Final Report

Total Maximum Daily Loads for Salt Creek, Illinois

Submitted to

Illinois Environmental Protection Agency

P.O. Box 19276
1021 North Grand Avenue East
Springfield, Illinois 62794-9276

October 2004

Prepared by

CH2MHILL

CH2M HILL Inc.
727 North First Street
Suite 400
St. Louis, MO 63102-2542

In association with

AQUA TERRA Consultants and
Applied Environmental Engineering, LLC

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:
WW-16J

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Watershed Management Section
BUREAU OF WATER

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BUREAU CHIEF'S OFF

29 SEP 2004

Marcia Willhite, Chief
Bureau of Water
IEPA
P.O. Box 19276
1021 North Grand Avenue East
Springfield, Illinois 62794-9276

Dear Ms. Willhite:

The United States Environmental Protection Agency (U.S. EPA) has conducted a complete review of the final Total Maximum Daily Loads (TMDL) for chlorides, carbonaceous biochemical oxygen demand (CBOD), volatile suspended solids (VSS) and ammonia-N, including supporting documentation, for 8 segments of the Salt Creek watershed, located in DuPage and Cook Counties, Illinois. Based on this review, U.S. EPA has determined that Illinois's TMDLs for these pollutants for these waterbodies meet the requirements of Section 303(d) of the Clean Water Act (CWA) and U.S. EPA's implementing regulations at 40 C.F.R. Part 130. Therefore, by this letter, U.S. EPA hereby approves 25 TMDLs for the Salt Creek watershed. The statutory and regulatory requirements, and U.S. EPA's review of Illinois' compliance with each requirement, are described in the enclosed decision document.

We wish to acknowledge Illinois' effort in these submitted TMDLs, and look forward to future quality TMDL submissions by the State of Illinois. If you have any questions, please contact Mr. Kevin Pierard, Chief of the Wetlands and Watersheds Branch at 312-886-4448.

Sincerely yours,

Jo Lynn Traub
Director, Water Division

Enclosure

Executive Summary

This report presents the development of total maximum daily loads (TMDLs) for Salt Creek in DuPage and Cook Counties, Illinois. Salt Creek is a tributary to the Des Plaines River in urban Chicago, Illinois. The 1998 303(d) List identified Salt Creek as impaired for nutrients, siltation, salinity/TDS/chlorides, suspended solids, low dissolved oxygen, habitat alterations, flow alterations, metals, pathogens, and noxious aquatic plants. The 2000 305(b) Report updated these potential causes of impairment to be nutrients, siltation, salinity/TDS/chlorides, suspended solids, habitat alterations, flow alterations, priority organics, PCBs, copper, excessive algal growth/chlorophyll-a and low dissolved oxygen. The Illinois Environmental Protection Agency ("the Agency") has adopted a policy of developing TMDLs only on potential causes of impairment that have a water quality standard, which in this case, were chlorides and low dissolved oxygen (DO). The copper and phosphorus (in Busse Woods Reservoir) impairments have been recommended for further monitoring.

This document describes and presents the methods and procedures used to develop a set of TMDLs for Salt Creek located in DuPage and Cook Counties, Illinois. The Salt Creek watershed covers about 148.5 square miles of northeastern Illinois. The watershed is located in the Des Plaines hydrologic unit code (HUC 7120004). Almost half (49.1 percent) of the land use in the watershed is residential. Approximately 23 percent of the total watershed area is impervious surfaces. There are 31 point sources in the watershed, the majority of which are either stormwater permits or minor discharges. There are 11 municipal permits in the basin, 10 of which are major facilities that have design flows of 1.0 million gallons per day (MGD) or greater.

The U.S. Environmental Protection Agency's (USEPA's) Hydrologic Simulation Program Fortran (HSPF) watershed model, Better Assessment Science Integrating Point and Nonpoint Sources (BASINS), and in-stream water quality model QUAL2E were used to characterize the watershed and evaluate TMDL allocations. Spatial data (land use and cover, hydrographic and topographic data, and best management practice (BMP) information), monitoring data (water quality, flow, and weather information), and pollutant source data were used to develop input parameters for the watershed models.

The watershed models were calibrated using information from three U.S. Geological Survey (USGS) gauges at Rolling Meadows, Elmhurst, and Western Springs, which were located inside the watershed.

TMDLs are sums of the individual waste load allocations (WLAs) for point sources, load allocations (LAs) for both nonpoint sources and natural background, and a margin of safety (MOS). This definition is denoted by the following equation:

$$TMDL = \Sigma \text{ WLAs} + \Sigma \text{ LAs} + MOS$$

Each TMDL for the Salt Creek watershed was developed to achieve full compliance with Illinois general-use (GU) water quality standards or criteria that are correlated to the pollutant of concern. For example, a chloride TMDL for conductivity or total dissolved solids was developed for those waters listed.

The chloride–total dissolved solids–conductivity TMDL will require an 8 percent reduction in overall chloride application to Salt Creek and a 41 percent reduction in Addison Creek. Addison Creek is a fully urbanized tributary to Salt Creek; Table E-1, below, summarizes the chloride TMDL.

The dissolved oxygen TMDL will require a 56percent reduction in 5-day CBOD and a 38percent reduction of ammonia nitrogen without dam removal (scenario 5). With one dam removed at river mile 11.6 (scenario 6), a reduction of 34% BOD and 38% NH_3 is needed to achieve the DO standard. Table E-2, below shows a summary of the DO TMDL.

TABLE E-1
Chloride TMDLs developed for Salt Creek Watershed

	WLA[a]	MS4 WLA[b]	MOS	TMDL
Chloride (lb/yr) - Salt Creek	5.11E+07	2.31E+07	Implicit	7.42E+07
Chloride (lb/yr) - Addison Creek	6.35E+06	3.45E+06	Implicit	9.80E+06

[a]WLA based on permitted design flow and concentration of 300 mg/L
[b]Represents an 8% Reduction in NPS Load in Salt Creek and 41% Reduction in NPS Load in Addison Creek

TABLE E-2
TMDL Allocations for CBOD and Ammonia and VSS for Salt Creek

Pollutant	Load Allocation (lbs/day)	Wasteload Allocation (lbs/day)	TMDL (lbs/day)	Permitted Load (lbs/day)[a]	Percent Reduction Needed from Permitted Load	Observed Load (lbs/day)[b]	Percent Reduction Needed from Observed Load
			Allocation Scenario 5				
5-day Carbon. Biochemical Oxygen Demand [b]	NA	2,729	2,729	6,251	56	1,561	0
Ammonia Nitrogen [b]	NA	507	507	813	38	162	0
			Allocation Scenario 6				
5-day Carbon. Biochemical Oxygen Demand [b]	NA	4,121	4,121	6,251	34	1,561	0
Ammonia Nitrogen [b]	NA	507	507	813	38	162	0
			Applies to both Scenario 5 and Scenario 6				
Volatile Suspended Solids [c]	2,152,943	-	2,152,943	-	-	NA	NA

[a] Loads calculated using design flows of individual point sources.
[b] Current permitted loads based on average monthly permit limits and design flow; current observed loads based on effluent data from 1995 USGS calibration dataset of 10 point sources listed in Table 5-4 and design flow; St. Charles CSO load assumed equal to 0.
[c] Unit for VSS is pounds per year

Segment GLA04 in Addison creek was listed for copper violations. There are only three data points at station GLA-05, and two of these data points show violations of the acute copper standard. Bensenville South MWWTP was likely the source of the copper. IEPA should collect additional information to verify whether copper is a problem in the creek since there are limited data that are now 8 years old. IEPA should then work with Bensenville to reduce its copper loads if warranted.

Segment RGZX, Busse Lake was listed for phosphorus contamination. Data collected since 1994 have shown a steady decline in the phosphorus concentration. The impairments are no longer present, and delisting is recommended.

There were no Confined Animal Feeding Operations (CAFOs) identified in this watershed. CAFOs were not identified as contributors of the pollutants for which this TMDL was developed, and were not addressed in this TMDL.

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Acronyms and Abbreviations

AGWRC	Basic groundwater recession
AS	acute standard
BASINS	Better Assessment Science Integrating Point and Nonpoint Sources database
BMP	best management practices
BOD	biochemical oxygen demand
CBOD	carbonaceous biochemical oxygen demand
cfs	cubic feet per second
CS	chronic standard
CSO	combined sewer overflow
CWA	Clean Water Act
DCDS	DEC Stormwater Management Division
DEC	DuPage County Department of Environmental Concerns
DEEPFR	Fraction of groundwater inflow to deep recharge
DEM	digital elevation models
DMR	discharge monitoring report
DO	dissolved oxygen
DP	dissolved phosphorus
DRG	digital raster graphic
EIA	effective impervious area
FRSS	facility-related stream surveys
GIS	geographic information system
GU	general use
HSPEXP	an expert system for hydrologic calibration
HSPF	Hydrologic Simulation Program Fortran
HUC	Hydrologic Unit Code
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
IRC	Interflow recession parameter
LA	load allocation
LZETP	Lower zone evapotranspiration parameter
LZSN	Lower zone nominal soils moisture
μmhos	micro mhos unit of measuring conductivity in water (μmhos/cm)
mg/L	milligrams per liter
MOS	margin of safety
MWRDGC	Metropolitan Water Reclamation District of Greater Chicago
NCDC	National Climatic Data Center
NIPC	Northeastern Illinois Planning Commission
NOAA	National Oceanographic and Atmospheric Administration
NVSS	nonvolatile suspended solids
PCS	permit compliance system
PET	potential evapotranspiration
PETMAX	Air temp below which ET is reduced

PETMIN	Air temp below which ET is set to zero
PRISM	parameter-elevation regressions on independent slopes model
QUAL2E	a stream water quality model
R-squared	coefficient of determination
RF3	reach file version 3
SOD	sediment oxygen demand
SSO	sanitary sewer overflow
STP	Sewage treatment plant
TCU	Transportation land use
TDS	total dissolved solids
TMDL	total maximum daily loads
TP	total phosphorus
TSNOW	a model parameter
TSS	total suspended solid
UCI	user control input
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UZSN	Upper zone nominal soils moisture
VSS	volatile suspended solid
WDM	watershed data management
WLA	waste load allocation
WQS	water quality standard
WRP	water reclamation plant
WWTP	wastewater treatment plant

SECTION 1

Introduction

1.1 Background

Section 303(d) of the Federal Clean Water Act (CWA) and the U.S. Environmental Protection Agency's (USEPA's) Water Quality Planning and Management Regulations (40 CFR Part 130) require states to identify water bodies that do not meet water quality standards (WQSs) applicable to their designated-use classifications and to develop total maximum daily loads (TMDLs) for these water bodies. The TMDL process establishes the allowable pollutant loads or other quantifiable parameters for a water body based on the relationship between pollutant sources and instream conditions. By following the TMDL process, states can establish water quality–based controls to reduce pollution from point and nonpoint sources and restore and maintain the water quality (USEPA, 1991).

Located in DuPage and Cook Counties, Illinois, Salt Creek and its tributaries were placed on the Illinois 303(d) list of impaired waters for several pollutants, including copper, conductivity, chloride, total phosphorus (TP), and dissolved oxygen (DO). TMDLs for all pollutants causing applicable WQS violations were established for each identified water body.

This document presents the TMDLs and describes the methods and procedures used to develop the TMDLs for impaired segments in the Salt Creek watershed.

1.2 Organization of the Report

This report is organized to provide a structured description of TMDL endpoints, watershed characterization and source assessment, the assessment of water quality and TMDL approach, a summary of modeling approach and assumptions, and a summary of all recommended allocation scenarios. It builds upon a series of technical memoranda that have been submitted throughout the Salt Creek TMDL development process. Comments on the technical memoranda have been incorporated into this report.

SECTION 2

Target Identification/Determination of TMDL Endpoints

The 1998 303(d) List identified Salt Creek as impaired for nutrients, siltation, salinity/TDS/chlorides, suspended solids, low dissolved oxygen, habitat alterations, flow alterations, metals, pathogens, and noxious aquatic plants. The 2000 305(b) Report updated these potential causes of impairment to be nutrients, siltation, salinity/TDS/chlorides, suspended solids, habitat alterations, flow alterations, priority organics, PCBs, copper, excessive algal growth/chlorophyll-a and low dissolved oxygen.

In developing the 2002 Illinois Section 303(d) List, the Illinois EPA revised its prioritization method that accounted for severity of pollution and the uses to be made of such waters. Prioritization was done on a watershed basis. For a detailed explanation see Appendix H or refer to the Illinois 2002 Section 303(d) list, available at http://www.epa.state.il.us/water/watershed/reports/303d-report/index.html. Under this new prioritization process, Illinois EPA established a policy to develop TMDLS for those parameters which had numeric WQS. These are identified in Table 2-1 and Figure 2-1. Therefore, this study focused on copper, chloride, phosphorus (in Busse Woods Reservoir) and dissolved oxygen.

The IEPA is aware of the other parameters previously listed and those parameters will be given attention through methods other than a TMDL and hence no further discussion of those will be provided in this document. Pending development of appropriate water quality standards as may be proposed by the Agency and adopted by the Pollution Control Board, Illinois EPA will continue to work toward improving water quality throughout the state by promoting and administering existing programs and working to innovate and create new methods of treating potential causes of impairment.

According to Illinois waterbody use classifications, the East Branch is designated for general use (GU). Based on this classification, we proceeded to developed TMDLs for chloride and DO.

The first part of this section outlines the different segments and the pollutants of concern for Salt Creek. The second part outlines the TMDL endpoints selected for each pollutant listed for Salt Creek under the Illinois 303(d) list.

2.1 Impaired Salt Creek Segments

Several segments of Salt Creek and its tributaries do not meet Illinois WQSs. Table 2-1 presents a complete list of all segments and causes of impairments associated with numeric WQS. Figure 2-1 shows the location of the impaired segments in Salt Creek.

TABLE 2-1
Segments of Salt Creek That This TMDL Report Addresses and Identified Potential Causes of Impairment

Segment Name	Segment Number	Copper	TDS/ Conductivity	Chloride	Phosphorus	DO
Salt Creek	GL 03		X			X
Salt Creek	GL 09		X			
Salt Creek	GL 10		X			
Salt Creek	GL 19					X
Addison Creek	GLA02		X	X		X
Addison Creek	GLA04	X				X
Spring Brook	GLB 01					X
Meacham Creek	GLBA					X
Busse Wood Reservoir	RGZX				X	

TDS, total dissolved solids.

2.2 Applicable Water Quality Standards and Total Maximum Daily Load Endpoints

The applicable WQS was the chosen endpoint for the TMDL. Table 2-2 shows a list of pollutants, WQS, and potential endpoints addressed in this report.

TABLE 2-2
Pollutants, Water Quality Standards, and TMDL Endpoints

Parameter	Water Quality Standard*	Total Maximum Daily Load Endpoints
Copper	Hardness-dependent acute and chronic standards	Use chronic standard, since more stringent than acute standard and will ensure compliance with both acute and chronic standards; dependent on water hardness
Phosphorus	Lakes—0.05 mg/L Streams that are tributaries to lake—0.05 mg/L**	Water quality standard
Chloride	500 mg/L	Water quality standard
Conductivity	TDS—1,000 mg/L, equivalent to 1,667 µmho/cm of conductivity	General-use standard for chloride of 500 mg/L
Dissolved oxygen	Not less than 5 mg/L at any time or not less than 6 mg/L for 16 hours out of 24 consecutive hours	Not less than 5 mg/L at any time or not less than 6 mg/L for 16 hours out of 24 consecutive hours

* Refer to 35 IL. Adm. Code Part 302.

** This standard applies to Spring Brook immediately upstream of Lake Kadijah

mg/L, milligrams per liter.
TDS, total dissolved solids.

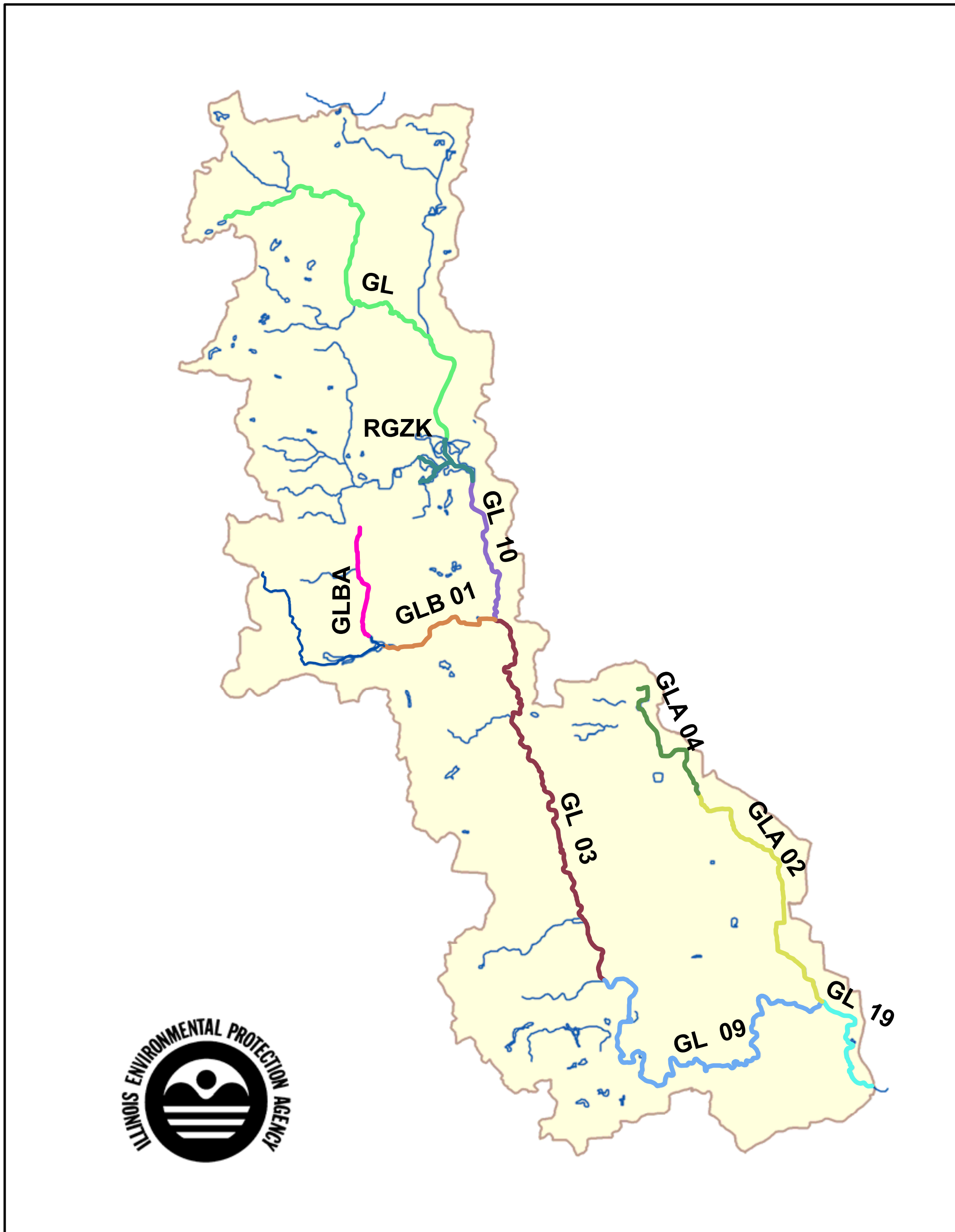

Figure 2-1
Impaired Segments
_in_
Salt Creek Watershed

Legend

- Streams
- GL
- GL 03
- GL 09
- GL 10
- GL 19
- GLA 02
- GLA 04
- GLB 01
- RGZK
- GLBA
- Salt Creek Watershed

0 0.5 1 2 3 4 5 Miles

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W E
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SECTION 3

Watershed Characterization and Source Assessment

This section describes the data acquired and the watershed characterization conducted to develop the Salt Creek TMDLs. The available historical data for each 303(d)-listed pollutant are presented and discussed and followed by an assessment of available data for watershed modeling.

3.1 Watershed Description and Background Information

The Salt Creek watershed encompasses about 148.5 square miles of northeastern Illinois. The DuPage County Department of Environmental Concerns (DEC) Stormwater Management Division (DCDS) developed subwatershed boundaries for its stormwater management program. The boundaries take into account areas in DuPage County that are drained by storm sewer systems, with sometimes nontopographically based drainage characteristics. The subwatershed areas range from 0.2 to 2,109 acres and average 119 acres. Because of the watershed's complex nature, existing subwatershed delineations that include storm sewer areas were used wherever possible in the TMDL modeling process. Figure 3-1 shows the subwatersheds in the Salt Creek watershed.

The Illinois Environmental Protection Agency (IEPA) also provided 14-digit Hydrologic Unit Code (HUC) watershed boundaries for the entire Salt Creek watershed. For areas in DuPage County, these boundaries were checked against the DCDS data. For areas outside DuPage County, the 14-digit HUC boundaries were verified using U. S. Geological Survey (USGS) 1:24,0000-scale digital elevation models (DEMs) to match the Reach File version 3 (RF3) stream segments. RF3 is the most detailed stream network data layer available from the Better Assessment Science Integrating Point and Nonpoint Sources (BASINS) data set. The HUC watershed boundaries were not detailed enough to use for Salt Creek subwatershed data in this report, but they were investigated and compared with the other data sources.

Busse Wood Reservoir (segment number RGZX) is listed for total phosphorus impairment. The drainage area for Busse Wood Reservoir was determined using the DEM data.

Topographic data were obtained in a digital format from the USGS and the DCDS. USGS topographical mapping was downloaded from the Illinois Geographic Information Council Website (http://wwww.state.il.us/ilgic/default.cfm) as a digital raster graphic (DRG) file. The topographic data were used to confirm drainage patterns established by the state 14-digit HUC and DCDS subwatershed delineation. No significant differences were found between the DRGs and DEMs. Therefore, only the DEMs from the USGS were used in the final data selection.

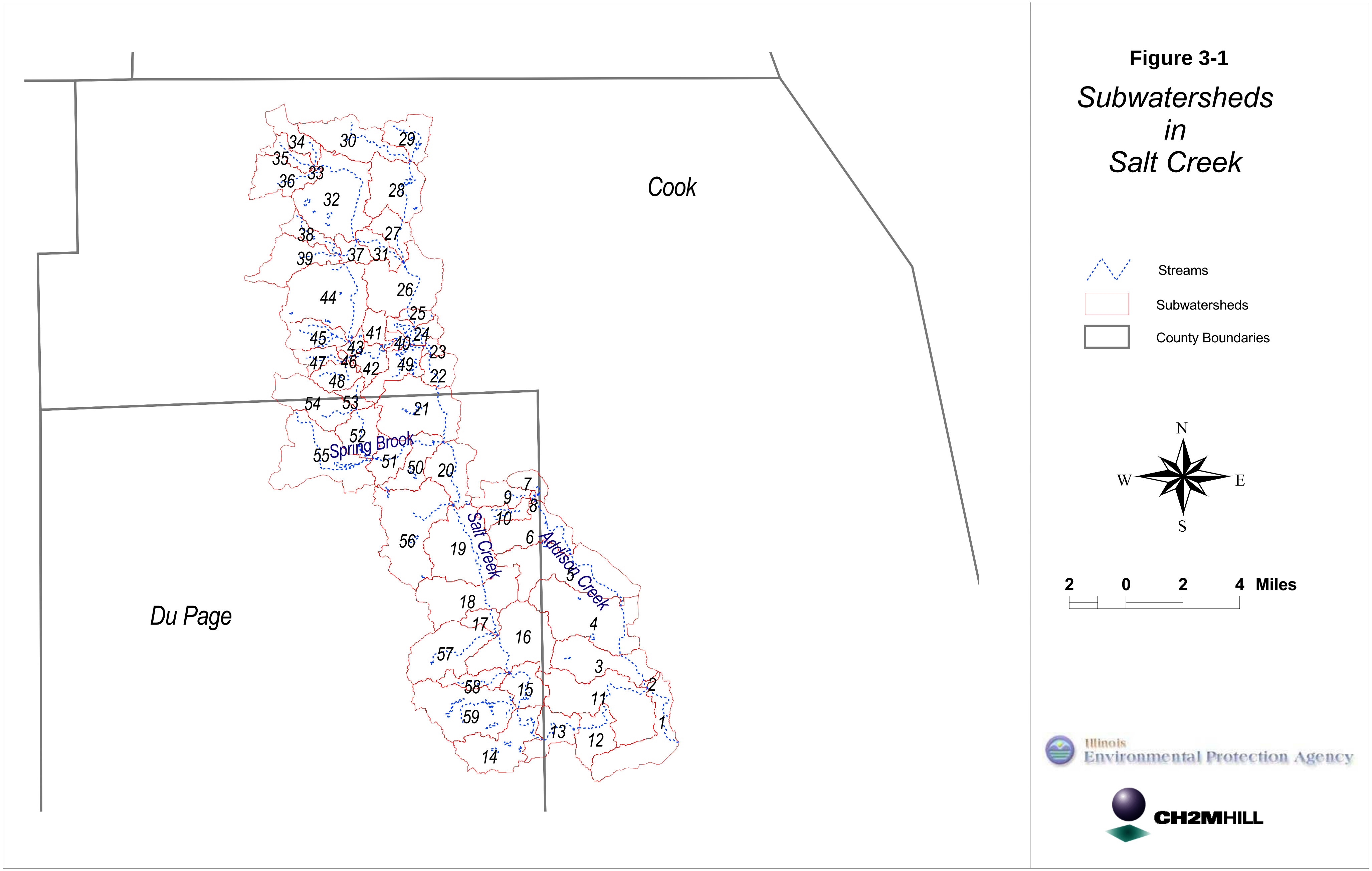


Figure 3-1

Subwatersheds in Salt Creek

3.2 Land Use

Land-use data were obtained from the DCDS, the Northeastern Illinois Planning Commission (NIPC), and BASINS. No data were received from Cook County.

The DCDS land-use data were defined for a higher resolution than NIPC data, but were not available for areas outside DuPage County. The NIPC data covered the entire study area with adequate detail for characterizing nonpoint sources of pollution and for modeling. BASINS land-use data were out of date and did not provide the necessary detail for modeling. A data set showing forested areas was obtained from the Illinois Department of Natural Resources (IDNR). In the NIPC data, forested areas were classified under open space. To identify what portions of the open space were forested areas, the IDNR forest coverage was overlaid with the NIPC data to produce the final land-use coverage for use in modeling. In addition, the category called "vacant excluding wetlands" in the geographic information system (GIS) layer was combined with the open space category for modeling purposes.

Figure 3-2 shows the Salt Creek watershed land use. The watershed consists primarily of developed areas. According to the land-use data obtained from NIPC, only 1.16 percent of the Salt Creek watershed is agricultural. Approximately 49.09 percent of the Salt Creek watershed is residential. Table 3-1 shows a complete list of land-use categories. Therefore, nonpoint source pollution from agricultural activities would be low for most listed pollutants when compared with the amount of pollution from other land uses. Nonpoint source loads from residential areas may contribute significantly to some pollutant loads.

Land-use data were used to characterize nonpoint pollution sources in the watershed and to complete the load allocation (LA) portion of the TMDL. The Salt Creek watershed was listed for several pollutants that are generated or transported by stormwater runoff. These include copper, total dissolved solids (TDS)/conductivity, chloride, TP, and DO. During modeling, these pollutants were linked to contributing types of land use (see Section 6).

TABLE 3-1
NIPC and IDNR Land-Use Distribution in Salt Creek*

		Area			
Land Use	**ID**	**Impervious**	**Pervious**	**Total (acres)**	**Total (miles)**
Cemeteries and vacant land	1		7445.47	7445.47	11.63
Commercial	2	7926.16	1398.73	9324.89	14.67
Forest	3		3784.51	3784.51	5.91
Industrial	4	5525.74	975.13	6500.87	10.16
Institutional	5	1021.12	2382.68	3403.8	5.32
Open Space	6		9978.53	9978.53	15.59
Residential	7	4669.78	42027.95	46697.73	72.97
TCU excluding Interstates**	8	999.76	666.52	1666.28	2.60
Expressways	9	1304.42	869.63	2174.05	3.40

TABLE 3-1
NIPC and IDNR Land-Use Distribution in Salt Creek*

Land Use	ID	Area			
		Impervious	Pervious	Total (acres)	Total (miles)
Wetlands	10		1327.87	1327.87	2.07
Agricultural	11		1159.31	1159.31	1.81

* All data from NIPC except areas classified as "Forest" and "Open space" which were determined from IDNR land-use data.

** All transportation land uses excluding interstates and expressways

3.3 Hydrographic Data

To model a stream network in a watershed, the selected models (Hydrologic Simulation Program Fortran [HSPF] and QUAL2E) required the stream network to be broken into reaches representing the stream characteristics. Flows and pollutants were routed through these reaches using trapezoidal channel geometry. Stream reach data were available from DCDS and BASINS data sets.

The DCDS provided hydrographic data that were compared with RF3 data in USEPA's BASINS 2.1. Both data sets had identical basic reach information. The DCDS data included smaller and isolated water bodies, but the stream network connectivity was poor. The RF3 data included all the connected streams in the watersheds and additional attribute information that were required to set up the model. Therefore, the RF3 data were used to develop the TMDLs. Appendix A includes a detailed summary of the reaches used for modeling.

3.4 Meteorological Data

Weather data were needed to calibrate hydrologic and water quality models and were used by the models to generate runoff volumes. The modeled runoff volumes were routed to determine streamflow values that were compared with data from several streamflow gauges in the Salt Creek watershed (see Section 3.6). Model input parameters were adjusted using this comparison of observed and modeled values,.

NIPC provided National Climatic Data Center (NCDC) and other weather data in Watershed Data Management (WDM) file format. Table 3-2 shows the data included in the WDM files. NIPC obtained precipitation data primarily from the NCDC and from a gauge at Argonne National Laboratory. Daily precipitation data were disaggregated using nearby hourly recording gauges. Figure 3-3 shows the location of each station from which precipitation data were collected for Salt Creek.

In addition to providing precipitation data, NIPC provided potential evapotranspiration (PET), cloud cover, solar radiation, air temperature, dew point, temperature, and wind movement data in WDM format. Most of these data came from the NCDC.

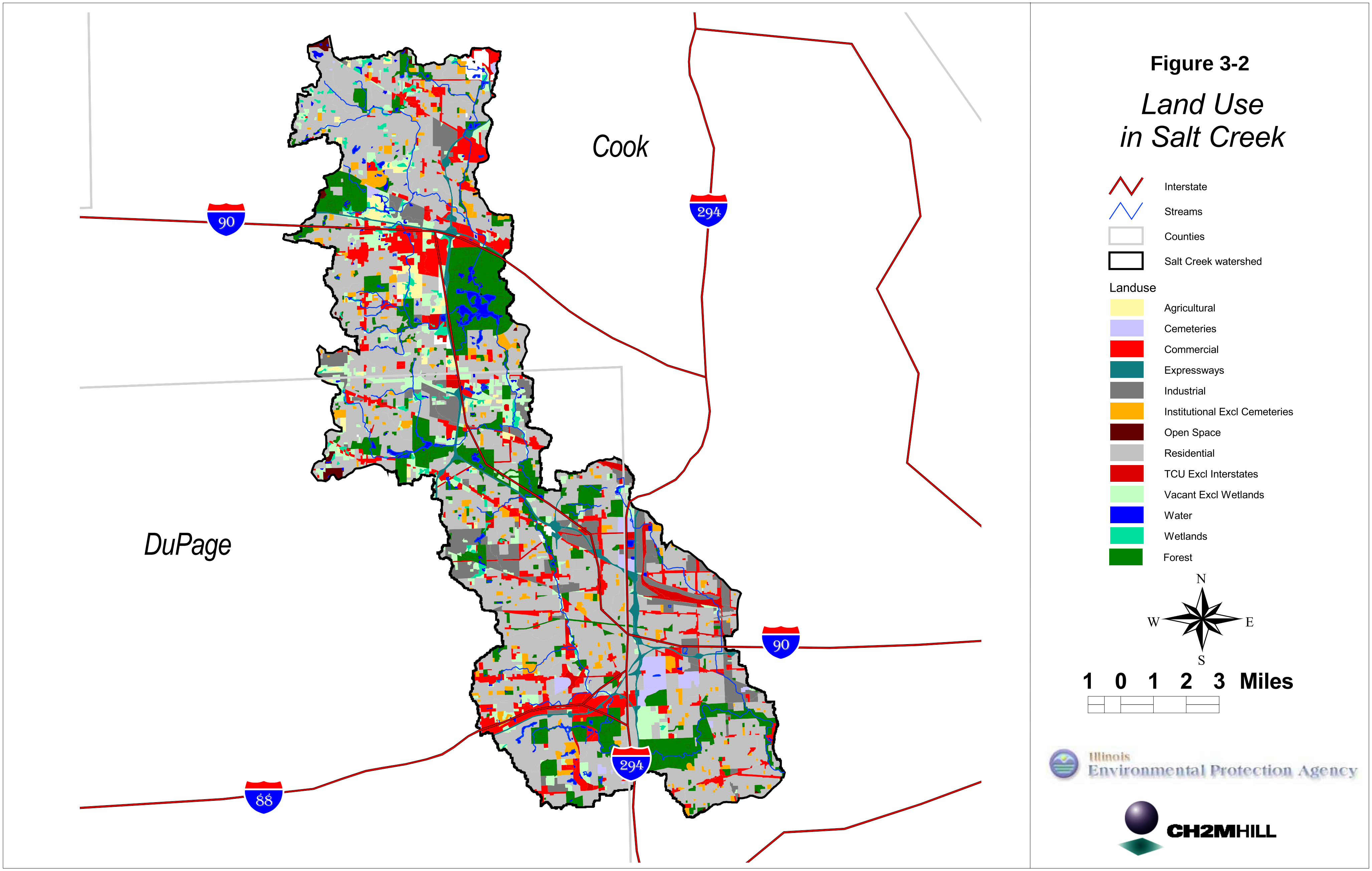


Figure 3-2

Land Use in Salt Creek

Elmhurst was the only weather station with precipitation data located in the Salt Creek watershed (Figure 3-3). This USGS flow gauge station also records 5-min precipitation data. Continuous simulation of hydrology requires a long-term precipitation time series at small intervals (e.g., hourly) as input. Additionally, no data gaps are allowed in the time series. Data from the Elmhurst station is preferred because of its location. However, it contained values only from 1996 to 2000, and occasionally data are missing. Therefore, in order to obtain the best precipitation data for modeling a 15-year time series of precipitation data, Elmhurst precipitation data (December 4, 1996, through December 31, 1999) and O'Hare precipitation data (January 1, 1985, through December 3, 1996) was used. For any missing data from the Elmhurst precipitation gauge between December 4, 1996, and December 31, 1999, was filled with O'Hare data. Dates of missing data are listed in Table 3-2. There are no missing data at O'Hare. This time series was called the O'Hare precipitation data and was applied to subwatersheds 4 through 10 and 19 through 56. A time series was also created from precipitation data from Wheaton for the period 1991 through 1999. The Wheaton precipitation data were applied to watersheds 1 through 3, 11 through 18, and 57 through 59. Figure 3-4 shows a map of the precipitation gauges used for each subbasin.

TABLE 3-2
Weather Data Provided in NIPC WDM Files

Start Date	End Date	Station ID	Data Type	Data Source	Daily or Recording
01/01/1948	07/31/1996	Chicago O'Hare WSE ARP R	Hourly precipitation (0.01 in.)	NCDC	Recording (hourly)
01/01/1948	09/30/1999	Chicago Midway AP 3 SW	Hourly precipitation (0.01 in.)	NCDC	Recording (hourly)
06/30/1948	09/30/1988	McHenry WG Stratton L&D	Hourly precipitation (0.01 in.)	NCDC	Recording (hourly)
09/30/1948	07/31/1996	Aurora	Daily data distributed to hourly (0.01 in.)	NCDC	Daily (converted to hourly using Argonne data)
01/01/1948	12/31/1999	Wheaton 3 SE	Daily data distributed to hourly (0.01 in.)	NCDC	Daily (converted to hourly using Argonne data)
09/30/1948	07/31/1996	Elgin	Daily data distributed to hourly (0.01 in.)	NCDC	Daily (converted to hourly using O'Hare data)
12/04/1996	12/31/2000	Elmhurst	5-min precipitation data	USGS	Hourly (aggregated to hourly from 5 min)
01/01/1948	07/31/1996	Argonne	Adjusted Argonne precipitation (0.01 in.)	NCDC	Recording (hourly)

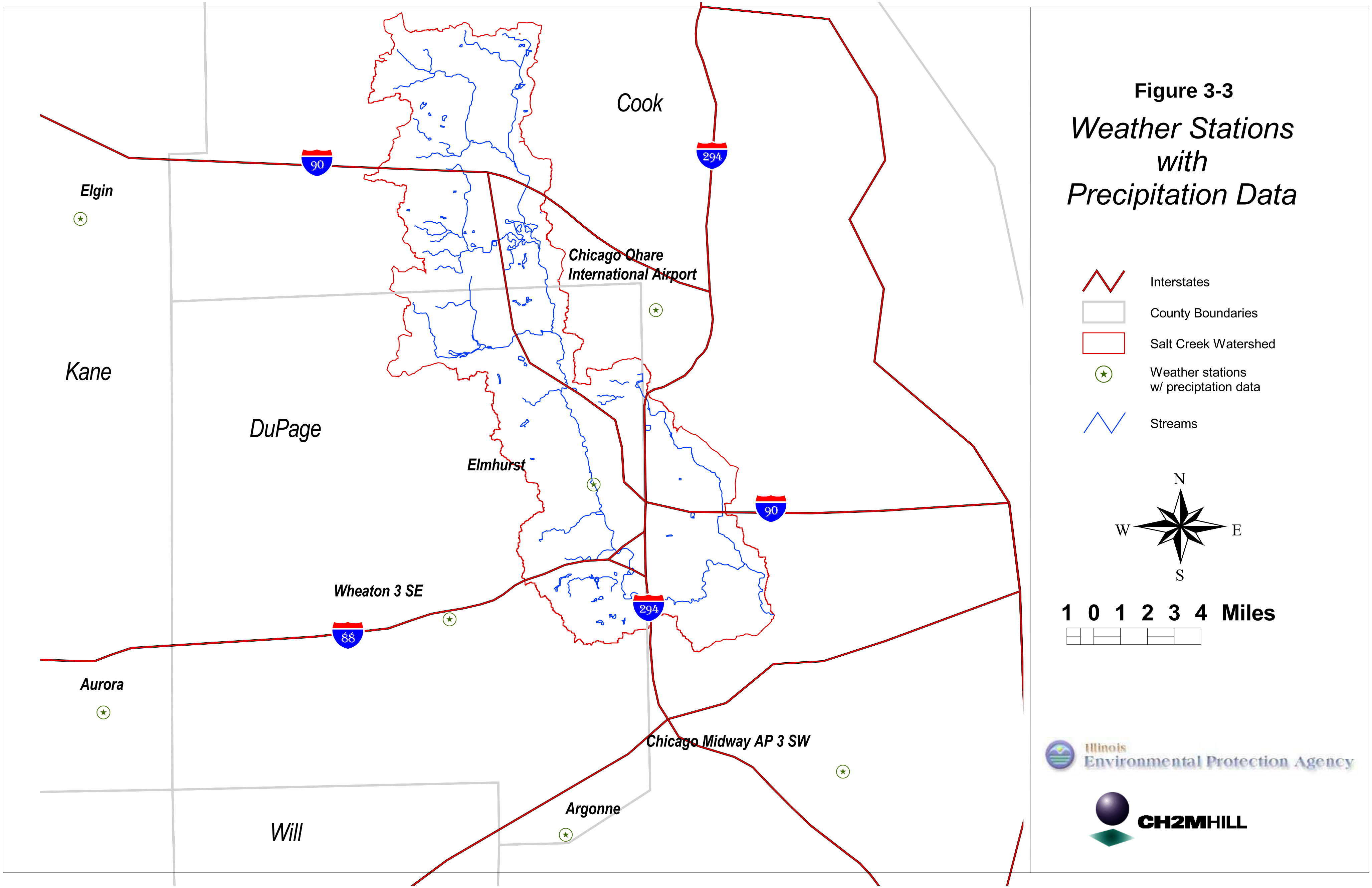
For detailed description of data, refer to *Application Guide for the Hydrologic Modeling in DuPage County Using Hydrologic Simulation Program—Fortran (HSPF): Model Organization and Use, Data Collection and Processing, Calibration* (May 1996). Tom Price, Northeastern Illinois Planning Commission.

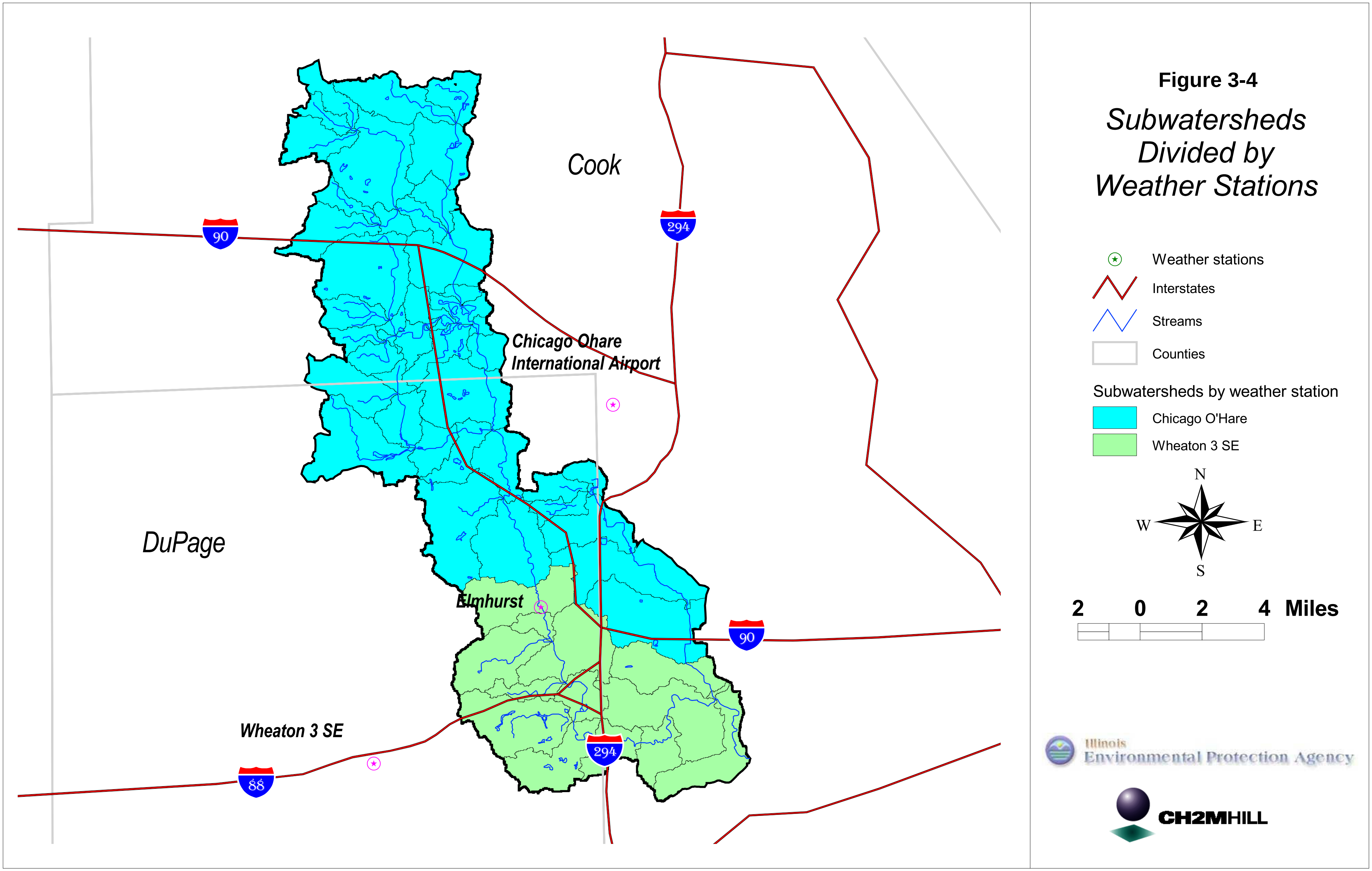
Dates for which Elmhurst precipitation data were missing and O'Hare precipitation data used instead:

1996	1997	1998	1999
12/03, 12/11	03/20–03/23; 04/02, 04/03; 06/22–06/30; 07/01–07/31; 08/01–08/10; 10/09–10/13, 10/24	None	09/28, 09/29

Figure 3-3

Weather Stations with Precipitation Data





Cook
DuPage
Chicago Ohare International Airport
Elmhurst
Wheaton 3 SE
90
294
88
Figure 3-4
Subwatersheds Divided by Weather Stations
Weather stations
Interstates
Streams
Counties
Subwatersheds by weather station
Chicago O'Hare
Wheaton 3 SE
N
W
E
S
2 0 2 4 Miles
Illinois Environmental Protection Agency
CH2MHILL

The spatial variability of rainfall throughout the study area was verified using annual rainfall data found at Oregon State University's software system web site (http://www.ocs.orst.edu/prism/). The parameter-elevation regressions on independent slopes model (PRISM) on the web site uses point data and a DEM to generate gridded estimates of climate parameters, including precipitation. The annual precipitation for Illinois was downloaded from this site. Review of the data shown in Figure 3-5 indicated that there were no significant spatial variations in rainfall patterns across the study area that would require special consideration. Over the 30-year period used in developing the PRISM data (1961-1990), the average annual precipitation values at O'Hare (35.8 in.) and Wheaton (36.5 in.) correspond to the average annual values from PRISM.

Hourly data from O'Hare were used for meteorological data such as solar radiation, wind speed, cloud cover, temperature, and dew point temperatures for the entire Salt Creek watershed. O'Hare was chosen because it had the most long-term hourly data.

Pan-evaporation data were obtained from the Midwestern Regional Climate Data Center (National Oceanographic and Atmospheric Administration [NOAA]) for the Urbana weather station in Champaign County. To adjust this to Salt Creek watershed conditions, the NOAA pan-evaporation charts were used to calculate a ratio of annual pan-evaporation from Urbana to Salt Creek. The data from Urbana were multiplied by this ratio to obtain a pan-evaporation time series for the Salt Creek watershed. The pan-evaporation was assumed to be equivalent to PET. To obtain the actual evapotranspiration from the PET, the NOAA pan-coefficient was applied (National Weather Service, 1982c). Evapotranspiration data packaged with the USEPA's BASINS software were significantly higher than the values reported by NOAA.

3.5 Streamflow Data

Streamflow data are needed to calibrate hydrologic and water quality models. As mentioned earlier, the weather data first are used to generate the runoff volumes from the watershed. Modeled runoff volumes are routed to determine streamflow values that are compared with data from several streamflow gauges located in the Salt Creek watershed. The USGS gauge station cover provided in BASINS 2.1 was used to determine the location of gauges. Figure 3-6 shows the location of all USGS gauge stations in Salt Creek.

From all the USGS flow gauges in Salt Creek, only three contained long-term data needed for model calibration: Rolling Meadows in the upper portion of the watershed, Elmhurst in the middle section, and Western Springs as the most-downstream gauge. Hence, these three stations were used for model calibration. Figure 3-7 shows the location of the three gauges in the Salt Creek watershed.

3.6 Point Sources

Point source discharge data are needed to complete the waste load allocation (WLA) portion of the TMDL. Most of the necessary data were available from the IEPA and BASINS. The USGS also completed a WLA for the Salt Creek watershed (USGS, 1996).

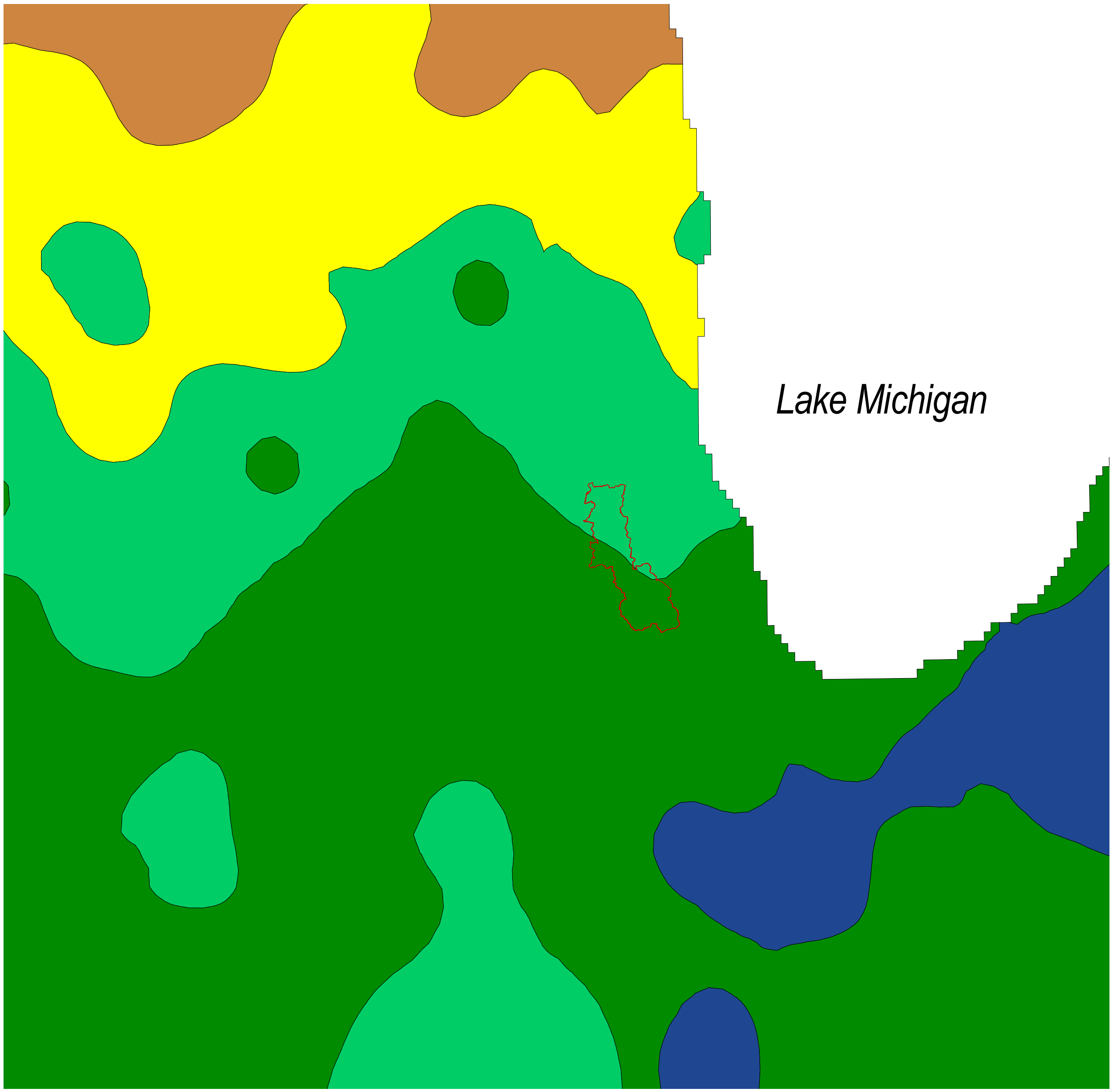


Figure 3-5

Annual Precipitation

Salt Creek Watershed

Annual Precipitation, Inches

- 31
- 31 - 33
- 33 - 35
- 35 - 37
- 37 - 39

N
W E
S

10 0 10 20 Miles

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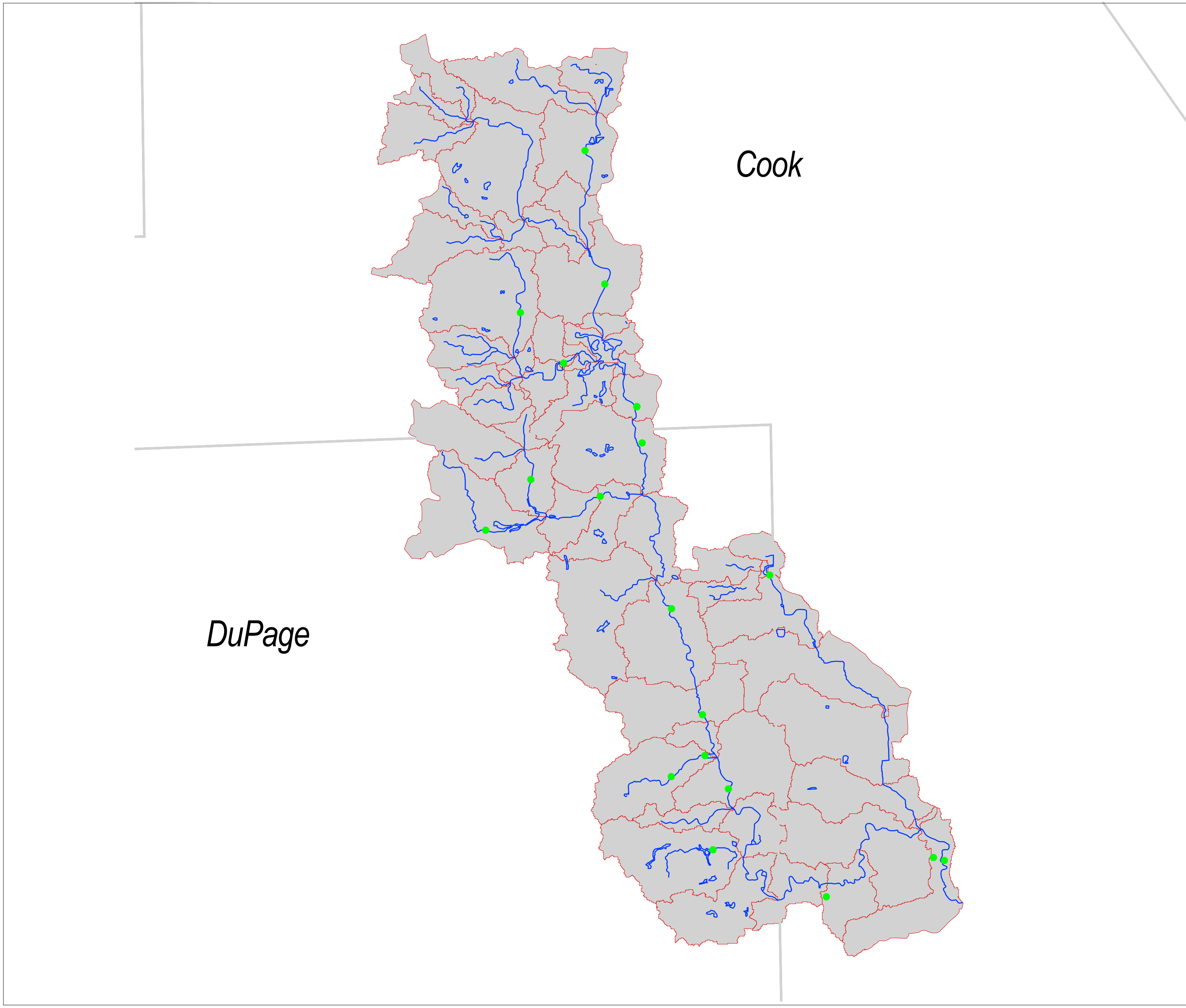
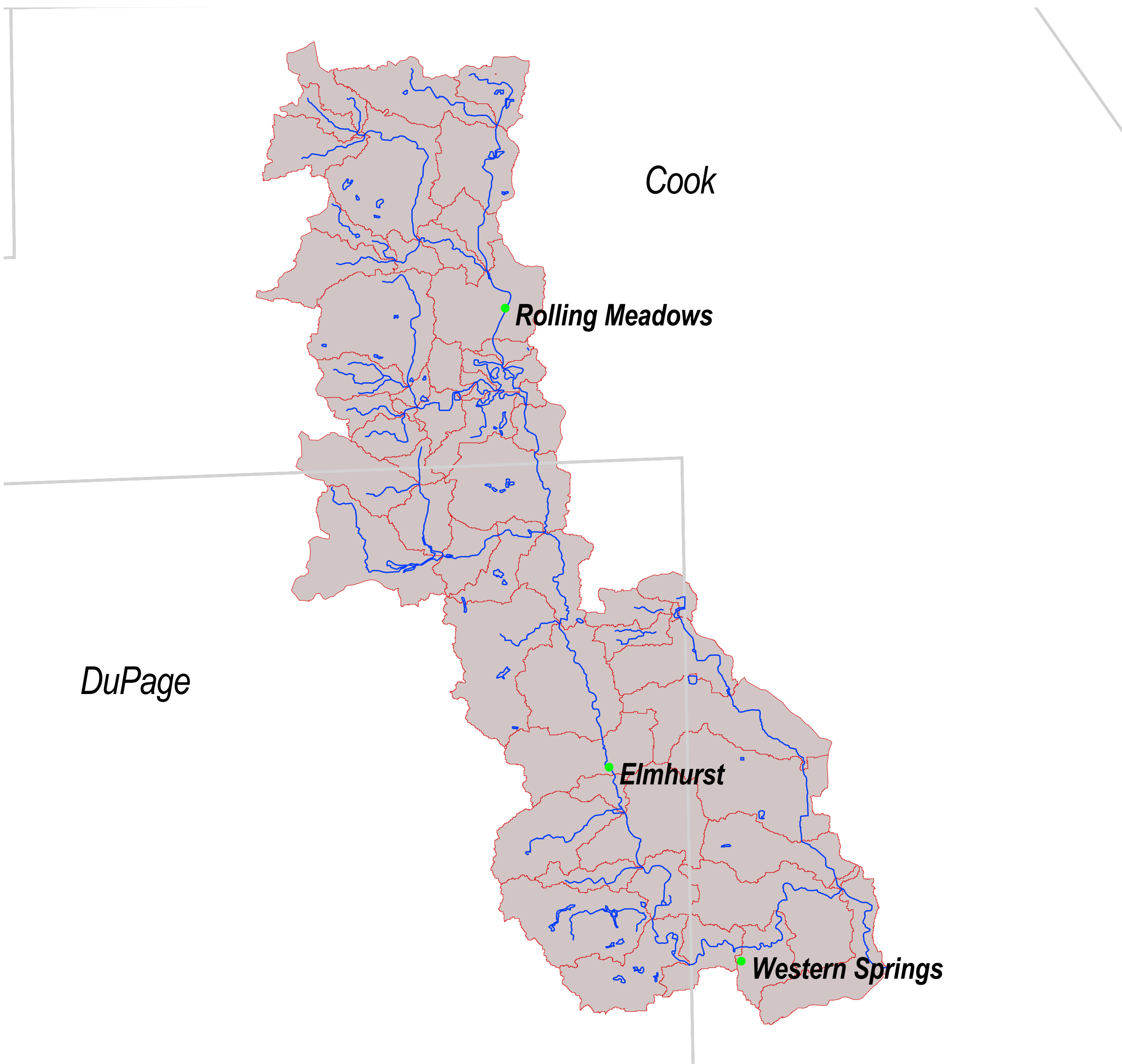


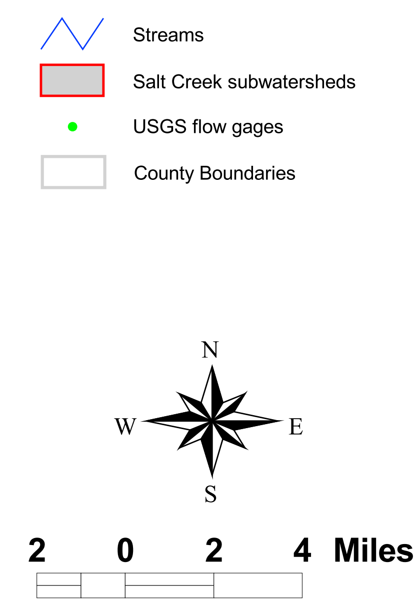
Figure 3-6

Location of USGS Gauges in Salt Creek Watershed

Figure 3-7

Location of USGS Gauges Used for Hydrologic Calibration





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The IEPA provided two data sets, one from the discharge monitoring report (DMR) system and an NPDES data set for NPDES permitted point sources. In addition, the BASINS 2.1 permit compliance system (PCS) layer was used to locate point sources in the Salt Creek watershed. Based on these three data sets, two of the point sources were relocated on the GIS data set. The Vulcan Materials Company and the Blackhawk Molding Company were located outside the watershed in the DMR data layer but inside subwatershed 59 and 19, respectively, in the other two data layers. Hence, these two point sources were moved to reflect their location in the NPDES and BASINS 2.1 data sets. Figure 3-8 shows the point source locations in Salt Creek. Table 3-3 shows a list of the point sources that were considered in the modeling. Reported effluent flow data in DMR was used in selecting point sources for modeling. Generally, if the DMR data did not include average flows for a discharger, the point source was not included in modeling. Assuming that the Villa Park Wet Weather STP discharges only during wet weather events, it was not included in the models for two reasons: 1. The continuous watershed model simulates wet weather flow from rainfall-runoff processes. Therefore, including the Villa Park Wet Weather STP in the model will account for the same flow twice—once from point source and again from nonpoint source. 2. The dissolved oxygen model was setup for dry weather condition requiring no input from the Villa Park Wet Weather STP.

3.7 Sewered and Unsewered Areas

Several of the reaches listed for impairment in Salt Creek were listed for not meeting DO WQS. Leaking combined sewers, sanitary sewers, and septic tanks can contribute to biochemical oxygen demand (BOD) load to the water bodies.

According to the IEPA Regional Office in Chicago, there are eight combined sewer overflows (CSOs) in Bellwood that discharge into Addison Creek, located between the Eisenhower Expressway and Adams Street (Berwyn and River Forest Quads). There are 19 CSOs that discharge into Salt Creek: two in Addison, five in Villa Park, two in Western Springs, three in La Grange Park, and seven in Brookfield. In addition there are 12 sanitary sewer overflows (SSOs) in Elmhurst and one in Villa Park. Based on this description an approximate map of the CSO outfall locations has been prepared and shown in Figure 3-9.

3.8 Nonpoint Sources

3.8.1 Wildlife and Pets

Wildlife and pets are another potential source of pollutant loads to the watershed. Several agencies, including the IEPA, the DuPage County Forest Preserve District, the Cook County Forest Preserve District, and the IDNR were contacted to request wildlife data. The DuPage County and Cook County animal control departments were also contacted to request homeowner pet count information. The data from the various agencies could not directly be used to estimate or characterize the wildlife and pet populations in Salt Creek.

3.8.2 Best Management Practices

Existing best management practices (BMP) data were requested from the DCDS and NIPC. Although no detailed information for these facilities was available from either agency, review of the DuPage County Countywide Stormwater and Floodplain Ordinance (September 1994) revealed that the ordinance promotes the application of BMPs to new development through riparian buffer zones, erosion control plans, detention basins, etc.

TABLE 3-3
Point-Source Dischargers in Salt Creek Watershed
Illinois TMDL Development

Name	NPDES	County	Subwsid [a]	Modeled [b]
A.G. Communications Systems	IL0070416	Cook	5	No
Accurate Cast Products	IL0064866	DuPage	19	No
Addison North STP	IL0033812	DuPage	56	Yes
Addison South-A.J. LaRocca STP	IL0027367	DuPage	19	Yes
Arlington International Racecourse	IL0063487	Cook	28	No
Badger Pipe Line Company	ILG910121	Cook	58	No
Bensenville South STP	IL0021849	DuPage	7	Yes
Blackhawk Molding Company	IL0065021	DuPage	19	No
Brookfield CSOS	IL0044890	Cook	1	No
Congress DEV Hillside Landfill	IL0035831	Cook	4	No
DuPage County-Nordic Park STP	IL0028398	DuPage	51	Yes
Elmhurst WWTP	IL0028746	DuPage	17	Yes
Garden Market Shopping Center	IL0069531	Cook	1	No
Itasca STP	IL0026280	DuPage	50	Yes
LaGrange Park CSOS	IL0033588	Cook	12	No
Material Serv Corp-Yard 19	ILG840029	Cook	1	No
Material Service Corp-Fed Qury	IL0001945	Cook	1	No
MWRDGC Egan WRP	IL0036340	Cook	42	Yes
Prairie Material Sales Inc.	IL0066427	Cook	28	No
Roselle–Devlin STP	IL0030813	DuPage	55	Yes
Salt Creek Sanitary District	IL0030953	DuPage	17	Yes
Stonewall Utility Co WWTP	ILG550015	DuPage	16	No
Union Pacific Railroad-Melrose	IL0002127	Cook	5	No
Vanee Foods Company-Berkley	IL0069124	Cook	4	No
Villa Park Wet Weather STP	IL0033618	DuPage	17	No
Vulcan Materials Company	IL0037737	DuPage	59	No
Wall's MHP-Elmhurst	IL0050695	DuPage	16	Yes
Wood Dale North STP	IL0020061	DuPage	20	Yes
Wood Dale South STP	IL0034274	DuPage	20	Yes
Woodlawn Engineering Co. Inc.	ILG250022	DuPage	19	No
Xerox Corp-Elk Grove Village	IL0070807	DuPage	21	No

[a] Indicates which subwatershed in Salt Creek the point source is located.
[b] “Yes” indicates that the point source is being considered in the watershed modeling for TMDL development.

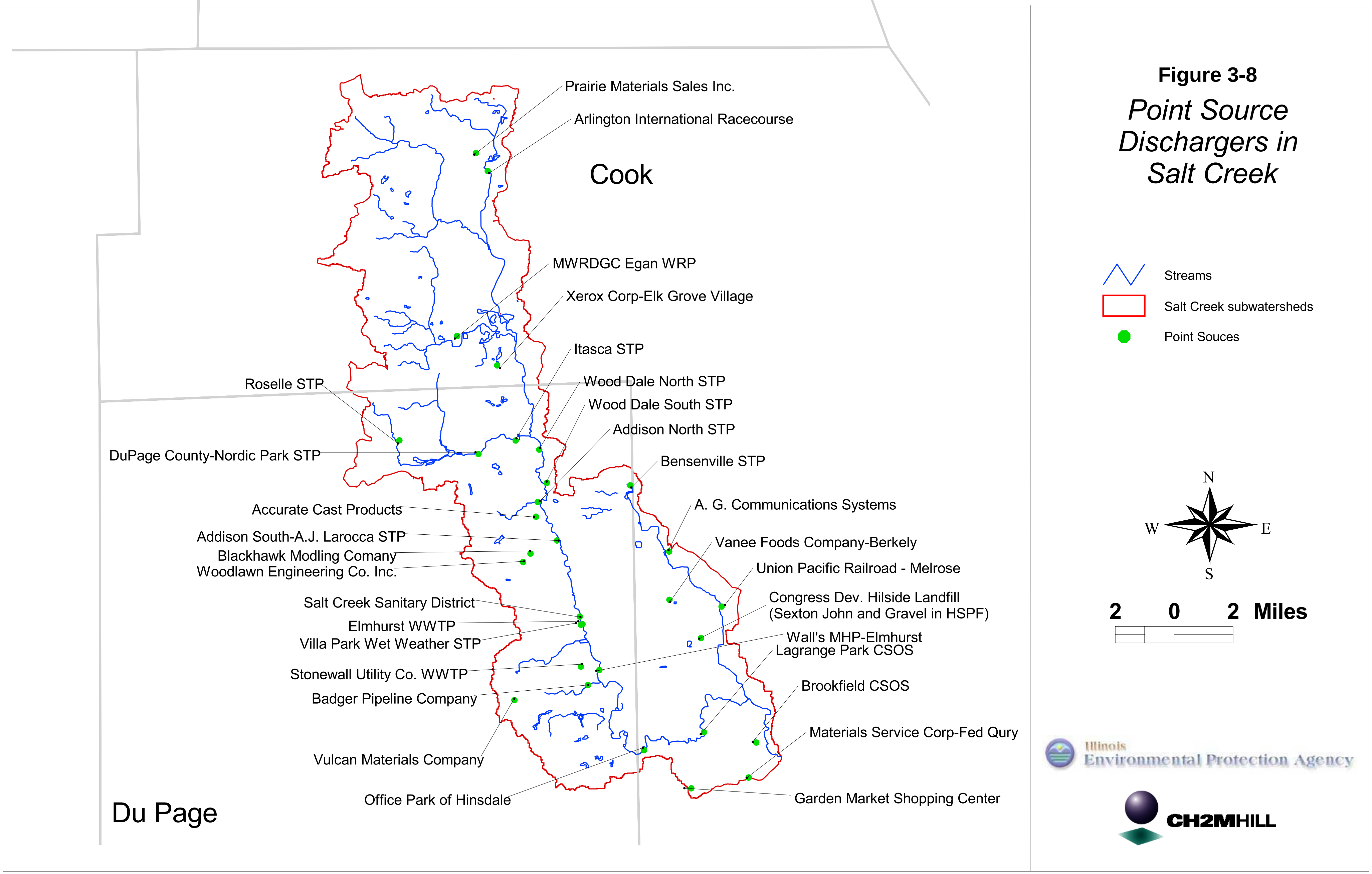
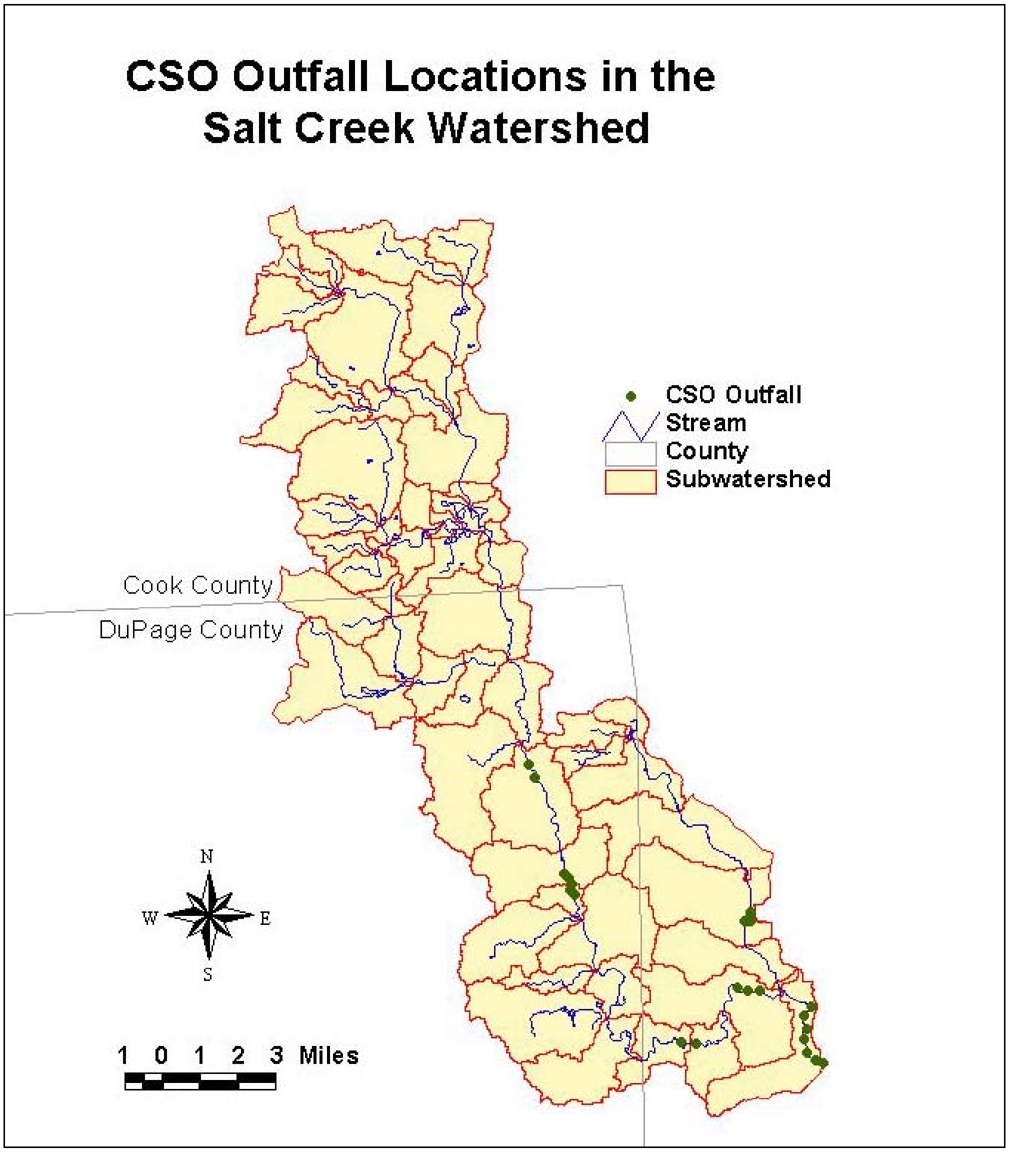


Figure 3-8

Point Source Dischargers in Salt Creek

FIGURE 3-9
Location of CSO Outfalls in the Salt Creek Watershed



3.9 Water Quality Data

Water quality data were obtained from two sources. Water quality data was available from STORET (http://www.epa.gov/storet), a national database maintained and operated by USEPA, through December 1998. The IEPA provided instream water quality data for 1995 intensive sampling events and monitoring data from 1999. The USGS real time water quality station at Western Springs collects temperature, specific conductance, dissolved oxygen, pH, turbidity (NTUs), and chlorophyll data in 30-min intervals. The data from all sources were carefully reviewed to verify the justification for listing on the 1998 303(d) list, to select appropriate modeling approaches, and identify water quality stations to be used for model calibration. Figure 3-10 shows the location of all water quality stations in the Salt Creek watershed.

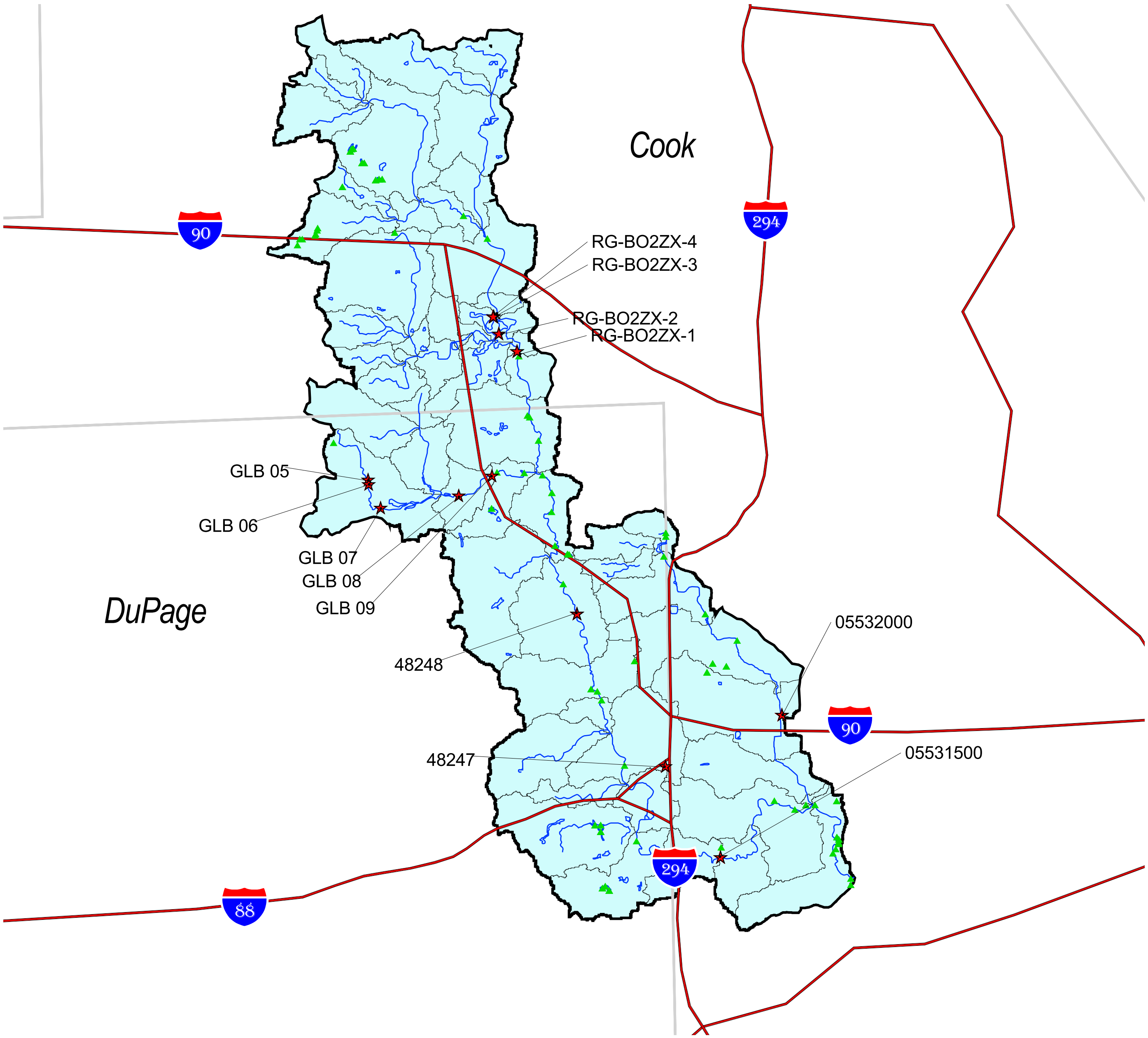


Figure 3-10

Location of Water Quality Stations in Salt Creek

Water Quality Stations

- Data not used for TMDL
- Data used for TMDL
- Streams
- Salt Creek Watershed
- Subwatersheds
- County Boundaries

N S W E

2 0 2 Miles

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SECTION 4

Assessment of Water Quality Data and TMDL Approach

This section summarizes each pollutant on the Salt Creek watershed list of impairments, and assesses the length of record and frequency of observations. The availability of data regarding frequency and amount of data varied for the different pollutants, which affected the selected modeling approaches. For each pollutant, a cause for listing has been provided, then an assessment of the potential sources, followed by a selected TMDL approach based on the findings of the first two sections for each pollutant. Details of the TMDL modeling are provided in Section 5.

4.1 Period of Assessment for Water Quality Data

Water quality impairments in a water body may be caused by pollutants from point and nonpoint sources. Generally dry weather periods are critical when direct discharge (e.g., point sources) is the primary source of the impairment. However, impairments during wet weather events may be caused by nonpoint sources or both point and nonpoint sources. Therefore, an analysis of long-term water quality is essential for a better understanding of the sources that cause the violations of WQS and to help select a correct approach for developing a TMDL. IEPA uses monitoring data from the most recent 5 years to prepare the 303(d) list of impairments. Therefore, water quality data collected between 1995 and 1999 was used to develop the TMDLs for Salt Creek and its tributaries.

4.2 Copper

4.2.1 Historic Data/Causes for Listing

The numeric acute standards (AS) and CS for copper are hardness dependent and presented below.

Acute numeric standard for total copper (μg/L) = exp[- 1.464 + 0.9422 ln(H)]

Chronic numeric standard for total copper (μg/L) = exp[- 1.464 + 0.8545 ln(H)]

where, ln(H) = natural logarithm of hardness (STORET 00900; mg/L as $CaCO_3$,).

The GU WQS (Section 302.208) also states that:

a) The AS for the chemical constituents shall not be exceeded at any time except as provided in subsection (d).

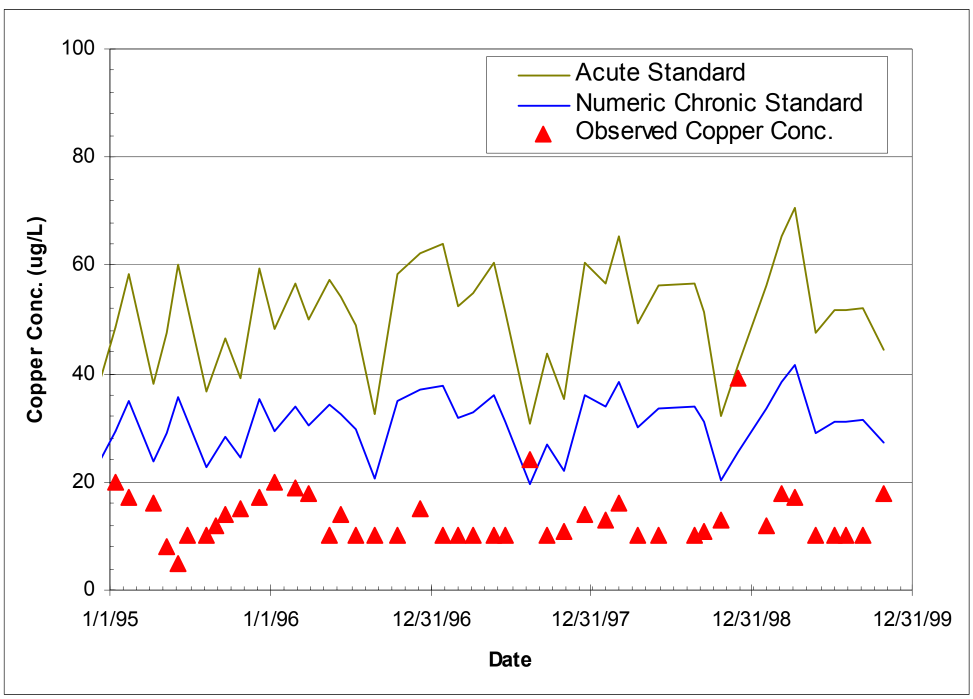
b) The CS for the chemical constituents shall not be exceeded by **the arithmetic average of at least four consecutive samples collected over any period of at least 4 days**, except as provided in subsection (d). The samples used to demonstrate compliance or lack of compliance with a CS must be collected in a manner that assures an average representative of the sampling period.

The term "numeric chronic standard" refers to a value computed using the CS formula and an instantaneous hardness. The term "chronic standard" refers to the average of at least four consecutive samples collected over any period of at least 4 days.

One segment of Addison Creek (GLA 04) was listed as impaired on the basis of two exceedances at George Street (station GLA-05) collected in 1995. Only three data points were available. It is likely that Bensenville South MWWTP was the source of this copper. IEPA should collect further information to verify whether copper is a problem since there are few data points, and the data are now 8 years old. In the meantime, this section of Addison Creek should remain on the consolidated list.

To ensure that the high copper values were not causing a problem downstream, an analysis of data collected during the 1995-1999 period at station 05532000 was performed. The numeric AS and CS were calculated using the observed hardness data and plotted in Figure 4-1 along with observed total copper concentrations. All data are included in Appendix A.

FIGURE 4-1
Observed Total Copper Concentrations at Addison Creek (station 05532000) and Corresponding Acute Standard and Numeric Chronic Standard by Sample Date



Total copper concentration exceeded the numeric CS on August 15, 1997 and November 30, 1998. To assess if the WQS was violated, three samples immediately prior to and three samples immediately after each date were used to calculate the arithmetic average of four consecutive samples. Each calculated average concentration spans over at least four days. Observed total copper concentrations and hardness, computed numeric AS and CS, 4-day averages of observed copper concentrations, and 4-day averages of the numeric CS are listed in Table 4-1.

TABLE 4-1
Observed Copper Concentrations, Hardness, and Acute and Chronic Copper Standards in Addison Creek by Sample Date

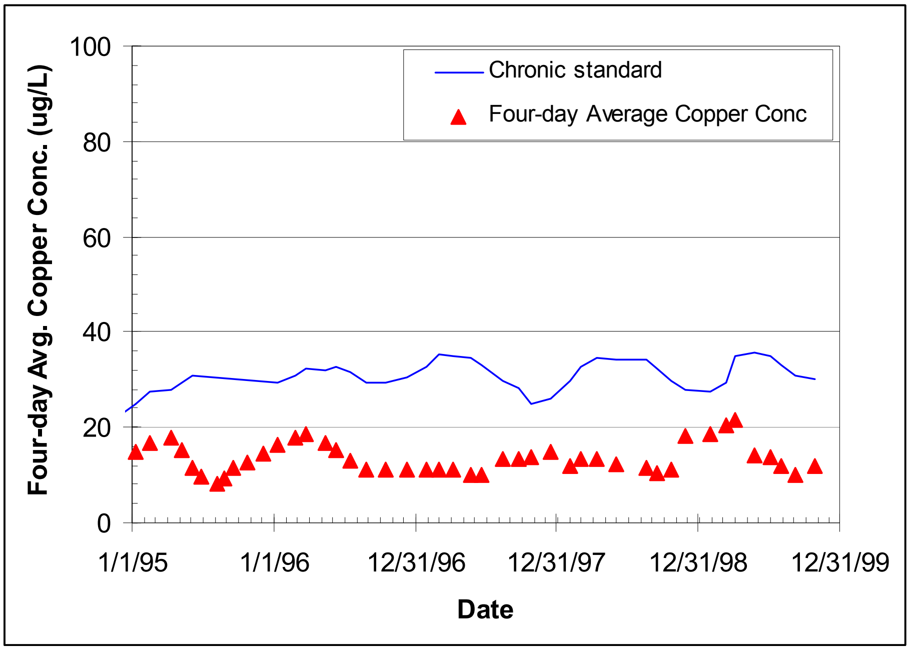
Date	Time	Observed Copper Conc. (μg/L)	Hardness (mg/L as $CaCO_3$)	Acute Standard (μg/L)	Numeric Chronic Standard (μg/L)	4-day Average of Observed Copper Conc. (μg/L)	4-day Average of the Numeric Chronic Standard (μg/L)
4/7/97	1130	10.0	332	54.90	32.97		
5/23/97	1145	10.0	368	60.50	36.00		
6/19/97	1100	10.0*	309	51.31	31.00		
8/15/97	**1100**	**24.0**	**179**	**30.68**	**19.45**	**13.50**	**29.85**
9/22/97	1000	10.0 *	261	43.77	26.84	13.50	28.32
10/28/97	1200	11.0	207	35.18	22.02	13.75	24.83
12/15/97	1225	14.0	368	60.50	36.00	14.75	26.07
2/2/98	1210	13.0	344	56.77	33.98	12.00	29.71
8/21/98	1030	10.0*	344	56.77	33.98		
9/14/98	1150	11.0	310	51.47	31.09		
10/23/98	1120	13.0	188	32.13	20.28		
11/30/98	**1200**	**39.0**	**248**	**41.71**	**25.69**	**18.25**	**27.76**
2/1/99	1130	12.0	340	56.15	33.64	18.75	27.68
3/11/99	1245	18.0	399	65.29	38.57	20.50	29.55
4/6/99	1215	17.0	434	70.67	41.45	21.50	34.84
5/26/99	1000	10.0 *	286	47.71	29.02	14.25	35.67

* Actual copper concentration is less than the detection limit of 10.00 μg/L

An analysis of observed water quality data showed that

- Observed total copper concentration never violated the acute copper standard
- Observed total copper concentration exceeded the numeric CS on two occasions, but did not violate the chronic WQS for total copper as shown in Figure 4-2. The 4-day average of observed total copper concentrations and the 4-day average of calculated numeric CS were calculated and compared to determine if the chronic WQS was violated.
- Generally, total copper does not pose a threat to the designated use of Addison Creek. Forty-four percent of observed total concentrations were below the detection limit and 95 percent of the observed concentrations (all samples but two on August 15, 1997, and November 30, 1998) were below 70 percent of the numeric CS.

FIGURE 4-2
Four-Day Average of Observed Total Copper Concentrations at Addison Creek (Station 05532000) and Corresponding Chronic Standard by Sample Date



On the basis of this analysis, the lower portion of Addison Creek is not impacted by copper and should not be included on the 303(d) list.

4.3 Total Dissolved Solids/Conductivity

Segments GL 03, GL 09, and GL 10 of Salt Creek and segment GLA 02 of Addison Creek are listed for TDS/conductivity impairments. Long-term TDS and conductivity data are available at two ambient water quality stations (05531500 at the lower end of Salt Creek, 05532000 at the lower end of Addison Creek). Station 05531500 is located on Salt Creek and station 05532000 is located on Addison Creek.

According to the Illinois GU WQS, TDS concentrations (STORET parameter code 70300) shall not exceed 1,000 mg/L. Conductivity is directly proportional to the TDS concentration. Although there is no GU WQS for conductivity, a conductivity value of 1,667 µmhos/cm corresponds to 1,000 mg/L of TDS (305(b) guideline). Therefore, an exceedance of 1,667 µmhos/cm of conductivity is considered indicative of potential exceedance of the 1,000 mg/L of the TDS standard. Since conductivity samples were collected more frequently than the TDS samples only conductivity data were analyzed to investigate TDS/conductivity impairments.

Plots (Figures 4-3 and 4-4) of water quality data collected at the Salt Creek station (05531500) and the Addison Creek station (05532000) clearly show that conductivity occasionally exceeded 1,667 µmhos/cm criteria during winter months. These plots included data collected between 1995 and 1999.

FIGURE 4-3
Plot of Salt Creek (station 05531500) Conductivity Data by Date

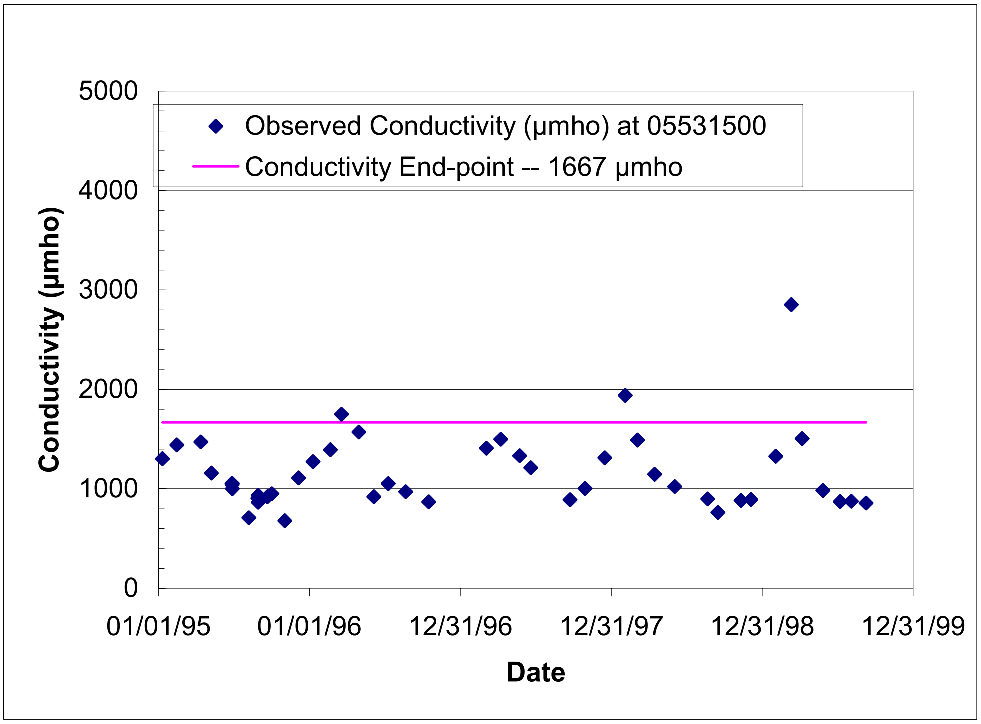


FIGURE 4-4
Plot of Addison Creek (station 05532000) Conductivity Data by Date

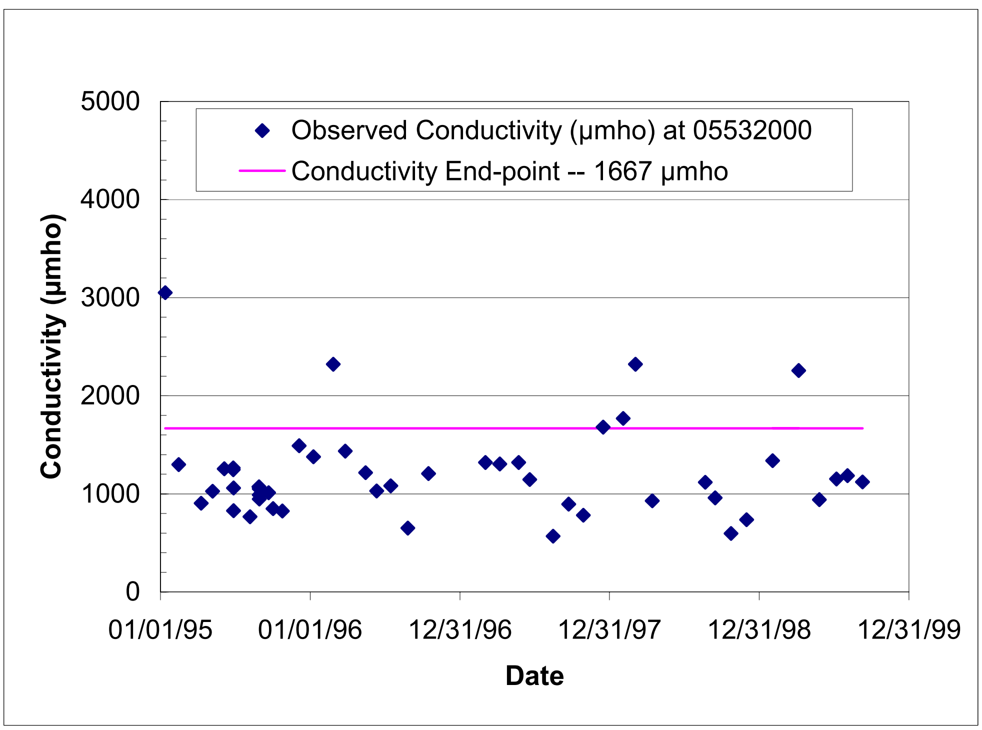
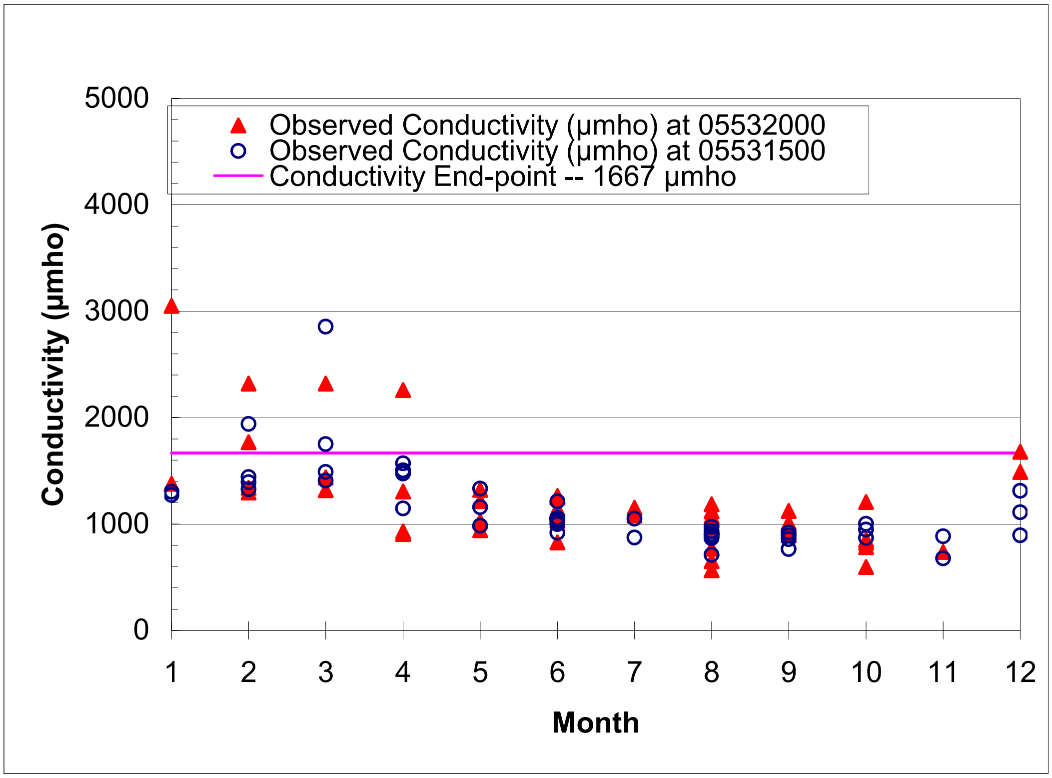


FIGURE 4-5
Observed Conductivity at Salt Creek and Addison Creek by Month 1995-1999



Generally, many dissolved anions and cations constitute TDS/conductivity in surface water. Most anions and cations are naturally occurring substances. Dissolution of minerals as water flows in contact with soil and precipitation containing atmospheric constituents contribute to naturally occurring TDS/conductivity. Anthropogenic sources such as road salt application, fertilizer application, and point sources increase the concentration of TDS/conductivity.

An investigation of seasonal pattern and correlation between chloride and conductivity showed that high TDS/conductivity is caused by road salt application in the winter months and directly proportional to chloride concentration. Chloride is the major component of TDS in winter months, which is the time of year subject to conductivity impairment. Snowmelt runoff includes chloride from roadway de-icing activities. Conductivity is generally higher during December through April than May through November (Figure 4-5). Conductivity is closely correlated to observed chloride concentration in Salt Creek (Figure 4-6) and Addison Creek (Figure 4-7). To verify that chloride is a major component of TDS/conductivity, a regression analysis of two constituents was performed. Chloride (417 mg/L) and conductivity (964 µmho) data collected on August 15, 1997, at the Salt Creek station (05531500) were excluded from analysis, because the chloride value was too high for the measured conductivity. Because of the relationship between chloride and conductivity it seemed unlikely that the recorded chloride value was correct. The conductivity value was with in range of the previous and next recorded value while the chloride observation was very high. This data point was disregarded from the sample set as an statistical outlier.

Initial regression analyses showed that conductivity values of 616 µmho and 564 µmho were contributed by background anions and cations (i.e., intercept of the regression equation, which is the level predicted if there were no chlorides instream) in Salt Creek and Addison Creek, respectively. For consistency, it was assumed that the background conductivity was the same in both creeks, and the value was set to 600 µmho to derive the final regression equations.

The relationship between conductivity and chloride in Salt Creek is given by:

Conductivity (µmho) = 600 + 2.76 × Chloride (mg/L)
$r^2 = 0.86$

Similarly, the relationship between conductivity and chloride in Addison Creek is given by

Conductivity (µmho) = 600 + 3.00 × Chloride (mg/L)
$r^2 = 0.91$

Figures 4-6 and 4-7 show these relationships graphically. A strong correlation between chloride and conductivity (i.e., high R^2 values) indicates that the variation in conductivity levels can be explained by chloride concentrations. Also, chloride and conductivity are high during winter months and concurrent with snowmelt runoff, confirming that salt from roadway de-icing activities is the major component of TDS. The quantity of sodium in road salt is as significant as chloride and contributes equally to the TDS concentrations/conductivity. Additionally, depending on the composition of road salt, there are other dissolved solids present in water.

FIGURE 4-6
Relationship between Conductivity and Chloride in Salt Creek

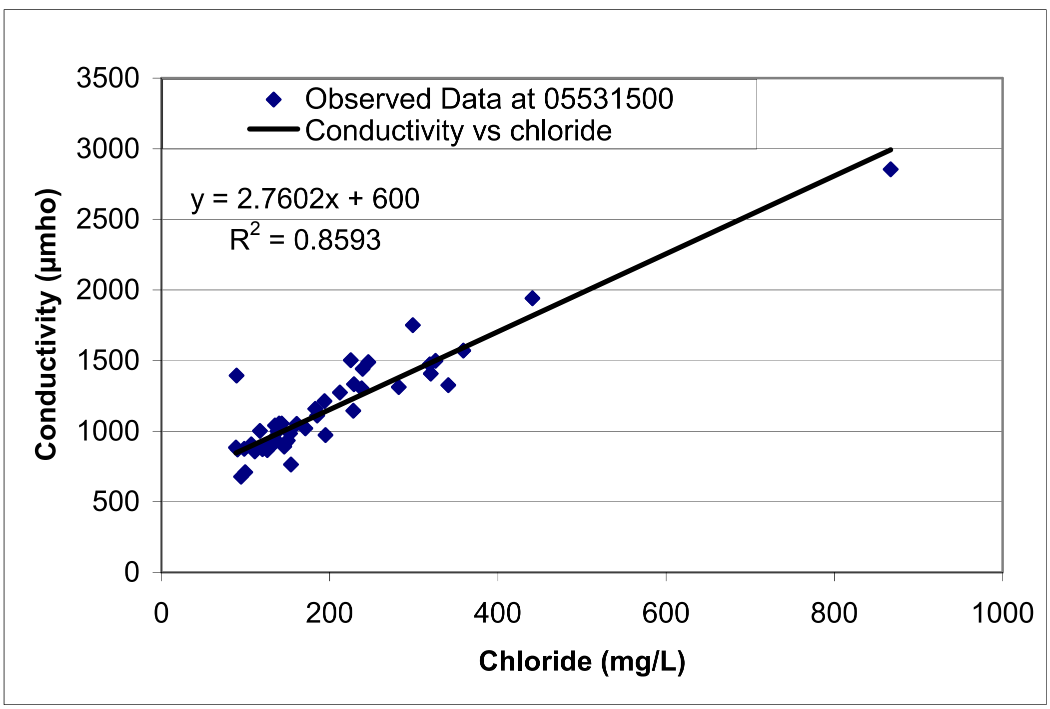
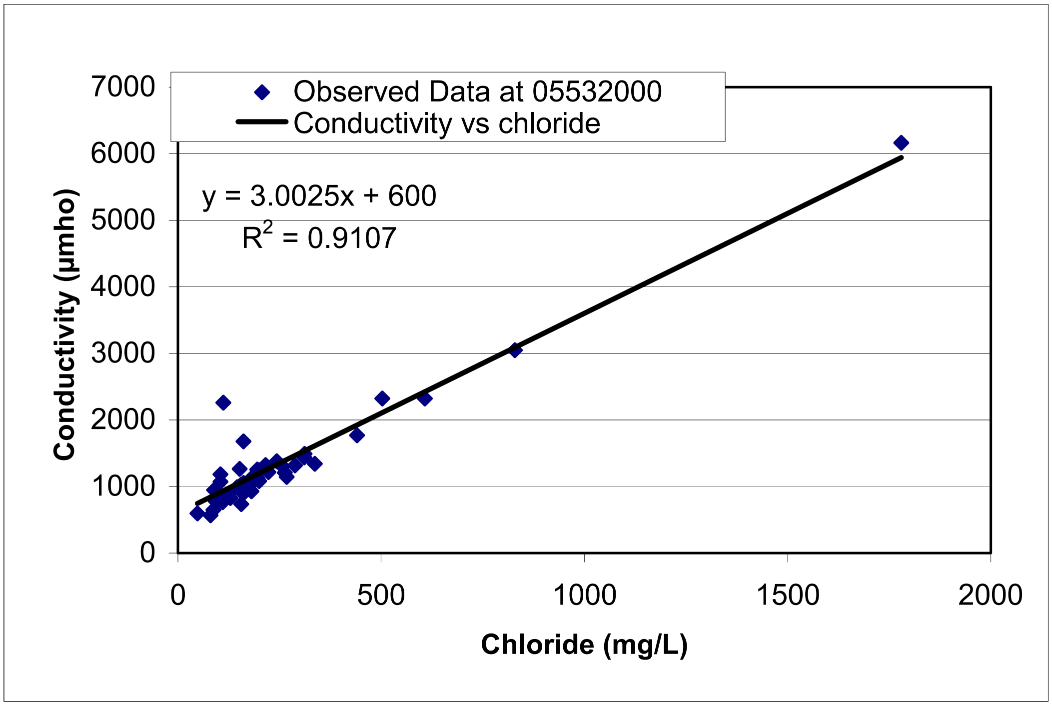


FIGURE 4-7
Relationship between Conductivity and Chloride in Addison Creek



Based on the analysis presented in this section, the TDS/conductivity considerations should be addressed through the evaluation and potential development of chloride TMDLs.

4.4 Chloride

4.4.1 Historic Data and Causes for Listing

Segment GLA 02 of Addison Creek is listed for chloride impairment. Long-term total chloride data are available at the ambient water quality stations at Addison Creek (station 05532000) and Salt Creek (station 05531500).

According to the Illinois GU WQS, concentration of chloride (STORET parameter code 00940) shall not exceed 500 mg/L.

Although Salt Creek segments are not listed for chloride impairment, a chloride TMDL may be necessary to meet the TDS/conductivity standard. Segments GL 03, GL 09, and GL 10 of Salt Creek and segment GLA 02 of Addison Creek are listed for TDS/conductivity impairments and discussed in the previous section. Chloride constitutes a significant part of TDS/conductivity and provides a means to control exceedances of the TDS/conductivity standard that would result in use impairment.

Water quality data collected between 1995 and 1999 show that there was one exceedance (Figure 4-8) of the chloride standard at the Salt Creek station (05531500) and four exceedances (Figure 4-9) at the Addison Creek station (05532000). These data, as listed in Table 4-2, show that all exceedances occurred during winter months. Figure 4-10 shows chloride concentrations by month. At the Salt Creek station (05531500), one sample, which recorded 417 mg/L of chloride concentration in August 15, 1997, appeared to be a data error. Conductivity on August 15, 1997, was significantly lower than the value that would correspond to 417 mg/L of chloride concentration. This confirmed that the sample had a data error. The maximum observed chloride concentration between May through November was 268 mg/L on 6/19/1997 at the Addison Creek station (05532000). Chloride concentrations at the Salt Creek station (05531500) were generally less than those at the Addison Creek station for the whole sampling period. Probabilities of exceedance of the chloride standard are 4 and 8.5 percent in Salt Creek and Addison Creek respectively.

FIGURE 4-8
Salt Creek (station 05531500) Chloride Concentrations by Sample Date and Water Quality Standard

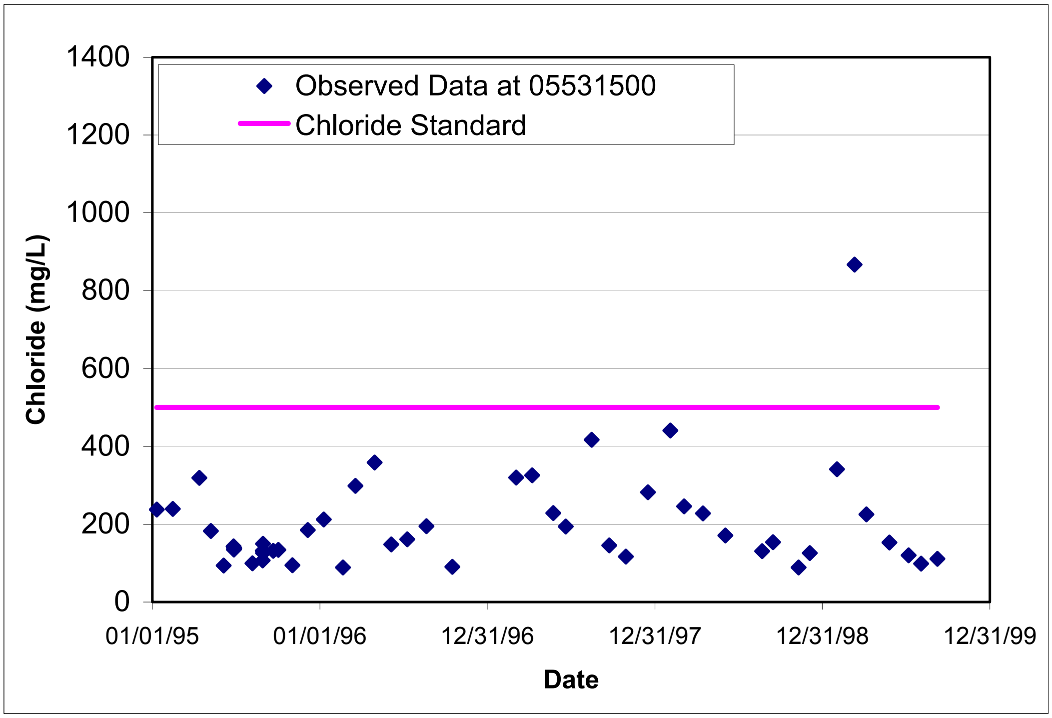


TABLE 4-2
Exceedances of the Chloride Standard in Salt Creek and Addison Creek

Date	Chloride (mg/L)	Station
3/11/99	867	Salt Creek
3/11/99	1780	Addison Creek
1/12/95	829	Addison Creek
2/26/96	608	Addison Creek
3/4/98	503	Addison Creek

FIGURE 4-9
Addison Creek (station 05532000) Chloride Concentrations by Sample Date and Water Quality Standard

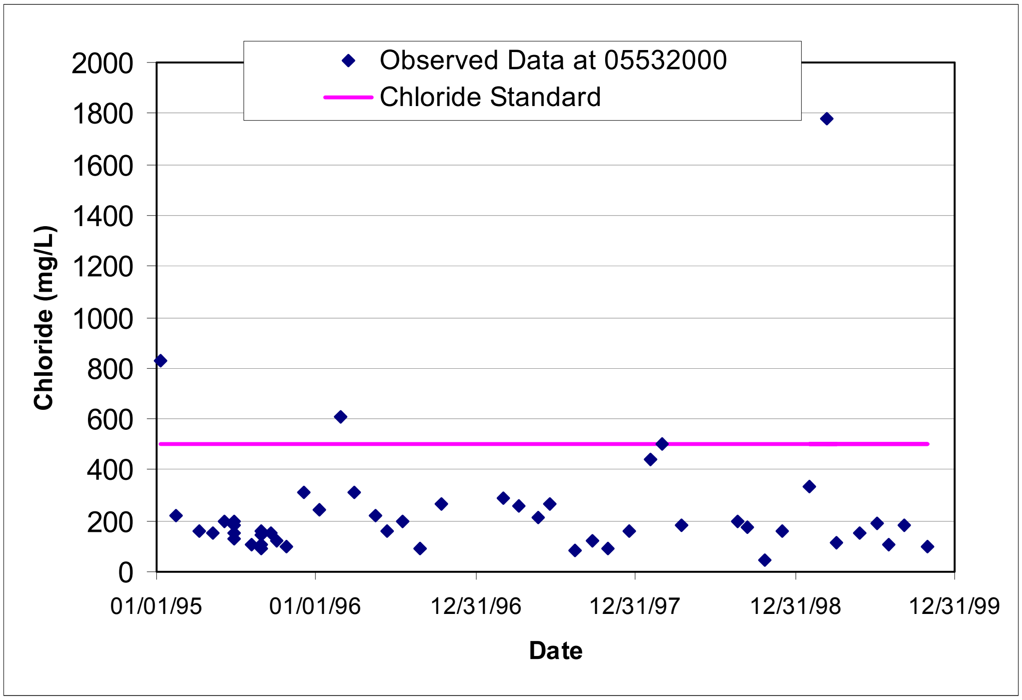
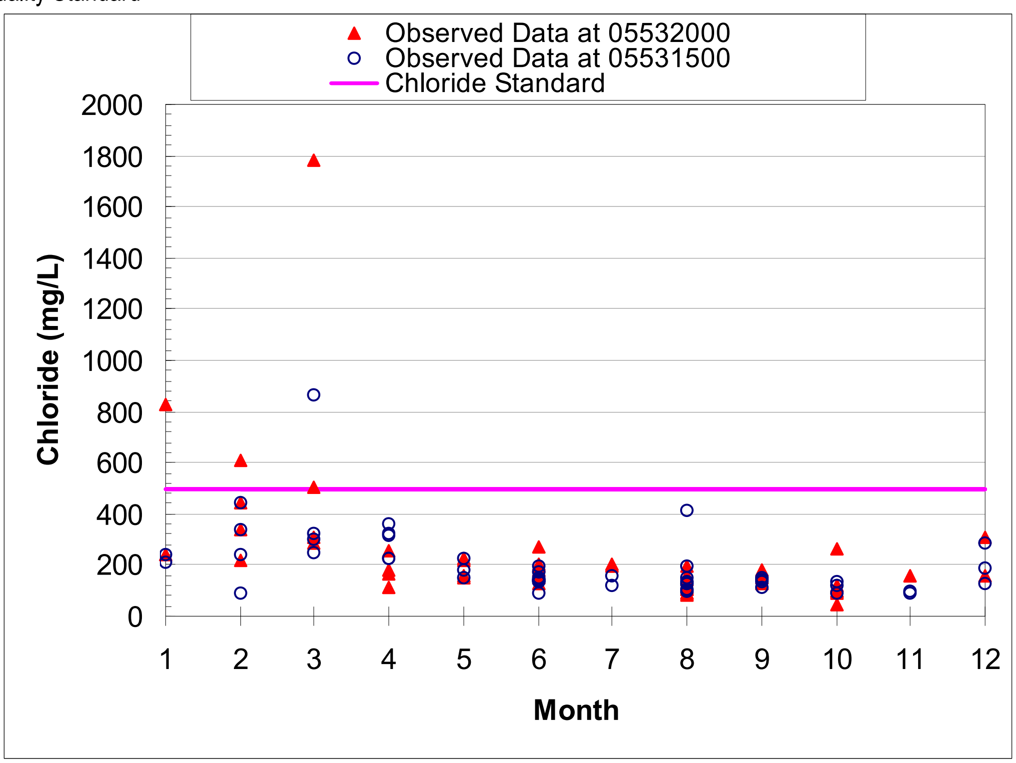


FIGURE 4-10
Chloride Concentrations in Salt Creek and Addison Creek by Sample Month, 1995 to 1999, and the Water Quality Standard



4.4.2 TMDL Approach

Chloride was modeled for the Salt Creek and the Addison Creek segments using HSPF. Road salt application information was incorporated in the model for calibration. Model calibration and validation was performed using chloride data collected at stations 05531500 and 05532000.

4.5 Total Phosphorus

4.5.1 Historic Data/Causes for Listing

Salt Creek segment RGZX (Busse Woods Lake) is listed for TP (STORET number 00665) impairment. Long-term TP and dissolved phosphorus data are available at the ambient water quality stations at Addison Creek (station 05532000) and Salt Creek (station 05531500). There are four water quality monitoring stations (RG-B02ZX-1, RG-B02ZX-2, RG-B02ZX-3, and RG-B02ZX-4) in the lake that recorded total and dissolved phosphorus (DP) data in 1991, 1994, 1997, and 2000. Monthly samples were collected, sometimes at different depths, between April and October.

Illinois WQS (Section 302.205) state that phosphorus (STORET number 00665) as P shall not exceed 0.05 mg/L in any reservoir or lake with a surface area of 8.1 hectares (20 acres) or more, or in any stream at the point where it enters any such reservoir or lake.

TP data collected from April to October 2000 at various locations of the lake are plotted in Figure 4-11. Twenty-nine percent of TP samples exceeded the WQS in 1997, whereas in 2000 this had dropped to only 16 percent, which is only 3 out of the 19 samples taken in 2000. Table 4-3 below shows annual summaries for 4 years , 1991, 1994, 1997, and 2000. From the mid 1990s to 2000, TP concentrations in Busse Lake decreased from 93 percent violations in 1994 to 29 percent in 1997 and to less than 16 percent in 2000. An analysis of flow data indicates that average flow between these years was relatively constant; it ranged from a low of 156 Cubic feet per second (cfs) to a high of 170 cfs for 1991, 1994, 1997, and 2000. This indicates that appropriate measures may have already been taken to address the water quality problems in the lake. The average reduction in TP concentrations since 1994 has been 56 percent. Monitoring should continue in the watershed to ensure that this downward trend is not short term.

A comparison of the data from the last decade reveals that TP concentration has declined significantly. The average reduction in TP concentration from 1994 to 2000 was 56 percent. To determine whether this downward trend was related to flow, the average flow conditions in 1991, 1994, 1997, and 2000 were reviewed. The average flows in each year were relatively equivalent, with a range of 156 to 170 cfs. The flows for each individual sampling date were then reviewed. In general, flow between the years sampling dates were relatively constant. However, there was one sampling date in 1991 when the flows were approximately double the next highest flow. When data from this date were removed from the analysis, the phosphorus values in Table 4-3 drop for 1991. The maximum is 0.091 mg/L, the mean is 0.055 mg/L, and the percent of samples that exceed the standard is 55. Since phosphorus loading is contingent on longer time frames, and the years have fairly consistent flows, it appears that phosphorus is declining. Monitoring should continue to ensure this is a long-term trend. DP concentration did not vary significantly among the stations. The average DP concentration was 0.014 mg/L and had increased slightly in 2000 measurements compared to 1994 and 1997 measurements. .

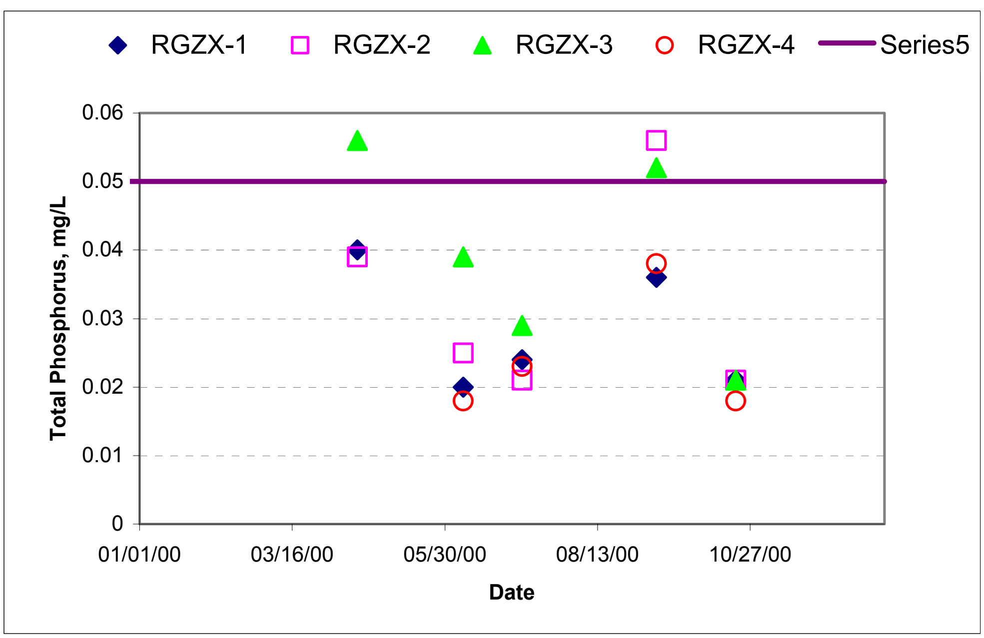
A summary of phosphorus data is presented in Table 4-3. One sample, collected on June 8, 1997, from station RG-B02ZX-4, was excluded from the analysis because of an apparent data error. DP concentration (0.055 mg/L) was recorded as higher than the TP concentration (0.028 mg/L).

There is no point source discharger located upstream of the Busse Woods Lake in the Salt Creek watershed. Therefore, nonpoint sources contribute 100 percent of the TP load. Potential nonpoint sources of phosphorus include urban runoff containing fertilizers and waterfowl and pet waste; broken or leaky sewers; and failed septic systems. There is no CSO upstream of the lake.

TABLE 4-3
Summary of Phosphorus Data from Busse Woods Lake

Year	No. Samples	Maximum Total Phosphorus (mg/L)	Average Total Phosphorus (mg/L)	Average Dissolved Phosphorus (mg/L)	Percent of Samples Exceeding Water Quality Standard
1991	25	0.097	0.061	0.013	64%
1994	15	0.110	0.071	0.012	93%
1997	21	0.082	0.048	0.013	29%
2000	37	0.056	0.031	0.017	15.7%

FIGURE 4-11
Total Phosphorus Concentrations in Busse Woods Lake by Sample Date and the Water Quality Standard



4.6 Dissolved Oxygen

4.6.1 Historic Data/Causes for Listing

Salt Creek segments (GL 03, GLB 01, GLBA, and GL 19) and Addison Creek segments (GLA02 and GLA04) are listed for DO impairment. Long-term in-stream DO data are available at the Addison Creek monitoring site (station 05532000) and the Salt Creek monitoring site (station 05531500). These data are collected during daytime hours nine times per year. Also, intensive sampling data for summer 1995 are available from USGS (Melching and Chang, 1996). These data were collected at 28 sites within the Salt Creek Basin including Salt Creek, Spring Brook, and Addison Creek. The data were collected monthly in April, June, August, and October, and intensive diurnal data were collected in June and August.

Illinois WQS states that the DO (STORET number 00300) shall not be 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. Two STORET parameters (00300 and 00299) represent DO (mg/L). Parameter 00299 specifically designates measurements of DO by probe in the field. Available data show that the number of DO measurements by probe (parameter 00299) is significantly larger than the number of DO measurements in the laboratory (parameter 00300). All IEPA data are currently collected by probe, and data collected at the long-term ambient stations have been collected by probe since 1981. All DO data, both parameters 00299 and 00300, were included in the analysis and the TMDL development.

DO data collected at various locations in Salt Creek and Addison Creek can be divided into two groups for a clear understanding of the problem. The first group includes samples collected at regular intervals from the Addison Creek monitoring site (station 05532000, GLA-02) and the Salt Creek monitoring site (station 05531500, GL-09). These data generally include nine samples per year at each monitoring site. The second group includes data from two extensive diel data collection efforts on June 27 and 28, 1995 and August 29 and 30, 1995. DO and other water quality data were collected at 6-hour intervals from many sites along Salt and Addison Creeks, including point source effluents. These data provide information on the extent of diurnal variation of DO along the creeks.

Except for one sample at the Salt Creek station, long-term regular interval samples collected between 1991 through 1998 (not including the diel samples collected in 1995) do not show any excursion below the 5 mg/L standard. Long-term DO from the Salt Creek and Addison Creek sites are presented in Figures 4-12 and 4-13, respectively. The DO data on December 5, 1995, at the Salt Creek station (Figure 4-12) was potentially recorded erroneously as 3.5 mg/L. Data collected between 1991 through 1998 show that DO consistently exceeded 10 mg/L from December through February. Continuous monitoring data (30-min interval) at the Salt Creek monitoring site at Western Springs (station 05531500), as shown in Figure 4-15, showed DO was always above the WQS (6 mg/L) between November 01, 2001 and March 31, 2002. There were two incidences of instrument malfunctioning (perhaps frozen probe) in November - January. Correspondence with IEPA (Eicken, 2003) indicates that the data at this continuos monitoring point may be suspect because the area sometimes is a backwater area filled with debris. DO observations under these conditions should be low. Observed DO at the Addison Creek site on December 9, 1995, was recorded as 13.75 mg/L. Except for two summer samples at the Addison Creek site and one sample at the Salt Creek site, DO concentrations were consistently above 6 mg/L at both Salt Creek and Addison Creek stations. DO concentrations generally decreased during summer months. Diel data show some excursions below the 5 mg/L DO standard at both Salt Creek and Addison Creek stations in summer 1995. Diel data collected on June 27 and 28, 1995, from the Salt Creek sites are presented in Figure 4-14. The summer low-flow condition was the critical condition for DO and, therefore, was used for TMDL development.

FIGURE 4-12
Monthly DO Data at the Salt Creek Site (station 05531500) by Sample Date and the Water Quality Standards for DO Data collected during daytime hours.

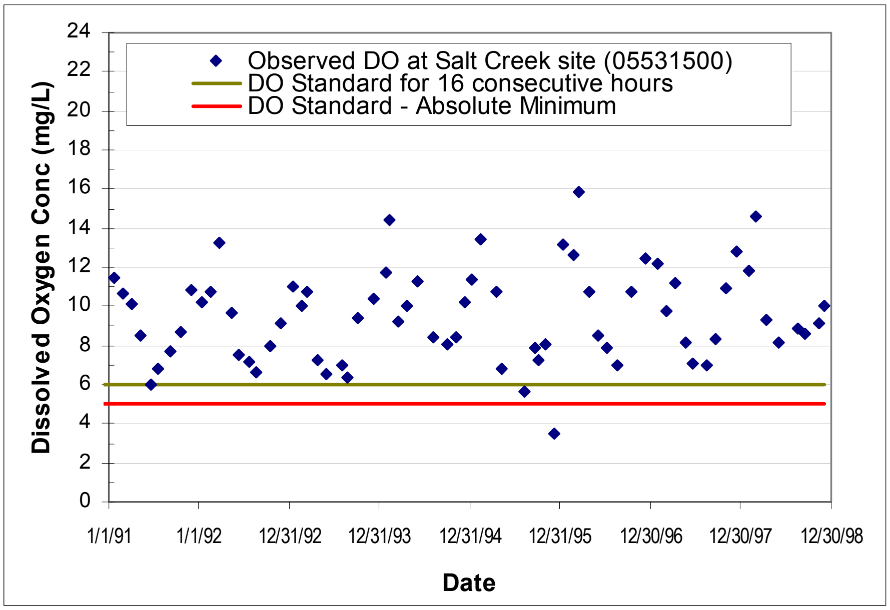


FIGURE 4-13
Monthly DO Data at the Addison Creek Site (station 05532000) by Sample Date and the Water Quality Standards for DO
Data collected during daytime hours.

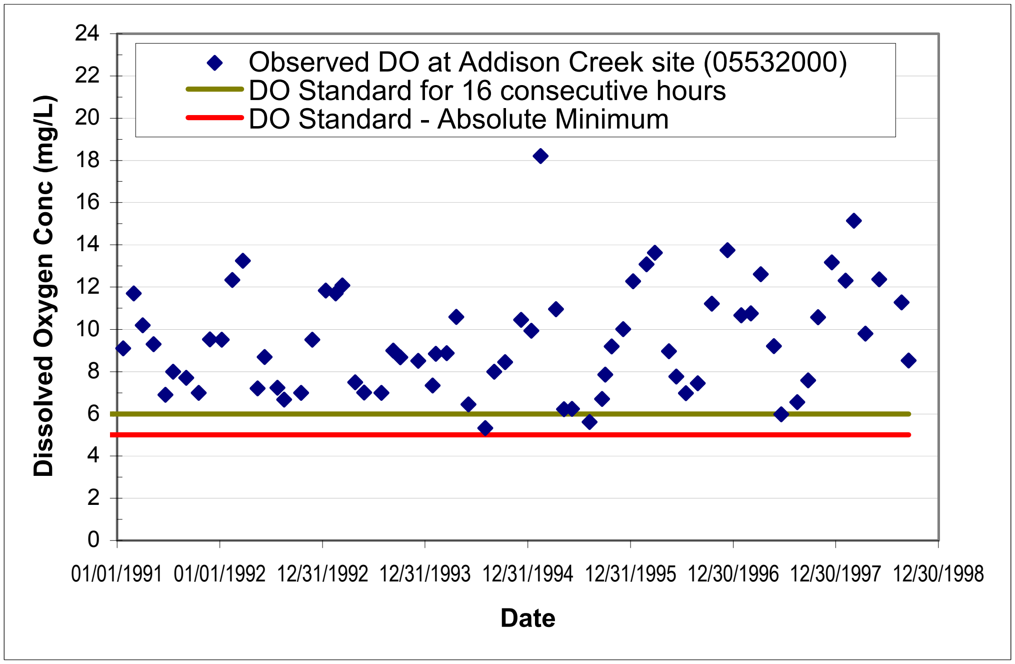


FIGURE 4-14
Diel DO Data Collected at 16 Salt Creek Sites on June 27 and 28, 1995, and the Water Quality Standards for DO

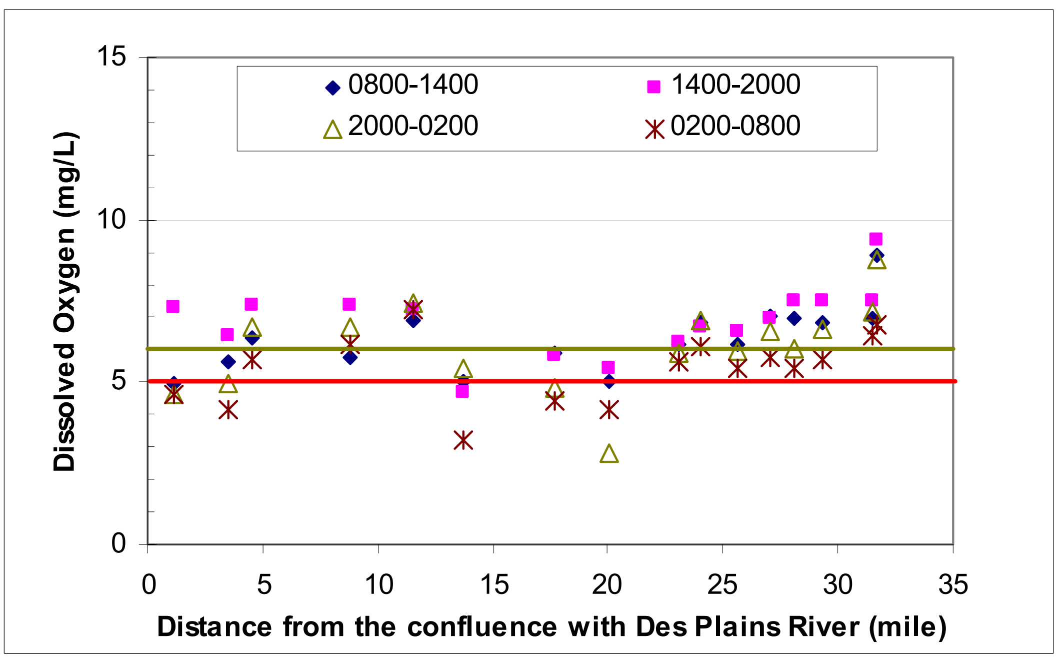
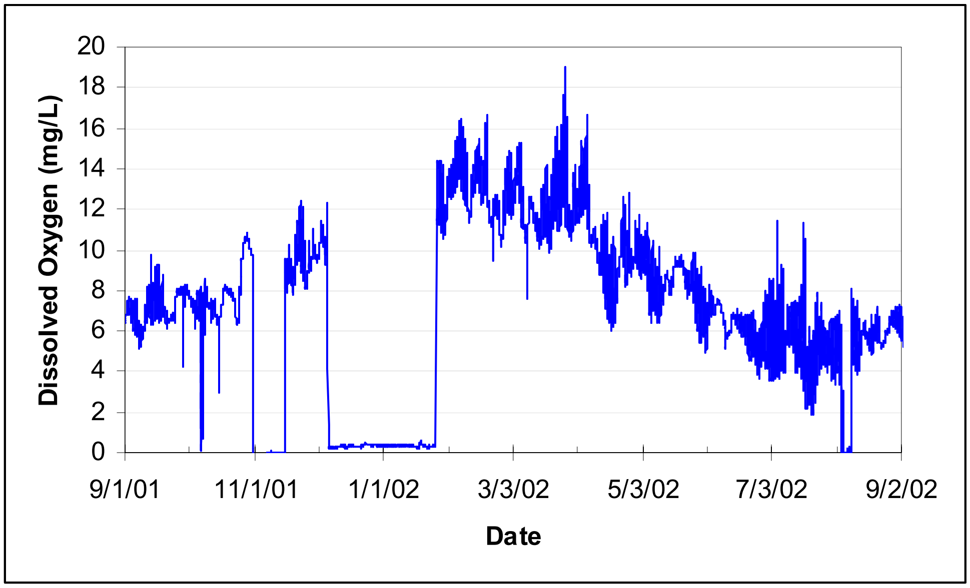


FIGURE 4-15
Continuous Monitoring Data at the Salt Creek Monitoring Site, Western Springs (station 05531500)



CSO, leaky combined and sanitary sewers, municipal point sources, and eutrophication that occurs because of excessive nutrients are potential causes of DO problems in streams. Eutrophication leads to high concentrations of algae, which in turn depletes nighttime oxygen levels via respiration. CSO and leaky combined and sanitary sewers are potential sources of BOD that deplete DO in surface water. CSOs occur during wet weather conditions, and leaky and broken combined and sanitary sewer systems may contribute to low DO concentrations by discharging oxygen-depleting materials and low-DO water.

Rainfall data from the O'Hare Airport suggest that the June 27, 1995, excursion occurred after 0.8 in. of rainfall. Monitoring data show that the St. Charles Road CSO was flowing on June 27, 1995, after the storm event and the CSO discharge contained significantly high BOD concentrations (444 mg/L of carbonaceous biochemical oxygen demand [CBOD]). The St. Charles Road CSO problem was fixed following the event. Other potential sources of oxygen-demanding materials include urban stormwater runoff and wastewater treatment plant (WWTP) effluent. Stormwater runoff includes pet and other animal wastes with high nutrient concentrations. WWTP effluents can deplete DO through BOD and ammonia loads. According to the DMR data, WWTPs in the Salt Creek watershed discharge BOD and ammonia concentrations well below their permit limits. Potential sources contributing to the DO excursions are listed in Table 4-4. The relative importance of the various sources are addressed in more detail in subsequent sections.

The analysis of DO in Salt Creek and potential sources provided key information necessary in identifying the modeling needs and selecting an appropriate model. DO TMDL evaluations for Salt Creek will be developed using the QUAL2E model. Although several sources of wet weather DO impairment are mentioned in the 1998 303(d) list, the DO problem has been characterized as having an association with low- to medium-flow conditions in the summer months. The QUAL2E model can adequately simulate DO and other water quality constituents (BOD, nutrient, chlorophyll *a*) contributing to DO problems under a given flow condition. After calibrating the model using diel sampling data, the model will be used to develop the DO TMDL using 7-day, 10-year (7Q10) low flow conditions.

TABLE 4-4
Sources of Low Dissolved Oxygen (from the State 1998 303(d) List)

Water Body Segment	Source
GL 03	CSOs[a] – Addison South (27367), Villa Park (33618), SSOs[b] – Elmhurst (28746).
GLA 01	CSOs – Bellwood (44946).
GLA 02	CSOs – Bellwood (44946).
GLA 03	Municipal point sources[c] – Bensenville South (21849), upstream impoundments[d] – George Street Reservoir, Mt. Emblem Cemetery Pond, Veterans Park Pond.
GLB 01	Municipal point sources – Roselle-Devlin (30813), DCDPW Nordic Park (28398), Upstream impoundments – Lake Kadijah, Itasca Golf Course pond.
GLBA	Source unknown.
RGZX	Urban runoff/ storm sewers[e], contaminated sediments, waterfowl.

[a] Combined sanitary and storm sewer overflow is based upon facility-related stream surveys (FRSS), agency effluent, discharge monitoring report, or other data.

[b] Sanitary sewer overflow is based upon FRSS, agency effluent, DMR, or other data.

[c] Municipal point source discharge is based upon FRSS, agency effluent, DMR, or other data.

[d] Upstream impoundments are based upon actual observation or other data.

[e] Urban and storm sewer runoff is based upon actual observation or other data.

4.7 Summary

Table 4-5 summarizes all the pollutants addressed in the TMDL for Salt Creek. Also listed are any WQS/ TMDL endpoints, other supporting data, and potential sources.

TABLE 4-5
Summary of Available Data, Water Quality Standards, and Potential Sources

Parameter	Water Quality Standard/ TMDL Endpoints	Data Supports Impairment	Potential Sources	Resolutions/ Comments
Copper	Hardness dependent acute and chronic standards	Yes for upper segment	Bensenville South MWWTP	Collect further information and if still needed work with Bensenville to reduce copper levels

TABLE 4-5
Summary of Available Data, Water Quality Standards, and Potential Sources

Parameter	Water Quality Standard/ TMDL Endpoints	Data Supports Impairment	Potential Sources	Resolutions/ Comments
Conductivity	TDS – 1,000 mg/L equivalent to 1,667 µmho/cm	Directly related to TDS and chloride standards.	Urban runoff/storm sewers, upstream impoundment	Will be addressed by the chloride TMDL; follow-up monitoring will indicate whether another phase of TMDL is needed.
Chloride	500 mg/L	Exceedances warrant further evaluation and potential TMDL development	Road deicing applications	
Phosphorus	Lakes and streams entering lakes – 0.05 mg/L	Yes	Urban runoff/storm sewers, contaminated sediments, waterfowl	Nonpoint sources only, data indicate load reductions occurring, continue trend monitoring
Dissolved Oxygen	Shall not be less than 6 mg/L during at least 16 consecutive hours out of any 24 period, nor less than 5 mg/L at any time	Yes	Urban runoff/storm sewers, contaminated sediments, waterfowl, CSO, SSO, municipal point sources, upstream impoundment	

SECTION 5

Modeling Approach and Assumptions

This section describes the detailed approach and assumptions used to characterize the pollutant sources for modeling and to develop the model input for TMDL analysis in the Salt Creek watershed. The first section outlines the procedure used to select the necessary models and tools to perform the TMDL analysis required. A section on the hydrologic calibration follows and the water quality calibrations for the pollutants of concern are presented.

5.1 Selection of Models and Tools

Two models were considered for use: HSPF and QUAL2E. HSPF is a continuous watershed model with stream modeling capabilities, while QUAL2E is a steady-state stream water quality model.

HSPF can model a wide variety of water quality constituents, sediment, and nutrients from various sources, including land uses. HSPF is also a continuous simulation model that can handle long-term simulations, which are needed for nonpoint source load allocations during TMDL development.

QUAL2E allows more detailed segmentation of reaches than HSPF and is a stream-only model (does not model watershed processes). QUAL2E applies a finite-difference solution to the advective-dispersive mass transport and reaction equations and simulates up to 15 water quality constituents in a channel network. QUAL2E is a constant-flow model with a dynamic weather/algae component. The maximum length of simulation for QUAL2E is less than 900 hours, hence it can run a continuos simulation for only 900 hr. Hence, it is best suited to run specific flow conditions, such as low-flow cases for a short steady-state period.

One model was selected for each type of impairment after analyzing the data and presented in the previous chapter.

5.2 Modeling Chloride Using HSPF

5.2.1 Hydrologic Calibration for HSPF General Background Information

Three long-term USGS streamflow gauges, Rolling Meadows, Elmhurst, and Western Springs, were selected for model calibration as a result of the streamflow discussion detailed in Section 3.5. The upstream-most gauge is at Rolling Meadows, with a drainage area of 30.5 square miles according to the USGS. The middle gauge is at Elmhurst, with a drainage area of 91.5 square miles, and the downstream-most gauge is at Western Springs, with a drainage area of 115 square miles.

The delineated subbasins within Salt Creek as described in Section 3.1 were used to calculate contributing areas for each flow gauge. Using this delineation, contributing area at the upstream gauge was about 11 percent lower than that reported by the USGS. Area at the bottom gauge was only 1 percent lower than that reported by the USGS. This discrepancy may be due to the extremely flat surface conditions and limitations of GIS technology used in the delineation process. Because of these limitations, some area that actually contributes to the top gauge may have been attributed below this gauge. To resolve this discrepancy, some area upstream of the upper gauge was moved below this gauge. Specifically, 2 square miles were taken from reach 44 and added to reach 39, and 1 square mile was taken from reach 26 and assigned to reach 27. This area was taken proportionally by land use from these two subbasins. This solution resulted in new area at the top gauge less than 1 percent lower than that reported by the USGS. This difference is within a range deemed acceptable for modeling.

Between the Rolling Meadows gauge and the Elmhurst gauge is the 590-acre Busse Woods Lake, which is used for flood control according to Price (1994).

The following sections detail the way various data were processed for use in hydrologic calibration of HSPF. Appendix B contains details on the calibration outputs and plots of simulated and observed flow.

5.2.2 Land-Use Data

From the discussion of available land-use data in Section 3.2, the classifications from Table 3-1 were used to determine the percentage of each land-use category in the drainage areas for the three flow gauges. The land-use breakdown for each flow gauge is shown in Table 5-1.

TABLE 5-1
Land-Use Summary for Each Flow Gauge

	Area Above Rolling Meadows (%)	Area Above Elmhurst (%)	Area Above Western Springs (%)	Effective impervious Area (%)
Cemeteries and vacant	5.9	8.6	8.1	0
Commercial	7.8	9.5	10.7	85
Forest	4.2	3.5	3.7	0
Industrial	3.9	6.2	5.1	85
Institutional	4.8	3.7	3.8	30
Open Space	7	12.4	12	0
Residential	58.6	48.6	50	10
Transp, Comm, Utils, Excluding Interstates	0.8	1.1	1.2	60
Expressways	1.7	2	2.1	60
Wetlands	2.9	2.3	1.8	0
Agricultural	2.2	2	1.6	0

The effective impervious area (EIA) percentages reflect only the estimated runoff from impervious areas that are directly connected to stormwater conveyance systems (e.g., stream channels, storm sewers) with no opportunity for infiltration. EIA values differ from total impervious area values because runoff from some impervious areas, including many rooftops, may flow onto pervious areas. These values were extracted from *Application Guide for Hydrologic Modeling in DuPage County Using Hydrologic Simulation Program - FORTRAN (HSPF)* (Price, 1996).

5.2.3 Meteorological Data

From the meteorological data discussion in Section 3.4, the O'Hare and Wheaton time series were created to use for model simulations. The time series were divided into two sets, one to be used for model calibration and one to be used for model validation. These two time series were assigned to the subbasins based on proximity. For hydrologic calibration, the data sets were divided into two sets for each time series, one set to be used for model calibration and one set to be used for model validation. Since the USGS gauge on Salt Creek at Elmhurst began recording streamflow data in 1989, it followed that the calibration period must be within the span of 1989 to 1999. The 5-year period between 1991 and 1995 was chosen as the calibration period since this span included a mix of wet and dry years. The last 4-year period, 1996 to 1999, was chosen as the validation period.

During the 5 years used for calibration, the Wheaton precipitation station recorded an average of 3.1 in. more rainfall than did the O'Hare station, a difference of about 9 percent. Much of the Salt Creek watershed was assigned rainfall from the O'Hare station, yet neither the O'Hare station nor the Wheaton station is within the watershed. To account for the distances between the watershed and the gauges, and assuming that the actual precipitation falling on the watershed is somewhere between that represented by the two gauges, the O'Hare input precipitation time series was increased by a 5-percent multiplier. In other words, the precipitation on model portions of the watershed assigned to the O'Hare gauge receive 5 percent more rainfall than that recorded at the O'Hare gauge, thus accounting for some of the variability of storm events across the watershed.

5.2.4 Point Sources Data

Point source discharges from WWTPs make up a significant portion of the flow in the Salt Creek below the Rolling Meadows gauge during low-flow periods. This point is illustrated by examining the long-term flow gauge at Western Springs. During the first 10 years on record, 1945 to 1954, the 10-percent lowest flows average about 3.2 cfs. But during the 10-year period from 1990 to 1999, the 10-percent lowest flows average about 48.5 cfs. This increase can be attributed to point sources that began discharging into the river during this period. Major contributors included the Egan and Elmhurst WWTPs.

According to the point source data provided in Section 3.6, 20 point source discharges in this watershed were considered in the TMDL modeling. The combined average monthly point source discharge above the USGS gauge at Western Springs is about 77 cfs.

Hydrologic Calibration of HSPF Model for DuPage County (Price, 1994) provides an explanation for the large difference between the point-source discharge data and the observed low flows at the USGS gauges. The discrepancy is related to stormwater infiltrating in the sanitary sewer system, where runoff enters the sanitary sewer system through manholes and through joints in the sewer pipe.

This study on Salt Creek assumes that the average discharge during the driest period (e.g., 7Q10 low flow) included discharge from point sources only and did not include any nonpoint source runoff. This study concludes that 42.3 cfs is the average point-source discharge into Salt Creek at

Western Springs. Thus, for the HSPF model it was assumed that the total point source contribution at the Western Springs gauge is 42.3 cfs.

The 42.3 cfs value was weighted among the point sources by average flow and input as a constant value at each point source over the calibration period. Using this method, water balances within 5 percent of observed flows are obtained at the three USGS gauges on the Salt Creek.

5.2.5 Hydrologic Calibration

The initial parameter values for this calibration were obtained from *Hydrologic Calibration of HSPF Model for DuPage County* (Price, 1994). The land uses referenced in this report include agricultural, forest, grassland, and impervious areas. Since these land uses do not correspond directly with the land uses modeled in this study, some assumptions and estimates were made in determining the initial parameter set. Price's agricultural parameters were used in this study for the agricultural land use, and the forest parameters were used for the forest areas in this study. Price's grassland parameters were used for every other category, with the exception of wetlands. Since Price did not parameterize wetlands, the initial wetland parameters were adjusted from Price's grassland values based on experience with wetlands in other watersheds.

Some of these initial parameters were changed to reflect the land-use variations across the watershed, where the initial parameter set used the same value for all land uses. An example of this type of change can be observed from the lower zone nominal soils moisture (LZSN) values. Where the Price report uses the same value for LZSN for all land uses, LZSN was changed to be higher for forest than for urban land uses. Similar changes were made for basic groundwater recession (AGWRC), fraction of groundwater inflow to deep recharge (DEEPFR), and Interflow recession parameters (IRC).

F-Tables contain rating curve (stage-discharge relationship) information for stream and lake segments in the model. One F-Table was developed for each stream segment in a subwatershed. F-Tables were developed using rating curves prepared by USGS at the gauge locations, available cross sectional information, and drainage areas. Rating-curve data at the USGS gauge locations were obtained from the USGS web page. Stream cross sectional information was estimated at different locations during an April 2000 field reconnaissance. Drainage areas were calculated based on GIS data.

A spreadsheet was used to calculate different F-Table components combining all this information. The spreadsheet also checked input values resulting in unacceptable F-Table components (e.g., negative outflow) and compared F-Table components for reaches with similar drainage areas. Thus, any discrepancy in the F-Tables was eliminated. The surface area of Busse Woods Lake was determined based on the lake shoreline in the USEPA's RF3 coverage.

Snow was calibrated using the measured daily snow pack depth observations at O'Hare Airport. For snow calibration, TSNOW (a model parameter) was increased slightly so that all major snow events observed at O'Hare were simulated as snow. The snow simulations show a fair agreement with the snow depth observations (Figure B1 in Appendix B). The calibration shows some day-to-day differences between simulated and observed values, but this is a common occurrence in snow simulations. These differences can be attributed to the distance between the watershed and the O'Hare meteorological station, and it is common to have significant variations in observed snow measurements within a watershed (AQUA TERRA Consultants and HydroQual, Inc., 2000).

The hydrologic calibration process was greatly facilitated with HSPEXP, an expert system for hydrologic calibration, specifically designed for use with HSPF, developed under contract for the USGS (Lumb, McCammon, and Kittle, 1994). This package gives calibration advice, such as which model parameters to adjust or input to check, based on predetermined rules, and allows the user to interactively modify the HSPF user control input (UCI) files, make model runs, examine statistics, and generate a variety of plots. HSPEXP still has some limitations, such as how much to change a parameter and relative differences among land uses, which required professional modeling experience and judgment.

The statistics computed by HSPEXP include error in total runoff volume, error in the 50-percent lowest flows, error in the 10-percent highest flows, error in the storm peaks, seasonal volume error, and summer storm volume error. The storm events are chosen by the user, and up to 36 storms can be used in figuring the storm error term.

During the hydrologic calibration process, a few parameters were changed from the initial set based upon experience and advice from HSPEXP. These changes include lowered upper zone nominal soils moisture (UZSN), lowered PETMIN (air temperature below which evapotranspiration is set to zero) and PETMAX (air temperature below which evapotranspiration is reduced), lowered interception storage, and adjusted lower zone evapotranspiration parameter (LZETP).

The total runoff volume errors at the three calibration locations are less than 5 percent, which indicates very good agreement. Table 5-2 compares the observed and simulated annual flows, with correlation coefficients.

TABLE 5-2
Hydrologic Calibration Summary

Station Name	Mean Observed Annual Flow (in.)	Mean Simulated Annual Flow (in.)	R^2 Daily	R^2 Monthly
Rolling Meadows	16.3	15.6	0.78	0.85
Elmhurst	21.8	20.9	0.8	0.9
Western Springs	21.4	21.2	0.87	0.93

Most of the calibration statistics computed by HSPEXP indicate a very good calibration. The exception is related to extreme low-flow events at the Rolling Meadow gauge. This statistic is influenced greatly by events where the stream flows are almost 0, where the differences between simulated and observed flows are less than 1 cfs (see Tables B1, B2, and B3 in Appendix B).

The flow duration curves show extremely good agreement (see Figures B2, B3, and B4 in Appendix B). Scatter plots of observed versus simulated flow at the two calibration locations show correlation coefficients of 0.78 to 0.87 for the daily data and 0.85 to 0.93 for the monthly flows (see Figures B5 and B6 in Appendix B).

5.2.6 Salt Creek Hydrologic Validation Summary

To validate the results of the hydrology calibration, HSPF was run for Salt Creek from January 1996 through September 1999. Table 5-3 includes statistical summaries of the calibration and validation results.

TABLE 5-3
Summary of Hydrologic Calibration and Validation - Annual Flow and Correlation Coefficients

	Rolling Meadows	Elmhurst	Western Springs
Calibration Period (1991-1995)			
Mean Observed Annual Flow (in.)	16.3	21.8	21.4
Mean Simulated Annual Flow (in.)	15.6	20.9	21.2
Difference (percent)	-4.3	-4.1	-0.9
R-Squared Daily	0.61	0.64	0.76
R-Squared Monthly	0.72	0.81	0.86
Validation Period (1996-Sept. 1999)			
Mean Observed Annual Flow (in.)	16.3	23.5	23.9
Mean Simulated Annual Flow (in.)	17.1	22.4	22.7
Difference (percent)	4.9	-4.7	-5
R-Squared Daily	0.42	0.56	0.59
R-Squared Monthly	0.45	0.51	0.55

For a hydrology calibration, the percent difference between simulated and observed flows often is used as a measure of the calibration's accuracy. A difference of less than 10 percent is considered a very good calibration, difference of 10 to 15 percent is considered good, and a difference between 15 and 25 percent is considered fair (Donigian, 2000).

Table 5-3 shows differences between simulated and observed flows of less than 5 percent for the calibration, indicating a very good calibration. For the validation period, the differences are in the range of 5 percent, also indicating a very good calibration.

R-squared, or the coefficient of determination, sometimes is used as a statistical measure of the quality of a calibration. When analyzing daily values, an R-squared value of 0.8 to 0.9 is considered very good, 0.7 to 0.8 is considered good, and 0.6 to 0.7 is considered fair. When analyzing monthly values, an R-squared value of 0.85 or higher is considered very good, 0.75 to 0.85 is considered good, and 0.65 to 0.75 is considered fair (A. Donigian, personal communication, 2001).

For the hydrology calibration, the daily R-squared values indicate a range from fair to good, while the monthly values indicate a range from fair to very good. For the validation, the daily R-squared values indicate a range from poor to fair, while the monthly values indicate a range from poor to fair. The poor values tend to be more toward the upper portions of the watershed, which are more influenced by the heavy point-source discharges during low-flow periods.

The validation period included several extreme events, including a rainfall event of more than 9 in. in July 1996. Such extreme events may affect the quality of the validation results. The validation period consists of a shorter time span than the calibration period, which can bias the validation statistics by magnifying the effect of extreme events. Further parameter changes could result in improved results for the validation period.

Since point sources are responsible for a large portion of flow during low-flow periods, the quality of the point-source data is likely leading to error in the calibration and validation. Since the point-source discharge data were provided as monthly values, daily point source discharge variation is not reflected in the simulation, and the effect of this monthly data would be felt the strongest during low-flow periods.

5.2.7 Water Quality Calibration for Chloride

From the water quality data discussion in Section 3.9, stations 05531500 and 0553200 were selected as good sources of long-term water quality data (Figure 3-10). Figure 5-1 shows the water quality calibration of chloride for station 05531500 and Figure 5-2 shows the water quality calibration for chloride at station 05532000.

The primary source of chloride is the road salt applications during winter months. HSPF was selected as the model for simulating snow accumulation, snow melt, and chloride concentrations in runoff. The hydrologic calibration phase included the calibration of the model for snow. The chloride simulation option was added to the hydrologically calibrated model using the general quality modules. The general quality modules simulate surface runoff of chloride using build-up (or accumulation) and washoff functions. A thorough analysis was performed to determine the chloride build-up rates on pervious and impervious land segments in different watersheds.

A GIS coverage of road data was obtained from Environmental Systems Research Institute, Inc. (http://www.esri.com/data/online/tiger/index.html). The data, whose origin was the U.S. Bureau of the Census TIGER/Line® 1995 Data, provided a detailed road network in all the subwatersheds. Miles of roads in each subwatershed were calculated and used as a basis for estimating the amount road salt applied to each subwatershed. The average number of snowfalls and ice storm, and the monthly distribution were estimated using historic precipitation and air temperature data. On an average, 14 snowfall events occurred in the area (consecutive days of snowfall was treated as one event). Distribution of snowfall events by month is provided in Table 5-4. It was assumed that 5.6 tons of salt were applied to every mile (3.5 tons/kilometer) of road-lane. This rate is consistent with road salt application rates found in literature for other major cities (Novotny et al., 1999) in the region. Daily accumulation rates were calculated based on the acres of pervious and impervious expressways; transportation land use (TCU) excluding interstates, residential, commercial, industrial and institutional land uses in each subwatershed; and the average number of snowfall events per month. The average concentration of chloride in groundwater wells in the Salt Creek watershed was 51.27 mg/L. Six groundwater quality samples were collected between 1993 and 1998 that included chloride measurements. The average groundwater concentration was incorporated in the model to account for the background concentration.

TABLE 5-4
Distribution of Snowfall Events per Month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
No. of events	3.87	3.27	2.07	0.53	0.07	0.00	0.00	0.00	0.00	0.07	1.33	2.87

FIGURE 5-1
Water Quality Calibration of Chloride at the Salt Creek Site (station 05531500)

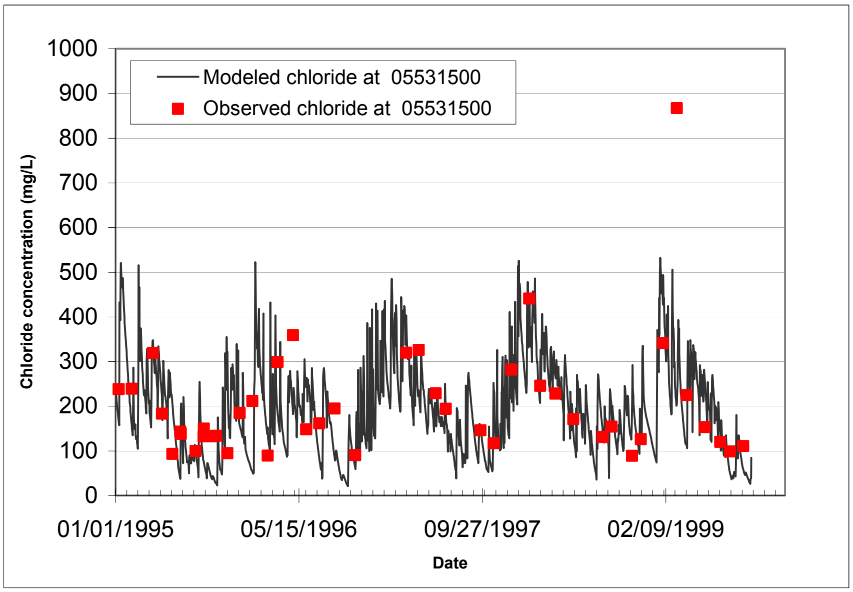
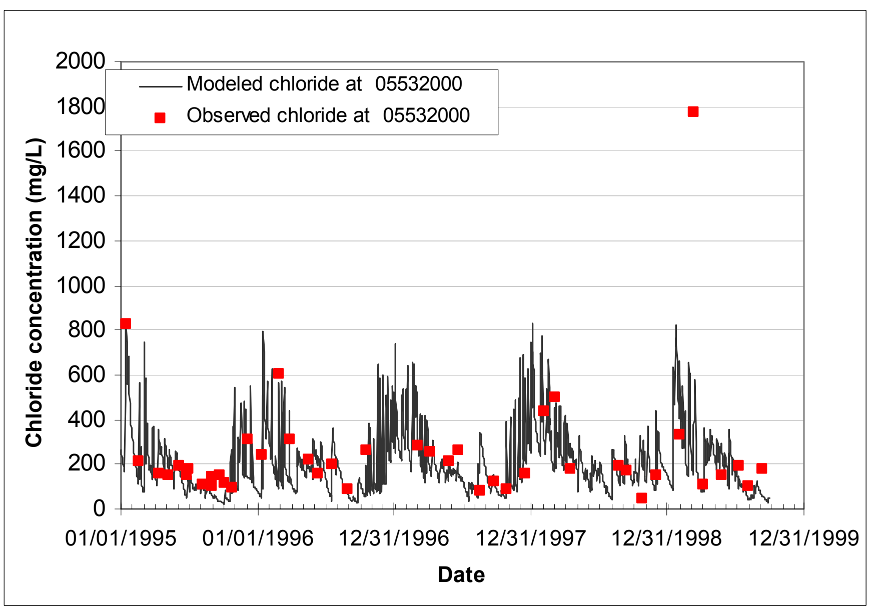


FIGURE 5-2
Water Quality Calibration of Chloride at the Addison Creek Site (station 05532000)



Model calibration results are shown in Figures 5-1 and 5-2 at the Salt Creek (05531500) and Addison Creek (05532000) water quality stations. The model successfully simulated chloride concentrations over a long period (1995 to 1999) and captured the variability of chloride concentrations in different seasons of the year. The model is considered adequately calibrated for developing TMDL allocation for chloride.

5.3 Modeling Dissolved Oxygen Using QUAL2E

This section analyzes the water quality problems associated with low flow conditions in order to develop the DO TMDL for the Salt Creek watershed. The QUAL2E model (Melching and Chang, 1996) was used to simulate DO, BOD, nutrients, and algae under steady-state and dynamic conditions.

The Salt Creek QUAL2E model developed by the USGS (1996) was used as the initial model and was further enhanced to include diurnal simulation option for the DO TMDL development. Salt Creek, as represented in the model, began immediately downstream of the Busse Woods Lake. A detailed description of the model setup was provided in *Simulation of Water Quality for Salt Creek in Northeastern Illinois* by USGS (1996). A list of all the point sources in the Salt Creek watershed is provided in Section 3.6 of this document. However, ten point source dischargers were incorporated in the QUAL2E model due to the quantity and type of effluent that may impact stream DO. The Villa Park Wet Weather Sewage Treatment Plant (STP) and the Roselle STP were not considered in the model. The Villa Park Wet Weather STP was excluded from the model assuming that it discharges only under wet weather condition. The QUAL2E model was setup for modeling DO under dry weather condition. Roselle STP is the most upstream point source discharger on Spring Brook. Lake Kadijah, situated between river miles 2.8 and 3.2 (upstream from the confluence of Spring Brook and Salt Creek) on Spring Brook, has a large storage capacity relative to low flows on Spring Brook (Melching and Chang, 1996). Because of the long residence time of the point source discharge in the lake, pollutant concentrations at the outlet of the lake may not be strongly related to the effluent concentrations from Roselle STP. Therefore, the outlet of Lake Kadijah at river mile 2.7 (Rohwling Road) defined the upstream boundary of Spring Brook. Locations of these point sources are shown in Figure 5-3 and their distances above the confluence with the Des Plaines River are listed in Table 5-5. The MWRDGC Egan Water Reclamation Plant (WRP) is the largest discharger in the watershed, constituting about 50 percent of the total point source discharge to the main stem of the Salt Creek. Also, according to the IEPA Regional Office in Des Plaines, there are eight CSOs in Bellwood that discharge into Addison Creek located between the Eisenhower Expressway and Adams Street (Berwyn and River Forest Quads). There are 19 CSOs that discharge into Salt Creek located in Addison (2), Villa Park (5), Western Springs (2), La Grange Park (3), and Brookfield (7). There are 13 SSOs located in Villa Park (1) and Elmhurst (12). Based on this description, an approximate map of the CSO outfall locations was prepared (Figure 5-4). During Model Calibration, using June 27, 1995 data, Melching and Chang (1996) assumed that the St. Charles Road CSO was flowing. The discharge from the CSO was assumed to contain BOD concentration of 444 mg/L. Therefore, the St. Charles Road CSO was explicitly considered as a point source in the model. Since then, the St. Charles Road CSO problem was fixed and no flow during dry weather conditions occurs.

The model also included three dams. Dams affect the DO concentration upstream of the dam due to the presence of the pool and the DO concentration downstream of the dam through reaeration at the outlet.

Extensive field data were collected on June 27 and 28 and August 28 and 29, 1995, that supported the modeling effort. The data included temperature, pH, conductivity and instream concentrations of DO, $CBOD_5$, ammonia, nitrate and nitrite, organic nitrogen, organic phosphorus, and DP. Additionally, flow and pollutant concentrations in point source effluents were determined to develop the model input. During each sampling day, four sets of data were collected from each site. These data sets represented evenly distributed time intervals (8:00 a.m. to 2:00 p.m., 2:00 p.m. to 8:00 p.m., 8:00 p.m. to 2:00 a.m., and 2:00 a.m. to 8:00 a.m.) over a 24-hour period. During each of these 4-hour periods, two sets of temperature, dissolved oxygen, and pH measurements were collected. Two sets of chlorophyll *a* samples were collected between 8:00 a.m. and 8:00 p.m. on June 27, 1995.

FIGURE 5-3
Location of Point Source Discharges in the Salt Creek Watershed

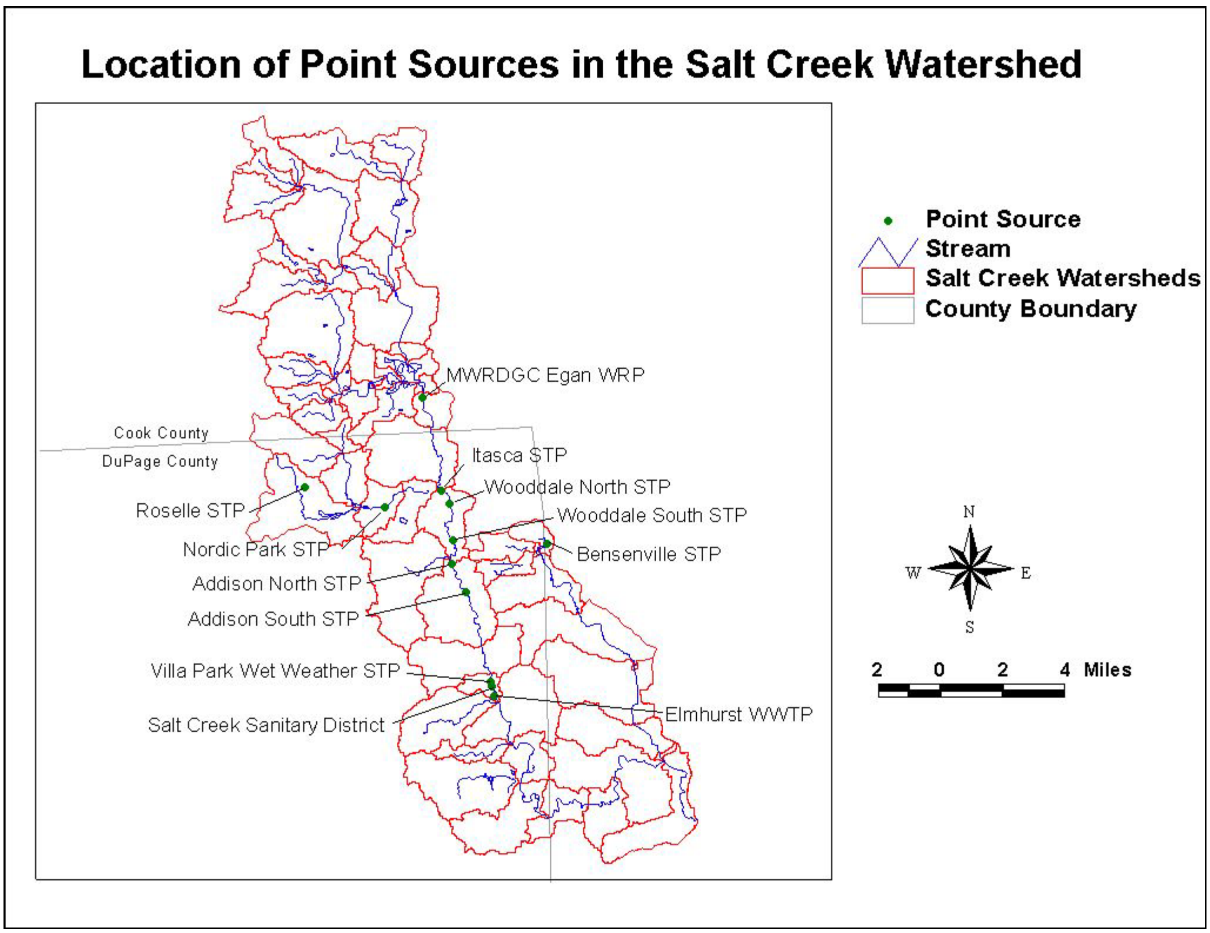


TABLE 5-5
Location of STP Outfalls, CSO Outfalls, and Dams in the Salt Creek Watershed

Name	Feature	Mile Point[a]
MWRD Egan STP	Point Source, Salt Creek	31.7
Itasca STP Salt Creek	Point Source, Spring Brook	0.1
Wood Dale North STP	Point Source, Salt Creek	27.7
Wood Dale South STP	Point Source, Salt Creek	26
Addison North STP	Point Source, Salt Creek	25
Addison South STP	Point Source, Salt Creek	23.3
Salt Creek SD STP	Point Source, Salt Creek	20
Elmhurst STP	Point Source, Salt Creek	19.7
DC Nordic Park STP	Point Source, Spring Brook	2.5
Bensenville South STP	Point Source, Addison Creek	10.3
Addison CSO	CSO, Salt Creek	23.5
St. Charles Road CSO	CSO, Salt Creek	19.9
Western Springs CSO	CSO, Salt Creek	8.8
Lagrange Park CSO	CSO, Salt Creek	4.6
Brookfield CSO	CSO, Salt Creek	2
Bellwood CSO	CSO, Addison Creek	--
Dam	Dam, Salt Creek	25.2
Dam	Dam, Salt Creek	13.5
Dam	Dam, Salt Creek	11.6

Mile points are measured from the confluence of Salt Creek and Des Plaines River except for Itasca STP, DC Nordic Park STP and Bensenville South STP. Mile points for Itasca STP and DC Nordic Park STP are measured from the confluence of Spring Brook with Salt Creek. Mile point for Bensenville South STP is measured from the confluence of Addison Creek with Salt Creek.

FIGURE 5-4
Location of CSO Outfalls in the Salt Creek Watershed

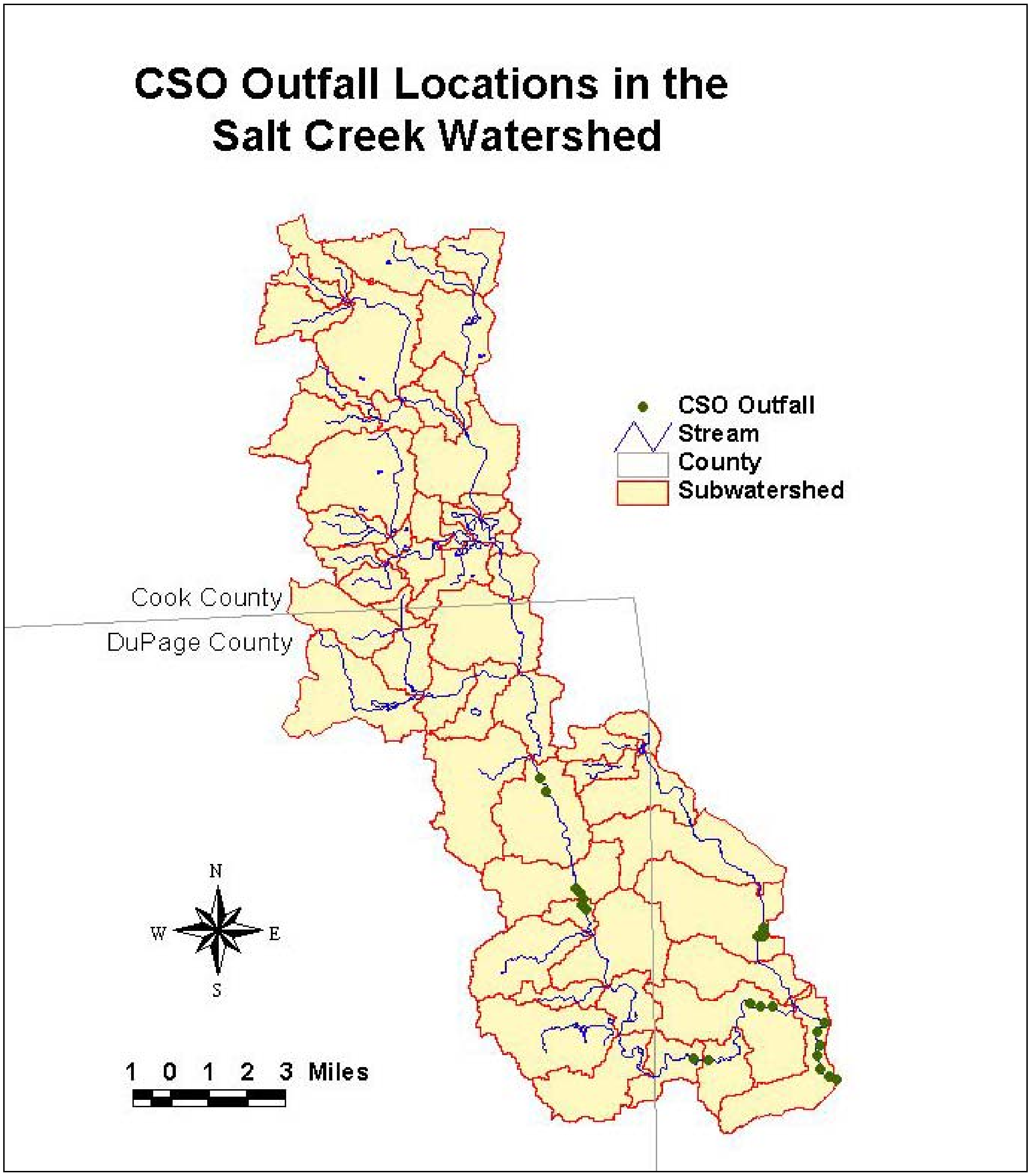


FIGURE 5-5
Observed and Modeled Dissolved Oxygen Concentrations at Different Locations in Salt Creek (June 27 and 28, 1995)

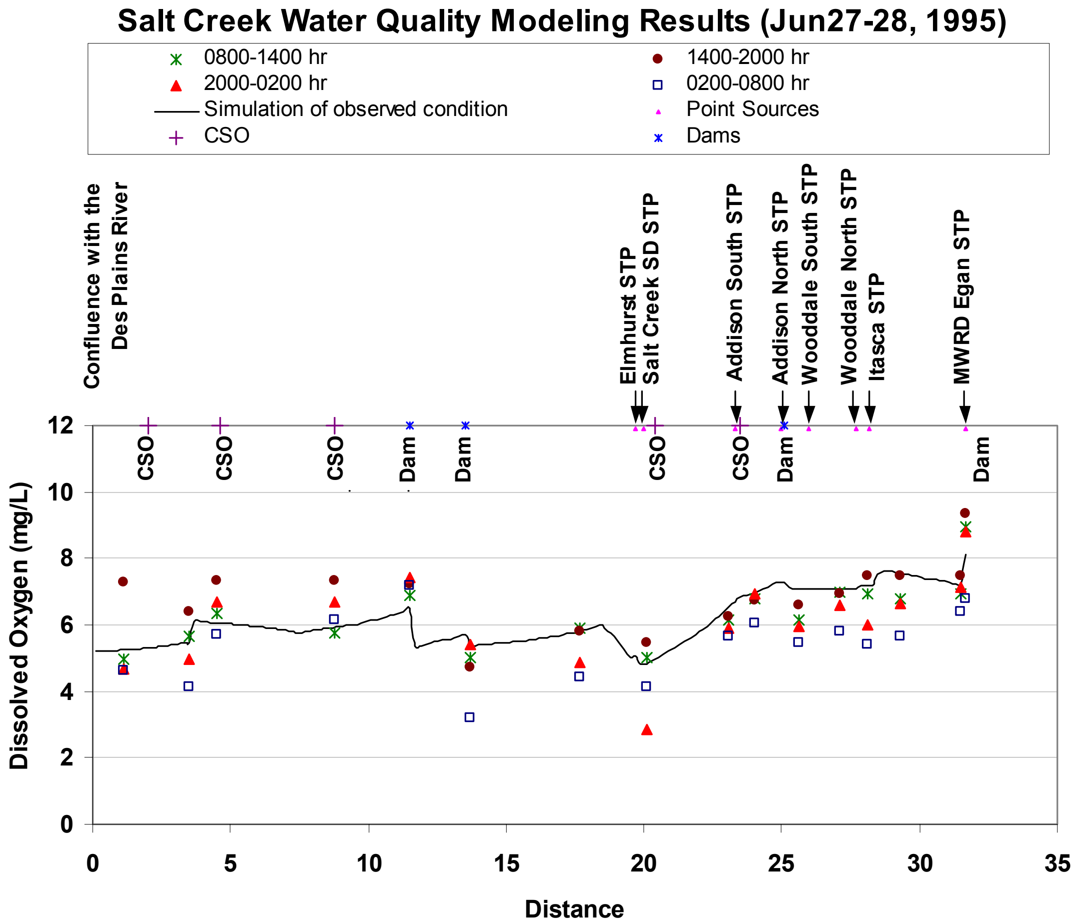


Figure 5-5 shows the observed DO concentrations at each sampling time interval as points and the simulated DO concentration as a solid line. The simulated DO concentrations were based on the steady-state modeling originally done by the USGS (1996). The horizontal axis in the plot shows the distance upstream from the confluence of Salt Creek with the Des Plaines River. A set of points at a given distance represents the observed concentrations at different times of the day. Location of the point sources, dams, and CSOs are shown along the top horizontal axis.

The DO concentrations (Figure 5-5) violated the WQS (5 mg/L minimum) at 1.1 to 4.5 miles and 11.5 to 23.1 miles. The DO concentrations between 11.5 to 23.1 miles were less than 6 mg/L in all samples, indicating a potential violation of the 16-hour average DO standard of 6 mg/L. Low DO concentrations (the minimum observed DO concentration of 2.84 mg/L at 20.1 miles) in nighttime samples are attributable to high BOD and low DO concentrations in point source and/or St. Charles Road CSOs discharges which was assumed to be flowing on June 27-28, 1995. However, it should be noted that since then the St. Charles Road CSO problem was fixed and no flow during dry weather conditions has occurred. The discharge from the CSO contained high BOD concentrations (e.g., 444 mg/L of CBOD).

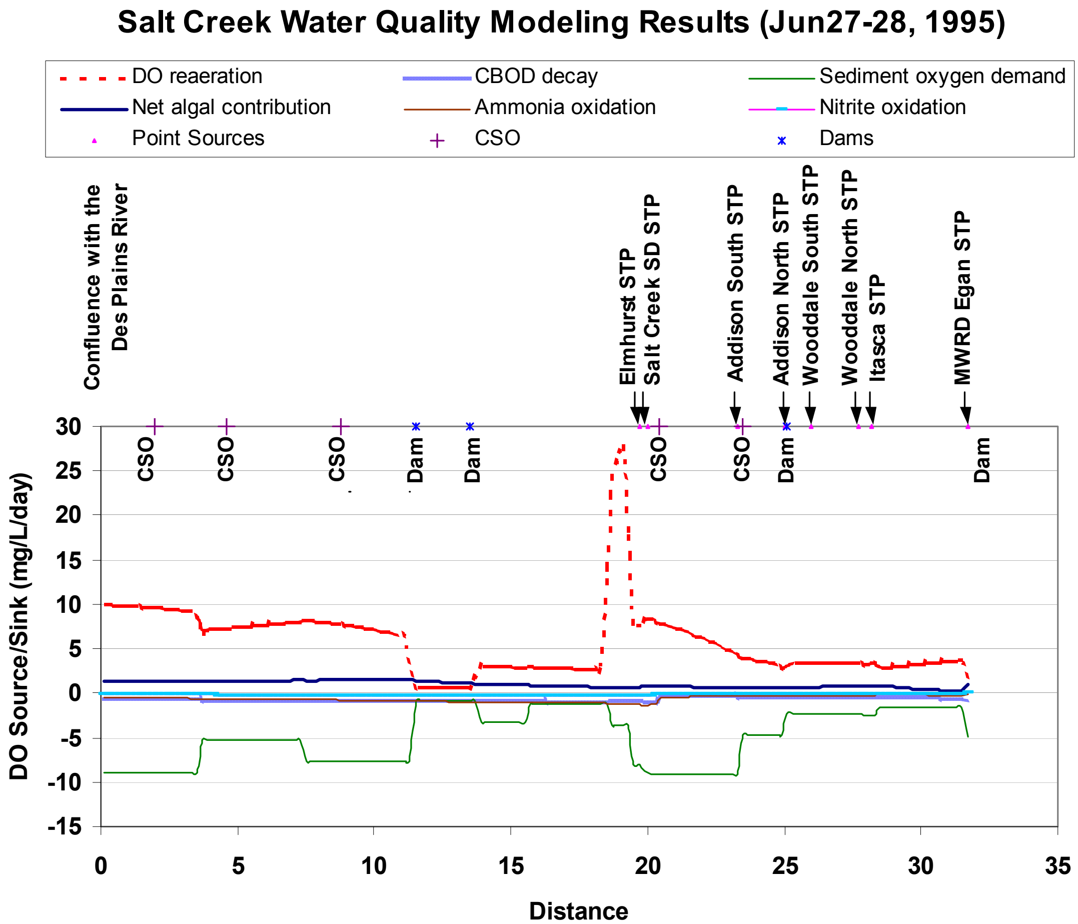
Various components of the DO mass balance (i.e., CBOD decay, exertion of sediment oxygen demand (SOD), nitrification, net algal contribution due to respiration and photosynthesis, and reaeration) were analyzed using the model results. Relative contributions and magnitudes of DO mass balance components were plotted in Figure 5-6 to determine the primary causes of DO sag at different locations and find the best remediation measures. The most important source of DO was the reaeration, and the most important sink was the SOD. The minimum reaeration rate (0.45 to 0.69 mg/L-day) was modeled at locations just upstream of the Fullersburg Dam (river miles 11.5 and 13.5) due to slow moving water. Also reaeration was relatively low (2.52 to 2.91 mg/L-day) between river miles 15. 6 and 18.6 due to an extremely flat bed slope (0.004 percent).The maximum reaeration rate (24.51 to 27.57 mg/L-day) was modeled between river miles 18.6 and 19.2 due to a relatively steep bed slope (0.15 percent).

SOD is caused by oxidation of organic material deposited in the streambed. Butts and Evans (1978) define SOD as "the usage of dissolved oxygen in the overlying water by benthic organisms. These benthic organisms include bacteria, brown algae, protozoa, fungi, periphyton, filamentous algae, and macroinvertebrates. Inorganic chemical oxidation reactions can exist in stream bottoms, but the extent and magnitude of their occurrence are minor compared to biological demands." Discharge of high BOD and solids from point and nonpoint sources, such as pets and water fowl, leaking septic tanks and CSO overflows, may result in high SOD. In Salt Creek and Addison Creek, high SOD values were found near the CSO discharges in all locations and SOD varied substantially from one location to another. High SOD was found through model calibration between river miles 19.5 and 23.3, immediately downstream of Addison North and South STPs, the Addison CSO outfall, and the St. Charles Road CSO outfall. The St. Charles Road CSO was found to discharge high concentrations of CBOD (e.g., 444 mg/L) under dry weather conditions. The flow rate from the St. Charles Road CSO was 0.51 cfs (Melching and Chang, 1996). High SOD values in the reaches between river miles 3.7 to 11.1 also may be attributed to CSO sources including the Western Spring and Lagrange Park CSOs. The Brookfield CSO and the Addison Creek discharge might have caused high SOD between river miles 0 to 3.7. There is no point source discharge outfall at this location.

Under dry weather flow and low flow conditions (smaller than design storm for the CSO) a CSO should not discharge untreated wastewater as the waste water treatment plant should have capacity for treatment of all flow in the CSO. CSO discharges are likely to have more impact under dry weather conditions or small storms than the large storms. Stream flows during a small storm and dry weather conditions do not have ample carrying capacity to transport particulate matter too far from the discharge location. Settled particulate matter with high BOD content increases SOD in the reach. Because of the untreated nature of the waste, the BOD concentrations in CSO discharges is higher than the concentrations found in the treated point source effluents. Therefore, particulate matter settling near the CSO outfall causes SOD to be even higher than that caused by the particulate matter settling near the point source discharge outlet. Once the discharge of BOD and settleable solids from the CSOs is reduced, SOD will gradually return to natural background levels through oxidation and burial of existing sediment. According to Bowie et al. (1985), average background SOD levels for mineral soil and sandy bottom are 0.07 g O_2/m^2-day and 0.5 g-O_2/m^2-day (0.0065 to 0.0465 g-O_2/ft^2-day), respectively.

Overall, the DO problem in Salt Creek and Addison Creek is attributed to SOD build-up near the CSO outfalls. As shown in Figure 5-6, SOD near the CSO outfalls are larger than the reaches receiving point source discharges.

FIGURE 5-6
Components of the DO Mass Balance Based on the Model Results for June 27 and 28, 1995

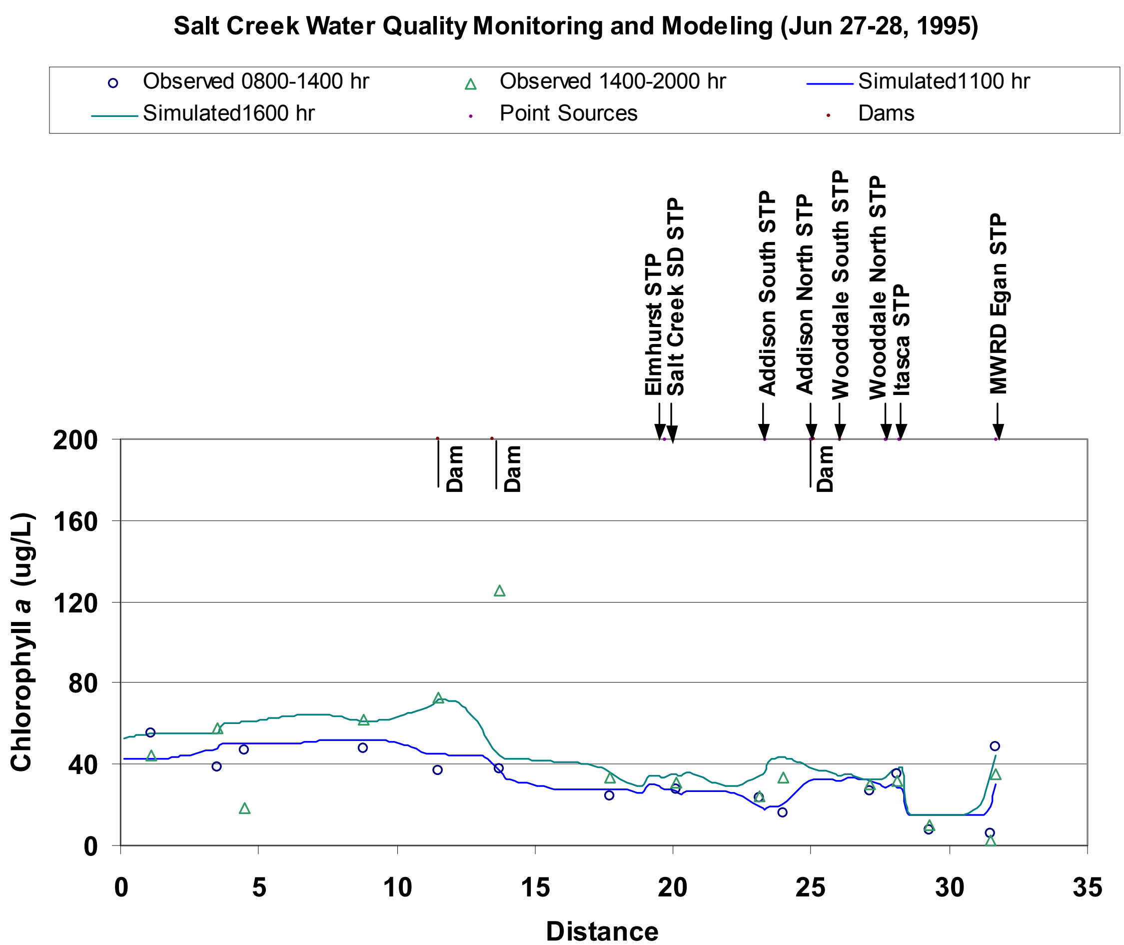


5.3.1 Diurnal Variation of Dissolved Oxygen Due to Algal Respiration and Photosynthesis

The QUAL2E model can also simulate diurnal variations of nutrients, chlorophyll *a*, and DO using a dynamic algae simulation option. However, QUAL2E does not allow time-varying input of flow and pollutant loads. The model assumes flow and input concentrations remain unchanged while the instream concentrations of water quality constituents change due to the impact of time-varying meteorological conditions (e.g., solar radiation, temperature, etc.) on kinetic processes. The original steady-state model developed by USGS was modified to include the diurnal simulation. Although there was an increase in streamflow during the 24-hour sampling period on June 27 and 28, 1995, the diurnal simulation results were plotted and compared with observed data to determine the potential ranges of the DO and the chlorophyll *a* concentrations. The comparison between the observed and the simulated concentrations should be carefully assessed because the steady-state assumption was not perfectly valid due to the increase in stream flow.

The diel sampling data from June 27, 1995, included two sets of chlorophyll *a* measurements—one during the 8:00 a.m. to 2:00 p.m. sampling and another during the 2:00 p.m. to 8:00 p.m. sampling. These data are plotted in Figure 5-7. The original steady-state USGS model was enhanced to include diurnal simulation of algae, nutrients, and DO. The observed data are shown as points, and the modeled chlorophyll *a* concentrations are shown as lines. Modeled chlorophyll *a* concentrations at 11:00 a.m. governed the initial conditions in the stream. The initial condition in the model was defined based on the observed data collected during the first sampling interval. The modeled chlorophyll *a* concentrations at 4:00 p.m. increased due to algal growth under the ambient conditions on June 27, 1995. The chlorophyll *a* concentration in Salt Creek is generally less than 40 µg/L at locations upstream of 17.7 miles and increases substantially between river miles 11.6 and 17.7. Slow moving water just upstream of the two dams at 11.6 and 13.5 miles might have caused this increase of chlorophyll *a* concentrations.

FIGURE 5-7
Observed and Simulated Chlorophyll *a* Concentrations in Salt Creek

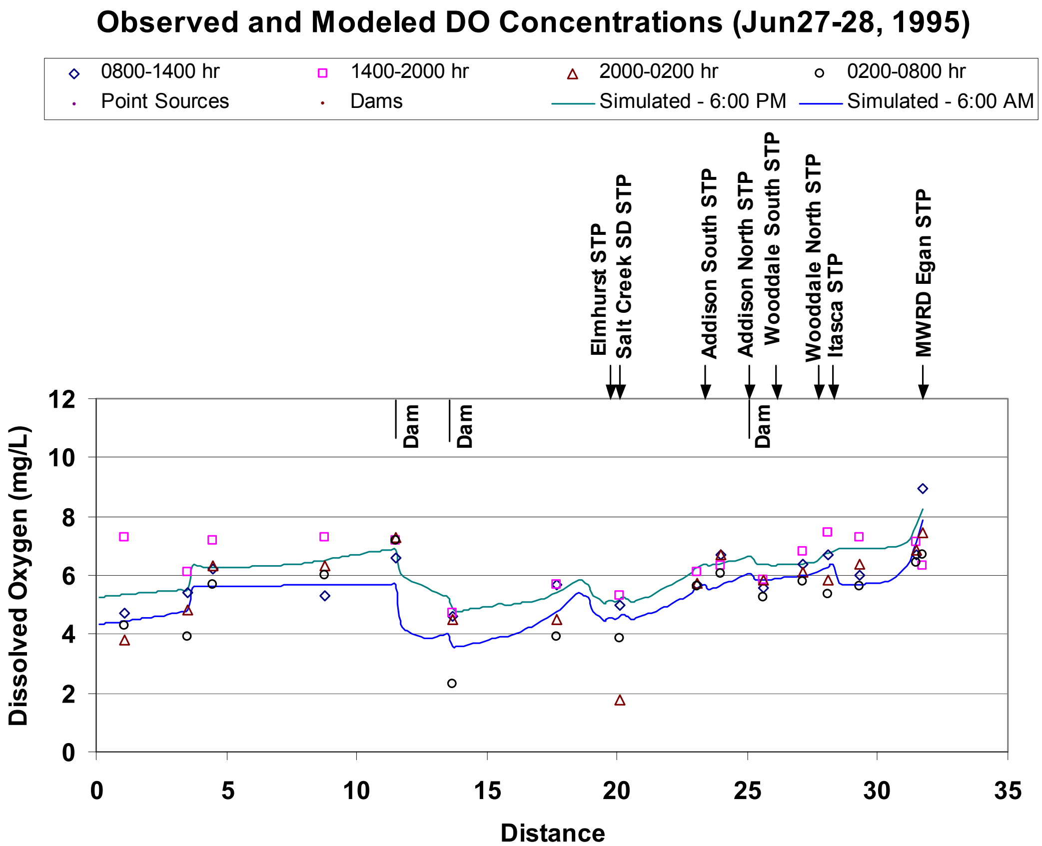


A healthy stream requires algae to provide food for the aquatic life. However, algal growth that severely depletes night-time DO concentrations can be problematic for aquatic life. Algae produces oxygen in the photosynthesis process in the presence of light and contributes to the DO pool. Algae also uptakes DO during respiration. During the day light hours, the algal production of DO exceeds the consumption and the net contribution gradually increases the instream DO concentration. The instream DO concentration reaches the maximum in the afternoon. At night, the DO uptake for respiration reduces DO concentration in water reaching the minimum in the early morning. The State of Illinois has no water quality criteria for chlorophyll *a*. However, for lakes, the state has developed a trophic status ranking to indicate how productive an impoundment is. They have defined these values as oligotrophic (<2.5 μg/L), mesotrophic (2.5-7.5 μg/L), eutrophic (7.5-55 μg/L), and hypereutrophic (≥ 55 μg/L) (IEPA, 1996).

In absence of any ambient WQS for chlorophyll *a* (the surrogate measure for algae), the impact of algae on DO was evaluated to determine if there was any need for nutrient control in order to reduce algae concentrations. Figure 5-8 shows the observed and the modeled DO concentrations at different locations and throughout the day. Modeled diurnal DO concentrations matched the general pattern of observed data. However, the extent of simulated DO variation is smaller than the range of observed data between 0.0 to 20.1 miles. This difference might have been caused by the limitation of the steady flow assumption in the stream. Observed data suggested that there was an increase in flow. For example, the average daily flow in Salt Creek at station 05531500 was 50 cfs on June 26, 62 cfs on June 27, 79 cfs on June 28, and 90 cfs on June 29. The flows in Addison Creek at station 05532000 were 2.7 cfs on June 26, 14 cfs on June 27, 15 cfs on June 28, and 7.8 cfs on June 29. Potential BOD load from urban runoff and CSOs might have contributed to the low DO concentration. Also, the model is not capable of simulating macrophytes and attached algae. Therefore from the available data and model, it cannot be concluded that algae are a cause of the observed low DO concentrations. In order for an accurate analysis of the role of the algae (and underlying nutrient concentrations) in DO balance in this system, the obvious cause of DO depletion, CSOs and SOD, would have to be removed.

Consequently, any DO variation due to the presence of macrophytes and attached algae is not reflected in the model results. Therefore, the model, even after good calibration for chlorophyll *a*, is not capable of simulating the full extent of the diurnal variation of DO.

FIGURE 5-8
The Observed and the Modeled Diurnal Variation of Dissolved Oxygen



SECTION 6

TMDL Allocation

6.1 Approach and Methodology

TMDLs are the sum of the individual waste load allocations (WLAs) for point sources, load allocations (Las) for both nonpoint sources and natural background, and a margin of safety (MOS). This definition is denoted by the following equation:

$$TMDL = \Sigma\ WLAs + \Sigma\ LAs + MOS$$

Development of a TMDL is an iterative process that involves modeling and generation of allocation scenarios that meet water quality targets. The Salt Creek TMDLs were developed using the calibrated models presented in Section 5. Each scenario was carefully evaluated and the TMDLs are presented in the following sections. Seasonal variability of pollutant concentrations and flow were considered explicitly in the model through continuous simulation and time varying input variables or through determination of critical condition, as discussed in Section 5. For the chloride TMDL, pollutant concentrations and flow were considered explicitly in the continuous HSPF model while for the DO TMDL seasonal variability was addressed by determining the critical season based on data analyses and applying the QUAL2E model to that season. Separate TMDLs were developed using approaches appropriate for the listed pollutants. The following sections present the TMDLs for each cause of impairment.

Section 303(d) of the CWA requires TMDLs to include “a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality.” There are two methods for incorporating the MOS (USEPA, 1991):

- Implicitly incorporate the MOS using conservative model assumptions to develop allocations
- Explicitly specify a portion of the total TMDL as the MOS; use the remainder for allocations

An implicit MOS was used in the development of the TMDLs presented in this report and discussed further in the following sections. Sections 6.3, 6.4, and 6.5 explain the development of TMDL allocations for chloride (and conductivity/TDS), and dissolved oxygen, respectively.

6.2 Future Growth

Future growth may have an impact on TMDL allocation scenarios in two ways:

- Modified point source loads
- Modified nonpoint source loads

A change in point source loads may occur due to an increase (or decrease when there is a declining population) in population densities in existing clusters or development of new clusters. The summer low flow condition was found to be the critical condition for the DO impairment. Therefore, point source contribution has the most significant impact on instream DO concentration and a change of population served by the point sources will affect the point source discharge. An analysis of projected population data shows that the population of DuPage County and Cook County will increase by 26 percent and 10 percent, respectively, from 1990 to 2020. Since the Salt Creek watershed is located in both DuPage and Cook Counties, an average population growth (i.e., 18 percent) was used to determine the increase in point source effluent. A model run with increased point source discharge actually shows slightly improved instream DO concentrations. Increase of instream DO due to flow augmentation offsets the DO reduction by increased pollutant loads and increases the minimum DO from 6.09 mg/L to 6.30 mg/L for the allocation run.

Future growth will also affect nonpoint source pollution by changing land-use coverage in the watersheds. For example, agricultural areas converted to residential land will have an impact on water quality in the impaired segments. The chloride and conductivity TMDL allocations require consideration of land-use changes, especially conversion to roads. Increased chloride load due to future growth in the watersheds was estimated assuming that all agricultural areas in the existing GIS coverage of land use would be converted to residential areas. Using GIS data of current road density it was estimated that up to 12 miles of new roads might be constructed in the process of land-use change. The new land-use data was incorporated in developing the TMDL allocation for chloride.

6.3 Conductivity/Total Dissolved Solids and Chloride

The chloride TMDL addresses issues involving the conductivity/TDS and the chloride exceedances in the Salt Creek watershed. A strong correlation was found between conductivity and chloride (Section 4.3). Road salt application for deicing contributes chloride loads to surface waters. All the chloride standard exceedances occurred during winter months. The HSPF model was used to simulate the chloride load from the watershed and to develop TMDL allocation scenarios. The model setup and calibration procedures are described in Section 5.2.7. The calibrated model was used to estimate the annual chloride load under existing conditions.

6.3.1 Critical Condition

Section 303(d) of the CWA and the USEPA's regulations at 40 CFR 130.7 require the consideration of seasonal variation of conditions affecting the constituent of concern and the inclusion of a MOS in the development of a TMDL. For the Salt Creek chloride TMDL, long-term monitoring data and continuous modeling results were used to determine seasonal variation of chloride concentration. The TMDL was developed based on the critical conditions in the winter months and the general-use chloride standard of 500 mg/L. Runoff and interflow generated from precipitation and snowmelt are the primary modes of transport of chloride from land surface to water bodies. A reasonable approach for TMDL allocation calculations requires selecting a year with average streamflow (not a dry or wet year) for modeling. Annual streamflow data between 1991 and 1998 were compared to determine an average flow year to avoid using an extreme wet or dry year. Stream flows in 1996 and 1997 were representative of average flow conditions. A 3-year period between January 1, 1996, and December 31, 1998, which included average flow conditions, was selected for TMDL scenario development.

6.3.2 Margin of Safety

An implicit MOS was incorporated in data analysis, modeling, and calculation of the TMDL allocations. Continuous modeling of hydrology and water quality provided in-stream chloride concentrations that allowed direct comparison of model results with observed data and seasonal variation of chloride concentrations. Direct comparison of model results with observed data show the ability of the model to simulate seasonal variability and the extent of violation of the chloride standard under different scenarios. Hydrologic modeling included continuous snow simulation providing runoff from snowmelt. The snow simulation capability was critical in determining the chloride load generated from road salt application for deicing. Three years of chloride data and three years of model output in the development of the TMDL provided a conservative approach for TMDL load calculations by ensuring a lower possibility of violation of the WQS. For example, if the 1997 data were used for TMDL allocation, Figure 6-1 and 6-2 suggest that a smaller reduction in TMDL allocation would be required to meet the WQS. Use of 5 years of data for model calibration and 3 years of data for TMDL allocation development required a larger reduction in chloride applications. Additionally, a background chloride concentration was incorporated in the model by specifying shallow groundwater concentrations based on observed data from groundwater wells in the surrounding areas. These conservative assumptions and approaches used in developing the TMDL constituted the implicit MOS.

FIGURE 6-1
Modeled Chloride Concentrations at the Salt Creek Station GL 09 for the TMDL Allocation Scenario

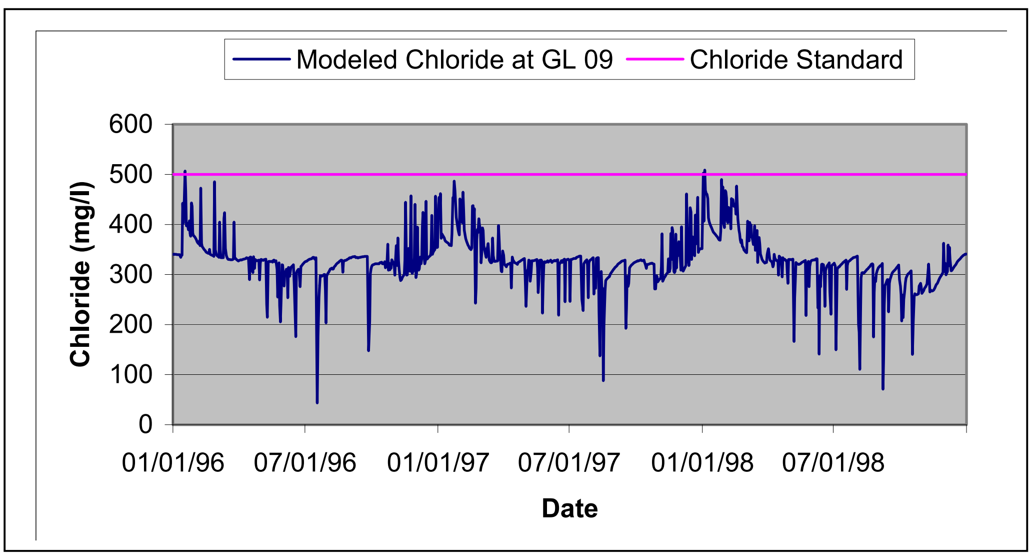
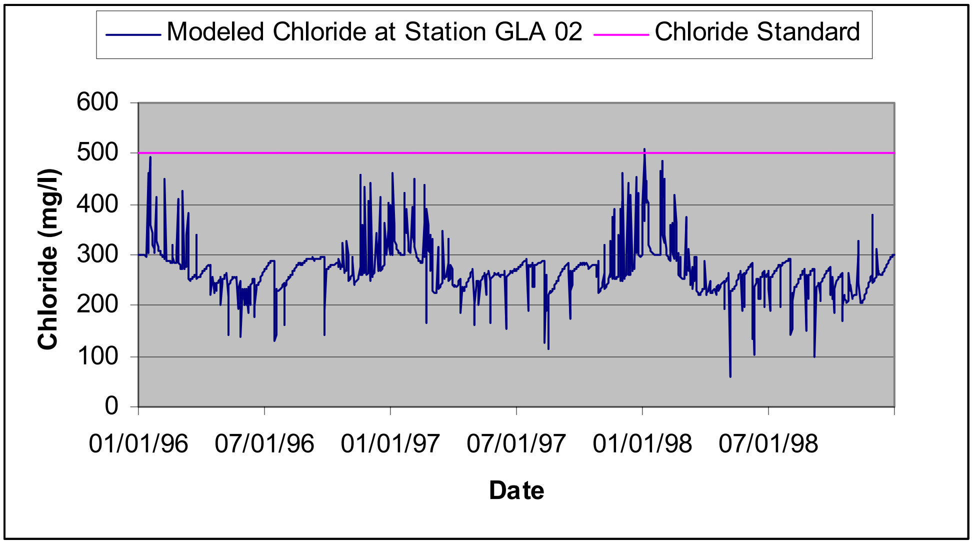


FIGURE 6-2
Modeled Chloride Concentrations at the Addison Creek Station GLA 02 for the TMDL Allocation Scenario



6.3.3 Chloride Exceedances

The WQS is expressed as a concentration of chloride (500 mg/L). The HSPF model was set up to output total load and daily average concentration of chloride. The model was run iteratively to determine percentage reductions in nonpoint source chloride contribution that would result in reasonable point source allocations. An 8 percent reduction in nonpoint source chloride was chosen in Salt Creek and a 41 percent reduction was chosen in Addison Creek. The number of exceedances over the 3-year critical condition period used for TMDL development (1996-1998) was determined. Table 6-1 summarizes this information for various point source discharge concentrations.

TABLE 6-1
Chloride Exceedance Summary by Point Source Discharge Concentration 1996-1998 for 8 Percent Nonpoint Source Reduction in Salt Creek and 41 Percent Reduction in Addison Creek; Point Sources Input at Permitted Design Flow

	100 mg/L	300 mg/L	400 mg/L	500 mg/L
No. Predicted Model Exceedances at 05531500 (Salt Creek Segment 13)	2	3	16	283
No. Predicted Model Exceedances at 05532000 (Addison Creek Segment 4)	0	1	11	26
Percent Exceedances at 05531500 (Salt Creek Segment 13)	0.18%	0.27%	1.46%	25.82%
Percent Exceedances at 05532000 (Addison Creek Segment 4)	0	0.09%	1.00%	2.37%

The Table 6-1 illustrates that even at point source concentrations of 100 mg/L, there are some exceedances of the chloride standard in Salt Creek. Per IEPA, there is point source data available for 11 MWWTPs from 1995. The effluent data ranged from 107 mg/L to 468 mg/L (Eicken, 2003). Thus, an effluent concentration of 100 mg/L may be unreasonable, and additional model runs were performed. There is only one additional exceedance at a point source concentration of 300 mg/L. Based on the analysis summarized in Table 6-1, a WLA based on effluent concentrations of 300 mg/L were applied to the TMDL. Further information is provided in the Point Source Load section (6.3.4.2) below.

6.3.4 Chloride Allocations

The TMDL process requires that the allowable load be allocated among point and nonpoint sources. A review of the available data and modeling results indicates that the chloride exceedances of 500 mg/L or more occur during the deicing season. The primary contributor to the exceedances is application of road salt for snow and ice control purposes.

As stated above, the model was run iteratively to determine an allocation scenario that meets the chloride standard at nearly all times. Figures 6-1 and 6-2 respectively show the allocation results for station 05531500 in Salt Creek and 05532000 in Addison Creek. The chloride standard is included in the plots to easily compare the modeled chloride concentrations with the standard. Since salt application for deicing is the major source of chloride leading to standard exceedance, the chloride TMDL indicates the need for salt application chloride reduction.

6.3.4.1 Nonpoint Source Load

The chloride TMDL describes load allocations (LAs; i.e., NPS allocations) as being applicable to stormwater sources of chloride, such as road salting activities. However, due to regulatory approaches, stormwater in municipal separate storm sewer systems (MS4s) is regulated as a point source instead of a non-point source. Consequently, the MS4 chloride load will be handled as a WLA and not as a LA. Additional discussion on MS4s and LA versus WLA is contained in Section 7 *Implementation Plan*.

Because Phase II of the NPDES stormwater program will apply to most or all of the municipalities in the watershed (see Appendix G for the list of stormwater permittees), as well as to the roads owned and operated by the state and the Toll way Authority, it is anticipated that stormwater-related allocations will actually be implemented as point source controls, as described in recent USEPA guidance and as governed by the Illinois Environmental Protection Agency (IEPA) General Permit for Stormwater Discharges. Consequently, chloride from road deicing materials is not included as a nonpoint source load allocation (LA). Instead, the load from road salt is listed as a waste load allocation (WLA) for MS4s and there is no nonpoint source load for this TMDL.

6.3.4.2 MS4 Load

The chloride WLA from deicing materials was determined by taking the average road salt application in tons applied per lane-mile as input in the calibration model (5.6 tons/lane mile-yr). TIGER data obtained from NIPC were used to estimate the miles of road in the Salt Creek and Addison Creek watershed; the number of lanes on each road was estimated by road type, and lane miles were then calculated. As outlined in Section 6.2, it was assumed that 12 additional miles of roadway were added. The current chloride application was estimated based on the lane miles and current salt application rates. An 8 percent reduction in Salt Creek results in an application of 23,100,000 pounds of chloride per year (equivalent to 38,200,000 pounds of salt). A 41 percent reduction in Addison Creek results in an application of 3,450,000 pounds of chloride per year (equivalent to 5,700,000 pounds of salt).

The MS4 WLA was based on the salt applied for deicing purposes since that is the most direct measurement of nonpoint source chloride in the watersheds. It should be noted that the road salt application rate targets were based on reducing the current application rate of 5.6 tons/lane-mile-year. This application rate was based on literature and the calibration of the water quality model. Monitoring should be completed to ensure that this application rate is an accurate baseline assumption. A combination of measuring chloride applied and instream chloride concentrations should provide a strong gauge for determining whether water quality standards are being met and whether the TMDL is being implemented.

6.3.4.3 Point Source Load

The NPDES facilities that have permitted design flow capacities were included in the model at their permitted design flows. The other point sources included in the HSPF model were included at the calibration flows with an allowance for 18 percent growth. While wet weather flows may not necessarily increase with growth in the watershed, the flows included in the model calibration were scaled back somewhat as described in Section 5.2.4. Table 6-2 summarizes the NPDES facilities and flow rates assumed for the TMDL.

TABLE 6-2
Point Source Flow Rates Used in TMDL WLA

NPDES Number	Point Source	Flow (cfs)
IL0021849	Bensenville South	7.27
IL0036340	MWRDGC - Egan	46.41
IL0028398	DuPage Co - Nordic Park	0.77
IL0026280	Itasca STP	4.02
IL0020061	Wood Dale North	3.05
IL0034274	Wood Dale South	1.75
IL0027367	Addison South - AJ LaRocca STP	4.95
IL0028746	Elmhurst WWTP	12.38
IL0033812	Addison North STP	8.2
	Other point sources	8.71

Including the point sources at the permitted design flow results in a reasonable WLA for the point sources as it allows for growth above current flows. Basing the WLA on a concentration of 300 mg/L protects the water quality standard for chloride.

6.3.4.4 TMDL

Based on the load calculations defined above, a TMDL was calculated for chloride for Addison Creek and Salt Creek. In order to account for all point and nonpoint sources, the TMDL was calculated at the mouth of each creek. Table 6-3 summarizes the TMDL.

The WLA value in Table 6-3 represents a lumped WLA for all point sources discharges (major and minor) and a separate WLA is calculated for MS4 permittees. The WLA could be broken down into WLAs specific to each point source based on relative effluent flow. At this time, however, IEPA intends to implement the WLA as a lumped value. As long as point sources collectively meet the lumped WLA, they will be considered in compliance with the TMDL. This will allow greater flexibility which is appropriate given that there is limited point source chloride data and that the concentration used to calculate the WLA is considerably lower than the standard.

The TMDL allocations require an 8 percent reduction in nonpoint source chloride loading in Salt Creek and a 41 percent reduction in Addison Creek.

TABLE 6-3
Chloride TMDL for the Mouths of Salt Creek and Addison Creek

	WLA[a]	MS4 WLA[b]	MOS	TMDL
Chloride (lb/yr) - Salt Creek	5.11E+07	2.31E+07	Implicit	7.42E+07
Chloride (lb/yr) - Addison Creek	6.35E+06	3.45E+06	Implicit	9.8E+06

[a]WLA based on permitted design flow and concentration of 300 mg/L
[b]Represents an 8% Reduction in NPS Load in Salt Creek and 41% Reduction in NPS Load in Addison Creek

6.4 Dissolved Oxygen

This section presents the TMDL allocations for pollutants causing the DO excursions in Salt Creek and its tributaries (Addison Creek and Spring Brook). The USEPA's QUAL2E model was used to determine the pollutant loads from point and nonpoint sources that ensured meeting the WQS. Analysis of DO data in Section 4.5 showed that the DO standards were not met under low flow conditions in the hot summer months. The QUAL2E model was setup and calibrated using field data collected in summer 1995. Model setup and calibration results were presented in Section 5.3. Finally, the streamflow in the calibrated model was replaced with the 7Q10 low flow (the minimum of 7-day/10-year running averages) to develop the TMDL allocations. Summer low flow represented the critical condition for DO. The model was run iteratively for various scenarios until the water quality target was met. Each scenario consisted of a combination of pollutant loads from point and nonpoint sources.

According to IEPA (Yurdin, Personal communication, 2001), a comparison of the chlorophyll *a* concentration (a measure of algae concentration) in Salt Creek with that of unimpaired Illinois streams did not show any obvious eutrophication problem. A high concentration of algae in a stream increases the diurnal fluctuation of DO in water due to algal photosynthesis and respiration. In the absence of significant algae, the steady-state QUAL2E model was appropriate for developing the DO TMDL.

6.4.1 Margin of Safety

MOS was incorporated implicitly in this DO TMDL development based on the following conservative assumptions:

- The pollutant loads from all point sources were discharging at their maximum allowable limits (monthly average limit) based on their NPDES permits which were established to protect the general water quality standards.
- The 7Q10 flow occurs under extended drought condition that is lower than normal summer flows. In addition, NPDES facilities typically discharge their maximum flows during higher flow periods. Therefore, the allocations based on 7Q10 stream flow and NPDES facility design flow are stringent and would provide an implicit MOS under normal summer flow conditions.
- Summer water temperatures (ranging from 74.4 °F to 77.6 °F), based on June 27, 1995 monitoring data, were used in the model.
- The Illinois WQS requires that the DO (STORET number 300) shall not be less than 6 mg/L during at least 16 hours of any 24-hour period, nor less than 5 mg/L at any time. For this TMDL development, an extensive DO data set was available, which led to a comprehensive analysis and reduced the uncertainty in the TMDL analysis. Additionally, a DO concentration of 6 mg/L, more stringent than the 5 mg/L criteria, was used as the water quality target for the TMDL allocation development using the steady-state model.

6.4.2 Load Allocation and Waste Load Allocation

Various pollutant reduction scenarios were analyzed to understand the importance of SOD and the point source loads and to determine the pollutant load reduction necessary to achieve an average DO concentration in excess of 6 mg/L. This TMDL endpoint was selected based on the Illinois WQS.

The DO concentrations for seven scenarios (existing condition, four trial scenarios and two allocation scenarios meeting WQS) were modeled and are presented in Table 6-4. Except for the existing scenario, all other scenarios considered 7Q10 flow and no discharge from the St. Charles Road CSO. Two extreme conditions were simulated in Scenarios 1 and 2 to evaluate the effect of existing SOD and point source discharge on DO, respectively. Scenario 1, as presented in Table 6-4, included the 7Q10 flow, monthly average permit limits for point source effluent concentrations, and no flow from the St. Charles Road CSO. However, the SOD values in all stream segments were set to 0. This scenario shows that even if all the SOD is eliminated, the WQS is not met under existing point source effluent limits. Scenario 2 was similar to Scenario 1 except that existing SOD values were used in all stream segments, and the pollutant concentrations in the point source effluents were set to 0. This scenario demonstrates that the WQS of 6 mg/L will not be met even in absence of the point sources. Scenario 3 shows that the WQS was met when the observed point source effluent concentrations were used instead of the monthly average permit limits and the SOD values are set to 0.

TABLE 6-4
Description of Various Modeling Scenarios

Allocation Scenario	Stream Flow	Point Source Effluent Concentrations	Status of the St. Charles Rd. CSO	SOD	Comment
Existing	Observed flow	Observed concentrations	Flowing	Existing condition	Existing condition violated the WQS for DO.
1	7Q10	Monthly average permit limit	No flow	0.0	DO was less than 6 mg/L between 11.5 to 12.9 miles.
2	7Q10	DO = 6.0 mg/L All pollutants = 0.0 mg/L	No flow	Existing condition	DO was less than 6 mg/L between 0 to 3.5 miles and 16.3 to 23.1 miles. Modeled DO also reaches below 5.0 mg/L in these segments.
3	7Q10	Observed concentrations	No flow	0.0	The water quality target (6 mg/L) was met at all locations.
4	7Q10	Monthly average permit limit for all point sources.	No flow	Adjusted the SOD of CSO affected reaches to match the SOD of non-CSO reaches.	The dam at river mile 13.5 was removed. DO was less than 6 mg/L between river miles 11.6 and 13.2.
5	7Q10	CBOD = 5 mg/L except for Bensenville which = 10 mg/L Ammonia N = 1 mg/L	No flow	Adjusted the SOD of CSO affected reaches to match the SOD of non-CSO reaches.	Achieved water quality target (6 mg/L) at all locations.
6	7Q10	CBOD = 8 mg/L except Bensenville = 10 mg/L Ammonia N = 1 mg/L	No flow	Adjusted the SOD of CSO affected reaches to match the SOD of non-CSO reaches.	The dam at river mile 11.6 was removed. Achieved water quality target (6 mg/L) at all locations

Scenario 4 and Scenario 6 investigated the effects of removing the dams at river miles 13.5 and 11.6, respectively. Removal of dam data in the model input does not show any improvement of DO by itself. Rather DO immediately downstream of the dam reduces as the reaeration at the outlet no longer exists. DO concentration generally increases upstream of the dam due to the changes in hydraulic parameter (i.e. coefficients and exponents defining velocity and depth) values. Scenario 4 considered point sources discharged at their current monthly average permit limits, SOD was reduced at CSO affected reaches to match the non-CSO reaches, and the dam at river mile 13.5 was removed. Because of the presence of a second dam at 11.6 miles, the hydraulic parameter at reach 9 (immediately upstream of the dam) may not change significantly. Scenario 4, therefore, used existing hydraulic parameter values. Modeled DO concentration did meet the water quality target between river miles 11.6 and 13.2. Figure 6-3 shows the modeled DO concentrations for these four scenarios.

For the allocation scenario 5, SOD values in CSO impacted reaches were adjusted to match those of non-CSO reaches. The assumption was that all CSO outfalls stopped flowing under dry weather conditions and small storms. Next, the pollutant concentrations in the point source effluent were adjusted until the WQS was met. It was assumed that all the point sources discharging to Salt Creek would have the same monthly average permit limit. A different set of values was used for the Bensenville STP, the only point source discharging to Addison Creek, in order to meet the WQS. Figure 6-4 shows that the model DO concentrations for TMDL allocation scenario meet the water quality target.

The allocation scenario 5 assumes that the effluent CBOD and the ammonia nitrogen concentrations for all point sources, except the Bensenville STP, were 5.0 mg/L and 1.0 mg/L, respectively (based on monthly average). The CBOD and the ammonia nitrogen concentrations for the Bensenville STP were 10 mg/L and 1.0 mg/L, respectively. The TMDL allocations of CBOD and ammonia nitrogen are provided in Table 6-5. The loads are expressed as pounds per day for the design flow condition. Modeled effluent CBOD and ammonia nitrogen concentrations from the TMDL allocation runs were multiplied by the design flows of individual point sources to calculate the WLA. The organic nitrogen, nitrate, organic phosphorus, and dissolved phosphorus concentrations remained unchanged. Modeled DO, CBOD, and ammonia nitrogen values for all reaches are listed in Appendix F. It should be noted that point sources could increase their permitted design flows and if they meet effluent concentrations of 5 mg/L CBOD5 and 1 mg/L ammonia, the instream DO standard will be protected. Thus, IEPA could consider implementing this TMDL as a concentration-based TMDL for WWTPs that require an increase in permitted design flow.

Allocation scenario 6 used permitted design flow for point source discharge, and the most downstream dam at river mile 11.6 was removed. It was assumed that hydraulic conditions in reach 10 (i.e. just upstream of the removed dam) would change and become similar to the reach downstream of the dam. Therefore, in addition to removing the dam from the model input, hydraulic parameters in reach 10 were set to those of reach 11. The current average monthly permit limits were then modified to achieve the water quality target (6 mg/L DO) at all model locations. In order to maintain the water quality standard, CBOD/NH3 limits of 8/1 are needed for all discharges except Bensenville, which requires limits of 10/1 to protect Addison Creek. This is a change from the first draft TMDL (August 2003) that recommended a reduction of 5 mg/L for CBOD5, based on current flow, from the WWTPs. This revised report uses permitted design flow in determining Allocation 6. Therefore, removal of the dam at river mile 11.6 is an acceptable allocation scenario as long as the WLA is based on a reduction in the point source effluent limits for CBOD and NH3. Modeled DO concentrations for the allocation scenarios are plotted in Figure 6-4, and a summary of the point source WLAs are presented in Table 6-5.

FIGURE 6-3
Modeled Dissolved Oxygen Concentrations for Scenarios 1, 2, 3, and 4

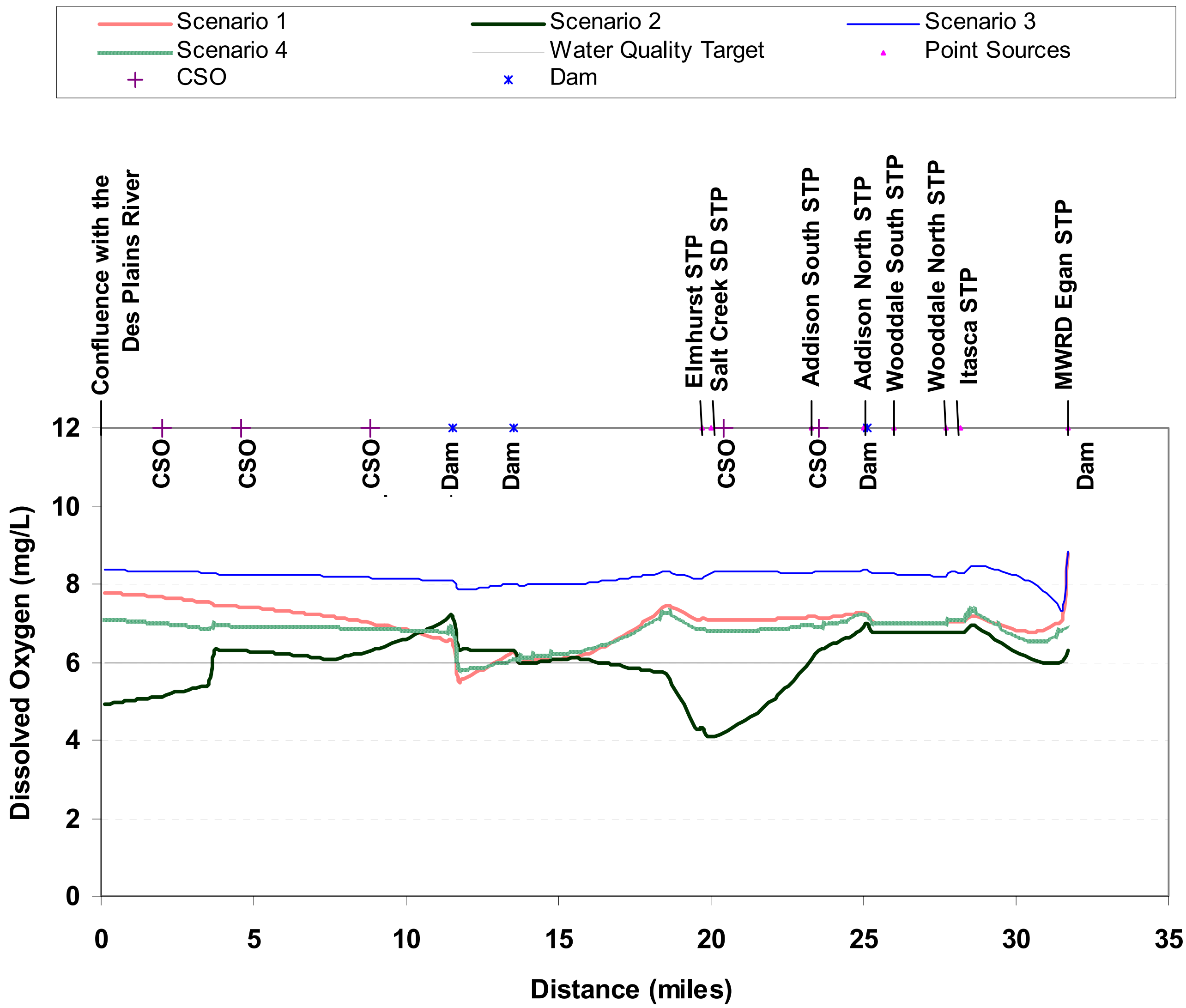


FIGURE 6-4
Modeled Dissolved Oxygen Concentrations for the TMDL Allocation Scenario

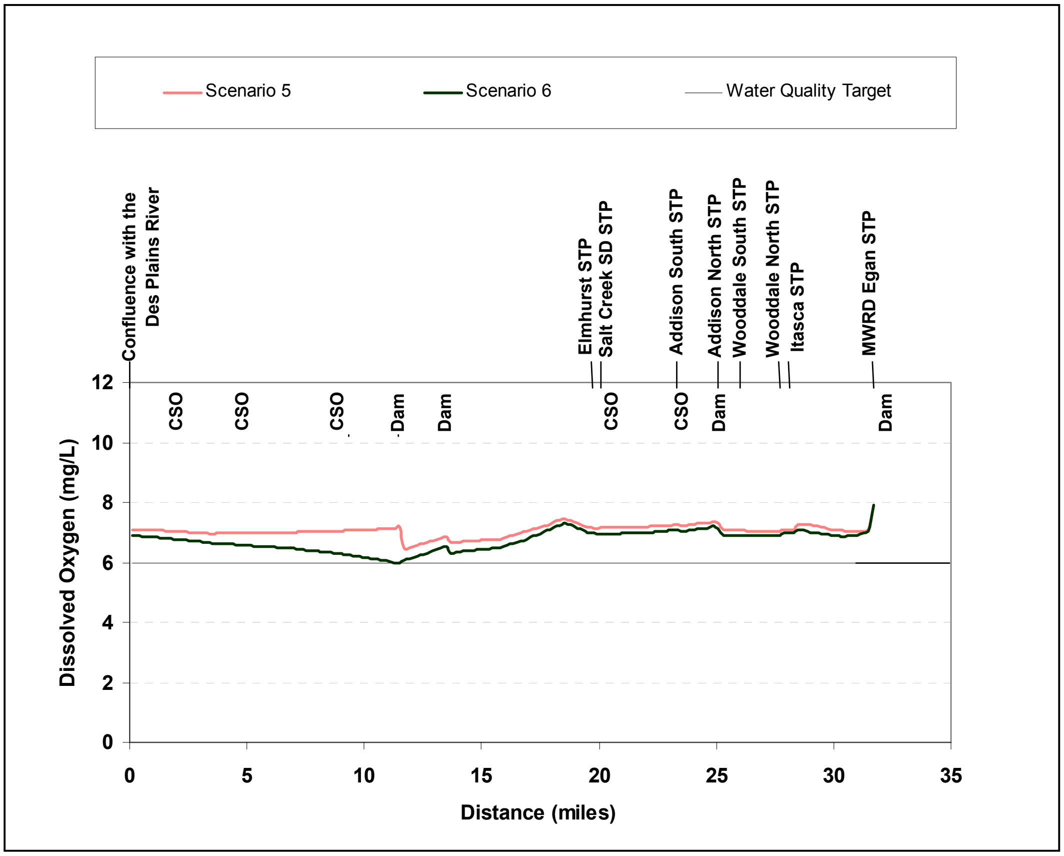


TABLE 6-5
Point Source Allocations for CBOD and Ammonia

		Allocation Scenario 5				Allocation Scenario 6			
Point Source	**Permit Design Flow (MGD)**	**CBOD (mg/L)**	**NH3 (mg/L)**	**CBOD (lb/d)**	**NH3 (lb/d)**	**CBOD (mg/L)**	**NH3 (mg/L)**	**CBOD (lb/d)**	**NH3 (lb/d)**
Bensonville	4.7	10	1	392	39	10	1	392	39
MWRDGC – Egan	30	5	1	1251	250	8	1	2002	250
DuPage Co – Nordic Park	0.5	5	1	21	4	8	1	33	4
Itasca	2.6	5	1	108	22	8	1	173	22
Wood Dale North	2	5	1	83	17	8	1	133	17
Wood Dale South	1.1	5	1	46	9	8	1	73	9
Addison South	3.2	5	1	133	27	8	1	214	27
Addison North	5.3	5	1	223	44	8	1	351	44
Salt Creek SD	3.3*	5	1	138	26	8	1	218	28
Elmhurst	8	5	1	334	67	8	1	534	67
Total				2729	507			4121	507

*(Melching and Chang, 1996)

Flow in Salt Creek under 7Q10 low flow conditions consists primarily of point source discharge (Singh and Ramamurthy, 1993). Nonpoint source flow, including leaky CSOs, should be minimal under critical summer low flow conditions. Nonpoint source contributions of CBOD and ammonia following a storm event do not require any control, because DO standards are not violated during high flows. Therefore, the nonpoint source contributions or load allocations (LAs) of CBOD and ammonia are not applicable for this TMDL. Any particulate CBOD that may contribute to SOD was addressed through VSS allocations as discussed below.

In addition to the reduction of CBOD and ammonia nitrogen loads from point sources, reduction of SOD was essential in meeting the water quality target. According to the model, SOD ranged from 0.05 g/square feet per day to 0.4 g/square feet per day and needed to be reduced by 52 percent. SOD is a measure of the rate of DO consumption by aerobic decomposition of settled organic matter. Settleable organic matter in surface water is determined by VSS or volatile nonfilterable residue (STORET parameter code 00535). Therefore, it was assumed that a 52 percent reduction of VSS load was necessary for a corresponding reduction of SOD.

An analysis of monitoring data showed that average VSS concentration at the Salt Creek monitoring site (05531500) was 10.4 mg/L and there was no correlation ($r^2 = 0.035$) between flow and the VSS concentration (Figure 6-5). The monthly maximum, minimum, and average of 10 years of VSS data are plotted in Figure 6-6, which shows that a seasonal pattern exists. During summer and fall months, falling leaves contribute to organic detritus transported by runoff, resulting in increased VSS concentrations. The existing annual VSS load was estimated by adding the product of the monthly average VSS concentrations and flows. Assuming that a 52 percent reduction of VSS load was necessary, the TMDL was calculated as 48 percent of the existing nonpoint source load. The QUAL2E model and the observed data showed the SOD concentration was lower near the point source outfalls, which indicated that the VSS concentration in point source effluents was very small. Generally, untreated waste from CSOs and runoff from various land uses contain significantly higher VSS concentrations. Considering these issues, it appears reasonable to target VSS transport and deposition from nonpoint sources. Also, because actual treatment levels for CBOD and ammonia are high, there should be little organic matter in the point source effluent. Therefore, the TMDL allocation for VSS was based on 100 percent nonpoint source contribution or load allocation. Table 6-6 summarizes the CBOD, ammonia, and VSS TMDL for Salt Creek; the VSS TMDL is presented as pounds per year.

FIGURE 6-5
The Relationship Between Volatile Suspended Solid and Flow Using the Salt Creek (station 05531500) Monitoring Data

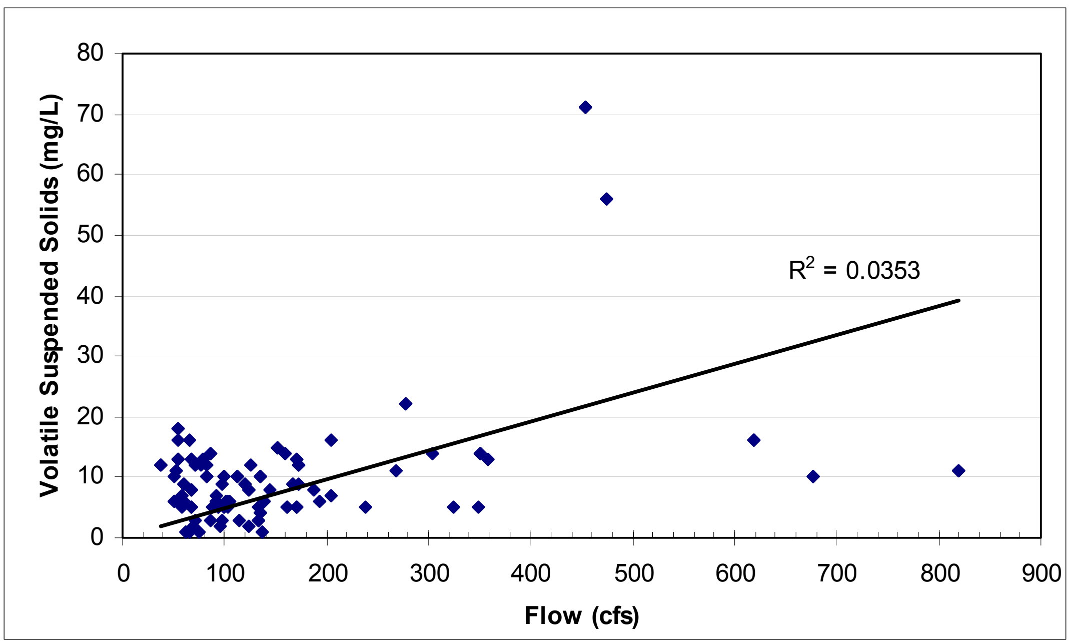


FIGURE 6-6
The Monthly Maximum, Minimum and Average VSS Concentrations Using the 1990-1998 Monitoring Data from the Salt Creek Site (05531500)

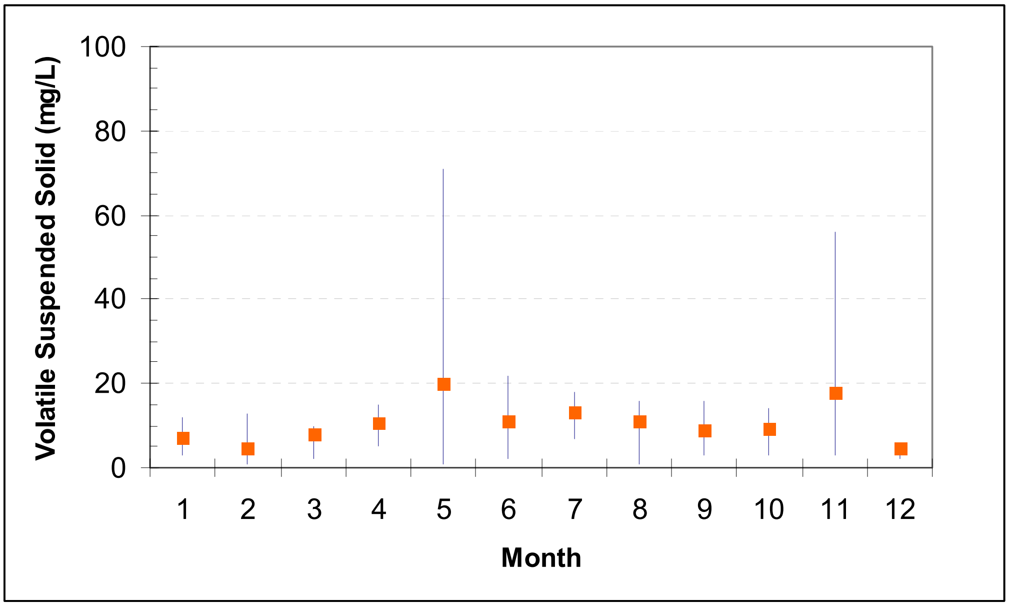


TABLE 6-6
TMDL Allocations for CBOD and Ammonia and VSS for Salt Creek

Pollutant	Load Allocation (lbs/day)	Wasteload Allocation (lbs/day)	TMDL (lbs/day)	Permitted Load (lbs/day)[a]	Percent Reduction Needed from Permitted Load	Observed Load (lbs/day)[b]	Percent Reduction Needed from Observed Load
Allocation Scenario 5							
5-day Carbon. Biochemical Oxygen Demand [b]	NA	2,729	2,729	6,251	56	1,561	0
Ammonia Nitrogen [b]	NA	507	507	813	38	162	0
Allocation Scenario 6							
5-day Carbon. Biochemical Oxygen Demand [b]	NA	4,121	4,121	6,251	34	1,561	0
Ammonia Nitrogen [b]	NA	507	507	813	38	162	0
Applies to both Scenario 5 and Scenario 6							
Volatile Suspended Solids [c]	2,152,943	-	2,152,943	-	-	NA	NA

[a] Loads calculated using design flows of individual point sources.
[b] Current permitted loads based on average monthly permit limits and design flow; current observed loads based on effluent data from 1995 USGS calibration dataset of 10 point sources listed in Table 5-4 and design flow; St. Charles CSO load assumed equal to 0.
[c] Unit for VSS is pounds per year

6.4.3 Implementation Considerations

Table 6-7 indicates that point source discharges would not be required to reduce CBOD and ammonia loads to meet the wasteload allocations for these pollutants based on observed effluent loads, but would have to reduce below permitted loads. This is because the observed effluent loads from point sources based on 1995 USGS sampling of these discharges for their model calibration dataset are well below current permitted monthly limitations. The implementation impacts these dischargers; therefore, it will depend on what their actual loads are today and in the foreseeable future. This information should be derived and evaluated as part of the implementation process, and adjustments made as appropriate.

It should also be noted that for allocation scenario 5, the permitted flow of a given WWTP can increase, and the instream DO standard will still be maintained as long as the NPDES facility meets 5 mg/L BOD and 1 mg/L NH3. Thus, once a given NPDES facility reaches its permitted design flow and requests an expansion, concentration-based limits can be applied to the facility which will result in a higher WLA (in terms of pounds), but will still maintain the instream DO standard.

In addition, this TMDL did not evaluate different allocation scenarios that may be worth considering. For example, an allocation scenario other than equal percent reduction for all facilities may be appropriate and would be consistent with this TMDL as long as the overall target is met and DO standards are protected in Salt Creek. Dam removal may also be a viable element of implementation of the DO TMDL, perhaps via a water quality trading process.

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Appendix A — RF3 Summary Table

TABLE A-1
Reach File 3 Reach Summary

Reach ID	Watershed	Type	Length (ft)
7120004 16 0.00	Salt Creek	Stream	16407
7120004 16 3.35	Salt Creek	Stream	39706
7120004 16 7.65	Salt Creek	Stream	526
7120004 16 7.70	Salt Creek	Stream	1526
7120004 16 7.87	Salt Creek	Stream	1091
7120004 16 7.98	Salt Creek	Stream	9637
7120004 16 9.03	Salt Creek	Stream	570
7120004 16 9.17	Salt Creek	Stream	8736
7120004 1610.11	Salt Creek	Stream	8318
7120004 1611.01	Salt Creek	Stream	633
7120004 1611.07	Salt Creek	Stream	29821
7120004 1614.29	Salt Creek	Stream	16729
7120004 1616.09	Salt Creek	Stream	19600
7120004 1618.20	Salt Creek	Lake	9654
7120004 1618.21	Salt Creek	Lake	10634
7120004 1618.88	Salt Creek	Lake	6791
7120004 1619.19	Salt Creek	Lake	14180
7120004 1619.60	Salt Creek	Stream	13811
7120004 1621.09	Salt Creek	Stream	1045
7120004 1621.20	Salt Creek	Stream	115
7120004 1621.21	Salt Creek	Stream	12119
7120004 1622.52	Salt Creek	Stream	22513
7120004 1624.95	Salt Creek	Stream	9764
7120004 20 0.00	Salt Creek	Stream	35320
7120004 20 5.70	Salt Creek	Lake	1015
7120004 20 5.86	Salt Creek	Stream	8907
7120004 20 7.30	Salt Creek	Lake	566
7120004 20 7.39	Salt Creek	Stream	4731
7120004 253 0.00	Salt Creek	Lake	3457
7120004 842 0.00	Salt Creek	Lake	2314

TABLE A-1
Reach File 3 Reach Summary

Reach ID	Watershed	Type	Length (ft)
7120004 842 0.27	Salt Creek	Stream	2519
7120004 843 0.00	Salt Creek	Stream	1848
7120004 844 0.00	Salt Creek	Stream	6892
7120004 845 0.00	Salt Creek	Stream	11411
7120004 845 2.16	Salt Creek	Stream	2966
7120004 845 2.72	Salt Creek	Stream	2740
7120004 845 3.24	Salt Creek	Stream	5087
7120004 846 0.00	Salt Creek	Stream	19574
7120004 847 0.00	Salt Creek	Stream	1194
7120004 847 0.23	Salt Creek	Stream	8138
7120004 848 0.00	Salt Creek	Stream	5498
7120004 849 0.00	Salt Creek	Stream	2013
7120004 849 0.38	Salt Creek	Stream	10615
7120004 850 0.00	Salt Creek	Stream	9164
7120004 851 0.00	Salt Creek	Stream	22056
7120004 851 4.16	Salt Creek	Stream	12357
7120004 852 0.00	Salt Creek	Stream	17296
7120004 853 0.00	Salt Creek	Stream	1174
7120004 853 0.22	Salt Creek	Stream	5792
7120004 854 0.00	Salt Creek	Stream	8358
7120004 855 0.00	Salt Creek	Stream	5032
7120004 855 0.95	Salt Creek	Stream	5502
7120004 856 0.00	Salt Creek	Stream	8448
7120004 858 0.00	Salt Creek	Stream	1843
7120004 858 0.36	Salt Creek	Lake	234
7120004 858 0.40	Salt Creek	Stream	14042
7120004 858 3.07	Salt Creek	Lake	2663
7120004 858 3.08	Salt Creek	Lake	3325
7120004 858 3.49	Salt Creek	Lake	3910
7120004 858 3.98	Salt Creek	Stream	242
7120004 858 4.02	Salt Creek	Lake	1312
7120004 858 4.03	Salt Creek	Lake	1266
7120004 858 4.26	Salt Creek	Stream	20522
7120004 859 0.00	Salt Creek	Stream	471

TABLE A-1
Reach File 3 Reach Summary

Reach ID	Watershed	Type	Length (ft)
7120004 859 0.09	Salt Creek	Lake	1050
7120004 859 0.10	Salt Creek	Lake	1271
7120004 859 0.29	Salt Creek	Stream	7544
7120004 859 1.71	Salt Creek	Stream	4939
7120004 860 0.00	Salt Creek	Stream	8054
7120004 861 0.00	Salt Creek	Stream	10410
7120004 862 0.00	Salt Creek	Stream	1304
7120004 862 0.25	Salt Creek	Stream	14417
7120004 864 0.00	Salt Creek	Stream	11995
7120004 865 0.00	Salt Creek	Stream	790
7120004 961 0.00	Salt Creek	Lake	9084

From Basins dataset

Appendix B — Hydrologic Calibration Data

Table B1: HSPEXP Output at Rolling Meadows:

```
 Simulated Observed
Total runoff, in inches 77.890 81.294
Total of highest 10% flows, in inches 38.060 36.314
Total of lowest 50% flows, in inches 7.390 8.268

 Simulated Potential
Evapotranspiration, in inches 105.500 152.300

 Simulated Observed
Total storm volume, in inches 15.880 18.007
Average of storm peaks, in cfs 163.231 176.471
Baseflow recession rate 0.930 0.900

Total simulated storm interflow, in inches > 13.060
Total simulated storm surface runoff, in inches > 25.340

 Simulated Observed
Summer flow volume, in inches 16.520 15.343
Winter flow volume, in inches 18.430 17.569
Summer storm volume, in inches 3.010 3.194

 Current Criteria
Error in total volume -4.200 10.000
Error in low flow recession -0.030 0.050
Error in 50% lowest flows -10.600 10.000
Error in 10% highest flws 4.800 15.000
Error in storm volumes -7.500 15.000
Seasonal volume error 2.800 10.000
Summer storm volume error 6.000 15.000
```

Table B2: HSPEXP Output at Elmhurst

```
 Simulated Observed
Total runoff, in inches 104.700 109.167
Total of highest 10% flows, in inches 38.110 39.469
Total of lowest 50% flows, in inches 20.740 22.360

 Simulated Potential
Evapotranspiration, in inches 104.900 152.300

 Simulated Observed
Total storm volume, in inches 18.300 20.488
Average of storm peaks, in cfs 431.705 444.412
Baseflow recession rate 0.970 0.950

Total simulated storm interflow, in inches > 13.160
Total simulated storm surface runoff, in inches > 26.920

 Simulated Observed
Summer flow volume, in inches 22.950 22.780
Winter flow volume, in inches 25.130 25.170
Summer storm volume, in inches 3.810 4.325

 Current Criteria
Error in total volume -4.100 10.000
Error in low flow recession -0.020 0.050
Error in 50% lowest flows -7.200 10.000
Error in 10% highest flws -3.400 15.000
Error in storm volumes -2.900 15.000
Seasonal volume error 0.900 10.000
Summer storm volume error -1.200 15.000
```

Table B3: HSPEXP Output at Western Springs

```
 Simulated Observed
Total runoff, in inches 106.100 107.214
Total of highest 10% flows, in inches 38.890 39.530
Total of lowest 50% flows, in inches 20.970 21.493

 Simulated Potential
Evapotranspiration, in inches 105.000 152.300

 Simulated Observed
Total storm volume, in inches 18.970 20.392
Average of storm peaks, in cfs 552.817 543.824
Baseflow recession rate 0.970 0.950

Total simulated storm interflow, in inches > 13.700
Total simulated storm surface runoff, in inches > 27.690

 Simulated Observed
Summer flow volume, in inches 22.800 21.973
Winter flow volume, in inches 25.290 24.522
Summer storm volume, in inches 4.090 4.307

 Current Criteria
Error in total volume -1.000 10.000
Error in low flow recession -0.020 0.050
Error in 50% lowest flows -2.400 10.000
Error in 10% highest flws -1.600 15.000
Error in storm volumes 1.700 15.000
Seasonal volume error 0.700 10.000
Summer storm volume error 2.000 15.000
```

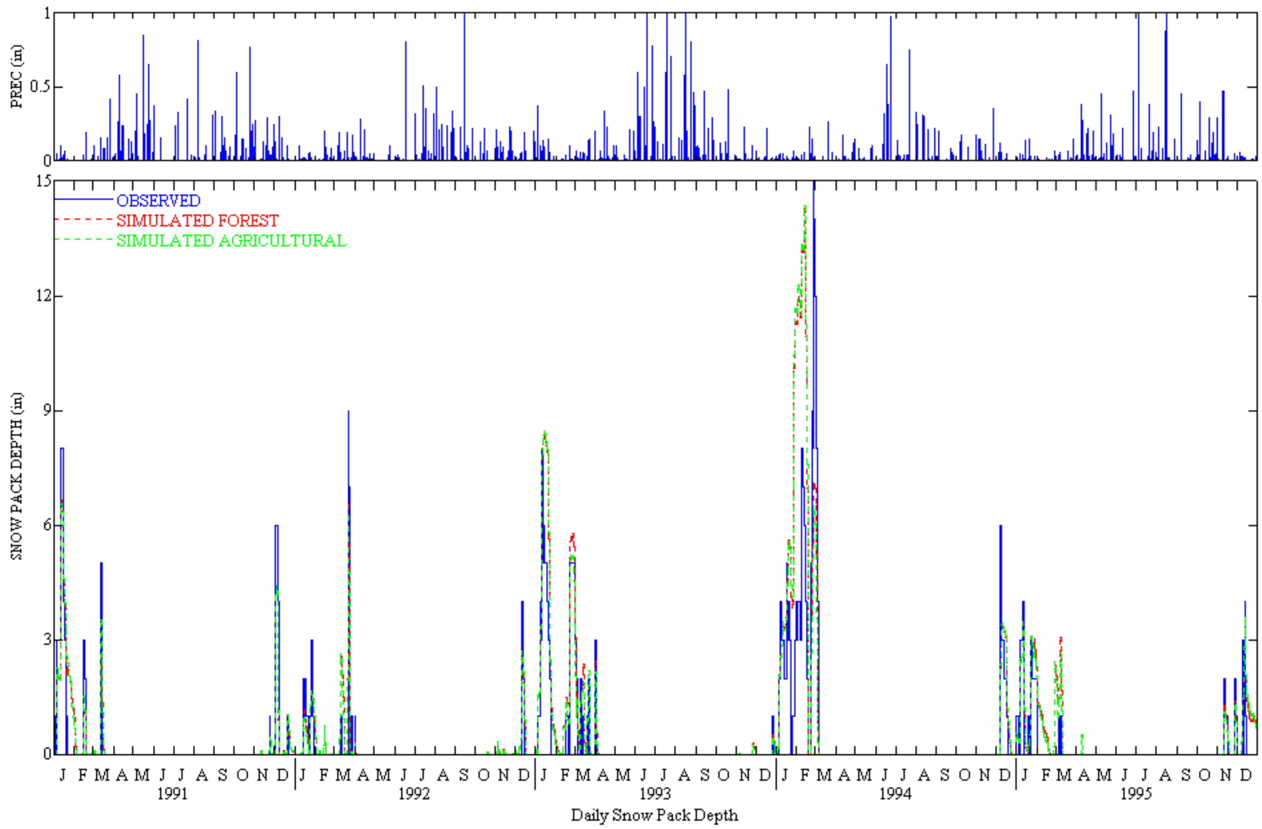


FIGURE B1 PLOT OF SNOW PACK DEPTH ON THE SALT CREEK WATERSHED

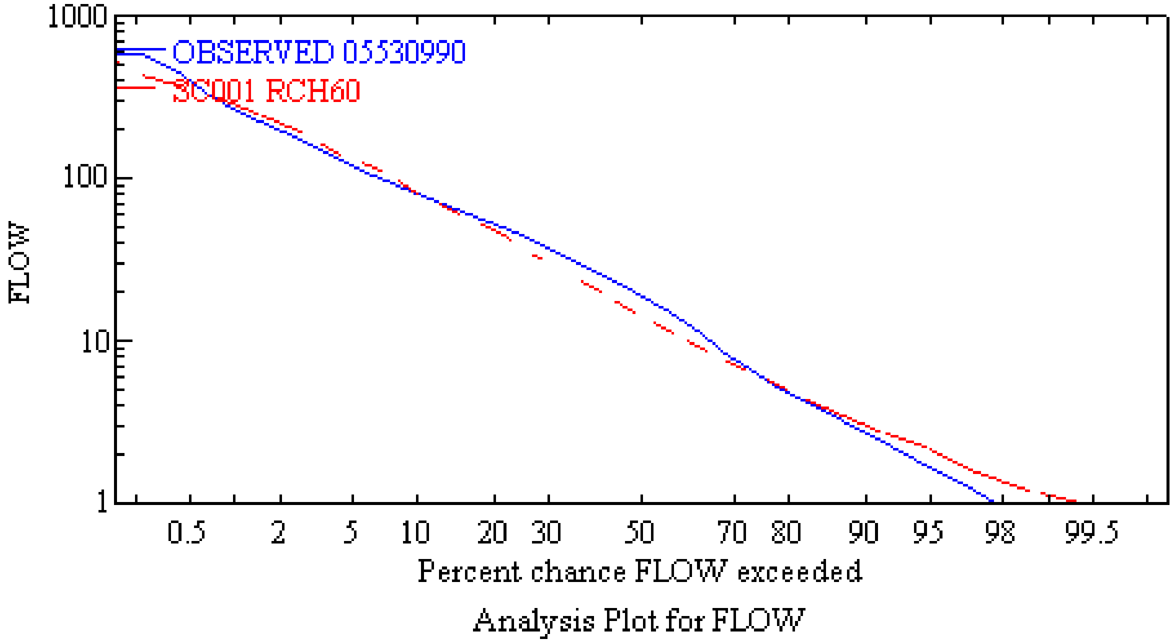


FIGURE B2 FLOW DURATION PLOT – SALT CREEK AT ROLLING MEADOWS

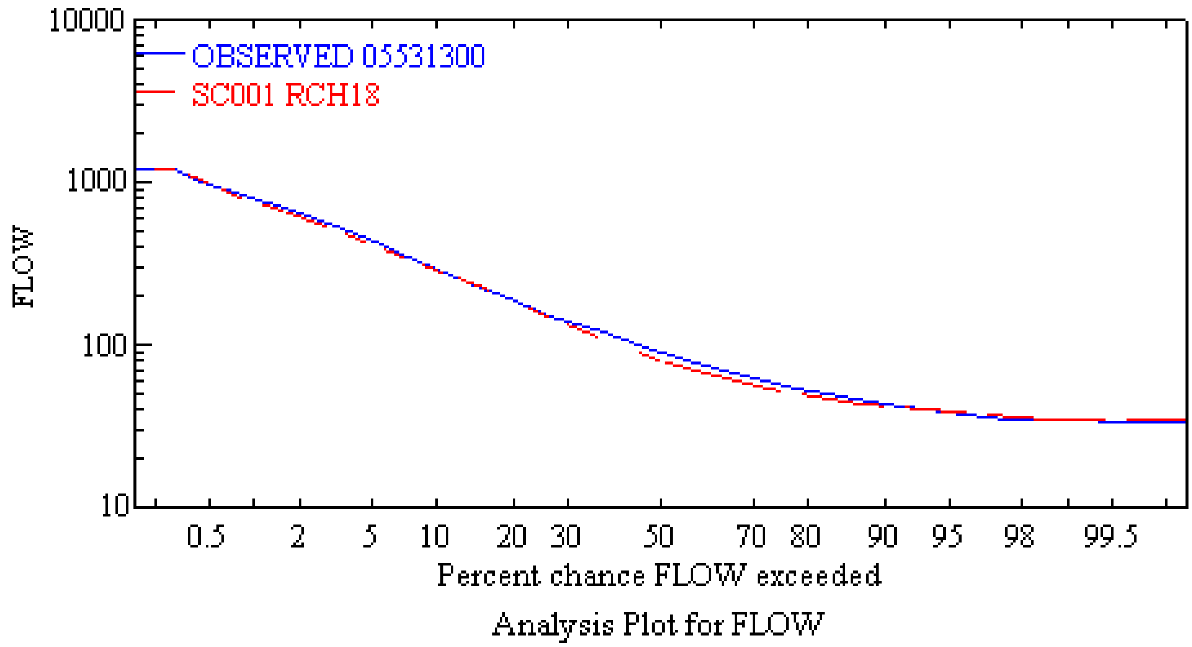


FIGURE B3 FLOW DURATION PLOT – SALT CREEK AT ELMHURST

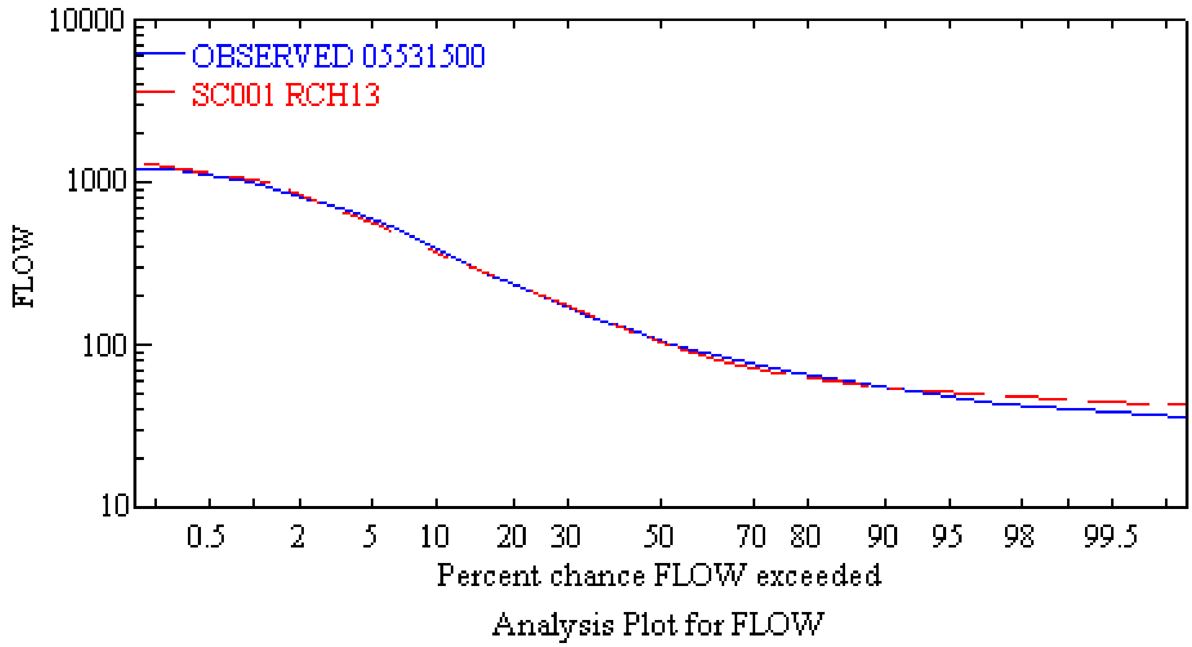
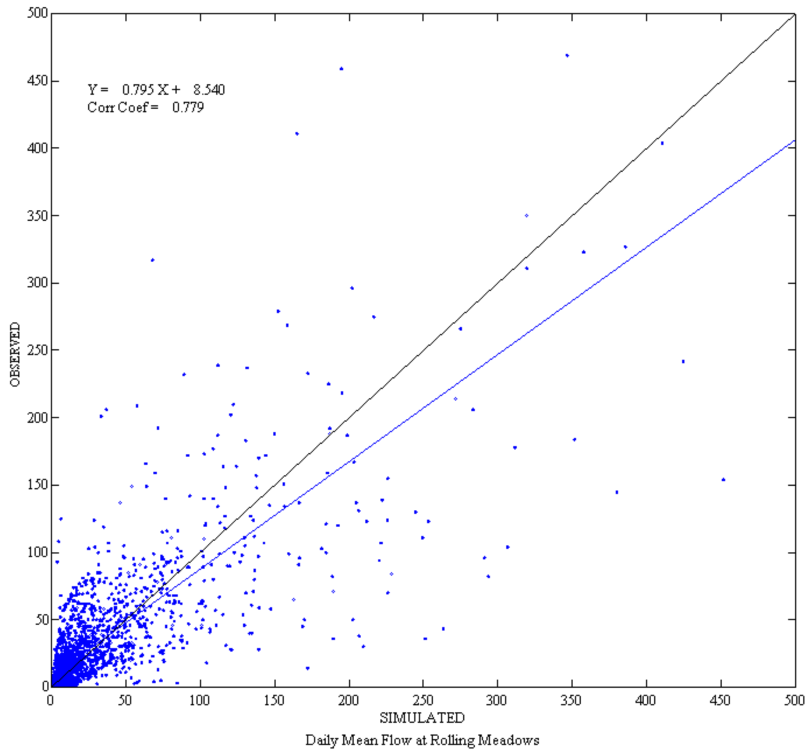


FIGURE B4 FLOW DURATION PLOT – SALT CREEK AT WESTERN SPRINGS



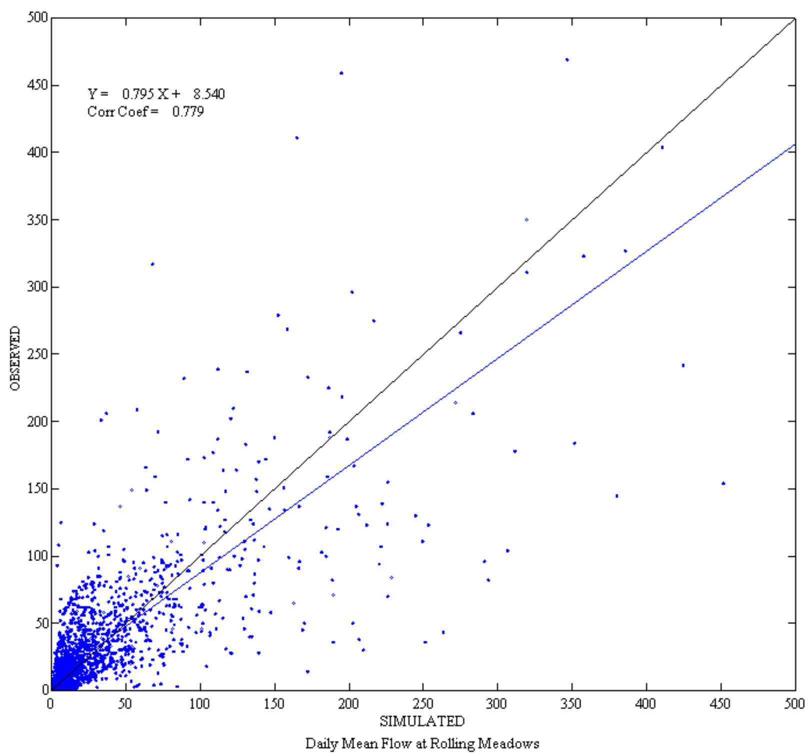


FIGURE B5 SCATTER PLOTS AT ROLLING MEADOWS

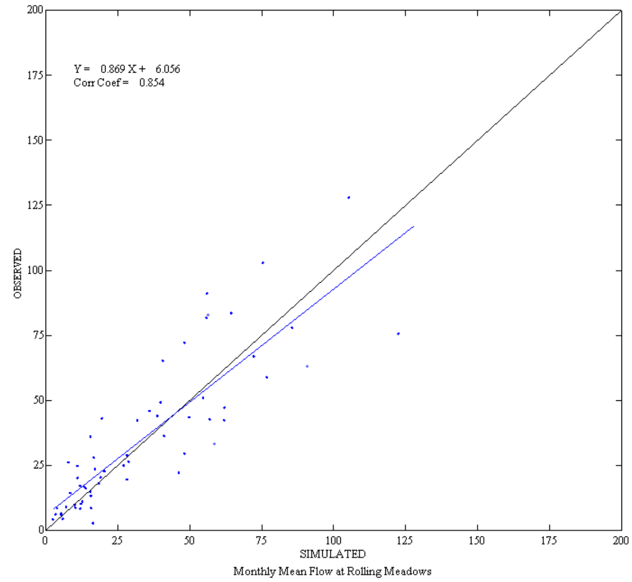


FIGURE B6 SCATTER PLOTS AT ROLLING MEADOWS

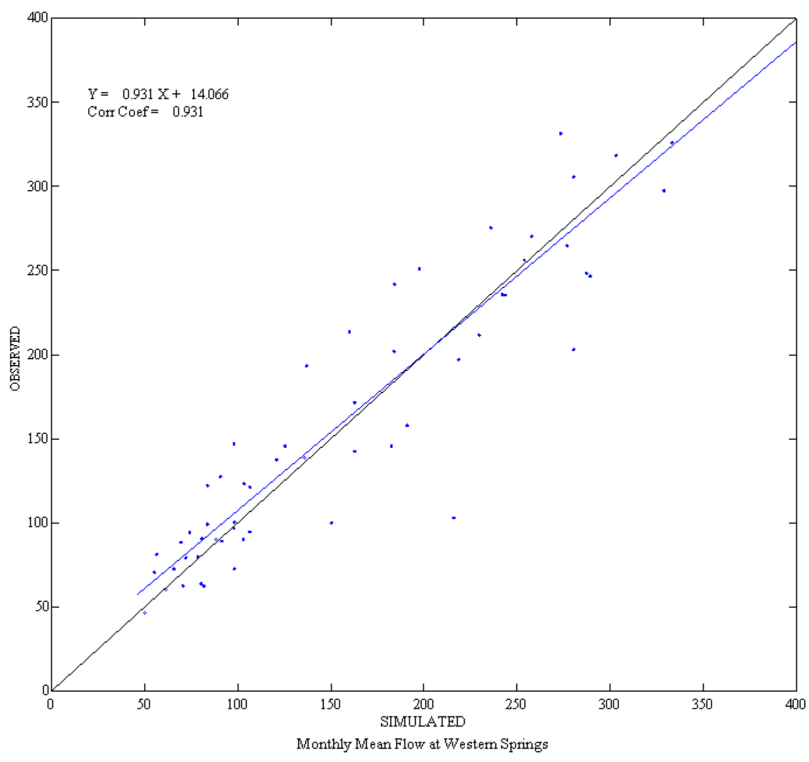


FIGURE B7 SCATTER PLOTS AT WESTERN SPRINGS

```
Water Balance for PERLND 1 - Cemeteries and Vacant - Salt Creek

 1991 1992 1993 1994 1995 SUM/AVER
Rainfall (in) 36.75 32.25 47.67 31.49 34.15 36.46

Runoff (in)
 Surface 0.2230 0.4200E-01 1.240 0.4570 0.1390 0.4202
 Interflow 3.356 1.454 7.482 2.648 2.878 3.564
 Baseflow 10.74 8.475 14.40 6.978 8.544 9.827
 Total 14.32 9.971 23.12 10.08 11.56 13.81

Deep Groundwater (in 0.5330 0.4700 0.7350 0.3710 0.4410 0.5100

Evaporation (in)
 Potential 33.53 27.85 27.27 34.11 29.44 30.44
 Intercep St 6.926 6.241 6.856 5.873 6.832 6.546
 Upper Zone 9.272 6.869 12.63 7.226 8.703 8.940
 Lower Zone 8.438 7.814 4.910 9.620 7.018 7.560
 Ground Water 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Baseflow 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Total 24.64 20.92 24.39 22.72 22.55 23.05


Water Balance for PERLND 2 - Commercial - Salt Creek

 1991 1992 1993 1994 1995 SUM/AVER
Rainfall (in) 36.75 32.25 47.67 31.49 34.15 36.46

Runoff (in)
 Surface 0.2230 0.4200E-01 1.240 0.4570 0.1390 0.4202
 Interflow 3.356 1.454 7.482 2.648 2.878 3.564
 Baseflow 10.74 8.475 14.40 6.978 8.544 9.827
 Total 14.32 9.971 23.12 10.08 11.56 13.81

Deep Groundwater (in 0.5330 0.4700 0.7350 0.3710 0.4410 0.5100

Evaporation (in)
 Potential 33.53 27.85 27.27 34.11 29.44 30.44
 Intercep St 6.926 6.241 6.856 5.873 6.832 6.546
 Upper Zone 9.272 6.869 12.63 7.226 8.703 8.940
 Lower Zone 8.438 7.814 4.910 9.620 7.018 7.560
 Ground Water 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Baseflow 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Total 24.64 20.92 24.39 22.72 22.55 23.05


Water Balance for PERLND 3 - Forest - Salt Creek

 1991 1992 1993 1994 1995 SUM/AVER
Rainfall (in) 36.77 32.22 47.59 31.47 34.15 36.44

Runoff (in)
 Surface 0.1300E-01 0.1000E-01 0.7600E-01 0.9000E-02 0.9000E-02 0.2340E-01
 Interflow 0.7260 0.2270 2.946 0.3900 0.3870 0.9352
 Baseflow 7.320 6.002 15.36 4.977 6.813 8.095
 Total 8.058 6.239 18.39 5.375 7.209 9.053

Deep Groundwater (in 1.603 1.386 2.700 1.264 1.389 1.668

Evaporation (in)
 Potential 33.65 27.94 27.39 34.31 29.50 30.56
 Intercep St 8.697 8.011 9.317 7.510 8.520 8.411
 Upper Zone 7.157 4.796 11.30 6.100 7.242 7.320
 Lower Zone 10.40 9.670 5.205 12.25 8.605 9.226
 Ground Water 1.475 1.446 0.6770 2.056 1.374 1.406
 Baseflow 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Total 27.73 23.92 26.50 27.92 25.74 26.36
```

```
Water Balance for PERLND 4 - Industrial - Salt Creek

 1991 1992 1993 1994 1995 SUM/AVER
Rainfall (in) 36.75 32.25 47.67 31.49 34.15 36.46

Runoff (in)
 Surface 0.2230 0.4200E-01 1.240 0.4570 0.1390 0.4202
 Interflow 3.356 1.454 7.482 2.648 2.878 3.564
 Baseflow 10.74 8.475 14.40 6.978 8.544 9.827
 Total 14.32 9.971 23.12 10.08 11.56 13.81

Deep Groundwater (in 0.5330 0.4700 0.7350 0.3710 0.4410 0.5100

Evaporation (in)
 Potential 33.53 27.85 27.27 34.11 29.44 30.44
 Intercep St 6.926 6.241 6.856 5.873 6.832 6.546
 Upper Zone 9.272 6.869 12.63 7.226 8.703 8.940
 Lower Zone 8.438 7.814 4.910 9.620 7.018 7.560
 Ground Water 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Baseflow 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Total 24.64 20.92 24.39 22.72 22.55 23.05


Water Balance for PERLND 5 - Institutional - Salt Creek

 1991 1992 1993 1994 1995 SUM/AVER
Rainfall (in) 36.75 32.25 47.67 31.49 34.15 36.46

Runoff (in)
 Surface 0.2230 0.4200E-01 1.240 0.4570 0.1390 0.4202
 Interflow 3.356 1.454 7.482 2.648 2.878 3.564
 Baseflow 10.74 8.475 14.40 6.978 8.544 9.827
 Total 14.32 9.971 23.12 10.08 11.56 13.81

Deep Groundwater (in 0.5330 0.4700 0.7350 0.3710 0.4410 0.5100

Evaporation (in)
 Potential 33.53 27.85 27.27 34.11 29.44 30.44
 Intercep St 6.926 6.241 6.856 5.873 6.832 6.546
 Upper Zone 9.272 6.869 12.63 7.226 8.703 8.940
 Lower Zone 8.438 7.814 4.910 9.620 7.018 7.560
 Ground Water 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Baseflow 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Total 24.64 20.92 24.39 22.72 22.55 23.05


Water Balance for PERLND 6 - Open Space - Salt Creek

 1991 1992 1993 1994 1995 SUM/AVER
Rainfall (in) 36.75 32.25 47.67 31.49 34.15 36.46

Runoff (in)
 Surface 0.2230 0.4200E-01 1.240 0.4570 0.1390 0.4202
 Interflow 3.356 1.454 7.482 2.648 2.878 3.564
 Baseflow 10.74 8.475 14.40 6.978 8.544 9.827
 Total 14.32 9.971 23.12 10.08 11.56 13.81

Deep Groundwater (in 0.5330 0.4700 0.7350 0.3710 0.4410 0.5100

Evaporation (in)
 Potential 33.53 27.85 27.27 34.11 29.44 30.44
 Intercep St 6.926 6.241 6.856 5.873 6.832 6.546
 Upper Zone 9.272 6.869 12.63 7.226 8.703 8.940
 Lower Zone 8.438 7.814 4.910 9.620 7.018 7.560
 Ground Water 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Baseflow 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Total 24.64 20.92 24.39 22.72 22.55 23.05
```

Water Balance for PERLND 7 - Residential - Salt Creek

```
 1991 1992 1993 1994 1995 SUM/AVER
Rainfall (in) 36.74 32.25 47.64 31.47 34.14 36.45

Runoff (in)
 Surface 0.2240 0.4200E-01 1.242 0.4500 0.1380 0.4192
 Interflow 3.364 1.461 7.463 2.639 2.883 3.562
 Baseflow 10.75 8.475 14.40 6.984 8.531 9.828
 Total 14.34 9.977 23.10 10.07 11.55 13.81

Deep Groundwater (in 0.5340 0.4700 0.7350 0.3710 0.4400 0.5100

Evaporation (in)
 Potential 33.53 27.85 27.26 34.11 29.43 30.43
 Intercep St 6.913 6.245 6.850 5.872 6.822 6.540
 Upper Zone 9.278 6.863 12.62 7.224 8.711 8.940
 Lower Zone 8.439 7.812 4.909 9.618 7.015 7.559
 Ground Water 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Baseflow 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Total 24.63 20.92 24.38 22.72 22.55 23.04
```

Water Balance for PERLND 8 - TCU Excl Interstates - Salt Creek

```
 1991 1992 1993 1994 1995 SUM/AVER
Rainfall (in) 36.75 32.25 47.67 31.49 34.15 36.46

Runoff (in)
 Surface 0.2230 0.4200E-01 1.240 0.4570 0.1390 0.4202
 Interflow 3.356 1.454 7.482 2.648 2.878 3.564
 Baseflow 10.74 8.475 14.40 6.978 8.544 9.827
 Total 14.32 9.971 23.12 10.08 11.56 13.81

Deep Groundwater (in 0.5330 0.4700 0.7350 0.3710 0.4410 0.5100

Evaporation (in)
 Potential 33.53 27.85 27.27 34.11 29.44 30.44
 Intercep St 6.926 6.241 6.856 5.873 6.832 6.546
 Upper Zone 9.272 6.869 12.63 7.226 8.703 8.940
 Lower Zone 8.438 7.814 4.910 9.620 7.018 7.560
 Ground Water 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Baseflow 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Total 24.64 20.92 24.39 22.72 22.55 23.05
```

Water Balance for PERLND 9 - Expressways - Salt Creek

```
 1991 1992 1993 1994 1995 SUM/AVER
Rainfall (in) 36.75 32.25 47.67 31.49 34.15 36.46

Runoff (in)
 Surface 0.2230 0.4200E-01 1.240 0.4570 0.1390 0.4202
 Interflow 3.356 1.454 7.482 2.648 2.878 3.564
 Baseflow 10.74 8.475 14.40 6.978 8.544 9.827
 Total 14.32 9.971 23.12 10.08 11.56 13.81

Deep Groundwater (in 0.5330 0.4700 0.7350 0.3710 0.4410 0.5100

Evaporation (in)
 Potential 33.53 27.85 27.27 34.11 29.44 30.44
 Intercep St 6.926 6.241 6.856 5.873 6.832 6.546
 Upper Zone 9.272 6.869 12.63 7.226 8.703 8.940
 Lower Zone 8.438 7.814 4.910 9.620 7.018 7.560
 Ground Water 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Baseflow 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Total 24.64 20.92 24.39 22.72 22.55 23.05
```

```
Water Balance for PERLND 10 - Wetlands - Salt Creek

 1991 1992 1993 1994 1995 SUM/AVER
Rainfall (in) 36.75 32.25 47.67 31.49 34.15 36.46

Runoff (in)
 Surface 0.6000E-02 0.3000E-02 0.1300E-01 0.3000E-02 0.3000E-02 0.5600E-02
 Interflow 0.1970 0.3200E-01 0.7400 0.4700E-01 0.3100E-01 0.2094
 Baseflow 10.96 9.368 19.90 8.524 10.86 11.92
 Total 11.16 9.404 20.65 8.574 10.90 12.14


Deep Groundwater (in 2.346 2.094 3.535 1.987 2.172 2.427

Evaporation (in)
 Potential 33.53 27.85 27.27 34.11 29.44 30.44
 Intercep St 6.926 6.241 6.856 5.873 6.832 6.546
 Upper Zone 4.861 3.193 10.07 3.774 4.130 5.206
 Lower Zone 9.640 8.884 5.923 10.83 8.738 8.804
 Ground Water 2.113 1.842 1.034 2.447 1.847 1.857
 Baseflow 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Total 23.54 20.16 23.88 22.93 21.55 22.41


Water Balance for PERLND 11 - Agricultural - Salt Creek

 1991 1992 1993 1994 1995 SUM/AVER
Rainfall (in) 36.75 32.25 47.67 31.49 34.15 36.46

Runoff (in)
 Surface 0.4000E-01 0.1800E-01 0.3070 0.8000E-01 0.1900E-01 0.9280E-01
 Interflow 1.759 0.5180 5.133 1.487 1.132 2.006
 Baseflow 11.26 8.342 17.13 7.705 9.185 10.72
 Total 13.06 8.878 22.57 9.272 10.34 12.82

Deep Groundwater (in 0.5600 0.4680 0.8730 0.4090 0.4760 0.5572

Evaporation (in)
 Potential 33.53 27.85 27.27 34.11 29.44 30.44
 Intercep St 6.581 6.286 7.096 5.664 6.637 6.453
 Upper Zone 7.760 5.097 11.41 5.566 7.314 7.429
 Lower Zone 11.51 10.57 6.370 12.35 9.857 10.13
 Ground Water 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Baseflow 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
 Total 25.85 21.95 24.87 23.58 23.81 24.01
```

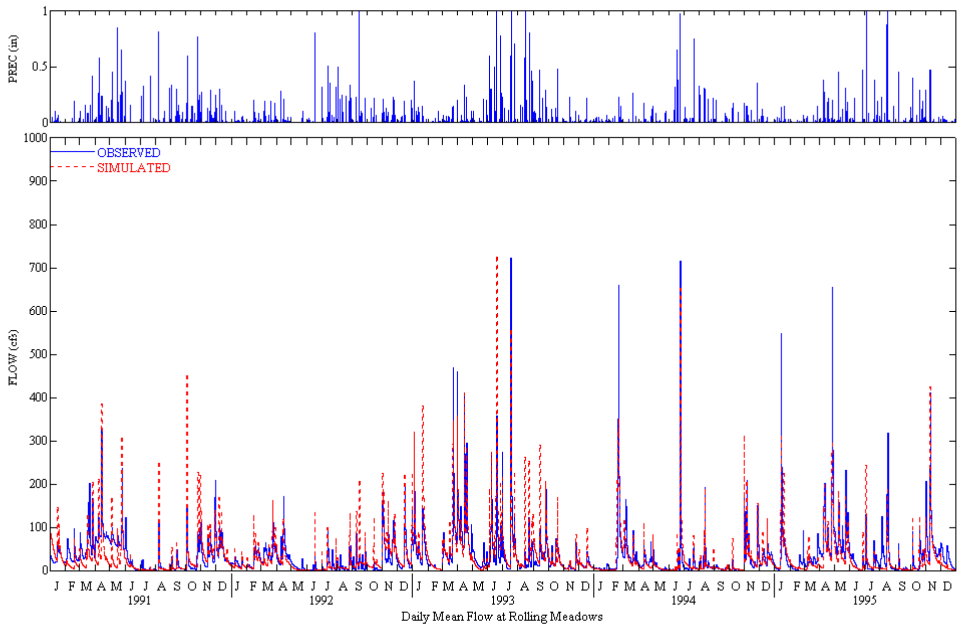


FIGURE B8 CALIBRATION PERIOD AT ROLLING MEADOWS OBSERVED VERSUS SIMULATED

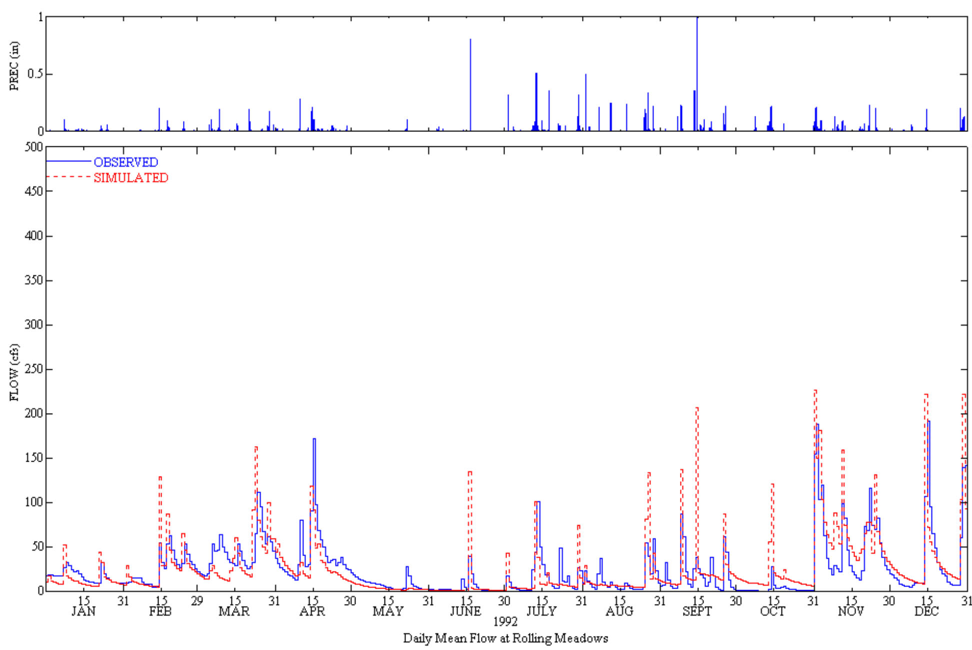


FIGURE B9 OBSERVED AND SIMULATED FLOW AT ROLLING MEADOWS IN 1992

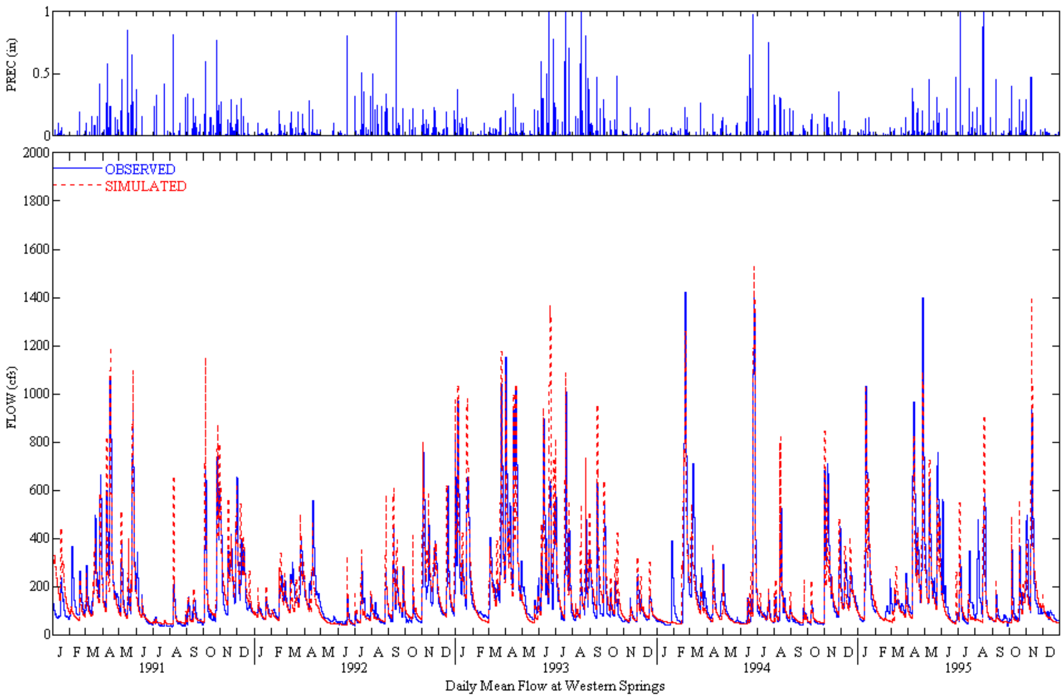


FIGURE B10 OBSERVED AND SIMULATED FLOW AT WESTERN SPRINGS IN CALIBRATION PERIOD

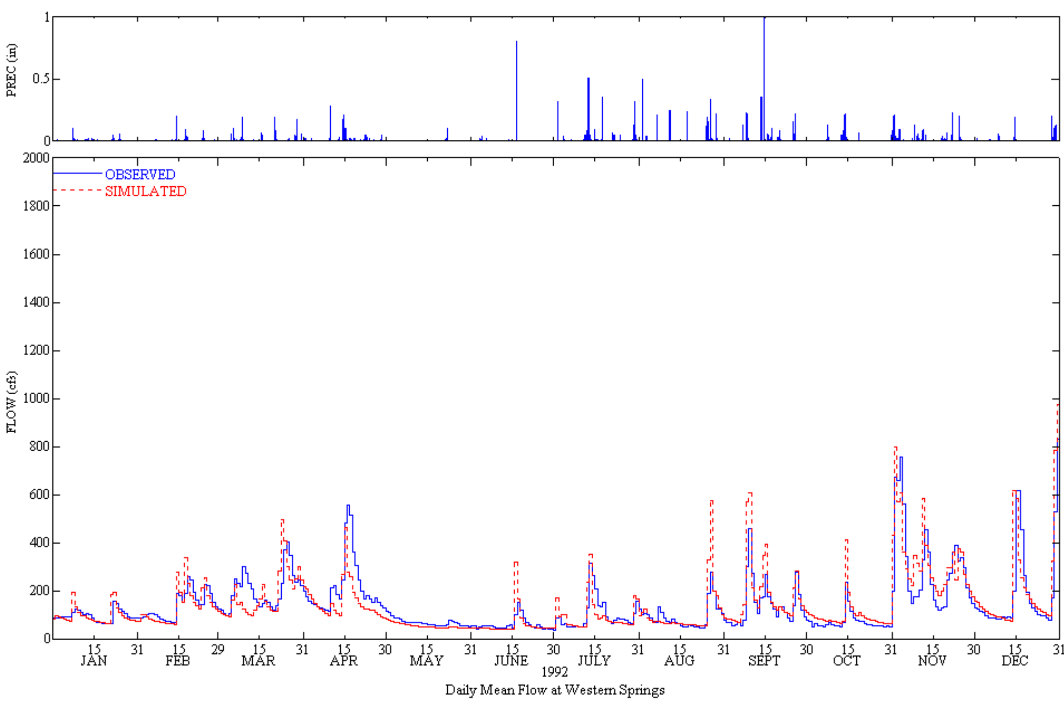


FIGURE B11 OBSERVED AND SIMULATED FLOW AT WESTERN SPRINGS IN 1992

HSPEXP Validation Output at Rolling Meadows

(See Figure B12)

```
 Simulated Observed
Total annual runoff, in inches 64.170 61.174
Total of highest 10% flows, in inches 32.650 32.400
Total of lowest 50% flows, in inches 7.430 4.999

 Simulated Potential
Evapotranspiration, in inches 91.170 126.300

 Simulated Observed
Total storm volume, in inches 10.840 10.423
Average of storm peaks, in cfs 205.395 173.632
Baseflow recession rate 0.930 0.880

Total simulated storm interflow, in inches > 11.940
Total simulated storm surface runoff, in inches > 21.930

 Simulated Observed
Summer flow volume, in inches 16.970 12.176
Winter flow volume, in inches 17.560 17.069
Summer storm volume, in inches 2.950 2.301

 Current Criteria
Error in total volume 4.900 10.000
Error in low flow recession -0.050 0.050
Error in 50% lowest flows 48.600 10.000
Error in 10% highest flws 0.800 15.000
Error in storm volumes 18.300 15.000
Seasonal volume error 36.500 10.000
Summer storm volume error 24.200 15.000
```

HSPEXP Validation Output at Elmhurst

(See Figure B13)

```
 Simulated Observed
Total annual runoff, in inches 84.310 88.030
Total of highest 10% flows, in inches 33.000 33.875
Total of lowest 50% flows, in inches 17.610 17.368

 Simulated Potential
Evapotranspiration, in inches 90.580 126.300

 Simulated Observed
Total storm volume, in inches 12.190 12.827
Average of storm peaks, in cfs 518.323 440.368
Baseflow recession rate 0.970 0.940

Total simulated storm interflow, in inches > 11.860

Total simulated storm surface runoff, in inches > 23.240

 Simulated Observed
Summer flow volume, in inches 22.460 21.091
Winter flow volume, in inches 22.270 21.859
Summer storm volume, in inches 3.140 2.842

 Current Criteria
Error in total volume -4.200 10.000
Error in low flow recession -0.030 0.050
Error in 50% lowest flows 1.400 10.000
Error in 10% highest flws -2.600 15.000
Error in storm volumes 17.700 15.000
Seasonal volume error 4.600 10.000
Summer storm volume error 15.500 15.000
```

HSPEXP Validation Output at Western Springs

(See Figure B14)

```
 Simulated Observed
Total annual runoff, in inches 85.160 89.734
Total of highest 10% flows, in inches 33.370 32.888
Total of lowest 50% flows, in inches 17.800 17.827

 Simulated Potential
Evapotranspiration, in inches 90.510 126.200

 Simulated Observed
Total storm volume, in inches 11.890 13.157
Average of storm peaks, in cfs 629.524 584.211
Baseflow recession rate 0.970 0.940

Total simulated storm interflow, in inches > 11.780
Total simulated storm surface runoff, in inches > 23.990

 Simulated Observed
Summer flow volume, in inches 23.220 21.203
Winter flow volume, in inches 21.860 22.013
Summer storm volume, in inches 2.820 2.699

 Current Criteria
Error in total volume -5.100 10.000
Error in low flow recession -0.030 0.050
Error in 50% lowest flows -0.200 10.000
Error in 10% highest flws 1.500 15.000
Error in storm volumes 7.800 15.000
Seasonal volume error 10.200 10.000
Summer storm volume error 14.100 15.000
```

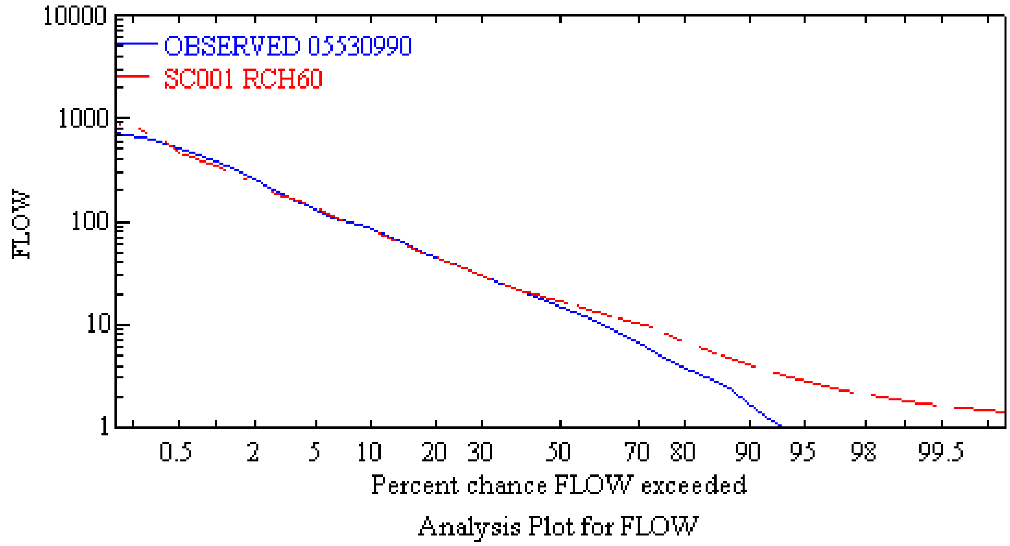


FIGURE B12 DURATION PLOT – SALT CREEK AT ROLLING MEADOWS

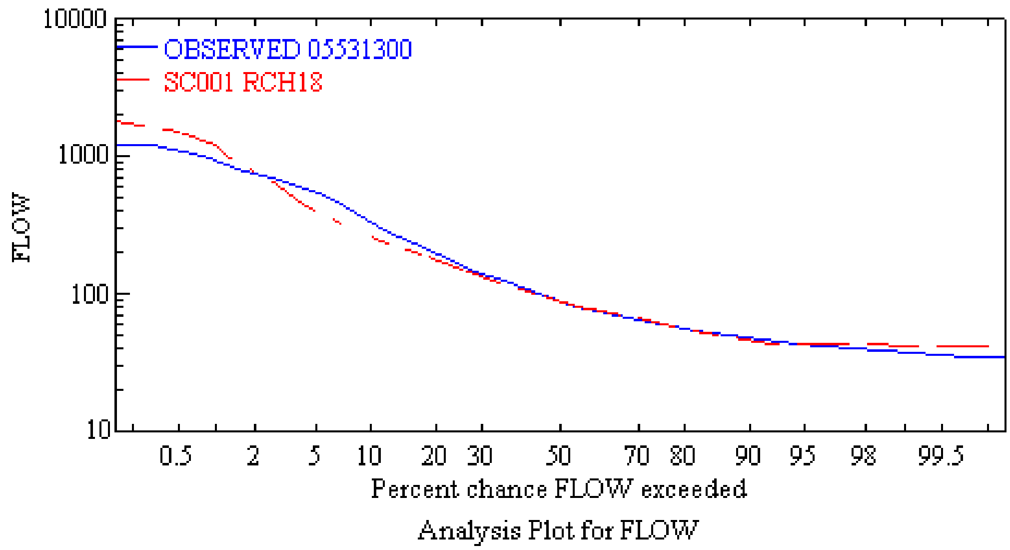


FIGURE B13 DURATION PLOT – SALT CREEK AT ELMHURST

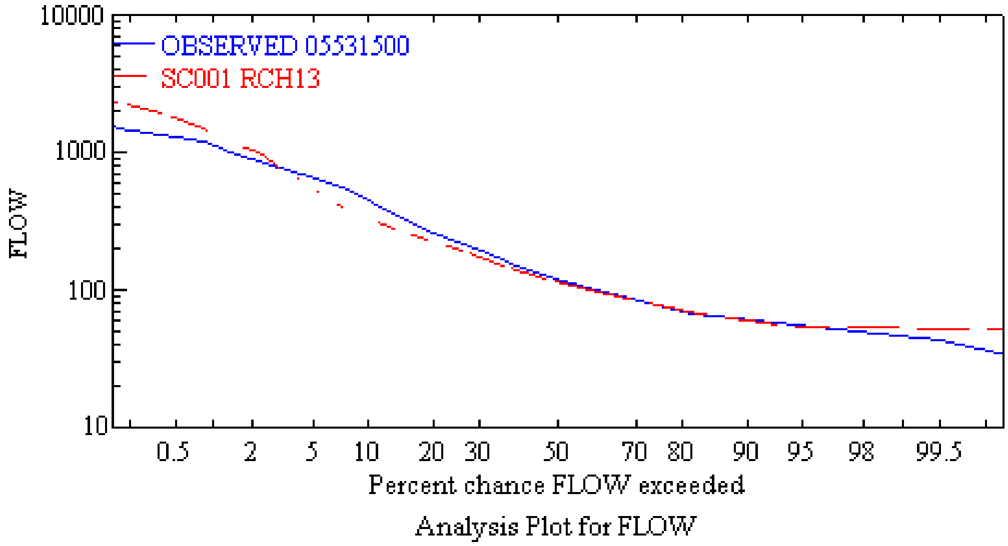


FIGURE B14 DURATION PLOT -- SALT CREEK AT WESTERN SPRINGS

Appendix C — DMR Data

TABLE C1 SUMMARY OF DMR DATA FOR POINT DISCHARGERS WHERE NO SIGNIFICANT MONTHLY VARIATIONS WERE OBSERVED

SALT CREEK	il0002127	il0020061	il0021849	il0026280	il0027367	il0028398	il0028746	il0030813	il0030953	il0033812	il0034274	il0035831	il0037737	il0050695	il0069124	il0070416	il0036340	Average over all stations
Acute / tot copper (as CU) 1042	no data	0.0025	no data	0.032955	0.024696	no data	0.0075	0.003	0.003813	0.023585	0.010254	no data	no data	no data	no data	no data	no data	0.013538
Chloride (residual) 50060	no data	0.099615	0.017656	0	0.065625	0	0.172891	0.066184	0.00325	0.098846	0.068077	no data	no data	1.213	0.120707	no data	0.001356	0.148247
Silver in Water (tot AG as AG) 1077	no data	0.025	no data	no data	0.002991	no data	0.025	0.000436	0.003194	0.002238	no data	no data	no data	no data	no data	no data	no data	0.00981
Lead (tot lead as Pb) 1051	no data	0.025	no data	no data	no data	no data	0.0125	0.001	0.001	no data	no data	no data	no data	no data	no data	no data	no data	0.009875
Mercury (tot mercury as Hg) 71900	no data	0.0001	no data	no data	no data	no data	0.00025	0.000157	0.0001	no data	no data	no data	no data	no data	no data	no data	no data	0.000152
Nitrate (tot Nitrate as N) 620	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	no data	0.6	no data	no data	no data	no data	no data	0.6
Fecal coliform 74055	no data	41.09375	330.0667	100.025	44.51829	75.95833	40.88235	65.35714	30.3	16.16146	28.125	no data	0	10605	no data	no data	17.63793	876.5481
Total Suspended Solids TSS 530	2.597561	4.1	2.177031	5.825	8.353571	2.322449	7.262533	5.210526	3.634	5.406923	2.986154	no data	6.859016	14.56	no data	no data	1.983051	5.23413
pH 400	2.902439	5.024615	7.132813	6.895455	4.759643	7.460204	5.721348	5.28114	7.314167	4.846692	4.626538	7.265	5.616721	7.35	7.173913	6.94	7.064407	6.080888
BOD 5 at 20 deg C 310	20.42793	2.492308	no data	no data	32.918	no data	8.589413	6.964912	no data	2.320308	1.584615	no data	no data	no data	no data	no data	no data	10.75678

TABLE C2 AMMONIA CONCENTRATIONS FROM POINT DISCHARGERS

SALT CREEK	il0002127	il0020061	il0021849	il0026280	il0027367	il0028398	il0028746	il0030813	il0030953	il0033812	il0034274	il0035831	il0037737	il0050695	il0069124	il0070416	il0036340
January	no data	0.45	0.638	0.47875	0.259	0.22	0.549667	0.291167	2.130333	0.176	0.22	no data	no data		no data	no data	0.186
Feburary	no data	0.44	0.427143	0.4725	0.13975	0.15	0.553	0.333333	0.615	0.129	0.264286	no data	no data		no data	no data	0.488333
March	no data	0.457143	1.3	0.503333	0.231	0.1625	0.294444	0.2666	0.9675	0.103	0.22	no data	no data		no data	no data	0.223
April	no data	0.53	0.8	0.503333	0.278429	0.31875	0.484	0.2274	1.47025	0.2318	0.2	no data	no data		no data	no data	0.227
May	no data	0.52	0.39	0.465	0.188333	0.241667	0.34396	0.2107	2.212143	0.1885	0.214286	no data	no data		no data	no data	0.142
June	no data	0.5	0.65	0.4675	0.243333	0.1625	0.319	0.30975	1.508364	0.136286	0.16	no data	no data		no data	no data	0.248
July	no data	0.4	0.376	0.4975	0.373	0.2625	0.3635	0.238	0.7196	0.155143	0.18	no data	no data	4.15	no data	no data	0.14
August	no data	0.65	0.27	0.52	0.1845	2.17	0.507	0.17775	1.126333	0.171333	0.2	no data	no data	10.7	no data	no data	0.212
September	no data	0.433333	0.363333	0.44	0.15225	0.191667	0.289333	0.25	0.49275	0.236333	0.1	no data	no data		no data	no data	0.19
October	no data	0.375	0.461111	0.415	0.182	0.125	0.1665	0.3		0.253	0.233333	no data	no data	9.9	no data	no data	0.17625
November		0.483333	0.421429	0.485	0.2065	0.25	0.2535	0.21	0.548375	0.0865	0.21	no data	no data		no data	no data	0.290833
December		0.433333	0.59	0.5475	0.244667	0.2	0.390667	0.2022	0.3875	0.1726	0.3	no data	no data		no data	no data	0.186667
average value		0.477846	0.498594	0.485	0.230696	0.417	0.347778	0.246474	1.168383	0.166908	0.216769	no data	no data	7.92	no data	no data	0.235085

Appendix D: Diel Survey Data

TABLE D1 SUMMARY OF DIEL 1 SURVEY DATA JUNE 27, 1995 – ROUND 1

SALT CREEK - PHASE 1 TMDL
DIEL 1 - (JUNE 27, 1995) Round 1

Site ID	Site Description	River Mile	Date	Time	Air Temp Degrees C	Water Temp Degrees C	DO mg/L	Cond.	pH	CBOD mg/L	Ammonia-N mg/L	Chlor *a* ug/L	total P mg/L
1/GL21	Upsteam MWRD Egan	31.7	27-Jun	0820-1205		25.5-23.08	8.95-8.92	968-902	8.2-7.71	3	0.03	48.82	0.49
2	MWRD Egan STP	31.7	27-Jun	0850-1210		19.7-20.0	6.9-7.3	897-930	7.3-8.0	2	0.14		4.0
3/GL/10	Salt Creek @ Arlington Hts. Road	31.5	27-Jun	0910-1222		20.0-20.1	6.7-7.2	899-876	9.6-7.5		0.14	6.1	3.9
4/GL/17	Salt Creek @ Thorndale Road	29.3	27-Jun	0940-1305		20.5-21.4	6.0-7.6	888-891	7.5-7.5	1	0.13	7.39	4.0
5/GLB/05	Sp. Brk -upstream of Roselle STP	5.7	27-Jun	0830-1205	26-31	18-20	8.3-8.35	474-921	7.7-7.15	<1	0.06	1.78	0.3
6	Roselle Devlin STP	5.7	27-Jun	0800-1210	26.0-31	19.88-18.6	8.55-8.3	950-464	7.15-7.9	<1	0.14		3.8
7GLB/06	Sp. Brk @ Foster Avenue	5.6	27-Jun	0850-1220	26-31	19.8-20.30	8.55-8.80	915-879	7.35-7.30		0.16	3.12	3.5
8/GLB07	Sp. Brk. @ Circle Avenue	4.9	27-Jun	0915-1225	27-27	20.3--20.9	6.3-6.8	1104-1105	7.6-7.6	1	0.12	11.2	1.7
9/GLB08	Sp. Brk. @ Relwling Road	2.7	27-Jun	0930-1235	31-24	25.1-26.6	5.9-6.7	1304-1301	7.8-7.9	2	0.25	52.55	0.2
10	DC Nordic park STP to Sp. Brk.	2.5	27-Jun	0950-1240	31-24	19.81-19.94	6.66-7.42	331-338	7.59-7.58	<1	0.02		2.9
11/GLB09	Sp. Brk. @ Maple & Lime Road	1.4	27-Jun	1015-1250	32-23	23.7-24.2	5.6-6.4	1454-1483	7.8-7.9		0.17	47.56	0.34
12/GLB01	Sp. Brk. @ Prospect Avenue	0.3	27-Jun	1030-1300	32-22	24.1-24.6	6.4-6.8	1385-1417	7.9-7.9	2	0.23	81.83	0.39
13	Itasla STP Salt Creek	28.2	27-Jun	1045-1305	32-23	20.1-20.12	5.2-5.22	1212-1179	6.8-6.97	2	0.26		3.4
14/GBL16	Salt Creek @ ____	28.1	27-Jun	1045-1313	32-22	21.8-22.46	6.7-7.2	1047-1042	7.4-7.41		0.15	35.3	3.2
15	Wooddale North STP	27.7	27-Jun	0817-1055	20.3-22.02	20.15-20.45	5.62-5.74	936-972	6.92-7.20	2	1.0		3.2
16/GL15	Salt Creek off Carter Avenue	27.1	27-Jun	1000-1330		21.2-22.3	6.4-7.6	977-967	7.81-7.8		0.18	27.08	3.4
17	Wooddale South STP	26.0	27-Jun	0800-1045	20.12-22.69	20.66-20.96	7.2-7.3	978-976	6.78-6.95	<1	0.05	?	2.6
18/GL14	Salt Creek @DC __ off 3rd Street	25.6	27-Jun	1030-1350		21.35-21.9	5.58-6.70	948-997	3.73-7.7	1	0.2	?	3.1
19	Addison North STP	25.0	27-Jun	0840-1105	20.42-22.13	20.31-20.78	7.92-8.05	1043-1029	7.03-7.2	1	0.05		3.05
20/GL23	Salt Creek @ Wooddale Avenue	24.0	27-Jun	1045-1400		22.2-22.4	6.7-6.9	949-902	7.6-7.8		0.26	15.79	3.3
21	Addison South STP	23.3	27-Jun	0900-1120	21.21-22.87	21.35-21.56	7.7-7.98	951-940	7.21-7.27	1	0.08		3.1
22/GL04	Salt Creek @ Fullerton Avenue	23.1	27-Jun	1100-1415		22.38-22.50	5.7-6.6	1005-936	7.67.7.9		0.62	23.14	3.1
23/GL22	Salt Creek @ Foot Bridge off RR Ave	20.1	27-Jun	0950-1200	22.18-22.43	21.76-22.24	5.05-4.98	1006-1010	7.31-7.37	3	0.08	27.59	3.2
24	Satl Creek SD STP	20.0	27-Jun	093501145	22.76-21.83	20.54-20.80	6.9-6.94	964-955	6.94-7.06	1	1.7		5.5
25	Elmhurst STP	19.7	27-Jun	0920-1135	21.35-22.47	20.47-20.66	7.32-7.42	980-970	7.02-7.06	<1	0.09		4.2
26/GL07	Salt Creek @ Butterfield Road	17.7	27-Jun	0745-1121	21.00-28.00	21.70-22.4	5.7-6.1	1022-999	7.1-7.3		0.43	24.0	2.9
27/GL18	Salt Creek @ 31st., Oak Brk	13.7	27-Jun	0800-1140	21.5-28.0	22.9-22.7	5.4-4.6	1039-1028	7.2-7.3	2	0.43	37.38	2.7
28/GL01	Salt Creek @ York Road	11.5	27-Jun	0845-1154	23.0-27.0	23.1-24.1	6.6-7.2	1049-1052	7.5-7.7	2	0.38	36.97	2.5
29/GL09	Salt Creek @ Wolf Road	8.8	27-Jun	0900-1207	24.0-26.0	23.1-23.9	5.3-6.2	1055-1052	7.5-7.6		0.26	47.3	2.5
30/GL20	Salt Creek @ Kemman Avenue	4.5	27-Jun	0930-1223	24.5-24.0	23.5-23.8	6.2-6.5	1064-1055	7.6-7.7	1	0.13	46.51	2.2
31/GLA06	Addison Creek. Upstream Bensenville S. STP	10.4	27-Jun	0745-1115	21.0-26.0	18.9-20.3	3.6-10.2	1101-996	7.3-7.8	16	0.35	14.41	0.378
32	Bensenville South STP	10.3	27-Jun	0815-1130	21.0-26.0	21.2-21.3	5.5-5.3	954-967	6.9-7.0	2	1.2		3.2
33/GLA05	Addison Creek @ Diana Court	9.8	27-Jun	0830-1145	21.0-26.0	21.1-21.4	6.9-7.2	975-970	7.0-7.1		1.1	5.34	3.2
34/GLA04	Addison Creek @ West Palmer Avenue	7.1	27-Jun	0900-1200	21.0-26.0	22.1-23.8	3.6-6.5	989-960	7.2-7.5	2	0.73	24.41	1.7

Site ID	Site Description	River Mile	Date	Time	Air Temp Degrees C	Water Temp Degrees C	DO mg/L	Cond.	pH	CBOD mg/L	Ammonia-N mg/L	Chlor *a* ug/L	total P mg/L
35/GLA03	Addison Creek @ Parkview Drive	5.9	27-Jun	0930-1215	25.0-26.0	24.0-25-0	6.7-7.7	1070-800	7.6-7.7	2	0.22	45.39	1.2
36/GLAD02	Addison Creek @ Washington Blvd.	3.2	27-Jun	0945-1230	25.0-26.0	22.6-23.1	5.1-5.8	1265-1345	7.5-7.7	3	0.23	23	0.93
37/GLA01	Addison Creek @ Cermak Road	0.3	27-Jun	1015-1245	26.0-26.0	22.0-22.0	2.2-1.7	1263-1238	7.4-7.5	3	0.24	34.71	0.81
38/GL11	Salt Creek @ maple Avenue	3.5	27-Jun	0950-1228	25.0-23.0	23.2-23.5	5.4-5.9	1129-1098	7.6-7.6	2.0	0.11	38.91	2.0
39/GL190	Salt Creek @ Washington Ave, Brkfld	1.1	27-Jun	1015-1242	26.5-24.0	23.2-23.4	4.7-5.2	1083-1100	7.5-7.5	2	0.13	55.04	1.94

TABLE D2 SUMMARY OF DIEL 1 SURVEY DATA JUNE 27, 1995 – ROUND 2

SALT CREEK - PHASE 1 TMDL
DIEL 1 - (JUNE 27, 1995) Round 2

Site ID	Site Description	River Mile	Date	Time	Air Temp Degrees C	Water Temp Degrees C	DO mg/L	Cond.	pH	CBOD mg/L	Ammonia-N mg/L	Chlor *a* ug/L	total P mg/L
1/GL21	Upsteam MWRD Egan	31.7	27-Jun	1505-1755		26.7-26.2	12.4-63.0	939-948	2.6-8.6	4	0.01	35.16	0.51
2	MWRD Egan STP	31.7	27-Jun	1515-1802		20.2-20.1	6.7-6.8	8.59-8.74	7.8-8.4	2	0.08		3.6
3/GL/10	Salt Creek @ Arlington Hts. Road	31.5	27-Jun	1530-1810		20.5-20.5	7.9-7.1	872-873	7.8-7.8	2	0.10	2.67	3.7
4/GL/17	Salt Creek @ Thorndale Road	29.3	27-Jun	1548-1827		21.9-21.4	7.7-7.3	895-889	7.9-7.8	2	0.08	9.79	3.7
5/GLB/05	Sp. Brk -upstream of Roselle STP	5.7	27-Jun	1415-1615	21.0-22.0	19.0-19.5	6.9-6.2	801-735	7.8-7.8	3	0.22	11.57	0.16
6	Roselle Devlin STP	5.7	27-Jun	1425-1625	23.0-22.0	20.05-20.1	8.49-8.52	936-942	7.32-7.53	1	0.07		3.8
7GLB/06	Sp. Brk @ Foster Avenue	5.6	27-Jun	1430-1630	25.0-22.0	20.22-20.1	5.52-7.2	909-906	7.51-7.53	2	0.07	4.45	3.1
8/GLB07	Sp. Brk. @ Circle Avenue	4.9	27-Jun	1440-1640	26.0-22.0	21.68-21.5	6.33-6.20	1262-1217	7.78-7.8	3	0.16	15.13	1.0
9/GLB08	Sp. Brk. @ Relwling Road	2.7	27-Jun	1500-1645	24.0-22.0	26.3-26.2	6.6-6.3	1300-1235	8.0-8.0	3	0.11	48.95	0.19
10	DC Nordic park STP to Sp. Brk.	2.5	27-Jun	1505-1700	24.0-22.0	20.8-20.05	7.6-6.27	2low-3350	7.3-7.63	1	0.02		3.1
11/GLB09	Sp. Brk. @ Maple & Lime Road	1.4	27-Jun	1515-1717	24.0-22.0	24.6-24.7	6.2-5.8	1510-1520	8.0-7.9	2	0.09	15.13	0.426
12/GLB01	Sp. Brk. @ Prospect Avenue	0.3	27-Jun	1530-1745	24.0-22.0	25.5-24.9	6.5-5.8	1421-1428	8.0-7.9	4	0.27-'19.88	19.88	0.47
13	Itasla STP Salt Creek	28.2	27-Jun	1545-1800	24.0-23.0	20.08-20.14	5.32-5.37	1212-1219	6.99-7.1	2.0	0.16		3.4
14/GBL16	Salt Creek @ ____	28.1	27-Jun	1600-1800	23.0-23.0	22.74-22.37	7.56-7.43	998-1006	7.45-7.45	2.0	0.07	32.04	3.4
15	Wooddale North STP	27.7	27-Jun	1450-1640	22.66-22.1	20.60-20.40	5.24-4.90	1000-992	7.05-7.12	3	0.05		3.8
16/GL15	Salt Creek off Carter Avenue	27.1	27-Jun	1605-2103		22.89-22.14	6.8-7.08	967-966	8.01-7.50	3	0.21	30.26	2.6
17	Wooddale South STP	26.0	27-Jun	1440-1625	22.58-22.20	21.0-20.88	7.48-7.14	978-987	7.21-7.24	1	0.07		2.7
18/GL14	Salt Creek @DC __ off 3rd Street	25.6	27-Jun	1625-2128		22.5-22.85	7.3-5.84	960-971	7.9-7.21	3	0.11		3.1
19	Addison North STP	25.0	27-Jun	1505	22.52	20.87	7.84	1028	7.33	2	<0.01		3.0
20/GL23	Salt Creek @ Wooddale Avenue	24.0	27-Jun	1655-2145		22.6-22.2	6.3-7.13	93.6-98.2	7.9-7.33	3	0.23	33.82	3.5
21	Addison South STP	23.3	27-Jun	1515-1700	22.47-22.33	21.53-21.51	7.86-7.56	924-029	7.36-7.36	2	0.03		3.4
22/GL04	Salt Creek @ Fullerton Avenue	23.1	27-Jun	1708-2200		22.5-22.12	6.4-6,1	905-971	7.9-7.2	2	0.23	24.03	3.0
23/GL22	Salt Creek @ Foot Bridge off RR Ave	20.1	27-Jun	1425-1735	21.53-21.08	22.56-22.70	5.6-5.31	1027-974	7.53.7.56	5	0.73	31.15	2.8
24	Salt Creek SD STP	20.0	27-Jun	1410-1550	21.95-22.26	20.79-20.71	6.65-7.03	951-949	6.98-6.69	2	0.87		5.3
25	Elmhurst STP	17.7	27-Jun	1400-1535	22.31-22.61	20.75-20.61	7.43-7.32	967-962	7.19-7.20	2	0.05		3.9
26/GL07	Salt Creek @ Butterfield Road	17.7	27-Jun	1403-1654	24.0-25.0	22.4-22.4	5.9-5.7	999-993	7.3-7.4	2	0.44	33.8	3.2
27/GL18	Salt Creek @ 31st., Oak Brk	13.7	27-Jun	1423-1707	25.0-24.0	22.8-23.0	4.7-4.7	1047-1033	7.3-7.3	2	0.37	125.49	2.7
28/GL01	Salt Creek @ York Road	11.5	27-Jun	1438-1716	23.0-26.0	24.5-24.7	7.2-7.22	1042-1037	7.8-7.8	2	0.18	72.98	2.5
29/GL09	Salt Creek @ Wolf Road	8.8	27-Jun	1458-1735	25.0-24.0	25.1-24.8	7.4-7.3	1053-1056	7.8-7.8	2	0.15	62.30	2.5
30/GL20	Salt Creek @ Kemman Avenue	4.5	27-Jun	1518-1750	25.0-24.0	24.8-24.7	7.5-7.2	1049-1050	7.9-7.8	2	0.05	18.69	2.3
31/GLA06	Addison Creek. Upstream Bensenville S. STP	10.4	27-Jun	1430-1630	26.0-26.0	19.9-19.2	9.0-4.7	1010-1040	7.5-7.3	5	0.18	33.82	0.41
32	Bensenville South STP	10.3	27-Jun	1445-1645	26.0-26.0	21.3-21.2	4.8-4.8	971-975	6.9-6.9	1	0.64		3.3
33/GLA05	Addison Creek @ Diana Court	9.8	27-Jun	1500-1700	25.0-26.0	21.1-21.2	6.9-6.8	880-960	7.2-7.0	3	0.82	8.90	2.6
34/GLA04	Addison Creek @ West Palmer Ave	7.1	27-Jun	1515-1715	25.0-25.0	23.1-22.8	6.0-4.7	640-870	7.2-7.2	4	0.69	13.35	1.1
35/GLA03	Addison Creek @ Parkview Drive	5.9	27-Jun	1530-1730	25.0-25.0	24.7-24.3	7.3-7.2	1028-1060	7.6-7.7	5	0.49	62.30	1.2
36/GLAD02	Addison Creek @ Washington Blvd.	3.2	27-Jun	1545-1745	25.0-25.0	24.2-23.8	6.5-5.5	1245-850	7.7-7.5	3	0.21		1.01
37/GLA01	Addison Creek @ Cermak Road	0.3	27-Jun	1600-1800	25.0-25.0	22.5-22.2	1.8-2.0	1150-1180	7.3-7.4	8	0.24	28.42	2.9
38/GL11	Salt Creek @ maple Avenue	3.5	27-Jun	1532-1759	25.0-25.0	24.5-24.2	6.7-6.1	1065-1077	7.8-7.7	3	0.10	57.74	1.94
39/GL190	Salt Creek @ Washington Ave, Brkfld	1.1	27-Jun	1547-1810	28.0-25.0	24.5-24.5	7.3-7.3	1092-1079	7.8-7.8	2	0.02	44.50	2.0

TABLE D3 SUMMARY OF DIEL1 SURVEY DATA JUNE 27, 1995 – ROUND 3

SALT CREEK - PHASE 1 TMDL
DIEL 1 - (JUNE 27, 1995) Round 3

Site ID	Site Description	River Mile	Date	Time	Air Temp Degrees C	Water Temp Degrees C	DO mg/L	Cond.	pH	CBOD mg/L	Ammonia-N mg/L	Chlor *a* ug/L	total P mg/L
1/GL21	Upsteam MWRD Egan	31.7	27-Jun	2010-2230		26.2-25.78	10.1-7.46	948-998	7.82-8.03	2	0.06		0.31
2	MWRD Egan STP	31.7	27-Jun	2022-2242		20.02-20.14	6.94-6.97	881-898	7.34-7.37	1	0.18		4.2
3/GL/10	Salt Creek @ Arlington Hts. Road	31.5	27-Jun	2033-2259		20.91-21.08	7.42-6.85	903-903	7.04-7.18	2	0.15		3.7
4/GL/17	Salt Creek @ Thorndale Road	29.3	27-Jun	2050-2113		20.93-20.50	6.93-6.36	912-900	7.28-7.27	2	0.09		3.7
5/GLB/05	Sp. Brk -upstream of Roselle STP	5.7	27-Jun	2005-2250	21.0-210	20.92-19.93	5.66-6.13	918-1096	7.55-7.69	4	0.09		0.16
6	Roselle Devlin STP	5.7	27-Jun	2000-2247	21.0-21.0	19.93-19.82	8.73-8.37	973-962	6.96-7.01	1	0.35		4.0
7GLB/06	Sp. Brk @ Foster Avenue	5.6	27-Jun	2022-2312	21.0-20.0	20.20-19.79	7.45-7.54	957-988	7.28-7.24	1	0.29		3.0
8/GLB07	Sp. Brk. @ Circle Avenue	4.9	27-Jun	2030-2323	22.0-20.0	20.71-19.91	6.43-5.50	1116-1053	7.77-7.58	2	0.12		0.92
9/GLB08	Sp. Brk. @ Relwling Road	2.7	27-Jun	2047-2350	22.0-20.0	25.83-25.33	6.02-5.36	1275-1292	7.71-7.73	2	0.22		0.23
10	DC Nordic park STP to Sp. Brk.	2.5	27-Jun	2057-2358	23.0-20.0	19.91-19.77	6.05-5.97	323-314	7.40-7.46	C1	0.07		2.9
11/GLB09	Sp. Brk. @ Maple & Lime Road	1.4	27-Jun	2120-0012	23.0-20.0	23.8-22.92	4.66-4.23	1464-1510	7.71-7.69	3	0.17		0.424
12/GLB01	Sp. Brk. @ Prospect Avenue	0.3	27-Jun	2134-0025	23.0-20.0	23.91-22.99	4.38-3.45	1440-1490	7.66-7.60	3	0.14		0.336
13	Itasla STP Salt Creek	28.2	27-Jun	2152-0035	23.0-20.0	20.15-20.20	5.40-5.33	1202-1190	6.79-6.86	2	0.21		3.2
14/GBL16	Salt Creek @ ____	28.1	27-Jun	2210-0050	23.0-20.0	20.92-20.27	6.16-5.84	969-945	7.19-7.18	2	0.31		0.42
15	Wooddale North STP	27.7	27-Jun	2012-0011	24.0-20.5	20.39-20.12	4.70-4.74	977-952	6.69-6.77	2	1.5		3.6
16/GL15	Salt Creek off Carter Avenue	27.1	27-Jun	2103-2128		22.14-21.22	7.08-6.10	966-960	7.50-7.16	2	0.13		3.4
17	Wooddale South STP	26.0	27-Jun	1955-2398	24.0-20.0	20.87-20.51	7.13-7.21	990-986	6.77-6.95	C1	0.05		2.6
18/GL14	Salt Creek @DC __ off 3rd Street	25.6	27-Jun	2128-2341		22.85-22.36	5.84-6.04	971-979	7.21-7.37	3	0.02		10.3
19	Addison North STP	25.0	27-Jun	2102-0022	22.0-21.0	20.59-20.31	7.62-7.67	1101-1147	6.85-7.03	1	0.04		3.0
20/GL23	Salt Creek @ Wooddale Avenue	24.0	27-Jun	2145-0001		22-20-22.25	7.13-6.69	9.82-9.73	7.33-7.95	2	0.13		2.8
21	Addison South STP	23.3	27-Jun	2043-0044	23.0-21.0	21.40-21.21	7.13-7.03	931-922	6.90-7.02	2	0.33		3.2
22/GL04	Salt Creek @ Fullerton Avenue	23.1	27-Jun	2200-0010		22.12-22.00	6.10-5.75	971-1014	7.20-7.78	3	0.13		2.6
23/GL22	Salt Creek @ Foot Bridge off RR Ave	20.1	27-Jun	2150-2335	22.0-20.0	22.31-21.75	3.88-1.79	915-927	7.14-7.1	6	0.53		2.5
24	Satl Creek SD STP	20.0	27-Jun	2139-0111	22.5-21.0	20.53-20.42	6.36-6.26	966-940	6.72-6.78	2	1.7		5.0
25	Elmhurst STP	17.7	27-Jun	2125-0059	22.0-21.5	20.42-20.23	9.81-7.11	969-973	6.92-6.98	1	0.11		4.0
26/GL07	Salt Creek @ Butterfield Road	17.7	27-Jun	1955-2343	22.5-20.0	22.5-21.6	5.2-4.5	973-911	7.3-7.2	3	0.89		2.1
27/GL18	Salt Creek @ 31st., Oak Brk	13.7	27-Jun	2021-0100	23.0-20.0	23.4-22.4	6.3-4.5	1023-990	7.4-7.3	2	0.28		2.6
28/GL01	Salt Creek @ York Road	11.5	27-Jun	2050-0110	22.0-20.0	23.7-22.72	7.6-7.3	1033-1027	7.6-7.5	2	0.26		2.6
29/GL09	Salt Creek @ Wolf Road	8.8	27-Jun	2113-0125	20.0-19.0	24.3-23.2	7.04-6.3	1044-1034	7.7-7.6	2	0.15		2.48
30/GL20	Salt Creek @ Kemman Avenue	4.5	27-Jun	2140-0145	21.0-19.0	23.9-23.5	7.04-6.3	1044-1034	7.7-7.60	2	0.15		2.2
31/GLA06	Addison Creek. Upstream Bensenville S. STP	10.4	27-Jun	1930-0011	22.0-20.0	19.7-19.84	3.6-0.64	1157-543	7.0-7.01	13	1.4		0.48
32	Bensenville South STP	10.3	27-Jun	2204-0017	20.0-19.5	21.30-21.29	4.47-4.72	949-952	7.04-7.06	2	1.3		3.4
33/GLA05	Addison Creek @ Diana Court	9.8	27-Jun	2224-0035	20.0-19.5	21.18-21.22	5.29-5.45	943-892	7.18-7.24	4	0.96		2.6
34/GLA04	Addison Creek @ West Palmer Ave	7.1	27-Jun	2242-0047	20.0-20.0	22.26-21.59	4.73-3.9	992-871	7.48-7.37	3	0.54		2.1
35/GLA03	Addison Creek @ Parkview Drive	5.9	27-Jun	2025-0057	22.0-20.0	23.19-23.21	5.05-4.95	1001-965	7.3-7.51	5	0.37		1.3
36/GLAD02	Addison Creek @ Washington Blvd.	3.2	27-Jun	2308-0110	19.0-20.0	22.63-22.42	2.32-2.79	987-1007	7.35-7.47	7	0.47		0.83
37/GLA01	Addison Creek @ Cermak Road	0.3	27-Jun	2326-0125	19.5-20.0	22.45-21.90	0.85-0.44	782-630	7.29-7.2	7	0.16		0.96
38/GL11	Salt Creek @ maple Avenue	3.5	27-Jun	2200-0155	20.0-19.0	23.6-23.3	5.1-4.8	1035-990	7.5-7.4	4	0.22		1.8
39/GL190	Salt Creek @ Washington Ave, Brkfld	1.1	27-Jun	2230-0210	20.0-20.0	23.6-22.9	5.5-3.8	1083-984	7.6-7.4	3	0.10		1.8

TABLE D4 SUMMARY OF DIEL1 SURVEY DATA JUNE 28, 1995 – ROUND 4

SALT CREEK - PHASE 1 TMDL
DIEL 1 - (JUNE 28 1995) Round 4

		River			Air Temp	Water Temp	DO			CBOD	Ammonia-N	Chlor *a*	total P
Site ID	Site Description	Mile	Date	Time	Degrees C	Degrees C	mg/L	Cond.	pH	mg/L	mg/L	ug/L	mg/L
1/GL21	Upsteam MWRD Egan	31.7	28-Jun	0415-0619		25.22-25.09	6.87-6.72	1010-1010	8.25-7.98	2	0.17		0.1
2	MWRD Egan STP	31.7	28-Jun	0425-0626		19.96-19.87	7.03-6.87	899-866	7.68-7.55	2	0.19		3.84
3/GL/10	Salt Creek @ Arlington Hts. Road	31.5	28-Jun	0437-0634		21.56-21.37	6.41-6.41	930-931	7.56-7.53	2	0.15		3.2
4/GL/17	Salt Creek @ Thorndale Road	29.3	28-Jun	0452-0651		20.64-20.63	5.73-5.62	921-926	7.51-7.54	2	0.14		3.5
5/GLB/05	Sp. Brk -upstream of Roselle STP	5.7	28-Jun	0213-0512	20.0-21.0	19.58-19.22	5.41-6.70	1038-785	7.62-7.65	8	0.08		0.14
6	Roselle Devlin STP	5.7	28-Jun	0220-0517	20.0-21.0	19.74-19.69	8.59-8.58	946-938	7.19-7.23	1	0.37		3.8
7GLB/06	Sp. Brk @ Foster Avenue	5.6	28-Jun	0237-0530	20.0-20.0	19.60-19.36	6.83-6.91	987-877	7.40-7.48	3	0.28		2.2
8/GLB07	Sp. Brk. @ Circle Avenue	4.9	28-Jun	0250-0540	21.0-21.0	19.67-19.41	5.55-5.70	1008-999	7.57-7.56	3	0.21		1.3
9/GLB08	Sp. Brk. @ Relwling Road	2.7	28-Jun	0312-0555	21.0-21.0	24.79-24.3	4.87-4.45	1295-1296	7.65-7.63	2	0.31		0.2
10	DC Nordic park STP to Sp. Brk.	2.5	28-Jun	0328-0605	21.0-22.0	19.72-19.62	6.10-6.41	309-312	7.46-7.50	1	0.08		2.9
11/GLB09	Sp. Brk. @ Maple & Lime Road	1.4	28-Jun	0347-0620	21.0-22.0	22.15-21.71	4.16-4.79	1530-1500	7.71-7.73	2	0.18		0.47
12/GLB01	Sp. Brk. @ Prospect Avenue	0.3	28-Jun	0400-0632	21.0-22.0	22.12-21.60	2.98-2.72	1453-1476	7.61-7.53	2	0.32		0.45
13	Itasla STP Salt Creek	28.2	28-Jun	0412-0640	21.0-23.0	20.03-20.0	5.00-4.66	1205-1205	6.91-6.82	3	0.25		3.2
14/GBL16	Salt Creek @ ____	28.1	28-Jun	0425-0651	21.0-22.0	20.29-20.33	5.49-5.36	960-976	7.25-7.25	2	0.22		3.4
15	Wooddale North STP	27.7	28-Jun	0410-0552	20.5-21.0	20.05-20.0	4.88-4.85	936-937	6.97-7.0	3	1.7		3.4
16/GL15	Salt Creek off Carter Avenue	27.1	28-Jun	0238-0507		20.44-20.33	5.78-5.80	938-945	7.49-7.92	2	1.4		3.4
17	Wooddale South STP	26.0	28-Jun	0354-0539	20.0-20.0	20.37-20.33	6.23-6.38	979-980	7.18-7.22	1	0.08		0.61
18/GL14	Salt Creek @DC __ off 3rd Street	25.6	28-Jun	0303-0529		21.44-20.77	5.65-5.23	962-953	7.76-7.50	2	0.14		3.2
19	Addison North STP	25.0	28-Jun	0425-0606	20.0-20.5	20.19-20.16	6.65-6.70	1154-1152	7.04-7.12	1	0.04		3.1
20/GL23	Salt Creek @ Wooddale Avenue	24.0	28-Jun	0322-0540		22.14-21.76	6.06-6.08	985-980	7.75-7.53	2	0.04		2.7
21	Addison South STP	23.3	28-Jun	0439-0623	20.0-20.5	21.14-21.11	6.09-5.95	917-908	7.09-7.11	2	0.13		3
22/GL04	Salt Creek @ Fullerton Avenue	23.1	28-Jun	0337-0552		22.07-21.97	5.69-5.61	965-984	7.72-7.59	2	0.02		2.8
23/GL22	Salt Creek @ Foot Bridge off RR Ave	20.1	28-Jun	0517-0704	20.5-22.5	21.50-21.35	3.86-4.41	986-1006	7.8-7.45	3	0.19		2.5
24	Satl Creek SD STP	20.0	28-Jun	0507-0653	22.0-22.5	20.43-20.43	6.20-5.37	921-907	6.80-6.84	2	0.71		4.7
25	Elmhurst STP	19.7	28-Jun	0455-0641	21.5-22.5	20.14-20.12	6.83-6.72	969-969	7.06-7.07	2	0.09		4.1
26/GL07	Salt Creek @ Butterfield Road	17.7	28-Jun	0238-0514	20.0-20.0	21.4-21.3	3.9-5.0	918-944	7.1-7.5	4	0.39		2.6
27/GL18	Salt Creek @ 31st., Oak Brk	13.7	28-Jun	0300-0530	19.0-19.0	22.2-22.0	4.1-2.3	1022-998	7.2-7.2	3	0.35		2.2
28/GL01	Salt Creek @ York Road	11.5	28-Jun	0315-0545	21.0-21.0	22.7-22.6	7.2-7.2	1022-1003	7.5-7.5	1	0.32		2.5
29/GL09	Salt Creek @ Wolf Road	8.8	28-Jun	0335-0555	19.0-20.0	22.6-22.4	6.3-6.0	1006-1031	7.5-7.5	2	0.26		2.6
30/GL20	Salt Creek @ Kemman Avenue	4.5	28-Jun	0405-0613	21.0-21.0	23.2-22.9	5.7-5.7	1044-1030	7.6-7.6	2	0.12		2.4
31/GLA06	Addison Creek. Upstream Bensenville S. STP	10.4	28-Jun	0200-0540	20.0-21.0	19.6-19.21	0.31-0.64	598-641	7.14-7.36	7	0.72		0.62
32	Bensenville South STP	10.3	28-Jun	0215-0551	20.0-21.0	21.25-21.18	4.95-5.24	944-928	7.22-7.26	1	1.5		3.3
33/GLA05	Addison Creek @ Diana Court	9.8	28-Jun	0230-0600	20.0-20.0	21.16-21.48	5.24-6.49	878-1099	7.32-7.78	3	1.3		2.7
34/GLA04	Addison Creek @ West Palmer Ave	7.1	28-Jun	0245-0613	20.5-19.0	21.60-21.22	4.36-4.50	811-895	7.59-7.69	3	0.67		1.8
35/GLA03	Addison Creek @ Parkview Drive	5.9	28-Jun	0300-0621	20.0-19.5	22.99-22.58	4.80-4.56	960-940	7.66-7.65	2	0.35		1.4
36/GLAD02	Addison Creek @ Washington Blvd.	3.2	28-Jun	0315-0628	20.0-20.0	22.06-21.92	2.56-3.43	1060-1122	7.55-7.70	4	0.3		0.94
37/GLA01	Addison Creek @ Cermak Road	0.3	28-Jun	0330-0647	19.5-20.0	21.89-21.66	0.81-1.03	790-901	7.35-7.52	6	0.36		0.65
38/GL11	Salt Creek @ maple Avenue	3.5	28-Jun	0420-0622	20.0-21.0	22.8-22.4	4.4-3.9	944-969	7.4-7.4	3	0.18		1.8
39/GL190	Salt Creek @ Washington Ave, Brkfld	1.1	28-Jun	0445-0640	20.0-21.0	22.9-22.8	4.9-4.3	991-985	7.4-7.4	3	0.14		1.9

TABLE D5 SUMMARY OF DIEL2 SURVEY DATA AUGUST 29-30, 1995 – ROUND 1

SALT CREEK - PHASE 1 TMDL
DIEL 2 - (AUGUST 29-30, 1995) Round 1

Site ID	Site Description	River Mile	Date	Time	Air Temp Degrees C	H2O Temp Degrees C	DO mg/L	Cond.	pH SU	CBOD mg/L	Amm-N mg/L	Clor *a* ug/L	Total P mg/L
1/GL21	Upsteam MWRD Egan	31.7	29-Aug	0826-1152	27-28	26.03-26.18	7.13-1.76	563-562	8.56-8.76	3	<0.01		0.059
2	MWRD Egan STP	31.7	29-Aug	0812-1142	27-28	22.36-22.39	6.73-6.80	8.62-8.56	6.98-7.13	2	<0.01		3.1
3/GL/10	Salt Creek @ Arlington Hts. Road	31.5	29-Aug	0850-1205	26-27.5	23.09-23.27	6.44-6.91	815-802	7.14-7.29		<0.01		2.5
4/GL/17	Salt Creek @ Thorndale Road	29.3	29-Aug	0913-1220	26.0-28.5	23.04-23.56	5.90-7.28	827-824	7.25-7.44	2			
5/GLB/05	Sp. Brk -upstream of Roselle STP	5.7	29-Aug	0745-1145	29-24	22.7-23.0	7.5-8.8	845-845	7.6-7.8	2	<0.01		0.08
6	Roselle Devlin STP	5.7	29-Aug	0800-1145	30-24	23.16-23.14	8.21-8.25	890-861	7.04-7.29	1	0.23		3.8
7GLB/06	Sp. Brk @ Foster Avenue	5.6	29-Aug	0815-1200	29-26	23.1-23.23	7.0-8.3	881-855	7.3-7.3		0.18		2.8
8/GLB07	Sp. Brk. @ Circle Avenue	4.9	29-Aug	0830-12--	29-24	22.9-23.14	6.2-6.7	922-920	7.4-7.5	1	0.15		1.9
9/GLB08	Sp. Brk. @ Relwling Road	2.7	29-Aug	0845-1215	39-26	25.8-25.99	3.8-3.86	989-981	7.4-7.4	2	0.49		0.19
10	DC Nordic park STP to Sp. Brk.	2.5	29-Aug	0900-1215	30-28	21.7-21.67	6.5-6.16	2900-2990	7.3-7.28	1	<0.01		3.0
11/GLB09	Sp. Brk. @ Maple & Lime Road	1.4	29-Aug	0915-1230	30-27	24.6-24.91	4.6-5.0	1080-1119	7.5-7.45		0.20		0.35
12/GLB01	Sp. Brk. @ Prospect Avenue	0.3	29-Aug	0930-1230	24-26	24.2-25.08	5.3-6.5	1108-1076	7.6-7.7	2	0.2		0.35
13	Itasla STP Salt Creek	28.2	29-Aug	1000-1245	24-24	23.3-23.3	5.5-5.64	1075-1064	6.8-6.92	2	0.08		2.7
14/GBL16	Salt Creek @ ____	28.1	29-Aug	1015-1245	24-24	23.4-24.08	6.00-7.28	883-873	7.1-7.28		0.03		2.2
15	Wooddale North STP	27.7	29-Aug	0800-1155	25-27	23.46-23.62	5.72-5.75	892-926	7.18-7.13	2	<0.01		2.5
16/GL15	Salt Creek off Carter Avenue	27.1	29-Aug	0945-1320	25-28	23.06-23.87	5.90-7.08	886-889	7.43-7.61		<0.01		0.3
17	Wooddale South STP	26.0	29-Aug	0820-1135	25-28	22.67-22.78	7.10-7.35	908-918	7.03-7.03	1	0.07		33
18/GL14	Salt Creek @DC __ off 3rd Street	25.6	29-Aug	1002-1334	25-29	23.11-23.55	5.47-6.13	867-875	7.49-7.60	2	<0.01		2.4
19	Addison North STP	25.0	29-Aug	0845-1205	29-28	23.17-23.32	7.16-7.28	940-956	6.95-7.13	2	<0.01		2.9
20/GL23	Salt Creek @ Wooddale Avenue	24.0	29-Aug	1030-1342	26-29.5	23.45-23.91	6.39-6.85	896-885	7.57-7.68		<0.01		2.3
21	Addison South STP	23.3	29-Aug	0915-1220	26-29	24.12-24.18	6.55-6.96	905-892	7.05-7.10	3			
22/GL04	Salt Creek @ Fullerton Avenue	23.1	29-Aug	0930-1215	27-29	23.75-23.89	5.95-6.26	910-907	7.45-7.47		0.02		2.21
23/GL22	Salt Creek @ Foot Bridge off RR Ave	20.1	29-Aug	1020-1330	27-35	23.90-24.34	5.57-6.05	922-928	7.51-7.56	1	0.04		2.4
24	Satl Creek SD STP	20.0	29-Aug	1000-1305	26-35	23.80-23.89	6.50-6.28	826-834	6.93-9.94	1	0.96		4.6
25	Elmhurst STP	19.7	29-Aug	0950-1300	27-35.0	23.71-24.06	7.20-7.99	835-861	7.21-7.21	1	<0.01		3.9
26/GL07	Salt Creek @ Butterfield Road	17.7	29-Aug	0715-1130	28-31	23.5-23.9	6.2-6.7	928-911	7.2-7.3		0.19		2.6
27/GL18	Salt Creek @ 31st., Oak Brk	13.7	29-Aug	0748-1145	28-31	24.3-24.2	5.7-5.3	933-922	7.3-7.3	2	0.2		2.4
28/GL01	Salt Creek @ York Road	11.5	29-Aug	0810-1200	29.50-31.0	24.56-24.8	6.8-7.2	901-911	7.6-7.6	2	0.11		2.2
29/GL09	Salt Creek @ Wolf Road	8.8	29-Aug	0830-1210	29.5-31.5	24.5-24.8	6.4-6.9	904-933	7.6-7.6		0.1		2.0
30/GL20	Salt Creek @ Kemman Avenue	4.5	29-Aug	0900-1220	30.31.5	24.6-24.8	6.3-6.7	919-910	7.5-7.6	2	0.04		1.9
31/GLA06	Addison Creek. Upstream Bensenville S. STP	10.4	29-Aug	0745-1130	26-29	22.4-22.7	2.7-2.9	662-692	7.0-7.0	5	0.40		0.38
32	Bensenville South STP	10.3	29-Aug	0800-1130	26-29	24.1-24.1	4.6-5.6	872-873	6.8-6.9	1	0.05		3.6
33/GLA05	Addison Creek @ Diana Court	9.8	29-Aug	0830-1145	26-29	24.0-24.0	6.2-6.8	867-855	6.8-7.0		0.1		3.3
34/GLA04	Addison Creek @ West Palmer Avenue	7.1	29-Aug	0845-1200	26-29	23.7-24.2	4.9-5.5	810-810	7.1-7.3	2	0.24		1.8
35/GLA03	Addison Creek @ Parkview Drive	5.9	29-Aug	0915-1215	26-29	24.6-25.1	5.5-6.3	872-859	7.4-7.5	3	0.24		1.1
36/GLAD02	Addison Creek @ Washington Blvd.	3.2	29-Aug	0930-1230	26-29	24.3-24.8	4.9-6.2	1071-1060	7.5-7.7	2	0.25		0.89
37/GLA01	Addison Creek @ Cermak Road	0.3	29-Aug	1000-1245	26-29	24.1-24.3	3.1-3.8	883-1000	7.5-7.4	3	0.22		0.68
38/GL11	Salt Creek @ maple Avenue	3.5	29-Aug	0915-1230	30-31.5	24.5-24.7	5.1-5.8	922-933	7.4-7.5	2	0.06		1.51
39/GL190	Salt Creek @ Washington Ave, Brkfld	1.1	29-Aug	0930-1240	30.5-32	24.5-24.7	4.7-5.4	920-918	7.3-7.4	2	0.08		

TABLE D6 SUMMARY OF DIEL2 SURVEY DATA AUGUST 29-30, 1995 – ROUND 2

SALT CREEK - PHASE 1 TMDL
DIEL 2- (August 29 & 30, 1995) Round 2

Site ID	Site Description	River Mile	Date	Time	Air Temp Degrees C	H2O Temp Degrees C	DO mg/L	Cond.	pH SU	CBOD mg/L	Amm-N mg/L	Clor *a* ug/L	Total P mg/L
1/GL21	Upsteam MWRD Egan	31.7	29-Aug	1418-1627	28-29	26.93-28.18	8.87-8.59	558-580	9.0-9.11	2	<0.01		0.05
2	MWRD Egan STP	31.7	29-Aug	1408-1622	29-30	22.47-22-59	7.03-6.89	847-852	7.2-7.3	1.2	<0.01		3.4
3/GL/10	Salt Creek @ Arlington Hts. Road	31.5	29-Aug	1430-1637	34-30	23.60-23.85	7.56-7.76	799-797	7.39-7.48	1.4	<0.01		2.7
4/GL/17	Salt Creek @ Thorndale Road	29.3	29-Aug	1500-1655	33-29	24.53-24.97	8.84-9.56	818-811	7.61-7.76	1.2	<0.01		2.4
5/GLB/05	Sp. Brk -upstream of Roselle STP	5.7	29-Aug	1315-1400	24-25	23.28-23.59	8.84-8.7	836-835	7.9-7.9	1	<0.01		0.08
6	Roselle Devlin STP	5.7	29-Aug	1415-1645	25-26	23.3-23.6	8.2-8.07	875-896	7.14-7.20	1	<0.01		3.7
7GLB/06	Sp. Brk @ Foster Avenue	5.6	29-Aug	1330-1430	24-25	23.36-23.7	8.5-8.8	853-861	7.7-7.4	1.2	<0.01		2.8
8/GLB07	Sp. Brk. @ Circle Avenue	4.9	29-Aug	1330-1430	25-26	23.43-23.79	7.1-7.34	926-929	7.5-7.58	1.1	<0.01		1.9
9/GLB08	Sp. Brk. @ Relwling Road	2.7	29-Aug	1345-1445	25-26	26.48-27.11	4.27-4.74	982-985	7.47-7.49	2	0.21		0.19
10	DC Nordic park STP to Sp. Brk.	2.5	29-Aug	1500-1730	25-25	21.57-22.24	6.5-6.2	3040-2950	7.36-7.45	1	<0.1		3.2
11/GLB09	Sp. Brk. @ Maple & Lime Road	1.4	29-Aug	1515-1745	25-25	25.27-26.29	5.58-5.70	1155-1161	7.55-7.72	1.6	0.06		0.38
12/GLB01	Sp. Brk. @ Prospect Avenue	0.3	29-Aug	1515-1800	15-25	27.2-27.38	7.6-7.6	1073-1079	7.8-7.85	1.5	0.03		0.35
13	Itasla STP Salt Creek	28.2	29-Aug	1530-1800	25-25	23.43-23.47	5.82-5.69	1067-1065	6.97-7.00	2	<0.01		2.7
14/GBL16	Salt Creek @ ____	28.1	29-Aug	1545-1815	26-25	25.36-25.64	8.8-8.96	867-855	7.35-7.49	2	<0.01		2.2
15	Wooddale North STP	27.7	29-Aug	1415-1620	33-33	23.74-23.94	5.90-5.69	935-927	7.08-7.09	2	<0.01		2.8
16/GL15	Salt Creek off Carter Avenue	27.1	29-Aug	1520-1710	32-28.5	24.78-25.28	8.20-7.73	884-878	7.75-7.88	3	<0.01		2.0
17	Wooddale South STP	26.0	29-Aug	1400-1605	33.0-33.0	22.95-23.21	7.18-7.20	928-935	7.03-7.05	2	<0.01		2.5
18/GL14	Salt Creek @DC __ off 3rd Street	25.6	29-Aug	1538-1729	32-26.5	24.25-24.89	6.81-7.60	888-890	7.68-7.78	3	<0.01		2.2
19	Addison North STP	25.0	29-Aug	1420-1630	30-30	23.63-23.93	7.31-7.29	960-950	7.14-7.15	2	<0.01		2.9
20/GL23	Salt Creek @ Wooddale Avenue	24.0	29-Aug	1555-1737	33-27	24.71-24.71	7.28-7.38	874-880	7.76-7.81	2	<0.01		2.4
21	Addison South STP	23.3	29-Aug	1450-1645	35-34	24.53-24.53	7.25-7.22	891-885	7.17-7.16	2	<0.01		3.5
22/GL04	Salt Creek @ Fullerton Avenue	23.1	29-Aug	1445-1640	35-34	24.40-25.0	6.85-7.16	894-895	7.52-7.55	2	0.14		2.2
23/GL22	Salt Creek @ Foot Bridge off RR Ave	20.1	29-Aug	1545-1720	41-33	25-25.28	6.40-6.51	922-925	7.6-7.6	2	0.04		2.2
24	Satl Creek SD STP	20.0	29-Aug	1525-1708	32-32	24.14-24.20	6.43-6.27	838-821	6.92-6.90	2	1.5		5.2
25	Elmhurst STP	19.7	29-Aug	1500-1700	35-34	24.55-24.72	8.00-8.00	858-858	7.21-7.2	2	<0.1		3.6
26/GL07	Salt Creek @ Butterfield Road	17.7	29-Aug	1425-1700	32-33	24.7-25.3	7.0-7.4	923-929	7.4-7.4	2	0.24		2.6
27/GL18	Salt Creek @ 31st., Oak Brk	13.7	29-Aug	1440-1718	32-32	24.5-24.8	5.9-6.5	907-920	7.4-7.5	2	0.32		2.4
28/GL01	Salt Creek @ York Road	11.5	29-Aug	1500-1730	32-32	24.55-25.57	7.6-7.43	919-928	7.78-7.78	2	0.27		2.4
29/GL09	Salt Creek @ Wolf Road	8.8	29-Aug	1515-1740	32-32	25.7-25.9	7.6-7.7	907-920	7.8-7.8	2	0.13		2.2
30/GL20	Salt Creek @ Kemman Avenue	4.5	29-Aug	1530-1755	32.5-30	25.8-25.9	7.9-7.4	902-903	7.8-7.8	2	0.11		1.9
31/GLA06	Addison Creek. Upstream Bensenville S. STP	10.4	29-Aug	1415-1630	33-31	23.5-24.5	3.2-4.3	689-703	7.2-7.3	3	0.31		0.36
32	Bensenville South STP	10.3	29-Aug	1430-1630	33-31	24.2-24.3	5.8-5.5	866-875	7.0-7.0	1	0.09		3.4
33/GLA05	Addison Creek @ Diana Court	9.8	29-Aug	1430-1650	33-31	24.3-24.4	7.4-7.7	866-860	7.2-7.2	1	0.09		3.3
34/GLA04	Addison Creek @ West Palmer Ave	7.1	29-Aug	1445-1700	33-31	25.4-16.2	7.1-7.5	813-815	7.5-7.6	2	0.47		2.0
35/GLA03	Addison Creek @ Parkview Drive	5.9	29-Aug	1500-1715	33-31	26.7-27.4	7.9-7.9	841-835	7.9-7.8	2	0.31		1.2
36/GLAD02	Addison Creek @ Washington Blvd.	3.2	29-Aug	1530-1730	33-31	26.3-26.4	8.3-7.7	1052-1049	8.0-8.0	2	0.22		0.82
37/GLA01	Addison Creek @ Cermak Road	0.3	29-Aug	1545-1745	33-31	25-25	4.9-4.6	1010-1005	7.7-7.7	2	0.22		0.69
38/GL11	Salt Creek @ Maple Avenue	3.5	29-Aug	1545-1800	33-30	25.8-25-7	7.4-7.7	920-926	7.7-7.5	2	0.13		1.6
39/GL190	Salt Creek @ Washington Ave, Brkfld	1.1	29-Aug	1600-1815	33-30	25.7-25.9	6.7-6.8	918-915	7.5-7.5	2	0.11		1.7

TABLE D7 SUMMARY OF DIEL2 SURVEY DATA AUGUST 29-30, 1995 – ROUND 3

SALT CREEK - PHASE 1 TMDL
DIEL 2 - (August 30, 1995) Round 3

Site ID	Site Description	River Mile	Date	Time	Air Temp Degrees C	H2O Temp Degrees C	DO mg/L	Cond.	pH SU	CBOD mg/L	Amm-N mg/L	Clor *a* ug/L	Total P mg/L
1/GL21	Upsteam MWRD Egan	31.7	30-Aug	0215-0420	21-22	26.25-25.95	6.93-5.18	565-569	8.75-8.62	3	0.1		0.06
2	MWRD Egan STP	31.7	30-Aug	0205-0612	21-22	22.50-22.41	7.11-6.97	909-874	7.21-7.24	1	0.11		3.47
3/GL/10	Salt Creek @ Arlington Hts. Road	31.5	30-Aug	0235-0440	24-23	23.16-23.04	6.77-6.51	844-842	7.28-7.30	1	0.11		2.8
4/GL/17	Salt Creek @ Thorndale Road	29.3	30-Aug	0255-0500	23-24	23.27-23.14	6.19-5.85	819-827	7.44-7.49	2	0.12		2.8
5/GLB/05	Sp. Brk -upstream of Roselle STP	5.7	30-Aug	0246-050	24-24	22.48-22.24	7.14-7.16	794-802	7.60-7.60	1	<0.01		0.1
6	Roselle Devlin STP	5.7	30-Aug	0242-0457	24-24	23.41-23.39	8.43-8.33	919-913	7.06-7.11	1	0.01		3.6
7GLB/06	Sp. Brk @ Foster Avenue	5.6	30-Aug	0302-0513	24-24	23.03-22.89	7.29-7.13	891-880	7.34-7.44	1	<0.01		2.66
8/GLB07	Sp. Brk. @ Circle Avenue	4.9	30-Aug	0310-0524	24-24	23.18-22.91	6.11-6.08	948-946	7.39-7.44	1	<0.01		1.8
9/GLB08	Sp. Brk. @ Relwling Road	2.7	30-Aug	0324-0539	24-24	26.18-26.03	4.90-5.05	1025-1044	7.40-7.46	1	0.35		0.22
10	DC Nordic park STP to Sp. Brk.	2.5	30-Aug	0333-0549	24-24	21.94-21.87	5.8-6.11	2850-2830	7.28-7.32	1	<0.01		3.3
11/GLB09	Sp. Brk. @ Maple & Lime Road	1.4	30-Aug	0345-0628	24-25	24.67-25.15	4.65-5.12	1181-1064	7.43-7.51	2	0.07		0.46
12/GLB01	Sp. Brk. @ Prospect Avenue	0.3	30-Aug	0356-0640	24-25	24.25-23.94	4.50-5.19	1192-1254	7.47-7.53	2	0.04		0.36
13	Itasla STP Salt Creek	28.2	30-Aug	0408-0645	24-25	23.32-23.30	5.58-5.32	1092-1088	6.86-7.06	5	0.01		2.7
14/GBL16	Salt Creek @ ____	28.1	30-Aug	0425-0653	24-25	23.36-23.34	5.68-5.68	866-919	7.13-7.27	3	<0.01		2.5
15	Wooddale North STP	27.7	30-Aug	0302-0444	24-23	23.49-23.45	5.20-5.30	852-850	6.85-6.81	2	0.05		2.9
16/GL15	Salt Creek off Carter Avenue	27.1	30-Aug	0511-0650	22-23	23.2-23.11	6.01-5.94	860-865	7.63-7.65	2	0.14		2.4
17	Wooddale South STP	26.0	30-Aug	0248-0432	23-23	22.68-22.64	6.87-7.09	881-881	7.04-7.07	1	0.02		2.6
18/GL14	Salt Creek @DC __ off 3rd Street	25.6	30-Aug	0525-0700	23-24	23.78-23.48	6.40-6.08	862-859	7.7-7.71	1	0.16		2.2
19	Addison North STP	25.0	30-Aug	0316-0454	24.5-23	23.28-23.23	6.56-6.54	990-994	6.99-7.06	1	0.03		3
20/GL23	Salt Creek @ Wooddale Avenue	24.0	30-Aug	0540-0710	24-27	24.29-24.18	7.28-7.04	890-885	7.81-7.82	1	0.18		2.2
21	Addison South STP	23.3	30-Aug	0330-0505	23-24	24.25-24.23	6.86-6.78	848-846	7.06-7.05	1	0.06		3.5
22/GL04	Salt Creek @ Fullerton Avenue	23.1	30-Aug	0338-0512	24-23.5	24.4-24.33	6.58-6.01	861-887	7.47-7.43	1	0.06		2.2
23/GL22	Salt Creek @ Foot Bridge off RR Ave	20.1	30-Aug	0225-0413	23-24	24.27-24.00	5.97-5.31	870-886	7.54-7.47	1	0.07		2.2
24	Satl Creek SD STP	20.0	30-Aug	0214-0554	23-24	23.75-23.67	6.17-5.80	824-830	6.81-6.71	1	3.1		5.4
25	Elmhurst STP	19.7	30-Aug	0203-0526	22-23	23.84-23.74	7.1-7.04	828-829	7.05-7.00	1	0.12		3.8
26/GL07	Salt Creek @ Butterfield Road	17.7	30-Aug	0205-0440	23-25	24.3-24.0	6.5-6.3	909-904	7.4-7.4	2	0.18		2.6
27/GL18	Salt Creek @ 31st., Oak Brk	13.7	30-Aug	0225-0456	23-23	25.2-24.8	6.5-5.8	933-932	7.4-7.4	2	0.23		2.27
28/GL01	Salt Creek @ York Road	11.5	30-Aug	0245-0510	23-23	24.5-24.3	6.8-6.7	923-923	7.6-7.6	2	0.28		2.3
29/GL09	Salt Creek @ Wolf Road	8.8	30-Aug	0310-0525	23-23	24.7-24.5	6.1-5.9	934-944	7.6-7.6	3	0.19		2.2
30/GL20	Salt Creek @ Kemman Avenue	4.5	30-Aug	0330-0546	23-24	24.8-24.5	5.8-5.5	921-926	7.6-7.6	2	0.09		2.2
31/GLA06	Addison Creek. Upstream Bensenville S. STP	10.4	30-Aug	0200-0545	24-25	22.01-21.99	3.71-4.02	760-730	7.53-7.75	3	0.3		0.62
32	Bensenville South STP	10.3	30-Aug	0210-0550	25-24	24.35-24.39	4.91-5.16	845-850	7.13-7.31	2	0.07		2.9
33/GLA05	Addison Creek @ Diana Court	9.8	30-Aug	0225-0600	24-25	24.13-23.69	5.68-6.48	840-910	7.36-7.60	2	0.1		2.8
34/GLA04	Addison Creek @ West Palmer Ave	7.1	30-Aug	0240-0615	24-25	24.44-24.42	3.24-5.38	820-800	7.70-7.75	2	0.64		2
35/GLA03	Addison Creek @ Parkview Drive	5.9	30-Aug	0250-0625	25-25	24.55-24.46	4.87-5.08	835-830	7.66-7.75	2	0.3		1.3
36/GLAD02	Addison Creek @ Washington Blvd.	3.2	30-Aug	0305-0635	24-24	24.16-24.27	4.11-4.05	990-960	7.72-7.82	2	0.21		1
37/GLA01	Addison Creek @ Cermak Road	0.3	30-Aug	0320-0655	24-25	24.42-24.55	3.80-4.00	990-1000	7.84-7.93	2	0.16		0.7
38/GL11	Salt Creek @ maple Avenue	3.5	30-Aug	0346-0603	23-24	24.5-24.4	5.1-5.0	934-939	7.5-7.5	3	0.14		2
39/GL190	Salt Creek @ Washington Ave, Brkfld	1.1	30-Aug	0408-0617	24-25	24.7-24.5	5.0-4.8	916-918	7.4-7.5	2	0.12		1.8

TABLE D8 SUMMARY OF DIEL2 SURVEY DATA AUGUST 29-30, 1995 – ROUND 4

SALT CREEK - PHASE 1 TMDL
DIEL 2 - (August 29-30, 1995) Round 4

Site ID	Site Description	River Mile	Date	Time	Air Temp Degrees C	H2O Temp Degrees C	DO mg/L	Cond.	pH SU	CBOD mg/L	Amm-N mg/L	Clor *a* ug/L	Total P mg/L
1/GL21	Upsteam MWRD Egan	31.7	29-30	2006-0035	23-21	27.83-26.57	8.99-7.17	563-566	8.92-8.75	2	0.05		0.06
2	MWRD Egan STP	31.7	29-30	1957-0025	23-21	22.75-22.56	7.39-7.21	871-893	7.04-7.16	1	0.07		3.5
3/GL/10	Salt Creek @ Arlington Hts. Road	31.5	29-30	2027-0055	25-23	23.72-23.31	7.55-6.91	813-829	7.22-7.27	1	0.08		2.8
4/GL/17	Salt Creek @ Thorndale Road	29.3	29-30	2050-0145	26-24	24.03-23.40	7.92-6.22	811-816	7.45-7.44	1	0.07		2.5
5/GLB/05	Sp. Brk -upstream of Roselle STP	5.7	29-29	1953-2235	23-22	24.15-23.38	7.78-7.11	844-812	7.63-7.61	2	<0.01		0.09
6	Roselle Devlin STP	5.7	29-29	1947-2230	23-22	23.61-23.52	8.42-8.16	947-941	6.66-6.64	2	0.12		3.8
7GLB/06	Sp. Brk @ Foster Avenue	5.6	29-30	206-0058	23-23	23.68-23.27	7.53-7.38	924-910	6.77-7.28	1	0.07		3
8/GLB07	Sp. Brk. @ Circle Avenue	4.9	29-29	2020-2257	23-22	24.30-23.88	6.32-5.88	948-950	7.11-7.24	1	<0.01		1.9
9/GLB08	Sp. Brk. @ Relwling Road	2.7	29-29	2040-2318	23-22	27.11-26.63	4.37-3.62	1018-1017	7.08-7.30	1	0.23		0.19
10	DC Nordic park STP to Sp. Brk.	2.5	29-30	2047-0130	23-23	22.05-22.12	6.19-5.57	2990-2880	7.10-7.28	1	<0.01		3.3
11/GLB09	Sp. Brk. @ Maple & Lime Road	1.4	29-29	2105-2337	23-22	25.69-25.15	4.86-4.56	1189-1230	7.15-7.45	1	<0.01		0.44
12/GLB01	Sp. Brk. @ Prospect Avenue	0.3	29-29	2120-2351	23-22	26.14-25.32	5.79-5.04	1149-1167	7.28-7.55	2	0.08		0.37
13	Itasla STP Salt Creek	28.2	29-30	2135-0003	23-22	23.45-23.41	5.74-5.73	1093-1094	6.66-6.84	3	<0.01		2.7
14/GBL16	Salt Creek @ ____	28.1	29-30	2147-0013	23-22	24.43-23.87	7.12-6.22	864-861	7.04-7.14	2	<0.01		2.3
15	Wooddale North STP	27.7	29-30	2205-0119	25.5-25.0	23.62-23.50	5.02-5.14	860-852	6.88-6.87	3	<0.01		3
16/GL15	Salt Creek off Carter Avenue	27.1	29-29	2108-2315	25-23	24.87-24.22	8.19-7.30	873-864	7.66-7.61	2	0.1		2.2
17	Wooddale South STP	26.0	29-29	2145-2328	24-22.5	22.82-22.76	6.61-6.47	891-885	6.95-6.95	1	<0.01		2.5
18/GL14	Salt Creek @DC __ off 3rd Street	25.6	29-29	2130-2345	25-23	25.17-24.19	8.27-7.86	889-881	7.70-7.73	2	0.09		2.1
19	Addison North STP	25.0	29-30	2216-0131	25-23	23.42-23.26	6.77-6.73	985-992	7.06-6.95	2	<0.01		3
20/GL23	Salt Creek @ Wooddale Avenue	24.0	29-29	2145-2359	26-24	24.43-24.49	7.38-7.41	907-910	7.63-7.70	2	0.11		2.2
21	Addison South STP	23.3	29-30	2008-0001	26-24	24.42-24.33	7.06-7.00	851-852	7.09-7.11	2	0.04		3.5
22/GL04	Salt Creek @ Fullerton Avenue	23.1	29-30	2018-0007	27-24	24.6-24.33	5.95-6.50	896-865	7.39-7.46	2	0.17		2.2
23/GL22	Salt Creek @ Foot Bridge off RR Ave	20.1	29-30	2119-0040	28-25	25.04-24.56	6.29-6.14	883-866	7.55-7.56	2	<0.01		2.1
24	Satl Creek SD STP	20.0	29-30	2109-0030	28-24	23.89-23.83	6.21-6.38	809-820	6.79-6.82	1	0.8		5.4
25	Elmhurst STP	19.7	29-30	2044-0022	26-24	24.15-23.88	7.43-7.30	825-827	7.07-7.05	1	<0.01		3.9
26/GL07	Salt Creek @ Butterfield Road	17.7	29-29	1950-2325	27-24	24.9-24.5	6.6-6.5	924-935	7.4-7.4	4	0.02		2.2
27/GL18	Salt Creek @ 31st., Oak Brk	13.7	29-29	2016-2340	27-24.5	25.1-25.2	6.8-6.9	925-918	7.4-7.4	1	0.02		2.39
28/GL01	Salt Creek @ York Road	11.5	29-29	2045-2355	26-23	25.4-24.9	7.1-7.0	929-923	7.7-7.6	1	0.05		2.2
29/GL09	Salt Creek @ Wolf Road	8.8	29-30	2115-0010	25-24	25.6-25.1	7.0-6.3	865-937	7.8-7.7	2	<0.01		2.3
30/GL20	Salt Creek @ Kemman Avenue	4.5	29-30	2140-0024	24.5-23.5	25.5-25.2	6.3-6.0	910-891	7.6-7.6	2	<0.01		2
31/GLA06	Addison Creek. Upstream Bensenville S. STP	10.4	29-29	1935-2310	27-25	23.15-22.31	3.0-3.26	713-740	7.4-7.55	4	0.07		0.34
32	Bensenville South STP	1.3	29-29	1945-2145	26-25	24.26-24.31	4.38-4.30	860-860	7.05-7.08	1	<0.01		3.3
33/GLA05	Addison Creek @ Diana Court	9.8	29-29	2000-2325	25-24	24.2-24.2	6.55-6.02	861-845	7.17-7.27	1	<0.01		2.9
34/GLA04	Addison Creek @ West Palmer Ave	7.1	29-29	2010-2205	26-26	25.25-25.12	5.39-5.02	840-850	7.51-7.50	3	0.24		2
35/GLA03	Addison Creek @ Parkview Drive	5.9	29-29	2020-2215	26-26	25.6-25.08	5.75-4.74	821-832	7.57-7.61	3	0.06		1.3
36/GLAD02	Addison Creek @ Washington Blvd.	3.2	29-30	2035-0005	25-24	25.79-24.55	5.39-4.30	947-1007	7.77-7.74	4	0.04		0.72
37/GLA01	Addison Creek @ Cermak Road	0.3	29-30	2100-0020	25-24	24.64-24.35	4.36-3.74	992-991	7.6-7.74	3	0.03		0.7
38/GL11	Salt Creek @ maple Avenue	3.5	29-30	2210-0037	25-24	25.3-24.9	5.7-5.2	920-934	7.6-7.5	3	<0.01		1.6
39/GL190	Salt Creek @ Washington Ave, Brkfld	1.1	29-30	2235-0050	25-24	25.5-25.1	6.1-5.3	911-917	7.5-7.5	2	<0.01		1.7

Appendix E: QUAL2E Input Files

TABLE E1 CALIBRATION INPUT FOR QUAL2E

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* * * QUAL-2E  STREAM QUALITY ROUTING MODEL * * *
                                                           Version 3.21  -  Feb. 1995

         $$$ (PROBLEM TITLES) $$$

        CARD TYPE                             QUAL-2E PROGRAM TITLES
        TITLE01             Salt Creek CALIBRATION
        TITLE02
        TITLE03  YES        CONSERVATIVE MINERAL I      Con IN   ??
        TITLE04  NO         CONSERVATIVE MINERAL II
        TITLE05  NO         CONSERVATIVE MINERAL III
        TITLE06  NO         TEMPERATURE
        TITLE07  YES        5-DAY BIOCHEMICAL OXYGEN DEMAND
        TITLE08  YES        ALGAE AS CHL-A IN UG/L
        TITLE09  YES        PHOSPHORUS CYCLE AS P IN MG/L
        TITLE10               (ORGANIC-P; DISSOLVED-P)
        TITLE11  YES        NITROGEN CYCLE AS N IN MG/L
        TITLE12               (ORGANIC-N; AMMONIA-N; NITRITE-N;' NITRATE-N)
        TITLE13  YES        DISSOLVED OXYGEN IN MG/L
        TITLE14  NO         FECAL COLIFORM IN NO./100 ML
        TITLE15  NO         ARBITRARY NON-CONSERVATIVE
        ENDTITLE

         $$$ DATA TYPE 1 (CONTROL DATA) $$$

        CARD TYPE                                     CARD TYPE
        LIST DATA INPUT              0.00000                                        0.00000
        WRITE OPTIONAL SUMMARY       0.00000                                        0.00000
        NO FLOW AUGMENTATION         0.00000                                        0.00000
        STEADY STATE                 0.00000                                        0.00000
        TRAPAZOIDAL                  0.00000                                        0.00000
        NO PRINT LCD/SOLAR DATA      0.00000                                        0.00000
        NO PLOT DO AND BOD DATA      0.00000                                        0.00000
        FIXED DNSTM CONC (YES=1)=    0.00000          5D-ULT BOD CONV K COEF  =    0.23000
        INPUT METRIC            =    0.00000          OUTPUT METRIC           =    0.00000
        NUMBER OF REACHES       =   17.00000          NUMBER OF JUNCTIONS     =    2.00000
        NUM OF HEADWATERS       =    3.00000          NUMBER OF POINT LOADS   =   12.00000
        TIME STEP (HOURS)       =    0.25000          LNTH. COMP. ELEMENT (DX)=    0.20000
        MAXIMUM ROUTE TIME (HRS)=   30.00000          TIME INC. FOR RPT2 (HRS)=    1.00000
        LATITUDE OF BASIN (DEG) =   41.90000          LONGITUDE OF BASIN (DEG)=   87.96000
        STANDARD MARIDIAN (DEG) =   75.00000          DAY OF YEAR START TIME  =  213.00000
        EVAP. COEF.,(AE)        =    0.00068          EVAP. COEF.,(BE)        =    0.00027
        ELEV. OF BASIN (ELEV)   =  660.00000          DUST ATTENUATION COEF.  =    0.06000
        ENDATA1                      0.00000                                        0.00000

         $$$ DATA TYPE 1A (ALGAE PRODUCTION AND NITROGEN OXIDATION CONSTANTS) $$$

        CARD TYPE                                           CARD TYPE
        O UPTAKE BY NH3 OXID(MG O/MG N)=    3.4300          O UPTAKE BY NO2 OXID(MG O/MG N)=    1.1400
        O PROD  BY ALGAE (MG O/MG A)   =    1.6000          O UPTAKE BY ALGAE (MG O/MG A)  =    1.9500
        N CONTENT OF ALGAE (MG N/MG A) =    0.0900          P CONTENT OF ALGAE (MG O/MG A) =    0.0150
        ALG MAX SPEC GROWTH RATE(1/DAY)=    2.6000          ALGAE RESPIRATION RATE (1/DAY) =    0.5000
        N HALF SATURATION CONST (MG/L) =    0.3000          P HALF SATURATION CONST (MG/L) =    0.0400
        LIN ALG SHADE CO (1/FT-UGCHA/L=)    0.0008          NLIN SHADE(1/FT-(UGCHA/L)**2/3)=    0.0000
        LIGHT FUNCTION OPTION (LFNOPT) =    1.0000          LIGHT SAT'N COEF (BTU/FT2-MIN) =    0.1100
        DAILY AVERAGING OPTION (LAVOPT)=    2.0000          LIGHT AVERAGING FACTOR (AFACT) =    0.9200
        NUMBER OF DAYLIGHT HOURS (DLH) =   13.2800          TOTAL DAILY SOLR RAD (BTU/FT-2)= 1392.0000
        ALGY GROWTH CALC OPTION(LGROPT)=    2.0000          ALGAL PREF FOR NH3-N (PREFN)   =    0.1000
        ALG/TEMP SOLR RAD FACTOR(TFACT)=    0.4400          NITRIFICATION INHIBITION COEF  =   10.0000
        ENDATA1A                            0.0000                                              0.0000

$$$ DATA TYPE 1B (TEMPERATURE CORRECTION CONSTANTS FOR RATE COEFFICIENTS) $$$

        CARD TYPE     RATE CODE     THETA VALUE

        THETA( 1)      BOD DECA        1.047     DFLT
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THETA( 2)      BOD SETT       1.024     DFLT
THETA( 3)      OXY TRAN       1.024     DFLT
THETA( 4)      SOD RATE       1.060     DFLT
THETA( 5)      ORGN DEC       1.047     DFLT
THETA( 6)      ORGN SET       1.024     DFLT
THETA( 7)      NH3 DECA       1.083     DFLT
THETA( 8)      NH3 SRCE       1.074     DFLT
THETA( 9)      NO2 DECA       1.047     DFLT
THETA(10)      PORG DEC       1.047     DFLT
THETA(11)      PORG SET       1.024     DFLT
THETA(12)      DISP SRC       1.074     DFLT
THETA(13)      ALG GROW       1.047     DFLT
THETA(14)      ALG RESP       1.047     DFLT
THETA(15)      ALG SETT       1.024     DFLT
THETA(16)      COLI DEC       1.047     DFLT
THETA(17)      ANC DECA       1.000     DFLT
THETA(18)      ANC SETT       1.024     DFLT
THETA(19)      ANC SRCE       1.000     DFLT
ENDATA1B

 $$$ DATA TYPE 2 (REACH IDENTIFICATION) $$$

CARD TYPE           REACH ORDER AND IDENT              R. MI/KM            R. MI/KM
STREAM REACH     1.0  RCH= EGAN -SPRING BK   FROM        31.8    TO          28.4
STREAM REACH     2.0  RCH=    SPRING BROOK   FROM         2.8    TO           0.0
STREAM REACH     3.0  RCH=   SPR BRK-ADD N   FROM        28.4    TO          25.0
STREAM REACH     4.0  RCH=   ADD N - ADD S   FROM        25.0    TO          23.4
STREAM REACH     5.0  RCH= ADD S - ST CHAR   FROM        23.4    TO          20.4
STREAM REACH     6.0  RCH=       CSO REACH   FROM        20.4    TO          19.4
STREAM REACH     7.0  RCH=     STEEP REACH   FROM        19.4    TO          18.6
STREAM REACH     8.0  RCH=      FLAT REACH   FROM        18.6    TO          15.6
STREAM REACH     9.0  RCH= FLAT REACH-31ST   FROM        15.6    TO          13.8
STREAM REACH    10.0  RCH= 31ST -FULL PARK   FROM        13.8    TO          11.4
STREAM REACH    11.0  RCH= DWN FR FULL PRK   FROM        11.4    TO           7.4
STREAM REACH    12.0  RCH=  TO CONF ADD CR   FROM         7.4    TO           3.6
STREAM REACH    13.0  RCH= BENSENVILLE DWN   FROM        10.4    TO           7.2
STREAM REACH    14.0  RCH= ADDISON REACH 2   FROM         7.2    TO           5.8
STREAM REACH    15.0  RCH= ADDISON REACH 3   FROM         5.8    TO           3.2
STREAM REACH    16.0  RCH= TO CONF SALT CR   FROM         3.2    TO           0.0
STREAM REACH    17.0  RCH= TO CONF DES PLA   FROM         3.6    TO           0.0
ENDATA2          0.0                                      0.0                 0.0

 $$$ DATA TYPE 3 (TARGET LEVEL DO AND FLOW AUGMENTATION SOURCES) $$$

CARD TYPE                  REACH  AVAIL HDWS TARGET     ORDER OF AVAIL SOURCES
ENDATA3                     0.        0.       0.0   0.    0.    0.    0.    0.    0.

 $$$ DATA TYPE 4 (COMPUTATIONAL REACH FLAG FIELD) $$$

CARD TYPE        REACH ELEMENTS/REACH             COMPUTATIONAL FLAGS
FLAG FIELD        1.       17.          1.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.3.0.0.0.
FLAG FIELD        2.       14.          1.6.2.2.2.2.2.2.2.2.2.2.2.6.0.0.0.0.0.0.0.
FLAG FIELD        3.       17.          4.2.2.6.2.2.2.2.2.2.2.6.2.2.2.2.2.0.0.0.0.
FLAG FIELD        4.        8.          6.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        5.       15.          6.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.
FLAG FIELD        6.        5.          6.2.6.6.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        7.        4.          2.2.6.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        8.       15.          2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.
FLAG FIELD        9.        9.          2.2.2.2.2.2.2.2.6.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD       10.       12.          2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.
FLAG FIELD       11.       20.          2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.
FLAG FIELD       12.       19.          2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.3.0.
FLAG FIELD       13.       16.          1.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.
FLAG FIELD       14.        7.          2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD       15.       13.          2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.
FLAG FIELD       16.       16.          2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.
FLAG FIELD       17.       18.          4.2.2.2.2.2.2.2.6.2.2.2.2.2.2.2.2.5.0.0.0.
ENDATA4           0.        0.          0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.

 $$$ DATA TYPE 5 (HYDRAULIC DATA FOR DETERMINING VELOCITY AND DEPTH) $$$

CARD TYPE        REACH  COEF-DSPN    SS1        SS2      WIDTH      SLOPE     CMANN
HYDRAULICS        1.     60.00     3.000      6.000    27.000      0.000     0.400
HYDRAULICS        2.     60.00     3.000      0.200    10.000      0.001     0.330
HYDRAULICS        3.     60.00     2.000      4.000    35.000      0.000     0.110
HYDRAULICS        4.     60.00     2.000      1.500    35.000      0.000     0.110
HYDRAULICS        5.     60.00     2.600      1.000    34.000      0.000     0.110
HYDRAULICS        6.     60.00     2.600      1.000    34.000      0.000     0.110
HYDRAULICS        7.     60.00     3.000      5.000    30.000      0.002     0.050
HYDRAULICS        8.     60.00     3.000      5.000    30.000      0.000     0.060
HYDRAULICS        9.     60.00     2.000      1.500    25.000      0.007     0.100
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HYDRAULICS	10.	60.00	5.000	5.000	50.000	0.000	0.260
HYDRAULICS	11.	60.00	5.600	4.400	55.000	0.001	0.052
HYDRAULICS	12.	60.00	5.600	4.400	55.000	0.001	0.052
HYDRAULICS	13.	60.00	1.000	1.000	32.000	0.001	0.200
HYDRAULICS	14.	60.00	6.000	2.000	15.000	0.001	0.200
HYDRAULICS	15.	60.00	2.500	2.500	25.000	0.001	0.080
HYDRAULICS	16.	60.00	2.500	2.500	25.000	0.001	0.080
HYDRAULICS	17.	60.00	2.600	3.300	39.000	0.000	0.052
ENDATA5	0.	0.00	0.000	0.000	0.000	0.000	0.000

$$$ DATA TYPE 5A (STEADY STATE TEMPERATURE AND CLIMATOLOGY DATA) $$$

CARD TYPE	REACH	ELEVATION	DUST COEF	CLOUD COVER	DRY BULB TEMP	WET BULB TEMP	ATM PRESSURE	WIND	SOLAR RAD ATTENUATION
TEMP/LCD R	1.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	2.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	3.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	4.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	5.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	6.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	7.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	8.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	9.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	10.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	11.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	12.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	13.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	14.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	15.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	16.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	17.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
ENDATA5A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 6 (REACTION COEFFICIENTS FOR DEOXYGENATION AND REAERATION) $$$

CARD TYPE	REACH	K1	K3	SOD RATE	K2OPT	K2	COEQK2 OR TSIV COEF OR FOR OPT 8	EXPQK2 SLOPE FOR OPT 8
REACT COEF	1.	0.14	0.00	0.180	1.	2.10	0.000	0.00000
REACT COEF	2.	0.14	0.00	0.148	1.	2.23	0.000	0.00000
REACT COEF	3.	0.14	0.00	0.135	1.	1.86	0.000	0.00000
REACT COEF	4.	0.16	0.00	0.300	1.	2.00	0.000	0.00000
REACT COEF	5.	0.12	0.00	0.300	1.	2.00	0.000	0.00000
REACT COEF	6.	0.12	0.00	0.300	1.	2.00	0.000	0.00000
REACT COEF	7.	0.14	0.00	0.120	1.	8.00	0.000	0.00000
REACT COEF	8.	0.16	0.00	0.120	1.	0.86	0.000	0.00000
REACT COEF	9.	0.14	0.00	0.120	1.	0.86	0.000	0.00000
REACT COEF	10.	0.14	0.00	0.040	1.	0.20	0.000	0.00000
REACT COEF	11.	0.15	0.00	0.150	1.	2.76	0.000	0.00000
REACT COEF	12.	0.14	0.00	0.150	1.	2.76	0.000	0.00000
REACT COEF	13.	0.15	0.00	0.220	1.	5.20	0.000	0.00000
REACT COEF	14.	0.15	0.00	0.050	1.	0.60	0.000	0.00000
REACT COEF	15.	0.15	0.00	0.100	1.	2.00	0.000	0.00000
REACT COEF	16.	0.15	0.00	0.200	1.	2.00	0.000	0.00000
REACT COEF	17.	0.11	0.00	0.400	1.	2.76	0.000	0.00000
ENDATA6	0.	0.00	0.00	0.000	0.	0.00	0.000	0.00000

$$$ DATA TYPE 6A (NITROGEN AND PHOSPHORUS CONSTANTS) $$$

CARD TYPE	REACH	CKNH2	SETNH2	CKNH3	SNH3	CKNO2	CKPORG	SETPORG	SPO4
N AND P COEF	1.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	2.	0.02	0.00	1.00	0.00	10.00	0.00	0.00	0.00
N AND P COEF	3.	0.02	0.20	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	4.	0.02	0.00	0.60	5.00	10.00	0.00	1.00	0.00
N AND P COEF	5.	0.02	0.00	0.60	5.00	10.00	0.00	1.00	0.00
N AND P COEF	6.	0.02	0.00	0.60	5.00	10.00	0.00	1.00	0.00
N AND P COEF	7.	0.02	0.00	0.60	5.00	10.00	0.00	1.00	0.00
N AND P COEF	8.	0.02	0.00	0.60	5.00	10.00	0.00	0.00	0.00
N AND P COEF	9.	0.02	0.00	0.60	5.00	10.00	0.00	1.00	0.00
N AND P COEF	10.	0.02	0.00	0.60	0.00	10.00	0.00	0.00	0.00
N AND P COEF	11.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	12.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	13.	0.02	0.00	0.45	11.00	10.00	0.00	1.00	0.00
N AND P COEF	14.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	15.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	16.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	17.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
ENDATA6A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 6B (ALGAE/OTHER COEFFICIENTS) $$$

CARD TYPE	REACH	ALPHAO	ALGSET	EXCOEF	CK5 CKCOLI	CKANC	SETANC	SRCANC
ALG/OTHER COEF	1.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	2.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	3.	50.00	3.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	4.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	5.	50.00	1.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	6.	50.00	1.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	7.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	8.	50.00	1.50	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	9.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	10.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	11.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	12.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	13.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	14.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	15.	50.00	1.25	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	16.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	17.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ENDATA6B	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 7 (INITIAL CONDITIONS) $$$

CARD TYPE	REACH	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
INITIAL COND-1	1.	74.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	2.	77.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	3.	75.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	4.	75.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	5.	76.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	6.	76.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	7.	76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	8.	75.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	9.	76.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	10.	76.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	11.	77.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	12.	77.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	13.	76.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	14.	77.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	15.	77.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	16.	76.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	17.	77.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA7	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 7A (INITIAL CONDITIONS FOR CHOROPHYLL A, NITROGEN, AND PHOSPHORUS) $$$

CARD TYPE	REACH	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P
INITIAL COND-2	1.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	2.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	3.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	4.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	5.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	6.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	7.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	8.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	9.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	10.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	11.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	12.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	13.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	14.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	15.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	16.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	17.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA7A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 8 (INCREMENTAL INFLOW CONDITIONS) $$$

CARD TYPE	REACH	FLOW	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
INCR INFLOW-1	1.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	2.	1.160	73.80	7.58	2.95	1090.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	3.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	4.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	5.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	6.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	7.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	8.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	9.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	10.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	11.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	12.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	13.	0.460	73.10	3.39	7.38	711.00	0.00	0.00	0.00	0.00

INCR INFLOW-1	14.	0.200	73.10	3.39	7.38	711.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	15.	0.380	73.10	3.39	7.38	711.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	16.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	17.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA8	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 8A (INCREMENTAL INFLOW CONDITIONS FOR CHLOROPHYLL A, NITROGEN, AND PHOSPHORUS) $$$

CARD TYPE	REACH	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P
INCR INFLOW-2	1.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-2	2.	6.68	0.86	0.00	0.00	1.00	0.01	0.07
INCR INFLOW-2	3.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-2	4.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-2	5.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-2	6.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-2	7.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-2	8.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-2	9.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-2	10.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-2	11.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-2	12.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-2	13.	0.00	0.90	0.27	0.00	2.37	0.06	0.36
INCR INFLOW-2	14.	0.00	0.90	0.27	0.00	2.37	0.06	0.36
INCR INFLOW-2	15.	0.00	0.90	0.27	0.00	2.37	0.06	0.36
INCR INFLOW-2	16.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-2	17.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA8A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 9 (STREAM JUNCTIONS) $$$

CARD TYPE	JUNCTION ORDER AND IDENT			UPSTRM	JUNCTION	TRIB
STREAM JUNCTION	1.	JNC=	1	17.	32.	31.
STREAM JUNCTION	2.	JNC=	2	155.	208.	207.
ENDATA9	0.			0.	0.	0.

$$$ DATA TYPE 10 (HEADWATER SOURCES) $$$

CARD TYPE	HDWTR ORDER	NAME	FLOW	TEMP	D.O.	BOD	CM-1	CM-2	CM-3
HEADWTR-1	1.	EGAN -SPRING BK	6.47	80.10	7.58	4.92	566.00	0.00	0.00
HEADWTR-1	2.	SPRING BROOK	3.18	79.60	4.33	2.95	1005.00	0.00	0.00
HEADWTR-1	3.	BENSENVILLE DWN	7.63	75.60	5.03	2.46	863.00	0.00	0.00
ENDATA10	0.		0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 10A (HEADWATER CONDITIONS FOR CHLOROPHYLL, NITROGEN, PHOSPHORUS, COLIFORM AND SELECTED NON-CONSERVATIVE CONSTITUENT) $$$

CARD TYPE	HDWTR ORDER	ANC	COLI	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P
HEADWTR-2	1.	0.00	0.00	32.93	0.93	0.04	0.00	0.01	0.01	0.05
HEADWTR-2	2.	0.00	0.00	23.58	1.02	0.32	0.00	0.60	0.03	0.17
HEADWTR-2	3.	0.00	0.00	5.00	1.10	0.05	0.00	18.25	0.50	2.81
ENDATA10A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 11 (POINT SOURCE / POINT SOURCE CHARACTERISTICS) $$$

CARD TYPE	POINT LOAD ORDER	NAME	EFF	FLOW	TEMP	D.O.	BOD	CM-1	CM-2	CM-3
POINTLD-1	1.	Egan	0.00	31.33	72.50	7.02	2.56	870.00	0.00	0.00
POINTLD-1	2.	Nordic Park	0.00	0.27	71.50	6.08	1.97	2933.00	0.00	0.00
POINTLD-1	3.	Itasca	0.00	2.11	74.10	5.63	5.90	1080.00	0.00	0.00
POINTLD-1	4.	Wood Dale N	0.00	1.35	74.50	5.46	4.43	887.00	0.00	0.00
POINTLD-1	5.	Wood Dale S	0.00	0.46	73.10	6.98	2.46	903.00	0.00	0.00
POINTLD-1	6.	Addison N	0.00	3.06	74.10	6.97	3.44	971.00	0.00	0.00
POINTLD-1	7.	Addison S	0.00	1.45	75.80	6.96	3.93	871.00	0.00	0.00
POINTLD-1	8.	St Char CSO	0.00	0.00	74.00	0.00	0.00	0.00	0.00	0.00
POINTLD-1	9.	SC SD	0.00	3.54	75.10	6.31	2.46	825.00	0.00	0.00
POINTLD-1	10.	Elmhurst	0.00	7.46	75.40	7.51	2.46	840.00	0.00	0.00
POINTLD-1	11.	Sugar Creek	0.00	5.23	79.60	4.33	7.38	1090.00	0.00	0.00
POINTLD-1	12.	Ginger Creek	0.00	6.88	79.60	4.33	7.38	1090.00	0.00	0.00
ENDATA11	0.		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 11A (POINT SOURCE CHARACTERISTICS - CHLOROPHYLL A, NITROGEN, PHOSPHORUS, COLIFORMS AND SELECTED NON-CONSERVATIVE CONSTITUENT) $$$

CARD TYPE	POINT LOAD ORDER	ANC	COLI	CHL-A	ORG-N	NH3-N	NO2-N	N03-N	ORG-P	DIS-P
POINTLD-2	1.	0.00	0.00	0.00	1.01	0.05	0.00	11.70	0.50	2.87
POINTLD-2	2.	0.00	0.00	0.00	0.96	0.00	0.00	14.00	0.58	2.72

POINTLD-2	3.	0.00	0.00	0.00	1.25	0.03	0.00	22.50	0.41	2.30
POINTLD-2	4.	0.00	0.00	0.00	1.13	0.02	0.00	18.70	0.42	2.38
POINTLD-2	5.	0.00	0.00	0.00	0.90	0.03	0.00	22.00	0.41	2.32
POINTLD-2	6.	0.00	0.00	0.00	1.29	0.01	0.00	17.90	0.44	2.51
POINTLD-2	7.	0.00	0.00	0.00	1.17	0.04	0.00	21.00	0.52	2.97
POINTLD-2	8.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POINTLD-2	9.	0.00	0.00	0.00	0.46	1.59	0.00	16.80	0.77	4.38
POINTLD-2	10.	0.00	0.00	0.00	0.97	0.03	0.00	14.80	0.57	3.23
POINTLD-2	11.	0.00	0.00	23.58	1.02	0.32	0.00	0.60	0.12	0.68
POINTLD-2	12.	0.00	0.00	23.58	1.02	0.32	0.00	0.06	0.12	0.68
ENDATA11A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 12 (DAM CHARACTERISTICS) $$$

	DAM	RCH	ELE	ADAM	BDAM	FDAM	HDAM
DAM DATA	1.	3.	17.	1.30	0.32	1.00	1.60
DAM DATA	2.	10.	2.	1.30	0.33	1.00	1.60
DAM DATA	3.	10.	12.	1.30	0.58	0.80	6.00
ENDATA12	0.	0.	0.	0.00	0.00	0.00	0.00

$$$ DATA TYPE 13 (DOWNSTREAM BOUNDARY CONDITIONS-1) $$$

CARD TYPE	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
ENDATA13	DOWNSTREAM BOUNDARY CONCENTRATIONS ARE UNCONSTRAINED							

$$$ DATA TYPE 13A (DOWNSTREAM BOUNDARY CONDITIONS-2) $$$

CARD TYPE	CHL-A	ORG-N	NH3-N	NO2-N	NH3-N	ORG-P	DIS-P
ENDATA13A	DOWNSTREAM BOUNDARY CONCENTRATIONS ARE UNCONSTRAINED						

TABLE E2 SCENARIO 1 INPUT FOR QUAL2E

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* * * QUAL-2E  STREAM QUALITY ROUTING MODEL * * *
                                                                  Version 3.22  --  May 1996

          $$$ (PROBLEM TITLES) $$$

         CARD TYPE                             QUAL-2E PROGRAM TITLES
         TITLE01              SALT CREEK TMDL, Scenario 1
         TITLE02              SOD = 0; Monthly Avg Permit Limit for BOD/NH3
         TITLE03  YES         CONSERVATIVE MINERAL I      Con IN   ??
         TITLE04  NO          CONSERVATIVE MINERAL II
         TITLE05  NO          CONSERVATIVE MINERAL III
         TITLE06  NO          TEMPERATURE
         TITLE07  YES         5-DAY BIOCHEMICAL OXYGEN DEMAND
         TITLE08  YES         ALGAE AS CHL-A IN UG/L
         TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
         TITLE10                (ORGANIC-P; DISSOLVED-P)
         TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
         TITLE12                (ORGANIC-N; AMMONIA-N; NITRITE-N;' NITRATE-N)
         TITLE13  YES         DISSOLVED OXYGEN IN MG/L
         TITLE14  NO          FECAL COLIFORM IN NO./100 ML
         TITLE15  NO          ARBITRARY NON-CONSERVATIVE
         ENDTITLE

          $$$ DATA TYPE 1 (CONTROL DATA) $$$

         CARD TYPE                                     CARD TYPE
         LIST DATA INPUT             0.00000                                       0.00000
         WRITE OPTIONAL SUMMARY      0.00000                                       0.00000
         NO FLOW AUGMENTATION        0.00000                                       0.00000
         STEADY STATE                0.00000                                       0.00000
         TRAPAZOIDAL                 0.00000                                       0.00000
         NO PRINT LCD/SOLAR DATA     0.00000                                       0.00000
         NO PLOT DO AND BOD DATA     0.00000                                       0.00000
         FIXED DNSTM CONC (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =    0.23000
         INPUT METRIC           =    0.00000          OUTPUT METRIC           =    0.00000
         NUMBER OF REACHES      =   17.00000          NUMBER OF JUNCTIONS     =    2.00000
         NUM OF HEADWATERS      =    3.00000          NUMBER OF POINT LOADS   =    9.00000
         TIME STEP (HOURS)      =    0.25000          LNTH. COMP. ELEMENT (DX)=    0.20000
         MAXIMUM NO. OF ITERATION= 720.00000          TIME INC. FOR RPT2 (HRS)=    1.00000
         LATITUDE OF BASIN (DEG) =  41.90000          LONGITUDE OF BASIN (DEG)=   87.96000
         STANDARD MARIDIAN (DEG) =  75.00000          DAY OF YEAR START TIME  =  213.00000
         EVAP. COEF.,(AE)       =    0.00068          EVAP. COEF.,(BE)        =    0.00027
         ELEV. OF BASIN (ELEV)   = 660.00000          DUST ATTENUATION COEF.  =    0.06000
         ENDATA1                     0.00000                                       0.00000

          $$$ DATA TYPE 1A (ALGAE PRODUCTION AND NITROGEN OXIDATION CONSTANTS) $$$

         CARD TYPE                                            CARD TYPE
         O UPTAKE BY NH3 OXID(MG O/MG N)=    3.4300          O UPTAKE BY NO2 OXID(MG O/MG N)=     1.1400
         O PROD  BY ALGAE (MG O/MG A)   =    1.6000          O UPTAKE BY ALGAE (MG O/MG A)  =     1.9500
         N CONTENT OF ALGAE (MG N/MG A) =    0.0900          P CONTENT OF ALGAE (MG O/MG A) =     0.0150
         ALG MAX SPEC GROWTH RATE(1/DAY)=    2.6000          ALGAE RESPIRATION RATE (1/DAY) =     0.5000
         N HALF SATURATION CONST (MG/L) =    0.3000          P HALF SATURATION CONST (MG/L) =     0.0400
         LIN ALG SHADE CO (1/FT-UGCHA/L=)    0.0008          NLIN SHADE(1/FT-(UGCHA/L)**2/3)=     0.0000
         LIGHT FUNCTION OPTION (LFNOPT) =    1.0000          LIGHT SAT'N COEF (BTU/FT2-MIN) =     0.1100
         DAILY AVERAGING OPTION (LAVOPT)=    2.0000          LIGHT AVERAGING FACTOR (AFACT) =     0.9200
         NUMBER OF DAYLIGHT HOURS (DLH) =   15.2200          TOTAL DAILY SOLR RAD (BTU/FT-2)=  1199.0000
         ALGY GROWTH CALC OPTION(LGROPT)=    2.0000          ALGAL PREF FOR NH3-N (PREFN)   =     0.1000
         ALG/TEMP SOLR RAD FACTOR(TFACT)=    0.4400          NITRIFICATION INHIBITION COEF  =    10.0000
         ENDATA1A                            0.0000                                               0.0000

          $$$ DATA TYPE 1B (TEMPERATURE CORRECTION CONSTANTS FOR RATE COEFFICIENTS) $$$

         CARD TYPE     RATE CODE     THETA VALUE

         THETA( 1)      BOD DECA        1.047     DFLT
         THETA( 2)      BOD SETT        1.024     DFLT
         THETA( 3)      OXY TRAN        1.024     DFLT
         THETA( 4)      SOD RATE        1.060     DFLT
         THETA( 5)      ORGN DEC        1.047     DFLT
         THETA( 6)      ORGN SET        1.024     DFLT
         THETA( 7)      NH3 DECA        1.083     DFLT
         THETA( 8)      NH3 SRCE        1.074     DFLT
         THETA( 9)      NO2 DECA        1.047     DFLT
         THETA(10)      PORG DEC        1.047     DFLT
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THETA(11)      PORG SET        1.024     DFLT
THETA(12)      DISP SRC        1.074     DFLT
THETA(13)      ALG GROW        1.047     DFLT
THETA(14)      ALG RESP        1.047     DFLT
THETA(15)      ALG SETT        1.024     DFLT
THETA(16)      COLI DEC        1.047     DFLT
THETA(17)      ANC DECA        1.000     DFLT
THETA(18)      ANC SETT        1.024     DFLT
THETA(19)      ANC SRCE        1.000     DFLT
ENDATA1B

 $$$ DATA TYPE 2 (REACH IDENTIFICATION) $$$

CARD TYPE           REACH ORDER AND IDENT              R. MI/KM             R. MI/KM
STREAM REACH     1.0  RCH= EGAN -SPRING BK   FROM         31.8    TO          28.4
STREAM REACH     2.0  RCH=    SPRING BROOK   FROM          2.8    TO           0.0
STREAM REACH     3.0  RCH=   SPR BRK-ADD N   FROM         28.4    TO          25.0
STREAM REACH     4.0  RCH=   ADD N - ADD S   FROM         25.0    TO          23.4
STREAM REACH     5.0  RCH= ADD S - ST CHAR   FROM         23.4    TO          20.4
STREAM REACH     6.0  RCH=       CSO REACH   FROM         20.4    TO          19.4
STREAM REACH     7.0  RCH=     STEEP REACH   FROM         19.4    TO          18.6
STREAM REACH     8.0  RCH=      FLAT REACH   FROM         18.6    TO          15.6
STREAM REACH     9.0  RCH= FLAT REACH-31ST   FROM         15.6    TO          13.8
STREAM REACH    10.0  RCH= 31ST -FULL PARK   FROM         13.8    TO          11.4
STREAM REACH    11.0  RCH= DWN FR FULL PRK   FROM         11.4    TO           7.4
STREAM REACH    12.0  RCH=  TO CONF ADD CR   FROM          7.4    TO           3.6
STREAM REACH    13.0  RCH= BENSENVILLE DWN   FROM         10.4    TO           7.2
STREAM REACH    14.0  RCH= ADDISON REACH 2   FROM          7.2    TO           5.8
STREAM REACH    15.0  RCH= ADDISON REACH 3   FROM          5.8    TO           3.2
STREAM REACH    16.0  RCH= TO CONF SALT CR   FROM          3.2    TO           0.0
STREAM REACH    17.0  RCH= TO CONF DES PLA   FROM          3.6    TO           0.0
ENDATA2          0.0                                       0.0                 0.0

 $$$ DATA TYPE 3 (TARGET LEVEL DO AND FLOW AUGMENTATION SOURCES) $$$

CARD TYPE                  REACH  AVAIL HDWS TARGET     ORDER OF AVAIL SOURCES
ENDATA3                     0.        0.       0.0  0.   0.   0.   0.   0.   0.

 $$$ DATA TYPE 4 (COMPUTATIONAL REACH FLAG FIELD) $$$

CARD TYPE        REACH ELEMENTS/REACH            COMPUTATIONAL FLAGS
FLAG FIELD        1.       17.         1.6.2.2.2.2.2.2.2.2.2.2.2.2.2.2.3.0.0.0.
FLAG FIELD        2.       14.         1.6.2.2.2.2.2.2.2.2.2.2.2.6.0.0.0.0.0.0.
FLAG FIELD        3.       17.         4.2.2.6.2.2.2.2.2.2.2.6.2.2.2.2.2.0.0.0.
FLAG FIELD        4.        8.         6.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        5.       15.         6.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.
FLAG FIELD        6.        5.         2.2.6.6.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        7.        4.         2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        8.       15.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.
FLAG FIELD        9.        9.         2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD       10.       12.         2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.
FLAG FIELD       11.       20.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.
FLAG FIELD       12.       19.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.3.0.
FLAG FIELD       13.       16.         1.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.
FLAG FIELD       14.        7.         2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD       15.       13.         2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.
FLAG FIELD       16.       16.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.
FLAG FIELD       17.       18.         4.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.5.0.0.
ENDATA4           0.        0.         0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.

 $$$ DATA TYPE 5 (HYDRAULIC DATA FOR DETERMINING VELOCITY AND DEPTH) $$$

CARD TYPE        REACH  COEF-DSPN    SS1       SS2      WIDTH     SLOPE     CMANN
HYDRAULICS        1.     60.00     3.000     6.000    27.000     0.000     0.560
HYDRAULICS        2.     60.00     3.000     0.200    10.000     0.001     0.330
HYDRAULICS        3.     60.00     2.000     4.000    35.000     0.000     0.110
HYDRAULICS        4.     60.00     2.000     1.500    35.000     0.000     0.110
HYDRAULICS        5.     60.00     2.600     1.000    34.000     0.000     0.110
HYDRAULICS        6.     60.00     2.600     1.000    34.000     0.000     0.110
HYDRAULICS        7.     60.00     3.000     5.000    30.000     0.002     0.050
HYDRAULICS        8.     60.00     3.000     5.000    30.000     0.000     0.060
HYDRAULICS        9.     60.00     2.000     1.500    25.000     0.007     0.100
HYDRAULICS       10.     60.00     5.000     5.000    50.000     0.000     0.070
HYDRAULICS       11.     60.00     5.600     4.400    55.000     0.001     0.052
HYDRAULICS       12.     60.00     5.600     4.400    55.000     0.001     0.052
HYDRAULICS       13.     60.00     1.000     1.000    32.000     0.001     0.200
HYDRAULICS       14.     60.00     6.000     2.000    15.000     0.001     1.200
HYDRAULICS       15.     60.00     2.500     2.500    25.000     0.001     0.080
HYDRAULICS       16.     60.00     2.500     2.500    25.000     0.001     0.080
HYDRAULICS       17.     60.00     2.600     3.300    39.000     0.000     0.052
ENDATA5           0.      0.00     0.000     0.000     0.000     0.000     0.000
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$$$ DATA TYPE 5A (STEADY STATE TEMPERATURE AND CLIMATOLOGY DATA) $$$

CARD TYPE	REACH	ELEVATION	DUST COEF	CLOUD COVER	DRY BULB TEMP	WET BULB TEMP	ATM PRESSURE	WIND	SOLAR RAD ATTENUATION
TEMP/LCD R	1.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	2.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	3.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	4.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	5.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	6.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	7.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	8.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	9.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	10.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	11.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	12.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	13.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	14.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	15.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	16.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	17.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
ENDATA5A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 6 (REACTION COEFFICIENTS FOR DEOXYGENATION AND REAERATION) $$$

CARD TYPE	REACH	K1	K3	SOD RATE	K2OPT	K2	COEQK2 OR TSIV COEF OR FOR OPT 8	EXPQK2 OR SLOPE FOR OPT 8
REACT COEF	1.	0.14	0.00	0.000	1.	2.10	0.000	0.00000
REACT COEF	2.	0.14	0.00	0.000	1.	2.23	0.000	0.00000
REACT COEF	3.	0.14	0.00	0.000	1.	1.86	0.000	0.00000
REACT COEF	4.	0.16	0.00	0.000	1.	2.00	0.000	0.00000
REACT COEF	5.	0.12	0.00	0.000	1.	2.00	0.000	0.00000
REACT COEF	6.	0.12	0.00	0.000	1.	2.00	0.000	0.00000
REACT COEF	7.	0.14	0.00	0.000	1.	8.00	0.000	0.00000
REACT COEF	8.	0.16	0.00	0.000	1.	0.86	0.000	0.00000
REACT COEF	9.	0.14	0.00	0.000	1.	0.86	0.000	0.00000
REACT COEF	10.	0.14	0.00	0.000	1.	0.20	0.000	0.00000
REACT COEF	11.	0.15	0.00	0.000	1.	2.76	0.000	0.00000
REACT COEF	12.	0.14	0.00	0.000	1.	2.76	0.000	0.00000
REACT COEF	13.	0.15	0.00	0.000	1.	5.20	0.000	0.00000
REACT COEF	14.	0.15	0.00	0.000	1.	0.60	0.000	0.00000
REACT COEF	15.	0.15	0.00	0.000	1.	2.00	0.000	0.00000
REACT COEF	16.	0.15	0.00	0.000	1.	2.00	0.000	0.00000
REACT COEF	17.	0.11	0.00	0.000	1.	2.76	0.000	0.00000
ENDATA6	0.	0.00	0.00	0.000	0.	0.00	0.000	0.00000

$$$ DATA TYPE 6A (NITROGEN AND PHOSPHORUS CONSTANTS) $$$

CARD TYPE	REACH	CKNH2	SETNH2	CKNH3	SNH3	CKNO2	CKPORG	SETPORG	SPO4
N AND P COEF	1.	0.02	-0.15	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	2.	0.02	-0.15	1.00	0.00	10.00	0.00	0.00	0.00
N AND P COEF	3.	0.02	0.20	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	4.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	5.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	6.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	7.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	8.	0.02	0.00	0.60	10.00	10.00	0.00	0.00	0.00
N AND P COEF	9.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	10.	0.02	0.00	0.60	0.00	10.00	0.00	0.00	0.00
N AND P COEF	11.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	12.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	13.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	14.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	15.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	16.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	17.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
ENDATA6A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 6B (ALGAE/OTHER COEFFICIENTS) $$$

CARD TYPE	REACH	ALPHAO	ALGSET	EXCOEF	CK5 CKCOLI	CKANC	SETANC	SRCANC
ALG/OTHER COEF	1.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	2.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	3.	50.00	3.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	4.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	5.	50.00	1.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	6.	50.00	1.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	7.	50.00	0.60	0.10	0.00	0.00	0.00	0.00

ALG/OTHER COEF	8.	50.00	1.50	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	9.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	10.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	11.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	12.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	13.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	14.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	15.	50.00	1.25	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	16.	50.00	1.10	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	17.	50.00	1.80	0.10	0.00	0.00	0.00	0.00
ENDATA6B	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 7 (INITIAL CONDITIONS) $$$

CARD TYPE	REACH	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
INITIAL COND-1	1.	69.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	2.	74.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	3.	71.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	4.	72.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	5.	71.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	6.	71.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	7.	71.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	8.	71.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	9.	72.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	10.	73.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	11.	74.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	12.	74.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	13.	70.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	14.	73.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	15.	73.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	16.	71.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	17.	74.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA7	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 7A (INITIAL CONDITIONS FOR CHOROPHYLL A, NITROGEN, AND PHOSPHORUS) $$$

CARD TYPE	REACH	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P
INITIAL COND-2	1.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	2.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	3.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	4.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	5.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	6.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	7.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	8.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	9.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	10.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	11.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	12.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	13.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	14.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	15.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	16.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	17.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA7A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 8 (INCREMENTAL INFLOW CONDITIONS) $$$

CARD TYPE	REACH	FLOW	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
INCR INFLOW-1	1.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	2.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	3.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	4.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	5.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	6.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	7.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	8.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	9.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	10.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	11.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	12.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	13.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	14.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	15.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	16.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	17.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA8	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 8A (INCREMENTAL INFLOW CONDITIONS FOR CHLOROPHYLL A, NITROGEN, AND PHOSPHORUS) $$$

CARD TYPE	REACH	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P

```
INCR INFLOW-2         1.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         2.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         3.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         4.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         5.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         6.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         7.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         8.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         9.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        10.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        11.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        12.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        13.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        14.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        15.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        16.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        17.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
ENDATA8A              0.      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 9 (STREAM JUNCTIONS) $$$

CARD TYPE               JUNCTION ORDER AND IDENT         UPSTRM   JUNCTION    TRIB
STREAM JUNCTION        1.     JNC=               1        17.       32.        31.
STREAM JUNCTION        2.     JNC=               2       155.      208.       207.
ENDATA9                0.                                  0.        0.         0.

 $$$ DATA TYPE 10 (HEADWATER SOURCES) $$$

CARD TYPE    HDWTR     NAME               FLOW      TEMP      D.O.       BOD       CM-1      CM-2      CM-3
             ORDER
HEADWTR-1      1.   EGAN -SPRING BK      1.00     77.80      8.94      5.90    935.00      0.00      0.00
HEADWTR-1      2.      SPRING BROOK      1.00     78.00      6.30      3.93   1302.00      0.00      0.00
HEADWTR-1      3.   BENSENVILLE DWN      3.00     70.30      5.40     10.00    960.00      0.00      0.00
ENDATA10       0.                        0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 10A (HEADWATER CONDITIONS FOR CHLOROPHYLL, NITROGEN, PHOSPHORUS,
                   COLIFORM AND SELECTED NON-CONSERVATIVE CONSTITUENT) $$$

CARD TYPE     HDWTR     ANC     COLI     CHL-A    ORG-N    NH3-N    NO2-N    NO3-N    ORG-P    DIS-P
              ORDER
HEADWTR-2       1.     0.00 0.00E+00    48.82     1.27     0.03     0.00     1.60     0.07     0.42
HEADWTR-2       2.     0.00 0.00E+00    52.55     1.15     0.25     0.00     0.10     0.03     0.17
HEADWTR-2       3.     0.00 0.00E+00     6.50     1.80     1.50     0.00    21.80     0.48     2.72
ENDATA10A       0.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00

 $$$ DATA TYPE 11 (POINT SOURCE / POINT SOURCE CHARACTERISTICS) $$$

              POINT
CARD TYPE     LOAD     NAME               EFF      FLOW      TEMP      D.O.       BOD     CM-1      CM-2      CM-3
              ORDER
POINTLD-1     1.          Egan           0.00     24.60     68.00      7.10     10.00    914.00      0.00      0.00
POINTLD-1     2.   Nordic Park           0.00      0.25     67.90      7.04     10.00    334.00      0.00      0.00
POINTLD-1     3.        Itasca           0.00      2.00     68.20      5.21     20.00   1196.00      0.00      0.00
POINTLD-1     4.   Wood Dale N           0.00      1.70     68.50      5.68     20.00    954.00      0.00      0.00
POINTLD-1     5.   Wood Dale S           0.00      0.45     69.30      7.15     20.00    977.00      0.00      0.00
POINTLD-1     6.     Addison N           0.00      3.30     68.80      7.98     20.00   1036.00      0.00      0.00
POINTLD-1     7.     Addison S           0.00      2.60     70.40      7.84     20.00    945.00      0.00      0.00
POINTLD-1     8.         SC SD           0.00      2.00     69.00      6.92     10.00    960.00      0.00      0.00
POINTLD-1     9.      Elmhurst           0.00      6.50     68.80      7.37     10.00    975.00      0.00      0.00
ENDATA11      0.                         0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 11A (POINT SOURCE CHARACTERISTICS - CHLOROPHYLL A, NITROGEN, PHOSPHORUS,
                   COLIFORMS AND SELECTED NON-CONSERVATIVE CONSTITUENT) $$$

              POINT
CARD TYPE     LOAD      ANC     COLI     CHL-A    ORG-N    NH3-N    NO2-N    N03-N    ORG-P    DIS-P
              ORDER
POINTLD-2       1.     0.00 0.00E+00     0.00     1.56     1.50     0.00    13.80     0.60     3.40
POINTLD-2       2.     0.00 0.00E+00     0.00     0.96     1.50     0.00    14.40     0.44     2.46
POINTLD-2       3.     0.00 0.00E+00     0.00     1.64     1.50     0.00    24.80     0.51     2.89
POINTLD-2       4.     0.00 0.00E+00     0.00     1.80     1.50     0.00    13.90     0.48     2.72
POINTLD-2       5.     0.00 0.00E+00     0.00     1.15     1.50     0.00    22.30     0.40     2.21
POINTLD-2       6.     0.00 0.00E+00     0.00     1.55     1.50     0.00    16.70     0.46     2.59
POINTLD-2       7.     0.00 0.00E+00     0.00     1.42     1.50     0.00    12.40     0.47     2.63
POINTLD-2       8.     0.00 0.00E+00     0.00     1.20     1.50     0.00    20.40     0.82     4.68
POINTLD-2       9.     0.00 0.00E+00     0.00     1.31     2.30     0.00    17.90     0.63     3.57
ENDATA11A       0.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00

 $$$ DATA TYPE 12 (DAM CHARACTERISTICS) $$$

                      DAM   RCH   ELE    ADAM    BDAM    FDAM    HDAM
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DAM DATA                1.    3.   17.    1.30    0.32    1.00    1.60
DAM DATA                2.   10.    2.    1.30    0.33    1.00    1.60
DAM DATA                3.   10.   12.    1.30    0.58    0.80    6.00
ENDATA12                0.    0.    0.    0.00    0.00    0.00    0.00

 $$$ DATA TYPE 13 (DOWNSTREAM BOUNDARY CONDITIONS-1) $$$

     CARD TYPE               TEMP       D.O.      BOD       CM-1      CM-2      CM-3       ANC      COLI

ENDATA13                     DOWNSTREAM BOUNDARY CONCENTRATIONS ARE UNCONSTRAINED

 $$$ DATA TYPE 13A (DOWNSTREAM BOUNDARY CONDITIONS-2) $$$

     CARD TYPE               CHL-A     ORG-N     NH3-N     NO2-N     NH3-N     ORG-P     DIS-P

ENDATA13A                    DOWNSTREAM BOUNDARY CONCENTRATIONS ARE UNCONSTRAINED
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TABLE E3 SCENARIO 2 INPUT FOR QUAL2E

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* * * QUAL-2E  STREAM QUALITY ROUTING MODEL * * *
                                                    Version 3.22  --  May 1996

         $$$ (PROBLEM TITLES) $$$

        CARD TYPE                            QUAL-2E PROGRAM TITLES
        TITLE01             SALT CREEK TMDL - Scenario 2
        TITLE02             Existing SOD; Point Source Conc. = 0
        TITLE03  YES        CONSERVATIVE MINERAL I      Con IN   ??
        TITLE04  NO         CONSERVATIVE MINERAL II
        TITLE05  NO         CONSERVATIVE MINERAL III
        TITLE06  NO         TEMPERATURE
        TITLE07  YES        5-DAY BIOCHEMICAL OXYGEN DEMAND
        TITLE08  YES        ALGAE AS CHL-A IN UG/L
        TITLE09  YES        PHOSPHORUS CYCLE AS P IN MG/L
        TITLE10               (ORGANIC-P; DISSOLVED-P)
        TITLE11  YES        NITROGEN CYCLE AS N IN MG/L
        TITLE12               (ORGANIC-N; AMMONIA-N; NITRITE-N;' NITRATE-N)
        TITLE13  YES        DISSOLVED OXYGEN IN MG/L
        TITLE14  NO         FECAL COLIFORM IN NO./100 ML
        TITLE15  NO         ARBITRARY NON-CONSERVATIVE
        ENDTITLE

         $$$ DATA TYPE 1 (CONTROL DATA) $$$

        CARD TYPE                                    CARD TYPE
        LIST DATA INPUT              0.00000                                  0.00000
        WRITE OPTIONAL SUMMARY       0.00000                                  0.00000
        NO FLOW AUGMENTATION         0.00000                                  0.00000
        STEADY STATE                 0.00000                                  0.00000
        TRAPAZOIDAL                  0.00000                                  0.00000
        NO PRINT LCD/SOLAR DATA      0.00000                                  0.00000
        NO PLOT DO AND BOD DATA      0.00000                                  0.00000
        FIXED DNSTM CONC (YES=1)=    0.00000         5D-ULT BOD CONV K COEF  =   0.23000
        INPUT METRIC            =    0.00000         OUTPUT METRIC           =   0.00000
        NUMBER OF REACHES       =   17.00000         NUMBER OF JUNCTIONS     =   2.00000
        NUM OF HEADWATERS       =    3.00000         NUMBER OF POINT LOADS   =   9.00000
        TIME STEP (HOURS)       =    0.25000         LNTH. COMP. ELEMENT (DX)=   0.20000
        MAXIMUM NO. OF ITERATION= 720.00000          TIME INC. FOR RPT2 (HRS)=   1.00000
        LATITUDE OF BASIN (DEG) =   41.90000         LONGITUDE OF BASIN (DEG)=  87.96000
        STANDARD MARIDIAN (DEG) =   75.00000         DAY OF YEAR START TIME  = 213.00000
        EVAP. COEF.,(AE)        =    0.00068         EVAP. COEF.,(BE)        =   0.00027
        ELEV. OF BASIN (ELEV)   = 660.00000          DUST ATTENUATION COEF.  =   0.06000
        ENDATA1                      0.00000                                  0.00000

         $$$ DATA TYPE 1A (ALGAE PRODUCTION AND NITROGEN OXIDATION CONSTANTS) $$$

        CARD TYPE                                           CARD TYPE
        O UPTAKE BY NH3 OXID(MG O/MG N)=    3.4300          O UPTAKE BY NO2 OXID(MG O/MG N)=    1.1400
        O PROD  BY ALGAE (MG O/MG A)   =    1.6000          O UPTAKE BY ALGAE (MG O/MG A)  =    1.9500
        N CONTENT OF ALGAE (MG N/MG A) =    0.0900          P CONTENT OF ALGAE (MG O/MG A) =    0.0150
        ALG MAX SPEC GROWTH RATE(1/DAY)=    2.6000          ALGAE RESPIRATION RATE (1/DAY) =    0.5000
        N HALF SATURATION CONST (MG/L) =    0.3000          P HALF SATURATION CONST (MG/L) =    0.0400
        LIN ALG SHADE CO (1/FT-UGCHA/L=)    0.0008          NLIN SHADE(1/FT-(UGCHA/L)**2/3)=    0.0000
        LIGHT FUNCTION OPTION (LFNOPT) =    1.0000          LIGHT SAT'N COEF (BTU/FT2-MIN) =    0.1100
        DAILY AVERAGING OPTION (LAVOPT)=    2.0000          LIGHT AVERAGING FACTOR (AFACT) =    0.9200
        NUMBER OF DAYLIGHT HOURS (DLH) =   15.2200          TOTAL DAILY SOLR RAD (BTU/FT-2)= 1199.0000
        ALGY GROWTH CALC OPTION(LGROPT)=    2.0000          ALGAL PREF FOR NH3-N (PREFN)   =    0.1000
        ALG/TEMP SOLR RAD FACTOR(TFACT)=    0.4400          NITRIFICATION INHIBITION COEF  =   10.0000
        ENDATA1A                            0.0000                                              0.0000

         $$$ DATA TYPE 1B (TEMPERATURE CORRECTION CONSTANTS FOR RATE COEFFICIENTS) $$$

        CARD TYPE     RATE CODE     THETA VALUE

        THETA( 1)      BOD DECA        1.047     DFLT
        THETA( 2)      BOD SETT        1.024     DFLT
        THETA( 3)      OXY TRAN        1.024     DFLT
        THETA( 4)      SOD RATE        1.060     DFLT
        THETA( 5)      ORGN DEC        1.047     DFLT
        THETA( 6)      ORGN SET        1.024     DFLT
        THETA( 7)      NH3 DECA        1.083     DFLT
        THETA( 8)      NH3 SRCE        1.074     DFLT
        THETA( 9)      NO2 DECA        1.047     DFLT
        THETA(10)      PORG DEC        1.047     DFLT
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THETA(11)      PORG SET        1.024     DFLT
THETA(12)      DISP SRC        1.074     DFLT
THETA(13)      ALG GROW        1.047     DFLT
THETA(14)      ALG RESP        1.047     DFLT
THETA(15)      ALG SETT        1.024     DFLT
THETA(16)      COLI DEC        1.047     DFLT
THETA(17)      ANC DECA        1.000     DFLT
THETA(18)      ANC SETT        1.024     DFLT
THETA(19)      ANC SRCE        1.000     DFLT
ENDATA1B

 $$$ DATA TYPE 2 (REACH IDENTIFICATION) $$$

CARD TYPE           REACH ORDER AND IDENT              R. MI/KM           R. MI/KM
STREAM REACH     1.0  RCH= EGAN -SPRING BK   FROM         31.8    TO          28.4
STREAM REACH     2.0  RCH=    SPRING BROOK   FROM          2.8    TO           0.0
STREAM REACH     3.0  RCH=   SPR BRK-ADD N   FROM         28.4    TO          25.0
STREAM REACH     4.0  RCH=   ADD N - ADD S   FROM         25.0    TO          23.4
STREAM REACH     5.0  RCH= ADD S - ST CHAR   FROM         23.4    TO          20.4
STREAM REACH     6.0  RCH=       CSO REACH   FROM         20.4    TO          19.4
STREAM REACH     7.0  RCH=     STEEP REACH   FROM         19.4    TO          18.6
STREAM REACH     8.0  RCH=      FLAT REACH   FROM         18.6    TO          15.6
STREAM REACH     9.0  RCH= FLAT REACH-31ST   FROM         15.6    TO          13.8
STREAM REACH    10.0  RCH= 31ST -FULL PARK   FROM         13.8    TO          11.4
STREAM REACH    11.0  RCH= DWN FR FULL PRK   FROM         11.4    TO           7.4
STREAM REACH    12.0  RCH=  TO CONF ADD CR   FROM          7.4    TO           3.6
STREAM REACH    13.0  RCH= BENSENVILLE DWN   FROM         10.4    TO           7.2
STREAM REACH    14.0  RCH= ADDISON REACH 2   FROM          7.2    TO           5.8
STREAM REACH    15.0  RCH= ADDISON REACH 3   FROM          5.8    TO           3.2
STREAM REACH    16.0  RCH= TO CONF SALT CR   FROM          3.2    TO           0.0
STREAM REACH    17.0  RCH= TO CONF DES PLA   FROM          3.6    TO           0.0
ENDATA2          0.0                                       0.0                 0.0

 $$$ DATA TYPE 3 (TARGET LEVEL DO AND FLOW AUGMENTATION SOURCES) $$$

CARD TYPE                  REACH  AVAIL HDWS TARGET     ORDER OF AVAIL SOURCES
ENDATA3                      0.        0.        0.0  0.   0.   0.   0.   0.   0.

 $$$ DATA TYPE 4 (COMPUTATIONAL REACH FLAG FIELD) $$$

CARD TYPE        REACH ELEMENTS/REACH             COMPUTATIONAL FLAGS
FLAG FIELD        1.       17.         1.6.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.3.0.0.0.
FLAG FIELD        2.       14.         1.6.2.2.2.2.2.2.2.2.2.2.2.6.0.0.0.0.0.0.0.
FLAG FIELD        3.       17.         4.2.2.6.2.2.2.2.2.2.2.6.2.2.2.2.2.0.0.0.0.
FLAG FIELD        4.        8.         6.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        5.       15.         6.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.
FLAG FIELD        6.        5.         2.2.6.6.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        7.        4.         2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        8.       15.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.
FLAG FIELD        9.        9.         2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD       10.       12.         2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.
FLAG FIELD       11.       20.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.
FLAG FIELD       12.       19.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.3.0.
FLAG FIELD       13.       16.         1.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.
FLAG FIELD       14.        7.         2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD       15.       13.         2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.
FLAG FIELD       16.       16.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.
FLAG FIELD       17.       18.         4.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.5.0.0.0.
ENDATA4           0.        0.         0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.

 $$$ DATA TYPE 5 (HYDRAULIC DATA FOR DETERMINING VELOCITY AND DEPTH) $$$

CARD TYPE        REACH  COEF-DSPN    SS1        SS2      WIDTH     SLOPE     CMANN
HYDRAULICS        1.     60.00     3.000     6.000    27.000     0.000     0.560
HYDRAULICS        2.     60.00     3.000     0.200    10.000     0.001     0.330
HYDRAULICS        3.     60.00     2.000     4.000    35.000     0.000     0.110
HYDRAULICS        4.     60.00     2.000     1.500    35.000     0.000     0.110
HYDRAULICS        5.     60.00     2.600     1.000    34.000     0.000     0.110
HYDRAULICS        6.     60.00     2.600     1.000    34.000     0.000     0.110
HYDRAULICS        7.     60.00     3.000     5.000    30.000     0.002     0.050
HYDRAULICS        8.     60.00     3.000     5.000    30.000     0.000     0.060
HYDRAULICS        9.     60.00     2.000     1.500    25.000     0.007     0.100
HYDRAULICS       10.     60.00     5.000     5.000    50.000     0.000     0.070
HYDRAULICS       11.     60.00     5.600     4.400    55.000     0.001     0.052
HYDRAULICS       12.     60.00     5.600     4.400    55.000     0.001     0.052
HYDRAULICS       13.     60.00     1.000     1.000    32.000     0.001     0.200
HYDRAULICS       14.     60.00     6.000     2.000    15.000     0.001     1.200
HYDRAULICS       15.     60.00     2.500     2.500    25.000     0.001     0.080
HYDRAULICS       16.     60.00     2.500     2.500    25.000     0.001     0.080
HYDRAULICS       17.     60.00     2.600     3.300    39.000     0.000     0.052
ENDATA5           0.      0.00     0.000     0.000     0.000     0.000     0.000
```

$$$ DATA TYPE 5A (STEADY STATE TEMPERATURE AND CLIMATOLOGY DATA) $$$

CARD TYPE	REACH	ELEVATION	DUST COEF	CLOUD COVER	DRY BULB TEMP	WET BULB TEMP	ATM PRESSURE	WIND	SOLAR RAD ATTENUATION
TEMP/LCD R	1.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	2.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	3.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	4.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	5.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	6.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	7.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	8.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	9.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	10.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	11.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	12.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	13.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	14.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	15.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	16.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	17.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
ENDATA5A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 6 (REACTION COEFFICIENTS FOR DEOXYGENATION AND REAERATION) $$$

CARD TYPE	REACH	K1	K3	SOD RATE	K2OPT	K2	COEQK2 OR TSIV COEF FOR OPT 8	OR OR	EXPQK2 SLOPE FOR OPT 8
REACT COEF	1.	0.14	0.00	0.200	1.	2.10	0.000		0.00000
REACT COEF	2.	0.14	0.00	0.148	1.	2.23	0.000		0.00000
REACT COEF	3.	0.14	0.00	0.150	1.	1.86	0.000		0.00000
REACT COEF	4.	0.16	0.00	0.300	1.	2.00	0.000		0.00000
REACT COEF	5.	0.12	0.00	0.600	1.	2.00	0.000		0.00000
REACT COEF	6.	0.12	0.00	0.600	1.	2.00	0.000		0.00000
REACT COEF	7.	0.14	0.00	0.120	1.	8.00	0.000		0.00000
REACT COEF	8.	0.16	0.00	0.120	1.	0.86	0.000		0.00000
REACT COEF	9.	0.14	0.00	0.120	1.	0.86	0.000		0.00000
REACT COEF	10.	0.14	0.00	0.040	1.	0.20	0.000		0.00000
REACT COEF	11.	0.15	0.00	0.230	1.	2.76	0.000		0.00000
REACT COEF	12.	0.14	0.00	0.150	1.	2.76	0.000		0.00000
REACT COEF	13.	0.15	0.00	0.220	1.	5.20	0.000		0.00000
REACT COEF	14.	0.15	0.00	0.050	1.	0.60	0.000		0.00000
REACT COEF	15.	0.15	0.00	0.100	1.	2.00	0.000		0.00000
REACT COEF	16.	0.15	0.00	0.350	1.	2.00	0.000		0.00000
REACT COEF	17.	0.11	0.00	0.450	1.	2.76	0.000		0.00000
ENDATA6	0.	0.00	0.00	0.000	0.	0.00	0.000		0.00000

$$$ DATA TYPE 6A (NITROGEN AND PHOSPHORUS CONSTANTS) $$$

CARD TYPE	REACH	CKNH2	SETNH2	CKNH3	SNH3	CKNO2	CKPORG	SETPORG	SPO4
N AND P COEF	1.	0.02	-0.15	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	2.	0.02	-0.15	1.00	0.00	10.00	0.00	0.00	0.00
N AND P COEF	3.	0.02	0.20	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	4.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	5.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	6.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	7.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	8.	0.02	0.00	0.60	10.00	10.00	0.00	0.00	0.00
N AND P COEF	9.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	10.	0.02	0.00	0.60	0.00	10.00	0.00	0.00	0.00
N AND P COEF	11.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	12.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	13.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	14.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	15.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	16.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	17.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
ENDATA6A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 6B (ALGAE/OTHER COEFFICIENTS) $$$

CARD TYPE	REACH	ALPHAO	ALGSET	EXCOEF	CK5 CKCOLI	CKANC	SETANC	SRCANC
ALG/OTHER COEF	1.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	2.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	3.	50.00	3.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	4.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	5.	50.00	1.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	6.	50.00	1.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	7.	50.00	0.60	0.10	0.00	0.00	0.00	0.00

ALG/OTHER COEF	8.	50.00	1.50	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	9.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	10.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	11.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	12.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	13.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	14.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	15.	50.00	1.25	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	16.	50.00	1.10	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	17.	50.00	1.80	0.10	0.00	0.00	0.00	0.00
ENDATA6B	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 7 (INITIAL CONDITIONS) $$$

CARD TYPE	REACH	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
INITIAL COND-1	1.	69.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	2.	74.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	3.	71.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	4.	72.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	5.	71.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	6.	71.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	7.	71.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	8.	71.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	9.	72.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	10.	73.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	11.	74.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	12.	74.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	13.	70.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	14.	73.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	15.	73.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	16.	71.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	17.	74.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA7	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 7A (INITIAL CONDITIONS FOR CHOROPHYLL A, NITROGEN, AND PHOSPHORUS) $$$

CARD TYPE	REACH	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P
INITIAL COND-2	1.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	2.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	3.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	4.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	5.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	6.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	7.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	8.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	9.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	10.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	11.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	12.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	13.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	14.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	15.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	16.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	17.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA7A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 8 (INCREMENTAL INFLOW CONDITIONS) $$$

CARD TYPE	REACH	FLOW	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
INCR INFLOW-1	1.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	2.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	3.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	4.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	5.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	6.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	7.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	8.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	9.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	10.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	11.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	12.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	13.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	14.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	15.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	16.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	17.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA8	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 8A (INCREMENTAL INFLOW CONDITIONS FOR CHLOROPHYLL A, NITROGEN, AND PHOSPHORUS) $$$

CARD TYPE	REACH	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P

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INCR INFLOW-2         1.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         2.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         3.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         4.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         5.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         6.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         7.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         8.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         9.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        10.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        11.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        12.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        13.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        14.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        15.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        16.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        17.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
ENDATA8A              0.      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 9 (STREAM JUNCTIONS) $$$

CARD TYPE               JUNCTION ORDER AND IDENT         UPSTRM   JUNCTION    TRIB
STREAM JUNCTION        1.     JNC=               1        17.       32.       31.
STREAM JUNCTION        2.     JNC=               2       155.      208.      207.
ENDATA9                0.                                  0.        0.        0.

 $$$ DATA TYPE 10 (HEADWATER SOURCES) $$$

CARD TYPE    HDWTR     NAME                 FLOW      TEMP      D.O.       BOD      CM-1      CM-2      CM-3
             ORDER
HEADWTR-1      1.   EGAN -SPRING BK      1.00     77.80      8.94      5.90    935.00      0.00      0.00
HEADWTR-1      2.      SPRING BROOK      1.00     78.00      6.30      3.93   1302.00      0.00      0.00
HEADWTR-1      3.   BENSENVILLE DWN      3.00     70.30      5.40     20.00    960.00      0.00      0.00
ENDATA10       0.                        0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 10A (HEADWATER CONDITIONS FOR CHLOROPHYLL, NITROGEN, PHOSPHORUS,
                    COLIFORM AND SELECTED NON-CONSERVATIVE CONSTITUENT) $$$

CARD TYPE     HDWTR     ANC      COLI     CHL-A    ORG-N    NH3-N    NO2-N    NO3-N    ORG-P    DIS-P
              ORDER
HEADWTR-2       1.     0.00 0.00E+00    48.82     1.27     0.03     0.00     1.60     0.07     0.42
HEADWTR-2       2.     0.00 0.00E+00    52.55     1.15     0.25     0.00     0.10     0.03     0.17
HEADWTR-2       3.     0.00 0.00E+00     6.50     1.80     3.00     0.00    21.80     0.48     2.72
ENDATA10A       0.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00

 $$$ DATA TYPE 11 (POINT SOURCE / POINT SOURCE CHARACTERISTICS) $$$

              POINT
CARD TYPE      LOAD    NAME                 EFF      FLOW      TEMP      D.O.      BOD      CM-1      CM-2      CM-3
              ORDER
POINTLD-1      1.           Egan           0.00     24.60     68.00      6.00      0.00      0.00      0.00      0.00
POINTLD-1      2.   Nordic Park           0.00      0.25     67.90      6.00      0.00      0.00      0.00      0.00
POINTLD-1      3.         Itasca           0.00      2.00     68.20      6.00      0.00      0.00      0.00      0.00
POINTLD-1      4.   Wood Dale N           0.00      1.70     68.50      6.00      0.00      0.00      0.00      0.00
POINTLD-1      5.   Wood Dale S           0.00      0.45     69.30      6.00      0.00      0.00      0.00      0.00
POINTLD-1      6.     Addison N           0.00      3.30     68.80      6.00      0.00      0.00      0.00      0.00
POINTLD-1      7.     Addison S           0.00      2.60     70.40      6.00      0.00      0.00      0.00      0.00
POINTLD-1      8.          SC SD           0.00      2.00     69.00      6.00      0.00      0.00      0.00      0.00
POINTLD-1      9.       Elmhurst           0.00      6.50     68.80      6.00      0.00      0.00      0.00      0.00
ENDATA11       0.                          0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 11A (POINT SOURCE CHARACTERISTICS - CHLOROPHYLL A, NITROGEN, PHOSPHORUS,
                    COLIFORMS AND SELECTED NON-CONSERVATIVE CONSTITUENT) $$$

              POINT
CARD TYPE      LOAD     ANC      COLI     CHL-A    ORG-N    NH3-N    NO2-N    N03-N    ORG-P    DIS-P
              ORDER
POINTLD-2       1.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
POINTLD-2       2.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
POINTLD-2       3.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
POINTLD-2       4.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
POINTLD-2       5.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
POINTLD-2       6.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
POINTLD-2       7.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
POINTLD-2       8.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
POINTLD-2       9.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
ENDATA11A       0.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00

 $$$ DATA TYPE 12 (DAM CHARACTERISTICS) $$$

                      DAM   RCH   ELE    ADAM    BDAM    FDAM    HDAM
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DAM DATA                1.    3.   17.    1.30    0.32    1.00    1.60
DAM DATA                2.   10.    2.    1.30    0.33    1.00    1.60
DAM DATA                3.   10.   12.    1.30    0.58    0.80    6.00
ENDATA12                0.    0.    0.    0.00    0.00    0.00    0.00

 $$$ DATA TYPE 13 (DOWNSTREAM BOUNDARY CONDITIONS-1) $$$

     CARD TYPE               TEMP       D.O.      BOD       CM-1      CM-2      CM-3       ANC       COLI

ENDATA13                     DOWNSTREAM BOUNDARY CONCENTRATIONS ARE UNCONSTRAINED

 $$$ DATA TYPE 13A (DOWNSTREAM BOUNDARY CONDITIONS-2) $$$

     CARD TYPE               CHL-A     ORG-N     NH3-N     NO2-N     NH3-N     ORG-P     DIS-P

ENDATA13A                    DOWNSTREAM BOUNDARY CONCENTRATIONS ARE UNCONSTRAINED
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TABLE E4 SCENARIO 3 INPUT FOR QUAL2E

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* * * QUAL-2E  STREAM QUALITY ROUTING MODEL * * *
                                                    Version 3.22  --  May 1996

          $$$ (PROBLEM TITLES) $$$

         CARD TYPE                             QUAL-2E PROGRAM TITLES
         TITLE01              SALT CREEK TMDL, Scenario 3
         TITLE02              Observed point source loads; SOD = 0
         TITLE03  YES         CONSERVATIVE MINERAL I      Con IN   ??
         TITLE04  NO          CONSERVATIVE MINERAL II
         TITLE05  NO          CONSERVATIVE MINERAL III
         TITLE06  NO          TEMPERATURE
         TITLE07  YES         5-DAY BIOCHEMICAL OXYGEN DEMAND
         TITLE08  YES         ALGAE AS CHL-A IN UG/L
         TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
         TITLE10                (ORGANIC-P; DISSOLVED-P)
         TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
         TITLE12                (ORGANIC-N; AMMONIA-N; NITRITE-N;' NITRATE-N)
         TITLE13  YES         DISSOLVED OXYGEN IN MG/L
         TITLE14  NO          FECAL COLIFORM IN NO./100 ML
         TITLE15  NO          ARBITRARY NON-CONSERVATIVE
         ENDTITLE

          $$$ DATA TYPE 1 (CONTROL DATA) $$$

         CARD TYPE                                     CARD TYPE
         LIST DATA INPUT             0.00000                                   0.00000
         WRITE OPTIONAL SUMMARY      0.00000                                   0.00000
         NO FLOW AUGMENTATION        0.00000                                   0.00000
         STEADY STATE                0.00000                                   0.00000
         TRAPAZOIDAL                 0.00000                                   0.00000
         NO PRINT LCD/SOLAR DATA     0.00000                                   0.00000
         NO PLOT DO AND BOD DATA     0.00000                                   0.00000
         FIXED DNSTM CONC (YES=1)=   0.00000           5D-ULT BOD CONV K COEF  =   0.23000
         INPUT METRIC           =    0.00000           OUTPUT METRIC           =   0.00000
         NUMBER OF REACHES      =   17.00000           NUMBER OF JUNCTIONS     =   2.00000
         NUM OF HEADWATERS      =    3.00000           NUMBER OF POINT LOADS   =   9.00000
         TIME STEP (HOURS)      =    0.25000           LNTH. COMP. ELEMENT (DX)=   0.20000
         MAXIMUM NO. OF ITERATION= 720.00000           TIME INC. FOR RPT2 (HRS)=   1.00000
         LATITUDE OF BASIN (DEG) =  41.90000           LONGITUDE OF BASIN (DEG)=  87.96000
         STANDARD MARIDIAN (DEG) =  75.00000           DAY OF YEAR START TIME  = 213.00000
         EVAP. COEF.,(AE)       =    0.00068           EVAP. COEF.,(BE)        =   0.00027
         ELEV. OF BASIN (ELEV)   = 660.00000           DUST ATTENUATION COEF.  =   0.06000
         ENDATA1                     0.00000                                   0.00000

          $$$ DATA TYPE 1A (ALGAE PRODUCTION AND NITROGEN OXIDATION CONSTANTS) $$$

         CARD TYPE                                            CARD TYPE
         O UPTAKE BY NH3 OXID(MG O/MG N)=    3.4300          O UPTAKE BY NO2 OXID(MG O/MG N)=    1.1400
         O PROD  BY ALGAE (MG O/MG A)   =    1.6000          O UPTAKE BY ALGAE (MG O/MG A)  =    1.9500
         N CONTENT OF ALGAE (MG N/MG A) =    0.0900          P CONTENT OF ALGAE (MG O/MG A) =    0.0150
         ALG MAX SPEC GROWTH RATE(1/DAY)=    2.6000          ALGAE RESPIRATION RATE (1/DAY) =    0.5000
         N HALF SATURATION CONST (MG/L) =    0.3000          P HALF SATURATION CONST (MG/L) =    0.0400
         LIN ALG SHADE CO (1/FT-UGCHA/L=)    0.0008          NLIN SHADE(1/FT-(UGCHA/L)**2/3)=    0.0000
         LIGHT FUNCTION OPTION (LFNOPT) =    1.0000          LIGHT SAT'N COEF (BTU/FT2-MIN) =    0.1100
         DAILY AVERAGING OPTION (LAVOPT)=    2.0000          LIGHT AVERAGING FACTOR (AFACT) =    0.9200
         NUMBER OF DAYLIGHT HOURS (DLH) =   15.2200          TOTAL DAILY SOLR RAD (BTU/FT-2)= 1199.0000
         ALGY GROWTH CALC OPTION(LGROPT)=    2.0000          ALGAL PREF FOR NH3-N (PREFN)   =    0.1000
         ALG/TEMP SOLR RAD FACTOR(TFACT)=    0.4400          NITRIFICATION INHIBITION COEF  =   10.0000
         ENDATA1A                            0.0000                                              0.0000

          $$$ DATA TYPE 1B (TEMPERATURE CORRECTION CONSTANTS FOR RATE COEFFICIENTS) $$$

         CARD TYPE     RATE CODE     THETA VALUE

         THETA( 1)      BOD DECA        1.047     DFLT
         THETA( 2)      BOD SETT        1.024     DFLT
         THETA( 3)      OXY TRAN        1.024     DFLT
         THETA( 4)      SOD RATE        1.060     DFLT
         THETA( 5)      ORGN DEC        1.047     DFLT
         THETA( 6)      ORGN SET        1.024     DFLT
         THETA( 7)      NH3 DECA        1.083     DFLT
         THETA( 8)      NH3 SRCE        1.074     DFLT
         THETA( 9)      NO2 DECA        1.047     DFLT
         THETA(10)      PORG DEC        1.047     DFLT
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THETA(11)      PORG SET       1.024     DFLT
THETA(12)      DISP SRC       1.074     DFLT
THETA(13)      ALG GROW       1.047     DFLT
THETA(14)      ALG RESP       1.047     DFLT
THETA(15)      ALG SETT       1.024     DFLT
THETA(16)      COLI DEC       1.047     DFLT
THETA(17)      ANC DECA       1.000     DFLT
THETA(18)      ANC SETT       1.024     DFLT
THETA(19)      ANC SRCE       1.000     DFLT
ENDATA1B

 $$$ DATA TYPE 2 (REACH IDENTIFICATION) $$$

CARD TYPE           REACH ORDER AND IDENT              R. MI/KM            R. MI/KM
STREAM REACH     1.0  RCH= EGAN -SPRING BK   FROM         31.8    TO          28.4
STREAM REACH     2.0  RCH=    SPRING BROOK   FROM          2.8    TO           0.0
STREAM REACH     3.0  RCH=   SPR BRK-ADD N   FROM         28.4    TO          25.0
STREAM REACH     4.0  RCH=   ADD N - ADD S   FROM         25.0    TO          23.4
STREAM REACH     5.0  RCH= ADD S - ST CHAR   FROM         23.4    TO          20.4
STREAM REACH     6.0  RCH=       CSO REACH   FROM         20.4    TO          19.4
STREAM REACH     7.0  RCH=     STEEP REACH   FROM         19.4    TO          18.6
STREAM REACH     8.0  RCH=      FLAT REACH   FROM         18.6    TO          15.6
STREAM REACH     9.0  RCH= FLAT REACH-31ST   FROM         15.6    TO          13.8
STREAM REACH    10.0  RCH= 31ST -FULL PARK   FROM         13.8    TO          11.4
STREAM REACH    11.0  RCH= DWN FR FULL PRK   FROM         11.4    TO           7.4
STREAM REACH    12.0  RCH=  TO CONF ADD CR   FROM          7.4    TO           3.6
STREAM REACH    13.0  RCH= BENSENVILLE DWN   FROM         10.4    TO           7.2
STREAM REACH    14.0  RCH= ADDISON REACH 2   FROM          7.2    TO           5.8
STREAM REACH    15.0  RCH= ADDISON REACH 3   FROM          5.8    TO           3.2
STREAM REACH    16.0  RCH= TO CONF SALT CR   FROM          3.2    TO           0.0
STREAM REACH    17.0  RCH= TO CONF DES PLA   FROM          3.6    TO           0.0
ENDATA2          0.0                                       0.0                 0.0

 $$$ DATA TYPE 3 (TARGET LEVEL DO AND FLOW AUGMENTATION SOURCES) $$$

CARD TYPE                  REACH  AVAIL HDWS TARGET     ORDER OF AVAIL SOURCES
ENDATA3                      0.        0.       0.0  0.   0.   0.   0.   0.   0.

 $$$ DATA TYPE 4 (COMPUTATIONAL REACH FLAG FIELD) $$$

CARD TYPE        REACH ELEMENTS/REACH             COMPUTATIONAL FLAGS
FLAG FIELD        1.       17.         1.6.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.3.0.0.0.
FLAG FIELD        2.       14.         1.6.2.2.2.2.2.2.2.2.2.2.2.6.0.0.0.0.0.0.
FLAG FIELD        3.       17.         4.2.2.6.2.2.2.2.2.2.2.6.2.2.2.2.2.0.0.0.
FLAG FIELD        4.        8.         6.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        5.       15.         6.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.
FLAG FIELD        6.        5.         2.2.6.6.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        7.        4.         2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        8.       15.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.
FLAG FIELD        9.        9.         2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD       10.       12.         2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.
FLAG FIELD       11.       20.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.
FLAG FIELD       12.       19.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.3.0.
FLAG FIELD       13.       16.         1.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.
FLAG FIELD       14.        7.         2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD       15.       13.         2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.
FLAG FIELD       16.       16.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.
FLAG FIELD       17.       18.         4.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.5.0.0.
ENDATA4           0.        0.         0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.

 $$$ DATA TYPE 5 (HYDRAULIC DATA FOR DETERMINING VELOCITY AND DEPTH) $$$

CARD TYPE        REACH  COEF-DSPN    SS1       SS2      WIDTH     SLOPE     CMANN
HYDRAULICS        1.     60.00     3.000     6.000    27.000     0.000     0.560
HYDRAULICS        2.     60.00     3.000     0.200    10.000     0.001     0.330
HYDRAULICS        3.     60.00     2.000     4.000    35.000     0.000     0.110
HYDRAULICS        4.     60.00     2.000     1.500    35.000     0.000     0.110
HYDRAULICS        5.     60.00     2.600     1.000    34.000     0.000     0.110
HYDRAULICS        6.     60.00     2.600     1.000    34.000     0.000     0.110
HYDRAULICS        7.     60.00     3.000     5.000    30.000     0.002     0.050
HYDRAULICS        8.     60.00     3.000     5.000    30.000     0.000     0.060
HYDRAULICS        9.     60.00     2.000     1.500    25.000     0.007     0.100
HYDRAULICS       10.     60.00     5.000     5.000    50.000     0.000     0.070
HYDRAULICS       11.     60.00     5.600     4.400    55.000     0.001     0.052
HYDRAULICS       12.     60.00     5.600     4.400    55.000     0.001     0.052
HYDRAULICS       13.     60.00     1.000     1.000    32.000     0.001     0.200
HYDRAULICS       14.     60.00     6.000     2.000    15.000     0.001     1.200
HYDRAULICS       15.     60.00     2.500     2.500    25.000     0.001     0.080
HYDRAULICS       16.     60.00     2.500     2.500    25.000     0.001     0.080
HYDRAULICS       17.     60.00     2.600     3.300    39.000     0.000     0.052
ENDATA5           0.      0.00     0.000     0.000     0.000     0.000     0.000
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$$$ DATA TYPE 5A (STEADY STATE TEMPERATURE AND CLIMATOLOGY DATA) $$$

CARD TYPE	REACH	ELEVATION	DUST COEF	CLOUD COVER	DRY BULB TEMP	WET BULB TEMP	ATM PRESSURE	WIND	SOLAR RAD ATTENUATION
TEMP/LCD R	1.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	2.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	3.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	4.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	5.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	6.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	7.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	8.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	9.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	10.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	11.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	12.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	13.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	14.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	15.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	16.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	17.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
ENDATA5A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 6 (REACTION COEFFICIENTS FOR DEOXYGENATION AND REAERATION) $$$

CARD TYPE	REACH	K1	K3	SOD RATE	K2OPT	K2	COEQK2 OR TSIV COEF OR FOR OPT 8	EXPQK2 SLOPE FOR OPT 8
REACT COEF	1.	0.14	0.00	0.000	1.	2.10	0.000	0.00000
REACT COEF	2.	0.14	0.00	0.000	1.	2.23	0.000	0.00000
REACT COEF	3.	0.14	0.00	0.000	1.	1.86	0.000	0.00000
REACT COEF	4.	0.16	0.00	0.000	1.	2.00	0.000	0.00000
REACT COEF	5.	0.12	0.00	0.000	1.	2.00	0.000	0.00000
REACT COEF	6.	0.12	0.00	0.000	1.	2.00	0.000	0.00000
REACT COEF	7.	0.14	0.00	0.000	1.	8.00	0.000	0.00000
REACT COEF	8.	0.16	0.00	0.000	1.	0.86	0.000	0.00000
REACT COEF	9.	0.14	0.00	0.000	1.	0.86	0.000	0.00000
REACT COEF	10.	0.14	0.00	0.000	1.	0.20	0.000	0.00000
REACT COEF	11.	0.15	0.00	0.000	1.	2.76	0.000	0.00000
REACT COEF	12.	0.14	0.00	0.000	1.	2.76	0.000	0.00000
REACT COEF	13.	0.15	0.00	0.000	1.	5.20	0.000	0.00000
REACT COEF	14.	0.15	0.00	0.000	1.	0.60	0.000	0.00000
REACT COEF	15.	0.15	0.00	0.000	1.	2.00	0.000	0.00000
REACT COEF	16.	0.15	0.00	0.000	1.	2.00	0.000	0.00000
REACT COEF	17.	0.11	0.00	0.000	1.	2.76	0.000	0.00000
ENDATA6	0.	0.00	0.00	0.000	0.	0.00	0.000	0.00000

$$$ DATA TYPE 6A (NITROGEN AND PHOSPHORUS CONSTANTS) $$$

CARD TYPE	REACH	CKNH2	SETNH2	CKNH3	SNH3	CKNO2	CKPORG	SETPORG	SPO4
N AND P COEF	1.	0.02	-0.15	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	2.	0.02	-0.15	1.00	0.00	10.00	0.00	0.00	0.00
N AND P COEF	3.	0.02	0.20	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	4.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	5.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	6.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	7.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	8.	0.02	0.00	0.60	10.00	10.00	0.00	0.00	0.00
N AND P COEF	9.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	10.	0.02	0.00	0.60	0.00	10.00	0.00	0.00	0.00
N AND P COEF	11.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	12.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	13.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	14.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	15.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	16.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	17.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
ENDATA6A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 6B (ALGAE/OTHER COEFFICIENTS) $$$

CARD TYPE	REACH	ALPHAO	ALGSET	EXCOEF	CK5 CKCOLI	CKANC	SETANC	SRCANC
ALG/OTHER COEF	1.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	2.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	3.	50.00	3.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	4.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	5.	50.00	1.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	6.	50.00	1.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	7.	50.00	0.60	0.10	0.00	0.00	0.00	0.00

ALG/OTHER COEF	8.	50.00	1.50	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	9.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	10.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	11.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	12.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	13.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	14.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	15.	50.00	1.25	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	16.	50.00	1.10	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	17.	50.00	1.80	0.10	0.00	0.00	0.00	0.00
ENDATA6B	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 7 (INITIAL CONDITIONS) $$$

CARD TYPE	REACH	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
INITIAL COND-1	1.	69.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	2.	74.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	3.	71.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	4.	72.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	5.	71.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	6.	71.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	7.	71.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	8.	71.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	9.	72.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	10.	73.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	11.	74.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	12.	74.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	13.	70.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	14.	73.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	15.	73.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	16.	71.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	17.	74.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA7	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 7A (INITIAL CONDITIONS FOR CHOROPHYLL A, NITROGEN, AND PHOSPHORUS) $$$

CARD TYPE	REACH	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P
INITIAL COND-2	1.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	2.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	3.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	4.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	5.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	6.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	7.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	8.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	9.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	10.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	11.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	12.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	13.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	14.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	15.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	16.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	17.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA7A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 8 (INCREMENTAL INFLOW CONDITIONS) $$$

CARD TYPE	REACH	FLOW	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
INCR INFLOW-1	1.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	2.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	3.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	4.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	5.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	6.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	7.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	8.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	9.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	10.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	11.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	12.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	13.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	14.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	15.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	16.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	17.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA8	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 8A (INCREMENTAL INFLOW CONDITIONS FOR CHLOROPHYLL A, NITROGEN, AND PHOSPHORUS) $$$

CARD TYPE	REACH	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P

```
INCR INFLOW-2         1.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         2.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         3.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         4.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         5.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         6.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         7.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         8.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         9.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        10.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        11.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        12.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        13.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        14.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        15.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        16.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        17.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
ENDATA8A              0.      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 9 (STREAM JUNCTIONS) $$$

CARD TYPE              JUNCTION ORDER AND IDENT         UPSTRM   JUNCTION    TRIB
STREAM JUNCTION       1.     JNC=              1       17.       32.       31.
STREAM JUNCTION       2.     JNC=              2      155.      208.      207.
ENDATA9               0.                                0.        0.        0.

 $$$ DATA TYPE 10 (HEADWATER SOURCES) $$$

CARD TYPE    HDWTR     NAME               FLOW      TEMP      D.O.       BOD      CM-1      CM-2      CM-3
             ORDER
HEADWTR-1      1.   EGAN -SPRING BK      1.00     77.80      8.94      5.90    935.00      0.00      0.00
HEADWTR-1      2.      SPRING BROOK      1.00     78.00      6.30      3.93   1302.00      0.00      0.00
HEADWTR-1      3.   BENSENVILLE DWN      3.00     70.30      5.40      3.93    960.00      0.00      0.00
ENDATA10       0.                        0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 10A (HEADWATER CONDITIONS FOR CHLOROPHYLL, NITROGEN, PHOSPHORUS,
                   COLIFORM AND SELECTED NON-CONSERVATIVE CONSTITUENT) $$$

CARD TYPE     HDWTR     ANC     COLI     CHL-A     ORG-N     NH3-N     NO2-N     NO3-N     ORG-P     DIS-P
              ORDER
HEADWTR-2       1.     0.00 0.00E+00   48.82      1.27      0.03      0.00      1.60      0.07      0.42
HEADWTR-2       2.     0.00 0.00E+00   52.55      1.15      0.25      0.00      0.10      0.03      0.17
HEADWTR-2       3.     0.00 0.00E+00    6.50      1.80      1.00      0.00     21.80      0.48      2.72
ENDATA10A       0.     0.00 0.00E+00    0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 11 (POINT SOURCE / POINT SOURCE CHARACTERISTICS) $$$

              POINT
CARD TYPE      LOAD    NAME               EFF      FLOW      TEMP      D.O.       BOD      CM-1      CM-2      CM-3
              ORDER
POINTLD-1      1.            Egan        0.00     24.60     68.00      7.10      3.93    914.00      0.00      0.00
POINTLD-1      2.   Nordic Park          0.00      0.25     67.90      7.04      0.98    334.00      0.00      0.00
POINTLD-1      3.          Itasca        0.00      2.00     68.20      6.00      3.93   1196.00      0.00      0.00
POINTLD-1      4.   Wood Dale N          0.00      1.70     68.50      5.68      3.93    954.00      0.00      0.00
POINTLD-1      5.   Wood Dale S          0.00      0.45     69.30      7.15      0.98    977.00      0.00      0.00
POINTLD-1      6.     Addison N          0.00      3.30     68.80      7.98      1.97   1036.00      0.00      0.00
POINTLD-1      7.     Addison S          0.00      2.60     70.40      7.84      1.97    945.00      0.00      0.00
POINTLD-1      8.         SC SD          0.00      2.00     69.00      6.92      1.97    960.00      0.00      0.00
POINTLD-1      9.      Elmhurst          0.00      6.50     68.80      7.37      0.98    975.00      0.00      0.00
ENDATA11       0.                        0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 11A (POINT SOURCE CHARACTERISTICS - CHLOROPHYLL A, NITROGEN, PHOSPHORUS,
                   COLIFORMS AND SELECTED NON-CONSERVATIVE CONSTITUENT) $$$

              POINT
CARD TYPE      LOAD     ANC     COLI     CHL-A     ORG-N     NH3-N     NO2-N     N03-N     ORG-P     DIS-P
              ORDER
POINTLD-2       1.     0.00 0.00E+00    0.00      1.56      0.14      0.00     13.80      0.60      3.40
POINTLD-2       2.     0.00 0.00E+00    0.00      0.96      0.02      0.00     14.40      0.44      2.46
POINTLD-2       3.     0.00 0.00E+00    0.00      1.64      0.26      0.00     24.80      0.51      2.89
POINTLD-2       4.     0.00 0.00E+00    0.00      1.80      1.00      0.00     13.90      0.48      2.72
POINTLD-2       5.     0.00 0.00E+00    0.00      1.15      0.05      0.00     22.30      0.40      2.21
POINTLD-2       6.     0.00 0.00E+00    0.00      1.55      0.05      0.00     16.70      0.46      2.59
POINTLD-2       7.     0.00 0.00E+00    0.00      1.42      0.08      0.00     12.40      0.47      2.63
POINTLD-2       8.     0.00 0.00E+00    0.00      1.20      1.70      0.00     20.40      0.82      4.68
POINTLD-2       9.     0.00 0.00E+00    0.00      1.31      0.09      0.00     17.90      0.63      3.57
ENDATA11A       0.     0.00 0.00E+00    0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 12 (DAM CHARACTERISTICS) $$$

                      DAM   RCH   ELE    ADAM    BDAM    FDAM    HDAM
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DAM DATA                1.    3.   17.    1.30    0.32    1.00    1.60
DAM DATA                2.   10.    2.    1.30    0.33    1.00    1.60
DAM DATA                3.   10.   12.    1.30    0.58    0.80    6.00
ENDATA12                0.    0.    0.    0.00    0.00    0.00    0.00

 $$$ DATA TYPE 13 (DOWNSTREAM BOUNDARY CONDITIONS-1) $$$

     CARD TYPE               TEMP       D.O.      BOD       CM-1      CM-2      CM-3       ANC      COLI

ENDATA13                     DOWNSTREAM BOUNDARY CONCENTRATIONS ARE UNCONSTRAINED

 $$$ DATA TYPE 13A (DOWNSTREAM BOUNDARY CONDITIONS-2) $$$

     CARD TYPE               CHL-A     ORG-N     NH3-N     NO2-N     NH3-N     ORG-P     DIS-P

ENDATA13A                    DOWNSTREAM BOUNDARY CONCENTRATIONS ARE UNCONSTRAINED
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TABLE E5 SCENARIO 4 INPUT FOR QUAL2E

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* * * QUAL-2E  STREAM QUALITY ROUTING MODEL * * *
                                                            Version 3.22  --  May 1996

         $$$ (PROBLEM TITLES) $$$

        CARD TYPE                             QUAL-2E PROGRAM TITLES
        TITLE01              SALT CREEK TMDL - Scenario 4
        TITLE02              Dam at 13.5 removed; Monthly avg point source concentration
        TITLE03  YES         CONSERVATIVE MINERAL I      Con IN   ??
        TITLE04  NO          CONSERVATIVE MINERAL II
        TITLE05  NO          CONSERVATIVE MINERAL III
        TITLE06  NO          TEMPERATURE
        TITLE07  YES         5-DAY BIOCHEMICAL OXYGEN DEMAND
        TITLE08  YES         ALGAE AS CHL-A IN UG/L
        TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
        TITLE10                (ORGANIC-P; DISSOLVED-P)
        TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
        TITLE12                (ORGANIC-N; AMMONIA-N; NITRITE-N;' NITRATE-N)
        TITLE13  YES         DISSOLVED OXYGEN IN MG/L
        TITLE14  NO          FECAL COLIFORM IN NO./100 ML
        TITLE15  NO          ARBITRARY NON-CONSERVATIVE
        ENDTITLE

         $$$ DATA TYPE 1 (CONTROL DATA) $$$

        CARD TYPE                                     CARD TYPE
        LIST DATA INPUT            0.00000                                           0.00000
        WRITE OPTIONAL SUMMARY     0.00000                                           0.00000
        NO FLOW AUGMENTATION       0.00000                                           0.00000
        STEADY STATE               0.00000                                           0.00000
        TRAPAZOIDAL                0.00000                                           0.00000
        NO PRINT LCD/SOLAR DATA    0.00000                                           0.00000
        NO PLOT DO AND BOD DATA    0.00000                                           0.00000
        FIXED DNSTM CONC (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =   0.23000
        INPUT METRIC           =   0.00000          OUTPUT METRIC           =   0.00000
        NUMBER OF REACHES      =  17.00000          NUMBER OF JUNCTIONS     =   2.00000
        NUM OF HEADWATERS      =   3.00000          NUMBER OF POINT LOADS   =   9.00000
        TIME STEP (HOURS)      =   0.25000          LNTH. COMP. ELEMENT (DX)=   0.20000
        MAXIMUM NO. OF ITERATION= 720.00000         TIME INC. FOR RPT2 (HRS)=   1.00000
        LATITUDE OF BASIN (DEG) =  41.90000         LONGITUDE OF BASIN (DEG)=  87.96000
        STANDARD MARIDIAN (DEG) =  75.00000         DAY OF YEAR START TIME  = 213.00000
        EVAP. COEF.,(AE)       =   0.00068          EVAP. COEF.,(BE)        =   0.00027
        ELEV. OF BASIN (ELEV)   = 660.00000         DUST ATTENUATION COEF.  =   0.06000
        ENDATA1                    0.00000                                           0.00000

         $$$ DATA TYPE 1A (ALGAE PRODUCTION AND NITROGEN OXIDATION CONSTANTS) $$$

        CARD TYPE                                          CARD TYPE
        O UPTAKE BY NH3 OXID(MG O/MG N)=    3.4300         O UPTAKE BY NO2 OXID(MG O/MG N)=    1.1400
        O PROD  BY ALGAE (MG O/MG A)   =    1.6000         O UPTAKE BY ALGAE (MG O/MG A)  =    1.9500
        N CONTENT OF ALGAE (MG N/MG A) =    0.0900         P CONTENT OF ALGAE (MG O/MG A) =    0.0150
        ALG MAX SPEC GROWTH RATE(1/DAY)=    2.6000         ALGAE RESPIRATION RATE (1/DAY) =    0.5000
        N HALF SATURATION CONST (MG/L) =    0.3000         P HALF SATURATION CONST (MG/L) =    0.0400
        LIN ALG SHADE CO (1/FT-UGCHA/L=)    0.0008         NLIN SHADE(1/FT-(UGCHA/L)**2/3)=    0.0000
        LIGHT FUNCTION OPTION (LFNOPT) =    1.0000         LIGHT SAT'N COEF (BTU/FT2-MIN) =    0.1100
        DAILY AVERAGING OPTION (LAVOPT)=    2.0000         LIGHT AVERAGING FACTOR (AFACT) =    0.9200
        NUMBER OF DAYLIGHT HOURS (DLH) =   15.2200         TOTAL DAILY SOLR RAD (BTU/FT-2)= 1199.0000
        ALGY GROWTH CALC OPTION(LGROPT)=    2.0000         ALGAL PREF FOR NH3-N (PREFN)   =    0.1000
        ALG/TEMP SOLR RAD FACTOR(TFACT)=    0.4400         NITRIFICATION INHIBITION COEF  =   10.0000
        ENDATA1A                            0.0000                                              0.0000

         $$$ DATA TYPE 1B (TEMPERATURE CORRECTION CONSTANTS FOR RATE COEFFICIENTS) $$$

        CARD TYPE     RATE CODE     THETA VALUE

        THETA( 1)      BOD DECA        1.047     DFLT
        THETA( 2)      BOD SETT        1.024     DFLT
        THETA( 3)      OXY TRAN        1.024     DFLT
        THETA( 4)      SOD RATE        1.060     DFLT
        THETA( 5)      ORGN DEC        1.047     DFLT
        THETA( 6)      ORGN SET        1.024     DFLT
        THETA( 7)      NH3 DECA        1.083     DFLT
        THETA( 8)      NH3 SRCE        1.074     DFLT
        THETA( 9)      NO2 DECA        1.047     DFLT
        THETA(10)      PORG DEC        1.047     DFLT
        THETA(11)      PORG SET        1.024     DFLT
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THETA(12)      DISP SRC        1.074     DFLT
THETA(13)      ALG GROW        1.047     DFLT
THETA(14)      ALG RESP        1.047     DFLT
THETA(15)      ALG SETT        1.024     DFLT
THETA(16)      COLI DEC        1.047     DFLT
THETA(17)      ANC DECA        1.000     DFLT
THETA(18)      ANC SETT        1.024     DFLT
THETA(19)      ANC SRCE        1.000     DFLT
ENDATA1B

 $$$ DATA TYPE 2 (REACH IDENTIFICATION) $$$

CARD TYPE           REACH ORDER AND IDENT              R. MI/KM           R. MI/KM
STREAM REACH     1.0  RCH= EGAN -SPRING BK   FROM          31.8    TO          28.4
STREAM REACH     2.0  RCH=    SPRING BROOK   FROM           2.8    TO           0.0
STREAM REACH     3.0  RCH=   SPR BRK-ADD N   FROM          28.4    TO          25.0
STREAM REACH     4.0  RCH=   ADD N - ADD S   FROM          25.0    TO          23.4
STREAM REACH     5.0  RCH= ADD S - ST CHAR   FROM          23.4    TO          20.4
STREAM REACH     6.0  RCH=       CSO REACH   FROM          20.4    TO          19.4
STREAM REACH     7.0  RCH=     STEEP REACH   FROM          19.4    TO          18.6
STREAM REACH     8.0  RCH=      FLAT REACH   FROM          18.6    TO          15.6
STREAM REACH     9.0  RCH= FLAT REACH-31ST   FROM          15.6    TO          13.8
STREAM REACH    10.0  RCH= 31ST -FULL PARK   FROM          13.8    TO          11.4
STREAM REACH    11.0  RCH= DWN FR FULL PRK   FROM          11.4    TO           7.4
STREAM REACH    12.0  RCH=  TO CONF ADD CR   FROM           7.4    TO           3.6
STREAM REACH    13.0  RCH= BENSENVILLE DWN   FROM          10.4    TO           7.2
STREAM REACH    14.0  RCH= ADDISON REACH 2   FROM           7.2    TO           5.8
STREAM REACH    15.0  RCH= ADDISON REACH 3   FROM           5.8    TO           3.2
STREAM REACH    16.0  RCH= TO CONF SALT CR   FROM           3.2    TO           0.0
STREAM REACH    17.0  RCH= TO CONF DES PLA   FROM           3.6    TO           0.0
ENDATA2          0.0                                        0.0                 0.0

 $$$ DATA TYPE 3 (TARGET LEVEL DO AND FLOW AUGMENTATION SOURCES) $$$

CARD TYPE                  REACH  AVAIL HDWS TARGET     ORDER OF AVAIL SOURCES
ENDATA3                     0.        0.       0.0  0.   0.   0.   0.   0.   0.

 $$$ DATA TYPE 4 (COMPUTATIONAL REACH FLAG FIELD) $$$

CARD TYPE        REACH ELEMENTS/REACH             COMPUTATIONAL FLAGS
FLAG FIELD        1.       17.          1.6.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.3.0.0.0.
FLAG FIELD        2.       14.          1.6.2.2.2.2.2.2.2.2.2.2.2.6.0.0.0.0.0.0.0.
FLAG FIELD        3.       17.          4.2.2.6.2.2.2.2.2.2.2.6.2.2.2.2.2.0.0.0.0.
FLAG FIELD        4.        8.          6.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        5.       15.          6.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.
FLAG FIELD        6.        5.          2.2.6.6.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        7.        4.          2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        8.       15.          2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.
FLAG FIELD        9.        9.          2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD       10.       12.          2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.
FLAG FIELD       11.       20.          2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.
FLAG FIELD       12.       19.          2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.3.0.
FLAG FIELD       13.       16.          1.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.
FLAG FIELD       14.        7.          2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD       15.       13.          2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.
FLAG FIELD       16.       16.          2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.
FLAG FIELD       17.       18.          4.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.5.0.0.0.
ENDATA4           0.        0.          0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.

 $$$ DATA TYPE 5 (HYDRAULIC DATA FOR DETERMINING VELOCITY AND DEPTH) $$$

CARD TYPE        REACH  COEF-DSPN    SS1        SS2      WIDTH      SLOPE     CMANN
HYDRAULICS        1.     60.00     3.000      6.000     27.000     0.000     0.560
HYDRAULICS        2.     60.00     3.000      0.200     10.000     0.001     0.330
HYDRAULICS        3.     60.00     2.000      4.000     35.000     0.000     0.110
HYDRAULICS        4.     60.00     2.000      1.500     35.000     0.000     0.110
HYDRAULICS        5.     60.00     2.600      1.000     34.000     0.000     0.110
HYDRAULICS        6.     60.00     2.600      1.000     34.000     0.000     0.110
HYDRAULICS        7.     60.00     3.000      5.000     30.000     0.002     0.050
HYDRAULICS        8.     60.00     3.000      5.000     30.000     0.000     0.060
HYDRAULICS        9.     60.00     2.000      1.500     25.000     0.007     0.100
HYDRAULICS       10.     60.00     5.000      5.000     50.000     0.000     0.070
HYDRAULICS       11.     60.00     5.600      4.400     55.000     0.001     0.052
HYDRAULICS       12.     60.00     5.600      4.400     55.000     0.001     0.052
HYDRAULICS       13.     60.00     1.000      1.000     32.000     0.001     0.200
HYDRAULICS       14.     60.00     6.000      2.000     15.000     0.001     1.200
HYDRAULICS       15.     60.00     2.500      2.500     25.000     0.001     0.080
HYDRAULICS       16.     60.00     2.500      2.500     25.000     0.001     0.080
HYDRAULICS       17.     60.00     2.600      3.300     39.000     0.000     0.052
ENDATA5           0.      0.00     0.000      0.000      0.000     0.000     0.000
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$$$ DATA TYPE 5A (STEADY STATE TEMPERATURE AND CLIMATOLOGY DATA) $$$

CARD TYPE	REACH	ELEVATION	DUST COEF	CLOUD COVER	DRY BULB TEMP	WET BULB TEMP	ATM PRESSURE	WIND	SOLAR RAD ATTENUATION
TEMP/LCD R	1.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	2.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	3.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	4.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	5.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	6.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	7.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	8.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	9.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	10.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	11.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	12.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	13.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	14.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	15.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	16.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	17.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
ENDATA5A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 6 (REACTION COEFFICIENTS FOR DEOXYGENATION AND REAERATION) $$$

CARD TYPE	REACH	K1	K3	SOD RATE	K2OPT	K2	COEQK2 OR TSIV COEF FOR OPT 8	EXPQK2 OR SLOPE FOR OPT 8
REACT COEF	1.	0.14	0.00	0.100	1.	2.10	0.000	0.00000
REACT COEF	2.	0.14	0.00	0.080	1.	2.23	0.000	0.00000
REACT COEF	3.	0.14	0.00	0.070	1.	1.86	0.000	0.00000
REACT COEF	4.	0.16	0.00	0.100	1.	2.00	0.000	0.00000
REACT COEF	5.	0.12	0.00	0.100	1.	2.00	0.000	0.00000
REACT COEF	6.	0.12	0.00	0.100	1.	2.00	0.000	0.00000
REACT COEF	7.	0.14	0.00	0.060	1.	8.00	0.000	0.00000
REACT COEF	8.	0.16	0.00	0.060	1.	0.86	0.000	0.00000
REACT COEF	9.	0.14	0.00	0.060	1.	0.86	0.000	0.00000
REACT COEF	10.	0.14	0.00	0.020	1.	0.20	0.000	0.00000
REACT COEF	11.	0.15	0.00	0.100	1.	2.76	0.000	0.00000
REACT COEF	12.	0.14	0.00	0.100	1.	2.76	0.000	0.00000
REACT COEF	13.	0.15	0.00	0.100	1.	5.20	0.000	0.00000
REACT COEF	14.	0.15	0.00	0.030	1.	0.60	0.000	0.00000
REACT COEF	15.	0.15	0.00	0.050	1.	2.00	0.000	0.00000
REACT COEF	16.	0.15	0.00	0.050	1.	2.00	0.000	0.00000
REACT COEF	17.	0.11	0.00	0.150	1.	2.76	0.000	0.00000
ENDATA6	0.	0.00	0.00	0.000	0.	0.00	0.000	0.00000

$$$ DATA TYPE 6A (NITROGEN AND PHOSPHORUS CONSTANTS) $$$

CARD TYPE	REACH	CKNH2	SETNH2	CKNH3	SNH3	CKNO2	CKPORG	SETPORG	SPO4
N AND P COEF	1.	0.02	-0.15	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	2.	0.02	-0.15	1.00	0.00	10.00	0.00	0.00	0.00
N AND P COEF	3.	0.02	0.20	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	4.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	5.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	6.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	7.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	8.	0.02	0.00	0.60	10.00	10.00	0.00	0.00	0.00
N AND P COEF	9.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	10.	0.02	0.00	0.60	0.00	10.00	0.00	0.00	0.00
N AND P COEF	11.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	12.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	13.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	14.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	15.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	16.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	17.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
ENDATA6A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 6B (ALGAE/OTHER COEFFICIENTS) $$$

CARD TYPE	REACH	ALPHAO	ALGSET	EXCOEF	CK5 CKCOLI	CKANC	SETANC	SRCANC
ALG/OTHER COEF	1.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	2.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	3.	50.00	3.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	4.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	5.	50.00	1.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	6.	50.00	1.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	7.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	8.	50.00	1.50	0.10	0.00	0.00	0.00	0.00

ALG/OTHER COEF	9.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	10.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	11.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	12.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	13.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	14.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	15.	50.00	1.25	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	16.	50.00	1.10	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	17.	50.00	1.80	0.10	0.00	0.00	0.00	0.00
ENDATA6B	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 7 (INITIAL CONDITIONS) $$$

CARD TYPE	REACH	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
INITIAL COND-1	1.	69.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	2.	74.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	3.	71.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	4.	72.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	5.	71.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	6.	71.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	7.	71.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	8.	71.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	9.	72.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	10.	73.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	11.	74.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	12.	74.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	13.	70.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	14.	73.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	15.	73.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	16.	71.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	17.	74.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA7	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 7A (INITIAL CONDITIONS FOR CHOROPHYLL A, NITROGEN, AND PHOSPHORUS) $$$

CARD TYPE	REACH	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P
INITIAL COND-2	1.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	2.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	3.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	4.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	5.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	6.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	7.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	8.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	9.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	10.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	11.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	12.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	13.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	14.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	15.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	16.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	17.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA7A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 8 (INCREMENTAL INFLOW CONDITIONS) $$$

CARD TYPE	REACH	FLOW	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
INCR INFLOW-1	1.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	2.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	3.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	4.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	5.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	6.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	7.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	8.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	9.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	10.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	11.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	12.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	13.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	14.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	15.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	16.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	17.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA8	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 8A (INCREMENTAL INFLOW CONDITIONS FOR CHLOROPHYLL A, NITROGEN, AND PHOSPHORUS) $$$

CARD TYPE	REACH	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P
INCR INFLOW-2	1.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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INCR INFLOW-2         2.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2         3.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2         4.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2         5.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2         6.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2         7.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2         8.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2         9.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2        10.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2        11.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2        12.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2        13.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2        14.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2        15.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2        16.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
INCR INFLOW-2        17.      0.00       0.00       0.00       0.00       0.00       0.00       0.00
ENDATA8A              0.      0.00       0.00       0.00       0.00       0.00       0.00       0.00

 $$$ DATA TYPE 9 (STREAM JUNCTIONS) $$$

CARD TYPE               JUNCTION ORDER AND IDENT         UPSTRM   JUNCTION    TRIB
STREAM JUNCTION         1.     JNC=              1        17.       32.       31.
STREAM JUNCTION         2.     JNC=              2       155.      208.      207.
ENDATA9                 0.                                 0.        0.        0.

 $$$ DATA TYPE 10 (HEADWATER SOURCES) $$$

CARD TYPE    HDWTR     NAME              FLOW      TEMP      D.O.       BOD      CM-1      CM-2      CM-3
             ORDER
HEADWTR-1      1.   EGAN -SPRING BK      1.00     77.80      8.94      5.90    935.00      0.00      0.00
HEADWTR-1      2.      SPRING BROOK      1.00     78.00      6.30      3.93   1302.00      0.00      0.00
HEADWTR-1      3.   BENSENVILLE DWN      3.00     70.30      5.40     10.00    960.00      0.00      0.00
ENDATA10       0.                        0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 10A (HEADWATER CONDITIONS FOR CHLOROPHYLL, NITROGEN, PHOSPHORUS,
                   COLIFORM AND SELECTED NON-CONSERVATIVE CONSTITUENT) $$$

CARD TYPE     HDWTR     ANC      COLI     CHL-A    ORG-N    NH3-N    NO2-N    NO3-N    ORG-P    DIS-P
              ORDER
HEADWTR-2       1.     0.00 0.00E+00    48.82     1.27     0.03     0.00     1.60     0.07     0.42
HEADWTR-2       2.     0.00 0.00E+00    52.55     1.15     0.25     0.00     0.10     0.03     0.17
HEADWTR-2       3.     0.00 0.00E+00     6.50     1.80     1.50     0.00    21.80     0.48     2.72
ENDATA10A       0.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00

 $$$ DATA TYPE 11 (POINT SOURCE / POINT SOURCE CHARACTERISTICS) $$$

              POINT
CARD TYPE      LOAD    NAME              EFF      FLOW      TEMP      D.O.      BOD      CM-1      CM-2      CM-3
              ORDER
POINTLD-1      1.          Egan         0.00    24.60     68.00     7.10    10.00    914.00      0.00      0.00
POINTLD-1      2.   Nordic Park         0.00     0.25     67.90     7.04    10.00    334.00      0.00      0.00
POINTLD-1      3.        Itasca         0.00     2.00     68.20     5.21    20.00   1196.00      0.00      0.00
POINTLD-1      4.   Wood Dale N         0.00     1.70     68.50     5.68    20.00    954.00      0.00      0.00
POINTLD-1      5.   Wood Dale S         0.00     0.45     69.30     7.15    20.00    977.00      0.00      0.00
POINTLD-1      6.     Addison N         0.00     3.30     68.80     7.98    20.00   1036.00      0.00      0.00
POINTLD-1      7.     Addison S         0.00     2.60     70.40     7.84    20.00    945.00      0.00      0.00
POINTLD-1      8.         SC SD         0.00     2.00     69.00     6.92    10.00    960.00      0.00      0.00
POINTLD-1      9.      Elmhurst         0.00     6.50     68.80     7.37    10.00    975.00      0.00      0.00
ENDATA11       0.                       0.00     0.00      0.00     0.00     0.00      0.00      0.00      0.00

 $$$ DATA TYPE 11A (POINT SOURCE CHARACTERISTICS - CHLOROPHYLL A, NITROGEN, PHOSPHORUS,
                    COLIFORMS AND SELECTED NON-CONSERVATIVE CONSTITUENT) $$$

              POINT
CARD TYPE      LOAD     ANC      COLI     CHL-A    ORG-N    NH3-N    NO2-N    N03-N    ORG-P    DIS-P
              ORDER
POINTLD-2       1.     0.00 0.00E+00     0.00     1.56     1.50     0.00    13.80     0.60     3.40
POINTLD-2       2.     0.00 0.00E+00     0.00     0.96     1.50     0.00    14.40     0.44     2.46
POINTLD-2       3.     0.00 0.00E+00     0.00     1.64     1.50     0.00    24.80     0.51     2.89
POINTLD-2       4.     0.00 0.00E+00     0.00     1.80     1.50     0.00    13.90     0.48     2.72
POINTLD-2       5.     0.00 0.00E+00     0.00     1.15     1.50     0.00    22.30     0.40     2.21
POINTLD-2       6.     0.00 0.00E+00     0.00     1.55     1.50     0.00    16.70     0.46     2.59
POINTLD-2       7.     0.00 0.00E+00     0.00     1.42     1.50     0.00    12.40     0.47     2.63
POINTLD-2       8.     0.00 0.00E+00     0.00     1.20     1.50     0.00    20.40     0.82     4.68
POINTLD-2       9.     0.00 0.00E+00     0.00     1.31     2.30     0.00    17.90     0.63     3.57
ENDATA11A       0.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00

 $$$ DATA TYPE 12 (DAM CHARACTERISTICS) $$$

                      DAM   RCH   ELE    ADAM    BDAM    FDAM    HDAM
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DAM DATA                 1.    3.   17.    1.30    0.32    1.00    1.60
DAM DATA                 2.   10.   12.    1.30    0.58    0.80    6.00
ENDATA12                 0.    0.    0.    0.00    0.00    0.00    0.00

 $$$ DATA TYPE 13 (DOWNSTREAM BOUNDARY CONDITIONS-1) $$$

     CARD TYPE              TEMP       D.O.      BOD       CM-1      CM-2      CM-3       ANC      COLI

ENDATA13                    DOWNSTREAM BOUNDARY CONCENTRATIONS ARE UNCONSTRAINED

 $$$ DATA TYPE 13A (DOWNSTREAM BOUNDARY CONDITIONS-2) $$$

     CARD TYPE              CHL-A     ORG-N     NH3-N     NO2-N     NH3-N     ORG-P     DIS-P

ENDATA13A                   DOWNSTREAM BOUNDARY CONCENTRATIONS ARE UNCONSTRAINED
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TABLE E6 SCENARIO 5 INPUT FOR QUAL2E – ALLOCATION 1

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* * * QUAL-2E  STREAM QUALITY ROUTING MODEL * * *
                                                   Version 3.22  --  May 1996

          $$$ (PROBLEM TITLES) $$$

         CARD TYPE                            QUAL-2E PROGRAM TITLES
         TITLE01              SALT CREEK TMDL - Allocation 1  (Scenario 5)
         TITLE02              Point Sources at 5/1/Permit Design Flow
         TITLE03  YES         CONSERVATIVE MINERAL I      Con IN
         TITLE04  NO          CONSERVATIVE MINERAL II
         TITLE05  NO          CONSERVATIVE MINERAL III
         TITLE06  NO          TEMPERATURE
         TITLE07  YES         5-DAY BIOCHEMICAL OXYGEN DEMAND
         TITLE08  YES         ALGAE AS CHL-A IN UG/L
         TITLE09  YES         PHOSPHORUS CYCLE AS P IN MG/L
         TITLE10                (ORGANIC-P; DISSOLVED-P)
         TITLE11  YES         NITROGEN CYCLE AS N IN MG/L
         TITLE12                (ORGANIC-N; AMMONIA-N; NITRITE-N;' NITRATE-N)
         TITLE13  YES         DISSOLVED OXYGEN IN MG/L
         TITLE14  NO          FECAL COLIFORM IN NO./100 ML
         TITLE15  NO          ARBITRARY NON-CONSERVATIVE
         ENDTITLE

          $$$ DATA TYPE 1 (CONTROL DATA) $$$

         CARD TYPE                                    CARD TYPE
         LIST DATA INPUT              0.00000                                   0.00000
         WRITE OPTIONAL SUMMARY       0.00000                                   0.00000
         NO FLOW AUGMENTATION         0.00000                                   0.00000
         STEADY STATE                 0.00000                                   0.00000
         TRAPAZOIDAL                  0.00000                                   0.00000
         NO PRINT LCD/SOLAR DATA      0.00000                                   0.00000
         NO PLOT DO AND BOD DATA      0.00000                                   0.00000
         FIXED DNSTM CONC (YES=1)=    0.00000         5D-ULT BOD CONV K COEF  =   0.23000
         INPUT METRIC            =    0.00000         OUTPUT METRIC           =   0.00000
         NUMBER OF REACHES       =   17.00000         NUMBER OF JUNCTIONS     =   2.00000
         NUM OF HEADWATERS       =    3.00000         NUMBER OF POINT LOADS   =   9.00000
         TIME STEP (HOURS)       =    0.25000         LNTH. COMP. ELEMENT (DX)=   0.20000
         MAXIMUM NO. OF ITERATION= 720.00000          TIME INC. FOR RPT2 (HRS)=   1.00000
         LATITUDE OF BASIN (DEG) =  41.90000          LONGITUDE OF BASIN (DEG)=  87.96000
         STANDARD MARIDIAN (DEG) =  75.00000          DAY OF YEAR START TIME  = 213.00000
         EVAP. COEF.,(AE)        =    0.00068         EVAP. COEF.,(BE)        =   0.00027
         ELEV. OF BASIN (ELEV)   = 660.00000          DUST ATTENUATION COEF.  =   0.06000
         ENDATA1                      0.00000                                   0.00000

          $$$ DATA TYPE 1A (ALGAE PRODUCTION AND NITROGEN OXIDATION CONSTANTS) $$$

         CARD TYPE                                           CARD TYPE
         O UPTAKE BY NH3 OXID(MG O/MG N)=    3.4300          O UPTAKE BY NO2 OXID(MG O/MG N)=    1.1400
         O PROD  BY ALGAE (MG O/MG A)   =    1.6000          O UPTAKE BY ALGAE (MG O/MG A)  =    1.9500
         N CONTENT OF ALGAE (MG N/MG A) =    0.0900          P CONTENT OF ALGAE (MG O/MG A) =    0.0150
         ALG MAX SPEC GROWTH RATE(1/DAY)=    2.6000          ALGAE RESPIRATION RATE (1/DAY) =    0.5000
         N HALF SATURATION CONST (MG/L) =    0.3000          P HALF SATURATION CONST (MG/L) =    0.0400
         LIN ALG SHADE CO (1/FT-UGCHA/L=)    0.0008          NLIN SHADE(1/FT-(UGCHA/L)**2/3)=    0.0000
         LIGHT FUNCTION OPTION (LFNOPT) =    1.0000          LIGHT SAT'N COEF (BTU/FT2-MIN) =    0.1100
         DAILY AVERAGING OPTION (LAVOPT)=    2.0000          LIGHT AVERAGING FACTOR (AFACT) =    0.9200
         NUMBER OF DAYLIGHT HOURS (DLH) =   15.2200          TOTAL DAILY SOLR RAD (BTU/FT-2)= 1199.0000
         ALGY GROWTH CALC OPTION(LGROPT)=    2.0000          ALGAL PREF FOR NH3-N (PREFN)   =    0.1000
         ALG/TEMP SOLR RAD FACTOR(TFACT)=    0.4400          NITRIFICATION INHIBITION COEF  =   10.0000
         ENDATA1A                            0.0000                                              0.0000

          $$$ DATA TYPE 1B (TEMPERATURE CORRECTION CONSTANTS FOR RATE COEFFICIENTS) $$$

         CARD TYPE     RATE CODE     THETA VALUE

         THETA( 1)      BOD DECA        1.047     DFLT
         THETA( 2)      BOD SETT        1.024     DFLT
         THETA( 3)      OXY TRAN        1.024     DFLT
         THETA( 4)      SOD RATE        1.060     DFLT
         THETA( 5)      ORGN DEC        1.047     DFLT
         THETA( 6)      ORGN SET        1.024     DFLT
         THETA( 7)      NH3 DECA        1.083     DFLT
         THETA( 8)      NH3 SRCE        1.074     DFLT
         THETA( 9)      NO2 DECA        1.047     DFLT
         THETA(10)      PORG DEC        1.047     DFLT
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THETA(11)      PORG SET        1.024     DFLT
THETA(12)      DISP SRC        1.074     DFLT
THETA(13)      ALG GROW        1.047     DFLT
THETA(14)      ALG RESP        1.047     DFLT
THETA(15)      ALG SETT        1.024     DFLT
THETA(16)      COLI DEC        1.047     DFLT
THETA(17)      ANC DECA        1.000     DFLT
THETA(18)      ANC SETT        1.024     DFLT
THETA(19)      ANC SRCE        1.000     DFLT
ENDATA1B

 $$$ DATA TYPE 2 (REACH IDENTIFICATION) $$$

CARD TYPE           REACH ORDER AND IDENT              R. MI/KM            R. MI/KM
STREAM REACH     1.0  RCH= EGAN -SPRING BK   FROM         31.8    TO          28.4
STREAM REACH     2.0  RCH=    SPRING BROOK   FROM          2.8    TO           0.0
STREAM REACH     3.0  RCH=   SPR BRK-ADD N   FROM         28.4    TO          25.0
STREAM REACH     4.0  RCH=   ADD N - ADD S   FROM         25.0    TO          23.4
STREAM REACH     5.0  RCH= ADD S - ST CHAR   FROM         23.4    TO          20.4
STREAM REACH     6.0  RCH=       CSO REACH   FROM         20.4    TO          19.4
STREAM REACH     7.0  RCH=     STEEP REACH   FROM         19.4    TO          18.6
STREAM REACH     8.0  RCH=      FLAT REACH   FROM         18.6    TO          15.6
STREAM REACH     9.0  RCH= FLAT REACH-31ST   FROM         15.6    TO          13.8
STREAM REACH    10.0  RCH= 31ST -FULL PARK   FROM         13.8    TO          11.4
STREAM REACH    11.0  RCH= DWN FR FULL PRK   FROM         11.4    TO           7.4
STREAM REACH    12.0  RCH=  TO CONF ADD CR   FROM          7.4    TO           3.6
STREAM REACH    13.0  RCH= BENSENVILLE DWN   FROM         10.4    TO           7.2
STREAM REACH    14.0  RCH= ADDISON REACH 2   FROM          7.2    TO           5.8
STREAM REACH    15.0  RCH= ADDISON REACH 3   FROM          5.8    TO           3.2
STREAM REACH    16.0  RCH= TO CONF SALT CR   FROM          3.2    TO           0.0
STREAM REACH    17.0  RCH= TO CONF DES PLA   FROM          3.6    TO           0.0
ENDATA2          0.0                                       0.0                 0.0

 $$$ DATA TYPE 3 (TARGET LEVEL DO AND FLOW AUGMENTATION SOURCES) $$$

CARD TYPE                  REACH  AVAIL HDWS TARGET     ORDER OF AVAIL SOURCES
ENDATA3                     0.        0.       0.0  0.   0.   0.   0.   0.   0.

 $$$ DATA TYPE 4 (COMPUTATIONAL REACH FLAG FIELD) $$$

CARD TYPE        REACH ELEMENTS/REACH             COMPUTATIONAL FLAGS
FLAG FIELD        1.       17.         1.6.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.3.0.0.0.
FLAG FIELD        2.       14.         1.6.2.2.2.2.2.2.2.2.2.2.2.6.0.0.0.0.0.0.
FLAG FIELD        3.       17.         4.2.2.6.2.2.2.2.2.2.2.6.2.2.2.2.2.0.0.0.
FLAG FIELD        4.        8.         6.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        5.       15.         6.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.
FLAG FIELD        6.        5.         2.2.6.6.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        7.        4.         2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        8.       15.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.
FLAG FIELD        9.        9.         2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD       10.       12.         2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.
FLAG FIELD       11.       20.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.
FLAG FIELD       12.       19.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.3.0.
FLAG FIELD       13.       16.         1.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.
FLAG FIELD       14.        7.         2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD       15.       13.         2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.
FLAG FIELD       16.       16.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.
FLAG FIELD       17.       18.         4.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.5.0.0.
ENDATA4           0.        0.         0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.

 $$$ DATA TYPE 5 (HYDRAULIC DATA FOR DETERMINING VELOCITY AND DEPTH) $$$

CARD TYPE        REACH  COEF-DSPN    SS1        SS2      WIDTH     SLOPE     CMANN
HYDRAULICS        1.     60.00     3.000      6.000     27.000     0.000     0.560
HYDRAULICS        2.     60.00     3.000      0.200     10.000     0.001     0.330
HYDRAULICS        3.     60.00     2.000      4.000     35.000     0.000     0.110
HYDRAULICS        4.     60.00     2.000      1.500     35.000     0.000     0.110
HYDRAULICS        5.     60.00     2.600      1.000     34.000     0.000     0.110
HYDRAULICS        6.     60.00     2.600      1.000     34.000     0.000     0.110
HYDRAULICS        7.     60.00     3.000      5.000     30.000     0.002     0.050
HYDRAULICS        8.     60.00     3.000      5.000     30.000     0.000     0.060
HYDRAULICS        9.     60.00     2.000      1.500     25.000     0.007     0.100
HYDRAULICS       10.     60.00     5.000      5.000     50.000     0.000     0.070
HYDRAULICS       11.     60.00     5.600      4.400     55.000     0.001     0.052
HYDRAULICS       12.     60.00     5.600      4.400     55.000     0.001     0.052
HYDRAULICS       13.     60.00     1.000      1.000     32.000     0.001     0.200
HYDRAULICS       14.     60.00     6.000      2.000     15.000     0.001     1.200
HYDRAULICS       15.     60.00     2.500      2.500     25.000     0.001     0.080
HYDRAULICS       16.     60.00     2.500      2.500     25.000     0.001     0.080
HYDRAULICS       17.     60.00     2.600      3.300     39.000     0.000     0.052
ENDATA5           0.      0.00     0.000      0.000      0.000     0.000     0.000
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$$$ DATA TYPE 5A (STEADY STATE TEMPERATURE AND CLIMATOLOGY DATA) $$$

CARD TYPE	REACH	ELEVATION	DUST COEF	CLOUD COVER	DRY BULB TEMP	WET BULB TEMP	ATM PRESSURE	WIND	SOLAR RAD ATTENUATION
TEMP/LCD R	1.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	2.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	3.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	4.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	5.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	6.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	7.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	8.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	9.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	10.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	11.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	12.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	13.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	14.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	15.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	16.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	17.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
ENDATA5A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 6 (REACTION COEFFICIENTS FOR DEOXYGENATION AND REAERATION) $$$

CARD TYPE	REACH	K1	K3	SOD RATE	K2OPT	K2	COEQK2 OR TSIV COEF OR FOR OPT 8	EXPQK2 SLOPE FOR OPT 8
REACT COEF	1.	0.14	0.00	0.100	1.	2.10	0.000	0.00000
REACT COEF	2.	0.14	0.00	0.080	1.	2.23	0.000	0.00000
REACT COEF	3.	0.14	0.00	0.070	1.	1.86	0.000	0.00000
REACT COEF	4.	0.16	0.00	0.100	1.	2.00	0.000	0.00000
REACT COEF	5.	0.12	0.00	0.100	1.	2.00	0.000	0.00000
REACT COEF	6.	0.12	0.00	0.100	1.	2.00	0.000	0.00000
REACT COEF	7.	0.14	0.00	0.060	1.	8.00	0.000	0.00000
REACT COEF	8.	0.16	0.00	0.060	1.	0.86	0.000	0.00000
REACT COEF	9.	0.14	0.00	0.060	1.	0.86	0.000	0.00000
REACT COEF	10.	0.14	0.00	0.020	1.	0.20	0.000	0.00000
REACT COEF	11.	0.15	0.00	0.100	1.	2.76	0.000	0.00000
REACT COEF	12.	0.14	0.00	0.100	1.	2.76	0.000	0.00000
REACT COEF	13.	0.15	0.00	0.100	1.	5.20	0.000	0.00000
REACT COEF	14.	0.15	0.00	0.030	1.	0.60	0.000	0.00000
REACT COEF	15.	0.15	0.00	0.050	1.	2.00	0.000	0.00000
REACT COEF	16.	0.15	0.00	0.050	1.	2.00	0.000	0.00000
REACT COEF	17.	0.11	0.00	0.150	1.	2.76	0.000	0.00000
ENDATA6	0.	0.00	0.00	0.000	0.	0.00	0.000	0.00000

$$$ DATA TYPE 6A (NITROGEN AND PHOSPHORUS CONSTANTS) $$$

CARD TYPE	REACH	CKNH2	SETNH2	CKNH3	SNH3	CKNO2	CKPORG	SETPORG	SPO4
N AND P COEF	1.	0.02	-0.15	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	2.	0.02	-0.15	1.00	0.00	10.00	0.00	0.00	0.00
N AND P COEF	3.	0.02	0.20	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	4.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	5.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	6.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	7.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	8.	0.02	0.00	0.60	10.00	10.00	0.00	0.00	0.00
N AND P COEF	9.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	10.	0.02	0.00	0.60	0.00	10.00	0.00	0.00	0.00
N AND P COEF	11.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	12.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	13.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	14.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	15.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	16.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	17.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
ENDATA6A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 6B (ALGAE/OTHER COEFFICIENTS) $$$

CARD TYPE	REACH	ALPHAO	ALGSET	EXCOEF	CK5 CKCOLI	CKANC	SETANC	SRCANC
ALG/OTHER COEF	1.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	2.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	3.	50.00	3.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	4.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	5.	50.00	1.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	6.	50.00	1.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	7.	50.00	0.60	0.10	0.00	0.00	0.00	0.00

ALG/OTHER COEF	8.	50.00	1.50	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	9.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	10.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	11.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	12.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	13.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	14.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	15.	50.00	1.25	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	16.	50.00	1.10	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	17.	50.00	1.80	0.10	0.00	0.00	0.00	0.00
ENDATA6B	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 7 (INITIAL CONDITIONS) $$$

CARD TYPE	REACH	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
INITIAL COND-1	1.	69.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	2.	74.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	3.	71.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	4.	72.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	5.	71.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	6.	71.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	7.	71.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	8.	71.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	9.	72.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	10.	73.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	11.	74.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	12.	74.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	13.	70.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	14.	73.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	15.	73.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	16.	71.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	17.	74.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA7	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 7A (INITIAL CONDITIONS FOR CHOROPHYLL A, NITROGEN, AND PHOSPHORUS) $$$

CARD TYPE	REACH	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P
INITIAL COND-2	1.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	2.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	3.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	4.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	5.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	6.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	7.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	8.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	9.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	10.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	11.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	12.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	13.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	14.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	15.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	16.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	17.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA7A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 8 (INCREMENTAL INFLOW CONDITIONS) $$$

CARD TYPE	REACH	FLOW	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
INCR INFLOW-1	1.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	2.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	3.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	4.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	5.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	6.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	7.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	8.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	9.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	10.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	11.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	12.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	13.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	14.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	15.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	16.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	17.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA8	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 8A (INCREMENTAL INFLOW CONDITIONS FOR CHLOROPHYLL A, NITROGEN, AND PHOSPHORUS) $$$

CARD TYPE	REACH	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P

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INCR INFLOW-2         1.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         2.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         3.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         4.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         5.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         6.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         7.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         8.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2         9.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        10.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        11.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        12.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        13.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        14.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        15.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        16.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        17.      0.00      0.00      0.00      0.00      0.00      0.00      0.00
ENDATA8A              0.      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 9 (STREAM JUNCTIONS) $$$

CARD TYPE              JUNCTION ORDER AND IDENT         UPSTRM   JUNCTION    TRIB
STREAM JUNCTION        1.     JNC=              1        17.       32.       31.
STREAM JUNCTION        2.     JNC=              2       155.      208.      207.
ENDATA9                0.                                0.        0.        0.

 $$$ DATA TYPE 10 (HEADWATER SOURCES) $$$

CARD TYPE    HDWTR    NAME                 FLOW      TEMP      D.O.       BOD      CM-1      CM-2      CM-3
             ORDER
HEADWTR-1      1.   EGAN -SPRING BK        1.00     77.80      8.94      5.90    935.00      0.00      0.00
HEADWTR-1      2.      SPRING BROOK        1.00     78.00      6.30      3.93   1302.00      0.00      0.00
HEADWTR-1      3.   BENSENVILLE DWN        7.27     70.30      6.00     10.00    960.00      0.00      0.00
ENDATA10       0.                          0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 10A (HEADWATER CONDITIONS FOR CHLOROPHYLL, NITROGEN, PHOSPHORUS,
                   COLIFORM AND SELECTED NON-CONSERVATIVE CONSTITUENT) $$$

CARD TYPE     HDWTR    ANC      COLI     CHL-A     ORG-N     NH3-N     NO2-N     NO3-N     ORG-P     DIS-P
              ORDER
HEADWTR-2       1.     0.00 0.00E+00     48.82      1.27      0.03      0.00      1.60      0.07      0.42
HEADWTR-2       2.     0.00 0.00E+00     52.55      1.15      0.25      0.00      0.10      0.03      0.17
HEADWTR-2       3.     0.00 0.00E+00      6.50      1.80      1.00      0.00     21.80      0.48      2.72
ENDATA10A       0.     0.00 0.00E+00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 11 (POINT SOURCE / POINT SOURCE CHARACTERISTICS) $$$

              POINT
CARD TYPE      LOAD    NAME                 EFF      FLOW      TEMP      D.O.       BOD      CM-1      CM-2      CM-3
              ORDER
POINTLD-1     1.            Egan           0.00     46.41     68.00      7.10      5.00    914.00      0.00      0.00
POINTLD-1     2.     Nordic Park           0.00      0.77     67.90      7.04      5.00    334.00      0.00      0.00
POINTLD-1     3.          Itasca           0.00      4.02     68.20      6.00      5.00   1196.00      0.00      0.00
POINTLD-1     4.     Wood Dale N           0.00      3.05     68.50      5.68      5.00    954.00      0.00      0.00
POINTLD-1     5.     Wood Dale S           0.00      1.75     69.30      7.15      5.00    977.00      0.00      0.00
POINTLD-1     6.       Addison N           0.00      8.20     68.80      7.98      5.00   1036.00      0.00      0.00
POINTLD-1     7.       Addison S           0.00      4.95     70.40      7.84      5.00    945.00      0.00      0.00
POINTLD-1     8.           SC SD           0.00      5.11     69.00      6.92      5.00    960.00      0.00      0.00
POINTLD-1     9.        Elmhurst           0.00     12.38     68.80      7.37      5.00    975.00      0.00      0.00
ENDATA11      0.                           0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 11A (POINT SOURCE CHARACTERISTICS - CHLOROPHYLL A, NITROGEN, PHOSPHORUS,
                   COLIFORMS AND SELECTED NON-CONSERVATIVE CONSTITUENT) $$$

              POINT
CARD TYPE      LOAD    ANC      COLI     CHL-A     ORG-N     NH3-N     NO2-N     N03-N     ORG-P     DIS-P
              ORDER
POINTLD-2       1.     0.00 0.00E+00      0.00      1.56      1.00      0.00     13.80      0.60      3.40
POINTLD-2       2.     0.00 0.00E+00      0.00      0.96      1.00      0.00     14.40      0.44      2.46
POINTLD-2       3.     0.00 0.00E+00      0.00      1.64      1.00      0.00     24.80      0.51      2.89
POINTLD-2       4.     0.00 0.00E+00      0.00      1.80      1.00      0.00     13.90      0.48      2.72
POINTLD-2       5.     0.00 0.00E+00      0.00      1.15      1.00      0.00     22.30      0.40      2.21
POINTLD-2       6.     0.00 0.00E+00      0.00      1.55      1.00      0.00     16.70      0.46      2.59
POINTLD-2       7.     0.00 0.00E+00      0.00      1.42      1.00      0.00     12.40      0.47      2.63
POINTLD-2       8.     0.00 0.00E+00      0.00      1.20      1.00      0.00     20.40      0.82      4.68
POINTLD-2       9.     0.00 0.00E+00      0.00      1.31      1.00      0.00     17.90      0.63      3.57
ENDATA11A       0.     0.00 0.00E+00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 12 (DAM CHARACTERISTICS) $$$

                      DAM   RCH   ELE    ADAM    BDAM    FDAM    HDAM
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DAM DATA                1.    3.   17.    1.30    0.32    1.00    1.60
DAM DATA                2.   10.    2.    1.30    0.33    1.00    1.60
DAM DATA                3.   10.   12.    1.30    0.58    0.80    6.00
ENDATA12                0.    0.    0.    0.00    0.00    0.00    0.00

 $$$ DATA TYPE 13 (DOWNSTREAM BOUNDARY CONDITIONS-1) $$$

     CARD TYPE               TEMP       D.O.      BOD       CM-1      CM-2      CM-3       ANC       COLI

ENDATA13                     DOWNSTREAM BOUNDARY CONCENTRATIONS ARE UNCONSTRAINED

 $$$ DATA TYPE 13A (DOWNSTREAM BOUNDARY CONDITIONS-2) $$$

     CARD TYPE               CHL-A     ORG-N     NH3-N     NO2-N     NH3-N     ORG-P     DIS-P

ENDATA13A                    DOWNSTREAM BOUNDARY CONCENTRATIONS ARE UNCONSTRAINED
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TABLE E7 SCENARIO 6 INPUT FOR QUAL2E – ALLOCATION 2

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                                             * * * QUAL-2E  STREAM QUALITY ROUTING MODEL * * *
                                                          Version 3.22  --  May 1996

 $$$ (PROBLEM TITLES) $$$

CARD TYPE                             QUAL-2E PROGRAM TITLES
TITLE01             SALT CREEK TMDL - Scenario 6
TITLE02             Allocation2(6/27/95) - Dam Removed; Design Flows
TITLE03  YES        CONSERVATIVE MINERAL I      Con IN   ??
TITLE04  NO         CONSERVATIVE MINERAL II
TITLE05  NO         CONSERVATIVE MINERAL III
TITLE06  NO         TEMPERATURE
TITLE07  YES        5-DAY BIOCHEMICAL OXYGEN DEMAND
TITLE08  YES        ALGAE AS CHL-A IN UG/L
TITLE09  YES        PHOSPHORUS CYCLE AS P IN MG/L
TITLE10               (ORGANIC-P; DISSOLVED-P)
TITLE11  YES        NITROGEN CYCLE AS N IN MG/L
TITLE12               (ORGANIC-N; AMMONIA-N; NITRITE-N;' NITRATE-N)
TITLE13  YES        DISSOLVED OXYGEN IN MG/L
TITLE14  NO         FECAL COLIFORM IN NO./100 ML
TITLE15  NO         ARBITRARY NON-CONSERVATIVE
ENDTITLE

 $$$ DATA TYPE 1 (CONTROL DATA) $$$

CARD TYPE                                      CARD TYPE
LIST DATA INPUT             0.00000                                        0.00000
WRITE OPTIONAL SUMMARY      0.00000                                        0.00000
NO FLOW AUGMENTATION        0.00000                                        0.00000
STEADY STATE                0.00000                                        0.00000
TRAPAZOIDAL                 0.00000                                        0.00000
NO PRINT LCD/SOLAR DATA     0.00000                                        0.00000
NO PLOT DO AND BOD DATA     0.00000                                        0.00000
FIXED DNSTM CONC (YES=1)=   0.00000          5D-ULT BOD CONV K COEF  =     0.23000
INPUT METRIC            =   0.00000          OUTPUT METRIC           =     0.00000
NUMBER OF REACHES       =  17.00000          NUMBER OF JUNCTIONS     =     2.00000
NUM OF HEADWATERS       =   3.00000          NUMBER OF POINT LOADS   =     9.00000
TIME STEP (HOURS)       =   0.25000          LNTH. COMP. ELEMENT (DX)=     0.20000
MAXIMUM NO. OF ITERATION= 720.00000          TIME INC. FOR RPT2 (HRS)=     1.00000
LATITUDE OF BASIN (DEG) =  41.90000          LONGITUDE OF BASIN (DEG)=    87.96000
STANDARD MARIDIAN (DEG) =  75.00000          DAY OF YEAR START TIME  =   213.00000
EVAP. COEF.,(AE)        =   0.00068          EVAP. COEF.,(BE)        =     0.00027
ELEV. OF BASIN (ELEV)   = 660.00000          DUST ATTENUATION COEF.  =     0.06000
ENDATA1                     0.00000                                        0.00000

 $$$ DATA TYPE 1A (ALGAE PRODUCTION AND NITROGEN OXIDATION CONSTANTS) $$$

CARD TYPE                                           CARD TYPE
O UPTAKE BY NH3 OXID(MG O/MG N)=    3.4300          O UPTAKE BY NO2 OXID(MG O/MG N)=    1.1400
O PROD  BY ALGAE (MG O/MG A)   =    1.6000          O UPTAKE BY ALGAE (MG O/MG A)  =    1.9500
N CONTENT OF ALGAE (MG N/MG A) =    0.0900          P CONTENT OF ALGAE (MG O/MG A) =    0.0150
ALG MAX SPEC GROWTH RATE(1/DAY)=    2.6000          ALGAE RESPIRATION RATE (1/DAY) =    0.5000
N HALF SATURATION CONST (MG/L) =    0.3000          P HALF SATURATION CONST (MG/L) =    0.0400
LIN ALG SHADE CO (1/FT-UGCHA/L=)    0.0008          NLIN SHADE(1/FT-(UGCHA/L)**2/3)=    0.0000
LIGHT FUNCTION OPTION (LFNOPT) =    1.0000          LIGHT SAT'N COEF (BTU/FT2-MIN) =    0.1100
DAILY AVERAGING OPTION (LAVOPT)=    2.0000          LIGHT AVERAGING FACTOR (AFACT) =    0.9200
NUMBER OF DAYLIGHT HOURS (DLH) =   15.2200          TOTAL DAILY SOLR RAD (BTU/FT-2)= 1199.0000
ALGY GROWTH CALC OPTION(LGROPT)=    2.0000          ALGAL PREF FOR NH3-N (PREFN)   =    0.1000
ALG/TEMP SOLR RAD FACTOR(TFACT)=    0.4400          NITRIFICATION INHIBITION COEF  =   10.0000
ENDATA1A                            0.0000                                              0.0000

 $$$ DATA TYPE 1B (TEMPERATURE CORRECTION CONSTANTS FOR RATE COEFFICIENTS) $$$

CARD TYPE     RATE CODE     THETA VALUE

THETA( 1)      BOD DECA        1.047     DFLT
THETA( 2)      BOD SETT        1.024     DFLT
THETA( 3)      OXY TRAN        1.024     DFLT
THETA( 4)      SOD RATE        1.060     DFLT
THETA( 5)      ORGN DEC        1.047     DFLT
THETA( 6)      ORGN SET        1.024     DFLT
THETA( 7)      NH3 DECA        1.083     DFLT
THETA( 8)      NH3 SRCE        1.074     DFLT
THETA( 9)      NO2 DECA        1.047     DFLT
THETA(10)      PORG DEC        1.047     DFLT
THETA(11)      PORG SET        1.024     DFLT
THETA(12)      DISP SRC        1.074     DFLT
THETA(13)      ALG GROW        1.047     DFLT
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THETA(14)      ALG RESP        1.047     DFLT
THETA(15)      ALG SETT        1.024     DFLT
THETA(16)      COLI DEC        1.047     DFLT
THETA(17)      ANC DECA        1.000     DFLT
THETA(18)      ANC SETT        1.024     DFLT
THETA(19)      ANC SRCE        1.000     DFLT
ENDATA1B

 $$$ DATA TYPE 2 (REACH IDENTIFICATION) $$$

CARD TYPE           REACH ORDER AND IDENT               R. MI/KM            R. MI/KM
STREAM REACH     1.0  RCH= EGAN -SPRING BK   FROM         31.8    TO          28.4
STREAM REACH     2.0  RCH=    SPRING BROOK   FROM          2.8    TO           0.0
STREAM REACH     3.0  RCH=   SPR BRK-ADD N   FROM         28.4    TO          25.0
STREAM REACH     4.0  RCH=   ADD N - ADD S   FROM         25.0    TO          23.4
STREAM REACH     5.0  RCH= ADD S - ST CHAR   FROM         23.4    TO          20.4
STREAM REACH     6.0  RCH=       CSO REACH   FROM         20.4    TO          19.4
STREAM REACH     7.0  RCH=     STEEP REACH   FROM         19.4    TO          18.6
STREAM REACH     8.0  RCH=      FLAT REACH   FROM         18.6    TO          15.6
STREAM REACH     9.0  RCH= FLAT REACH-31ST   FROM         15.6    TO          13.8
STREAM REACH    10.0  RCH= 31ST -FULL PARK   FROM         13.8    TO          11.4
STREAM REACH    11.0  RCH= DWN FR FULL PRK   FROM         11.4    TO           7.4
STREAM REACH    12.0  RCH=  TO CONF ADD CR   FROM          7.4    TO           3.6
STREAM REACH    13.0  RCH= BENSENVILLE DWN   FROM         10.4    TO           7.2
STREAM REACH    14.0  RCH= ADDISON REACH 2   FROM          7.2    TO           5.8
STREAM REACH    15.0  RCH= ADDISON REACH 3   FROM          5.8    TO           3.2
STREAM REACH    16.0  RCH= TO CONF SALT CR   FROM          3.2    TO           0.0
STREAM REACH    17.0  RCH= TO CONF DES PLA   FROM          3.6    TO           0.0
ENDATA2          0.0                                       0.0                 0.0

 $$$ DATA TYPE 3 (TARGET LEVEL DO AND FLOW AUGMENTATION SOURCES) $$$

CARD TYPE                  REACH  AVAIL HDWS TARGET     ORDER OF AVAIL SOURCES
ENDATA3                     0.        0.       0.0   0.    0.    0.    0.    0.    0.

 $$$ DATA TYPE 4 (COMPUTATIONAL REACH FLAG FIELD) $$$

CARD TYPE        REACH ELEMENTS/REACH            COMPUTATIONAL FLAGS
FLAG FIELD        1.       17.         1.6.2.2.2.2.2.2.2.2.2.2.2.2.2.2.3.0.0.0.
FLAG FIELD        2.       14.         1.6.2.2.2.2.2.2.2.2.2.2.2.6.0.0.0.0.0.0.
FLAG FIELD        3.       17.         4.2.2.6.2.2.2.2.2.2.2.6.2.2.2.2.2.0.0.0.
FLAG FIELD        4.        8.         6.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        5.       15.         6.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.
FLAG FIELD        6.        5.         2.2.6.6.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        7.        4.         2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD        8.       15.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.
FLAG FIELD        9.        9.         2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD       10.       12.         2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.
FLAG FIELD       11.       20.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.
FLAG FIELD       12.       19.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.3.0.
FLAG FIELD       13.       16.         1.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.
FLAG FIELD       14.        7.         2.2.2.2.2.2.2.0.0.0.0.0.0.0.0.0.0.0.0.0.
FLAG FIELD       15.       13.         2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.0.0.0.
FLAG FIELD       16.       16.         2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.0.0.0.0.
FLAG FIELD       17.       18.         4.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.5.0.0.
ENDATA4           0.        0.         0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.

 $$$ DATA TYPE 5 (HYDRAULIC DATA FOR DETERMINING VELOCITY AND DEPTH) $$$

CARD TYPE        REACH  COEF-DSPN    SS1        SS2      WIDTH     SLOPE     CMANN
HYDRAULICS        1.     60.00     3.000      6.000    27.000     0.000     0.560
HYDRAULICS        2.     60.00     3.000      0.200    10.000     0.001     0.330
HYDRAULICS        3.     60.00     2.000      4.000    35.000     0.000     0.110
HYDRAULICS        4.     60.00     2.000      1.500    35.000     0.000     0.110
HYDRAULICS        5.     60.00     2.600      1.000    34.000     0.000     0.110
HYDRAULICS        6.     60.00     2.600      1.000    34.000     0.000     0.110
HYDRAULICS        7.     60.00     3.000      5.000    30.000     0.002     0.050
HYDRAULICS        8.     60.00     3.000      5.000    30.000     0.000     0.060
HYDRAULICS        9.     60.00     2.000      1.500    25.000     0.007     0.100
HYDRAULICS       10.     60.00     5.600      4.400    55.000     0.000     0.070
HYDRAULICS       11.     60.00     5.600      4.400    55.000     0.001     0.052
HYDRAULICS       12.     60.00     5.600      4.400    55.000     0.001     0.052
HYDRAULICS       13.     60.00     1.000      1.000    32.000     0.001     0.200
HYDRAULICS       14.     60.00     6.000      2.000    15.000     0.001     1.200
HYDRAULICS       15.     60.00     2.500      2.500    25.000     0.001     0.080
HYDRAULICS       16.     60.00     2.500      2.500    25.000     0.001     0.080
HYDRAULICS       17.     60.00     2.600      3.300    39.000     0.000     0.052
ENDATA5           0.      0.00     0.000      0.000     0.000     0.000     0.000

 $$$ DATA TYPE 5A (STEADY STATE TEMPERATURE AND CLIMATOLOGY DATA) $$$
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CARD TYPE	REACH	ELEVATION	DUST COEF	CLOUD COVER	DRY BULB TEMP	WET BULB TEMP	ATM PRESSURE	WIND	SOLAR RAD ATTENUATION
TEMP/LCD R	1.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	2.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	3.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	4.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	5.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	6.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	7.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	8.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	9.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	10.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	11.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	12.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	13.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	14.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	15.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	16.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
TEMP/LCD R	17.	1000.00	0.06	0.30	70.00	60.00	29.90	0.00	1.00
ENDATA5A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 6 (REACTION COEFFICIENTS FOR DEOXYGENATION AND REAERATION) $$$

CARD TYPE	REACH	K1	K3	SOD RATE	K2OPT	K2	COEQK2 OR TSIV COEF OR FOR OPT 8	EXPQK2 SLOPE FOR OPT 8
REACT COEF	1.	0.14	0.00	0.100	1.	2.10	0.000	0.00000
REACT COEF	2.	0.14	0.00	0.080	1.	2.23	0.000	0.00000
REACT COEF	3.	0.14	0.00	0.070	1.	1.86	0.000	0.00000
REACT COEF	4.	0.16	0.00	0.100	1.	2.00	0.000	0.00000
REACT COEF	5.	0.12	0.00	0.100	1.	2.00	0.000	0.00000
REACT COEF	6.	0.12	0.00	0.100	1.	2.00	0.000	0.00000
REACT COEF	7.	0.14	0.00	0.060	1.	8.00	0.000	0.00000
REACT COEF	8.	0.16	0.00	0.060	1.	0.86	0.000	0.00000
REACT COEF	9.	0.14	0.00	0.060	1.	0.86	0.000	0.00000
REACT COEF	10.	0.14	0.00	0.020	1.	0.20	0.000	0.00000
REACT COEF	11.	0.15	0.00	0.100	1.	2.76	0.000	0.00000
REACT COEF	12.	0.14	0.00	0.100	1.	2.76	0.000	0.00000
REACT COEF	13.	0.15	0.00	0.100	1.	5.20	0.000	0.00000
REACT COEF	14.	0.15	0.00	0.030	1.	0.60	0.000	0.00000
REACT COEF	15.	0.15	0.00	0.050	1.	2.00	0.000	0.00000
REACT COEF	16.	0.15	0.00	0.050	1.	2.00	0.000	0.00000
REACT COEF	17.	0.11	0.00	0.150	1.	2.76	0.000	0.00000
ENDATA6	0.	0.00	0.00	0.000	0.	0.00	0.000	0.00000

$$$ DATA TYPE 6A (NITROGEN AND PHOSPHORUS CONSTANTS) $$$

CARD TYPE	REACH	CKNH2	SETNH2	CKNH3	SNH3	CKNO2	CKPORG	SETPORG	SPO4
N AND P COEF	1.	0.02	-0.15	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	2.	0.02	-0.15	1.00	0.00	10.00	0.00	0.00	0.00
N AND P COEF	3.	0.02	0.20	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	4.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	5.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	6.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	7.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	8.	0.02	0.00	0.60	10.00	10.00	0.00	0.00	0.00
N AND P COEF	9.	0.02	0.00	0.60	10.00	10.00	0.00	1.00	0.00
N AND P COEF	10.	0.02	0.00	0.60	0.00	10.00	0.00	0.00	0.00
N AND P COEF	11.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	12.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
N AND P COEF	13.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	14.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	15.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	16.	0.02	0.00	0.45	0.00	10.00	0.00	1.00	0.00
N AND P COEF	17.	0.02	0.00	0.60	0.00	10.00	0.00	1.00	0.00
ENDATA6A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 6B (ALGAE/OTHER COEFFICIENTS) $$$

CARD TYPE	REACH	ALPHAO	ALGSET	EXCOEF	CK5 CKCOLI	CKANC	SETANC	SRCANC
ALG/OTHER COEF	1.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	2.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	3.	50.00	3.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	4.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	5.	50.00	1.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	6.	50.00	1.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	7.	50.00	0.60	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	8.	50.00	1.50	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	9.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	10.	50.00	0.00	0.10	0.00	0.00	0.00	0.00

ALG/OTHER COEF	11.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	12.	50.00	1.30	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	13.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	14.	50.00	0.00	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	15.	50.00	1.25	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	16.	50.00	1.10	0.10	0.00	0.00	0.00	0.00
ALG/OTHER COEF	17.	50.00	1.80	0.10	0.00	0.00	0.00	0.00
ENDATA6B	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 7 (INITIAL CONDITIONS) $$$

CARD TYPE	REACH	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
INITIAL COND-1	1.	69.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	2.	74.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	3.	71.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	4.	72.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	5.	71.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	6.	71.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	7.	71.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	8.	71.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	9.	72.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	10.	73.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	11.	74.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	12.	74.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	13.	70.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	14.	73.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	15.	73.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	16.	71.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-1	17.	74.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA7	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 7A (INITIAL CONDITIONS FOR CHOROPHYLL A, NITROGEN, AND PHOSPHORUS) $$$

CARD TYPE	REACH	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P
INITIAL COND-2	1.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	2.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	3.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	4.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	5.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	6.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	7.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	8.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	9.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	10.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	11.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	12.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	13.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	14.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	15.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	16.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INITIAL COND-2	17.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA7A	0.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 8 (INCREMENTAL INFLOW CONDITIONS) $$$

CARD TYPE	REACH	FLOW	TEMP	D.O.	BOD	CM-1	CM-2	CM-3	ANC	COLI
INCR INFLOW-1	1.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	2.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	3.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	4.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	5.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	6.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	7.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	8.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	9.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	10.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	11.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	12.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	13.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	14.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	15.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	16.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-1	17.	0.000	70.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENDATA8	0.	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

$$$ DATA TYPE 8A (INCREMENTAL INFLOW CONDITIONS FOR CHLOROPHYLL A, NITROGEN, AND PHOSPHORUS) $$$

CARD TYPE	REACH	CHL-A	ORG-N	NH3-N	NO2-N	NO3-N	ORG-P	DIS-P
INCR INFLOW-2	1.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-2	2.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
INCR INFLOW-2	3.	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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INCR INFLOW-2        4.     0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        5.     0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        6.     0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        7.     0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        8.     0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2        9.     0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2       10.     0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2       11.     0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2       12.     0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2       13.     0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2       14.     0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2       15.     0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2       16.     0.00      0.00      0.00      0.00      0.00      0.00      0.00
INCR INFLOW-2       17.     0.00      0.00      0.00      0.00      0.00      0.00      0.00
ENDATA8A             0.     0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 9 (STREAM JUNCTIONS) $$$

CARD TYPE               JUNCTION ORDER AND IDENT         UPSTRM   JUNCTION    TRIB
STREAM JUNCTION         1.     JNC=              1        17.       32.       31.
STREAM JUNCTION         2.     JNC=              2       155.      208.      207.
ENDATA9                 0.                                 0.        0.        0.

 $$$ DATA TYPE 10 (HEADWATER SOURCES) $$$

CARD TYPE    HDWTR     NAME              FLOW      TEMP       D.O.       BOD      CM-1      CM-2      CM-3
             ORDER
HEADWTR-1     1.   EGAN -SPRING BK      1.00     77.80      8.94      5.90    914.00      0.00      0.00
HEADWTR-1     2.      SPRING BROOK      1.00     78.00      6.30      3.93   1302.00      0.00      0.00
HEADWTR-1     3.   BENSENVILLE DWN      7.27     70.30      6.00     10.00    960.00      0.00      0.00
ENDATA10      0.                        0.00      0.00      0.00      0.00      0.00      0.00      0.00

 $$$ DATA TYPE 10A (HEADWATER CONDITIONS FOR CHLOROPHYLL, NITROGEN, PHOSPHORUS,
                   COLIFORM AND SELECTED NON-CONSERVATIVE CONSTITUENT) $$$

CARD TYPE     HDWTR     ANC      COLI     CHL-A    ORG-N    NH3-N    NO2-N    NO3-N    ORG-P    DIS-P
              ORDER
HEADWTR-2       1.     0.00 0.00E+00    48.82     1.27     0.03     0.00     1.60     0.07     0.42
HEADWTR-2       2.     0.00 0.00E+00    52.55     1.15     0.25     0.00     0.10     0.03     0.17
HEADWTR-2       3.     0.00 0.00E+00     6.50     1.80     1.00     0.00    21.80     0.48     2.72
ENDATA10A       0.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00

 $$$ DATA TYPE 11 (POINT SOURCE / POINT SOURCE CHARACTERISTICS) $$$

              POINT
CARD TYPE      LOAD    NAME              EFF     FLOW     TEMP      D.O.      BOD     CM-1     CM-2     CM-3
              ORDER
POINTLD-1      1.           Egan        0.00    46.41    68.00     7.10     8.00   914.00     0.00     0.00
POINTLD-1      2.    Nordic Park        0.00     0.77    67.90     7.04     8.00   334.00     0.00     0.00
POINTLD-1      3.         Itasca        0.00     4.02    68.20     7.00     8.00  1196.00     0.00     0.00
POINTLD-1      4.    Wood Dale N        0.00     3.05    68.50     5.68     8.00   954.00     0.00     0.00
POINTLD-1      5.    Wood Dale S        0.00     1.75    69.30     7.15     8.00   977.00     0.00     0.00
POINTLD-1      6.      Addison N        0.00     8.20    68.80     7.98     8.00  1036.00     0.00     0.00
POINTLD-1      7.      Addison S        0.00     4.95    70.40     7.84     8.00   945.00     0.00     0.00
POINTLD-1      8.          SC SD        0.00     5.11    69.00     6.92     8.00   960.00     0.00     0.00
POINTLD-1      9.       Elmhurst        0.00    12.38    68.80     7.37     8.00   975.00     0.00     0.00
ENDATA11       0.                       0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00

 $$$ DATA TYPE 11A (POINT SOURCE CHARACTERISTICS - CHLOROPHYLL A, NITROGEN, PHOSPHORUS,
                   COLIFORMS AND SELECTED NON-CONSERVATIVE CONSTITUENT) $$$

              POINT
CARD TYPE      LOAD     ANC      COLI     CHL-A    ORG-N    NH3-N    NO2-N    N03-N    ORG-P    DIS-P
              ORDER
POINTLD-2       1.     0.00 0.00E+00     0.00     1.56     1.00     0.00    13.80     0.60     3.40
POINTLD-2       2.     0.00 0.00E+00     0.00     0.96     1.00     0.00    14.40     0.44     2.46
POINTLD-2       3.     0.00 0.00E+00     0.00     1.64     1.00     0.00    24.80     0.51     2.89
POINTLD-2       4.     0.00 0.00E+00     0.00     1.80     1.00     0.00    13.90     0.48     2.72
POINTLD-2       5.     0.00 0.00E+00     0.00     1.15     1.00     0.00    22.30     0.40     2.21
POINTLD-2       6.     0.00 0.00E+00     0.00     1.55     1.00     0.00    16.70     0.46     2.59
POINTLD-2       7.     0.00 0.00E+00     0.00     1.42     1.00     0.00    12.40     0.47     2.63
POINTLD-2       8.     0.00 0.00E+00     0.00     1.20     1.00     0.00    20.40     0.82     4.68
POINTLD-2       9.     0.00 0.00E+00     0.00     1.31     1.00     0.00    17.90     0.63     3.57
ENDATA11A       0.     0.00 0.00E+00     0.00     0.00     0.00     0.00     0.00     0.00     0.00

 $$$ DATA TYPE 12 (DAM CHARACTERISTICS) $$$

                      DAM   RCH   ELE    ADAM    BDAM    FDAM    HDAM

DAM DATA                1.    3.   17.    1.30    0.32    1.00    1.60
DAM DATA                2.   10.    2.    1.30    0.33    1.00    1.60
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ENDATA12                0.    0.    0.    0.00    0.00    0.00    0.00

 $$$ DATA TYPE 13 (DOWNSTREAM BOUNDARY CONDITIONS-1) $$$

     CARD TYPE                TEMP       D.O.      BOD       CM-1      CM-2      CM-3       ANC       COLI

ENDATA13                    DOWNSTREAM BOUNDARY CONCENTRATIONS ARE UNCONSTRAINED

 $$$ DATA TYPE 13A (DOWNSTREAM BOUNDARY CONDITIONS-2) $$$

     CARD TYPE                CHL-A     ORG-N     NH3-N     NO2-N     NH3-N     ORG-P     DIS-P

ENDATA13A                   DOWNSTREAM BOUNDARY CONCENTRATIONS ARE UNCONSTRAINED
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Appendix F: QUAL2E Model Output

TABLE F1 **QUAL2E MODEL OUTPUT FOR SCENARIO 5**

RCH NUM	ELE NUM	DO MG/L	BOD MG/L	ORGN MG/L	NH3N MG/L	NO2N MG/L	NO3N MG/L
1	1	7.93	5.62	1.35	0.1	0	2.54
1	2	7.07	4.97	1.57	0.93	0.02	13.41
1	3	7.05	4.91	1.59	0.88	0.04	13.44
1	4	7.04	4.84	1.61	0.84	0.04	13.48
1	5	7.03	4.78	1.62	0.8	0.04	13.52
1	6	7.03	4.72	1.64	0.76	0.05	13.56
1	7	7.04	4.66	1.66	0.72	0.04	13.6
1	8	7.06	4.6	1.68	0.69	0.04	13.64
1	9	7.08	4.54	1.7	0.65	0.04	13.68
1	10	7.1	4.48	1.72	0.62	0.04	13.71
1	11	7.13	4.42	1.74	0.59	0.04	13.75
1	12	7.16	4.37	1.77	0.57	0.04	13.78
1	13	7.2	4.31	1.79	0.54	0.04	13.81
1	14	7.23	4.26	1.81	0.52	0.03	13.85
1	15	7.26	4.2	1.83	0.49	0.03	13.91
1	16	7.28	4.16	1.84	0.48	0.03	14.02
1	17	7.26	4.14	1.83	0.47	0.03	14.27
2	1	6.18	3.89	1.17	0.24	0.01	0.43
2	2	6.36	4.3	1.1	0.51	0.03	6.29
2	3	6.24	4.24	1.11	0.45	0.04	6.33
2	4	6.16	4.17	1.13	0.41	0.04	6.37
2	5	6.12	4.11	1.15	0.37	0.04	6.4
2	6	6.1	4.05	1.16	0.33	0.04	6.44
2	7	6.1	4	1.18	0.3	0.04	6.47
2	8	6.11	3.94	1.2	0.27	0.03	6.49
2	9	6.14	3.88	1.22	0.24	0.03	6.51
2	10	6.18	3.82	1.24	0.22	0.03	6.53
2	11	6.22	3.77	1.26	0.2	0.02	6.55
2	12	6.27	3.72	1.28	0.18	0.02	6.62
2	13	6.29	3.72	1.32	0.2	0.02	7.44
2	14	6.12	4.51	1.56	0.68	0.03	18.7
3	1	7.1	4.17	1.78	0.49	0.03	14.92
3	2	7.1	4.16	1.77	0.48	0.03	14.93
3	3	7.1	4.14	1.76	0.47	0.03	14.94
3	4	7.02	4.17	1.75	0.49	0.03	14.89
3	5	7.03	4.15	1.74	0.48	0.03	14.9
3	6	7.03	4.13	1.73	0.48	0.03	14.91
3	7	7.03	4.11	1.72	0.47	0.03	14.92
3	8	7.04	4.1	1.71	0.46	0.03	14.93
3	9	7.04	4.08	1.69	0.45	0.03	14.94

RCH NUM	ELE NUM	DO MG/L	BOD MG/L	ORGN MG/L	NH3N MG/L	NO2N MG/L	NO3N MG/L
3	10	7.05	4.06	1.68	0.44	0.03	14.94
3	11	7.05	4.04	1.67	0.44	0.03	14.96
3	12	7.06	4.05	1.65	0.45	0.03	15.18
3	13	7.07	4.04	1.64	0.44	0.03	15.19
3	14	7.07	4.02	1.63	0.43	0.03	15.2
3	15	7.08	4	1.62	0.42	0.03	15.21
3	16	7.09	3.99	1.6	0.42	0.03	15.21
3	17	7.3	3.98	1.59	0.41	0.03	15.23
4	1	7.35	4.08	1.59	0.48	0.03	15.41
4	2	7.33	4.06	1.59	0.48	0.03	15.42
4	3	7.31	4.05	1.59	0.47	0.03	15.42
4	4	7.29	4.03	1.59	0.47	0.03	15.43
4	5	7.27	4.01	1.59	0.47	0.03	15.44
4	6	7.25	3.99	1.59	0.46	0.03	15.45
4	7	7.23	3.98	1.58	0.46	0.03	15.45
4	8	7.22	3.97	1.58	0.46	0.03	15.45
5	1	7.25	4.02	1.57	0.49	0.03	15.25
5	2	7.24	4.01	1.57	0.49	0.03	15.26
5	3	7.23	4	1.57	0.48	0.03	15.27
5	4	7.22	3.98	1.57	0.48	0.03	15.27
5	5	7.21	3.97	1.57	0.48	0.03	15.28
5	6	7.2	3.96	1.57	0.47	0.03	15.29
5	7	7.19	3.95	1.57	0.47	0.03	15.3
5	8	7.18	3.93	1.57	0.46	0.03	15.3
5	9	7.18	3.92	1.57	0.46	0.03	15.31
5	10	7.17	3.91	1.57	0.46	0.03	15.32
5	11	7.17	3.9	1.57	0.46	0.03	15.32
5	12	7.16	3.89	1.57	0.45	0.03	15.33
5	13	7.16	3.87	1.56	0.45	0.03	15.34
5	14	7.15	3.86	1.56	0.45	0.03	15.34
5	15	7.15	3.85	1.56	0.44	0.03	15.35
6	1	7.15	3.84	1.56	0.44	0.03	15.36
6	2	7.15	3.83	1.56	0.44	0.03	15.39
6	3	7.13	3.9	1.54	0.48	0.03	15.73
6	4	7.16	4.04	1.51	0.54	0.03	16.02
6	5	7.15	4.02	1.5	0.54	0.03	16.02
7	1	7.22	4.02	1.5	0.53	0.03	16.03
7	2	7.29	4.01	1.5	0.53	0.03	16.03
7	3	7.35	4.01	1.5	0.53	0.03	16.03
7	4	7.41	4	1.5	0.53	0.03	16.04
8	1	7.46	3.99	1.5	0.53	0.03	16.04
8	2	7.4	3.96	1.5	0.52	0.03	16.05
8	3	7.34	3.94	1.5	0.51	0.03	16.06
8	4	7.28	3.92	1.5	0.51	0.03	16.08
8	5	7.22	3.89	1.5	0.5	0.03	16.09
8	6	7.17	3.87	1.5	0.49	0.03	16.1
8	7	7.11	3.85	1.5	0.49	0.03	16.11
8	8	7.06	3.83	1.5	0.48	0.03	16.12

RCH NUM	ELE NUM	DO MG/L	BOD MG/L	ORGN MG/L	NH3N MG/L	NO2N MG/L	NO3N MG/L
8	9	7.02	3.81	1.5	0.47	0.03	16.13
8	10	6.97	3.78	1.5	0.47	0.03	16.14
8	11	6.93	3.76	1.49	0.46	0.03	16.15
8	12	6.89	3.74	1.49	0.46	0.03	16.16
8	13	6.85	3.72	1.49	0.45	0.03	16.17
8	14	6.82	3.7	1.49	0.45	0.03	16.18
8	15	6.78	3.68	1.49	0.44	0.03	16.19
9	1	6.77	3.66	1.49	0.44	0.03	16.2
9	2	6.75	3.66	1.49	0.44	0.03	16.2
9	3	6.74	3.66	1.49	0.44	0.03	16.2
9	4	6.73	3.65	1.49	0.44	0.03	16.21
9	5	6.71	3.65	1.49	0.44	0.03	16.21
9	6	6.7	3.64	1.49	0.44	0.03	16.21
9	7	6.69	3.64	1.49	0.44	0.03	16.21
9	8	6.68	3.64	1.49	0.44	0.03	16.21
9	9	6.66	3.63	1.49	0.44	0.03	16.22
10	1	6.65	3.62	1.49	0.43	0.03	16.22
10	2	6.85	3.61	1.49	0.42	0.03	16.23
10	3	6.8	3.59	1.49	0.42	0.03	16.23
10	4	6.75	3.58	1.49	0.41	0.03	16.24
10	5	6.7	3.57	1.49	0.4	0.03	16.25
10	6	6.66	3.55	1.49	0.4	0.03	16.26
10	7	6.61	3.54	1.49	0.39	0.03	16.26
10	8	6.57	3.52	1.49	0.38	0.03	16.27
10	9	6.53	3.51	1.49	0.38	0.03	16.28
10	10	6.49	3.5	1.48	0.37	0.03	16.28
10	11	6.47	3.48	1.48	0.37	0.03	16.29
10	12	7.18	3.47	1.48	0.36	0.03	16.29
11	1	7.14	3.46	1.48	0.36	0.03	16.3
11	2	7.13	3.45	1.48	0.35	0.02	16.3
11	3	7.12	3.44	1.48	0.35	0.02	16.31
11	4	7.11	3.43	1.48	0.35	0.02	16.31
11	5	7.1	3.42	1.48	0.34	0.02	16.31
11	6	7.09	3.41	1.48	0.34	0.02	16.32
11	7	7.09	3.41	1.48	0.34	0.02	16.32
11	8	7.08	3.4	1.48	0.33	0.02	16.32
11	9	7.07	3.39	1.48	0.33	0.02	16.33
11	10	7.06	3.38	1.48	0.33	0.02	16.33
11	11	7.06	3.37	1.48	0.32	0.02	16.33
11	12	7.05	3.36	1.48	0.32	0.02	16.34
11	13	7.05	3.36	1.48	0.32	0.02	16.34
11	14	7.04	3.35	1.48	0.31	0.02	16.34
11	15	7.04	3.34	1.48	0.31	0.02	16.35
11	16	7.03	3.33	1.48	0.31	0.02	16.35
11	17	7.03	3.32	1.48	0.3	0.02	16.35
11	18	7.03	3.31	1.48	0.3	0.02	16.36
11	19	7.02	3.31	1.48	0.3	0.02	16.36
11	20	7.02	3.3	1.48	0.3	0.02	16.36

RCH NUM	ELE NUM	DO MG/L	BOD MG/L	ORGN MG/L	NH3N MG/L	NO2N MG/L	NO3N MG/L
12	1	7.02	3.29	1.48	0.29	0.02	16.36
12	2	7.01	3.28	1.48	0.29	0.02	16.37
12	3	7.01	3.27	1.48	0.29	0.02	16.37
12	4	7.01	3.27	1.48	0.28	0.02	16.37
12	5	7	3.26	1.48	0.28	0.02	16.38
12	6	7	3.25	1.48	0.28	0.02	16.38
12	7	7	3.25	1.48	0.28	0.02	16.38
12	8	7	3.24	1.48	0.27	0.02	16.38
12	9	7	3.23	1.48	0.27	0.02	16.39
12	10	6.99	3.22	1.48	0.27	0.02	16.39
12	11	6.99	3.22	1.48	0.27	0.02	16.39
12	12	6.99	3.21	1.47	0.26	0.02	16.39
12	13	6.99	3.2	1.47	0.26	0.02	16.4
12	14	6.99	3.19	1.47	0.26	0.02	16.4
12	15	6.99	3.19	1.47	0.26	0.02	16.4
12	16	6.99	3.18	1.47	0.25	0.02	16.4
12	17	6.99	3.17	1.47	0.25	0.02	16.41
12	18	6.99	3.16	1.47	0.25	0.02	16.41
12	19	6.99	3.16	1.47	0.25	0.02	16.42
13	1	6.33	9.91	1.8	0.97	0.02	21.81
13	2	6.58	9.81	1.8	0.95	0.03	21.83
13	3	6.78	9.72	1.79	0.92	0.03	21.85
13	4	6.92	9.63	1.79	0.9	0.04	21.87
13	5	7.04	9.54	1.79	0.88	0.04	21.89
13	6	7.13	9.45	1.79	0.85	0.04	21.91
13	7	7.2	9.36	1.79	0.83	0.04	21.93
13	8	7.26	9.27	1.79	0.81	0.04	21.96
13	9	7.31	9.18	1.78	0.79	0.04	21.98
13	10	7.35	9.1	1.78	0.77	0.04	22
13	11	7.39	9.01	1.78	0.75	0.04	22.02
13	12	7.42	8.93	1.78	0.73	0.04	22.04
13	13	7.44	8.84	1.78	0.71	0.03	22.06
13	14	7.47	8.76	1.78	0.7	0.03	22.08
13	15	7.49	8.68	1.78	0.68	0.03	22.1
13	16	7.5	8.59	1.77	0.66	0.03	22.12
14	1	7.34	8.31	1.77	0.6	0.03	22.17
14	2	6.99	8.05	1.77	0.55	0.03	22.21
14	3	6.73	7.81	1.77	0.51	0.03	22.24
14	4	6.56	7.57	1.77	0.47	0.02	22.27
14	5	6.46	7.35	1.77	0.44	0.02	22.28
14	6	6.43	7.15	1.78	0.4	0.02	22.3
14	7	6.45	6.98	1.78	0.38	0.02	22.3
15	1	6.52	6.89	1.78	0.37	0.02	22.31
15	2	6.54	6.85	1.78	0.36	0.02	22.31
15	3	6.56	6.81	1.79	0.36	0.02	22.31
15	4	6.57	6.77	1.79	0.35	0.02	22.31
15	5	6.58	6.73	1.79	0.35	0.02	22.31
15	6	6.59	6.69	1.79	0.34	0.02	22.31

RCH NUM	ELE NUM	DO MG/L	BOD MG/L	ORGN MG/L	NH3N MG/L	NO2N MG/L	NO3N MG/L
15	7	6.6	6.65	1.79	0.33	0.02	22.31
15	8	6.61	6.61	1.79	0.33	0.02	22.32
15	9	6.62	6.57	1.79	0.32	0.02	22.32
15	10	6.63	6.53	1.79	0.32	0.02	22.32
15	11	6.63	6.49	1.79	0.32	0.02	22.32
15	12	6.64	6.46	1.79	0.31	0.02	22.32
15	13	6.64	6.42	1.79	0.31	0.02	22.33
16	1	6.66	6.38	1.79	0.3	0.02	22.33
16	2	6.67	6.34	1.79	0.3	0.02	22.33
16	3	6.69	6.31	1.79	0.29	0.01	22.33
16	4	6.7	6.27	1.79	0.29	0.01	22.33
16	5	6.71	6.24	1.79	0.29	0.01	22.33
16	6	6.72	6.2	1.79	0.28	0.01	22.34
16	7	6.73	6.16	1.79	0.28	0.01	22.34
16	8	6.74	6.13	1.79	0.27	0.01	22.34
16	9	6.75	6.09	1.79	0.27	0.01	22.34
16	10	6.76	6.06	1.79	0.27	0.01	22.34
16	11	6.77	6.03	1.79	0.26	0.01	22.34
16	12	6.78	5.99	1.79	0.26	0.01	22.35
16	13	6.78	5.96	1.79	0.26	0.01	22.35
16	14	6.79	5.92	1.79	0.25	0.01	22.35
16	15	6.79	5.89	1.79	0.25	0.01	22.35
16	16	6.8	5.82	1.78	0.25	0.01	22.28
17	1	6.96	3.37	1.5	0.25	0.02	16.88
17	2	6.97	3.36	1.5	0.24	0.02	16.88
17	3	6.98	3.35	1.5	0.24	0.02	16.89
17	4	6.99	3.34	1.5	0.24	0.02	16.89
17	5	7	3.34	1.5	0.24	0.02	16.89
17	6	7.01	3.33	1.5	0.23	0.02	16.89
17	7	7.02	3.32	1.5	0.23	0.02	16.89
17	8	7.03	3.32	1.5	0.23	0.02	16.9
17	9	7.03	3.31	1.5	0.23	0.02	16.9
17	10	7.04	3.3	1.5	0.22	0.02	16.9
17	11	7.05	3.3	1.5	0.22	0.02	16.9
17	12	7.06	3.29	1.49	0.22	0.02	16.91
17	13	7.07	3.28	1.49	0.22	0.02	16.91
17	14	7.07	3.28	1.49	0.22	0.02	16.91
17	15	7.08	3.27	1.49	0.21	0.02	16.91
17	16	7.09	3.26	1.49	0.21	0.02	16.91
17	17	7.09	3.25	1.49	0.21	0.01	16.92
17	18	7.1	3.25	1.49	0.21	0.01	16.92

Appendix G: MS4s in Salt Creek Watershed

MS4 Permittees in Cook County

County: Cook

Permit No.	Operator Name	Address	County	Date Recd	Final Action
ILR400279	ALSIP VILLAGE OF ALSIP	4500 W 123RD ST, ALSIP, IL. 60658	COOK	3/10/2003	
ILR400282	ARLINGTON HEIGHTS VILLAGE OF ARLINGTON HEIGHTS	33 S ARLINGTON HEIGHTS RD, ARLINGTON HEIGHTS, IL. 60005	COOK	3/10/2003	
ILR400285	BARRINGTON VILLAGE OF BARRINGTON	300 N RAYMOND AVENUE, BARRINGTON, IL. 60010	COOK	3/10/2003	
ILR400008	BARRINGTON BARRINGTON TOWNSHIP	129 MONUMENT AVE, BARRINGTON, IL. 60010	COOK		
ILR400514	BARRINGTON HILLS VILLAGE OF BARRINGTON HILLS	112 ALGONQUIN ROAD, BARRINGTON HILLS, IL. 60010	COOK	3/10/2003	
ILR400289	BEDFORD PARK VILLAGE OF BEDFORD PARK	6701 SOUTH ARCHER AVENUE, BEDFORD PARK, IL. 60501	COOK	3/10/2003	
ILR400291	BELLWOOD VILLAGE OF BELLWOOD	3200 WASHINGTON BLVD, BELLWOOD, IL. 60104	COOK	3/10/2003	7/17/2003
ILR400166	BERKELEY BERKELEY VILLAGE	5819 ELECTRIC AVE, BERKELEY, IL. 60163	COOK	7/23/2003	
ILR400293	BERWYN CITY OF BERWYN	6700 26TH STREET, BERWYN, IL. 60402	COOK	9/19/2002	9/23/2002
ILR400012	BLOOM BLOOM TOWNSHIP	425 S HALSTED ST, CHICAGO HEIGHTS, IL. 60411	COOK		
ILR400297	BLUE ISLAND CITY OF BLUE ISLAND	13051 GREENWOOD, BLUE ISLAND, IL. 60406	COOK		

ILR400017	BREMEN BREMEN TOWNSHIP	15350 S OAK PARK AVE, OAK FOREST, IL. 60452	COOK		
ILR400301	BRIDGEVIEW VILLAGE OF BRIDGEVIEW/WM H GREEN SR	7500 S OKETO AVE, BRIDGEVIEW, IL. 60455	COOK	2/24/2003	
ILR400167	BROADVIEW BROADVIEW VILLAGE	2350 S 25TH AVE, BROADVIEW, IL. 60153	COOK	3/6/2003	
ILR400302	BROOKFIELD VILLAGE OF BROOKFIELD	8820 BROOKFIELD AVE, BROOKFIELD, IL. 60513	COOK	2/27/2003	
ILR400169	BURBANK BURBANK VILLAGE	6530 W 79TH ST, BURBANK, IL. 60459	COOK		
ILR400170	BURNHAM BURNHAM VILLAGE	14450 S MANISTEE AVE, BURNHAM, IL. 60633	COOK		
ILR400304	BURR RIDGE VILLAGE OF BURR RIDGE	7660 S COUNTYLINE RD, BURR RIDGE, IL. 60521	COOK	3/17/2003	
ILR400171	CALUMET CALUMET PARK VILLAGE	12409 S THROOP ST, CALUMET PARK, IL. 60827	COOK	11/18/2002	2/5/2003
ILR400021	CALUMET CALUMET TOWNSHIP	2353 YORK ST, BLUE ISLAND, IL. 60406	COOK		
ILR400306	CALUMET CITY CITY OF CALUMET CITY	204 PULASKI RD, CALUMET CITY, IL. 60409	COOK	3/10/2003	
ILR400483	CAMPTON TOWNSHIP CAMPTON TOWNSHIP HIGHWAY DEPT	5N790 ROUTE 47, MAPLE PARK, IL. 60151	COOK	3/10/2003	
ILR400173	CHICAGO CHICAGO CITY	30 N LASALLE ST 25TH FLOOR, CHICAGO, IL. 60602	COOK	3/10/2003	
ILR400174	CHICAGO CHICAGO HEIGHTS CITY	1601 CHICAGO RD, CHICAGO HEIGHTS, IL. 60411	COOK	3/10/2003	
ILR400314	CHICAGO RIDGE VILLAGE OF CHICAGO RIDGE	10455 S RIDGELAND AVENUE, CHICAGO RIDGE, IL. 60415	COOK	3/11/2003	
ILR400315	CICERO TOWN OF CICERO	4936 25TH PLACE, CICERO, IL. 60650	COOK		
ILR400544	Cicero Township	4937 W. 25th Street, Cicero, IL. 60804			

	Cicero Township			
ILR400485	COOK COUNTY	69 W WASHINGTON ST STE 2100, CHICAGO, IL. 60602	COOK	3/13/2003
	COOK COUNTY HIGHWAY DEPT			
ILR400177	COUNTRY CLUB HILL	4200 W MAIN ST, COUNTRY CLUB HILLS, IL. 60478	COOK	3/5/2003
	COUNTRY CLUB HILL			
ILR400178	COUNTRYSIDE	5550 EAST AVE, COUNTRYSIDE, IL. 60525	COOK	
	COUNTRYSIDE CITY			
ILR400320	CRESTWOOD	13840 SOUTH CICERO, CRESTWOOD, IL. 60445	COOK	8/14/2003
	CITY OF CRESTWOOD			
ILR400325	DES PLAINES	1420 MINOR STREET, DES PLAINES, IL. 60016	COOK	3/10/2003
	CITY OF DES PLAINES			
ILR400326	DIXMOOR	170 W 145TH, DIXMOOR, IL. 60426	COOK	3/10/2003
	VILLAGE OF DIXMOOR			
ILR400182	DOLTON	14014 PARK AVE, DOLTON, IL. 60419	COOK	3/10/2003
	DOLTON VILLAGE			
ILR400185	EAST HAZEL CREST	1904 W 174TH ST, HAZEL CREST, IL. 60429	COOK	3/10/2003
	EAST HAZEL CREST VILLAGE			
ILR400048	ELK GROVE	2400 S ARLINGTON HEIGHTS RD, ARLINGTON HEIGHTS, IL. 60005	COOK	10/10/2003
	ELK GROVE TOWNSHIP			
ILR400334	ELK GROVE VILLAGE	901 WELLINGTON AVE, ELK GROVE VILLAGE, IL. 60007	COOK	3/10/2003
	VILLAGE OF ELK GROVE VILLAGE			
ILR400188	ELMWOOD PARK	11 CONTI PARKWAY, ELMWOOD PARK, IL. 60707	COOK	
	ELMWOOD PARK VILLAGE			
ILR400335	EVANSTON	2100 RIDGE AVENUE, EVANSTON, IL. 60201	COOK	3/7/2003
	CITY OF EVANSTON			
ILR400569	Evanston Township	1910 Main Street, Evanston, IL. 60202		
	Evanston Township			
ILR400336	EVERGREEN PARK	9418 S KEDZIE AVE, EVERGREEN PARK, IL. 60642	COOK	3/20/2003
	VILLAGE OF EVERGREEN PARK			
ILR400337	FLOSSMOOR	2800 FLOSSMOOR ROAD, FLOSSMOOR, IL. 60422	COOK	3/19/2003
	VILLAGE OF FLOSSMOOR			
ILR400191	FORD HEIGHTS	1343 ELLIS AVE, FORD HEIGHTS, IL. 60411	COOK	

	FORD HEIGHTS VILLAGE				
ILR400338	FOREST PARK	517 DES PLAINES AVE, FOREST PARK, IL. 60130	COOK	3/17/2003	
	VILLAGE OF FOREST PARK				
ILR400192	FOREST VIEW	7000 24TH ST, FOREST VIEW, IL. 60402	COOK	3/7/2003	7/17/2003
	FOREST VIEW VILLAGE				
ILR400053	FRANKFORT	PO BOX 782, FRANKFORT, IL. 60423	COOK		
	FRANKFORT TOWNSHIP				
ILR400194	FRANKFORT	432 W NEBRASKA ST, FRANKFORT, IL. 60423	COOK	3/10/2003	
ILR400195	FRANKLIN PARK	9501 W BELMONT AVE, FRANKLIN PARK, IL. 60131	COOK	3/3/2003	
	FRANKLIN PARK VILLAGE				
ILR400198	GLENCOE	675 VILLAGE COURT, GLENCOE, IL. 60022	COOK	3/10/2003	
	GLENCOE VILLAGE				
ILR400343	GLENVIEW	1225 WAUKEGAN RD, GLENVIEW, IL. 60025	COOK	3/10/2003	
	VILLAGE OF GLENVIEW				
ILR400344	GLENWOOD	ONE ASSELBORN WAY, GLENWOOD, IL. 60425	COOK	3/10/2003	
	VILLAGE OF GLENWOOD				
ILR400200	GOLF	POB 231, GOLF, IL. 60029	COOK	3/13/2003	
	GOLF VILLAGE				
ILR400579	Goodings Grove	, , .			
	Goodings Grove				
ILR400063	HANOVER	8N180 IL ROUTE 59, BARTLETT, IL. 60103	COOK		
	HANOVER TOWNSHIP				
ILR400349	HARVEY	15320 BROADWAY, HARVEY, IL. 60426	COOK	3/10/2003	
	CITY OF HARVEY				
ILR400208	HARWOOD HEIGHTS	7343 W LAWRENCE AVE, HARWOOD HEIGHTS, IL. 60656	COOK	3/6/2003	
	HARWOOD HEIGHTS VILLAGE				
ILR400350	HAZEL CREST	3000 W 170TH PL, HAZEL CREST, IL. 60614	COOK	3/10/2003	
	VILLAGE OF HAZEL CREST				
ILR400351	HICKORY HILLS	8652 W 95TH ST, HICKORY HILLS, IL. 60457	COOK	3/5/2003	
	HICKORY HILLS				
ILR400354	HILLSIDE	30 NORTH WOLF ROAD, HILLSIDE, IL. 60162	COOK	8/18/2003	
	VILLAGE OF HILLSIDE				

ILR400356	HODGKINS VILLAGE OF HODGKINS	8990 LYONS, HODGKINS, IL. 60525	COOK	
ILR400210	HOFFMAN ESTATES HOFFMAN ESTATES VILLAGE	1900 HASSELL RD, HOFFMAN ESTATES, IL. 60195	COOK	3/10/2003
ILR400357	HOMEWOOD VILLAGE OF HOMEWOOD	17755 ASHLAND, HOMEWOOD, IL. 60430	COOK	3/18/2003
ILR400354	HILLSIDE VILLAGE OF HILLSIDE	30 NORTH WOLF ROAD, HILLSIDE, IL. 60162	COOK	8/18/2003
ILR400356	HODGKINS VILLAGE OF HODGKINS	8990 LYONS, HODGKINS, IL. 60525	COOK	
ILR400210	HOFFMAN ESTATES HOFFMAN ESTATES VILLAGE	1900 HASSELL RD, HOFFMAN ESTATES, IL. 60195	COOK	3/10/2003
ILR400357	HOMEWOOD VILLAGE OF HOMEWOOD	17755 ASHLAND, HOMEWOOD, IL. 60430	COOK	3/18/2003
ILR400358	INDIAN HEAD PARK VILLAGE OF INDIAN HEAD PARK	201 ACACIA DRIVE, INDIAN HEAD PARK, IL. 60525	COOK	2/26/2003
ILR400359	INVERNESS VILLAGE OF INVERNESS	1400 W BALDWIN RD, PALATINE, IL. 60067	COOK	3/10/2003
ILR400362	JUSTICE VILLAGE OF JUSTICE	7800 ARCHER ROAD, JUSTICE, IL. 60458	COOK	3/17/2003
ILR400354	HILLSIDE VILLAGE OF HILLSIDE	30 NORTH WOLF ROAD, HILLSIDE, IL. 60162	COOK	8/18/2003
ILR400356	HODGKINS VILLAGE OF HODGKINS	8990 LYONS, HODGKINS, IL. 60525	COOK	
ILR400210	HOFFMAN ESTATES HOFFMAN ESTATES VILLAGE	1900 HASSELL RD, HOFFMAN ESTATES, IL. 60195	COOK	3/10/2003
ILR400357	HOMEWOOD VILLAGE OF HOMEWOOD	17755 ASHLAND, HOMEWOOD, IL. 60430	COOK	3/18/2003
ILR400358	INDIAN HEAD PARK VILLAGE OF INDIAN HEAD PARK	201 ACACIA DRIVE, INDIAN HEAD PARK, IL. 60525	COOK	2/26/2003
ILR400359	INVERNESS VILLAGE OF INVERNESS	1400 W BALDWIN RD, PALATINE, IL. 60067	COOK	3/10/2003

ILR400362	JUSTICE VILLAGE OF JUSTICE	7800 ARCHER ROAD, JUSTICE, IL. 60458	COOK	3/17/2003	
ILR400214	KENILWORTH KENILWORTH VILLAGE	419 RICHMOND RD, KENILWORTH, IL. 60043	COOK	8/8/2003	
ILR400364	LA GRANGE VILLAGE OF LA GRANGE	53 S LA GRANGE RD, LA GRANGE, IL. 60525	COOK		
ILR400365	LAGRANGE PARK VILLAGE OF LAGRANGE PARK	447 N CATHERINE AVE, LAGRANGE PARK, IL. 60525	COOK	3/4/2003	7/22/2003
ILR400373	LANSING VILLAGE OF LANSING	18200 CHICAGO AVE, LANSING, IL. 60438	COOK	3/10/2003	
ILR400075	LEMONT LEMONT TOWNSHIP	16020 127TH ST, LEMONT, IL. 60439	COOK		
ILR400076	LEYDEN LEYDEN TOWNSHIP	10200 W GRAND AVE, FRANKLIN PARK, IL. 60131	COOK		
ILR400218	LINCOLNWOOD LINCOLNWOOD VILLAGE	6900 N LINCOLN AVE, LINCOLNWOOD, IL. 60712	COOK	3/12/2003	
ILR400380	LYNWOOD VILLAGE OF LYNWOOD	21460 LINCOLN HIGHWAY, LYNWOOD, IL. 60411	COOK	3/10/2003	
ILR400082	LYONS LYONS TOWNSHIP	4919 WOODLAND ST, WESTERN SPRINGS, IL. 60558	COOK		
ILR400220	LYONS LYONS VILLAGE	7801 OGDEN AVE POB 38, LYONS, IL. 60534	COOK		
ILR400223	MARKHAM MARKHAM CITY	16313 KEDZIE PARKWAY, MARKHAM, IL. 60426	COOK	3/6/2003	
ILR400383	MATTESON VILLAGE OF MATTESON	4900 VILLAGE COMMONS, MATTESON, IL. 60443	COOK	3/10/2003	
ILR400384	MAYWOOD VILLAGE OF MAYWOOD	115 S 5TH AVE, MAYWOOD, IL. 60153	COOK		
ILR400224	MCCOOK MCCOOK VILLAGE	50TH AND GLENCOE, MCCOOK, IL. 60525	COOK		
ILR400386	MELROSE PARK VILLAGE OF MELROSE PARK	104 N 23RD ST, MELROSE PARK, IL. 60160	COOK	11/14/2002	

ILR400226	MERRIONETTE PARK MERRIONETTE PARK VILLAGE	11720 S KEDZIE, MERRIONETTE PARK, IL. 60803	COOK	12/16/2002	12/19/2002
ILR400637	Mettawa Village of Mettawa	1000 Allanson Rd., Mettawa, IL. 60060			
ILR400387	MIDLOTHIAN VILLAGE OF MIDLOTHIAN	14801 SOUTH PULASKI, MIDLOTHIAN, IL. 60445	COOK	2/28/2003	
ILR400391	MORTON GROVE VILLAGE OF MORTON GROVE	6101 CAPULINA, MORTON GROVE, IL. 60053	COOK	3/10/2003	
ILR400393	MOUNT PROSPECT VILLAGE OF MOUNT PROSPECT	1700 2 CENTRAL RD, MOUNT PROSPECT, IL. 60056	COOK	3/10/2003	
ILR400094	NEW TRIER NEW TRIER TOWNSHIP	739 ELM ST, WINNETKA, IL. 60093	COOK		
ILR400398	NILES VILLAGE OF NILES	1000 CIVIC CENTER DRIVE, NILES, IL. 60714	COOK	3/5/2003	
ILR400096	NILES NILES TOWNSHIP	5255 MAIN ST, SKOKIE, IL. 60077	COOK		
ILR400400	NORRIDGE VILLAGE OF NORRIDGE	4020 N OLCOTT, NORRIDGE, IL. 60634	COOK	3/10/2003	
ILR400229	NORTH RIVERSIDE NORTH RIVERSIDE VILLAGE	2401 DESPLAINES AVE, NORTH RIVERSIDE, IL. 60546	COOK	3/10/2003	7/17/2003
ILR400404	NORTHBROOK VILLAGE OF NORTHBROOK	1225 CEDAR LANE, NORTHBROOK, IL. 60062	COOK	3/7/2003	
ILR400098	NORTHFIELD NORTHFIELD TOWNSHIP	1928 LEHIGH AVE, GLENVIEW, IL. 60025	COOK	10/8/2003	
ILR400405	NORTHFIELD VILLAGE OF NORTHFIELD	361 HAPP RD, NORTHFIELD, IL. 60093	COOK	3/10/2003	
ILR400406	NORTHLAKE CITY OF NORTHLAKE	55 E NORTH AVENUE, NORTHLAKE, IL. 60164	COOK	3/14/2003	
ILR400099	NORWOOD PARK NORWOOD PARK TOWNSHIP	7833 W LAWRENCE AVE, NORRIDGE, IL. 60656	COOK		
ILR400408	OAK FOREST CITY OF OAK FOREST	15440 S CENTRAL AVE, OAK FOREST, IL. 60452	COOK	3/10/2003	

ILR400409	OAK LAWN VILLAGE OF OAK LAWN	9446 RAYMOND AVENUE, OAK LAWN, IL. 60453	COOK	3/10/2003
ILR400410	OAK PARK VILLAGE OF OAK PARK	1 VILLAGE PLAZA, OAK PARK, IL. 60302	COOK	
ILR400413	OLYMPIA FIELDS FIELDS, IL. 60461	20701 GOVERNOR'S HWY & SCOTT DRIVE, OLYMPIA	COOK	2/28/2003
ILR400233	ORLAND HILLS ORLAND HILLS VILLAGE	16033 S 94TH AVE, ORLAND HILLS, IL. 60477	COOK	3/20/2003
ILR400414	ORLAND PARK VILLAGE OF ORLAND PARK	14700 S RAVINIA AVENUE, ORLAND PARK, IL. 60462	COOK	3/10/2003
ILR400416	PALATINE VILLAGE OF PALATINE	200 E WOOD STREET, PALATINE, IL. 60067	COOK	3/13/2003
ILR400107	PALATINE PALATINE TOWNSHIP	721 S QUENTIN ROAD, PALATINE, IL. 60067	COOK	
ILR400108	PALOS PALOS TOWNSHIP	10802 S ROBERTS ROAD, PALOS HILLS, IL. 60465	COOK	
ILR400417	PALOS HEIGHTS CITY OF PALOS HEIGHTS	7607 W COLLEGE DRIVE, PALOS HEIGHTS, IL. 60463	COOK	
ILR400418	PALOS HILLS CITY OF PALOS HILLS	10335 S ROBERTS RD, PALOS HILLS, IL. 60465	COOK	3/10/2003
ILR400419	PALOS PARK VILLAGE OF PALOS PARK	8999 W 123RD STREET, PALOS PARK, IL. 60464	COOK	3/10/2003
ILR400422	PARK RIDGE CITY OF PARK RIDGE	505 PARK PLACE, PARK RIDGE, IL. 60068	COOK	3/10/2003
ILR400234	PHOENIX PHOENIX VILLAGE	15240 VINCENNES RD, PHOENIX, IL. 60426	COOK	
ILR400519	PORT BARRINGTON VILLAGE OF PORT BARRINGTON	69 SOUTH CIRCLE, PORT BARRINGTON, IL. 60010	COOK	3/11/2003
ILR400236	POSEN POSEN VILLAGE	2440 WALTER ZIMMY DR, POSEN, IL. 60469	COOK	
ILR400643	Prairie Grove Village of Prairie Grove	3125 Barreville Rd., Prairie Grove, IL. 60012		

ILR400427	PROSPECT HEIGHTS CITY OF PROSPECT HEIGHTS	401 PIPER LANE, PROSPECT HEIGHTS, IL. 60070	COOK	4/1/2003	
ILR400112	PROVISO PROVISO TOWNSHIP	131 BROADWAY STREET, MELROSE PARK, IL. 60160	COOK		
ILR400644	Rapids City Village of Rapids City	P.O. Box 134, Rapids City, IL. 61278	8/1/2003		
ILR400113	RICH RICH TOWNSHIP	22013 GOVERNORS HIGHWAY, RICHTON PARK, IL. 60471	COOK		
ILR400605	Richmond Township Richmond Township	3502 Sherwood Forest Drive, Spring Grove, IL. 60081			
ILR400428	RICHTON PARK VILLAGE OF RICHTON PARK	4455 W SAUK TRAIL RD, RICHTON PARK, IL. 60471	COOK	4/3/2003	
ILR400429	RIVER FOREST VILLAGE OF RIVER FOREST	VILLAGE HALL 400 PARK AVE, RIVER FOREST, IL. 60305	COOK		
ILR400430	RIVER GROVE VILLAGE OF RIVER GROVE	2621 THATCHER AVE, RIVER GROVE, IL. 60171	COOK	3/10/2003	
ILR400237	RIVERDALE RIVERDALE VILLAGE	157 W 144TH ST, RIVERDALE, IL. 60827	COOK	2/10/2003	2/14/2003
ILR400115	RIVERSIDE RIVERSIDE TOWNSHIP	27 RIVERSIDE ROAD, RIVERSIDE, IL. 60546	COOK		
ILR400238	RIVERSIDE RIVERSIDE VILLAGE	27 RIVERSIDE RD, RIVERSIDE, IL. 60546	COOK		
ILR400239	ROBBINS ROBBINS VILLAGE	3327 W 137TH ST, ROBBINS, IL. 60472	COOK	3/10/2003	
ILR400435	ROLLING MEADOWS CITY OF ROLLING MEADOWS	3600 W KIRCHOFF RD, ROLLING MEADOWS, IL. 60008	COOK	3/12/2003	
ILR400438	ROSEMONT VILLAGE OF ROSEMONT	5300 NORTH PEARL, ROSEMONT, IL. 60018	COOK	3/10/2003	
ILR400441	SAUK VILLAGE VILLAGE OF SAUK VILLAGE	21701 TORRENCE AVENUE, SAUK VILLAGE, IL. 60411	COOK	3/10/2003	
ILR400443	SCHAUMBURG VILLAGE OF SCHAUMBURG	101 SCHAUMBURG COURT, SCHAUMBURG, IL. 60172	COOK	3/10/2003	

ILR400122	SCHAUMBURG SCHAUMBURG TOWNSHIP	ONE ILLINOIS BLVD, HOFFMAN ESTATES, IL. 60194	COOK	8/11/2003	
ILR400444	SCHILLER PARK VILLAGE OF SCHILLER PARK	9526 IRVING PARK RD, SCHILLER PARK, IL. 60176	COOK	3/10/2003	
ILR400447	SKOKIE VILLAGE OF SKOKIE	9050 GROSS POINT ROAD, SKOKIE, IL. 60077	COOK	3/12/2003	
ILR400449	SOUTH CHICAGO HGTS VILLAGE OF SOUTH CHICAGO HGTS	3317 CHICAGO ROAD, SOUTH CHICAGO HGTS, IL. 60411	COOK	3/17/2003	
ILR400451	SOUTH HOLLAND VILLAGE OF SOUTH HOLLAND	16226 WAUSAU AVE, SOUTH HOLLAND, IL. 60473	COOK	3/5/2003	
ILR400247	STICKNEY STICKNEY VILLAGE	6533 PERSHING RD, BERWYN, IL. 60402	COOK		
ILR400133	STICKNEY STICKNEY TOWNSHIP	5635 STATE ROAD, BURBANK, IL. 60459	COOK		
ILR400248	STONE PARK STONE PARK VILLAGE	1629 N MANNHEIM RD, STONE PARK, IL. 60165	COOK	7/28/2003	
ILR400456	STREAMWOOD VILLAGE OF STREAMWOOD	565 S BARTLETT RD, STREAMWOOD, IL. 60107	COOK	3/12/2003	
ILR400457	SUMMIT VILLAGE OF SUMMIT	7321 W 59TH ST, SUMMIT, IL. 60501	COOK	7/14/2003	7/22/2003
ILR400459	THORNTON THORNTON	111 E MARGARET ST, THORNTON, IL. 60476	COOK	3/10/2003	
ILR400138	THORNTON THORNTON TOWNSHIP	333 E 162ND STREET, SOUTH HOLLAND, IL. 60473	COOK		
ILR400460	TINLEY PARK VILLAGE OF TINLEY PARK	16250 S OAK PARK AVENUE, TINLEY PARK, IL. 60477	COOK	3/10/2003	
ILR400250	UNIVERSITY PARK UNIVERSITY PARK VILLAGE	698 BURNHAM DR, UNIVERSITY PARK, IL. 60466	COOK	3/10/2003	
ILR400468	WESTCHESTER VILLAGE OF WESTCHESTER	10300 ROOSEVELT RD, WESTCHESTER, IL. 60154	COOK	3/10/2003	
ILR400469	WESTERN SPRINGS VILLAGE OF WESTERN SPRINGS	740 HILLGROVE AVE, WESTERN SPRINGS, IL. 60558	COOK	8/21/2003	

ILR400471	WHEELING VILLAGE OF WHEELING	255 W DUNDEE ROAD, WHEELING, IL. 60090	COOK	2/26/2003
ILR400153	WHEELING WHEELING TOWNSHIP	1616 N ARLINGTON HEIGHTS RD, ARLINGTON HEIGHTS, IL. 60004	COOK	
ILR400472	WILLOW SPRINGS VILLAGE OF WILLOW SPRINGS	ONE VILLAGE CENTER, WILLOW SPRINGS, IL. 60480	COOK	3/10/2003
ILR400473	WILMETTE VILLAGE OF WILMETTE	1200 WILMETTE AVE, WILMETTE, IL. 60091	COOK	3/12/2003
ILR400476	WINNETKA VILLAGE OF WINNETKA	510 GREEN BAY RD, WINNETKA, IL. 60093	COOK	3/12/2003
ILR400513	WINNETKA PARK DISTRICT	510 GREEN BAY ROAD, WINNETKA, IL. 60093	COOK	3/12/2003

MS4 Permittees in DuPage County

County: DU PAGE

Permit No.	*Operator Name*	*Address*	*Date Recd*	*Final Action*
ILR400001	ADDISON ADDISON TOWNSHIP	441 W POTTER ST, ADDISON, IL. 60191	3/10/2003	
ILR400277	ADDISON VILLAGE OF ADDISON	ONE FRIENDSHIP PLAZA, ADDISON, IL. 60101	3/10/2003	
ILR400283	AURORA CITY OF AURORA	44 E DOWNER PL, AURORA, IL. 60507	3/14/2003	
ILR400286	BARTLETT VILLAGE OF BARTLETT	228 S MAIN ST, BARTLETT, IL. 60103	3/10/2003	
ILR400292	BENSENVILLE VILLAGE OF BENSENVILLE	12 S CENTER STREET, BENSENVILLE, IL. 60106	3/10/2003	
ILR400013	BLOOMINGDALE BLOOMINGDALE TOWNSHIP	123 N ROSEDALE RD, BLOOMINGDALE, IL. 60108	3/10/2003	

ILR400295	BLOOMINGDALE	201 S BLOOMINGDALE RD, BLOOMINGDALE, IL. 60108	3/10/2003	
	VILLAGE OF BLOOMINGDALE			
ILR400538	Campton Township	4N928 Brown Road, Saint Charles, IL. 60175		
	Campton Township			
ILR400308	CAROL STREAM	500 N GARY AVE, CAROL STREAM, IL. 60187	3/10/2003	
	VILLAGE OF CAROL STREAM			
ILR400175	CLARENDON	1 N PROSPECT AVE, CLARENDON HILLS, IL. 60514	3/10/2003	
	CLARENDON HILLS VILLAGE			
ILR400180	DARIEN	1702 PLAINFIELD RD, DARIEN, IL. 60561	3/10/2003	
	DARIEN CITY			
ILR400040	DOWNERS GROVE	4340 PRINCE ST, DOWNERS GROVE, IL. 60515	3/10/2003	
	DOWNERS GROVE TOWNSHIP			

Permit No.	Operator Name	Address	Date Recd	Final Act
ILR400183	DOWNERS GROVE	801 BURLINGTON AVENUE, DOWNERS GROVE, IL. 60515	3/10/2003	
	DOWNERS GROVE VILLAGE			
ILR400502	DUPAGE COUNT	421 N COUNTY FARM ROAD, WHEATON, IL. 60187	3/10/2003	
	DUPAGE COUNTY			
ILR400187	ELMHURST	209 N YORK ST, ELMHURST, IL. 60126	3/10/2003	
	ELMHURST CITY			
ILR400199	GLEN ELLYN	30 S LAMBERT ROAD, GLEN ELLYN, IL. 60137	3/10/2003	
	GLEN ELLYN VILLAGE			
ILR400342	GLENDALE HEIGHTS	300 CIVIC CENTER, GLENDALE HEIGHTS, IL. 60139	3/10/2003	
	VILLAGE OF GLENDALE HEIGHTS			
ILR400347	HANOVER PARK	2121 WEST LAKE ST, HANOVER PARK, IL. 60103	3/10/2003	
	VILLAGE OF HANOVER PARK			
ILR400355	HINSDALE	19 EAST CHICAGO AVE, HINSDALE, IL. 60521	3/10/2003	
	VILLAGE OF HINSDALE			
ILR400494	ILLINOIS STATE TOLL	2700 OGDEN AVENUE, DOWNERS GROVE, IL. 60515	3/7/2003	
	HIGHWAY AUTHORITY			

	ILLINOIS STATE TOLL HIGHWAY AUTHORITY			
ILR400360	ITASCA	100 N WALNUT ST, ITASCA, IL. 60143	3/10/2003	
	VILLAGE OF ITASCA			
ILR400497	LEMONT	418 MAIN STREET, LEMONT, IL. 60439	2/28/2003	
	VILLAGE OF LEMONT			
ILR400079	LISLE	4721 INDIANA AVE, LISLE, IL. 60532	3/10/2003	
	LISLE TOWNSHIP			
ILR400376	LISLE	1040 BURLINGTON AVE, LISLE, IL. 60532	3/10/2003	
	VILLAGE OF LISLE			
ILR400378	LOMBARD	255 E WILSON, LOMBARD, IL. 60148	3/10/2003	
	VILLAGE OF LOMBARD			
ILR400086	MILTON	1492 N MAIN ST, WHEATON, IL. 60187	3/10/2003	
	MILTON TOWNSHIP			

Permit No.	*Operator Name*	*Address*	*Date Recd*	*Final Act*
ILR400092	NAPERVILLE	31W331 NORTH AURORA ROAD, NAPERVILLE, IL. 60563	3/10/2003	
	NAPERVILLE TOWNSHIP			
ILR400396	NAPERVILLE	400 S EAGLE ST POB 3020, NAPERVILLE, IL. 60566	3/10/2003	
	CITY OF NAPERVILLE			
ILR400407	OAK BROOK	1200 OAK BROOK RD, OAK BROOK, IL. 60521	3/10/2003	
	VILLAGE OF OAK BROOK			
ILR400232	OAKBROOK TERRACE	17W275 BUTTERFIELD RD, OAKBROOK TERRACE, IL. 60181	3/10/2003	
	OAKBROOK TERRACE CITY			
ILR400437	ROSELLE	31 S PROSPECT STREET, ROSELLE, IL. 60172	3/10/2003	
	VILLAGE OF ROSELLE			
ILR400463	VILLA PARK	20 S ARDMORE AVE, VILLA PARK, IL. 60181	3/10/2003	
	VILLAGE OF VILLA PARK			
ILR400274	WARRENVILLE	28 W 701 STAFFORD PLACE, WARRENVILLE, IL. 60555	3/10/2003	
	CITY OF WARRENVILLE			
ILR400149	WAYNE	4N 230 KLEIN ROAD, WEST CHICAGO, IL. 60185	3/10/2003	

	WAYNE TOWNSHIP			
ILR400500	WAYNE	5N430 RAILROAD STREET, WAYNE, IL. 60184	3/10/2003	
	VILLAGE OF WAYNE			
ILR400466	WEST CHICAGO	475 MAIN STREET POB 488, WEST CHICAGO, IL. 60185	3/10/2003	
	CITY OF WEST CHICAGO			
ILR400254	WESTMONT	31 W QUINCY ST, WESTMONT, IL. 60559	3/10/2003	
	WESTMONT VILLAGE			
ILR400470	WHEATON	303 W WESLEY ST POB 727, WHEATON, IL. 60187	3/10/2003	
	CITY OF WHEATON			
ILR400255	WILLOWBROOK	7760 S QUINCY ST, WILLOWBROOK, IL. 60521	3/10/2003	
	WILLOWBROOK VILLAGE			
ILR400155	WINFIELD	30W575 ROOSEVELT RD, WEST CHICAGO, IL. 60185	3/10/2003	
	WINFIELD TOWNSHIP			

Permit No.	*Operator Name*	*Address*	*Date Recd*	*Final Act*
ILR400474	WINFIELD	27W465 JEWELL ROAD, WINFIELD, IL. 60190	3/10/2003	
	VILLAGE OF WINFIELD			
ILR400478	WOOD DALE	404 NORTH WOOD DALE ROAD, WOOD DALE, IL. 60191	3/10/2003	
	CITY OF WOOD DALE			
ILR400480	WOODRIDGE	ONE PLAZA DR, WOODRIDGE, IL. 60517	3/10/2003	
	VILLAGE OF WOODRIDGE			
ILR400159	YORK	19W475 ROOSEVELT ROAD, LOMBARD, IL. 60148	3/10/2003	
	YORK TOWNSHIP			

SALT CREEK TMDL

APPENDIX H

RESPONSIVENESS SUMMARY

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RESPONSIVENESS SUMMARY

This responsiveness summary responds to substantive questions and comments received during the public comment period from August 30, 2003, through December 1, 2003 (postmarked) including those from the September 30, 2003 public meeting.

WHAT IS A TMDL?

A Total Maximum Daily Load (TMDL) is the sum of the allowable amount of a single pollutant that a water body can receive from all contributing sources and still meet water quality standards or designated uses. The Salt Creek TMDL report contains a plan detailing the actions necessary to reduce pollutant loads to Salt Creek and ensure compliance with applicable water quality standards. The Illinois EPA implements the TMDL program in accordance with Section 303(d) of the federal Clean Water Act and the regulations thereunder.

BACKGROUND

The watershed targeted for TMDL development is Salt Creek (ILGL09). The targeted waterbody segments are GL 03, GL 09, GL 10, GL19, GLA 02, GLA 04, GLB 01, GLBA, RGZX. Located in DuPage and Cook Counties, Salt Creek is a tributary to the Des Plaines River in urban Chicago, Illinois. It was placed on the Illinois 303(d) List for water quality impairments potentially caused by a number of parameters.

The Salt Creek watershed covers about 148.5 square miles of northeastern Illinois. The watershed is located in the Des Plaines hydrologic unit code (HUC 7120004). Almost half (49.1 percent) of the land use in the watershed is residential. Approximately 23 percent of the total watershed area is impervious surfaces. There are 31 point sources in the watershed, the majority of which are either stormwater permits or minor discharges. There are 11 municipal permits in the basin, 10 of which are major facilities that have design flows of 1.0 million gallons per day (MGD) or greater.

PUBLIC MEETING

An initial public meeting was held in the Elmhurst City Hall (209 N. York St., Elmhurst, IL) on January 24, 2001. A public meeting on the proposed plan was held on Thursday, September 30, 2003 at the Elmhurst City Hall in Elmhurst, IL. The public comment period remained open until midnight December 1, 2003. A total of 26 exhibits were received either during the meeting or within the public comment period.

The Illinois EPA provided public notice for the meeting by placing boxed display ads in local newspapers and by mailing meeting notices to individual citizens, legislators, municipalities, and interested groups. The notice gave the date, time, location, and purpose of the public meeting. The notice also provided references to obtain additional information about this specific site, the TMDL Program, and other related issues, as well as the name, address, and phone number of the IEPA hearing officer. The Draft TMDL Report was available for review on the Agency's web page at http://www.epa.state.il.us/water/tmdl/tmdl-reports.html. The report was also available by mail upon request.

On January 28, 2004, Illinois EPA (the Agency) met with representatives from the Illinois Association of Wastewater Agencies (IAWA) and other stakeholders to discuss issues relating to the Draft TMDL Reports on Salt Creek and East Branch of the DuPage River. Based on these discussions, the Agency developed the responses to comments #1 and #2 that constitute our approach to this TMDL, particularly as it affects dissolved oxygen (DO).

In Several cases, comments were filed for both the Salt Creek and the East Branch of the DuPage TMDLs. The questions and our responses may reflect these two joint filings.

QUESTIONS AND COMMENTS

Impairment Issues

1. The failure to identify maximum nutrient loads is unacceptable. Several pollutants contribute to violations of dissolved oxygen (DO) standards. One purpose of the draft TMDL is to identify maximum loads for pollutants that affect DO to ensure that the standards are met at all times. Therefore, it is not appropriate to exclude nutrients from this analysis. As mentioned at the public meeting, it is not necessary to have adopted nutrient standards before determining maximum loads for meeting DO standards. There are currently no instream water quality standards for CBOD, but water quality based effluent limits are determined and enforced to ensure that DO standards are met. Nutrients should be similarly limited to ensure that these standards are met.

   Additionally, the largest reduction of oxygen demand that is proposed in this TMDL is the reduction of sediment oxygen demand (SOD). Nutrients contribute to water column algae and periphyton growth. These organisms eventually die, may settle to the stream bottoms, and decay. This process contributes to sediment oxygen demand. Therefore, to reduce SOD, nutrients should be limited.

   We have described the modeling effort and the assumption that CSOs and SOD are the obvious contributors to low DO (page 5-14). We believe an adaptive management approach dictates prioritizing the obvious sources and least cost options. In addition, current nutrient control is complicated by the adoption of new standards within the next 5-7 years, rendering nutrient control now potentially difficult to manage economically if additional controls are necessary after those imposed through the TMDL are in-place.

   We agree that algal response and nutrients are important to the understanding of the SOD factor. However, the model indicates attainment of the DO standard through other means—improvement of the natural in-stream re-aeration via dam removal and further control of CBOD through stormwater management. If additional controls prove necessary or if these options are not practical or achievable, we will consider other methods of increasing DO, such as nutrient control or in-stream aeration.

   In general, the Illinois EPA agrees with your comment. We recognize that the dissolved oxygen (DO) concentration in a water body is affected by numerous factors. However, the important factors that affect DO concentrations with space and time in a stream/river are:

   - **Atmospheric re-aeration (K2)**
   - **Biochemical oxygen demand (BOD – carbonaceous BOD (CBOD) and nitrogenous BOD (NBOD))**
   - **Nutrients (nitrogen (N) – ammonia N (NH3-N), nitrate N (NO3-N), nitrite N (NO2-N), and phosphorus (P – total and available))**
   - **Algae (chlorophyll a)**

- **Macrophytes**
- **Sediment oxygen demand (SOD)**
- **Water temperature**
- **Time of the day, stream flow (depth, velocity and quantity) and configuration**
- **Decay and settling rates associated with BOD, nutrients and algae, and others**

In turn, each of these components influencing DO in a stream/river is affected by more than one factor. For example, K2 is affected by depth, velocity and quantity of flow, energy gradient and temperature. SOD is affected by the ability of the stream to move the bed load, the amount of BOD, nutrients and algae that settle to the bottom of the stream, nonpoint source contributions of BOD and nutrients to the stream, mixing/disturbance that occurs at the interface of stream bed and water column, and temperature. Most of the components/factors that affect DO concentrations in a stream/river can be measured in-situ. However, assumptions have to be made about the applicability of these measurements with respect to space and time.

In recognition of these matters and consistent with the original implementation plan in the draft TMDL, we are therefore proposing that the Agency, WWTPs, environmental groups and other partners take the following actions between the time that the TMDL is approved by USEPA and the time that nutrient standards are adopted:

1) **Convene a watershed stakeholders committee to plan activities and act as a clearinghouse for further action related to the TMDL.**
2) **Establish a monitoring program for DO and related constituents.**
3) **Use this new monitoring data to investigate dam removal and re-aeration scenarios.**
4) **Catalogue all NPS related activities in the watershed.**
5) **Initiate CSO controls in an expedited time frame.**

Illinois EPA plans to use a phased TMDL with an adaptive management approach to bring the stream into compliance with the water quality standards (WQS) for DO. This will be accomplished with the help of a newly created local watershed committee consisting of representatives from Illinois EPA, point source dischargers, environmental groups, USEPA, the public, and others. The approach will be flexible/adaptable and will include a phased-in step-by-step implementation of a plan concurrent with monitoring, capable of reviewing and revisiting model calibration and verification.

The adaptive management aspects, to be employed consistent with the monitoring program, will allow us to identify success or failure in to achieving WQS for DO as each remedy is implemented successively or as the plan is modified as needed over time. The monitoring program will address several needs and be designed to:

1) **Measure results of the implemented plan(s).**
2) **Collect additional data (DO, nutrients and others).**
3) **Pin-point DO levels now and as management steps occur.**
4) **Supplement existing Agency monitoring efforts.**
5) **Allow the Agency to list or de-list current and future causes of impairment.**
6) **Support development of nutrient standards and control strategy.**
7) **Support decision making for the expansion of existing wastewater treatment plants (WWTP) and establishment of new sources/WWTPs.**

2. We do not believe the IEPA has shown reasonable assurance that water quality standards will be met for DO. This is because not all oxygen-depleting/oxygen-impacting substances were included in the modeling, and the DO modeling has inadequacies such as apparent lack of validation. If the reduced WWTP CBOD and ammonia limits are imposed and the in-stream DO does not increase, millions of dollars will have been wasted.

   See response to #4 regarding modeling inaccuracies and validation of the model. The Agency realizes that some uncertainty exists regarding the extent of each WWTPs' ability to comply over the long-term, and throughout the critical summer, low flow period when DO levels are lowest. We are also aware that imposition of lower limits for CBOD will affect the ability of WWTPs to fund successful nutrient controls when and if those controls become necessary in this watershed, based on the adoption of nutrient standards by the Pollution Control Board.

   As discussed in our response to #1, the Agency is planning a phased approach with this TMDL that involves recommendations for dam removal, re-aeration, CSO and stormwater management and additional monitoring. Adaptive management will allow us, through the monitoring program to be developed with a local watershed committee, to identify success or failure to achieve WQS for DO as each remedy is attempted successively, and make changes/improvements as we go.

   The implementation plan for these TMDLs will be phased-in in the following sequence:

   Step 1: Organize a local watershed committee. Establish a meeting schedule, organizational structure and funding mechanisms. Begin a monitoring program (e.g.,participants, QAPP, schedule

   Step 2: Place re-aerators at strategic locations in the stream to achieve WQS for DO. Conduct pre- and post installation monitoring over a critical period. Make adjustments to the monitoring and re-aeration system as necessary to attain WQS. If this proposition is not cost-effective or for some reason not institutionally acceptable or practical, information regarding this option will be discussed by the local watershed committee prior to moving on to step 3.

   Step 3: Removal of low head dams in East Branch of the DuPage River (East Branch) and the Fullersburg dam in Salt Creek. If dam removal fails institutionally (i.e., we can not convince the dam owner to rectify the situation) or technically (we remove or bypass the dam and WQS for DO is not attained and maintained), this will be discussed by the local watershed committee prior to moving on to step 4.

   Step 4: A combination of steps 2 and 3, assuming that steps 2 and 3 are institutionally acceptable. This would occur if, for example, re-aeration failed initially or was not acceptable or cost-effective, and dam removal was tried but did not positively affect DO concentrations. In this case, re-aeration may be needed in addition to dam removal and should be reconsidered, assuming acceptability issues had changed. (Acceptability may include an issue like acquiring utility right of way.)

   Step 5: If Steps 2 through 4, taken in sequence, do not bring the East Branch and Salt Creek into compliance with the WQS for DO, then with the understanding of the local watershed committee, appropriate effluent limits will be incorporated in the NPDES permits of the point source dischargers on these two streams.

In addition to the above-indicated steps of the phased approach, we will continue to rely on Phase II storm water controls and CSO control strategies to reduce volatile suspended solid (VSS) input to reduce SOD. Also, when nutrients standards become available, we will re-visit the model to develop a strategy for compliance with DO and nutrient water quality standards.

3. There is not adequate justification that a DO TMDL is required. The alleged DO impairments appear to be based on few excursions. There has been no attempt to link DO to the actual impairments. We request that appropriate statistical analyses of in-stream DO excursions be conducted to determine the amount of time during the 7Q10 or 7Q5 that DO is less than WQS and that this be compared to the 6 mg/L time-based standard. The appropriateness of the DO standards themselves should be assessed. The modeling indicates that as WWTP (and stream) flows increase, the likelihood of DO excursions will decrease.

   The Agency has collected DO samples in Salt and Addison Creeks over a variety of times and locations. The data are shown on Tables 4-12 through 4-15. The typically collected data indicate compliance with the standard, with an occasional exceedance. This type of result is best shown in Tables 4-12 and 4-13. However, when diel sampling is conducted, as shown in Tables 4-14 and 4-15, another picture of DO emerges. Note that between August 2001 and September 2002, USGS/Agency continuous monitoring program collected over 14,000 samples for DO and other related constituents at Western Springs. The revision of the DO standard was not within the study objectives of the TMDL, and would more properly be evaluated as part of a triennial review or a use attainability analysis of the watershed. In the future the Agency will re-evaluate the DO standards within the context of the nutrient standards development project. Since increased modeled WWTP and stream flows result in improved DO conditions in-stream, we believe an adaptive management approach is in order—one that allows us to continue to implement and monitor incremental improvements, and evaluate in-stream DO as flows increase. Please see the responses to comments # 1 and #2.

4. The DO TMDL was not based on sound science. The data is inadequate and outdated, SOD was never measured in the field at least for the East Branch of the DuPage River, some oxygen-depleting substances were excluded, temperature impacts were not fully assessed, and the model was not validated or verified with an independent set of data.

   The Agency believes the data used are sound and are indicative of the conditions found in the stream. More recently collected data are discussed in our response to #3. DO modeling in this TMDL was based on the USGS study conducted in 1996 (Melching et al, 1996). The USGS model was calibrated using 1995 data collected by the Agency specifically for that purpose. This TMDL revised the inputs to that model, as described in detail on page 5-9.

   From June 20 through July 3, 1995, SOD rates were measured at 10 sites in the Salt Creek watershed. Two SOD measurements were made at each site. The mean value of the measured SOD rate for each site is listed in Table 5 of the above referenced USGS report. Regarding the age of data used in these TMDLs modeling effort, not only do collection and analysis of data take time, but so do communication of results to the parties involved. At any point the results that we use will be based on data and information, which can potentially be three to five years old. There is typically a lag of about two years in the Agency's data collection, assessment and impairment listing process. For further information on the Agency's strategy for moving forward, please see the responses to comments #1 and #2.

5. IAWA questions whether there in fact is a necessity to perform a DO TMDL for Salt Creek as the draft TMDL is based on data that are four to eight years old, with most of the DO modeling based on data that are six to eight years old. There were few exceedances of water quality standards for total dissolved solids (TDS) (conductivity) and chloride, and some of these may have been statistical outliers. There were relatively few excursions for DO based on the data presented in the draft TMDL Reports.

   More recent data confirms the impairment for these constituents—refer to our response to #3. The four to eight year old data were used in the DO modeling since the USGS had used the same data and same model in 1996 (this TMDL revised the model parameters to account for several loading changes to the stream). Sampling results for chloride between 1995 and 2000, as shown in Figure 4-10, indicate four exceedances over this period. The criterion for identifying stream segments as not attaining full support of the aquatic life designated use is "at least one violation of applicable standard for TDS (conductivity umho/cm x 0.6 = TDS mg/L or chlorides" (Table 3-7 for the 2002 Water Quality Report)). Therefore, the listing of this segment as impaired for TDS/conductivity/chloride appears to be valid. Also, please see the responses to comments #1, #2 and #4.

6. For both watersheds, most of the individual DO excursions appeared to occur at night or in the early morning hours, indicating classic eutrophication response. Nutrients entering the river contribute to elevated algal production. This enhanced algal production is particularly noticeable in the reservoirs where water residence times are long and phytoplankton biomass accumulates. Algae produce DO during the day and also use DO for respiration. At night, they respire but do not produce DO, resulting in large diurnal variations in DO concentrations. As the algae die, they settle to the bottom where their decay contributes to sediment oxygen demand (SOD). Chlorophyll *a* concentrations presented in Section 5 of the Salt Creek report, the 2002 303(d) List, and diurnal DO variation in both streams point to eutrophic to hypereutrophic conditions in Salt Creek and the East Branch. Based on the information presented in the reports, we disagree with the statement made in Section 6.4 of the Salt Creek TMDL Report that the data do "not show any obvious eutrophication problem." Just as the IEPA has observed chloride excursions occur in the winter and are therefore related to road salt runoff, it appears from the data in the reports that the DO excursions occur at night and in the early morning hours and are therefore related to algae.

   Please see the responses to comments # 1 and #2.

7. Although not a true oxygen "depleting" substance, temperature strongly impacts DO. The draft TMDLs do not assess the relationship between temperature and DO other than to use a conservatively high summer temperature in the modeling. The relationship between temperature and DO should be modeled so there is more ability for the IEPA and stakeholders to determine when the critical conditions on the streams occur and, therefore, select a reasonable period of time to impose any permit limits. The relationship between temperature and DO may also be helpful in assessing proper allocations and implementation plans. For example, dam removal and additional shade will have the effect of reducing summer stream temperatures, which may actually provide more DO benefit than what was modeled.

   Please see the responses to comments # 1 and #2.

8. Despite the observed eutrophic conditions, SOD and algae were essentially excluded from these TMDL development efforts. Newer data for both streams should be reviewed and, potentially, additional modeling should be done to reassess the role of DO, algae, volatile suspended solids (VSS), SOD, and nutrients on DO. The IEPA has stated they do not intend to prepare any nutrient TMDLs for rivers and streams until they develop nutrient water quality criteria for rivers and streams. The nutrient criteria are not likely to be developed until the 2005 to 2008 time-frame, according to the IEPA. We appreciate the IEPA's stance on nutrient TMDLs. However, the validity of a DO TMDL that does not include all oxygen-depleting substances or oxygen-reducing causes is unacceptable. Under the current approach, the WWTPs could have very restrictive summer average CBOD and ammonia limits implemented as part of these TMDLs when in fact other oxygen-affecting constituents may be important contributors to oxygen depletion. For example, the modeling shows that the DO problem would still exist even if all the point sources discharges zero CBOD and ammonia, which indicates SOD is very important. The optimal solution matrix must address all potential contributors to this impairment to ensure fiduciary responsibility in spending the public's money.

   Please see the responses to comments # 1 and #2.

9. Several other pollutants are listed on the 303(d) list as causes of impairment. What is the state's projected timeline for completing TMDLs for these other pollutants?

   The Agency has adopted a policy of developing TMDLs only on potential causes of impairment that have Water Quality Standards. State nutrient standards are expected to be finalized in the next 5-7 years. Until that time, the Agency will continue to work with watershed planning groups and other stakeholders to identify and apply existing control mechanisms to potential sources causing impairment for waters, but not develop TMDLs for such causes. Watershed groups are encouraged to apply for funding from the Agency and IL Dept of Agriculture to implement nonpoint source BMPs as recommended in the TMDL and to develop watershed restoration plans. Waters on the 303(d) list will be given priority in funding.

10. Perhaps more important than the DO WQS, is it not clear that the proposed TMDLs will address the basis for listing these streams as impaired in the first place. The linkages between potential causes of impairment and the fish IBI and MBI have not been established. It is very plausible that the fish IBI and the MBI are not significantly affected by the occasional, apparently short-term DO standard excursions that have occurred in the East Branch and Salt Creek. Habitat, toxicity, or other factors may be more important. These linkages should be established before proceeding with the TMDLs.

    The Agency uses IBI and MBI scores to determine impairment. Then we establish causes using water quality data. Please refer to the 305(b) assessment methodology for a detailed explanation. However, the TMDL was not designed to investigate this linkage. Assuming this linkage does not sufficiently exist for Salt Creek, the Agency believes that DO is still implicated as a cause of impairment based on water column monitoring data alone.

11. The IEPA's draft guidelines for preparing the state 2004 305(b) report (IEPA, 2003) have methods for determining impairment that appear to agree with USEPA guidance (USEPA, 2002, 2003). However, much of the data used for the listing are not included in the reports. Data on fish IBI and MBI were obtained from IEPA upon our consultant's request. The data were collected between 1987

and 1998. Based on this data, only two segments of the East Branch were monitored for these parameters, once each. Segment GBL 02 (closest to the main branch DuPage River) had a 1997 MBI that would indicate full aquatic life use support and an Alternative IBI (AIBI) only slightly below the Illinois cutoff of 41 for full support (using IEPA, 2003 Figure 3-3). GBL 10 (about midway up the river) had a 1998 IBI indicating partial support and an MBI indicating full support. The limited data combined with relatively good indices lead us to suggest additional biological and habitat assessment should be done before a costly TMDL is implemented.

In general, we agree that more data are always useful in making water quality decisions. However, the Agency believes assessment decisions for Salt Creek were based on adequate data and are indicative of stream conditions at that time. As stated in the responses to comments #1 and #2, we plan to take an adaptive management approach to this TMDL and will continue to monitor conditions in the stream, adjusting management actions as new data become available.

12. The Salt Creek watershed has had slightly more biological assessment done, and most of the segments including tributaries have one MBI data point. IBIs were determined for four segments on Salt Creek. The MBI data all indicate partial to full support. Some of the IBI data indicate partial support; however, two AIBI scores are lower than the fish IBI cutoff of 21 for partial support. We are not certain that AIBI scores can be directly compared to IBI. Again, additional assessment appears in order.

    The Index of Biotic Integrity (IBI) is a commonly accepted method of assessing the relative health of streams based on a fish population sample. The IBI measures the fish assemblage data for twelve metrics against what is considered a background or non-impaired stream site. The twelve metrics used to assess fish communities are in the following three categories; species richness and composition, trophic composition and fish abundance and condition. The metrics in total are capable of identifying small changes in the population. Generally, the IBI is designed to be adaptable to specific regions by adjusting the details of one or more metric.

    The IBI metrics were adapted for Illinois streams by calibrating them for regional fish assemblages. Additionally, the metric that considers the proportion of fish with disease or other anomalies was modified. Because it is often difficult to determine the proportion of fish in a sample with disease or anomalies in the field, an Alternate IBI (AIBI) may be calculated. The AIBI uses the average of the other eleven metrics (1, 3 or 5 each) for this metric. Both the IBI and the AIBI values range from 12 to 60.

13. In absence of IBI and MBI data (i.e., most of the East Branch segments), chemical data are used next. When assessing aquatic life use for conventionals and other pollutants (these include DO and chloride/TDS/salinity), if there are at least 10 samples available of data less than or equal to 5 years old, the water is considered impaired if 10 percent of those samples exceed the standard. When fewer than 10 samples are available of data less than or equal to 5 years old, the water is considered impaired if there are two exceedances of the standard. When these new guidelines are applied to the East Branch, West Branch, and Salt Creek, it appears very possible that some segments can be delisted or some of the causes of impairment should no longer be listed on the 2004 303(d) list.

    Please see our response to comment #11.

14. The basis for listing the Salt Creek as impaired in the Illinois 303(d) list is not stated in the report. It is not specified whether the Salt Creek was listed based on its value for the Index of Biotic Integrity (IBI) or the Macroinvertebrate Biotic Index (MBI) or as a result of its chemical constituents. The methodology for listing the segments should have been included on the report, along with the relevant values and data, respectively. The direct relationship between the pollutants of concern for this TMDL and the basis for listing should be clearly stated. It is also not clear whether habitat (or lack thereof) has any affect on the biological water quality of the listed segments.

    For an explanation of the methodology used to list Salt Creek as impaired, please see the pages 24 through 44 of the 2000 (305(b) Report.

15. It is not clear whether Salt Creek can attain General Use water quality standards. It would be prudent to first conduct a UAA on Salt Creek prior to the development of TMDLs, given that the CWA requires that states review applicable water quality standards and to modify and/or adopt standards as appropriate at least once every three years. To the District's knowledge, this required procedure has not taken place for the Salt Creek since it was originally designated as a General Use waterway. It is premature to set TMDLs for a waterbody prior to making a determination as to whether the designated use can or is being attained.

    The Agency reviews applicable water quality standards every three years. The Agency does not periodically review use designation or water quality standards for all individual streams. At this time we have no basis to state that Salt Creek cannot meet the general use designation. If, after recommendations in the TMDL are implemented and general use continues to be impaired, the Agency may at that time re-evaluate Salt Creek's use designation.

16. Sec. 4.2 - Copper: This section appears to conclude that copper is not a problem, based on ambient water quality monitoring. However, there is no apparent consideration of problematic copper concentrations in sediments. Based on reviews of sediment concentrations in other suburban northeastern Illinois watersheds where metals and other toxic constituents were reported at highly elevated concentrations in sediments, it is recommended that copper concerns in salt creek be reevaluated.

    Based on ambient water quality sampling, it was determined that the single excursion over the copper limit was an outlier and a result of sampling error. Copper concentrations in the sediment were not investigated. The concern over possible elevated copper concentrations can be addressed in the future through Agency monitoring efforts and /or through a watershed specific monitoring program initiated by a watershed committee as suggested in the response to comment #1.

17. Sec. 4.4 - Chloride: It is reported that there were only limited exceedances of the chloride standard. However, the limited (monthly) grab sample methodology utilized in this study is likely to miss significant wet-weather, snow melt occurrences in which chloride concentrations are likely to be elevated.

    It is possible that the present sampling techniques missed exceedances of the chloride standard during wet-weather, snowmelt occurrences. However, at this time the Agency monitoring program is not designed to conduct wet-weather sampling on specific waterbody segments.

This issue could be addressed through a watershed specific monitoring program initiated by a watershed committee as suggested in the response to comment #1.

18. 4.5 - Total Phosphorus: It is reported that phosphorus concentrations appear to be dropping in recent years and that "appropriate measures may have already been taken" to address phosphorus related water quality problems. First, it is possible (likely?) that observed phosphorus changes could be explained by changing weather and/or algal uptake occurrences. Second, while "appropriate measures" are alluded to, there is no discussion of what such measures may have been. Since there is little point source input above Busse Lake, it is hard to imagine that unknown remedial nonpoint source controls have been implemented to cause such a change.

    We are not certain what changes in the watershed have led to this trend. This could be a result of Best Management Practices (BMPs) recently implemented in the watershed. Currently, there are not enough data available to know for sure. We will continue to monitor this trend and recommend that phosphorus be included as a parameter in the monitoring plan suggested in the response to comment #1.

19. 4.6 - Dissolved Oxygen: Although it is noted that both wet-weather and summer, low-flow conditions are potentially contributing to dissolved oxygen impairment, for unexplained reasons it is concluded that "the DO problem" is associated with the latter circumstances and only summer, low-flow conditions will be modeled. This decision seems to be very limiting, particularly considering that making this determination essentially rules out wet-weather/nonpoint source runoff from further assessment and consideration.

    We did not have wet-weather and non-point source data for modeling purposes. Using the data we had available to us, we considered low-flow conditions as the most critical time when considering the effects of low DO on aquatic life. Please see the response to comment #1 detailing plans for future monitoring efforts.

20. The report notes that summer low-flow conditions are the critical condition for DO impairment. While this may be true, and presuming that this low-flow impairment can be eliminated, there remains the concern that wet-weather impairments (even if less severe than low-flow impairments) will continue into the future unabated. The report also notes that point source contribution has the most significant impact under current conditions and will continue under future conditions. This may or may not be the case.

    Please see the responses to comments #19 and #1.

21. Our greatest concern is the failure to address the role that nutrients play in the problems with low dissolved oxygen levels in the East Branch and Salt Creek. The combination of the decision to not develop TMDLs for water quality parameters for which there is not an Illinois water quality standard and the limited algal information available for modeling have produced TMDLs which consequently focus all their attention on the reduction of oxygen demand from other sources to resolve the low dissolved oxygen problems of these waterways. We are concerned that this will make the recovery of dissolved oxygen levels necessary to sustain aquatic life more difficult.

We understand that nutrients play a role in affecting the DO level in Salt Creek. Please see the responses to comments #1 and #2 for an explanation of the Agency's plan to address the nutrient issue in Salt Creek.

22. We support the recommendations of East Branch and Salt Creek TMDLs and Watershed Implementation Plans (WIPs) to limit the discharge of deoxygenating waste (BOD) and ammonia into these waterways as a component of the plan to achieve compliant levels of dissolved oxygen. However, we are concerned that by not addressing the role which nutrient-fed algae play, the scope of the problem will not be addressed. This is manifested in various specific ways in the TMDLs and WIPs for both watersheds as described below. In the case of Salt Creek, it meant that future increases in wastewater discharge were ignored in the modeling. For Salt Creek, the absence of data on macrophytes and attached algae led to a WIP that does not address algae despite the finding of diurnal variations in dissolved oxygen levels which could not be modeled solely with data on algae in the water column. Consequently, any DO variation due to the presence of macrophytes and attached algae is not reflected in the model results. Therefore, the model, even after good calibration for chlorophyll *a*, is not capable of simulating the full extent of the diurnal variation of DO. (Salt Creek TMDL, Sec. 5.3.1)

    Please see our responses to comments #1 and #2.

23. Like for the East Branch, the WIP requires no change from the current levels of loading of BOD and ammonia from wastewater discharges on the creek. The sole immediate change recommended is the reduction of SOD through the control of deoxygenating waste entering the creek from stormwater runoff and combined sewer overflows. Yet, the effectiveness of this approach is questioned.

    "In addition, reduction of VSS [volatile suspended solids] from stormwater and CSO sources will occur over time in relation to implementation of the Phase II and WWTP NPDES permits. However, the improvement DO due to reduction of SOD that derives from this will take an uncertain amount of time with uncertain effectiveness." (Salt Creek WIP, Sec. 4.2)

    Please see the response to question #1 and #2.

24. Each TMDL should explain why a cause of impairment listed in the 1998 303(d) List for any waterbody in the three watersheds was addressed in the TMDL. The 1998 303(d) List shows Salt Creek as also impaired due to nutrients, siltation and pathogens. Busse Woods Lake is listed as impaired due to siltation, dissolved oxygen, suspended solids and noxious aquatic plants. Meacham Creek and Westbury Lake were also listed as water segments to be included in the Salt Creek TMDL.

    The TMDL for Salt Creek officially began in January of 2000. In determining the parameters to target for TMDL development, the Agency strives to base the analysis on the most recent data available at the time. In January 2000, the most recent data available were those in the 1998 303(d) List and 2000 305(b) Illinois Water Quality Report. The Agency was not required to compile a 2000 303(d) List. Also, please see response to comment #9.

    Busse Woods Lake (RGZX) was listed for nutrients, siltation, DO, suspended solids and noxious aquatic plants on the 1998 303(d) List. However, according to the 2000 305(b) Report, Busse Woods Lake is not impaired for DO. Meacham Creek (GLBA) is listed for DO in the 2000 305(b) Report and is included in the DO TMDL. Westbury Lake (WGN) was initially listed in the 1998 303(d) List based on volunteer lake monitoring data. Starting in 2000, due to quality

assurance issues, the Agency discontinued the use of volunteer data in listing waters. Due to this change, Westbury Lake (WGN) was delisted and was not targeted for TMDL development. WGN is in Table 2 – Inaccurately Listed Waters of the 2002 303(d) List.

25. As a 52% decrease in VSS from these sources is the projected need to restore dissolved oxygen levels in Salt Creek, the uncertainty of this approach is troublesome. Still, CSO contributions to low dissolved oxygen levels in the creek along with their other obvious negative impacts on the use of the creek by area residents make this an issue worth immediate attention.

    The Agency hopes that this TMDL can lay out a framework and act as a guide for the local community and watershed committee to move towards implementing controls for contributions from stormwater and CSOs to reduce VSS by 52% and, in effect, improve DO levels. Also, please see the responses to comments #1 and #2.

26. In summary, our concern with both the East Branch and Salt Creek TMDLs is that by overlooking the role which nutrients play in causing low dissolved oxygen levels in both streams, WIPs have been produced which place much of the burden to restore the streams to healthy DO levels on reducing VSS in runoff. The uncertainty of this approach, reiterated in the text of the TMDLs and WIPs numerous times, does not bode well for restoration of dissolved oxygen to levels protective of aquatic life. We are also concerned that future impacts of increases in wastewater discharge have also been underestimated by this approach. Clearly, to be effective, the TMDL must consider and address all water quality parameters which affect dissolved oxygen levels, even those such as nutrients for which Illinois water quality standards currently do not exist.

    Thank you for your comments. Until nutrient standards are developed, the Agency will continue to address the nutrient issue through methods other than a TMDL. This TMDL is one step in improving water quality in Salt Creek. We believe an adaptive management approach that involves prioritizing the obvious sources and most cost efficient options for pollution control is the best strategy to follow at this stage in the TMDL process. Please see our responses to comments #1, #2 and #3.

27. We recommend that resources be put towards the collection of nutrient, diurnal DO, algal (both water column and attached) and macrophyte data needed to properly model the role of nutrients in these waterways. The control of nutrients should be included as a component of the TMDLs.

    Please see our response to comment #26 in regard to why nutrients were not included in this TMDL. We agree and encourage stakeholders in the watershed to form a stakeholder group to implement and seek funding for the above suggestions. Funding can come in the form of Section 319 matching funds or other sources. Monitoring can involve wet weather sampling and WWTP effluent monitoring. Also, please see the response to comments #1 and #2.

28. Section 6.4.2, Load Allocation and Waste Load Allocation, within the Dissolved Oxygen section state that various pollutant reduction scenarios were analyzed. Does this mean that only alternatives for improving dissolved oxygen were studied? What about the other pollutants? In the same vein, does this report purport to look at alternatives to improve water quality or is it just to quantify allowable pollutant loads?

This report analyzed several potential causes of impairment, not just DO. Please see the responses to comments #1, #2 and #26 for a further discussion of nutrients. The establishment of a Total Maximum Daily Load sets the pollutant reduction goal necessary to bring the waterbody into compliance with the applicable water quality standards. Along with load reductions, the report describes and suggests stormwater management programs, road de-icing management, and dam removal as methods to improve water quality.

29. Comments in the report relating to dissolved oxygen are strongly disagreed with by our staff. The diurnal DO variation in the stream points to eutrophic conditions. The statement that "data does not show any obvious eutrophication problem" cannot be correct with the documented evening/early morning DO excursions. We do not feel that there is adequate justification for a DO TMDL to be required. The alleged DO impairment seems to be based on only a few excursions. It is not based in sound science and is inadequate and outdated.

    Please see responses to comments #1 and #2 for a discussion on the nutrients issue and our plan for moving forward. Also see the response to comment #3 for a description of available DO data.

30. The TMDL indicated that Salt Creek also has a chloride impairment. During the telephone discussion of the Salt Creek TMDL, the Agency stated that the data supporting the chloride WQ standard was not developed in Illinois. The IEPA admitted that the water quality standards for chlorides are taken from other states and "may be pretty close for the Illinois streams". The city would like to suggest that IEPA establish firm chloride standards that are based in good science and reflect what chloride limits should be in Illinois streams.

    There appears to be a misunderstanding or miscommunication concerning the water quality standard for chloride in Illinois. In 1972, the IPCB adopted the Illinois water quality standard (WQS) for chloride of 500 mg/L, which was approved by USEPA pursuant to the Clean Water Act. The standard was set to protect aquatic life and downstream public water supply. The Illinois standard is within the range of chloride values defined by the acute and chronic USEPA national criteria found in <u>Ambient Water Quality Criteria for Chloride – 1988.</u> For this reason, IEPA believes that the existing IPCB water quality standard for chloride remains appropriate. The Agency has no plans to change this standard and USEPA has not implied that the standard must be changed from the federal perspective.

    The USEPA document <u>Ambient Water Quality Criteria for Chloride - 1988</u> can be found at http://www.epa.gov/ost/pc/ambientwqc/chloride1988.pdf and gives further information on chloride toxicity studies and background on development of chloride water quality criteria.

31. The TMDL states that the anticipated source of chlorides in Salt Creek is salting operations during wintertime. Yet the Agency suggested that there may be future limitations on POTW effluents for chlorides and that POTW's may be a significant source of chlorides to the stream. The City of Elmhurst would like to strongly disagree with this statement and point out that there is little or no measurement of chlorides in wastewater plant effluents and no evidence at all that POTW's are a source of chlorides to the stream, also, that the POTW's can remove little of the chlorides that it receives even in a combined sewer system. Elmhurst is a separate sewer system and therefore should have little or no chloride in its effluent. To this end the city would like assurances that Elmhurst would not have future chloride restrictions imposed on its outfall.

The report does not recommend chloride, total dissolved solids (TDS), or conductivity effluent limits in the WWTP National Pollutant Discharge Elimination System (NPDES) permits' effluent limits. Effluent concentrations of these constituents are not expected to be problematic. The report has shown that elevated levels of chloride, TDS and conductivity are seasonal and occur predominantly during the winter months as a result of road de-icing activities. The report has recommended chloride BMPs and ongoing CSO improvements to address the problem.

We are, however, taking an adaptive management approach to implement this TMDL. If the recommendations in the report are implemented and do not result in improvement, the Agency must leave open the possibility of monitoring POTW effluent and determining whether they are contributing to the problem and NPDES permit changes need to be made, specifically for stormwater inflow and infiltration controls.

32. The City of Elmhurst would like to ask Illinois EPA to reconsider the current designated use of Salt Creek. Urban streams such as Salt Creek have unique properties that don't exist in non-urban streams throughout the state. The Salt Creek is an effluent dominated urban stream and as a result may not ever achieve a general use standard. The agency in the past has used several criteria for measuring general use standards for a stream, first of which being stream biota and fish indexes that indicate the health of the stream. It is the understanding of Elmhurst then that if biotic indices are not achieved the agency would scrutinize water chemistry data as the second measurement criteria. Elmhurst would like to ask the agency instead to consider stream habitat as the second index as a possible cause for lower fish and invertebrate diversity. In effluent dominated urban streams the habitat may not be conducive to the migration of organisms back into the basin or because of other conditions inherent to urban streams (periodic storm flows, low dry weather flows, elevated summer temperatures, etc.) this diversity level may not be achieved as would be in other less urban streams. Water chemistry should not be considered until the stream habitat has been apprised and is determined to be conducive to sustaining the diverse fish and invertebrate populations that the agency expects to be present in a general use stream. In streams such as Salt Creek it would seem appropriate to develop another use designation that takes into account the fact that urban effluent dominated streams should have designated uses other than general use.

    Salt Creek has been considered a General Use stream since it was originally classified. If after the recommendations in the TMDL are implemented and Salt Creek does not meet water quality standards, the Agency will consider re-examining the waterbody's designated use. Also, please see the response to comment #15.

33. The Assumption that point sources do contribute to chloride standard violations is unjustified. Section 6.3.3 of the report states that the point sources do not contribute to the chloride standard violations, because the measured instream concentrations during the months of May through November do not exceed standards. This argument is based on an assumption that the effluent concentration of chloride in winter months is essentially the same as that in the summer months. However, elsewhere in the report it is clear that there are several combined sewers in the watershed. Because the stormwater is routed to and through the sewage treatment plant, it is reasonable to expect that the road salt that causes increased chloride instream during winter months could also cause increased chloride at the sewage treatment plants that receive stormwater. If chloride has not been monitored in the effluent of these sewage treatment plants during winter months, such monitoring

should be conducted before assuming that the effluent does not contribute to chloride standards violations.

While we conducted no site-specific monitoring of chloride from dischargers in this watershed, we recently conducted such monitoring in the West Branch of the DuPage River, as part of the TMDL for that watershed. Based on those results showing chloride effluent concentrations of approximately 350 mg/L, in meeting water quality standards for chloride in Salt Creek it appears wastewater treatment plant effluent is not expected to be problematic. It is unlikely that CSO controls could positively affect chloride concentration in a cost effective way, relative to the proposed chloride BMPs contained in the Implementation Plan and the ongoing CSO improvements.

34. The Village requests that newer data be admitted, additional monitoring performed as necessary, and delisting of Salt Creek and tributary segments for DO and total dissolved solids (TDS)/conductivity considered: The listing of conductivity and DO as use impairment causes in Salt Creek may have been based on insufficient data. Before demands are placed on wastewater treatment plants (WWTPs), the compliance with which might ultimately cost municipalities millions of dollars, it would make sense to make sure that the alleged impairment and its causes are real. If it is found that there really was no impairment or that impairment causes were misattributed, and that the taxpayers paid large sums for no benefit, the credibility of the Illinois Environmental Protection Agency (IEPA), the TMDL program, the treatment plant operators, the engineers, and the environmental advocacy groups could be irreparably damaged. Requests for funding to meet future TMDLs may meet with firm resistance regardless of how much they are needed.

    Please see responses to comments #1, #2 and #3.

35. The City should not be included in the chloride TMDL or implementation plan. There is no evidence presented in the report that the stream reach where the City discharges stormwater and WWTP effluent (GL 03) had any excursions for TDS or chloride. Reach GL 03 is not on the 2002 303(d) list for chloride. There also appears to be an error in the chloride WLA calculation. The IEPA has verbally stated that the WWTPs will not have effluent limits for chloride as a result of this TMDL. We request that IEPA check the WLA and confirm in writing in the final TMDL that Wood Dale and other WWTPs will not have effluent limits for chloride, TDS, or conductivity as a result of this TMDL. We reserve the right to comment further on the chloride TMDL if the City may be faced with a future WWTP effluent limit for chloride.

    We are taking an adaptive management approach to implement this TMDL. If the recommendations in the report are implemented and they do not result in improvement, the Agency must leave open the possibility of monitoring POTW effluent and determining whether they are contributing to the problem and NPDES permit changes need to be made.

    Please refer to the answers to comments #1 and #2 for an overview of the Agency's strategy for moving forward with this TMDL. Also, please refer to the responses to comment # 31 and #33 pertaining to NPDES limits for chloride.

36. It is evident in the report that the combined sewer overflows (CSO) located in the areas of the Elmhurst Sewage Treatment Plant (STP) are periodically discharging raw sewage into the Salt Creek, which is increasing the settled particulate matter with high biochemical oxygen demand (BOD)

causing an increase in sediment oxygen demand (SOD) which is depleting the dissolved oxygen (DO) in the creek. This is one of the main sources contributing to the problem of DO in Salt Creek in the area of the Fullersburg Dam at mile point 11.6.

The TMDL states that CSOs are a potential source of DO problems in streams. However, according to the Report: "Flow in Salt Creek under 7Q10 low flow conditions consist primarily of point source discharges. Nonpoint source flow, including leaky CSOs, should be minimal under critical summer low flow conditions. Nonpoint source contributions of CBOD and ammonia following a storm event do not require any control, because DO standards are not violated during high flows. Therefore, the nonpoint source contributions or load allocations (LAs) of CBOD and ammonia nitrogen were set to 0 pounds per day." The report goes on to say "Generally, untreated waste from CSOs and runoff from various land uses contain significantly higher VSS concentrations. Considering these issues, it appears reasonable to target VSS transport and deposition from nonpoint sources. Also, because actual treatment levels for CBOD and ammonia are high, there should be little organic matter in the point source effluent. Therefore, the TMDL allocation for VSS was based on 100 percent nonpoint source contribution or load allocation."

Please see the responses to comments #1 and #2 for the Agency's strategy for moving forward with this TMDL and implementing stormwater and CSO management.

37. Please be advised that the Fullersburg Woods Area Association expects the IEPA to work closely with the STP operators in Elmhurst, Salt Creek SD, and Addison to correct the cause of the DO problem at its source. This should include some level of treatment for CSO raw sewage discharges and tightening of effluent limits contained in the NPDES permits for the STP's.

    Thank you for your comment. The Agency will continue to work with stakeholders in the watershed to implement the most cost effective solutions to water quality impairment. Also, please see responses to comments 1 and 2.

38. The Village strongly objects to a potential tightening of the carbonaceous biochemical oxygen demand (CBOD) limit and to the proposed tightening of the ammonia nitrogen limit in its NPDES permit as a result of the DO TMDL and requests that the implementation of the DO TMDL be delayed: In the event that delisting for DO cannot be considered or justified, we believe that several justifications exist for delaying the proposed implementation of the DO TMDL: lack of water quality justification for the urgency of the proposed implementation, failure of the draft TMDL to account for the impact of nutrients and for the diurnal action of algae and other aquatic plants, and the approaching arrival of nutrient WQS in Illinois.

    Please see the responses to comments #1 and #2.

39. The Draft TMDL Report concludes that <u>under current loadings from point sources</u>, no action would be required by the existing point sources to meet the wasteload allocations for CBOD and ammonia with respect to the DO WQS. We question the relevancy of the proposed implementation to addressing the existing water quality in Salt Creek. Furthermore, we also see no justification for any urgency to impose the DO-related TMDLs on this Village and other WWTP point sources, such as by tightening the CBOD and ammonia limits in the WWTP NPDES permits.

Please see the responses to comments #1 and #2

40. At the public meetings, the IEPA indicated that nutrients would not be considered in this TMDL process because no nutrient WQSs have been developed yet. The Draft TMDL Report supports the omission of the nutrient impacts by stating that the chlorophyll *a* levels in Salt Creek "did not show any obvious eutrophication problem" and that there was an "absence of significant algae". Having examined the Draft TMDL Report, we do not see any support for the statement that algae are not significant in Salt Creek. What we understand the Draft TMDL Report to be documenting is that clearly measurable diurnal fluctuations in DO have been observed in Salt Creek. We further understand that the modeling approach selected by the TMDL Contractor failed to match the magnitude of the observed DO fluctuations, although it matched their direction. However, the failure of the selected model to account for observations cannot possibly be interpreted to mean that the observations were incorrect. Moreover, the suggestion in the Draft TMDL Report that CSO and other point source and urban stormwater discharges affected the diurnal DO behavior in a pattern seemingly consistent with photosynthesis and respiration strains credibility.

    The levels of algae in Salt Creek clearly are not negligible. The presumption must have been that their effects matter, or else why were they included in the QUAL2E model of Salt Creek. Melching and Chang (1996), the authors of the original Salt Creek modeling effort on the results of which the DO considerations in the Draft TMDL Report are based, stated in their report that "measured DO concentrations vary widely throughout a diel period because of the effects of algal photosynthesis and respiration."

    The point we wish to make is that the majority of available evidence appears to suggest a presence rather than absence of eutrophication problems in Salt Creek. The most recent 303(d) list lends additional support to our understanding, as it lists nutrients and algae as causes of impairments in several segments of Salt Creek. We do not believe that a DO TMDL that fails to address the effect of nutrients and aquatic plants on instream DO concentrations in Salt Creek is scientifically defensible.

    Thank you for your comments and analysis. Please refer to the responses to comments #1 and #2 for an overview of the Agency's strategy for moving forward.

Water Quality Standards and Data

41. Use of the chloride standard as a surrogate for the TDS standard is unjustified. In developing the TMDL for total dissolved solids (TDS) and chloride, it was assumed that if the chloride standard of 500 mg/L is met, the total dissolved solids standard of 1000 mg/L will be met. However, the information presented in the TMDL document suggest that this is not an appropriate assumption. First, while TDS was identified as a cause of impairment for several segments of the watershed, chloride was identified as a cause of impairment for only one of the segments. Apparently, several segments currently meet standards for chloride, but not for TDS.

    Please see response to question #42

42. Secondly, the correlation between chloride and conductivity was estimated for the Addison Creek and Salt Creek stations as shown on the plots on pages 4-7 and 4-8 of the report. It was stated that the TDS standard of 1000 mg/L is equivalent to conductivity of 1667 μmho/cm. The plots and equations

presented suggest that a more appropriate target for chloride would be somewhere between 350 and 390 mg/L.

The purpose of addressing the correlation between conductivity and chloride was to simplify the TMDL by showing that chloride contributed to the conductivity excursions and could be modeled and controlled as one constituent. Road salt contributes more to increased conductivity than simply increasing the chloride concentration. Sodium and other materials add to the conductivity. In controlling chloride via road salt, the Agency must address the need for deicing measures that affect public safety. We must therefore take an incremental approach and continue to monitor the improvement.

43. The draft TMDLs do not explain the basis behind including the various segments and streams on the Illinois 303(d) list. This information should be provided in these and future draft TMDLs because of the relevance to the TMDL program and to the issue of designated use attainability. If the listing was based on the fish Index of Biotic Integrity (IBI) or the Macroinvertebrate Biotic Index (MBI) values, the reports should state this and should include a summary of those values. If fish IBI and MBI data were not available for the streams and the listing was based on chemical and other information, this should also be stated and the relative chemical data provided. Habitat assessment scores, if available, should also be provided in the reports. The IEPA needs to demonstrate the linkages between the proposed TMDL pollutants of concern and the basis for the impairment listing. The IEPA should identify the real stressors that cause biological impairment and document the scientific evidence that points to potential causes of impairment (USEPA, 2000). Without this information, it is impossible to assess whether the proposed TMDL and Implementation Plan will lead to the ultimate water quality goal. The ultimate goal, of course, is to attain full support of the designated use for the stream or stream reach.

    Illinois EPA biologists determine water quality impairments on the basis of physical, chemical and biological data and their personal/professional experiences related to the waterbody. This process is described in the 2000 Illinois Water Quality Report 305(b) section B. Assessment Methodology, pp. 24-41. Impaired waters from the 305(b) are then placed on the 303(d) List. Waters from the 303(d) List are then chosen, based on a variety of factors, for TMDL development.

44. Providing information on the reasons for listing and the linkages between cause and effect is particularly important when the TMDLs do not attempt to address all listed causes and sources of impairment, as is the case with these draft TMDLs. These draft TMDLs address only a few listed causes (TDS/chloride/salinity and low DO) and not others such as habitat, flow alteration, nutrients, algae, and bacteria. The potential cost to address these few causes is so high that IEPA must provide a very high level of assurance (not just "reasonable assurance") that the proposed Implementation Plans will attain full support of the designated use. If this assurance cannot be provided, then consideration should be given to evaluating other causes or changing the designated use.

    The Agency has adopted the policy of limiting development of TMDLs to potential causes of impairment that have established water quality standards. We have adopted this policy to give the TMDL a scientific and legally binding endpoint. Unfortunately, there are parameters that impair our waters for which there are no water quality standards. Potential causes of impairment not analyzed in the TMDL will be addressed holistically through the BMPs and recommendations in the implementation plan, and by working with stakeholders in the watershed in various ways.

45. In addition to the above, IAWA would like to know the basis for the original designation of these stream segments and the assessment of support for those uses. For example, some of the segments are listed in the 2002 303(d) list as partially supporting "overall use," yet "overall use" does not appear to be an official use category in Illinois. Many of the East Branch and Salt Creek stream segments are not designated as primary contact; therefore, we question whether the Secondary Contact and Indigenous Aquatic Life standards (with a numerical DO standard of 4 mg/L) could apply instead of the General Use standards. Furthermore, what is the technical basis for the numerical DO standards for General Use and Secondary Contact and Indigenous Aquatic Life; what organisms are we protecting by requiring 5.0 mg/L DO at all times and 6.0 mg/L most of the time, and are these organisms indigenous to these streams? There is an exception to the 4.0 mg/L Secondary Contact DO standard for Calumet-Sag Channel of 3.0 mg/L; could there perhaps be an exception to the General Use DO standard during dry weather in point-source dominated streams in highly urbanized watersheds? We request IEPA's clarification on these points so we can further evaluate the appropriateness of these draft TMDLs and designated use attainability.

    The "overall use" designation was used until 2002 as a summation of all designated uses. Please see page 41 of the Illinois 2000 305(b) Report for a definition of overall use.

    The Illinois Pollution Control Board adopted the current DO water quality standard (WQS) on March 7, 1972. The standard is not targeted at a specific species, but is meant to meet the needs of all aquatic life in the stream.

    At this time, the Agency has no plans to make exception to the DO standard during dry weather low flow conditions in point-source dominated urban streams.

46. In addition, there seems to be an insufficient amount of data that show exceedance of water quality standards for both chloride and dissolved oxygen to make decisions as to actual water quality impairment. The chloride criteria exceedances for Addison and Salt Creeks, both monitored and modeled, are infrequent (less than 10 percent of the time) as stated in the Implementation Report Section 4.1 page 13. The United States Environmental Protection Agency (USEPA) guidance recommends that water bodies should only be considered impaired if exceedances occur more than a given percent of time, depending on such factors as pollutant type and data distribution. For acute and chronic chemical criteria for conventional pollutants, the USEPA guidance identifies a greater than 10 percent exceedance threshold for non-attainment of standards and 305(b) and 303(d) listings.

    Please see the responses to comments #1 and #2.

47. Specifically, there were only three exceedances of the standard for total dissolved solids (TDS) (conductivity) and one for chloride. The long-term data collected in Salt Creek from 1991 through 1998 do not show any excursions below the 5 mg/L DO standard, except for diel samples collected during one or two events (data from the second event are not included in the report) in 1995. Data for DO from September 2001 through September 2002 are presented in Figure 4-15 of the TMDL Report and show DO excursions below 5 mg/L throughout the summer months. However, pages 4-13 indicate that this data may be biased low because the DO probe is located in a backwater area."

    Therefore, we question whether enough documentation of a DO problem in Salt Creek exists to justify the imposition of tighter effluent permit limits on point source dischargers to Salt Creek. We believe that additional monitoring should be conducted and/or additional data gathered from stakeholders in order to perform a data gap analysis, which will provide a truer, indication of the current state of the waterway.

Please see the responses to comments #1 and #2.

48. We are concerned with the use of chloride as a substitute for total dissolved solids (TDS)/conductivity, a water quality parameter for which there is a numeric standard. For example in Salt Creek, a number of stream segments are listed as impaired for TDS/conductivity but not for chloride. (Salt Creek TMDL, Table 2.1) This would suggest that the TDS violations found in the creek are not just due to chlorides. Further explanation is needed to demonstrate that the chloride reductions called for in the TMDLs will be sufficient to address TDS violations.

    Please refer to the response to comment #42.

49. Since discharge monitoring reports typically report flow data on a daily basis, we wonder why point discharge daily flow data were not made available to the modelers to improve the hydrological simulation of the HSPF model.
    "Since point sources are responsible for a large portion of flow during low-flow periods, the quality of the point-source data is likely leading to error in the calibration and validation. Since the point-source discharge data were provided as monthly values, daily point source discharge variation is not reflected in the simulation, and the effect of this monthly data would be felt the strongest during low -flow periods." (Salt Creek TMDL, Sec. 5.2.6)

    Point source dischargers are required to report two flow measurements to the Agency: 1) Monthly Average Flow (MAF), which is the average of reported flows on all days they discharged and 2) Daily Maximum Flow (DMF), which is the highest flow of any one day in a calendar month. Dischargers record daily flows, but they do not report these numbers to the Agency. Monthly flows were used in the interest of time and practicality and were considered adequate for modeling purposes.

50. Is there a time frame for nutrient standards? Will the Agency go back and complete nutrient TMDLs when standards are complete?

    The present time frame for the development of nutrient standards is 3 to 6 years, plus 2 years for adoption by the Illinois Pollution Control Board. When nutrient standards are in place, the Agency will re-evaluate previously developed TMDLs in an adaptive management framework to determine if nutrient TMDLs are appropriate on those waterbodies.

    The Agency has proposed an effluent standard for phosphorus of 1.0 mg/L for major point source discharges that are new and those being upgraded. The proposal was filed with the Illinois Pollution Control Board on May 10, 2004.

    In regards to Salt Creek, please see the response to comments #1 and #2.

51. Was the Agency able to look at hydrological modifications (wetlands, etc.)- any areas where this may be able to be implemented in the watershed?

The Agency did not look at specific areas in the watershed for wetland creation. Section 2.3 of the Implementation plan discusses funding sources for non-point BMPs such as streambank restoration. Since 1994, there have been sixteen Section 319 projects initiated in the Salt Creek Watershed. The total estimated cost for these projects is $ 1,814,659.50.

52. Has Illinois EPA looked at Busse Lake data beyond the year 2000 to see if decline in Phosphorus levels has continued?

    According to the 2004 305(b) Report, phosphorus is not listed as a potential cause of impairment in Busse Woods Lake.

53. Busse Woods is impaired in the 2002 list for excessive algae growth. Doesn't this show there is a problem?

    Please see the response to questions #9 and #24. The Agency can assist by directing Section 319 funds in the Salt Creek watershed toward the issues in Busse Lake if a 319 application is submitted by watershed or community groups.

54. Some new causes are listed in Salt Creek in the 2002 List. Will IEPA have to do new TMDLs on them?

    Yes. We will continue to monitor Salt Creek and apply an adaptive management approach to address new and evolving water quality issues in the watershed.

55. Will IEPA determine a WLA for chloride and organic matter in stormwater permits?

    Yes. The permits issued earlier this year for Phase 2 stormwater (MS4) establish a condition in them for watersheds that have approved TMDLs. The MS4 permit contains a condition that states if there is an approved TMDL, the permittee must modify their program to conform to the TMDL and they have an 18-month compliance period. At the appropriate time, the Agency will notify permittees of their obligations concerning an approved TMDL.

56. Will that determination occur at the local level - between IEPA and municipalities as to what the LA will be?

    Stormwater permits can pertain to a number of different stakeholders in the watershed. They can affect municipalities that operate on combined sewer and sanitary sewer overflow systems, or to a developer that is building on an area that is over 1 acre in size. Stakeholders in a TMDL watershed may have difficulty obtaining a permit or may find themselves with more restrictive permit limits or conditions if they are operating in a TMDL watershed. Permit applications are examined and approved on a case-by-case basis. Those permits are required to go through a public comment process.

57. Would recommendations of a TMDL be different if IEPA had data on macrophytes and attached algae? When diurnal fluctuations in DO were modeled, they felt the model fit well but said they lacked some data. Would having that data give us a better assessment?

    At this time, there is no water quality standard for macrophytes and attached algae. There is also no standard or accepted protocol for sampling for "attached" algae. This impairment is based on observations made in the field by our biologists. Having more data is always helpful; however, resource limitations have not made selective monitoring of TMDL watersheds possible. Hopefully, this may change in the future.

58. Section 2 states that the TMDLs were developed for each pollutant and were designed to meet applicable water quality standards (WQS). Section 2.2 states that the applicable WQS was the chosen endpoint for the TMDL. Table 2-2 appears to make the TMDL's the default WQS criteria. Does this mean that the defined WQS are just picked as the TMDL, and if so, why was there a need for a report?

    TMDL is an acronym for Total Maximum Daily Load. It determines the greatest amount of a given pollutant that a water body can receive without violating applicable water quality standards (WQS) and designated uses. A TMDL uses the WQS to set the pollution reduction goals that are necessary to bring a waterbody into compliance with applicable water quality standards. It is the goal of a TMDL to bring a waterbody back to the point where it meets WQS. Once this load reduction is determined, an implementation plan is designed that recommends and describes Best Management Practices (BMPs) and other methods to meet the TMDL.

59. POTW'S throughout the state are awaiting new phosphorus nutrient criteria. IEPA has stated that these criteria should be in place by 2007 or 2008. If the Salt Creek TMDL proceeds and is submitted to USEPA as written POTW's in the Salt Creek basin could be investing upwards of $18 million in improvements to achieve the desired water quality (WQ) goals. However, in just a few years the POTW's will be required to upgrade again to remove phosphorus and may, with that nutrient removal, also achieve a higher dissolved oxygen concentration throughout the basin. It would seem that modeling the TMDL with a proposed phosphorus limit in place may result in no dissolved oxygen (DO) impairment. For this reason the city is asking that the TMDL submittal be delayed until the state phosphorus limits be identified. That new standard would then be used to model the stream and determine what future DO impairments may exist after phosphorus is removed. The city feels it is a burden on its ratepayers to impose costly improvements now and come back later and impose new nutrient limits, which may alone improve the Salt Creek.

    Please see responses to comments #1 and #2.

60. The DO TMDL was not based on sound science. The data appear inadequate and old, it is unclear from the report whether SOD was ever measured in the field, some oxygen-depleting substances were excluded from the TMDL, and the model was not validated or verified with an independent set of data. Model calibration is questionable because calibration of a steady state model (QUAL2E) was done using data obtained during unsteady conditions (i.e., increasing stream flow and additional pollutant loadings because of rain). We disagree with the conclusions regarding eutrophication and algal impacts on DO. There are many apparent omissions and inconsistencies in the draft reports.

Please see response to comment # 4.

61. On one of your charts, you were showing data points. One of the data points for chloride was way up and you made a comment that is was "out of whack." Does that mean you weren't considering that one data point? It only takes one day of being way "out of wack" to kill everything in the stream.

    Our goal is to model the average conditions in the stream, not the most extreme conditions. The data point you are referring to was so much different from all the others that it was put in question as a sampling error or extreme outlier and was not considered in the model. If we would adjust the model to match that one extreme data point, the model would over predict in all of its calculations. We would use the same approach if we had a sample value that was on the very low end of the spectrum. We must use judgment in viewing the data and deciding which values are appropriate for analysis.

62. If you are looking for trends, that's ok, but if you are coming up with a total maximum daily load, then every single point needs to be considered, if it's a real point, and if that is your data, its probably correct. Sierra Club monitoring data shows some points where the chloride level jumped very high. I don't think that is an anomaly and should be considered as something that needs to be addressed.

    Please see the response to question # 61.

Water Quality and Hydrologic Modeling

63. After calibrating the model, the model should be validated using available water quality data to determine the extent to which it accurately predicts conditions. Why was the decision made not to validate?

    Data were collected at two separate times in the months of June and August. The two data sets were not similar. During the June diel sampling, there was considerable rainfall, whereas, during August diel sampling there was no rain. Because of this difference, the model (QUAL2E) calibrated by one data set could not be validated by the other. However, in the water quality modeling work done by Melching and Chang (Melching, 1996), an attempt was made to calibrate and validate the QUAL2E model. This work was used as a guide by the consultant in performing the work.

64. On the DO TMDL, what variables used were measured data and which were assumed based on literature values and tweaked in calibration? In particular the SOD values?

    The reaeration coefficient (K2) and SOD were respectively measured in-situ at six and nine locations in Salt Creek. The decay coefficient values for CBOD (K1) were calculated at 11 sampling sites from long-term CBOD data obtained from laboratory analysis. All other kinetic coefficients were determined from literature and model calibration process. This report outlines the methodologies used to calibrate the coefficients. Data were available to calibrate all parameters. In some cases, the measured values were modified to better predict the instream dissolved oxygen. We made the adjustments since SOD is collected at specific locations, and

SOD at a given location may not be indicative of the SOD along an entire reach. The model input files used in this TMDL analysis are provided in Appendix E to allow comparison.

65. Where did the rearation rates come from?

    The USGS collected reaeration data in August and September 1995 on Salt Creek, Spring Brook and Addison Creek. The values obtained during these surveys were applied in the reaches where they were collected and hydraulically similar reaches. For reaches 3-7 (approximately river miles 28 through 18) on Salt Creek, data were not available. The USGS estimated the reaeration rates for these reaches using the O'Connor-Dobbins equation. Reaeration rates behind the dams were input at lower rates to reflect the deeper, slower moving water.

66. What decay kinetic coefficients and ammonia oxidation rate coefficients where used?
    The model input files have been included in Appendix E. Also, see response to comment #64.

67. Was there any uncertainty analysis done? St. Charles Road CSO, what has happened to it? Which river mile is it at?

    There was no direct explicit uncertainty analysis performed. However, during model calibration, parameters were adjusted to match as closely as possible with the observed values. Consequently, there was indirect understanding of uncertainty related to those parameters. The St. Charles Road CSO, located at river mile 20.4, was observed to be flowing during dry weather on June 27, 1995 by Agency personnel. Since that time the St. Charles Road CSO has been repaired and does not continue to flow during dry weather.

68. We are looking for an appropriate DO TMDL and feel that controlling nutrients is a component of meeting the DO standards. Particularly when data show violations occurring during the pre-dawn hours. As we do not have in-stream criteria for BOD, we regulate it in order to meet the dissolved oxygen standard. We don't need to wait for nutrient standards to look at developing nutrient limits that will meet the DO criteria.

    Please see the responses to comments #1 and #2.

69. In the draft TMDL Reports, a paper by Price, Hydrologic Calibration of HSPF Model for DuPage County, 1994, is referenced as providing an explanation of the large difference between point source data and the observed flows at the USGS gauges. It appears that Price establishes the dry weather flow from point sources based on the average flow during the driest month over several years. The reports do not indicate what the "several year" period was, but the calibration was done for the years 1979 through 1988. Depending on what year was the driest, the point source flows then were probably much different than they are now. If these flows were used to derive current WLAs, the WLAs could be much lower than using current dry weather flows. It appears these flows may have been used for the chloride WLA, as discussed below. The IEPA should check the basis for the point source flows and the WLAs.

As described in Section 5.2.4 of the TMDL, the total point source flow used in the HSPF model was 42.3 cfs in Salt Creek and 6.1 cfs in Addison Creek which is somewhat lower than the point source flows used to calibrate the QUAL2E model during low flow conditions. Additional modeling runs were completed for the chloride TMDL to determine a WLA that is more realistic for the point source discharges while protective of the water quality standard. The revised TMDL is based on design flows and a concentration of 300 mg/l for the point sources.

70. The TMDL Report indicates that monthly average data for the WWTPs were used in the modeling and other assessment efforts in lieu of daily flow data. Daily flow data are not available on WWTP discharge monitoring reports (DMRs); IEPA's contractor would have had to obtain this data directly from the WWTPs. This could have been done. Use of the monthly average data introduces error to the hydrologic calibration (as noted in the TMDL Reports). On page 5-6 of the Salt Creek TMDL Report, a statement is made that the R-Squared Monthly values during the validation period were "poor to fair" when in fact they were poor........We understand that the hydrologic calibration affects the chloride modeling and not the DO modeling; however, these procedures and statements lead us to be very concerned with the overall process used to assess point source flows for both chloride and DO modeling. The process for developing TMDLs in the future should be modified to ensure that contractors utilize all available data including daily flow data maintained by WWTPs.

    The Price report indicated that stormwater infiltrates the sanitary sewer system. Thus, to avoid double-counting flow during storm events, the average point source discharge during low flow was assumed to come from point sources during storm events as well. The additional water generated during storm events was included as nonpoint source flow. Using this methodology resulted in predicted flows being within 5 percent of observed flow at the gages. This is an excellent hydrologic calibration. Since QUAL2E is a steady-state model, only one flow is input for each point source in the model. Therefore, DO analyses were not impacted by the assumption.

71. The reports do not explain how some of the tributaries were modeled. Some of these tributaries are listed as impaired and could contribute significantly to the impairments on the main branch. The methods used should be explained in the final reports.

    The impaired segments in Salt Creek are summarized in Table 2-1 and Figure 2-1. The entire Salt Creek watershed was modeled for chlorides using HSPF. This modeling therefore addressed all segments impaired by chloride and conductivity. For DO, Salt Creek was modeled beginning at the dam of Busse Wood Reservoir to its mouth at the Des Plaines River. The QUAL2E model also included Spring Brook and Addison Creek, the other tributaries impaired due to low DO.

72. It is not clear from the reports how the East Branch or Salt Creek SOD values were established. The report discussions indicate that at least some of the SOD values were determined through use of the model rather than by measuring SOD in the field. The IEPA has verbally indicated that SOD was not measured in the field for the East Branch nor was reaeration. The technique of deriving SOD from the model is subject to significant error and cannot be proven accurate since the models do not appear to have been validated or verified using an independent data set. The apparent lack of independently verified SOD values makes the entire DO modeling effort scientifically unacceptable.

During June 20 through July 3, 1995, SOD rates were measured at 10 sites in the Salt Creek watershed (see Appendix D). Two SOD measurements were made at each site. The mean value of the measured SOD rate for each site is listed in Table 5, pp. 56 of the USGS report Simulation of Salt Creek in Northeastern IL (Melching, 1996). These measurements were used directly in the modeling and were used as a guide for modeling the remaining portions of the watershed. Please see the Responsiveness Summary for the East Branch of the Dupage TMDL for a discussion of SOD data sources for that report. Additional SOD monitoring could be included as part of the strategy outlined in the response to comments #1 and #2.

73. The reports point to SOD as the most important oxygen depletion contributor, as noted in several places in the text and shown in Figure 5-6 of the Salt Creek TMDL Report and Figure 5-7 of the East Branch TMDL Report. The statement is made that, "overall the DO problem in Salt Creek and Addison Creek is attributed to SOD build-up near the combined sewer overflow (CSO) outfalls." This statement and the modeling results appear to conflict with another statement (page 6-1 of the Salt Creek report), namely "...point source contribution has the most significant impact on the in-stream DO concentration...." It is not clear whether the term "point source" is intended to include CSOs, but the context in the report suggests it is intended to mean the WWTP point sources. The modeling results (Figures 5-6 for Salt Creek and 5-7 for East Branch) show very little impact on DO from CBOD and ammonia, yet the implementation plans place the greatest burden of reduction (in terms of cost) on the WWTPs. This is unacceptable.

    Please see the response to comments #1 and #2.

74. Obviously, the true magnitude of the SOD impact is very important and should be measured, or the models should at least be validated with independent data, so there is more confidence in the derived values for SOD. The sources of SOD should also be reevaluated. After these steps are taken, more technically sound allocations can be made.

    Please see the response to comment # 72.

75. Based on the above discussion, we believe the only reasonable course of action is for IEPA to delay DO TMDLs statewide until all oxygen-depleting parameters can be evaluated and understood. Including all oxygen-depleting parameters will result in a more holistic approach to TMDLs and, potentially, more options for implementing such TMDLs. Where more options exist, there is greater potential to develop creative solutions that provide the greatest water quality benefit for the cost.

    Please see our responses to comments #1 and #2.

76. References: There are no references to previous modeling and water quality analyses performed during the NIPC 208 study. This is both perplexing and troubling. While conditions have obviously changed during the intervening years, the dynamic water quality modeling performed during 208, and subsequent follow-up applications on the DuPage River, are still the definitive applications of state-of-the-art, dynamic water quality modeling for Salt Creek and similar streams in this region.

    Thank you for your comment. The report Sediment Oxygen Demand Studies of Selected Northeastern Illinois Streams by Butts and Evans was reviewed for this TMDL and is listed in

the References section. However, the NIPC report, published in 1978, is over 25 years old and was not considered as pertinent as more recent data.

77. Sec. 3.6 - Point Sources: It is stated that the dissolved oxygen model was set up for just dry weather conditions. This would seem to be a major shortcoming. Our experience in the 208 assessment and modeling process indicated significant wet-weather dissolved oxygen depletion, including standard violations, during wet weather. DO depletion was caused by both nonpoint source runoff as well as combined sewer and sanitary sewer overflows, depending on watershed circumstances. There is a strong likelihood that such occurrences still continue at the present time, but apparently are not being represented in the Salt Creek TMDL model. Why?

    There have been many improvements in wet weather non-point source pollution prevention since the NIPC study was published in 1978. Wet weather conditions were not represented in the model due to a lack of readily available wet weather data. The Agency believes that 7Q10 dry weather conditions are the most critical for DO.

78. 5.2.6 - Salt Creek Hydrologic Validation: In this section, and preceding discussions of the HSPF hydrologic modeling and calibration, reference is made to the calibrations performed by Price for DuPage County. This is a very useful and important point of reference. However, no reference is made to previous 208 hydrologic and water quality modeling of Salt Creek. This seems like a serious oversight, particularly because the 208 modeling focused heavily on the accuracy of low-flow modeling, whereas the more recent modeling (Price) is focused principally on high flow (wet-weather) conditions. More specifically, it is noted that monthly point source flow data were used, resulting in an inability to represent daily discharge variations. This is a shortcoming in both model calibration and eventual simulation. As noted previously in this chapter (5.2.4), monthly treatment plant flows are much higher, on average, than daily low flows due to the effects of infiltration and inflow. In addition, it is know that even diurnal treatment plant discharge variations are very substantial and can effect both calibration and simulation results. Considering this, it is unclear why daily flow data were not obtained from treatment plant operators. Further, HSPF allows representation of diurnal variability in point source flows, based on actual observations. It is our recollection that both types of flow variability were incorporated into the previous 208 modeling work, and we suggest, should have been incorporated into the TMDL study.

    The NIPC 208 modeling study was published in 1978 and is not considered pertinent to this TMDL. Daily flow data are not reported to IEPA. Thus, available data were used to examine the flow balance. The Price report indicated that infiltration and inflow to the sanitary sewer system occurs during storms. To avoid double-counting flow during storm events, the average point source discharge during low flow was assumed to come from point sources during storm events as well. The additional water generated during storm events was included as nonpoint source flow. Using this methodology resulted in predicted flows being within 5 percent of observed flow at the gages. This is an excellent hydrologic calibration. For modeling chlorides, it is unnecessary to model diurnal variability since instream chloride concentration is not impacted by time of day.

79. 5.2.7 - Chloride Calibration: The report concludes that the model is adequately calibrated for chloride concentrations. However, the highest concentrations reported in grab samples are not even closely approached in the simulation, suggesting a possible problem. This may be explained by the complexity of representing road salt application. While the model apparently assumes a regular,

predictable buildup/washoff function, in reality salt is applied on a very irregular, concentrated basis in response to snow and ice events. Therefore, it is probably no surprise that the rather basic model representation may be under-simulating extreme salt concentrations occurring during melt/runoff events. Similarly, the model would normally represent snow melt based on natural phenomena – i.e., temperature and solar radiation. However, salt-induced snow melt during sub-freezing conditions may be causing some of the most concentrated chloride conditions instream – i.e., very concentrated runoff occurring during very low dilution conditions. Are these latter salt-induced conditions represented in any way in the model?

These are all relevant concerns, but the model was not designed to describe extreme conditions. However, these issues can be investigated through a monitoring program to be established by a watershed committee as suggested in the response to comments #1 and #2. In the meantime, the Agency will continue to recommend road salt management programs, MS4 improvements and other BMPs as detailed in the implementation plan and consistent with the adaptive management approach recommended in the TMDL.

80. 5.3 - Modeling Dissolved Oxygen Using QUAL2E: Several comments are noted for this section. First, while it is noted that HSPF can represent DO over a wider range of dynamic conditions than the narrow nearly steady state range represented by QUAL2E, there is little discussion as to why HSPF is not used instead. This decision eliminates the ability to represent potential wet-weather DO problems and also limits the ability to represent variable DO conditions during lower flow periods intervening between wet-weather. It also eliminates the related representation of the complex conditions of variable algal concentrations that respond to variability in flow, temperature, and cloud cover and, in turn, affect DO concentrations.

    A large amount of data are needed to use HSPF. In general, whenever HSPF has been used, a significant number of parameters must be assumed or estimated. For QUAL2E, relatively less information is required and as a result, assumptions are made on a relatively smaller number of parameters.

81. It is noted that model representations of Salt Creek and Spring Brook began, respectively, downstream of Busse Lake and Lake Kadijah. This seems problematic from the perspective of a complete and adequate dissolved oxygen representation, particularly the diurnal effects caused by algal concentrations which tend to be much more prominent (and potentially problematic) in impounded reaches. Why were the lakes and upstream reaches not represented?

    The Busse Wood Lake analysis was done separately from the stream reaches of Salt Creek. It was determined that there were not significant loadings upstream of Lake Kadijah so it was not incorporated into the analysis. Therefore, Lake Kadijah was used as the headwater for the analysis of DO in Spring Brook. The upper 5.8 miles of Spring Brook were not considered.

82. It is noted in the report that sediment oxygen demand (SOD) is "found through model calibration." This approach seems problematic, particularly considering that SOD is measurable and measured rates would provide a much more reliable point of reference versus backing into assumed levels through model calibration. During the previously mentioned 208 modeling project, an extensive SOD monitoring study was done by the Illinois State Water Survey (along with the Metropolitan Water Reclamation District). At a minimum, those measured concentrations should be used as a point of reference in establishing SOD rates in the TMDL study. While the ISWS SOD report is listed as a

reference, there is no indication how that information may have been used in the TMDL analysis. Having sound, measured SOD numbers provides much more reliability in calibrating realistic oxidation and nitrification rates, and greatly reduces the possibility of a false conclusion in determining the relative sources of oxygen demand, such as represented in figure 5-6.

The SOD data are discussed in the response to comment #72. The NIPC 208 study was referenced, but the data were not used because the report is over 25 years old.

83. 5.3.1 - Diurnal Variation of DO Due to Algae and Photosynthesis: The report notes that QUAL2E cannot represent time-varying flow and pollutant loads. It notes several other shortcomings, including the sample period used for diurnal calibration (e.g., significant flow variability during the period, inability to represent attached algae). It ends up concluding that the model is not capable of simulating the full extent of the diurnal variation of DO. As previously pointed out, it is puzzling why HSPF was not used instead. In particular, HSPF does not have the limitations of QUAL2E in representing diurnal and flow-varied changes in DO and algal concentrations, can also represent attached algae, and was successfully applied to Salt Creek and a range of other stream and river conditions during the 208 process. A consequence of limitations of the selected model may be mis-representation of critical factors, such as phosphorus and other nutrients, that contribute to observed DO problems.

    Please refer to the response to comment #80 concerning why HSPF was not used to model diurnal variation.

84. It is reported that a future-conditions model run with increased point source loadings shows improved DO conditions in the creek. This model result, and its explanation – "flow augmentation" – seem counterintuitive and inconsistent with previous modeling results (e.g., NIPC and others). It also raises further questions regarding the previously mentioned relationships between SOD, instream BOD and ammonia, and diurnal algal effects, and the adequacy of their representation in a model that is admittedly constrained in its ability to represent complex instream phenomena.

    The improved DO concentration with increased flow was a very small increase and it did not make a difference in the load allocations.

85. 6.4 - Dissolved Oxygen: This section notes that chlorophyll a concentrations in Salt Creek "did not show any obvious eutrophication problem." It is therefore concluded that the steady-state QUAL2E model was appropriate for developing the DO TMDL. This seems to directly contradict both the observed significant diurnal variations in DO (figure 4.14) and the simulated diurnal variability (figure 5.8), albeit with a model that admittedly has limited ability to represent actual diurnal variations. As a result, any results coming out of such steady state modeling that does not represent algal-induced diurnal variations is suspect, at best, and likely to substantially underestimate the actual degree of dissolved oxygen violations in the creek. It also leads directly to a likely erroneous conclusion that there is no need to evaluate factors (i.e., phosphorus) that contribute to algal growth.

    There is diurnal variation and higher chlorophyll a concentrations in Salt Creek. However, according to IEPA staff, the chlorophyll a concentrations in Salt Creek are lower than in streams impaired for DO in the state. The steady-state application of QUAL2E was appropriate to use for this application not only based on this statement by IEPA, but also by the modeling results shown in Figure 5-6. This figure shows that modeling algae has a small

positive impact on predicted DO under steady-state conditions, but the overall impact of algae on the system is very small when compared to other parameters. Since QUAL2E cannot model the impact of macrophytes and attached algae, it was determined that for this adaptive management TMDL, the steady-state model without simulation of algae was appropriate to use. Monitoring will continue in Salt Creek to determine if management strategies implemented as part of this TMDL are working. Also, see responses to comments # 1 and # 2.

86. As the connection between nutrient levels, algae and demand on dissolved oxygen was not considered, we have to also question model results that suggest that increases in point source discharges improve instream DO levels due to augmented flow. This assumption led to the impacts of future increases in wastewater discharge to the creek being ignored in the modeling. (Salt Creek TMDL, Sec. 6.2)

    Please see the response to comment #84.

87. Section 3.5. HSPF is a dynamic simulation model that has been calibrated using the data from USGS gauging stations on Salt Creek. Did the calibration take into account the changing land uses over the calibration period? In Section 5.2.6 the validation data seems to have a low r2 for daily and monthly data. For hydrologic simulations these low r2 may be acceptable. However, for water quality modeling that is concerned with diurnal fluctuations these long-term calibrations may not be adequate. I believe it would be of benefit to have a calibration plot included in the report.

    The calibration accounts for the landuse presented in Figure 3-2. Hydraulic plots are presented in the appendices. Diurnal variation is not important when examining chlorides since time of day does not influence chloride concentration.

88. Section 3.8. I am assuming the HSPF non-point source (NPS) model was used in the simulations in conjunction with QUAL2E. What were the areal loadings assumed for constituents such as BOD5, and NO3-N? Were these validated by sampling runoff, e.g. storm flows prior to entering the main body of the stream?

    The HSPF model was used for the chloride TMDL only. It was not used in conjunction with QUAL2E. The areal loadings were determined through the traditional inputs to QUAL2E.

89. Section 6.2. Future growth has been addressed. An average of 18% population growth was assumed and the waste loadings increased in proportion. I could not glean from this discussion if these projections were obtained for the individual communities within the watershed or were County wide numbers. Communities like Villa Park and Addison have very static populations because the communities are virtually "land-locked". Could the Agency please expound on the discussion of population growth.

    The projections were taken from the Northeastern Illinois Planning Commission report <u>Toward 2020:Population, Household and Employment Forecasts for Counties and Municipalities in Northeastern Illinois</u>. The report is available at NIPC's website at: http://www.nipc.cog.il.us/revised_2020_table.htm

90. I understand that the 7Q10 in stream flow was used. However, the point sources were modeled at their design average permit flows and loadings implicitly providing a MOS. When there are low flows in the stream because of dry weather conditions, there are often low flows at wastewater treatment plants. Perhaps an effort should be made to identify the time period for the 7Q10 data and then to solicit from the point source discharges their actual discharge loadings for this same period of time.

NPDES permits are based on the design average flow (DAF) from the plant under 7Q10 stream flow conditions. For this reason, the point sources were modeled at design average permit flow.

91. The Design Average Flows (DAF) and the Illinois State Water Survey 7Q10 flows for the point sources are listed below:

Treatment Plant	Permit ID	DAF (MGD)	7Q10 (MGD)
MWRD Egan STP	IL0036340	30.0	26.44
Itasca STP Salt Creek	IL0026280	2.60	1.29
Wood Dale North STP	IL0020061	1.97	1.10
Wood Dale South STP	IL0034274	1.13	0.29
Addison North STP	IL0033812	5.30	1.68
Addison South STP	IL0027367	3.20	2.13
Salt Creek SD STP	IL0030953	3.30	1.29
Elmhurst STP	IL0028746	8.00	4.20
Bensenville South STP	IL0021849	4.70	3.03
TOTALS	-	60.20	41.45

As evidenced by the Table above the 7Q10 is 68.8% of the DAF. Therefore, the MOS as modeled in the allocation scenarios is at least 31.2%. The MOS is much greater than 31.2% considering that the treatment plants are operating below the maximum month permit limits for BOD, Ammonia, TSS, etc. In fact, the vast majority of treatment plants discharge substantially less than their permitted limits. Therefore, the actual waste load to the creek is substantially less than the modeled load. Can a Table be added to the report that states what the modeled waste loads are for each of the point source dischargers under the various allocation scenarios?

The Agency does not believe another table is necessary. Please refer to the response to comments #1 and #2.

92. If the actual data are obtained from the point source dischargers and the model is executed, I believe the Agency's contractor will find that there is a more substantial DO sink (Section 5.3.2) as a result of non-point source sediment deposits resulting from wet weather conditions and these yield a more substantial oxygen demand.

In addition to the steps of the phased approach detailed in the responses to comments #1 and #2, we will continue to rely on Phase II storm water permits and CSO control strategies to reduce volatile suspended solid (VSS) input to the streams to reduce/eliminate SOD. Also, when nutrients standards are adopted, we will employ them in the model to develop a strategy for concurrent compliance with DO and nutrient water quality standards.

93. Clarify what WWTP discharges were used in the water quality modeling scenario runs and, especially, in the allocation run of the QUAL2E model: The discussion in Section 6.4.1 of the Draft TMDL Report implies that the allocation run combined the 7Q10 stream condition with the WWTP design discharges. If this implication truly reflects what was done, we object to the patently incongruous nature of the approach. The Draft TMDL Report states (on p. 6-9) that flow in Salt Creek under the 7Q10 condition consists primarily of point source discharge. How can the 7Q10 stream condition be reconciled with the WWTP discharges at "design flow" when the former consists primarily of the latter? The Village will object to any margin of safety (MOS) that employs impossible conditions, as well as to any NPDES limit reductions derived using such a MOS.

The following WWTP discharges were included in the QUAL2E model: MWRDGC Egan, Dupage County-Nordic Park, Itasca, Wood Dale North, Wood Dale South, Addison North, Addison South, Salt Creek Sanitary District, Elmhurst, and Bensenville. For the HSPF model, these facilities plus Accurate Cast Products, Blackhawk Molding, Congress DEV Hillside Landfill, Prairie Material Sales, Union Pacific, Vulcan Materials, and Wall's MHP were included in the analysis. In the QUAL2E model application, the 7Q10 flow was used for the instream flow. It is common practice to model the impact of point source dischargers on instream DO under 7Q10 conditions; this practice is supported by EPA in its *Technical Guidance Manual for Developing Total Maximum Daily Loads - Book 2: Streams and Rivers, Part 1: Biochemical Oxygen Demand/Dissolved Oxygen and Nutrients/Eutrophication*.

The TMDL report states that the design flows of the point sources were also used in the model, and the TMDL summary in Table 6-3 is based on design flow. Again, it is common practice to include point sources at their design flows in BOD/DO model applications, and this approach is supported by EPA. Using design flows allows WWTPs to use the entire capacity of their plant. However, when the modeling input files were re-examined, it was noted that the model was actually set up using current average point source flows which would result in a smaller WLA since the load is calculated based on flow and concentration. To ensure that the WLA provided in Table 6-3 will protect water quality, the model was rerun for both Scenario 5 and Scenario 6. For scenario 5, the DO standard is protected at design average flow; for scenario 6, the DO standard was not protected at design average flow. For scenario 6, point source flows reflecting an 18 percent increase above current flows protect the DO standard. Alternatively, the TMDL can be calculated based on design flows and BOD/NH3-N limits of 8/1 for all discharges except Bensonville which must achieve 10/1 in order to protect Addison Creek. Tables 6-2 and 6-3 of the TMDL report were updated to reflect this allocation.

Load Reductions

94. We support the reductions in chloride loading prescribed for the East Branch (21%), West Branch (35%), Salt Creek (8 %) and Addison Creek (41 %) in the three TMDLs and WIPs. We recommend that outreach to local citizens be employed as one of the means to foster changes in road salt best management practices in the DuPage River watershed. The Northeastern Illinois Planning Commission brochure Pavement Deicing-Minimizing the Environmental Impacts offers a good overview of the impacts of road salt and alternative deicing management methods.

Thank you for your comment. We encourage citizens in affected communities to take an active part in establishing a watershed committee and moving forward with pollution control

strategies suggested in the implementation plan. The Agency will be glad to partner with these communities in implementation of management strategies.

95. Please clarify the relationship between the volatile suspended solids (VSS) load and sediment oxygen demand. The TMDL scenarios proposed both require reduction of SOD below CSO outfalls to be reduced to that found elsewhere along the creek. This is expressed in the TMDL as 52% reduction in the VSS load. Please describe the rationale behind the assumption that VSS is the only component contributing to SOD below CSO outfalls. Because these are not settleable solids, and therefore would not be expected to settle to the stream substrate quickly, the relationship is particularly unclear.

    Please refer to the response to comment # 96.

96. Point sources contribute to sediment oxygen demand, and therefore some portion of the VSS load or other contributing pollutant to SOD should be identified and regulated as a WLA. As pointed out elsewhere in the TMDL report and implementation plan, many of the stormwater discharges are considered point sources that are regulated under the NPDES programs. Therefore, Table 6-3 should be revised to clarify which portion of the TMDL for VSS is the WLA and which portion is the LA.

    The report states on pg. 6-14 that according to the QUAL2E model and the observed data the VSS concentration in point source effluents was very small. Generally, untreated waste from CSOs and runoff from various land uses contain significantly higher VSS concentrations. Considering these issues, it appears reasonable to target VSS transport and deposition from nonpoint sources. Therefore, the TMDL allocation for VSS was based on 100 percent nonpoint source contribution or load allocation. Stormwater discharges are covered under recent stormwater regulations; however, numerical permit limits have not been assigned. Consequently, assigning a percentage of the VSS reduction to the WLA would not necessarily hasten actual load reduction. The Agency will work toward meeting the 52% reduction goal regardless of whether it is included in the WLA or the LA.

97. 6.4.2 - DO LA and WLA: It is stated that nonpoint contributions of CBOD and ammonia do not require any control because DO standards are not violated during high flow. As noted previously in these comments, the basis of this conclusion does not appear to be valid. First, while the limited wet-weather monitoring data available for Salt Creek probably is not adequate to make a firm conclusion, regional observations would certainly suggest the likelihood of wet-weather DO problems. Secondly, the chosen modeling approach in this study does not have the capacity to represent wet-weather DO conditions.

    Please refer to the responses to comments #77, 79, 80.

98. The IAWA strongly opposes potential chloride, total dissolved solids (TDS), or conductivity effluent limits in the WWTP National Pollutant Discharge Elimination System (NPDES) permits because the chloride and TDS excursions are clearly associated with winter/spring road salt runoff. In many cases, the TMDLs are based on very few exceedances of water quality standards (WQS) for chloride and TDS (conductivity). Some segments are not listed for chloride/TDS/salinity at all, yet the TMDL reports are written as if the entire waterbody is impaired.

    Please see the response to comment #31.

99. We attempted to check the chloride WLAs in each of the TMDL reports. In each case it appears the WLAs are much lower than what would be expected by the discussion in the text. For example, for Salt Creek if a chloride concentration of 500 mg/L is used along with 50 mgd of WWTP flow (the approximate sum of the design average flows [DAF] discharged to Salt Creek based on the limited information in the Salt Creek TMDL Report and Implementation Plan), the WLA would be 50 mgd × 500 mg/L × 500 mg/L × 8.34 × 365 days/year = 76.1 × 10^6 lb/year. This is ten times higher than the WLA presented in the report (8.34 × 10^6 lbs/year).

The chloride TMDL was calculated based on a total point source flow of 42.3 cfs in Salt Creek and a point source flow of 6.1 cfs in Addison Creek as described in Section 5.2.4 of the TMDL. The point sources were input at a concentration of 100 mg/l. Using this lower point source flow along with this low concentration results in an unrealistic WLA as presented in Table 6-1. Additional modeling runs were completed that set a reasonable reduction for nonpoint sources; modeling runs with point sources set at design flows and varying concentrations were then completed to determine the impact on instream chloride concentrations. Based on these additional modeling runs, an alternative TMDL based on a point source concentration of 300 mg/l and design flows was developed. The language in the report was modified to reflect the final TMDL.

100. In deriving the Chloride WLAs, different WWTP effluent concentrations were used for each stream. In the Salt Creek TMDL, the report states that the WQS (500 mg/L) at average point source discharge was used. In the East Branch TMDL, the report states that both the WQS and the observed chloride discharge concentrations were analyzed and the observed concentrations at average flows were selected. In the West Branch TMDL, the TMDL report states that average/design flow and a concentration of 300 mg/L were used. It would seem that consistent point source concentrations and procedures should be used in all three watersheds.

Derivation of the waste load allocation (WLA) is dependent on many factors that differ from stream to stream. These factors include: point source loads of chloride, chloride concentrations in-stream, the 7Q10 low flow conditions of that stream, percentage of impervious surfaces in the watershed and municipal road de-icing practices. Because of the complexity of the relationships among different variables that define concentrations and flow, an iterative approach was necessary to determine the final allocation scenario. The HSPF model was set up to output total load and daily average concentrations of chloride. The model was run iteratively reducing the overall winter season chloride load from salt application until daily average concentrations met the WQS at all times. Please refer to Section 6.3 of each TMDL for a detailed explanation of the process and the resultant load allocation numbers.

101. We are concerned that chloride WLAs may be construed as subsequently requiring point source effluent limitations. However, the IEPA has verbally stated that they do not intend to include WWTP effluent limits because the excursions are clearly related to road salt runoff. Therefore, the IEPA should either remove the WLAs from the reports or make a written statement in the reports that WWTP NPDES permits will not be affected. It is also not clear from the TMDL reports how or whether IEPA will implement chloride conditions in municipal separate storm sewer system (MS4) and/or General Industrial Stormwater Permits. We believe the IEPA does not intend any special conditions related to chloride in the MS4 permits. The reports should clarify this.

Please see our response to comment #31. The Agency does not have plans to implement WWTP effluent limits for chloride at this time. It was determined through data analysis and modeling that point source dischargers did not contribute enough chloride to cause exceedance of water quality standards. However, a waste load allocation (WLA) is required as part of a TMDL. While, the chloride impairment has been attributed to non-point sources, there is a point source component in the TMDL equation that must be accounted for.

102. The methods used in the TMDLs to arrive at load and wasteload allocations, particularly for the DO impairment, do not take full advantage of current guidance on this topic. The USEPA's Technical Support Document for Water Quality-based Toxics Control (USEPA, 1991) lists 19 possible allocation scenarios but also states the list is not all-inclusive, and "any reasonable allocation scheme that meets the antidegradation provisions and other requirements of State water quality standards" can be used. The Federal Advisory Committee came to a similar conclusion in 1998 (NACEPT, 1998) and went on to identify four considerations in making allocation decisions: technical and programmatic feasibility, cost-effectiveness, relative source contributions, the degree of certainty (i.e., reasonable assurance WQS will be met).

The USEPA has various other documents that provide guidance on allocation methods and stress the importance of economic considerations and stakeholder involvement in the development of allocations (USEPA 1999a, b, and c and 2001). In addition, the USEPA has guidance available on its Internet site including a spreadsheet-based model framework entitled "Framework for Identifying Optimal Allocations." This framework compares the relative costs and feasibility of three different allocation scenarios including equal percent reduction, equal loads, and minimum total abatement cost.

Despite these recently developed guidance documents and tools, it appears that IEPA has focused primarily on the "degree of certainty" consideration from the older guidance documents and also on the technical and programmatic feasibility criteria in deriving the load and WLAs contained in the reports. Relative source contributions and cost-effectiveness were not seriously considered, particularly for the East Branch. This is evidenced by the fact that SOD is shown to be the most important factor in oxygen depletion whereas the most significant costs appear to be associated with CBOD and ammonia control. We recognize that an attempt was made to look at alternatives to point source controls (e.g., aerating an impoundment on the East Branch and removing a dam on Salt Creek). However, there does not appear to be any systematic or logical approach to developing and evaluating these scenarios. For example, why wasn't a dam removal scenario modeled on the East Branch? We believe IEPA should reassess its methods for allocating loads and wasteloads, placing more emphasis on cost-effectiveness and stakeholder involvement. This should be done for the draft TMDLs discussed herein as well as new TMDLs.

Various pollutant reduction scenarios were analyzed to understand the importance of SOD and the point source loads and to determine the pollutant load reduction necessary to achieve an average DO concentration in excess of 6 mg/L. A total of 6 different scenarios are listed in Table 6-2 of the report. The TMDL was not designed to be a cost analysis of pollution reduction strategies in the watershed. Cost analysis, done with stakeholder involvement, will be an important aspect of future actions in the watershed and of Agency policy going forward. However, at this time the Agency must concentrate on determining the causes of impairment and implementation considerations. Dam removal was not initially considered on the East Branch of the DuPage River due to different river hydrology and substantially less available data. We have since re-run the dam removal scenario for the East Branch, using design

average flow for WWTPs. Results indicate that removal of the dam would result in achievement of the DO WQS.

103. There are a number of IAWA member agencies that discharge to the East Branch and Salt Creek. These areas are undergoing growth, and that growth means the member agencies, as well as other similar situated communities, will have increased utilization of their existing WWTPs. In many instances, they will have to undergo substantial WWTP expansion in the future.

The Agency acknowledges that recommendations in the report may result in considerable financial commitments for WWTPs. It is not the intent of the Agency for WWTPs to be the sole recipients of the cost burden associated with TMDL implementation. We have outlined in our responses to comments #1 and #2 how we plan to address the water quality impairment issues in the Salt Creek watershed. We feel our strategy is supportive of sound science and is the most cost effective path to an agreeable solution for all parties involved. However, it must be accepted that along with increased population and economic growth come inevitable environmental consequences. The pressure of urbanization on natural resources will likely increase as economic growth continues. Plant upgrades will eventually be necessary to meet <u>present</u> permit limits.

104. In the Salt Creek and East Branch draft TMDLs, the DO model was used to simulate future population growth. WWTP effluent concentrations were held constant while flow rates from the WWTPs were increased. Model results indicated the simulation of future higher discharge rates resulted in a small increase in DO in the streams even though the CBOD and ammonia mass load increased. If the proposed mass loading limits are based on the concentrations as described in the Implementation Plan, then future plant expansions will require a decrease in effluent concentration limits in direct proportion to the increase in plant capacity. This conflicts with the results from the future growth simulations. The modeling demonstrates that a decrease in CBOD and ammonia concentrations will not be needed in the future.

In effluent dominated streams, QUAL2E often predicts higher dissolved oxygen when WWTPs achieve high levels of treatment due to increased velocity. This is true in Salt Creek. For modeling scenario 5, the point sources can increase their permitted load as long as they meet 5 mg/l CBOD. The TMDL will be revised to state that it can be concentration-based. For modeling scenario 6, a cap for CBOD and NH3-N is needed to protect water quality. In this scenario, higher point source flows result in decreased concentrations of predicted DO. Also, see responses to comments # 1 and # 2.

105. A TMDL is the maximum mass the particular waterbody can accept or assimilate and still meet water quality standards. It is normally expected that this mass will not increase over time because the assimilative capacity of the waterbody often does not change. However, in the case of the East Branch and Salt Creek, the assimilative capacity of the rivers will increase as WWTP flows increase, as indicated by the modeling results. Because of this, it is not appropriate to set a mass "cap" for CBOD and ammonia, and the CBOD and ammonia WLAs as presented are not valid.

There is no general evidence showing that the assimilative capacity of the stream will change with increased flow. The statement in the TMDL that increased flows improved the DO regime were based on our initial modeling, and the DO increases shown in those model runs indicate

very low level changes. However, it may be subject to revision after additional model runs. Also, please see our responses to comments #1 and #2.

106. Since the draft reports indicate that in-stream DO increases with WWTP flow, we suggest the IEPA determine another method of expressing the TMDL DO-related allocations that makes more scientific sense for this unique situation. Possible ways include expressing the CBOD and ammonia WLAs in terms of concentration only or allowing the mass-based WLA to increase with flow.

Please see the response to comment #105. Also, please see the responses to comments #1 and #2, which outline a phased-in adaptive management approach to bring Salt Creek into compliance with the applicable DO Water Quality Standards.

107. The technical feasibility of meeting the CBOD and ammonia discharge limits and sustaining them for long periods of time is questionable. It is technically feasible to meet the monthly average concentration limits proposed in the draft TMDL during dry weather, but it may not be feasible to meet weekly limits or mass limits that may be proposed by the IEPA.

Please see the responses to comments #1 and #2. If in the event changes in permit limits are required, the 8 mg/L and 1 mg/L limits for $CBOD_5$ and ammonia nitrogen, respectively, will only apply during the critical period that will be determined at the time of permit renewal, based on historic flows. This period will most likely be the critical summer low flow (7Q10). There would be two load limits: one on DAF and one on Design Maximum Flow (DMF). Mass and concentration of daily and monthly maximum would change.

108. Related to the above, consideration should be given to the levels at which point sources discharge in relation to their permit limits. Typical point source dischargers make a practice of targeting a pollutant discharge concentration level significantly lower than the NPDES permit limit. This practice is necessary to remain in compliance when the inherently variable testing and operational parameters at a WWTP range beyond the norm and so that future discharge levels will remain consistently below permit limits. As a result, the imposition of permit limits at one level will result in lower discharge levels most, if not all, of the time. The data from the TMDL report appears to show this to be the case. There can be a reasonable expectation that there will be times when discharge concentrations at a particular discharge are near or at the permit level. We believe that evaluation of the data will demonstrate this variability and show how frequently pollutant levels range near permit limits.

Thank you for your comment. The Agency will take this point into account in its phased-in adaptive management approach to bring Salt Creek in compliance with DO water quality standards as we evaluate the load allocation scenarios presented in the report. Also, see responses to comments #1 and #2.

109. We encourage consideration of this variability when considering the impact on stream quality from several point sources. The variability of discharge from each point source is predictable based on historic performance. Similarly, the variability of the overall load from a number of point source discharges can be characterized as well. Analysis of the data will show that the likelihood that all permitees are discharging at their permit limits at the same time is statistically remote. This is consistent with the actual conditions in the stream, as evidenced by the historical stream DO data shown in the TMDL. This is a valid consideration to take when setting limits to protect water quality

and could support keeping permit limits at 10 mg/L, for example, and still meeting water quality goals.

Please see the responses to comments #1 and #2. This issue will be addressed in the proposed phased-in adaptive management approach to bring Salt Creek in compliance with DO water quality standards.

110. MWRDGC - A strong correlation was found between conductivity (proportional to TDS concentrations) and chloride. Although Salt Creek segments are not listed for chloride impairment, a chloride TMDL was felt to be necessary to meet the TDS/Conductivity standard. An investigation of seasonal patterns and correlation between chloride and conductivity showed that high TDS/conductivity is caused by road salt application in the winter months, which contributes chloride loads to the water bodies. Although the report implied that chloride TMDLs will not be incorporated into POTW's NPDES permits and although it appears that the TDS/conductivity/chloride TMDL will have no impact on the operation of the Egan WRP, the District would like to state for the record that it objects to the inclusion of chloride limits in NPDES permits for POTWs.

Please refer to the responses to comments #31 and #101.

111. The report listed two methodologies to resolve the low DO conditions: 1) Reduction of CBOD5 and Ammonia N NPDES permit limits to 5.0 mg/L and 1.0 mg/L, respectively, and 2) removal of the dam at river mile 11.6. However, the District objects to the fact that other oxygen-depleting substances such as SOD and nutrients/algae were not taken into consideration in the TMDL. Although it is understood that the IEPA will not prepare any nutrient TMDLs for rivers and streams until nutrient water quality standards are developed, a DO TMDL that does not take into account these major oxygen-depleting substances is not valid. The report states that SOD is perhaps the most important contributor to DO depletion in Salt Creek; however, the report targets CBOD and ammonia reduction from point sources as one mode of resolution. Lowering CBOD and ammonia limits in NPDES permits may appear to be a tough enforcement stance, but in reality will do little to improve DO conditions in the waterway.

Please see the responses to comments #1 and #2.

112. The Salt Creek TMDL did not take into account the increased DO that will be available to the stream as flows from the various POTWs in the stream increase. The TMDL predicts increases in flows from each of the POTW's over the next ten years. That increased flow should incorporate more DO which would assimilate greater quantities of CBOD. The model that CH2M Hill used did not take into account that added DO and the greater assimilation of CBOD. For that reason the city believes that the TMDL may not accurately predict the assimilation rate that the stream is capable of at those higher flows. The TMDL should be modified to include that information.

Please see response to comment # 105.

113. Elmhurst has some significant concerns regarding the implementation of the 5mg/L CBOD and 1mg/L ammonia effluent limits. The TMDL data indicate that all of POTWs are meeting those criteria in more than 95% of the time. If the Agency were to leave the limits as they are today without change, the Agency would be assured that the POTW's would be meeting the lower limits in 95% of the time. Therefore, the city sees no reason why the limits should be changed in the first

place. It is highly unreasonable to expect that multiple wastewater treatment plants would be exceeding the 5mg/L-1mg/L concentrations simultaneously. It's likely that if a plant exceeds that limit it would be the only plant in the basin at the moment that is exceeding the 5mg/L-1mg/L concentration. So in the end the agency would be requiring all the POTWs to implement more strict standards and cost implements up to $18 million with no benefits to the stream at all.

A conservative modeling approach was taken to adjust for a level of uncertainty that accompanies any model. Although POTWs may be presently meeting standards 95% of the time, 5% of the time they are not. Illinois Pollution Control Board regulations require that water quality standards for DO are met 100% of the time. For this reason, the TMDL was completed using a "worst case" scenario. This is part of the implicit Margin of Safety that accounts for uncertainty in the TMDL.

114. Though the Elmhurst WWTP currently meets the 5mg/L-1mg/L concentrations the mass loadings are not clearly identified for future permits. The mass limits, if imposed on daily average flows, can offer severe restrictions for future growth for the Elmhurst plant, furthermore, the agency has not indicated if the new mass limits would be daily maximums or if they would be monthly averages. The city would like to have those values identified before the TMDL is submitted.

Proposed permit limits would be in effect during the critical time period. The period modeled indicates low flow summer conditions are the critical period. That time period would be determined at the time of permit renewal or when permit limits are modified. There will be both mass and concentration limits as there are under current NPDES permits. The mass limits would be for both Design Average Flow (DAF) and Design Maximum Flow (DMF). The concentration limits would be based on DAF. Determination of specifics of the limits would also be made at the time of permit renewal. Also, please see the response to comment #107.

115. During the telephone conference on Salt Creek a question arose concerning anti-backsliding and limits on CBOD and ammonia. The IEPA representative commented that anti-backsliding would not necessarily lock the city or other POTWs on Salt Creek to those new limits. In other words, there may be flexibility after the Phase II Storm improvements as well as other improvements on Salt Creek were achieved. The city would like clarification on this comment as well as assurances that the Agency, if it imposes a 5mg/L CBOD-1mg/L ammonia limit, would be open to future relief from those limits as the stream improves.

Antibacksliding regulations could become an issue in the future after nutrient standards are adopted. If a WWTP can prove that increasing a permit limit would not negatively impact water quality, backsliding could be considered. As expressed in response #2, we do not anticipate the imposition of lower effluent limits (if required at all) until after nutrient water quality standards are adopted.

116. <u>Bensenville -</u> The Village strongly objects to the potential addition of any TDS, conductivity, or chloride limits to its WWTP NPDES permit: We concur with the direction taken in the Draft Implementation Plan to target the use of BMPs related to winter road deicing operations as the method for lowering the potential for violations of the water quality standard (WQS) for TDS. Due to the seasonal patterns in the instream conductivity observations, that direction seems appropriate. Nonetheless, the Village does wish to submit its objection to the potential addition of any effluent limits related to the chloride TMDL to the NPDES permit of its WWTP.

Thank you for your comment. Please see the responses to comments #31 and #101.

117. Clarify the applicable averaging periods for any stricter limits for CBOD and ammonia: The Draft TMDL Report and the Draft Implementation Plan are both silent on other than monthly averaging periods for TMDL-derived CBOD and ammonia limits. Yet the determination of the critical averaging period for compliance with WQS should have been (and probably was) undertaken in the Draft TMDL Report during the selection of the QUAL2E model, its input data, and in the formulation of the water quality scenarios for the model. We request that the reports be clarified with respect to potential WWTP effluent limits based on shorter than monthly averaging periods, such as weekly average limits and daily maximum limits. Further, should any such shorter averaging periods be found to apply, we request that the manner of determination of the appropriate numeric limits be clearly described and justified.

Please see response to comment #114

118. Clarify the potential inclusion of stricter mass limits for CBOD and ammonia in the NPDES permits: Although the Draft Implementation Plan mentions the "overall WLA mass restriction" for the DO TMDL (on p. 13), the Draft TMDL Report does not actually justify stricter mass limits in the NPDES permits. In fact, the Draft TMDL Report provides evidence that an increase in the WWTP discharges will result in an augmented stream discharge, which in turn will result in an increase in the amount of DO contributed by reaeration (the most significant DO source) and in a reduction of the amount of DO consumed by the sediment oxygen demand (SOD, the most significant DO sink). Other things being equal, including the CBOD and ammonia concentrations in the WWTP effluents, an increase in the WWTP discharges will tend to increase the instream DO. Because restricting the mass limits in the WWTP NPDES permits would run contrary to the findings in the Draft TMDL Report and because a large margin of safety is already implicit in the proposed concentration limits, we request that no stricter mass limits for CBOD and ammonia nitrogen be included in the WWTP NPDES permits. Should the mass limits be deemed justified, we request that the manner of determination of such mass limits for all applicable averaging periods be clearly defined.

Please refer to the responses to comments #104 and #105.

119. Clearly address the future expansion of WWTPs: The Draft TMDL Report recommends that for the Bensenville WWTP, the ammonia nitrogen effluent limit be reduced to 1.0 mg/l. The Village's 4.7 mgd treatment plant that is currently permitted to discharge 1.5 mg/l ammonia nitrogen (59 lbs of ammonia nitrogen/day) would have that limit reduced to 1.0 mg/l ammonia nitrogen (39 lbs of ammonia nitrogen/day). The Draft Implementation Plan implies that when a treatment plant expands, the mass load limits should remain fixed. In our example, say the treatment plant is expanded from 4.7 mgd to 6.0 mgd. The Draft Implementation Plan would have the load limit unchanged at 39 lbs of ammonia nitrogen/day, which equates to the concentration limit of 0.78 mg/l ammonia nitrogen.

However, this outcome is in direct conflict with the finding of the Draft TMDL Report that increased WWTP discharges benefit the instream DO as a consequence of streamflow augmentation. Section 6.2 of the Draft TMDL Report indicates that the projected growth in WWTP discharges will allow the instream DO to reach a target of 6.30 mg/l (instead of the 6.09 mg/l in the allocation run) under the critical condition. In effect, this target further expands the implicit margin of safety (MOS). We suspect that the MOS is overly conservative even when the DO target is set to 6.0 mg/l (as discussed in Section 6.4.1 of the Draft TMDL Report), and fail to see the need to compound the MOS with ever more layers of conservative assumptions.

Please refer to the responses to comments #104 and #105. The Agency believes the MOS used in the report is appropriate and serves as an additional protective measure in bringing Salt Creek into compliance with DO water quality standards.

120. Based on the information in the Draft TMDL Report, neither the concentration limits nor the mass load limits should have to remain fixed when the WWTP discharges increase. As WWTPs expand, it should be possible to increase the mass load limits and, to some extent, even the concentration limits without deleterious effects, because of the net beneficial effects of increased discharges at the same effluent concentrations of CBOD and ammonia. Consequently, the 1.0 mg/l ammonia nitrogen limit in the above example would not only not have to be further reduced upon plant expansion from 4.7 mgd to 6.0 mgd, but it would even become more protective at the unchanged value as a result of the expansion.

The TMDL has determined the maximum load that can enter Salt Creek, and which can still allow Salt Creek to be in compliance with applicable water quality standards. Increasing the flow in Salt Creek will not change the maximum load that it can assimilate. Please see responses to comments #104 and #105.

121. The City of Wood Dale strongly disagrees with the proposed CBOD and ammonia WLA and proposed WWTP limits, for the following reasons: There is not adequate justification that a DO TMDL is required. The alleged DO impairment appears to be based on one excursion. The IEPA's November 2003 draft document Determining Resource Quality and Potential Reasons for Impairments.... (Methods Used for 2004 305(b) Reporting) indicates that a waterbody should not be considered impaired for DO unless more than 10 percent of samples exceeded the standard. Also, the modeling indicates that as WWTP (and stream) flows increase, the likelihood of DO excursions will decrease.

Please refer to the responses to comments #1 and #2.

122. The technical feasibility of meeting the CBOD and ammonia discharge limits is questionable. It is technically feasible to meet the monthly average concentration limits proposed in the draft TMDL during dry weather, but it may not be feasible to meet weekly limits, mass limits, etc., that may be proposed by IEPA or to meet the proposed concentration limits during an unusually wet summer month.

Prior to establishing any effluent limits for CBOD and ammonia, the Agency intends to re-evaluate modeling efforts in Salt Creek. Please see the responses to comments #1 and #2 for the Agency's strategy for moving forward with this TMDL.

123. Were current levels based on what was happening around 2000? At that time many permits were up for renewal and some facilities were not discharging to their maximum permitted allowance and others were over discharging. When you say, "hold things as they are," is it as they are on paper or as they are in real life?

For calibration of the model, the actual discharges recorded during the June 1995 field surveys were used in the model. "Holding things as they are," means keeping current effluent concentrations as they presently are. What we have recorded on paper is the closest thing we have to the actual "real life" concentrations. When completing the allocation scenario, we included an implicit Margin of Safety that is meant to account for certain unknowns that are difficult for us to quantify. We believe that the process we used is very conservative and the resulting load allocations will be protective of water quality standards in the stream.

124. Your recommendation was to leave flows as they are?

We plan to further investigate this recommendation through an adaptive management process outlined in the responses to comments #1 and #2.

Margin of Safety and Future Growth

125. Error analysis should be conducted as a means of determining an appropriate margin of safety. The margin of safety (MOS) must "take into account any lack of knowledge concerning the relationship between effluent limitations and water quality." (CWA §303(d)(1)(C)) Therefore, to set aside an appropriate margin of safety, either explicitly or implicitly, the uncertainty associated with the modeling must first be determined. It is not clear from the discussion of MOS in the TMDL document whether a relatively large MOS is assumed based on considerable uncertainty or a small MOS is assumed based on less uncertainty.

The TMDL was developed using an implicit Margin of Safety (MOS). The MOS is an additional factor included in the TMDL to account for scientific uncertainties, growth, and other factors such that applicable water quality standards are achieved or maintained. The MOS can be included implicitly in the calculations of the WLA and LA or can be expressed explicitly as a separate value. Part of this implicit MOS included the modeling assumption that all point sources were discharging at their maximum allowable limits (monthly average limits).

There was no direct explicit uncertainty analysis performed. However, during model calibration, parameters were adjusted to match as closely as possible with the observed values. Consequently, there was indirect understanding of uncertainty related to those parameters. By using conservative assumptions throughout the modeling process, the agency considers the implicit MOS to be very conservative. It is not possible to present a numerical valuedue to the nature of the implicit MOS,

126. Future population change in the watershed was apportioned very crudely based on county totals for DuPage and Cook. Alternatively, population change could easily have been estimated more accurately by overlaying GIS-based quarter-section or census tract forecast information on top of watershed and sub-watershed boundaries. This approach is commonly applied by NIPC in its routine watershed planning work.

Thank you for the comment. The consultant chose to use the population projections from the NIPC report <u>Toward 2020:Population, Household and Employment Forecasts</u> f<u>or Counties and</u>

<u>Municipalities in Northeastern Illinois</u>. These projections were considered appropriate by the Agency. The Agency will consider taking this GIS based approach in future TMDL projects.

127. 6.3.2 - Chloride Margin of Safety: The referenced "conservative" chloride assumptions really don't appear "conservative." In light of measured concentrations that on occasion greatly exceeded 500 mg/l which were not approached by model calibration results, and the previous comments on the complexity of simulating road salt runoff and resultant chloride levels, it is suggested that a significant additional margin of safety is needed in setting the TMDL, at least from the nonpoint source side.

The Agency believes that the present implicit margin of safety for chloride is adequate. We plan to use the resulting MS4 WLA as a basis for road salt management programs and improvements in stormwater management throughout the watershed. Since the Agency does not have regulatory authority over nonpoint sources and nonpoint BMPs are voluntary, the most important aspect of this TMDL is not the exact load reduction number, but the implementation measures taken in the communities to correct the problem. These steps must be taken in a manner that is coordinated with monitoring programs tailored to isolate stream segments, BMPs and point sources.

128. 6.4.1 - Margin of Safety for DO: Most of the assumptions referenced in this section seem reasonable and appropriately conservative. However, the assumed summer temperature range (74-77 degrees F) based on a June 1995 monitoring period does not seem conservative, and water/air temperature are critical factors influencing low dissolved oxygen. What is the actual range of summer, low-flow water temperatures seen in Salt Creek? In particular, what was the air temperature range during the June 27, 1995 sample period?

According to data in STORET for the June 27-28, 1995 diel survey, water temperatures ranged from 66.2 ^{0} F to 77 ^{0} F in Salt Creek. For the same sampling period the daily-mean air temperatures were between 69.6 ^{0} F and 74.8 ^{0} F at Salt Creek monitoring stations.

129. The Village objects to the arbitrary manner in which the margin of safety (MOS) was applied in the development of the DO TMDL and requests that the percentage of the loading capacity set aside for this MOS be identified. We request that the portion of the overall DO-related loading capacity consumed by the assumptions in the "implicit" MOS be quantified. We understand that the implicit MOS in the Draft TMDL Report relied on modeling assumptions that were more conservative than necessary, and that its quantitative estimate is not available unless additional analyses are performed. Nonetheless, because a QUAL2E water quality model is now available for Salt Creek as a result of the TMDL development, these additional analyses can and should be performed. Unless we are provided an estimate of the extent to which the conservative assumptions used in the Draft TMDL Report reduced the resulting wasteload allocations, we must object to the proposed allocations as potentially exposing the Village to unjustified and arbitrary drains on our scarce resources. The analyses we are requesting could follow the recent recommendations in the 2003 "Navigating the TMDL Process: Evaluation and Improvements" report by the Water Environment Research Foundation, wherein the results of the conservatively biased model are compared with those of a more realistic "best-estimate" model, and conclusions regarding the percent MOS drawn from this comparison, both for the allocation run and for the future growth run.

This analysis could be completed as part of the adaptive management process as detailed in the responses to comments #1 and #2.

130. Section 6.4.1. I believe it would be beneficial to further discuss 7Q10 and Margin of Safety (MOS). It would be helpful to define MOS as a percentage, and for comparison discuss other watershed TMDLs and the MOSs used.

The MOS in the TMDL is implicit due to conservative assumptions made through out the TMDL development process. Providing an MOS as a percentage would require a substantial re-working of the TMDL calculations. Please see the response to question #129 concerning further analysis of the MOS. The Agency feels that a discussion of the MOS is previous TMDLs is unnecessary. For a discussion of margin of safeties in other TMDL reports, please refer to the appropriate TMDLs, which can be viewed on the Agency website at: http://www.epa.state.il.us/water/tmdl/.

Implementation Considerations and Plans

131. The implementation plan does not provide reasonable assurance that load reductions from stormwater discharges will be achieved. This TMDL demonstrates that discharges from MS4s and CSOs are causing or contributing to violations of applicable water quality standards for DO and chloride. Because the general permit for MS4s specifically prohibits discharges from causing or contributing to a violation of standards and CSO permits typically contain a similar special condition, the holders of these permits are currently violating the terms of the permits. Please identify the MS4 operators whose storm sewers discharge to waters in the watershed, and provide more detail on the measures that these permittees must implement as well as the proposed timeline for compliance. If the terms of the general MS4 permit do not contain provisions specific enough to comply with water quality standards, please provide a timeline for IEPA to develop an individual permit for these discharges.

A list of all MS4 permits in Salt Creek Watershed (Cook and DuPage Counties) is provided in Appendix G. An explanation of the IEPA General Stormwater NPDES Permit is in section 2.1.2 of the Salt Creek TMDL Implementation plan.

132. Relative to the dam removal scenario, it is stated that existing wastewater treatment plant (WWTP) permit limits for CBOD5 and ammonia-nitrogen would be retained if the dam at river mile 11.6 on Salt Creek is removed. However, no information is given as to whether the removal of this Salt Creek dam is actually feasible. For example: Who owns the dam at river mile 11.6? Will the owner be amenable to dam removal? Is the dam a historic site? What would public reaction be to dam removal? What is the quantity and quality of the sediment in the pool upstream of the dam? How would the sediment be removed? What would be the cost of sediment and dam removal?

Though studies on other streams have shown that dam removal can benefit stream habitat quality, fisheries potential, and biotic integrity, the possibility that the dam can actually be removed must be addressed first.

The work required to respond to your questions was not a part of this TMDL contractual work. Please refer to the responses to comments #1 and #2 for an overview of the Agency's strategy for moving forward with TMDL implementation in an adaptive management framework.

133. TMDL Implementation – There is no information in the TMDL report as to exactly how the TMDL will be implemented and many questions remain unanswered. The 7Q10 low flow was used to develop the TMDL allocations since this was defined as the critical period. Although the IEPA stated in a conference call that the critical period would be approximately June through September, the critical period is not defined therein. It is not known how these TMDLs will be implemented during wet weather and/or high flows; how mass limits will be imposed; whether mass limits will be based on flow and concentration or otherwise; how expansion will affect the mass limits or whether the limits will be based on the DAF or the DMF. Due to the fact that so many uncertainties remain, the public should have an opportunity to review and comment on the planned implementation of the TMDL prior to incorporation into NPDES permits.

Please see the response to comment #114.

134. 6.4.3 - Implementation Considerations: Reference is made to possible dam removal as an option for TMDL implementation. It is strongly recommended that this option be further evaluated and pursued. Not only would dam removal help achieve DO standards, it also would contribute significantly to improved aquatic habitat, fish movement, and recreational boating access.

Thank you for your comment. The Agency believes that dam removal and/or instream re-aeration could be options for improving water quality in Salt Creek. Please see the responses to comments #1 and #2.

135. Scope: As previously noted in comments on the TMDL report, we have concerns that the TMDL is limited to just chloride and DO (from point sources and VSS contributed by nonpoint sources and CSOs). Other constituents recommended for serious evaluation, and possible TMDL setting, include:

a. nutrients as a causative factor for algal growth that creates problematic diurnal DO swings
b. nonpoint source runoff, CSOs, and sanitary sewer overflows as likely contributors to wet-weather DO violations
c. Copper as a potential contributor to water column and sediment toxicity problems
d. Various other constituents (metals, pesticides, organics) for their contribution to elevated concentrations of toxic constituents in the sediment

Please see the responses to comments #1, #2, #9 and #24.

136. 2.1 - Point Sources–Stormwater: It is stated that stormwater-related allocations will be implemented as point source controls under NPDES Phase II. However, it appears that NPDES Phase II as currently being enforced in Illinois will, at best, address prevention of problems associated with new development but will not provide for effective remediation of existing stormwater loads.

Dischargers must develop a stormwater management plan designed to reduce the discharge of pollutants from MS4s to the maximum extent practicable. The stormwater management plan must include: Public education and outreach on storm water impacts; Public involvement and participation; Illicit discharge detection and elimination; Construction site storm water runoff control; Post construction storm water management in new development and redevelopment and Pollution prevention/good housekeeping for municipal operations.

The permits issued earlier this year for Phase II stormwater (MS4) contain a condition for watersheds that have approved TMDLs. The MS4 permit condition states if there is an approved TMDL, the permittee must modify their program to conform to the TMDL. Permitees are given an 18-month compliance period. At the appropriate time, the Agency will notify permittees of their obligations concerning an approved TMDL in this watershed. Also, see responses to comments #1 and #2.

137. 2.4 - Reasonable Assurance: It is noted that stormwater control for MS4s will be accomplished through the "NPDES Phase II general permit." How will this happen? Does an existing general permit call for basin wide remediation of existing stormwater discharges?

Please see response to comment #136

138. 3.1.1 - General BMPs for Road Deicing: It is suggested that a recommendation be added for anti-icing as an additional BMP that can reduce the use of road salt.

Thank you for the comment.

139. 3.1.3 - Recommended Management Actions for Chloride: The recommended actions for road deicing in this section seem to be very vague. How will specific recommendations be monitored and enforced to ensure that salt reductions will actually take place?

Since chloride application is a non-point source issue, recommendations are adopted on a voluntary basis. The Agency does not have regulatory authority in the area of non-point source pollution control. Concerns of public safety must also be considered when decreasing the amount of road salt used. Also see our response to #127.

140. 3.2.1 - Recommended Management actions for DO: The recommendations for VSS reduction for stormwater presume that Phase II stormwater remediation will occur "over time." What mechanisms are in place to ensure that this will happen?

Please see the response to comment # 136.

141. This TMDL does not provide a comprehensive evaluation of alternatives to address the alleged DO impairment, such as in-stream aeration, dam removal, etc. but rather focuses on point source controls. In addition, the report does not provide a cost effective evaluation of the recommendations and such other alternatives. The omission of the evaluation of an instream aeration alternative is particularly troublesome given that the MWRDGC operates successful Side stream Elevated Pool Aeration (SEPA) stations on the Calumet-Sag Channel and the little Calumet River, only a few miles away from the East Branch. It is our understanding that these SEPA stations were found to be a more cost effective alternative than increased treatment at the MWRDGC's treatment facilities.

It is not the purpose of this report to provide a detailed, comprehensive evaluation of implementation plan alternatives to address the DO impairment in Salt Creek. The TMDL report determined the load reduction necessary to bring Salt Creek into compliance with

applicable water quality standards. The watershed committee, as suggested in the response to comments #1 and #2, should take a leadership role in the task of detailing implementation plan alternatives.

142. Current USEPA guidelines require states to consider costs when implementing new regulations or programs. The Salt Creek TMDL is proposed to be submitted recommending BOTH scenarios #5 & #6. Those are imposition of lower carbonaceous biological oxygen demand (CBOD) and ammonia limits on POTWs to achieve the DO WQ goals. That cost is estimated at $18 million by the engineer. The second scenario recommends the removal of the dam at river mile 11.6. That cost has not been identified but could be less than the cost of imposing lower effluent limits with both capitol costs and O&M costs that are continuous annual costs. Elmhurst would request that the IEPA limit the suggested approach to achieving the DO WQ goals be to remove the dam at river mile 11.6. Further, the city believes that if the dam at river mile 11.6 is the cause of the DO impairment that it is the responsibility of the owner of the dam to remove that impairment. That may be accomplished by either removal of the dam or by providing supplemental aeration to achieve the in stream.

Please see the responses to comments #1 and #2.

143. The Fullersburg Dam is located at the historic Graue Mill site which is owned by the Forest Preserve District of DuPage County. Many millions of dollars have been spent to restore the Mill, the miller's house, acquire land and maintain the site and thousands of people visit Graue Mill each year. The Mill is listed on the National Register of Historic Places. The Fullersburg Dam provides scenic relief as a cultural and historic landmark within the Salt Creek watershed and Graue Mill and the Fullersburg Dam may well be one of the most visited and popular attractions in DuPage County. Two other dams were mentioned in the meeting as candidates for removal to increase dissolved oxygen in Salt Creek. I strongly urge IEPA to consider removal of these other dams and to find other alternatives to solving the dissolved oxygen problem in this segment of Salt Creek rather than removing Fullersburg Dam. Fullersburg Dam is probably doing more good than harm. Destruction of this resource when other options are available would be a disservice to the people of DuPage County and to local visitors and tourists choosing Graue Mill as a destination for open space and historic appreciation.

Thank you for your comment. Please see the responses to comments #1 and #2.

144. The Oak Brook Historical Society (OBHS) is aware of the draft report recommending the removal of the Fullersburg Dam on Salt Creek to increase dissolved oxygen in Salt Creek. Great concern was expressed by the OBHS at its October 17 meeting, as the dam is part of a significant historic site. The Graue Mill is listed in the National Register of Historic Places as a "mechanical engineering" designation. The original log dam was built in the 1840s to supply the power for the operation of the Graue Mill. Since that time, the Fullersburg dam has been rebuilt twice. The Graue Mill is the only operating mill in Illinois, and once a stopover on the Underground Railroad. The Frederick Graue home adjacent to the mill was purchased by the Forest Preserve District of DuPage County and historically restored in 2001-2002. Thousands of students and tourists visit the Graue Mill historic site each year. The historic site is photographed and painted by artists. We strongly urge the IEPA to reconsider the recommendation and find other ways to correct the existing concern.

Thank you for your comment. Please see the response to comments #1 and #2.

145. The TMDL Draft Report, rather than proposing correction measures at the point source such as aeration or installation of retention basins to capture the CSO discharges for subsequent treatment, suggests that removal of the Fullersburg Dam may be a viable element to correct the DO problem that was caused well upstream of the Fullersburg area. The Fullersburg Dam was originally built in 1837 and is part of the Graue Mill which is listed in the National Register of Historic Places and existed long before any STP or CSO was ever built upstream. Any proposal to remove the Fullersburg Dam as a solution to the DO problem caused by the CSO's and STP's upstream is insensitive, irresponsible, and unjustified.

Thank you for your comment. Please see the response to comments #1 and #2.

146. The Village is very concerned with the potential removal of the Fullersburg Dam. It is owned and operated by the DuPage County Forest Preserve District and we have notified them of your Report. The dam and adjacent Graue Mill is an historical and is visited by hundreds of people each year including school children. Its removal would drastically change the landscape of the area. Additionally, the resultant lowering of the Salt Creek normal water level would have very negative impacts upstream.

Thank you for your comment. Specifics on possible dam removal and the resultant effects on water levels in Salt Creek will be discussed and analyzed by a watershed committee proposed in the responses to comments #1 and #2. Dam removal has only been considered as an option at this time. Please refer to the response to comment #1 and #2 for an outline of the Agency's strategy for moving forward.

147. I attended the public meeting last Tuesday, September 30th, in Elmhurst. I was surprised when I heard that you were listing the removal of the Fullersburg Dam as a viable option. When I previously perused the Draft Report, I found no mention of the Fullersburg Dam. I reviewed the document again after the meeting and again found no mention of the dam by name. What I did find was the mention of dam removals at river miles 1.6 and 13.5. Unfortunately, this reference means nothing to me or to any layman. I recommend that you use common English so that the public understands what you are intending.

Section 6.4.2 of the report discusses possible removal of dams at river mile 11.6, which is the Fullersburg dam, and river mile 13.5, which is the Oak Brook Country Club dam.

148. Section 6.4.3, Implementation Considerations, also within the Dissolved Oxygen section apparently discusses only DO items. Shouldn't the other pollutants consider implementation?

Section 3 of the Draft Implementation Plan discusses general BMPs for road deicing, specific road salting BMPs in the Salt Creek watershed, recommended management actions, institutional arrangements and cost considerations of chloride BMPs.

149. Regarding road de-icing, we stand ready to work with any agency or organization to better manage and apply deicer salt or other chemical.

Thank you for your willingness to work with any agency or organization to better manage and apply deicer salt or other chemicals. In the near future the Agency will contact local governmental agencies and others to suggest alternative means and possible funding options to reduce road salt use, consistent with public safety limitations.

150. The Forest Preserve District of DuPage County (the "District") fully supports the goal of the TMDL program, which is to improve water quality in our lakes, streams and rivers. Organizationally, many of the District's policies emphasize the importance of controlling and eliminating pollution in our waterways. Our Land Management Policy states "Rivers and streams within District boundaries shall be left in a natural state. Winding courses, eddies, riffles, rapids or falls, shaded banks, vegetated banks, oxbows and backwaters, all contribute to a diverse and healthy stream." We have a Policy on the Development, Preservation and Operation of Historic Structures, which states our support for the preservation of "… structures connected with events important to the patterns of history; structures connected with regionally important people; structures that represented community development or were instrumental to settlement of an area; and structures that are essentially intact or undisturbed." The Graue Mill Dam at Fullersburg Woods Forest Preserve, which is owned by the District, clearly falls into this category of being an important historic structure. A dam has existed at this site since at least 1852, to supply a source of waterpower for a gristmill constructed by Frederick Graue, one of DuPage County's earliest settlers. The existing dam was constructed in 1934 by the Civilian Conservation Corps, as part of the Works Progress Administration. The Graue Mill is a National Historic Landmark, and one of DuPage County's most popular tourist destinations. Visitors are able to see the mill operate virtually the same way that it did 150 years ago. It is my understanding that the Graue Mill has the only operable millrace powered waterwheel in the State of Illinois. So, admittedly, the District has conflicting policies regarding the Graue Mill Dam at Fullersburg Woods. Without the historic significance of the structure, and its critical importance in the overall operation and interpretive programs at the Graue Mill, our existing policies would seem to lead us to support the recommended removal of the dam. We agree that the dam does create some negative impacts on water quality and the overall ecological health of Salt Creek. However, the historic importance of the dam cannot be ignored, as the draft version of the TMDL report has done.

Thank you for giving a detailed background and history of the Graue Mill and Fullersburg dam. The historic, cultural and economic value of this dam will be considered when a final plan to bring Salt Creek in compliance with DO Water Quality Standards is implemented. Please refer to our responses to comments #1 and #2 for our plan on accomplishing that goal.

151. It appears to us that the draft *Salt Creek Watershed Implementation Plan* offers two basic alternatives with respect to the TMDL for dissolved oxygen: 1) Reduce the average monthly allowable pollutant concentrations of $CBDO_5$ and ammonia to 5.0 mg/L and 1.0 mg/L, respectively, at the wastewater treatment plants within the Salt Creek watershed, or 2) remove the Graue Mill Dam at Fullersburg Woods. If we understand the report correctly, the cost of the first alternative is estimated to be $18 million, on a watershed-wide basis, while the cost for the dam removal option has not been calculated.

The cost of dam removal was not estimated in the report due to the complex nature of the project. If dam removal is adopted as a viable implementation strategy, removal estimates can be made through cooperative interaction between stakeholders, in the form of a watershed committee, and the Agency. This report, and its subsequent approval by USEPA, is the first step in establishing load reductions and implementing pollution reduction strategies in the watershed.

152. The draft TMDL report tells us that water quality in Salt Creek would improve if the dam is removed, but doesn't tell us how the upstream sediment would be dealt with or how much the project would cost, or who would pay for the project. In addition, we feel that the IEPA should consult with the Illinois Historic Preservation Agency regarding the acceptability of the dam removal option, given the classification of the Graue Mill as a National Historic Landmark. Will IEPA be addressing any of these types of issues before finalizing the Salt Creek TMDL Plan?

The Illinois EPA is proposing to form a watershed committee (see responses to comments #1 and #2), which will be expected to refine the implementation plan that will provide answers to questions raised here. As alternatives are brought more clearly into focus, we will confer with the county, as the owner of the dam, and other interested parties.

153. We believe other alternatives for implementing the DO TMDL should have received due attention instead of predominantly targeting the WWTPs**:** The Draft TMDL Report and the Draft Implementation Plan propose to address the modeled DO problem in Salt Creek by lowering CBOD and ammonia effluent limits in the NPDES permits of the WWTPs on Salt Creek. We are requesting that the IEPA evaluate other alternatives to address the DO TMDL for Salt Creek. One such strategy that we feel bears evaluation is the requirement for permit holders to install aeration equipment in the impaired water segments. While the IEPA's legal position to do so may require that the point sources request this as an addition to the permit, it may be the most effective method to address the DO situation in Salt Creek. We are requesting that the IEPA withdraw the implementation plan that requires that WWTP NPDES permit limits for CBOD and ammonia be reduced.

Please see the responses to comments #1 and #2.

154. Are you asking all towns in the Addison Creek watershed to reduce salting by 40% or is it on a case by case basis?

The recommended reduction is a gross allocation for the watershed with opportunities for trading and more flexible approaches that can be developed through the implementation process. As further monitoring will be conducted, we believe that specific stream segments and deicing techniques can be targeted

155. Is it at the village's discretion to limit the amount of salt applied as not to compromise the safety of the residents?

Yes. Public safety is an important part of any road salt management program. Salt management strategies and alternatives to road salt (sodium chloride) are discussed in the TMDL Implementation Plan. Also, please see the response to comment #139.

156. Do villages have to prove they are trying these methods?

All of these methods are being used or have been used in the past and not one in particular is being prescribed. As part of Phase II stormwater permits, appropriate BMPs will be employed, which may ultimately address such an issue.

157. There are private companies that do de-icing work. How are they to be monitored?

The TMDL does not address private de-icing activities. That issue could be discussed and accomplished as part of a city ordinance or as part of an MS4's stormwater plan.

Financial Considerations

158. The cost of WWTP compliance for CBOD and ammonia control will be very high (projected to be at least $2.5 million for Glendale Heights and $5 million for Wood Dale, for example), and there will be additional WWTP costs in five years or so for nutrient standard compliance.

Thank you for your comment. These costs and potential additional (but related) actions for nutrient control are among the reasons we are proposing an adaptive management approach.

159. Once a numeric limit is placed in a permit, it will be very difficult to remove or increase it because of state and federal antibacksliding rules. We understand from conversations with the IEPA that the burden will likely be on the discharger to perform an antidegradation-type analysis before the limit can be increased. The types of WWTP improvements required for removing nutrients are different than those required for meeting more stringent CBOD and ammonia limits. The initially required capital improvements for CBOD and ammonia may prove to be unwise spending of ratepayers' money if other parameters are later found to be the more important cause of impairment.

Please see the response to comment # 115.

160. Major WWTP improvements would be required at the WWTPs in order to assure compliance with the proposed CBOD and ammonia limits. The costs associated with these improvements appear to be significantly underestimated in the TMDL reports. The $18 million cost suggested for the Salt Creek WWTP dischargers also appears to be based on $0.30 per gallon of design average flow; therefore, it is also too low. Several of the WWTPs have assessed the cost impacts on their WWTPs and you will be receiving individual comments from some of them. As examples, the costs presented above for Glendale Heights account for intermediate pumping and a filtration upgrade, and the costs for Wood Dale include new effluent filtration and intermediate pumping at both plants for meeting the CBOD limit, as well as other general treatment upgrades at one of their WWTPs related to the proposed ammonia limit. The costs assume meeting the limits only during dry weather (i.e., pumping and filtration facilities were assumed to be sized for summer peak flows rather than wet weather peak flows). In terms of design average flows, these costs are on the order of $0.80 to $0.95 per gallon, resulting in significantly higher costs than projected in the draft TMDL reports. A value of $0.80 per gallon would result in a cost of $48 million for Salt Creek dischargers rather than the $18 million presented in the draft report. This will result in significant increases in sewer user charges for the residents in the watersheds. The projected costs are unacceptable, particularly considering the lack of sound science behind the DO TMDL and the future costs for nutrient limit compliance.

The primary purpose of the TMDL is to determine the load reduction necessary to bring Salt Creek into compliance with applicable DO water quality standards. The TMDL was not designed to provide specific costs of implementation to all dischargers in the watershed. The costs given in the report are preliminary and generalized initial estimates which may be subject

to revision as local cost information is obtained by the watershed committee proposed by the Illinois EPA in the responses to comments #1 and #2. It is not the intention of the Agency to arbitrarily impose high costs on the POTWs to implement TMDL recommendations. The Agency plans to work with all parties involved to arrive at the most cost effective solutions that work towards bringing Salt Creek in compliance with the DO water quality standards.

161. The cost for dam removal or dam modification on the East Branch and Salt Creek should have been investigated and reported so that reasonable allocation and implementation decisions could be made.

This was outside the scope of contractual work to develop the TMDLs on the East Branch and Salt Creek. However, the Illinois EPA plans to procure the necessary cost information prior to implementing the recommendations of the TMDL report. Information on cost to implement each alternative will be conducted as part of the watershed committee activities identified in responses #1 and #2.

162. A capital cost of $0.30 was assumed for tertiary filtration requirements. I can understand the need to identify capital costs. The costs for individual plants will obviously vary based on existing infrastructure. A document that I referred to that is rather dated is the "Innovative and Alternative Technology Assessment Manual" EPA430/9-78-009. This manual sites dual media filtration costs in 1980 of approximately $0.40/gallon. If this were escalated to 2005 dollars this would be $0.84/gallon assuming a 3% annual inflation rate. The annual O&M costs including power labor and material in 1980 were sited at approximately $0.035/gallon, or $0.073/gallon in 2005 dollars.

Thank you for this information.

163. There are a number of different filtration technologies available. Some that will be cheaper than those I sited above. Could you provide some basis for the $0.30/gallon value? Does this include annual O&M costs?

Please see the response to comment #160.

164. In the Final Report, it would be helpful to compare the removal of the dams versus the life-cycle costs of building and operating tertiary filter systems at the wastewater treatment facilities.

This scenario could be evaluated by a watershed stakeholder group as suggested in the response to comment #1. Responses to comments #1, #2, #160 and #161 provide Illinois EPA's approach to address issues related to further investigations of costs for implementing the recommendations in the TMDL report.

165. 3.2.3 - Cost Considerations: The estimated cost for WWTP improvements is estimated at about $18 million. However, the cost for dam removal which could achieve similar benefits is not estimated. It is strongly recommended that this estimate be provided. Even if only crude cost estimates are available, it seems very likely that the dam removal cost would be much less than the $18 million for WWTP improvements.

Please see the response to comment # 160, #161 and #164.

166. This recommendation to reduce $CBOD_5$ and ammonia permit limits, if implemented, would require the construction of improvements to the Downers Grove Sanitary District Wastewater Treatment Center which would cost in excess of several million dollars. The current District facility was not designated nor constructed to meet these reduced limits and significant improvements would be necessary as this facility approaches its design organic and hydraulic loading.

The Agency realizes that some uncertainty exists regarding the extent of each WWTPs' ability to comply with reduced permit limits over the long term. We are also aware that imposition of lower limits for CBOD could result in the need for costly plant improvements. It is hoped that through nonpoint source BMPs (including stormwater management plans), immediate implementation of CSO controls, development of a WWTP effluent re-aerating program prior to discharging into the stream, investigation of dam removal and strategic location of re-aeration schemes in the stream, the DO water quality standards can be achieved in Salt Creek and costly and potentially unnecessary plant upgrades can be avoided.

167. We object to the increased treatment costs in the future for no clear benefit: The Draft TMDL Report clearly indicates that the segment to which the Village's WWTP discharges does not show signs of impairment for the pollutants currently subject to the Salt Creek TMDLs. The report indicates that the alleged DO problem occurs significantly downstream from the Village's WWTP. The proposed reduction in the CBOD and ammonia effluent limits in the NPDES permit for the Village's WWTP will potentially increase the Village's future cost of treatment without any measurable environmental benefit. As the Village's WWTP nears capacity, the Village will be required to staff the WWTP 24 hours per day in order to respond to the operational fluctuations that occur when operating so near the technology's capability.

Please see the responses to comments #1 and #2, which outline the Illinois EPA approach to bring Salt Creek and its tributaries into compliance with the DO water quality standard.

168. Operating the WWTP close to the capabilities of the applicable treatment processes will result in a higher potential for noncompliance and third-party lawsuits: As allowed for in the Clean Water Act, third parties may sue permit holders for instances of noncompliance. Noncompliance will likely occur when operating a treatment plant so close to the capabilities of the treatment processes used. The costs associated with defending lawsuits will potentially become a tremendous burden to the Village of Bensenville. The IEPA has not demonstrated that reducing the permit limitations will have any measurable environmental benefits, yet the stricter limits may jeopardize the Village's position relative to any future lawsuits.

Please see the response to comment # 167. Also, a higher potential of third party lawsuits appears premature. The approach specified in the responses to comments #1 and #2 will involve several interested parties. As this process moves forward we believe litigation may be avoided through cooperative arrangements, plan development and data sharing.

169. The cost of WWTP compliance for CBOD and ammonia control will be very high ($5 million or more for Wood Dale's two treatment plants), and there will be additional WWTP costs in five years

or so for nutrient standard compliance. Since nutrients also affect DO, it would be much more reasonable to delay the TMDL as described in item 3 below.

Delay of the TMDL is not necessary. Please see the responses to comments # 1, # 2 and # 160.

General Comments

170. The MWRDGC objects to the fact that there was very little opportunity for stakeholder involvement in the development of the TMDLs for Salt Creek. Although several public meetings were held, these meetings were more for educational/informational purposes rather than to solicit input and feedback from the stakeholders. By not actively including stakeholders in the TMDL process, valuable information and data are potentially ignored which, if included, could contribute to a more scientifically sound TMDL. A deficient TMDL could potentially result in time-consuming litigation. In addition, the USEPA deems stakeholder involvement as essential to the TMDL process.

Thank you for your comment. Please refer to our response to comments #1 and #2 concerning the formation of a watershed committee to develop implementation plans to bring Salt Creek in compliance with the applicable water quality standards.

171. Additionally, it would be beneficial and prudent to extend the public comment period of regulatory proceedings from the current 30 days to 90 days, especially in the instances such as the Salt Creek TMDL process, where the public was not given an ample or meaningful opportunity to participate in the TMDL process.

In accordance with Agency policy, the TMDL document was made available for public review on the Agency website and in the reference area of the Elmhurst College Library on August 30, 2003. A public meeting was held to discuss the draft report on September 30, 2003 at the Elmhurst City Hall Building – City Council Chambers. After this meeting, the public comment period was set to close on October 15, 2003. After several requests at the public meeting, the comment period was extended to November 15, 2003 and then extended again to December 1, 2003.

172. Although the IEPA held several conference calls with the Salt Creek stakeholders, it would have been beneficial to conduct such communications much earlier in the TMDL process and with a regular frequency. The Use Attainability Analyses (UAA) that are currently underway for the Lower Des Plaines River and the Chicago Area Waterways (CAWS) provide good examples of effective public participation/stakeholder involvement in a regulatory procedure and should be used as a model for current and future regulatory proceedings. The IEPA should provide a framework for a minimum acceptable level of public participation within the consultant contract for mandatory adherence by the consultant.

Thank you for you comment. The contract for this TMDL called for 3 public meetings. At each meeting the public participation process was discussed. The Agency also developed a web page so that additional information could be readily obtained. A statewide TMDL stakeholder's workgroup met several times during the course of drafting this TMDL. In an effort to overcome whatever deficiencies remain, we are recommending that a workgroup be formed. Please refer to our response to comments #1 and #2.

173. Our organization conducts two stream cleanings per year and our home is on Salt Creek. Salt Creek has not frozen in three decades. Not even in the record cold year of 1983. When we canoe south from Elk Grove on our clean-ups, the water clarity drops *dramatically* once we pass Elk Grove High school. We are hoping you check *all* the discharge pipes in your determination.

Thank you for bringing this to our attention. These specifics can be investigated during the TMDL implementation process.

174. We find dead wildlife, that are intact, in the water. We cannot allow our dog into the creek. Children often get into the creek to play and we shoo them off. Gosh knows what they have been exposed to. Salt Creek runs through neighborhoods in a dozen towns. We trust that you have the expertise and heart to make the decisions to limit TMDL's to a humane level. Please do your best.

Restoring water quality in Illinois waters is crucial in maintaining a healthy ecosystem and ensuring the sustainability of the state's waters for all to use and enjoy. The development of TMDLs for potential causes of impairment is a method that can help the Agency reach this goal. The process of developing and implementing TMDLs provides an opportunity for all interested parties to work together to restore the quality of local waterbodies. We will continue to do our best to protect and restore the waters of the state.

175. How far upstream does the Old Oak Brook Dam affect the water level of the Salt Creek in reference to the Eldridge Park Canoe Launch just north of Butterfield Road? If there is a reduction in the water level during dry spells due to the water moving faster off site because of the removal of man made obstructions, will there be enough left in the channel for the development of the Salt Creek Canoe Trail as proposed in the *Salt Creek Greenway Master Plan* by the Northeastern Illinois Planning Commission Open Lands, Dupage County Department and Environmental Concerns? The Elmhurst Park District has invested a large sum of time and money into the development and construction of the existing canoe launch in Eldridge Park. Will it be high and dry for portions of the year?

This issue can be addressed as the Salt Creek workgroup discussed in the responses to comments #1 and #2 move forward with further investigation into the dam removal option. The impacts on stream users would have to be assessed during investigation and cost analysis of dam removal. Total cost of dam removal should account for loss of recreational opportunities and/or re-engineering of irrigation systems.

176. By removing the Grahm Center/Sugar Creek Dam in Elmhurst down stream from the sanitary plant discharge, the Old Oak Brook Dam and the Graue Mill (Fullersburg) Dam will it have a ripple effect up and downstream by increasing the speed of storm water and reducing the quantity of water left in the channel after a storm event? What effects would the increase in stream flow have on the stream bank erosion and the ecosystem that has been reestablishing itself along the creek? Will there me any grant money available for erosion and bank control if needed once this project is implemented?

Please see the response to comment # 175. There may be short-term streambank erosion following dam removal as the river returns to normal elevation. However, once the river reaches equilibrium there would be no additional erosion beyond what would normally occur.

177. In addition, the Eldridge park Soccer fields are irrigated with water drawn from the Salt Creek. During the dry periods the low water level should drop due to the removal of the dams and the increase run off down stream, who would pay for the re-engineering and reconstruction of the present intake system or having to hook up to City of Elmhurst water?

Please see the response to comment # 175.

178. The report is very hard to understand. For example, the Executive Summary does not state the list of contaminants that are being addressed. I understand that it may have been written for the technical person, but I believe it would be wise to also include text for the layman.

This TMDL is a technical report and may be difficult to understand for those without a science background. This technical language is necessary in order to describe the complex stream processes that are being analyzed. A list of potential causes of impairment can be found in Table 2-1.

179. Within Table 2-1, Segment Number GL 9 is not located on Figure 2-1 (which is not labeled as such).

GL 09 is located on at the bottom of the watershed in Figure 2-1

180. I find it somewhat odd that the TMDL conclusions are listed in Section 4.7 Summary in the middle of the report. The report then continues with Section 5, Modeling Approach and Assumptions, and Section 6, TMDL Allocation. Conclusions are usually placed at the end after all of the analysis.

Section 4.7 is a summary of potential causes, water quality standards and potential sources. This section is meant to be a summary of the discussions contained in *Section 4: Assessment of Water Quality Data and TMDL Approach.*

181. The opportunity for the involvement of the Village of Bensenville was a stakeholder in the Salt Creek TMDL development process has been insufficient. The public meetings predating the release of the Draft TMDL Report and of the Draft Implementation Plan were held when not enough substantive material was yet available for the Village's and other stakeholders' review, and merely provided the stakeholders with information of a largely generic nature. We strongly believe that had the Village been allowed to be involved constructively in the development of the substance of the Salt Creek TMDL, many of the resulting deficiencies (on which we comment below) would have been avoided and a more scientifically sound and defensible TMDL would have resulted. Unfortunately, this letter is the first substantive means of involvement afforded to the Village as a stakeholder in the Salt Creek TMDL development process. Consequently, to compensate for the prior lack of opportunity for stakeholder involvement, the Village respectfully requests that it, along with other stakeholders, be allowed an opportunity for review of and comment on the updated Draft TMDL

Report and the updated Draft Implementation Plan prior to the submittal of these documents to the USEPA.

Illinois EPA attempted to provide ample time for the stakeholders to review and provide comments on the Salt Creek TMDL activities and report. Please see the response to comment #171. We regret that the report published in August 2003 was the earliest and most meaningful means of providing information on this TMDL to the public. We view this report as the first step in a continuing process of stakeholder involvement. Please refer to the response to comments #1 and #2 concerning the development of a watershed stakeholders group to continue planning within the basin, review monitoring data, etc.

182. Wood Dale (Strand) - Appendix D of the TMDL report is not on the IEPA's web site. We requested the appendix from IEPA in early September and received it October 21.

During the public comment period, due to a mix-up with the contractor, Appendix D- "Predicted Water Quality in Salt Creek Under Allocation Scenario 5" was not posted on the Agency's website. The report has since been revised. The information is now located in Appendix F - QUAL2E Model Results.

183. Most of the full-size figures are not labeled with figure numbers.

The revised Final Draft will have figure numbers on all of the figures.

184. It would be helpful to list gauging stations, monitoring stations, etc. by name and number on the figures. It would be helpful to have a single figure showing the impaired segments, the impairments in those segments, and potential sources (point and non-point).

Thank you for your comment. We feel the figures provided for gauging stations and monitoring stations in the draft are appropriate. The Final Draft will have a table (Table 2-1)clearly listing which segments and which potential causes of impairment were addressed in the TMDL report.

185. The recently USEPA-approved 2002 303(d) List should be summarized in a table early in the TMDL Report, perhaps in place of Table 2-1, which is incomplete. The report does not address all segments and all impairments in the watershed, yet the report implies that all segments or impairments are included. For example, the second paragraph of the Executive Summary states "One TMDL was developed for each pollutant on the 303(d) List," which is not true based on the 2002 303(d) List. The reason for the exclusions should be explained (i.e., IEPA has a policy against developing TMDLs for pollutants that have no water quality standards).

Please see the response to comment #24.

186. The TMDL Report and the Implementation Plan have inconsistencies when referring to CSOs. These should be consistently referred to as point sources (not nonpoint sources) and perhaps included in WLAs as appropriate.

Thank you for your comment. The Agency will discuss this further with watershed stakeholders as we proceed with the implementation process in the watershed.

187. Based on the information presented in the TMDL report, it appears the DO model was not validated. If true, the model results and basis for the WLAs are questionable. This should be explained.

Please see response to question #63.

188. Page 1-1, section 1.2 notes that "Comments on the technical memoranda have been incorporated…." The report should state whose comments these were. Specifically, we would like to know whether a stakeholder group had opportunity to comment.

These interim technical memoranda were reviewed and commented upon by Agency staff and were part of the TMDL development process. The memoranda were not released for public comment.

189. Page 2-1, Section 2.1 states that all segments and causes of impairment are listed in Table 2-1. This is not true. Most notably within the apparent scope of this TMDL, Busse Woods Lake is no longer listed for phosphorus (based on the 2002 303(d) list) but is listed for TDS and algae. On the other hand, several stream segments are now listed for phosphorus. All segments listed for nutrients and algae should be so noted in this table, since these parameters potentially affect DO. The text can then explain why nutrient TMDLs are not being developed at this time.

Please see the response to comment #24 and #184.

190. Page 2-2 and the title of Table 2-2 state that the table includes "available data, and potential sources" when in fact it doesn't. This information should be provided.

The title of Table 2-2 will be corrected in the Final Report. Diel survey data is provided in Appendix D of the revised Draft Final Report. Thank you for your comment.

191. Table 2-2 appears to be in error with respect to the TMDL endpoints for conductivity (1,667 umho/com was used) and dissolved oxygen (6 mg/L was used).

Please see response to comment # 42.

192. Figure 2-1 has several errors. It should be updated so that the segment designations agree with the 2002 303(d) List and the figure agrees with Table 2-1. For example, Addison Creek should be shown as GLA-02 and GLA-04 on the map, the designation "GL 10" above Busse Woods Lake should be changed to "GL," GL 19 should be shown on the map, WGN should be in the table, etc.

The Final Draft will have a table clearly listing which segments and which potential causes of impairment were addressed in the TMDL report. The map will be clarified to show all impaired segments of the river.

193. Table 3-1 does not indicate how impervious versus pervious area was determined, and the residential impervious percentage appears low.

The impervious values are effective impervious values. Dupage County has an ordinance which requires that downspouts be routed to grassed areas which reduces effective impervious area. Using the impervious values outlined in Table 3-1 for residential areas resulted in a good hydrologic calibration.

194. Page 3-9, section 3.6 indicates USGS completed a WLA for the Salt Creek watershed. It would be helpful to have more information about the results of this WLA and whether they compare well with the more recent modeling.

The USGS report by Melching and Chang was referenced when developing this TMDL. Please see the reference for this report in the "References" section of the TMDL Report.

195. It would be helpful to have gauge names/numbers on Figure 3-6.

USGS gauge names and numbers can be accessed at the USGS website using the water quality mapping tool: http://il.water.usgs.gov/proj/mapping_tool/index.html.

196. Section 3.6 indicates that several point sources were not included in the modeling efforts. Reasons are given for some of these but not others. The reason for excluding the Villa Park Wet Weather sewage treatment plant (STP) is not clear: is it based on an assumption of no flow or actual DMR data? Since it rained on June 27, 1995, there may have been flow from this facility and the various CSOs and sanitary sewer overflows (SSOs) throughout the watershed. Further explanation about these and other point sources should be provided. Also, later sections of the TMDL report indicate that the St. Charles Road CSO was specifically included in the modeling because it was discharging in June 1995, yet this CSO is not mentioned by name in Table 3-3.

The Villa Park Wet Weather STP discharges only during wet weather conditions. It was not included in the chloride model since HSPF simulates flow from rainfall and runoff processes. Including Villa Park in that model would have resulted in double counting the flow during rain events. QUAL2E is applied during low flow, steady-state conditions. The St. Charles Road CSO was included in the QUAL2E calibration model since it was flowing during the June survey. No CSO data are available from any other discharge during this survey. The QUAL2E model was applied for allocation purposes at 7Q10 flows, and does not include wet weather discharges, including the St. Charles Road CSO.

197. Figure 3-9 should include designations (i.e., municipality name and CSO name or number) for each CSO. The Elmhurst and Villa Park SSOs should be added to this figure or shown on another figure.

This figure is meant to give the reader a visual representation on where CSOs are in the watershed. The Agency does not believe the suggested changes would add any additional meaning to the intent and purpose of this figure.

198. Page 4-1 indicates that "IEPA uses monitoring data from the most recent 5 years to prepare the 303(d) List of impairments" and, therefore, data from 1995 through 1999 were used for the TMDL. These data should no longer be considered "recent." It is possible that IEPA reviewed newer data to develop the 2002 303(d) List. The newer data should be presented and, potentially, used to validate the TMDL modeling.

The Agency attempts to ensure that the TMDL was developed with the most recent information possible. We continually update our assessments and make corresponding changes in the reports. However, there is a point in every report where no further changes can be made. This must be done due to monetary and time constraints. The 2000 305(b) Report was the most recent document used in developing the Salt Creek TMDL. The TMDL report was nearly completed when the 2002 303(d) List was released for public comment and it was not feasible to make substantial changes to the report at that time.

The Agency has adopted a policy of developing TMDLs only on potential causes of impairment that have a water quality standard. We feel the need for a legally designated endpoint is necessary for us to implement any regulatory actions that may result from a TMDL. Nutrients, excessive algal growth and several other parameters listed in the 303(d) do not presently have water quality standards and will not have TMDLs completed on them at this time. For this reason, there may be some differences between the 1998 303(d), the 2000 305(b) Report and the parameters addressed in this TMDL report. The Agency will continue to work with stakeholders in the watershed to remediate causes of impairment not addressed in this report, through methods other than a TMDL. Also, please see the response to comment #24.

199. Page 4-2 refers to George Street station "GLA-05", which should be shown on Figure 3-10.

The Agency agrees with this observation. However it does not appear that the absence of this site on Figure 3-10 is a matter of critical importance in understanding the TMDL.

200. Page 4-4, section 4.3: Segments GL 03, GL, 09, GL 10, and GLA 02 are listed for TDS/conductivity impairments, which appears correct. However, according to the 2002 303(d) list, segments GL and RGZX are also listed for TDS/conductivity and should be included in the evaluation.

Please see the response to comment #24.

201. Page 4-8, Section 4.4.1: It is noted that there was only one exceedance for chloride in Salt Creek. There were few exceedances for TDS. Based on this, it seems reasonable to continue monitoring the stream and consider delisting it.

The General Use Water Quality Standard for chloride is 500 mg/L. One exceedance of this standard requires the segment to be listed as impaired because the Illinois Pollution Control Board regulations does not allow water quality standards for any pollutants to be exceeded or violated at any time. There were also several exceedances of the conductivity standard. Please see the response to comment #1 for the Agency's recommendations on further monitoring.

202. Figures 4-9 and 4-10 appear to have incorrect titles (they should be switched).

We agree with your comment. The change has been made to the Final Report.

203. Page 4-11, Section 4.5.1: it is noted that Busse Woods Lake is listed for total phosphorus (TP). This should be updated based on the new 2002 303(d) List; the lake is no longer listed for phosphorus but is listed for algae and a few other parameters.

Please see the response to comment #24.

204. Page 4-12: the statement is made that nonpoint sources contribute to 100 percent of the TP load to Lake Busse. We believe this is an important observation and indicates that NPS pollution may be a significant cause for the related impairments in the watershed (low DO, phosphorus, nitrates, algae).

The TMDL establishes that nonpoint source (NPS) pollution is a large part of the problem in Salt Creek. However, there is also a contribution by point sources and this must be addressed. Also, see responses to comments #1 and #2.

205. Page 4-13: GLBA (Meacham Creek) should be removed from the segments that are noted for low DO impairment; it was removed from the 2002 303(d) List.

Please see response to comment #24.

206. Section 4 and elsewhere: reference is made to August 29 and 30, 1995, data, which are not provided. These data should be provided and, potentially, used for validating the DO and algae modeling. This seems particularly important since the June 1995 data do not appear to be "dry weather" data (stream flows increased during this time period, and a June 27 rainfall event is noted in the report).

Diel data collected by IEPA in August 1995 were used to initially calibrate the model. Data from IEPA's June survey were used to validate the model; the model inputs based on the August 1995 survey were modified slightly using the June survey data. Appendix D contains the diel survey data from both the June and August 1995 surveys.

207. Figure 4-14 and related text: it would be helpful to have a listing of the sampling stations that are represented by the figure. These could be added to Table 5-5. Dam and outfall locations should also be shown on this figure. Note that Figure 4-14 indicates that the water quality standards for DO were not violated in the upper portion of the watershed including the area likely impacted by Wood Dale's WPCF outfalls.

This information was not included in the figure to avoid cluttering. The dam locations are shown in Figures 5-5 through 5-8.

208. Figure 4-14: because of the rainfall and increasing stream flows over the sampling period, it would be useful to show the DO data for each of the two days in tabular or graphic form, such as in an appendix, rather than only presenting the combined data on one graph.

The Agency believes that the current figure is the best way to present the data to the public.

209. Page 4-16 and Table 4-4: Wood Dale is not included in the list of potential sources for the DO impairment in GL 03. This may be important for future negotiations with other stakeholders and the IEPA.

Thank you for the comment.

210. Page 4-17, Section 4.7: There is a statement that Table 4-5 summarizes “all the pollutants...” when it does not.

Thank you for your comment. This has been corrected to state that Table 4-5 summarizes all pollutants addressed in the TMDL.

211. Section 4 and elsewhere: references are made to sources of the DO impairment including CSOs, SSOs, urban runoff/storm sewers, sediment oxygen demand, and upstream impoundments; however, the Implementation Plan focuses on point source controls or downstream dam removal. If point sources and the downstream dam are not the most important causes of impairment, then the proposed implementation scenarios seem counterproductive. We believe the Implementation Plan should consider WLAs for the CSOs and SSOs and specific controls and LAs for NPS to reduce the SOD in the streams.

Please see the response to comments #1 and #2.

212. Page 5-1, Section 5.2: the title of this section indicates that total phosphorus was modeled using HSPF, yet the text does not present the phosphorus modeling.

The Agency feels that section 5.2 gives an accurate and thorough summary of the HSPF modeling completed for this TMDL.

213. Page 5-3: reference is made to the point source discharges totaling 77 cfs (50 mgd) above the gauge at Western Springs. We suspect this is annual average flow. It would be useful to compare the sum of the dry weather flows for the WPCFs with the low flow readings at the Western Springs gauge.

This is the combined average monthly point source discharge. A comparison of the sum of the dry weather flows for the WPCFs with the low flow readings at the Western Springs gauge may have been a useful exercise. However, such an exercise has no bearing on the development of the TMDL.

214. Page 5-3 and elsewhere: in general, daily flow data from the WWTPs should have been used for the modeling effort instead of monthly averages. The communities in the watershed have varying degrees of leaking sewers, combined sewers, separate sewer overflows, and peak-to-average flow. Therefore, using monthly average WWTP flows with daily streamflows and daily water quality data could introduce a great deal of error.

Dischargers record daily flows, but they do not routinely report these numbers to the Agency. Monthly flows were used in the interest of time and practicality and were considered adequate for modeling purposes.

215. Table 5-2: it would be helpful to have a graph of modeled versus observed flow.

The Agency believes that the present table is sufficient for a hydrologic calibration summary.

216. Page 5-6: the text indicates that the validation was "fair to poor" for the R-Squared Monthly values when in fact it would be considered "poor" based on the criteria provided.

Thank you for your comment. We will consider these R-squared values when re-evaluating the model during the adaptive management process.

217. Figure 5-5: it is not clear whether the DO observed values at the dams are upstream or downstream of the dams. We can generally guess which it is, but, again, a table showing sample station locations in terms of river miles would be helpful.

Thank you for the comment.

218. Page 5-13: a statement is made that "Low DO concentrations ... in nighttime samples are ... caused by high BOD and low DO in point source and/or St. Charles Road CSO...." Elsewhere in the report nutrients and algae are noted as a cause for low nighttime DO, and this is the more likely explanation for diurnal DO variations. WWTP BOD loadings are highest during the day, not at night. If the St. Charles Road CSO was only discharging at night, then this should be stated.

The St. Charles Road CSO was observed to be flowing and sampled by IEPA field personnel during daylight hours on July 19, 1995. Since that time, the CSO has been repaired. The model was calibrated using water quality data from that time frame, so model assumptions included the St. Charles Road CSO.

219. Page 5-14, first paragraph: the reference to Figure 5-8 should be changed to Figure 5-6.

Thank you for your comment. This has been corrected in the Final Draft.

220. Page 5-14: we understand that SOD was measured in this watershed. These data should be presented for comparison with model results.

Please refer to the response to comment # 72.

221. Page 5-14 indicates a direct relationship between CSOs and SOD, and, therefore, the DO impairment. At the top of Page 5-15, it is stated that "Overall, the DO problem in Salt Creek and Addison Creek is attributed to SOD build-up near the CSO outfalls." As noted previously, the Implementation Plan should place more emphasis on controlling these sources of impairment rather than only the WWTP point sources.

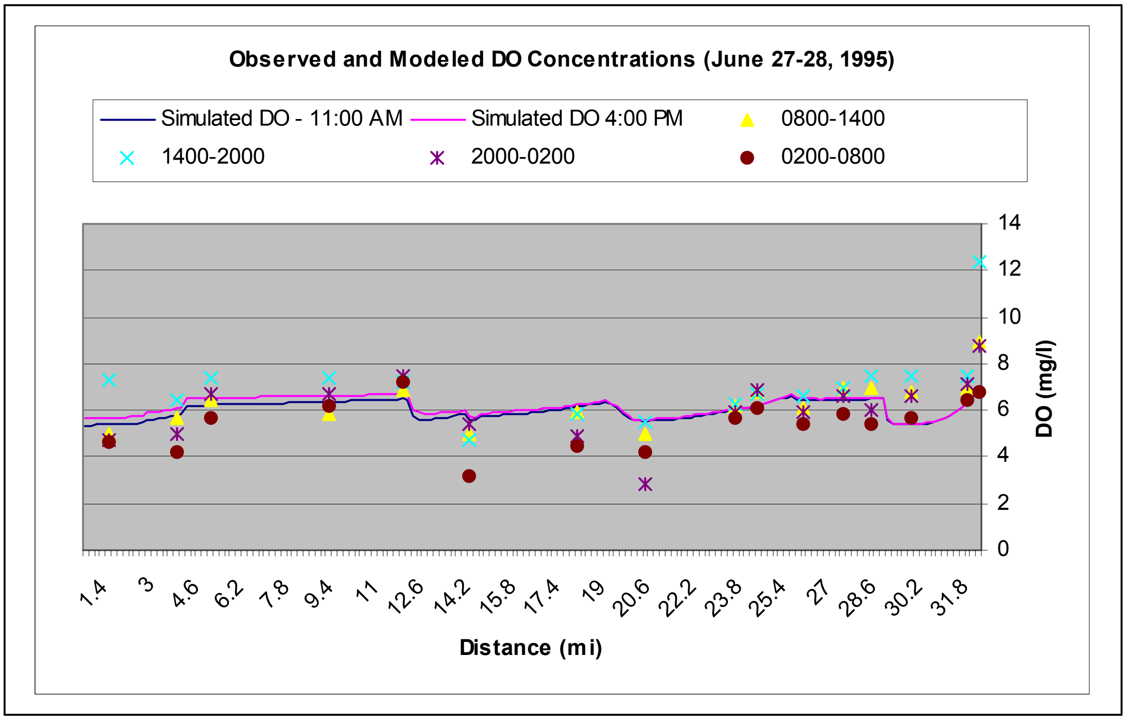
A general stormwater permit is in place to help control discharges from CSOs. However, the permit has only been in place since March 1, 2003. It will take time to see how it will effect impairment in the watershed. The Clean Water Act requires the Agency to bring impaired waters into compliance. At this time, the only regulatory control available is adjustment of individual NPDES permits.

222. Figure 5-6: It is hard to see the change in algal contribution, CBOD decay, ammonia oxidation, and nitrite oxidation on this graph. A separate graph could be used for these. If these parameters are truly as low as shown in the graph, it supports the above argument that SOD and reaeration are much more important than WWTP effluent CBOD and ammonia and thus should be the primary focus of the Implementation Plan.

Your point is well taken. The Agency believes the current figure is appropriate in its display of the information. Five separate graphs are not necessary, especially in light of our future strategy as outlined in the responses to comments #1 and #2.

223. Figures 5-7 and 5-8: we question why the chlorophyll a concentrations are plotted for 11 a.m. and 4 p.m. while the DO concentrations are plotted for 6 a.m. and 6 p.m. If the DO concentrations were plotted at 11 a.m. and 4 p.m. they might better match the observed DO. This might change the conclusions on page 5-17 which are, "... from the available data and model, it cannot be concluded that algae are a cause of the observed low DO concentrations" and, "Therefore, the model... is not capable of simulating the full extent of the diurnal variation of DO." Perhaps a different model such as Aquatox would provide a better model of the various processes that are occurring and, therefore, a better "fit" for the DO data.

The chlorophyll was simulated during the times that chlorophyll a data were collected instream. These data were used to calibrate the algal kinetics. DO was then simulated based on these algal kinetic rates, and model input is obtained every hour. Since the point of this analysis was to determine whether applying the dynamic version of QUAL2E results in better predictions of instream DO than the steady-state version, the DO was plotted at 6:00 AM and 6:00 PM to determine how well the dynamic model reflects the diurnal variation in observed DO. Selecting an early morning and evening time, results in approximately maximum differences in predicted DO. A plot of the model results at 11:00 and 4:00 shows very similar predicted DO at the two times since algal activity has been occurring under both those times. Since the dynamic model did not simulate the instream DO any better than the steady-state model, the steady-state model was applied. The report acknowledges that QUAL2E cannot simulate the impact of macrophytes and attached algae. Other models can simulate these conditions better, but generally require more data to calibrate them.



224. Note that pages 5-16 and 5-17, as well as the 2002 303(d) list, indicate very high chlorophyll a concentrations and algae in the river, including the impoundments. We believe this provides adequate explanation for diurnal variation of DO.

Please see the responses to comment #1 and #2.

225. Section 5: modeled and observed CBOD, ammonia, and phosphorus versus river mile should also be presented in this section.

Thank you for your comment.

226. Page 6-2, Section 6.2: we would like to know what CBOD concentrations were used for the model run with the increased point source discharge. This model run appears to support our suggestion that there should be no decrease in the mass limits at the WPCFs even if more restrictive CBOD concentration limits are imposed (since increased WPCF flow has a positive impact on in-stream DO).

These model runs were performed using the CBOD and NH3-N concentrations assumed in the allocation scenarios as outlined in Table 6-4.

227. Figure 6-1: the title appears incorrect – is this supposed to be segment GL 09? Or station GLB 09? The legend box in the figure indicates "station IL 09", which is not shown on Figure 3-10.

Figure 6-1 shows modeled chloride concentrations at the Salt Creek Station GL 09. The legend box will be corrected to read GL 09.

228. Figure 6-2: same type of comments as for Figure 6-1.

Figure 6-2 shows modeled chloride concentrations at the Addison Creek Station GLA 02. The legend box will be corrected to read GLA 02.

229. Page 6-4, Section 6.3.3: there is a statement that "WLAs for point sources were calculated using the average flow...." Does the reference to point sources apply only to treatment plants or also to CSOs? Was current average or design average flow used?

Design average flow was used. The reference applies only to treatment plants.

230. Table 6-1: a back-calculation for flow from the chloride WLA (using 500 mg/L chloride, a conversion factor of 8.34, and 365 days/year) results in a flow of only 5.5 mgd for the WWTPs in the Salt Creek WLA and 0.6 mgd for the WWTPs in the Addison Creek WLA. These are too low to account for all of the WWTPs in the basin. There is concern that, if the chloride WLA was incorrectly calculated, the IEPA may change its current thinking on whether to have WWTP permit limits for chloride. If this happens, the WWTPs should be prepared to comment.

Please see the response to comment #99.

231. Page 6-5, Section 6.4: the following statement is made: "Analysis of DO data .showed that the DO standards were not met under low flow condition in the hot summer months." We question whether this is a valid statement since the June 1995 data were collected after a rainfall event when runoff was occurring and stream flow was increasing, the August 1995 data were never presented, and the data in Figure 4-15 were said to be suspect because of the probe location in a debris-filled backwater.

The statement is valid. While the data collected at Western Springs may be low since it is a backwater area that sometimes is filled with debris, other data show low DO concentrations in the summer. Substandard DO data were collected during the August 1995 survey, and these data have been included in Appendix D. A portion of June survey data were also collected prior to rainfall, and these data also show low DO concentrations.

232. Page 6-5: the 7Q10 flow values for Salt Creek and Addison Creek should be provided.

Thank you for your comment. We will take this into consideration for the Final Draft.

233. Page 6-5 and 6-6, Section 6.4: we disagree that there is no obvious eutrophication problem in the Salt Creek watershed. Chlorophyll a concentrations presented in section 5, the 2002 303(d) List, and diurnal DO variation all point to a eutrophic to hypereutrophic condition. This places more importance on nutrients as a cause of the DO impairment and supports the suggestion that the DO TMDL be delayed until nutrient criteria are developed and holistic modeling conducted.

Please refer to the response to comments #1 and # 2.

234. Page 6-6: using a 6 mg/L DO endpoint may provide too much margin of safety, particularly considering the actual 7Q10 will likely continue to increase in this watershed over time (because of increasing WPCF flows), with a resulting positive impact on in-stream DO. The IEPA should consider using a 5.0 or 5.5 mg/L DO endpoint.

The Illinois Water Quality Standard for DO states: "Dissolved oxygen shall not be 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." This is the endpoint the Agency must use. In establishing a MOS, we established the TMDL target for DO at 6 mg/L at all times. As additional and more specific data are collected (see response to #1 and #2), the MOS can be adjusted.

235. Page 6-7 and Implementation Plan: more information should be provided on the dams (i.e., dimensions, importance for flood control, other uses, owner/operator, etc.) so that the stakeholders can better assess the feasibility of dam removal.

This information is beyond the scope of this TMDL. Implementation of recommendations in the report can be accomplished through cooperation between state and local agencies as well as stakeholders in the watershed as suggested in the responses to comments #1 and #2.

236. Page 6-8 and Figure 6-3: the existing condition is not shown on the graph yet the text states that it is shown.

Thank you for your comment. This has been corrected in the Final Draft.

237. Table 6-3 and Page 6-11: it is noted that CSOs and runoff contain significantly higher VSS than WPCF effluents. Again, it may be appropriate to include a WLA for VSS from the CSOs.

There is not a water quality standard for VSS. This would make a WLA difficult to calculate. Please see our response to comment #96.

238. Page 6-11, last paragraph: there is a statement that "...actual treatment levels for CBOD and ammonia are low...." This should read "high" not "low" (high treatment, low effluent concentrations).

This has been corrected in the Final Draft.

239. Page 6-12, section 6.4.3: an allocation scenario other than equal concentration limits for all facilities should be explored further if the dam removal scenario is not implemented. This is particularly important for Wood Dale and other facilities in the upper portion of the watershed where the DO standard may not be violated.

This TMDL did not evaluate different allocation scenarios that may be worth considering. An allocation scenario other than equal percent reduction for all facilities may be appropriate as long as the overall target is met and DO standards are protected in Salt Creek. This topic can

be addressed by the suggested stakeholder workgroup and the Agency as implementation of the TMDL progresses.

240. Implementation Plan, page 6, section 2.2: this should read "WWTPs, CSOs and SSOs."

Thank you for your comment. The Agency feels the present section title is appropriate.

241. Implementation Plan, page 7, section 2.4: this section acknowledges that VSS reductions are applicable to CSO discharges. Again, we believe the CSOs should have a VSS WLA. Additional information should be provided on the "reasonable assurance" that the CSOs and SSOs will achieve the needed VSS reductions.

Please see the response to comments # 1, #2 and #221.

242. Implementation Plan, page 12, section 3.2.2: an allocation scenario should be run with Wood Dale and other "upper watershed" WPCFs at 10 mg/L CBOD similar to Bensenville, since DO excursions were not reported in this portion of the watershed.

Please see the response to comments #239 and #1.

243. Implementation Plan, page 12, section 3.2.2: IEPA should be informed that additional treatment will be required for Wood Dale to meet a 5 mg/L CBOD limit.

Thank you for your comment. Please see the response to comment #166.

244. Implementation Plan, page 12: data for MWRDGC's Egan WWTP should be provided.

The data have been added.

245. Implementation Plan, page 13, section 3.2.2: the statement, "...how future growth may be addressed without exceeding the overall WLA mass restriction" seems in conflict with the model scenario that was run at 26 percent growth (see comment on page 6-2 above).

This statement can be re-evaluated as implementation recommendations are put into place through the Agency's strategy outlined in the responses to comments #1 and #2.

246. Implementation Plan, page 13, Section 3.2.3: the costs projected for filtration are very low and may not include intermediate or effluent pumping, technical services, contractor's general conditions, and other necessary items. A value of $0.25 to $0.30 per gallon may be appropriate for complete system capital costs if it is applied to the peak hourly flow upon which filtration facilities are designed. The 60 mgd used to arrive at $18 million is the design average flow.

Please see the response to comment # 160.

247. Implementation Plan: proposed dates should be provided for the recommended summer season limits (i.e., April through October, June through September, only during 7Q10 flows, or other duration) so that stakeholders can better assess the potential impacts to their facilities.

The proposed dates for seasonal limits will require additional analysis of annual temperatures and flow levels by the Agency and discussion between stakeholders in the watershed. This information would be included in any permit renewals issued in the watershed.

248. What took so long to get to this point?

Through a combination of staff changes with the consultant and policy changes at the Agency, this report took considerably longer to complete than previously anticipated. The Agency hopes to improve on completion time of future TMDLs.

249. In the report, there is a delineated dam at approximately mile marker 25, it indicates it is at the outfall of the Addison WTP. I know of no dam on Salt Creek that causes any hydraulic jump at that location. There is a dam on Westwood Creek, which is a western tributary to Salt Creek (at 290 and Addison Road), but does not influence Salt Creek's flow characteristics at any point other than during flood stages. I request the consultant go back and visit that and see if this dam actually does exist and how it fits into the model.

There is a dam located at mile 25 near the Elmhurst Country Club. It is a low head dam and may not be causing a hydraulic jump.

END

GLOSSARY AND ACRONYMS

ALUS	Aquatic Life Use Support
AWQMN	Ambient Water Quality Monitoring Network
BMPs	Best Management Practices. These are practices that have been determined to be effective and practical means of preventing or reducing pollution from nonpoint sources.
CSS	Combined Sewer System. Wastewater collection systems designed to carry both sanitary sewage and storm water runoff in a single pipe to a wastewater treatment plant.
CSOs	Combined Sewer Overflows. These occur during wet weather periods when the hydraulic capacity of the CSS becomes overloaded. This causes overflows at discharge points within the CSS.
DAF	Design Average Flow
DMF	Design Maximum Flow
DMR	Discharge Monitoring Reports
FY2000	Fiscal Year 2000
IBI	Index of Biological Integrity. Primary purpose is to assess the biological integrity of a habitat using samples of living organisms and to evaluate the consequences of human actions on biological systems. Developed for use in managing aquatic resources (e.g., to establish use designations for water bodies, biological water quality standards, or goals for restoration).
IBS	Intensive Basin Survey
IEPA	The Illinois Environmental Protection Agency (also referred to as the Agency or Illinois EPA)
LA	Load Allocation. The maximum load of pollutants from non-point sources
MS4s	Municipal Separate Storm Sewer Systems
NVSS	Non-volatile suspended solids
POTWs	Publicly Owned Treatment Works
SOD	Sediment Oxygen Demand
SSO	Sanitary Sewer Overflow
STPs	Sewage Treatment Plants

TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids. Solids in water that can be trapped by a filter. TSS can include a wide variety of material, such as silt, decaying plant and animal matter, industrial wastes, and sewage. High concentrations of suspended solids can cause many problems for stream health and aquatic life.
USEPA	United States Environmental Protection Agency
WIP	Watershed Implementation Plan
WLA	Waste Load Allocation. The maximum load of pollutants from point sources.
WPCFs	Water Pollution Control Facilities
WQS	Water Quality Standards
WWTPs	Waste Water Treatment Plants

DISTRIBUTION OF RESPONSIVENESS SUMMARY

Additional copies of this responsiveness summary are available from Mark Britton, Illinois EPA Office of Community Relations, phone 217-524-7342 or e-mail Mark.Britton@epa.state.il.us.

ILLINOIS EPA CONTACTS

TMDL Inquiries..Bruce Yurdin................................217-782-3362
Legal Questions..Sanjay Sofat.................................217-782-5544
Public Relations..Mark Britton................................ 217-524-7342

Questions regarding the public meeting record and access to the exhibits should be directed to Bruce Yurdin at 217-782-3362.

Written requests can be mailed to:

Illinois Environmental Protection Agency
Bureau of Water
Planning Unit, Watershed Management Section
1021 North Grand Avenue East
Post Office Box 19276
Springfield, IL 62794-9276

Final Report

Salt Creek Watershed Implementation Plan

Prepared for

Illinois Environmental Protection Agency

October 2004

CH2MHILL
727 North First Street
Suite 400
St. Louis, MO 63102-2542

Contents

Tables

1 Scope of this Implementation Plan

Each total maximum daily load (TMDL) described in this report should have a reasonable assurance of implementation in the watershed and should be consistent with all applicable federal regulations and guidance provided by the U. S. Environmental Protection Agency (USEPA). This plan includes the management practices to be implemented and the associated costs and institutional arrangements necessary for implementation, and it addresses the following TMDLs:

- Chloride TMDL for Addison Creek and Salt Creek
  - Applicable to road salting activities
- Dissolved oxygen (DO) TMDL for Salt Creek:
  - Oxygen-demanding materials discharged to Salt Creek ($CBOD_5$ and ammonia) by wastewater treatment plant (WWTP) point sources

– Organic material (measured as volatile suspended solids [VSS]) from non-point sources (NPS) and combined sewer overflows (CSO) that accumulate in the stream bottom and contribute to sediment oxygen demand (SOD)

2 General Description of Applicable Pollution Control Programs

2.1 Point Sources—Stormwater

The chloride TMDL describes load allocations (LAs; i.e., NPS allocations) applicable to stormwater sources of chloride, such as road salting activities. Similarly, there are VSS LAs associated with the DO TMDL. They will also be applicable to stormwater discharges. However, Phase II of the NPDES stormwater program will apply to most or all of the municipalities in the watershed, as well as the roads owned and operated by the state and Tollway Authority. Thus, it is anticipated that stormwater-related allocations will actually be implemented as point source controls, as described in recent USEPA guidance and as governed by the Illinois Environmental Protection Agency (IEPA) General Permit for Stormwater Discharges.

2.1.1 USEPA Regulations and Guidance

USEPA has recently issued guidance directing how stormwater sources are to be addressed in TMDLs (source: USEPA. *Establishing Total Maximum Daily Load [TMDL] Wasteload Allocations [WLAs] for Stormwater Sources and NPDES Permit Requirements Based on Those WLAs*. Memorandum from Robert Wayland and James Hanlon to Water Division Directors. November 22, 2002). Relevant key points presented in this guidance include:

- NPDES-regulated stormwater discharges must be addressed by the WLA component of the TMDL [40 CFR 130.2(h)].
- NPDES-regulated stormwater discharges may not be addressed by the LA component of the TMDL [40 CFR 130.2(g)&(h)].
- Stormwater discharges from sources that are not currently subject to NPDES regulation may be addressed by the LA component of the TMDL [40 CFR 130.2(g)].
- It may be reasonable to express allocations for NPDES-regulated stormwater discharges from multiple point sources as a single categorical WLA when data and information are insufficient to assign each source or outfall individual WLAs separately [40 CFR 130.2(i)]. In such cases where WLAs have been developed for categories of discharges, these categories should be defined as narrowly as available information allows.
- The WLAs and LAs are to be expressed in numeric form in the TMDL [40 CFR 130.2(h)&(i)]. USEPA expects TMDL authorities to make separate allocations to NPDES-regulated stormwater discharges (in the form of WLAs) and unregulated stormwater (in the form of LAS). USEPA recognizes that these allocations might be rudimentary due to data limitations and variability in the system.
- Water Quality Based Effluent Limits (WQBELs) for NPDES-regulated stormwater discharges that implement WLAs in TMDLs may be expressed in the form of best

management practices (BMPs) under specific circumstances [40 CFR 122.44(k)(2)&(3)]. If BMPs alone adequately implement the WLAs, then additional controls are not necessary.

- USEPA expects that most WQBELs for NPDES-regulated municipal and small construction stormwater discharges will be in the form of BMPs, and that numeric limits will be used only in rare instances.

According to this guidance, all of the chloride and DO-related allocations for the Salt Creek TMDLs should be characterized as WLAs for point sources. In all other respects, the Salt Creek TMDLs are consistent with this guidance.

2.1.2 IEPA General Stormwater NPDES Permit

IEPA has recently issued General Permit No. ILR40, *General NPDES Permit for Discharges from Small Municipal Separate Storm Sewer Systems*. The effective date of this permit is effective March 1, 2003 through February 29, 2008. Applicable Municipal Separate Storm Sewer Systems (MS4s) are expected to file a notice of intent to be covered by the permit, and then comply with all applicable permit requirements. The two sections of the permit most relevant to this plan are Part III C (Special Conditions for TMDL Watersheds) and Part IV (Stormwater Management Programs). Each of these sections is reproduced below, describing the conditions and requirements for covered permittees:

Part III. Special Conditions for TMDL Watersheds

C. If a TMDL allocation or watershed management plan is approved for any waterbody into which you discharge, you must review your stormwater management program to determine whether the TMDL or watershed management plan includes requirements for control of stormwater discharges. If you are not meeting the TMDL allocations, you must modify your stormwater management program to implement the TMDL or watershed management plan within 18 months of notification by the Agency of the TMDL's approval. Where a TMDL or watershed management plan is approved, you must:

1. Determine whether the approved TMDL is for a pollutant likely to be found in stormwater discharges from your MS4.
2. Determine whether the TMDL includes a pollutant wasteload allocation (WLA) or other performance requirements specifically for stormwater discharges from your MS4.
3. Determine whether the TMDL addresses a flow regime likely to occur during periods of stormwater discharge.
4. After the determinations above have been made and if it is found that your MS4 must implement specific WLA provisions of the TMDL, assess whether the WLAs are being met through implementation of existing stormwater control measures or if additional control measures are necessary.
5. Document all control measures currently being implemented or planned to be implemented. Also include a schedule of implementation for all planned controls. Document the calculations or other evidence that shows that the WLA will be met.
6. Describe and implement a monitoring program to determine whether the stormwater controls are adequate to meet the WLA.

7. If the evaluation shows that additional or modified controls are necessary, describe the type and schedule for the control additions/revisions. Continue Paragraphs four above through seven until two continuous monitoring cycles show that the WLAs are being met or that WQ standards are being met.

Part IV. Stormwater Management Programs

A. Requirements

You must develop, implement, and enforce a stormwater management program designed to reduce the discharge of pollutants from your small municipal separate storm sewer system to the maximum extent practicable (MEP) to protect water quality and to satisfy the appropriate water quality requirements of the Illinois Pollution Control Board Rules and Regulations (35 Ill. Adm. Code, Subtitle C, Chapter 1) and the Clean Water Act. Your stormwater management program must include the minimum control measures described in section B of this Part. You must develop and implement your program by 5 years from your coverage date under this permit.

B. Minimum Control Measures

The six minimum control measures to be included in your stormwater management program are:

1. Public education and outreach on stormwater impacts.

   You must:

   a. implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies and the steps that the public can take to reduce pollutants in stormwater runoff; and

   b. define appropriate BMPs for this minimum control measure and measurable goals for each BMP. These measurable goals must ensure the reduction of all of the pollutants of concern in your stormwater discharges to the maximum extent practicable.

2. Public Involvement/Participation.

   You must:

   a. at a minimum, comply with State and local public notice requirements when implementing a public involvement/ participation program; and

   b. define appropriate BMPs for this minimum control measure and measurable goals for each BMP, which must ensure the reduction of all of the pollutants of concern in your stormwater discharges to the maximum extent practicable.

3. Illicit discharge detection and elimination.

   You must:

   a. develop, implement, and enforce a program to detect and eliminate illicit discharges into your small MS4;

b. develop, if not already completed, a storm sewer system map, showing the location of all outfalls and the names and location of all waters that receive discharges from those outfalls;

c. to the extent allowable under state or local law, effectively prohibit, through ordinance or other regulatory mechanism, non-stormwater discharges into your storm sewer system and implement appropriate enforcement procedures and actions;

d. develop, implement, and adequately fund a plan to detect and address non-stormwater discharges, including illegal dumping, to your system;

e. inform public employees, businesses, and the general public of the hazards associated with illegal discharges and improper disposal of waste;

f. address the categories of non-stormwater discharges listed in Section I.B.2 only if you identify them as a significant contributor of pollutants to your small MS4 (discharges or flows from firefighting activities are excluded from the effective prohibition against non-stormwater and need only be addressed where they are identified as significant sources of pollutants to waters of the United States); and

g. define appropriate BMPs for this minimum control measure and measurable goals for each BMP. These measurable goals must ensure the reduction of all of the pollutants of concern in your stormwater discharges to the maximum extent practicable.

4. Construction site stormwater runoff control.

   You must:

   a. develop, implement, and enforce a program to reduce pollutants in any stormwater runoff to your small MS4 from construction activities that result in a land disturbance of greater than or equal to 1 acre. Reduction of stormwater discharges from construction activities disturbing less than 1 acre must be included in your program if that construction activity is part of a larger common plan of development or sale that would disturb 1 acre or more, or it has been designated by the permitting authority.

      Your program must include the development and implementation of, at a minimum:

      i. an ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to the extent allowable under state or local law;

      ii. requirements for construction site operators to implement appropriate erosion and sediment control best management practices;

      iii. requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality;

      iv. require all regulated construction sites to have a stormwater pollution prevention plan that meets the requirements of Part IV of NPDES permit No. ILR10, including management practices, controls, and other provisions at least as protective as the requirements contained in the Illinois Urban Manual, 2002;

v. procedures for site plan review which incorporate consideration of potential water quality impacts and review of individual pre-construction site plans to ensure consistency with local sediment and erosion control requirements;

vi. procedures for receipt and consideration of information submitted by the public; and

vii. procedures for site inspections and enforcement of control measures.

b. define appropriate BMPs for this minimum control measure and measurable goals for each BMP. These measurable goals must ensure the reduction of all of the pollutants of concern in your stormwater discharges to the maximum extent practicable.

5. Post-construction stormwater management in new development and redevelopment

You must:

a. develop, implement, and enforce a program to address stormwater runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale or that have been designated to protect water quality, that discharge into your small MS4. Your program must ensure that controls are in place that would protect water quality and reduce the discharge of pollutants to the maximum extent practicable;

b. develop and implement strategies which include a combination of structural and/or non-structural BMPs appropriate for your community that will reduce the discharge of pollutants to the maximum extent practicable;

c. use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under state or local law;

d. require all regulated construction sites to have post-construction management that meets or exceeds the requirements of Section IV (D)(2)(b) of NPDES permit No. ILR10 including management practices, controls, and other provisions at least as protective as the requirements contained in the Illinois Urban Manual, 2002;

e. ensure adequate long-term operation and maintenance of BMPs; and

f. define appropriate BMPs for this minimum control measure and measurable goals for each BMP. These measurable goals must ensure the reduction of all of the pollutants of concern in your stormwater discharges to the maximum extent practicable.

6. Pollution prevention/good housekeeping for municipal operations

You must:

a. develop and implement an operation and maintenance program that includes a training component and is designed to prevent and reduce the discharge of pollutants to the maximum extent practicable;

b. using training materials that are available from USEPA, the state of Illinois, or other organizations, your program must include employee training designed to prevent and reduce stormwater pollution from activities such as park and open space maintenance, fleet and building maintenance, operation of storage yards, snow disposal, new construction and land disturbances, and stormwater system maintenance procedures for proper disposal of street cleaning debris and catch basin material; it must address ways that flood management projects impact water quality, NPS pollution control, and aquatic habitat; and

c. define appropriate BMPs for this minimum control measure and measurable goals for each BMP. These measurable goals must ensure the reduction of all of the pollutants of concern in your stormwater discharges to the maximum extent practicable.

2.2 Point Sources—WWTPs

The WWTPs already have individual NPDES permits for their discharges. The DO TMDL should be implemented as described below. For chloride, the available data on existing WWTP effluent concentrations indicate that point sources are not a significant contribution to the chloride exceedances. The WLA can be implemented as a lumped value. As long as point sources collectively meet the lumped WLA, they will be considered in compliance with the TMDL. This will allow greater flexibility which is appropriate given that there is limited point source chloride data and that the concentration used to calculate the WLA is considerably lower than the standard.

2.3 Non-point Sources

Section 319 of the Clean Water Act (CWA) authorizes states to address NPS pollution through the development of assessment reports and the adoption and implementation of NPS management programs. USEPA awards grants to states to assist in implementing these programs. 319 programs are largely voluntary, and promote practices on a watershed scale. IEPA is the designated state agency in Illinois for the 319 program. IEPA provides technical assistance, and informational and educational programs and funding to various units of local government and other organizations to implement projects that utilize cost-effective BMPs (source: IEPA. *Illinois EPA and Section 319*. IEPA/BOW/98-010. August 1998).

Previous section 319 grants for watershed improvements in the Salt Creek watershed were primarily used to fund stream stabilization and wetland restoration projects. Additional wetland restoration projects, as well as structural water quality BMPs, may provide a benefit related to DO concentration levels in Salt Creek, but these particular projects are not of a type likely to have an impact on chloride concentration levels. Other types of projects, however, could be funded through the 319 program that would help implement the chloride TMDL, including the general BMPs identified above that are already not being utilized in the watershed. A total of $20 million in section 319 grant money has been awarded since 1990 to fund a total of 132 watershed improvement projects (source: IEPA. *Illinois EPA and Section 319*. IEPA/BOW/98-010. August 1998).

2.4 Reasonable Assurance

For watersheds that have a combination of point sources and NPS, where reduction goals can only be achieved by including some NPS reduction, the TMDL must incorporate reasonable assurances that NPS reductions will be implemented and effective in achieving the load allocation (source: USEPA. *Guidance for Water Quality-Based Decisions: The TMDL Process*. EPA 440/4-91-001. Month 1991).

The Salt Creek watershed is heavily urbanized, with only a very small percentage of agricultural land use (i.e., less than 1 percent). As the chloride TMDL largely focuses on the use of road salt for deicing, agricultural activities are not relevant to this TMDL. In addition, there are no load allocations for $CBOD_5$ or ammonia applicable to NPS for the DO TMDL. VSS reductions are applicable to stormwater and CSO discharges. Given the preponderance of urban/suburban land uses in the watershed, the success of the VSS reduction will not rely on a reduction from agricultural sources.

As such, point source controls will be utilized to achieve the TMDL reduction goals. Specifically, reductions from the WWTPs will be accomplished through the incorporation of wasteload allocations into individual NPDES permits. Stormwater control for MS4s will be accomplished through the NPDES Phase II general permit. These point source controls are described above.

The assurance of achievement of TMDL goals will be provided by point source permit programs.

3 Specific Implementation Considerations for Salt Creek Chloride and DO TMDLs

3.1 Chloride TMDL

The allocation scenario for chloride assumes that the WQS must be met at nearly all times and that a reduction in overall annual road salt application mass would be used to achieve that end. This is a very conservative approach because a reduction in an overall annual load may not be feasible or necessary to meet the designated uses. Thus, as described below, this approach should be further evaluated in the context of an adaptive or iterative implementation plan.

3.1.1 General BMPs for Road Deicing

The following BMPs are generally considered practicable for road deicing activities (source: FHWA. *Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring*. FHWQ-EP-00-002. May 2000).

- Optimization of use:

  Storage:

  - Salt storage piles need to be completely covered (i.e., use of salt domes)
  - Storage and handling operations should be performed on impervious surfaces
  - Stormwater runoff from areas where salt is stored should be contained in a suitable area

  Application:

  - Use of calibrated spreaders; trucks can be equipped with ground speed sensors that can accurately control the rate of spreading

   - Training programs for drivers and handlers should be implemented to improve the efficiency of application and to reduce losses
   - Snow plow operators need to avoid piling snow on or near frozen ponds, lakes, streams, or wetlands

- Other:
   - Identify ecosystems that are sensitive to salts
   - Use of alternatives such as calcium chloride and calcium magnesium acetate may be less environmentally harmful to sensitive ecosystems; these alternatives are more expensive than regular salt, but they are less corrosive to bridges and overpasses (see Tables 1 and 2 for information on these alternatives)
   - In some instances, sanding may be used in place of salt to improve traction, but the use of sand may not be appropriate where sedimentation has adverse environmental impacts

TABLE 1
Alternative Road Deicers—Temperature, Cost, and Environmental Considerations

Check the Label For	Works Down to:	Cost is:	Environmental Impacts
Calcium Magnesium Acetate (CMA)	22°F to 25°F	20× more than rock salt	(+) Less toxic
Calcium Chloride (CaCl)	-25°F	3× more than rock salt	(+) Can use lower doses (+) No cyanide (-) Chloride impact
Urea	20°F to 25°F	5× more than rock salt	(+) Less corrosion (-) Adds needless nutrients
Sand	No melting effect	~$3 for a 50 lb bag	(-) Accumulates in streets and streams
Sodium Chloride (NaCl; rock salt)	15°F	~$5 for a 50 lb bag	(-) Contains cyanide (-) Chloride impact

Source: Envirocast Newsletter. Volume 1, No. 3. http://www.stormcenter.com/envirocast/2003-01-01. January 2003.

TABLE 2
Alternative Road Deicers—Temperature and Cost Considerations

Deicer	Minimum Operating Temperature	Cost ($/lane mile/season)
Sodium chloride	12°F	$6,371-6,909
Calcium chloride	-20°F	$6,977-7,529
CG-90 Surface Saver	1°F	$5,931-6,148
Calcium Magnesium Acetate	23°F	$12,958-16,319

Source: Center for Watershed Protection. *Stormwater BMP Design Supplement for Cold Climates*. Prepared for USEPA. December 1997.

3.1.2 Specific Road Salting BMPs–Salt Creek Watershed

Local communities, IDOT, and the Illinois Tollway Authority are the primary parties responsible for the removal of snow and the application of road salt within the Salt Creek watershed. While specific practices may vary from community to community, the following typical general description is applicable. This information is based on responses given during telephone interviews of officials from several of the communities in the watershed, IDOT, and the Illinois Tollway Authority.

IDOT is responsible for maintaining state highways and roads including snow removal and road salt application operations. These roadways typically, although not always, have an U. S. or Illinois state highway route number assigned to them. While IDOT has agreements with some municipalities in the State under which the local municipality conducts the maintenance operations in place of IDOT, these agreements are rare in DuPage County.

The Illinois Tollway Authority is responsible for maintaining tollways, including snow removal and road salt application operations. The I-88 and I-294 Tollways are located within the Salt Creek watershed. The Tollway Authority typically dispatches snow removal and road salt application crews during or immediately after a snow event. Snow that is cleared is deposited in the Tollway right-of-way off the shoulder of the road or within the Tollway median. The Tollway Authority uses digitally-calibrated spreader trucks at an application rate of either 200, 300, or 500 lb/road-mile for its salting operations. The application rate used depends on several factors, including the severity of the storm and present road conditions. The spreader trucks are automated to spread salt at the selected rate regardless of vehicle speed. Operators are required to participate in a yearly training program.

DuPage County and local communities and townships located within the watershed are responsible for maintaining all county roadways and local streets, including local collector and arterial streets. Municipal Public Works Departments typically dispatch snow removal and road salt application crews during or immediately after a snow event. In most cases, snow that is cleared is deposited on the side of the road. In certain locations, such as in downtown areas, the snow that is cleared may be hauled away and stored at a central location. With the possible exception of snow storage sites located upstream of a local stormwater detention basin, such sites typically do not have erosion and sediment control practices or structural or non-structural water quality BMPs in place. Most communities are in the process of phasing in new salt spreader trucks which tend to have automated salt spreader controls that are connected to the vehicle's speedometer and which automatically apply salt at a proscribed rate regardless of vehicle speed. Newer salt spreader trucks are digitally calibrated and do not need to be calibrated yearly, as is generally required for older salt spreader trucks. Those communities which use older salt spreader trucks typically instruct drivers to stop spreading salt when the truck is stopped at a stoplight or in traffic. Training procedures vary by municipality, but all drivers are trained upon hiring, and most communities have some type of annual meeting or annual training requirements.

The following agencies or communities within the Salt Creek watershed were contacted to provide information about their snow removal and salt application activities: DuPage County, Illinois Tollway Authority, Illinois Department of Transportation, Addison, and Elmhurst. Information on whether the agency/community has a written snow plan, conducts yearly training, and/or owns digitally-calibrated salt spreading equipment is presented below.

TABLE 3
Summary of Snow Removal and Salt Application Information Collected from Selected Agencies and Municipalities

Agency/Community	Written Plan	Yearly Training	Digital Spreaders
IDOT	Yes	No	"Vast Majority"
Tollway	Yes	Yes	Yes
DuPage County	No	No	8 of 40
Addison	Yes	Yes	No
Elmhurst	Yes	Yes	No

The following is a list of municipal and government entities which are likely to conduct snow removal and salt application operations within the Salt Creek watershed:

Addison
Arlington Heights
Bellwood
Bensenville
Berkeley
Bloomingdale
Broadview
Brookfield
Clarendon Hills
Downers Grove
Elk Grove Village
Elmhurst
Franklin Park
Hillside
Hinsdale
Hoffman Estates
Inverness
Itasca
La Grange
La Grange Park
Lombard
Lyons
Maywood
Melrose Park
North Riverside
Northlake
Oak Brook
Oakbrook Terrace
Palatine
Riverside
Rolling Meadows
Roselle
Schaumburg
Stone Park
Villa Park
Westchester
Western Springs
Westmont
Wood Dale
Cook County
DuPage County
Downers Grove Township
Elk Grove Township
Lyons Township
Palatine Township
Proviso Township
Schaumburg Township
Wheeling Township
York Township
Illinois Department of Transportation
Illinois Tollway Authority

3.1.3 Recommended Management Actions and Institutional Arrangements

It is recognized that road deicing is necessary for public safety. Thus, the implementation of the chloride TMDL by MS4s should be based on prudent and practicable road salting BMPs to the extent that the safety of the public is not compromised.

Section III C. of IEPA General Permit No. ILR40, *General NPDES Permit for Discharges from Small Municipal Separate Storm Sewer Systems,* identifies the specific actions and schedule that each permittee will be required to follow to comply with TMDLs. If it is determined that a permittee will need to implement additional BMPs beyond those already in place, then the general road salting BMPs identified should be evaluated for their applicability and effectiveness as a part of that permittee's plan to comply with TMDLs.

The General Permit requires that each permittee notify IEPA if it does not currently meet the WLA for a TMDL. For the chloride TMDL, separate WLAs were not identified according to each individual jurisdiction that conducts road deicing activities. Instead, a single allocation was made for a category of discharges, namely deicing-related discharges. Thus, permittees should have the option of either: 1) demonstrating to IEPA that their activities do not cause or contribute to chloride exceedances, 2) using prudent and practicable BMPs already in place, or 3) proceeding to implement the remaining TMDL provisions of the General Permit.

3.1.4 Cost Considerations

It is anticipated that many of the general BMPs identified above for road salting, if not already in place, can be implemented over time by the appropriate jurisdictions. For example, the controlled application of salt is a reasonable and prudent step that is commonly used to avoid over-salting. However, the use of alternative deicing agents will have to be carefully considered by each permittee in relation to cost, applicability, practicability, and public safety. As shown above, costs for alternatives to sodium chloride-based rock salt are substantially higher, and these alternatives cannot be used in all conditions or locations. In addition, each of the alternatives poses its own adverse water quality impacts which must be taken into consideration.

3.2 DO TMDL

3.2.1 Specific Treatment Technologies–Salt Creek Watershed

The WWTPs in the Salt Creek watershed have existing individual NPDES permits that contain limitations requiring at least secondary treatment (i.e., monthly $CBOD_5$ limits in the 10 to 20 mg/L range; and monthly ammonia limits in the 1.5 to 2.3 mg/L range, requiring nitrification). The 1995 model calibration data set and DMR data from 1995 through 2000 show that these WWTPs generally discharge $CBOD_5$ and ammonia concentrations that are well below these permitted limits (Table 4 summarizes the DMR data).

TABLE 4
Summary of Average Effluent Concentrations for Salt Creek WWTPs, 1995–2000

NPDES#	Facility	Design Flow, mgd	Parameter	DMR Maximum, mg/L	DMR Average, mg/L	mg/L
IL0036340	MWRDGC EGAN WRP	30	Nitrogen, ammonia total (as n)	2.1	0.17	1.5
IL0036340	MWRDGC EGAN WRP		Bod, carbonaceous 05 day, 20c	10.0	1.40	10
IL0020061	Wood Dale North STP	2	Nitrogen, ammonia total (as n)	3.2	0.40	1.5
IL0020061	Wood Dale North STP	-	Bod, carbonaceous 05 day, 20c	8.0	3.92	20
IL0021849	Bensenville STP	4.7	Nitrogen, ammonia total (as n)	8.0	0.37	1.5
IL0021849	Bensenville STP	-	Bod, carbonaceous 05 day, 20c	17.0	1.22	10
IL0026280	Itasca STP	2.6	Nitrogen, ammonia total (as n)	1.5	0.50	1.5

TABLE 4
Summary of Average Effluent Concentrations for Salt Creek WWTPs, 1995–2000

IL0026280	Itasca STP	-	Bod, carbonaceous	05 day, 20c	3.2	1.33	20
IL0027367	Addison South–A.J. Larocca STP	3.2	Nitrogen, ammonia	total (as n)	7.3	0.22	1.5
IL0027367	Addison South–A.J. Larocca STP	-	Bod, carbonaceous	05 day, 20c	5.2	3.01	20
IL0028398	DuPage County–Nordic Park STP	0.5	Nitrogen, ammonia	total (as n)	36.0	0.81	1.5
IL0028398	DuPage County–Nordic Park STP	-	Bod, carbonaceous	05 day, 20c	13.5	1.34	10
IL0028746	Elmhurst WWTP	8	Nitrogen, ammonia	total (as n)	4.0	0.36	2.3
IL0028746	Elmhurst WWTP	-	Bod, carbonaceous	05 day, 20c	11.0	2.40	10
IL0030813	Roselle STP		Nitrogen, ammonia	total (as n)	1.6	0.25	
IL0030813	Roselle STP	-	Bod, carbonaceous	05 day, 20c	8.0	3.16	
IL0030953	Salt Creek Sanitary District	3.3	Nitrogen, ammonia	total (as n)	10.5	0.79	1.5
IL0030953	Salt Creek Sanitary District	-	Bod, carbonaceous	05 day, 20c	10.4	2.23	10
IL0033812	Addison North STP	5.3	Nitrogen, ammonia	total (as n)	4.6	0.15	1.5
IL0033812	Addison North STP	-	Bod, carbonaceous	05 day, 20c	8.7	2.69	20
IL0034274	Wood Dale South STP	1.1	Nitrogen, ammonia	total (as n)	2.1	0.20	1.5
IL0034274	Wood Dale South STP		Bod, carbonaceous	05 day, 20c	9.0	2.81	20

Note: Data is representative of April through September only.

3.2.2 Recommended Actions and Institutional Arrangements

Two allocation scenarios have been developed for the TMDL:

- Reduce average monthly WWTP permit limits for the summer season to 5 mg/L $CBOD_5$ and 1 mg/L ammonia (except Bensenville, which would have limits of 10 mg/L $CBOD_5$ and 1 mg/L ammonia)
- Remove the dam at river mile 11.6 and reduce monthly average WWTP permit limits for the summer season to 8 mg/l $CBOD_5$ and 1 mg/L ammonia (except Bensonville which must meet 10 mg/L $CBOD_5$ to protect Addison Creek).

Both scenarios envision a VSS reduction through stormwater and CSO management to reduce the SOD.

DMR data for the WWTPs (Table 4) show that average summer values for $CBOD_5$ and ammonia are below the proposed limits for the allocation scenario using reduced monthly limits in summer. Thus, it may be possible that these WLAs can be met with little or no additional treatment. Additional review of the design and compliance implications should be further discussed with the permittees, including how future growth might be addressed without exceeding the overall WLA mass restriction. Institutionally, if this allocation scenario is implemented, the limits in the permits would need to be changed to be consistent with the TMDL WLAs. If the dam removal option is pursued, permits limits would not need to be reduced as much

A reduction in VSS through stormwater and CSO management would be expected to occur over time in relation to the implementation of Phase II of the stormwater program and in compliance with CSO permits. Evaluation of the long-term reduction of VSS should be accomplished by periodic DO monitoring in Salt Creek and, if resources allow, periodic measurement of the SOD at appropriate locations.

3.2.3 Cost Considerations

As noted above, the existing effluent quality may already meet the first allocation scenario. If additional treatment is required, it would likely be needed to meet the $CBOD_5$ limits, and it would likely be accomplished through effluent filtration. Effluent filtration costs can vary considerably according to specific site considerations. A capital cost of about $0.30 per gallon of wastewater treated is a fairly typical cost for municipal effluent filtration (compared to $1.50 to $2.50 per gallon treated for secondary treatment). Thus, given that the total existing design capacity of the WWTPs affected by this TMDL is about 60 mgd, the incremental cost to add filtration to all of the facilities may cost about $18 million.

Costs to implement the dam removal option cannot be estimated at this time due to the highly variable site-specific factors.

4 Adaptive Management

4.1 Chloride TMDL

The chloride criteria exceedances for Addison and Salt creeks, both monitored and modeled, are infrequent (less than 10 percent of the time). For example, USEPA guidance recommends that water bodies should only be considered impaired if exceedances occur more than a given percent of time, depending on such factors as pollutant type and data distribution (see USEPA July 2002 Consolidated Assessment and Listing Methodology guidance). For acute and chronic chemical criteria for conventional pollutants, the USEPA guidance identifies a greater than 10 percent exceedance threshold for non-attainment of standards and 305(b) and 303(d) listings. In addition, it may be possible to identify which specific hydrologic and salt application conditions lead to elevated instream chloride concentrations through additional discussion with permittees, or through additional monitoring and/or modeling activities. It may be possible to target control actions specific to these conditions. If successful, it would not be necessary to achieve an overall annual salt application reduction of the magnitude indicated in the TMDL.

4.2 DO TMDL

For the allocation scenarios above, point source WWTP discharges may not be required to reduce existing $CBOD_5$ and ammonia loads to meet the WLAs for these pollutants based on observed effluent loads, but such discharges would have to comply with allocations below existing permitted loads. This is because the observed effluent loads from point sources based on a 1995 USGS sampling of these discharges for their model calibration dataset and DMR data from 1995 through 2000 are generally below current permitted monthly limitations. In addition, this TMDL did not evaluate different allocation scenarios that may be worth considering. For example, an allocation scenario other than equal effluent quality for all facilities may be appropriate and would be consistent with this TMDL as long as the overall target is met and DO standards are protected in Salt Creek. Dam removal may also be a viable element of implementation of the DO TMDL, perhaps through a water quality trading process or some other mechanism. In addition, reduction of VSS from stormwater and CSO sources will occur over time in relation to implementation of the Phase II and

WWTP NPDES permits. However, the improvement in DO due to reduction of SOD that derives from this will take an uncertain amount of time with uncertain effectiveness.

4.3 Recommended Elements of Adaptive TMDL Implementation

The following discussion summarizes adaptive management language included in the Tualatin River TMDL, as approved by USEPA (source: Oregon DEQ. August 2001).

As a goal of the CWA and associated administrative rules for Illinois, water quality standards shall be met or all feasible steps should be taken toward achieving the highest quality water attainable. This is a long-term goal in many watersheds. The TMDLs developed for the Salt Creek watershed are based on mathematical models and other analytical methods that are designed to simulate complicated physical, chemical, and biological processes. They are, to a certain extent, simplifications of the actual processes, and thus do not produce an exact prediction of a particular system response to pollutants. These uncertainties have been recognized and conservative assumptions have been used to address them, as acknowledged in the margin of safety considerations. Subject to available resources, IEPA should review, and, if necessary, modify the TMDLs if IEPA determines that new scientific information is available which indicates that significant changes are warranted.

This watershed plan is designed to reduce pollutant loads to meet TMDL targets. However, it should be recognized that it may take an extended period of time before management practices become fully effective in reducing and controlling certain pollutants (i.e., VSS reductions manifesting in lower SODs). In addition, technology for controlling some pollutant sources, such as NPS and stormwater, are in the early stages of development, and it will take one or more iterations to develop effective techniques. Finally, it is possible that after application of all reasonable BMPs, some of these TMDLs cannot be achieved as originally established.

When developing WQBELs for NPDES permits, IEPA should ensure that the limits are consistent with the assumptions of the WLA (40 CFR 122.44(d)(1)(vii)(B)) and work with stormwater permittees in developing management plans that are consistent with the TMDLs.

IEPA should regularly review progress towards achievement of the TMDLs. If and when IEPA determines that the plan has been fully implemented, that all feasible practices have reached maximum effectiveness, and that a TMDL or its target have not been achieved, the TMDL should be reopened, and the targets and associated water quality standards adjusted as necessary. The determination that all feasible steps have been taken should be based on site-specific balancing of: 1) the protection of designated uses, 2) appropriateness to local conditions, 3) the use of best treatment technologies or BMPs, and 4) the cost of compliance.