb oxygen at night while respiring. This daily cycle produces a diurnal fluctuation in the DO level. The net effect of algae during this cycle is to produce DO. When excessive populations die off, however, the decomposition of dead algal matter exerts an oxygen demand which depresses DO levels. High algal populations may also contribute to low night-time DO levels during low flows. However, the light limitation in the Chicago River/Sanitary and Ship Canal Basin does not make this situation critical.

(4) Combined Sewer Overflows: Overflows from combined sewers exert substantial BOD loads in both Reaches 21 and 41. In Reach 21 combined sewers make up 59 percent of the land cover but only 6 percent of the stream flow. The BOD concentration is very high, however, as combined sewers comprise 33 percent of the BOD loadings. Since overflows occur during wet weather, their direct effects impact during high flows. Because the relative contribution of impervious areas is so small (See Table 20-15) and point source loads are diluted by the high volumes of stormwater runoff, low DO levels during storm events are largely due to combined sewer overflows. The high BOD strength of combined sewer overflows is due to the mixing of raw sanitary sewage with stormwater. The high solids content in overflows also are significant contributors to benthic deposits.

Combined sewer overflows are also substantial in the Calumet Sag Channel (Reach 41). Although only 4 percent of the total stream flow, combined sewer overflows contribute 28 percent of the BOD. Loadings of ammonia, nitrate, and phosphate from combined sewers are all less than 10 percent in both reaches 21 and 41. Thus, control of combined sewers will have important effects on BOD levels only, whereas point source controls will effect all major pollutant constituents.

(5) Pervious Surfaces: Land covers in this category include grasslands, croplands, and lowlands. These form only one percent of the total land cover in Reach 21 and contribute no measurable flow or BOD, ammonia, nitrate, or phosphate. The contribution of pervious surfaces is slightly greater in Reach 41 where 25 percent of the basin is in these land covers. However, only five percent of the stream flow and a minor amount of nitrate and phosphate are contributed by pervious washoff. Relative to point sources, combined sewers, and boundary conditions, pervious areas contribute negligible pollutant loads.

(6) Impervious Surfaces: Impervious land covers, their loadings, and flow contributions are negligible in this basin. Very little impervious cover actually exists that is not drained by combined sewers.

(7) Boundary Conditions: Flows moving into the Chicago River/Sanitary and Ship Canal reaches from the North Branch of the Chicago River and into the Cal Sag Canal reach from the Little Calumet River are important sources of pollutants.

Loadings for Reach 21 include contributions from Lake Michigan and the North Branch of the Chicago River. Contributions of higher quality Lake Michigan water tend to improve the water quality in the Chicago River/Sanitary and Ship Canal reaches. However, flows from the North Branch of the Chicago River contribute considerable pollutant loads to Reach 21. Overall, flows from outside the basin contribute to Reach 21, 23 percent of the streamflow and the following percentages of pollutants: 7 percent of the BOD loading, 3 percent of the ammonia loading, 5 percent of the nitrate loading, and 11 percent of the phosphate loading.

Reach 41 loads include contributions from Lake Michigan, and the Little Calumet and Grand Calumet Rivers. Boundary flows amount to 63 percent of the total flow simulated in this section of the basin. The major contributor is the Little Calumet River. Boundary flows are the major contributors of nitrate and phosphate for Reach 41 - 50 percent of the nitrate loading and 67 percent of the phosphate loading, respectively. Important contributions of BOD (32 percent) and ammonia (18 percent) also are made by this source. Only point source loadings are more significant than boundary flows in the Calumet Sag Channel

portion of the basin. Any program designed to eliminate pollution in the Chicago River/Sanitary and Ship Canal Basin must be fully cognizant of the contributions from neighboring basins.

(8) Summary: Water quality is poor in this basin due to two major factors. The basin is highly urbanized, making point source loads very high. Sewage contributions to MSDGC treatment plants also come from adjacent areas outside the basin making point source loadings higher than would be expected from the basin alone. Low DO levels during low flows are largely the result of heavy point source loadings of BOD and ammonia. Combined sewers are also important load contributors of BOD and ammonia. Since combined sewer loadings occur during wet-weather conditions, their impacts are expressed by DO violations during high flows. The other major source of pollution comes from flows which originate outside the basin. Flows from the North Branch Chicago River and Little Calumet River are major causes of poor water quality in the basin.

Although nutrients are available for algal production, algae populations are not excessive in this system because poor light penetration suppresses algae growth. Accordingly, low DO values from night-time respiration or massive die-offs were not simulated.

Channel gradients are extremely low, thus reducing natural reaeration. Water depths are substantial, flow velocities are slow and sluggish. Benthic demands are very high, and the resuspension of bottom sediments occurs frequently as a result of heavy barge traffic.

20.04 POINT SOURCES: EXISTING CONDITIONS

a. Municipal-Type Wastewater Treatment Plants

Figure 20-4 shows point source locations within the basin. There are five municipal-type wastewater treatment facilities presently operating. The MSDGC operates the Northside, West-Southwest, Calumet, and Lemont plants, treating flows from the North, Central, South, and Lemont Service Areas. The characteristics of these facilities are contained in Table 20-17. A small, privately owned wastewater treatment plant, the Star Utility Company Villa West facility, near Orland Park, is the only municipal-type facility that is privately owned in the basin. Its characteristics are also set forth in Table 20-16.

Information on future expansions of service, upgrading of treatment facilities, and other relevant factors are contained in Section 20.04 f - "Local Facilities Planning."

Figure 20-4: POINT SOURCE DISCHARGES



Revised 2/15/79

TABLE 20-16 : POLLUTANT CONTRIBUTIONS BY SOURCE CATEGORY, EXISTING CONDITIONS

REACH: 21-Chicago River and San. and Ship Canal

PARAMETER	POINT SOURCES			NON-POINT SOURCES			Total Loads
	Comb Sewers	Treatment Plants	Boundary Conditions	Pervious Surfaces		Impervious	
				Surface	Ground	Surface	
BOD Load (tons/year)	14700	26700	2870	5.31	1.68	0	44300
% Total Load	33	60	7	0	0	0	100
AMMONIA Load (tons/year)	635	6300	197	0.53	0.17	0	7130
% Total Load	9	88	3	0	0	0	100
NITRATE Load (tons/year).	58.1	8730	501	0.53	3.58	0	9290
% Total Load	1	94	5	0	0	0	100
PHOSPHATE Load (tons/year)	136	1080	145	0.05	0.18	0	1360
% Total Load	10	79	11	0	0	0	100

REACH: 41-Calumet Sag Channel

PARAMETER	POINT SOURCES			NON-POINT SOURCES			Total Loads
	Comb Sewers	Treatment Plants	Boundary Conditions	Pervious Surfaces		Impervious	
				Surface	Ground	Surface	
BOD Load (tons/year)	5530	7580	6200	65.11	45.41	189	19650
% Total Load	28	39	32	0	0	1	100
AMMONIA Load (tons/year)	226	4770	1120	4.49	2.27	21.0	6160
% Total Load	4	78	18	0	0	0	100
NITRATE Load (tons/year)	14.8	499	638	14.93	101	8.66	1270
% Total Load	1	39	50	1	8	1	100
PHOSPHATE Load (tons/year)	23.9	112	295	2.79	2.72	2.79	439
% Total Load	5	25	67	1	1	1	100

b. Industrial Wastewater Treatment Plants

The basin has four industrial process wastewater dischargers. Ceco Steel manufacturing and Union Oil Company are located in the Will County portion of the basin; the Commonwealth Edison-Crawford Plant and Reynolds Metals Company are located in the Cook County portion. Information on these facilities, including treatment units, wastewater loads, and effluent limitations is presented in Table 20-18.

c. Miscellaneous Wastewater Treatment Plants

There are 14 "miscellaneous" wastewater treatment facilities in the basin. Current information available for these facilities, including treatment units, flows, and effluent limitations, is presented in Table 20-19.

d. Other Pcint Source Discharges

A number of other point source discharges occur in the basin. Most are of cooling water, filter backwash, and other such uses. Flows, NPDES permit numbers, effluent requirements, and general comments are included in Table 20-20.

e. Combined Sewer Overflows

NPDES permits that allow the discharge of untreated overflows during heavy rainfall events have been issued to the communities of Blue Island, Calumet Park, Evanston, Lincolnwood, Palos Park, and Summit, all in Cook County. A permit has also been issued to the City of Chicago which allows for 229 overflow points within the city. It is estimated that 297 square miles (63 percent) of the basin are tributary to combined sewer overflows.

f. Local Facilities Planning

(1) Introduction: The future water quality in this basin is dependent on the plans of the MSDGC in its North, Central, South, and Lemont service areas. The facilities planning activities of the North Branch Chicago River Basin and Little Calumet River Basin (discussed in Chapters Eleven and Thirteen), also affect this basin. Wastewater Service Areas are shown in Figure 20-5. Tables 20-17A through 20-17E highlight the status of facilities planning in the basin. Additional information follows.

(2) North Service Area: The MSDGC Northside Sewage Treatment Works (C-8) is the only municipal-type plant in the North Service Area. The completed and approved MSDGC Facilities Plan calls for the Northside plant to remain at 333.0 MGD capacity through the year 2000. The plant will be upgraded to include nitrification and tertiary filtration, probably by 1983. A portion of the population presently served by the Northside plant is scheduled to be transferred by 1980 to the MSDGC O'Hare plant currently under construction in the Upper Des Plaines Basin. Combined sewer overflows in the Northside Service Area will be captured by the TARP Mainstream System. The Northside plant will not function as a TARP dewatering facility. Combined sewer overflows from the Northside Service Area will be given treatment at the MSDGC West-Southwest Sewage Treatment Works in the Central Service Area.

(3) Central Service Area: The only municipal-type plant in the MSDGC Central Service Area is the West-Southwest Sewage Treatment Works (C-11). The completed and approved MSDGC Facility Plan calls for the expansion of the West-Southwest plant from 1,200 MGD to 1,358 MGD by 1983. Additional facilities to accomplish nitrification and tertiary filtration also will be installed. The expansion of the West-Southwest plant is required to provide capacity to treat combined sewer overflows stored in the TARP Mainstream System. The combined sewer overflows in the Central Service Area will be collected in the TARP Mainstream System.

(4) South Service Area: The MSDGC Calumet Sewage Treatment Works (C-4) is the only municipal-type plant in the South Service Area. The completed and approved MSDGC Facility Plan calls for expansion of the Calumet plant from 220 MGD to 354 MGD by 1983. The Calumet plant will also add nitrification and tertiary filtration processes. The expansion will provide capacity needed to handle variations in daily flows and to treat the combined sewer overflows from the South Service Area stored in the TARP Calumet System. The Homewood and Thornton wastewater treatment plans are expected to be phased out to the Calumet plant by 1980.

(5) Lemont Service Area: The only municipal-type plant in the Lemont Service Area is the Lemont Water Reclamation Plant (C-7). The completed MSDGC Facilities Plan calls for the conversion of the existing Lemont plant into a conventional activated sludge plant. The MSDGC plans to add two settling tanks at the Lemont plant by 1990 which will increase plant capacity from 1.2 MGD to 2.4 MGD. The combined sewer overflows in the Lemont Service Area will be eliminated by sewer separation and the construction of new storm sewers.

TABLE 20-17 A: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	FACILITY NAME	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	RECEIVING STREAM NAME	RECEIVING STREAM 7 DAY 10 YR. LOW FLOW (MGD) 1970	RECEIVING STREAM 7 DAY 10 YR. LOW FLOW (MGD) 2000	PUBLICLY OWNED TREATMENT WORKS NO	PUBLICLY OWNED TREATMENT WORKS YES	IEPA FY 78 PRIORITY NO.
C4	MSDGC-Calumet	MSDGC/MSDGC	Chicago	Little Calumet	32.3			X	83
C7	MSDGC-Lemont	MSDGC/MSDGC	Lemont	CS & SC	985.0			X	972
C8	MSDGC-Northside	MSDGC/MSDGC	Skokie	North Shore Channel	18.7			X	31
C11	MSDGC-West-Southwest	MSDGC/MSDGC	Stickney	CS & SC	284.9			X	4
C12	Star Utility Co. Villa West	MSDGC/MSDGC	Orland Park	McGinnis Slough to Mill Creek	0		X		

TABLE 20-17 B: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	NPDES PERMIT NUMBER	NPDES PERMIT DATE ISSUED	NPDES PERMIT DATE EXPIRES	EFFLUENT REQUIREMENTS (mg/l) INTERIM (A) BOD_5	INTERIM (A) TSS	INTERIM (A) P	INTERIM (A) NH_3N	FINAL (A) EFFECTIVE DATE	FINAL (A) BOD_5	FINAL (A) TSS	FINAL (A) P	FINAL (A) NH_3N	YEAR 2000 (B) BOD_5	YEAR 2000 (B) TSS	YEAR 2000 (B) P	YEAR 2000 (B) NH_3N	COMMENTS
C4	0028061	7-1-77	6-30-82						10	12			10	12		(a)	(a) 2.5 Apr-Oct. 4.0 Nov-Mar. (b) 1.5 mg/l in stream after mixing
C7	0028070	6-30-77	2-28-82						20	25			20	25		(a)	
C8	0028088	6-30-77	2-28-82						10	12			10	12		(a)	
C11	0028053	6-30-77	2-28-82						10	12			10	12		(a)	
C12	0031992	5-30-75	12-31-79	—					4	5			4	5		(b)	

(A) From NPDES Permits (B) From Facility Plans

TABLE 20-17 C: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	STATUS OF TREATMENT PLANT INTERIM YES	INTERIM PHASE OUT DATE	PERMANENT EXISTING	PROPOSED NEW YES	PROPOSED NEW EST. DATE IN SERVICE	WASTEWATER TREATMENT PLANT (MGD) AVERAGE FLOWS (a) 1975	1980	1985	1990	1995	2000	DESIGN CAPACITIES 1975	1985	OTHER YEAR	2000	COMMENTS
C4			X			220.0	233.0	268.0	278.0	289.0	(b) 299.0	220.0	354.0		354.0	(a) From facility plans or needs analysis documents unless noted. (b) Includes TARP flows (c) Private utility year 2000 flows assumed to be the same as 1975 flows due to lack of information.
C7			X			0.80	1.07	1.24	1.54	2.29	3.19	1.20	1.60	1990 2.40	2.40	
C8			X			330.0	311.0	319.0	322.0	325.0	327.0	333.0	333.0		333.0	
C11			X			857.0	874.0	1033.0	1036.0	1040.0	(b) 1044.0	1200.0	1358.0		1358.0	
C12			X			0.07	0.07	0.07	0.07	0.07	(c) 0.07	0.10	0.10		0.10	

TABLE 20-17 D: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANT

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	POPULATION SERVED (1000's)						PROPOSED PROJECTS (C)								CAPITAL COSTS (million $)		
							PLANT				SEWERS						
	1975	1980	1985	1990	1995	2000	Exp.	UpG	New	Out	I/I	SSE	New	Reh	Initial	Future	Total
C4	1035.0	1107.0	1161.8	1221.2	1282.9	1343.5	X	X					X		See Table 20-29		
C7	5.4	6.8	9.0	10.8	16.0	22.1	X	X					X		See Table 20-29		
C8	1623.0	1374.0	1381.0	1387.0	1387.0	1388.0		X							See Table 20-29		
C11	2549.0	2431.0	2441.0	2450.0	2461.0	2472.0	X	X							See Table 20-29		
C12	0.7	0.7	0.7	0.7	0.7	0.7									Private costs		

(C) PROPOSED PROJECTS

SEWER(S): I/I - Infiltration/Inflow Study; SSE - Sewer System Evaluation; New - New Sewer Construction; Reh - Rehabilitation of Existing Sewers

PLANT: Exp - Expansion, UpG - Upgrading; New - New plant; Out - Phase out

TABLE 20-17 E. MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	FACILITY PLANS												COMMENTS
	TYPE		STATUS			REVIEWS / APPROVALS							
						NIPC			IEPA				
	NEEDS ANALYSIS	STEP ONE STUDY	COMPLETED	UNDER WAY	LOCAL ISSUES	NUMBER	ENDORSED	UNDER REVIEW	NUMBER	APPROVED	UNDER REVIEW	UNRESOLVED ISSUES	
C4		X	X			75-360 75-070	X		C17-5416	X			
C7		X	X			75-360 75-073	X		C17-5416	X			
C8		X	X			75-360 75-069	X		C17-5416	X			
C11		X	X			75-360 75-074	X		C17-5416	X			
C12		(a)											(a) Private plant

g. Privately Owned Municipal-Type Facilities

The Star Utility Company Villa West wastewater treatment facility is the only privately owned municipal-type plant in the basin. The future plans of this facility have not been revealed to date. In the absence of better information, it has been assumed that this plant will remain in service through the year 2000.

TABLE 20-18 A: INDUSTRIAL WASTEWATER TREATMENT PLANTS

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
W3	Ceco Steel Mfg. #003	0001309	Romeoville/ Romeoville	Lemont	K	4.000	3.980	-	3.980
C1	Comm. Edison Crawford #001	0002186	MSDGC/MSDGC	Chicago	F		0.274	-	0.274
C4	Reynolds Metals Sheet/Plate Wks	0001341	MSDGC/MSDGC	McCook	K		1.020	-	1.020
W15	Union Oil	0001589	Romeoville/ Romeoville	Lemont	A;IM,K	3.000	4.400	-	4.40
	(1): Activated sludge (A); tertiary filter (F); special treatment (K); stormwater holding (IM)								

(1) See key.

TABLE 20-18 B: INDUSTRIAL WASTEWATER TREATMENT PLANTS

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	RECEIVING STREAM			NPDES PERMIT DATES		SIC CODE	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
	NAME	7 DAY-10 YR. LOW FLOW (MGD)						
		1970	2000	ISSUED	EXPIRES			
W3	CS & SC			9-23-75	7-1-78	-	15 TSS, 15 o/g, 1 (DM)P	
C1	CS & SC	1383.1		8-29-75	7-1-78	72-4911	15 TSS, 15 o/g, 0.1 Pb	
C4	Summit-Lyons ditch	0		6-12-75	3-31-79	72-3352	10 BOD, 12 TSS, DM; 15 o/g, 15 Fluorides, 1.0 Cr^{+3}	
W15	CS & SC			10-9-74	6-30-78	-	Temp, 20 BOD, DM; 50 BOD, 15 o/g, 1500 TDS, 2 (tot)Fe,1 Zn,0.025 Cn	

(1) Current, from NPDES Permits

TABLE 20-19 A: MISCELLANEOUS WASTEWATER TREATMENT PLANTS

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
C2	Car Carriers	0002721	MSDGC/ /MSDGC	Chicago	A,F,E	0.004	0.003	-	0.003
W7	Ceco Steel Corp, #002	0001309	Romeoville/ Romeoville	Lemont	AD,F,E	0.013	0.018	-	0.018
W7	Ceco Steel Corp, #004	0001309	Romeoville/ Romeoville	Lemont	AD,F,E	0.010	0.009	-	0.009
C8	Donohoe R.P.	0032042	MSDGC/ /MSDGC	Lemont			0.020	-	0.020
C13	Guldan J.Jr.	0049352	MSDGC/ /MSDGC	Palos Park			0.001	-	0.001
C14	Holy Family Villa .	0024678	MSDGC/ /MSDGC	Lemont	IM, FB, E	0.015	0.012	-	0.012
C16	Ingram Barge Inc.	0052035	MSDGC/ /MSDGC	Lemont		0.001		-	
C18	Kennedy Lt.J.P. School	0024660	MSDGC/ /MSDGC	Palos Park	IM,FB,E		0.029	-	0.029
C21	Lemont Ship Building	0049018	MSDGC/ /MSDGC	Lemont	L,F	0.012		-	
C22	MCA Housing	0032964	MSDGC/ /MSDGC					-	
C23	Material Serv. Corp.Yard #5	0035378	MSDGC/ /MSDGC	Calumet Park	L,E		0.003	-	0.003
C24	Material Serv. Corp.Yard #9	0022276	MSDGC/ /MSDGC	Chicago	A,F,E	0.001	0.001	-	0.001
W32	Material Serv. Corp.Yd #67-68	0033375	Romeoville/ Romeoville	Romeoville	A,E	0.010	0.003	-	0.003
C25	Matterhorn Restaurant	0037290	MSDGC/ /MSDGC	Palos Park	IM,L,F,E	0.004	0.100	-	0.100
C40	U.S. Steel Agri Chem. Div.	0047554	MSDGC/ /MSDGC	Chicago			0.0016	-	0.0016
	(1): Activated sludge (A); extended aeration (AD); chlorination (E); tertiary filter (F); buried sand filter(FB); Imhoff Tank (IM); tertiary lagoon (L).								

(1) See key.

TABLE 20-19 B: MISCELLANEOUS WASTEWATER TREATMENT PLANTS

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	RECEIVING STREAM			NPDES PERMIT DATES		EFFLUENT REQUIREMENTS (mg/l)								COMMENTS
	NAME	7 DAY-10 YR. LOW FLOW (MGD)				1976(1)				2000				
		1970	2000	ISSUED	EXPIRES	BOD	TSS	P	NH_3-N	BOD	TSS	P	NH_3-N	
C2	Grand Calumet	12.9		6-6-75	7-31-79	4	5							
W7	CS & SC	1152.5		9-23-75	7-1-78	20	25							
W7	CS & SC	1152.5		9-23-75	7-1-78	20	25							
C8	CS & SC	1098.2		3-31-75	7-31-78	20	25							
C13	Cal-Sag Channel	0												
C14	ditch to CS & SC	0		6-18-75	6-1-79	4	5							
C16	CS & SC			Draft	9-30-82	4	5							
C18	ditch to Cal-Sag Channel	0		6-9-75	12-31-79	4	5							
C21	CS & SC			2-25-76	12-31-79	30	30							
C22	CS & SC			1-14-74	6-6-78									
C23	Cal-Sag Channel	191.2		4-17-75	8-1-79	30	30							
C24	CS & SC	284.2		4-28-75	10-1-79	30	30							
W32	CS & SC	1112.0		5-16-75	12-31-78	20	25							
C25	Mill Creek	0		6-18-75	6-30-79	10	12							
C40	Little Calumet			6-27-75	12-31-79	30	30							

(1) From NPDES Permits

TABLE 20-20 A: OTHER POINT SOURCE DISCHARGES

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
C1	Airco Ind. Gases Div.	0002801	MSDGC/ /MSDGC	Broadview	1.560	5-17-74	12-31-78
C4	Allied Oil Co.	0032280	MSDGC/ /MSDGC	Chicago	0.500	4-15-75	9-1-79
C5	Amer. Brick Co.	0037435	MSDGC/ /MSDGC	Riverdale	0.270	6-16-75	12-31-79
C6	Amer. Thermo-plastics	0035157	MSDGC/ /MSDGC	Calumet City	0.004	4-29-75	5-20-79
C13	Beucher,Nick & Sons Rendering Plant	0001546	MSDGC/ /MSDGC	Chicago	1.380	8-21-74	5-31-79
W4	Ceco Steel Corp. #001	0001309	Romeoville/ /Romeoville	Lemont	0.040	9-23-75	7-1-78
C21	Chicago,City of Cent'l Off Bldg	0035491	MSDGC/ /MSDGC	Chicago		5-27-75	12-31-78
C26	Chgo Sun-Times Daily News Bldg	0001333	MSDGC/ /MSDGC	Chicago		1-24-75	10-31-78
C27	Chgo Tribune Building Corp	0035602	MSDGC/ /MSDGC	Chicago	0.038	3-13-75	12-31-78
C28	Chicago Union Station	0035238	MSDGC/ /MSDGC	Chicago	0.127	1-24-77	2-27-81
C34	Comm. Edison Crawford-001-FBW	0002186	MSDGC/ /MSDGC	Chicago	0.107	9-29-75	7-1-78
C34	Comm. Edison Crawford-001-CCW	0002186	MSDGC/ /MSDGC	Chicago	353.0	9-29-75	7-1-78
C34	Comm. Edison Crawford-001-DRW	0002186	MSDGC/ /MSDGC	Chicago	0.028	9-29 -75	7-1-78

TABLE 20-20 A: OTHER POINT SOURCE DISCHARGES

CHICAGO RIVER / SANITARY AND SHIP CANAL /CALUMET SAG CHANNEL BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
C35	Comm. Edison Fisk-001	0002178	MSDGC/ /MSDGC	Chicago	315.0	8-1-74	9-1-78
C35	Comm. Edison Fisk-001 APD	0002178	MSDGC/ /MSDGC	Chicago		8-1-74	9-1-78
C36	Comm. Edison Ridgeland 001B	0002194	MSDGC/ /MSDGC	Chicago	0.830	9-26-75	7-1-78
C36	Comm. Edison Ridgeland 001 CCW	0002194	MSDGC/ /MSDGC	Chicago	584.0	9-26-75	7-1-78
C36	Comm. Edison Ridgeland 001 D1	0002194	MSDGC/ /MSDGC	Chicago	0.100	9-26-75	7-1-78
C36	Comm. Edison Ridgeland 001 D2	0002194	MSDGC/ /MSDGC	Chicago	1.138	9-26-75	7-1-78
W11	Comm. Ed.Will Co.Ganwaukee 001 CDW	0002208	Romeoville/ /Romeoville	Romeoville	934.0	10-29-74	7-1-78
W11	Comm.Ed.Will Co.Ganwaukee 001 FPE	0002208	Romeoville/ / Romeoville	Romeoville	8.800	10-29-74	7-1-78
W11	Comm. Ed.Will Co. Ganwaukee 005 DFB	0002208	Romeoville/ / Romeoville	Romeoville	0.080	10-29-74	7-1-78
W11	Comm.Ed.Will Co. Ganwaukee 005 DRW	0002208	Romeoville/ / Romeoville	Romeoville	0.045	10-29-74	7-1-78
C37	Container Corp.of Amer.	0001503	MSDGC/ /MSDGC	Chicago	1.138	11-27-74	7-31-78
C44	Enterprise Paint Mfg. Co.	0035394	MSDGC/ /MSDGC	Chicago		1-6-77	9-30-81
C45	Erman Walter Co.	0033901	MSDGC/ /MSDGC	Lemont		6-6-75	12-31-79
C46	Equit.Life Assur.Society	0035726	MSDGC/ /MSDGC	Chicago		1-20-77	3-31-81

TABLE 20-20 A: OTHER POINT SOURCE DISCHARGES

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
C48	Finkl,A. & Sons Co.	0035483	MSDGC/ /MSDGC	Chicago			
C52	Four Hundred Assoc. Outer Drive East	0005215	MSDGC/ /MSDGC	Chicago		5-30-74	11-30-77
C56	Gen. Motors Co. Electro-motive Div.	0001813	MSDGC/ /MSDGC	McCook		4-2-76	9-30-80
C59	Great Lakes Solvents	0026956	MSDGC/ /MSDGC	Chicago	0.004	4-15-75	12-1-78
C60	Hartford Bldg	0035637	MSDGC/ /MSDGC	Chicago	0.100	1-23-75	12-31-79
C60	Hartford Bldg	0035629	MSDGC/ /MSDGC	Chicago	0.042	1-23-75	12-31-79
C65	IBM Corp#001	0037613	MSDGC/ /MSDGC	Chicago	2.160	6-25-75	5-31-80
C65	IBM Corp#002	0037613	MSDGC/ /MSDGC	Chicago	2.800	6-25-75	5-31-80
C72	Interlake Steel River-dale #002	0002119	MSDGC/ /MSDGC	Riverdale	1.540	9-23-74	12-31-77
C72	Interlake Steel River-dale #003	0002119	MSDGC/ /MSDGC	Riverdale	7.800	9-23-74	12-31-77
C72	Interlake Steel River-dale #004	0002119	MSDGC/ /MSDGC	Riverdale	6.700	9-23-74	12-31-77
C72	Interlake Steel River-dale #005	0024449	MSDGC/ /MSDGC	Riverdale	7.700	9-23-74	12-31-77
C79	Kraft Foods	0024449	MSDGC/ /MSDGC	Morton Grove		12-16-74	9-30-79
C81	Lake-Rivers Terminals Inc	0001317	MSDGC/ /MSDGC	Berwyn	0.008	3-6-75	6-30-79

TABLE 20-20 A: OTHER POINT SOURCE DISCHARGES

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
C85	Lurie Co.-La Salle Wacker Building	0002054	MSDGC/ /MSDGC	Chicago		3-13-75	8-1-79
C90	Material Svcs Thornton Quarry	0001937		Thornton		7-29-74	11-30-78
C91	Material Svcs Yard #3	00034576	MSDGC/ /MSDGC			3-24-75	9-1-79
C92	Material Svcs Fed. Quarry #19	0001945	MSDGC/ /MSDGC	McCook	1.100	3-24-75	9-1-79
C96	Merchandise Mart Bldg.	0001368	MSDGC/ /MSDGC	Chicago	0.012		8-31-79
C98	Montgomery Ward & Co.	0035343	MSDGC/ /MSDGC	Chicago	0.280	3-13-75	9-30-79
C104	One Illinois Center	0026531	MSDGC/ /MSDGC	Chicago	2.760	4-15-75	9-10-79
C111	Proctor & Gamble Mfg. Co.	0004863	MSDGC/ /MSDGC	Chicago		3-8-74	12-31-78
C112	Prudential Insurance Co.	0004936	MSDGC/ /MSDGC	Chicago		3-6-75	9-30-79
C115	Rexnard Inc. Cylinder Drive	0023973	MSDGC/ /MSDGC	Chicago	0.010	1-31-75	9-30-79
C116	Reynolds Metals McCook-002 CWD	0001341	MSDGC/ /MSDGC	McCook	0.320	6-12-75	3-31-79
C117	Richards WC Co.	0034002	MSDGC/ /MSDGC	Blue Island	0.005	6-23-75	12-31-79
C118	Richardson Co.	0035424	MSDGC/ /MSDGC	Lemont			

TABLE 20-20 A: OTHER POINT SOURCE DISCHARGES

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
C124	Schlegel Ill.Co.	0005258	MSDGC/ /MSDGC	Chicago	0.070	4-14-75	10-1-79
C128	Surcrest #001	0002780	MSDGC/ /MSDGC	Chicago	1.440	6-30-75	6-30-79
C128	Surcrest #002	0002780	MSDGC/ /MSDGC	Chicago	0.576	6-30-75	6-30-79
C131	Texas Eastern Transmission	0047911	MSDGC/ /MSDGC	Alsip		6-30-75	3-31-80
C132	Thirty-Five E. Wacker Dr. Co.	0005070	MSDGC/ /MSDGC	Chicago		5-31-74	4-30-79
C134	Three Thirty Three Building Corporation	0035173	MSDGC/ /MSDGC	Chicago	1.750	6-11-75	8-1-79
C135	Tishman-Adams 10 Riverside	0002852	MSDGC/ /MSDGC	Chicago		6-3-75	12-31-79
C136	Tishman-Adams 222 Riverside	0005169	MSDGC/ /MSDGC	Chicago		4-15-75	12-31-78
C137	Tishman-Adams 120 Riverside	0049239	MSDGC/ /MSDGC	Chicago		3-9-76	12-31-79
C139	Triangle Refineries Inc.	0049760	MSDGC/ /MSDGC	Chicago	0.001	4-19-76	12-31-80
C140	Twenty North Wacker Corp.	0037621	MSDGC/ /MSDGC	Chicago	2.780	6-30-75	5-31-80
C141	Two Illinois Center	0048640	MSDGC/ /MSDGC	Chicago	4.430	3-30-76	6-30-80
C144	United Insur. Building	0037711	MSDGC/ /MSDGC	Chicago	1.500	5-29-75	8-1-79

TABLE 20-20 A: OTHER POINT SOURCE DISCHARGES

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
C146	U.S.P.O. Chgo.	0034436	MSDGC/ /MSDGC	Chicago	8.000	4-30-74	4-20-79
C149	Universal Oil Products McCook	0001694	MSDGC/ /MSDGC	McCook	0.150	7-29-74	6-30-79
C151	Vulcan Matls Co	0035785	MSDGC/ /MSDGC	McCook	0.800	6-12-75	12-31-78
C152	Wacker-Wabash Corp.	0005070	MSDGC/ /MSDGC	Chicago	4.200	5-31-75	4-30-79
C154	Waterway Terminals Inc.	0024635	MSDGC/ /MSDGC	Forest View		4-19-77	5-31-80
C157	Wolf-Point Project	0036889	MSDGC/ /MSDGC	Chicago		6-23-75	12-31-78
C158	Wrigley Bldg.	0002879	MSDGC/ /MSDGC	Chicago	0.225	5-31-74	12-31-78

TABLE 20-20 B: OTHER POINT SOURCE DISCHARGES

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	7 DAY-10 YR. LOW FLOW (MGD) 2000	EFFLUENT REQUIREMENTS[1] (mg/l)	COMMENTS
C1	South Br. of Chicago River			Temp	Cooling water
C4	CS & SC			DM: 15 o/g	Intermittent discharge of up to 5 MGD from 9 outfalls
C5	ditch to Little Calumet	0		DM: 15 TSS, 15 o/g, 2 (tot) Fe, 0.1 Pb	Quarry Pumpage
C6	storm sewer to Little Calumet	0		Temp, 15 (DM) TSS	Cooling water
C13	North Br. of Chicago River	267.4		Temp, 10 o/g	
W4	CS & SC	1152.5		Temp	Cooling water
C21	CS & SC			Monitor Flow and Temp. only	
C26	ditch to N.Br. Chicago River	0		Temp	Air cond. cooling water
C27	ditch to Chicago River	0		Temp	Air cond. cooling water
C28	S.Br. of Chicago River			Temp. 15 TSS, 15 (DM) o/g	Includes discharge 001-003
C34	CS & SC	284.9		DM: 15 TSS, 15 o/g	Filter backwash
C34	CS & SC	284.9		Temp.	Condenser cooling water
C34	CS & SC	284.9		TDS, monitoring	Demineralizer regenerative wastes

(1) From NPDES Permits

TABLE 20-20 B: OTHER POINT SOURCE DISCHARGES

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	7 DAY-10 YR. LOW FLOW (MGD) 2000	EFFLUENT REQUIREMENTS[1] (mg/l)	COMMENTS
C35	South Br. of Chicago River	284.9		Temp	Cooling water
C35	South Br. of Chicago River	284.9		DM: 15 TSS, 15 o/g	Ash Pond discharge
C36	CS & SC	936.7		DM: 15 TSS, 15 o/g	Fly ash sluice and settling system discharge
C36	CS & SC	936.7		Temp	Condenser cooling water
C36	CS & SC	936.7		DM: 15 TSS, 15 o/g	Demineralizer regenerant wastes
C36	CS & SC	936.7		DM: 15 TSS, 15 o/g	Filter backwash water
W11	CS & SC	1110.5		DM: 15 TSS, 15 o/g	Cooling water
W11	CS & SC	1110.5		DM: 15 o/g, 2 (tot) FE, 0.5 (dis) Fe	Filtration plant effluent
W11	CS & SC	1110.5		DM: 15 TSS	Filter backwash water
W11	CS & SC	1110.5		None	Demineralizer regenerant wastes
C37	North Br. of Chicago River	269.0		Temp	Non-contact cooling water
C44	S. Fork of S. Br. Chgo Rvr			Temp	Stormwater runoff and non-contact cooling water
C45	CS & SC	4386.3		Temp	Non-contact cooling water
C46	Chicago River			Temp	

(1) From NPDES Permits

TABLE 20-20 B: OTHER POINT SOURCE DISCHARGES

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	7 DAY-10 YR. LOW FLOW (MGD) 2000	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
C48	North Br. of Chicago River				Stormwater runoff and cooling water discharge
C52	ditch to Calumet River	0		Temp	Air cond. cooling water
C56	McCook-Summit ditch	0		Temp	Cooling water
C59	North Br. of Chicago River			DM: 15 TSS, 15 o/g	
C60	ditch to S.Br. of Chicago Rvr	0		Temp	Air cond. cooling water
C60	ditch to S.Br. of Chicago Rvr	0		Temp	Air cond. cooling water
C65	ditch to Chicago River	0		Temp DM: 15 TSS	Air cond. cooling water and filter backwash
C65	ditch to Chicago River	0		Temp DM: 15 TSS	Air cond. cooling water and filter backwash
C72	Little Calumet	168.0		Temp	Filter backwash water
C72	Little Calumet	168.0		Temp	Non-contact cooling water
C72	Little Calumet	168.0		Temp	Non-contact cooling water
C72	Little Calumet	168.0		Temp	Non-contact cooling water
C79	storm sewer to Kirk Ck	0		Temp	
C81	CS & SC	742.9		Temp	Steam condensation

(1) From NPDES Permits

TABLE 20-20 B: OTHER POINT SOURCE DISCHARGES

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	7 DAY-10 YR. LOW FLOW (MGD) 2000	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
C85	ditch to Chicago River	0		Temp	Air cond. cooling water
C90					
C91	North Br. of Chicago River	269.4			Quarry operations are currently shut down
C92	storm sewer to CS & SC	0		20 TSS	
C96	Chicago River	17.4		Temp	Air cond. cooling water
C98	Chicago River			Temp	Air cond. cooling water
C104	Chicago River			Temp	Air cond. cooling water
C111	North Br. of Chicago River	268.7		Temp, 20 BOD, 15 (DM) TSS, 10 o/g	Once-thru cooling water
C112	ditch to Chicago River			Temp	Air cond. cooling water
C115	North Br. of Chicago River			Limited to non-contact cooling water	
C116	Summit-Lyons ditch			DM: 15 TSS, 15 o/g, 750 TDS	Stormwater and cooling water
C117	Stanley Creek			Temp	Cooling water
C118	Cal-Sag Channl				Cooling water

(1) From NPDES Permits

TABLE 20-20 B: OTHER POINT SOURCE DISCHARGES

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	2000	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
C124	North Br. of Chicago Rvr	277.8		Temp	Non-contact cooling water
C128	Ogden slip to Chicago River	17.4		Temp	Cooling water
C128	Ogden slip to Chicago River	17.4		Temp	Cooling water
C131	Cal-Sag Chnl			15 (DM) o/g	
C132	Chicago River			Temp	
C134	ditch to Chicago River			Temp	Air cond. cooling water
C135	ditch to S. Br.Chgo River	0		Temp	Air cond. cooling water
C136	ditch to S. Br.Chgo River	0		Temp	Air cond. cooling water
C137	ditch to S. Br.Chgo River	0		Temp	Air cond. cooling water
C139	CS & SC	284.2			
C140	ditch to S.Br. Chicago River	0		Temp	Air cond. cooling water
C141	ditch to Chicago River	0		Temp	Air cond. cooling water
C144	ditch to Chicago River	0		Temp	Air cond. cooling water

(1) From NPDES Permits

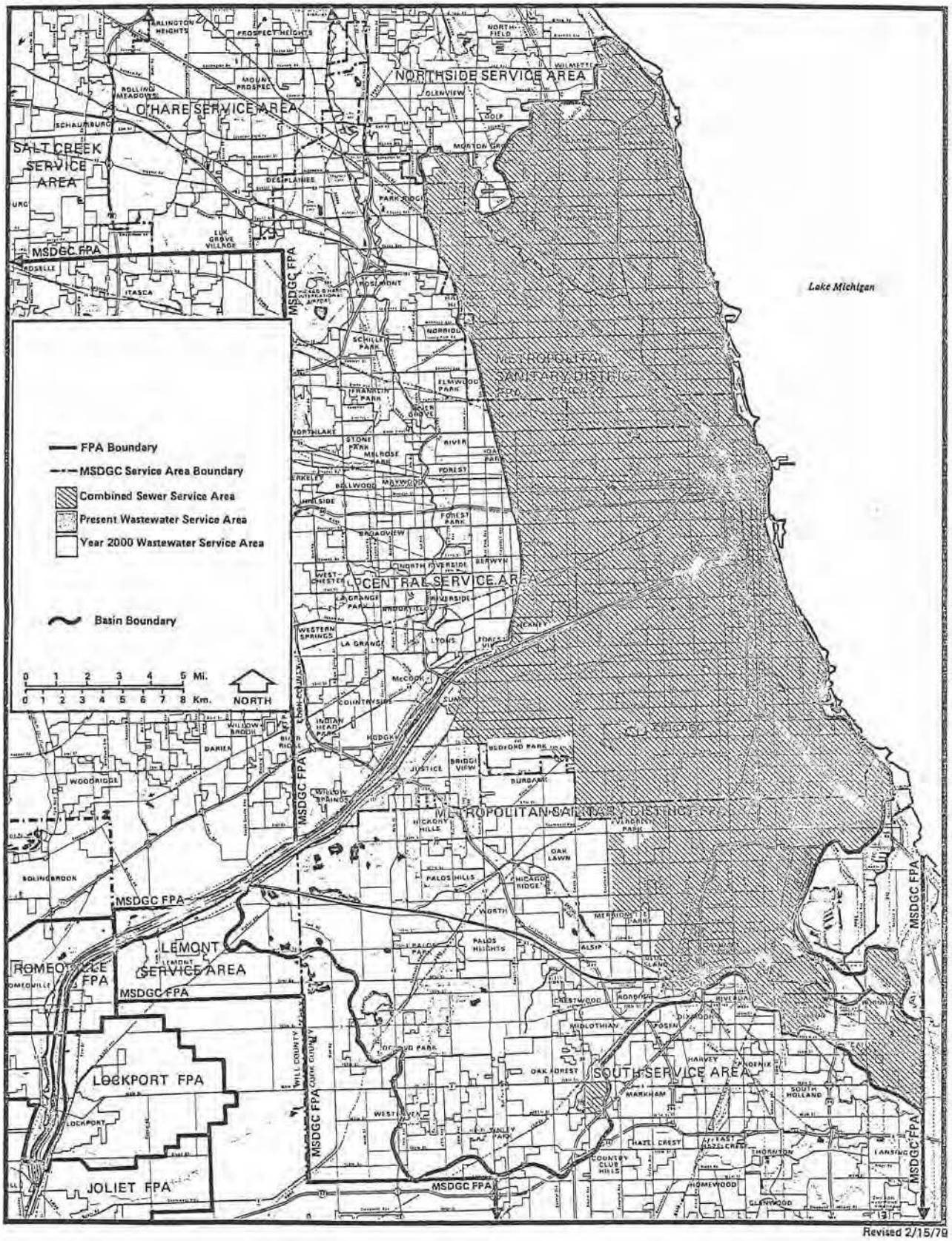
TABLE 20-20 B: OTHER POINT SOURCE DISCHARGES

CHICAGO RIVER / SANITARY AND SHIP CANAL / CALUMET SAG CHANNEL BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	7 DAY-10 YR. LOW FLOW (MGD) 2000	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
C146	ditch to S.Br Chicago River	0		Temp	Air cond. cooling water
C149	sewer to Mc-Cook Summit	0		10 TSS, 10 o/g	Cooling water
C151	McCook-Summit drainage dtch	0		DM: 15 TSS, 15 o/g	
C152	ditch to Chicago River	0		Temp	Air cond. cooling water
C154	CS & SC			15 (DM) o/g	
C157	North Br. of Chicago River			Temp	
C158	ditch to Chicago River	0		Temp	Air cond. cooling water

(1) From NPDES Permits

Figure 20-5: WASTEWATER SERVICE AREAS



Revised 2/15/78

TABLE 20-21: SUMMARY OF SEPTIC TANK INSTALLATIONS

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

COUNTY	NUMBER OF SEPTIC SYSTEMS			POPULATION SERVED		
	RESIDENTIAL	NON RESIDENTIAL	TOTAL	RESIDENTIAL	NON RESIDENTIAL (PE)	TOTAL
Cook	2,121	20	2,141	8,469	40	8,509
DuPage	0	0	0	0	0	0
Will	0	0	0	0	0	0
TOTAL	2,121	20	2,141	8,469	40	8,509

20.05 NONPOINT SOURCES: EXISTING CONDITIONS

a. Urban Stormwater Systems

Within the Chicago River/Sanitary and Ship Canal/Cal Sag Basin separate sewer systems serve all of portions of 19 municipalities and numerous unincorporated areas. It is estimated that 21 square miles, five percent of the basin area, are served by separate storm sewers. These systems follow natural drainage courses and discharge either directly into streams of the Chicago River/Sanitary and Ship Canal/Cal Sag Basin or indirectly via ditches or small channels that are tributary to the system.

Combined sewer systems serve all or portions of approximately 24 municipalities in the basin. It is estimated that 297 square miles, 70 percent of the basin, are tributary to combined sewer overflows.

In the remainder of the basin, about 104 square miles, or 25 percent of the total area, stormwater enters the drainage system by overland flow, through ditches or other small water courses.

b. Construction Activities

As discussed in Chapter Six, construction operations, coupled with stormwater runoff and resultant erosion, can contribute sediments, chemicals, and biological nutrients to rivers and streams. Construction activities are not known to be causing water pollution problems at present, but their potential for damage to water quality will exist in the future.

c. Septic Systems

At the present time, 2,121 residential septic systems serve an estimated 8,469 people (See Table 20-21). In addition, the basin has 20 non-residential septic systems serving a population equivalent of 40 in commercial, recreational, industrial, and institutional establishments. All of the septic systems in the basin are located in Cook County. Septic areas are depicted in Figure 20-6.

TABLE 20-22: SEPTIC SYSTEM AREAS HAVING LIMITATIONS

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Cook	Lemont	Sag Bridge	8	26	12-1
Cook	Lemont		16	56	12-7
Cook	Palos		73	288	13-3*
Cook	Palos	Palos Park	854	3358	13-5
Cook	Palos		85	335	13-6
Cook	Worth	Chicago Ridge	2	1	14-1
Cook	Worth	Alsip	35	136	14-2
Cook	Worth	Alsip	69	268	14-3
Cook	Worth		21	82	14-4
Cook	Worth		29	110	14-6
Cook	Orland		12	50	15-2
Cook	Orland		33	138	15-3
Cook	Orland	Silver Lake Dells Subdivision	86	360	15-4
Cook	Orland		6	23	15-7
Cook	Bremen		12	49	16-1
Cook	Bremen		49	200	16-2
Cook	Bremen		81	320	16-3
Cook	Bremen		18	73	16-4
Cook	Bremen		69	276	16-7
Cook	Bremen		45	185	16-9

*Located partially in this basin

Figure 20-6: LOCATION OF SEPTIC AREAS



Revised 2/15/79

There are 20 areas located entirely or partially within this basin that have been identified as having site limitations. These areas contain 1,530 residential and non-residential septic systems serving an estimated 6,056 people.

Table 20-22 lists each area by county, township, and familiar name (if available) along with the number of septic systems and population served. A map identification number, keyed to Figure 20-6 is also provided. The basin also includes a part of one area containing 73 septic systems serving 288 people.

The largest septic area with limitations is in the Village of Palos Park, containing 854 residential septic systems serving 3,358 people. Limitations here are due to undersized septic systems and obstruction of tile fields by tree roots.

d. Hydrologic Modifications

Hydrologic modifications are activities that disturb the natural flow patterns of either surface or groundwaters. Those affecting surface waters include channelization, dredging, land reclamation, the construction of dams and impoundments, and other routine construction operations in or on the water, such as bridges and utility crossings. In terms of quantity and overall impacts, the largest pollution load from these activities consists of sediment. Groundwater may be hydrologically affected by deep surface excavations, and subsurface activities such as mining and the construction of tunnels or wells. In these circumstances, groundwater flow patterns may be altered, water levels lowered, or waters from various aquifers comingled and downgraded. In some instances, the introduction of polluted surface waters may take place.

In this basin, both maintenance dredging and channelization are of concern. Channelization of streams or drainage systems is conducted by private individuals, drainage organizations, the State of Illinois, and the Corps of Engineers, as necessary. During these operations, sediment is placed in suspension and its effect on water quality and aquatic life can be pronounced. Streams are periodically ditched, straightened, channelized, or dredged to remove accumulated deposits. The Illinois Department of Conservation has identified eight channelized water bodies: the Calumet River, the Calumet Sag Channel, the Chicago River and its branches, the Chicago Sanitary and Ship Canal, the Grand Calumet River, the North Shore Channel, Midlothian Creek, and Stoney Creek. This type of activity is expected to continue, although where, when, and what impact it will have on water quality is unknown.

e. Marine Activities

Marine activities in the basin may affect water quality through oil wastes, ballast discharges, bilge water, sanitary sewage, dredged material, and refuse. Authority to control the discharge of wastes and other materials from recreational and commercial vessels exzists at the federal, state, and local levels. The Federal Water Pollution Control Act of 1972 prohibits the discharge of oil or hazardous materials into or upon the navigable waters of the United States. It also directs the Secretary of Transportation and the U.S. Coast Guard to develop regulations governing the design and operation of marine sanitation devices. These regulations have been issued and require that new vessels (i.e. where construction started on or after January 30, 1975) be equipped with special toilet facilities or holding tanks.

At the state level, the Illinois Pollution Control Board (IPCB) regulates the disposal of wastes from watercraft. The IPCB states that "no person shall dispose of any sewage or wastewater accumulated in a holding tank or any other container on a watercraft in such a manner that the sewage or wastewater reaches or may reach the waters of the state."

Local ordinances also regulate the discharges of wastes from recreational and commercial vessels. The City of Chicago Department of Environmental Control - Harbor Pollution Control Ordinance has specific regulations concerning the befouling of public waters, prohibition of disposal of refuse in harbors, use of approved wastewater treatment facilities in a harbor, deterioration of land facilities associated with marine activities, and harbor dredging.

The City of Chicago and Chicago Park District also require that vessels with toilets, heads, or urinals have waste retention tanks. Within ten miles of the Chicago shoreline, pleasure craft with holding tanks must have seals to prevent the discharge of galley and head wastes. Noncompliance fines range from $100-$300. About 1,500 boats out of 3,500 require these seals. During the 1977 boating season about 1,200 inspections were made. Waste disposal must occur at a shore facility. Pump out facilities are available at eight Park District harbors as well as four private marinas on the Chicago and Calumet Rivers.

20.06 DISPOSAL OF RESIDUALS

The areawide aspects of residuals waste management were discussed in Chapter Seven, which included a summary of current practices in the region, residual waste characteristics, and alternative methods for their utilization and/or disposal. The information that follows

pertains specifically to the Chicago River/Sanitary and Ship Canal/Cal Sag Basin.

The MSDGC wastewater treatment plants are the major residual producers in the basin. The Calumet Sewage Treatment Works produces slightly over 1 million tons of sludge per year. Calumet also handles sludge (18,250 tons/year) from the Lemont facility. Processed sludge is disposed of by scavengers--independent operators hauling and disposing of the sludge for their own purposes. The Northside Sewage Treatment Works produces almost 4 million tons annually which are pumped to the West-Southwest Sewage Treatment Works for disposal. Northside also receives sludge from the Egan plant (212,000 tons/year). plant (12,000 tons/year). The West-Southwest Sewage Treatment Plant handles 14.25 million tons of sludge annually, receiving sludge from the Northside treatment plant. Sludges are disposed by land treatment.

Some sludge from the MSDGC Calumet Plant is treated to form a soil conditioner and fertilizer called NuEarth. Individual citizens or others haul the material from MSDGC facilities and utilize it for lawns, gardens, etc.

Industrial and miscellaneous wastewater treatment plants also produces residuals. The important industrial facilities in the basin include: Ceco Steel Manufacturing, Commonwealth Edison Crawford Station, Reynolds Metals Sheet and Plate Works, and Union Oil Company. Very little is known about the majority of the miscellaneous plants.

Information on waste disposal sites for sludges is also difficult to acquire. One landfill of interest in the basin is the CID Landfill which accepts some 3.2 MG of industrial sludge a year. The dry solids loading is approximately 670 tons annually, and the disposal site extends over 390 acres.

Further details on sludge generation and disposal are contained in the Commission's 208 Staff Paper, No. 30 "Regional Sludge Management Report."

At the present time, there are no known problems associated with residuals management in the basin. As sludge volumes increase in the future because of increased waste loads (particularly due to TARP) and higher levels of treatment, costs of processing, removing, disposing, or utilizing the sludge materials will increase.

20.07 EXISTING MANAGEMENT PROGRAMS

The major features of the existing water quality management system in northeastern Illinois have already been discussed in Part I of this report. In this chapter, management programs within the Chicago River/Sanitary and Ship Canal/Cal Sag Basin are presented, but only to the extent that it is necessary to clarify the previous discussion.

Table 20-23 is a list of the public agencies and private utilities in the basin which are currently involved in water quality related activities. Variations in programs and responsibilities between these agencies are indicated by numerical code.

20.08 MODELING PROCESSES: FUTURE CONDITIONS

As described previously, the first major use of the computerized model in the process of simulation was to develop an overview of existing water quality conditions in the basin. The statistics produced showed the waters in the basin to be of poor quality. State standards, which generally call for at least 4 mg/l of DO, are being violated in all reaches.

Overflows from combined sewers account for 32 percent of the BOD in the basin; discharges from wastewater treatment plants, 54 percent; and boundary condition flows, 14 percent.

Thus, three sources: combined sewers, treatment plants, and flows from outside the basin, became the focus of efforts to develop a recommended plan for the basin. The result of those efforts, that grew out of staff work, meetings with MSDGC personnel, and public discussion, are described below.

a. First Test Plan Assumptions

During November, 1977, staff members of the Commission met with citizens and public officials to develop a proposal for improving water quality in this basin. That proposal, known as the "first plan" for the basin, was evaluated using the computer model. The purpose of that evaluation was to determine what impact the test plan would have if it acutally were implemented. The computer model was told to assume that the test plan was put into effect, and to "simulate" the water quality that would result in the year 2000.

In addition to the recommendations developed at the above mentioned meetings, the test plan was shaped by assumptions made to reflect forecasted population changes, land cover changes, improvements in wastewater and stormwater treatment, flood control and channel improvements, and changes in agricultural acreage and practices. These assumptions are described below.

(1) Population and Land Use: The Commission's 1976 forecasts for the year 2000 were applied to each reach to determine future changes in land cover and wastewater loads. Overall, a 1.5 percent decrease in population was forecasted.

TABLE 20-23: EXISTING LOCAL WATER QUALITY MANAGEMENT AGENCIES AND PROGRAMS: CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN*

MUNICIPALITIES			
Alsip	1 +	Lincolnwood	1,3
Bedford Park	1,3	Merrionette Park	1
Berwyn (Des Plaines)	1,3,5	Midlothian (Little Calumet)	1,6
Blue Island	1,3	Morton Grove (N. Branch of the Chgo. River)	1,3,5
Burbank	1	Niles (N. Branch of the Chgo. River)	1,3,5
Burnham	1,3	Norridge (Des Plaines)	1,3,5
Calumet City (Little Calumet)	1,3,5	Oak Forest	1
Calumet Park	1,3	Oak Lawn	1
Chicago (Des Plaines)	1,3	Oak Park (Des Plaines)	1,3,5
Chicago Ridge	1	Orland Park (Des Plaines)	1
Cicero (Des Plaines)	1,3	Palos Heights	1
Country Club Hills (Little Calumet; Hickory Creek)	1,5	Palos Hills	1
Crestwood	1	Palos Park	1
Dolton (Little Calumet)	1,3,5	Park Ridge (Des Plaines)	1,3,5
Evanston (Lake Michigan South)	1,3	Riverdale (Little Calumet)	1,3,5
Evergreen Park	1	Robbins	1
Forest View (Des Plaines)	1,3,5	Skokie	1,3
Harwood Heights (Des Plaines)	1,3,5	Stickney (Des Plaines)	1,3
Hickory Hills	1	Summit (Des Plaines)	1,3
Hodgkins (Des Plaines)	1	Tinley Park (Hickory Creek)	1,4,5
Hometown	1,3	Westhaven	1
Justice	1	Willow Springs (Des Plaines)	1
Kenilworth (Lake Michigan South; North Branch of the Chicago River)	1,3,5	Wilmette (N. Branch of the Chgo. River)	1,3,4,5
Lemont (Des Plaines)	1	Worth	1

COUNTIES			
Cook	4	Will	3,4

SANITARY DISTRICTS	
Bremen Heights	MSDGC
Central Stickney	Norwood Park
Garden Homes	Ridgeland Park
Grandview Park	South Palos
	South Stickney

SOIL AND WATER CONSERVATION DISTRICTS
North Cook
South Cook
Will County

* Additional basins shown in parentheses for those municipalities which cross basin boundaries.

+ Numbers indicate existing water quality related activities as follows:

1. Wastewater collection agency
2. Wastewater treatment agency
3. To be included in MSDGC TARP system
4. Has enacted erosion and sediment control regulations
5. Has enacted stormwater detention regulations or similar regulations of another agency apply

(2) Land Cover: Present land cover in the basin was determined by satellite photography. This information was divided into four categories:

- Lowlands, marshes, swamps, and forested areas lying close to rivers and streams;
- Grasslands open to the infiltration of rainwater and snowmelt but not tilled regularly, including pastures, parks, golf courses, and upland forest;
- Impervious surfaces covered with buildings, roads, and parking lots.
- Croplands regularly tilled for agricultural purposes (there is some exchange between cropland and grassland due to crop rotation);

For the test plan, estimates of land cover changes by the year 2000 were made using population forecasts and their attendant housing and employment assumptions. Land required for new urbanization in the basin was taken from the grassland and cropland categories first. When this land was largely depleted, land from the lowland taken for urban purposes. Table 20-23 shows the results of this process.

(3) Local Facilities Plans: Extensive planning has been conducted in this basin in recent years for the expansion and improvement of wastewater treatment facilities by the MSDGC. These plans were included in the forecast of water quality conditions for the year 2000. Table 20-17 shows what assumptions were made about municipal point sources for year 2000 conditions.

In general, it was assumed that all planned improvements in municipal wastewater treatment plants (per local facilities plans) would be in operation, and that industrial treatment plants would meet required water quality standards in their effluent discharges. No changes in the capacities of industrial or miscellaneous treatment plants were estimated, given the many imponderables asscciated with such forecasts for small areas and individual enterprises.

(4) Phosphate Reductions: The City of Chicago and several suburbs have ordinances limiting the phosphate content in home laundry detergents. Because a substantial portion of the metropolitan area market has limitations on phosphate in

TABLE 20-24: CHANGES IN LAND COVER, 1976-2000

Category	1976 Land Cover Estimates	Year 2000 Land Cover Forecast	% Change
Lowlands	33.9 sq.mi.	336 sq. mi.	-0.9
Grasslands	69.2 sq.mi.	.73.1 sq. mi.	+5.6
Croplands	12.1 sq.mi.	6.8 sq. mi.	-43.8
Impervious	10.1 sq.mi.	11.8 sq. mi.	+16.8
TOTAL *	422.3 sq.mi.	422.3 sq. mi.	0

Source: Northeastern Illinois Planning Commission

* Includes 297 square miles of combined sewers/TARP area.

home laundry detergents, most distributors have withdrawn high phosphate detergents from the entire area. In considering changes in wastewater treatment practices for the year 2000, it was assumed that regulations limiting the amount of phosphate in domestic laundry detergents would be expanded to cover all communities and to include, in part, commercial and industrial uses as well. However, because of the overwhelming proportion of the basin already under high phosphate detergent restrictions (Chicago), the effects of this assumption would be minor in this basin.

(5) Combined Sewer Overflows: It was assumed that combined sewer overflows in the Cook County portion of the basin would be eliminated by the year 2000 by the diversion of these flows to the completed MSDGC Tunnel and Reservoir Plan (TARP).

(6) Urban Stormwater Runoff: The conditions set for the year 2000 in simulating future water quality assumed that 25 percent of the materials constituting BOD in urban stormwater runoff from separately sewered areas would be removed from the existing impervious areas (largely through street sweeping and vacuuming) and prevented from entering the waters of the Chicago River/Sanitary and Ship Canal/Cal Sag Basin. In newly developing urban areas, it was assumed that 50 percent of the BOD materials would be captured by a variety of techniques, including street vacuuming, stormwater detention basins, planned unit developments, and other measures.

(7) Septic Systems: The impact of septic systems on water quality was also considered in the simulation of conditions in the year 2000. In the first test plan, it was assumed that the adverse effects of septic systems on water quality would be eliminated by the year 2000, either by the conversion of these systems to sewage collection and treatment systems, or by eliminating problems with the remaining systems themselves.

(8) Soil Conservation: Agricultural "Best Management Practices" (BMP's), recommended by local U.S. Department of Agricultural officials, were included in the calculations of future water quality. In the Chicago River/Sanitary and Ship Canal Basin, 2,830 acres of land were forecast to be under conservation practices in the year 2000, employing conservation tillage, contouring, terracing, combinations of these, or conversions to grassland.

(9) Boundary Conditions: The water quality of flows from the North Branch, Chicago River and the Little Calumet River was changed to reflect the expected improvement by their respective first test plan results, as well as by the improvement in flows from Indiana, with respect to the latter. Considering the importance of boundary condition

loadings to the basin, this assumption was extremely important.

b. First Test Plan: Simulated Results

If a water quality program actually were implemented that contained all the features of the "test plan", the overall water quality in the basin would be good. However, attention is invited to the more liberal water quality standards which are authorized for these "secondary contact" waters. (See Section 20-03a) Results of the test plan simulation are contained in Tables 20-25, 20-26, 20-27, and 20-28.

(1) Dissolved Oxygen: The simulation showed that test plan efforts to clean up the water were highly effective. The minimum state standard for DO in this basin is 4 mg/l. The only reaches to show any violations of this standard were Reaches 29, 32, 35, and 41. All of these reaches are on either the Little Calumet River or the Calumet Sag Channel.

In terms of water quality, the worst of these was Reach 35, which violated the DO standard about two percent of the time. However, any violation period of under 5 percent is considered good, so even DO in Reach 35 was at an acceptable level.

(2) TARP: Table 20-26 shows DO levels in the reaches of the basin. All reaches show considerable improvement; many do not suffer DO violations, and those subject to DO violations show a reduced number with shorter durations. Three factors relate to these improvements: 1) substantial BOD and ammonia load reductions; 2) improved quality in boundary condition flows; and 3) the use of instream aerators. While many reaches rated "poor" or "bad" under existing conditions, all are rated "good" or "excellent" under test plan conditions. Undoubtedly, the most significant factor in the first test plan is the assumption that all facilities planned by the MSDGC will be constructed and in operation by the year 2000. These facilities include the MSDGC's TARP, additional instream aeration, and the upgrading of sewage treatment plants.

The TARP project will eliminate combined sewer overflows which heavily pollute the waterways in the basin. If the MSDGC estimations of the TARP project are correct, the combined sewer overflows will be trapped in the tunnels instead of being released into the waterways. Most pollution now found in the overflows will then be removed at treatment plants. The oxygen-reducing effects of those nutrients and other waste matters not removed by sewage treatment process will be partially offset by additional instream aeration.

TABLE 20-25 : COMPARISON OF POLLUTANT CONCENTRATIONS,
EXISTING CONDITIONS – FIRST TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 1 North Shore Channel		REACH 4 North Shore Channel		REACH 9 N. Br.Chicago River		REACH 10 N. Br. Chicago River		REACH 15 Chicago San. & Ship Canal		REACH 21 Chicago San. & Ship Canal	
		Existing	1st	Existing	1st	Existing	1st	Existing	1st	Existing	1st	Existing	1st
BOD (mg/l) Maximum	None	55.5	7.6	49.9	23.6	49.1	11.2	24.5	2.5	52.4	9.3	40.0	23.9
Minimum		0.5	1.8	4.7	2.9	4.7	2.7	1.3	1.1	3.1	2.4	2.4	3.8
Mean		6.6	3.5	19.7	10.2	15.0	6.5	3.1	1.6	10.1	4.8	9.1	8.2
Ammonia (mg/l) Maximum		5.64	0.26	12.0	1.73	9.44	1.40	3.49	0.98	8.63	1.32	7.00	2.87
Minimum		0.02	0.00	0.95	0.18	1.22	0.27	0.01	0.12	1.05	0.06	1.00	0.01
Mean		0.56	0.16	5.71	0.92	5.12	0.90	0.46	0.24	4.13	0.73	3.09	0.88
Frequency of Violation	2.5	15	0	32	0	26	0	5	0	45	0	77	5
Average Duration of Violations (hours)	2.5	24	0	772	0	955	0	80	0	480	0	226	61
Nitrate (mg/l) Maximum		2.37	0.32	14.7	18.9	8.47	17.4	1.64	0.46	6.74	13.7	7.58	17.6
Minimum		0.10	0.00	0.29	1.23	0.45	1.85	0.00	0.15	0.44	1.66	1.01	4.21
Mean		0.25	0.21	2.54	6.44	2.60	6.08	0.29	0.22	7.07	5.41	3.77	9.82
Frequency of Violation	10.0	0	0	4	81	0	26	0	0	0	8	0	91
Average Duration of Violations (hours)	10.0	0	0	13	49	0	102	0	0	0	204	0	136
Phosphate (mg/l) Maximum		1.49	0.26	4.97	4.83	3.13	2.99	1.01	0.27	2.61	2.45	1.19	0.93
Minimum		0.03	0.00	0.32	0.38	0.27	0.35	0.06	0.15	0.32	0.39	0.31	0.13
Mean		0.33	0.18	1.55	1.68	1.46	1.49	0.27	0.21	1.22	1.33	0.65	0.50
Frequency of Violation	0.05	2	1	1	1	1	1	1	1	1	1	1	1
	0.20	54	28	1	1	1	1	52	12	1	1	1	4
Average Duration of Violations (hours)	0.05	13000	26000	26000	26000	26000	26000	26000	26000	26000	26000	26000	26000
	0.20	400	232	26000	26000	26000	26000	310	1316	26000	26000	26000	6460

(1) Illinois Pollution Control Board Standard

TABLE 20-25 : COMPARISON OF POLLUTANT CONCENTRATIONS, EXISTING CONDITIONS – FIRST TEST PLAN

Water Quality Indicators	Standard[1] (or other level)	REACH 28 Chicago San. & Ship Canal		REACH 29 Little Calumet River		REACH 32 Little Calumet River		REACH 35 Cal Sag Channel		REACH 41 Cal Sag Channel			
		Existing	1st	Existing	1st	Existing	1st	Existing	1st	Existing	1st		
BOD (mg/l) Maximum	None	29.6	18.1	59.4	10.6	48.7	28.6	38.3	17.7	26.8	12.1		
Minimum		2.2	3.3	1.3	1.8	2.8	2.8	2.9	3.1	2.5	1.6		
Mean		7.8	6.8	7.8	5.7	12.2	10.7	11.2	8.0	7.6	6.3		
Ammonia (mg/l) Maximum		8.43	2.38	4.39	0.72	22.7	1.49	17.5	1.56	16.2	1.52		
Minimum		1.34	0.16	0.00	0.00	1.37	0.00	1.48	0.11	1.34	0.00		
Mean		4.08	0.93	0.82	0.21	8.67	0.60	6.85	0.74	6.52	0.68		
Frequency of Violation	2.5	39	0	11	0	36	0	27	0	20	0		
Average Duration of Violations (hours)	2.5	590	0	101	0	666	0	902	0	1220	0		
Nitrate (mg/l) Maximum		6.05	17.6	1.02	0.84	5.09	22.0	3.15	18.0	2.92	17.2		
Minimum		1.06	3.98	0.24	0.00	0.17	0.91	0.37	1.30	0.39	1.34		
Mean		2.99	9.58	0.65	0.46	1.11	11.7	1.17	9.90	1.18	9.42		
Frequency of Violation	10.0	0	87	0	0	0	77	0	61	0	40		
Average Duration of Violations (hours)	10.0	0	123	0	0	0	178	0	189	0	262		
Phosphate (mg/l) Maximum		1.05	0.84	0.68	0.19	1.11	1.03	1.23	1.07	1.16	1.00		
Minimum		0.28	0.14	0.04	0.00	0.13	0.00	0.17	0.11	0.16	0.10		
Mean		0.63	0.49	0.23	0.09	0.30	0.29	0.55	0.43	0.56	0.43		
Frequency of Violation	0.05	1	1	2	126	1	6	1	1	1	1		
	0.20	1	2	85	0	88	114	5	15	4	17		
Average Duration of Violations (hours)	0.05	26000	26000	13000	109	26000	358	26000	26000	26000	26000		
	0.20	26000	13000	126	0	250	146	5180	1690	6470	1490		

(1) Illinois Pollution Control Board Standard

TABLE 20-26 : CHANGES IN DISSOLVED OXYGEN LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

(All data in mg/l)	REACH 1 - North Shore Cha		REACH 4 - North Shore Ch		REACH 9 - North Branch Ch		REACH 10-North Branch Chi		REACH 15-Chicago Sanitary Canal		REACH 21-Chicago Sanitary Canal	
	Existing	1st	Existing	1st	Existing	1st	Existing	1st	Existing	1st	Existing	1st
Maximum	13.4	12.8	10.2	11.8	10.5	12.2	13.9	13.8	11.1	13.8	9.3	11.7
Minimum	2.3	6.8	3.2	7.8	0.0	5.4	4.8	6.4	0.0	5.7	0.0	5.6
Mean	8.8	10.0	7.1	9.5	5.5	9.1	10.1	10.1	5.9	9.8	4.5	9.0
* Violations	15	0	7	0	42	0	0	0	65	0	31	0
Average Duration	115	0	27	0	193	0	0	0	88	0	347	0
** Overall Assessment	Fair	Excellent	Good	Excellent	Bad	Excellent	Excellent	Excellent	Bad	Excellent	Bad	Excellent

(All data in mg/l)	REACH 28-Chicago Sanitary &		REACH 29 - Little Calumet		REACH 32 - Little Calumet		REACH 35-Calumet Sag Channe		REACH 41-Calumet Sag Channel			cago River
	Existing	1st	Existing	1st	Existing	1st	Existing	1st	Existing	1st	2nd	2nd
Maximum	9.6	12.8	12.9	12.9	10.8	10.6	10.4	12.0	12.0	14.1		
Minimum	0.0	4.4	0.7	4.9	0.0	3.3	0.0	1.2	0.1	3.2		
Mean	4.6	9.1	8.5	9.5	5.7	8.0	4.5	8.3	5.8	9.1		
* Violations	42	0	11	0	115	8	115	72	183	4		
Average Duration	251	0	10	0	30	2	86	18	32	5		
** Overall Assessment	Bad	Excellent	Good	Excellent	Poor	Good	Bad	Good	Poor	Good		

*With respect to minimum standard of 4.0 mg/l.
**Based on percent of time DO levels were above 4.0 mg/l. Possible ratings are: Excellent, Good, Fair, Poor and Bad.

TABLE 20-27: COMPARISON OF SOURCES AND VOLUMES OF POLLUTANTS

REACH 21

Pollutant Indicator and Source	Existing Conditions				First Test Plan			
	Surface		Ground		Surface		Ground	
	Amount	%	Amount	%	Amount	%	Amount	%
BOD (tons/yr.) Boundary Cond.	2870	7			1450	5		
Treatment Plants	26700	60			25200	95		
Comb. Sewer Over.	14700	33						
Lowland								
Cropland								
Grassland	5.31	0	1.68	0	5.31	0	1.68	0
Impervious								
TOTAL	44300	100	1.68	0	26700	100	1.68	0
Ammonia (tons/yr.) Boundary Cond.	197	3			65.5	3		
Treatment Plants	6300	88			2080	97		
Comb. Sewer Over.	635	9						
Lowland								
Cropland								
Grassland	0.53	0	0.17	0	0.53	0	0.17	0
Impervious								
TOTAL	7130	100	0.17	0	2150	100	0.17	0

Pollutant Indicator and Source	Existing Conditions				First Test Plan			
	Surface		Ground		Surface		Ground	
	Amount	%	Amount	%	Amount	%	Amount	%
Nitrate (tons/yr.) Boundary Cond	501	5			469	2		
Treatment Plants	8730	94			22500	98		
Comb. Sewer Over	58.1	1						
Lowland								
Cropland								
Grassland	0.53	0	3.58	0	0.53	0	3.58	0
Impervious								
TOTAL	9290	100	3.58	0	23000	100	3.58	0
Phosphorous (tons/yr.) Boundary Cond.	145	11			54.7	5		
Treatment Plants	1080	79			1050	95		
Comb. Sewer Over.	136	10						
Lowland								
Cropland								
Grassland	0.05	0	0.18	0	0.05	0	0.18	0
Impervious								
TOTAL	1360	100	0.18	0	1100	100	0.18	0

TABLE 20-28: COMPARISON OF SOURCES AND VOLUMES OF POLLUTANTS

REACH 41

Pollutant Indicator and Source	Existing Conditions				First Test Plan			
	Surface		Ground		Surface		Ground	
	Amount	%	Amount	%	Amount	%	Amount	%
BOD (tons/yr.) Boundary Cond.	6200	32			1870	23		
Treatment Plants	7580	39			5870	73		
Comb. Sewer Over	5530	28			0	0		
Lowland	6.93	0	4.98	0	6.71	0	4.93	0
Cropland	5.98	0	5.23	0	2.92	0	2.53	0
Grassland	52.2	0	35.2	0	56.2	1	37.4	1
Impervious	189	1			224	3		
TOTAL	19600	100	45.4	0	8030	99	44.9	1
Ammonia (tons/yr.) Boundary Cond.	1120	18			274	34		
Treatment Plants	4770	78			465	58		
Comb. Sewer Over	22 6	4			0	0		
Lowland	0.69	0	0.24	0	0.67	0	0.24	0
Cropland	1.19	0	0.26	0	0.58	0	0.13	0
Grassland	2.61	0	1.77	0	28.1	4	1.88	0
Impervious	21.0	0			25.7	3		
TOTAL	6160	100	2.27	0	794	100	3.25	0

Pollutant Indicator and Source	Existing Conditions				First Test Plan			
	Surface		Ground		Surface		Ground	
	Amount	%	Amount	%	Amount	%	Amount	%
Nitrate (tons/yr.) Boundary Cond	638	50			1010	13		
Treatment Plants	494	39			6630	85		
Comb. Sewer Over	14.8	1			0	0		
Lowland	1.37	0	10.9	1	1.30	0	10.8	0
Cropland	3.16	0	11.5	1	1.54	0	5.56	0
Grassland	10.4	1	78.6	6	11.2	0	87.3	1
Impervious	8.66	1			10.6	0		
TOTAL	1170	92	101	8	7650	99	9 7	1
Phosphorous (tons/yr.) Boundary Cond.	295	67			186	49		
Treatment Plants	112	25			182	48		
Comb. Sewer Over	23.4	5			0	0		
Lowland	0.28	0	0.31	0	0.27	0	0.30	0
Cropland	0.44	0	0.31	0	0.21	0	0.15	0
Grassland	2.07	1	2.10	1	2.23	1	2.23	1
Impervious	2.79	1			3.28	1		
TOTAL	436	99	2.72	1	374	99	2.68	1

The elimination of combined sewers will remove the source of most oxygen-demanding stream sediments. The remaining sediments will stabilize in the future at lower oxygen-demanding levels.

(3) Boundary Conditions: If the TARP system is fully implemented, street sweeping and vacuuming and the cleaning of catch basins would be necessary for aesthetic reasons, but not for water quality. The water quality of the basin will also benefit from efforts to clean up two basins which flow into the basin. These are the North Branch of the Chicago River Basin and the Little Calumet River Basin. In terms of DO, both basins are now draining "bad" quality water into the basin. That means the water at the output points of these basins is violating the 5 mg/l level at least 30 percent of the time. [The state standard for these two basins is different than for the Chicago River/Sanitary and Ship Canal/Cal Sag Basin where the DO standard is 4 mg/l.)

The first test plan assumed that the North Branch water quality would be "good" in the year 2000, which means it would violate the 5 mg/l standard less than five percent of the time. However, the water quality of the Little Calumet Basin outflow would be "poor," which means it would be in violation about 15 percent of the time. Little Calumet River water quality could be improved to "good" if a number of assumptions are met as outlined in Chapter Thirteen. For the analyses in this basin, "poor" water quality was used as modeled.

This poor quality water probably contributed to the violations of the DO standard simulated in the first test plan for the Chicago River/Sanitary and Ship Canal/Cal Sag Basin. The negative effects of this poor quality water from the Little Calumet Basin would not be completely offset by the improvement of the level of treatment at the Calumet Sewage Treatment Plant.

(4) Algal Blooms: Reach 35, which had the greatest number of DO violations, suffered from algae blooms. When the simulated algae bloom died off, an increased instream BOD load was created, which removed more oxygen from the water. The poor quality water from the Little Calumet Basin undoubtedly contributed much of the nutrients necessary for algal blooms.

The simulation showed that algal blooms were most severe during June when the model assumed instream aerators would be operating at less than full capacity. Therefore, if the aerators were operated at full capacity during these blooms, the increased oxygen-enriching effect would offset part of the oxygen demand caused by the blooms and reduce the percentage of time Reach 35 would be in violation.

(5) Fish: Given all other considerations, the oxygen levels in the Chicago River/Sanitary and Ship Canal/Cal Sag Basin would be able to support a greater variety of aquatic life. Problems would exist, however. Possible toxic effects of metals and other constituents could harm fish populations. In addition, the hydraulic configuration of the canals leaves little shallow water for the growth of fish food supplies.

(6) Concentrations of Pollutants: Table 20-25 gives the instream concentration of the modeled pollutants and information on the violation of standards, where applicable. For comparison purposes, the existing conditions simulations are also presented. Table 20-26 presents existing and test plan simulated conditions for DO as well as a qualitative rating of the overall water quality based on DO. Tables 20-27 and 20-28 give the simulated loads of the various constituents of interest. Results are shown for Reaches 21 and 41 under existing and test plan conditions.

(7) Pollutant Loads: Examination of the year 2000 simulation loadings in Tables 20-27 and 20-28 is most enlightening. Population and land use are forecasted to be relatively stable between the present and year 2000. Thus, the total amount of BOD, ammonia, nitrates, phosphates, and other pollutants produced is relatively constant. However, the tables shows substantial reductions in the loadings of BOD and ammonia, the constitutents that generate the major oxygen demands in the basin. The reductions are due mainly to the elimination of combined sewer overflows. Other factors resulting in reduced BOD and ammonia loads for Reaches 21 and 41 are improved water quality received from boundary condition flows, and enhanced point source treatment.

(8) Nutrients: Note in Tables 20-27 and 20-28 that phosphate and nitrate loads in Reaches 21 and 41 behave differently than do BOD and ammonia loads. This is because the combined sewer overflows have been eliminated in the test plan. Under test plan conditions for year 2000, the predominant contributors of Bod and ammonia are point sources and boundary flows. However, nitrate loadings show an increase under test plan conditions, and phosphate loadings do not change substantially. The higher nitrate loads come from increased treatment that converts ammonia to nitrate. Phosphate loads do not change considerably because the majority of the MSDGC service area has been under a high phosphate domestic laundry detergent ban for a number of years. Minor reductions are caused by increased treatment of wastewater flows.

(9) Percent of Time Standards Are Violated: The assessment of the plans tested in each basin is based on the extent to which a given plan reduces the total time that instream water quality standards are violated.

The Commission, in the formulation of strategies in the initial areawide plan, attempted to develop plans that would allow all streams to comply with standards 95 percent of the time. Table 20-29 illustrates the effect that the first test plan would have on compliance with standards in Reaches 1, 4, 9, 10, 15, 21, 29, 32, 35, 41, and 28 of the basin. The final three columns in each table shows the percent of time that standards for each pollutant indicator would be violated in each reach. The objective was to have all figures in this column below 5 percent.

20.09 PROBLEM ASSESSMENT

In Part I of the Areawide Plan, a number of problems were identified and solutions recommended. Those findings are applicable to all basins. Noted below are certain problems specifically associated with the Chicago River/Sanitary and Ship Canal/Cal Sag Basin.

a. Excessive Infiltration/Inflow (I/I)

In order to qualify for construction grants related to wastewater system improvements, regulations issued after the enactment of PL 92-500 require applicants to follow certain procedures. Code of Federal Regulations 40 CFR 35.927 requires evidence that the treatment works for which grant assistance is being sought will not be subject to excessive infiltration or inflow. An I/I analysis is performed to demonstrate the existence or non-existence of excessive infiltration and/or inflow in each sewer system. If excessive flows are found, the next step is a Sewer System Evaluation Survey (SSES). If corrective measures are justified to remedy in whole or in part the identified problems, a sewer rehabilitation project may be authorized as part of the facilities planning project.

Within the MSDGC area, the initial I/I study was performed by that District and excessive flows were found to exist. Because of the large number of individual SSES studies in each municipal and separate sanitary district sewer system, the work is to be done by local governments. Grants for 75 percent of allowable costs are available upon the submission of applications and their approval covering work in the separate sewer areas.

In the combined sewer areas, the grant procedures are more complicated because the sewers are considered to be multi-purpose. In addition to pollution abatement, the sewers provide local stormwater drainage and may have some flood control implications. According to the USEPA Program

TABLE 20-29: WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

REACH 1-NORTH SHORE CHANNEL

Pollution Indicator	LEVEL	Number of Violations		Average Duration of Violations (hours)		Percent of Times in Violation	
		Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan
Temperature °C	34.0	0	0	0	0	0	0
Dissolved Oxygen as O, mg/l	4.0	15	0	115	0	6.6	0
BOD_{20} Carbonaceous as O, mg/l	None						
Ammonia as N, mg/l	2.5	15	0	24	0	1.4	0
Nitrate as N, mg/l	10.0	0	0	0	0	0	0
Phosphorus Soluble as P, mg/l	0.05	2	1	13000	26000	100	100

REACH 4-NORTH SHORE CHANNEL

Pollution Indicator	LEVEL	Number of Violations		Average Duration of Violations (hours)		Percent of Times in Violation	
		Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan
Temperature °C	34.0	0	0	0	0	0	0
Dissolved Oxygen as O, mg/l	4.0	7	0	27	0	0.7	0
BOD_{20} Carbonaceous as O, mg/l	None						
Ammonia as N, mg/l	2.5	32	0	772	0	95.0	0
Nitrate as N, mg/l	10.0	4	81	13	49	0.2	15.3
Phosphorus Soluble as P, mg/l	0.05	1	1	26000	26000	100	100

REACH 9-NORTH BRANCH CHICAGO RIVER

Pollution Indicator	LEVEL	Number of Violations		Average Duration of Violations (hours)		Percent of Times in Violation	
		Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan
Temperature °C	34.0	0	0	0	0	0	0
Dissolved Oxygen as O, mg/l	4.0	42	0	193	0	31.2	0
BOD_{20} Carbonaceous as O, mg/l	None						
Ammonia as N, mg/l	2.5	26	0	955	0	95.5	0
Nitrate as N, mg/l	10.0	0	26	0	102	0	10.2
Phosphorus Soluble as P, mg/l	0.05	1	1	26000	26000	100	100

REACH 10 NORTH BRANCH CHICAGO RIVER

Pollution Indicator	LEVEL	Number of Violations		Average Duration of Violations (hours)		Percent of Times in Violation	
		Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan
Temperature °C	34.0	0	0	0	0	0	0
Dissolved Oxygen as O, mg/l	4.0	0	0	0	0	0	0
BOD_{20} Carbonaceous as O, mg/l	None						
Ammonia as N, mg/l	2.5	5	0	80	0	1.5	0
Nitrate as N, mg/l	10.0	0	0	0	0	0	0
Phosphorus Soluble as P, mg/l	0.05	1	1	26000	26000	100	100

TABLE 20-29: WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS (Continued)

REACH 15-CHICAGO SANITARY AND SHIP CANAL

Pollution Indicator	LEVEL	Number of Violations		Average Duration of Violations (hours)		Percent of Times in Violation	
		Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan
Temperature °C	34.0	7	0	44	0	1.2	0
Dissolved Oxygen as O, mg/l	4.0	65	0	88	0	22.0	0
BOD_{20} Carbonaceous as O, mg/l	None						
Ammonia as N, mg/l	2.5	45	0	480	0	83.1	0
Nitrate as N, mg/l	10.0	0	8	0	204	0	6.3
Phosphorus Soluble as P, mg/l	0.05	1	1	26000	26000	100	100

REACH 21-CHICAGO SANITARY AND SHIP CANAL

Pollution Indicator	LEVEL	Number of Violations		Average Duration of Violations (hours)		Percent of Times in Violation	
		Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan
Temperature °C	34.0	0	0	0	0	0	0
Dissolved Oxygen as O, mg/l	4.0	31	0	347	0	41.4	0
BOD_{20} Carbonaceous as O, mg/l	None						
Ammonia as N, mg/l	2.5	77	5	226	61	66.9	1.2
Nitrate as N, mg/l	10.0	0	91	0	136	0	47.6
Phosphorus Soluble as P, mg/l	0.05	1	1	26000	26000	100	100

REACH 28-CHICAGO SANITARY AND SHIP CANAL

Pollution Indicator	LEVEL	Number of Violations		Average Duration of Violations (hours)			
		Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan
Temperature °C	34.0	0	0	0	0	0	0
Dissolved Oxygen as O, mg/l	4.0	42	0	251	0	40.5	0
BOD_{20} Carbonaceous as O, mg/l	None						
Ammonia as N, mg/l	2.5	39	0	590	0	88.5	0
Nitrate as N, mg/l	10.0	0	87	0	123	0	41.2
Phosphorus Soluble as P, mg/l	0.05	1	1	26000	26000	100	100

REACH 29-LITTLE CALUMET RIVER

Pollution Indicator	LEVEL	Number of Violations		Average Duration of Violations (hours)		Percent of Times in Violation	
		Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan
Temperature °C	34.0	0	0	0	0	0	0
Dissolved Oxygen as O, mg/l	4.0	11	0	10	0	0.4	0
BOD_{20} Carbonaceous as O, mg/l	None						
Ammonia as N, mg/l	2.5	11	0	101	0	4.3	0
Nitrate as N, mg/l	10.0	0	0	0	0	0	0
Phosphorus Soluble as P, mg/l	0.05	7	126	13 000	109	100	52.8

TABLE 20-29: WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS (Continued)

REACH 32-LITTLE CALUMET RIVER

Pollution Indicator	LEVEL	Number of Violations		Average Duration of Violations (hours)		Percent of Time in Violation	
		Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan
Temperature °C	34.0	0	0	0	0	0	0
Dissolved Oxygen as O, mg/l	4.0	115	8	30	2	13.3	0.06
BOD_{20} Carbonaceous as O, mg/l	None						
Ammonia as N, mg/l	2.5	36	0	666	0	92.2	0
Nitrate as N, mg/l	10.0	0	77	0	178	0	52.7
Phosphorus Soluble as P, mg/l	0.05	1	69	26000	358	100	95.0

REACH 35 CALUMET SAG CHANNEL

Pollution Indicator	LEVEL	Number of Violations		Average Duration of Violations (hours)		Percent of Time in Violation	
		Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan
Temperature °C	34.0	0	0	0	0	0	0
Dissolved Oxygen as O, mg/l	4.0	115	32	86	16	38.0	2.0
BOD_{20} Carbonaceous as O, mg/l	None						
Ammonia as N, mg/l	2.5	27	0	902	0	93.7	0
Nitrate as N, mg/l	10.0	0	61	0	189	0	443
Phosphorus Soluble as P, mg/l	0.05	1	1	26000	26000	100	100

REACH 41-CALUMET SAG CHANNEL

Pollution Indicator	LEVEL	Number of Violations		Average Duration of Violations (hours)		Percent of Time in Violation	
		Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan	Existing Conditions	1st Test Plan
Temperature °C	34.0	0	0	0	0	0	0
Dissolved Oxygen as O, mg/l	4.0	183	4	32	5	22.5	0.08
BOD_{20} Carbonaceous as O, mg/l	None						
Ammonia as N, mg/l	2.5	20	0	1220	0	93.8	0
Nitrate as N, mg/l	10.0	0	40	0	262	0	40.3
Phosphorus Soluble as P, mg/l	0.05	1	1	26000	26000	100	100

Guidance Memo PG-61, dated December 16, 1976, rehabilitation and/or construction grants will be made available only for the pro rata costs allocable to pollution abatement. However, the SSES studies themselves are fundable as are any concurrent special studies necessary to determine the causes of and alternative corrective measures related to combined sewer overflows and sewer backups.

To date, only 86 applications for SSES grants have been received from the 130 municipal governments and separate sanitary districts located within the MSDGC area. Local units of government which have not already done so should submit applications for grants to undertake these SSES's.

b. MSDGC Facility Plans

Flows and loads from point sources are extremely important in the basin. During low-flow conditions, they are the dominant factors determining water quality. As demonstrated by the existing conditions and test plan simulation results, implementation of the MSDGC facilities plans is critical for the attainment of required water quality conditions.

c. Sediment Oxygen Demand (SOD)

Actual SOD measurements (Table 20-9) made by the MSDGC indicate the polluted nature of streams. Considerable demand for DO is exerted by these benthic deposits, and improved water quality will only occur after this demand has stabilized to a level that will support a healthy aquatic environment. Decreased oxygen demands from the elimination of combined sewer overflows, upgraded point source treatment, improved boundary condition flows, and instream aeration will make DO available to oxidize sediment demands. Note that the implementation of these measures will not bring about an immediate increase in DO levels until the SOD is satisfied. It is assumed that SOD levels will decline greatly by year 2000, and this has been incorporated in the test plan simulation.

d. Combined Sewer Overflows

The effects of overflows from combined sewers are demonstrated in the results of the existing conditions simulation. Large loads of oxygen-demanding materials (BOD and ammonia) are discharged during wet weather. Deposits of solid materials in overflows contribute to the SOD. Thus, combined sewer overflows generate long lasting problems in the basin. The assumption in the test plan is that the Tunnel and Reservoir Plan (TARP) is in place controlling

combined sewer overflows in the 297-square mile combined sewer area.

e. Boundary Condition Flows

Another important factor influencing water quality is the condition of flows entering from the North Branch Chicago River, Little Calumet River, Grand Calumet River, and Lake Michigan. It is assumed that flows entering from outside the basin will have improved water quality resulting from their 201 and 208 plans.

f. Algae Populations

Nutrients are present in basin waters sufficient to support large algal populations; however, algae populations are suppressed by high turbidity and perhaps, by excessive concentrations of toxic materials. A general increase in algae population is expected in the future because of suspended solids controls which will reduce turbidity. This enhancement of algal growth could result in severe DO deficiencies when algal blooms die and create an excessive oxygen demand. Problems may also result from dips in the DO levels during algal respiration.

g. Excessive Water Quality Improvement Measures

The point has been raised by some that the measures being taken to upgrade water quality (TARP, MSDGC facility plans, instream aeration, etc.) in the Chicago River/Sanitary and Ship Canal Basin are excessive, considering the use designation assigned to the waters. This question must also be examined in relation to the other river basins in the region.

h. Water Quality Modeling Results

Results of the water quality modeling revealed that with respect to DO, the reaches of the North Shore Channel, the North Branch of the Chicago River, and the Sanitary and Ship Canal would all be considered excellent. The reaches of the Little Calumet River and Calumet Sag Channel in the basin would all be rated as good. There are no reaches where instream standards are seriously violated.

i. Marine Activities

The effects of marine activities in the basin are difficult to quantify. Dredging and the resuspension of sediments by barge and boat traffic cause high turbidity levels that retard algal growth. The detrimental effects of these activities have been discussed previously. The magnitude of the problem of sanitary waste disposal into basin waters from pleasure crafts and commercial vessels is not known.

j. Mining

There are two stone quarries, totaling 60 acres, located in the Will County portion of the basin. Information on mining activities in the Cook County part of the basin is not available.

Surface mining creates a visible defacement of the earth's surface, and results in disturbance of large land areas. Waste materials, if not regraded to conform with the original topography, are subjected to erosion, and stormwater runoff will carry sediment into nearby streams. These materials destroy fish and wildlife habitats and, upon settling, decrease the capacity of streams and reservoirs. Mining activities also have an effect on groundwater supplies since various operations can alter the groundwater distribution patterns. The enactment of federal and state laws governing the control of mining activities and the restoration of mine sites will go far in preventing the initial occurrence of pollution.

k. Construction

Existing and projected population growth results in demands not only for new housing but also for the construction of supporting facilities, particularly roads, highway improvements, and community services such as shopping areas and schools. Historically, all types of construction, but particularly roadways, have resulted in water pollution. Pollutants from construction operations can be broadly grouped under three headings: sediments, chemicals, and biological organisms.

Pollutional impacts are usually generated by construction activities that involve large clearing and grading operations. When these areas are self-contained, preventive measures can be planned and installed at modest additional costs. However, the most severe impacts are associated with lineal construction within narrow right-of-ways, such as highways and other utilities that require the disturbance of substantial amounts of terrain or earth. The configuration of these areas is such that preventive and

corrective measures involve more planning, foresight, and funds.

Given the difficulties of long-range forecasting of construction activities as to timing, location, and size, no useful purpose will be served in attempting to conduct such an academic exercise. Suffice to say that if municipalities and counties prepare suitable soil erosion ordinances, and if they adequately enforce them, then this particular type of problem can be controlled. The unknown factor concerns highway construction by state agencies, and other large projects such as stormwater and flood control facilities by either federal, state, or regional agencies. Also indicated as potential problems are utilities where public and private firms have the right of eminent domain. Thus, the degree of control that may be exercised by local governments needs to be clarified and strengthened, if necessary.

20.10 BASIN RECOMMENDATIONS

a. Overview

Recommended measures for improving and protecting water quality in the Chicago River/Sanitary and Ship Canal/Cal Sag Basin are derived from the recommendations in Chapters Four through Eight of the areawide plan, but tailored to the specific problems in the basin. Solutions to local problems are also incorporated. Of particular importance are the serious impacts of treatment plant discharges, the water quality handicap posed by sluggish stream flows, and the pollution problems from poor quality boundary flows. The effects of combined sewer overflows in the basin also must be eliminated.

Implementation of the local facilities plans of the MSDGC should reduce problems from treatment plant effluents and eliminate combined sewer overflows. It is imperative, however, that actual performance be consistent with plan provisions.

Additional measures, such as reduction of wastewater flows, post-treatment aeration, and in-stream aeration also are recommended in this basin. Aeration should help correct the extremely low DO levels now experienced in some reaches.

Recommendations with respect to nonpoint sources are basically the same as the overall program outlined in Chapter Six. Control of pollutants in stormwater runoffs from urban development is of critical importance in this basin, because of the extensive development in Cook County.

b. Point Sources

(1) Publicly Owned Wastewater Systems:

(a) The MSDGC should implement its 201 plan as summarized in Section 20.04f.

(b) The following listed Cook County communities having separate sewers should seek federal grants and initiate and/or complete by July 1, 1981 sewer systems evaluation studies as required by 40 CFR 35.927: Burbank, Country Club Hills, Oak Forest, Oak Lawn, Orland Park, Palos Hills, and Westhaven.

(c) The following listed communities having combined sewers in all or portions of their corporate limits should complete the same studies by July 1, 1981, plus supplementary studies to determine what works will be necessary to optimize local systems in order to take advantage of TARP capacity: Bedford Park, Burnham, Calumet City, Chicago, Cicero, Forest View, Harwood Heights, Hometown, Lincolnwood, Oak Park, Park Ridge, Riverside, Stickney, and the Central Stickney Sanitary District.

(d) By July 1, 1983 all treatment plants whose seven-day ten-year low flow dilution ratio is 10 to 1 or less should provide or continue to provide not less than 80 percent oxygen saturation in their effluents. Monitoring of wastewater quality after aeration should be conducted. However, during the continuing planning program, studies should be undertaken to determine where this requirement may be waived without detriment to instream water quality.

(e) Municipal sewer service required to serve future growth within service areas identified for the year 2000 should be provided only by the MSDGC, except where this is impractical or not cost-effective. Projected five-year service areas will be identified in the NPDES permit issued by IEPA.

(f) No NPDES permit should be issued for municipal-type wastewater service within the five-year service area, other than to the MSDGC, except on a finding by IEPA that the proposed facility is the most cost-effective means of providing service, is an interim facility pending extension of service by the treatment authority, or is intended to serve an isolated location.

(g) Treatment plant operators should assure the very high standard of performance for wastewater treatment plants which the 201 plans assume. The IEPA should monitor treatment plant operation and performance and its effect on in-stream water quality. The IEPA should establish a technical assistance program to aid treatment plant operators and laboratory technicians in dealing with technical problems and assuring a consistent high level of performance in treatment operations.

(h) All municipalities in the basin and the counties of Cook and Will should continue to reduce the consumption of potable waters in order to conserve water resources and reduce wastewater flows to publicly and privately owned treatment plants. This should be accomplished through the modification of building codes by requiring water conserving plumbing fixtures, metering of all new developments, pricing policies, and public education.

(2) Privately Owned Utilities:

(a) NPDES permits issued by IEPA to private utility companies should identify projected five year service areas. No other NPDES permits should be issued for municipal type wastewater service within those five-year service areas to other treatment authorities except upon a finding by the IEPA that the proposed facility is the most cost-effective means of providing service, is an interim facility pending extension of service by another established treatment authority, or is intended to serve an isolated location.

(b) The Star Utility Company Villa West should continue in operation but its service area should be extended and its treatment capacity increased only in cases where service cannot be provided by a publicly-owned wastewater treatment authority.

(3) Industrial Wastewater Treatment Plants:

(a) The IEPA should continue to enforce all requirements of NPDES permits for all industries in the basin and assure that treatment plants achieve and maintain required standards of plant performance. This can be achieved through IEPA standards for treatment plant personnel and through frequent sampling and analysis of treatment plant effluent by the IEPA for the purpose of monitoring compliance with NPDES permits.

(b) Heat discharges from Commonwealth Edison electric power generation facilities are expected to be eliminated by the year 2000. Present tentative plans of the utility

call for the retirement of the stations over a period of 11 years prior to the year 2000.

(4) Miscellaneous Wastewater Treatment Plants:

(a) Miscellaneous publicly and privately owned wastewater treatment plants should continue in operation until such time as wastewater service can be provided by publicly owned municipal-type wastewater systems on a cost-effective basis. Service areas of privately owned treatment systems should not be expanded or their treatment capacities increased when service can be provided on a cost-effective basis by publicly owned municipal-type wastewater systems.

(b) The IEPA should continue to enforce all requirements of NPDES permits and assure that treatment plant operators achieve required standards of plant performance.

(5) Combined Sewer Overflows:

(a) The MSDGC should control combined sewer overflows in the 297-square mile combined sewer area in this basin as provided by its Tunnel and Reservoir Plan (TARP.)

(b) Local combined sewer improvements related to the MSDGC facilities plan should be implemented by the appropriate municipalities.

c. Non-Point Sources

(1) Urban Stormwater Runoff:

(a) By July 1, 1983, all municipalities and counties should implement measures to work toward a reduction of BOD in urban stormwater runoffs from separately sewered areas. Reductions of 25 percent of 1976 surface loadings on impervious surfaces are recommended as a target. From areas to be urbanized in the future, target reductions of 50 percent of 1976 surface loadings are recommended.

(b) In attempting to meet the above targets, the implementing agencies should work through the countywide water quality committees to develop plans and standards for the implementation of appropriate measures such as catch basin cleaning, performance zoning, street cleaning, use of pervious pavement surfaces, increased vegetation cover, grass waterways, wetland storage of stormwater, stormwater detention, sedimentation and erosion controls, and other measures to achieve the desired pollutant reductions.

(c) Township and state highway organization, the Illinois State Toll Highway Authority, and facility engineering departments at state and federal installation should participate in the programs described above by implementing accelerated and/or improved street sweeping programs for streets, roads and highways that are hydraulically connected to perennial streams or permanent lakes via stormwater conveyance systems.

(d) During the period up to July 1, 1983 agencies sould utilize voluntary exploratory programs, implementing techniques to control pollutants from urban nonpoint sources.

(e) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should adopt and enforce adequate stormwater detention ordinances. These ordinances should include provisions which clearly establish longterm responsibilities for maintenance of detention facilities. All such local ordinances also should be consistent with minimal areawide standards set forth in the model ordinance.

(f) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should develop and enforce adequate erosion and sedimentation control ordinances. All such local ordinances should be consistent with minimal areawide standards set forth in the model ordinance.

(g) Within one year following the preparation by NIPC of a model ordinance, Cook and Will counties and all municipalities in the basin should adopt measures to control surface runoff from open storage yards containing industrial stockpiles and other materials which may go into solution or which may be carried away by stormwater runoff and pollute streams and other water bodies.

(h) Municipalities, townships, counties, and state and county highway departments responsible for de-icing streets and highways should develop programs to control the application of de-icing materials, to train personnel in proper application methods, and to use proper equipment in order to minimize any negative water quality impacts. The impact of de-icing agents on water quality will be given further study by the Commission in the continuing planning program.

(2) Agricultural Runoff:

(a) By July 1, 1980 the North Cook County and Will-South Cook County Soil and Water Conservation Districts, in conjunction with agencies of the United States and Illinois Departments of Agriculture and the countywide water quality committees, should identify the best management practices necessary to implement the agricultural aspects of the 208 plan, including conservation tillage, contour plowing, terracing, and conversion of cropland to grassland.

(b) By July 1, 1981, agricultural lands on which BMP's should be applied should be identified by appropriate soil and water conservation districts. Agencies of the U.S. Department of Agriculture and countywide water quality committees should be consulted.

(c) By July 1, 1985, a comprehensive conservation plan should be prepared for each farm in the basin which has soil ercsion losses in excess of standards set by the Illinois Department of Agriculture and soil and water conservation districts under House Bill 818.

(d) Using available cost sharing and technical assistance programs, the soil and water conservation districts should ensure implementation of the BMP program according to the following schedule on approximately 2,830 acres of agricultural lands:

By 1985 - 30% of the identified land.
By 1995 - 70% of the identified land.
By 2000 - 100% of the identified land.

(e) The IEPA, NIPC, and local governments should provide the results of their instream water quality monitoring to the soil and water conservation districts and to the Departments of Agriculture so that priority can be given to the areas most sensitive from a water quality standpoint in order to maximize the impact of the best management practices.

(f) The IEPA should enforce the IPCB regulations which require permits for feedlots and should use the IEPA draft technical policy WPC-2 "Design Criteria for Field Application of Livestock Wastes" as a guide.

(g) Illinois Department of Agriculture, Illinois Department of Public Health, and USEPA regulations on the use of pesticides and disposal of containers, and Illinois Department of Agriculture regulations on the training and licensing of pesticide applicators and operators should be continued.

(h) Farmers should implement good pasture management practices, utilize grass waterways, vegetative filter strips, and field borders, and make wise use of fertilizers wherever possible in accordance with the Illinois Agronomy Handbook to reduce the dangers of pollution. The U.S. Department of Agriculture agencies should assist farmers in recognizing the water quality problems posed by improper practices, and asssist them in the use of proper practices.

(3) On-site Disposal Systems:

(a) Individual malfunctioning on-site disposal systems outside of the five-year service areas should be repaired wherever possible upon complaint to the appropriate authorities or replaced with new systems if necessary.

(b) By July 1, 1983 special service areas should be established under the sponsorship of municipal governments (for sites located within corporate limits) and by the counties (in unincorporated areas) where necessary, to facilitate the financing of any innovative-type systems or other on-site improvements necessary to correct or replace malfunctioning systems in areas outside the five-year projected service areas.

(c) The minimum requirements of the Illinois Private Sewage Disposal Code should be upgraded to require more innovative site analysis techniques, and Cook and Will County Health Departments should require a construction permit to regulate the design, location, and installation of every new on-site system in incorporated as well as unincorporated areas.

(d) Local officials should inspect all septic systems known to be failing, threatening public health or causing nuisance conditions. The inspection should result in the issuance of a repair permit for corrective measures which are to be undertaken and paid for by the septic system owner.

(e) Septic systems also should be inspected by local officials prior to the transfer of ownership of properties where such systems are installed. The results of the inspections should be made known to the lending institutions which are furnishing the mortgages.

(4) Air Pollution:

(a) As part of the continuing planning program, the IEPA in cooperation with the Illinois Institute for Natural Resources, the Illinois State Water Survey, and local air quality management agencies should analyze the relationship between air pollution and water quality in all of its aspects. The IEPA should cooperate with the Commission in devising strategies for correcting present negative effects and preventing future problems through the 208 continuing planning program.

(5) Sanitary Landfills:

(a) The IEPA should ensure that every sanitary landfill complies with all regulations of the IPCB for its siting, design, construction, and operation. As a substitute for existig state regulations, the IEPA and IPCB should consider certification of local solid waste disposal programs which comply with plans to be prepared under the Federal Resource Conservation and Recovery Act. Alternatives to land disposal of solid wastes, including recycling, should be considered and utilized wherever feasible.

(6) Waterways:

(a) Instream aeration as provided for in the MSDGC facilities plan should be implemented.

(b) Given the existence of a federal navigation project calling for a 9-foot barge channel extending from Lake Calumet downstream via the Little Calumet River, the Calumet Sag Channel, and the Sanitary and Ship Canal, the MSDGC should continue to cooperate with the Corps of Engineers in identifying and making available suitable dredge spoil disposal areas related to maintenance of the project depths.

(c) Because of the narrow navigation channels and shallow project depths, bottom deposits are readily resuspended by heavily laden barges and fast moving pleasure craft. Measures to control these resuspended sediments and thus improve water quality should be studied in the continuing planning program in joint research with the Corps of Engineers.

(d) Will County is encouraged to develop an organization similar to the Cook County Clean Stream Committee, consisting of volunteers and organizational representatives who maintain surveillance over water bodies for activities adverse to water quality, flood control, recreation, fish, wildlife, and/or navigation.

(e) The Commission, in conjunction with the countywide water quality committees, in the continuing planning program, should develop recommendations to simplify the highly fragmented system for channel maintenance and improvement in the streams, rivers, and canals of the Chicago River/Sanitary and Ship Canal Basin. Present responsibility for such maintenance functions as debris removal, stream bank stabilization, public access, dredging, disposal of dredge spoil, protection and augmentation of habitat, tree shading, and vegetation is shared between a host of federal, state and local authorities.

(f) In-stream water quality data collected by local treatment plant operators should be periodically published by the IEPA.

d. Residuals

(1) As regulated by the IEPA, present methods for the disposal of sludge from treatment plants are adequate to handle present and anticipated future volumes, and should continue to be administered by the IEPA.

(2) Highest priority should be given to the use of sludge as a soil conditioner, and efforts to utilize sludge for that purpose should be expanded. The IEPA should assure proper practices in the utilization of sludge on agricultural lands through implementation of the draft standards in IEPA Technical Policy WPC-3 "Design Criteria for Municipal Sludge Utilization on Agricultural Land."

(3) The USEPA standards and the IPCB regulations for permits for the disposal of hazardous or toxic substances should continue to be enforced by the IEPA.

e. Groundwater

(1) By July 1, 1980 the Illinois State Water Survey and the Illinois State Geological Survey should undertake a coordinated well sampling program to monitor groundwater quality in areas where a potential for infiltration by pollutants now exists or might exist in the future.

f. Inland Lakes

(1) By July 1, 1979 and in accordance with Section 314 of PL 92-500, the IEPA should undertake expanded lake sampling to identify eutrophic conditions and, in conjunction with the Commission and the countywide water quality committees, develop plans to control sources of pollution and restore water quality.

g. Mining

(1) The present IPCB regulations for the control of pollution from aggregate producing activities are considered generally satisfactory. However, the IEPA should continue to study the types and volumes of pollutants associated with these activities and their potential effects on surface and groundwater quality. Any needed changes in present regulations should be identified by July 1, 1980.

h. Boundary Conditions

(1) Grand Calumet River flows entering Illinolis from Indiana should meet the following water quality criteria; a maximum ammonia nitrogen concentration of 2.5 mg/l in the months April through October and a maximum of 4.0 mg/l at other times; a mean BOD concentration of 10 mg/l; and dissolved oxygen levels in excess of 4 mg/l at least 95 percent of the time.

20.11 COSTS OF RECOMMENDED PLAN

a. Facility Plans

(1) General: Table 20-30 shows pertinent capacities in the year 2000 for publicly owned wastewater treatment plants expected to remain in service, their effluent standards, and constuction costs. Local collector sewer projects are shown, if they have been processed for federal or state grants. Also shown are total MSDGC costs allocated to Chicago River/Sanitary and Ship Canal Basin.

Cost data were assembled from various sources as noted below and in the tables that follow. The processing of this information and its allocation to the Chicago River/Sanitary and Ship Canal/Cal Sag Basin are described, where applicable.

Except for the MSDGC area, the initial costs of facility plans listed in Table 20-30 refer to the first phase of any project which is to be followed at some future date by programmed expansions or extensions. Under this

TABLE 20-30 : RECOMMENDED PLANS, PUBLICLY OWNED TREATMENT SYSTEMS — CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

MAP CODE	FACILITY NAME	DESIGN CAPACITIES (MGD)		EFFLUENT STANDARDS (Year 2000) (mg/l)				CAPITAL COSTS (million $)			COMMENTS
		1975	2000	BOD_5	TSS	P	NH_3N (2)	INITIAL	FUTURE	TOTAL	
C8	MSDGC Northside	333	333	10	12	(1)	2.5/ 4.0				(1) No P standard applicable
C11	MSDGC Central	1200	1358	10	12	(1)	2.5/ 4.0				(2) 2.5 mg/l summer months,
C4	MSDGC South	220	354	10	12	(1)	2.5/ 4.0				4.0 mg/l winter months
C7	MSDGC Lemont	1.2	2.4	20	25	(1)					(3) Costs apportioned on ad
	MSDGC (3)							2157.2	16.8	2174	valorem basis.
	Local improvements related to MSDGC (3)							302.2	57.8	360	

TABLE 20-31 : SUMMARY OF FUTURE COSTS (All data in 1977 dollars in millions)

Jurisdiction	Capital Costs						Annual Operations & Maintenance Expense				
	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	Total	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)
MSD	2157.2	16.8				2174.0	4.88	18.85	19.74	19.74	19.74
Local improvements related to MSD	302.2	57.8				360.0					
Agricultural BMP's							0.005	0.01	0.01	0.02	0.03
Urban Stormwater Management Expense							0.05	0.05	0.05	0.05	0.05
Total	2459.4	74.6				2534.0	4.94	18.91	19.80	19.81	19.82

TABLE 20-32: PROJECTED ANNUALIZED LOCAL COSTS (All data in 1977 dollars in millions)

Jurisdiction	CAPITAL COSTS			LOCAL CAPITAL PLUS O & M ANNUALIZED Costs (Mil./yr.)*					Total Cost** 1978-2000	Comments
	Cost Total Through Yr. 2000	Est. Fed'l. Share	Est. Local Share	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000		
MSD	2174.0	1630.5	543.5	55.79	70.16	71.05	71.05	20.14	1400.67	
Local Improvements Related to MSD	360.0	260.0	90.0	7.13	8.50	8.50	8.50	1.36	167.23	
Agricultural BMP's				0.005	0.01	0.01	0.02	0.03	.315	
Urban Stormwater Management Expense				0.05	0.05	0.05	0.05	0.05	1.15	
Total	2534.0	1900.5	633.5	62.97	78.72	79.61	79.61	21.58	1569.36	

*Local Capital Amortized @ 7% for 20 yrs. **Sum of Local Capital Plus O & M Annualized Costs, in million $

definition, the total cost of works currently under construction fall under the classification "Initial" even though the project has not yet been completed and future payments to contractors will be made. Except for the MSDGC area, "future" costs in Table 20-30 cover phased work scheduled at later dates.

(2) MSD Area: Special procedures were followed in depicting MSDGC costs because of the magnitude and complexity of the costs involved. Total costs of MSDGC improvements and related locally funded improvements were taken from Table U7-Ix-1 and from page 229 of the MSDGC's 1977 Facilities Plan Update Supplement. They were revised and brought up to date in a conference with MSDGC staff representatives on March 14, 1978.

The cost of all MSDGC improvements was assumed to be spread throughout the MSDGC service area on an ad valorem basis. Thus, each basin's share of the cost was assumed to be proportional to the share of total District assessed valuation in that basin.

For locally funded improvements, the estimates for local sewer upgrading are 1977 values from page 229 of the MSDGC 1977 Facilities Plan Update Supplement. For other local improvements, the estimates in pages XI-18 and XI-19 of the MSDGC Overview Report are as of January 1, 1975, also updated as noted above. Where applicable, costs were also updated at 6 percent compounded for the intervening period to January, 1977 levels.

For local sewer improvements in the MSDGC portion of this basin which is outside the TARP area, the costs were allocated to communities in accordance with their share of the total assessed valuation for all non-TARP areas.

(3) Future Costs: Table 20-31 distributes costs within five-year time frames. Annual operating and maintenance costs are also shown, which are based on data furnished by operating agencies. In the absence of agency data, operating and maintenance costs were estimated from information in 208 Staff Paper No. 20, "Wastewater Treatment Processes and Cost Estimating Data."

(4) Local Costs: Table 20-32 shows annualized local costs.

(5) Increased Costs: Table 20-33 shows the estimated annual increases in wastewater charges per household for the basin as a whole, for the previously described improvements and/or expansions.

TABLE 20-33 : PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)
Assessed Valuation (Mil. $)	15796	15748	15700	15652	15604
Additional Ad Valorem Rate: ($/$100 A.V.)					
Capital Related	.368	.380	.381	.382	.011
O & M Related	.031	.120	.126	.127	.127
Total Rate:	.399	.500	.507	.509	.138
Additional Cost per Home of $45,000 FMV ($/yr.)	59.85	75.00	76.05	76.35	20.70
Existing Av. Annual WW Cost ($/Household yr.)	72.60				
Total Av. Annual WW Cost ($ / Household yr.)	132.45	147.60	148.65	149.95	93.3
Percent Av. Increase* in WW Costs per Household (%)	82.4	103.3	104.8	105.2	28.5

*Total Rate Used

b. Urban Stormwater

Methods for controlling pollution in urban stormwater runoff include: street sweeping, catch basin cleaning, performance zoning, use of porous payments, increased vegetation, grass waterways, wetland storage of stormwater, stormwater detention, and erosion and sediment controls. The goals of a 25 percent decrease in BOD loads on existing (1976), separately sewered impervious surfaces and a 50 percent decrease in BOD loads on separately sewered impervious areas built between 1976 and 2000 are to be achieved by combinations of the above practices. The cost of the mix of specific practices which would meet these goals is dependent upon the practices selected and the intensity of their individual use.

An estimate of the total cost based solely on street cleaning utilizing vacuum sweepers is $1,126,000 through the year 2000, increasing from $45,100/year in 1978 to $52,800/year in the final year. The frequency of cleaning streets with vacuum sweepers averaged about once every 12 days in 1976 and increased to once every 6 days during the year 2000, excluding the three winter months of December through February.

The above costs did not include street cleaning in combined sewer areas where the stormwater runoffs would be treated. Naturally, some street cleaning activities would be required in these areas for sanitary, public relations, or other reasons. Costs for that cleaning are not included in the above figures.

c. Agricultural Runoff

Agricultural croplands presently amount to 7,770 acres in the basin, and are projected to decrease to 4,350 acres by the year 2000. In order to reduce agricultural pollution from croplands, BMP's are targeted for implementation by the year 2000 on 2,830 acres at a total cost over the years of $478,000.

Although a comprehensive farm plan would include a wide range of BMP's, the following four practices and several combinations have been recommended for implementation: conservation tillage, contouring, terracing, and cropland conversion to pastureland. These BMP's were selected because of their direct effects on water quality as well as their ability to reduce soil erosion. Many other practices which would be contained in a farm plan, but not considered by the Commission, are either too localized or difficult to evaluate for their effects on water quality.

Of the above total costs, there were $213,300 that represented initial installation (or capital) expenditures for which grants may be available from the Federal government. The cost-sharing ratios are expected to be on the order of 50 percent. The proposed expenditure of

$264,700 represents total operating and maintenance costs. The farmers' share is estimated at 50 percent of the total based on federal funding for the remaining 50 percent.

For estimating purposes, it was assumed that 30 percent of the BMP's will be installed by 1985, 70 percent by 1995, and 100 percent by the year 2000.

20.12 WATER QUALITY CONDITIONS IN 1983

a. Introduction

Public Law 92-500 includes the statement "Wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water be achieved by July 1, 1983." The water quality standards of the Illincis Pollution Control Board for Secondary Contact and Indigenous Aquatic Life streams, such as for the Chicago River/Sanitary and Ship Canal/Cal Sag basin were adopted to protect the State's waters for aquatic life, and for incidental or accidental contact during recreational activities. As noted in Section 20.03a state water quality standards are more liberal for "Secondary Contact" water than for "General Use" waters. Illinois standards, as modified by this plan, are being used to judge compliance with the 1983 national goal. This chapter assesses the feasibility of compliance with the dissolved oxygen and ammonia standards in 1983 in the Chicago River/Sanitary and Ship Canal/Cal Sag Basin.

b. Assumpticns of Changes in the Basin

(1) Land Cover: Land cover estimates for the years 1976, 1983, and 2000 are summarized in Table 20-34. It should be noted that impervious area is forecast to increase by 17 percent from 1976 to 2000. Also forecast is some shifting from lowland and cropland to grassland.

(2) Urban Runoff Control: Management measures are to be implemented with the objective of reducing runoff-related BOD from existing, separately sewered urbanized areas by 25 percent of loadings found to be present in 1976. The BOD loadings from areas urbanized after that year are to be reduced by 50 percent of 1976 loads. This will result in an overall 26 percent reduction in urban runoff pollution loads by 1983.

(3) Point Sources: Effluent characteristics of point sources are given for 1976 and 1983 in Table 20-35.

TABLE 20-34 : LAND COVER, CHANGES

	Area in Square Miles		
Cover Type	1976	1983	2000
Lowland	33.89	33.82	33.66
Cropland	12.14	10.48	6.79
Grassland	66.34	67.53	70.18
Impervious	10.08	10.62	11.82

(4) Combined Sewers: Phase I of the Tunnel and Reservoir Plan (TARP) will be fully implemented by 1983. Combined sewer overflows and constituent loads will be reduced 90 percent from existing conditions.

(5) Boundary Conditions: Diversions from Lake Michigan in 1983 will be the same as in the year 2000 First Test Plan. The North Branch and Little Calumet boundary conditions are as calculated from their 1983 loads analysis, assuming the same basin reduction factors as under existing conditions.

(6) In-Stream Aeration: All planned instream aeration stations will be operational by 1983. Table 20-36 shows the station locations and their rated capacity. The stations will operate as required to maintain instream dissolved oxygen levels greater than four milligrams per liter. The minimum station operation will be at one-third capacity.

(7) Benthic Oxygen Demands: Sediment oxygen demands will remain the same as under existing conditions. This assumes that the sediments will not have had a chance to stabilize following the completion of TARP Phase I which will reduce particulate inflows.

c. Expected Water Quality in 1983

The water quality model was used indirectly to estimate 1983 water quality conditions. Results of 1976 and year 2000 served as the basis for estimating 1983 values. In the process, pollution loads to the river were calculated for each of those three years. These loads are reported in Table 20-37 for 11 reaches, along with the water quality ratings for dissolved oxygen and ammonia associated with the

loads. The ratings for 1976 and 2000 are from previous water quality modeling results. The 1983 ratings are informed judgments.

The goal (expressed in terms of achievement of water quality standards) is considered to met satisfactory when a rating of "good" or "excellent" is achieved. Assignment of these adjective ratings was based on the following criteria with respect to dissolved oxygen:

Excellent = no dissolved oxygen concentration below 4 mg/l.

Good = dissolved oxygen remains above 4 mg/l 95 percent of the time or more.

Fair = dissolved oxygen remains above 4 mg/l 85 percent of the time or more.

Poor = dissolved oxygen remains above 4 mg/l 70 percent of the time or more.

Bad = dissolved oxygen remains above 4 mg/l less than 70 percent of the time.

In any reach where the dissolved oxygen drops to zero, the qualitative state of the reach is lowered by one category. Ratings for ammonia are set up analogously for the standard of 2.5 mg/l and identical percentages for compliance. The standards for dissolved oxygen and ammonia appear to be met or not met in 1983 as noted in Table 20-38.

d. Evaluation

The results of the simulation clearly show the effects of the TARP plan, instream aeration, and improved treatment of wastewaters at MSDGC facilities. The good ratings for stretches along the Little Calumet River and the Calumet Sag Channel are not serious. The major reasons why DO violations continue to exist in these reaches are: 1) continued pollutant loads from boundary flows, 2) very low stream gradients, and 3) the overwhelming dominance of point source flows.

On the basis of this evaluation, it appears that the 1983 goals will be met in all reaches. DO violations of 4 mg/l standard are not expected to exceed 5 percent of the time in any reach of the basin. At the present time, fish populations and diversity of species are low. Improvement may occur although this is not very likely. Despite dissolved oxygen levels expected to be among the highest in the region, suitable habitat for fish life and propagation do not exist in this basin to any large extent. The heavy use of the waters for commerce and its associated traffic and dredging may preclude obtaining a well-diversified and

TABLE 20-35 : EXISTING AND 1983 CONDITIONS, POINT SOURCES

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

Plant Name	Existing			1983		
	Flow (cfs)	BOD_{20} (mg/l)	NH_3 (mg/l)	Flow (cfs)	BOD_{20} (mg/l)	NH_3 (mg/l)
Wilmette Diversion (BC)	141	4.4	0.2	44	4.4	0.2
Northside STP	509	23.7	6.96	494	15.4	1.0
North Branch Chicago River (BC)	123	9.45	0.92	118	8.3	0.46
CRCW Division (BC)	352	3.3	0.18	91	3.3	0.18
Stickney STP-Main	1310	7.8	2.04	1572	15.4	1.0
Stickney STP-Bypass	35.1	140	5.84	0	0	0
Comm. Ed. Ridgeland	1.28	9.04	4.0	1.28	9.04	4.0
Material Service	2.00	8.0	0.4	2.00	8.0	0.4
Reynolds Metals	1.53	8.0	0.4	1.53	8.0	0.4
Lemont STP	1.03	3.32	0.33	1.45	30.8	15.0
Ceco-Lemont Mfg.	6.16	8.6	3.54	6.16	8.6	3.54
Union Oil	4.26	10.6	36.3	4.26	10.6	36.3
Comm. Ed. Will FPE	13.6	9.0	4.0	13.6	9.0	4.0
Comm. Ed. Will STS	1.39	9.0	4.0	1.39	9.0	4.0
O'Brien Diversion	505	4.8	0.4	103	4.8	0.4
Interlake Steel	2.32	9.0	9.0	2.32	9.0	9.0
Calumet STP	305	25.3	16.0	366	15.4	1.0
Little Calumet River (BC)	247	16.3	3.9	221	14.2	2.88

(BC) - Boundary Condition
STP - Sewage Treatment Plant
FPE - Filtration Plant Effluent
STS - Slag Tank Supernatant

TABLE 20-36 : PLANNED MSDGC IN-STREAM AERATION STATIONS

CHICAGO RIVER/SANITARY AND SHIP CANAL/CALUMET SAG CHANNEL BASIN

Station	1983 and Test Plan Condition Maximum Oxygen Supply Capacity (lbs/day)
Devon	13,300
Webster	8,000
Randolph	18,000
SW Expressway	40,000
Lemont	35,000
LCR #3 Light	15,000
Ashland	8,000
Crawford	5,000
Harlem	17,000
U.S. 45	6,000

TABLE 20-37 : WATER QUALITY RATINGS IN 1983

Reach 1, North Shore Channel			
Loads and Ratings	1976	1983	2000
BOD, tons/year	973	226	190
Ammonia, tons/yr.	42.7	10.1	8.56
Dissolved Oxygen	fair	ex.*	ex.
Ammonia	good	ex.	ex.

Reach 4, North Shore Channel			
Loads and Ratings	1976	1983	2000
BOD, tons/yr.	14500	7840	6150
Ammonia, tons/yr.	3580	507	506
Dissolved Oxygen	good	ex.	ex.
Ammonia	bad	ex.	ex.

Reach 9, North Branch Chicago River			
Loads and Ratings	1976	1983	2000
BOD, tons/year	19800	9220	7130
Ammonia, tons/yr.	3870	573	548
Dissolved Oxygen	bad	ex.	ex.
Ammonia	bad	ex.	ex.

Reach 10, North Branch Chicago River			
Loads and Ratings	1976	1983	2000
BOD, tons/yr.	1260	304	290
Ammonia, tons/yr.	65.6	15.8	15.2
Dissolved Oxygen	ex.	ex.	ex.
Ammonia	good	ex.	ex.

Reach 15, Chicago Sanitary and Ship Canal			
Loads and Ratings	1976	1983	2000
BOD, tons/year	24900	9900	7420
Ammonia, tons/yr.	4110	606	563
Dissolved Oxygen	bad	ex.	ex.
Ammonia	bad	ex.	ex.

Reach 21, Chicago Sanitary and Ship Canal			
Loads and Ratings	1976	1983	2000
BOD, tons/yr.	44300	34100	26700
Ammonia, tons/yr.	7130	2170	2150
Dissolved Oxygen	bad	ex.	ex.
Ammonia	bad	good	good

Reach 29, Little Calumet River			
Loads and Ratings	1976	1983	2000
BOD, tons/year	4350	700	500
Ammonia, tons/yr.	267	46.9	38.8
Dissolved Oxygen	good	ex.	ex.
Ammonia	good	ex.	ex.

Reach 32, Little Calumet River			
Loads and Ratings	1976	1983	2000
BOD, tons/yr.	13400	6380	6370
Ammonia, tons/yr.	5090	432	504
Dissolved Oxygen	poor	good	good
Ammonia	bad	ex.	ex.

Reach 35, Calumet Sag Channel			
Loads and Ratings	1976	1983	2000
BOD, tons/year	19420	9740	7880
Ammonia, tons/yr.	6130	1010	755
Dissolved Oxygen	bad	good	good
Ammonia	bad	ex.	ex.

Reach 41, Calumet Sag Channel			
Loads and Ratings	1976	1983	2000
BOD, tons/yr.	19650	9890	8080
Ammonia, tons/yr.	6160	1040	797
Dissolved Oxygen	poor	good	good
Ammonia	bad	ex.	ex.

Reach 28, Chicago Sanitary and Ship Canal			
Loads and Ratings	1976	1983	2000
BOD, tons/year	64050	44250	34750
Ammonia, tons/yr.	13500	3470	3190
Dissolved Oxygen	bad	ex.	ex.
Ammonia	bad	ex.	ex.

* Excellent

TABLE 20-38 : AMMONIA AND DISSOLVED OXYGEN RATINGS IN 1983

Stream and Reach	Dissolved Oxygen	Ammonia
North Shore Channel 1	excellent	excellent
North Shore Channel 4	excellent	excellent
N. Branch Chicago River 9	excellent	excellent
N. Branch Chicago River 10	excellent	excellent
Chicago Sanitary & Ship Canal 15	excellent	excellent
Chicago Sanitary & Ship Canal 21	excellent	good
Little Calumet River 29	excellent	excellent
Little Calumet River 32	good	excellent
Calumet Sag Channel 35	good	excellent
Calumet Sag Channel 41	good	excellent
Chicago Sanitary & Ship Canal 28	excellent	excellent

healthy fish population. Certainly, more research is needed in this area of study. 2715

CHAPTER 21

Lower Des Plaines River

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CHAPTER TWENTY-ONE: LOWER DES PLAINES RIVER BASIN

21.01 DESCRIPTION OF THE BASIN

a. Physical Characteristics

(1) Geography: The 178,052-acre drainage area identified as the Lower Des Plaines River Basin corresponds with the area drained by the Des Plaines River from Hoffman Dan at Riverside in Cook County, to the Grundy-Will County line. This latter boundary is about three miles downstream of the Des Plaines confluence with the Du Page and about one mile upstream of its confluence with the Kankakee River. The basin is approximately 36 miles long and receives drainage from parts of Cook, Du Page, and Will counties. The largest portion of the basin is in Will County as shown in Figure 21-1.

Certain areas in the basin are environmentally sensitive and deserve special attention. They include more than 60 wetland areas and three prairies. Certain lands near Hinsdale and Lockport also merit special attention, because of their importance as wildlife habitats or their special sensitivity to pollution.

(2) Waterways: The waterway system in the basin is complicated. The modeled portion of the basin is split by the Chicago Sanitary and Ship Canal and the Illinois and Michigan Canal. The western part includes (from north to south) Flagg Creek and Sawmill Creek. The eastern part includes Long Run Creek, Fiddyment Creek and Fraction Run. See Tables 21-1 and 21-2 for descriptions of streams and lakes.

The Chicago Sanitary and Ship Canal joins the Des Plaines about one mile south of Fraction Run. The Illinois and Michigan Canal also meets the river about 3.5 miles south of Fraction Run. Hickory Creek enters the Des Plaines about 5 miles south of Fraction Run. The Du Page River joins the Des Plaines about 3.5 miles upstream of the Will/Grundy county line. The Kankakee River joins the Des Plaines about one mile west of the Will/Grundy county border. There is also wet weather flow diversion capability (above Lockport Dam) from the Chicago Sanitary and Ship Canal to the Des Plaines River.

(3) Geology and Soils: Unconsolidated glacial deposits where they exist, range up to almost 50 feet in thickness above bedrock. Till is widespread over the basin (though less common here than in other parts of the region) and is the predominant deposit in the northern portion of the basin. Till is relatively impermeable; it has limited recharge capability, and it poses the risk of pollutant runoff to surface waters in applications of wastes, fertilizers or agrichemicals.

TABLE 21-1: STREAM INVENTORY

STREAM NAME	LENGTH (MILES)	AVG. WIDTH (FT.)	WATER SURFACE (ACRES)	GRADIENT (FT/MILE)	DRAINAGE AREA(1) (SQ. MILES)	COMMENTS
Des Plaines River	37.0	469.8	2107	2.1	(2) (3) 2093	
Flagg Creek	7.4	30.0	26.9	6.1	19.7	
Illinois and Michigan Canal	34.3	56.0	227.4	NA	(4) 55.1	
Jackson Creek	16.8	56.6	115.3	8.9	52.7	
Long Run Creek	12.6	15.0	22.9	7.7	27.7	
Sawmill Creek	3.8	15	6.9	25.0	13.2	
Hickory Creek	18	50.8	9.7	110.8	109	

Revised 2/15/79

(1) From "Drainage Areas for Illinois Streams" by USGS

(2) Des Plaines River at mouth near Dresden Island includes 2,111 sq. miles This includes 135 sq. miles in Wisconsin and 65.8 sq. miles in Indiana

(3) Above Kankakee River confluence, near Channahon. Lower Des Plaines Basin itself contains 278 sq. miles

(4) Above Joliet, at mouth near Joliet

TABLE 21-2: LAKE AND POND INVENTORY

NAME	LOCATION			SURFACE AREA (ACRES)	SHORE-LINE (MILES)	MAXIMUM DEPTH (FT)	WATER-SHED (ACRES)	DATE CON-STRUCTED	OWNER-SHIP	ACCESSIBILITY
	TWP N	RNGE E	SECT							
BEDERMAN LAKE	37	11	15,16	35.0	1.9	2	NA	NA	Public	Closed to public
BRUCE LAKE	38	11	32	13.5	0.9	9	NA	1957	Org.	Residents Only
GOLFVIEW HILLS LAKE	38	11	14	32.5	1.3	9	NA	Natural	Org.	NA
LAKE JDA	38	12	21	10.0	0.4	16	NA	1964	Public	Open to public
RUTH LAKE	38	11	14	20.1	1.1	4	NA	1927	Org.	NA
TAMPIER LAKE (SLOUGH)	37	12	31	161.6	4.9	14	NA	1962-64	Public	Open to public

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Figure 21-1: BASIN LOCATION


WISCONSIN
IOWA
ILLINOIS
SPRINGFIELD
INDIANA
MISSOURI
KENTUCKY
MAP LOCATION
Basin Boundary
0 1 2 3 4 5 Mi.
0 1 2 3 4 5 6 7 8 Km.
NORTH
Des Plaines River
Salt Creek
Flagg Creek
Addison Creek
Spring Brook
Creek
Run
Hickory Creek
Plum Creek
Prairie Creek
Forked Creek
Jackson Creek
Jackson Creek
Jackson

Extensive sand and gravel deposits are found in the Will County portion of the basin in the form of valley trains or outwash. In the Des Plaines River Valley these deposits sometimes directly overlie bedrock. Infiltration is rapid in these materials, and pollutants may enter groundwaters in the form of leachate from landfills, discharges from septic tanks, and runoff from the surface application of wastes, fertilizers, or agrichemicals.

Other surficial materials include glacial lake and wind-blown deposits, which are of minor importance at the basin scale (though they may be of vital importance at a particular site for a specific land use).

Some suitable sites for sanitary landfills can be found in the northern half of the basin, but the entire basin is limited with regard to septic tank usage and the land application of wastes, fertilizers and agrichemicals. Limitations for these uses include bedrock at or near the surface, poor soil drainage, steep slopes, and groundwater discharge.

Soils vary widely in type and in the properties which poses risks for downgrading water quality under certain conditions. Soil types are identified in Table 21-3.

(4) Wildlife: Under natural, pre-urbanization conditions, the lower Des Plaines River watershed offered prairie-marsh habitat typical of most of northeastern Illinois. However, urban development (particularly since World War II) has adversely affected habitat quality and species population and density. Numerous species of small mammals, birds, and waterfowl are still observed, particularly in undisturbed forest preserve trails along the river.

b. Socio-Economic Characteristics

(1) Population: The estimated 1975 population of the basin was 342,265, representing 11 percent of the combined estimated 1975 populations of Will, Du Page and suburban Cook counties (3,119,831). Most of the population is accounted for by suburban areas in Cook and Du Page counties and the city of Joliet in Will County.

Table 21-4 provides population forecasts for the basin and for facilities planning areas. Projected wasteloads for facility planning areas, which are discussed later in this chapter, are based in part on these population forecasts.

It should be noted that portions of the Illinois and MIchigan Canal and Rock Run watersheds, which technically drain to the Du Page River, are included in the narrative, population, land use, employment, and nonpoint cost estimates of the lower Des Plaines report. The subject watershed areas include approximately 16,934 acres (26.4 square miles). Population and land use data for these areas, which are often subject to interbasin flow, are shown in appropriate sections below. The population forecasts for

TABLE 21-3: PREDOMINANT SOIL UNIT CHARACTERISTICS FOR NORTHEASTERN ILLINOIS

Unit In Basin	Soil Unit	Soil Color	Soil Texture	Permeability	Drainage	Subsoil Texture	Underlying Materials	Agricultural Usage Limitations	Approximate Percentage of Prime Agri. Land	Development Usage Limitations
	Fox-Dresden-Casco	brown	loam	mod-rapid	well	loam	sand and gravel	E, D, LF	12	S, E, ST
YES	Warsaw-Rodman-Lorenzo	brown	loam	moderate	well	loam	sand and gravel	E, D	50	S, E, ST
	Volinia-Selma-Lomax	brown	loam	moderate	excessive	loam	sand	WE, D, W	80	W, S, P
	Maumee-Watseka Plainfield	black	loamy sand	rapid	excessive	sand	sand	W, WE, D	30	S, W
	Zurich-Grays-Wauconda	gray	silt loam	moderate	moderate	clay loam	silt loam	W, E, LF	90	S, W, ST
YES	Drummer-Brenton-Proctor	brown	silt loam	moderate	moderate	clay loam	loam	W, E	100	W, S, P
YES	Miami-Kidder-McHenry	gray-brown	loam	moderate	well	clay loam	loam	E, ST, LF	40	ST, S, SS
YES	Drummer-Saybrook-Lisbon	dark gray	silt loam	moderate	moderate	clay loam	loam	W, E	80	W, S, SP, SS
	Ringwood-Griswold	brown	loam	moderate	well	clay loam	sandy loam	E, W	85	S, W, ST
YES	Morley-Markham-Ashkum	gray	loam	slow	moderate	silty clay	clay loam	E, W, LF	60	ST, SP, SS, W, HC
YES	Elliot-Ashkum-Beecher	dark gray	silt loam	slow	moderate	silt loam	clay loam	W, E	85	W, SP, CS, SS
	Milford-Martinton	black	silt loam	mod. slow	poor	silty clay	calcareous sediment	W	95	W, HC, P, SP, SS
YES	Symerton-Andres-Ashkum	black	silt loam	moderate	moderate	clay loam	clay loam	E, W	95	W, SP, SS
	Nappanee-Peotone-Del Rey	dark gray	silt loam	slow	well	silt loam	calcareous sediment	W, T, LF, E	50	W, SP, HC, P
YES	Frankfort-Bryce-Montgomery	dark brown	silt loam	slow	poor	silty clay	calcareous sediment	W, T, LF, E	5	W, SP, HC, P
YES	Romeo-Joliet	black	loam	moderate	poor	loam	limestone	W, STN, FL	60	W, SH, FL, SS
YES	Otter-Huntsville-Millington	black	loam	moderate	moderate	loam	loam	FL, W	95	W, FL
YES	Fox-Wauconda-Sawmill	dark gray	silt loam	moderate	poor	loam	sand	W, FL, E	75	W, FL
	Houghton-Lena	black	muck/peat	rapid	poor	muck/peat	sand/silt	HWT, W	0	W, P, S, HWT, LS

USAGE LIMITATION CODES

CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
CS	Clayey Subsoil	D	Drouthiness	E	Erosion	FL	Flooding
HC	Heavy Clayey Subsoil	HWT	High Water Table	LF	Low Fertility	LS	Low Strength
P	Ponding	S	Seepage	SH	Shallowness to Bedrock	SP	Slow Percolation
SS	Shrink-Swell	ST	Steepness	STN	Stoniness	T	Soil Tilth
W	Wetness	WE	Wind Erosion				

TABLE 21-4: POPULATION CHANGE 1975-2000

FACILITY PLANNING AREAS	1975	1980	1985	1990	1995	2000	% Change 1975-2000
Braidwood (1)	2,500	2,800	3,000	3,200	3,300	3,400	36.0
Channahon	3,190	3,950	4,790	5,630	6,480	7,340	130.1
Crest Hill (2)	(8,500)	(10,800)	(11,900)	(12,500)	(13,000)	(13,500)	58.8
Elwood	900	1,000	1,100	1,100	1,100	1,200	33.3
Hinsdale	47,440	53,490	59,090	64,670	68,450	72,130	52.0
Joliet (3)	110,600	125,000	137,100	149,100	168,900	188,500	70.4
Chicago MSD Lemont FPA	10,000	11,000	13,000	14,000	19,000	24,000	140.0
Lockport	18,000	18,800	21,200	23,600	25,900	28,200	56.7
Manhattan	1,700	1,800	2,000	2,100	2,300	2,400	41.2
Marionbrook	28,970	31,870	37,240	42,610	48,330	53,940	86.2
Rockdale (2)	(2,000)	(2,100)	(2,300)	(2,600)	(2,900)	(3,000)	50.0
Romeoville	16,480	19,000	21,500	24,000	27,500	31,000	88.1
FPA Total	239,780	268,710	300,020	330,010	371,260	412,110	71.9
Basin Total	342,265	337,026 (4)	352,826	368,625	398,212	427,798	25.0

(1) Not in the Lower Des Plaines River Basin; drains to the Illinois River

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(2) Included in Joliet FPA figures

(3) Excludes figures for Oak Highlands-Ingalls Park Sanitary District service areas which is in the Joliet FPA

(4) Decrease in population from 1975

1/ Facility Planning area is located in more than one basin
Source: Northeastern Illinois Planning Commission

TABLE 21-5: POPULATION CHANGES - PORTIONS OF I&M CANAL AND ROCK RUN WATERSHEDS

Year	1975	1980	1985	1990	1995	2000
Population	53,052	59,185	64,203	69,221	72,733	76,245

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TABLE 21-6: REVISED POPULATION CHANGES, 1975-2000
(Excluding Portions of Rock Run and I&M Canal)

	1975	1980	1985	1990	1995	2000
Table 21-4	342,265	337,026	352,826	368,625	398,212	427,798
Table 21-5	53,052	59,185	64,203	69,221	72,733	76,245
Table 21-4 (revised)	289.,213	277,841	288,623	299,404	325,479	351,553

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TABLE 21-7: 1970 LAND USE

Land Use Category	Total Acres	% of Total
Single Family Residential	20,693	11.6
Multi Family Residential	599	0.3
Mobile Home Parks	150	0.1
Manufacturing and Processing	2,833	1.6
Transportation, Communications, & Utilities	4,894	2.8
Railroad Rights-of-way	1,965	1.1
Airports	1,792	1.0
Streets & Parking	9,675	5.4
Trade	926	0.5
Services-Private	344	0.2
Services-Institutional	7,703	4.3
Military Services	6,837	3.8
Cemetaries	402	0.2
Entertainment Assembly	100	0.1
Public Buildings	4	0
Public and Quasi-Public Open Space	7,191	4.0
Mining and Quarries	3,036	1.7
Vacant, Agricultural & Forest Areas	103,952	58.4
Vacant-Under Development	643	0.4
Water	3,914	2.2
Warehousing	229	0.1
Shopping Centers	82	0.1
Hotels-Motels	59	0.1
Parking Lots	29	0
Total	178,052	100

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the above areas which are subject to interbasin flow are shown in Table 21-5. Revised population forecasts for the Lower Des Plaines River Basin, including the Rock Run and I & M Canal area, are shown in Table 21-6.

(2) Land Use: There is a wide variety of land use in this basin, as indicated by Table 21-7. However, a large proportion (58 percent) of the basin's land remains undeveloped (vacant, agricultural, forested). Only 4 percent of the basin is in public open space, most of which is in the form of forest preserves, including a large preserve in the vicinity of Argonne National Laboratory. The Des Plaines River Valley in Will County is an important center of mining activities - the area includes 10 limestone quarries and three sand and gravel pits.

Land use information for the Rock Run and I & M Canal area is shown in Table 21-8. Similar information for the basin, exclusive of the Rock Run and I & M Canal area described above, is shown in Table 21-9.

Land use forecasts anticipate continuing urbanization of the basin and accompanying changes in land use as indicated in Table 21-10. The information shown is for the outer basin, including the Rock Run and I & M Canal areas previously described. The largest increases (proportionately) are forecasted in nonresidential land use categories, particularly manufacturing and commercial.

TABLE 21-8: 1970 LAND USE CATEGORIES - PORTIONS OF I&M CANAL & ROCK RUN WATERS

Land Use Category	Total Acres	% of Total
Single Family Residential	2939.8	17.36
Multi Family Residential	112.8	.66
Mobile Home Parks		
Manufacturing and Processing	190.8	1.13
Transportation, Communications, & Utilities	400.7	2.37
Railroad Rights-of-way	192.4	1.14
Airports	168.6	1.00
Streets & Parking	1481.8	8.75
Trade	161.3	0.95
Services-Private	51.7	0.31
Services-Institutional	710.2	4.19
Military Services		
Cemetaries	86.4	0.51
Entertainment Assembly	2.2	0.01
Public Buildings		
Public and Quasi-Public Open Space	382.6	2.26
Mining and Quarries	342.4	2.02
Vacant, Agricultural & Forest Areas	9379.4	55.39
Vacant-Under Development	62.2	0.37
Water	174.6	1.03
Warehousing	24.9	0.15
Shopping Centers	54.9	0.32
Hotels-Motels	13.9	0.08
Parking Lots		
Total	16,933.6	100.00

TABLE 21-9: REVISED 1970 LAND USE (EXCLUDING PORTIONS OF ROCK RUN AND I&M CANAL AREAS)

Land Use Category	Total Acres	% of Total
Single Family Residential	17,753	11.0
Multi Family Residential	486	0.3
Mobile Home Parks	150	0.1
Manufacturing and Processing	2,642	1.6
Transportation, Communications, & Utilities	4,493	2.8
Railroad Rights-of-way	1,773	1.1
Airports	1,623	1.0
Streets & Parking	8,193	5.0
Trade	765	0.5
Services-Private	292	0.2
Services-Institutional	6,993	4.3
Military Services	6,837	4.2
Cemetaries	316	0.2
Entertainment Assembly	98	0.1
Public Buildings	4	0
Public and Quasi-Public Open Space	6,808	4.2
Mining and Quarries	2,694	1.7
Vacant, Agricultural & Forest Areas	94,573	58.7
Vacant-Under Development	581	0.4
Water	3,739	2.3
Warehousing	204	0.1
Shopping Centers	27	0
Hotels-Motels	45	0
Parking Lots	29	0
Total	161,118	98.5*

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* Less than 100% due to rounding

TABLE 21-10: LAND USE FORECASTS (ACRES) (INCLUDING PORTIONS OF ROCK RUN AND I&M CANAL AREAS)

Land Use Category	1980	1985	1990	1995	2000
Residential	29,323	30,748	32,172	33,982	35,792
Manufacturing	3,024	4,348	5,672	6,881	8,090
Commercial	2,712	3,394	4,076	5,180	6,284
Transportation/Communication, etc.	27,550	28,626	29,701	31,178	32,654
Open Space, Vacant Agriculture, etc.	115,443	110,936	106,431	100,831	95,232
Total	178,052	178,052	178,052	178,052	178,052

SOURCE: Northeastern Illinois Planning Commission, 1976

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(3) Economy: Total employment in the basin (including portions of the Illinois and Michigan Canal and Rock Run watersheds) was 112,705 in 1970 (Table 21-11). Manufacturing, mainly concentrated in the Joliet area, dominanted employment with nearly 40 percent of the total number of employees. In recent years, however, employment in the service industries and in retail trade has grown considerably faster than in manufacturing.

As shown in Table 21-11, these trends are expected to continue in the future. Total employment in the basin is forecast to increase by 28 percent, to 144,258, by the year 2000. All categories are forecasted to grow, though increases in manufacturing will be minimal.

TABLE 21-11: EMPLOYMENT FORECAST
(INCLUDING PORTIONS OF ROCK RUN AND I&M CANAL AREAS)

CATEGORY	1970	1980	1985	1990	1995	2000	1970-2000 % Increase
Manufacturing	38,251	43,053	43,710	44,368	45,463	46,558	21.7
Local Retail	9,042	10,164	10,939	11,714	12,296	12,877	42.4
Other	65,412	73,604	76,074	78,543	81,683	84,823	29.7
Total	112,705	126,821	130,723	134,625	139,442	144,258	28.0

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(4) Water Supply: Lake Michigan will continue to be the major source of water supply for northeastern Illinois. About 5 million people in Chicago and 89 other communities use lake water. Nine communities are at least partially within the basin, all in Cook County, representing about 10 percent of the basin's total population. Remaining communities and unincorporated areas obtain their water supply from groundwater sources. Deep sandstone wells account for 73 percent of groundwater pumpage and shallow dolomite wells, for 27 percent.

(5) Government: Included in the lower Des Plaines basin are all or parts of 32 municipalities, 19 townships, four sanitary districts, and five other special districts with water quality responsibilities.

(6) Recreation: Recreational resources are limited in most parts of the basin and are based mostly on the Des Plaines River itself. Forest preserves border the river in some parts of Cook, Du Page, and southeastern Will counties, including the Illinois and Michigan Canal State Park and the large Des Plaines River Conservation Area at the southernmost edge of the basin. These areas offer opportunities for hiking, picknicking, fishing and canoeing. Private marinas on the river are used for pleasure boating and some power boating near Lyons. The Des Plaines River bottomlands in Will County are good gamebird, waterfowl, and deer hunting areas.

21.02 IMPACTS OF OTHER PROJECTS

a. Introduction

In many basins there are studies or projects underway which may impact directly or indirectly on surface and/or groundwater quality. Most will have indirect effects since they usually pertain to water quantity or hydrologic modifications. These include the flood control activities of the U.S. Soil Conservation Service (SCS), the U.S. Army Corps of Engineers, and the Illinois Division of Water Resources, (IDWR). Also of interest are SCS soil conservation programs.

Many local, county, state and federal public works projects are not related directly to water quality but they have water quality impacts. Perhaps the most significant involve the construction or improvement of roads and highways, as a result which drainage patterns may be altered, local farm tiles may be interrupted, silt may be introduced into waterways during construction, and vehicular pollutants may be conveyed to rivers and streams. Waterway crossings by highway projects and various public and private utilities all affect water quality to varying degrees and for various lengths of time. Not to be overlooked are public and private storm sewer outlets.

Discussion in this section will serve as a check list to assure consideration of significant projects.

b. Corps of Engineers

(1) Navigation: The Corps has general jurisdiction over navigation in United States waters. Responsibilities include harbor and channel construction and maintenance, clearing and snagging of navigable waters, and control over the location and placement of structures which may impact upon navigability. In this basin, the Corps has responsibility for maintaining a 9-foot depth in the Illinois waterway, a barge channel extending upstream from the Grundy County line via the Des Plaines River to the junction of the Chicago Sanitary and Ship Canal and then continuing northeasterly via the Calumet Sag Channel to Lake Calumet. The Corps is currently studying the proposed construction of duplicate locks at Lockport. One alternative plan calls for the new set of locks at Lockport to alsc replace the Brandon Road Lock and Dam which are located on the Des Plaines River south of Joliet and below the confluence of Hickory Creek.

(2) Lake Diversion Study: Section 166 of the Water Resources Development Act of 1976 authorized the Corps to evaluate the practicability of increasing the Illinois diversion of Lake Michigan water in order to alleviate shoreline damage on the Great Lakes during periods of high water levels, and to improve water quality in the Illinois Waterway. The project consists of a 5-year demonstration program which would increase average annual diversion from 3,200 cfs to as much as 10,000 cfs. Resultant adverse and/or beneficial impacts are to be evaluated.

Current efforts include the collection of baseline data to serve for comparison purposes and the initiation of an environmental impact assessment. Under the authorizing legislation, a report is to be submitted to Congress in October 1981 with the results of the demonstration study, including recommendations as to whether to continue the authority or to change the criteria. As now envisioned, actual increased diversion would not begin until the latter part of 1979 and then only if the conditions set forth in the Act exist at the time.

(3) C-SELM Studies: Pursuant to Section 206 of the Flood Control Act of 1958 and Resolutions adopted by Congress in 1971, the Corps was involved in a planning study on alternative wastewater management systems for the Chicago-South End of Lake Michigan (C-SELM) area, which covered portions of northeastern Illinois and northwestern Indiana. Specifically, the study was directed at the evaluation of various regional pollutant discharges into water bodies. An initial pilot study was completed in 1974. However, since this was only a planning study, the report contained no recommendations for federal action with respect to any of the specific wastewater management systems evaluated. The intent of Congress was for the studies to be presented to local units of government for their consideration and adoption, as desired.

(4) TARP: As part of the overall C-SELM study, the Corps is also involved in an investigation of the appropriate "federal interest" in the Tunnel and Reservoir Plan (TARP) proposed by the MSDGC. In its Interim Report No. 1, the Corps confirmed that supplemental sewers, tunnels and reservoirs (such as proposed in the TARP) were the optimum means for controlling runoff on both a community and an areawide basis.

The report noted that the flood damage reduction aspects of the plan appeared to fall within the purview of the federal flood control program, thus establishing federal interest in that component. Follow-on studies concluded that the tunnel, reservoir, and channel widening components of the plan (related to flood control) were appropriate for implementation under the regular flood control program administered by the Corps. Subsequently, the Water Resource Development Act of 1976 authorized the preparation of Phase I General Design Memoranda studies, which will evaluate the federal interest in the flood control aspects of certain tunnels and reservoirs called for by the "TARP II" phase of the MSDGC plan.

(5) Dredge and Fill Permits: Under Section 404 of PL 92-500, the Corps is authorized to issue permits for the placement of dredged or fill materials into navigable waters or on adjacent land sites. Permits may be withheld if it is determined that the discharge of materials will have adverse effects on water supplies, fish and wildlife, or recreation. Under current guidelines, Corps authority extends to all navigable waters and tributaries thereto, up to points where the average annual flow is 5 cfs or more. Thus, much of the lower Des Plaines basin is included under the permit program.

(6) Flood Control: The Corps traditionally has been the principal federal agency involved in flood control matters, particularly on larger rivers. Authority for Corps activity is granted in general legislation as well as in a series of flood control acts, the first of which was enacted in 1936. However, there are no flood control studies or projects authorized in this basin.

c. U.S. Department of Agriculture

The Agricultural Stabilization and Conservation Service (ASCS) and the Soil Conservation Service are the two principal units of the U.S. Department of Agriculture with programs related to water quality management.

(1) Conservation Programs: The SCS and ASCS perform a variety of functions to reduce soil erosion. The SCS offers extensive technical assistance to individuals, local soil and water conservation districts, and other interested parties in developing erosion control plans. The ASCS gives assistance through cost-sharing to farmers to control erosion and agriculturally related water pollution. Various site specific control techniques are available for implementation under this program, depending upon the nature of local problems.

(2) PL-566 Projects: The small watershed program of the SCS, authorized by the Watershed Protection and Flood Prevention Act of 1954 (PL 83-566) provides a framework through which federal, state and local units of government can deal with local water resources problems on a cooperative basis. The program is principally oriented toward the prevention of soil erosion and the control of flooding and sedimentation damages. Works typically include the construction of small reservoirs, stream channelization, grade stabilization, and bank protection. Projects are sponsored by and coordinated through local soil and water conservation districts and other interested agencies.

The Chicago Area River Basin Study was initiated by the SCS in 1971 under PL-566. Work was undertaken in six watersheds in Cook and Lake counties under the local sponsorship of the MSDGC. The principal objective of the study was to develop comprehensive plans to reduce flood damage.

The Des Plaines River was included in this study, and in January 1976, a floodwater management plan was completed. The plan was developed to reduce flood damages, reduce erosion and sedimentation, protect existing wildlife habitat, improve surface water quality, enhance stream fisheries, provide additional recreational opportunities, and provide additional public open space. No structural measures are planned within the lower Des Plaines basin.

d. Illinois Department of Transportation

Two divisions of the Illinois Department of Transportation have responsibilities related to water quality management: the Illinois Division of Water Resources (IDWR) and the Division of Highways (DOH).

(1) IDWR: The IDWR has statutory responsibility for navigation and flood control projects on water bodies throughout the state. It also has permit authority for private and public projects which enter or cross over or under such waters. The IDWR has underway a number of flood control projects in the region. However, none are in this basin.

IDWR has also been charged with surveillance of the diversion of Lake Michigan water by and for all parties in Illinois. A long series of hearings culminated in the initial allocation and re-allocation of lake waters. This will be a continuing responsibility, with the actual quantities of water available within the 3,200 cfs Supreme Court limitation being influenced by such ongoing activities as the following: the determination of a revised method for computing natural diversion of storm water and groundwater (a proposal currently being negotiated with other lake states) and the impact on dilution waters used by the MSDGC after completion of the TARP. Given the critical nature of declining supplies available to a number of communities now using well water, the availability of Lake Michigan water will strongly influence the potential for growth of those communities. If relief is not forthcoming, the question will not be growth, but rather, maintenance of established standards. Impacts on wastewater quality and quantity are self-evident.

(2) DOH: The Division of Highways is responsible for the construction and maintenance of state highways. Highways have asscciated water quality impacts both during their construction (e.g., erosion and sedimentation, disruption of drainage, etc.) and when placed in use (e.g., road salt usage, roadway drainage, etc.).

e. Local Units of Government

Municipalities, counties, and special purpose districts are involved in a number of local projects which have direct or indirect effects on water quality. The general purpose units are empowered to adopt ordinance regulating floodplains on-site stormwater detention and soil erosion and sedimentation. All have the potential for impacting on water quality. Still other effects result from more routine activities such as street sweeping, sewer and catch basin cleaning, and solid waste management. Of special importance from a water quality standpoint are building permits which involve stormwater drainage systems discharging into streams.

Special purpose districts also are involved. The Cook County Forest Preserve District has been especially active in acquiring land and preserving it in a natural state.

Another organization of note is the Cook County Clean Streams Committee which handles citizen reports of pollution incidents. Through a committee of volunteers and correspondence, follow-up actions are taken to identify pollutant sources and to institute corrective measures.

21.03 WATER QUALITY IN THE BASIN

a. Applicable State Standards and Designations

According to Chapter 3 of the Illinois Pollution Control Board Regulations "Water Pollution", all waterways in the basin are designated as "general use, protected for public and food processing water supply," except for the 11.5 mile segment of the Des Plaines River extending from its confluence with the Chicago Sanitary and Ship Canal (due east of Crest Hill and north of Joliet) to the crossing of the Des Plaines River by the Interstate 55 bridge (southwest of Joliet near the confluence of the Du Page River). This exception is designated "secondary contact and indigenous aquatic life." In-stream water quality standards for "secondary contact" waters are significantly different from those applicable to "general use" waters. Of particular importance are the differences in dissolved oxygen (DO) and ammonia (NH_3) standards. DO in "general use" waters must meet 6.0 mg/l and not be below 5.0 mg/l. In "secondary contact" waters, the minimum DO standard is 4.0 mg/l. In "general use" waters, the maximum NH_3 content is 1.5 mg/l; in "secondary contact" waters, the maximum content is 2.5 mg/l in the summer months (April through October) and 4.0 mg/l for the balance of the year.

b. IEPA Segment Classifications

The state has been divided by the Illinois Environmental Protection Agency into hydrologic units that coincide with major river basins. These units have been further divided into segments on the basis of common characteristics. The lower Des Plaines includes parts of segments A-6, A-15, B-3, and B-4, four of the 20 segments in the Des Plaines/Lake Michigan hydrologic unit as defined by IEPA. These segments all have been designated "water quality limited." This designation means that water quality in the waterways does not currrently meet applicable standards and/or is not expected to meet those standards even after the minimum statutory limitations have been applied to effluents discharged to the water bodies.

Figure 21-2: WATER SAMPLING STATIONS



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c. Sources of Information

Assessment of current water quality conditions in the lower Des Plaines River basin is based on information developed by this Commission's water quality sampling program and by other public agencies, principally the Illinois Environmental Protection Agency. A brief description of the sampling programs is presented below, with various sampling sites depicted in figure 21-2.

(1) Commission In-Stream Sampling: The instream sampling program conducted by the Commission involved 48 sampling stations, two of which were in the lower Des Plaines basin.

Station 21: Des Plaines River at McDonough Street in Joliet

Station 23: Des Plaines River at the Material Service Bridge in Lockport

Data were collected at seasonal intervals over a 13-month period (April 1976 - April 1977) at each of these stations. Sampling results were used principally for calibrating the water quality model, but they also represent important information on the characteristics of the river. Samples were analyzed for 19 constituents.

(2) Land Use Stormwater Sampling: The Commission conducted stormwater runoff sampling and analysis at 18 sites, representing various land uses in the region and two ravines tributary to Lake Michigan. One of the stormwater sites (residential) is located within the Lower Des Plaines basin. However, the data from the stormwater samples are not intended to be basin-specific; rather, they indicate characteristics of runoff from particular types of land uses wherever they are found in the region. Results of the sampling effort are discussed in Chapter Six.

(3) SOD Measurements: Sediment oxygen demand (SOD) measurements from bottom deposits were made by the Commission at 110 stations. Benthic community (macroinvertebrate) samples were taken from bottom deposits at the same 110 sections plus six others. One of the sites at which SOD was measured was in this basin. In addition, bottom sediment samples were collected, analyzed, and described.

(4) Other Commission Studies: In addition to above, the Commission conducted dam aeration/deaeration measurement at 48 structures and fish population surveys at 248 sites.

(5) IEPA Sampling: The IEPA water quality sampling network consists of about 176 sampling stations in the six-county region, 17 of which are in the lower Des Plaines basin. Sampling results discussed later are from the IEPA's sampling of chemical parameters at these sites in 1976.

(6) Computer Simulation of Existing Conditions: After the water quality model was balanced, using (among other data) the information collected by the Commission in its in-stream sampling program, it was used to develop a continuum of information bridging the gap between the discrete sampling events. Intermittent but intense measurements of water quality, by the Commission, did not provide information pertaining to the intervening periods when a wide variety of factors affected the quantity and quality of in-stream flows. It was here that the water quality model was able to develop data reflecting cause and effect relationships, and the behavior of the system over a period of time. Statistical analyses of that data then provided valuable insights not otherwise available. The results of the computer simulation of present water quality conditions are discussed in subsequent sections.

d. Current Water Quality

(1) Commission In-Stream Sampling: The results of the Commission's in-stream sampling program are shown in Table 21-12 for Stations 21 and 23. Of the 19 parameters evaluated, the state has established standards only for pH, temperature, dissolved oxygen, and ammonia. Violations of state standards are used in this study as a measure of the relative water quality. It was found that the ammonia/nitrogen standard is the one violated most frequently in this basin. Samples from Station 21, near the Hickory Creek confluence with the Des Plaines, produced the greatest number of violations of ammonia.

In Station 21, where "secondary contact" standards apply, the mean values of ammonia were 2.1, 4.1 and 4.2 mg/l in three non-winter sampling periods when the standard not to be exceeded was 2.5 mg/l. The mean values were 3.7 and 3.2 mg/l during the two winter sampling periods when the standard was 4.0 mg/l. However, the maximum readings of individual samples during the non-winter period were all far in excess of 2.5 mg/l - being 4.6, 5.4, and 4.7 mg/l respectively. During the winter, maximum values observed were 5.9 and 3.6 mg/l.

Dissolved oxygen concentrations violated the 4.0 mg/l standard in minimum readings during three of the five sampling periods.

At Station 23, where "general use" standards apply, ammonia nitrogen analyses all met and were well below the 1.5 mg/l standard. Dissolved oxygen standards were also met, except during the August sampling cycle when a minimum reading of 3.0 mg/l was observed, which was well below the 6.0 mg/l standard.

TABLE 21-12: IN-STREAM WATER QUALITY ANALYSES–SUMMARY DATA

STATION NO. 21

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
MAY 3-12 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	7.9	184	54	145	646	30	19	10	12	13			5.8	4.6	3.7	0.43	13	286	11	
	Minimum	7.2	120	15	23	394	4	9	4	2	4			1.5	0.8	1.7	0.05	6	279	5	
	Mean	7.4	159	32	63	521	12	14	6	5	7			2.9	2.1	2.7	0.27	9	282	8	
AUGUST 2-11 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	9			30	30	30	30	10	2	10	
	Maximum	7.9	184	34	67	704	14	29	14	6	24			6.8	5.4	3.5	1.03	6	237	67	
	Minimum	7.4	149	8	9	460	2	25	2	2	6			3.8	3.1	1.1	0.24	4	223	20	
	Mean	7.6	163	14	27	534	7	27	5	4	9			5.1	4.1	2.1	0.61	5	230	42	
NOVEMBER 3-12 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	8.9	175	27	74	604	13	17	19	5	7			6.4	5.9	5.5	1.27	11	255	12	
	Minimum	7.2	130	8	11	508	2	6	3	2	2			4.1	2.9	3.6	0.49	5	246	3	
	Mean	7.7	155	13	26	547	6	13	6	3	6			4.7	3.7	4.2	0.75	6	250	6	
JAN. 31 - FEB. 7, 1977	No. of Analyses	12	8	12	12	12	12	12	10	8	8			12	12	12	12	8	2	7	
	Maximum	7.7	161	16	22	406	9	5	12	5	32			4.7	3.6	1.3	0.84	5	247	2	
	Minimum	6.8	147	7	10	310	3	0	10	4	8			3.6	2.8	0.8	0.43	3	213	1	
	Mean	7.2	154	10	15	372	6	3	11	5	16			4.2	3.2	1.1	0.59	4	230	2	
APRIL 25-30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	7.7	188	16	41	642	18	20	8	6	23			5.8	4.7	2.7	2.90	6	287	25	3100
	Minimum	7.3	164	7	14	552	4	17	1	2	2			4.4	3.4	1.0	0.50	5	281	11	1700
	Mean	7.4	176	10	23	588	8	18	4	4	11			5.2	4.2	1.6	1.16	5	284	15	1960

STATION NO. 23

MAY 3-12 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.0	184	57	133	766	22	17	9	4	7			1.3	0.8	3.9	0.37	15	299	23	
	Minimum	7.3	113	22	36	402	4	8	7	1	4			0.5	0.1	1.8	0.13	8	265	10	
	Mean	7.7	152	35	62	503	10	12	9	3	5			0.9	0.4	2.6	0.24	10	282	15	
AUGUST 2-11 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.7	288	64	160	1016	30	27	13	8	24			2.3	0.9	3.2	1.14	9	389	412	
	Minimum	7.8	166	40	76	714	11	20	3	4	12			1.0	0.0	1.5	0.48	2	305	90	
	Mean	8.2	218	52	110	877	21	23	8	6	16			1.8	0.3	2.2	0.74	6	347	169	
NOVEMBER 3-12 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	8.5	244	40	57	1328	13	7	16	8	13			2.6	0.8	7.1	2.44	9	438	54	
	Minimum	7.5	215	5	4	880	1	2	7	3	5			1.1	0.4	5.8	1.64	3	419	14	
	Mean	8.3	232	10	18	967	5	5	13	5	10			1.9	0.6	6.3	2.08	5	428	27	
JAN. 31 - FEB. 7, 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
APRIL 25-30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	7.9	216	26	57	980	15	18	9	6	12			1.6	0.4	3.1	0.77	8	442	94	450
	Minimum	7.4	191	5	36	848	9	12	6	2	7			1.1	0.1	2.4	0.57	4	380	40	308
	Mean	7.7	204	21	50	923	12	14	7	4	9			1.2	0.3	2.8	0.62	6	411	56	395

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

TABLE 21-13: VIOLATIOS TABLE 21-13: VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen 1.50	Fecal[2] Coliform (per 100 ml.) 200	Iron 1.0	Copper 0.02	Dissolved Oxygen 5.0	Lead 0.10	Silver 0.005	Chloride (4)	Fluoride 1.4	PH (Units) (4)	Boron (4)	Sulfate 500	Cyanide 0.025	Hexavalent Chromium (4)	Total Phosphorus (4)	Manganese 1.0	Phenol (4)	Total Dissolved Solids (4)	Temp. (°F) (4)
86	Des Plaines River	No. of Analyses	1	1	1	1	1	1	1		1			1	1			1			
		No. of Violations	0	1	0	0	0	0	0		0			0	0			0			
G 01		Maximum		1200																	
		Minimum		1200																	
		Mean[3]		1199																	
158	Des Plaines River	No. of Analyses	7	7	2	2	7	2	2		2			2	2			2			
		No. of Violations	0	4	1	1	0	0	0		0			0	0			0			
G 11		Maximum		27000	1.1	0.04															
		Minimum		100	0.7	0.01															
		Mean[3]		595	0.9	0.02															
159	Des Plaines River	No. of Analyses	7	7	3	3	7	3	3		3			3	3			3			
		No. of Violations	0	3	2	3	1	1	1		0			0	0			0			
G 02		Maximum		25000	1.7	0.09	16.9	0.13	0.020												
		Minimum		100	0.4	0.06	3.7	0.01	0.000												
		Mean[3]		775	1.1	0.07	10.0	0.07	0.007												
160	Des Plaines River	No. of Analyses	7	7	2	2	6	2	2		2			2	2			2			
		No. of Violations	0	5	2	0	1	0	0		0			0	0			0			
G 03		Maximum		48000	1.5		13.1														
		Minimum		100	1.4		3.8														
		Mean[3]		1346	1.4		8.6														
162	Des Plaines River	No. of Analyses	8	8	3	3	8	3	3		3			3	3			3			
		No. of Violations	5	8	2	3	4	2	0		0			0	0			0			
G 04		Maximum	5.60	180,000	2.2	0.10	15.5	1.10													
		Minimum	0.33	300	0.4	0.05	1.3	0.02													
		Mean[3]	2.67	5972	1.3	0.07	6.6	0.41													
165	Des Plaines River	No. of Analyses	7	7	3	3	7	3	3		3			3	3			3			
		No. of Violations	3	6	2	3	1	0	0		0			0	0			0			
G 18		Maximum	3.50	40,000	1.4	0.07	12.9														
		Minimum	0.10	100	0.8	0.04	2.7														
		Mean[3]	1.31	3038	1.1	0.05	8.6														
166	Des Plaines River	No. of Analyses	7	7	2	2	7	2	2		2			2	2			2			
		No. of Violations	3	6	1	1	1	0	0		0			0	0			0			
G 17		Maximum	4.00	150,000	1.3	0.03	13.5														
		Minimum	0.04	100	0.2	0.00	4.6														
		Mean[3]	1.41	9946	0.7	0.01	9.4														
99	Deep Run Creek	No. of Analyses	7	7	2	2	7	2	2		2			2	2			2			
		No. of Violations	2	3	1	0	1	0	0		0			0	0			0			
GIX 01		Maximum	4.60	4200	1.2		16.7														
		Minimum	0.09	100	0.0		0.0														
		Mean[3]	0.81	324	0.6		10.2														
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

TABLE 21 : VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER ALITY STANDARDS

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																			
			Ammonia Nitrogen 1.50	Fecal[2] Coliform (per 100 ml.) 200	Iron 1.0	Copper 0.02	Dissolved Oxygen 5.0	Lead 0.10	Silver 0.005	Chloride (4)	Fluoride 1.4	PH (Units) (4)	Boron (4)	Sulfate 500	Cyanide 0.025	Hexavalent Chromium (4)	Total Phosphorus (4)	Manganese 1.0	Phenol (4)	Total Dissolved Solids (4)	Temp. (°F) (4)
97	I & M Canal	No. of Analyses	7	7	2	2	7	2	2		2			2	2			2				
		No. of Violations	0	7	2	1	0	0	0		0			0	0			0				
GH 02		Maximum		8300	2.1	0.03																
		Minimum		400	1.1	0.01																
		Mean[3]		3371	1.6	0.02																
98	I & M Canal	No. of Analyses	7	7	2	2	7	2	2		1			2	2			2				
		No. of Violations	0	3	1	0	0	0	0		0			0	0			0				
GH 01		Maximum		18,000	1.1																	
		Minimum		100	0.9																	
		Mean[3]		391	1.0																	
163	Flagg Creek	No. of Analyses	8	8	1	1	8	1	1		1			1	1			1				
		No. of Violations	1	3	0	0	0	0	0		0			0	0			0				
GK 01		Maximum	6.00	7000																		
		Minimum	0.15	100																		
		Mean[3]	1.04	343																		
164	Flagg Creek	No. of Analyses	6	6	0	0	5	0	0		0			0	0			0				
		No. of Violations	0	2			0															
GK 02		Maximum		3000																		
		Minimum		100																		
		Mean[3]		297																		
87	Jackson Creek	No. of Analyses	5	5	1	1	5	1	1		1			1	1			1				
		No. of Violations	0	2	1	0	0	0	0		0			1	0			0				
GC 01		Maximum		1100	2.2									615								
		Minimum		100	2.2									615								
		Mean[3]		288	2.2									615								
161	Sawmill Creek	No. of Analyses	7	7	3	3	7	3	3		3			3	3			3				
		No. of Violations	5	4	0	2	1	1	0		0			0	0			0				
GJ 01		Maximum	15.00	35000		0.14	12.7	5.3														
		Minimum	0.72	100		0.02	3.9	0.01														
		Mean[3]	4.67	1145		0.07	8.5	1.77														
48	Illinois River	No. of Analyses	6	6	3	3	6	3	3		3			3	3			3				
		No. of Violations	2	3	2	2	0	0	0		0			0	0			0				
D 10		Maximum	2.2	2000	1.2	0.07																
		Minimum	0.32	100	0.5	0.01																
		Mean[3]	1.16	323	0.9	0.04																
49	Illinois River	No. of Analyses	6	6	3	3	6	3	3		2			3	3			3				
		No. of Violations	3	4	2	3	0	0	0		0			0	0			0				
D 26		Maximum	2.70	1100	1.7	0.06																
		Minimum	0.17	100	0.7	0.05																
		Mean[3]	1.21	309	1.2	0.05																

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																			
			Ammonia Nitrogen 4.00	Fecal[2] Coliform (per 100 ml.) 1000	Iron (4)	Copper (4)	Dissolved Oxygen (4)	Lead (4)	Silver (4)	Chloride (4)	Fluoride (4)	PH (Units) (4)	Boron (4)	Sulfate (4)	Cyanide (4)	Hexavalent Chromium (4)	Total Phosphorus (4)	Manganese (4)	Phenol (4)	Total Dissolved Solids (4)	Temp. (°F) (4)
88	Des Plaines River	No. of Analyses	8	9																		
		No. of Violations	2	8																		
G 12		Maximum	5.20	22000																		
		Minimum	1.00	900																		
		Mean[3]	3.03	4255																		

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

(2) IEPA Sampling: The IEPA collected samples at 13 sites in the basin during 1976. Figure 21-2 describes the locations of the sampling sites, and Table 21-13, the results. Violations of standards for DO, copper and fecal coliform were noted frequently. Of 85 analyses for fecal coliforms, 21 apparent violations were recorded. (The word apparent is used because the IEPA uses a different methodology of sampling for fecal coliforms.) Of 23 analyses for copper, 13 violations were noted.

Fecal coliform violations were found in most of the samples taken in the Des Plaines River upstream of its junction with the Chicago Sanitary and Ship Canal, and downstream of its confluence with Hickory Creek. In addition to the frequency of violations, the fecal coliform counts themselves were extremely high. Dissolved oxygen violations were found in about 50 percent of the samples at Station 162, which is located near Willow Springs, and in one of about seven samples taken at six other stations.

(3) Fish Species and Habitat: Fish population surveys were conducted at 37 locations in the basin in 1976 as part of the 208 sampling program. Forty-two species and two hybrid crosses were collected in the survey, of which only five of the species are considered to be intolerant of habitat abuse. All other species collected have varying degrees of tolerance. Bluntnose minnows (a tolerant species) represented 26 percent of the total number of fish collected.

Follow-on analyses by the Illinois Natural History Survey (INHS) involved calculation of a toxicity index relating water quality to fish habitat suitability. Included in the parameters for computing the index (using bluegills as the target species) are cadmium, silver, arsenic, ammonia nitrogen, and copper, in addition to many others. On the basis of its analysis, the INHS determined that at three of eleven IEPA sampling stations in the basin, the toxicity index was in excess of the theoretical maximum level above which a high quality, diverse fishery cannot be maintained. Those parameters contributing to the high index values were silver, ammonia nitrogen, MBAS, and syanide.

The INHS concluded that the main river channel maintains a fishery dominated by tolerant species. Conditions in the river's tributaries varied. Water quality analyses of Flagg Creek indicated the stream should support a diverse fishery. Yet collections from this stream were limited to tolerant species. Tolerant species were also taken from Sawmill Creek. Black Partridge Creek was one of the many tributaries which enhanced the river's fishery. River collections in this area and downstream included a limited number of intolerant species. Fish collections from the Illinois-Michigan Canal indicate it maintains a fish population similar to that of the river. The fishery of the Sanitary and Ship Canal is extremely degraded, but the River and Sugar Run (a diverse, good-quality stream) dilute the toxic conditions of the Canal.

Figure 21-3: BASIN MODELING SEGMENTS



Water quality analyses indicate Jackson Creek to be a good to high-quality stream. Fishery collections taken from the same area included a diverse assemblage of species. Water quality sampling was not conducted within or downstream from the Joliet arsenal, but fish collections from these downstream reaches progressively degraded.

(4) Benthic and SOD Analyses: The results of analyses by the Illinois State Water Survey of benthic macroinvertebrate communities and sediment oxygen demands are presented in Tables 21-14 and 21-15 respectively. These data are for Station 63 in the lower Des Plaines, near Sag Bridge, in the vicinity of Willow Springs. Based on biological analyses of the benthic communities reflecting their nature and diversity, and using the Shannon-Weaver index, the site was considered severely polluted; using the IEPA's classification system, it was rated polluted. Based on SOD measurements, the site was described as heavily polluted.

TABLE 21-14 : BIOLOGICAL STREAM SITE CLASSIFICATIONS

Station Number	Stream Name	IEPA Classification[1]	Shannon-Weaver	
			Index	Classification[2]
63	Des Plaines River	P	0.45	SeP

(1) Polluted (P); Semi-polluted (SP); Unbalanced (U); Balanced (B).
(2) Severe pollution (Se P); Moderately polluted (MP); Clean (C).

TABLE21-15 : GENERALIZED BENTHIC SEDIMENT CONDITIONS

STATION NUMBER	STREAM NAME	BENTHIC CONDITION*
63	Des Plaines River	Heavily Polluted

*Based on SOD value

(5) Computer Simulation: As shown in Figure 21-3, for modeling purposes the basin was divided into a number of areas called reaches. Each reach is composed of a segment of a major stream, the waterways that are tributary to that segment, and the land area drained within the segment. Each is a direct tributary to the reach immediately downstream along the same major stream, and is an indirect tributary to other downstream reaches. Reach 217 is the farthest downstream point for which water quality data in the basin were simulated. Since water from all other Lower Des Plaines Basin reaches eventually flows into Reach 217, it represents a summary of pollutant loadings to the basin. That is why, in general, the discussion in this section focuses on conditions in Reach 217. Conditions in Reaches 170, 210, and 213 are discussed as necessary. The most downstream points in each of these four important reaches are described in Table 21-16.

The simulation of existing conditions provides a more comprehensive picture of water quality in the basin than do the results of periodic sampling programs. Not only were pollutant concentrations determined and related to state standards, but also the relative amounts of pollutants contributed by various sources were described.

TABLE 21-16: DATA OUTPUT POINTS

Reach 170 Hoffman Dam, Riverside	Reach 213 Stateville Penitentiary, vicinity of Lockport
Reach 210 Stephen Street Bridge, Lemont	Reach 217 Brandon Lock and Dam

(a) Pollutant Concentrations: Although the Commission analyzed or measured 19 parameters, simulation reports on existing conditions were prepared for only eight: streamflow, temperature (° C), chlorophyll a, dissolved oxygen, biochemical oxygen demand, ammonia (NH_3), nitrate (NO_3), and phosphate (PO_4). The last four of these represent pollutants that can be quantified and tied to specific categories of sources using the model.

Assessments of conditions with respect to each parameter are based on state in-stream standards, if established. Statistical values express the minimum, maximum, and average concentrations of pollutants or water quality indicators. Values also describe the number of times that simulated concentrations of pollutants violated state standards and the average duration of the violations.

The model simulation was continuous, with hourly outputs over a 3 year period. Therefore, if a standard for a particular pollutant was consistently violated over the entire simulation period, that was reflected in the statistics for number and frequency of violations, as follows:

- Number of violations: one (because there was only one violation, even though it was of 3 years' duration)
- Average duration: 26,304 hours (the total number of hours in the 3 year period)

Table 21-17 (A,B) summarizes pollutant levels simulated for the lower Des Plaines under existing (and first test plan) conditions. As indicated by the results of the in-stream sampling programs discussed earlier, problems are apparent with respect to ammonia. Standards for oxygen levels are being violated in all reaches.

TABLE 21-17A: STATISTICAL SUMMARY OF CURRENT WATER QUALITY CONDITIONS

Water Quality Indicators	Standard[1] (or other level)	REACH 210[4]			REACH 213[4]			REACH 217[5]		
		Existing	1st	2nd	Existing	1st	2nd	Existing	1st	2nd
Flow										
Maximum	None	4980	4000		8370	4920		15300	13900	
Minimum		105	270		109	274		1770	1970	
Mean		775	943		848	967		4650	4300	
Temperature (C)										
Maximum		36.3	36.3		35.9	35.4		32.7	30.9	
Minimum		0	0		0	0		3.70	0.62	
Mean		13.9	13.9		14.2	14.1		17.8	15.3	
Number of Violations	32.2[2]	20	10		34	16		1	0	
Average Duration of Violations (hours)	32.2[2]	7	8		7	8		16	0	
Dissolved Oxygen (mg/l)										
Maximum		12.4	17.8		13.4	17.1		9.09	12.5	
Minimum		0	1.35		0.13	2.10		0	3.47	
Mean		6.59	8.38		8.19	9.27		4.65	9.04	
Number of Violations of levels listed, or of standards	1.0	21	0		3	0		90	0	
	2.0	86	21		7	0		192	0	
	4.0[6]	249	110		117	98		230	6	
	5.0[3]	307	196		225	189		157	76	
	6.0[3]	361	284		342	301		82	219	
Average Duration of Violations for levels listed, or of standards (hours)	1.0	10	0		6	0		8	0	
	2.0	11	1		6	0		12	0	
	4.0[6]	21	6		12	6		42	4	
	5.0[3]	26	10		13	7		93	5	
	6.0[3]	31	18		16	8		233	7	
BOD (mg/l)										
Maximum	None	37.8	30.7		39.8	39.4		25.8	16.5	
Minimum		0.77	2.44		0.79	2.66		2.91	4.02	
Mean		10.8	10.0		11.8	11.0		7.83	7.34	

Revised 2/15/79

(1) Illinois Pollution Control Board Standard

(2) 16.6 during December, January, February and March; 32.2 during other months.

(3) No less than 6.0 mg/l during at least 16 hours of any 24 hour period; no less than 5.0 mg/l at any time.

(4) General Use Waters

(5) Secondary Contact and Indigenous Aquatic Life Waters

(6) Not less than 4.0 mg/l for Secondary Contact and Indigenous Aquatic Life Waters (Reach 217).

TABLE 21-17B: STATISTICAL SUMMARY OF CURRENT WATER QUALITY CONDITIONS

WATER QUALITY INDICATORS	Standard[1] (or other level)	REACH 210[3]			REACH 213[3]			REACH 217[4]		
		Existing	1st	2nd	Existing	1st	2nd	Existing	1st	2nd
Ammonia (mg/l) Maximum		1.86	1.03		5.40	1.06		6.45	3.47	
Minimum		0	0		0	0		1.28	0.14	
Mean		0.59	0.39		0.60	0.37		3.27	0.79	
Frequency of Violation	1.5[1]	5	0		48	0		7[5]	7[5]	
Average Duration of Violations	1.5[1]	27	0		12	0		3730	74	
Nitrate (mg/l) Maximum	None	11.4	13.2		11.6	13.2		6.11	15.0	
Minimum		0	1.00		0	0.56		1.16	1.48	
Mean		3.17	5.27		3.18	5.16		3.14	8.52	
Frequency of Violation	10.0	1	5		1	4		0	54	
Average Duration of Violations (hours)	10.0	220	231		250	276		0	115	
Phosphate (mg/l) Maximum		2.69	1.73		2.74	1.76		1.03	.91	
Minimum		0.07	0.05		0.03	0.02		.29	.17	
Mean		0.76	0.67		0.77	0.67		0.63	.51	
Frequency of Violation	.05[1][2]	1	1		2	7		1	1	
	.20	27	38		26	72		1	2	
Average Duration of Violations (hours)	.05[1][2]	26300	26300		13200	3750		26300	26300	
	.20	963	670		998	348		26300	13100	
Chlorophyll a (μg/l) Maximum	None	454	361		480	460		81.5	92.8	
Minimum		0.06	0.06		0.06	0.06		0.15	.17	
Mean		51.9	58.9		59.4	68.0		15.2	27.4	

Revised 2/15/79

(1) Illinois Pollution Control Board Standard

(2) In any reservoir or lake, or in any stream at the point where it enters any reservoir or lake.

(3) General Use Waters

(4) Secondary Contact and Indigenous Aquatic Life Waters

(5) Standard is 2.5 mg/l April through October; 4.0mmg/l at other times

The phosphate standard of .05 mg/l, although it does not apply to rivers and streams like in this basin, was theoretically violated in all three reaches. Levels of BOD were variable, but maximum levels in all three reaches were considered excessive. One particular statistic, the minimum DO levels of zero in Reaches 210 and 217 and nearly zero in Reach 213, indicate the seriousness of the DO problems in the basin.

(b) Pollutant Loadings and Sources: An analysis of pollutant loads as to sources is presented in Table 21-18 for Reaches 210, 213, and 217. The table represents only those loads entering the Lower Des Plaines basin and does not reflect boundary condition loads entering from the upper Des Plaines. Reach 217 under "Boundary Conditions" reflects the confluence of the Chicago Sanitary and Ship Canal.

(c) Point Sources: These contribute 23 percent of the total flow in Reach 210 (according to Table 21-18), but account for an even greater share of ammonia (50 percent), nitrate (69 percent), and phosphorous (84 percent). From other computations, it was found that the 5 mg/l dissolved oxygen standard was violated 30 percent of the time in Reach 210, 11 percent of the time in Reach 213. The 4 mg/l dissolved oxygen standard time in Reach 217 was violated 20 percent of the time.

(d) Pervious Sources: BOD, ammonia, nitrate, and phosphorous contributions from pervious land sources (e.g., lowland, cropland, and grassland) include surface and groundwater components (See Table 21-18).

In Reach 213, runoff from pervious land cover accounts for about one-third of the total stream flow. Of this portion, about 8 percent is surface runoff and 26 percent is from groundwater. However, the pollutant loads of BOD and ammonia associated with surface runoff are disproportionate to the flow, reflecting the highly concentrated nature of pollutants found in surface runoff. The majority of the nitrate (NO_3) from pervious land cover enters through groundwater, reflecting the conversion of ammonia to nitrate. There are large amounts of nitrate in the groundwater, but the nitrate does not present a problem.

(e) Impervious Sources: Runoff from impervious surfaces within the basin accounts for negligible proportions of total flow and pollutant loadings in Reach 217, where this impact of boundary conditions (i.e.: contributions by the Sanitary and Ship Canal) is overwhelming. The impact of impervious sources is greater in upstream reaches 210 and 213. In Reach 210, runoff from impervious cover accounts for nearly 25 percent of the flow, and nearly 60 percent of the BOD load. In Reach 213, impervious cover runoff is responsible for 15 percent of the streamflow and nearly 27 percent of the BOD.

TABLE 21-15. SOURCES OF POLLUTANTS, EXISTING CONDITIONS

REACH/SOURCE	PERCENTAGES					
	AREA	STREAM FLOW	POLLUTANTS			
			BOD	NH_3	NO_3	PO_4
1.						
(REACH NO. 210)						
BOUNDARY CONDITIONS						
POINT SOURCES		23.3	15.9	50.5	69.4	83.8
COMBINED SEWERS						
PERVIOUS COVER						
Surface Runoff	85	9.9	17.5	25	8.3	8.6
Groundwater		42.1	7.1	7.1	18.3	3.1
IMPERVIOUS COVER	15	24.7	59.5	17.4	4.0	4.5
2.						
(REACH NO. 213)						
BOUNDARY CONDITIONS		38	53.8	61.3	34.9	12.0
POINT SOURCES		13.3	7.5	12.1	35.1	19.9
COMBINED SEWERS						
PERVIOUS COVER						
Surface Runoff	87.9	8.1	8.6	19.8	7.1	2.2
Groundwater		25.5	3.4	1.9	20.3	1
IMPERVIOUS COVER	12.1	15.1	26.7	4.9	2.6	64.9
3.						
(REACH NO. 217)						
BOUNDARY CONDITIONS	76.6	96.0	97.0	99.1	95.7	96.4
POINT SOURCES		0.6	0.4	0.2	1.6	2.7
COMBINED SEWERS						
PERVIOUS COVER						
Surface Runoff	20.6	0.7	0.7	0.4	0.8	0.4
Groundwater		1.8	0.2	0.1	1.7	0.2
IMPERVIOUS COVER	2.9	0.9	1.6	0.2	0.2	0.3

Figure 21-4: POINT SOURCE DISCHARGES



Revised 2/15/79

(f) Boundary Conditions: Boundary conditions on an extremely significant factor in the downstream reaches of this basin, following the confluence of the Sanitary and Ship Canal. In Reach 217, they account for 96 percent of the streamflow, 97 percent of the BOD, 99 percent of the ammonia, and 96 percent of the nitrate and phosphate.

(g) Summary: When loads from the upper Des Plaines are considered, the poor water quality observed in the lower Des Plaines at Reach 217 (as measured by BOD loads) is due to boundary conditions (97 percent), impervious areas (1.6 percent), pervious areas (1 percent), and treatment plants (less than 1 percent). Dissolved oxygen levels are a problem throughout the basin due to heavy loads of oxygen-demanding constituents entering the system during both wet and dry weather.

21.04 POINT SOURCES: EXISTING CONDITIONS

a. Municipal Type Wastewater Treatment Plants

Facilities treating wastewaters from municipalities and subdivisions are classified as "municipal type" plants. These systems are usually publicly owned by a municipality, county or sanitary district. However, in this study, privately owned (utility) wastewater treatment companies are also included under this classification.

Within the basin, there are 15 municipal type wastewater treatment facilities currently in operation, serving portions of Du Page and Will counties. The plants are described in Table 21-19. All point sources are located on Figure 21-4.

b. Industrial Wastewater Treatment Plants

There are 17 industries treating and discharging process wastewaters located within the lower Des Plaines River basin. One facility, North American Car Corporation in Lemont, is located in Cook County, all the other plants are in Will County. Information on these facilities is described in Table 21-20.

c. Miscellaneous Wastewater Treatment Plants

Twenty-six miscellaneous wastewater treatment facilities are located in the basin. Details are shown in Table 21-21. The wastewater loads represent average annual flows.

TABLE 21-19A: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

LOWER DES PLAINES RIVER BASIN

MAP CODE	FACILITY NAME	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	RECEIVING STREAM			PUBLICLY OWNED TREATMENT WORKS		
				NAME	7 DAY 10 YR. LOW FLOW (MGD)				
					1970	2000	NO	YES	IEPA FY 78 PRIORITY NO.
W3	Bonnie Brae Forest Manor S.D.	Lockport/Bonnie Brae / Forest Manor SD	Lockport	Fiddyment Ck	0			X	195
W7	Chickasaw Hill Utility Company	None	Lockport	Long Run Creek	0		X		None
D9	Citizen's Utility Co. Santa Fe	Marionbrook/DPCDPW	Lemont	ditch to Des Plaines	15.5		X		None
W15	Derby Meadows Utility Company	Lockport/Bonnie Brae / Forest Manor SD	Lemont	Long Run Creek	0		X		None
D17	DPCDPW Marionbrook	Marionbrook /DPCDPW	Darien	W. Br. Saw Mill Creek	0			X	18
D19	DPCDPW Space Valley	Marionbrook/ DPCDPW	Willow Springs	ditch to Des Plaines	0			X	18
W16	Elwood	Elwood/Elwood	Elwood	Jackson Creek	0.10			X	267
D26	Hinsdale S.D. Burr Ridge	Hinsdale/Hinsdale S.D.	Burr Ridge	Flagg Creek	0			X	990
W19	Joliet-East	Joliet/Joliet	Joliet	Hickory Creek	12.9			X	728
W20	Joliet-West	Joliet/Joliet	Joliet	Des Plaines	1100			X	728
W21	Lockport	Lockport/Bonnie Brae / Forest Manor SD	Lockport	Deer Run Creek	7.36			X	619
W22	Lockport Heights S.D.	Lockport/Bonnie Brae / Forest Manor SD	Lockport	N. Br. Long Run Creek	0			X	234
W23	Manhattan	Manhattan/Manhattan	Manhattan	Manhattan Ck	0			X	319
W28	New Lenox #2 Laraway Road	New Lenox/New Lenox	New Lenox	Jackson Creek	0			X	None
W36	Romeoville #1	Romeoville/Romeoville	Romeoville	ditch to Des Plaines	0			X	808
W37	Romeoville #2	Romeoville/Romeoville	Romeoville	Des Plaines	17.4			X	808
W44	Channahon	Channahon/Channahon	Channahon					X	763

TABLE 21-19B: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

LOWER DES PLAINES RIVER BASIN

MAP CODE	NPDES PERMIT			EFFLUENT REQUIREMENTS (mg/l)														COMMENTS
	NUMBER	DATE		INTERIM (A)				FINAL (A)					YEAR 2000 (B)					
		ISSUED	EXPIRES	BOD_5	TSS	P	NH_3N	EFFECTIVE DATE	BOD_5	TSS	P	NH_3N	BOD_5	TSS	P	NH_3N		
W3	0021261	Draft	6-30-80						4	5			4	5		(c)		(a) Not in operation.
W7	0031984	3-22-76 (a)	5-1-80						4	5			4	5		(c)		
D9	0032760	5-30-75	12-31-79						4	5						(c)		(b) 7 day avg. 2.5 Apr-Oct 4.0 Nov-Mar.
W15	0045993	6-9-75	12-31-79						4	5			4	4		(c)		
D17	0028495	3-27-75	7-31-79						10	12			10	12		(c)		(c) 1.5 mg/l in-stream after mixing.
D19	0028461	6-22-77	1-31-82						10	12						-		
W16	0049867	8-15-76	1-31-82						10	12			10	12		(c)		(d) Proposed plant.
D26	0022586	11-13-74	6-1-79						5	6			5	6		(c)		
W19	0022519	1-25-77	6-1-82						20	25		(b)	20	25		(b)		
W20	0033553	12-10-74	12-31-77						20	25		(b)	20	25		(b)		
W21	0029611	12-23-74	10-1-79						10	12			10	12		(c)		
W22	0022144	5-30-75	6-30-79						10	12			10	12		(c)		
W23	0020222	3-27-75	6-30-79						4	5			4	5		(c)		
W28	0046264	6-30-75	12-31-79						4	5			4	5		(c)		
W36	0030805	11-27-74	9-30-79						4	5			10	12		(c)		
W37	0048526	5-11-77	4-30-82						4	5			20	25		(c)		
W44	(d)																	

(A) From NPDES Permits (B) From Facility Plans

TABLE 21-19C: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

LOWER DES PLAINES RIVER BASIN

MAP CODE	STATUS OF TREATMENT PLANT					WASTEWATER TREATMENT PLANT (MGD)										COMMENTS
	INTERIM		PERMANENT			AVERAGE FLOWS (b)						DESIGN CAPACITIES				
	YES	PHASE OUT DATE	EXISTING	PROPOSED NEW		1975	1980	1985	1990	1995	2000	1975	1985	OTHER YEAR	2000	
				YES	EST. DATE IN SERVICE											
W3			X			0.19	0.26	0.33	0.40	0.47	0.53 (c)	0.250	0.600		0.600	(a) Phased out to D17.
W7			X			0.10	0.10	0.10	0.10	0.10	0.10 (d)	0.600	–		–	
D9			X			–	0.20	0.40	0.60	0.80	1.00 (e)	1.000	–		–	(b) Facility plans or needs analysis documents unless noted.
W15			X			0.03	0.03	0.03	0.03	0.03	0.03 (d)	0.300	–		–	
D17			X			3.31	3.88	4.45	5.02	5.59	6.15 (f)	4.500	4.500		4.500	(c) NIPC estimate.
D19	X	12-79 (a)				0.01	–	–	–	–	–	0.014	–		–	(d) Private utility year 2000 flows assumed to be the same as 1975 flows due to lack of information.
W16				X	6-79	–	0.10	0.18	0.26	0.34	0.40	0	0.460		0.460	
D26			X			4.99	6.11	7.23	8.35	9.47	10.58 (c)	12.00	12.00			
W19			X			18.10	19.48	20.86	22.24	23.62	25.00 (c)	22.50			(g)	
W20			X			1.86	3.13	4.40	5.67	6.94	8.22 (c)	10.00			(g)	(e) Private utility flows estimated based on capacity
W21			X			1.38	1.50	1.62	1.74	1.86	1.95 (c)	2.000			(g)	
W22			X			0.07	0.12	0.17	0.22	0.27	0.31 (c)	0.110			(g)	(f) Flows in excess of 4.5 MGD to be treated at DCDPW Woodridge plant.
W23			X			0.25	0.26	0.27	0.29	0.31	0.32 (c)	0.200	0.400		0.400	
W28			X			0.01	0.12	0.23	0.34	0.45	0.56	0.200	0.56		0.56	(g) Capacity to be determined by facilities planning.
W36			X			0.98	1.17	1.36	1.55	1.74	1.92 (c)	2.000			(g)	
W37			X			0.70	0.79	0.88	0.97	1.06	1.13 (c)	1.500			(g)	
W44				X	1-80	–	0.28	0.34	0.39	0.45	0.50					

TABLE 21-19D: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

LOWER DES PLAINES RIVER BASIN

MAP CODE	POPULATION SERVED (1000's)						PROPOSED PROJECTS (C)								CAPITAL COSTS (million $)		
							PLANT				SEWERS						
	1975	1980	1985	1990	1995	2000	Exp.	UpG	New	Out	I/I	SSE	New	Reh	Initial	Future	Total
W3	2.3	3.0	3.6	4.1	4.9	5.7					X	X			0.4		0.4
W7	1.0	1.0	1.0	1.0	1.0	1.0									Private Costs		
D9															Private Costs		
W15	0.3	0.3	0.3	0.3	0.3	0.3									Private Costs		
D17	20.8	28.4	33.2	33.2	33.2	33.2					X	X	X	X	1.6	0.8	2.4
D19	0.1	-	-	-	-	-				X			X		SEE D17		
W16	-	1.0	1.1	1.1	1.1	1.2			X				X		1.3	-	1.3
D26	44.9	53.5	59.1	64.7	68.5	72.1	X	X			X	X			23.6	-	23.6
W19	68.4	73.0	80.3	87.6	95.9	104.0					X	X	X	X	42.9	-	42.9
W20	16.2	37.1	44.1	50.6	64.4	77.8					X	X	X	X	SEE W19		
W21	11.3	12.4	13.5	14.5	15.8	17.0					X	X			3.2		3.2
W22	1.1	2.0	2.3	2.6	3.1	3.5					X	X			0.2		0.2
W23	1.7	1.8	2.0	2.1	2.3	2.4	X	X			X	X			0.8	-	0.8
W28	0.2	1.2	2.3	.34	4.5	5.6	X	X							-	-	-
W36	10.4	12.0	13.6	15.2	17.4	19.6	X				X	X			4.0	-	4.0
W37	6.1	7.0	7.9	8.8	10.1	11.4	X	X			X	X			1.4	-	1.4
W44	-	2.8	3.4	3.9	4.5	5.0			X				X		2.1	-	2.1

(C) PROPOSED PROJECTS

SEWER(S): I/I - Infiltration/Inflow Study; SSE - Sewer System Evaluation; New - New Sewer Construction;

PLANT: Exp - Expansion; UpG - Upgrading; New - New plant; Out - Phase out

TABLE 21-19E: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS

LOWER DES PLAINES RIVER BASIN

MAP CODE	FACILITY PLANS												COMMENTS
	TYPE		STATUS			REVIEWS / APPROVALS							
						NIPC			IEPA				
	NEEDS ANALYSIS	STEP ONE STUDY	COMPLETED	UNDER WAY	LOCAL ISSUES	NUMBER	ENDORSED	UNDER REVIEW	NUMBER	APPROVED	UNDER REVIEW	UNRESOLVED ISSUES	
W3		X		X					C17-1590				(a) Private plant
W7		(a)											(b) Local funds-no grant
D9		(a)											(c) Conditional
W15		(a)											
D17		X	X			76-458	X		C17-1644	X			
D19		X	X			76-458	X		C17-1644	X			
W16		X	X			76-102	X		C17-1413		X		
D26		X		X		72-345	(c)		C17-1447				
W19		X		X					C17-1583				
W20		X		X					C17-1583				
W21		X		X					C17-2204				
W22		X		X					C17-1543				
W23		X		X					C17-1580				
W28		(b)				None			None				
W36		X		X					C17-2196				
W37		X		X					C17-2196				
W44		X		X					C17-1877				

TABLE 21-20A: INDUSTRIAL WASTEWATER TREATMENT PLANTS

LOWER DES PLAINES RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
W1	Amoco Chemical Co.	0001643	Joliet/Joliet	Joliet	A, L, F	1.500	0.597	-	0.597
W2	Caterpillar Tractor Co.	0001732	Joliet/Joliet	Joliet	K	1.173	0.920	-	0.920
W4	Commonwealth Edison-#001B	0002216	Joliet/Joliet	Joliet	L		3.700	-	3.700
W6	GAF Corp.	0002933	Joliet/Joliet	Joliet	A,L			-	
W7	Mobil Oil	0002861	Joliet/Joliet	Joliet	A, L, K	3.200	2.620	-	2.620
C3	North American Car Corp.	0005126	MSDGC/MSDGC	Lemont	LM,k		0.240	-	0.240
W8	Olin Corp. Blockson Works	0002020	Joliet/Joliet	Joliet	K		0.160	-	0.160
W9	Rexene Polymers	0001619	Joliet/Joliet	Joliet	A,L		0.112	-	0.112
W10	SCM Corp. Glidden-Durkee	0002038	Joliet/Joliet	Joliet	A, L, K	0.430	0.420	-	0.420
W12	Stephan Chemical Co.	0002453	Elwood/Elwood	Elwood	A, K, E	1.400	0.660	-	0.660
W13	Texaco #001	0002305	Lockport/Bonnie Brae Forest S.D.	Lockport	A, K	5.750	5.750	-	5.750
W14a	U.S.Army Ammunitions #001	0002666	Joliet/Joliet	Joliet	K	12.10	10.50	-	10.50
W14b	U.S.Army Ammunitions #002	0002666	Joliet/Joliet	Joliet		12.20	8.900	-	8.900
W14c	U.S.Army Ammunitions #003	0002666	Joliet/Joliet	Joliet	L, K	0.066	0.053	-	0.053
W14d	U.S. Army Ammunitions #004	0002666	Joliet/Joliet	Joliet	K	7.200	6.300	-	6.300
W14e	U.S. Army Ammunitions #005	0002666	Joliet/Joliet	Joliet		4.500	4.500	-	4.500
W16	U.S. Steel	0002674	Joliet/Joliet	Joliet	L, K	23.00	23.00	-	23.00
	(1): Activated sludge (A); chlorination (e); tertiary filter (F); special treatment (K); tertiary lagoon (L); stormwater holding (LM).								

TABLE 21-20B: INDUSTRIAL WASTEWATER TREATMENT PLANTS

LOWER DES PLAINES RIVER BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	7 DAY-10 YR. LOW FLOW (MGD) 2000	NPDES PERMIT DATES ISSUED	NPDES PERMIT DATES EXPIRES	SIC CODE	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
W1	Des Plaines	1162.8		7-18-74	1-1-78	72-2818	20 BOD, 25 TSS, 10 oil and grease Max: 2(tot)Fe, 1 Mn, 0.0005 Hg	(o/g) Daily
W2	Des Plaines	1156.3		9-30-74	6-30-79	72-3531	20 BOD, 20 TSS, 5 o/g, Daily Max: (tot) Cr, 1(tot)Fe	0.1 $Cr^{+}6$, 0.5
W4	Des Plaines	1170.6		10-29-74	7-1-78	72-4911	Daily Max: 15 TSS, 15 o/g 2(tot)Fe	, 0.5(dis) Fe
W6	Des Plaines	1157.0		11-7-74	12-31-77	72-2952	20 BOD, 25 TSS, Daily Max: (Dm) 15 o/g	
W7	Des Plaines	1186.1		8-30-76	6-30-78	72-2911	30 BOD, 25 TSS, DM: 15 o/g, 1(tot)	Cr, 3500 TDS,
C3	Illinois and Mich. Canal			11-19-75	9-30-79	72-4011	Temp, DM: 15 TSS, 15 o/g, 0.3 $Cr^{+}6$, 0.025 Cn	2(tot)Fe,
W8	Des Plaines	1172.5		11-20-74	12-31-79	72-2819	20 BOD, 15 (DM), TSS	
W9	Des Plaines	1211.9		2-25-75	10-1-78	72-2821	25 BOD, 20 TSS, 100 COD, 3500 TDS, 15 o/g	2(tot)Fe,
W10	Des Plaines	1185.4		4-14-75	7-15-79	67-2096	20 BOD, 25 TSS, DM: 2(tot)Fe, 1 Zn	, 15 o/g
W12	Des Plaines	1181.0		9-20-74	7-31-79	-		
W13	Deer Run Ck	0		10-23-74	6-30-78	72-2911	10 BOD, DM: 1000 TDS, 0.3 $Cr^{+}6$, 0.025 Cyanide	
W14a	Goose Creek	0		9-27-74	1-1-79	72-2819	10 BOD, 15 TSS, 1025 TDS, 20 COD, Nitrates, 400 Sulphates, 0.0005 Hg	8 TOC, 20
W14b	Jackson Ck	0.07		9-27-74	1-1-79	72-2819	10 BOD, 15 TSS, 1025 TDS, 20 COD, Nitrates, 170 Sulphates, 0.0005 Hg	10 TOC, 20
W14c	Grant Creek	0		9-27-74	1-1-79	72-2819	10 BOD, 15 TSS, 1025 TDS, 20 COD, 10 Sulphites, 0.0005 Hg	500 Sulphates,
W14d	Grant Creek	0		9-27-74	1-1-79	72-2819	10 BOD, 15 TSS, 10 TOC, 20 Nitrates, 0.5 TNT, 0.1 Chlorinated Hydrocarbons	175 Sulphates
W14e	Grant Creek	0		9-27-74	1-1-79	72-2819	10 BOD, 15 TSS, 1025 TDS, 15 TOC, 1.0 Nitrite, 250 Sulphate	20 Nitrates,
W16	Illinois and Mich. Canal			9-20-74	4-30-79	72-3310	DM: 15 TSS, 15 o/g, 1.0 Zn, 0.025 2(tot)Fe, 0.1 Pb	Cyanide,

(1) Current, from NPDES Permits

TABLE 21-21A: MISCELLANEOUS WASTEWATER TREATMENT PLANTS

LOWER DES PLAINES RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
D3	Argonne Nat'l Labs #001	0034592	Marionbrook/ DPCDPW	Darien	FT,F,E	0.435	0.830	-	0.830
W10	Com. Ed. 001E	0002216	Joliet/Joliet	Joliet	FT,E		0.012	-	0.012
W10	Com. Ed. 002E	0002216	Joliet/Joliet	Joliet	FT,E	0.037	0.007	-	0.007
W11	Com. Ed. 003	0002208	Romeoville/ Romeoville	Romeoville	FT,E	0.0125	0.010	-	0.010
D7	Curran,F.J.Co.	0037079	Downers/Downers Grove / Grove	Downers Grove	IM,FB		0.231	-	0.231
C12	Franciscan Sisters		MSDGC/MSDGC	Lemont	A,E	0.060	0.006	-	0.006
W15	GAF Corp.	0002933	Joliet/Joliet	Joliet	A,E	0.019	0.011	-	0.011
W17	Hoerner-Waldorf	0002615	Joliet/Joliet	Joliet	A,E	0.013	0.025	-	0.025
C17	KA Steel	0022934	MSDGC/MSDGC	Lemont				-	
C20	Lemont Mech. Ind. Inc.	0051772	MSDGC/MSDGC	Lemont		0.001	0.0003	-	0.0003
W26	Lewis University	0047589	Lockport/Bonnie Brae For.Mnr SD	Joliet	A,E	0.115	0.090	-	0.090
W27	Liberty Trailer Park			Lemont	A,L			-	
W31	Mat'l Services Hawkeye Yd.#60	0048429	Lockport/Bonnie Brae For.Mnr SD	Lockport	L	3.800	1.500	-	1.500
C27	Mount Assisi Convent	0049743	MSDGC/MSDGC	Lemont	L,E	0.040		-	
W33	Peoples Gas Light & Coke	0046779		Elwood		0.006		-	
.3	Palisade Comm. Schl Dist.#180	0052230	Marionbrook/ DPCDPW	Hinsdale	AD,E	0.006		-	
C28	Pleasantdale No.Elem.Schl.	0050130	MSDGC/MSDGC	La Grange	IM,FT,E	0.032	0.006	-	0.006
W37	Ranch Oaks Service Corp.	0055841		Manhattan		0.030			
C31	St.Mary Seminary		MSDGC/MSDGC	Lemont	AD,E	0.010			
C32	St. Vincent De Paul Seminary	0022811	MSDGC/MSDGC	Lemont	IM,FT,E	0.017	0.017	-	0.017
C33	Stanley A.E. Chemical Co.	0002399	MSDGC/MSDGC	Lemont	IM,F,L,E		0.020	-	0.020
W41a	U.S.Army Ammunitions	0033065	Joliet/Joliet	Joliet	A,E	0.075		-	
W41c	U.S.Army Ammunitions 001	0033049	Joliet/Joliet	Joliet	S	0.006		-	
W41d	U.S.Army Ammunitions 002	0033049	Joliet/Joliet	Joliet	S	0.006		-	
W14f	U.S.Army Amm. 001-002	0033057	Joliet/Joliet	Joliet	A,E	0.475		-	
D25	Wescom, Inc.	0037095	Downers/Downers Grove / Grove	Downers Grove	AD,F,E	0.030	0.019	-	0.019

(1): Activated sludge (A); extended aeration (AD); chlorination (E); tertiary filter (F); buried sand filter (FB); trickling filter (FT); Imhoff tank (IM); tertiary lagoon (L); septic (S).

See serv

TABLE 21-21B: MISCELLANEOUS WASTEWATER TREATMENT PLANTS

LOWER DES PLAINES RIVER BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	2000	NPDES PERMIT DATES ISSUED	EXPIRES	EFFLUENT REQUIREMENTS (mg/l) 1976(1) BOD	TSS	P	NH_3-N	2000 BOD	TSS	P	NH_3-N	COMMENTS
D3	Saw Mill Creek	0.78		5-29-75	5-8-79	10	12							
W10	Des Plaines	1172		10-29-74	7-1-79	30*	30*							* or 85% removal whichever is less
W10	Des Plaines	1172		10-29-74	7-1-79	30*	30*							
W11	Des Plaines			10-29-74	7-1-79	30*	30*							
D7	ditch to Saw Mill Creek	0		6-6-75	6-30-79	4	5							
C12	Illinois and Michigan Canal	0		APPLICATION APPLIED FOR										
W15	Des Plaines	1157		11-7-74	12-31-77	30	30							
W17	Storm sewer to Des Plaines	1181		5-10-74	9-30-78	20	25							
C17	Des Plaines			6-30-75	8-1-79	4	5							
C20	Illinois and Michigan Canal	0		Draft	9-30-82	4	5							
W26	ditch to Des Plaines	0		6-30-75	12-31-79	4	5							
W27	Long Run Creek	0												
W31	Des Plaines			4-26-76	3-31-80	30	30							
C27	Illinois and Michigan Canal	0		8-2-76	12-31-80									
W33	Cedar Creek			6-30-75	12-31-79									
D18	ditch to Des Plaines	0		Draft	8-31-81	4	5							
C28	Flagg Creek	1.16		Draft	6-1-81	4	5							
W37	Jackson Creek	0		Draft	9-30-82	30	30							
C31	ditch to I & M Canal	0												
C32	ditch to I & M Canal	0		5-30-75	12-31-79	4	5							
C33	ditch to I & M Canal	0		6-30-75	1-1-79	30	30							
W41a	Jackson Creek	0.05		3-21-74	3-19-79	10	12							
W41c	Grant Creek	0		3-21-74	3-19-79	30	30							
W41d	Jackson Creek	0		3-21-74	3-19-79	30	30							
W41f	Grant Creek	0		3-21-76	3-19-79	10	12							
D25	pond to Saw Mill Creek	0		6-30-75	6-30-78									

(1) From NPDES Permits

d. Other Point Source Discharges

Other point source discharges include those not classified under the municipal, industrial, or miscellaneous categories previcusly discussed. Water treatment plant residues, agricultural runoffs from concentrated activities, cooling water discharges, and selected stormwater runoffs, particularly from industrial areas, are the types of discharges covered. Data for these discharges is presented in Table 21-22.

(1) Water Treatment Plant Residues: There are four water supply treatment facilities in the basin that discharge backwash residues. Three plants are in Cook County and one plant is in Will County.

TABLE 21-22A: OTHER POINT SOURCE DISCHARGES LOWER DES PLAINES RIVER **BASIN**

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
W1	Amoco Chemical Co. 002-004	0001643	Joliet/Joliet	Joliet	0.070	7-18-74	1-1-78
C7	Amoco Chemical Willow Springs	0001627	MSDGC/MSDGC	Willow Springs	0.030	4-29-75	6-30-79
D2	Argonne Nat'l Acc'l Lab #002	0034592	Marionbrook/DPCDPW	Darien	0.110	5-29-75	5-8-79
W9	Collier C&C Co.		Romeoville/Romeoville	Lemont			
W10	Com.Ed.-001A-CWD	0002216	Joliet/Joliet	Joliet	733.0	10-29-74	10-1-79
W10	Com. Ed.-001B PSPD	0002216	Joliet/Joliet	Joliet	3.700	10-29-74	10-1-79
W10	Com. Ed.001 D1	0002216	Joliet/Joliet	Joliet	0.037	10-29-74	10-1-79
W10	Com. Ed. 001 F	0002216	Joliet/Joliet	Joliet	75.20	10-29-74	10-1-79
W10	Com. Ed. 002A-CWD	0002216	Joliet/Joliet	Joliet	464.0	10-29-74	10-1-79
W10	Com. Ed. 002C-PHW	0002216	Joliet/Joliet	Joliet	43.00	10-29-74	10-1-79
W10	Com.Ed. 002 D1	0002216	Joliet/Joliet	Joliet	0.040	10-29-74	10-1-79
W10	Com. Ed. 003	0002216	Joliet/Joliet	Joliet	5.500	10-29-74	10-1-79
W13	Dow Chemical Co. 001-002	0037851	Joliet/Joliet	Joliet	0.300	6-17-75	12-31-79
W15	GAF Co. 001	0002933	Joliet/Joliet	Joliet	0.280	11-7-74	12-31-77

TABLE 21-22A: OTHER POINT SOURCE DISCHARGES

LOWER DES PLAINES RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
W26	Mobil Oil #001 Storm	0002861	Joliet/Joliet	Joliet		10-24-74	6-30-78
C102	No. American Car Corp.	0005126	MSDGC/MSDGC	Lemont	0.240	11-19-75	9-30-79
W29	Olin Corp. Ammonia Terml	0024431	Joliet/Joliet	Joliet	2.400	4-15-75	10-1-79
W32	RHO Chemical	0037559	Joliet/Joliet	Joliet		6-18-75	12-31-79
W33	Stauffer Chem.	0002569	Joliet/Joliet	Joliet		9-18-74	5-31-79
W35	Texaco #002	0002305	Lockport/Bonnie Brae Forest Manor S.D.	Lockport	15.10	10-23-74	6-30-78
W35	Texaco #004	0002305	Lockport/Bonnie Brae Forest Manor S.D.	Lockport		10-23-74	6-30-78
W36	Vulcan Materls	0002313				1-9-74	11-30-78
C150	Vulcan Materls	0037737	MSDGC/MSDGC	McCook		10-3-75	3-31-79
D25	Wescom Inc.	0037095	Downers/ Downers Grove / Grove S.D.	Downers Grove	0.024	6-30-75	6-30-78
C38	Cook Co. Edge-water Acres		MSDGC/MSDGC				
C63	Hinsdale	0051446	MSDGC/MSDGC	Hinsdale			
C97	Midwest Wolf Water Co.	0042676	MSDGC/MSDGC	Brookfield	0.0025	6-20-75	12-31-78
W37	Will Co. Derby Meadows Subdiv.	0051411	Lockport/Bonnie Brae Forest Manor S.D.	Lockport	0.001	6-9-75	12-31-79
W7	Chicago-Joliet LMC-Feedlot	0037524	Joliet/Joliet	Joliet	Overflow	3-5-75	12-1-79
C57	General Motors Fisher Body Div	0034401	MSDGC/MSDGC	Willow Springs		4-30-75	12-31-78
W17	Hoerner-Waldorf Corp.	0002615	Joliet/Joliet	Joliet		5-10-74	9-30-78
W18	Ill. Central Gulf R.R.	0033243	Joliet/Joliet	Joliet		4-16-76	12-31-78
D17	Ill. State Tollway	0048801	Hinsdale/Hinsdale SD	Hinsdale		3-11-76	9-30-80
D18	Int'l Harvester	0035025	Hinsdale/Hinsdale SD	Hinsdale		3-24-75	8-1-79
C76	K.A. Steel	0022934	MSDGC/MSDGC	Lemont		6-30-75	8-1-79
C77	Kavin-Greg Co.	0049182	MSDGC/MSDGC	Lemont		5-11-76	12-31-79
W21	Lincoln Stone	0024091	Joliet/Joliet	Joliet	0.600	4-14-75	6-1-78
W22	Material Servcs Yard #60	0048437	Lockport/Bonnie Brae Forest Manor S.D.	Lockport	1.200	4-26-76	3-31-80
W23a	Material Servcs Yard #61-001	0035131	Romeoville/Romeoville	Romeoville	0.075	3-17-75	9-1-79
W23b	Material Servcs Yard #61-002	0035131	Romeoville/Romeoville	Romeoville		3-17-75	9-1-79
W24	Meyer Material	0026824		Channahon	0.150	3-24-75	9-1-79
W26	Mobil Oil #001	0002861	Joliet/Joliet	Joliet		10-24-74	6-30-78
W26	Mobil Oil #001 NCCW	0002861	Joliet/Joliet	Joliet		10-24-74	6-30-78

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TABLE 21-22B: OTHER POINT SOURCE DISCHARGES

LOWER DES PLAINES RIVER BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	7 DAY-10 YR. LOW FLOW (MGD) 2000	EFFLUENT REQUIREMENTS[1] (mg/l)	COMMENTS
W1	drainage ditch to Des Plaines	1162.0		20 BOD, 25 TSS	Contaminated stormwater and non-contact cooling waters
C7	storm sewer to Des Plaines			Temp., 15 (DM) TSS, 10 o/g	Cooling water and stormwater runoff
D2	Saw Mill Ck	0.78		12 TSS, 600 TDS	
W9	I & M Canal				Stormwater runoff
W10	Des Plaines	1172.5		Temp., DM: 15 TSS, 15 o/g	Cooling water
W10	Des Plaines	1172.5		DM: 15 TSS, 15 o/g,2(tot)Fe,0.5 (dis) Fe	Pyrite sluice pond discharge
W10	Des Plaines	1172.5		Monitor Flow and TDS	Demineralizer regenerant wastes
W10	Des Plaines	1172.5		None	Non-contact cooling water
W10	Des Plaines	1172.5		Temp., DM, 15 TSS, 15 o/g	Condenser cooling water
W10	Des Plaines	1172.5		None	Plant house service water
W10	Des Plaines	1172.5		Monitor flow and TDS	Demineralizer regenerant waste
W10	Des Plaines	1172.5		DM: 15 TSS, 15 o/g, 2(tot)Fe, 0.5 (dis) Fe	Quarry discharge
W13	ditch to Des Plaines	0		DM: 15 TSS, 15 o/g	Stormwater runoff
[illegible]	Des Plaines	1157.0		Temp.	Non-contact cooling water
W26	Des Plaines			DM: 15 o/g, 35 TOC	Stormwater runoff
C102	I & M Canal			Temp., DM: 15 TSS, 15 o/g, 0.3 Cr^{+3}, 2 (tot) Fe, 0.025 Cn	Stormwater Runoff
W29	Des Plaines	1180.9		Temp.	Cooling water
W32	Des Plaines			Monitor flow and temp.	
W33	Des Plaines	1155.1		Temp. DM: 30 BOD, 15 TSS 15 o/g, 0.1 Pb, 0.025 Cn	Cooling water
W35	Chgo. Sani. and Ship Cnl	1700		Temp.	Cooling water
W35	I and M Canal			DM: 10 BOD, 12 TSS, 1000 TDS, 15 o/g	
W36	ditch to Sugar Run Ck	0		20 TSS	Quarry pumpage and runoff
C150	ditch to Des Plaines	0		20 TSS	Quarry pumpage and runoff
W25	ditch to Saw Mill Ck	0		15 TSS, DM: 1 Cu, 0.1 Pb,1 Ni, 1 Zn	Cooling water
C38	ditch to Des Plaines	0			Water plant
C63	ditch to Flagg Creek	0			Water plant
[illegible]	Flagg Creek			Monitor flow and TDS	Water plant
W37	ditch to Long Run Ck	0		15 TSS, 0.2 (tot) Fe	Water plant
W7	ditch to Grant Creek	0		Discharge from runoff structure occurs only after heavy rainfall events	

(1) From NPDES Permits

TABLE 21.22b: OTHER POINT SOURCE DISCHARGES

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	7 DAY-10 YR. LOW FLOW (MGD) 2000	EFFLUENT REQUIREMENTS[1] (mg/l)	COMMENTS
C57	Des Plaines	12.3		DM: 15 TSS, 15 o/g	
W17	Storm sewer to Des Plaines	1180.9			Combines with process prior to entering the Des Plaines
W18	Sugar Run CK	0		15 TSS, 15 o/g	Stormwater treatment plant
D17	Ditch to Flagg Creek	0		15 (DM), o/g	
D18	Flagg Creek	0		Temp.	Cooling water
C76	I & M Canal			DM: 15 o/g, 2(tot)Fe, 0.5 (dis) Fe	Cooling water
C77	ditch to I & M Canal	0			Non-contact cooling water
W21	Des Plaines			20 TSS	
W22	Des Plaines			30 BOD, 30 TSS	
W23	Des Plaines	17.4		2 TSS	Quarry pumpage
W23	Des Plaines	17.4		Temp., 10 o/g	Non-contact cooling water
W24	Des Plaines			20 TSS, 30 (DM) TSS	
W26	Des Plaines			Temp., DM: 0.2 chlorine residual	
W26	Des Plaines			DM: 0.5 TOC	Non-contact cooling water

(1) From NPDES Permits

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(2) Agricultural Wastes: These types of discharges are associated with concentrated animal feeding operations. There is one feedlot located in the basin the Chicago-Joliet Livestock Marketing Center in Channahon Township, Will County, where up to 2,000 hogs and 8,000 cattle are confined. The NPDES permit allows discharge (overflow) from this facility when (1) rainfall exceeds 5 inches in any 24-hour period or (2) when a series of rainfall events accumulate in the runoff control structure.

(3) Cooling Waters: Steam-electric power plants and a number of industrial operations require large volumes of water to cool equipment. In a once-through system, heat is dissipated by this cooling water. The pollution problem usually associated with cooling water is high water temperature. The discharge of any large volumes of high temperature cooling water to receiving streams may result in undesirable changes to the extent that beneficial uses of the water are impaired.

(4) Stormwater Runoffs: Industrial stormwater discharges result from the collection of rainfall runoff from the plant property. This surface runoff may carry such pollutants as oil, grease, and solids into the receiving waters. Pollutants of this type accumulate upon the ground surface as a result of leakages, spillages, or other operations. In some instances, poor housekeeping over an extended period of time has allowed the plant ground to become saturated with

various pollutants which may be flushed into the receiving stream during wet weather. Treatment of these stormwater flows is usually provided by settling and oil-skimming prior to discharge.

e. Local Facilities Planning

The future water quality of the lower Des Plaines is directly influenced by facilities planning in the Channahon, Elwood, Hinsdale, Joliet, Lockport, Manhattan, Marionbrook, New Lenox, and Romeoville facilities planning areas. (See Figure 21-5 for facility planning area boundaries.) While portions of the Bolingbrook, Downers Grove, Mokena-Frankfort, and MSDGC planning areas fall within the basin, they do not contribute any point source discharges. The facilities plans of point sources in the Upper Des Plaines River Basin, Sanitary and Ship Canal Basin, and Hickory Creek also impact on water quality in the Lower Des Plaines. The future plans of point sources in those basins are summarized in other basin chapters of this plan.

(1) Channahon FPA: There presently is one municipal type wastewater treatment plant in the Channahon FPA. It is the Camelot Utility Co. plant which is actually in the Du Page basin. A facilities plan is being prepared for Channahon but is not yet completed. The facilities plan will focus on several alternatives, including continued use of on-site disposal systems (septics), constructing a new collection and treatment system in the east central part of the FPA, expanding the private utility plant, and constructing a collection system with service by Joliet's West plant. It appears unlikely that Channahon can afford the high cost of an independent municiapal sewage collection and treatment system. It is also unlikely that the private utility will be expanded. It appears, therefore, that Channahon will continue to use traditional septic systems in areas where they function properly, and innovative on-site disposal techniques in areas with septic problems.

(2) Elwood FPA: There presently are no operational municipal type plants in the Elwood FPA. However, the completed and approved Elwood facilities plan recommended construction of an Elwood wastewater treatment facility. Completion of this plant and a new sewer system is expected by the middle of 1979. Approximately 50 percent of the FPA population presently discharges raw sewage to Grant Creek through a series of farm tiles. These discharges will be eliminated by the proposed treatment and collection system.

(3) Hinsdale FPA: The only municipal type plant in the Hinsdale FPA which discharges to the lower Des Plaines River basin, is the Hinsdale Sanitary District Burr Ridge wastewater treatment facility. The Sanitary District recently completed expansion of this plant to 12 mgd average capacity. In 1972, the district also proposed further expansion of the plant to 17 mgd, but this expansion was modified to 13.3 mgd and was finally ruled ineligible for grant funds by the USEPA. The sanitary district has indicated that future facility planning will depend on

development trends and on the results of this Commission's 208 study.

(4) Joliet FPA: The City of Joliet owns and operates an east plant and a west plant which discharge to Hickory Creek and the Des Plaines River, respectively. Both plants are in the lower Des Plaines basin for purposes of this plan. The Oak Highlands/Ingall's Park Sanitary District discharges to Hickory Creek in the Hickory Creek basin. The Will County Water Co. discharges to the Du Page River, Crest Hill discharges to the Rock Run, and Rockdale discharges to the Illinois and Michigan Canal. All three of these plants are in the Du Page basin. (The Hickory Creek and Du Page basin plants are not shown on Figure 21-4.)

The City of Joliet also owns and operates 35 combined sewer overflows, 23 of which discharge to the lower Des Plaines River basin.

The facilities plan for the Joliet FPA is currently being prepared and is not expected to be completed before mid-1979.

Joliet and the other wastewater treatment authorities in the Joliet FPA have completed infiltration/inflow (I/I) studies which recommend corrective works. These communities are presently seeking grant funds to conduct sewer system evaluation surveys to identify and eliminate specific sources of I/I. The Rockdale and Joliet I/I studies recommend separation of the combined sewer systems in those communities. The Joliet project would also involve rerouting sewage flows so that flows originating on the west side of the Des Plaines River are treated at the new west side plant, while flows from the east side are treated at the east side plant. Joliet and Rockdale are conducting further research on their combined sewer overflow problem, and the results of that study may affect the implementation of the recommended sewer separation in those communities.

In the absence of a completed facilities plan for the Joliet FPA, it has been assumed that the configuration of wastewater treatment facilities would be the same as that outlined in this Commission's Regional Wastewater Plan. Under that plan, the Joliet east plant would be retained at its present 22.5 mgd capacity, and the Joliet west plant would be retained at its present 10 mgd capacity. The Rockdale and Crest Hill plants would be phased out to Joliet West; the Oak Highlands/Ingalls Park Sanitary District plant would be retained and expanded; the unsewered portion of the Shorewood sub-FPA would be serviced by Joliet West, and the sewered part, by the Will County Water Company plant. These assumptions could be superceded by the detailed analyses of wastewater treatment alternatives to be presented in the Joliet Facilities Plan. Until that document is completed and approved, the Regional Wastewater Plan is the best information available.

Figure 21-5: WASTEWATER SERVICE AREAS



Revised 2/15/

(5) Lockport FPA: There are five municipal type wastewater treatment plants in the Lockport FPA. The City of Lockport, the Lockport Heights Sanitary District, the Bonnie Brae Forest Manor Sanitary District, the Derby Meadows Utility Company, and the Chickasaw Hills Utility Company each own and operate collection and treatment facilities. The City of Lockport also owns and operates 442 acres of combined sewers and one combined sewer overflow to the Des Plaines River. A facilities plan is being prepared for the Lockport FPA but, to date, only the I/I study has been completed for the three municipal service areas. It appears likely that the wastewater treatment facilities in the Lockport FPA will remain independent through the year 2000. Based on this Commission's population forecasts for the Lockport FPA and on information contained in the I/I analyses for the Lockport FPA, it appears that the Lockport, the Lockport Heights Sanitary District, and the Bonnie Brae Forest Manor Sanitary District plants would all require expansion by 1980. Lockport would eliminate its combined sewer overflow through a sewer separation project. The completed Lockport facility plan may present conclusions different from those above. Until that document is completed and approved, the above assumptions represent the best information available.

(6) Manhattan FPA: The Village of Manhattan owns and operates the only municipal type plant in the Manhattan FPA. A facilities plan is being prepared but, to date, no conclusions have been reached. Based on this Commission's population forecasts and current wastewater flows, the Manhattan plant would probably require expansion from its current 0.2 mgd probably by 1980. The conclusions of the final Manhattan facility plan may differ from the above statement, but until that document is completed and approved, the previous information is the best available.

(7) Marionbrook FPA: The following three municipal type plants are located in the Marionbrook FPA and discharge to the lower Des Plaines River basin: the Du Page County Department of Public Works (DCDPW) Marionbrook, the Citizens Utility Company Santa Fe, and the DCDPW Space Valley. Facilities planning in the Marionbrook FPA has been completed and approved under a facilities planning exception to the Woodridge facilities plan. The DCDPW Space Valley plant will be phased out to the Marionbrook plant by means of a new interceptor to be completed by 1980. As the Marionbrook plant approaches capacity, probably in about 1985, an interceptor will be constructed connecting the Marionbrook plant to the DCDPW Woodridge plant where excess flows will be treated.

(8) New Lenox FPA: The Village of New Lenox Laraway wastewater treatment facility is the only municipal type plant in the New Lenox FPA discharging to the lower Des Plaines River basin. A facilities plan is being prepared

for the New Lenox FPA, but it will concentrate on the New Lenox No. 1 plant, which is tributary to the Hickory Creek basin. The Village of New Lenox recently expanded the Laraway plant to 0.56 mgd and upgraded it to include ammonia/nitrogen removal and tertiary filtration. It is expected that this plant will continue in service at this capacity through the year 2000.

(9) Romeoville FPA: The Village of Romeoville owns and operates the Romeoville No. 1 and Romeoville No. 2 wastewater treatment facilities, which are the only municipal type plants in the FPA. A facilities plan is being prepared for the Romeoville FPA but to date no conclusions have been reached. However, it appears likely that both Romeoville plants will remain in service through the year 2000. The Romeoville No. 2 plant will probably require expansion from the present 1.5 mgd by 1985, and the Romeoville No. 1 plant may require an expansion from the present 2 mgd by 1990. A boundary conflict concerning an overlap between the proposed Romeoville and Bolingbrook FPAs exists. The resolution of this conflict may depend on the results of the Romeoville facilities plan which is expected to be completed in 1979.

(10) Other Treatment Facilities: As noted earlier, there are several privately owned municipal type plants as well as many industrial and miscellaneous type plants. There are also many other sources of point discharges. Information concerning the future status of these discharges is not available at this time. In the absence of such information, it has been assumed that all of these facilities will remain in operation through the year 2000.

(11) MSDGC: In the Cook County portion of the basin, wastewater service is provided by the MSDGC West Southwest wastewater treatment plant. This located plant is in the Chicago Sanitary and Ship Canal basin. Facilities plans for all of the MSDGC have been available for several years, with concerted efforts being made to implement their recommendations. These include sewer estension, plant improvements, solids disposal and in-stream aeration. Also included are recommendations for the elimination of excessive infiltration/inflow in separately sewered communities and the treatment of overflows from combined sewer communities by the Tunnel and Reservoir Plan (TARP). Local municipal/sanitary district efforts to correct excessive I/I have been underway for some time.

(12) Combined Sewer Overflows: Combined sewers are found in the communities of Forest View, Lyons, Lemont, La Grange, Hinsdale, Joliet, and Lockport. It is estimated that about 12.5 square miles, of the lower Des Plaines basin are tributary to combined sewer overflows.

Encrmous increases in flow to the two Joliet wastewater treatment plants occur during rain events, notwithstanding the existence of over 30 overflow points required to relieve surcharging and backups. A thin layer of unconsolidated glacial drift covers the surface in most of the areas, underlain by silurian dolomite which, some locations, is near the surface, and in other places is 10 to 20 feet below. Construction in many places has had to take place in rock trenches, where the rock is not creviced, these trenches become holding basins for surface water as it percolates into the ground. In many instances, these waters enter the sewer system.

Where the glacial drift is thicker, during extremely wet seasons the groundwater levels rise, and the waters enter the sewers through defective joints and pipeline fractures. Under these conditions, sustained filtration is possible for several months.

21.05 NONPOINT SOURCES: EXISTING CONDITIONS

a. Urban Stormwater Systems

Within the Lower Des Plaines River Basin separate storm sewer systems serve all or portions of approximately 14 municipalities and numerous unincorporated areas. It is estimated that approximately 12 square miles, or 4.3 percent of the basin are served by separate storm sewers. These systems follow natural drainage courses and discharge either directly into the Des Plaines River or indirectly via ditches or streams that are tributary to the river.

Combined sewer systems serve all or portions of approximately seven municipalities in the basin. It is estimated that 12.5 square miles, or 4.3 percent of the basin, are served by combined sewer systems. Combined sewers are located in Cook, Du Page and Will counties.

Areas of the basin not served by either separate storm sewers or combined sewer systems comprise 253 square miles, or 91.2 percent of the basin area. Stormwater falling upon these areas enters the lower Des Plaines River via ditches or other small watercourses.

b. Construction Activities

Based on an inventory of nonpoint sources by Du Page and Will counties in 1976, erosion associated with construction activities was occurring - or is expected to occur - in nine areas totalling 2.47 square miles located wholly or partially within the Lower Des Plaines River Basin. One of these areas is located in Will County; the remaining areas are located in Du Page County. While these sites may have water pollution potential, none are presently known to be causing problems. No information is available

on erosion generated by construction activities in the Cook County part of the basin.

c. Agricultural Runoff

During storm events, agricultural pollutants enter the lower Des Plaines River by direct overland flow and through various tributary streams. In 1976, this Commission completed an agricultural survey of fertilizer (nutrients) and pesticide usage, as well as an inventory of livestock. Details of this survey for each county in the six-county planning area are contained in Staff Paper No. 25, "Summary of 1976 Agricultural Inventory."

d. Mining

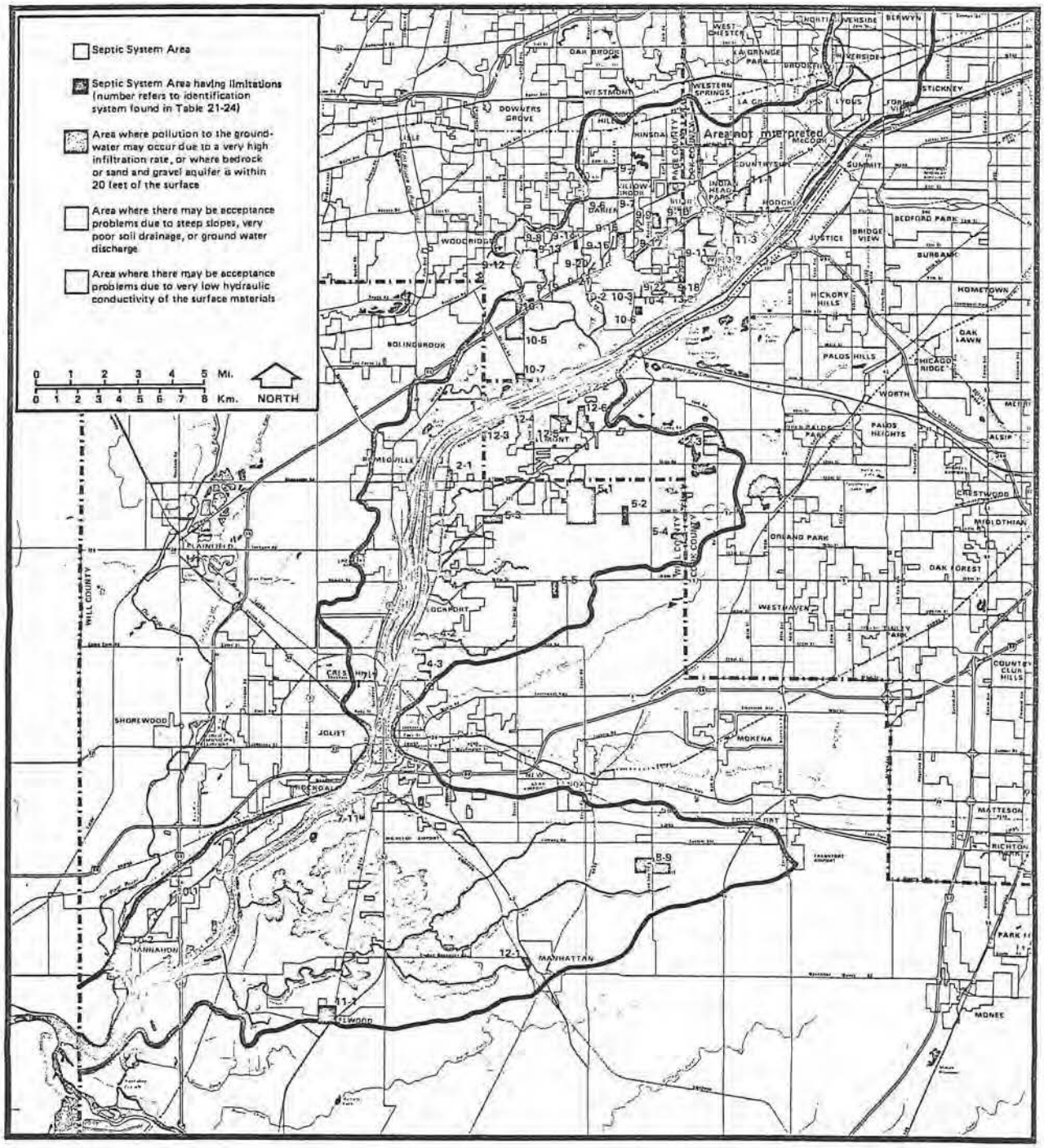
The inventory of nonpoint sources of pollutants by Will County in 1976 indicated that numerous gravel pits and stone quarries totaling 1.19 square miles are found in 26 areas of the Will County portion of the Lower Des Plaines River Basin. Mining in some of these areas is intermittent, depending on market demands. No specific water quality problems have been linked to these activities. However, the potential for pollution has been recognized. According to the Du Page County inventory, there were no mining operations at that time in the Du Page County portion of the basin. No information is available on mining activities in the Cook County part of the basin.

e. Septic Systems

Based on inventories and analyses by Du Page and Will counties in 1976, septic systems are widely used as on-site wastewater treatment systems in the Lower Des Plaines River Basin. At the present time, 8,632 residential septic systems serve an estimated 31,221 people (See Table 21-23). In addition, the basin has 85 non-residential septic systems serving a population equivalent of 1,106. The latter systems serve commercial, recreational, industrial, and institutional establishments. Approximately 16 percent of the septic systems are located in Cook County, 35 percent in Du Page County, and 49 percent in Will County. Septic areas are depicted in Figure 21-6.

There are 50 septic tank disposal areas located entirely within the basin that have been identified as having site limitations. These areas contain 5,390 residential and nonresidential septic systems serving 19,017 people. Information in Table 21-24 lists each area by county, township, and familiar name (if available), along with the number of septic systems and population served. A

Figure 21-6: LOCATION OF SEPTIC AREAS



map identification number, keyed to Figure 21-6, is also provided.

Septic areas located partially within the basin are indicated by an asterisk in the last column of Table 21-24. There are six such areas containing 661 septic systems serving 2,337 people.

The largest septic area with limitations is the community known as Fairmont (Map No. 4-3) located between Lockport and Joliet. This area contains 1,000 residential septic systems serving 3,500 people. Limitations here are due to poor soil and small lots. Recently, some 900 homes were converted from septic to sewer systems.

It should be noted that the figures for the number of residential septic systems and the population served are approximate. They were obtained by counting residences in unsewered areas and multiplying by an average number of residents per dwelling unit. Numbers for nonresidential septic systems are also approximations.

Identification of Cook County septic areas with limitations was based primarily on two sources: information provided by the Cook County Public Health Department and an analysis of soil suitability maps prepared by the Illinois State Geological Survey (ISGS). The ISGS maps identify areas that may have limitations for septic disposal. To accurately assess the suitability of any given site, an on-site investigation is necessary.

f. Surface Waste Disposal Sites

The lower Des Plaines basin contains eight waste disposal sites located in Du Page and Will counties': five active sanitary landfills, one inactive landfill, and two inactive dumps. While these areas have the potential to contribute to surface and subsurface water quality problems,

TABLE 21-23: SUMMARY OF SEPTIC TANK INSTALLATIONS

COUNTY	NUMBER OF SEPTIC SYSTEMS			POPULATION SERVED		
	RESIDENTIAL	NON RESIDENTIAL	TOTAL	RESIDENTIAL	NON RESIDENTIAL (PE)	TOTAL
Cook	1,342	9	1,351	4,807	37	4,844
DuPage	3,056	31	3,087	11,581	304(1)	11,885
Will	4,234	45	4,279	14,833	765	15,598
Total	8,632	85	8,717	31,221	1,106	32,327

(1) Non-residential population served provided only for septic systems with PE of 35 or greater.

TABLE 21-24: SEPTIC SYSTEM AREAS HAVING LIMITATIONS

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Du Page	Downers Grove - N		19	68	9-18
Du Page	Downers Grove - N		145	522	9-19
Du Page	Downers Grove - N		19	68	9-20
Du Page	Downers Grove - N		317	1141	9-21
Du Page	Downers Grove - N		35	39	9-22
Du Page	Downers Grove - S		81	292	10-1*
Du Page	Downers Grove - S		90	324	10-2
Du Page	Downers Grove - S		64	230	10-3
Du Page	Downers Grove - S		113	407	10-4
Du Page	Downers Grove - S		304	1094	10-5
Du Page	Downers Grove - S		91	328	10-6
Du Page	Downers Grove - S		37	133	10-7
Will	Du Page		10	35	2-1
Will	Lockport		65	228	4-1
Will	Lockport	South Lockport	20	70	4-2
Will	Lockport	Fairmont	1000	3500	4-3
Will	Homer		215	752	5-1
Will	Homer		63	221	5-2
Will	Homer		55	193	5-3
Will	Homer		40	140	5-4
Will	Homer	Bristol Heights Subd.	65	228	5-5
Will	Joliet	Joliet	10	35	7-1
Will	Joliet		259	907	7-11
Will	Joliet		57	200	7-12
Will	New Lenox		25	88	8-9
Will	Channahon		120	360	10-1
Will	Channahon	Partly in Village of Channahon	274	959	10-2 *
Will	Jackson	Elwood	237	830	11-1
Will	Manhattan		25	88	12-1
Cook	Proviso-Riverside		34	121	10-1
Cook	Lyons	Countryside	253	900	11-1
Cook	Lyons		290	1039	11-2
Cook	Lyons		38	135	11-3
Cook	Lyons		37	132	11-4
Cook	Lemont		25	87	12-2
Cook	Lemont		18	63	12-3
Cook	Lemont	Lemont	37	122	12-4
Cook	Lemont		90	314	12-5
Cook	Lemont		128	438	12-6
Cook	Palos		55	217	13-1
Cook	Palos		39	175	13-2
Cook	Palos		73	288	13-3 *
Du Page	Downers Grove - N	Partially in Willowbrook	95	342	9-4
Du Page	Downers Grove - N	Partially in Westmont	84	302	9-6 *
Du Page	Downers Grove - N		65	234	9-7
Du Page	Downers Grove - N	Partially in Downers Grove	89	320	9-8 *
Du Page	Downers Grove - N		45	162	9-9
Du Page	Downers Grove - N	Burr Ridge	74	266	9-10
Du Page	Downers Grove - N	Burr Ridge	90	324	9-11
Du Page	Downers Grove - N		60	216	9-12*
Du Page	Downers Grove - N		136	490	9-13
Du Page	Downers Gorve - N	Darien	21	76	9-14
Du Page	Downers Grove - N	Willowbrook	74	266	9-15
Du Page	Downers Grove - N		154	554	9-16
Du Page	Downers Grove - N		73	263	9-17

*Area partially in this basin

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there is no evidence that directly links any water quality problems to these areas. No information is available on the Cook County portion of the basin.

g. Hydrologic Modifications

Hydrologic modifications are activities that disturb the natural flow patterns of either surface or groundwaters. Those affecting surface waters include the construction of dams and impoundments, channelization, dredging, and land reclamation, as well as other routine construction operations in or on the water, such as bridges and utility crossings.

In the Lower Des Plaines Basin, both dredging and channelization are of concern. Channelization of streams or drainage systems is conducted by private individuals, drainage organizations, by the State of Illinois, or by the Corps of Engineers, as necessary. During dredging and channelization and sediment is placed in suspension its effect on water quality and aquatic life can be pronounced.

Several streams in the basin are periodically ditched, straightened, or channelized. The Illinois Department of Conservation has identified six streams which have undergone some modification: the Des Plaines River, Flagg Creek, the Illinois and Michigan Canal, Jackson Creek, Jackson Creek Branch, and Long Run Creek. This type of activity is expected to continue in the future.

As noted previously, the Corps of Engineers maintains a 9-foot deep barge channel which, in this basin, extends from the junction of the Chicago Sanitary and Ship Canal downstream to the Grundy/Will county line. A duplicate set of locks is being studied by the Corps, which will replace the present Lockport and Brandon Road locks and dams. Current and near-future maintenance dredging is proposed by the Corps at the Brandon Road Lock and Dam.

21.06 DISPOSAL OF RESIDUALS

The areawide aspects of residuals waste management were discussed in Chapter Seven. Disposal of residuals in the lower Des Plaines is accomplished as follows: the city of Joliet, the Rexene Polymer Company, Commonwealth Edison (Joliet), and the Caterpillar Tractor Company all use landfills; Lockport, Manhattan, and Romeoville use farmlands; Lockport Heights uses private sources; Hinsdale (Burr Ridge), Marionbrook, and DCDPW Space Valley residents use their communities' wastewater treatment plant residuals as soil conditioners, and Derby Meadows conveys its solids to another municipal plant.

TABLE 21-25: EXISTING LOCAL WATER QUALITY MANAGEMENT AGENCIES AND PROGRAMS

MUNICIPALITIES*			
Bolingbrook (DuPage)	1,2,5 +	Lockport (DuPage)	1,2
Brookfield (Salt Creek)	1,3,5	Lyons (Salt Creek)	1,3,5
Burr Ridge	1	Manhatton (Kankakee)	1,2
Channahon		McCook	1
Clarendon Hills (Salt Creek)	1,5	New Lenox (Hickory Creek)	1,2,4,5
Countryside		Orland Park (Chicago River/Sanitary & Ship Canal, Hickory Creek)	
Crest Hill (DuPage)	1,2	Rockdale	
Darien	1	Romeoville (DuPage)	1,2
Elwood		Stickney (Chicago River/Sanitary & Ship Canal)	1,3
Forest View (Chicago River/Sanitary & Ship Canal)	1,3,5	Summit (Chicago River/Sanitary & Ship Canal)	1,3
Frankfort (Hickory Creek)	1,2,5	Western Springs (Salt Creek)	1,3,5
Hinsdale (Salt Creek)	1,5	Westmont (Salt Creek)	1,5
Hodgkins (Chicago River/Sanitary & Ship Canal)	1	Willowbrook	1
Indian Head Park		Willow Springs (Chicago River/Sanitary & Ship Canal)	1
Joliet (Hickory Creek, DuPage)	;.2.5	Woodridge (DuPage)	1
LaGrange (Salt Creek)	1,3,5		
Lemont (Chicago River/Sanitary & Ship Canal)	1		

SANITARY DISTRICTS	
All listed under Upper Des Plaines River Basin	

COUNTIES	
Cook	4
DuPage	1,2

SOIL AND WATER CONSERVATION DISTRICTS
Kane/DuPage
Will/South Cook

* Additional basins shown in parentheses for those municipalities which cross basin boundaries.

+ Numbers indicate existing water quality related activities as follows:
1. Wastewater collection agency
2. Wastewater treatment agency
3. To be included in MSDGC TARP System
4. Has enacted erosion and sediment control regulations
5. Has enacted stormwater detention regulations or similar regulations of another agency apply

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(It should be noted that this list is based on information gathered from a variety of sources over a period of many months. An attempt has been made to compile the most complete and current information available. However, due to the number and variety of local programs in the region, as well as the constantly evolving nature of these programs, this list may well be incomplete. The 208 staff expects it will be necessary to periodically revise or correct the list; they would appreciate any assistance that local agencies or individuals can provide.)

Further details on sludge generation and disposal are contained in the Commission's 208 Staff Paper No. 30, "Regional Sludge Management Report."

It is difficult to accurately estimate the present annual volume of septic sludge (septage) produced in the basin due to the many variables involved. However, using an average annual volume of 70 gallons of septage per person, it is possible to make a rough approximation. There are 31,221 persons in the basin served by residential septic systems. Thus, 31,221 x 70 gallons equals 2,185,470 or about 2.2 million gallons of residential septage produced each year. This figure would be higher if nonresidential septage were included.

At the present time, except for septage, there are no known problems associated with residuals management in the basin. As sludge volumes increase in the future, because of increased waste loads and higher levels of treatment, the costs of processing, removing and disposing, or utilizing the sludge materials will also increase. Continued urbanization of the six-county region will impact adversely on the availability of potential lands suitable for the disposal or application of sludges.

21.07 EXISTING MANAGEMENT PROGRAMS

The major features of the existing water quality management system in northeastern Illinois within the Lower Des Plaines Basin are presented in Table 21-25. This table includes a list of the public agencies currently involved in water quality related activities. Variations in programs and responsibilities between these agencies are indicated by a numerical code.

21.08 MODELING PROCESSES: FUTURE CONDITIONS

The first major use of the computer model in the process of simulation was to develop a summary of existing water quality in the basin from Reach 170 (Riverside) through Reach 217, the most downstream point of which is located at the confluence of the I and M Canal and the Des Plaines River. The modeled basin area contains about 133 square miles from Reach 170 to Reach 217, or 47.8 percent of the basin's total of 278 square miles. The remainder of the basin was not modeled due to time and budget constraints associated with estimating the hydraulic operating characteristics of the Brandon Road Dam.

For the modeled portion of the basin, the statistics produced showed the waters in the basin to be of poor quality. State standards were being violated in all reaches.

At Reach 217, discharges from wastewater treatment plants account for less than 1 percent of the BOD in the basin stormwater runoff, 2.5 percent; and boundary conditions, 97 percent.

In addition to heavy BOD loads, the basin is stressed by a serious pollutant, ammonia. More than 15,600 tons enter the lower Des Plaines every year.

a. The First Test Plan: Assumptions

Beginning in 1978, the Commission held a series of meetings in the Lower Des Plaines Basin. The purpose was to explain the water quality situation in the basin to residents and local officials and to allow them to participate in the development of the basin's component of the areawide plan.

At the initial meeting, NIPC staff reported on existing water quality conditions, identified sources of pollution, and assisted participants in developing appropriate strategies. In addition to the recommendations developed through this process, the first test plan was shaped by assumptions made to reflect forecasted population increases; land cover changes; improvements in wastewater and stormwater treatment; flood control and channel improvements; changes in agricultural acreages and practices; and changes in the boundary conditions whereby the upper Des Plaines River and Chicago Sanitary and Ship Canal Basin's impacted on the Lower Des Plaines Basin. These assumptions are described below:

(1) Population and Land Use: The Commission's 1976 forecasts for the year 2000 were used to determine future changes in land cover and wastewater loads. These forecasts were applied in each reach. Overall, a 72.4 percent increase in population was forecast.

Present land cover in the basin was determined by satellite photography. This information was divided into the following four categories: (1) lowlands--marshes, swamps, and forested areas lying close to rivers and streams; (2) grasslands--open to the infiltration of rainwater and snowmelt but not tilled regularly, including pastures, parks, golf courses, and upland forest; (3) croplands--regularly tilled for agricultural purposes (there is some exchange between cropland and grassland due to crop rotation); and (4) impervious surfaces--covered with buildings, roads, and parking lots. For the first test plan, estimates of land cover changes by the year 2000 were made using population forecasts and their attendant housing and employment assumptions. Land required for new urbanization in the basin was taken from the grassland and cropland categories first. When this land was largely depleted, land from the lowland category was taken for urban purposes. Table 21-26 shows the results of this process.

(2) Local Facilities Plans: Extensive planning has been completed in recent years for the improvement of public and private wastewater treatment facilities. These plans were included in the forecast of water quality conditions for the year 2000. Where such plans were lacking, information was developed through contracts with consultants or local officials. In the absence of more current data, information appearing in the Commission's Regional Wastewater Plan was used, modified by 201 plan assessments made as part of the 208 study.

In general, it was assumed that all planned improvements in municipal wastewater treatment plants would be in operation and that industrial treatment plants would meet required water quality standards in their effluent discharges. No changes in the capacities of industrial and miscellaneous treatment plants were estimated, given the many imponderables associated with such forecasts for small areas and individual enterprises.

(3) Phosphate Reductions: The City of Chicago and several suburbs have ordinances limiting the phosphate content of home laundry detergents. Because of this, most distributors have withdrawn high phosphate detergents from the entire area. In considering changes in wastewater treatment practices for the year 2000, it was assumed that regulations limiting the amount of phosphate in domestic laundry detergents would be expanded to cover all communities and to include, in part, commercial and industrial uses as well. Based upon studies of the effect of detergent phosphate reductions on wastewater treatment plant operations, it was assumed that phosphate concentrations in plant effluent for the year 2000 would be two-thirds of existing levels.

TABLE 21-26: CHANGES IN LAND COVER, 1976-2000

Category	1976 Land Cover Estimates	Year 2000 Land Cover Forecast	% Change
Lowlands	14.23	14.23	0
Grasslands	68.99	77.20	+11.9
Croplands	26.29	14.65	-44.3
Impervious	15.42	18.85	+22.2
TOTAL	124.93	124.93	0

(4) Combined Sewer Overflows: It was assumed that combined sewer overflows in the Cook County portion of the basin would be eliminated by the year 2000 by diversion to the tunnel and reservoir system now being constructed by the MSDGC. In Du Page and Will counties, combined sewer overflows were assumed to be eliminated or completely controlled.

(5) Urban Stormwater Runoff: The conditions set for year 2000 in simulating future water quality assumed that 25 percent of the materials constituting BOD in urban stormwater runoff would be removed from the existing impervious areas (largely through street sweeping and vacuuming) and prevented from entering the waters of the lower Des Plaines. In newly developing urban areas, it was assumed that 50 percent of the BOD materials would be captured by a variety of techniques, including street vacuuming, stormwater detention basins, planned unit developments, and other measures.

(6) Septic Systems: The impact of septic systems on water quality was also considered in the simulation of conditions in the year 2000. It was assumed that the adverse effects of septic systems on water quality would be eliminated by the year 2000. This would result by the construction of sewers or by eliminating the problems themselves.

(7) Agricultural Pollution: Agricultural "best management practices" (BMPs), recommended by local U.S. Department of Agriculture officials, were included in the calculations of future water quality. In the lower Des Plaines basin, 34,670 acres of land were forecast to be under conservation practices in the year 2000, employing conservation tillage, contouring, terracing, combinations of these, or conversions to grassland.

(8) Animal Populations: The change in animal populations associated with food production was calculated for each township in the region. However, these changes were not included in the first test plan because not enough is known about the impact of animal pasturing and feedlot operations to reflect their influence separately in the water quality model.

(9) Fertilizer Applications: Studies of agricultural fertilizer applications revealed a high degree of efficiency in its use. No changes in rates of application were forecasted in simulations of year 2000 water quality conditions.

b. First Test Plan Simulated Results

Implementation of a water quality program that contained all the features of the first test plan would improve the overall water quality, although it still would be less than ideal in some areas.

Water quality in the basin must be discussed in two parts: the area above the confluence of the Chicago Sanitary and Ship Canal, and the area below it.

Water quality above this confluence is heavily affected by the quality of water flowing from the Upper Des Plaines River Basin, including the Des Plaines watershed in Wisconsin, and the Salt Creek Basin, which is tributary to the Des Plaines at the upper limits of the Lower Des Plaines River Basin. The first test plan simulation assumed that water quality control measures would be implemented in all three of these areas. For the Salt and upper Des Plaines, the NIPC staff assumed that recommended first test plans would be implemented. Therefore, it was assumed that water flowing into the lower Des Plaines from Salt Creek would be of "good" quality (in terms of DO), instead of the existing "poor" quality. Water from the upper Des Plaines would be of "fair" quality, instead of the present "bad" quality.

In addition to these changes, the simulation assumed the implementation of certain water quality control measures to point and nonpoint pollution sources within the Lower Des Plaines Basin. These measures included improved wastewater treatment, correction of combined sewer problems, street sweeping and vacuuming, the separately sewered areas, cropland conservation practices, and elimination of the impact of problem septic systems.

Dissolved oxygen (DO) has been used by the Commission as a summary indicator of water quality. These ratings were based on the following classification schedule for "General Use" stream reaches (ie: Reaches 210 and 213):

Excellent = no dissolved oxygen concentrations below 5 mg/l.

Good = dissolved oxygen remains above 5 mg/l 95 percent of the time or more.

Fair = dissolved oxygen remains above 5 mg/l 85 percent of the time or more.

Poor = dissolved oxygen remains above 5 mg/l 70 percent of the time or more.

Bad = dissolved oxygen remains above 5 mg/l less than 70 percent of the time.

TABLE 21-27: WATER QUALITY EVENTS IN VIOLATION OF DESIRED LEVELS UNDER ALTERNATIVE TEST PLAN CONDITIONS

REACH 210

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan
Temperature °C	32.2	20	10		7	8		1	0	
Dissolved Oxygen as O, mg/l	5.0	307	196		26	10		30	7	
BOD_{20} Carbonaceous as O, mg/l	10	126	81		100	117		48	36	
Ammonia as N, mg/l	1.5	5	0		27	0		1	0	
Nitrate as N, mg/l	10	1	5		220	231		1	4	
Phosphorus Soluble as P, mg/l	.05	1	1		26,300	26,300		100	100	

REACH 213

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan
Temperature °C	32.2	34	16		7	8		1	0	
Dissolved Oxygen as O, mg/l	5.0	225	189		13	7		11	5	
BOD_{20} Carbonaceous as O, mg/l	10	87	82		160	128		53	40	
Ammonia as N, mg/l	1.5	48	0		12	0		2	0	
Nitrate as N, mg/l	10	1	4		250	270		1	4	
Phosphorus Soluble as P, mg/l	.05	2	7		13,200	3,750		100	100	

REACH 217

Pollution Indicator	LEVEL	Number of Violations			Average Duration of Violations (hours)			Percent of Time in Violation		
		Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan	Existing Conditions	1st Test Plan	* 2nd Test Plan
Temperature °C	32.2	1	0		16	0		0	0	
Dissolved Oxygen as O, mg/l	4.0	230	6		42	4		4	0	
BOD_{20} Carbonaceous as O, mg/l	10	93	122		56	19		20	9	
Ammonia as N, mg/l	1.5	7	7		3,730	74		99	2	
Nitrate as N, mg/l	10	0	54		0	115		0	24	
Phosphorus S[illegible]ble as P, mg/l										

*Data are fr[illegible]e first simulation of the 2nd Test Plan

TABLE 21-28: CHANGES IN POLLUTANT LOADS BY SOURCE UNDER ALTERNATIVE TEST PLAN CONDITIONS (all data in tons per year)

REACH 217

Pollutant and Source	Existing Conditions tons/yr.	1st Test Plan		2nd Test Plan	
		tons/yr.	Percent Change from Existing	tons/yr.	Percent Change from Existing
BOD_{20} Carbonaceous as O Boundary Conditions	33,600	25,800	-23		
Combined Sewer Overflows	1,620	0	-100		
Point Sources	738	2,140	+190		
Nonpoint Sources	2,680	2,490	-7		
Total	38,600	30,300	-22		
Ammonia as N Boundary Conditions	14,700	3,200	-78		
Combined Sewer Overflows	121	0	-100		
Point Sources	460	359	-22		
Nonpoint Sources	361	332	-8		
Total	15,600	3,900	-75		
Nitrate as N Boundary Conditions	10,900	31,600	+190		
Combined Sewer Overflows	223	0	-100		
Point Sources	359	2,360	+557		
Nonpoint Sources	650	758	+17		
Total	12,100	34,700	+187		
Phosphorus dissolved as P Boundary Conditions	2,400	1,710	-29		
Combined Sewer Overflows	32.3	0	-100		
Point Sources	157	325	+107		
Nonpoint Sources	77.3	70.9	-8		
Total	2,670	2,110	-21		

If, in any reach, the dissolved oxygen drops to zero, the qualitative state of the reach is lowered by one category. For Reach 217, which has been classified by the state for "secondary contact and indigenous aquatic life," 4 mg/l of DO was used as the discriminatory level.

Table 21-27 summarizes the water quality impacts of the first test plan and compares them to existing conditions. Table 21-28 illustrates the effect the first test plan would have on total pollutant loads from various sources in the basin.

The simulation showed that implementation of all of the above changes would move Reach 210 from a "bad" to a "fair" category and Reach 213 from a "fair" to a "good" category. In both of these lower Des Plaines reaches, not only was there an increase in DO, but there was also a reduction in the mean concentration of pollutants that remove oxygen from water.

The third and final reach in the lower Des Plaines basin, Reach 217, receives approximately 80 percent of its flow from the Chicago Sanitary and Ship Canal. Obviously, then, the quality of the canal water is a dominating factor in water quality of this reach. The first test plan simulation assumed that the Canal Basin first test plan would be implemented. Planned efforts to clean up the canal water are ambitious, requiring the multi-billion dollar construction of a tunnel and reservoir system to collect all combined sewer overflows from the City of Chicago and 49 suburbs.

Other efforts to clean up the canal water include the improvement of effluent quality from MSDGC plants, as called for in existing 201 facilities plans; reduction of thermal discharges from industrial and power plants; and the neutralization of most oxygen demanding sediments.

These and changes within Reach 217 will have a dramatic effect on water quality. DO in this reach will go from bad to good. Ammonia will be reduced by 75 percent, BOD by 22 percent, and phosphorous by 21 percent.

The Lower Des Plaines River now supports only a few fish species, all of which are highly tolerant of pollution. If the first test plan were implemented, dissolved oxygen levels on two of the lower Des Plaines reaches would improve enough to support higher quality fish species, given all other considerations. If none of the first test plan improvements were implemented, the lower Des Plaines River would become more polluted than it is today because of increased urbanization of the basin.

The assessment of the plans tested in each basin is based on the extent to which a given plan reduced the total time that instream water quality standards are violated. In the formulation of strategies in the initial areawide plan, an attempt was made to develop plans that would allow all streams to comply with state standards 95 percent of the

time. Table 21-27 illustrates the effect that the first test plan would have on compliance with standards in Reaches 210, 213, and 217. The right-hand most columns in each table shows the percentage of time that standards for each pollutant indicator would be violated in each reach. The objective was to have all figures in this column below 5 percent. As noted, this was not achieved in all cases.

With respect to DO, the first test plan would produce significant improvements, if implemented. For example, whereas conditions in Reach 210 now violate the state DO standards about 30 percent of the time, the first test plan would reduce the percentage to 7; in Reach 213, the percentages of time in violation would be reduced from 11 to 5. In Reach 217, where the DO standard is 4 mg/l, the percentages of time in violation would be reduced from 4 to zero.

21.09 PROBLEM ASSESSMENT

In Part I of this report, a number of problems were identified and solutions recommended. Those findings are applicable tc all basins. Noted below are certain problems specifically associated with the Lower Des Plaines River Basin.

a. Excessive Infiltration/Inflow

In order to qualify for construction grants related to wastewater system improvements, regulations issued after the enactment of PL 92-500 require applicants to follow certain procedures. Code of Federal Regulations 40 CFR 35.927 requires evidence that the treatment works for which grant assistance is sought will not be subject to excessive infiltration or inflow (I/I). An I/I analysis is required to be performed to demonstrate the existence or nonexistence of excessive infiltration and/or inflow in each sewer system. If excessive flows are found, the next step is a sewer system evaluation survey (SSES). If corrective measures are justified to remedy in whole or in part the identified problems, a sewer rehabilitation project may be authorized as part of the facilities planning project.

In the MSDGC area, the initial I/I study was performed by the District, and excessive flows were found to exist. Because of the large number of individual sewer system evaluation surveys that had to be made of each municipal and separate sanitary district sewer system, the detailed work was to be done by the local governments. Grants for 75 percent of allowable costs of work in the separate sewer areas are available upon the submission and approval of applications.

In the combined sewer areas, the grant procedures are more complicated, because the sewers are considered to serve multi-purposes. In addition to pollution abatement, the sewers provide local stormwater drainage and may have some flood control benefits. According to the USEPA Program Guidance Memo PG-61, dated December 16, 1976, rehabilitation and/or construction grants will be made available only for the pro rata costs allocable to pollution abatement. However, the SSES studies themselves are fundable, as are any concurrent special studies necessary to determine the causes of and solutions to combined sewer overflows and sewer backups.

To date, only about 75 applications for SSES grants have been received from the municipal governments and separate sanitary districts in the MSDGC area. Local units of government which have not already done so should submit applications for grants to undertake sewer system evaluation surveys.

b. DO Deficiency In Reach 210

Under the first test plan, DO would fall below 5 mg/l 196 times in a 3-year period. In each case, the duration would be about 10 hours. This would result in DO being below the desired standard for approximately 7 percent of the time, which is contrary to the 5 percent tolerance established as a 208 plan objective.

c. Unresolved Facility Plans

Failure to complete facility plans in certain areas was documented earlier. Lack of these results has handicapped 208 planning, as certain assumptions had to be substituted which will be subject to revisions after facility plans are completed and accepted. Completion of these studies should be expedited.

d. Resuspension of Bottom Deposits

Bottom sediments in the relatively narrow and shallow barge channel are placed into suspension by the passage of barge traffic and fast moving pleasure craft. There are no known methods to keep this from happening, except to remove the sediment by periodic dredging. Studies should be undertaken to determine the adverse impacts of dredging on water quality and to identify any better measures.

e. Dredge Spoil Disposal Areas

Given the requirements for maintaining the project depth in the federal barge channel, the identification of suitable dredge spoil disposal sites is a continuing problem.

f. Disposal of Industrial Residuals

The USEPA has estimated that in the United States, industrial firms generate some 344 million metric tons of sludges, slurries, and solid wastes per year in 14 major categories, of which 10 to 15 percent can be called hazardous. Given the large number of industries located in this basin, it is axiomatic that the disposal of residuals is a problem, even though evidence of its existence has not surfaced. Attempts by a consultant working for this Commission to identify volumes and disposal practices were unsuccessful, because information was withheld on grounds it was proprietary and privileged, (plus other reasons). This matter will require further study, particularly for this basin, in the continuing planning program.

g. Unmodeled Portions of Basins

As noted by Figure 21-3 and the related text on modeling, the most downstream reach in the basin which was modeled was Reach 217. The reach terminates at Brandon Road Lock and Dam, located near the southern limits of Joliet. As part of the continuing program, the balance of the lower Des Plaines River should be studied, particularly to determine the impact of Hickory Creek and the combined sewer overflows from Joliet which now discharge to the Des Plaines and to Hickory Creek near its mouth (below Reach 217).

h. Interbasin Flow Areas

As noted in Section 21.01b, (1), physical and economic data for about 26.4 square miles of land on the west side of the lower Des Plaines, near Reach 217, were included in this basin report but were modeled in the Du Page River basin. The area in question concerns portions of the I and M Canal and Rock Run riversheds, which technically drain to the Du Page but are often subject to interbasin flows into the Des Plaines. In the continuing planning program, the statistical data on population, employment, land use, and nonpoint cost estimates should be transferred to the Du Page basin.

21.10 BASIN RECOMMENDATIONS

a. Overview

Measures for protecting and improving water quality in the Lower Des Plaines River Basin are derived from the recommendations in Chapters Four through Eight of the areawide plan and from problems identified in the preceding sections of this chapter. Of particular importance are the serious impacts of treatment plant discharges and the wet weather pollution from pervious and impervious surfaces.

The adverse effects of combined sewer overflows in portions of the basin also must be eliminated. The preparation of facilities plans in many FPAs in the basin is necessary to quantify future requirements.

Additional areawide measures, such as reduction of wastewater flows and post-treatment aeration, are recommended for this basin. This aeration should help correct the extremely low DO levels experienced in some reaches.

Recommendations on nonpoint sources are basically the same as the overall program outlined in Chapter Six.

b. Point Sources

(1) Publicly-Owned Wastewater Systems

(a) The villages of Bolingbrook, Channahon, Elwood, Frankfort, Manhattan, New Lenox, and Romeoville, the cities of Joliet and Lockport, the Du Page County Department of Public Works, the Hinsdale Sanitary District, and the Metropolitan Sanitary District of Greater Chicago will implement their respective portions of their 201 plans as they have been or may be approved by the Illinois and/or U.S. Environmental Protection Agencies. A Summary of the current status of these plans appears in Section 21.04(e) and suggested changes thereto or features to be included are noted below. In the absence of completed and/or approved facility plans, certain assumptions had to be made as to the expected locations and/or sizes of treatment plants, their estimated costs and designated management agencies. This information must not be construed as binding in the Areawide Plan until the 201 facility plans have been finalized.

(b) The following listed Cook County communities or sanitary districts having separate sewers should seek federal grants, initiate and/or complete by July 1, 1981, sewer system evaluation studies as required by 40 CFR 35.927:

- Initiate and Complete - Countryside, Orland Park.
- Complete - Hodgkins, McCook, and the LaGrange Highlands and South Lyons sanitary districts.

The following listed communities having combined sewers in all or portions of their corporate limits will complete similar studies by July 1, 1981, plus supplementary studies to optimize local systems in order to take advantage of TARP capacity:

- Initiate and Complete - Forestview, Stickney.
- Complete - Lyons, Lemont, LaGrange, Brookfield, Willow Springs, and Western Springs.

Based on these studies and others for the remainder of the MSDGC area, the MSDGC should analyze the overall impacts on its sewer systems and treatment plants, revising as necessary its 201 facilities plan.

(c) By July 1, 1983, all treatment plants whose 7-day, 10-year low-flow dilution ratio is 10 to 1 or less should provide or continue to provide not less than 80 percent oxygen saturation in their effluents. Monitoring of wastewater quality after aeration should be conducted. However, during the continuing planning program, studies should be undertaken to determine where this requirement may be waived without detriment to in-stream water quality.

(d) Municipal sewer service required to serve future growth within service areas identified for the year 2000 should be provided only by treatment authorities listed above, except where this is impractical or not cost-effective.

(e) Projected 5-year service areas should be identified in the NPDES permit issued by IEPA. No NPDES permit should be issued for municipal type wastewater service within the 5-year service area, other than to the treatment authority, except on a finding by IEPA that the proposed facility is the most cost-effective means of providing service, is an interim facility pending extension of service by the treatment authority, or is intended to serve an isolated location.

(f) Treatment plant operators should assure the very high standard of performance for wastewater treatment plants which the 201 plans assume. The IEPA should monitor treatment plant operation and performance and their effect on in-stream water quality. The IEPA should establish a technical assistance program to aid treatment plant operators and laboratory technicians in dealing with technical problems and assuring a consistently high level of performance in treatment operations.

(g) The Hinsdale Sanitary District, having received an exemption from the preparation of facility plans under the provisions of 40 CFR 35.917 (c), should submit an application for a federal grant covering the preparation of a formal facility plan as described by 40 CFR 35.900: This proposed study should include an analysis of combined sewer overflows.

(h) Bolingbrook, having had a Needs Analysis study prepared for it by this Commission through financial support of the IEPA, should submit an application for a federal grant to prepare a formal facility plan (as described in 40 CFR 35.900) within 6 months after it has been notified of its eligibility. Such a facility plan should complement, revise, or expand, but not duplicate the information developed in the Needs Analysis report.

(i) Facility plans covering the control of combined sewer overflows in their areas of responsibility should be completed by Joliet and Lockport by July 1, 1979.

(j) All municipalities in the basin and the counties of Cook, Du Page and Will should continue to reduce the consumption of potable waters to conserve water resources and reduce wastewater flows to treatment plants. This should be accomplished through the modification of building codes by requiring water conserving plumbing fixtures, metering all new developments, pricing policies, and public education.

(2) Private Utilities

(a) NPDES permits issued by IEPA to private utility companies should identify projected 5-year service areas. No other NPDES permits should be issued for municipal type wastewater service within those 5-year service areas to other treatment authorities, except upon a finding by the IEPA that the proposed facility is the most cost-effective means of providing service; or is an interim facility pending extension of service by another established treatment authority; or is intended to serve an isolated location.

(b) The Chickasaw Hills, Citizens-Santa Fe, and Derby Meadows Utility companies, not being located in any FPA, should continue in operation, but their service areas should be extended and their capacities increased only in cases where service cannot be provided by an existing municipal type wastewater treatment authority.

(3) Industrial Wastewater Treatment Plants

(a) The IEPA should continue to enforce all requirements of NPDES permits for all industries in the basin and assure that treatment plants achieve and maintain required standards of plant performance. This can be achieved through IEPA standards for treatment plant personnel and through frequent sampling and analysis of treatment plant effluents by the IEPA for the purpose of monitoring compliance with NPDES permits.

(4) Miscellaneous Wastewater Treatment Plants

(a) Miscellaneous publicly and privately owned wastewater treatment plants should continue in operation until such time as wastewater service can be provided by publicly owned municipal type wastewater systems on a cost-effective basis. Service areas of privately owned treatment systems should not be expanded or their treatment capacities increased when service can be provided on a cost-effective basis by publicly owned municipal type wastewater systems.

(b) The IEPA should continue to enforce all requirements of NPDES permits and assure that treatment plant operators achieve required standards of plant performance.

(5) Combined Sewer Overflows

(a) The MSDGC should control combined sewer overflows in the 4-square-mile combined sewer area in this basin as provided by its Tunnel and Reservoir Plan. The implementation of TARP is critical to water quality throughout the combined sewer area and in downstream rivers and canals.

c. Nonpoint Sources

(1) Urban Stormwater Runoff

(a) By July 1, 1983, all municipalities and counties should implement measures to work toward a reduction of BOD in urban stormwater runoffs from separately sewered areas. Reductions of 25 percent of 1976 surface loadings on impervious surfaces are recommended as a target. From areas to be urbanized in the future, target reductions of 50 percent of 1976 surface loadings are recommended.

(b) In attempting to meet the above targets, the implementing agencies should work through the countywide water quality committees to develop plans and standards for the implementation of appropriate measures such as catch basin cleaning, performance zoning, street cleaning, use of pervious pavement surfaces, increased vegetation cover, grass waterways, wetland storage of stormwater, stormwater detention, sedimentation and erosion controls, and other measures to achieve the desired pollutant reductions.

(c) Township and state highway organizations, the Illinois State Toll Highway Authority, and facility engineering departments at state and federal installation should participate in the programs described above by implementing accelerate and/or improved street sweeping programs for streets, roads and highways that are hydraulically connected to perennial streams or permanent lakes via stormwater conveyance systems.

(d) During the period up to July 1, 1983 agencies should utilize voluntary exploratory programs, implementing techniques to control pollutant from urban nonpoint sources.

(e) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should adopt and enforce adequate stormwater detention ordinances. These ordinance should include provisions which clearly establish long-

term responsibilities for maintenance of detention facilities. All such local ordinances also should be consistent with minimal areawide standards set forth in the model ordinance.

(f) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should develop and enforce adequate erosion and sedimentation control ordinances. All such local ordinances should be consistent with minimal areawide standards set forth in the model ordinance.

(g) Within one year following the preparation by NIPC of a model ordinance, Cook, Du Page and Will counties and all municipalities in the basin should adopt measures to control surface runoff from open storage yards containing industrial stockpiles and other materials which may go into solution or which may be carried away by stormwater runoffs and pollute streams and other water bodies.

(h) Municipalities, townships, counties, and state and county highway departments responsible for de-icing streets and highways should develop programs to control the application of de-icing materials, to train personnel in proper application methods, and to use proper equipment to minimize any negative water quality impacts. The impact of de-icing agents on water quality will be given further study by NIPC in the continuing planning program.

(2) Agricultural Runoff

(a) By July 1, 1980, the Will-South County and the Kane-DuPage County Soil and Water Conservation Districts, in conjunction with agencies of the United States and Illinois Departments of Agriculture and the countywide water quality committees, should identify the best management practices necessary to implement the agricultural aspects of the 208 plan, including conservation tillage, contour plowing, terracing, and conversion of cropland to grassland.

(b) By July 1, 1981, agricultural lands on which BMP's should be applied should be identified by appropriate soil and water conservation districts. Agencies of the U.S. Department of Agriculture and countywide water quality committees should be consulted.

(c) By July 1, 1985, a comprehensive conservation plan should be prepared for each farm in the basin which has soil ercsion losses in excess of standards set by the Illinois Department of Agriculture and soil and water conservation districts under House Bill 818.

(d) Using available cost sharing and technical assistance programs, the soil and water conservation districts should ensure implementation of the BMP program according to the following schedule on approximately 34,670 acres of agricultural lands:

By 1985 - 30% of the identified land.

By 1995 - 70% of the identified land.

By 2000 - 100% of the identified land.

(e) The IEPA, NIPC, and local governments should provide the results of their instream water quality monitoring to the soil and water conservation districts and to the Departments of Agriculture so that priority can be given to the areas most sensitive from a water quality standpoint in order to maximize the impact of the best management practices.

(f) The IEPA should enforce the IPCB regulations which require permits for feedlots and should use the IEPA draft technical policy WPC-2 "Design Criteria for Field Application of Livestock Wastes" as a guide.

(g) Illinois Department of Agriculture, Illinois Department of Public Health, and USEPA regulations on the use of pesticides and disposal of containers, and Illinois Department of Agriculture regulations on the training and licensing of pesticide applicators and operators should be continued.

(h) Farmers should implement good pasture management practices, utilize grass waterways, vegetative filter strips, and field borders, and make wise use of fertilizers wherever possible in accordance with the Illinois Agronomy Handbook to reduce the dangers of pollution. The U.S. Department of Agriculture agencies should assist farmers in recognizing the water quality problems posed by improper practices, and assist them in the use of proper practices.

(3) On-Site Disposal Systems

(a) Individual malfunctioning on-site disposal systems outside of the 5-year service areas should be repaired wherever possible upon complaint to the appropriate authorities or be replaced with a new system if necessary.

(b) By July 1, 1983, special service areas should be established under the sponsorship of municipal governments (for sites located within corporate limits) and by the counties (in unincorporated areas) where necessary to facilitate the financing of any innovative-type systems or other on-site improvements

necessary to correct or replace malfunctioning systems in areas outside the 5-year projected service areas.

(c) The minimum requirements of the Illinois Private Sewage Disposal Code should be upgraded to require more innovative site analysis techniques, and Cook, Du Page and Will county health departments should require a construction permit to regulate the design, location, and installation of every new on-site system in incorporated as well as unincorporated areas.

(d) Local officials should inspect all septic systems known to be failing, threatening public health or causing nuisance conditions. The inspection should result in the issuance of a repair permit for corrective measures which are to be undertaken and paid for by the septic system owner.

(e) Septic systems also should be inspected by local officials prior to the transfer of ownership of properties where such systems are installed. The results of the inspections should be made known to the lending institutions which are furnishing the mortgages.

(4) Air Pollution

(a) As part of the continuing planning program, the IEPA, in cooperation with the Illinois Institute for Natural Resources, the Illinois State Water Survey, and local air quality management agencies, should analyze the relationship between air pollution and water quality in all of its aspects. The IEPA should cooperate with NIPC in devising strategies for correcting present negative effects and preventing future problems through the 208 continuing planning program.

(5) Sanitary Landfills

(a) The IEPA should ensure that every sanitary landfill complies with all regulations of the IPCB for its siting, design, construction, and operation. As a substitute for existing state regulations, the IEPA and IPCB should consider certification of local solid waste disposal programs which comply with areawide plans to be prepared under the Federal Resource Conservation and Recovery Act. Alternatives to land disposal of solid wastes, including recycling, should be considered and utilized wherever feasible.

(6) Waterways

(a) Du Page and Will counties are encouraged to develop an organization similar to the Cook County Clean Stream Committee, consisting of volunteers and organizational representatives who maintain surveillance over water bodies for activities adverse to water quality, flood control, recreation, fish, wildlife, and/or navigation.

(b) NIPC, in conjunction with the county water quality committees in the continuing planning program, should develop recommendations to simplify the highly fragmented system for channel maintenance and improvement in the lower Des Plaines River and its tributaries. Present responsibility for such maintenance functions as debris removal, streambank stabilization, public access, dredging, disposal of dredge spoil, protection and augmentation of habitat, tree shading, and vegetation is shared between a host of federal, state, and local authorities.

(c) Given the existence of a federal navigation project to maintain minimum channel depths in the lower Des Plaines River, local authorities should cooperate with the U.S. Army Corps of Engineers in identifying and making available suitable dredge spoil disposal areas.

(d) The resuspension of bottom deposits in the barge channel by passing barge and boat traffic should be studied in a joint effort with the Corps of Engineers to determine its impact on water quality and to develop feasible prevention measures.

(e) In-stream water quality data collected by local treatment plant operators should be periodically published by the IEPA.

d. Residuals

(1) As regulated by the IEPA, present methods for the disposal of sludge from treatment plants are adequate to handle present and anticipated future volumes and should continue to be administered by the IEPA.

(2) Highest priority should be given to the use of sludge as a soil conditioner, and efforts to use sludge for that purpose should be expanded. The IEPA should assure proper practices in the utilization of sludge on agricultural lands through implementation of the draft standards in IEPA Technical Policy WPC-3, "Design Criteria for Municipal Sludge Utilization on Agricultural Land."

(3) The USEPA standards and the IPCB regulations for permits for the disposal of hazardous or toxic substances should continue to be enforced by the IEPA.

e. Groundwater

(1) By July 1, 1980, the Illinois State Water Survey and the Illinois State Geological Survey should undertake a coordinated well sampling program to monitor groundwater quality in areas where a potential for infiltration by pollutants exists.

f. Inland Lakes

(1) By July 1, 1979, and in accordance with Section 314 of PL 92-500, the IEPA should undertake an expanded lake sampling program to identify eutrophic conditions and, in conjunction with NIPC and the countywide water quality committees, develop plans to control sources of pollution and to restore water quality.

g. Mining

(1) The present IPCB regulations for the control of pollution from aggregate producing activities are considered generally satisfactory. However, the IEPA should continue to study the types and volumes of pollutants associated with these activities and their potential effects on surface and groundwater quality. Any needed changes in present regulations should be identified by July 1, 1980.

21.11 COSTS OF RECOMMENDED PLAN

a. Facility Plans

(1) General: Table 21-29 shows capacities in the year 2000 for surviving publicly owned wastewater treatment plants, their effluent standards and construction costs. Local collector sewer projects are shown, if they have been processed for federal or state grants. Also shown are total MSDGC costs allocated to this basin.

Cost data were assembled from various sources as noted below and in the tables that follow.

Except for the MSDGC area, the initial costs of facility plans listed in Table 21-29 refer to the first phase of any project which is to be followed at some future date by programmed expansions or extensions. Under this definition, the total cost of works currently under construction fall under the classification "initial" even

TABLE 21-29: RECOMMENDED PLANS, PUBLICLY OWNED TREATMENT SYSTEMS

MAP CODE	FACILITY NAME	DESIGN CAPACITIES (MGD)		EFFLUENT STANDARDS (Year 2000) (mg/l)				CAPITAL COSTS (million $)			COMMENTS
		1975	2000	BOD_5	TSS	P	NH_3N	INITIAL	FUTURE	TOTAL	
W3	Bonnie Brae (1) Forest Manor S.D.	0.25	0.60	4	5		(2) 1.5	(1) 0.4	-	0.4	(1) Facilities Plan not available.
D17	DPCDPW Marionbrook	4.50	4.50	10	12		(2) 1.5	(3) 1.6	(4) 0.8	2.4	Information estimated by NIPC.
D19	DPCDPW Space Valley	0.014	0				-	SEE D17			(2) In-stream, after mixing.
W16	Elwood	0	0.4	10	12		(2) 1.5	(3) 1.3	-	1.3	(3) Work underway.
D26	Hinsdale S.D. Burr Ridge (1)	12.0	12.0	5	6		(2) 1.5	(5) 23.6	-	23.6	(4) Marionbrook to Woodridge inter-
W19	(1) Joliet-East	22.5	22.5	20	25		(2) 1.5	(6) 42.9	-	42.9	ceptor.
W20	(1) Joliet-West	10.0	10	20	25		(2) 1.5	SEE W19			(5) Treatment plant work ($18.5 mil-
W21	(1) Lockport	2.0	2.37	10	12		(2) 1.5	(1) 3.2	-	3.2	lion); completed interceptor
W22	(1) Lockport Hts. S.D.	0.11	0.37	10	12		(2) 1.5	(1) 0.2	-	0.2	work ($5.1 million) underway.
W23	Manhattan	0.2	0.4	4	5		(2) 1.5	(1) 0.8	-	0.8	(6) From NIPC estimates and Joliet
W28	New Lenox #2 Laraway Road (1)	0.2	0	10	12		(2) 1.5	(7) -	-	-	Infiltration/Inflow Analysis.
W36	(1) Romeoville #1	2.0	3.75	10	12		(2) 1.5	(1) 4.0	-	4.0	(7) Project completed.
W37	(1) Romeoville #2	1.5	2.25	20	25		(2) 1.5	(1) 1.4	-	1.4	
	MSDGC							55.8		55.8	
	Local Facilities Related to MSDGC							15.2		15.2	

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TABLE 21-30: SUMMARY OF FUTURE COSTS (All data in 1977 dollars in millions)

Jurisdiction	Capital Costs						Annual Operations & Maintenance Expense				
	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	Total	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)
Bonnie Brae-Forest Manor	0.40					0.40	0.01	0.03	0.05	0.06	0.08
DPCDPW Marionbrook	1.60	0.80				2.40	0.02	0.06	0.09	0.13	0.15
Elwood	1.30					1.30	0.01	0.03	0.05	0.07	0.08
Hinsdale S.D.-Burr Ridge	23.60					23.60	0.03	0.07	0.11	0.16	0.19
Joliet	42.90					42.90	0.05	0.14	0.22	0.31	0.38
Lockport	3.20					3.20	0.02	0.05	0.08	0.11	0.13
Lockport Heights S.D.	0.20					0.20	0.006	0.02	0.03	0.04	0.05
Manhattan	0.80					0.80	0.005	0.01	0.02	0.03	0.03
Romeoville	5.40					5.40	0.03	0.07	0.11	0.16	0.19
Channahon	2.10					2.10	0.01	0.03	0.04	0.06	0.08
MSDGC	55.40	0.40				55.80	0.13	0.48	0.51	0.51	0.51
Local Improvements Related to MSDGC	13.20	2.00				15.20					
Agricultural BMP's							0.05	0.12	0.17	0.25	0.30
Urban Stormwater Management Expense							0.42	0.50	0.59	0.67	0.73
Total	150.10	3.20				153.30	0.79	1.61	2.07	2.56	2.90

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though the project has not yet been completed. Except for the MSDGC area, future costs in Table 21-29 cover phased work scheduled at later dates.

(2) MSDGC Area: Special procedures were followed for MSDGC costs because of their magnitude and complexity. Total costs of MSDGC improvements and related locally funded improvements were taken from Table U7-IX-1 and from page 229 in the MSDGC's 1977 Facilities Plan Update Supplement, dated March 1978. They were revised and brought up to date in a conference with MSDGC staff representatives.

The cost of all MSDGC improvements was assumed to be spread throughout the MSDGC service area on an ad valorem basis. Thus, each basin's share of the cost was assumed to be proportional to the share of total District assessed valuation in that basin.

For locally funded improvements, the estimates for local sewer upgrading are 1977 values from page 229 of the MSDGC 1977 Plan Update Supplement, updated as noted above. For other local improvements, the estimates in pages XI-18 and XI-19 of the MSDGC Overview report are as of January 1, 1975, also updated as noted above. Where applicable, costs were also updated at 6 percent compounded for the intervening period to January 1977 levels.

The costs of local improvements were allocated differently, depending upon the particular type of project. Local sewer upgradings required as supplements to the TARP apply only to the 49 communities in the TARP area. A basin's share of the total cost of these upgradings was assumed to be equal to the percentage share of the total TARP area's assessed valuation in TARP communities in that basin.

For local sewer improvements outside the TARP area, the costs were allocated to non-TARP communities in each basin in accordance with their share of the total assessed valuation for all non-TARP areas.

(3) Summary of Future Costs: Table 21-30 distributes capital costs within 5-year time frames. Annual operating and maintenance costs are also shown, which are based on data included in current reports, where available, or from data furnished by operating agencies. In their absence, these costs were estimated based on information in Staff Paper No. 20, "Wastewater Treatment Processes and Cost Estimating Data."

(4) Annualized Local: Table 21-31 shows annualized local costs.

(5) Increased Costs: Tables 21-32, 21-33, and 21-34 show the estimated annual increases in wastewater charges per household for the basin as a whole; for DuPage county residents in the basin; and for Will County residents in of

TABLE 21-31: PROJECTED ANNUALIZED LOCAL COSTS (All data in 1977 dollars in millions)

Jurisdiction	CAPITAL COSTS			LOCAL CAPITAL PLUS O & M ANNUALIZED Costs (Mil./yr.)*					Comments
	Cost Total Through Yr. 2000	Est. Fed'l. Share	Est. Local Share	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	
Bonnie Brae-Forest Manor	0.40	0.30	0.10	0.02	0.04	0.06	0.07	0.08	
DPCDPW Marionbrook	2.40	1.80	0.60	0.06	0.12	0.15	0.19	0.17	
Elwood	1.30	0.98	0.32	0.04	0.06	0.08	0.10	0.08	
Hinsdale S.D.-Burr Ridge	23.60	17.70	5.90	0.59	0.63	0.67	0.72	0.19	
Joliet	42.90	32.18	10.72	1.06	1.15	1.23	1.32	0.38	
Lockport	3.20	2.40	0.80	0.10	0.13	0.16	0.19	0.13	
Lockport Heights S.D.	0.20	0.15	0.05	0.01	0.02	0.03	0.04	0.05	
Manhattan	0.80	0.60	0.20	0.02	0.03	0.04	0.05	0.03	
Romeoville	5.40	4.05	1.35	0.16	0.20	0.24	0.29	0.19	
Channahon	2.10	1.58	0.52	0.06	0.08	0.09	0.11	0.08	
MSDGC	55.80	41.85	13.95	1.44	1.80	1.83	1.83	0.52	
Local Improvements Related to MSDGC	15.20	11.40	3.80	0.31	0.36	0.36	0.36	0.05	
Agricultural BMP's				0.05	0.12	0.17	0.25	0.30	
Urban Stormwater Management Expense				0.42	0.50	0.59	0.67	0.73	
Total	153.30	114.99	38.31	4.34	5.24	5.70	6.19	2.98	

*Local Capital Amortized @ 7% for 20 yrs.

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TABLE 21-32: PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST

BASIN TOTAL

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	1436.8	1606.7	1766.3	1986.3	2161.1	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.247	.226	.205	.183	.004	
O & M Related	.055	.100	.118	.129	.134	
Total Rate:	.302	.326	.323	.312	.138	
Additional Cost per Home of $45,000 FMV ($/yr.)	45.30	48.90	48.45	46.80	20.70	
Existing Av. Annual WW Cost ($/Household yr.)	90.49					
Total Av. Annual WW Cost ($ / Household yr.)	135.79	139.39	138.94	137.29	111.19	
Percent Av. Increase* in WW Costs per Household (%)	50.1	54.0	53.5	51.7	22.9	

*Total Rate Used

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TABLE 21-33: PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST DuPAGE COUNTY

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	327.1	365.9	402.2	452.3	492.1	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.184	.169	.154	.129	.004	
O & M Related	.047	.075	.118	.119	.117	
Total Rate:	.231	.244	.272	.248	.121	
Additional Cost per Home of $45,000 FMV ($/yr.)	34.65	36.60	40.80	37.20	18.15	
Existing Av. Annual WW Cost ($/Household yr.)	90.49					
Total Av. Annual WW Cost ($ / Household yr.)	125.14	127.09	131.29	127.69	108.64	
Percent Av. Increase* in WW Costs per Household (%)	38.3	40.4	45.1	41.1	20.1	

*Total Rate Used

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TABLE 21-34: PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST WILL COUNTY

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	664.8	743.2	817.1	918.9	999.8	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.200	.180	.163	.145		
O & M Related	.054	.089	.116	.137	.150	
Total Rate:	.254	.269	.279	.282	.150	
Additional Cost per Home of $45,000 FMV ($/yr.)	38.10	40.35	41.85	42.30	22.50	
Existing Av. Annual WW Cost ($/Household yr.)	96.39					
Total Av. Annual WW Cost ($ / Household yr.)	134.49	136.74	138.25	138.69	118.89	
Percent Av. Increase* in WW Costs per Household (%)	39.5	41.9	43.4	43.9	23.3	

*Total Rate Used

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the basin, respectively, for the previously described improvements and/or expansions.

b. Urban Stormwater

Methods for controlling pollution in urban stormwater runoff include street sweeping, catch basin cleaning, performance zoning, use of porous pavements, increased vegetation, grass waterways, wetland storage of stormwater, stormwater detention, and erosion and sediment controls. The goals of a 25 percent decrease in BOD loads on existing (1976) separately sewered impervious areas and a 50 percent decrease in BOD loads on impervious areas built between 1976 and 2000 are to be achieved by combinations of the above practices. The cost of the mix of specific practices which would meet these goals is dependent upon the practices selected and the intensity of their individual use.

An estimate of the total cost based solely on street cleaning (utilizing vacuum sweepers) is $12,547,000 through the year 2000, increasing from $343,000/year in 1978 to $748,000/year in the final year. The frequency of cleaning streets with vacuum sweepers averaged about once every 12.3 days in 1976 and once every 6.8 days during the year 2000, excluding the three winter months of December, January, and February.

The above costs did not include street cleaning in combined sewer areas where the stormwater runoffs would be treated. Naturally, some street cleaning activities would be required in those areas for sanitary and aesthetic reasons. Costs for that cleaning are not included in the above figures.

c. Agricultural Runoff

Agricultural croplands presently amount to 63,520 acres in the basin and are projected to decrease to 53,340 acres by the year 2000. In order to reduce agricultural pollution from croplands, best management practices are targeted for implementation by the year 2000 on 34,670 acres at a total cost over the years of $5,525,000.

Although a comprehensive farm plan would include a wide range of BMPs, the following four practices, plus several combinations, have been recommended for implementation: conservation tillage, contouring, terracing, and cropland conversion to pastureland. These BMPs were selected because of their direct effects on water quality as well as their ability to reduce soil erosion. Many other practices which would be contained in a farm plan, but which were not considered by the Commission, are either too localized or difficult to evaluate for their effects on water quality.

Of the above total costs, $2,614,000 represent initial installation (or capital) expenditures for which grants may be available from the federal government. The cost-sharing ratios will probably be on the order of 50 percent. The balance of $2,911,000 represents operating and maintenance costs.

For estimating purposes, it was assumed that 30 percent of the EMPs will be installed by 1985, 70 percent by 1995, and 100 percent by the year 2000.

21.12 WATER QUALITY CONDITIONS IN 1983

a. Introduction

Public Law 92-500 includes the statement "Wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water be achieved by July 1, 1983." The water quality standards of the Illinois Pollution Control Board for General Use streams, such as the Lower Des Plaines above Lockport, were adopted to "protect the State's waters for aquatic life,...primary and secondary contact use,...". The Lower Des Plaines downstream from its confluence with the Chicago Sanitary and Ship Canal is designated for Secondary Contact and Indigenous Aquatic Life instead of for General Use. Less stringent standards apply. This Commission is using the Illinois standards, as modified by this plan, to judge compliance with the 1983 national goal. This chapter assesses the feasibility of compliance with the dissolved oxygen and ammonia standards in 1983 in the Lower Des Plaines.

b. Assumptions of Changes in the Basin

(1) Land Cover: Land cover estimates for the years 1976, 1983, and 2000 are summarized in Table 21-35. It should be noted that impervious area is forecast to increase by less than 10 percent from 1976 to 1983. Also forecast is some conversion of cropland to urban land. The cropland areas listed under "conservation" indicate those lands where additional soil conservation practices are expected to be implemented.

(2) Urban Runoff Control: Management measures are to be implemented with the objective of reducing runoff-related pollutants from existing urbanized areas by 25 percent of BOD loadings found to be present in 1976. The loadings from areas urbanized after that year are to be reduced by 50 percent of 1976 loads. This will result in an overall 26 percent reduction in urban runoff BOD loads by 1983.

TABLE 21-35: LAND COVER, CHANGES

Cover Type	Area in Square Miles		
	1976	1983	2000
Lowland	14.2	14.2	14.2
Cropland	26.3	22.7	14.6
Conservation	(0)	(1.87)	(10.4)
Grassland	69.0	71.5	77.2
Impervious	15.4	16.5	18.8

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(3) Point Sources: Effluent characteristics of point sources are given for 1976 and 1983 in Table 21-36. 2380

TABLE 21-36: POINT SOURCES IN THE LOWER DES PLAINES BASIN

Plant Name	Reach	Effluent Characteristics					
		Flow, cfs		BOD_5 (mg/l)		Ammonia (mg/l)	
		1976	1983	1976	1983	1976	1983
Derby Meadows	217	0.122	0.122	1.5	1.5	0.46	0.46
Marionbrook	210	4.75	5.08	3	4	5.67	1.5
Space Valley	210	0.029	*	17		0.75	
Hinsdale	210	7.34	9.11	2.5	5	0.06	1.5
Lockport	217	2.42	2.42	9	10	0.46	5
Lockport Heights	217	0.98	1.17	1.5	10	0.46	5
Romeoville No.1	213	1.37	1.51	2.5	4	0.08	0.08
Romeoville No.2	213	1.45	1.59	9	10	6.01	6.01
Amoco Chemicals	210	0.046	0.046	2	2	0.1	0.1
International Harv.	210	0.006	0.006	2	2	0.1	0.1
Pleasantdale School	210	0.009	0.009	3.5	3.5	0.08	0.08
Wescom, Inc.	210	0.037	0.037	2	2	0.1	0.1
Argonne Lab No.1	210	0.166	0.166	2	2	0.1	0.1
Argonne Lab No.2	210	1.70	1.70	1.5	1.5	0.46	0.46
Curran Chemical	210	0.347	0.347	3.5	3.5	0.08	0.08
Material Service No.1	213	0.155	0.155	2	2	0.1	0.1
Material Service No.2	213	0.09	0.09	2	2	0.1	0.1
Lewis University	213	0.26	0.26	1.5	1.5	0.46	0.46
North American Can	217	0.355	0.355	2	2	0.1	0.1
GAF, Cooling	217	0.433	0.433	2	2	0.1	0.1
GAF, Process	217	1.008	1.008	1.5	1.5	0.46	0.46
Texaco	217	0.464	0.464	17	17	0.75	0.75
Stauffer Chemical	217	0.111	0.111	2	2	0.1	0.1

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* flow diverted to another plant

TABLE 21-37: WATER QUALITY RATINGS IN 1983

ach 210, Des River at Lemont			
Loads & Ratings	1976	1983	2000
BOD, tons/year	6550	6280	7760
Ammonia, tons/yr.	1140	870	800
Dissolved Oxygen	Bad	Fair	Fair
Ammonia	Good	Good	Exc.

Reach 213, Des Plaines River above Sanitary Canal			
Loads & Ratings	1976	1983	2000
BOD, tons/year	7300	6420	7960
Ammonia, tons/yr	1350	893	819
Dissolved Oxygen	Fair	Good	Good
Ammonia	Good	Good+	Exc.

Reach 217, Des Plaines River at Brandon Dam			
Loads & Ratings	1976	1983	2000
BOD, tons/year	38600	33900	30300
Ammonia, tons/yr.	15600	4250	3900
Dissolved Oxygen	Bad	Good	Good
Ammonia	Bad+	Good	Good

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c. Expected Water Quality in 1983

The water quality model was used indirectly to estimate 1983 water quality conditions. Results of 1976 and year 2000 served as the basis for estimating 1983 values. In the process, pollution loads to the river were calculated for each of those three years. These loads are reported in Table 21-37 for three reaches, along with the water quality ratings for dissolved oxygen and ammonia associated with the loads. The ratings for 1976 and 2000 are from previous water quality modeling results. The 1983 ratings are informed judgments.

The goal (expressed in terms of achievement of water quality standards) is considered to be met satisfactorily when a rating of "good" or "excellent" is achieved. Assignment of these adjective ratings was based on meeting and ammonia standards in accordance with the same schedule described in Section 21.08b above.

The General Use standards apply to Reaches 210 and 213 but not to Reach 217, a Secondary Contact location. However, the General Use levels are applied to Reach 217 in this section to simplify comparison and because even the higher General Use standards will be met in that reach in 1983.

The standards for dissolved oxygen and ammonia appear to be met or not met in 1983 as noted in Table 21-38.

Both dissolved oxygen and ammonia are expected to meet 1983 goals in all three reaches of the Lower Des Plaines except for dissolved oxygen in the uppermost reach, 210. The "fair" condition in 1983 in Reach 210 represents a substantial improvement from the "bad" rating of existing conditions. Conditions at this reach are dominated by flows from the Upper Des Plaines basin. Recovery from a "bad" condition several reaches upstream at Reach 210 is well underway at Reach 210, with the river being assigned a "good" rating by Reach 213.

TABLE 21-38: AMMONIA AND DISSOLVED OXYGEN RATINGS IN 1983

Stream	Reach	Dissolved Oxygen	Ammonia
Des Plaines River	210	Fair	Good+
Des Plaines River	213	Good	Good+
Des Plaines River	217	Good	Good

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d. Evaluation

On the basis of this evaluation it appears that the 1983 goals will be met below Reach 210 and will be approached in that uppermost reach.

CHAPTER 22

Lake Michigan South

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CHAPTER TWENTY TWO
LAKE MICHIGAN BASIN-SOUTH

22.01 DESCRIPTION OF THE BASIN

a. Physical Characteristics

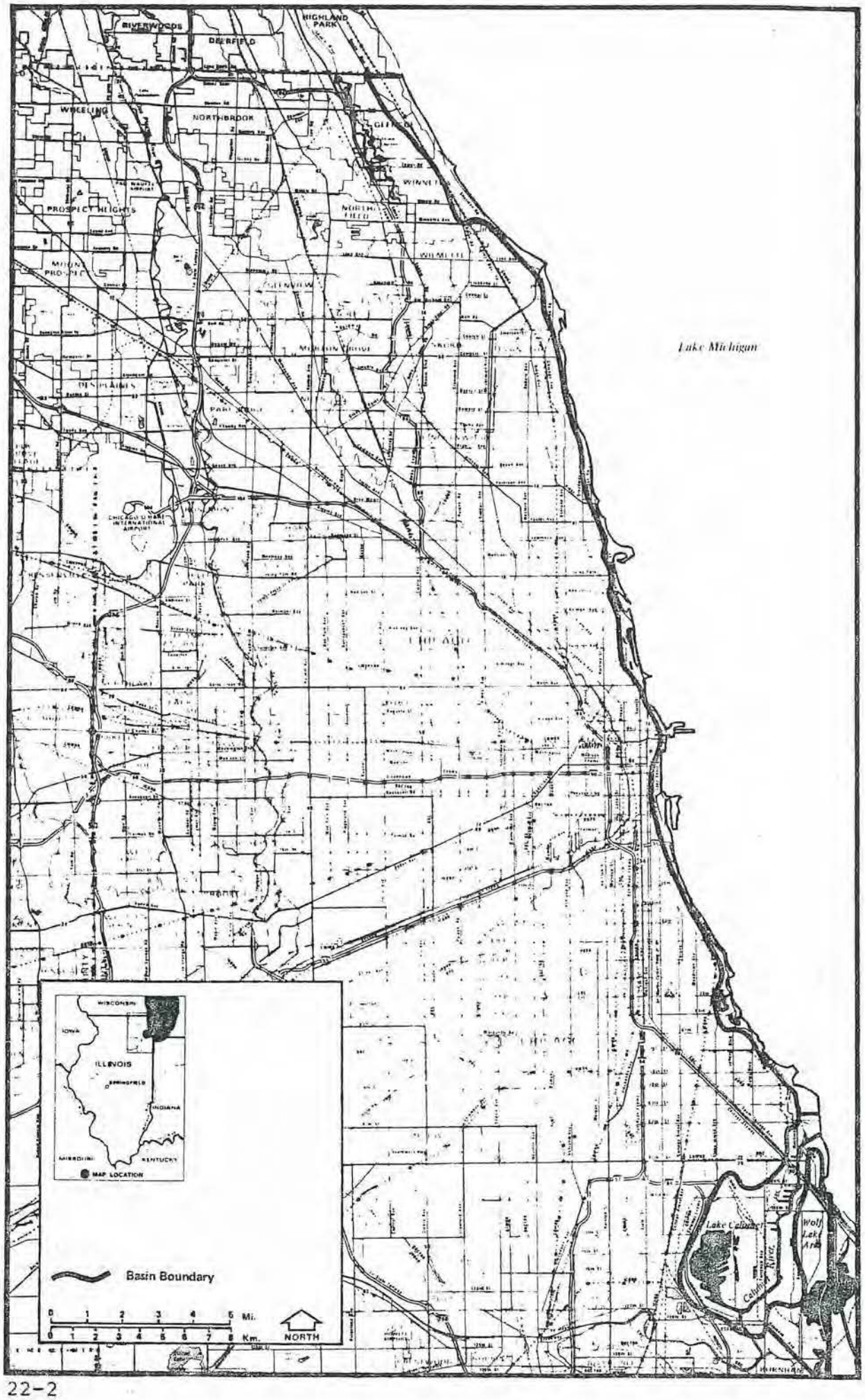
(1) Geography: For purposes of this plan, the Lake Michigan Basin-South drainage area is located entirely within Cook County. It includes about 34 miles of Lake Michigan shoreline, extending from the Lake-Cook County line on the north, to the Illinois-Indiana State line on the south. Approximately 1,575 square miles of Lake Michigan proper fall within Illinois' borders, offshore of Cook and Lake counties. The basin also includes Lake Calumet and the Calumet River downstream to the O'Brien Lock. The basin extends inland about three-quarters of a mile at its northern limits. At its southern limits, from the mouth of the Calumet River downstream to the O'Brien Lock, the distance is about 6.9 miles. The western boundary of the basin was determined by topography in areas having separate sewers. In combined sewered areas, the boundaries were identified by the division of flow between the combined systems (which flow inland) and the presence (if any) of local storm sewers which drain to the Lake or its tributaries. (See Fig. 22-1).

It should be noted that the exact drainage area of the Lake Michigan Basin-South is very difficult to define because of the extensive drainage alterations, flow reversals, and water level manipulations that have occurred. The presence of combined sewers has further complicated the picture. This is especially true in the Lake Calumet-Calumet River area, where hydrologic modifications have been particularly severe.

Wolf Lake is included in this basin report since it is hydrologically connected to the Calumet River. Its drainage area in Illinois contains about 4.12 square miles. That Lake straddles the State line and has about an equal drainage area in Indiana.

(2) Water Bodies: Lake Michigan, the second largest of the Great Lakes and the dominant body of water in northeastern Illinois, is a unique water body with several complex features. The lake bed is divided into two parts by an underwater ridge running from northern Wisconsin to central Michigan. The southern part of the Lake is shallower and warmer than the northern part. Shoreline configuration, underwater topography and geology affect littoral drift, turbulence and the disposition of suspended solids and benthic deposits. The areas of the lake bed most susceptible to damage as a result of man's activities generally are near harbors and marinas.

Figure 22-1 : BASIN LOCATION



There are two "zones" in the Lake, a nearshore zone and an offshore zone that begins about five to ten miles offshore. The two zones are the result of differences in water temperature and density. There is little mixing of nearshore and offshore waters, so that pollutants discharged into nearshore waters tend to remain close to shore. Winds and bottom topography also restrict the offshore movement of surface waters and inhibit the spread of nearshore pollution.

Annual and seasonal variations in Lake water levels depend primarily on changes in precipitation and evaporation. Seasonal water levels generally are highest in mid-summer and lowest in mid - and late-winter. Rapid, short-term variations in Lake levels are caused by changes in atmospheric pressure and wind velocity. Long-term variations are affected by cumulative departures from normal annual precipitation.

Originally, the Chicago River drained into Lake Michigan. Polluted waters entering the Lake were the cause of serious epidemics and became the underlying reason for the creation of the Metropolitan Sanitary District of Greater Chicago. The District was charged with the reversal of flow in the River westward to the Mississippi by the construction of the Sanitary and Ship Canal at the turn of the century. A lock was constructed at the mouth of the Chicago River to control this flow.

Another connection to the Lake is the North Shore Channel at Wilmette. This man-made channel, completed in 1910, also connects with the North Branch, Chicago River, and thence with the Sanitary and Ship Canal.

In times of heavy rainfall, storm drainage to the Chicago River system, together with the discharge of combined sewer overflows, create sewer backups and dangerously high water levels in the waterways. To provide relief, the locks at Wilmette and on the Chicago River often must be opened, temporarily permitting polluted waters to enter the Lake.

Under natural conditions, the Little Calumet and Grand Calumet Rivers joined to form the Calumet River, which, in turn, flowed into Lake Michigan. In 1922, the Calumet-Sag Channel was constructed which permitted the westward reversal of flow in part of the Calumet River and the Grand and Little Calumet Rivers. The present control structure, the O'Brien Lock, is located on the Calumet River, about seven miles from its mouth. The present drainage basin of the Calumet River is hydraulically-connected to Lake Michigan and includes Lake Calumet, an essentially man-made facility which can accomodate deep draft Great Lakes shipping. A shallow draft (9 foot) channel is maintained from Lake Calumet southward, which permits barge traffic to pass through the O'Brien Lock and proceed westward to the Mississippi River via the Little Calumet River, the Cal-Sag Channel, the Sanitary and Ship Canal, the Des Plaines River and the Illinois River.

It should be noted that waters lakeward of the O'Brien Lock in the Calumet River are coastal waters, with water levels of Lake Calumet and the Calumet River being controlled by the level of Lake Michigan. The O'Brien Locks are operated so as to generally maintain a head of minus 1.8' on the downstream side. With some 9000 lockages per year, a modest amount of water from the Lake Michigan basin is passed through the Locks, thus maintaining a slight downstream current. Occasionally, the locks are opened to divert supplemental water for the Cal-Sag Channel. Reversal of flow into Lake Michigan is possible, but has not taken place since the Cal-Sag Channel was widened and deepened in the early 1960's.

There are a number of harbors and lagoons directly connected to the Lake. As noted, Lake Calumet is connected to Lake Michigan via the Calumet River. The Wolf Lake area has been severely modified by grading for railroad and highway right-of-ways and has no significant outlet. Powder Horn Lake is located about one mile south of Wolf Lake and it also has become isolated, principally by railroad embankments. Table 22-1 contains pertinent statistics on these three lakes.

TABLE 22-1: LAKE AND POND INVENTORY

Lake Michigan Basin - South and Wolf Lake Area

NAME	LOCATION			SURFACE AREA (ACRES)	SHORE-LINE (MILES)	MAXIMUM DEPTH (FT)	WATER-SHED (ACRES)	DATE CON-STRUCTED	OWNER-SHIP	ACCESSIBILITY
	TWP N	RNGE E	SECT							
Lake Calumet	37	14	(1)	1600	7.2	10		NA		Closed to public
Wolf Lake	37	15	29	419	13.5	21		NA		Open to public
Powder Horn Lake	36	15	5	34.5	1.1	13		1958		Open to public
(1) Sections 13, 14, 22, 23, 24, 25, 26, 27										

(3) Geology: Four major types of geologic materials are found in the basin. From the Lake-Cook county line southward to the North Shore Channel, the predominant material is till. This is a durable material and forms the low lakefront bluffs along this stretch of shoreline. It is relatively impermeable, a characteristic which protects the groundwater table from surficial pollutants. However, this same impermeability increases the runoff direct to Lake Michigan, or via the tributary ravines. Hence, pollutants on the surface may readily find their way to Lake Michigan.

Old glacial lakebed or lakeshore deposits are common throughout the remainder of the basin, consisting of finer-grained clay and coarser-grained sand. The finer grained clays lack vertical drainage and can result in pollution from surface runoff. The coarser sand deposits readily allow water to percolate downward.

Man-made fill is prevalent along the Chicago lakefront and in the Lake Calumet area. The construction of jettys, groins, docks and promontories into the Lake proper has caused natural deposition of sand present in the littoral drift on the north sides, while eroding away the materials on the south sides of these protrusions. The eroded areas

are often later reclaimed and extended by landfills. Materials in these fills are both natual and man-made. Their hydrologic and water quality impact is determined by the type of materials present, and must be studied at each individual site.

The fourth major geologic material is the modern beach deposits along the Lake Michigan shoreline and in adjacent areas. These sands are extremely permeable. Their presence is not likely to result in water quality problems, except insofar as their being put into suspension by storms, resulting in temporarily turbid waters.

(4) Fish Species and Habitat There was no fish sampling conducted in the Lake Michigan South-Basin as part of the 208 program, except for the five stations in the Calumet River and Calumet Harbor. However, extensive sampling has been conducted over the years by the Illinois Natural History Survey and other agencies, and a good data base is available. Current knowledge of present fish populations in the Lake is based largely on the works of about 10 individuals where studies extended over the years 1970-1974.

Records indicate that 58 species are present in the Illinois portion of the Lake and its tributaries. These include non-native salmon species which have been introduced in recent years, and now provide excellent sportfishing opportunites, enhancing the recreational potential of the Lake.

As part of the 208 project, the Natural History Survey performed a number of "toxicity index" calculations relating existing water quality conditions to fish habitat suitability. Included in the parameters for computing the toxicity index are cadmium, nickel, arsenic, silver, chromium, boron, mercury, cyanide, ammonia, and copper, among others. On the basis of its analysis, the Natural History Survey determined that the toxicity index was well below the maximum level above which a diverse fishery cannot be maintained. In other words, existing water quality conditions in the Lake and tributary streams do not adversely impact upon fish and aquatic life. Indeed, the Lake is favorable for the support of a diverse fishery.

Many fish native to the Lake have been either extirpated or their numbers vastly depleted due to poor fisheries management and other factors, such as the introduction of sea lampreys and alewives from the Atlantic Ocean, and imbalances in the food chain caused by the loss of predatory fish. Excessive PCB levels are a lingering problem affecting several game fish species, such as lake trout and other members of the salmonid family. This problem is addressed in greater detail subsequently in this chapter.

b. Socio-Economic Characteristics

(1) Population: The basin includes portions of six municipalities including Glencoe, Winnetka, Kenilworth, Evanston, Wilmette, and Chicago. In the City of Chicago, the basin includes some of the high rise buildings along the shore, which makes population estimates difficult. Table 22-2 contains historical information on population for the communities in the basin. However, it should be noted that all these communities extend into one or more other basins. Lake Michigan Basin-South itself had a population of about 106,300 in 1975. It is expected to decrease to about 104,400 by the year 2000, a change of 1.8%.

(2) Land Use: As shown in Table 22-3, a significant portion of the basin (27.6%) is in the category of open space and vacant. This category includes the parks and beaches along the lakefront as well as vacant areas in the vicinity of Lake Calumet. The remaining, urbanized portion of the basin includes heavy industrial development near Lake Calumet and the Calumet River, parts of downtown Chicago, single-family residential areas and high-rise residential areas. Land use is not expected to change significantly in the future except in the Lake Calumet area, where industrial development is forecasted on now vacant land.

(3) Economy: Total employment in the basin was estimated at 92,536 in 1970 This is shown in Table 22-4 and is broken down into manufacturing, local retail, and "other" categories. Forecasts to the year 2000 are also shown, with significant increases being visualized, particularly for manufacturing.

(4) Water Supply: Lake Michigan is now, and will continue to be the major source of water supply for northeastern Illinois. About five million people in Chicago and 89 other communities in northeastern Illinois use lake water.

(5) Government: Included in the basin are parts of six municipalities, seven townships, one sanitary district, and two other special purpose districts with water quality responsibilites.

(6) Recreation: Lake Michigan and its shoreline offer recreational opportunites of local, regional and national importance. Numerous parks and beaches are located along the lakeshore, available for swimming, picnicking, and other recreational pursuits. Extensive public ownership along the lakefront in the City of Chicago allows for convenient and ready access by a large number of urban dwellers.

TABLE 22-2: POPULATION CHANGE 1950-1975

Area	Population				% Change 1950-75
	1950	1960	1970	1975 (est.)	
Glencoe	6,980	10,472	10,675	10,571	51.4
Winnetka	12,105	13,368	13,998	14,216	17.4
Kenilworth	2,789	2,959	2,980	2,990	7.2
Evanston	73,641	79,283	79,808	77,975	5.9
Wilmette	18,162	28,268	32,134	32,567	79.3
Chicago	3,620,962	3,550,404	3,369,359	3,199,678	-11.6

NOTE : All communities are located in more than one basin.

TABLE 22-3: LAND USE (Square Miles)

	1970	2000	% Change 1970-2000
Urbanized	19.16	20.69	8.0
Open Space and Vacant	7.31	5.78	-20.9
Total	26.47	26.47	

TABLE 22-4: EMPLOYMENT FORECAST

CATEGORY	1970	1980	1985	1990	1995	2000	1970-2000 % Increase
Manufacturing	37314	41595	45682	49769	54653	59537	59.6
Local Retail	5129	5479	5842	6204	6586	6968	35.8
Other	50093	53356	55642	57929	59831	61733	23.2
Total	92536	100430	107166	113902	121070	128238	38.6

Chicago has six small boat harbors which can moor about 2,689 boats. Yacht clubs with boat launching ramps are available at Jackson Harbor, Burnham Harbor and Diversey Harbor. Launching ramps are also available at Calumet Park, 79th Street, and Wilson Avenue. The north shore communities of Evanston and Winnetka have launching ramps, and Wilmette has harbor mooring facilities as well.

Recreational boating is a major activity with local harbor facilities unable to handle the demand. The Lake Michigan Regional Boating Survey, completed by the Corps of Engineers in 1974, indicated an existing excess demand for about 1745 permanent storage facilities along the Illinois portion of the Lake shoreline, and 33 launching ramps at that time. By 1980, the deficiencies were predicted to be 2245 berths or moorings and 53 launching ramps. The major part of these deficiencies were allocated to facilities located in Lake Michigan Basin-South.

22.02 IMPACTS OF OTHER PROJECTS

a. Introduction

In many basins there are studies or projects underway which may directly or indirectly affect water quality. Most will have indirect effects since they usually pertain to water quantity or hydrologic modifications. Included among these are the navigation and shore erosion control projects of the U.S. Army Corps of Engineers, and the flood control activities of the U.S. Soil Conservation Service (SCS), the Corps of Engineers, and the Illinois Division of Water Resources. Of direct impact are the soil conservation programs of the SCS.

In addition, there are many local, state and federal public works projects other than those related to water quality per se which impact on water bodies. Perhaps the most significant involve the construction or improvement of roads and highways. In those instances, drainage patterns may be altered, silt may be introduced during construction, and vehicular pollutants may be conveyed to rivers and streams thereafter, all affecting water quality. Waterway crossings by highway projects and similar crossings by various public and private utilities all affect water quality to varying degrees and for various lengths of time. Not to be overlooked are storm sewer outlets which may be authorized in the future.

As can be seen, there is a wide variety of projects which have impact on water quality. However, in this section, attention will be given only to those of significant size or breadth of impact.

b. Corps of Engineers

The U.S. Army Corps of Engineers has a variety of responsibilities relating primarily to navigation and flood control, as well as activities related to shore erosion, diversion of Lake Michigan waters, and water quality.

(1) Navigation: The Corps has general jurisdiction over navigation in the waters of the United States. Responsibilities include channel and harbor construction and maintenance, clearing and snagging of navigable waters, and control over the location and placement of structures which might impact on navigability.

Through authorization granted by various River and Harbor Acts, the Corps has constructed navigation projects in the vicinity of Navy Pier, the Calumet River and Lake Calumet. Periodic dredging is required to maintain navigability, with the next maintenance dredging scheduled for 1980, to include both the Calumet River and Calumet Harbor.

Public Law 91-611 authorized the Corps to construct dredge spoil confinement structures, with a capacity for a 10-year period of dredging. Due to USEPA determination that the bottom sediments from the Chicago River and Harbor as well as Calumet River and Harbor were polluted, few sites studied have met all necessary criteria. Currently, polluted spoil is disposed of at a site at 122nd Street and Stoney Island Avenue, which has about 200,00 cu. yds of capacity remaining. The Corps has also proposed a new disposal site (2,000,000 cu. yd. capacity) to be located south of Calumet Harbor. However, the Illinois EPA has not yet concurred in the use of this site.

(2) Shore Erosion: The Corps also is involved in a continuing survey of shore erosion problems and control measures. The study area includes the entire Illinois shore, extending from the Wisconsin line south to the Indiana line. The original project was authorized in 1953 and included a series of groins, and other shoreline protective measures, some of which have been installed at periodic intervals on a cost-sharing basis with municipal governments where public property was to be protected. Current House resolutions call for review and updating of earlier findings. In this regard, efforts have been coordinated with the Illinois Coastal Zone Management Program. If that program is ever fully implemented, the Corps may undertake site-specific projects such as construction of protective works in critical areas and beach nourishment.

(3) Wastewater Studies: Pursuant to Section 2012 of the Flood Control Act of 1958 and resolutions adopted by Congress in 1971, the Corps developed plans for alternative wastewater management systems for the Chicago-South End of Lake Michigan (C-SELM) area, which covered portions of northeastern Illinois and northwestern Indiana. Specifically, the study was directed at the evaluation of various regional wastewater management systems, including plans which would result in the elimination of pollutant discharges. An initial pilot study was completed in 1974. However, since this was only a planning study, the report contained no recommendations for federal action with respect to any of the specific wastewater management systems evaluated. The intent of Congress was for these studies to be presented to local units of government for their consideration and adoption, as desired.

(4) Lake Diversion Study: Section 1612 of the Water Resources Development Act of 1976 authorized the Corps to evaluate the practicability of increasing the Illinois diversion of Lake Michigan waters in order to alleviate shoreline damage on the Great Lakes during periods of high water levels, and to improve water quality in the Illinois Waterway. The project consists of a 5-year demonstration

program which would increase average annual diversion from 3,200 cfs to as much as 10,000 cfs. Resultant adverse and/or beneficial impacts are to be evaluated.

The diversion rate may only be increased when: 1) the level of Lake Michigan is above its average levels; 2) when the Illinois Waterway is at less than bankfull capacity; and 3) when no adverse navigation effects would impact upon the St. Lawrence Seaway.

Current efforts are directed at the collection of data to serve for comparison purposes, and the initiation of an environmental impact assessment. Under the authorizing legislation, a report is to be submitted to Congress in October 1981 with the results of the demonstration study, including recommendations as to whether to continue the authority or to change the criteria. As now envisioned, actual increased diversion would not begin until July of 1980, and then only if the conditions set forth in the Act exist at the time.

(5) Dredge and Fill Permits: Under Section 404 of Public Law 92-500, the Corps is authorized to issue permits for the placement of dredged or fill material into navigable waters or on adjacent land sites. Permits may be withheld if it is determined that the discharge of materials will have adverse effects on water supplies, fish and wildlife, or recreation. Under current guidelines, Corps authority extends to all navigable waters and tributaries thereto, up to points where the average annual flow is 5 cfs or more.

(6) TARP Study: Under the provisions of the Water Resources Development Act of 1976, the Corps was authorized to prepare a Phase I General Design in the so-called "TARP II" phase of the MSDGC's Tunnel and Reservoir Plan. According to the Corps' August, 1979 draft Plan of Study for the Phase I General Design Memorandum investigation, its main objective "will be to determine if a more cost effective and socially and environmentally acceptable alternative to, or modification of, Phase II TARP can be formulated."

c. Illinois Division of Water Resources

The Division of Water Resources, a unit of the Illinois Department of Transportation, is involved in programs directly pertaining to water and related land resources management in the basin.

(1) Coastal Zone Management: In 1972, Congress passed the Coastal Zone Management Act (PL 92-583) which established a national policy to preserve, protect, develop, restore, and enhance coastal zone resources (incuding the coastal zone of the Great Lakes). Program requirements include: identification of the boundaries of the coastal zone; definition of what constitutes permissible land and water uses within the coastal zone that have direct and

significant impacts on the coastal waters; an inventory and designation of areas of particular concern; an identification of the means by which the state proposes to exert control over these lands and waters; broad guidelines on the priority of uses in particular areas; and a description of the organizational structure proposed to implement the program.

In Illinois, a recommended CZM program was developed by the Division of Water Resources. Major water quality related features of the program included greater control of the water quality impacts of construction activities in the shoreline area, and attention to shore and bluff erosion. However, in November, 1978, the General Assembly failed to pass the necessary enabling legislation which would have allowed these and other elements of the program to be implemented. As a result, federal support for the program is uncertain, and will be dependent upon the passage of the necessary legislation or other steps to satisfy federal requirements in future years.

(2) Lake Water Allocation: The Division also has been assigned responsibility for allocating Lake Michigan water to Illinois users for water supply and other purposes within the 3,200 cfs diversion limitation established by the U.S. Supreme Court. Following extensive hearings, an initial allocation was made to various units of government through the year 1980. The allocation order sets forth the amount of water which can be used by each unit and the purposes for which it may be used. The order also establishes rules and regulations relative to the management of water use. All communities in the basin are affected by the initial allocation order, and will continue to be affected by subsequent orders.

(3) Lake Water Diversion Accounting Procedures: The Division and other state agencies currently are attempting to secure a revision in the method by which the amount of water diverted from Lake Michigan is measured and accounted for. Under this proposed revision, direct diversion would be measured at the lakefront intake structures instead of at Lockport, where measurements are now made. In addition, the stormwater runoff component of diversion would be assumed a constant, 550 cfs long-term average. (Currently, this amount is computed at approximately 730 cfs.) The rationale for assigning the lower 550 cfs figure is predicated on the fact that the stormwater runoff component of the diversion varies from year to year, with the long-term average being 550 cfs. Due to certain wet years, the natural diversion has been established at 730 cfs, a maximum, five-year moving average. Since the Supreme Court decree specified a five year moving average of 3200 cfs total water use, it is necessary that 730 be reserved each year for natural diversion in order to meet the limitations. The use of the 550 cfs long-term average as a fixed value will also facilitate accounting procedures.

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ordinances. All of these have the potential for favorably impacting on water quality. Still other effects result from more routine activities such as street sweeping, sewer and catch basin cleaning, and solid waste management. Of paramount impact on water quality are building permits which involve stormwater drainage systems and discharges.

Two specific plans involving the City of Chicago are the Lakefront Plan and the Lakefront Interceptor Project.

(1) Chicago Lakefront Plan: In 1972, the Lakefront Plan was developed by the City of Chicago, and in 1973, fourteen policies were adopted by the City Council to reinforce the concepts presented in the Plan. Later in 1973, an ordinance was adopted entitled "Lake Michigan and Chicago Lakefront Protection Ordinance" to coordinate and regulate development within one and one-half blocks shoreward of the public/private interface.

The Lakefront Plan proposed that the City undertake a feasibility study aimed at the expansion of the lakefront. The Plan suggested that some 2,400 acres of land be added to the shoreline in the form of land extensions and islands and the creation of approximately 6,000 acres of sheltered water area.

(2) Lakefront Interceptor: The Lakefront Interceptor Project is a joint study by the city which involves the interception and diversion of stormwater runoff from drainage areas tributary to Lake Michigan in Cook County. Proposed facilities include collection sewers, rock tunnels, mined storage reservoirs, and connections to the Tunnel and Reservoir Plan (TARP) system. As of May 1978, the project cost was estimated at $130 million. However, feasibility of implementation is in doubt, due to the non-availability of federal funds for stormwater control projects.

h. International Agreement

A new Great Lakes Water Quality Agreement was signed by the United States and Canada in 1978, replacing an earlier (1972) contractual document. The current Agreement contains a number of "objectives" to be pursued which in effect also represent water quality policies and standards designed to improve water quality in the six Great Lakes. A list of toxic substances which are to be controlled is also part of the agreement.

i. International Joint Commission

This body, made up of representatives of the Canadian and United States governments, was constituted to resolve matters involving the boundary waters of the Great Lakes Basin. Questions pertaining to lake levels, navigation, diversion into and out of the Great Lakes, water quality and other related matters are studied by appropriate technical committees. Findings approved by the Commission then become the subject of international agreements between the two countries.

22.03 WATER QUALITY IN THE BASIN

a. Stream Classifications and Applicable State Standards

According to Chapter 3 of the Illinois Pollution Control Board Regulations "Water Pollution," the waterways in the basin have several water use designations. The Calumet River and Lake Calumet are designated "Secondary Contact and Indigenous Aquatic Life." Wolf Lake is designated for General Use and also for Public and Food Processing Water Supply. Lake Michigan is designated "General Use." However, the State has set more stringent standards for Lake Michigan waters for certain parameters, as listed in Table 22-5.

In-stream water quality standards for Secondary Contact waters are less stringent than those applicable to General Use waters. Of particular importance in this study are the differences in dissolved oxygen (DO) and ammonia (NH3) standards. DO in General Use waters must not be less than 6 mg/l during at least 16 hours of any 24-hour period, and not be below 5 mg/l at any time. In Secondary Contact waters, the DO shall not be less than 4 mg/l at any time. In General Use waters, the maximum ammonia content is 1.5 mg/l; in Secondary Contact waters, the maximum content is 2.5 mg/l in the summer months is (April through October) and 4.0 mg/l for the balance of the year.

In addition to the different standards for various parameters, specific standards for Lake Michigan water temperature also have been established. Table 22-5 compares selected Lake Michigan standards with those applicable to "General Use" and "Secondary Contact" waters.

As discussed in Chapter Four of this Plan, the IEPA has divided the state into hydrologic units that coincide with major river basins. These units have been further divided into segments on the basis of common characteristics. Lake Michigan Basin-South has five segments: A-02, -03, -04, -05 and -12. Wolf Lake involves segment A-16. These six segments are parts of the Des Plaines/Lake Michigan hydrologic unit as defined by the IEPA. These segments, like all others in the state, have been designated "water quality limited". This designation means that water quality does not currently meet applicable standards and/or is not expected to meet those standards even after the minimum statutory limitations here been applied to effluents discharged to the water body.

b. Sources of Water Quality Information

Because this Commission's areawide waste treatment study was limited in both time and financial resources, it was not possible to conduct a full scale research program sophisticated enough to adequately account for all the complexities of pollution in Lake Michigan. With the knowledge that water quality problems in the Lake were being addressed by a variety of other agencies, this Commission's efforts during the initial 208 planning program were limited in scope. The Commission's principal efforts regarding Lake

TABLE 22-5: IN-STREAM WATER QUALITY STANDARDS, SELECTED PARAMETERS (In mg/l unless otherwise indicated)

	Lake Michigan	General	Public & Food Processing, Water Supply(1)	Secondary Contact Indigenous Aquatic Life
BIOLOGICAL				
Fecal Coliform (2)	20(3)	200(3)	200(3)	1000(3)
CHEMICAL				
Ammonia Nitrogen (as N)	0.02	1.5	1.5	2.5/4.0(4)
Arsenic	1.0	1.0	0.1(5)	0.25
Chloride	12.0	500	250	-
Dissolved Oxygen	(6)	6/5(7)	6/5(7)	4.0(8)
Iron (Total)	0.1	0.1	0.3(9)	0.1
Phenols	0.1	0.1	0.001	0.3
Phosphorus (as P)	0.007	0.05(10)(11)	0.05(10)(11)	1.0
Sulfates	24	500	250	-
PHYSICAL				
Total Dissolved Solids	180	1000	500	3500

(1) At point where water is withdrawn for treatment
(2) Count per 100 ml
(3) Based on a minimun of 5 samples taken within 30 days
(4) 2.5 mg/l: April-October; 4.0 mg/l: November-March
(5) IPCB Order 76-1 proposes 0.05 mg/l
(6) Not less than 90% of saturation
(7) Not less than 6.0 mg/l during at least 16 hours of any 24 hour period, nor less than 5.0 mg/l at any time
(8) Except for North Shore Channel, where it shall be 5.0 mg/l during any 24 hour period and not less than 4 mg/l at any time
(9) IPCB Order 76-1 proposes 1.0 mg/l
(10) In any reservoir or lake, or in any stream where it enters a lake or stream
(11) IPCB Order 76-1 proposes these standards to be applicable after December 31, 1978, where lake or reservoir exceeds 20 acres in surface area

water quality involved the sampling and analysis of water flowing into the Lake via streams and ravines.

Assessment of current water quality conditions in Lake Michigan and its tributaries is based on information from agencies at several levels. No water quality model simulation results are available because the basin is one of three in the region for which water quality modeling was not conducted as part of 208 planning. Lake Michigan is so vast and its hydrology so complicated that no meaningful results could be anticipated from modeling within the time and financial resources available.

In general, assessment of water quality in the basin has been based on information from these sources:

(1) Commission Sampling and Analyses Programs: Sampling and analyses programs conducted by the Commission as part of 208 planning included 48 in-stream sampling stations, two of which were located in Lake Michigan Basin-South. Their locations were:

Station 35: Calumet River, Ewing Avenue, Chicago

Station 36: Calumet River, 130th Street, Chicago

No stations for land use sampling were located in the basin. However, results of the ravine sampling in the Lake Michigan Basin-North are considered reasonable for quantifying pollution loads from similar areas in the Lake Michigan Basin-South.

(2) IEPA Data: Data cited in this report are from the IEPA sampling of chemical and physical parameters in 1976. Samples were collected at 199 stations in the basin. Two stations were in streams, 14 were off beaches, and three were at public water supply intakes. Station locations are shown in Figure 22-2 and described in Table 22-6.

(3) Other Studies. Two organizations, the Illinois Coastal Zone Management Program (ICZM) and the Great Lakes Basin Commission, have issued recent reports on various aspects of Lake Michigan and its shoreline. Both have emphasized the water quality impacts of shoreline erosion. Their findings have been used as a basis for assessing erosion problems in the basin and have been considered in the analyses of other subjects of concern, including toxic substances.

Additional aspects of Lake Michigan water quality are being examined in federally sponsored programs, including a recently concluded two-year study of the Lake's water quality by USEPA. The study is part of a U.S.-Canadian research effort sponsored by the International Joint Commission.

Another series of studies by the International Joint Commission was conducted under a program carrying the acronym "PLUARG", (Pollution from Land Use Activities Reference Group). These studies covered a variety of subjects, with the study sites located in various basins of

Figure 22-2 : WATER SAMPLING STATIONS

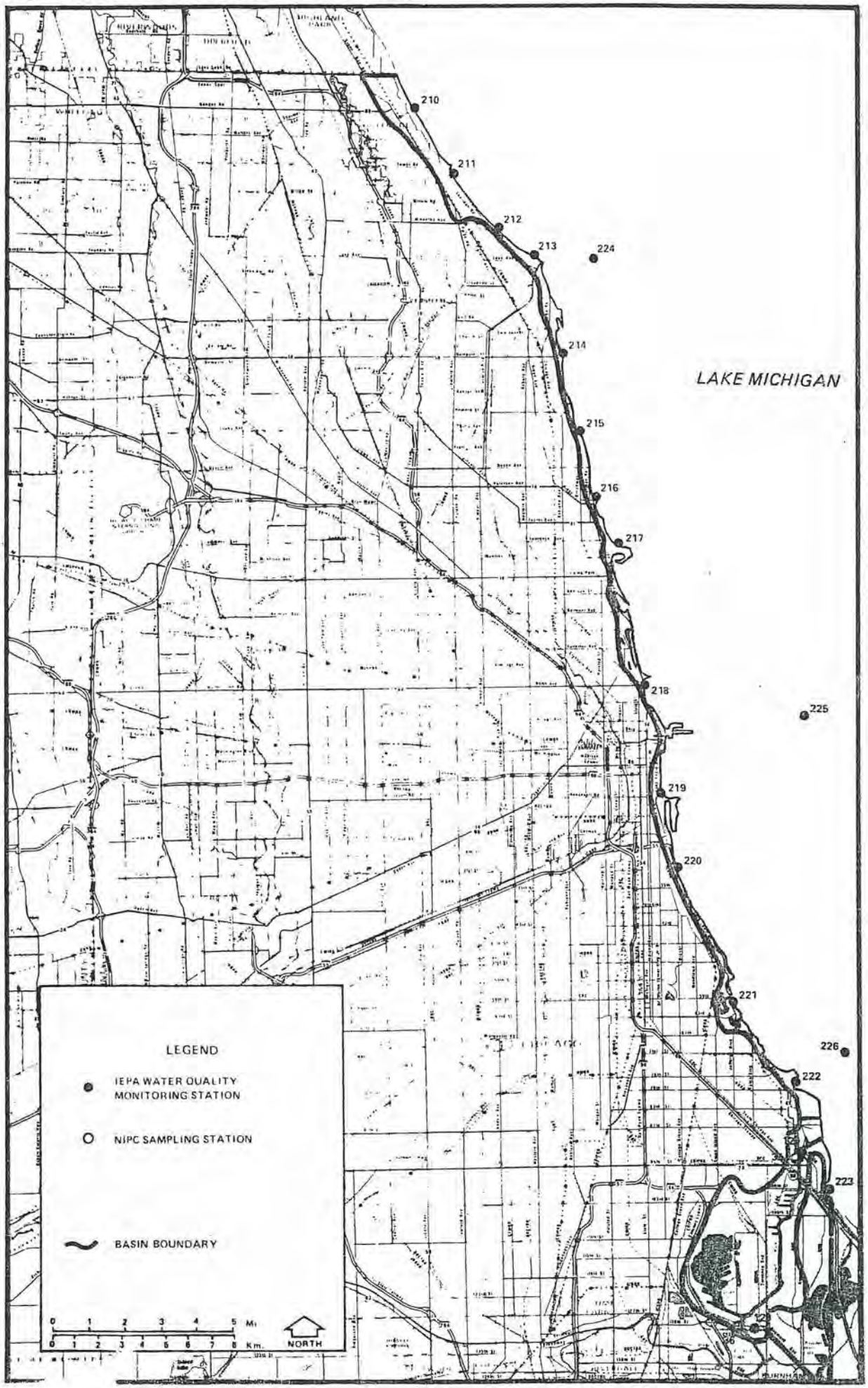


TABLE 22-6: ILLINOIS ENVIRONMENTAL PROTECTION AGENCY WATER QUALITY STATIONS

LAKE MICHIGAN SOUTH - BASIN

MAP STATION NUMBER	IEPA CODE NUMBER	STATION DESCRIPTION	STREAM NAME
128	HAA 01	130th St. Bridge, S of Lake Calumet	Calumet River
129	HAA 02	U.S. RT.41, Ewing Av. Bridge Near Mouth @ Lake	Calumet River
210	QK 04	Glencoe-Park Ave. Beach @ Bath House	Lake Michigan
211	QK 07	Winnetka-Lloyd PK. Beach @ Bath House	Lake Michigan
212	QL 03	Kenilworth-Middle Kenilworth Av. Beach	Lake Michigan
213	QL 06	Wilmette-Lake Av. Beach @ Bath House	Lake Michigan
214	QM 03	Evanston-Dempster St. Beach @ South End	Lake Michigan
215	QN 01	Chicago-Touhy Ave. Beach Ft of Touhy	Lake Michigan
216	QN 03	Chicago-Ardmore-Hollywood Beach-Middle	Lake Michigan
217	QN 05	Chicago-Montrose Av. Beach at Bath House	Lake Michigan
218	QO 01	Chicago-North Ave. Beach at Bath House	Lake Michigan
219	QQ 01	Chicago-Roosevelt Rd. Beach at Bath House	Lake Michigan
220	QQ 02	Chicago-31st St. Beach @ Bath House	Lake Michigan
221	QS 02	Chicago-Jackson PK. Beach at Bath House	Lake Michigan
222	QS 03	Chicago-Rainbow PK. Beach @ Bath House	Lake Michigan
223	QT 03	Chicago-100th St. Beach @ Bath House	Lake Michigan
224	QM 01	Evanston Water Intake	Lake Michigan
225	QP 01	Chicago-Central Water Plant Intake	Lake Michigan
226	QS 01	Chicago-South Water Plant Intake	Lake Michigan

the Great Lakes' system. While the results have minimal transferability, one PLUARG objective was that other agencies would benefit from the methods and procedures employed when future studies were undertaken by others to evaluate pollutants from non-point sources.

Underway is a series of reports entitled "Environmental Status of the Lake Michigan Region." Responsibility for these studies rests with the U.S. Energy Research and Development Administration, but the reports themselves are being prepared by the Argonne National Laboratory. As results of these studies become available during subsequent years, they will be reviewed and applied as appropriate to this initial plan for the basin. The same holds true for ongoing work of IEPA and other agencies that monitor the water quality of the Lake and its tributaries.

A full discussion of all major monitoring and analysis programs that include Lake Michigan can be found in the Commission's 208 Staff Paper No. 11, "Lake Michigan Water Quality Trends and Monitoring Programs in Illinos Waters."

c. Results of Sampling and Analyses

(1) IEPA Programs: Table 22-7 shows violations of water quality standards at Lake Michigan beaches in 1976; Table 22-9 shows violations at three water supply intakes. The data indicate violations of some water quality standards were recorded at virtually every sampling station. Standards for fecal coliform and total phosphorus were violated at 15 of 17 in-lake stations; most stations experienced violations of standards for ammonia nitrogen.

Total phosphorus and ammonia nitrogen standards were violated consistently at all beach sampling stations. There was a 98 percent violation of the phosphorus standard, and 85 percent of the samples showed ammonia nitrogen violations. Fecal coliform standards were violated in 31 percent of the beach samples.

Total phosphorus and ammonia nitrogen standards were violated consistently at all three water intake stations. There was an 87 percent violation of the phosphorus and an 80 percent violation of the ammonia nitrogen standard. Fecal coliform standards were violated in 19 percent of the samples taken from water supply intakes.

In reviewing these results, it should be kept in perspective that the standards applicable to Lake Michigan are quite stringent - much more so than those applied to inland lakes, rivers, and streams.

TABLE 22-7: VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS (BEACHES)

Lake Michigan South BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen	Fecal[2] Coliform (per 100 ml)	Iron	Copper	Dissolved Oxygen	Lead	Silver	Chloride	Fluoride	PH (Units)	Boron	Sulfate	Cyanide	Hexavalent Chromium	Total Phosphorus	Manganese	Phenol	Total Dissolved Solids	Temp. (°F)
			0.02	20	1.0	0.02	(4)	(4)	(4)	12				24	(4)	(4)	0.007	(4)	(4)	180	(45-80)
210	Lake Michigan (Beach)	No. of Analyses	14	12	7	7				14				15			15			14	16
		No. of Violations	10	6	0	0				0				0			15			0	1
QK 04		Maximum	0.22	100													0.090				74
		Minimum	0.00	2													0.014				48
		Mean[3]	0.05	21													0.047				62
211	Lake Michigan (Beach)	No. of Analyses	14	15	7	7				14				15			14			15	16
		No. of Violations	11	6	0	1				0				0			13			1	1
QK 07		Maximum	0.19	2100		0.03											0.100			183	76
		Minimum	0.00	2		0.00											0.003			160	48
		Mean[3]	0.05	17		0.00											0.047			167	64
212	Lake Michigan (Beach)	No. of Analyses	14	14	7	7				14				15			15			15	16
		No. of Violations	9	5	0	0				0				0			15			0	2
QL 03		Maximum	0.10	500													0.125				75
		Minimum	0.00	2													0.015				49
		Mean[3]	0.03	10													0.058				64
213	Lake Michigan (Beach)	No. of Analyses	15	15	7	7				15				16			16			16	17
		No. of Violations	9	7	0	0				0				0			16			0	1
QL 06		Maximum	0.09	130													0.250				75
		Minimum	0.00	2													0.025				48
		Mean[3]	0.03	14													0.076				64
214	Lake Michigan (Beach)	No. of Analyses	14	14	7	7				14				14			12			14	16
		No. of Violations	10	7	0	1				0				0			12			0	1
QM 03		Maximum	0.15	400		0.08											0.350				74
		Minimum	0.00	2		0.00											0.028				50
		Mean[3]	0.05	15		0.01											0.082				62
215	Lake Michigan (Beach)	No. of Analyses	14	15	7	7				14				14			13			14	16
		No. of Violations	11	5	0	1				0				0			13			0	1
QN 01		Maximum	0.17	1000		0.07											0.105				74
		Minimum	0.00	2		0.00											0.035				50
		Mean[3]	0.05	10		0.01											0.063				62
216	Lake Michigan (Beach)	No. of Analyses	14	15		7				14				14			14			14	16
		No. of Violations	13	6	0	0				1				0			14			1	3
QN 03		Maximum	0.14	500						13							0.170			182	75
		Minimum	0.00	2						8							0.030			160	50
		Mean[3]	0.06	12						9							0.070			168	65
217	Lake Michigan (Beach)	No. of Analyses	14	15	7	7				14				14			14			14	16
		No. of Violations	12	6	1	0				0				0			14			0	1
QN 05		Maximum	0.12	330	1.5												0.190				74
		Minimum	0.00	2	0.0												0.008				49
		Mean[3]	0.06	15	0.3												0.074				64
218	Lake Michigan (Beach)	No. of Analyses	13	14	7	7				13				13			13			13	15
		No. of Violations	10	3	0	1				0				0			13			0	1
QO 01		Maximum	0.22	1000		0.06											0.222				75
		Minimum	0.00	2		0.00											0 034				49
		Mean[3]	0.07	9		0.00											0.089				64

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.
(2) Fecal coliform violations are apparent violations. (See narrative)
(3) All mean values are arithmetic except for fecal coliforms which are geometric.
(4) No water quality violations for this parameter were reported.

TABLE 22-7: VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS (BEACHES) (Cont'd)

Lake Michigan South BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen	Fecal[2] Coliform (per 100 ml.)	Iron	Copper	Dissolved Oxygen	Lead	Silver	Chloride	Fluoride	PH (Units)	Boron	Sulfate	Cyanide	Hexavalent Chromium	Total Phosphorus	Manganese	Phenol	Total Dissolved Solids	Temp. (°F)
			0.02	20	1.0	0.02	(4)	(4)	(4)	12	(4)	(4)	(4)	(24)	(4)	(4)	0.007	(4)	(4)	180	(45-85)
219	Lake Michigan (Beach)	No. of Analyses	14	15	7	7				14				14			13			14	16
		No. of Violations	11	2	0	0				0				0			12			0	1
QQ 01		Maximum	2.10	200													0.072				75
		Minimum	0.00	2													0.000				51
		Mean[3]	0.19	7													0.045				64
220	Lake Michigan (Beach)	No. of Analyses	14	15	7	7				14				14			14			14	16
		No. of Violations	12	3	0	0				0				0			13			0	2
QQ 02		Maximum	0.29	70													0.160				74
		Minimum	0.00	2													0.000				48
		Mean[3]	0.08	7													0.065				64
221	Lake Michigan (Beach)	No. of Analyses	14	15	7	7				14				14			13			14	16
		No. of Violations	11	2	0	0				0				0			13			0	3
QS 02		Maximum	0.15	100													0.130				74
		Minimum	0.00	2													0.011				49
		Mean[3]	0.06	4													0.058				65
222	Lake Michigan (Beach)	No. of Analyses	14	15	7	7				14				14			14			14	16
		No. of Violations	13	1	0	1				0				0			14			0	1
QS 03		Maximum	0.15	44		0.22											0.700				75
		Minimum	0.00	2		0.00											0.009				50
		Mean[3]	0.06	4		0.03											0.094				94
223	Lake Michigan (Beach)	No. of Analyses	12	11	7	7				11				12			11			12	12
		No. of Violations	11	3	0	0				0				1			11			1	1
QT 03		Maximum	0.19	100										25			0.120			182	75
		Minimum	0.00	2										18			0.009			166	52
		Mean[3]	0.07	11										21			0.049			171	62
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative).

(3) All mean values are arithmetic except for fecal coliforms which are geometric.

(4) No water quality standard set for this parameter.

TABLE 2[illegible]: VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS (WATER SUPPLY INTAKES)

LAKE MICHIGAN BASIN SOUTH

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																		
			Ammonia Nitrogen	Fecal[2] Coliform (per 100 ml.)	Iron	Copper	Dissolved Oxygen	Lead	Silver	Chloride	Fluoride	PH (Units)	Boron	Sulfate	Cyanide	Hexavalent Chromium	Total Phosphorus	Manganese	Phenol	Total Dissolved Solids	Temp. (°F)
			0.02	20	0.3	0.02	(4)	(4)	(4)	(4)	(4)	(4)	(4)	24	(4)	(4)	0.007	(4)	0.001	180	(45-80)
224	Lake Michigan Water Intake	No. of Analyses	22	22	12	12								23			20		22	23	24
		No. of Violations	17	4	1	3								2			17		1	1	3
QM 01		Maximum	0.16	100	0.5	0.04								28			1.80		0.005	184	93
		Minimum	0.00	2	0.00	0.00								17			0.00		0.000	160	34
		Mean[3]	0.06	4	0.10	0.02								21			0.116		0.000	167	56
225	Lake Michigan Water Intake	No. of Analyses	21	22	11	11								21			16		21	21	23
		No. of Violations	17	3	0	0								1			14		0	0	1
QP 01		Maximum	0.22	150										28			0.062				75
		Minimum	0.00	2										18			0.000				38
		Mean[3]	0.05	4										20			0.022				57
226	Lake Michigan Water Intake	No. of Analyses	22	23	11	11								22			16		22	22	24
		No. of Violations	18	6	0	0								0			14		0	0	0
QS 01		Maximum	0.23	100													0.550				
		Minimum	0.01	2													0.000				
		Mean[3]	0.07	6													0.056				
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			
		No. of Analyses																			
		No. of Violations																			
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		Minimum																			
		Mean[3]																			
		No. of Analyses																			
		No. of Violations																			
		Maximum																			
		Minimum																			
		Mean[3]																			

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

Water quality information for stations 128 and 129 on the Calumet River are not shown. However, analytical results showed all values in conformance with all applicable standards except for one violation of the dissolved oxygen standard.

The IEPA sampling program for Stations 128 and 129 on the Calumet River includes data from 1971 through 1976. For the period 1971 through 1975, the IEPA developed a system for comparing the results of water quality trends over time. DO, fecal coliform, total dissolved solids, and ammonia nitrogen parameters were used in arriving at these indices. Sampling data, coupled with the findings and experience of IEPA field engineers and biologists, were then used to compute water quality indices for each station. Ratings are: Good (A); Average (B); Semi-Polluted (C); and, Polluted (P). The ratings for both locations for 1971 through 1975 were good. Parameters violated in 1975 at station 128 were fecal coliform, copper, and lead. At station 129 the only parameter violated was cyanide.

There is one IEPA water quality sampling station in Wolf Lake located at the Indiana State Line Beach. Data for 1975 from this station are presented in Table 22-9.

TABLE 22-9: VIOLATIONS IN 1975 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS–WOLF LAKE

Parameter	Limit mg/l	Sample	
		Date	Results mg/l
Lead	0.1	Nov. 3	0.21
Total Phosphorus	0.05	Mar. 25	0.12
		June 13	0.06
Copper	0.02	Feb. 2	0.16
		Mar. 25	0.30
		Nov. 3	0.12

(2) Commission Programs:

(a) Stream Sampling Results of the Commission's limited sampling program on the Calumet River during 1976-1977 generally were consistent with the IEPA's findings (see Table 22-10). In certain samples, minimum dissolved oxygen standards were not met.

TABLE 22-10: IN-STREAM WATER QUALITY ANALYSIS–SUMMARY DATA (CALUMET RIVER)

LAKE MICHIGAN - SOUTH BASIN

STATION NO. 35

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		pH (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
JUNE 1 -10 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.5	115	16	27	752	10	22	11	3	5			12.2	12.0	1.0	0.37	1	154	10	
	Minimum	7.2	105	6	2	178	1	14	7	2	2			0.0	0.0	0.1	0.00	0	147	5	
	Mean	8.0	109	8	11	266	4	17	9	2	3			0.8	0.5	0.3	0.13	1	151	7	
SEPTEMBER 7 - 16 1976	No. of Analyses	29	10	29	29	29	29	29	29	9	10			29	29	29	29	10	2	10	
	Maximum	8.3	109	13	26	292	8	26	10	3	5			3.9	3.5	1.0	0.90	2	158	9	
	Minimum	7.3	103	7	7	122	1	20	2	1	1			0.2	0.1	0.2	0.01	1	143	6	
	Mean	8.0	106	9	15	210	3	21	8	1	2			0.7	0.2	0.3	0.16	1	151	7	
DECEMBER 5 - 15 1976	No. of Analyses	13	9	13	13	13	13	13	13	9	9			13	13	13	13	9	2	9	
	Maximum	7.9	111	15	31	246	7	5	14	5	30			1.8	0.4	0.3	0.29	2	149	6	
	Minimum	7.4	105	5	12	166	2	0	11	2	4			0.1	0.1	0.2	0.11	0	141	3	
	Mean	7.7	108	9	18	189	5	1	13	3	8			0.6	0.1	0.2	0.17	1	145	5	
FEBRUARY 21 - 28 1977	No. of Analyses	12	8	12	12	12	12	12	12	8	0			12	12	12	12	8	2	8	
	Maximum	8.0	130	19	37	240	9	4	14	5				0.8	0.2	0.3	0.14	2	158	5	
	Minimum	7.4	119	4	7	134	2	1	4	2				0.0	0.1	0.2	0.01	0	155	3	
	Mean	7.8	124	7	17	192	5	2	10	4				0.3	0.1	0.3	0.03	1	157	4	
MARCH 14 - 19 1977	No. of Analyses	10	6	10	10	10	10	10	9	6	6			10	10	10	10	6	2	6	10
	Maximum	7.9	119	11	80	304	11	16	14	3	4			0.8	0.1	0.3	0.05	1	161	9	1550
	Minimum	7.2	113	2	1	194	1	7	9	1	0			0.1	0.1	0.2	0.01	0	153	6	260
	Mean	7.5	117	6	22	223	5	8	11	2	2			0.4	0.1	0.3	0.02	1	157	8	814

STATION NO. 36

JUNE 1 - 10 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.3	118	17	45	754	8	23	10	3	4			2.4	1.0	1.3	0.34	2	186	14	
	Minimum	7.5	105	8	2	320	1	16	2	1	1			0.4	0.0	0.2	0.00	1	182	6	
	Mean	7.9	111	13	17	425	3	20	7	2	3			1.1	0.7	0.8	0.12	1	184	9	
SEPTEMBER 7 - 16 1976	No. of Analyses	29	10	29	29	29	29	29	29	9	10			29	29	29	29	10	2	9	
	Maximum	8.2	110	27	53	346	12	27	9	2	6			1.2	0.5	1.0	0.17	3	161	13	
	Minimum	7.6	100	8	13	206	1	20	1	1	2			0.3	0.1	0.3	0.02	1	147	5	
	Mean	7.9	107	15	22	293	4	23	7	1	3			0.6	0.1	0.9	0.11	2	154	9	
DECEMBER 5 - 15 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	10	
	Maximum	7.9	211	23	39	260	9	4	13	4	27			1.4	0.5	0.3	0.20	3	157	6	
	Minimum	7.5	110	10	14	186	2	0	11	1	3			0.4	0.1	0.2	0.09	1	147	3	
	Mean	7.8	121	15	22	229	5	2	12	2	9			0.8	0.3	0.3	0.15	2	152	4	
FEBRUARY 21 - 28 1977	No. of Analyses	12	8	12	12	12	12	12	12	8	0			12	12	12	12	8	2	8	
	Maximum	8.0	132	28	71	316	8	14	13	5				1.2	0.6	0.3	0.11	5	164	5	
	Minimum	7.6	118	4	8	176	1	1	6	2				0.3	0.1	0.2	0.01	1	163	2	
	Mean	7.7	125	8	20	231	5	4	11	3				0.7	0.4	0.3	0.02	2	164	3	
MARCH 14 - 19 1977	No. of Analyses	10	6	10	10	10	10	10	9	6	6			10	10	10	10	6	2	6	10
	Maximum	7.9	133	20	75	342	10	17	14	3	6			1.4	0.8	0.4	0.04	2	187	16	17
	Minimum	7.5	125	5	7	272	3	7	6	2	1			0.7	0.6	0.3	0.01	0	173	10	6
	Mean	7.7	127	13	34	303	6	10	11	2	3			1.0	0.7	0.3	0.03	1	180	13	11

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

At Station 35, where Secondary Contact standards apply, the mean values of ammonia were 0.5 and 0.2 mg/l in two non-winter sampling periods when the standard not to be exceeded is 2.5 mg/l. However, the maximum readings of individual samples during the two non-winter sampling periods were in excess of the 2.5 mg/l standard, having been 12 mg/l in June and 3.5 mg/l in September. The mean values were 0.1 mg/l during the three winter sampling periods when the standard is 4.0 mg/l. During the winter, maximum values observed were 0.4, 0.2, and 0.1 mg/l. Dissolved oxygen concentrations violated the 4.0 mg/l standard for minimum readings during one of the sampling periods.

At Station 36, where Secondary Contact standards also apply, the mean values of ammonia were 0.7 and 0.1 mg/l in the non-winter sampling periods when the standard not to be exceeded is 2.5 mg/l. The mean values during the three winter sampling periods were 0.3, 0.4, and 0.7 mg/l when the standard is 4 mg/l. Maximum readings did not exceed the standards at any time. Dissolved oxygen levels violated the 4.0 mg/l minimum standard in two sampling periods.

(1) Land Use Runoff Program Table 22-11 presents the summary statistics of laboratory analyses of stormwater runoff samples collected during seven storms for two ravine sites, both of which were located in Lake County, in Lake Michigan Basin-North. Fifteen chemical and seven heavy metal constituents were analyzed. Mean and maximum values for both copper and lead violated state standards. Both mean and maximum values for all other heavy metals met the standards.

Illinois has established water quality standards for pH, DO, ammonia nitrogen and total phosphorus. The pH and ammonia nitrogen values (maximum and mean) complied with the standard. The soluble phosphorus concentrations alone, which should be equal to or less than the total phosphorus in the sample, exceeded the established standard (0.05 mg/l) for total phosphorus. In addition, the total suspended solids and COD concentrations (maximum and mean) were high.

d. Overview of Water Quality

(1) Lake Michigan: The quality of the Lake's near shore waters shows positive improvement in many areas primarily as a result of point source pollution abatement programs. As indicated by the IEPA's 1976 data from beach sampling stations, however, near shore conditions could be improved with respect to certain parameters. Again, the significance of these violations has to be assessed in light of the very stringent standards Illinois has established for the Lake. For example, the fecal coliform standard for General Use inland waterways is 200 per 100 ml, while the Lake Michigan standard is 20 per 100 ml.

TABLE 22-11: LAND USE WATER QUALITY SAMPLING – SUMMARY DATA – RAVINES

STATISTICS	CHEMICALS							
	PARAMETERS[1]							
	ph (units)	Alkalinity	Hardness	Total Suspended Solids	Volatile Suspended Solids	Total Solids	Dissolved Oxygen	BOD_5 [2]
No. of Events[4]	7	7	7	7	7	7	7	7
No. of Analyses	84	14	7	84	84	84	0	46
Maximum	8.1	238	398	4240	346	4738		43
Minimum	6.7	75	147	56	12	406		3
Mean	7.6	121	250	1076	97	1364		14

STATISTICS	CHEMICALS							
	PARAMETERS[1]							
	BOD_{20} [2]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Flow (cfs)	Chemical Oxygen Demand[3]
No. of Events[4]	7	7	7	7	7	7	7	7
No. of Analyses	7	84	84	84	84	84	51	4
Maximum	70	9.0	1.2	2.0	0.46	172	7.5	337
Minimum	12	0.6	0.1	0.2	0.04	7	0.3	74
Mean	33	2.9	0.3	0.8	0.12	31	2.2	174

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by IEPA.

(4) Events refer to runoff periods for which sampling data were collected. Automatic samplers went into operation when streamflow reached a predetermined height, indicating that stormwater runoff was taking place.

STATISTICS	HEAVY METALS						
	PARAMETERS[1]						
	Zinc (mg/l)	Cadmium	Copper	Total Chromium	Nickel	Lead	Mercury
No. of Events[4]	7	7	7	7	7	7	7
No. of Analyses	19	19	19	19	19	19	19
Maximum	0.41	2.1	150	45	62	570	0.4
Minimum	0.02	0.3	1	0	5	13	0
Mean	0.20	1.0	45	21	39	242	0.2

(1) All units are expressed in micograms per liter (µg/l) unless otherwise noted.

A June 1978 paper presented at a USEPA-sponsored conference stated:". . . the open waters of Lake Michigan are still slowly deteriorating." Over the last ten years, chloride concentrations have accumulated more rapidly than ever before. Sulfate has leveled off with no increase since 1970. Concentrations of DDT in fish have decreased steadily since 1969. In 1976, PCB concentrations were lower than in previous years, but it is not clear if this is the start of a downward trend. (It is appropriate to note that an estimated 80-90 percent of the PCBs reaching the Lake are atmospherically derived.)

(2) Calumet River: According to the IEPA's "water quality index" rating discussed previously, the Calumet River was classified "good" over the period 1971-1975. (It should again be noted that this rating is based on conformance with "Secondary Contact" rather than higher "General Use" standards).

Other measures of overall conditions were provided by the sediment oxygen demand (SOD) measurements and benthic organism samplings conducted as part of the 208 program. According to other criteria for quality based on the benthic organisms present, two sites on the Calumet River were rated "semi-polluted".

The apparent discrepancies between the above general ratings (i.e. water quality index, SOD, and benthic organisms) stem from the fact that each is predicated on different criteria being used for different purposes.

(3) Wolf Lake: The overall IEPA water quality index classification for Wolf Lake was "good" for 1974 and 1975. Nevertheless, standard violations for lead, total phosphorus, and copper were reported during the sample years.

22.04 POINT SOURCES: EXISTING CONDITIONS

a. Municipal-Type Wastewater Treatment Plants

There are no municipal-type wastewater treatment facilities located within the basin. All municipal type wastes generated are treated at Metropolitan Sanitary District of Greater Chicago (MSDGC) facilities located outside the basin.

b. Industrial Wastewater Treatment Plant

International Harvester-Wisconsin Steel Division, which discharges to the Calumet River, is the only industry treating its own process wastes in the study area. The treatment units at this facility include: scale pits, cyanide destruction, and pressure filtration. Discharges average 57 million gallons per day (MGD), of which 22 MGD are treatment plant effluents and 35 MGD are cooling waters. Additional information on the facility is shown in Table 22-12. In addition, Figure 22-3 depicts the location of this and other point source discharges within the basin.

c. Miscellaneous Wastewater Treatment Plants

There are two miscellaneous wastewater treatment facilities in the basin. These are operated by Cargill Inc. and Continental Grain Company. Both operate activated sludge plants and chlorinate their effluents before discharging into the Calumet River. Information, including wastewater loads and effluent limitations, is presented in Table 22-13.

d. Other Point Source Discharges:

(1) Water Supply Treatment Plants Residues: Although there are seven water treatment plants located within the basin, there are no longer any waste discharges from these plants into the Lake. All discharge into sanitary sewers for subsequent treatment at MSDGC facilities.

(2) Cooling Water Discharges: Information on those facilities which discharge contact or non-contact cooling waters is shown in Table 22-14.

Figure 22-3 : POINT SOURCE DISCHARGES



TABLE 22-12A: INDUSTRIAL WASTEWATER TREATMENT PLANTS

LAKE MICHIGAN-SOUTH BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
C2	International Harvester Wisconsin Steel	0001660	MSDGC/MSDGC	Chicago	K		22.00		

(1): Special Treatment (K).

TABLE 22-12B: INDUSTRIAL WASTEWATER TREATMENT PLANTS

LAKE MICHIGAN-SOUTH BASIN

MAP CODE	RECEIVING STREAM			NPDES PERMIT DATES		SIC CODE	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
	NAME	7 DAY-10 YR. LOW FLOW (MGD)		ISSUED	EXPIRES			
		1970	2000					
C2	Calumet River			5-16-74	12-31-78	72-3312	Daily Maximum: 15 TSS, 15 o/g, 2.0 (tot)Fe,0.025 Cu,0.1 Pb,1.0 Zn	

(1): Current, from NPDES Permits

TABLE 22-13A: MISCELLANEOUS WASTEWATER TREATMENT PLANTS

LAKE MICHIGAN-SOUTH BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
C3	Cargill, Inc.	0037087	MSDGC/MSDGC	Chicago	A,E	0.007	0.006		
C5	Continental Grain Elevators	0037401	MSDGC/MSDGC	Chicago	A,F,E	0.005	0.005		

(1): Activated Sludge (A); Chlorination (E); Tertiary Filter (F).

TABLE 22-13B: MISCELLANEOUS WASTEWATER TREATMENT PLANTS

LAKE MICHIGAN-SOUTH BASIN

MAP CODE	RECEIVING STREAM			NPDES PERMIT DATES		EFFLUENT REQUIREMENTS (mg/l)								COMMENTS
	NAME	7 DAY-10 YR. LOW FLOW (MGD)				1976(1)				2000				
		1970	2000	ISSUED	EXPIRES	BOD	TSS	P	NH_3-N	BOD	TSS	P	NH_3-N	
C3	Calumet River			6-23-75	12-31-79	30	30							
C5	Calumet River			6-9-75	12-31-79	30	30							

(1): From NPDES Permits

(3) Stormwater Discharges: Information on those facilities that have NPDES permits covering the discharge of stormwater runoff is also presented in Table 22-14. In 1974, the City of Chicago completed a study for the MSDGC entitled "Lakefront Outfall Study." This identified all outfalls into Lake Michigan and its tributaries. A total of 581(?) were found, of which 539 were found to discharge stormwater exclusively. The remaining 47 outfalls discharged process cooling waters along with stormwaters, air conditioning waters, swimming pool waters and several other types of wastewaters. The largest outfall was associated with stormwater drainage from the Calumet Expressway, which is pumped into Lake Calumet.

(4) Combined Sewer Overflows: There are six known combined sewer overflow discharge points within the basin, all of which are located along the Calumet River.

e. Local Facilities Planning

Lake Michigan Basin-South is located entirely within the MSDGC Facilities Planning Area. The basin extends into the three largest treatment plant service areas of the MSDGC. These are: North side Area (Lake-Cook County line to Fullerton Avenue); the Central Area (Fullerton to 77th Street) and the South Area (77th Street to the Indiana State line). Combined sewers are found in these areas as well as overflow points and some elements of the Tunnel and Reservoir Plan.

The MSDGC has prepared a comprehensive facility plan with additional reports for each treatment plant service area. There also have been four updates of the facility plans.

TABLE 22-14: A: OTHER POINT SOURCE DISCHARGES

LAKE MICHIGAN-SOUTH BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
C3	Allied Chemical Corp.	0002640	MSDGC/MSDGC	Chicago		8-15-74	8-1-79
C42	Dundee Cement Co.Southside	0034011	MSDGC/MSDGC	Chicago		12-18-74	9-30-79
C50	Ford Motor Co. Chgo Assembly	0035742	MSDGC/MSDGC	Chicago			
C159	General Mills	0001465	MSDGC/MSDGC	Chicago	0.36	1-23-75	10-31-79
C71	Interlake Steel Blast Furnace #001	0002101	MSDGC/MSDGC	Chicago	11.50	2-20-74	7-1-78
C71	Interlake Steel Blast Furnace #002	0002101	MSDGC/MSDGC	Chicago	9.750	2-20-74	7-1-78
C71	Interlake Steel Blast Furnace #003	0002101	MSDGC/MSDGC	Chicago	9.650	2-20-74	7-1-78
C74	International Harvester Wisconsin Steel	0001660	MSDGC/MSDGC	Chicago	35.00	5-16-74	12-31-78
C83	Larabida Childrens Hosp.	0005240	MSDGC/MSDGC	Chicago		1-10-74	12-31-78
C88	Marblehead Lime #001-002	0035475	MSDGC/MSDGC	Chicago	0.130	6-30-75	9-30-79
C114	Republic Steel #001	0002593	MSDGC/MSDGC	Chicago	21.00	6-7-76	12-31-78
C114	Republic Steel #003	0002593	MSDGC/MSDGC	Chicago	14.30	6-7-76	12-31-78
C114	Republic Steel #004	0002593	MSDGC/MSDGC	Chicago	30.00	6-7-76	12-31-78
C147	U.S.Steel South Works-001	0002691	MSDGC/MSDGC	Chicago	110.9	5-28-76	9-1-79
C147	U.S.Steel South Works-002	0002691	MSDGC/MSDGC	Chicago	30.00	5-28-76	9-1-79
C147	U.S.Steel South Works-005	0002691	MSDGC/MSDGC	Chicago	4.000	5-28-76	9-1-79
C147	U.S.Steel South Works-006	0002691	MSDGC/MSDGC	Chicago	20.00	5-28-76	9-1-79
C156	Winnetka Power Plant	0002364	MSDGC/MSDGC	Winnetka	25.00	4-14-75	3-1-80

TABLE 22-14B: OTHER POINT SOURCE DISCHARGES

LAKE MICHIGAN-SOUTH BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	7 DAY-10 YR. LOW FLOW (MGD) 2000	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
C3	Calumet River			Daily Maximum (DM): 15 TSS, 1 (tot)Fe	Cooling water
C42	Calumet River	19.4		Temp.	Cooling water
C50	Calumet River				Cooling water
C159	Calumet River Slip #4			Temp.	
C71	Calumet River			Temp.	Cooling water
C71	Calumet River			Temp.	Cooling water
C71	Calumet River			Temp.	Non-contact cooling water and stormwater runoff
C74	Calumet River			Temp.	Non-contact cooling water
C83	Lake Michigan			Temp.	Air conditioning water
C88	Calumet River			Temp.,DM: 15 TSS, 15 oil/grease (o/g) 750 TDS	Cooling water and surface storm-water runoff
C114	Calumet River			Temp.	Stormwater runoff
C114	Calumet River			Temp.	Cooling water and stormwater runoff
C114	Calumet River			Temp.	Non-contact cooling water
C147	Lk.Michigan			Temp.,DM: 15 TSS, 0.025 Cn	Cooling Water
C147	Lk.Michigan			Temp.,DM: 15 TSS, 0.025 Cn	Cooling Water
C147	Lk.Michigan			Temp.,DM: 15 TSS, 0.025 Cn	Cooling Water
C147	Calumet Rvr			DM: 15 TSS, 5 o/g 0.025 Cn	Cooling Water
C156	Lk.Michigan			Temp., DM: 15 TSS, 1 (tot) Fe, 1 (tot) Cu, 1 (tot) Zn	Cooling Water

(1) From NPDES Permits

22.05 NONPOINT SOURCES: EXISTING CONDITIONS

a. Urban Stormwater Systems

Separate storm sewer systems serve portions of Winnetka and Glencoe. These systems discharge either directly into the Lake, or indirectly via ditches, ravines, or other small water courses. In addition to storm sewers, combined sewer systems serve portions of Chicago, Evanston, Kenilworth, and Wilmette.

b. Construction Activities

As discussed in Chapter Six, construction operations, coupled with stormwater runoff and resultant erosion, can contribute sediments, chemicals, and other pollutants to waterways. When evaluations were conducted in 1976-77, several areas of the basin were experiencing construction or other surface disturbances. However, none of these activities were found to be causing actual water pollution.

The potential for water quality degradation as a result of construction activities will not diminish in future years. Changes in population and land use, as forecasted, will generate additional residential and commercial construction accompanied by other surface disturbances for roads and utilities.

c. Air Pollution

The impacts of air pollution fallout on water quality vary in response to several factors. Critical among these is the surface area-volume ratio of the water body. In general, fallout is of greater concern with respect to larger water bodies such as Lake Michigan than it is to smaller, inland waters. Indeed, recent research indicates that as much as 80 to 90% of the current PCB input to Lake Michigan may be atmospherically-derived. In addition, an estimated 26% of the total annual phosphorus loading to the Lake is from the atmosphere.

d. Erosion and Sedimentation

Another problem is erosion of the shoreline bluffs along the Lake and resultant sedimentation. The primary cause is the undercutting of the bluffs by high waves. While studies have not been completed, and contradictory evidence may yet be found, shoreline erosion appears to be more of an economic and aesthetic problem rather than a water quality problem.

Stormwater-induced erosion of the ravines tributary to the Lake also is a potential source of sediment and associated contaminants.

e. Septic Systems

The basin has an insignificant number of septic systems and these are not considered to be causing water quality problems.

f. Hydrologic Modifications

Dredging of Calumet Harbor is conducted periodically by the U.S. Army Corps of Engineers. The Calumet River has been channelized along all or most of its length, and it too requires periodic maintenance dredging. Maintenance dredging also takes place in connection with the federal channel leading to Navy Pier in Chicago. Other dredging is necessary from time to time in connection with the small boat harbors located along the shore.

Federal navigation projects at Navy Pier and in Calumet Harbor were designed to be compatible with the St. Lawrence Seaway Project where 27' depths were provided. In the Calumet River, project depth decreases to 21.5' and extends to Lake Calumet. Maintenance of project depths is important to the economic viability of Chicago and the region, with its influence actually extending downstate. This is because products can be barged up the Illinois River to Chicago and transferred to deep draft vessels for trans-oceanic shipment. Limited depths in the harbors and channels require both incoming and outgoing vessels to be light-loaded, with significant adverse economic impacts on the viability of the Port of Chicago.

Large quantities of dredged material are generated as a result of maintenance activities, on the order of 200,000 cubic yards annually. Dredging operations disturb aquatic life during the removal of dredged materials and after deposition, when turbid water drains back into the waterway. In addition to turbidity, polluted waters can leak or flow back. If not protected properly, confined disposal sites may also be subjected to inundation by flood waters.

Until 1969, dredged materials were deposited in Lake Michigan open waters. Since this practice was discontinued, the Chicago River and Chicago Harbor have not been dredged. Material from the Calumet Harbor and River, until recently, was deposited on a land area next to the Calumet River. Proposed dredging projects and existing and proposed dredge spoil disposal sites in the basin are discussed in Section 22.02.

At various times, municipal governments and private landowners have constructed facilities to combat shore erosion. Usually these are of two types: groins and various types of revetments or sea walls. During their emplacement, pollutants may be introduced by the construction activities, but these are relatively minor and are of a transitory nature. The most significant of these adverse effects are the temporary turbid waters when surface and sub-surface materials are disturbed and placed into suspension.

g. Marine Activities

Commercial navigation in the Basin involves the Port of Chicago, which includes Chicago (Navy Pier), the Calumet River and Lake Calumet Harbor. Over 100 different commodities pass through the Port including coal, crude petroleum, phosphate rock, dry sulphur, molasses, sodium hydroxide, alcohol, benzene, toluene, nitrogenous and phosphorus chemical fertilizers, cement, newsprint, gasoline, jet fuel, naptha, liquified gas, lime slag, and iron. Existing laws as well as safety and economic considerations mitigate potential adverse water quality impacts associated with commercial shipping. Commerce has averaged about 41 million tons annually since 1965.

Authority to control the discharge of wastes and other materials from recreational and commercial vessels exists at the Federal, State, and local levels. The provisions of PL 92-500 prohibit the discharge of oil or hazardous materials into or upon the navigable waters of the United States. They also direct the U.S. Coast Guard to develop regulations governing the design and operation of marine sanitation devices. These regulations have been issued and require new vessels (construction started on or after January 30, 1975) with toilet facilities to have Type I, II, or III sanitation services.

TYPE I - Equivalent to macerator-chlorinator.

TYPE II - Equivalent to chloride secondary plant.

TYPE III - Holding tank, recirculator, incinerator.

Existing vessels with toilet facilities were required to have Type II or III facilities by January 30, 1980. Under certain conditions, a Type I facility is also acceptable.

At the State level, the Illinois Pollution Control Board (IPCB) states that "no person shall dispose of any sewage or wastewater accumulated in a holding tank or any other container or watercraft in such a manner that the sewage or wastewater reaches or may reach the waters of the State."

Local ordinances also regulate the discharge of wastes from recreational and commercial vessels. The City of Chicago Department of Environmental Control's Harbor Pollution Control Ordinance has specific regulations concerning befouling public waters, prohibition of disposal of refuse in harbors, use of approved wastewater treatment facilities in a harbor, deterioration of land facilities associated with marine activities, and harbor dredgings.

The City and Chicago Park District also require that vessels with toilets or urinals have waste retention tanks. Within ten miles of the Chicago shoreline, pleasure craft with holding tanks must have seals to prevent discharge of galley and head wastes. Waste disposal must occur at a shore facility. Pump-out facilities are available at Park District harbors as well as at four private marinas on the

Chicago and Calumet Rivers. The Park District facilities are located at Montrose, Belmont, Diversey, Monroe Street, Burnham, 59th Street, and Jackson Park harbors. Of the approximately 500 foreign ships which visit Chicago each year, those not having holding tanks must use portable waste facilities.

h. Sediments

Certain organic compounds such as dieldrin, DDT and polychlorinated bipheynls have accumulated in the lake bed sediments, after having been introduced by various vectors, such as stormwater and atmospheric fallout. By accumulating in successive levels of the food chain, they have been found particularly in larger, predator fish at concentrations which exceed established guidelines. Precautionary measures have been necessary such as: prohibitions against commercial fishing of larger fish species; recommended selective fileting of fish caught by sport fishermen; and suggested limits on weekly consumption of fish flesh. Recent fish flesh analyses show that concentrations of organic compounds have been declining. This may reflect reduced inputs of pollutants, or it may be that the materials gradually have been bound-up in the sediments and are no longer absorbed in the food chain.

22.06 DISPOSAL OF RESIDUALS

Within Lake Michigan Basin-South, there are no municipal-type wastewater treatment plants and therefore, no residuals of this nature are being generated. The basin is currently served by the MSDGC whose treatment facilities are located in other basins. Information on the MSDGC facilities, including residual waste generation and disposal, is presented in other basin reports.

There is one industrial wastewater treatment plant discharging within Lake Michigan Basin-South. This facility, International Harvester-Wisconsin Steel Division, discharges approximately 22 MGD of process waste effluents. No information is available describing types of residual wastes or their method of disposal.

There are two miscellaneous treatment plants within the Lake Michigan Basin-South. Both are small industrial facilities which treat only their own domestic wastes. Information describing residual waste production or disposal is unavailable.

There are seven water supply treatment plants, all of which discharge their backwash waters and other residuals to sewers for subsequent treatment at MSDGC waste treatment plants.

22.07 EXISTING MANAGEMENT PROGRAMS

The major features of the existing water quality management system in the Lake Michigan Basin-South are presented in Table 22-15. This table includes a list of the public agencies which are currently involved in water quality related activities. Variations in programs and responsibilities between these agencies are indicated by a numerical code.

TABLE 22-15: EXISTING LOCAL WATER QUALITY MANAGEMENT AGENCIES AND PROGRAMS: LAKE MICHIGAN BASIN-SOUTH AND WOLF LAKE

Municipalities			
Chicago (Sanitary and Ship Canal, Des Plaines)*	1+,3+	Kenilworth (Sanitary and Ship Canal, North Branch)*	1,3,5
Evanston (Sanitary and Ship Canal)*	1,3	Wilmette (Sanitary and Ship Canal, North Branch)*	1,3,4,5
Glencoe (North Branch)*	1,4,5	Winnetka (North Branch)*	1,5
Counties			
Cook	4		
Sanitary Districts			
Metropolitan Sanitary District of Greater Chicago	2,5		

* Additional basins in which communities are located are shown in parentheses for those municipalities which cross basin boundaries.

\+ Numbers indicate existing water quality related activities as follows:

1. Wastewater collection agency
2. Wastewater treatment agency
3. To be included in MSDGC TARP system
4. Has enacted erosion and sediment control regulations
5. Has enacted stormwater detention regulations or similar regulations of another agency apply

a. Water Quality Management Programs

From Table 22-15 it can be seen that, compared to other basins, Lake Michigan Basin-South contains relatively few local agencies that have programs related to water quality management. However, Lake Michigan itself is of concern beyond this region, and agencies at the state, interstate,

national and international levels are involved in researching, planning, implementing or monitoring programs affecting the basin. These include the Illinois Division of Water Resources, the IEPA, the Great Lakes Basin Commission, the USEPA and the International Joint Commission of Canada and the United States.

The operation of wastewater treatment plants is the most familiar type of waste management program. The responsibility for wastewater treatment in the Lake Michigan Basin-South belongs to the MSDGC.

The District's facilities include treatment plants, pumping stations, and large interceptor sewers. In most cases, the MSDGC does not directly collect wastewater from individual homes and businesses; the construction and operation of local collection systems is a municipal or local sanitary district responsibility. However, the MSDGC, as the eventual treatment agency, has authority to inspect and approve or disapprove all connections to its system or to municipally-owned sewers tributary to its system. It also has the authority to set design standards for all collection systems tributary to its facilities.

Many industrial discharges in the basin are connected to the MSDGC system. Industries are required to meet pretreatment standards established to protect treatment facilities. Surcharges may be levied against industrial wastewater sources.

The MSDGC charges a fee for all connections to its system, but the District's principal source of revenue is taxation on real property within its boundaries. It can, by statute, issue bonds against its property tax income up to a maximum of 5 percent of the total valuation of property in the district.

While wastewater management is centralized, responsibility for urban stormwater management is fragmented. Many government agencies, including municipalities, the county, and state and local highway departments, either construct and maintain their own drainage systems, or regulate the construction of such systems by private individuals.

b. Regulatory Programs

(1) Municipal Regulations: Because all of this basin lies within the corporate boundaries of municipalities, local regulatory programs are highly significant. For example, zoning ordinances, by influencing the location and form of new development and redevelopment, can affect the quantity and quality of surface runoff. Such ordinances also are a factor in determining the capacity required in treatment facilities. The frequency with which streets in separately sewered areas are cleaned and the type of equipment used have a paramount influence on the quality of stormwater runoff and its impact on receiving water bodies. In combined sewer areas, street cleaning practices influence the quality of the wastewater in the sewers. In turn, this affects the degree of treatment required at the treatment

plant.

All communities in the basin are affected by the MSDGC's water-related ordinances. At this time, Glencoe, Kenilworth, Wilmette, and Winnetka have stormwater detention regulations which are required by the MSDGC in separately sewered areas. Glencoe and Wilmette also have soil erosion and sediment control regulations. All municipalities in the basin have adopted floodplain regulations.

(2) State and Federal Regulations:

Typically, State and Federal regulations, including the National Pollutant Discharge Elimination System, apply uniformly to all portions of the region. Some regulatory programs affect only the Lake Michigan basin, however, because of the unusual problems involved in protecting the Lake. A series of court decisions dating back to the late nineteenth century have established that Illinois has a special responsibility to protect Lake Michigan as a "public trust." Ownership of the lake bed itself has been clearly vested in the state. Relying largely on the "public trust" doctrine as well as environmental laws, the Illinois Attorney General has used litigation actively to restrict the discharge of pollutants into Lake Michigan. Successful lawsuits related to the Lake in recent months include actions taken against the U.S. Steel Corporation and the City of Milwaukee.

The U.S. Army Corps of Engineers maintains a direct role in a variety of programs affecting Lake Michigan water quality, including dredging, filling of wetlands, spoil disposal, harbor improvements and issuance of permits for structures in the Lake (including erosion protection devices). Another federal agency, the U.S. Coast Guard, is responsible for enforcing dumping and spilling regulations for commercial navigation, and for spill cleanups.

From an historical perspective, the importance of Lake Michigan and the need for effective water quality management programs are highlighted by the following statement of Albert B. Maris, Special Master of the U.S. Supreme Court, which was delivered in his 1962 report on Lake Michigan water diversion.

> I fully agree with the opinion of the United States Public Health Service, reached after a comprehensive study of the Illinois waterway and Lake Michigan, that the discharge of treated sewage effluent to Lake Michigan would not be in the best interest of the protection of the public health in the use of the lake for water supply and recreation; that the damage to the water quality of Lake Michigan from such discharges over an extended period would be great; and that future uses of Lake Michigan would be impaired thereby. (Finding VII-76) Moreover such a pollution of one of our largest reservoirs of comparatively pure fresh water would be contrary to the goals of pollution abatement and conservation of water resources to which the United States is committed by the Federal Water Pollution Control Act of 1948 and its amendments and supplements.

22.08 PROBLEM ASSESSMENT

a. Water Quality

It is difficult to draw clear and valid conclusions about Lake Michigan water quality from the information available. The complexity of the Lake's dynamics and the variety of pollutants in it preclude any simple generalizations. However, there are a number of problems remaining, some of which may be readily solvable, while others will be less so.

In researching for available water quality information, it was found that international, national, state and local agencies, organizations, scientists and academicians were involved in numerous studies, reports, plans and actions. Better coordination of their efforts and broader dissemination of their results were indicated.

b. Point Sources

With regard to point source discharges, completion of the MSDGC's Tunnel and Reservoir Plan will have a beneficial impact since combined sewer overflows and backflows to the Lake will be controlled. Discharges of pollutants from industrial and miscellaneous-type plants in the Calumet area can be expected to diminish as the result of wastewater recycling and of treatment facilities completed or planned. The Federal NPDES permit program will provide a needed means of measuring and assuring progress in pollution control.

Point source discharges directly and indirectly to the Lake in Indiana continue to impact upon water quality in Lake Michigan Basin-South, although corrective measures are being steadily implemented. Reductions in phosphorus loadings to the Lake from Indiana sources have already been recorded.

c. Nonpoint Sources

(1) Stormwater: Problems associated with urban stormwater runoff continue to exist, but are difficult to quantify. In relation to total pollutant discharges from all sources, which are decreasing in the basin, the relative importance of stormwater may increase. The increasing concentrations of chlorides were previously noted.

(2) Dredging: Lake Calumet, the Calumet River and the channel to Navy Pier require periodic dredging to maintain navigable depths. Potential pollution from dredging includes localized and short-term suspension of bottom sediments, turbidity, nutrient activation, and destruction of habitat. Adverse effects are possible if dredge spoils are not disposed of properly, but current disposal practices do not appear deficient.

(3) Shore Erosion: Erosion of Lake Michigan's shoreline historically has varied in severity according to lake levels. Shoreline erosion and the sediment created by erosion are potential long-term problems unless measures to control Lake levels or to protect the shoreline are taken. Shoreline erosion was among the problems addressed by the Illinois Coastal Zone Management Program.

(4) Marine Activities: Watercraft wastes and oil spills may be continuing water pollution problems, depending upon the success of surveillance and enforcement programs designed to bring about compliance with regulations. A recently signed Memorandum of Understanding provides for a coordinated U.S.-Canadian aerial surveillance system. It will monitor pollution from shipping activities on the Great Lakes and may be an important step toward improved controls.

(5) Air Pollution: The impacts on water quality from air pollution have only recently been quantified with any degree of reliability, mainly through efforts of the International Joint Commission (IJC). In its July 1978 "Strategic" report, it was noted that the total phosphorus load to Lake Michigan was estimated as 6,350 metric tons per year, with twenty-six per-cent derived from the atmosphere. Phosphorus loads in 1976 exceeded the recommended target loads in all of the six Great Lakes. However, the point source control programs recommended for Lake Michigan, when fully implemented, will be sufficient to meet the target loads.

Toxic substances have gained access to the Great Lakes from diffused sources, especially atmospheric deposition. Lead enters the lakes in substantial quantities through atmospheric deposition, and it is believed that mercury also enters in a similar manner, although this has not been confirmed. The highest loadings of lead, mainly from nonpoint sources, were found in Lake Michigan and Lake Erie.

(6) Boundary Conditions: The International Joint Commission has identified one general out-of-state problem area in Lake Michigan which impacts on water quality in Lake Michigan Basin-South. This is the Indiana Harbor area, located about four miles southeast of the Illinois State line. This area was identified as being the most polluted in Lake Michigan due to heavy municipal and industrial waste loadings. The main pollutants have been ammonia, oil, iron, fecal coliform, phenols, cyanide, and some heavy metals. Because of near shore water currents, pollutants originating in the Indiana Harbor area frequently are transported to the Illinois waters of Lake Michigan. Concern for this problem area has been longstanding, and remedial measures are being implemented on a gradual basis.

Pollution originating from the Milwaukee area is also a recognized interstate problem, and is associated with the discharge of municipal effluent to the Lake and its tributaries, as well as combined sewer overflows. The problem was confirmed in recent and ongoing litigation between Wisconsin and Illinois. In the latest stage, a U.S. Court of Appeals has ruled that combined sewer overflows in the Milwaukee area must be eliminated in order to afford protection to the people of Illinois. An earlier lower court ruling which would have required Milwaukee to upgrade its treatment capability from secondary to advanced waste treatment levels was overruled, however.

d. Near Shore Conditions

There is a significant difference in water quality between the near shore and offshore waters of Lake Michigan. However, the dividing line between these waters is not clearly defined. The IJC has recognized that the physical boundaries vary considerably, ranging essentially from zero width, where the waters are completely mixed, to several kilometers distance from the shore. Such factors as wind direction, intensity and duration, as well as shoreline and lake bottom morphology influence the extent of the zone. The near zone has higher concentrations of most pollutants and there is a dynamic mixing of waters. It is the area most affected by man's activities and its importance is reflected by its use as the source of water for potable purposes, recreation and other activities. The IJC recommends that greater emphasis be placed in the future on studies of the near shore areas.

e. Organic Compounds

Pesticides and polychlorinated biphenyls (PCBs) have been a cause for concern, although conditions appear to be improving.

(1) DDT: In 1976, DDT levels in Lake Michigan trout exceeded the 5.0 mg/kg. guideline, although there was a continuing declining trend. Recent (1978) tests by the Illinois Department of Public Health showed acceptable levels in fish flesh. A ban on the production and use of DDT undoubtedly has accounted for the favorable results, although elevated levels in sediments are still found in some locations.

(2) Aldrin - Dieldrin: During 1969, Lake Michigan fish contained concentrations just at or below the U.S. Food and Drug Administration guideline of 0.3 mg/kg. However, concentrations in 1975 and 1976 unexpectedly and unaccountably exceeded that limit. The use of aldrin and its derivative product, dieldrin, was banned in 1974, and should result in declining levels. This has been confirmed in 1978 fish flesh analyses which showed all results within the prescribed guidelines.

(3) PCBs: Polychlorinated biphenyls (PCBs) continue to be a problem, even though contamination of Lake fish appears to be declining. In 1978, test results of 20 trout of varying sizes taken from Illinois waters showed PCB levels to be well within the current guideline of 5 parts per million (ppm) in all samples. There is some concern, however, that larger trout and salmon (over seven pounds) may exceed the proposed lower guideline of 2 ppm. Diffuse sources, including atmospheric inputs, account for the major loading of PCBs to the Lake.

22.09 BASIN RECOMMENDATIONS

a. Overview

Measures for protecting and improving water quality in Lake Michigan Basin-South are derived from the recommendations in Chapters Four through Eight of the areawide plan and from problems identified in the preceding sections of this chapter.

b. Point Sources

(1) Publicly-Owned Wastewater Systems:

(a) The MSDGC should implement its 201 facilities plans as summarized in other basin chapters.

(b) The following listed Cook County communities having separate sewers should seek federal grants, and initiate and/or complete by July 1, 1981 sewer system evaluation studies as required by 40 CFR 35.927: Wilmette, Kenilworth, Winnetka, and Glencoe.

(c) The following listed communities having combined sewers within all of portions of their corporate limits should initiate and complete the same studies plus supplementary studies by July 1, 1981 to determine what improvements will be necessary to optimize local systems in order to take advantage of TARP capacity: Evanston, Wilmette, Kenilworth, and Chicago.

(d) All basin municipalities should seek to achieve continued reductions in water use in order to help reduce wastewater flows at publicly owned treatment plants. This should be accomplished through pricing policies, modification of building codes to require water conserving plumbing fixtures, metering in new developments, and public education.

(e) The treatment plant operators of the MSDGC should continue to assure the very high standard of performance for wastewater treatment plants which the 201 facilities plans assume.

(f) The IEPA should monitor treatment plant operation and performance and their effect on in-stream water quality.

(g) The IEPA should establish a technical assistance program to aid operators of treatment plants in dealing with technical problems and assuring a consistent high level of performance in treatment operations.

(h) In-stream water quality data collected by local treatment plant operators should be periodically published by IEPA.

(i) The MSDGC should control combined sewer overflows in the combined sewer area as provided by its Tunnel and Reservoir Plan (TARP). The implementation of TARP is critical to improving water quality throughout the combined sewer area, as well as in Lake Michigan, which currently receives backflows of polluted waters during flow reversals made necessary during periods of severe wet weather. Implementation also will further the 208 Plan goal which seeks to achieve the "elimination of all discharges of wastes or pollutants into Lake Michigan."

(j) Local governments in the basin should ensure that adequate pump-out facilities are maintained at all boat marinas and docks for the proper disposal of wastes generated aboard watercraft.

(2) Industrial Wastewater Treatment Plants:

(a) The IEPA should continue to enforce all requirements of NPDES permits for all industries in the basin and assure that treatment plants achieve and maintain required standards of plant performance. This can be accomplished through IEPA standards for treatment plant personnel and through frequent sampling and analysis of treatment plant effluents by the IEPA for the purpose of monitoring compliance with NPDES permits.

(3) Miscellaneous Wastewater Treatment Plants

(a) Miscellaneous-type wastewater treatment plants should continue in operation until such time as wastewater service can be provided by publicly-owned municipal-type wastewater systems on a cost-effective basis.

(4) Other Point Source Discharges:

(a) Other point source discharges should continue in operation and the IEPA should enforce all NPDES requirements.

c. Non-Point Sources

(1) Urban Stormwater Runoff

(a) By July 1, 1983, Cook County and all affected municipalities should implement measures working toward a reduction of BOD in urban stormwater runoffs from separately-sewered impervious surfaces of 50 percent of 1976 surface loadings in already urbanized areas and in newly urbanized areas tributary to the Lake. The implementing agencies should work through the

countywide water quality committee to develop plans and standards for the implementation of appropriate measures, such as street and catch basin cleaning; performance zoning; use of porous pavement surfaces; increased vegetative cover; grassed waterways; wetland storage of stormwater; stormwater detention; sedimentation and erosion controls; and other measures to achieve the desired pollutant reductions.

(b) As noted in Chapter Six, in the implementation of these and other measures, it is recommended that the countywide water quality committee develop a system whereby credit can be given to those units of government which are already more advanced in the application of preventive and corrective techniques for nonpoint source control.

(c) State highway organizations and facility engineering departments at state and federal installations should participate in the program described above by implementing accelerated and/or improved street sweeping programs for streets, roads and highways that are hydraulically connected to the Lake or its tributaries via stormwater conveyance systems.

(d) During the period up to July 1, 1983 agencies should utilize voluntary exploratory programs and implementing techniques to reduce pollutants from urban nonpoint sources.

(e) Within one year following the preparation by NIPC of a recommended model ordinance, all municipalities and the County of Cook should develop and enforce adequate erosion and sedimentation control ordinances. All such local ordinances should be consistent with minimal areawide standards set forth in the model ordinance.

(f) Within one year following the preparation by NIPC of a recommended model ordinance, all municipalities and the County of Cook should adopt and enforce adequate stormwater detention ordinances. These ordinances should include provisions which clearly establish long-term responsibilities for the maintenance of detention facilities. All such local ordinances also should be consistent with minimal areawide standards set forth in the model ordinance.

(g) Within one year following the preparation by NIPC of a recommended model ordinance, Cook County and all municipalities in the basin should adopt measures to control surface runoff from open storage yards containing industrial stockpiles and other materials which may go into solution or which may be carried away by stormwater runoffs and pollute streams and other water bodies.

(h) Municipalities, Cook County and the State Division of Highways responsible for de-icing streets and highways should develop programs to control the application of de-icing materials, to train personnel in proper application methods, and to use proper equipment in order to minimize any negative water quality impacts. The impact of de-icing agents on water quality will be given further study by the Commission in the continuing planning program. In the interim, local units of government should become familiar with technical materials on proper de-icing programs published by the USEPA, the Illinois Department of Transportation, and the Salt Institute.

(i) The Lakefront Interceptor Plan of the MSDGC by which existing storm drains would be diverted away from the Lake and its tributaries should be reviewed to determine appropriate costs and benefits. This is necessary because of the prohibition of federal construction grants by Section 211(c) of the Clean Water Act for projects designed to control pollution discharges from separate storm sewer systems.

(2) Air Pollution

(a) As part of the continuing planning program, the Commission in cooperation with the IEPA, the Illinois Institute for Natural Resources, the Illinois State Water Survey, and local air quality management agencies should analyze the relationships between air quality and water quality.

(3) Sanitary Landfills

(a) The IEPA should ensure that all sanitary landfills comply with regulations of the IPCB for their siting, design, construction and operation. As a substitute for existing state regulation, the IEPA and IPCB should consider certification of local solid waste disposal programs which comply with areawide plans to be prepared under the federal Resource Conservation and Recovery Act. Alternatives to land disposal of solid waste, including recycling, should be considered and utilized wherever feasible.

d. Waterways

(1) NIPC, in conjunction with the countywide water quality committee, in the continuing planning program should develop recommendations to simplify the highly fragmented system for channel maintenance and improvement. Present responsibilities for such functions as debris removal, streambank stabilization, public access, dredging, disposal of dredge spoil, protection and augmentation of habitat, tree shading and vegetation are shared between a host of federal, state and local authorities.

(2) Given the existence of federal navigation projects in Calumet Harbor, the Calumet River and at Navy Pier, local authorities should continue to cooperate with the Corps of Engineers in identifying and making available suitable dredge spoil disposal areas related to maintenance of the project depths.

(3) Bottom deposits in the Calumet River and Lake Calumet are often resuspended by heavily laden barges and deep draft vessels. Measures to control these resuspended sediments and thus improve water quality should be studied in the continuing planning program in joint research with the Corps of Engineers.

e. Residuals

(1) As regulated by the IEPA, present methods for the disposal of sludge from treatment plants are adequate to handle present and anticipated future volumes, and should continue to be effectively administered by the IEPA.

(2) Highest priority should be given to the use of sludge as a soil conditioner and to expanded efforts to utilize sludge for that purpose. The IEPA should assure proper practices in the utilization of sludge on agricultural lands through implementation of the draft standards in IEPA Technical Policy WPC-3 "Design Criteria for Municipal Sludge Utilization on Agricultural Land."

(3) The USEPA standards and the IPCB regulations for permits for disposal of hazardous or toxic substances should continue to be enforced by the IEPA.

f. Groundwater

(1) By July 1, 1980, the Illinois State Water Survey and the Illinois State Geological Survey should undertake a coordinated well sampling program to monitor groundwater quality in areas where a potential for infiltration by pollutants now exists or might exist in the future.

g. Boundary Conditions

(1) The USEPA, appropriate State pollution control agencies in Illinois, Indiana, and Wisconsin, and local agencies and districts should continue efforts to control the interstate pollution problems originating from Indiana Harbor and the City of Milwaukee.

h. Water Quality Data

(1) Given the vast amounts of information collected on water quality by a wide variety of agencies, institutions and individuals, more efective coordination of their efforts is indicated. Accordingly, it is recommended that the Great Lakes Basin Commission undertake a study to evaluate present procedures and develop a program which will improve coordination and the dissemination of summaries of proposals, work items, final reports, plans, or other resultant documents.

22.10 COSTS OF RECOMMENDED PLAN

a. Facility Plans

(1) General: There are no publicly owned treatment plants in this basin. MSDGC facility plans covering this basin are described in other basin chapters.

Because of their magnitude and complexity, special procedures were followed in depicting the MSDGC costs. Total costs of MSDGC improvements and locally funded improvements were taken from Table U7-IX-1 and from page 229 in the MSDGC's 1977 Facilities Plan Update Supplement. They were revised and updated in a conference with MSDGC staff representatives on March 14, 1978.

The cost of all MSDGC improvements was assumed to be spread throughout the MSDGC service area on an ad valorem basis. Thus, each basin's share of the cost was assumed to be proportional to the share of total District assessed valuation in that basin.

For locally funded improvements, the estimates for local sewer upgrading are current 1977 values from page 229 of the MSDGC 1977 Facilities Plan Update Supplement. For other local improvements, the estimates on pages XI-18 and XI-19 of the MSDGC Overview Report are as of January 1, 1975. Where applicable, costs were also updated at 12 percent compounded for the intervening period to January 1977 levels.

The costs of local improvements were allocated differently, depending upon the particular type of project. Local sewer upgradings required as supplements to the TARP apply only to communities in the TARP service area. A basin's share of the total cost of these upgradings was assumed to be equal to the percentage share of the total TARP area assessed valuation in TARP communities in that basin.

For local sewer improvements within the MSDGC's jurisdiction that are outside the TARP area, the costs were allocated to non-TARP communities in each basin in accordance with their share of the total assessed valuation for all non-TARP areas.

(2) Summary of Future Costs: Tables 22-16 and 22-17 distribute capital costs within 5-year time frames for the Lake Michigan Basin-South and Wolf Lake areas, respectively. Annual operating and maintenance costs are also shown.

(3) Annualized Local Capital Costs: Tables 22-18 and 22-19 shows annualized local capital costs for the Lake Michigan Basin-South and Wolf Lake areas, respectively.

(4) Projected Increased Annual Costs: Tables 22-20 and 22-21 show the estimated annual increases in wastewater charges per household for residents in the two areas.

b. Urban Stormwater:

Methods for controlling pollution in urban stormwater runoff in separately sewered areas include street sweeping, catch basin cleaning, performance zoning, use of porous pavements, increased vegetation, grassed waterways, wetland storage of stormwater, stormwater detention, and erosion and sediment controls. Cook County and all municipalities in the basin having separately sewered areas draining into Lake Michigan should implement measures working toward a 50% reduction in BOD loadings from presently urbanized areas and for areas urbanized in the future. The cost of the mix of specific practices which will meet these goals is dependent upon the practices selected and the intensity of their individual use.

The estimated total costs, based solely on street cleaning utilizing vacuum sweepers through the year 2000 are shown for the Lake Michigan Basin-South and Wolf Lake areas in the tables noted above.

The above costs do not include street cleaning in combined sewer areas where the stormwater runoffs will be treated. Naturally, some street cleaning activities will be required in those areas for sanitary or public relations reasons.

22.11 WATER QUALITY CONDITIONS IN 1983

According to Section 101(a) of PL 92-500, it is the national goal that "wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish and wildlife, and provides for recreation in and on the water shall be achieved by July 1, 1983."

The waters of Lake Michigan now provide good quality aquatic habitat, and fish collections indicate a diverse assemblage. Recreational opportunities in and on the waters are of the highest order, and the 1983 goals are currently met. Admittedly, on rare occasions following severe rain events, certain beaches are closed for short periods of time. The unsatisfactory water quality is caused by stormwater flows into the Lake, or by backflows of stream waters polluted with combined sewer overflows.

Wolf Lake and Powder Horn Lake are classified for General Use. IEPA water quality data for Wolf Lake indicate no serious violation of standards. However, in its initial inventory of all publicly owned lakes greater than 20 acres in size, the IEPA noted that all are "noticeably eutrophic" to some degree. Given the nonpoint source controls which are recommended by the Plan, water quality conditions will improve. Thus, while the 1983 goals are currently met, they will be further enhanced by that year.

TABLE 22-16: SUMMARY OF FUTURE COSTS (All data in 1977 dollars in millions)

LAKE MICHIGAN BASIN-SOUTH

Jurisdiction	Capital Costs						Annual Operations & Maintenance Expense				
	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	Total	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)
MSD	124.87	0.97				125.84	0.28	1.09	1.14	1.14	1.14
Local Improvements Related to MSD	31.19	4.98				36.17					
Urban Stormwater Management Expense*							0.1	0.1	0.1	0.1	0.1
TOTAL	156.06	5.95				162.01	0.29	1.10	1.15	1.15	1.15

*Does not include Lakefront Interceptor costs.

TABLE 22-17: SUMMARY OF FUTURE COSTS (All data in 1977 dollars in millions)

WOLF LAKE AREA

Jurisdiction	Capital Costs						Annual Operations & Maintenance Expense				
	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	Total	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)
MSD	24.10	0.19				24.29	0.05	0.21	0.22	0.22	0.22
Local Improvements Related to MSD	6.02	0.96				6.98					
Urban Stormwater Management Expense							0.002	0.002	0.002	0.002	0.002
TOTAL	30.12	1.15				31.27	0.05	0.21	0.22	0.22	0.22

*Local Capital Amortized @ 7% for 20 yrs.

TABLE 22-18: PROJECTED ANNUALIZED LOCAL COSTS (All data in 1977 dollars in millions)

LAKE MICHIGAN BASIN-SOUTH

Jurisdiction	CAPITAL COSTS			LOCAL CAPITAL PLUS O & M ANNUALIZED Costs (Mil./yr.)*					Comments
	Cost Total Through Yr. 2000	Est. Fed'l. Share	Est. Local Share	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	
MSD	125.84	94.38	31.46	3.23	4.06	4.11	4.11	1.16	
Local Improvements Related to MSD	36.17	27.13	9.04	0.74	0.85	0.85	0.85	0.12	
Urban Stormwater Management Expense				0.1	0.1	0.1	0.1	0.1	
TOTAL	162.01	121.51	40.50	3.98	4.92	4.97	4.97	1.29	

TABLE 22-19: PROJECTED ANNUALIZED LOCAL COSTS (All data in 1977 dollars in millions)

WOLF LAKE AREA

Jurisdiction	CAPITAL COSTS			LOCAL CAPITAL PLUS O & M ANNUALIZED Costs (Mil./yr.)*					Comments
	Cost Total Through Yr. 2000	Est. Fed'l. Share	Est. Local Share	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	
MSD	24.29	18.22	6.07	0.62	0.78	0.79	0.79	0.22	
Local Improvements Related to MSD	6.98	5.24	1.74	0.14	0.16	0.16	0.16	0.02	
Urban Stormwater Management Expense				0.002	0.002	0.002	0.002	0.002	
TOTAL	31.27	23.46	7.81	0.76	0.94	0.95	0.95	0.24	

TABLE 22-20: PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST

LAKE MICHIGAN BASIN-SOUTH

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	1049.2	1068.6	1090.8	1112.8	1130.3	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.351	.357	.351	.344	.012	
O & M Related	.028	.103	.105	.103	.102	
Total Rate:	.379	.460	.456	.447	.114	
Additional Cost per Home of $45,000 FMV ($/yr.)	56.85	69.00	68.40	67.05	17.10	
Existing Av. Annual WW Cost ($/Household yr.)	72.60					
Total Av. Annual WW Cost ($ / Household yr.)	129.45	141.60	141.00	139.65	89.70	
Percent Av. Increase* in WW Costs per Household (%)	78.3	95.0	94.2	92.4	23.6	

*Total Rate Used

TABLE 22-21: PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST

WOLF LAKE AREA

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)	Comments
Assessed Valuation (Mil. $)	202.5	206.3	210.5	214.8	218.2	
Additional Ad Valorem Rate: ($/$100 A.V.)						
Capital Related	.349	.353	.345	.341	.009	
O & M Related	.026	.103	.106	.102	.102	
Total Rate:	.375	.456	.451	.443	.111	
Additional Cost per Home of $45,000 FMV ($/yr.)	56.25	68.40	67.65	66.45	16.65	
Existing Av. Annual WW Cost ($/Household yr.)	72.60					
Total Av. Annual WW Cost ($ / Household yr.)	128.85	141.00	140.25	139.05	89.25	
Percent Av. Increase* in WW Costs per Household (%)	77.5	94.2	93.2	91.5	22.9	

*Total Rate Used

CHAPTER 23

Kankakee River

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CHAPTER TWENTY-THREE: KANKAKEE RIVER BASIN

23.01 DESCRIPTION OF THE BASIN

a. Physical Characteristics

(1) Geography: The Kankakee River drains an area of 5,165 square miles in northwestern Indiana and northeastern Illinois, of which 368 square miles are in the NIPC 208 planning area. In this chapter, the term "Kankakee River Basin" will refer only to that portion of the basin within Will County, plus a small area in southwestern Will County drained by the Illincis River but considered as part of the Kankakee River basin for purposes of this report. Nineteen of the river's 59 Illinois miles are in this area. The river flows through Will County to its confluence with the Des Plaines River just west of the Will-Grundy County Line. The basin is 40 miles long and 12 miles wide at its widest point, encompassing most of southern Will County. Figure 23-1 is a basin location map of the Kankakee River.

Some environmentally sensitive areas (generally nature preserves and wildlife habitats) are found in the western portion of the basin. The most unique of these is a sandy slough near the Kankakee River in Custer Township. There are also 15 wetlands, three prairies, and two forested areas of special concern, the largest of which is the Kankakee River State Park.

(2) Waterways: The waterway network in the basin is relatively simple, consisting of eight lakes and ponds over 10 acres in size and a number of tributary streams. The streams are described in Table 23-1. Most of the basin's lakes are abandoned quarry or strip-mining sites, and are described in Table 23-2. In the Illinois River Basin, there are numerous small lakes created by abandoned strip mines. Also, Claypool Ditch conveys flow westward across the Will-Grundy County Line to the Illinois River.

(3) Geology and Soils: Deposits of unconsolidated glacial drift range from one foot to 150 feet in thickness above bedrock, with the average between 50 and 100 feet. The most abundant surficial material is till, which is relatively impermeable and has limited capability for groundwater recharge. There is a risk of polluting surface waters from applications of wastes, fertilizers, or agrichemicals to till soils, since these run off with stormwater.

Large quantities of sand and gravel occur at or near the surface in the Kankakee River drainageway, approaching a thickness of 50 feet near Channahon. Infiltration is rapid in these materials, and pollutants may enter groundwater as a result of leachate from landfills, discharges from septic tanks, and the surface application of wastes, agrichemicals, or fertilizer.

TABLE 23-1: STREAM INVENTORY

STREAM NAME	LENGTH (MILES)	AVG. WIDTH (FT.)	WATER SURFACE (ACRES)	GRADIENT (FT/MILE)	DRAINAGE AREA (SQ. MILES)	COMMENTS
BLACK WALNUT CREEK	11.0	15.0	20.0	5.4	NA	
FORKED CREEK	13.5	25.8	42.2	2.5	111.0	
HORSE CREEK	NA	NA	NA	NA	128.0	
KANKAKEE RIVER	19.0	788.0	1815.2	1.5	368	(1)
PRAIRIE CREEK	15.3	28.1	52.1	14.7	24.8	
TERRY CREEK	NA	NA	NA	NA	NA	
TRIM CREEK	6.5	12.8	10.1	6.2	NA	

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(1): Figures for Kankakee River refer only to the Will County portion of the basin. Total drainage area, including Indiana is 5,165 square miles.

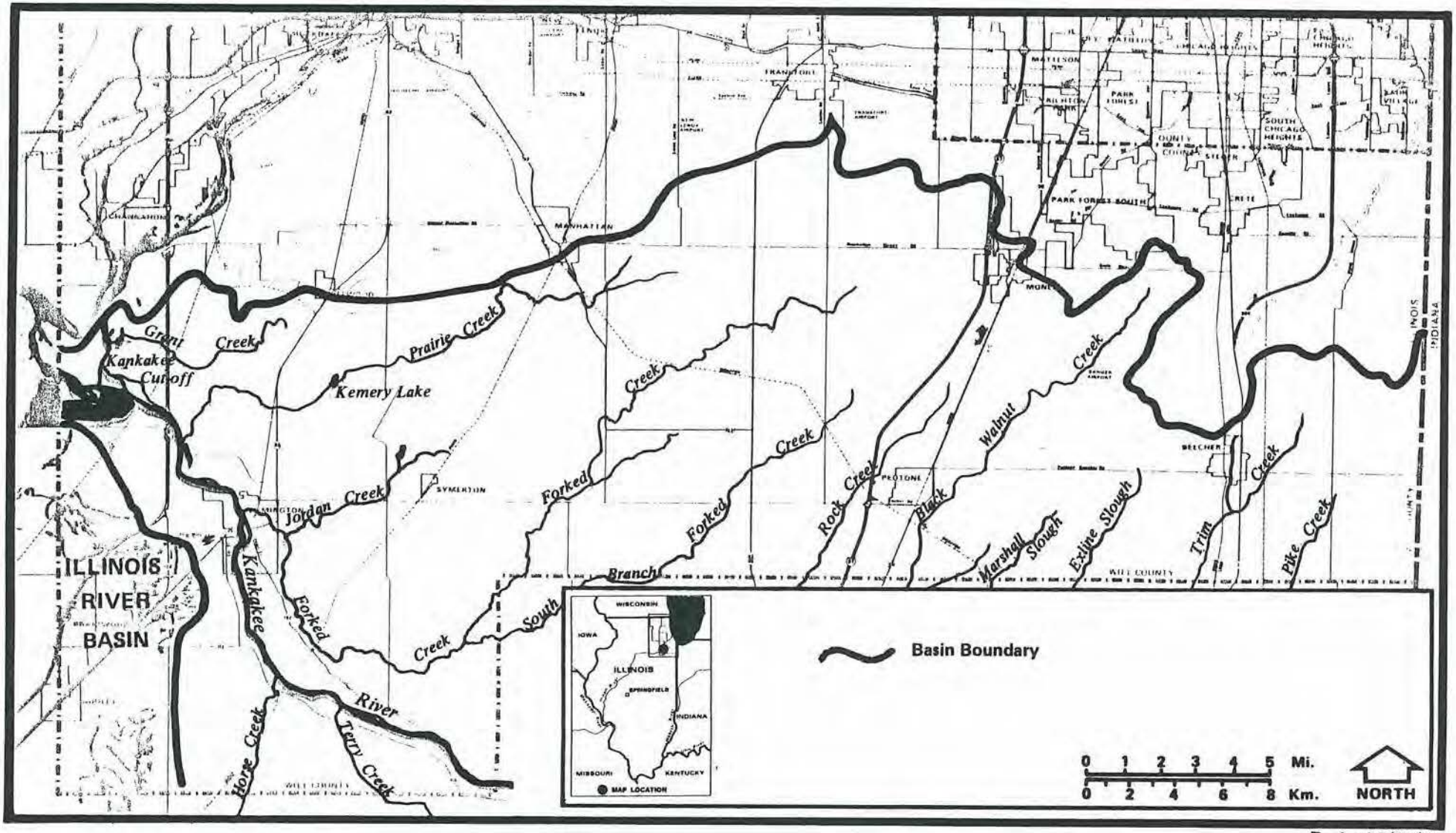
TABLE 23-2: LAKE AND POND INVENTORY

NAME	LOCATION			SURFACE AREA (ACRES)	SHORE-LINE (MILES)	MAXIMUM DEPTH (FT)	WATER-SHED (ACRES)	DATE CON-STRUCTED	OWNER-SHIP	ACCESSIBILITY
	TWP N	RNGE E	SECT							
ARROWHEAD CLUB LAKE	32	9	28,33	100.0	5.5	51	NA	1930	Org.	Members & Guests
BRAIDWOOD REC. CLUB	32	9	3,4, 9,10	NA	NA	NA	NA	1920	Org.	Members & Guests
CLEAR LAKE	33	9	18	30.5	2.8	40	NA	1945	Org.	Members & Guests
COMMONWEALTH EDISON-DRESDEN LAKE	33	8	12	865.0	NA	NA	NA	NA	Private	Authorized Personnel
DES PLAINES GAME FARM LAKE	33	9	15,22	21.4	1.0	9.5	NA	1961	State	Open to Public
IZAAK WALTON LODGE LAKE DOWNS	34	13	32	40.0	2.0	40	NA	1916	Org.	Members & Guests
NEW LENNOX RECREATION CLUB	32	9	3	38.6	NA	NA	NA	1930	Org.	Members & Guests
SOUTH WILMINGTON SPORTS-MENS CLUB	32	9	33	43.2	NA	NA	NA	1930	Org.	Members & Guests

*Local Capital Amortized at 7% for 20 yrs.

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Figure 23-1: BASIN LOCATION



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Shallow, fine-grained glacial lake deposits are found east and west of the river valley, underlain and surrounded by till. These deposits are low in permeability and are similar to till in hydraulic behavior. Coarser grained sands are also found in outwash plains east and west of the river, sometimes reaching 40 feet in thickness. These materials are similar to the glacial sand and gravel deposits but are underlain by till.

Areas along the main river valley and its major tributaries are severely restricted for land burial of wastes, septic tank usage, the land application of wastes, and the application of fertilizers and agrichemicals because of shallow depths to bedrock or to surface aquifers. Remaining areas in the basin have little or no restrictions on land burial of wastes, but they may not be suitable for land applications of waste or for septic tank usage because of waste acceptance problems or the shallowness to bedrock.

Soils vary in type and properties that indicate the potential for negative effects on water quality under certain conditions. Predominant soils in northeastern Illinois are described in Chapter Three. Soils occurring in the basin are identified in Table 23-3.

b. Socio-Economic Characteristics

(1) Population: The estimated 1975 population of the basin was 25,323, representing 9 percent of Will County's estimated 1975 population of 296,224. Population density (69 persons per square mile) is among the lowest in northeastern Illinois. The largest community in the basin, Wilmington, had an estimated municipal population of 4,685 in 1975, while the smallest, Symerton, had 183.

Table 23-4 shown population forecasts and facilities planning areas the basin. Projected wasteloads for facilities planning areas (which are discussed later in this chapter) are based in part on these forecasts.

(2) Land Use: As indicated in Table 23-5, land use in the basin is dominated by the category of "Vacant, Agricultural, and Forest Areas," most of which is agricultural land. Land in the second largest category, "Military Services," is largely accounted for by the Joliet Army Ammunition Plant. Portions of this site are actually in agricultural use, having been leased to farmers.

Other land uses take up a relatively small proportion of the basin. Communities are typically small farm service centers, with little or no manufacturing activity. Public and quasi-public open space is limited to a few small forest preserves, plus the Kankakee River State Park and the Des Plaines Conservation Area, both located on the Kankakee River in southwestern Will County. Extensive areas of strip-mined land are found in the southwestern corner of the basin.

TABLE 23-3: PREDOMINANT SOIL UNIT CHARACTERISTICS FOR NORTHEASTERN ILLINOIS

Unit In Basin	Soil Unit	Soil Color	Soil Texture	Permeability	Drainage	Subsoil Texture	Underlying Materials	Agricultural Usage Limitations	Approximate Percentage of Prime Agri. Land	Development Usage Limitations
	Fox-Dresden-Casco	brown	loam	mod-rapid	well	loam	sand and gravel	E, D, LF	12	S, E, ST
Yes	Warsaw-Rodman-Lorenzo	brown	loam	moderate	well	loam	sand and gravel	E, D	50	S, E, ST
Yes	Volinia-Selma-Lomax	brown	loam	moderate	excessive	loam	sand	WE, D, W	80	W, S, P
Yes	Maumee-Watseka-Plainfield	black	loamy sand	rapid	excessive	sand	sand	W, WE, D	30	S, W
	Zurich-Grays-Wauconda	gray	silt loam	moderate	moderate	clay loam	silt loam	W, E, LF	90	S, W, ST
Yes	Drummer-Brenton-Proctor	brown	silt loam	moderate	moderate	clay loam	loam	W, E	100	W, S, P
	Miami-Kidder-McHenry	gray-brown	loam	moderate	well	clay loam	loam	E, ST, LF	40	ST, S, SS
	Drummer-Saybrook-Lisbon	dark gray	silt loam	moderate	moderate	clay loam	loam	W, E	80	W, S, SP, SS
	Ringwood-Griswold	brown	loam	moderate	well	clay loam	sandy loam	E, W	85	S, W, ST
Yes	Morley-Markham-Ashkum	gray	loam	slow	moderate	silty clay	clay loam	E, W, LF	60	ST, SP, SS, W, HC
Yes	Elliot-Ashkum-Beecher	dark gray	silt loam	slow	moderate	silt loam	clay loam	W, E	85	W, SP, CS, SS
	Milford-Martinton	black	silt loam	mod. slow	poor	silty clay	calcareous sediment	W	95	W, HC, P, SP, SS
	Symerton-Andres-Ashkum	black	silt loam	moderate	moderate	clay loam	clay loam	E, W	95	W, SP, SS
	Nappanee-Peotone-Del Rey	dark gray	silt loam	slow	well	silt loam	calcareous sediment	W, T, LF, E	50	W, SP, HC, P
Yes	Frankfort-Bryce-Montgomery	dark brown	silt loam	slow	poor	silty clay	calcareous sediment	W, T, LF, E	5	W, SP, HC, P
	Romeo-Joliet	black	loam	moderate	poor	loam	limestone	W, STN, FL	60	W, SH, FL, SS
Yes	Otter-Huntsville-Millington	black	loam	moderate	moderate	loam	loam	FL, W	95	W, FL
	Fox-Wauconda-Sawmill	dark gray	silt loam	moderate	poor	loam	sand	W, FL, E	75	W, FL
Yes	Houghton-Lena	black	muck/peat	rapid	poor	muck/peat	sand/silt	HWT, W	0	W, P, S, HWT, LS

USAGE LIMITATION CODES

CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
CS	Clayey Subsoil	D	Drouthiness	E	Erosion	FL	Flooding
HC	Heavy Clayey Subsoil	HWT	High Water Table	LF	Low Fertility	LS	Low Strength
P	Ponding	S	Seepage	SH	Shallowness to Bedrock	SP	Slow Percolation
SS	Shrink-Swell	ST	Steepness	STN	Stoniness	T	Soil Tilth
W	Wetness	WE	Wind Erosion				

TABLE 23-4: POPULATION CHANGE 1975-2000

FACILITY PLANNING AREAS	1975	1980	1985	1990	1995	2000	% Change 1975-2000
Beecher	2000	2200	2700	3200	4000	4500	125.0
Peotone	2800	3200	3300	3300	3700	4000	42.9
Wilmington	5900	5500	6100	6800	7500	8200	39.3
Symerton	180	200	200	200	200	200	11.1
Total Basin FPA's	10880	11,100	12,300	13,500	15,400	16,900	55.3
Basin Total	25323	27974	31,079	34,184	39,304	44,423	75.4
Braidwood	2500	2800	3,000	3,200	3,300	3,400	36.0

Source: Northeastern Illinois Planning Commission

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TABLE 23-5: 1970 LAND USE

Land Use Category	Total Acres	% of Total
Single Family Residential	3799	1.6
Multi Family Residential	9	0
Mobile Home Parks	16	0
Manufacturing and Processing	114	.1
Transportation, Communications, & Utilities	791	.3
Railroad Rights-of-way	1120	.5
Airports	50	.1
Streets & Parking	5275	2.2
Trade	100	.1
Services-Private	22	0
Services-Institutional	144	.1
Military Services	17495	7.4
Cemetaries	145	.1
Entertainment Assembly	0	0
Public Buildings	0	0
Public and Quasi-Public Open Space	3630	1.5
Mining and Quarries	3178	1.4
Vacant, Agricultural & Forest Areas	197339	83.7
Vacant-Under Development	305	.1
Water	2192	.9
Warehousing	36	0
Shopping Centers	0	0
Hotels-Motels	12	0
Parking Lots	0	0
Total	235772	100.0

NIPC land use forecasts anticipate increasing urbanization with accompanying changes in land use (Table 23-6). The largest proportionate increases are forecast in nonresidential land use categories, particularly in land for manufacturing and commercial purposes. However, the total acreage of undeveloped (vacant, agricultural, forested) land is forecast to decrease by only about 3 percent by the year 2000.

(3) Economy: A relatively small proportion (15 percent) of the population was employed in non-farm activities in 1970. Total employment was estimated at 3,863 employees in 1970 and is forecast to increase by 122 percent, to approximately 8,577 employees by the year 2000. Most of this increase will be realized by 1980, after which growth will slow, and manufacturing employment will show a slight decline. See Table 23-7.

(4) Water Supply: Groundwater pumpage is the sole current source of private domestic and public water supply in the basin. Dolomite wells represent 39 percent of total groundwater pumpage, while deep sandstone wells account for 61 percent.

(5) Government: That portion of the basin lying within the NIPC planning area is located in Will County. Included in this area are all or parts of 15 townships, 8 municipalities, 24 drainage districts, and 2 other special districts with responsibilities relating to water quality.

(6) Recreation: Recreational areas and facilities, both public and private, are concentrated in the western portion of the basin. The largest public areas are the Des Plaines Conservation Area and the Kankakee River State Park with facilities for camping, hiking, picnicking, fisning, boating, and canoeing. Private facilities include private marinas along the Kankakee River and private sports clubs with facilities for hunting, fishing, and swimming. Bottomlands along the Kankakee River are good waterfowl and deer hunting areas. Public hunting of game birds and deer is allowed in the Des Plaines Conservation Area on a permit basis; however, most hunting is done on private lands.

23.02 IMPACTS OF OTHER PROJECTS

a. Introduction

In many basins there are studies or projects underway which may directly or indirectly affect surface and/or groundwater quality. Most will have indirect effects since they usually pertain to water quantity or hydrologic modifications. Included in these classifications are the flood control activities of the U.S. Soil Conservation Service (SCS), the U.S. Army Corps of Engineers, and the

TABLE 23-6: LAND USE FORECASTS (ACRES)

Land Use Category	1980	1985	1990	1995	2000
Residential	4198	4455	4712	4989	5266
Manufacturing	447	671	894	1131	1368
Commercial	442	661	880	1123	1366
Transportation/Communication, etc.	20188	20553	20918	21326	21733
Open Space, Vacant Agriculture, etc.	210497	209432	208368	207203	206039
Total	235772	235772	235772	235772	235772

SOURCE: Northeastern Illinois Planning Commission, 1976

TABLE 23-7: EMPLOYMENT FORECAST

CATEGORY	1970	1980	1985	1990	1995	2000	1970-2000 % Increase
Manufacturing	1660	3804	3710	3615	3640	3666	120.8
Local Retail	679	881	975	1069	1028	988	45.5
Other	1524	2709	3023	3337	3600	3863	153.5
Total	3863	7394	7707	8021	8299	8577	122.0

illincis Division of Water Resources. Also, of direct impact, are the soil conservation programs of the SCS.

There are also many local, county, state and federal public works projects other than those related to water quality per se which impact on local water bodies. Perhaps the most significant type involves the construction or improvement of roads and highways. In those instances, drainage patterns may be altered, local farm tiles may be interrupted, silt may be introduced during construction, and vehicular pollutants may be conveyed to rivers and streams thereafter, all affecting water quality. Waterway crossings by highway projects and similar crossings by various public and private utilities all affect water quality to varying degrees and for various lengths of time. Not to be overlocked are public and private storm sewer outlets which may be authorized in the future.

As can be seen, a wide variety of projects can impact on water quality. However, attention will be given here only to those of significant size or breadth of impact.

b. Corps of Engineers

The U.S. Army Corps of Engineers has a variety of responsibilities relating to navigation and flood control.

(1) Navigation: The Corps has general jurisdiction over navigation in the waters of the United States. The Corps has no active navigation projects in the portion of the Kankakee Basin included in this plan. Some inspection work relative to the need for clearing and snagging of navigable waters was done recently in the Indiana portion of the basin from Route 30 to the Illinois-Indiana State Line. Results of the inspection are not yet available.

(2) C-SELM Studies: Pursuant to Section 206 of the Flood Control Act of 1958 and resolutions adopted by Congress in 1971, the Corps was involved in a planning study on alternative wastewater management systems for the Chicago-South End of Lake Michigan (C-SELM) area, which covered portions of northeastern Illinois and northwestern Indiana. Specifically, the study involved an evaluation of various regional wastewater management systems, including plans which would eliminate pollution discharges. An initial pilot study was completed in 1974. The report contained no recommendations for federal action with respect to any of the wastewater management systems evaluated. The intent of Congress was for these studies to be presented to local units of government for their consideration and adoption, as desired.

(3) Dredge and Fill Permits: Under Section 404 of PL 92-500, the Corps is authorized to issue permits for the placement of dredged or fill material into navigable waters

or on adjacent land sites. Permits may be withheld if it is determined that the discharge of materials will have adverse effects on water supplies, fish and wildlife, or recreation. Under current guidelines, Corps authority extends to all navigable waters and tributaries thereto, up to points where the average annual flow is 5 cfs or more.

(4) Dam Inventory and Inspection: By authority of the National Dam Inspection Act dated August 8, 1972 (PL 92-367), the Corps is required to inventory all dams (whose upstream hydraulic elevation is greater than 6 feet or whose storage capacity is greater than 50 acre/feet). Actual inspection of dams in the basin is dependent on the hazard potential to area residents.

(5) Flood Control: The Corps traditionally has been the principal federal agency involved in flood control matters, particularly on larger rivers. Authority for Corps activity is granted in general legislation as well as in a series of flood control acts, the first of which was enacted in 1936. However, the corps has no such studies or projects authorized for this basin.

c. U.S. Department of Agriculture

The U.S. Agricultural Stabilization and Conservation Service (ASCS) and the Soil Conservation Service are the two principal units of the U.S. Department of Agriculture having programs related to water quality management.

(1) Conservation Programs: The SCS and ASCS provide a variety of functions and services directed at reducing soil erosion. The SCS offers extensive technical assistance to individuals, local soil and water conservation districts, and other interested parties in developing erosion control plans. The ASCS gives assistance through cost-sharing to farmers in order to control erosion and agriculturally related water pollution. Various site specific control techniques can be instituted under this program depending upon the nature of problems.

(2) PL 83-566 Projects: The small watershed program of the SCS, authorized by the Watershed Protection and Flood Prevention Act of 1954 (PL 83-566) provides a framework through which federal, state, and local units of government can deal with local water resources problems on a cooperative basis. The program is principally oriented toward the prevention of soil erosion and the control of flooding and sedimentation damages. Works typically include the construction of small reservoirs, stream channelization, grade stabilization, and bank protection. Projects are sponsored by and coordinated through local soil and water conservation districts and other interested agencies.

(3) SCS Study (Indiana): This study (final draft dated July 1976) was prepared by the State of Indiana, the Soil Conservation Service, and the U.S. Geological Survey. It provides physical and economic information regarding the Indiana portion of the basin, including identification of problems and needs, as well as an analysis of alternatives to deal with issues. The report covers use and management of land for long-term agricultural production; control of flooding; control of soil erosion in isolated areas; installation of adequate crop drainage systems; improvements in land-based recreational opportunities; and protection of prime wetlands. A corresponding study by the SCS in Illinois has not been prepared. Illinois citizens have expressed concern that construction of levees and removal of shoals, designed to contain and expedite the passage of flood flows, would have adverse impact on lower lying lands.

d. U.S. Environmental Protection Agency

The Chicago Region V office of USEPA is preparing a toxic hazardous substances report for selected segments of the basin. This study was given high priority due to widespread use of the Kankakee for water supply, recreation, and fishing. Work involves the identification of significant potential dischargers of these substances, sampling of ambient river conditions at six sites, fish sampling at most of these sites, fish tissue analyses, and preparation of a report.

e. Illinois EPA 208 Planning

The IEPA is preparing a Water Quality Management Plan under Section 208 of PL 92-500 for the Kankakee River Basin exclusive of the portion in Will County. A draft report on water quality was published in January 1978. Its significant recommendations relating to the Kankakee River Basin in Will County call for improving the quality of the treatment plant effluent of three dischargers in the basin which do not appear to be meeting their current standards. (Two of these are in Will County). Other findings concern non-point source controls directed toward reducing the erosion and sedimentation associated with agricultural and construction activities and the pollutants in urban runoff.

f. Illinois Department of Transportation

Two divisions of this Department have duties and responsibilities related to water quality management: the Division of Water Resources (IDWR) and the Division of Highways (IDH).

(1) Illinois Division of Water Resources: The IDWR has statutory responsibility for navigation and flood control projects on water bodies throughout the state, as well as permit authority for private and public projects which enter or cross over or under such waters. The IDWR also has underway a number of flood control projects in the region. Current work involves studies for the Kankakee River Basin Task Force. Recommendations for improvements in portions of the Kankakee for recreational boating activities are presented in the draft report.

(2) Illinois Division of Highways: The Division of Highways is responsible for the construction and maintenance of state highways. Highways have associated water quality impacts both during their construction (e.g. erosion and sedimentation, disruption of drainage, etc.) as well as when placed in use. A transportation study is currently being prepared by the Will County Regional Planning Commission and the Will County Highway Department as well as other agencies. Results of the study will identify needed highway maintenance and capacity improvements for the next five years. This will more than likely involve arterials in the Kankakee Basin.

g. Kankakee River Task Force: See Section 23.03d(8) below

h. Northwestern Indiana Regional Planning Commission

The Northwestern Indiana Regional Planning Commission (NIRPC) is the regional planning agency for Lake and Porter counties, Indiana, the former of which is adjacent to Cook and Will counties in Illinois. NIRPC has recently completed a 208 water quality management plan for its jurisdictional area. Due to the commonality of interest in certain water bodies of an interstate nature (Lake Michigan, Grand Calumet River, Kankakee River, and Little Calumet River), water planning activities of NIPC and NIRPC have been coordinated for some time. The mechanism for this interstate coordination is the Illinois-Indiana Bi-State Commission, which was created to help coordinate planning programs and public construction projects of mutual concern to northeastern Illinois and northwestern Indiana.

i. Northeastern Illinois Planning Commission - Regional Water Supply Plan

This plan covers water supply issues, problems, goals, objectives, policies, criteria, standards, recommended sources of supply, and new subregional water supply systems for the SLK county area of northeastern Illinois. Municipalities designated in the plan as having the Kankakee River as the preferred future source of potable water include Elwood, Joliet, Rockdale and Wilmington.

j. Local Units of Government

Municipalities, Will County, and special purpose districts are involved in a number of local projects which have direct or indirect quality impacts. General purpose units are empowered to adopt ordinances regulating flood plains on-site stormwater detention and soil erosion and sedimentation. All of these have the potential for at least peripheral impacts on water quality. Still other effects result from more routine activities such as street sweeping, sewer and catch basin cleaning, and solid waste management. Building permits involving stormwater drainage systems which discharge into local streams can have significant water quality implications.

23.03 WATER QUALITY IN THE BASIN

a. Applicable State Standards and Designations

All waterways in the basin are designated as "General Use, Protected for Public and Food Processing Water Supply" and are subject to state standards for waterways with such designation. A full discussion on General Use standards and other standards applicable to water quality is included in Chapter Four.

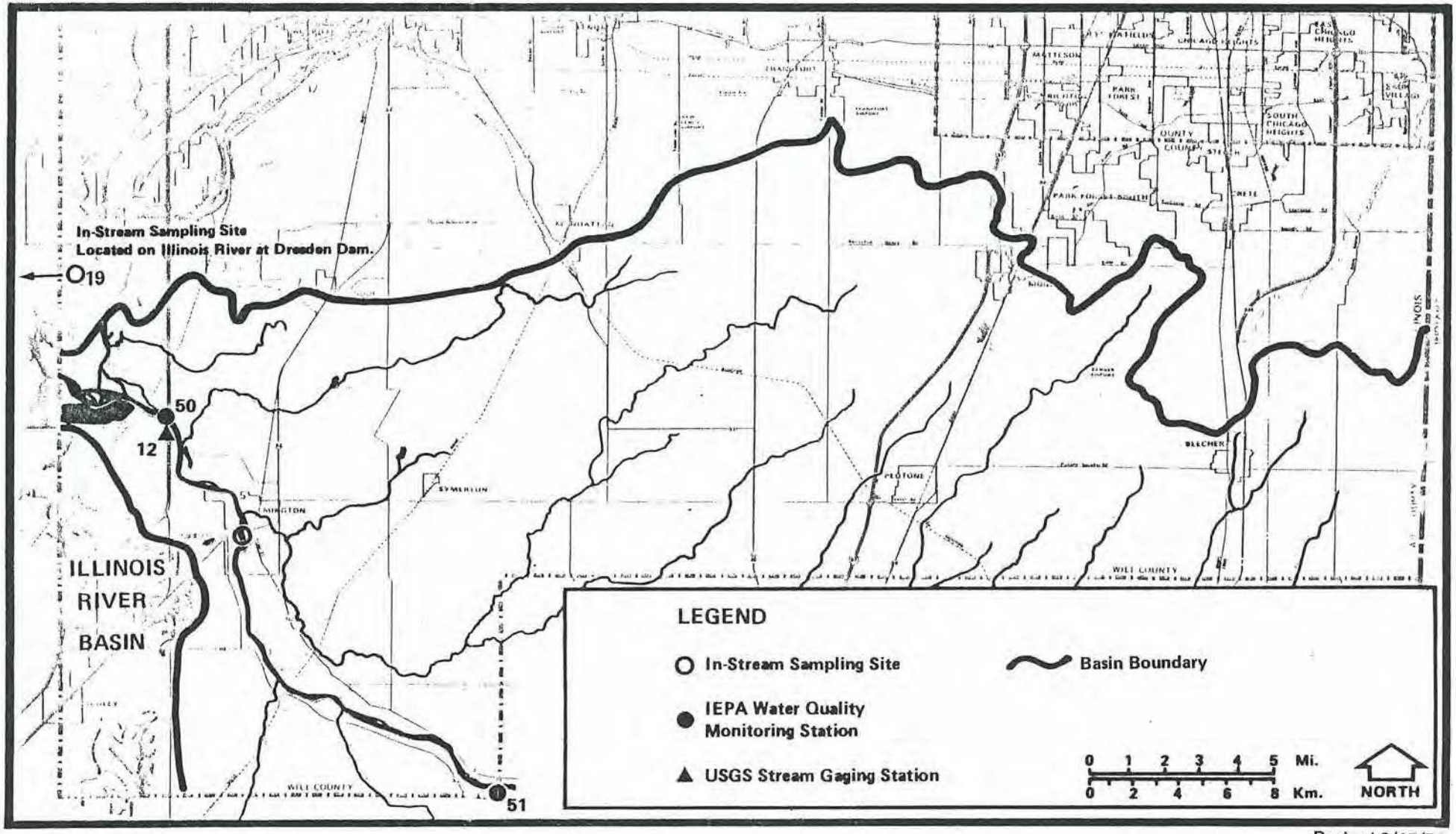
b. IEPA Segment Classification

The state has been divided by the IEPA into hydrologic units that coincide with major river basins. These units have been further divided into segments on the basis of common characteristics. The Kankakee River Basin includes part of segments B-1 and B-2, two of the three segments in the Kankakee hydrologic unit as defined by the IEPA. These segments, like all others in the state, have been designated "water quality limited." This designation means that water quality does not currently meet applicable water quality standards and/or is not expected to meet those standards even after the minimum statutory limitations have been applied to effluents discharged to the water body.

c. Sources of Information

Assessment of current water quality conditions of the Kankakee and its tributaries is based on information developed in the Commission's water quality sampling program and on data from other public agencies, principally, the IEPA. Results are described below:

Figure 23-2: WATER SAMPLING STATIONS



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(1) Commission In-Stream Sampling: The sampling program conducted by the Commission involved 48 instream sampling stations. One of these, Station 19, is located in the basin at Illinois Highway 53 in Wilmington (Figure 23-2). Data were collected at seasonal intervals over a 12-month period (May 1976-April 1977). Nineteen constituents were analyzed.

(2) Land Use Stormwater Sampling: Stormwater runoff sampling and analysis were conducted at 18 sites, representing various land uses in the region, and at two ravines tributary to Lake Michigan.

One of the stormwater sites (general agriculture) is located in the Kankakee Basin, on the South Branch of Rock Creek at Beecher-Peotone Road. However, the data from the stormwater samples are not intended to be basin-specific; rather, they indicate characteristics of runoff from particular kinds of land uses, wherever they are found in the region.

(3) IEPA Sampling: The IEPA water quality sampling network consists of about 176 sampling stations in the region, two of which are in the Kankakee River Basin. Sampling results discussed below are from the IEPA's sampling of chemical parameters at these two sites in 1976. Sites where IEPA samples were collected are shown in Figure 23-2.

d. Current Water Quality

(1) Commission In-Stream Sampling: Results of the Commission's sampling program are shown in Table 23-8. Of the 19 parameters evaluated, the State of Illinois has established standards for pH, temperature, DO, and ammonia. Violations of state standards are used in this study as a measure of the relative water quality of rivers and streams. At Station 19, near Wilmington, only one violation was reported of the state DO standard.

(2) IEPA In-Stream Sampling: Results of the IEPA sampling program for Stations 50 and 51 include data from 1971 through 1976. For the period 1971 through 1975, the IEPA developed a system for comparing the results of water quality trends over time. DO, fecal coliform, total dissolved solids, and ammonia nitrogen parameters are used in arriving at these indices. This sampling data, coupled with the findings and experiences of IEPA field engineers and biologists, are then used to compute water quality indices for each station.

Ratings are: Good (A); Average (B); Semi-Polluted (C); and, Polluted (P). The ratings in Table 23-9 were assigned by the IEPA for data collected during 1971 through 1975.

TABLE 23-8: IN-STREAM WATER QUALITY ANALYSES–SUMMARY DATA

KANKAKEE RIVER BASIN

STATION NO. 19

SAMPLING PERIOD	STATISTICS	PARAMETERS[1]																			
		ph (units)	Alkalinity	Turbidity (JTU)	Total Suspended Solids	Total Solids	Volatile Suspended Solids	Temperature (°C)	Dissolved Oxygen	BOD_5[2]	BOD_{20}[2]	Chemical Oxygen Demand[3]	Total Organic Carbon[3]	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrite-Nitrate Nitrogen	Soluble Phosphorus	Silica	Hardness	Chlorophyll a (µg/l)	Flow (cfs)
MAY 3 – 12 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.1	184	160	480	810	63	17	14	6	9			2.1	1.4	7.9	0.24	19	314	21	
	Minimum	7.5	119	12	26	400	3	8	8	1	2			0.3	0.0	2.6	0.04	8	312	7	
	Mean	7.8	163	49	128	534	18	12	10	3	4			0.9	0.4	5.1	0.12	11	313	11	
AUGUST 2 – 11 1976	No. of Analyses	30	10	30	30	30	30	30	30	10	10			30	30	30	30	10	2	10	
	Maximum	8.4	193	29	63	594	11	25	12	2	10			0.9	0.5	1.8	0.38	12	308	62	
	Minimum	7.9	160	21	16	380	3	21	0	1	2			0.4	0.0	1.0	0.04	9	256	6	
	Mean	8.2	176	24	44	483	6	23	8	2	4			0.7	0.1	1.6	0.18	10	282	22	
NOVEMBER 3 – 12 1976	No. of Analyses	14	10	14	14	14	14	14	14	10	10			14	14	14	14	10	2	9	
	Maximum	8.7	205	11	23	458	5	8	16	7	9			1.1	0.1	0.7	0.19	3	339	15	
	Minimum	8.2	180	4	4	416	1	1	6	2	2			0.3	0.1	0.4	0.10	2	339	10	
	Mean	8.4	200	6	10	435	3	4	14	4	6			0.7	0.1	0.5	0.15	3	339	12	
JANUARY 31 FEBRUARY 7 1977	No. of Analyses	0	0	0	0	0	0	0	0	0	0			0	0	0	0	0	0	0	
	Maximum																				
	Minimum																				
	Mean																				
APRIL 25 – 30 1977	No. of Analyses	10	6	10	10	10	10	10	10	6	6			10	10	10	10	6	2	6	10
	Maximum	8.7	207	17	48	522	12	15	14	3	6			0.7	0.1	1.7	0.09	7	328	23	3600
	Minimum	7.9	196	6	14	428	4	13	5	1	2			0.4	0.1	1.6	0.04	5	328	17	3140
	Mean	8.1	200	10	26	484	6	14	10	2	4			0.5	0.1	1.7	0.07	6	328	20	3423

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) BOD's are inhibited.

(3) Analysis by Nalco.

Revised 2/15/79

TABLE 23-9: IEPA WATER QUALITY RATINGS, 1971-1975

Revised 2/15/79

Station No.	Location	1971	1972	1973	1974	1975
51	Kankakee-Will County Line	-	A	A	A	A
50	I-55 Bridge near Wilmington	A	A	A	B	A

In 1975, violations at these two stations involved fecal coliform, copper, iron and lead.

Table 23-10 summarizes the sampling data which were observed at IEPA Stations Nos. 50 and 51 during 1976. To add perspective to the quality of water entering Will County, similar information is also shown for three other stations (Nos. 53, 54, and 55, located further upstream).

From Table 23-10, it can be seen that among the five stations listed, most violations occurred at Station No. 51, which is located downstream from the City of Kankakee. Fecal coliform and iron concentrations were the highest at Station No. 51, with the coliform standard being violated in three out of six analyses, and the iron standards, in one out of three analyses. The copper standard was violated in two out of three analyses.

(3) Land Use Stormwater Sampling: Table 23-11 summarizes data for the agricultural site on the South Branch of Rock Creek which was sampled during four runoff events. These were four agricultural sites in northeastern Illinois which were sampled under similar conditions.

A comparison of data in Table 23-11 with those for all four agricultural land use sites reveals the following: the mean ammonia nitrogen concentration at the Beecher-Peotone site was greater than the mean for all four sites (0.57 mg/l versus 0.4 mg/l). The mean soluble phosphorus was equal to the mean of all four sites (0.27 mg/l). Total suspended solids were less than half of the mean of all sites. The mean BOD was slightly greater and mean total solids less than the mean of all sites. Mean total dissolved solids is slightly greater than the mean of all sites.

(4) Fish Species and Habitat: There was no fish sampling conducted in the basin as part of the 208 program. However, records of the Illinois Natural History Survey and the results of recent monitoring programs by private firms indicate that 79 species of fish have been recorded in the basin. The overall assemblage of fishes is diverse, with about one-third of the species classified as intolerant of habitat degradation. The river maintains good populations of rock bass, smallmouth bass, walleye, northern pike, and channel catfish. A special feature of the river is its

TABLE 23-10: VIOLATIONS IN 1976 OF ILLINOIS IN-STREAM WATER QUALITY STANDARDS

KANKAKEE RIVER BASIN

MAP STATION NUMBER / IEPA CODE NUMBER	STREAM NAME	STATISTICS	PARAMETERS AND STANDARDS[1]																			
			Ammonia Nitrogen (4)	Fecal[2] Coliform (per 100 ml.) 200	Iron 1.0	Copper 0.02	Dissolved Oxygen (4)	Lead 0.10	Silver (4)	Chloride (4)	Fluoride (4)	PH (Units) (4)	Boron (4)	Sulfate (4)	Cyanide (4)	Hexavalent Chromium (4)	Total Phosphorus (4)	Manganese (4)	Phenol (4)	Total Dissolved Solids (4)	Temp. (°F) (4)
50	Kankakee River	No. of Analyses		6	0	0		0														
		No. of Violations		2																		
		Maximum		900																		
F 01		Minimum		100																		
		Mean[3]		223																		
51	Kankakee River	No. of Analyses		6	3	3		3														
		No. of Violations		3	1	2		0														
		Maximum		1400	7.0	0.04																
F 04		Minimum		100	0.4	0.02																
		Mean[3]		297	2.7	0.03																
52	Kankakee River	No. of Analyses	NO SAMPLES COLLECTED IN 1976																			
		No. of Violations																				
		Maximum																				
F 02		Minimum																				
		Mean[3]																				
53	Kankakee River	No. of Analyses		4	3	3		3														
		No. of Violations		0	2	2		0														
		Maximum			1.2	0.04																
F 03		Minimum			0.4	0.01																
		Mean[3]			0.9	0.03																
54	Kankakee River	No. of Analyses		3	0	0		0														
		No. of Violations		2																		
		Maximum		600																		
F 05		Minimum		100																		
		Mean[3]		288																		
55	Kankakee River	No. of Analyses		4	3	3		3														
		No. of Violations		0	1	2		1														
		Maximum			2.4	0.05		0.14														
F 06		Minimum			0.4	0.00		0.00														
		Mean[3]			1.0	0.02		0.04														
		No. of Analyses																				
		No. of Violations																				
		Maximum																				
		Minimum																				
		Mean[3]																				
		No. of Analyses																				
		No. of Violations																				
		Maximum																				
		Minimum																				
		Mean[3]																				
		No. of Analyses																				
		No. of Violations																				
		Maximum																				
		Minimum																				
		Mean[3]																				

(1) All units are expressed in milligrams per liter (mg/l) unless otherwise noted.

(2) Fecal coliform violations are apparent violations. (See narrative)

(3) All mean values are arithmetic except for fecal coliforms, which are geometric.

(4) No water quality violations for this parameter were reported.

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TABLE 23-11: LAND USE RUNOFF SITE DATA(1)

STATISTICS	Flow (cfs)	Ammonia Nitrogen	Soluble Phosphorus	Total Suspended Solids	BOD_5 (2)	Total Solids
No of Events	4	4	4	4	4	4
No of Analyses	48	48	48	48	24	48
Maximum	10	1.50	0.88	646	36	990
Minimum	2.6	0.10	0.07	70	5	504
Mean	5.1	0.57	0.27	283	17	707

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(1) Units are mg/l unless othewise noted.
(2) BOD's are inhibited.

extensive, biologically productive rocky riffle and pool areas providing unique habitat.

As part of the 208 project, the Natural History Survey performed a number of "toxicity index" calculations relating existing water quality conditions to fish habitat suitability. Included in the parameters for computing the toxicity index (using bluegills as the target species) are cadmium, nickel, silver, arsenic, chromium, boron, mercury, cyanide, ammonia, and copper, among others. On the basis of its analysis, the Survey determined that the toxicity index was well below the maximum level above which a diverse fishery cannot be maintained. Indeed, most of the parameters utilized in the index calculations were not even detected in the water sampling programs.

The conclusion drawn is that the main channel of the river contains a good quality aquatic environment, with excellent fish species diversity.

The findings were more recently confirmed by the Illinois Department of Conservation. One indication of the Kankakee's good condition was the presence of northern hog suckers, bottom feeders that can exist only in relatively clean water. The fish is found only in one or two other Illinois waterways. The Department's electric shocking survey and inventory of fish species and numbers constituted the most intensive program for any river in the State. This was due to the Kankakee's reported premier position as one of Illinois' best fisheries, and its location in the heavily populated northeastern corner of the State.

Since the survey covered the entire course of the river in Illinois, it should be noted that heavy siltation, primarily from Indiana, is a problem in certain eastern reaches, outside the six county area in the vicinity of Momence. The heavy silt loads, proposals to tap the river for municipal water supply, and repeated efforts to dam or channelize the upstream reaches in Indiana, all are factors which will influence the future of water quality and fish habitat of the Kankakee River in Will County.

(5) Pesticides and PCB Concentrations in Fish: In 1974, the IEPA and the Illinois Department of Conservation analyzed tissue from fish collected from several northeastern Illinois waterways to determine pesticide and polychlorinated biphenyl (PCB) concentrations. Three fish were taken near Wilmington: two carp and one smallmouth bass. The flesh analyses revealed that all three fish had heptachlor epoxide below the tolerance level of 0.3 micrograms per gram, as established by the U.S. Food and Drug Administration (USFDA). Dieldrin and total DDT readings were also well below the 0.3 and 5.0 micrograms per gram tolerance levels.

(6) Historical Records

(a) Station No. 50: Starting in 1959 and continuing through 1962, only semi-annual samples were taken, with the frequency gradually increasing until 1967, when a monthly sampling program was started.

During the entire period, with one exception, DO readings were all better than the IPCB standard. The single violation was reported in 1959, and that fell between 6.0 and 5.0 mg/l. Seasonal variations were noted, with highs of 12 mg/l or better in the winter months, and lows of 8 to 10 mg/l during the summer months.

Fecal coliform counts were made during the years 1967 through 1975 and a number were in excess of the standard. The frequency of violations increased over the years, with 6 of the 11 counts in excess of the 200 mg/l standard occurring in 1975 alone.

Ammonia nitrogen analyses were also limited to the years 1970-1975. In that entire period, only six analyses were in violation of the 1.5 mg/l, standard with the majority of the readings being on the order of 0.5 mg/l or lower.

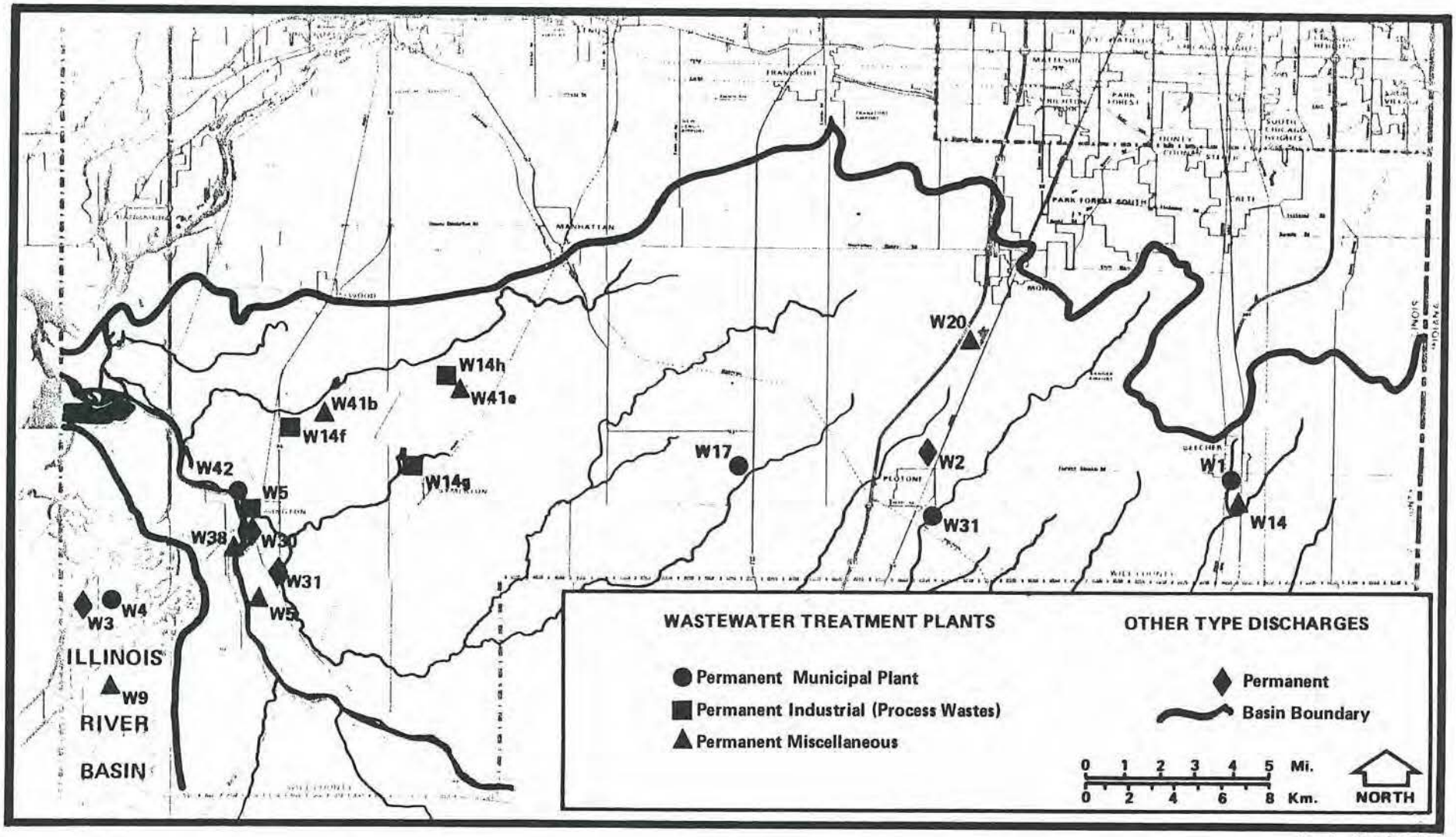
Total dissolved solids were all averaging about 400 mg/l throughout the period 1959-1975.

(b) Station 51: During the four-year period 1972-1975, DO concentrations were always better than the 6 mg/l standard. During the summer months, it averaged between 8 and 9 mg/l. In the winter months, DO concentrations averaged between 12 and 14 mg/l throughout the 1972-1975 period.

There were a number of fecal coliform violations throughout the period of record. In the summer of 1973, two readings extraneous to the general pattern were noted, both of which were on the order of 8,000 counts. In the spring of 1974, there was one extreme reading of over 30,000.

All ammonia nitrogen readings were well within the 1.5 mg/l standard as were the total dissolved solids which averaged 400 mg/l versus the standard of 1,000 mg/l.

Figure 23-3 : POINT SOURCE DISCHARGES



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(7) Benthic Surveys: Surveys made in 1971 of bottom-dwelling organisms near the City of Kankakee and the City of Wilmington indicated that the river was balanced, i.e. organisms which are intolerant of pollution were many in number and species. The only exception was immediately downstream of the Kankakee sewage treatment plant, where the reach was classified as being semi-polluted.

(8) Kankakee River Task Force: The Kankakee River Basin Task Force was created by the Governor of Illinois in response to concerns and needs of people living in the Illinois portion of the basin. Its purpose was to study a variety of issues affecting the basin, including: sedimentation, flooding, water quality, future growth, public agencies, recreation, public water supply, crustaceans, natural areas, and navigation plans.

Each issue was studied by an appropriate state agency. The completed report was submitted to the Governor on April 1, 1978. The report included a statement of the issues, the history, current activities that result in these issues, and alternate solutions. Information on water quality was developed by the IEPA.

The report stated that the river has generally good water quality. Although it has slightly alkaline and relatively hard water, DO levels support diverse aquatic biota. Relative to other Illinois streams, fisheries resources and aquatic macroinvertebrate populations are excellent. Problem contaminants which occasionally exceed "General Use" standards include: total iron, copper, lead, and fecal coliform bacteria. Ammonia and total phosphorus are within acceptable levels. Significantly lower concentrations of heavy metals, nutrients, and organic matter exist in the basin as compared to other areas in Illinois.

Surprisingly, many of the tributaries to the Kankakee have been classified as "unbalanced," a classification reflecting pollution. Treatment plants, industrial discharges, urban runoffs, septic systems and some livestock operations were cited as probable causes.

23.04 POINT SOURCES: EXISTING CONDITIONS

a. Municipal-Type Wastewater Treatment Plants

The four existing municipal type plants in the basin include Beecher, Peotone, Wilmington, and Forked Ridge subdivision. The Braidwood facility is in the Illinois River Basin. The plants are shown on Figure 23-3 and described in Table 23-12.

TABLE 23-12A: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS — KANKAKEE AND ILLINOIS RIVER BASIN

MAP CODE	FACILITY NAME	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	RECEIVING STREAM NAME	7 DAY 10 YR. LOW FLOW (MGD) 1970	7 DAY 10 YR. LOW FLOW (MGD) 2000	PUBLICLY OWNED TREATMENT WORKS NO	PUBLICLY OWNED TREATMENT WORKS YES	IEPA FY 78 PRIORITY NO.
W1	Beecher	Beecher/Beecher	Beecher	Trim Creek	0			X	-
W4	Braidwood	Braidwood/Braidwood	Braidwood	ditch to Mazon River	0				269
W17	Forked Ridge Subdivision	NONE	Peotone	South Branch Forked Creek	0		X		NONE
W31	Peotone	Peotone/Peotone	Peotone	Black Walnut Ck	0			X	889
W42	Wilmington	Wilmington/Wilmington	Wilmington	Kankakee	290.1			X	901

TABLE 23-12B: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS — KANKAKEE AND ILLINOIS RIVER BASIN

MAP CODE	NPDES PERMIT NUMBER	NPDES PERMIT DATE ISSUED	NPDES PERMIT DATE EXPIRES	EFFLUENT REQUIREMENTS (mg/l) INTERIM (A) BOD_5	INTERIM (A) TSS	INTERIM (A) P	INTERIM (A) NH_3N	FINAL (A) EFFECTIVE DATE	FINAL (A) BOD_5	FINAL (A) TSS	FINAL (A) P	FINAL (A) NH_3N	YEAR 2000 (B) BOD_5	YEAR 2000 (B) TSS	YEAR 2000 (B) P	YEAR 2000 (B) NH_3N	COMMENTS
W1	0049522	8-19-76	12-31-78						10	12			10	12		(a)	(a) 1.5 mg/l in stream after mixing
W4	0051292	Draft	9-1-80						10	12			10	12		(a)	
W17	0031909	6-8-75	12-31-79						4	5			4	5		(a)	
W31	0030627	5-2-77	6-30-82						4	5			4	5		(a)	
W42	0026085	1-10-74	12-31-78						30	30			30	30		(a)	

(A) From NPDES Permits (B) From Facility Plans

TABLE 23-12C: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS — KANKAKEE AND ILLINOIS RIVER BASIN

MAP CODE	STATUS OF TREATMENT PLANT: INTERIM YES	INTERIM PHASE OUT DATE	PERMANENT EXISTING	PROPOSED NEW YES	PROPOSED NEW EST. DATE IN SERVICE	WASTEWATER TREATMENT PLANT (MGD): AVERAGE FLOWS (a) 1975	1980	1985	1990	1995	2000	DESIGN CAPACITIES 1975	1985	OTHER YEAR	2000	COMMENTS
W1			X			0.23	0.23	0.27	0.31	0.37	0.41	0.30	0.60		0.60	(a) From facility plans or needs analysis documents unless noted.
W4				X	1-80	-	0.28	0.30	0.32	0.34	0.37		0.37		0.37	
W17			X			0.01	0.01	0.01	0.01	0.01	(b) 0.01	0.07	0.07		0.07	
W31			X			0.28	0.36	0.44	0.52	0.60	0.70	0.31	0.70		0.70	(b) Private utility year 2000 flows assumed to be the same as 1975 flows due to lack of information.
W42			X			0.32	0.41	0.50	0.59	0.68	0.75	0.75	0.75		0.75	

TABLE 23-12D: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANT — KANKAKEE AND ILLINOIS RIVER BASIN

MAP CODE	POPULATION SERVED (1000's)						PROPOSED PROJECTS (C)								CAPITAL COSTS (million $)		
							PLANT				SEWERS						
	1975	1980	1985	1990	1995	2000	Exp.	UpG	New	Out	I/I	SSE	New	Reh	Initial	Future	Total
W1	2.0	2.2	2.7	3.2	4.0	4.5	X	X			X	X	X		1.6	-	1.6
W4	-	2.8	3.0	3.2	3.3	3.4			X				X		2.7	-	2.7
W17	0.1	0.1	0.1	0.1	0.1	0.1									Private Funds		
W31	2.8	3.2	3.3	3.3	3.7	4.0	X	X			X	X			1.2	-	1.2
W42	4.4	5.5	6.1	6.8	7.5	8.2	X				X	X			1.2	-	1.2

(C) PROPOSED PROJECTS

SEWER(S): I/I - Infiltration/Inflow Study; SSE - Sewer System Evaluation; New - New Sewer Construction; Reh - Rehabilitation of Existing Sewers

PLANT: Exp - Expansion; UpG - Upgrading; New - New plant; Out - Phase out

TABLE 23-12E: MUNICIPAL-TYPE WASTEWATER TREATMENT PLANTS — KANKAKEE AND ILLINOIS RIVER BASIN

MAP CODE	FACILITY PLANS												COMMENTS
	TYPE		STATUS			REVIEWS / APPROVALS							
						NIPC			IEPA				
	NEEDS ANALYSIS	STEP ONE STUDY	COMPLETED	UNDER WAY	LOCAL ISSUES	NUMBER	ENDORSED	UNDER REVIEW	NUMBER	APPROVED	UNDER REVIEW	UNRESOLVED ISSUES	
W1	X		X				X		77-A-012	X			
W4		X		X					C17-0768				
W17		(a)											(a) Private plant
W31		X		X					C17-1909				
W42		X		X					C17-2293				

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b. Industrial Wastewater Treatment Plants 679

There are four industrial plants in the basin treating 681
their own process wastes. These are listed in Table 23-13. 684

c. Miscellaneous Wastewater Treatment Plants 688

Table 23-14 lists the six miscellaneous plants in the 690
basin and the one additional plant in the Illinois River 692
Basin.

d. Other Point Source Discharges 696

There are three "other" point source discharges in the 698
basin and one in the Illinois Basin, as listed in Table 23- 700
15. Two discharge cooling waters, one occasionally 701
discharges overflows from a pond used to recycle cooling 702
water, with the fourth point discharging wastes from a water
treatment plant.

TABLE 23-13A: INDUSTRIAL WASTEWATER TREATMENT PLANTS — KANKAKEE AND ILLINOIS RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
W5	Diamond Int'l Co.	0036455	Wilmington/ Wilmington	Wilmington	L, K	0.250	0.250	-	0.250
W14f	US Army-Joliet Ammunitions-006	0002666	Joliet/Joliet	Joliet	K	0.023	0.015	-	0.015
W14g	US Army-Joliet Ammunitions-007	0002666	Joliet/Joliet	Joliet	K	0.0024	0.00075	-	0.00075
W14h	US Army-Joliet Ammunitions-008	0002666	Joliet/Joliet	Joliet	K	0.910	0.058	-	0.058
	(1): Special treatment (k): tertiary lagoon (L).								

TABLE 23-13B: INDUSTRIAL WASTEWATER TREATMENT PLANTS — KANKAKEE AND ILLINOIS RIVER BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD)		NPDES PERMIT DATES		SIC CODE	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
		1970	2000	ISSUED	EXPIRES			
W5	Kankakee	290.0		6-30-75	12-31-78	72-2621	30 BOD, 30 TSS, DM: 15 o/g, 0.025 Cn	
W14	Prairie Ck.	0.065		9-27-74	1-1-78	72-2819	10 BOD, 15 TSS, 1025 TDS, 15 TOC, 20 COD, 0.5 TNT, DM: 0.1 Pb, 0.0005 Hg	
W14	Jordan Ck.	0		9-27-74	1-1-78	72-2819	10 BOD, 15 TSS,10 TOC, 20 COD, 0.5 TNT, DM: 0.1 Pb, 0.0005 Hg	
W14	Prairie Ck.	0.065		9-27-74	1-1-78	72-2819	10 BOD, 15 TSS, 10 TOC, 10 COD, 1025 TDS, 0.5 TNT, DM: 0.1 Pb, 0.0005 Hg	

(1) Current, from NPDES Permits

e. Combined Sewer Overflows

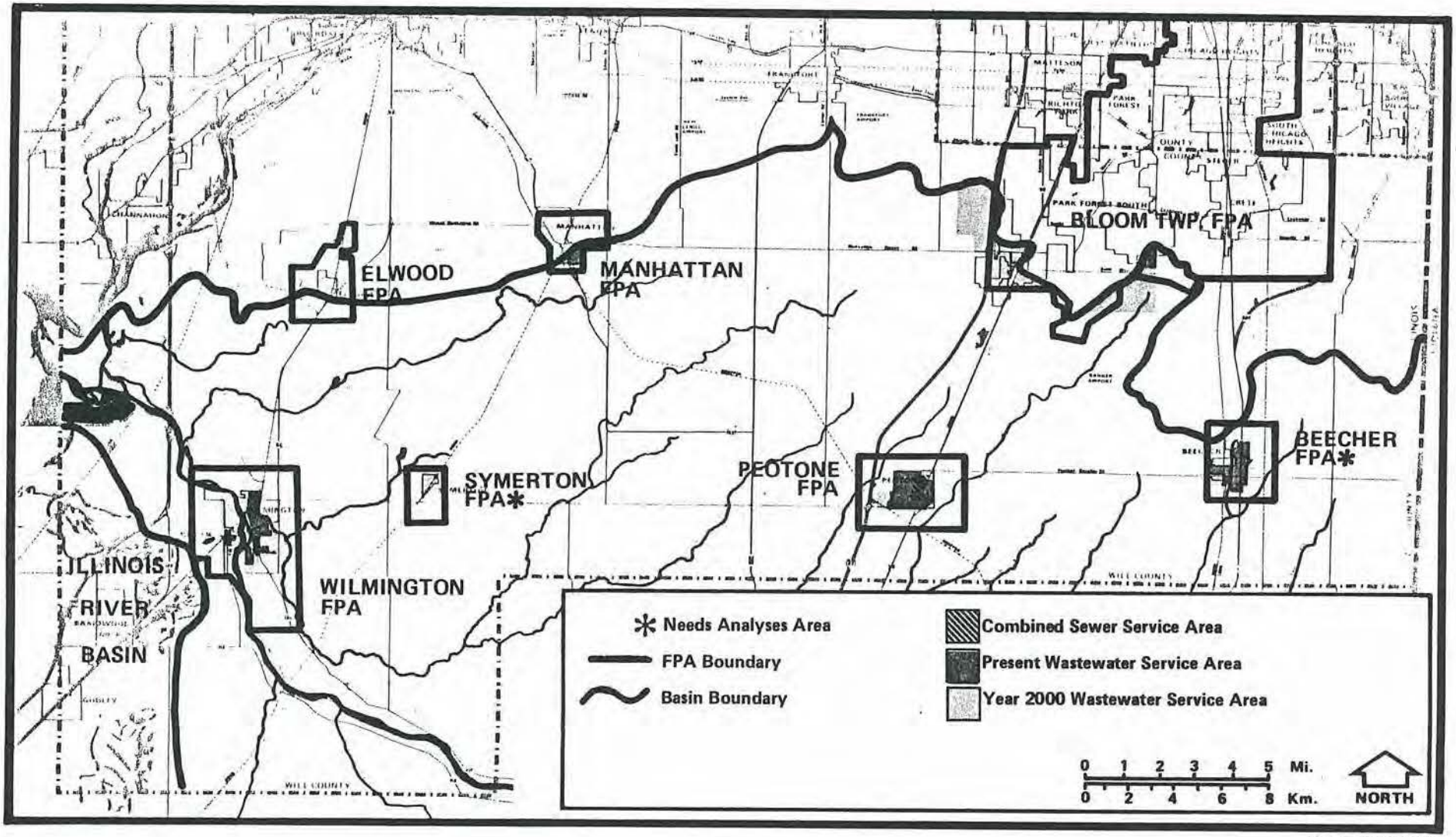
Approximately 27 acres in Peotone are served by combined sewers. The Village has separate sewers for the balance of its service area.

f. Local Facilities Planning

Water quality in the Kankakee River Basin is influenced by facilities planning activities in the Beecher, Peotone, Symerton, Wilmington, and Braidwood FPA's. In addition, portions of the Manhattan, Elwood and Bloom Township planning areas are located in the Kankakee Basin (See Figure 23-4). However, they do not contribute point source loads to the Kankakee River.

(1) Beecher FPA: The Village of Beecher (W-1, in Figure 23-3) wastewater treatment facility is the only municipal-type plant in the Beecher FPA. A Needs Analysis study was prepared for the village which calls for extension of the present sewer system to serve future growth, and the

Figure 23-4: WASTEWATER SERVICE AREAS



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TABLE 23-14A: MISCELLANEOUS WASTEWATER TREATMENT PLANTS KANKAKEE AND ILLINOIS RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	NEAREST MUNICIPALITY	TREATMENT UNITS(1)	WASTEWATER LOADS MGD			
						CURRENT		1985	2000
						DESIGN CAPACITY	1975 LOAD		
W5	Bruning School Dist. #209	0050105	Wilmington/ Wilmington	Wilmington	AD, E	0.006	0.003	--	0.003
W14	Dover Corp. Bernard Div.	0038008		Beecher	AD, F, E	0.010			
W20	Illinois Dept. of Transport.	0032051		Monee	L, E	0.026			
W38	Riverside Trailer Park		Wilmington/ Wilmington	Wilmington	S, FB	0.006			
W41b	U.S.Army-Joliet Ammunitions-LP	0033031	Joliet/Joliet	Joliet	IM, FT, E	0.650			
W41e	U.S.Army-Joliet Ammun.STK-003	0033049	Joliet/Joliet	Joliet	S	0.006			
W9	Comm. Edison	0048321	Godley	Braidwood		0.015			
	(1): Extended aeration (AD); chlorination (E); tertiary filter (F); buried sand filter (FB); trickling filter (FT); Imhoff tank (IM); tertiary lagoon (L); septic (s).								

(1) See key

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TABLE 23-14B: MISCELLANEOUS WASTEWATER TREATMENT PLANTS KANKAKEE AND ILLINOIS RIVER BASIN

MAP CODE	RECEIVING STREAM			NPDES PERMIT DATES		EFFLUENT REQUIREMENTS (mg/l)								COMMENTS
	NAME	7 DAY-10 YR. LOW FLOW (MGD)				1976(1)				2000				
		1970	2000	ISSUED	EXPIRES	BOD	TSS	P	NH_3-N	BOD	TSS	P	NH_3-N	
W5	Storm Sewer to Kankakee	288.8		3-1-77	1-1-81	30	30							Discharge includes cooling water
W14	Trim Creek	0		6-19-75	12-31-79	4	5							
W20	North Branch Rock Creek	0		6-9-75	12-31-79	4	5							Rest Area
W38	Kankakee	284.2												
W41b	Prairie Creek	0.065		1-20-77	8-17-79	10	12							Domestic from Load and Pack Area
W41e	Prairie Creek	0.065		3-21-74	3-19-79	30	30							Septic Tanks
W9	Ditch to Mazon River	0		11-11-75	4-1-81	4	5							

(1) From NPDES Permits

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expansion of the present treatment facilities by 1985 from 0.3 MGD to 0.6 MGD. The Needs Analysis consultant also recommended upgrading the present treatment facilities by 1980 by the addition of tertiary treatment facilities and a holding basin for hydraulic overloads.

(2) Braidwood FPA (Illinois River Basin): Until just recently, there were no municipal-type plants in the Braidwood FPA. Braidwood has not completed a formal facilities plan, but has received a facilities planning

TABLE 23-15A: OTHER POINT SOURCE DISCHARGES — KANKAKEE AND ILLINOIS RIVER BASIN

MAP CODE	FACILITY NAME	NPDES PERMIT NUMBER	FACILITY PLANNING AREA / LEAD AGENCY	LOCATION AND NEAREST MUNICIPALITY	FLOW (MGD) 1976	NPDES PERMIT DATES	
						ISSUED	EXPIRES
W2	Bennett Indus.	0033774	None	Peotone	0.001	3-31-75	9-30-79
W30	P. Carey - Panacon Corp.	0001911	Wilmington/Wilmington	Wilmington	0.350	3-31-75	9-30-79
W31	Personal Products Co.	0036633	None	Wilmington	overflow	6-20-75	3-31-80
W3	Braidwood Water Company	0051292	Braidwood/Braidwood	Braidwood		8-9-76	12-31-79

TABLE 23-15B: OTHER POINT SOURCE DISCHARGES — KANKAKEE AND ILLINOIS RIVER BASIN

MAP CODE	RECEIVING STREAM NAME	7 DAY-10 YR. LOW FLOW (MGD) 1970	7 DAY-10 YR. LOW FLOW (MGD) 2000	EFFLUENT REQUIREMENTS(1) (mg/l)	COMMENTS
W2	Surface drain to Rock Creek	0		15 TSS, DM: 15 o/g, 3500 TDS	cooling water
W30	Kankakee	288.8		Temp.	cooling water
W31	ditch to Forked Creek	0		Temp.	Discharge represents occasional overflow from recycle pond.
W3	ditch to Mazon River	0		Temp., DM: 15 TSS, 15 o/g, 3500 TDS, Fe	Tributary to the Illinois River

(1) From NPDES Permits

exemption from IEPA under 40 CFR 35.900. The Village has now constructed a new sewer system, and in August 1978 a new 0.365 MGD wastewater treatment plant (W-4) became operational. The new plant includes nitrification and tertiary filtration.

(3) Peotone FPA: The Village of Peotone owns and operates the only municipal-type plant in the Peotone FPA (W-31). A facilities plan is being prepared for it, but to date no conclusions have been reached. It is likely that the Peotone plant will require expansion by 1980 from the current 0.31 MGD, probably to about 0.70 MGD.

(4) Symerton FPA: There are no municipal-type plants in the Symerton FPA. A Needs Analysis report was prepared for the village, which calls for the continued use of conventional septic systems in areas where they work properly. Non-traditional alternatives such as mounded sand absorption fields, partial sewering of problem areas to a community absorption field, or partial sewering to holding tanks with trucking of sewage to a treatment plant should be considered in areas unsuitable for septics.

(5) Wilmington FPA: The Wilmington wastewater treatment facility (W-42) is the only municipal-type plant in the Wilmington FPA. A facilities plan is being prepared for the village but to date no conclusions have been reached. It is not likely that the plant will require an expansion from its present 0.75 MGD capacity before the year 2000.

(6) Bloom Township FPA: Approximately four square miles of the Kankakee Basin are included in the Park Forest South sub. FPA, an element of the Bloom Township FPA. The area includes the majority of the community of Monee which is served by septic systems. Based on the latest facilities planning information from Park Forest South, the areas in the Kankakee Basin will be served by the Park Forest South plant.

23.05 NONPOINT SOURCES: EXISTING CONDITIONS

a. Urban Stormwater Systems

Separate storm sewer systems serve all or portions of approximately five municipalities and various unincorporated areas. It is estimated that 1.8 square miles are served by separate storm sewers. These systems follow natural drainage courses and discharge either directly into the Kankakee River or indirectly via ditches or tributary streams.

In the remaining areas of the basin, about 366.2 square miles or 99.5 percent of the total area, stormwater enters the Kankakee River by overland flow, or through ditches or other small water courses.

b. Construction Activities

As discussed in Chapter Six, construction activities, coupled with stormwater runoff and resultant erosion, can contribute sediments, chemicals and biological organisms to rivers and streams. Construction activities are not known to be causing water pollution problems at present, but the potential for damage to water quality will exist in the future. Changes in population and land use, as forecasted, will generate substantial residential and commercial construction, accompanied by surface disturbances for roads and utilities.

c. Septic Systems

Septic systems are used widely in the basin. Presently there are an estimated 2,389 residential systems serving about 8,371 persons (See Table 23-16). In addition, the

TABLE 23-16: SUMMARY OF SEPTIC TANK INSTALLATIONS

COUNTY	NUMBER OF SEPTIC SYSTEMS			POPULATION SERVED		
	RESIDENTIAL	NON RESIDENTIAL	TOTAL	RESIDENTIAL	NON RESIDENTIAL (PE)	TOTAL
Will*	1,452	20	1,472	5,088	284	5,372
Will**	937	10	947	3,283	207	3,490

*Kankakee Basin

**Illinois Basin

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basin has thirty non-residential septic systems serving a population equivalent of about 490 persons. 837

Figure 23-5 shows the locations of all septic systems 839
and Table 23-17 provides a general description of areas 840
known to have existing or potential limitations for septic system usage.

TABLE 23-17: SEPTIC SYSTEM AREAS HAVING LIMITATIONS

COUNTY	TOWNSHIP	NAME OF AREA (IF AVAILABLE)	NUMBER OF SYSTEMS	POPULATION EQUIVALENT	MAP NUMBER
Will	Monee	Village of Monee	425	1,488	14-1*
Will	Crete		12	42	15-6*
Will	Wilmington		148	518	16-1
Will	Wilmington		25	88	16-2

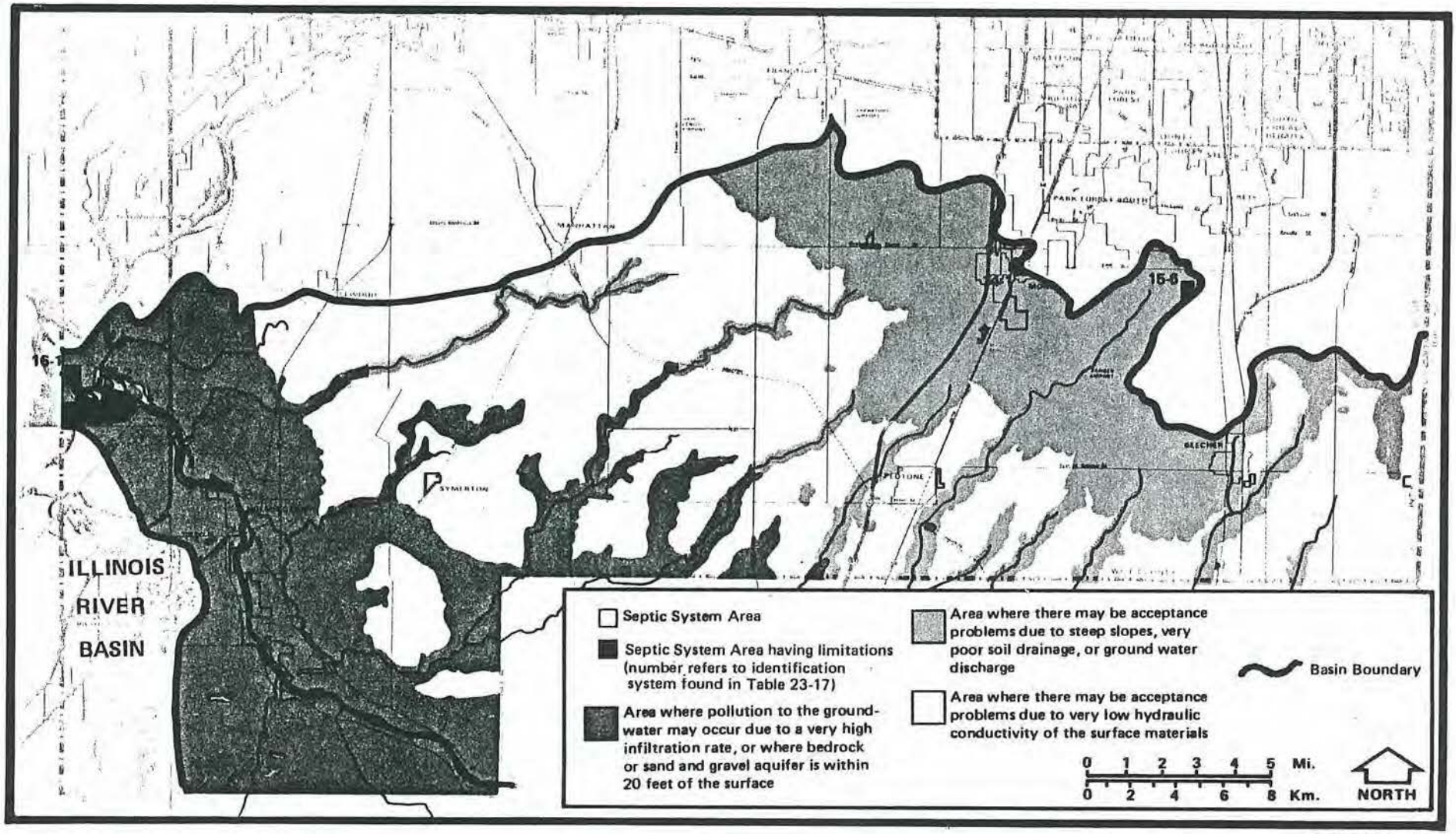
*In more than one basin

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d. Hydrologic Modifications 844

Many rivers in northeastern Illinois contain channels, 846
dams, weirs, and other structures which significantly 848
influence DO concentrations in these water bodies. The 849
influence of a channel dam on water quality can often be dramatic. Weirs and dams create pools which have DO levels 850
below or above those normally expected if the stream is 851
free-flowing. Forty-eight dams were analyzed in the six- 852
county region, were analyzed for water quality impacts, but 853
none were located in the Kankakee Basin.

Figure 23-5: LOCATION OF SEPTIC AREAS



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e. Mining

Between 1883 and 1974, Will County produced approximately 44.2 million tons of mined coal, principally in the vicinity of Braidwood. Since 1975, no coal has been produced. Nearly all mined areas in the county have a 30° to 40° slope with varying degrees of ground cover. In most areas, the combination of topography and poor soil conditions have caused severe erosion problems. This can lead to surface water pollution through increased sedimentation and siltation. In addition, acids, heavy metals and other pollutants may enter streams from mine drainage. However, no information on water quality in the ponds created by the mining activities was collected in connection with the 208 study.

There are also a number of small sites where exposed gob (coarse, coal preparation plant refuse) and slurry (fine refuse from coal washing) from abandoned underground coal mines present a potential water quality problem. Research conducted for the Illinois Institute for Environmental Quality identified 15 such areas in the vicinities of Braidwood and Godley. A total of 65 problem areas were identified, with all sites exhibiting potential for surface drainage to adjacent or nearby streams. Drainage and refuse samples collected typically had low pH values characteristics of these waste materials. Several gob piles are high (as much as 80 feet), steeply sloped, and lacking in adequate vegetative cover.

Due to the relatively small sizes of areas affected, the Will county sites were assigned relatively low problem severity rankings by the researchers. Nevertheless, each area is site-specific, and should be subjected to a more detailed appraisal of problem conditions, and the need and means for conducting any necessary reclamation activities.

23.06 DISPOSAL OF RESIDUALS

There are five municipal-type wastewater treatment facilities generating residuals within the Kankakee-Illinois basin. Information is available for the two largest of these. Peotone disposes about 14,000 gallons of sludge annually on agricultural lands, while Wilmington operates a landfill on its premises.

There are two industrial process treatment facilities generating residuals: Diamond International and the U.S. Army-Joliet Ammunitions Plant. Information is available for only Diamond International which generates about 2,700 cubic yards of sludge per year which is disposed of at the ESL, Inc. landfill near Joliet.

The Commonwealth Edison - Braidwood Plant operates a miscellaneous treatment facility which discharges to the Illinois River via a ditch tributary to the Mazon River. About 10,000 gallons of sludge per year are generated at this facility which are trucked to the ESL, Inc. landfill.

There are five miscellaneous wastewater treatment facilities in the Basin generating residuals. Data are available only for the Bruning School that produces about 3,000 gallons of sludge per year which is trucked to the Kankakee wastewater treatment plant for processing.

There are no water supply treatment plants located in the Kankakee Basin. However, the City of Braidwood has a water treatment plant located in the Illinois River Basin. No information is available on the volume or disposal of residuals from this facility.

Currently, there are no concentrated animal feedlot operations in the basin.

One landfill site has been identified. The City of Wilmington's wastewater treatment plant disposes sludge in a landfill site located on the plant property.

There is also one land application site identified. This is located approximately one mile north of Peotone. In addition, farmers and residents throughout Will County use sludge for fertilizer, and soil conditioner, either on farmland or home lawns and gardens. Septage is collected by scavengers and disposed of on farmland or at the ESI, Inc. landfill.

23.07 EXISTING MANAGEMENT PROGRAMS

The major features of the existing water quality management system in the Basin are presented in Table 23-18. This table includes a list of the public agencies which are currently involved in water quality related activities. Variations in programs and responsibilities between these agencies are indicated by a numerical code.

23.08 PROBLEM ASSESSMENT

Water quality conditions in the Kankakee River are far superior to those in many other rivers and streams in the region. Indeed, from the standpoint of overall water quality and aesthetics, the Kankakee is judged to be one of the finest waterways in the state. Nonetheless, certain existing or potential problems must be addressed.

(a) Upstream Impacts: Given the fact that the Will County portion of the basin constitutes only the most downstream 7 percent of the total basin drainage area, it is obvious that conditions will be primarily dependent upon upstream water quality management practices. Those include activities in Illinois (chiefly in Kankakee and Iroquois counties), as well as in Indiana. Water quality management plans are currently being prepared or have been prepared by other agencies for these areas, which will result in recommended strategies for point and nonpoint source pollution control.

TABLE 23-18: EXISTING LOCAL WATER QUALITY MANAGEMENT AGENCIES AND PROGRAMS: KANKAKEE RIVER BASIN

MUNICIPALITIES			
1. Beecher	1,2**	6. Park Forest So. (Hickory Creek, Little Calumet)*	1
2. Braidwood		7. Peotone	1,2
3. Godley		8. Symerton	
4. Manhattan (Lower Des Plaines)*	1,2	9. Wilmington	1,2
5. Monee (Little Calumet)*			
COUNTIES			
Will	3,4		
SANITARY DISTRICTS			
None			
SOIL AND WATER CONSERVATION DISTRICTS			
Will-South Cook			

* Additional basins shown in parentheses for those municipalities which cross basin boundaries.

** 1. Wastewater collection agency.
2. Wastewater treatment agency
3. Has enacted erosion and sedimentation control regulations.
4. Has enacted stormwater detention regulations

The Indiana portion of the basin is deserving of special mention. In that state, substantial hydrologic modifications have occurred over time in the course of flood control and agricultural drainage activities. Many reaches of the mainstem river have been extensively channelized. These actions, plus the soil erosion loads introduced from intensive agriculture have created concern for serious sedimentation problems which exist now in certain areas and may develop later in others.

(b) Septics: Another problem relates to septic systems which exist despite known physical limitations regarding their usage. The problems in Mcnee particularly require additional attention. Possible solutions include improving on-site disposal methods or connection to the Park Forest South wastewater system.

(c) Combined Sewers: Combined sewers currently exist in a section of Peotone. A project to eliminate overflows from these sewers is nearly completed, and no problems are expected to occur in the future.

(d) Infiltration/Inflow Studies: Finally, in order to qualify for construction grants related to wastewater system improvements, regulations issued after the enactment of PL 92-500 require applicants to follow certain procedures. Code of Federal Regulations 40 CFR 35.927 requires evidence that the treatment works for which grant assistance is sought will not be subject to excessive infiltration or inflow (I/I). An I/I analysis is performed to demonstrate the existence or non-existence of excessive infiltration and/or inflow in each sewer system. If excessive flows are found, the next step is a Sewer System Evaluation Survey (SSES). If corrective measures are justified to remedy in whole or in part the identified problems, a sewer rehabilitation project may be authorized as part of the facilities planning project.

(e) Facility Plans: Step 1 facility planning is underway by Manhattan, Peotone and Wilmington, where the above statutory requirements must be met. A Needs Analysis report, which is an abbreviated facility plan, was prepared for Beecher by this Commission. An I/I analysis will have to be performed at a later date in connection with any Step 1 facility plan which may be undertaken by that village. Mined-Cut Areas: The water quality problems associated with its mined out areas need further study.

(f) Mined-Cut Areas: The water quality problems associated with the mined out areas need further study.

23.09 BASIN RECOMMENDATIONS

a. Overview

Measures for protecting and improving water quality in the Kankakee Basin are derived from the recommendations in Chapters Four through Eight and from problems identified in the preceding sections of this chapter. Of particular importance are the impacts of treatment plant discharges and pollution associated with stormwater runoffs from urbanized and agricultural areas. The initiation and/or completion of facilities plans by several communities is also necessary to quantify future requirements. Recommendations with respect to nonpoint sources are basically the same as in the overall program outlined in Chapter Six.

b. Point Sources

(1) Publicly-Owned Wastewater Systems

(a) The Villages of Peotone and Park Forest South and the City of Wilmington should implement their respective portions of their 201 plans as they have been or may be approved by the Illinois and/or U.S. Environmental Protection Agencies. A summary of the current status of these plans appears in Section 23.04f and suggested changes thereto or features to be included are noted below. In the absence of completed and/or approved facility plans, certain assumptions had to be made as to the expected location and/or sizes of treatment plants, their estimated costs and designated management agencies. This information must not be construed as binding in the Areawide Plan until the 201 facility plans have been finalized.

(b) The Village of Park Forest South should include in its facility plan a study of the wastewater requirements for the village of Monee.

(c) The following listed communities having had Needs Analyses prepared for them by this Commission through financial support of the IEPA, should submit applications for federal grants to prepare formal facility plans (as described in 40 CFR 35.900) within six months after they have been notified of their eligibility: Symerton and Beecher. All such facility plans should complement, revise, or expand, but not duplicate, the information developed in the Needs Analyses reports.

(d) By July 1, 1983, all treatment plants whose seven-day ten-year low flow dilution ratio is 10 to 1 or less should provide or continue to provide not less than 80

percent oxygen saturation in their effluents. Monitoring of wastewater quality after aeration should be conducted. However, during the continuing planning program, studies should be undertaken to determine where this requirement may be waived without detriment to instream water quality.

(e) Municipal sewer service required to serve future growth within service areas identified for the year 2000 should be provided only by publicly-owned treatment authorities except where this is impractical or not cost-effective. Projected five-year service areas will be identified in the NPDES permit issued by IEPA.

(f) No NPDES permit should be issued for municipal-type wastewater service within the five-year service area, other than to the treatment authority, except on a finding by IEPA that the proposed facility is the most cost-effective means of providing service, is an interim facility pending extension of service by the treatment authority, or is intended to serve an isolated location.

(g) Treatment plant operators should assure the very high standard of performance for wastewater treatment plants which the 201 plans assume. The IEPA should monitor treatment plant operation and performance and its effect on in-stream water quality. IEPA should establish a technical assistance program to aid plant operators in dealing with technical problems and assuring a consistent high level of performance in treatment operations.

(h) All municipalities in the basin and Will County should continue to reduce the consumption of potable water in order to conserve water resources and reduce wastewater flows to publicly and privately owned treatment plants. This should be accomplished through the modification of building codes by requiring water conserving plumbing fixtures, metering of all new developments, pricing policies, and public education.

(2) Private Utilities

(a) The Forked Ridge Subdivision plant should continue in operation but its service area should be extended only in cases where service cannot be provided by an existing municipal-type wastewater treatment authority.

(b) NPDES permits issued by IEPA to private utility companies should identify projected five year service areas. No other NPDES permits should be issued for municipal-type wastewater service within those five-year service areas to other treatment authorities

except upon a finding by the IEPA that the proposed facility is the most cost effective means of providing service; is an interim facility pending extension of service by another established treatment authority; or is intended to serve an isolated location.

(3) Industrial Wastewater Treatment Plants

(a) The IEPA should continue to enforce all requirements of NPDES permits for all industries in the basin and assure that treatment plants achieve and maintain required standards of plant performance. This can be achieved through IEPA standards for treatment plant personnel and through frequent sampling and analysis of treatment plant effluent by the IEPA for the purpose of monitoring compliance with NPDES permits.

(4) Miscellaneous Wastewater Treatment Plants

(a) Miscellaneous publicly and privately owned wastewater treatment plants should continue in operation until such time as wastewater service can be provided by publicly owned municipal type wastewater systems on a cost effective basis. Service areas of privately owned treatment systems should not be expanded, nor should treatment capacities be increased, when service can be provided on a cost effective basis by publicly owned municipal type wastewater systems.

(b) The IEPA should continue to enforce all requirements of NPDES permits and assure that treatment plant operators achieve required standards of plant performance.

c. Non-Point Sources

(1) Urban Stormwater Runoff

(a) By July 1, 1983, all municipalities and Will County should implement measures to work toward a reduction of PCB in urban stormwater runoffs from separately sewered areas. Reductions of 25 percent of 1976 surface loadings on impervious surfaces are recommended as a target. From areas to be urbanized in the future, target reductions of 50 percent of 1976 surface loadings are recommended.

(b) In attempting to meet the above targets, the implementing agencies should work through the countywide water quality committee to develop plans and standards for the implementation of appropriate measures such as catch basin cleaning, performance zoning, street cleaning, use of pervious pavement surfaces, increased vegetation cover, grass waterways, wetland storage of stormwater, stormwater detention, sedimentation and erosion controls, and other measures to achieve the desired pollutant reductions.

(c) Township and state highway organizations, the Illinois State Toll Highway Authority, and facility engineering departments at state and federal installation should participate in the programs described above by implementing accelerated and/or improved street sweeping programs for streets, roads and highways that are hydraulically connected to perennial streams or permanent lakes via stormwater conveyance systems.

(d) During the period up to July 1, 1983 agencies should utilize voluntary exploratory programs, implementing techniques to control pollutants from urban nonpoint sources.

(e) Within one year following the preparation by NIPC of a recommended model ordinance, all municipalities and the county should adopt and enforce adequate stormwater detention ordinances. These ordinances should include provisions which clearly establish long-term responsibilities for maintenance of detention facilities. All such local ordinances also should be consistent with minimal areawide standards set forth in the model ordinance.

(f) Within one year following the preparation by NIPC of a recommended model ordinance, all municipalities and the county of Will should develop and enforce adequate erosion and sedimentation control ordinances. All such local ordinances should be consistent with minimal areawide standards set forth in the model ordinance.

(g) Within one year following the preparation by NIPC of a model ordinance, Will County and all municipalities in the basin should adopt measures to control surface runoff from open storage yards containing industrial stockpiles and other materials which may go into solution or which may be carried away by stormwater runoffs and pollute streams and other water bodies.

(h) By July 1, 1979 municipalities, townships, the county and state highway departments responsible for de-icing streets and highways should develop programs to control the application of de-icing materials, to train personnel in proper application methods, and to use proper equipment in order to minimize any negative water quality impacts. The impact of de-icing agents on water quality should be given further study by the Commission in the continuing planning program.

(2) Agricultural Runoff

(a) By July 1, 1980, the Will-South Cook County Soil and Water Conservation District, in conjunction with agencies of the United States and Illinois Departments of Agriculture and the countywide water quality committee, should identify the best management practices necessary to implement the agricultural aspects of the 208 plan, including conservation tillage, contour plowing, terracing, and conversion of cropland to grassland.

(b) By July 1, 1981, agricultural lands on which BMP's should be applied should be identified by appropriate soil and water conservation districts. Agencies of the U.S Department of Agriculture and countywide water quality committee should be consulted.

(c) By July 1, 1985, a comprehensive conservation plan should be prepared for each farm in the basin which has soil erosion losses in excess of standards set by the Illinois Department of Agriculture and soil and water conservation districts under House Bill 818.

(d) Using available cost sharing and technical assistance programs, the soil and water conservation districts should ensure implementation of the BMP program according to the following schedule on approximately 109,600 acres of agricultural lands:

By 1985 - 30% of the identified land.
By 1995 - 70% of the identified land.
By 2000 - 100% of the identified land.

(e) The IEPA, NIPC, and local governments should provide the results of their instream water quality monitoring to the soil and water conservation districts and to the Departments of Agriculture so that priority can be given to the areas most sensitive from a water quality standpoint in order to maximize the impact of the best management practices.

(f) The IEPA should enforce the IPCB regulations which require permits for feedlots and should use the IEPA draft technical policy WPC-2 "Design Criteria for Field Application of Livestock Wastes" as a guide.

(g) Illinois Department of Agriculture, Illinois Department of Public Health, and USEPA regulations on the use of pesticides and disposal of containers, and Illinois Department of Agriculture regulations on the training and licensing of pesticide applicators and operators should be continued.

(h) Farmers should implement good pasture management practices, utilize grass waterways, vegetative filter strips, and field borders, and make wise use of fertilizers wherever possible in accordance with the Illinois Agronomy Handbook to reduce the dangers of pollution. The U.S. Department of Agriculture agencies should assist farmers in recognizing the water quality problems posed by improper practices, and assist them in the use of proper practices.

(3) On-site Disposal Systems

(a) Individual malfunctioning on-site disposal systems outside of the five-year service areas should be repaired wherever possible upon complaint to the appropriate authorities or replaced with a new system if necessary.

(b) By July 1, 1983 special service areas should be established under the initial sponsorship of municipal governments (for sites located within corporate limits)

and by Will County (in unincorporated areas), where necessary, to facilitate the financing of any innovative-type systems or other on-site improvements necessary to correct or replace malfunctioning systems in areas outside the five-year projected service areas.

(c) The minimum requirements of the Illinois Private Sewage Disposal Code should be upgraded to require more innovative site analysis techniques, and the Will County Health Department should require a construction permit to regulate the design, location, and installation of every new on-site system in incorporated as well as unincorporated areas.

(d) Local officials should inspect all septic system known to be failing, threatening public health or causing nuisance conditions. The inspection should result in the issuance of a repair permit for corrective measures which are to be undertaken and paid for by the septic system owner.

(e) Septic systems also should be inspected by local officials prior to the transfer of ownership of properties where such systems are installed. The results of the inspections should be made known to the lending institutions which are furnishing the mortgages.

(4) Air Pollution

(a) As part of the continuing planning program the IEPA, in cooperation with the Illinois Institute for Natural Resources, the Illinois State Water Survey, and local air quality management agencies should analyze the relationship between air pollution and water quality in all of its aspects. The IEPA should cooperate with the Commission devising strategies for correcting present negative effects and preventing future problems through the 208 continuing planning program.

(5) Sanitary Landfills

(a) The IEPA should ensure that every sanitary landfill complies with all regulations of the IPCB for its siting, design, construction and operation. As a substitute for existing State regulations, the IEPA and IPCB should consider certification of local solid waste disposal programs which comply with areawide plans to be prepared under the Federal Resource Conservation and Recovery Act. Alternatives to land disposal of solid wastes, including recycling, should be considered and utilized wherever feasible.

(6) Waterways

(a) Will County is encouraged to develop an organization similar to the Cook County Clean Streams Committee, consisting of volunteers and organizational representatives who maintain surveillance over water bodies for activities adverse to water quality, flood control, recreation, fish, wildlife, and/or navigation.

(b) The Commission, in conjunction with the countywide water quality committee, in the continuing planning program, should develop recommendations to simplify the highly fragmented system for channel maintenance and improvement in the Kankakee River and its tributaries. Present responsibility for such maintenance functions as debris removal, streambank stabilization, public access, dredging, disposal of dredge spoil, protection and augmentation of habitat, tree shading and vegetation is shared between a host of federal, state and local authorities.

(c) In-stream water quality data collected by local treatment plant operators should be periodically published by the IEPA.

d. Residuals

(1) As regulated by the IEPA, present methods for the disposal of sludge from treatment plants are adequate to handle present and anticipated future volumes, and should continue to be administered by the IEPA.

(2) Highest priority should be given to the use of sludge as a soil conditioner and efforts to utilize sludge for this purpose should be expanded. The IEPA should assure proper practices in the utilization of sludge on agricultural lands through implementation of the draft standards in IEPA Technical Policy WPC-3 "Design Criteria for Municipal Sludge Utilization on Agricultural Land."

(3) The preferred method for the disposal of domestic septage is through land application, and this method should be encouraged and used whenever possible. Recognizing a continuing need for the disposal of large volumes of septage at wastewater treatment plants, specific facilities should be designated by the IEPA to receive domestic septage on recommendation by NIPC through the continuing planning process.

(4) The USEPA standards and the IPCB regulations for permits for the disposal of hazardous or toxic substances should continue to be enforced by the IEPA.

e. Groundwater

(1) By July 1, 1980 the Illinois State Water Survey and the Illinois State Geological Survey should undertake a coordinated well sampling program to monitor groundwater quality in areas where a potential for infiltration by pollutants now exists or might exist in the future.

f. Inland Lakes

(1) By July 1, 1979, and in accordance with Section 314 of PL 92-500, the IEPA should undertake expanded lake sampling to identify eutrophic conditions and, in conjunction with this Commission and the countywide water quality committee, develop plans to control sources of pollution and restore water quality.

g. Mining

(1) The present IPCB regulations for the control of pollution from aggregate producing activities are considered generally satisfactory. However, the IEPA should continue to study the types and volumes of pollutants associated with these activities and their potential effects on surface and groundwater quality. Any needed changes in present regulations should be identified by July 1, 1980.

(2) The adverse impact on water quality of the mined-out area should be given further study in the continuing planning program.

h. Boundary Conditions

(1) Out-of-state influences on Kankakee River quality should continue to be monitored by IEPA and USEPA to determine impacts on the Illinois portion of the River.

(2) Flows entering Will County from Kankakee County should meet the following standards: dissolved oxygen concentration of 5.0 mg/l, or greater, at least 95 percent of the time; a mean concentration of BOD_5 of 4.0 mg/l; and, a maximum concentration 1.5 mg/l or ammonia nitrogen (NH_3).

23.10 COSTS OF RECOMMENDED PLAN

a. Facility Plans

(1) General: Table 23-19 shows pertinent capacities in the year 2000 for publicly owned treatment plants expected to remain in operation, their effluent standards, and construction costs. Local collector sewer projects are shown, if they have been processed for federal or state grants.

Cost data were assembled from various sources as noted below and in the tables that follow.

"Initial" costs of facility plans listed in Table 23-19 refer to the first phase of any project which is to be followed at some future date by programmed expansions or extensions. Under this definition, the total cost of works currently under construction fall under the classification "Initial" even though the project has not yet been completed. "Future" costs in Table 23-19 cover phased work scheduled at later dates.

(2) Summary of Future Costs: Table 23-20 is a summary of future costs, with capital costs and annual operating and maintenance costs distributed within five year time frames. The information is based on data furnished by operating agencies. In the absence of agency data, operating and maintenance costs were estimated from on information in 208 Staff Paper No. 20, "Wastewater Treatment Processes and Cost Estimating Data."

(3) Annualized Local Costs: Table 23-21 shows annualized local costs.

(4) Increased Annual Costs: Table 22-23 shows the estimated annual increases in wastewater charges per household.

b. Urban Stormwater

Methods for controlling urban stormwater runoff pollution include street sweeping, catch basin cleaning, performance zoning, use of porous pavements, increased vegetation, grass waterways, wetland storage of stormwater, stormwater detention, and erosion and sediment controls. The goals of a 25 percent decrease in BOD loads from existing (1976) impervious areas and a 50 percent decrease in BOD loads from impervious areas built between 1976 and 2000 are to be achieved by combinations of the above practices. The cost of the mix of specific practices which would meet these goals is dependent upon the practices selected and the intensity of their individual use. An estimate of the total cost based solely on street cleaning utilizing vacuum street sweepers is $1,720,400 through the

TABLE 23-19: RECOMMENDED PLANS, PUBLICLY OWNED TREATMENT SYSTEMS KANKAKEE BASIN

MAP CODE	FACILITY NAME	DESIGN CAPACITIES (MGD)		EFFLUENT STANDARDS (Year 2000) (mg/l)				CAPITAL COSTS (million $)			COMMENTS
		1975	2000	BOD_5	TSS	P	NH_3N	INITIAL	FUTURE	TOTAL	
W1	Beecher	0.3	0.6	4	5		(1) 1.5	(2) 1.6		1.6	(1) In-stream, after mixing (2) Includes interceptors (3) Plant expansion (4) New sewers (5) For new plant and interceptor system
W31	Peotone	0.35	0.70	4	5		(1) 1.5	(3) 1.2		1.2	
W42	Wilmington	0.75	0.75	30	30		(1) 1.5	(4) 1.2		1.2	
W4	Braidwood	-	0.37	10	12		(1) 1.5	(5) 2.7		2.7	

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TABLE 23-20: SUMMARY OF FUTURE COSTS (All data in 1977 dollars in millions)

Jurisdiction	Capital Costs						Annual Operations & Maintenance Expense				
	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000	Total	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)
Beecher	1.60					1.60	0.01	0.02	0.04	0.05	0.06
Peotone	1.20					1.20	0.01	0.02	0.03	0.04	0.05
Wilmington	1.20					1.20	0.005	0.01	0.02	0.03	0.04
Braidwood	2.70					2.70	0.01	0.03	0.05	0.07	0.09
Symerton	0.015	0.015	0.015	0.015	0.01	0.07	0.001	0.001	0.001	0.001	0.001
Agricultural BMP's							0.18	0.42	0.58	0.84	1.01
TOTAL	6.715	0.015	0.015	0.015	0.01	6.77	0.22	0.50	0.72	1.03	1.25

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TABLE 23-21: PROJECTED ANNUALIZED LOCAL COSTS (All data in 1977 dollars in millions)

Jurisdiction	CAPITAL COSTS			LOCAL CAPITAL PLUS O & M ANNUALIZED Costs (Mil /yr)*				
	Cost Total Through Yr. 2000	Est. Fed'l Share	Est. Local Share	1978-1982	1983-1987	1988-1992	1993-1997	1998-2000
Beecher	1.60	1.20	0.40	0.05	0.06	0.08	0.09	0.06
Peotone	1.20	0.90	0.30	0.04	0.05	0.06	0.07	0.05
Wilmington	1.20	0.90	0.30	0.03	0.04	0.05	0.06	0.04
Braidwood	2.70	2.02	0.68	0.07	0.09	0.11	0.13	0.09
Symerton	0.07	0.05	0.02	0.001	0.002	0.002	0.002	0.002
Agricultural BMP's				0.18	0.42	0.58	0.84	1.01
TOTAL	6.77	5.07	1.70	0.37	0.66	0.88	1.19	1.25

*Local Capital Amortized at 7% for 20 yrs.

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TABLE 23-22: PROJECTED AVERAGE ANNUAL INCREASE IN HOUSEHOLD WASTEWATER COST

	1978-1982 (aver.)	1983-1987 (aver.)	1988-1992 (aver.)	1993-1997 (aver.)	1998-2000 (aver.)
Assessed Valuation (Mil. $)	198.1	219.6	243.4	277.7	306.7
Additional Ad Valorem Rate: ($/$100 A.V.)					
Capital Related	.076	.073	.066	.057	
O & M Related	.111	.228	.296	.371	.408
Total Rate:	.187	.301	.362	.428	.408
Additional Cost per Home of $45,000 FMV ($/yr.)	28.05	45.15	54.30	64.20	61.20
Existing Av. Annual WW Cost ($/Household yr.)	42.20				
Total Av. Annual WW Cost ($ / Household yr.)	70.25	87.35	96.50	106.40	103.40
Percent Av. Increase* in WW Costs per Household (%)	66.5	107.0	128.7	152.1	145.0

*Total Rate Used

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year 2000, increasing from $54,300 per year in 1978, to $95,300 per year in the final year. The frequency of cleaning streets with vacuum sweepers averaged about once every 7.5 days during the year 2000, excluding the three winter months of December through February.

c. Agricultural Runoff

(1) Kankakee Basin: Agricultural croplands presently amount to 170,300 acres in the Kankakee Basin, and are projected to decrease to 168,500 acres by the year 2000. In order to reduce agricultural pollution from croplands, BMPs are targeted for implementation by the year 2000 on 109,600 acres at a total of $17,840,000 over the years.

Although a comprehensive farm plan would include a wide range of BMPs, the following four practices and several combinations are recommended for implementation: conservation tillage, contouring, terracing, and cropland conversion to pastureland. These BMPs were selected because of their direct effects on water quality as well as their ability to reduce soil erosion. Many other practices which would be contained in a farm plan, but not considered by the

Commission, are either too localized or too difficult to evaluate as to effects on water quality.

Of the above total costs, $8,258,000 represent initial installation (or capital) expenditures for which grants may be made available from the federal government. The cost-sharing ratios will probably be on the order of 50 percent. The balance of $9,582,000 represent operating and maintenance costs. For estimating purposes it is assumed that 30 percent of the BMPs will be installed by 1985, 70 percent by 1995 and 100 percent by the year 2000.

(2) Illinois Basin: Agricultural croplands presently amount to 9,310 acres in the portion to the Illinois River Basin included in this study and are projected to decrease to 9,160 acres by the year 2000. In order to reduce agricultural pollution from croplands, BMPs are targeted for implementation by the year 2000 on 6,420 acres at a total cost over the years of $923,000.

Of the above total costs, $110,000 represent initial installation (or capital) expenditures. The balance of $813,000 represent operating and maintenance costs to the farmer.

For estimating purposes, it was again assumed that 30 percent of the BMPs will be installed by 1985, 70 percent by 1995 and 100 percent by the year 2000.

23.11 WATER QUALITY CONDITIONS IN 1983

According to Section 101(a) of PL 92-500, it is the national goal that "wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water shall be achieved by July 1, 1983."

As noted in previous sections on existing water quality and fish inventories, the Kankakee River in Will County now is rated outstanding. Its present use for recreation was also noted.

The areawide plan calling for expansion and upgrading of wastewater treatment plants, the correction of problem septic tank areas, the implementation of agricultural BMP's, which will reduce the entrance of nutrients and sediments, and the recommended plan for reducing pollutants accumulating on impervious surfaces which are now washed into the streams by stormwater runoffs, all are measures which will further improve water quality.

Accordingly, the Kankakee River is judged as now meeting the 1983 objectives and will continue to meet them in that year.

CHAPTER 24

Environmental Assessment

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CHAPTER TWENTY-FOUR: ENVIRONMENTAL ASSESSMENT OF WATER QUALITY MANAGEMENT PLANS

24.01 INTRODUCTION

The National Environmental Policy Act (NEPA) of 1969, implemented by Executive Order 11514 and the Council on Environmental Quality Guidelines of April 23, 1971, requires that all agencies of the federal government prepare detailed environmental statements on proposals for legislation and other major federal actions which significantly affect the quality of the human environment.

The United States Environmental Protection Agency instructions on the implementation of the NEPA are covered by its regulations Title 40, Part 6 (40 CFR 6): "Preparation of Environmental Impact Statements." These "Statements" are reports prepared by federal agencies, identifying and analyzing in detail the environmental impacts of a proposed action. "Environmental Assessments" are analyses submitted by local agencies describing the environmental impacts of proposed actions. These assessments form the basis for judgments as to whether or not impact statements need to be prepared.

Section 511(c) (1) of PL 92-500 exempts water quality management programs prepared under Section 208 of the same Act. The basis for this exemption is that no action proposed or taken under Section 208 "shall be deemed a major federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969."

Initial guidance for the preparation of environmental assessments with respect to areawide water quality plans were contained in Chapter 11, of USEPA Manual: "Guidelines for Areawide Waste Treatment Management Planning." However, USEPA instructions issued as Program Guidance Memorandum No. SAM-34, dated August 21, 1978, state the agency's policy as being consistent with the spirit and intent of NEPA. This Environmental Assessment is consistent with all of the foregoing.

Because of the close relationship between impact statements and assessments, the regulations cover in detail the requirements of the former. The contents of such statements are described in Subpart C of 40 CFR 6, Section 6.300 through 6.304. More detailed guidance with respect to Areawide Water Quality Management plans is contained in Subpart E of 40 CFR 6, Sections 6.500 through 6.514.

The preparation of an environmental impact statement or assessment requires judgment as to the scope and details that will be included or excluded. In recent months, guidance from higher offices and admonitions from the national levels of government have all cautioned against the use of unnecessary details, the development of extraneous inventories and minute attention to items of little

significance. This environmental assessment was developed under the regulations, guidance and admonitions noted above.

As a preliminary step in preparing this environmental assessment, the Commission conducted a workshop with representatives from basin planning groups, steering committees and the Areawide Planning Advisory Committee to explore methods and procedures for assessing environmental impacts of the plan. The impact of implementing the areawide plan for point sources of pollution (municipal wastewater dischargers, combined sewer overflows, industrial wastewater dischargers, agricultural wastewater dischargers, and miscellaneous wastewater dischargers) and for nonpoint sources (urban stormwater runoff, agricultural runoff, septic wastes, air pollution deposition, surface waste disposal, marine activities, groundwater, and soil erosion) is assessed in the following pages. Disposal of residual wastes from wastewater and water supply treatment plants, and septic tanks is also assessed.

24.02 EXISTING ENVIRONMENT

Northeastern Illinois covers more than 3,700 square miles and includes all of Cook, Du Page, Kane, Lake, McHenry, and Will counties. The area is bordered by Wisconsin on the north, Lake Michigan on the east, Indiana on the southeast and downstate Illinois on the south and west. The region includes all of the Illinois Lake Michigan shoreline.

Natural geological characteristics of the region are varied and include the Chicago Lake Plain Area, the Wheaton Morainal Area, and the Fox River Valley.

The region's chief natural resources are: Lake Michigan, its rich farmlands, the groundwater aquifers, and deposits of sand, gravel, limestone, and peat. Former deposits of coal have been mined.

Most of the region lies in one or the other of two river systems, the Des Plaines or the Fox, and both waterways are part of the Illinois River system. A narrow band of land stretching from Wisconsin to Indiana is tributary to Lake Michigan and the Great Lakes system. The area in western McHenry County and northwestern Kane County is tributary to the Kishwaukee River, and thence to the Rock and Mississippi riverbasins.

Other waterways (Salt Creek, Hickory Creek, Du Page River, Little and Grand Calumet Rivers, North Branch of the Chicago River, and the Sanitary and Ship Canal and the Calumet-Sag Canal) all join the Des Plaines River before it leaves the region. The Kankakee River drains portions of southern Will County, and joins the DesPlaines River to form the Illincis River.

The generally flat topography of the region causes many streams to be sluggish in their drainage. It is also common for some small waterways to flow only during and after storm events.

The climate of northeastern Illinois is characterized as "humid continental." Precipitation during the period 1941-70 averaged 34.44 inches per year. June and July average the greatest amount of preciptiation, each month accounting for an average of 4 inches of rainfall. Skies are clear or partly cloudy an average of 197 days per year. Prevailing winds are from the northwest in the winter and the southwest in the summer.

24.03 POPULATION AND ECONOMY

The region's population has grown steadily, reaching the 7 million mark in 1970. The period of the most accelerated growth was 1950-70, which coincided with rapid postwar suburban development. The region's population has increased by nearly 2 million since 1950. Population growth in suburban Cook County and in Du Page County has been very rapid. The number of people in Cook County outside Chicago more than doubled between 1950 and 1970; the population of Du Page County more than tripled during the same period. Substantial growth was also recorded in Kane, Lake, and Will counties and to a lesser extent, in McHenry County.

In 1976, the Commission prepared population forecasts in cooperation with municipal and county governments. The forecasts indicated that the population will continue to increase over the rest of the century. However, the overall rate of growth, as projected in the 1976 forecasts, is not expected to be as dramatic as it was during the 1950-70 period. The disparity in relative rates of growth in the suburbs and in older cities, is forecast to be even more significant than it has been in the past, a prospect that has caused some concern. In late 1977 and early 1978, the Commission generated discussion throughout the region on the decline in population and a downturn in certain economic activities in Chicago and other "mature urban areas." For example, Joliet and Waukegan were losing population from their urban centers, while new development flourished around them. This is a continuing issue that has yet to be resolved. A related issue concerns the lower population forecast figures that have been assigned to northeastern Illinois by the state since the 1976 forecasts were prepared.

Northeastern Illinois has long been one of the major economic centers of the country. In terms of value added by manufacturing, the region's output during the early 1970s exceeded that of 44 individual states. Yet, even though the region's manufacturing capacity is tremendous, less than one of every three workers is employed in manufacturing, a statistic that illustrates another important facet of the

region's economy: it's diversity. Another measure of this diversity is the fact that more than half of the land in the region, despite the extent of urban and industrial development, still is devoted to agriculture. Not only are the region's farmlands expansive, they are among the finest in the nation, producing farm products valued at more than $261 million in 1974.

An economy of such importance, diversity, and complexity must be considered judiciously in water quality planning. Manufacturing has a great effect on water quality. About half of all the wastewater generated in northeastern Illinois comes from industrial sources. Industrial effluent either is discharged directly from industrial treatment facilities or is conveyed to municipal facilities for treatment and discharge.

Because of PL 92-500, and because of more stringent effluent standards applicable to all dischargers, industries have undertaken water conservation and recycling programs. The net result has been a trend of decreasing wastewater flows despite increased industrial outputs. Because of the foregoing, together with changing industrial processes, and other factors, the plan makes no attempt to forecast future industrial wastewater volumes or loads. Current information is continued to the year 2000 unless specific data to the contrary were developed for individual treatment plants.

Significant increases are forecasted in manufacturing employment in suburban Cook County and in each of the other five counties. The possibility that industrial wastewaters will be generated in areas not now required to accommodate industrial effluents is apparent.

Farming and related agricultural activities have always been a mainstay of the economy in northeastern Illinois. Farming remained important, even as the region became more and more urbanized. Corn and soybeans are the principal crops, accounting jointly for more than 75 percent of the total agricultural land use. Land devoted to other grain crops or hay, or is used as pasture, is found less frequently, but it still accounts for more than 250,000 acres. The Commission's forecasts indicate that agricultural acreage will decrease in every county, except one, during the next 22 years as the amount of land required for development increases.

The protection of the region's water supply, which was a factor in the economic development of the region, is a long range concern of areawide planning. Changes in the use of water will be necessary in the next few decades if the water supply is to be sufficient to accomodate all users. Though the region does not face a water shortage, it is important to allocate the available sources so no one supply is exhausted.

24.04 EXISTING WATER QUALITY CONDITIONS

An overview of water quality conditions and problems is included in Chapter Four. That chapter addresses both surface and groundwaters and discusses various factors which affect their suitability for intended uses.

It should be noted that many waterways in the region are incapable of sustaining balanced populations of fish and aquatic life due to factors quite independent of water quality. Many smaller streams are subject to wide seasonal fluctuations in water levels and flows, including periods of no flow. Thus, they obviously are incapable of furnishing dependable aquatic habitat. The aquatic life in some shallow water bodies also is susceptible to winter kills when the thickness of ice and snow is substantial. Physical changes as a result of channelization or other drainage measures also have had significant effect on aquatic life. In many streams, the changed conditions are both controlling and irreversible. Thus, even if water quality were to be greatly improved, some waterways could offer only marginal to poor habitat due to adverse bottom or bank conditions.

Following is a summary of conditions in the principal water bodies of the region.

a. Chicago Sanitary and Ship Canal

This drainage system is a combination of altered natural waterways and manmade channels. The aquatic habitat is severely degraded, and the few organisms present are mostly pollution-tolerant species. During the Commission's instream sampling program, DO and ammonia standard violations were noted. Violations of those same parameters were common in the IEPA samples taken in 1976 at 29 sites, as were fecal coliform and lead analyses. Most benthic conditions at 21 stations were classified as heavily polluted or pollutant.

b. Des Plaines River

The existing water quality conditions of the upper Des Plaines River range from good to bad. As the river flows south through the region, habitat gradually deteriorates, with species of game fish surrendering to varieties of rough fish. Degradation is particularly severe along the middle and lower reaches of the river, where habitat is marginal to poor.

c. Du Page River

Existing water quality conditions range from good to poor. Prior to intensive urbanization, the Du Page River maintained a balanced and diverse community of fish and aquatic life. Habitat now, however, must be classified as poor along the East Branch, and intermittently poor and fair

along the West Branch. On the DuPage River itself, stream quality varies from fair in the upper reaches to good, in the lower reaches until its confluence with the Des Plaines, where it again is degraded to a fair status.

d. Fox River

Existing water quality conditions in the Fox River range from excellent to fair. The river still offers adequate habitat for desirable fish and aquatic life, although aquatic species have suffered as a result of the effects of urbanization in the basin. Generally, the farther downstream on the Fox, the more conditions deteriorate.

e. Hickory Creek

Existing water quality conditions range from excellent to good. The creek has considerably higher water quality than most other streams in the region.

f. Kankakee River

This river also offers excellent fish and aquatic life habitat. Species diversity is high, and the river maintains stable populations of game fish and other high level species.

g. Kishwaukee River

The existing water quality conditions of the Kishwaukee River range from good to poor. Certain reaches have been impaired as a result of dredging and channelization.

h. Lake Michigan Basin-North

Lake Michigan offers high quality habitat, as evidenced by its diverse population of fish and aquatic life. During the 1976 IEPA sampling program, at 17 stations, violations of some State standards were recorded at each site, with fecal coliform and total phosphorus standards being violated at all stations. However, the quality of the Lake's near shore waters rated good, giving due consideration to the very stringent standards which Illinois has established for that Lake.

i. Little Calumet River

Existing conditions range from fair to bad. The river affords poor habitat for fish and aquatic life, both along its mainstem and in most of its tributaries. The extensive channelization and combined sewer overflows in the basin have greatly impaired habitat.

j. North Branch Chicago River 322

Existing conditions range from good to bad. The North 327
Branch system drains a predominantly urbanized area.
Extensive channel modifications have had significant 328
negative effects.

k. Salt Creek 331

The existing water quality conditions of Salt Creek 333
range from good to bad. Habitat has been seriously degraded 335
as a result of the intensive urbanization which has occured 336
in the watershed.
The most serious water quality problems in the region 338
are the following:

24.05 EXISTING PROBLEMS 341

a. Combined Sewer Overflows 343

These represent the most severe water quality problem 345
in northeastern Illinois. The problem associated with the 347
375 square mile combined sewer area of the Metropolitan
Sanitary District of Greater Chicago, in and adjacent to the 348
City of Chicago, is in itself one of the major problems in 349
the region. Water quality simulation has shown that 350
wherever combined sewer systems exist in the region, they 351
are major sources of pollution. Overflows generally take 352
place only a few times each year, but the impacts are acute
and long-lasting.

b. Treatment Plants 356

In northeastern Illinois, all municipal type wastewater 358
plants have secondary treatment capabilities and a high 360
percentage have tertiary treatment facilities. Discharges 361
from these plants, therefore, are not the water quality
threat they would be in areas where fewer local, state and 362
federal resources had been applied to improving wastewater 363
treatment. Persistent problems are noted throughout the 364
region, however, as a result of overflows from sewers and 365
plants during wet weather. Many older sewer systems receive 366
excessive infiltration and inflow. During storms, the total 367
loads on treatment facilities become so great that partly-
treated or untreated wastes must be discharged to the 368
waterways. Even if such discharges are infrequent, their 369
severity can be sufficient to inflict long-term damage. It 371
also should be noted that even when effluent standards are
met, treatment plant discharges have significant adverse 372
impacts in some cases.

c. Urban Stormwater Runoff 376

Stormwater drained from areas with large expanses of 378
impervious surfaces, including roads, streets, parking lots, 380
roofs and sidewalks, all contain large quantities of
pollutants which are discharged into lakes and streams. The 382
effects are varied and widespread but, as shown by water
quality simulation, are of significance in all urbanized
areas.

d. Agricultural Runoff 386

Runoff from tilled lands rates a high priority, 388
especially when considering the extensive agricultural 390
activities in the region, particularly in McHenry, Kane and
Will Counties, and giving due recognition to the large 391
cattle raising operations, mainly in open pastures. Of 392
particular concern are the effects of ammonia, organics,
nutrients, pesticides, and sediment on water quality. 393

e. Soil Erosion 397

Eroded materials, from construction sites and 399
croplands, are known to be contributing large volumes of 401
sediment and associated pollutants to rivers and streams and
also to Lake Michigan, where tons of soil are eroded from 402
shoreline bluffs. Erosion is most important, relatively 403
speaking, in rural areas where many other types of problems
may be absent, and in developing areas where specific 404
construction sites are not being managed properly. 405

f. Bottom Sediments 409

These materials generate severe oxygen demands on 411
overlying waters. These deposits also contain a variety of 413
pollutant, including toxics, that become resuspended as a 414
result of turbulence created by boats, barges, and ships.
Such problems occur in major rivers, in the region's canal 415
system, in many inland lakes, and in the marinas and port 416
facilities on Lake Michigan. In cases where deposits have 417
been allowed to accumulate, barge traffic and other
navigation important to the region's economy has been 418
restricted. The problem is compounded by the postponement 419
of maintenance dredging in harbors and channels, sometimes 420
because funds are not available and also at times because of
controversies over the disposal of dredged materials. It is 422
recognized that dredging is only a short-term solution
unless coupled with other pollution abatement programs. 423

g. Unsatisfactory Septic Systems

These are another threat to the region's water quality. Six percent of the region's population depends on septic systems for the disposal of wastewaters and large numbers of these systems are unsatisfactory. The impacts on water quality are often overshadowed by the health hazards associated with such unsatisfactory systems and by the obnoxious public nuisances created in a number of places. The problem is complicated by certain political and institutional aspects, as well as by technical and economic issues. For example, septic systems often serve low-income areas where the ability to finance local corrective measures is absent. In other locations, extensions of municipal sewers to replace septic systems would be dependent on annexation. Furthermore, costs for extending sewer systems are often extremely high because of the distances involved, low densities and adverse topography.

h. Hydrologic Modifications

Dams and stream channelization often have serious negative impacts on aquatic habitats, resulting in reductions of certain fish species. One typical impact of channel modification is the elimination of desirable substrate conditions due to siltation. Flow velocities and depths are altered, also. Drainage of wetlands has resulted in the reduction in the range of fish species due to loss of habitat. Dams and impoundments tend to reduce flow velocities, cause increased sedimentation, raise water temperature, promote algal growth, and often result in impaired dissolved oxygen conditions relative to free-flowing reaches.

i. Low-Flows

Conditions in waterways during dry weather help illustrate both the success and shortcomings of the region's treatment plants. Dissolved oxygen conditions are often satisfactory in many streams during dry weather when treatment plant discharges comprise the major pollutant load. However, there are major exceptions, including the Chicago Sanitary and Ship Canal System, the North Branch, the Little Calumet, the Des Plaines, and the East Branch DuPage, where dry weather dissolved oxygen concentrations are often low. These conditions are generally due to excess point source pollutant loadings relative to the limited assimilative capacity of the streams. Also contributing are high levels of sediment oxygen demand (SOD). Ammonia concentrations are generally high during dry weather conditions except in streams where there is sufficient flow to dilute point source discharges.

j. Boundary Conditions

The quality of the region's waters is influenced by the pollutants in streams flowing from Indiana and Wisconsin. The Fox and DesPlaines River basins in Wisconsin represent essentially unurbanized areas, and pollutant contributions from these areas are significant. However, the Grand Calumet and Little Calumet River Basins in Indiana contain wastewater treatment plant effluents from large cities, combined sewer overflows, urban stormwater drainage, and industrial effluents. Pollution from these sources has serious impacts on Illinois waterways. In contrast, the Kankakee River Basin in Indiana is largely an agricultural area and pollution entering Illinois is not as severe. Federal regulations in support of Public Law 92-500 require Indiana and Wisconsin to take into consideration the water quality of downstream waters in Illinois and to insure that the Illinois standards are met as the water enters Illinois.

k. Poor Operation of Treatment Facilities

Operation and maintenance of existing facilities have been cited as national problems by the USEPA and the General Accounting Office. Surveys by both agencies have revealed that nationwide, one-third of all treatment plants appear to be failing to meet their design criteria for suspended solids. While it is possible only to generalize about the operation and maintenance of plants in this region, it is safe to assume that correctable problems exist in many of the region's several hundred plants. The effectiveness of many plants is impaired by excessive infiltration and inflow, improper treatment of unfamiliar industrial wastes, inadequate training for plant operating personnel, and other problems.

l. Management

The most serious management problems related to water quality are the following:

(1) The fragmentation of responsibility.

(2) Absence of coordination among many local water quality agencies, with management of projects and programs achieved largely through the imposition of standards and sanctions by the state.

(3) The quality of administration and enforcement of programs and regulations related to water quality management vary widely among units of local government.

(4) Water quality management projects have been reviewed from an areawide perspective only when they have been proposed for federal funding and thus required consideration under the A-95 review process.

(5) State enforcement of water quality standards has been limited principally to point sources of pollution (limits of NPDES permits). Pollution sources related to nonpoint sources have not been subjected to enforcement action, despite statutory authority under which state enforcement proceedings could be instituted.

(6) Federal and state programs offering financial incentives for nonpoint sources control, such as the cost-sharing program of the Department of Agriculture ASCS, have not been administered with deliberate attention to water quality.

(7) Lack of adequate technical information.

m. Summary

Northeastern Illinois has most of the problems associated with water pollution in diverse metropolitan areas. The region is fortunate, however, in that many problems associated with point sources, are under control or will be under control when existing plans are completed and implemented. This is not to say that solutions are easy to implement, only that they are available. Major capital investments, including a multi-billion dollar investment just to eliminate combined sewer problems in Cook County, face the region in the years ahead.

Halting pollution from nonpoint sources must be labeled as a problem for which solutions are not yet apparent. Strategies are available, but their effectiveness and their acceptability in the region have yet to be tested. In other cases, as in the control of soil erosion, corrective measures known for many years have been rejected, for many complex reasons, by those in a position to exercise them.

Problems associated with pollution generated in other states, particularly in the Indiana portion of the Calumet basin, also will be difficult to eliminate. Studies to date indicate that the investment required to clean up those waters before they enter Illinois may be beyond the collective financial capability of Indiana citizens, industries and governments.

24.06 PLANNING METHODOLOGY

a. Principles

In developing an areawide water quality management plan, the Commission directed a planning effort based on the following principles:

- Clean water planning must be based on research and technical work that is currect and accurate;
- The final plan must be politically, socially, environmentally, and financially realistic; and
- County and local governments, public interest groups, business, industry, and concerned citizens need to participate in developing the basin plans.

b. Stages

Involved in the formulation of the basin planning process were local steering committees in each county, drainage basin advisory committees, and local technical advisory committees. Citizen and professional organizations and state and federal agencies influenced the planning through the Areawide Planning Advisory Committee. Also involved were the Commission's Water Resources Technical Advisory Committee, several ad-hoc advisory groups and task forces and individual technical/professional advisors. Many public meetings were held during the preparation of this plan including a public hearing on planning and evaluation procedures.

Alternatives and assumptions were developed through three stages which began in July 1977.

(1) Stage One: During the months of July and August 1977, the Commission released research reports entitled "Existing Water Quality Conditions" for the various basins. Other citizens in each basin listed above. These reports, along with other information, were provided to help citizens and local officials in the basins to participate effectively in the development of a plan for each basin.

The information in the reports was discussed in each basin, and the results of these discussions were used in the formulation of basin plans for dealing with present and future pollution.

(2) Stage Two: During August and September, Commission staff met with citizens and public officials to develop proposals for improving water quality in each basin. Each "first test plan" addressed the problems which had been identified and was shaped by assumptions made to reflect forecasted population increases, land cover changes,

improvements in wastewater treatment, in reducing pollutants found in urban stormwater and changes in agricultural practices. A first test plan simulation report for each of the modeled basins was released during October and November 1977. In these reports, the impacts of the first test plan were depicted.

The first test plan for each basin also contained the first full discussions of political, governmental, and financial issues related to the effort to improve water quality.

(3) Stage Three: In late 1977, basin residents analyzed the first test plans and made suggestions for revising them. Several of these suggestions were incorporated into the second test plans.

c. Management Alternatives

After several months of analysis and discussions with government officials and citizens, the Commission selected three alternative approaches to areawide wastewater management and explored the pros and cons of each in detail. The following summary analyzes each of the three alternatives and is based primarily on information contained in Staff Paper No. 21.

(1) Alternative A - A Management System Based on County Government: There are at least three separate types of agencies under which a countywide waste management program could be established: (1) A public works department under the supervision of the county board; (2) a countywide sanitary district; or (3) a separate county wastewater board. Only the third option would require new state legislative authorization.

(2) Alternative B - A Management System Based on a New Areawide Authority: A regional waste management authority would be created, consisting of representatives of subregional management sectors or of major levels and units of government. This regional authority might be assigned complete responsibility for the construction and operation of all new plants and interceptors. Some or all existing plants would be transferred to theauthority, either because the present owner wished to be free of the responsibility or because the authority determined the transfer to be necessary.

A variation would be a more limited regional authority which would neither own nor operate facilities. This authority would be limited to overall regional policy-making and planning for locally owned and operated facilities. Even the more limited form of regional authority, however, would assume responsibility for allocating funds from

federal and state grant programs among the local operating agencies.

(3) Alternative C - A Management System Based on Subregional Authorities: Waste management programs would be organized on the basis of the facility planning areas (FPAs) which have already been determined for local facilities planning. Where a single public agency is presently responsible for waste treatment in an FPA, it would be designated in the areawide plan as the waste management agency. In instances where more than one agency is involved, it would be necessary to designate a single lead agency for planning of the facilities and for the development of a coordinated management program. This coordination would be achieved either through contracts and other types of formal intergovernmental agreements or by the creation of a new, FPA-wide treatment authority.

In either case, the agencies involved would have to reach agreement on the ownership of facilities, the allocations of future capacity in the systems, the payment of construction and operating costs and other detailed manners.

Depending upon local circumstances, numerous arrangements for the ownership and operation of the existing facilities are possible, including: (1) the retention of ownership and operating responsibilities by all present owners; (2) the retention of ownership by present owners with some responsibility for operation transferred to other agencies through contractual agreements; (3) the consolidation of ownership and operation under a single existing agency; and (4) consolidation under a new FPA-wide treatment authority.

While the above focus was on the handling of point source discharges emanating from publicly owned treatment works, other responsibilities were detailed for the management of nonpoint sources of pollution, particularly those related to stormwater runoffs.

24.07 SUMMARY OF TECHNICAL PLAN RECOMMENDATIONS

a. General

The proposed Areawide Water Quality Management Plan is in two parts: technical and management. The technical portion includes selected structural and non-structural pollution control options dealing with both point and nonpoint sources. The management portion focuses on the designation of responsible enforcement agencies and the development of organizational, legal, and financial means to implement the technical plan.

The plan includes recommendations for the construction of wastewater treatment plants, the handling of combined sewer overflows, the promotion of cropland runoff controls, the enforcement of ordinances for the control of erosion and sediment from construction sites, and the control of urban development in unincorporated areas.

The following is a summary of the more significant technical plan recommendations dealing with standards, point source controls, nonpoint source controls, and residuals management. Readers should refer to Chapter Four through Seven, and the basin-specific chapters, for a complete listing of technical plan recommendations.

b. Standards

- (1) In the development of new water quality standards, the IEPA is urged to include allowances for excursions from fixed numerical standards, expressing tolerances as allowable extreme limits which may be accepted for prescribed conditions for durations.

- (2) Section 407(b) of Chapter 3 "Water Pollution" or the Illinois Pollution Control Board Rules and Regulations should be modified to read: "No effluent from any point source which is tributary to the Chain of Lakes and whose untreated waste load is 1,500 or more population equivalents shall contain more than 1.0 mg/l of phosphorus as P after the date this plan goes into effect. Point sources below McHenry Dam not immediately tributary to a lake or reservoir need not provide phosphorus removal after that date."

- (3) A dissolved oxygen standard of 5.0 mg/l should be maintained for General Use water bodies in northeastern Illinois. Attainment of this level 95 percent of the time should be deemed full compliance with the standard.

- (4) Where no feasible solution can be developed to meet the 5.0 mg/l DO standard, problems will be identified and recommended for further study in the continuing planning program. It was deemed advisable to take this conservative approach at this time rather than to recommend changes in stream classifications and/or related water quality standards.

- (5) This Commission will assist the IEPA in preparing the necessary submittals to the Pollution Control Board for changes in standards. Additionally, as part of the continuing planning process, the Commission will assist the IEPA in the future classification of water bodies in the region for designated uses.

c. Point Sources

o [1) By July 1, 1980 appropriate local treatment authorities should develop plans for controlling combined sewer overflows.

o [2) Within the MSDGC service area, communities having combined sewers in all or portions of their corporate limits will seek Federal grants, initiate and/or complete by July 1, 1981 Sewer System Evaluation Studies as required by 40 CFR 35.927, and the supplementary studies necessary to determine what facilities will be necessary to optimize local sewer systems in order to take advantage of the TARP system.

o [3) Within the MSDGC service area, communities and sanitary districts having separate sewers will seek Federal grants, initiate and/or complete by July 1, 1981 Sewer System Evaluation Studies as required by 40 CFR 35.927.

o [4) Subject to assigned priorities and the availability of federal or state grants, all other municipalities and sanitary districts will expeditiously complete their facility plans, to include Infiltration/Inflow Studies and Sewer System Evaluation Studies (as required). Implementation of corrective and/or preventive measures will be scheduled as elements of Step III construction activities.

o [5) Incorporation of existing miscellaneous and privately-owned point source discharges into municipal-type systems should be encouraged wherever practical. No NPDES permit should be issued for the expansion of an existing miscellaneous or privately-owned point source discharge if the proposed expansion is inconsistent with local land use plans, or in the absence of a showing by the applicant that incorporating into a municipal-type system cannot be practically accomplished within a reasonable period of time.

o [6) The Illinois Commerce Commission should be required to give notice to the IEPA and local land use control authorities whenever it receives an application for certification of a new privately-owned wastewater treatment system, or an application for a revision to an existing certification, including changes in the franchise area of an existing system.

o [7) The IEPA and local land use control authorities should review the proposed private facility for consistency with the 208 plan and local land use plans. The local land use authority should be given a 30-day

period during which it may comment on the proposed action and transmit any such comments to the IEPA. An IEPA finding of consistency, expressed in the form of intent to issue necessary permits, should be a prerequisite to ICC Issuance of a certificate of convenience and necessity.

- (8) Miscellaneous publicly and privately owned wastewater treatment plants should continue in operation until such time as wastewater service can be provided by publicly owned municipal type wastewater systems on a cost effective basis. Service areas of privately owned treatment systems should not be expanded or their treatment capacities increased when service can be provided on a cost effective basis by publicly owned municipal type wastewater systems.

- (9) NPDES permits issued by IEPA to private utility companies should identify projected five year service areas. No other NPDES permits should be issued for municipal-type wastewater service within those five year service areas to other treatment authorities except upon a finding by the IEPA that the proposed facility is the most cost effective means of providing service, in a interim facility pending extension of service by another established treatment authority; or is intended to serve an isolated location.

- (10) The IEPA should continue to enforce all requirements of NPDES permits and assure that treatment plant operators achieve required standards of plant performance.

- (11) Operators of publicly-owned treatment plants should maintain current inventories of all significant industrial wastes being conveyed to their plants for treatment.

- (12) The IEPA shall continue to enforce all requirements of NPDES permits for all industries and assure that treatment plants achieve and maintain required standards of plant performance. This can be achieved through IEPA standards for treatment plant personnel and through frequent sampling and analysis of treatment plant effluent by the IEPA for the purpose of monitoring compliance with NPDES permits.

- (13) All municipalities and counties should consider enacting ordinances that ban the sale of high phosphate home laundry detergents.

- (14) In the planning period before the Areawide Plan is approved by the USEPA, all 201 plans underway on a current or subsequently approved priority list should proceed expeditiously through completion, State certification and approval by the USEPA. Water quality planning agencies are expected during this period to utilize and incorporate (not duplicate) the 201 funded information.

- (15) After the Water Quality Management Plan has been completed and the management agency or agencies identified by the plan have been approved by the state and USEPA, all facilities plans underway at the time the plan is approved will be expeditiously completed by the agencies which received the Step 1 grant through State certification and USEPA approval. An exception to this basic policy covers situations where the Water Quality Management Plan clearly justifies a change in regional treatment levels or an alternative approach on the basis of substantially lower costs or major changes in projected environmental impacts.

- (16) Municipal-type wastewater treatment authorities should implement their respective portions of their 201 plans as they have been or may be approved by the Illinois and/or U.S. Environmental Protection Agencies. In the absence of completed and/or approved facility plans, certain assumptions had to be made in this areawide plan as to the expected locations and sizes of treatment plants, their estimated costs and designated management agencies. This information must not be construed as binding in the Areawide Plan until the 201 facility plans have been finalized.

- (17) Local facility planning initiated after certification of the initial areawide plan must be in conformance with the plan.

- (18) By July 1, 1979 the Commission should prepare revised subregional population forecasts in cooperation with county governments. Revisions should reflect the most current regional forecasts from the State of Illinois.

- (19) Where new forecasts indicate the need for a reexamination of population assumptions in ongoing local facilities plans, the Commission should make appropriate recommendations to the local management agencies involved.

- (20) The Commission, in response to requests from local management agencies, should assist in resolving conflicts related to FPA boundaries.

- (21) Facilities planning should be closely coordinated with local government planning and decision-making with respect to growth and development.

- (22) Unresolved disputes over treatment plant consolidations should be settled with the assistance of countywide water quality committees and guidance provided by the areawide plan.

- (23) Wastewater services should be provided by publicly-owned, municipal-type systems except where considerations of cost effectiveness dictate otherwise.

- (24) New medium and high-density development in the region should take place in areas where municipal-type sewer service is existing or planned. An exception concerns instances where an industrial plant will process its own wastewaters, the effluents of which will meet all applicable regulatory and permit requirements and will not adversely affect water quality in the receiving stream.

- (25) Municipal-type wastewater service required to serve future growth within service areas identified for the year 2000 should be provided only by treatment authorities designated in this plan, except where this is not practical or cost-effective.

- (26) In any application for issuance or amendment of an NPDES permit, each designated treatment authority should delineate its projected five-year service area for which treatment capacity is in place or under construction consistent with agreed regional population forecasts.

- (27) No NPDES permit should be issued for municipal-type wastewater service within the five-year service area delineated in the permit other than to the treatment authority. Exceptions may be based on a finding by IEPA that the proposed facility (1) is the most cost-effective means of providing service or (2) is an interim facility pending extension of service by the treatment authority or is intended to serve an isolated location and that it is consistent with municipal, county, and regional land use plans.

- (28) When any NPDES permit is due for renewal, the applicant should include a description of steps to provide wastewater service to the service area delineated in the permit.

o (29) At least every five years, the year 2000 service areas delineated in the areawide plan should be revised to reflect existing development and facilities, existing population forecasts, intergovernmental agreements on service area boundaries, and other relevant factors.

o (30) No NPDES permit should be issued for municipal-type wastewater service outside the five-year service area, but within the year 2000 service area, without review and comment on the permit application by the treatment authority, the countywide water quality committee, and the Commission and unless the development to be served is consistent with municipal, county, and regional land use plans.

o (31) Whenever an NPDES permit is issued to an agency other than the treatment authority for wastewater service outside the five-year service area but within the year 2000 service area, the IEPA should require that the design and construction of the treatment system be such as to permit eventual connection to the treatment authority's system.

o (32) No NPDES permit should be issued for municipal-type wastewater service outside a year 2000 service area unless (1) the development to be served is consistent with municipal, county, and regional land use plans, and (2) the area to be served is unacceptable for the use of on-site disposal systems.

o (33) The state priority system, administered by IEPA, should determine areawide priorities for local facilities planning, design and construction grants.

o (34) The construction of new interim treatment plants or expansion/upgrading of plants to be phased out is discouraged.

o (35) All wastewater treatment authorities placed on the IEPA critical review list should apply for new or revised local facility planning and construction grants (under Section 201), except if an interim treatment plant is involved, or if the deficiency can be corrected by non-structural methods.

o (36) By July 1, 1983, all treatment plants whose seven-day ten-year low flow dilution ratio is 10 to 1 or less shall provide or continue to provide not less than 80 percent oxygen saturation in their effluents. Monitoring of wastewater quality after aeration will be conducted. However, during the continuing planning program, studies will be undertaken to determine where

this requirement may be waived without detriment to in-stream quality standards.

- (37) Management of municipal wastewater systems should be organized on the basis of those units of local government which own their own sewer systems and/or operate wastewater treatment systems. Such units should be designated as management agencies under the Areawide Plan.

- (38) Municipal governments that furnish potable water to industries and other large users should study the possibility for the reuse of effluents from municipal wastewater treatment plants as a substitute for part of the water supply required by these major users. Industries that are responsible for thier own water supply systems should undertake the same types of studies.

- (39) Industries that treat their own wastewater should explore opportunities to recycle and reuse the treated effluent, at the same time studying possibilities to extract residuals that might be of use in the basic plant processes.

- (40) Where cooling water discharges to the region's waters cannot be eliminated, users should explore opportunities for the reuse of the cooling waters in ways that take advantage of the heat energy those waters contain.

- (41) Municipal and county governments should implement programs to reduce water usage and help reduce wastewater flows at publicly and privately-owned treatment plants.

- (42) Wastewater treatment plant designers and operating agencies are encouraged to utilize innovative and alternative technologies which provide for the reclaiming and reuse of wastewater treatment plant effluents in the productive recycling of wastewater constituents, the recovery of energy, and the elimination of discharges of pollutants.

d. Nonpoint Sources

- (1) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should develop and enforce adequate erosion and sedimentation control ordinances. All such local ordinances should be consistent with minimal areawide standards set forth in the model ordinance.

- (2) Within one year following the preparation by NIPC of a recommended model ordinance, all municipal and county governments should adopt and enforce adequate stormwater detention ordinances. These ordinances should include provisions which clearly establish long-term responsibilities for maintenance of detention facilities. All such local ordinances also should be consistent with minimal areawide standards set forth in this model ordinance.

- (3) Within one year following the preparation by NIPC of a recommended model ordinance, all counties and municipalities will adopt measures to control surface runoff from open storage yards containing industrial stockpiles and other materials which may go into solution or which may be carried away by stormwater runoffs and pollute streams and other water bodies.

- (4) Existing stormwater basins detention should be maintained so as to provide the full capacities and pollution control benefits for which they were designed. Every effort should be made to require the agency which currently is legally responsible (e.g., individual landowners, homeowner's associations, municipalities, park districts, etc.) to perform this maintenance. However, in some instances, and as a last resort, it may be necessary for a municipality or sanitary district to step in and assume this responsibility in the interests of pollution control.

- (5) Where wet-bottomed basins are the only viable solution or where the added benefits of recreation and aesthetics are desired, local ordinances should require a clear assignment of ownership and maintenance responsibilities at the time of subdivision. These ordinances should also give preference to the centralization of wet-bottomed detention facilities to provide basins of sufficient size to be of recreational and/or aesthetic value and more efficient in terms of maintenance. Agreement should be reached on the type of maintenance which may be required and its approximate cost. Those responsible, whether public agencies or private individuals, should be informed of their responsibilities and be required to make definite commitments to carry them out.

- (6) By July 1, 1983, all municipalities and counties should implement measures to work toward a reduction of BOD in urban stormwater runoffs from separately sewered areas. Except for areas where existing systems convey stormwaters to Lake Michigan, reductions of 25 percent of 1976 surface loadings on impervious surfaces are recommended as a target. From areas to be urbanized in

the future, target reductions of 50 percent of 1976 surface loadings are recommended.

- (7) By July 1, 1983, Lake County and all its affected municipalities should seek to achieve a 50 percent reduction in BOD found in stormwater runoffs draining into Lake Michigan from urbanized impervious surfaces.

- (8) In attempting to meet the above targets, the implementing agencies should work through the countywide water quality committees to develop plans and standards for the implementation of appropriate measures such as catch basin cleaning, performance zoning, street cleaning, use of porous pavement surfaces, increased vegetative cover, grassed waterways, wetland storage of stormwater, stormwater detention, sedimentation and erosion controls, and other measures to achieve the desired pollutant reductions.

- (9) Township and state highway organizations, the Illinois State Toll Highway Authority, and facility engineering departments at state and federal installations should participate in the programs described above for reducing BOD in stormwater runoffs by implementing accelerated and/or improved street sweeping programs for streets, roads and highways that are hydraulically connected to perennial streams or permanent lakes via stormwater conveyance systems.

- (10) During the period up to July 1, 1983 agencies should utilize voluntary exploratory programs and implementing techniques to control pollutants from urban nonpoint sources.

- (11) Local governments should upgrade their public service programs and housekeeping efforts in order to improve the quality of urban stormwater runoff.

- (12) Local governments should encourage the application of performance zoning concepts that contribute to the reduction of urban stormwater pollution.

- (13) Municipalities, townships, counties, and state and county highway departments responsible for de-icing streets and highways should develop programs to control the application of de-icing materials, to train personnel in proper application methods, and to use proper equipment in order to minimize any negative water quality impacts. The effect of de-icing on water quality will be given further study by NIPC in the continuing planning program.

- (14) Existing units of local government should have the primary responsibility and regulatory authority for controlling urban drainage and reducing pollution from stormwater runoff.

- (15) Once the general permit authority of the IEPA has been clarified, a general permit program should be implemented in northeastern Illinois in support of the areawide water quality management plan. The IEPA should issue NPDES permits for specific stormwater discharges only to municipalities, or unincorporated areas of counties, that fail to comply with general permit requirements.

- (16) By July 1, 1980, the various soil and water conservation districts in conjunction with agencies of the United States and Illinois Departments of Agriculture and the countywide water quality committees, should identify the best management practices necessary to implement the agricultural aspects of the 208 plan, including conservation tillage, contour plowing, terracing, and conversion of cropland to grassland.

- (17) By July 1, 1981, agricultural lands on which BMPs should be applied should be identified by appropriate soil and water conservation districts. Agencies of the U.S. Department of Agriculture and countywide water quality committees should be consulted.

- (18) By July 1, 1985, a comprehensive conservation plan should be prepared for each farm which has soil erosion losses in excess of standards set by the Illinois Department of Agriculture and soil and water conservation districts under House Bill 819.

- (19) Using available cost sharing and technical assistance programs, the soil and water conservation districts should ensure implementation of the BMP program according to the following schedule:

  By 1985 - 30% of the identified land.
  By 1995 - 70% of the identified land.
  By 2000 - 100% of the identified land.

- (20) The implementation of agricultural BMPs should take place through a voluntary program, in which primary responsibility is assigned to farm owners and farm operators. Technical and financial assistance should be provided by public agencies.

- (21) The progress made in the voluntary implementation of BMPs should be monitored and assessed annually by soil and water conservation districts. Regulatory action or direct public implementation should be required if progress is judged to be inadequate after a reasonable period of time. As part of the annual areawide plan implementation program, soil and water conservation districts should submit current reports on progress and on remaining problem areas to the appropriate countywide water quality committees. These reports will identify areas for which BMPs should be developed in the forthcoming year.

- (22) The countywide water quality committees in conjunction with agencies of the U.S. and Illinois Departments of Agriculture will identify localized pollution problems resulting from cattle grazing. By July 1, 1980, NIPC, as part of its continuing planning responsibilities, should recommend measures for the correction of those problems through established programs.

- (23) Each soil and water conservation district should be designated as a water quality management agency in the areawide plan.

- (24) The ASCS, through its county committees, will provide a leadership role in establishing priorities for the disbursing of public cost-sharing funds for agricultural pollution control.

- (25) Soil and water conservation districts, with assistance from state and federal agencies, should undertake demonstration projects based on the recommendations of the areawide plan.

- (26) The Illinois agricultural community, and associated public agencies, should encourage statewide or national studies to better define the relationships between agricultural practices and water quality.

- (27) The Illinois Department of Agricultural (IDA) and soil and water conservation districts should take necessary actions to ensure that House Bill 818 will be ready for implementation by January 1, 1981. Standards developed by the IDA for House Bill 818 should be submitted to the IEPA, the Commission, and all county water quality committees for review and comment before they are adopted.

- (28) The counties should inspect all septic systems known to be failing, threatening public health or causing nuisance conditions. The inspection should result in the issuance of a repair permit for

corrective measures which are to be undertaken and paid for by the septic system owner.

- (29) Individual malfunctioning on-site disposal systems outside of the five-year service areas identified in NPDES permits should be repaired wherever possible upon complaint to the appropriate authorities or replaced with a new system, if necessary.

- (30) Septic systems should be inspected by local environmental health officials prior to the transfer of ownership of properties where such systems are installed. The results of the inspection should be made known to the lending institution which is furnishing the mortgage.

- (31) In areas of septic failures involving several systems, where there is no possibility of cost-effective, conventional sewer service, the failing systems should be replaced by innovative-type on-site waste disposal or effluent transfer systems connected to individual homes by connector pipes.

- (32) Septic management systems should be modified to allow all local governments in the region tc take advantage of new federal grant programs for septic systems. By July 1, 1983 special service areas should be established under spcnsorship of the counties and/or local municipalities, where necessary, to facilitate the financing of innovative or alternative systems or making other on-site improvements necessary to correct or replace malfunctioning septic systems.

- (33) Innovative type septic systems should be required in all new developments where conditons indicate that problems could result from the installation of a series of individual systems.

- (34) Local governments should require a construction permit to regulate the design, location, and installation of every new on-site system in incorporated as well as unincorpcrated areas.

- (35) Regulatory agencies should make better use of data on soils and surficial geology in evaluating septic system locations. In this connection, county and municipal zoning officials should give serious consideration to the types of soil which are present in proposed subdivisions before authorizing their platting.

- (36) No county or municipality should approve a subdivision of land which is intended to be served by on-site disposal systems within the five-year projected service area of a designated wastewater treatment or collection authority until that authority has been given an opportunity to review and comment upon the proposed subdivision. This provision is intended to supplement, and not replace, existing statutes regarding the subdivision of land within one and one-half miles of any municipality.

- (37) Each county and municipality should adopt an ordinance prohibiting the renovation or installation of any on-site disposal system within a specified distance from a sewer with available capacity. This ordinance shall also prohibit the continued use of a malfunctioning or illegally connected existing on-site system when a sewer with available capacity is extended to the property line. Neither of these prohibitions shall apply if the property owner has made a good-faith effort to secure connection and has been denied permission by the owner of the collection system.

- (38) The Illinois Pollution Control Board may find, on recommendation of the IEPA, the Illinois Department of Public Health, or a county or municipal authority responsible for the regulation of on-site disposal systems, that water quality problems associated with an area of failing on-site disposal systems can be corrected most cost-effectively by the removal of the systems and the provision of municipal-type wastewater service. The Board may issue an order to the owner or occupant to abate the pollution. The measures employed will be decided by the individual owners of the malfunctioning on-site disposal units.

- (39) Counties, municipalities and sanitary districts should consider enacting ordinances to cover situations where mandatory elimination of existing septic systems may cause serious economic hardships on property owners who are elderly or living on fixed incomes. Under these circumstances, the agency installing or controlling an existing sewer system may finance the capital costs which are normally assessed or borne by the property owner, including the house connection. A lien would be attached on the property for recouping those costs, plus interest, when the property is sold.

- (40) As a substitute for existing state regulations, the IEPA and IPCB should consider certification of local solid waste disposal programs which comply with areawide plans prepared under the Federal Resource Conservation and Recovery Act.

- (41) Local governments should plan ahead for surface waste disposal so that site selection can be based as much as possible on suitability rather than on availability.

- (42) As part of the continuing planning program the IEPA in cooperation with the Illinois Institute for Natural Resources, the Illinois State Water Survey, and local air quality management agencies should analyze the relationships betwen air pollution and water quality in all of their aspects. The IEPA should cooperate with NIPC in devising strategies for correcting present negative effects and preventing future problems through the 208 continuing planning program.

- (43) The IEPA should continue to study the types and volumes of pollutants associated with mining activities and their potential effects on surface and groundwater quality. Any needed changes in present regulations should be identified by July 1, 1980.

- (44) The IPCB should issue regulations governing the proper containment of dredge spoil and requiring the filtering of excess waters before they are discharged to water bodies.

- (45) Except for the removal of polluted benthic deposits, dredging operations typically provide little water quality benefit but do cause disruptions in the aquatic environment. The possible negative impacts on water quality should be assessed against the flood control, drainage or navigation benefits by sponsors of any proposed dredging project.

- (46) Sponsors should give serious consideration to the potential negative water quality impacts of impoundments which are proposed for construction.

- (47) The highly fragmented authorities for stream channel maintenance and improvements should be clarified and delegated by appropriate state legislation or assumed through intergovernmental agreements or other administrative or legal procedures sponsored by countywide water quality committees.

- (48) Given the high nutrient concentrations in the region's streams, special site-specific design features and operational procedures must be considered to avoid any potential negative water quality impacts of any proposed impoundments to be constructed pursuant to the flood control and/or recreation plans. These design and operating procedures should include, but not be limited to off-stream reservoir pump-out designs which

incorporate adequate reaeration of discharges that provide not less than 80 percent oxygen saturation during dewatering operations. Aeration in the reservoirs and the optimization of retention times are other considerations. These measures must be addressed on a site-by-site basis since any given reservoir may exhibit both positive and negative water quality impacts in varying degrees over time.

- (49) The feasibility of making structural changes to the low-flow impoundments on the region's streams, or the actual removal of the dams, should be considered in the continuing planning program with the objective of conserving super-saturated DO concentrations and/or reducing the adverse water quality impacts of these dams during low flow periods.

- (50) Stream flows entering Illinois from Indiana and Wisconsin shall meet the instream water quality standards described in the respective basin plans.

- (51) By July 1, 1980, the Illinois State Water Survey and the Illinois State Geological Survey should undertake a coordinated well sampling program to monitor groundwater quality in areas where a potential for infiltration by pollutants now exists or might exist in the future.

- (52) By July 1, 1979, and in accordance with Section 314 of PL 92-500, the IEPA should undertake expanded lake sampling to identify eutrophic conditions and, in conjunction with NIPC and the county water quality committees, develop plans to control sources of pollution and restore water quality.

- (53) As part of the continuing planning program, the IEPA in coordination with local governmental sampling programs should maintain an adequate in-stream and effluent monitoring program including chemical, physical and biological components to assure the effectiveness of the 208 plan. Both the IEPA and NIPC should periodically review the monitoring program to assure its adequacy, and the continuing planning program should recommend any needed monitoring changes to more effectively assess progress in implementing the 208 plan.

e. Residuals

- (1) Residual materials generated by wastewater treatment processes are a resource and should be utilized to the maximum extent possible in northeastern Illinois. Highest priority should be given to use of

sludge as a soil conditioner and efforts should be expanded to utilize it for that purpose.

- (2) To the extent that sludge materials must be disposed of rather than utilized, disposal should take place in sanitary landfills that have been designated by the IEPA as suitable.

- (3) Local authorities should ensure that maximum use is made of existing sludge management systems and disposal sites.

- (4) The preferred method for the disposal of domestic septage is through land application, and this method should be encouraged and used whenever possible. Recognizing a continuing need for the disposal of large volumes of septage at wastewater treatment plants, specific facilities should be designated by the IEPA to receive domestic septage on recommendation by NIPC through the continuing planning process.

- (5) During periods of adverse weather, or in areas where land application is not possible, septage should be disposed of in wastewater treatment plants where special tanks can hold the septage for analysis and pretreatment aeration. Alternatively, the septage should be disposed of in approved sanitary landfills.

- (6) Septage that contains hazardous or toxic wastes should be deposited in landfills permitted by the IEPA as suitable for hazardous waste disposal.

- (7) The dispcsal of water treatment plant residues should be evaluated on a case-by-case basis. Potential methods include discharge to sanitary sewer systems for subsequent handling in wastewater treatment plants, as well as dewatering and disposal in sanitary landfills.

- (8) Sludges from industrial wastewater treatment processes containing heavy metals or toxic materials in excess of limits acceptable for land application, should be disposed of in landfills that have received the appropriate state permits.

- (9) Sludge management should receive high priority in that statewide solid waste plan to be prepared by the IEPA under Public Law 94-580.

TABLE 24-1. APPLICABILITY OF AGRICULTURAL BEST MANAGEMENT PRACTICES BY COUNTY (1)

Potential Pollutant Control Measure	Cook[2]	DuPage[2]	Kane	Lake	McHenry	Will
Sediment						
Conservation Tillage	X	X	X	X	X	X
Crop Rotation			X	X	X	
Contouring			X		X	X
Contour Strip Cropping			X		X	X
Critical Area Protection	X	X	X	X	X	X
Cover Crops			X	X	X	X
Pasture & Hayland Establishment & Management	X	X	X	X	X	X
Terraces			X		X	X
Diversions	X	X	X	X	X	X
Water & Grade Control Structures	X	X	X	X	X	X
Grassed Waterways			X	X	X	X
Change in Land Use	X	X	X	X	X	X
Pesticides						
Soil Erosion & Runoff Controls	X	X	X	X	X	X
Proper Pesticide Selection	X	X	X	X	X	X
Correct Pesticide Application Rates	X	X	X	X	X	X
Optimization of Pesticide Placement	X	X	X	X	X	X
Proper Disposal of Unused Materials and Containers	X	X	X	X	X	X
Nonchemical Methods	X	X	X	X	X	X
Integrated Controls	X	X	X	X	X	X
Legal Controls	X	X	X	X	X	X
Nutrients						
Determine Proper Amount Form Method & Time of Nutrient Applications & Placement	X	X	X	X	X	X
Use Cultural Practices	X	X	X	X	X	X
Soil Erosion & Runoff Controls	X	X	X	X	X	X
Livestock Wastes						
Proper Site Selection			X	X	X	X
Control Runoff			X	X	X	X
Proper Collection & Storage of Waste			X	X	X	X
Land Disposal			X	X	X	X
Pasture Management			X	X	X	X

(1) Counties where practice is most applicable are indicated. However, practice may have limited applicability in other counties.

(2) Only relatively small portions of the county are used for agriculture.

24.08 SUMMARY OF MANAGEMENT PLAN

a. General

The implementation of the Areawide Water Quality Management Plan will require the efforts of more than 350 units of government and even larger numbers of individuals and organizations.

The Northeastern Illinois Planning Commission has identified in the Areawide Water Quality Management Plan specific responsibilities that various units of government should assume if necessary water quality control measures are to be instituted. See Chapter Eight, "The Water Quality Management Framework."

The areawide plan will change as parts of it are implemented, as new water quality problems are identified, and as knowledge of effective control strategies increases. Change is consistent with federal guidelines, which state that an areawide water quality management plan "should be a dynamic management tool rather than rigid, static computation of data and material."

To implement the plan, there must be an areawide management process through which the actions of designated management agencies can be monitored and coordinated and their accomplishments and shortcomings assessed. A management process is one of the principle recommendations of the Areawide Water Quality Management Plan.

A major requirement of areawide planning, as set forth in Public Law 92-500, is that management agencies be designated by the governor to implement the plan. According to federal regulations, all agencies responsible for carrying out any portion of a water quality management plan must be designated as management agencies. This includes "agencies responsible for plan implementation by their own direct activities; agencies responsible for overseeing the performance of any person or entity through regulatory or other means; and agencies that review or coordinate overall water quality management agency actions."

b. Overview

The areawide water quality management plan will be managed by a three-level areawide system incorporating both existing and new institutions. Existing units of local government will be linked through new intergovernmental structures at the countywide level and through the Commission, which will serve as the areawide coordinating body.

The State of Illinois, through various agencies, will use its existing authority to set and enforce standards, issue permits and allocate wastewater grants and other resources. The recommended framework is consistent with the overall objectives of the areawide plan. It is based on the following five policies, each of which derives directly from Areawide Water Quality Management Plan objectives.

- (1) Local governments will have the primary responsibility for implementing technical provisions of

the areawide plan and for coordinating implementation efforts among themselves. Local governments also will aid in identifying and correcting deficiencies in the plan.

- (2) No new level of government will be interposed between local governments and the state, or between existing units of local government.

- (3) The management system will provide cooperative forums through which management agencies can communicate and reach joint decisions on management matters, resolve conflicts or refer them to higher authorities for resolution, and monitor progress in implementing the water quality plan.

- (4) Ultimate legal responsibility for the attainment of areawide plan goals will continue to rest with the state. The state will delegate major responsibilities to local governments by certifying the plan. But, it must retain the ability to set water quality and performance standards and enforce them.

- (5) The continuing plan review and revision process will maximize local government involvement.

The management functions fall within the following four general categories:

- management programming and certification,

- coordination,

- conflict resolution, and

- continuing planning

The agencies comprising the management framework are identified and their responsibilities described in Table 24-2, "Designated Management Agencies and Responsibilities."

c. Local Implementation Agencies

It is recommended by the Commission that a number of local governments be designated by the governor as management agencies. As such, these local governments will have primary responsibility for managing wastewater collection and treatment systems and for providing the public services and regulatory controls required by the water quality strategies recommended in the areawide plan (See Chapter Eight).

A basic premise of this plan, particularly with respect to control of point and nonpoint sources, is that local governments will make the commitments and take the actions that are necessary to control water pollution.

d. Countywide Water Quality Committees

One way to overcome the problem created by the number and variety of management agencies would be to require that

all agencies conform to a strong state system of standards, permits, and enforcement procedures. This plan recommends, however, that the primary direction for the implementation activities of local management agencies should come from intergovernmental agreements formed by the management agency representatives. The spirit of the 1970 Illinois Constitution, which emphasizes home rule and intergovernmental cooperation, requires that this approach be given an opportunity to succeed before more direct measures are applied.

In each of DuPage, Kane, Lake, McHenry, and Will counties, a countywide water quality committee will be established or another organization will be identified to assure countywide coordination of water quality management. A single countywide body will be identified in each county area through which the basic coordinating responsibilities can be performed. This body may be a countywide water quality committee, a countywide coordinating body working in conjunction with subcounty management advisory committees, or existing agency such as a county regional planning commission. The term "countywide water quality committee" refers to any of these alternative forms.

Each countywide water quality committee should be substantially representative of the designated management agencies in the county. The selection of the membership of the countywide committee should be made by agreement among the elected or appointed officials of the designated management agencies within the county. Each committee, whether existing or newly created, should be composed predominantly of representatives of the management agencies. These members should be responsible officials within their own jurisdictions, preferably elected members of principal policy bodies or alternatively chief appointed officials. Membership on each committee should be sufficiently broad to assure that all management agencies will consider themselves adequately represented.

Major economic and environmental interests and the general public should also be represented on the countywide committees. On any newly-established committee, non-governmental representatives should comprise between one-sixth and one-third of the membership.

The Metropolitan Sanitary District, acting through its Board of Commissioners, will continue as the water quality planning, coordinating, and management agency for its jurisdiction. The District will continue to maintain and refine the 208 plan elements for its jurisdiction and will submit such elements to the Commission so that the Commission may make certain that they are consistent with the adopted 208 plan for the region. The District will perform the coordinating functions of the countywide water quality committees. The District will perform its coordinating functions in consultation with Management Advisory Committees (MACs) in each basin area. The MACs will be established by resolution of the District and the other management agencies within each basin. In those portions of Cook County not served by the District, local governments may choose to coordinate their activities through separate management advisory committees as outlined below, or to be included under the coordinating umbrella of the District.

TABLE 24-2: DESIGNATED MANAGEMENT AGENCIES AND RESPONSIBILITIES

Responsibility	Designated Management Agencies
1. Implementation of Control Strategies	
A. Wastewater treatment, pre-treatment programs, other point source controls	Municipalities, sanitary districts, county departments designated as waste treatment authorities
B. Urban stromwater management	Municipalities, Counties, MSDGC
C. Agricultural Source Management	Soil and Water Conservation Districts, Illinois Department of Agriculture
D. Regulation of on-site disposal systems	Counties, municipalities, Illinois Department of Public Health
2. Implementation Programming, Funding	
A. Annual implementation programs	County Water Quality Committees, NIPC
B. Coordinate implementation programs	County Committees, NIPC
C. Certify implementation programs	IEPA
D. Fund implementation activities	Local management agencies, IEPA, ASCS, SCS
3. Coordination & Enforcement	
A. Coordinate implementation activities	County Committees, NIPC
B. Water Quality Monitoring	IEPA, Waste treatment authorities
C. Negotiated conflict resolution	County Committees, NIPC
D. Enforcement proceedings	Local management agencies, IEPA, IPCB, courts
4. Continuing Planning	
A. Annual plan review, revision	NIPC, County Committees, with technical and public adivsors
B. Develop standards, rules	IEPA, IPCB, IIEQ
C. Relate 208 to comprehensive planning	Municipalities, County Planning Agencies, NIPC

(1) Legal Basis: Local governments could establish countywide committees, as they are described in this plan, by intergovernmental agreement under the local government article of the 1970 Illinois constitution. Alternatively, county committees could be established under the general enabling legislation for the promotions of regional councils of public officials (85 Ill. Rev. Stat. 1011) or under new enabling legislation.

It is recommended that each countywide committee be created or (in the case of an existing agency) authorized by intergovernmental agreement. The agreement will take effect in each county upon its adoption by a majority of the management agencies in that county. This should occur within nine months after certification of the management portion of the plan by the Governor. A model agreement will be prepared by the Commission in consultation with the local steering committees and interim coordinating bodies. Where an existing agency is to be designated, the agreement will outline its water quality-related functions and indicate concurrence by the local management agencies in its designation. The agreement will address the composition and activities of the countywide committee, and also the division of activities between it and any subcounty management advisory committees which may be established.

(2) Internal Organization: Each countywide committee should consider the establishment of a technical advisory committee (TAC) consisting of staff members of designated management agencies, private interests, and organizations with expertise or interest in water quality management. Funding for the countywide committees should be provided from federal funds made available to the Commission for the continuing planning process, and from contributions by the designated management agencies in each county. The ratio for local funding of the committee should be the same as the ratio applied by USEPA in determining the share of continuing planning costs that must be borne by the Commission.

Drainage Basin Forums in each basin will provide the principal opportunity for broad public participation in the continuing review and revision of the 208 plan. The Forums will be based on the Drainage Basin Advisory Committees created for the initial preparation of the plan. In fulfilling their roles in continuing planning and in the identification and resolution of basinwide issues, the forums will be advisory to the countywide committees and the Commission. They will not be formally organized as structured committees with defined membership, but will be open to the broadest possible participation. Every opportunity must be taken to educate the general public through the forums to water quality problems and solution.

e. Northeastern Illinois Planning Commission

The Northeastern Illinois Planning Commission should be designated by the governor as the agency responsible for continuing water quality management planning and for areawide oversight and coordination as specified in this plan. The Commission's water quality management activities should be integrated with its ongoing planning program.

In reviewing proposed areawide plan amendments and implementation programs, including those submitted through the A-95 review process, the Commission will assess compatibility with the certified areawide water quality plan and with other adopted regional plans and programs.

Policy responsibility for the development and amendment of plans and policies should be retained by the Commission's 208 Steering Committee. The committee will be reconstituted by resolution of the Commission as the Areawide Water Quality Steering Committee. The resolution will provide for voting participation by the countywide coordinating body in each county, the Areawide Planning Advisory Committee, and the Water Resources Technical Advisory Committee. Responsibility for project review, including the review of facilty plans and NPDES permits, will be retained by the Commission's Governmental Services Committee.

The Commission should maintain adequate staff to permit it to fulfill the responsibilities identified in the areawide plan, including the continuing technical assessment of water quality management strategies. The staff should be organized as part of the agency's regular staff, and members should work through its established programs, including project review and local services.

(1) Areawide Advisory Groups: The Commission should utilize areawide advisory bodies representing specialists, local, state and federal management agencies, economic interests, and environmental and public interest groups.

The Commission should continue to rely on its Water Resource Technical Advisory Committee for advice on developing and reviewing research projects, for reviewing the relationship of the Commission's water resources plans to those of other agencies, and for guidance on revising the areawide plan.

The Areawide Planning Advisory Committee (APAC) should be maintained as a forum for groups concerned with water quality management on an areawide scale. The APAC should be convened to review annual implementation progress reports and proposed plan revisions. The APAC also should review proposed areawide research programs and management proposals and recommend studies to the Commission.

(2) Conferences: In conjunction with the review and update of the areawide plan, the Commission should sponsor areawide, public conferences for the purpose of assessing progress in implementing plans and for examining major

issues in water quality confronting the region. Such conferences should be held at least once every 3 years.

f. State of Illinois

The third level of the management framework consists of administrative divisions of the State of Illinois, which has overall responsibility for water quality in the region. The primary agency for water quality management is the Illinois Environmental Protection Agency (IEPA).

The IEPA should consult regularly with designated management agencies in northeastern Illinois in the development of statewide plans, programs, and standards.

A permanent advisory committee for areawide and statewide water quality planning and management should be established by the IEPA. The committee should include representatives of the Commission local and counterpart agencies from elsewhere in Illinois.

The advisory committee should meet periodically to review progress in implementing areawide plans throughout the state; to advise IEPA on its water quality monitoring programs and on standards, regulations, and programs in preparation; to review proposed legislation and levels of state funding for the plan implementation activities; and to develop recommendation for changes in federal policies bearing on implementation of areawide plans.

g. Water Quality Monitoring

The IEPA should retain primary responsibility for monitoring water quality and for preparing data on which assessments of areawide plan implementation can be based.

The IEPA should provide quarterly summaries of the results of its in-stream sampling program to the Commission and countywide committees.

The Northeastern Illinois Planning Commission and the countywide committees should make recommendations to IEPA on the location and the frequency of in-stream sampling to assure that results are adequate for assessing implementation progress.

The IEPA should assure that a portion of its sampling sites in the region are coordinated with stream flow gauging to permit continuing calibration and refinement of the computer simulation model.

h. Coordination

Designated management agencies should have the opportunity to review and comment on proposed actions which may affect water quality within their areas of interest or

affect the water quality management program in which they are involved.

Each countywide committee should establish procedures and criteria, consistent with the areawide plan, for notification of agencies potentially affected by proposed actions. These procedures and criteria should be included in each committee's annual management program.

Federal and state actions with potential impacts on water quality or on the implementation of this plan, should be made available for advance review and comment by affected management agencies.

The IEPA and the Commission should take lead roles in identifying the types of state projects to be submitted for regional review, the process through which this is to be done, and the time limits and reasonable safeguards to be included.

Under the A-95 process, the Northeastern Illinois Planning Commission will transmit notice of all projects that may affect water quality to any countywide committee affected, as well as to local governments. Comments and recommendations received will be transmitted to the federal funding agency with the Commission's comments.

i. Enforcement

The areawide plan assigns responsibility to the state for taking any necessary enforcement action against designated management agencies. Each countywide committee should provide a process through which issues concerning plan implementation can be heard and conciliated prior to formal enforcement proceedings. A similar process should be provided through the Commission for issues which cannot be resolved at the countywide level.

Complaints alleging the failure of a designated management agency to carry out its responsibilities under the plan may be submitted to a countywide committee. The countywide committee may, if it chooses, assist the parties to the issue in identifying mutually acceptable resolutions.

Complaints that involve interagency or basin issues may be brought by a designated management agency, a countywide committee, or an areawide advisory committee to the Commission. Upon the receipt of such complaint, the Commission may appoint an ad hoc committee comprising members of the Commission and representatives of the advisory bodies to hear the issues and make recommendations as to their resolution.

Recommendations of the ad hoc committee shall be referred to the designated management agency in question and the entity filing the complaint for their consideration. Any finding and recommendation shall be strictly advisory.

In the event that a county committee or ad hoc areawide committee finds that an issue can best be resolved by an amendment to the areawide plan, it will submit a finding to that effect to the Commission (See Chapter Eight).

24.09 ASSESSMENT OF PROPOSED PLAN

The preparation of an environmental assessment, and the possible preparation of a more detailed environmental impact statement by the sponsoring federal agency, are covered by the National Environmental Policy Act of 1969. Implementing instructions are in 40 CFR 6.56b(3) and Sections 6.32(a) through (g), and in the USEPA publication: "Environmental Assessment of Water Quality Management Plans" (January 1977). Asssessments and impact statements are prepared when it is believed that proposed actions will have significant impacts on the environment, both beneficial and adverse, primary and secondary, and of short-term or long-term duration. Adverse impacts that cannot be reduced in severity or to acceptable levels must be covered, together with any controversial matters.

a. Sewer Service Areas

The 208 plan proposes the delineation of projected sewer service areas forecasted five years into the future. This information should be incorporated in NPDES permits. The objective is to encourage local planning and to assist in removing unsatisfactory septic systems on a preplanned basis. Where sewer service is not foreseen within the next five years, the establishment of special service areas is recommended, with the installation of innovative-type on-site wastewater treatment improvements.

b. Stormwater Runoffs

The two most significant non-point source controls recommended by the plan involve agricultural and urban stormwater runoff. In the agricultural areas, water quality modeling simulated practices that would have a direct impact on the reduction of pollutants transported by runoff. Coincidentally, the same practices would have beneficial impacts by reducing soil erosion. While the model considered the adoption of conservation tillage, contour plowing, terracing, combinations of these, and conversion of tilled lands to pasture lands, it is recognized that actual implementation will require more detailed, farm-specific studies for the selection of the most appropriate practices.

A wide range of actions to control urban stormwater pollution are described in Chapter Six. Cost studies in this plan were based on the increased use of vacuum street sweepers in separately sewered areas to reduce the input of BOD normally found in urban stormwater runoffs. A target reduction of 25 percent in BOD from impervious urban areas is established on lands presently urbanized, and a 50 percent target reduction is established for areas to be urbanized in the future, all based on present surface loadings.

These practices will have significant impact on water quality. However, it is recognized that the cause and effect relationship of these and other Best Management Practices have not been adequately determined. Accordingly, implementation of the agricultural program is dependent on the availability of adequate federal grants. For the urban runoff program, controls will be installed incrementally or progress is evaluated.

c. Interrelationships with Other Projects or Proposals

(1) General: Given the possible adverse water quality impacts of off-channel reservoirs where high stream flows are detained, consideration should be given to preventative or corrective measures. Problems may become acute when wet weather flows are stored for long periods of time and pollutants deplete the oxygen in the reservoirs. If future reservoir operating rules result in long detention times, facilities may have to be installed to aerate the stored waters, or the discharges. The plan focuses attention on off-channel flood control reservoirs which have been or may be constructed, and others which have been proposed by the USDA Soil Conservation Service, the U.S. Army Corps of Engineers, the Illinois Division of Water Resources, and other agencies.

(2) Salt Creek Basin: In the Salt Creek basin, given the possible adverse impacts of reservoirs where algae will flourish and accumulate, or where depressed DO levels will occur, consideration should be given to preventative or corrective measures. Also, if problems become acute when wet weather flows are stored for long periods of time, depressed oxygen levels will result. For in-stream reservoirs, low flows during dry weather periods will encourage algae growth. Of special concern is the 589-acre Busse Woods flood control-recreational reservoir, newly constructed in the upstream portion of the watershed. Despite the absence of point source discharges tributary to the reservoir, water quality modeling results indicate that the state in-stream standard for phosphorus will be violated almost continually. This may result in excessive aquatic weed and algal growth, affecting not only the future recreational use of that water body, but also water quality

conditions downstream following seasonal weed and algae die-offs.

(3) Hickory Creek Basin: Given the possible adverse impacts of reservoirs where algae will accumulate and oxygen depletion may occur, consideration should be given to preventive or corrective measures for the proposed Spring Creek reservoir which will have a permanent pool. Reaeration of reservoir discharges may be necessary. The plan also calls for critical evaluation of any future dredging proposals for Hickory Creek and its tributaries because of the negative impact such projects typically have on water quality and the overall stream and adjacent land environments.

(4) Little Calumet Basin: The plan focuses attention on off-channel flood control reservoirs which have been proposed by the MSDGC and the USDA Soil Conservation Service. If future reservoir operating rules result in long detention times, facilities may have to be installed to aerate the stored water or the discharges.

The Corps of Engineers proposes a flood control-recreational navigation project for the Little Calumet River basin in Indiana. The critical impact on water quality in Illinois will be derived from a proposed dam near the state line. This will divert high flows eastward, through Indiana, for eventual discharge into Lake Michigan via Burns Ditch. The impacts of this proposal on Illinois water quality in the Little Calumet River, as well as on Lake Michigan, need to be determined.

Communities and sanitary districts in Indiana, now discharging into the Little Calumet River have under preparation their own 201 facility plans. Given the in-stream standards expected by this Plan concerning flows from Indiana into Illinois, the attitudes of Indiana local governments and of the State of Indiana itself will also have to be evaluated.

The impacts of proposed future improvements of Indiana municipal and industrial plants discharging into the Little Calumet River, as well as the impacts of proposed Indiana nonpoint source controls, need to be analyzed to determine their impacts on boundary water quality conditions. The financial and technical feasibility of meeting the standards, at the state line as described by this Plan, will also need to be evaluated.

(5) North Branch Chicago River Basin: The most prominent topic of discussion during the plan preparation phase was the restoration of the Skokie Lagoons. Points of view ranged from the suggestion that they be converted into a marsh area, to a complete restoration, which would involve the removal of accumulated bottom deposits; to the bypassing of low flows. Cost estimates will have to be prepared on the basis of more detailed studies. An approximate cost of

$3 million was suggested. Given the many factors that require further evaluation, the plan recommends restoration on the basis of future detailed plans. The adverse impact of point source nutrients (Clavey Road WWTP) and from pollutants originating from nonpoint sources, indicate that an ongoing lagoon maintenance program will be required to remove algae after restoration has been completed. However, such decisions can await actual experience.

(6) Du Page River Basin: There are several locations in the Du Page basin where low-head dams create pools which may be the sites of degraded water quality. Flow velocities behind the dams are slowed, reducing the reaeration potential of the water and allowing sediments to settle. Longer detention times allow for greater degradation of oxygen-demanding pollutants and may allow algae populations to build up. Typically, dissolved oxygen levels in these pools are lower than adjacent free-flowing reaches. The severity of water quality degradation in the low-flow pools is dependent on the relative size of the pool (which determines flow through time) and the quality of the water entering the pool. Computer simulations have indicated particular problems in the Churchill Woods Forest Preserve Lagoon on the Upper East Branch. Further monitoring and study of these sites are needed. Possible strategies for dealing with the problem include modification of the dams, instream aeration, or more stringent point source controls upstream.

(7) Chicago River/Sanitary and Ship Canal/Cal Sag Channel Basin: The most significant project involves dredging related to the navigable rivers and canals in the basin. There is a small Soil Conservation Service project along the Calumet Sag Channel but its water quality impacts will be very minor.

The importance of dredging should be decreased in the future with the implementation of certain aspects of the plan. Sediment loads to streams will be decreased through effective erosion controls. The implementation of TARP will reduce sediment loads from combined sewer overflows. Decreased loads will reduce the need for dredging and disposal sites for spoil. Turbidity of the water will also decline which may result in excessive algae populations in some reaches.

(8) Des Plaines River Basin: The U.S. Department of Agriculture, Soil Conservation Service, PL-566 proposals to construct 11 flood-control reservoirs on the Upper Des Plaines River could have negative water quality impacts by returning stored water to the Des Plaines after significant biological decomposition has occurred, thereby lowering DO levels.

The Illinois Division of Water Resources Lake Michigan Water Allocation Program could also have significant water quality impacts in both the Upper and Lower Des Plaines River Basin. The influence of water conservation measures mandated by the program and the impacts of allocations on development patterns will affect wastewater loads from all sources. The Corps of Engineers Lake Diversion study may also affect water quality in the lower Des Plaines, if implemented, by providing additional (temporary) dilution water from Lake Michigan. The impacts of this project are yet to be assessed but potential influences on water quality will result from increased flows which will provide pollutant dilution. The extra flows may scour oxygen demanding bottom deposits and accelerate water quality improvements. Increased bank erosion may also occur.

(9) Fox River Basin: There currently is one proposed project being conducted by other agencies which would impact on basin water quality. The IDWR has proposed constructing a 0.27 mile dike along Poplar Creek which is expected to reduce sediment entering the Creek by 28,100 tons per year. Water quality impacts are expected to be minor. The NIPC "Regional Water Supply Plan" recommends the use of the Fox River as a water supply source.

(10) Lake Michigan Basin North: The Corps of Engineers is scheduled to implement the increased Lake Michigan diversion program referenced under the Des Plaines River Basin. Some diversion may take place through the Wilmette Control structure and affect the lower reaches of the North Branch. The Illinois Division of Water Resources Lake Michigan Water Allocation Program will affect water usage and development patterns in the basin. There is under study a controversial proposal to construct a 3000 boat recreational harbor near Zion. The impacts of this project have yet to be quantified but potential affects stem from construction and marine activities, and from the possible changes to the shoreline from erosion and/or accretion which harbor protective works may generate.

(11) Kankakee River Basin: The U.S. Soil Conservation Service has prepared a comprehensive land management plan for the Indiana portion of the Kankakee Basin. The report covers proper use and management of land for long-term agricultural production; control of flooding; control of soil erosion in isolated areas; installation of adequate crop drainage systems; improvement in land-based recreational opportunities; and protection of prime wetlands. A corresponding study by the SCS in Illinois has not been prepared. Illinois citizens have expressed concern that construction of levees and removal of shoals in Indiana designed to contain and expedite the passage of flood flow would have an adverse impact on lower lying lands in Illinois. Increased sedimentation in the Illinois portion

of the basin is also a possibility. The Illinois Division of Water Resources has presented draft recommendations for improving recreational boating activities in the Kankakee. The NIPC "Regional Water Supply Plan" recommends the Kankakee as a water supply source. Water quality impacts are expected to be minimal.

(12) Other Recommendations: These include various ordinances pertaining to water conservation, soil erosion, and stormwater detention. Also included are statements pertaining to the assurance of high operating efficiencies in treatment plants. However, the benefits of these statements cannot be evaluated at this time in a quantititive manner.

d. Population Trends

Population and related land use forecasts were based on data prepared by the Commission and adopted in 1976. Since that time, new Illinois Bureau of the Budget forecasts have been prepared for the six-county region which, if accepted, will reduce the year 2000 population by about 1 million people below the 1976 estimate. The IBOB forecasts are at the regional level and will need to be allocated down to small unit areas. Thus, the 1976 forecasts were continued in use, recognizing that some oversizing may result in facility plans and in estimating pollution loads associated with urbanization.

e. Environmental Impact

(1) Hickory Creek Basin: The recommended plan would improve water quality to meet the Commission's objective of having in-stream DO values of 5 mg/l at least 95 percent of the time. This objective would be achieved in all reaches in the year 2000. This is significant in view of the higher pollutant loads that would be introduced in the future if the plan were not developed and implemented.

(2) North Branch Chicago River Basin: The 95 percent DO objective cannot be met in all instances because of problems in Reach 5 (West Fork) and Reaches 36 and 42 (Middle Fork). Natural conditions, such as flat stream gradients and marshy areas in the headwaters, make it impracticable to meet the standard. The effectiveness of the proposed restoration of the Skokie Lagoon needs to be evaluated.

(3) Du Page River Basin: The recommended plan would improve water quality to meet, for the most part, the objective of 5 mg/l DO at least 95 percent of the time. This objective may not be met in all instances because of potential problems in the East Branch. Natural conditions,

such as relatively flat stream gradients combined with high pollutant loads may result in less than desirable water quality.

(4) Salt Creek Basin: The recommended plan would improve water quality to meet, for the most part, the objective of 5 mg/l DO at least 95 percent of the time. This objective cannot be met in all instances because of problems in Reach 19 (Addison Creek). Even in Addison Creek, however, significant improvements over current conditions are expected to result from plan implementation. In other reaches, improvements (sometimes dramatic) are anticipated.

(5) Little Calumet River Basin: The recommended plan would improve water quality, although the DO objective cannot be met in Reach 31 unless Indiana delivers Little Calumet Basin water meeting the specifications outlined in the Chapter Thirteen recommendations on "Boundary Conditions".

(6) Fox River Basin: This 95 percent DO objective cannot be met in all instances because of problems in Reaches 370 and 480. However, it is expected that this problem may be alleviated by lower future population growth in the basin, as explained in Chapter Nineteen.

(7) Lake Michigan Basin North: The recommended plan would improve water quality. Lake Michigan standards for phosphorus and ammonia-nitrogen probably will continue to be violated due to influences external to the Illinois portion of the basin.

(8) Kishwaukee River Basin: The recommended plan would improve water quality to meet (except for Reach 48) the 5 mg/l DO objective at least 95 percent of the time. The DO in Reach 48 was raised only to a "fair" classification, indicating DO compliance only 85-95 percent of the time.

(9) Upper Des Plaines River Basin: The recommended plan would improve water quality in the Upper Des Plaines but not enough to meet the objective of 5 mg/l DO at least 95 percent of the time. This objective will not be met in Reaches 24, 48, 60, 84, 130 and 170 because of high pollutant loads from boundary conditions, point sources and nonpoint sources. The low assimilative capacity of the river due to sluggish flow as a result of dams and flat channel gradient also contribute to the problem.

(10) Kankakee River Basin: Instream water quality meets established state standards with certain minor exceptions. Implementation of facility plans, correction of septic problem areas and implementation of stormwater BMP's will further enhance water quality. This is particularly important because the Kankakee River has been identified as

the most probable source of future water supplies for Joliet and other communities.

(11) Chicago River/Sanitary and Ship Canal/Cal Sag Channel Basin: The recommended plan would improve water quality to meet the State standards for instream DO of 4 mg/l. This objective, according to the model, will be met in all basin reaches.

f. Indigenous Aquatic Life

(1) North Branch Chicago River, Little Calumet, DuPage and Upper Des Plaines River Basins: Some improvement in fish species and diversity may result. However, additional attention will have to be given in the continuing program to other pollutants (such as silver and cyanide) which by the aggregation of their individual toxicity impacts may create adverse conditions for fish and aquatic life. Another important concern is the alteration of physical habitat through channelization, sediment deposition, flow alteration, etc.

(2) Salt Creek Basin: Some improvement in fish species and diversity should result from improved water quality conditions. However, additional attention will have to be given in the continuing program to other pollutants such as silver, cyanide, and iron. Bottom conditions and low flows will continue to be the overriding habitat factors in much of the watershed, however. There are adequate numbers of species and of fish at the present time. The proposed plan will further enhance the aquatic population.

(3) Hickory Creek Basin: The plan should allow present fish habitat and populations to be maintained in the future. Additional attention may have to be given to other pollutants, particularly, silver, which has been identified as exerting an adverse toxicity impact.

(4) Fox River Basin: Some improvement in fish species and diversity will result. However, since the overall conditions for aquatic life are relatively good today, the greatest attention in the continuing planning program should be to prevent any further degradation of habitats.

(5) Kishwaukee River Basin: Based on a recent inventory of fish by the Illinois Natural History Survey, about one-third of the fish were classified as being intolerant of pollution, about one-third were moderately tolerant and one-third as being tolerant of pollution. Thus the fish population is at a precarious balance. The calculated toxicity index did not reveal any adverse impact from the chemical pollutants which were found in the waters. The conclusion is drawn that physical conditions must account

for the shortage of pollution intolerant species. The proposed agricultural BMPs which will also reduce soil erosion, should improve water quality and stream bed conditions, and thus favor the return of higher grade fish.

(6) Chicago River/Sanitary and Ship Canal/Cal Sag Channel Basin: Some improvement in fish species and diversity will result. However, additional attention will have to be given in the continuing program to the benthic deposits and to other pollutants, such as heavy metals and toxics. Adverse aquatic habitats are also created by barge and boat traffic.

(7) Lake Michigan Basin-North and Kankakee River Basin: There are adequate numbers and species of fish at the present time. The proposed plans will further enhance the aquatic population.

g. Recreation

(1) North Branch Chicago River, Little Calumet and DuPage River Basins: Health risks from recreation in and on the waters will be reduced because of treatment plant, combined sewer, and septic system improvements. Because of limited stream widths and depths, together with low summer flows, expanded recreational use of these water bodies appears limited. Increased canoeing is one possible benefit.

(2) Salt Creek Basin: Health risks from recreation in and on the water will be diminished because of treatment plant improvements and other measures. However, given the limited stream widths and depths, and low summer flows, greatly expanded recreational use of Salt Creek appears limited. Busse Woods Reservoir is likely to provide increased recreational opportunity as it is developed.

(3) Hickory Creek Basin: Health risks from recreation in and on the water will diminish because of treatment plant and particularly from septic system improvements. However, given the relatively narrow stream widths and shallow depths, limited opportunities for public access, and low summer flows, the expanded recreational use of Hickory Creek and its tributaries may be restricted. In any event, water quality conditions are not expected to be the limiting factor with regard to recreational opportunities in the basin.

(4) Fox River Basin: Recreational opportunities in and on the water will be increased from their already high levels.

(5) Lake Michigan Basin North: Health risks from recreation in and on the water will diminish because of treatment plant and stormwater system improvements.

(6) Kishwaukee River Basin: Health risks from recreation in and on the water will diminish because of treatment plant and septic system improvements. However, given the limited stream widths and depths and low summer flows, the expanded recreational use of the water appears limited. Increased interest in canoeing is one possible benefit. Restricted public access is a problem.

(7) Upper Des Plaines River Basin: Recreational opportunities in and on the water will be improved by the elimination of combined sewers and by treatment plant and septic system improvements. As the Des Plaines River is one of the larger streams in the region, recreational benefits should be greatly improved in the future.

(8) Chicago River/Sanitary and Ship Canal/Cal Sag Channel Basin: Health risks from recreation opportunities in and on the water will diminish because of treatment plant and septic system improvements. However, given the predominant urban setting and the extent of commercial barge traffic, the expanded recreational use of the water appears limited.

(9) Kankakee River Basin: High recreational use of the river is now enjoyed by many. It is doubtful if proposed improvements will have any direct impact on increased recreational use.

h. Beneficial Impacts - All Basins

(1) Facilities Planning: The facilities program will increase employment in the construction trades and the completed systems will require more full time and better trained personnel to monitor and control the sophicated treatment processes. Employment numbers and skills will be increased. With facilities on hand designed to meet year 2000 conditions, local units of government will be less subject to developmental pressures where package plants or on-site disposal systems are now provided because of inadequate capacities in existing systems. Growth patterns and land use can be controlled more effectively. Health hazards will be reduced and visual aesthetics will be enhanced by the elimination of treatment plant bypasses, combined sewer overflows, or the discharge of inadequately treated effluents. Thus, recreational opportunities will increase. Unsatisfactory septic tank installation can be corrected by innovative on-site systems or replaced by municipal sewers. Health hazards and nuisances will be eliminated and water quality enhanced.

(2) Urban Stormwater: The accelerated street sweeping program (or other programs designed to reduce BOD) will automatically reduce other pollutants normally found in urban stormwater runoffs, such as: solids, heavy metals,

nutrients, hydrocarbons and pesticides. These actions will permit the more rapid recovery of the water bodies from the initial adverse first flush impacts and sooner allow the use of those water bodies for recreation. The survival of aquatic life will be enhanced. Lake eutrophication will be slowed. Where water bodies are now used as sources of industrial waters, the quality will be improved and the costs of treatment reduced. The long range plans for the future use of certain selected streams for potable water (i.e.: Fox, Kankakee) will be enhanced.

(3) Agricultural Runoff: The implementation of BMP's will reduce soil erosion and increase the recharging of the ground water tables. Better aquifer recharging should result. Reduced silting of lakes and streams will enhance the feeding and propagation of aquatic life and increase the recreational use of those water bodies. Costs of cleaning local drainage systems will be reduced and the capacities of water bodies to move high (flood) flows will not be reduced as is the case now when silt builds up to restrict flows or occupy valuable storage space in lakes. The reduced input of pesticides and nutrients (found in fertilizers) will enhance water quality, reduce the growth of algae and decrease the rate of eutrophication of these inland lakes.

i. Adverse Impacts - All Basins

The primary adverse impacts will be those associated with costs. While federal grants are expected to be available to assist farmers in the initial installation of structural elements of the BMP's, no such funds are available for the continued operation and maintenance. Thus, local farmers must absorb these expenditures which may put them at an economic disadvantage if similar controls are not enacted elsewhere.

Local governments seek ways to reduce BOD loadings from impervious areas. Street vacuuming equipment is more expensive than conventional brush type sweepers now commonly used, but which are not effective in removing the fine fractions of street and parking lot dirt which contains most of the pollutants.

Unsatisfactory septic system areas which cannot be served by sewer extensions forecast for the next five years are to be corrected. This may encourage growth in areas not contiguous to areas already having sewer service, or which are expected to have it within the next five years.

The higher degree of wastewater treatment called for IPCB regulations, all of which are more demanding than federally established secondary effluent standards of 30 mg/l BOD and 30 mg/l suspended solids, will call for the expenditure of increased funds to construct and operate the planned facilities. Higher energy requirements are

involved, as well as more sludges and costs (and energy) related to residuals processing and disposal.

j. Unavoidable Adverse Impacts

While primary impacts on water quality will all be favorable, secondary impacts will involve higher taxes and other costs, greater use of energy, and adverse economic impacts on farmers if similar BMPs are not enacted in other areas. The impact of higher taxes and of regulatory controls on economic growth cannot be evaluated at this time. The unavoidable adverse impacts listed below apply to all basins. However, under nonpoint sources, the statement pertaining to the MSDGC TARP is not applicable to the Du Page River, Fox River, Hickory Creek, Lake Michigan North, Kishwaukee River and the Kankakee River basins.

(1) Point Sources: With respect to point source discharges, it is possible that future economic and water quality studies, as well as national policies, may indicate that meeting presently prescribed water quality standards is not in the national interest. Evidence of this trend is reflected by Section 44 of the Clean Water Act of 1977, which amended Section 301(b) of PL 92-500. Secondary treatment is no longer mandated and may be waived for discharges into certain marine waters. If standards are relaxed, and the facilities for advanced treatment are already installed, future operation and maintenance costs may be reduced but capital improvement already made will have small salvage value.

(2) Nonpoint Sources: The principal unavoidable adverse impacts will be associated with the expenditure of funds for nonpoint BMPs. However, given the incremental manner in which agricultural and urban stormwater controls will be implemented, it is self-evident that the program can be stopped at any time when it appears that benefits are no longer commensurate with expenditures.

(3) TARP: It is possible that TARP II may be eliminated particularly in the light of adverse comments made by the Office of Management and Budget. The TARP will require recharging of the ground water table when water levels drop below the tunnel elevations. This will be necessary to prevent the possible ex-filtration of polluted waters. Maintenance of the positive head of groundwaters on the tunnel will ensure that this condition will not occur.

(4) Fishability: The question of toxic effects of ammonia were discussed in the areawide report, together with the interrelationships of ammonia, temperature, and pH. Also discussed was the toxicity index developed by the Illinois Natural History Survey. As noted in the latter