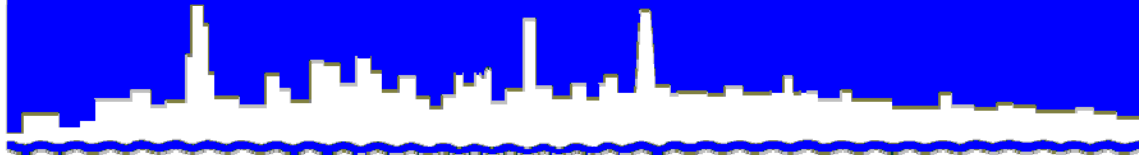


Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago

***MONITORING AND RESEARCH
DEPARTMENT***

REPORT NO. 14-21

***CONTINUOUS DISSOLVED OXYGEN MONITORING
IN THE DEEP-DRAFT CHICAGO WATERWAY SYSTEM
DURING 2013***

July 2014

Metropolitan Water Reclamation District of Greater Chicago

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IN THE DEEP-DRAFT CHICAGO WATERWAY SYSTEM
DURING 2013**

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Particular thanks are due to Marie Biron for reviewing, editing, and preparing the report for print.

DISCLAIMER

Mention of proprietary equipment and chemicals in this report does not constitute endorsement by the Metropolitan Water Reclamation District of Greater Chicago.

INTRODUCTION

The Chicago Area Waterway System (CAWS) consists of 78 miles of canals, which serve the Chicago area for two principal purposes: (1) the drainage of urban stormwater runoff and treated municipal wastewater effluent, and (2) the support of commercial navigation. Approximately 75 percent of the length is composed of man-made canals, and the remainder is composed of natural streams that have been deepened, straightened, and/or widened to such an extent that reversion to the natural state is not possible. The flow of water in the CAWS is artificially controlled by hydraulic structures. The CAWS has two river systems: The Calumet River System and the Chicago River System (CRS).

More than 30 years ago, the Metropolitan Water Reclamation District of Greater Chicago (District) determined that applicable Illinois Pollution Control Board (IPCB) dissolved oxygen (DO) standards for Chicago area waterways could not be met exclusively by advanced wastewater treatment at its three major regional water reclamation plants (WRPs), the Calumet, the Terrence J. O'Brien (O'Brien), and the Stickney WRPs, and by the capture and treatment of combined sewer overflows (CSOs). In order to increase the DO concentration in the Chicago and Calumet River Systems, the District designed and constructed artificial aeration systems (instream diffuser and sidestream elevated pool aeration stations during the late 1970s and early 1990s, respectively).

From October 1994 through May 1996, the Monitoring and Research (M&R) Department conducted weekly DO surveys in the CRS. Water samples were collected manually, chemically fixed in the field, and returned to the laboratory for analysis. The results from these surveys showed that DO concentrations in selected waterway reaches were less than the IPCB DO standards applicable to these reaches.

In 1998, M&R initiated a comprehensive field-monitoring program in order to locate and identify reaches in the CRS where the DO concentration were below the applicable IPCB DO standard. Initially, the program was to focus on the CRS for a two-year period. The scope of the monitoring program was expanded to include the Calumet River System, and then later, the Chicago area wadeable streams. Currently, continuous DO monitoring in the CRS and Calumet River System is required in NPDES permits for the O'Brien, Stickney, and Calumet WRPs. The data are used to characterize the DO behavior in waterway systems receiving District effluents. The resulting data have also been used for the calibration and verification of a water quality model for the CAWS.

Data in this report are from 14 deep-draft continuous DO monitoring stations of the District's Continuous Dissolved Oxygen Monitoring (CDOM) Program. This report covers the monitoring results for the period January 1, 2013, through December 31, 2013, for the deep-draft waterways of the CRS and the Calumet River System.

MONITORING LOCATIONS AND APPLICABLE DISSOLVED OXYGEN STANDARDS

Locations and Descriptions

The CDOM Program supplies the District with water quality data throughout the year for both the wadeable and deep-draft waterways within its jurisdiction. All of the 2013 CDOM stations are shown in Figure 1. Descriptions of the locations for the deep-draft monitoring stations are listed in Table 1.

Effective June 18, 2013, the CDOM station at Kinzie Street on the North Branch Chicago River was discontinued and replaced with a monitoring station upstream at Division Street.

Designated Uses

The IPCB has assigned water uses for specific water bodies within the state of Illinois. All waters in Illinois are designated for General Use, except those selected as Secondary Contact and Indigenous Aquatic Life Waters (Secondary Contact). In the Chicago and Calumet River Systems, General Use Waters include the North Shore Channel from Lake Michigan to the O'Brien WRP, and the Chicago and Calumet Rivers. Secondary Contact Waters include the North Shore Channel from the O'Brien WRP to the North Branch Chicago River, the North Branch of the Chicago River from the North Shore Channel to the Chicago River, the South Branch of the Chicago River, Bubbly Creek, the Chicago Sanitary and Ship Canal (CSSC), the Grand Calumet River, the deep-draft portion of the Little Calumet River, the Calumet-Sag Channel, and the Des Plaines River from its confluence with the CSSC to the Interstate Highway 55 bridge southwest of Joliet.

Dissolved Oxygen Water Quality Standards

The IPCB has established water quality standards for DO in both General Use and Secondary Contact Waters. In Secondary Contact Waters, the DO shall not be less than 4.0 mg/L at any time, except in the Calumet-Sag Channel, where the DO shall not be less than 3.0 mg/L at any time, and in the portion of the North Shore Channel from the O'Brien WRP to the North Branch Chicago River, where the DO shall not be less than 5.0 mg/L for 16 hours of any 24-hour period nor less than 4.0 mg/L at any time. On December 18, 2009, the United States Environmental Protection Agency approved new DO standards for General Use Waters in the state of Illinois. In General Use Waters the DO shall not be less than 3.5 mg/L at any time and shall meet a 4.0 mg/L daily minimum averaged over seven days and shall meet a 5.5 mg/L daily mean averaged over 30 days from August through February; and the DO shall not be less than 5.0 mg/L at any time and shall meet a 6.0 mg/L daily mean averaged over seven days from March through July.

FIGURE 1: 2013 CONTINUOUS DISSOLVED OXYGEN MONITORING STATIONS

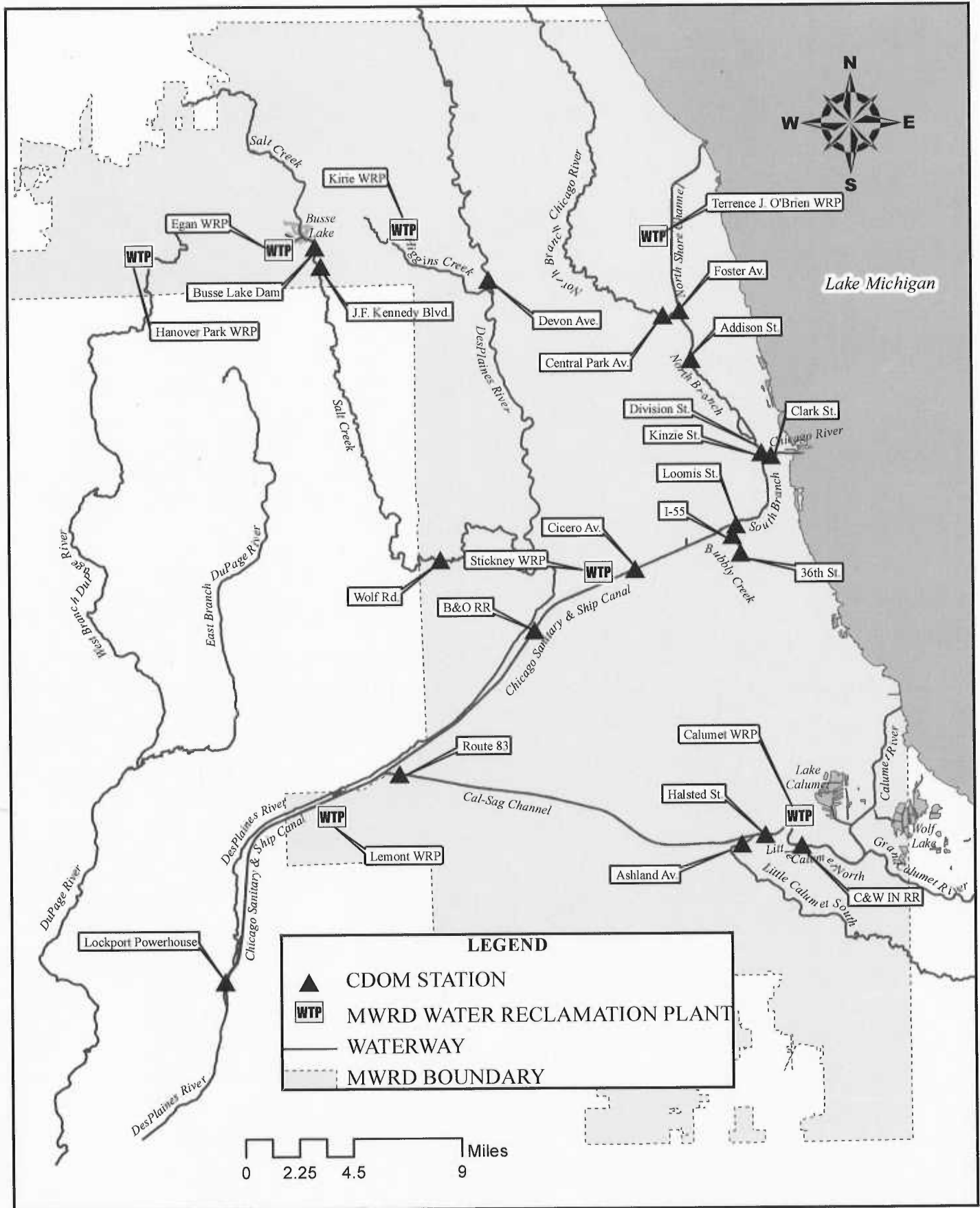


TABLE 1: DEEP-DRAFT CONTINUOUS DISSOLVED OXYGEN
MONITORING STATIONS DURING 2013

Monitoring Station	Waterway	Description of Monitoring Station
<u>Chicago River System</u>		
Foster Avenue	North Shore Channel	3.2 miles below O'Brien WRP outfall, 1.5 miles below Devon Aeration Station, 0.1 mile above junction with North Branch Chicago River, monitor on northwest side Foster Avenue bridge, 3 feet below water surface.
Addison Street	North Branch Chicago River	5.2 miles below O'Brien WRP outfall, monitor on northwest side Addison Street bridge, 3 feet below water surface.
Division Street	North Branch Chicago River	8.8 miles below O'Brien WRP outfall; 1.4 miles below Webster Aeration Station; monitor on northeast side Division Street bridge, 3 feet below water surface.
Kinzie Street	North Branch Chicago River	9.9 miles below O'Brien WRP outfall, 3.1 miles below Webster Aeration Station, 0.2 mile above junction with Chicago River, monitor on northeast side Kinzie Street bridge, 3 feet below water surface.
Clark Street	Chicago River	1.2 miles below Chicago River Controlling Works, 0.4 mile above junction with South Branch Chicago River, monitor on northeast side Clark Street bridge, 3 feet below water surface.
Loomis Street	South Branch Chicago River	3.6 miles below junction with Chicago River, monitor on northeast side Loomis Street bridge, 3 feet below water surface.

TABLE 1 (Continued): DEEP-DRAFT CONTINUOUS DISSOLVED OXYGEN
MONITORING STATIONS DURING 2013

Monitoring Station	Waterway	Description of Monitoring Station
<u>Chicago River System (Continued)</u>		
36th Street	Bubbly Creek	0.2 mile below Racine Avenue Pumping Station, 1.2 miles above junction with South Branch of the Chicago River, monitor attached to concrete wall on west side of river, 3 feet below water surface.
Interstate Highway 55	Bubbly Creek	1.0 mile below Racine Avenue Pumping Station, 0.4 mile above junction with South Branch of the Chicago River, monitor on northwest side I-55 bridge, 3 feet below water surface.
Cicero Avenue	Chicago Sanitary and Ship Canal	1.5 miles above Stickney WRP outfall, 1.1 miles below Crawford Generating Station cooling water discharge, monitor on northeast side Cicero Avenue bridge, 3 feet below water.
B&O Central Railroad	Chicago Sanitary and Ship Canal	3.6 miles below Stickney WRP outfall, monitor in center of canal, east side B&O Central RR bridge, 3 feet below water surface.
Lockport Powerhouse	Chicago Sanitary and Ship Canal	0.1 mile above Lockport Powerhouse, 1.1 miles above junction with Des Plaines River, monitor on north side of canal, in forebay area on fender wall, 3 feet below water surface.

TABLE 1 (Continued): DEEP-DRAFT CONTINUOUS DISSOLVED OXYGEN
MONITORING STATIONS DURING 2013

Monitoring Station	Waterway	Description of Monitoring Station
<u>Calumet River System</u>		
C&W Indiana Railroad	Little Calumet River	5.2 miles below SEPA 1, 1.5 miles above SEPA 2, 3.6 miles below Thomas J. O'Brien Lock and Dam, 1.3 miles above Calumet WRP outfall, monitor attached to northeast side C&W Indiana RR bridge, 3 feet below water surface.
Halsted Street	Little Calumet River	7.7 miles below SEPA 1, 1.0 mile below SEPA 2, 1.2 miles below Calumet WRP, 0.5 mile above junction with Calumet-Sag Channel, monitor attached to southeast side Halsted Street bridge, 3 feet below water surface.
Route 83	Calumet-Sag Channel	0.4 mile above junction with Chicago Sanitary and Ship Canal, 0.3 mile above Canal Junction SEPA Station, monitor on southwest side Illinois Central-Gulf RR bridge, 3 feet below water surface.

MATERIALS AND METHODS

Water Quality Monitor

The continuous water quality monitors (monitor) used to collect these data were manufactured by YSI Incorporated (YSI) of Yellow Springs, Ohio. The DO was measured hourly using the YSI Model 6920 or Model 6600 monitor. In order to protect and safeguard the monitors from marine navigation and vandalism, the monitors were deployed in the field in stainless steel housings. A fixed length of 8-inch diameter stainless steel pipe is mounted on a bridge abutment with multiple 2-inch circular openings on the submerged end to allow sufficient flow of water through the pipe and an access hatch on the top end to allow for the exchange of monitors.

The District personnel retrieved each monitor from the field following 14 days of continuous monitoring. Prior to retrieval, a water sample was collected next to the protective housing for DO analysis using the Winkler method for subsequent comparison with the monitor results. An additional monitor, that had been previously calibrated and serviced in the laboratory, was then deployed to replace the retrieved monitor. The retrieved monitors were returned to the laboratory for data downloading, exterior cleaning, servicing, and calibration of the DO sensors. The monitors were temporarily stored in holding tanks containing tap water for subsequent deployment during the following week.

Data Management and Review

Hourly DO data were directly exported electronically from individual monitors to a specially designed Oracle[®] database for data processing and storage. All DO data were carefully reviewed for accuracy.

The review process included the following:

1. Comparing the grab sample DO concentration measured in the field with a DO concentration recorded by the respective monitor retrieved in the field (DO rejection criteria = difference greater than 2.0 mg/L).
2. Comparing the last hourly DO concentration measured by the monitor retrieved in the field with the first hourly DO concentration recorded by the monitor that replaced it (DO rejection criteria = difference greater than 2.0 mg/L).
3. Comparing a DO concentration measured in a laboratory holding tank and a DO concentration recorded by a monitor after retrieval from the field (DO rejection criteria = difference greater than 1.0 mg/L).

Criterion 3 would entail rejection of all hourly readings; criteria 1 and 2 may or may not result in rejection of all readings. Incidents of equipment malfunction would also entail rejection of data. Only data that met the quality control criteria were used to compile the results in this report.

A comprehensive description of methods is presented in Revision 2.0 of the Continuous Dissolved Oxygen Monitoring Program Quality Assurance Project Plan, Effective April 1, 2011.

Cross-Sectional Surveys

During the spring, summer, and fall of 2013, cross-sectional DO surveys were conducted in the Chicago River System and Calumet River System, to determine if the fixed continuous monitoring locations represented the DO concentrations across the waterway. The DO concentrations were measured directly with a monitor at multiple locations and depths across the waterway. The cross-sectional DO measurements were taken in the center of the waterway and at the right and left side of the flow from a bridge, catwalk, or boat. DO measurements were recorded at up to four depths for each location, including just above the bottom of the stream bed, one-half the total depth, three feet below the surface, and at the surface. If the overall depth was less than eight feet, then the one-half depth measurement was not recorded. If the overall depth was less than four feet, only bottom and surface measurements were recorded. If the overall depth was less than one foot, only a surface measurement was recorded.

RESULTS

The annual minimum, maximum, and mean DO concentrations measured at all 14 stations during 2013 are shown in Table 2.

The number and percent of measured DO concentrations rejected and removed from the Oracle® database following review during 2013 are summarized in Table 3.

The percent distribution of DO concentrations in 1 mg/L increments from <1.0 mg/L to >5.0 mg/L at the 14 deep-draft monitoring stations during 2013 are presented in Table 4. The current national one-day minimum DO criterion for adult life stages of fish is 3.0 mg/L (USEPA, 1986).

Individual graphs showing hourly DO concentrations at each monitoring station are presented in Figures 2 through 15 including applicable any time DO standards for reference. Weekly DO summary statistics during 2013 are presented for each monitoring station in Appendix A, Tables A-1 through A-14.

Summary statistics for DO measured during cross-sectional surveys are shown in Appendix A, Table A-15. The results from the cross-sectional surveys showed that the differences across the waterway were generally small.

TABLE 2: MINIMUM, MAXIMUM, AND MEAN HOURLY DISSOLVED OXYGEN CONCENTRATIONS DURING 2013^a

Monitoring Station	Waterway	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
<u>Chicago River System</u>				
Foster Avenue	North Shore Channel	3.7	12.5	7.3
Addison Street	North Branch Chicago River	3.4	11.7	7.6
Division Street ^b	North Branch Chicago River	1.3	9.8	6.3
Kinzie Street ^c	North Branch Chicago River	4.7	10.9	8.2
Clark Street	Chicago River	2.1	13.1	7.7
Loomis Street	South Branch Chicago River	0.7	11.4	7.0
36 th Street	Bubbly Creek	0.0	25.5	4.5
Interstate Highway 55	Bubbly Creek	0.0	18.5	3.9
Cicero Avenue	Chicago Sanitary and Ship Canal	0.0	12.2	6.2
B&O Central Railroad	Chicago Sanitary and Ship Canal	1.5	10.6	7.4
Lockport Powerhouse	Chicago Sanitary and Ship Canal	0.7	10.2	6.4
<u>Calumet River System</u>				
C&W Indiana Railroad	Little Calumet River	0.5	21.4	9.7
Halsted Street	Little Calumet River	0.2	13.8	6.8
Route 83	Calumet-Sag Channel	1.5	12.6	6.8

^aDissolved oxygen was measured hourly using a YSI Model 6920 or Model 6600 continuous water quality monitor.

^bData collected after June 18, 2013.

^cData collected through June 18, 2013.

TABLE 3: NUMBER AND PERCENT OF DISSOLVED OXYGEN VALUES NOT MEETING ACCEPTANCE CRITERIA DURING 2013^a

Monitoring Station	Waterway	Number of DO Values Rejected	Percent of DO Values Rejected
<u>Chicago River System</u>			
Foster Avenue	North Shore Channel	59	1 ^b
Addison Street	North Branch Chicago River	1,349	15 ^c
Division Street ^d	North Branch Chicago River	673	14 ^e
Kinzie Street ^f	North Branch Chicago River	674	17 ^g
Clark Street	Chicago River	343	4 ^h
Loomis Street	South Branch Chicago River	1,370	16 ⁱ
36 th Street	Bubbly Creek	3,020	34 ^j
Interstate Highway 55	Bubbly Creek	1,660	19 ^k
Cicero Avenue	Chicago Sanitary and Ship Canal	1,345	15 ^l
B&O Central Railroad	Chicago Sanitary and Ship Canal	984	11 ^m
Lockport Powerhouse	Chicago Sanitary and Ship Canal	1,042	12 ⁿ
<u>Calumet River System</u>			
C&W Indiana Railroad	Little Calumet River	1,993	23 ^o
Halsted Street	Little Calumet River	2,029	23 ^p
Route 83	Calumet-Sag Channel	0	0

^aDissolved oxygen was measured hourly using a YSI Model 6920 or Model 6600 continuous water quality monitor. DO values were rejected based on quality control check and/or operational problems with monitor.

^b1/1 - 3/13 monitor failed criterion 3.

^c5/7 - 6/4/13 monitor failed criteria 1 and 2. 7/30 - 8/13/13, 9/10 - 9/24/13 monitor failed criterion 3.

^dData collected after June 18, 2013.

^e8/13 - 8/27/13 monitor failed criteria 1 and 2. 8/27 - 9/10/13 monitor failed criterion 3.

^fData collected through June 18, 2013.

^g5/7 - 6/4/13 monitor failed criteria 1 and 2.

^h6/4 - 6/18/13 monitor failed criterion 3.

ⁱ5/15 - 5/30/13 monitor failed criterion 3. 7/11 - 7/24/13, 8/21 - 9/5/13 monitor failed criteria 1 and 2.

^j2/6 - 3/20/13, 4/17 - 5/15/13, 6/26 - 7/10/13 monitor failed criterion 3. 8/7 - 8/21/13, 9/18 - 10/16/13 monitor failed criteria 1 and 2.

^k3/6 - 3/20/13 monitor failed criterion 3. 3/20 - 4/3/13, 5/1 - 5/15/13, 5/30 - 6/12/13, 10/2 - 10/16/13 monitor failed criteria 1 and 2.

^l4/17 - 5/1/13, 6/12 - 6/26/13, 8/7 - 8/21/13 monitor failed criterion 3. 9/18 - 10/2/13 monitor failed criteria 1 and 2.

^m7/10 - 7/23/13 monitor failed criteria 1 and 2. 7/23 - 8/20/13 monitor failed criterion 3.

ⁿ5/29 - 7/10/13 monitor failed criterion 3.

^o5/29 - 7/23/13 monitor failed criteria 1 and 2. 7/23 - 8/20/13 monitor failed criterion 3.

^p1/1 - 1/8/13 monitor failed criterion 3. 5/29 - 7/10/13, 9/4 - 10/9/13 monitor failed criteria 1 and 2.

TABLE 4: PERCENT OF DISSOLVED OXYGEN VALUES IN SELECTED RANGES DURING 2013

Monitoring Station	Waterway	Percent of DO Values in Range (mg/L) ^a					
		<1	1-<2	2-<3	3-<4	4-<5	≥5
<u>Chicago River System</u>							
Foster Avenue	North Shore Channel	0	0	0	<1	1	99
Addison Street	North Branch Chicago River	0	0	0	<1	3	97
Division Street ^b	North Branch Chicago River	0	<1	1	4	10	85
Kinzie Street ^c	North Branch Chicago River	0	0	0	0	<1	>99
Clark Street	Chicago river	0	0	<1	1	2	97
Loomis Street	South Branch Chicago River	<1	1	1	2	16	81
36 th Street	Bubbly Creek	44	7	5	5	5	34
Interstate Highway 55	Bubbly Creek	22	13	13	11	8	34
Cicero Avenue	Chicago Sanitary and Ship Canal	5	5	6	11	11	62
B&O Central Railroad	Chicago Sanitary and Ship Canal	0	<1	1	3	8	88
Lockport Powerhouse	Chicago Sanitary and Ship Canal	<1	1	3	8	16	72
<u>Calumet River System</u>							
C&W Indiana Railroad	Little Calumet River	1	1	1	3	3	91
Halsted Street	Little Calumet River	<1	<1	1	3	6	90
Route 83	Calumet-Sag Channel	0	<1	3	6	12	79

^aPercentages greater than one are rounded to nearest whole number.

^bData collected after June 18, 2013.

^cData collected through June 18, 2013.

FIGURE 2: DISSOLVED OXYGEN CONCENTRATION MEASURED HOURLY AT FOSTER AVENUE ON THE NORTH SHORE CHANNEL FROM JANUARY 1, 2013, THROUGH DECEMBER 31, 2013

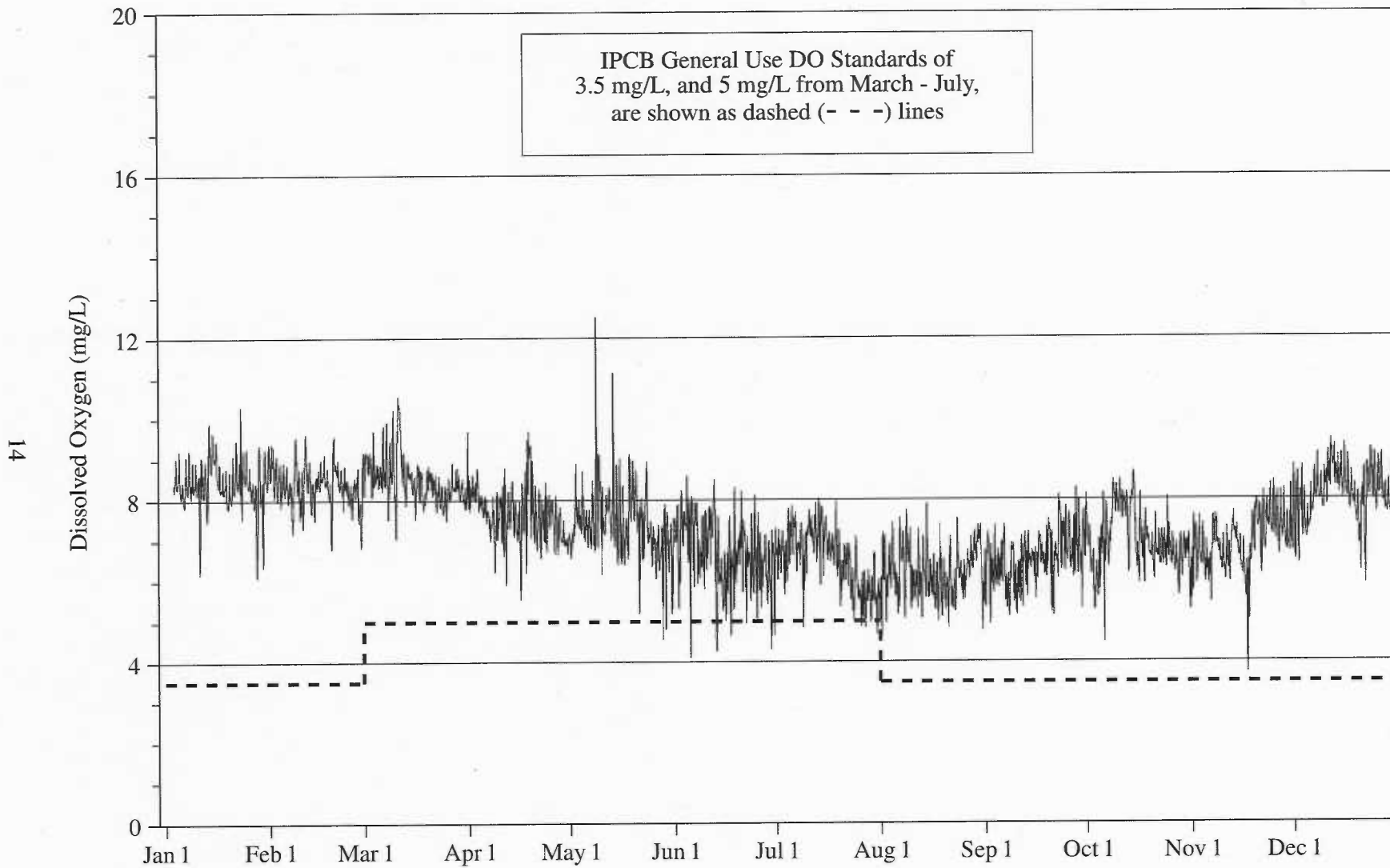


FIGURE 3: DISSOLVED OXYGEN CONCENTRATION MEASURED HOURLY AT ADDISON STREET ON THE NORTH BRANCH CHICAGO RIVER FROM JANUARY 1, 2013, THROUGH DECEMBER 31, 2013

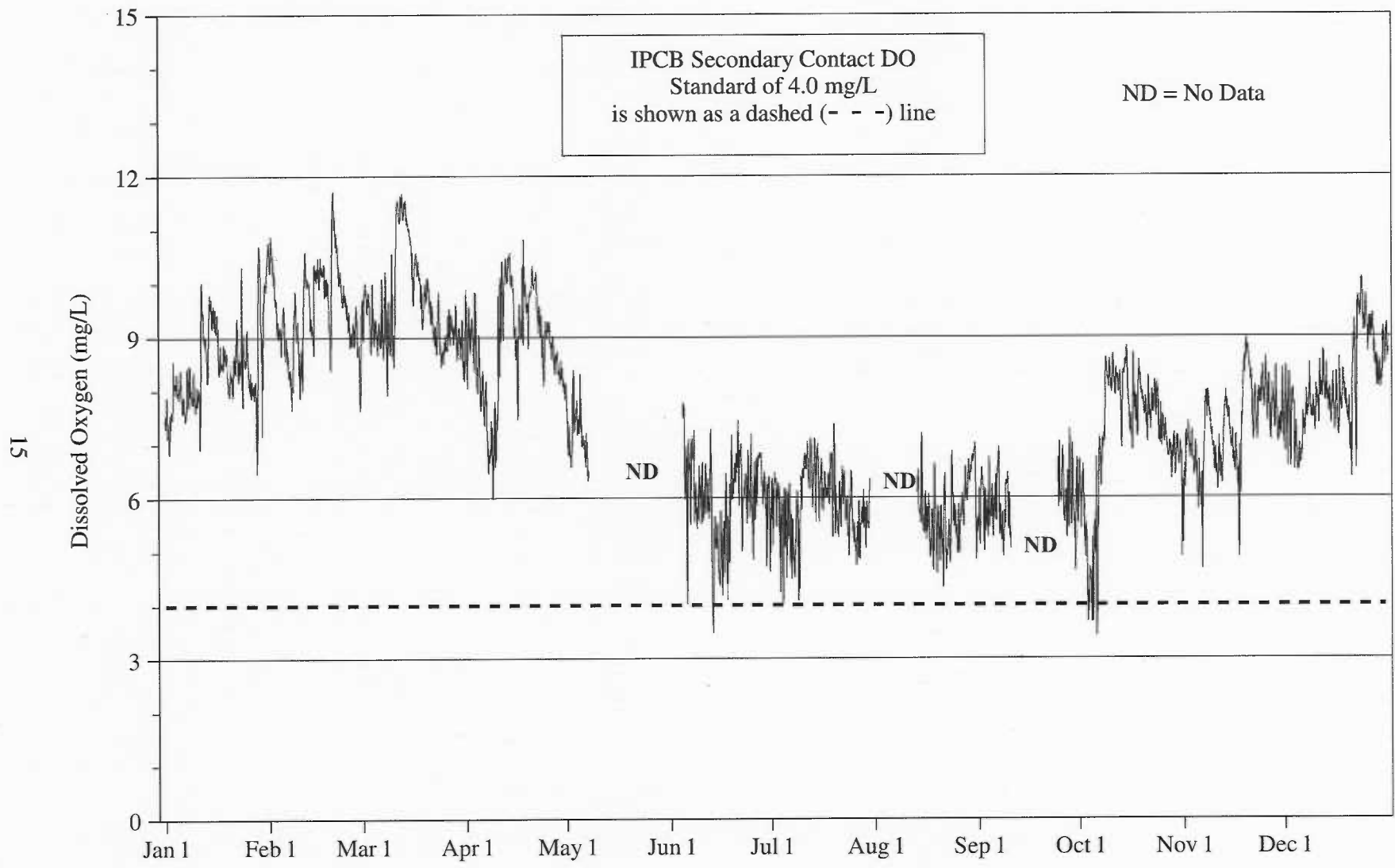


FIGURE 4: DISSOLVED OXYGEN CONCENTRATION MEASURED HOURLY AT DIVISION STREET ON THE NORTH BRANCH CHICAGO RIVER FROM JANUARY 1, 2013, THROUGH DECEMBER 31, 2013

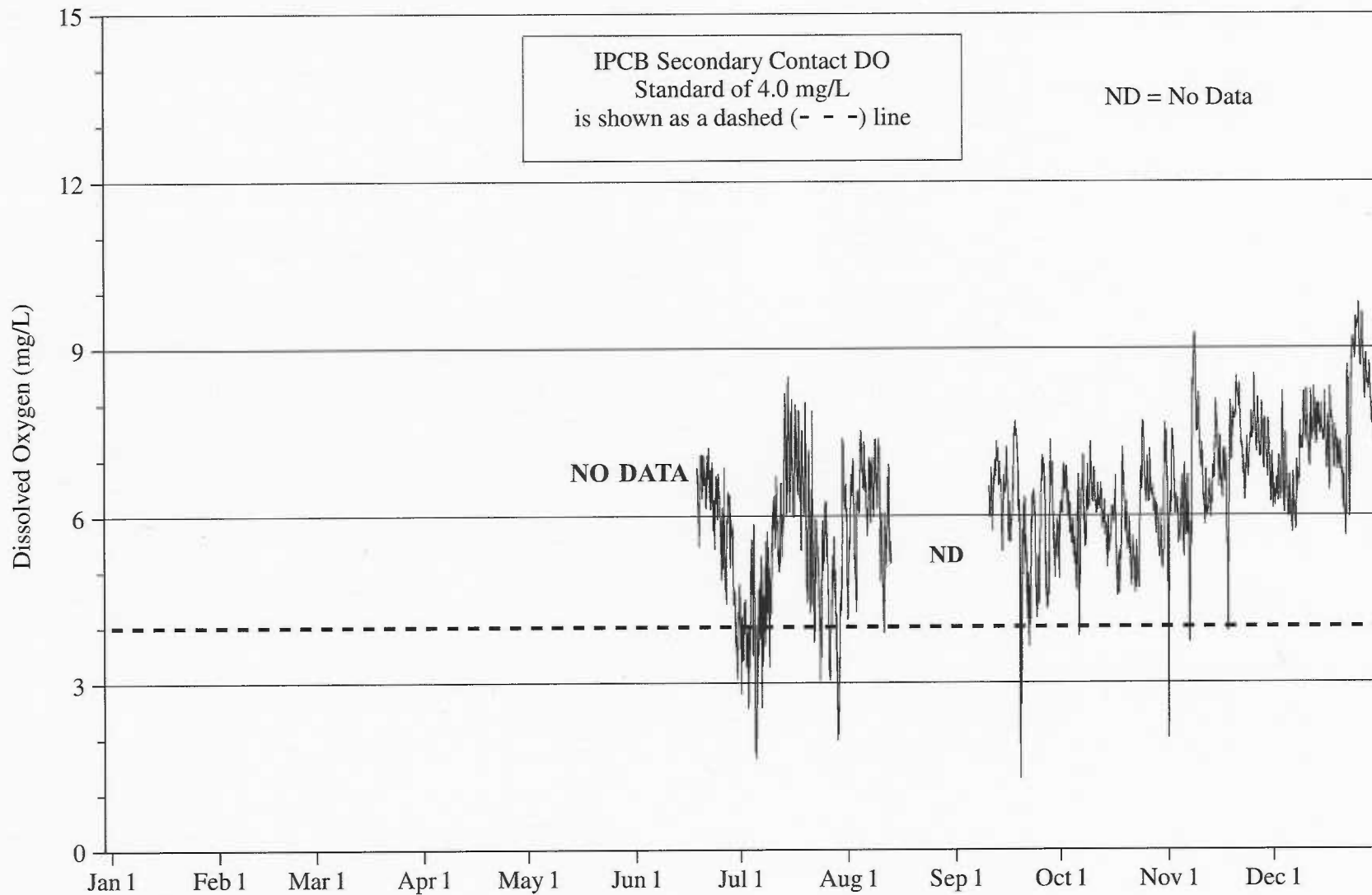


FIGURE 5: DISSOLVED OXYGEN CONCENTRATION MEASURED HOURLY AT KINZIE STREET ON THE NORTH BRANCH CHICAGO RIVER FROM JANUARY 1, 2013, THROUGH DECEMBER 31, 2013

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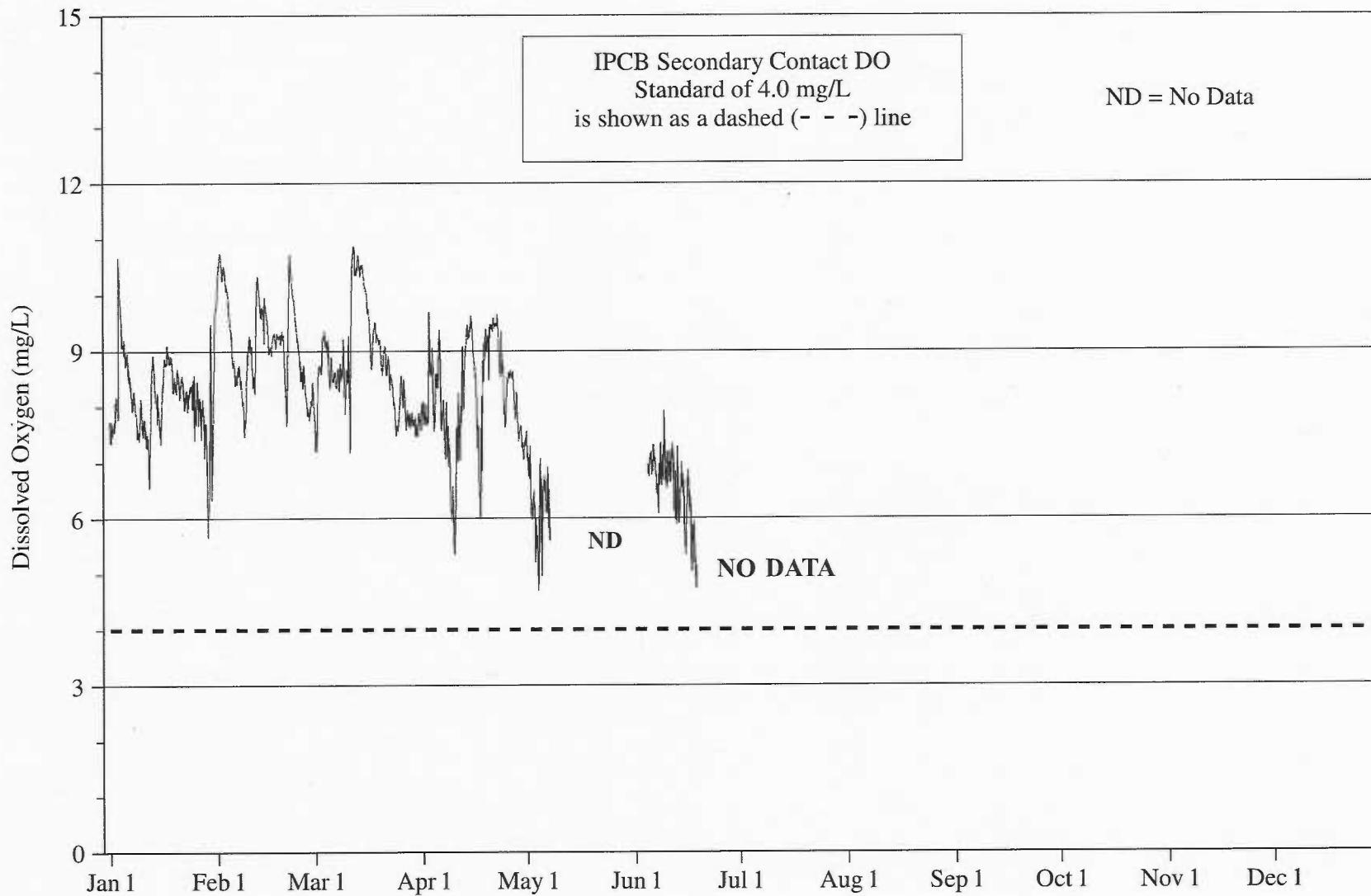


FIGURE 6: DISSOLVED OXYGEN CONCENTRATION MEASURED HOURLY AT CLARK STREET ON THE CHICAGO RIVER FROM JANUARY 1, 2013, THROUGH DECEMBER 31, 2013

18

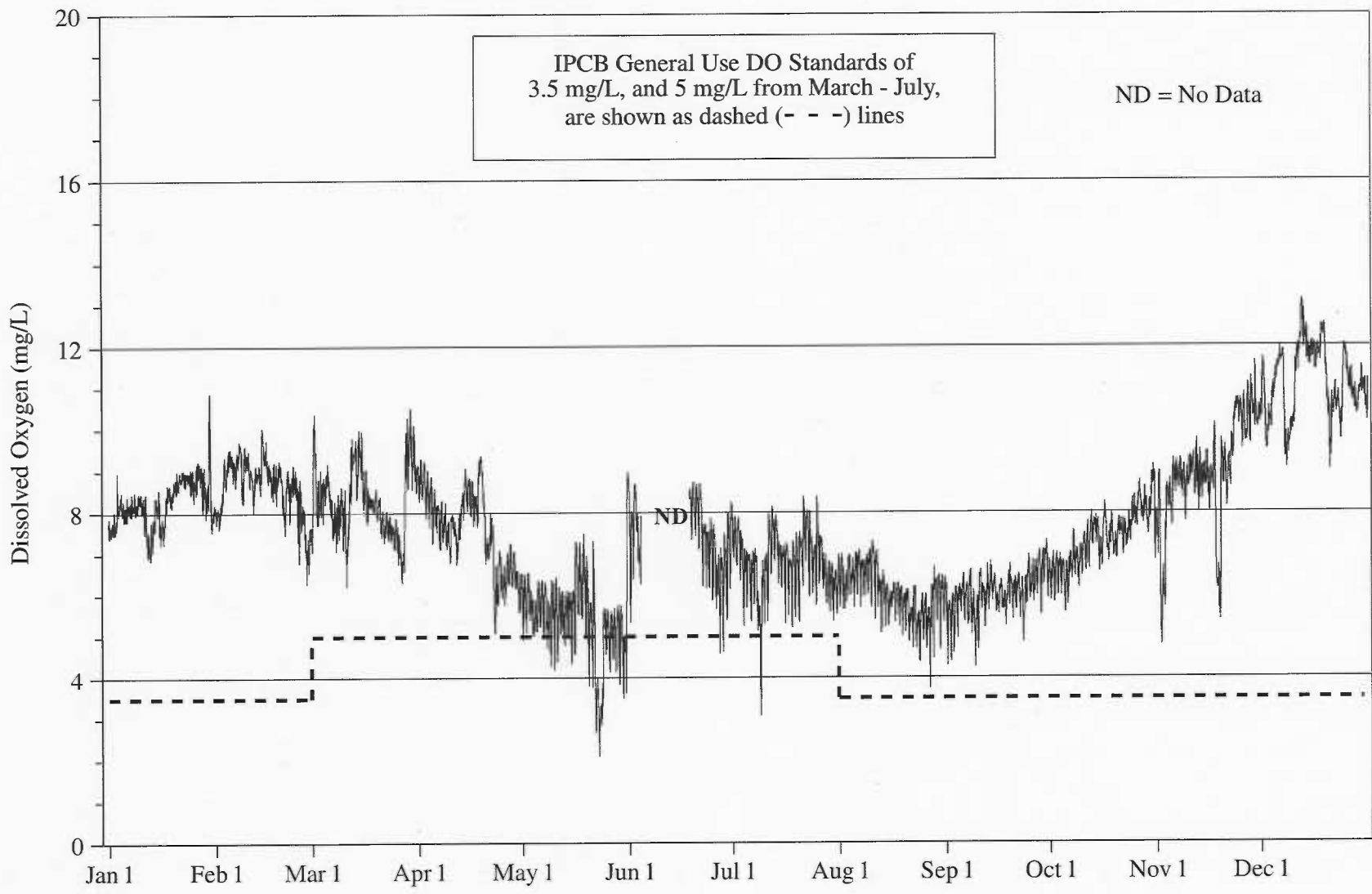


FIGURE 7: DISSOLVED OXYGEN CONCENTRATION MEASURED HOURLY AT LOOMIS STREET ON THE SOUTH BRANCH CHICAGO RIVER FROM JANUARY 1, 2013, THROUGH DECEMBER 31, 2013

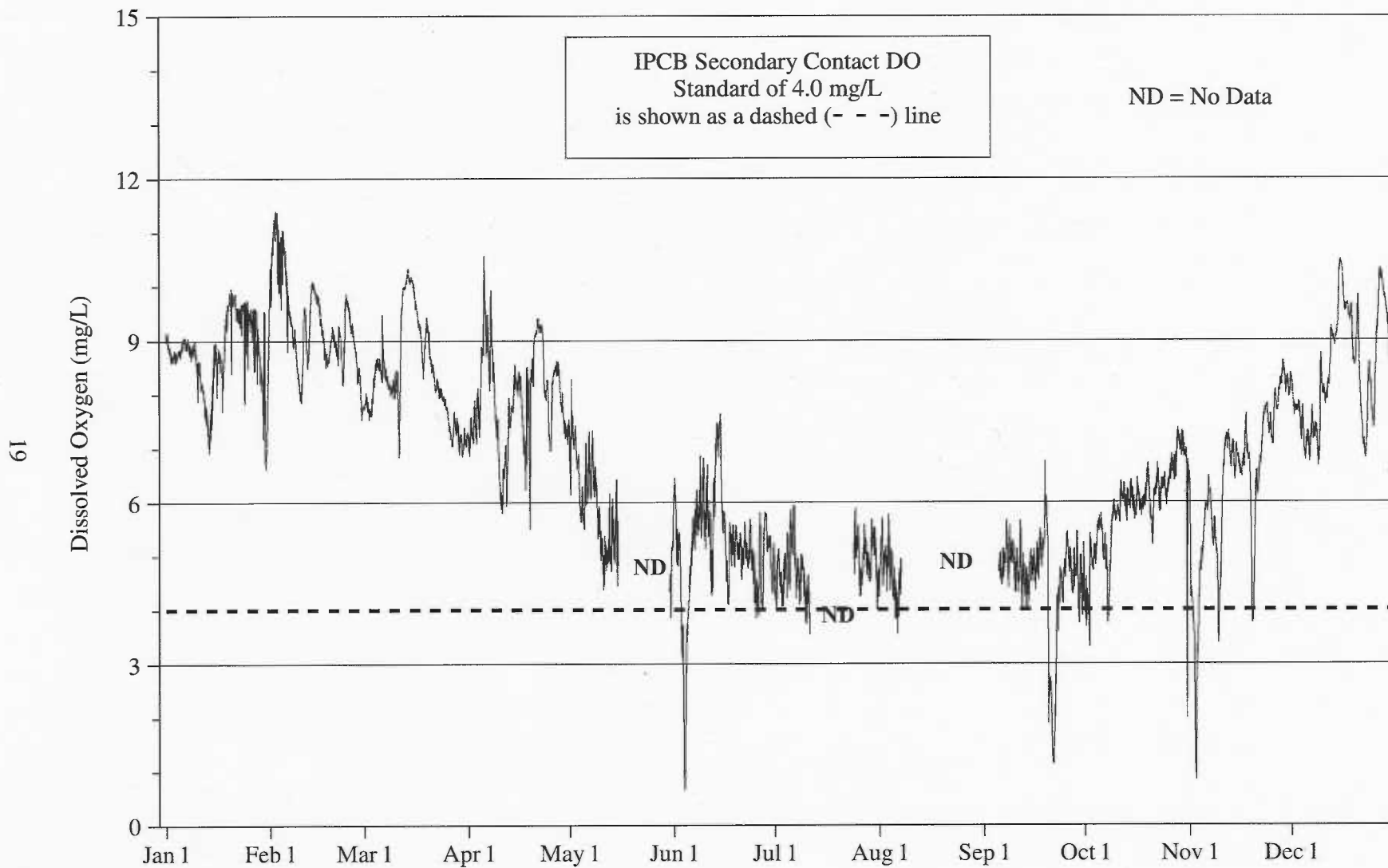


FIGURE 8: DISSOLVED OXYGEN CONCENTRATION MEASURED HOURLY AT 36TH STREET ON BUBBLY CREEK FROM JANUARY 1, 2013, THROUGH DECEMBER 31, 2013

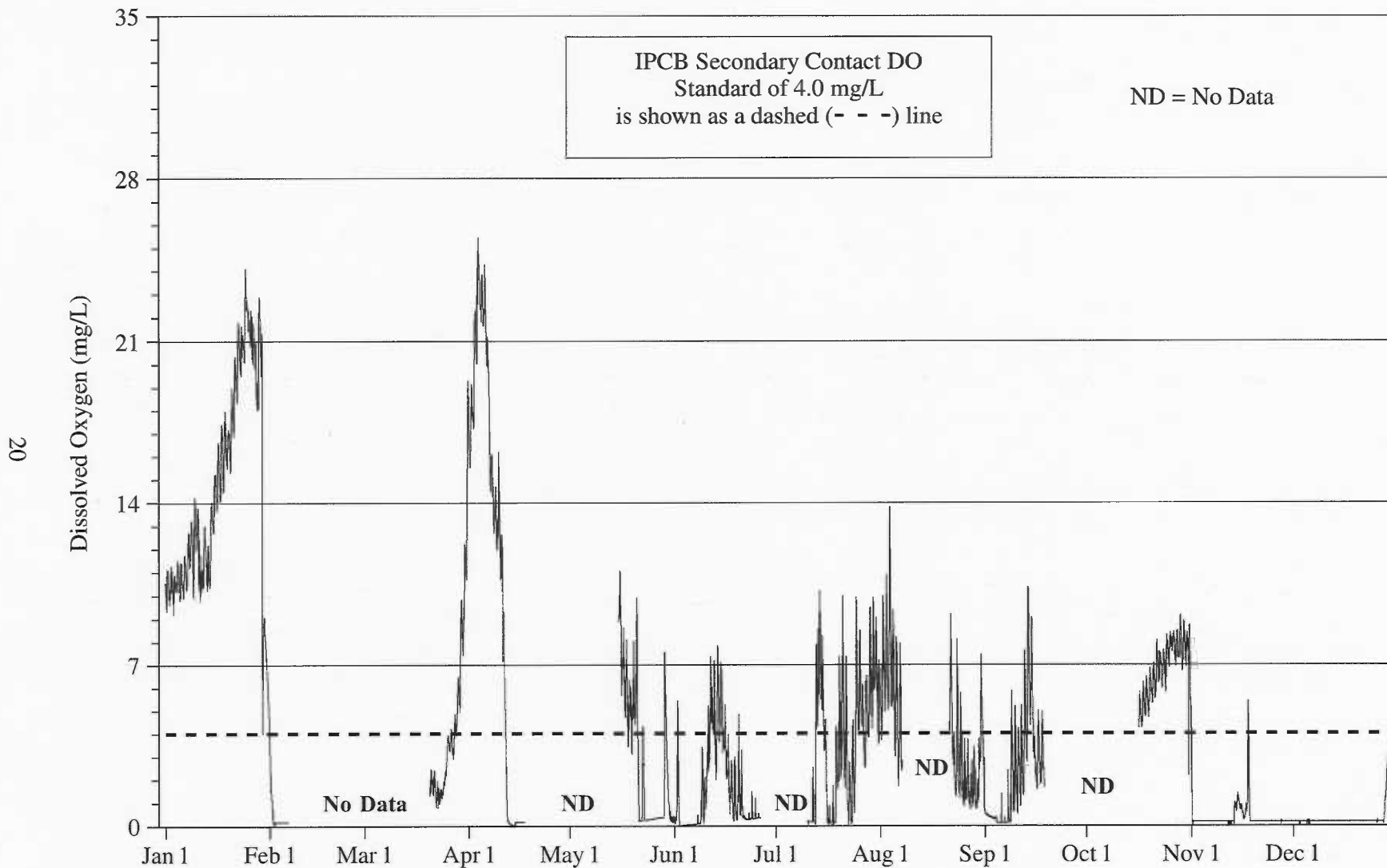


FIGURE 9: DISSOLVED OXYGEN CONCENTRATION MEASURED HOURLY AT INTERSTATE HIGHWAY 55 ON BUBBLY CREEK FROM JANUARY 1, 2013, THROUGH DECEMBER 31, 2013

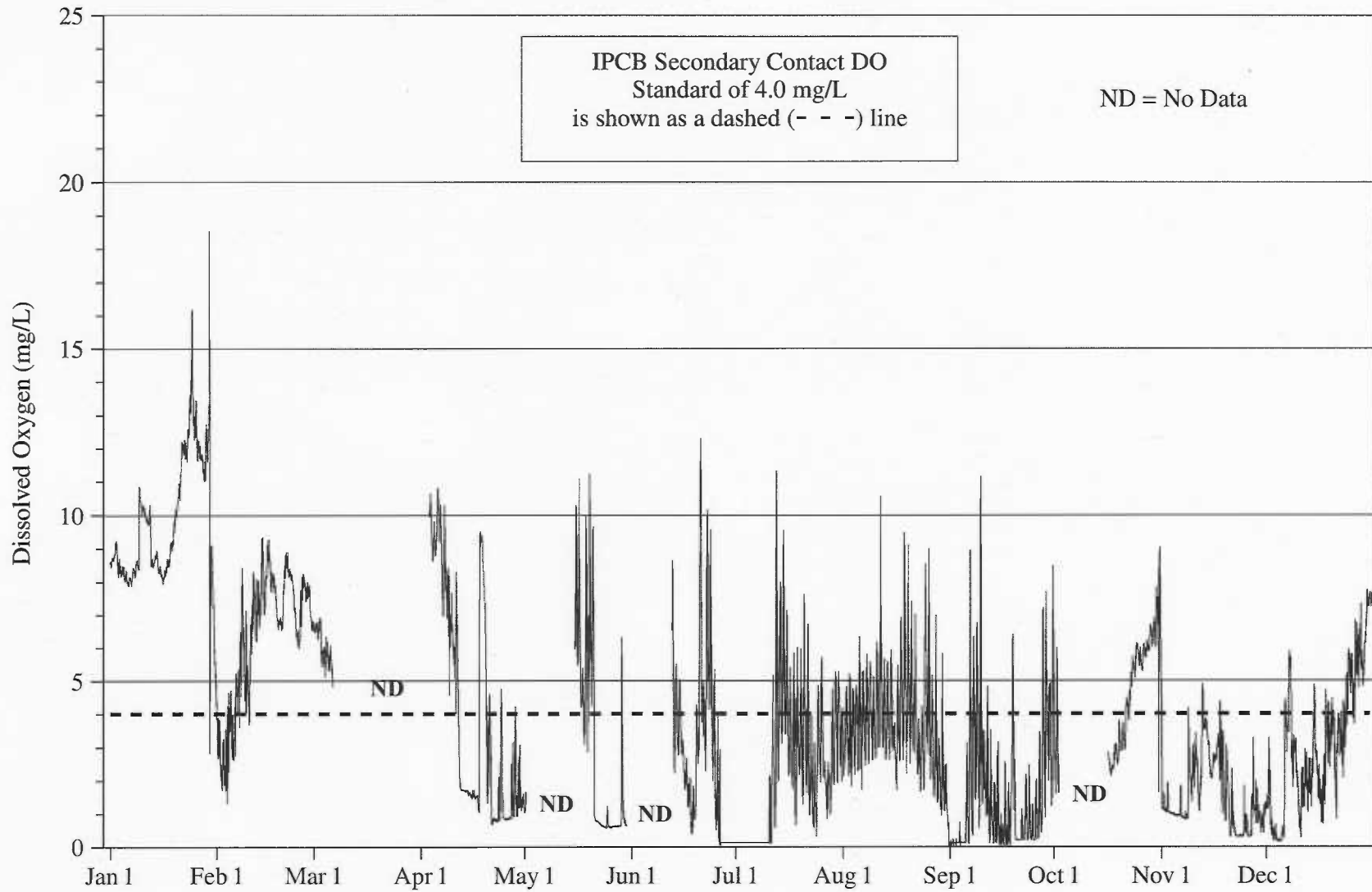


FIGURE 10: DISSOLVED OXYGEN CONCENTRATION MEASURED HOURLY AT CICERO AVENUE ON THE CHICAGO SANITARY AND SHIP CANAL FROM JANUARY 1, 2013, THROUGH DECEMBER 31, 2013

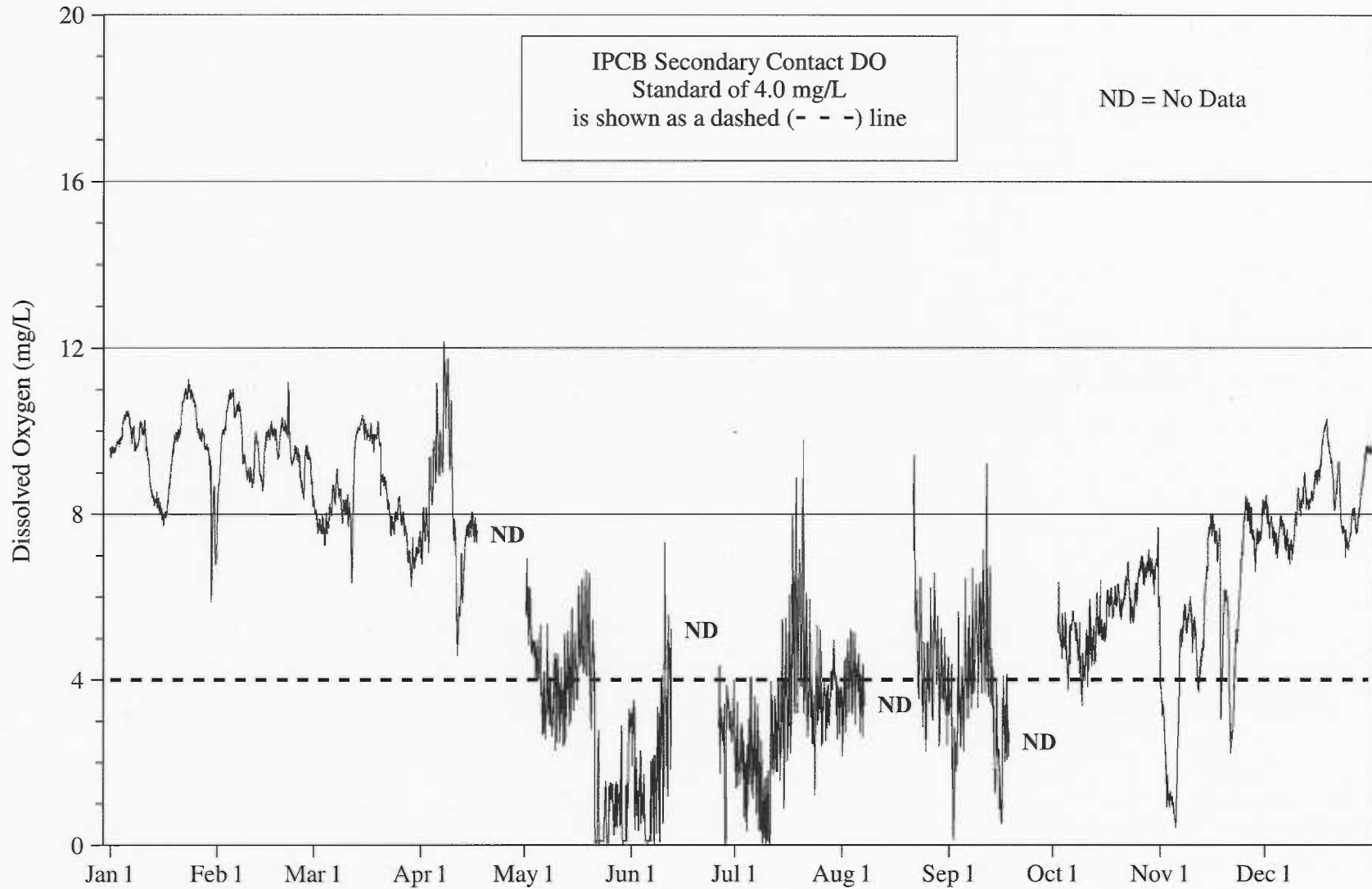


FIGURE 11: DISSOLVED OXYGEN CONCENTRATION MEASURED HOURLY AT B&O CENTRAL RAILROAD ON THE CHICAGO SANITARY AND SHIP CANAL FROM JANUARY 1, 2013, THROUGH DECEMBER 31, 2013

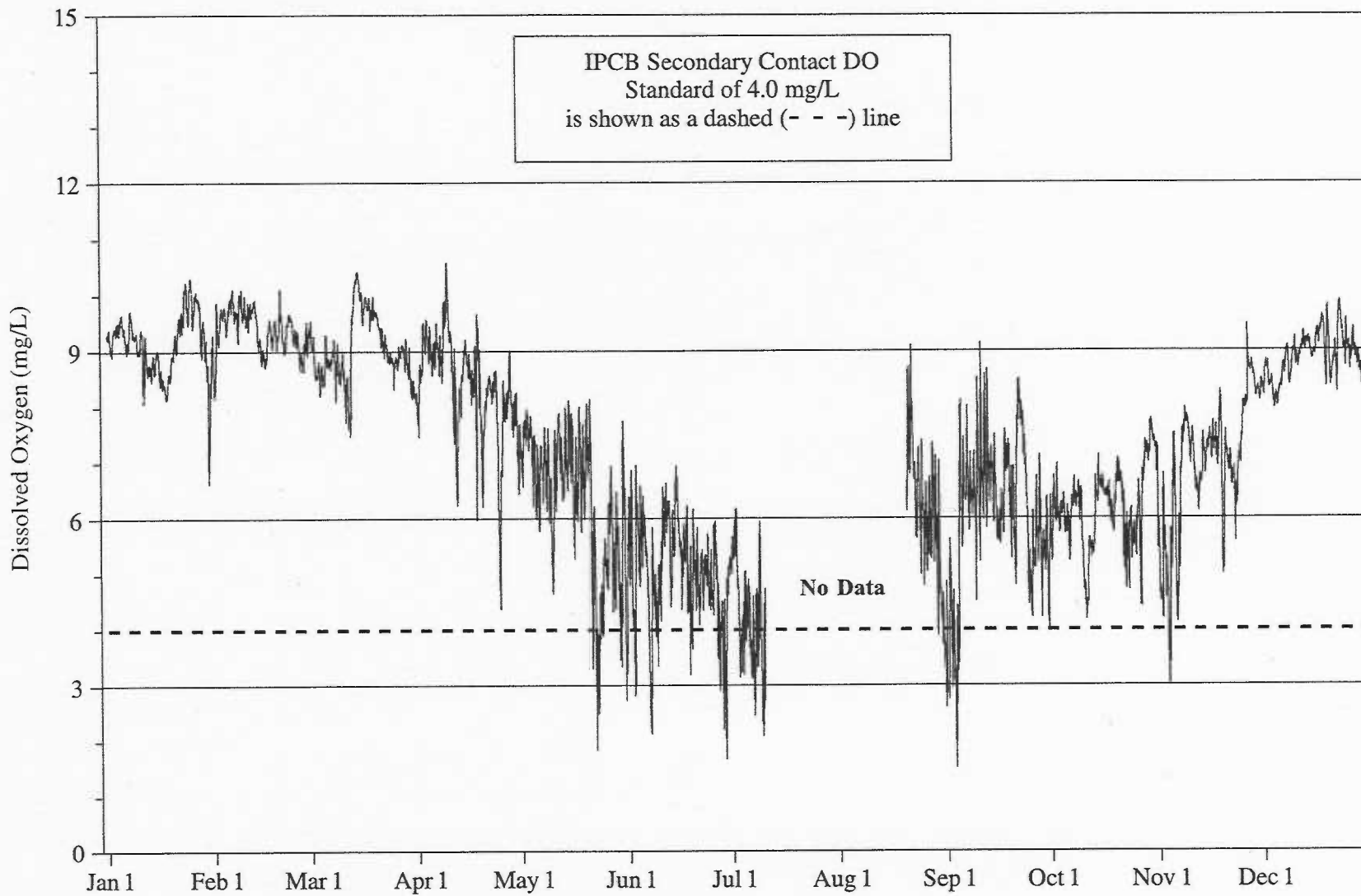


FIGURE 12: DISSOLVED OXYGEN CONCENTRATION MEASURED HOURLY AT LOCKPORT POWERHOUSE ON THE CHICAGO SANITARY AND SHIP CANAL FROM JANUARY 1, 2013, THROUGH DECEMBER 31, 2013

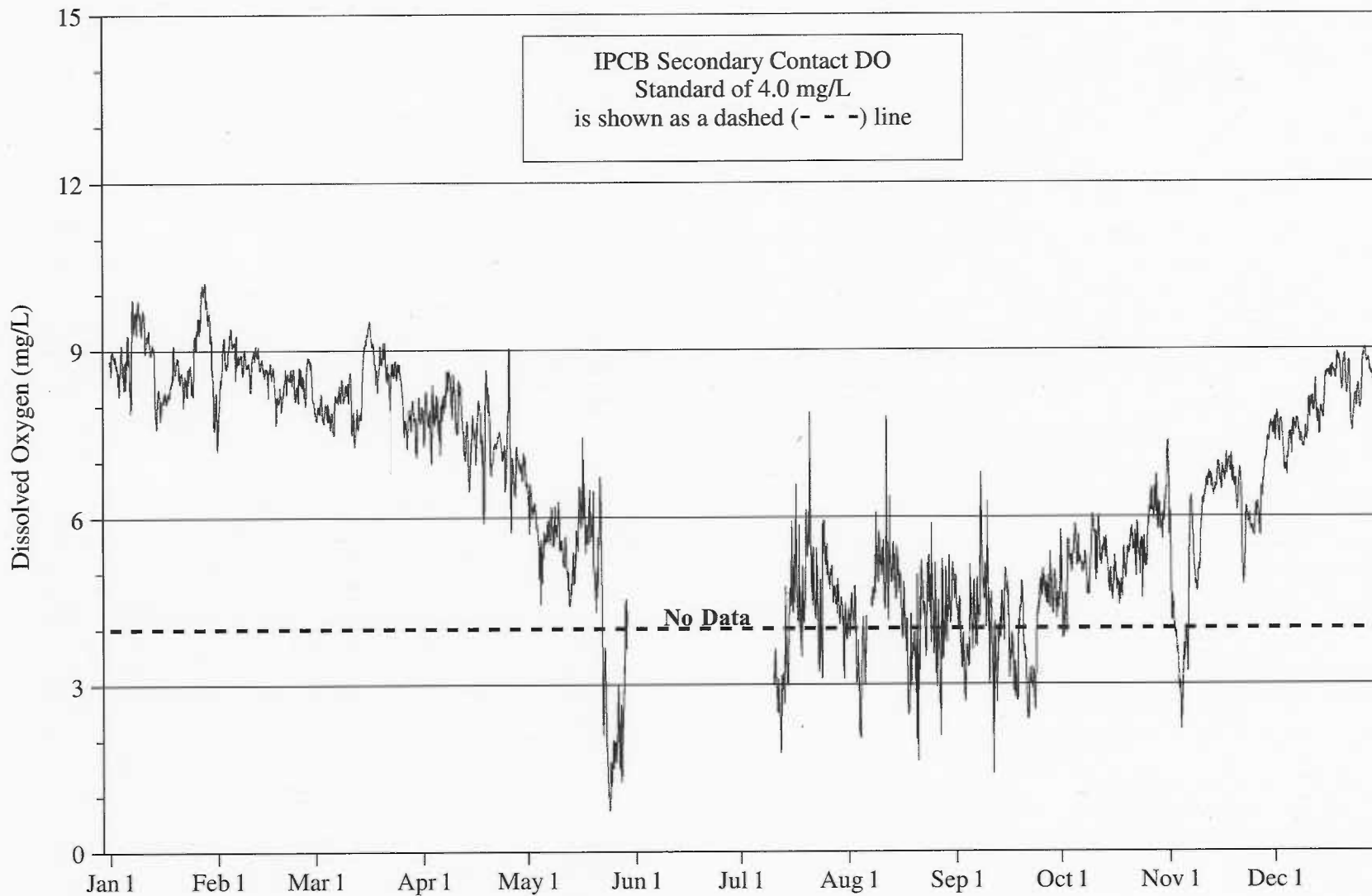


FIGURE 13: DISSOLVED OXYGEN CONCENTRATION MEASURED HOURLY AT C&W INDIANA RAILROAD ON THE LITTLE CALUMET RIVER FROM JANUARY 1, 2013, THROUGH DECEMBER 31, 2013

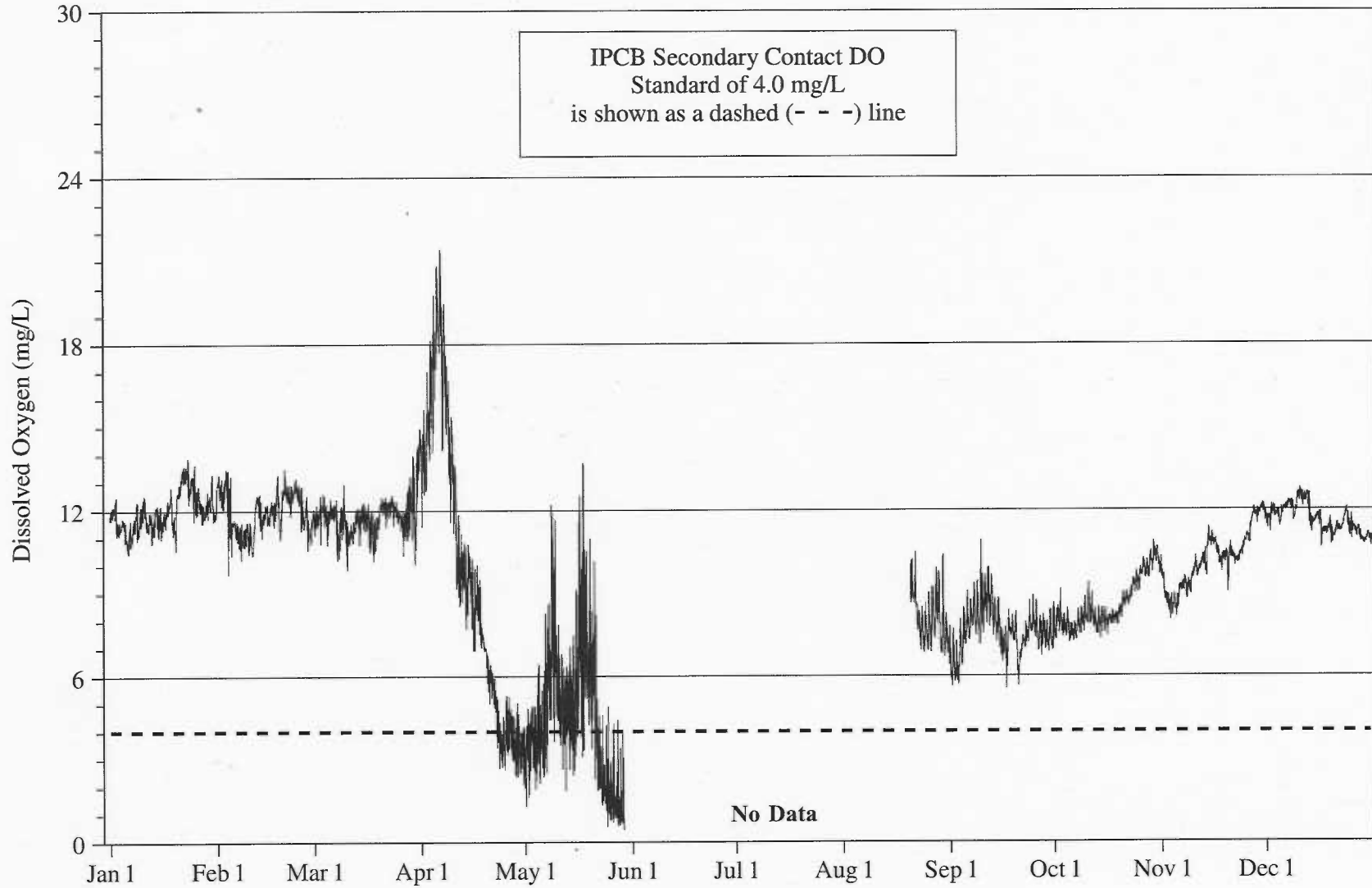


FIGURE 14: DISSOLVED OXYGEN CONCENTRATION MEASURED HOURLY AT HALSTED STREET ON THE LITTLE CALUMET RIVER FROM JANUARY 1, 2013, THROUGH DECEMBER 31, 2013

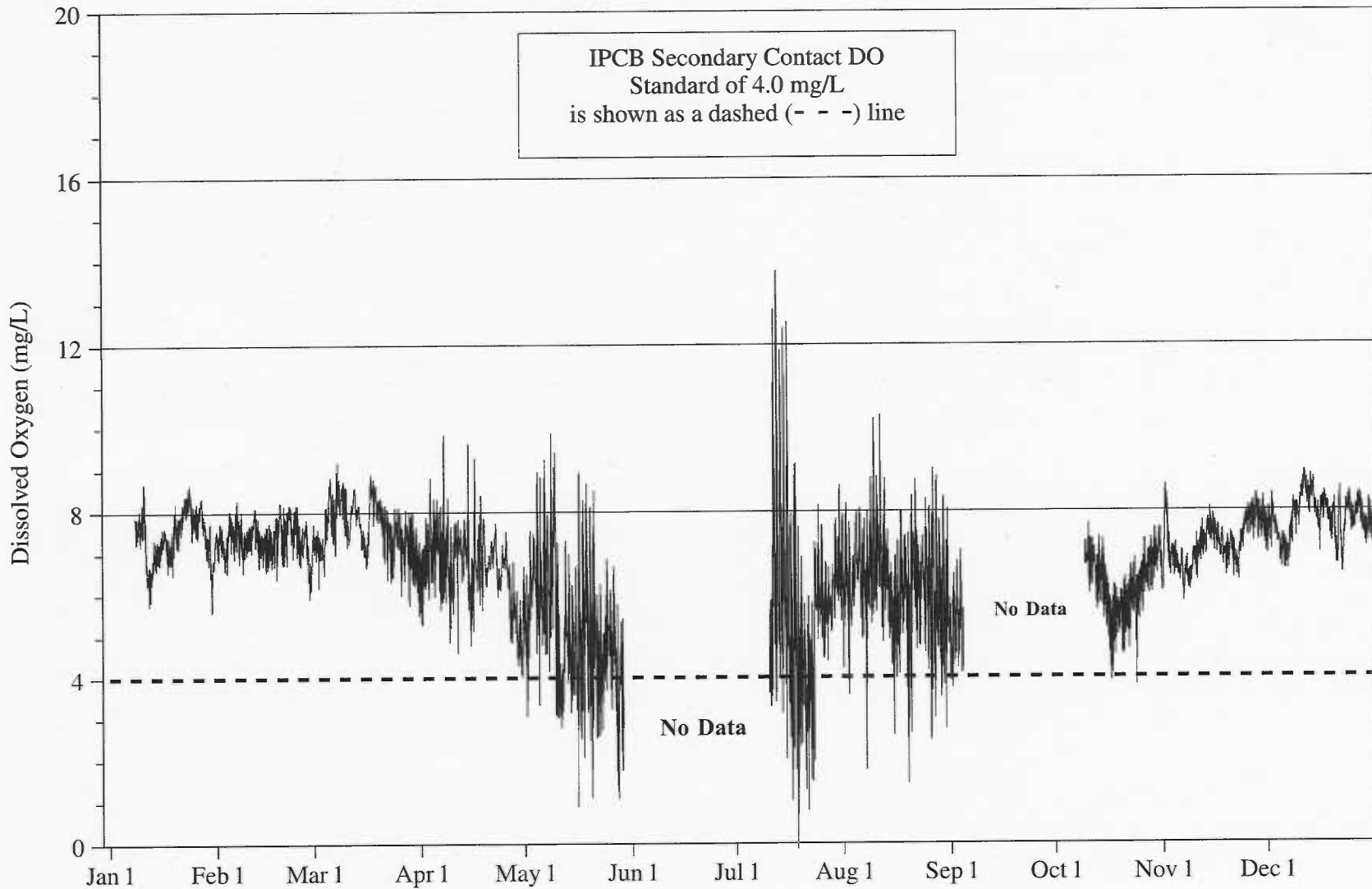
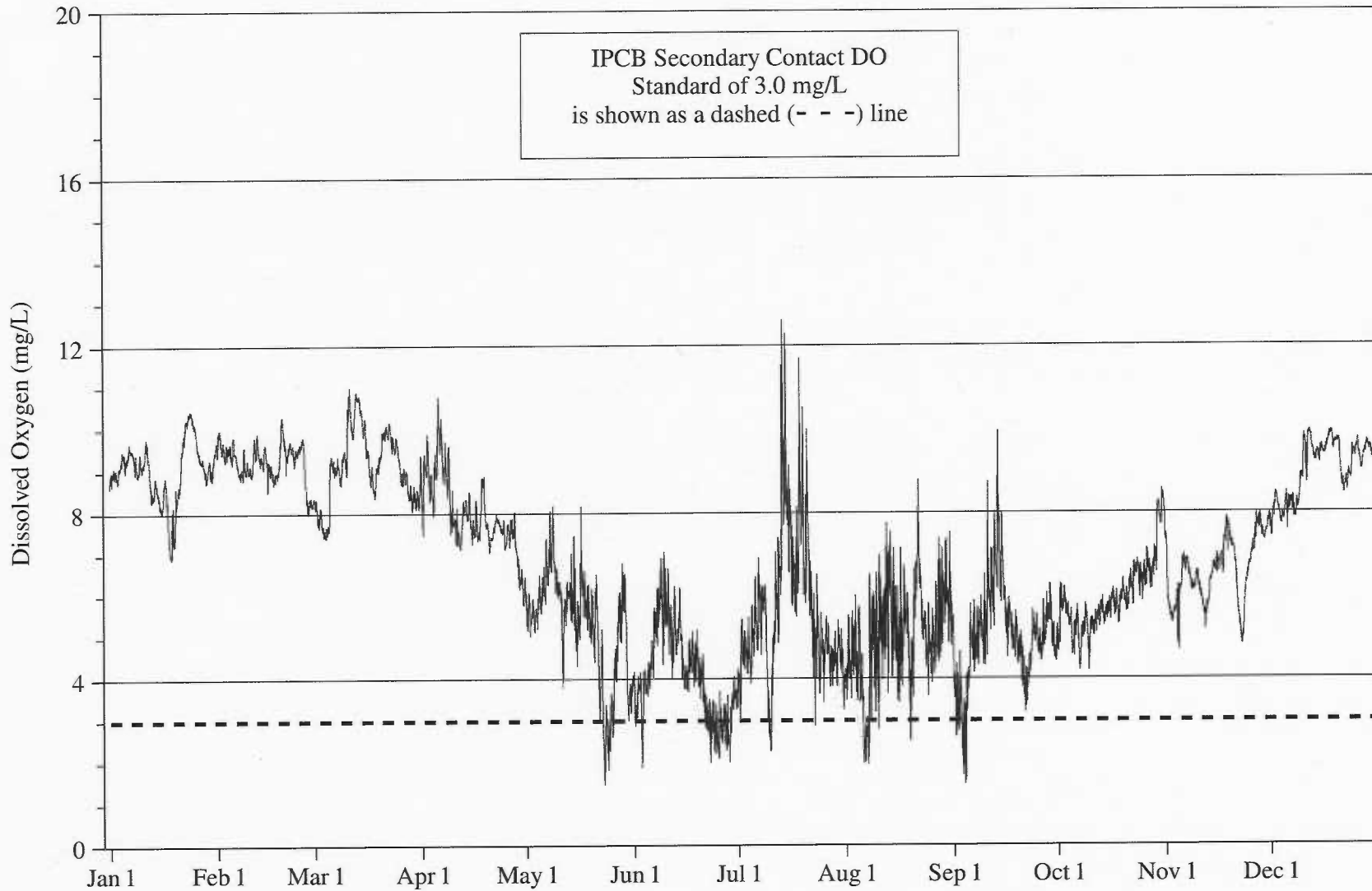


FIGURE 15: DISSOLVED OXYGEN CONCENTRATION MEASURED HOURLY AT ROUTE 83 ON THE CALUMET-SAG CHANNEL FROM JANUARY 1, 2013, THROUGH DECEMBER 31, 2013



REFERENCES

United States Environmental Protection Agency (USEPA), "Ambient Water Quality Criteria for Dissolved Oxygen," EPA 440/5-86-003, United States Environmental Protection Agency, Office of Water Regulations and Standards, Washington, D.C., 1986.

APPENDIX A

WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS AT ALL DEEP-DRAFT
MONITORING STATIONS DURING 2013

TABLE A-1: WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
AT FOSTER AVENUE ON THE
NORTH SHORE CHANNEL DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
01/01/13 - 01/06/13	84	7.8	9.2	8.3
01/07/13 - 01/13/13	168	6.2	9.2	8.3
01/14/13 - 01/20/13	168	7.8	9.9	8.5
01/21/13 - 01/27/13	168	7.6	10.3	8.5
01/28/13 - 02/03/13	168	6.1	9.4	8.4
02/04/13 - 02/10/13	168	7.2	9.6	8.3
02/11/13 - 02/17/13	168	7.4	9.6	8.5
02/18/13 - 02/24/13	168	6.8	9.6	8.4
02/25/13 - 03/03/13	168	6.8	9.7	8.4
03/04/13 - 03/10/13	168	7.1	10.2	8.7
03/11/13 - 03/17/13	167	7.5	10.6	8.7
03/18/13 - 03/24/13	168	7.6	8.9	8.2
03/25/13 - 03/31/13	168	7.5	9.7	8.2
04/01/13 - 04/07/13	168	7.0	8.8	7.9
04/08/13 - 04/14/13	168	5.9	8.8	7.6
04/15/13 - 04/21/13	168	5.6	9.7	7.8
04/22/13 - 04/28/13	168	6.6	8.4	7.4
04/29/13 - 05/05/13	168	6.6	8.9	7.3
05/06/13 - 05/12/13	168	6.2	12.5	7.8
05/13/13 - 05/19/13	168	6.4	11.1	7.6
05/20/13 - 05/26/13	168	5.2	8.9	7.3
05/27/13 - 06/02/13	168	4.6	8.2	6.8
06/03/13 - 06/09/13	168	4.1	8.6	7.1
06/10/13 - 06/16/13	168	4.3	8.5	6.6
06/17/13 - 06/23/13	168	4.7	8.3	6.6
06/24/13 - 06/30/13	168	4.3	8.1	6.3
07/01/13 - 07/07/13	168	5.7	7.8	6.8
07/08/13 - 07/14/13	168	4.9	8.0	7.0
07/15/13 - 07/21/13	168	5.4	8.0	6.7
07/22/13 - 07/28/13	168	4.9	7.1	5.8
07/29/13 - 08/04/13	168	4.7	7.4	6.0
08/05/13 - 08/11/13	168	5.1	7.7	6.2
08/12/13 - 08/18/13	168	5.0	7.9	6.1
08/19/13 - 08/25/13	168	4.8	7.5	6.0

TABLE A-1 (Continued): WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT FOSTER AVENUE ON THE
 NORTH SHORE CHANNEL DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
08/26/13 - 09/01/13	168	4.8	7.4	6.5
09/02/13 - 09/08/13	168	4.9	7.4	6.2
09/09/13 - 09/15/13	168	5.2	7.2	6.3
09/16/13 - 09/22/13	168	5.2	8.1	6.7
09/23/13 - 09/29/13	168	5.3	8.3	6.9
09/30/13 - 10/06/13	168	4.5	8.1	6.7
10/07/13 - 10/13/13	168	6.2	8.5	7.7
10/14/13 - 10/20/13	168	5.9	8.7	7.0
10/21/13 - 10/27/13	168	5.7	8.1	6.7
10/28/13 - 11/03/13	168	5.3	7.6	6.6
11/04/13 - 11/10/13	168	5.5	7.6	6.6
11/11/13 - 11/17/13	168	3.7	7.7	6.5
11/18/13 - 11/24/13	167	6.2	8.4	7.3
11/25/13 - 12/01/13	168	6.5	8.8	7.4
12/02/13 - 12/08/13	168	6.4	9.1	7.8
12/09/13 - 12/15/13	168	7.8	9.5	8.5
12/16/13 - 12/22/13	168	5.9	9.4	7.9
12/23/13 - 12/29/13	168	7.6	9.2	8.3
12/30/13 - 12/31/13	48	8.0	9.2	8.4

TABLE A-2: WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT ADDISON STREET ON THE
 NORTH BRANCH CHICAGO RIVER DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
01/01/13 - 01/06/13	144	6.8	8.6	7.7
01/07/13 - 01/13/13	168	6.9	10.0	8.2
01/14/13 - 01/20/13	168	7.9	9.8	8.8
01/21/13 - 01/27/13	168	7.7	10.3	8.4
01/28/13 - 02/03/13	168	6.5	10.9	9.6
02/04/13 - 02/10/13	168	7.7	9.9	8.8
02/11/13 - 02/17/13	168	8.0	10.6	9.9
02/18/13 - 02/24/13	168	8.4	11.7	10.0
02/25/13 - 03/03/13	168	7.6	10.0	9.2
03/04/13 - 03/10/13	168	7.9	10.6	9.2
03/11/13 - 03/17/13	167	9.6	11.7	10.9
03/18/13 - 03/24/13	168	8.5	10.1	9.4
03/25/13 - 03/31/13	168	8.2	9.9	9.0
04/01/13 - 04/07/13	168	6.5	9.8	8.3
04/08/13 - 04/14/13	168	6.0	10.6	8.9
04/15/13 - 04/21/13	168	7.5	10.8	9.5
04/22/13 - 04/28/13	168	8.1	10.1	8.9
04/29/13 - 05/05/13	168	6.6	8.6	7.6
05/06/13 - 05/12/13	35	6.3	7.2	6.8
05/13/13 - 06/02/13		NO DATA		
06/03/13 - 06/09/13	132	4.0	7.8	6.3
06/10/13 - 06/16/13	168	3.5	7.3	5.5
06/17/13 - 06/23/13	168	4.1	7.4	6.1
06/24/13 - 06/30/13	168	4.6	7.2	6.1
07/01/13 - 07/07/13	168	4.0	6.5	5.6
07/08/13 - 07/14/13	168	4.1	7.1	6.2
07/15/13 - 07/21/13	167	5.3	7.4	6.1
07/22/13 - 07/28/13	168	4.8	6.6	5.7
07/29/13 - 08/04/13	35	5.1	6.3	5.7
08/05/13 - 08/11/13		NO DATA		
08/12/13 - 08/18/13	131	4.7	7.2	5.7
08/19/13 - 08/25/13	168	4.3	6.9	5.4
08/26/13 - 09/01/13	168	4.9	7.0	6.1
09/02/13 - 09/08/13	168	4.9	6.9	5.8

TABLE A-2 (Continued): WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT ADDISON STREET ON THE
 NORTH BRANCH CHICAGO RIVER DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
09/09/13 - 09/15/13	36	5.1	6.5	5.9
09/16/13 - 09/22/13		NO DATA		
09/23/13 - 09/29/13	133	4.6	7.3	6.1
09/30/13 - 10/06/13	168	3.4	7.1	5.3
10/07/13 - 10/13/13	168	6.2	8.7	7.9
10/14/13 - 10/20/13	168	6.9	8.8	7.9
10/21/13 - 10/27/13	168	6.8	8.3	7.4
10/28/13 - 11/03/13	168	4.9	7.4	6.7
11/04/13 - 11/10/13	168	4.7	8.0	6.8
11/11/13 - 11/17/13	168	4.9	8.0	6.9
11/18/13 - 11/24/13	168	6.6	9.0	8.0
11/25/13 - 12/01/13	168	6.6	8.6	7.6
12/02/13 - 12/08/13	167	6.5	8.5	7.3
12/09/13 - 12/15/13	168	7.2	8.7	7.9
12/16/13 - 12/22/13	168	6.4	9.7	7.8
12/23/13 - 12/29/13	168	8.0	10.1	9.1
12/30/13 - 12/31/13	48	8.2	9.2	8.8

TABLE A-3: WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
AT DIVISION STREET ON THE
NORTH BRANCH CHICAGO RIVER DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
01/01/13 - 06/16/13		NO DATA		
06/17/13 - 06/23/13	133	5.4	7.2	6.5
06/24/13 - 06/30/13	168	3.1	6.9	5.3
07/01/13 - 07/07/13	168	1.7	5.9	3.9
07/08/13 - 07/14/13	168	3.3	8.5	5.8
07/15/13 - 07/21/13	168	4.3	8.1	6.5
07/22/13 - 07/28/13	168	2.0	6.3	4.7
07/29/13 - 08/04/13	168	2.0	7.5	5.6
08/05/13 - 08/11/13	168	3.9	7.4	6.2
08/12/13 - 08/18/13	35	5.1	6.9	5.8
08/19/13 - 09/08/13		NO DATA		
09/09/13 - 09/15/13	133	5.4	7.3	6.5
09/16/13 - 09/22/13	168	1.3	7.7	5.7
09/23/13 - 09/29/13	168	4.2	7.4	5.7
09/30/13 - 10/06/13	168	3.8	6.9	5.9
10/07/13 - 10/13/13	168	5.4	7.3	6.3
10/14/13 - 10/20/13	168	4.6	7.2	5.7
10/21/13 - 10/27/13	168	4.6	7.7	6.0
10/28/13 - 11/03/13	168	2.0	7.7	6.1
11/04/13 - 11/10/13	168	3.7	9.3	6.7
11/11/13 - 11/17/13	168	5.5	8.1	6.7
11/18/13 - 11/24/13	168	3.9	8.5	7.3
11/25/13 - 12/01/13	168	6.1	8.5	7.2
12/02/13 - 12/08/13	168	5.7	8.2	6.6
12/09/13 - 12/15/13	168	6.9	8.3	7.6
12/16/13 - 12/22/13	168	5.6	8.7	7.1
12/23/13 - 12/29/13	168	6.0	9.8	8.6
12/30/13 - 12/31/13	48	7.4	8.3	7.7

TABLE A-4: WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
AT KINZIE STREET ON THE
NORTH BRANCH CHICAGO RIVER DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
01/01/13 - 01/06/13	143	7.4	10.7	8.6
01/07/13 - 01/13/13	168	6.6	8.9	7.8
01/14/13 - 01/20/13	168	7.3	9.1	8.4
01/21/13 - 01/27/13	168	7.4	8.6	8.2
01/28/13 - 02/03/13	168	5.7	10.7	9.0
02/04/13 - 02/10/13	168	7.5	10.0	8.7
02/11/13 - 02/17/13	168	8.2	10.3	9.4
02/18/13 - 02/24/13	168	7.7	10.7	9.3
02/25/13 - 03/03/13	168	7.2	9.4	8.3
03/04/13 - 03/10/13	168	7.7	9.3	8.6
03/11/13 - 03/17/13	168	7.2	10.9	10.0
03/18/13 - 03/24/13	168	7.5	9.5	8.6
03/25/13 - 03/31/13	168	7.5	8.6	7.9
04/01/13 - 04/07/13	168	7.1	9.7	8.2
04/08/13 - 04/14/13	167	5.4	9.6	7.8
04/15/13 - 04/21/13	168	6.0	9.6	8.6
04/22/13 - 04/28/13	168	7.4	9.7	8.4
04/29/13 - 05/05/13	168	4.7	7.7	6.5
05/06/13 - 05/12/13	34	5.6	6.9	6.3
05/13/13 - 06/02/13		NO DATA		
06/03/13 - 06/09/13	133	6.1	7.9	6.9
06/10/13 - 06/16/13	168	5.2	7.3	6.5
06/17/13 - 06/23/13	34	4.8	5.9	5.4
06/24/13 - 12/31/13		NO DATA		

TABLE A-5: WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
AT CLARK STREET ON THE
CHICAGO RIVER DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
01/01/13 - 01/06/13	144	7.4	9.0	7.9
01/07/13 - 01/13/13	168	6.9	8.5	7.9
01/14/13 - 01/20/13	167	7.3	9.0	8.2
01/21/13 - 01/27/13	168	8.3	9.2	8.8
01/28/13 - 02/03/13	168	7.6	10.9	8.4
02/04/13 - 02/10/13	168	8.2	9.7	9.1
02/11/13 - 02/17/13	168	8.0	10.0	9.0
02/18/13 - 02/24/13	168	7.3	9.3	8.6
02/25/13 - 03/03/13	168	6.3	10.4	8.0
03/04/13 - 03/10/13	168	6.8	9.2	8.1
03/11/13 - 03/17/13	167	6.2	10.0	8.7
03/18/13 - 03/24/13	168	7.2	8.6	7.9
03/25/13 - 03/31/13	165	6.3	10.5	8.4
04/01/13 - 04/07/13	168	7.1	9.3	8.3
04/08/13 - 04/14/13	168	6.8	9.1	7.7
04/15/13 - 04/21/13	168	6.8	9.4	8.2
04/22/13 - 04/28/13	168	5.1	7.9	6.5
04/29/13 - 05/05/13	168	4.9	6.6	5.9
05/06/13 - 05/12/13	168	4.2	6.4	5.6
05/13/13 - 05/19/13	168	4.4	7.5	6.0
05/20/13 - 05/26/13	168	2.1	7.3	4.6
05/27/13 - 06/02/13	168	3.5	9.0	6.1
06/03/13 - 06/09/13	34	6.3	8.0	7.2
06/10/13 - 06/16/13		NO DATA		
06/17/13 - 06/23/13	134	6.2	8.7	7.9
06/24/13 - 06/30/13	168	4.6	8.3	6.8
07/01/13 - 07/07/13	168	5.3	7.9	6.9
07/08/13 - 07/14/13	168	3.1	8.1	6.6
07/15/13 - 07/21/13	168	5.2	8.4	6.8
07/22/13 - 07/28/13	168	5.8	8.4	7.0
07/29/13 - 08/04/13	168	5.4	7.0	6.4
08/05/13 - 08/11/13	168	5.4	7.3	6.6
08/12/13 - 08/18/13	168	5.1	6.7	6.0
08/19/13 - 08/25/13	168	4.4	6.2	5.5

TABLE A-5 (Continued): WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT CLARK STREET ON THE
 CHICAGO RIVER DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
08/26/13 - 09/01/13	168	3.7	6.7	5.8
09/02/13 - 09/08/13	168	4.4	6.6	5.8
09/09/13 - 09/15/13	168	4.3	6.8	5.9
09/16/13 - 09/22/13	168	5.3	6.7	6.0
09/23/13 - 09/29/13	168	4.9	7.3	6.4
09/30/13 - 10/06/13	168	5.6	7.0	6.5
10/07/13 - 10/13/13	167	6.2	8.0	7.1
10/14/13 - 10/20/13	168	6.6	8.2	7.4
10/21/13 - 10/27/13	167	7.0	8.8	7.8
10/28/13 - 11/03/13	168	4.8	9.1	7.6
11/04/13 - 11/10/13	168	7.7	9.3	8.7
11/11/13 - 11/17/13	168	7.8	10.1	8.9
11/18/13 - 11/24/13	168	5.4	10.7	8.9
11/25/13 - 12/01/13	168	9.5	11.7	10.5
12/02/13 - 12/08/13	168	9.1	12.0	10.7
12/09/13 - 12/15/13	168	9.4	13.1	11.5
12/16/13 - 12/22/13	168	9.0	12.6	11.3
12/23/13 - 12/29/13	168	9.7	12.0	10.9
12/30/13 - 12/31/13	48	10.2	11.5	10.9

TABLE A-6: WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
AT LOOMIS STREET ON THE
SOUTH BRANCH CHICAGO RIVER DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
01/01/13 - 01/06/13	144	8.6	9.2	8.8
01/07/13 - 01/13/13	168	6.9	9.0	8.4
01/14/13 - 01/20/13	168	7.1	10.0	8.8
01/21/13 - 01/27/13	168	7.8	9.9	9.5
01/28/13 - 02/03/13	168	6.6	11.4	9.4
02/04/13 - 02/10/13	168	7.9	11.1	9.4
02/11/13 - 02/17/13	168	8.5	10.1	9.4
02/18/13 - 02/24/13	167	8.2	9.9	9.0
02/25/13 - 03/03/13	168	7.5	9.3	8.2
03/04/13 - 03/10/13	168	7.9	9.5	8.4
03/11/13 - 03/17/13	168	6.9	10.3	9.5
03/18/13 - 03/24/13	167	7.8	9.4	8.5
03/25/13 - 03/31/13	168	6.9	7.9	7.3
04/01/13 - 04/07/13	168	6.9	10.6	8.2
04/08/13 - 04/14/13	168	5.8	8.9	7.3
04/15/13 - 04/21/13	168	5.5	9.4	8.1
04/22/13 - 04/28/13	168	7.0	9.3	8.2
04/29/13 - 05/05/13	168	5.5	8.3	6.8
05/06/13 - 05/12/13	168	4.4	7.3	5.8
05/13/13 - 05/19/13	58	4.5	6.4	5.3
05/20/13 - 05/26/13		NO DATA		
05/27/13 - 06/02/13	84	3.9	6.5	5.2
06/03/13 - 06/09/13	168	0.7	6.9	4.6
06/10/13 - 06/16/13	168	4.1	7.6	5.9
06/17/13 - 06/23/13	168	4.1	5.7	5.1
06/24/13 - 06/30/13	168	3.9	5.8	4.9
07/01/13 - 07/07/13	168	4.0	5.9	4.8
07/08/13 - 07/14/13	82	3.6	5.0	4.4
07/15/13 - 07/21/13		NO DATA		
07/22/13 - 07/28/13	110	4.3	5.9	5.0
07/29/13 - 08/04/13	168	4.0	5.8	5.0
08/05/13 - 08/11/13	58	3.6	4.9	4.3
08/12/13 - 09/01/13		NO DATA		
09/02/13 - 09/08/13	87	4.4	5.7	4.9

TABLE A-6 (Continued): WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT LOOMIS STREET ON THE
 SOUTH BRANCH CHICAGO RIVER DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
09/09/13 - 09/15/13	168	4.0	5.7	4.7
09/16/13 - 09/22/13	168	1.1	6.8	4.0
09/23/13 - 09/29/13	168	3.8	5.5	4.7
09/30/13 - 10/06/13	168	3.3	5.8	4.9
10/07/13 - 10/13/13	168	3.8	6.4	5.6
10/14/13 - 10/20/13	168	5.4	6.7	6.1
10/21/13 - 10/27/13	168	5.2	6.9	6.3
10/28/13 - 11/03/13	168	0.9	7.4	5.4
11/04/13 - 11/10/13	168	3.4	6.7	5.4
11/11/13 - 11/17/13	168	6.4	7.6	6.9
11/18/13 - 11/24/13	168	3.8	7.8	6.6
11/25/13 - 12/01/13	168	7.1	8.6	8.0
12/02/13 - 12/08/13	168	6.7	7.9	7.4
12/09/13 - 12/15/13	168	6.8	10.5	8.7
12/16/13 - 12/22/13	168	6.9	10.4	8.9
12/23/13 - 12/29/13	168	6.8	10.3	8.9
12/30/13 - 12/31/13	48	8.5	9.1	8.8

TABLE A-7: WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT 36TH STREET ON
 BUBBLY CREEK DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
01/01/13 - 01/06/13	144	9.2	11.8	10.6
01/07/13 - 01/13/13	168	9.8	14.2	11.7
01/14/13 - 01/20/13	168	10.4	19.0	15.2
01/21/13 - 01/27/13	168	16.9	24.1	20.7
01/28/13 - 02/03/13	168	0.0	22.9	7.6
02/04/13 - 02/10/13	58	0.0	0.0	0.0
02/11/13 - 03/17/13		NO DATA		
03/18/13 - 03/24/13	110	0.8	2.5	1.6
03/25/13 - 03/31/13	168	2.2	19.3	6.7
04/01/13 - 04/07/13	168	14.5	25.5	20.1
04/08/13 - 04/14/13	168	0.0	16.2	6.7
04/15/13 - 04/21/13	58	0.0	0.0	0.0
04/22/13 - 05/12/13		NO DATA		
05/13/13 - 05/19/13	111	3.1	11.1	6.4
05/20/13 - 05/26/13	168	0.2	9.9	1.5
05/27/13 - 06/02/13	168	0.0	7.6	1.3
06/03/13 - 06/09/13	168	0.0	3.4	0.3
06/10/13 - 06/16/13	168	0.8	7.8	4.1
06/17/13 - 06/23/13	168	0.2	4.8	1.0
06/24/13 - 06/30/13	58	0.3	1.2	0.4
07/01/13 - 07/07/13		NO DATA		
07/08/13 - 07/14/13	111	0.0	10.2	3.2
07/15/13 - 07/21/13	168	0.0	10.0	2.6
07/22/13 - 07/28/13	168	0.0	9.9	4.1
07/29/13 - 08/04/13	168	3.6	13.8	7.0
08/05/13 - 08/11/13	58	1.7	8.2	4.8
08/12/13 - 08/18/13		NO DATA		
08/19/13 - 08/25/13	110	0.9	9.2	3.5
08/26/13 - 09/01/13	168	0.4	7.5	1.9
09/02/13 - 09/08/13	168	0.1	5.9	0.4
09/09/13 - 09/15/13	168	0.5	10.4	3.9
09/16/13 - 09/22/13	59	1.6	5.0	3.0
09/23/13 - 10/13/13		NO DATA		
10/14/13 - 10/20/13	110	4.3	7.1	5.5

TABLE A-7 (Continued): WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT 36TH STREET ON
 BUBBLY CREEK DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
10/21/13 - 10/27/13	168	5.5	8.5	7.3
10/28/13 - 11/03/13	168	0.0	9.2	4.3
11/04/13 - 11/10/13	168	0.0	0.0	0.0
11/11/13 - 11/17/13	168	0.0	5.4	0.7
11/18/13 - 11/24/13	168	0.0	2.6	0.1
11/25/13 - 12/01/13	168	0.0	0.2	0.0
12/02/13 - 12/08/13	168	0.0	0.2	0.0
12/09/13 - 12/15/13	168	0.0	0.0	0.0
12/16/13 - 12/22/13	168	0.0	0.0	0.0
12/23/13 - 12/29/13	168	0.0	3.1	0.6
12/30/13 - 12/31/13	48	0.0	1.9	0.4

TABLE A-8: WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT INTERSTATE HIGHWAY 55 ON
 BUBBLY CREEK DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
01/01/13 - 01/06/13	144	7.9	9.2	8.4
01/07/13 - 01/13/13	167	7.9	10.9	9.2
01/14/13 - 01/20/13	168	7.9	10.8	8.9
01/21/13 - 01/27/13	168	10.5	16.2	12.3
01/28/13 - 02/03/13	168	1.3	18.5	6.4
02/04/13 - 02/10/13	167	1.4	8.4	4.8
02/11/13 - 02/17/13	168	5.8	9.3	7.8
02/18/13 - 02/24/13	168	6.0	8.9	7.4
02/25/13 - 03/03/13	168	5.4	8.2	7.0
03/04/13 - 03/10/13	58	4.8	6.3	5.7
03/11/13 - 03/31/13		NO DATA		
04/01/13 - 04/07/13	110	7.0	10.8	9.3
04/08/13 - 04/14/13	168	1.6	8.4	4.5
04/15/13 - 04/21/13	168	0.7	9.5	3.7
04/22/13 - 04/28/13	168	0.8	4.7	1.4
04/29/13 - 05/05/13	58	1.1	3.1	1.6
05/06/13 - 05/12/13		NO DATA		
05/13/13 - 05/19/13	110	2.9	11.2	6.2
05/20/13 - 05/26/13	168	0.6	9.6	1.6
05/27/13 - 06/02/13	84	0.6	6.3	1.2
06/03/13 - 06/09/13		NO DATA		
06/10/13 - 06/16/13	109	1.7	8.7	3.8
06/17/13 - 06/23/13	168	0.4	12.3	4.0
06/24/13 - 06/30/13	168	0.0	5.3	0.8
07/01/13 - 07/07/13	168	0.0	0.0	0.0
07/08/13 - 07/14/13	168	0.0	11.3	2.4
07/15/13 - 07/21/13	168	0.7	7.6	3.6
07/22/13 - 07/28/13	168	0.3	5.7	2.4
07/29/13 - 08/04/13	168	1.8	5.3	3.5
08/05/13 - 08/11/13	168	1.7	10.6	4.1
08/12/13 - 08/18/13	168	1.7	9.5	4.1
08/19/13 - 08/25/13	168	1.7	9.1	4.1
08/26/13 - 09/01/13	168	0.0	7.0	1.9
09/02/13 - 09/08/13	168	0.0	9.0	1.4

TABLE A-8 (Continued): WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT INTERSTATE HIGHWAY 55 ON
 BUBBLY CREEK DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
09/09/13 - 09/15/13	168	0.0	11.1	1.8
09/16/13 - 09/22/13	168	0.0	6.4	1.1
09/23/13 - 09/29/13	168	0.2	7.7	2.0
09/30/13 - 10/06/13	57	1.3	8.5	3.5
10/07/13 - 10/13/13		NO DATA		
10/14/13 - 10/20/13	108	2.1	3.8	2.8
10/21/13 - 10/27/13	168	2.9	6.2	5.1
10/28/13 - 11/03/13	168	1.0	9.0	4.3
11/04/13 - 11/10/13	168	0.8	4.2	1.5
11/11/13 - 11/17/13	168	1.1	4.9	2.8
11/18/13 - 11/24/13	168	0.3	3.5	1.1
11/25/13 - 12/01/13	168	0.3	3.3	1.0
12/02/13 - 12/08/13	168	0.2	5.9	1.8
12/09/13 - 12/15/13	167	0.3	4.9	2.2
12/16/13 - 12/22/13	168	0.7	4.7	2.7
12/23/13 - 12/29/13	168	2.1	7.3	5.1
12/30/13 - 12/31/13	48	6.6	7.8	7.4

TABLE A-9: WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
AT CICERO AVENUE ON THE
CHICAGO SANITARY AND SHIP CANAL DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
01/01/13 - 01/06/13	144	9.4	10.5	9.9
01/07/13 - 01/13/13	168	8.2	10.3	9.5
01/14/13 - 01/20/13	168	7.7	10.0	8.7
01/21/13 - 01/27/13	168	9.8	11.3	10.5
01/28/13 - 02/03/13	168	5.9	10.6	9.0
02/04/13 - 02/10/13	168	8.8	11.0	10.0
02/11/13 - 02/17/13	168	8.6	10.2	9.5
02/18/13 - 02/24/13	168	9.1	11.2	9.8
02/25/13 - 03/03/13	168	7.5	9.7	8.5
03/04/13 - 03/10/13	168	7.2	9.1	8.2
03/11/13 - 03/17/13	168	6.4	10.4	9.4
03/18/13 - 03/24/13	167	7.5	10.2	8.8
03/25/13 - 03/31/13	168	6.3	8.4	7.4
04/01/13 - 04/07/13	168	6.8	12.2	8.9
04/08/13 - 04/14/13	168	4.6	11.7	7.9
04/15/13 - 04/21/13	57	7.3	8.0	7.7
04/22/13 - 04/28/13		NO DATA		
04/29/13 - 05/05/13	110	3.6	6.9	5.0
05/06/13 - 05/12/13	168	2.3	5.3	3.6
05/13/13 - 05/19/13	168	2.9	6.6	4.7
05/20/13 - 05/26/13	168	0.0	5.4	1.3
05/27/13 - 06/02/13	168	0.0	3.5	1.4
06/03/13 - 06/09/13	168	0.0	4.1	1.2
06/10/13 - 06/16/13	61	0.5	7.3	3.5
06/17/13 - 06/23/13		NO DATA		
06/24/13 - 06/30/13	111	0.0	4.4	2.8
07/01/13 - 07/07/13	168	0.3	4.1	2.1
07/08/13 - 07/14/13	168	0.0	5.5	2.0
07/15/13 - 07/21/13	168	0.9	9.8	4.8
07/22/13 - 07/28/13	168	1.2	5.9	3.5
07/29/13 - 08/04/13	168	2.2	5.2	3.9
08/05/13 - 08/11/13	58	2.6	4.6	3.9
08/12/13 - 08/18/13		NO DATA		
08/19/13 - 08/25/13	107	2.3	9.4	4.9

TABLE A-9 (Continued): WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT CICERO AVENUE ON THE
 CHICAGO SANITARY AND SHIP CANAL DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
08/26/13 - 09/01/13	168	1.9	6.6	4.1
09/02/13 - 09/08/13	168	0.1	6.7	3.7
09/09/13 - 09/15/13	168	0.9	9.2	4.1
09/16/13 - 09/22/13	57	0.5	4.1	2.6
09/23/13 - 09/29/13		NO DATA		
09/30/13 - 10/06/13	111	3.8	6.3	5.0
10/07/13 - 10/13/13	168	3.4	6.1	4.7
10/14/13 - 10/20/13	167	4.9	6.4	5.7
10/21/13 - 10/27/13	168	5.4	7.0	6.3
10/28/13 - 11/03/13	168	0.9	7.7	4.8
11/04/13 - 11/10/13	168	0.4	6.0	3.9
11/11/13 - 11/17/13	168	3.7	8.0	6.2
11/18/13 - 11/24/13	168	2.2	7.7	5.0
11/25/13 - 12/01/13	168	6.6	8.5	7.8
12/02/13 - 12/08/13	168	6.8	8.1	7.5
12/09/13 - 12/15/13	168	7.1	9.0	8.3
12/16/13 - 12/22/13	168	8.1	10.3	9.2
12/23/13 - 12/29/13	168	7.0	9.3	7.9
12/30/13 - 12/31/13	48	9.3	9.6	9.5

TABLE A-10: WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT B&O CENTRAL RAILROAD ON THE
 CHICAGO SANITARY AND SHIP CANAL DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
01/01/13 - 01/06/13	144	8.9	9.7	9.3
01/07/13 - 01/13/13	168	8.1	9.7	9.0
01/14/13 - 01/20/13	168	8.1	9.3	8.7
01/21/13 - 01/27/13	168	9.0	10.3	9.7
01/28/13 - 02/03/13	168	6.6	9.9	9.0
02/04/13 - 02/10/13	168	9.2	10.1	9.7
02/11/13 - 02/17/13	168	8.7	9.9	9.3
02/18/13 - 02/24/13	168	9.0	10.1	9.4
02/25/13 - 03/03/13	168	8.2	9.6	9.0
03/04/13 - 03/10/13	168	8.1	9.3	8.7
03/11/13 - 03/17/13	168	7.5	10.4	9.4
03/18/13 - 03/24/13	167	8.8	10.0	9.3
03/25/13 - 03/31/13	168	7.9	9.2	8.7
04/01/13 - 04/07/13	168	7.5	9.6	8.9
04/08/13 - 04/14/13	168	6.2	10.6	8.7
04/15/13 - 04/21/13	168	6.0	9.7	8.3
04/22/13 - 04/28/13	168	4.4	9.0	7.8
04/29/13 - 05/05/13	168	6.0	8.3	7.3
05/06/13 - 05/12/13	168	4.7	7.9	6.7
05/13/13 - 05/19/13	168	5.3	8.1	6.9
05/20/13 - 05/26/13	168	1.8	8.1	5.2
05/27/13 - 06/02/13	168	2.7	7.7	5.1
06/03/13 - 06/09/13	168	2.1	7.0	5.0
06/10/13 - 06/16/13	168	4.2	6.9	5.7
06/17/13 - 06/23/13	168	3.2	6.2	5.0
06/24/13 - 06/30/13	168	1.7	6.0	4.5
07/01/13 - 07/07/13	168	2.5	6.2	4.3
07/08/13 - 07/14/13	57	2.1	5.9	3.8
07/15/13 - 08/18/13		NO DATA		
08/19/13 - 08/25/13	135	4.8	9.1	6.7
08/26/13 - 09/01/13	168	2.6	7.3	5.1
09/02/13 - 09/08/13	168	1.5	8.1	5.5
09/09/13 - 09/15/13	168	4.5	9.1	6.7
09/16/13 - 09/22/13	168	4.8	8.5	6.8

TABLE A-10 (Continued): WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT B&O CENTRAL RAILROAD ON THE
 CHICAGO SANITARY AND SHIP CANAL DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
09/23/13 - 09/29/13	168	4.2	7.5	5.7
09/30/13 - 10/06/13	168	4.0	7.0	5.9
10/07/13 - 10/13/13	168	4.2	6.8	5.7
10/14/13 - 10/20/13	168	5.8	7.1	6.5
10/21/13 - 10/27/13	168	4.4	7.4	5.9
10/28/13 - 11/03/13	168	3.0	7.8	6.2
11/04/13 - 11/10/13	168	3.4	8.0	6.6
11/11/13 - 11/17/13	168	6.1	7.7	7.1
11/18/13 - 11/24/13	168	5.0	8.3	6.9
11/25/13 - 12/01/13	168	7.6	9.5	8.4
12/02/13 - 12/08/13	168	8.0	9.1	8.5
12/09/13 - 12/15/13	168	8.5	9.4	9.0
12/16/13 - 12/22/13	168	8.2	9.8	9.1
12/23/13 - 12/29/13	168	8.4	9.9	9.1
12/30/13 - 12/31/13	48	8.5	9.7	9.2

TABLE A-11: WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT LOCKPORT POWERHOUSE ON THE
 CHICAGO SANITARY AND SHIP CANAL DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
01/01/13 - 01/06/13	144	8.2	9.3	8.7
01/07/13 - 01/13/13	168	7.9	9.9	9.3
01/14/13 - 01/20/13	168	7.6	9.1	8.3
01/21/13 - 01/27/13	168	8.0	10.2	8.8
01/28/13 - 02/03/13	168	7.2	10.2	8.8
02/04/13 - 02/10/13	168	8.3	9.4	8.9
02/11/13 - 02/17/13	168	7.7	9.1	8.7
02/18/13 - 02/24/13	168	7.9	8.7	8.3
02/25/13 - 03/03/13	168	7.7	8.9	8.2
03/04/13 - 03/10/13	168	7.5	8.6	8.1
03/11/13 - 03/17/13	168	7.3	9.5	8.5
03/18/13 - 03/24/13	167	7.9	9.1	8.7
03/25/13 - 03/31/13	168	7.1	8.7	7.8
04/01/13 - 04/07/13	168	7.0	8.6	7.9
04/08/13 - 04/14/13	168	6.5	8.6	7.8
04/15/13 - 04/21/13	168	5.9	8.6	7.5
04/22/13 - 04/28/13	168	5.7	9.0	7.1
04/29/13 - 05/05/13	168	4.5	7.2	6.1
05/06/13 - 05/12/13	168	4.4	6.3	5.6
05/13/13 - 05/19/13	168	4.4	7.4	5.7
05/20/13 - 05/26/13	168	0.7	6.7	3.1
05/27/13 - 06/02/13	59	1.3	4.5	2.7
06/03/13 - 07/07/13		NO DATA		
07/08/13 - 07/14/13	108	1.8	4.8	3.1
07/15/13 - 07/21/13	168	3.5	7.9	5.0
07/22/13 - 07/28/13	168	3.1	5.9	4.7
07/29/13 - 08/04/13	168	2.0	4.8	3.9
08/05/13 - 08/11/13	136	3.0	7.8	4.8
08/12/13 - 08/18/13	168	2.5	6.4	4.4
08/19/13 - 08/25/13	168	1.6	5.9	4.1
08/26/13 - 09/01/13	168	2.1	5.3	4.2
09/02/13 - 09/08/13	168	2.7	6.8	4.2
09/09/13 - 09/15/13	168	1.4	6.3	4.1
09/16/13 - 09/22/13	168	2.4	4.9	3.4

TABLE A-11 (Continued): WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT LOCKPORT POWERHOUSE ON THE
 CHICAGO SANITARY AND SHIP CANAL DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
09/23/13 - 09/29/13	168	2.5	5.4	4.5
09/30/13 - 10/06/13	167	3.8	5.9	5.0
10/07/13 - 10/13/13	168	4.6	6.1	5.4
10/14/13 - 10/20/13	168	4.4	5.8	5.0
10/21/13 - 10/27/13	168	4.6	6.7	5.7
10/28/13 - 11/03/13	168	2.8	7.4	5.3
11/04/13 - 11/10/13	168	2.2	6.4	4.8
11/11/13 - 11/17/13	168	6.4	7.1	6.7
11/18/13 - 11/24/13	168	4.8	7.1	6.2
11/25/13 - 12/01/13	168	5.7	7.9	6.9
12/02/13 - 12/08/13	168	6.8	7.8	7.4
12/09/13 - 12/15/13	168	7.2	8.6	7.9
12/16/13 - 12/22/13	168	7.7	8.9	8.6
12/23/13 - 12/29/13	168	7.5	9.0	8.4
12/30/13 - 12/31/13	48	8.1	8.3	8.2

TABLE A-12: WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT C&W INDIANA RAILROAD ON THE
 LITTLE CALUMET RIVER DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
01/01/13 - 01/06/13	144	10.5	12.5	11.5
01/07/13 - 01/13/13	168	10.7	12.5	11.6
01/14/13 - 01/20/13	168	10.6	12.9	11.8
01/21/13 - 01/27/13	168	11.6	13.9	12.8
01/28/13 - 02/03/13	168	11.6	13.5	12.4
02/04/13 - 02/10/13	168	9.7	13.5	11.3
02/11/13 - 02/17/13	168	10.4	12.6	11.8
02/18/13 - 02/24/13	168	11.0	13.5	12.5
02/25/13 - 03/03/13	168	10.6	12.9	11.8
03/04/13 - 03/10/13	168	9.9	13.0	11.6
03/11/13 - 03/17/13	168	10.5	12.3	11.5
03/18/13 - 03/24/13	167	10.2	12.6	11.9
03/25/13 - 03/31/13	168	10.0	15.0	12.3
04/01/13 - 04/07/13	168	11.4	21.4	16.5
04/08/13 - 04/14/13	168	7.8	17.6	11.8
04/15/13 - 04/21/13	168	5.0	10.4	7.5
04/22/13 - 04/28/13	168	2.4	5.9	3.9
04/29/13 - 05/05/13	168	1.3	6.4	3.6
05/06/13 - 05/12/13	168	1.9	12.2	5.8
05/13/13 - 05/19/13	168	2.5	13.7	6.2
05/20/13 - 05/26/13	168	0.6	10.2	2.9
05/27/13 - 06/02/13	60	0.5	4.4	1.3
06/03/13 - 08/18/13		NO DATA		
08/19/13 - 08/25/13	132	6.9	10.5	8.2
08/26/13 - 09/01/13	168	5.6	10.4	7.7
09/02/13 - 09/08/13	167	5.7	9.4	7.5
09/09/13 - 09/15/13	168	6.7	10.9	8.4
09/16/13 - 09/22/13	168	5.6	8.4	7.2
09/23/13 - 09/29/13	168	6.7	8.9	7.7
09/30/13 - 10/06/13	168	7.0	9.1	7.8
10/07/13 - 10/13/13	168	7.3	9.4	8.1
10/14/13 - 10/20/13	168	7.4	9.0	8.1
10/21/13 - 10/27/13	168	8.5	10.2	9.4
10/28/13 - 11/03/13	168	8.1	10.9	9.6

TABLE A-12 (Continued): WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT C&W INDIANA RAILROAD ON THE
 LITTLE CALUMET RIVER DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
11/04/13 - 11/10/13	168	8.2	10.3	9.2
11/11/13 - 11/17/13	168	9.6	11.4	10.4
11/18/13 - 11/24/13	168	9.1	11.0	10.3
11/25/13 - 12/01/13	168	10.8	12.2	11.7
12/02/13 - 12/08/13	168	11.2	12.3	12.0
12/09/13 - 12/15/13	168	11.2	12.8	12.1
12/16/13 - 12/22/13	168	10.6	11.9	11.3
12/23/13 - 12/29/13	168	10.8	12.1	11.3
12/30/13 - 12/31/13	48	10.7	11.2	11.0

TABLE A-13: WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT HALSTED STREET ON THE
 LITTLE CALUMET RIVER DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
01/01/13 - 01/06/13		NO DATA		
01/07/13 - 01/13/13	132	5.8	8.7	7.2
01/14/13 - 01/20/13	168	6.5	8.2	7.2
01/21/13 - 01/27/13	168	7.1	8.6	8.0
01/28/13 - 02/03/13	168	5.6	8.0	7.2
02/04/13 - 02/10/13	168	6.6	8.3	7.4
02/11/13 - 02/17/13	168	6.6	8.1	7.3
02/18/13 - 02/24/13	168	6.4	8.2	7.6
02/25/13 - 03/03/13	168	5.9	7.8	7.1
03/04/13 - 03/10/13	168	6.5	9.2	8.0
03/11/13 - 03/17/13	168	6.7	8.9	7.8
03/18/13 - 03/24/13	167	6.4	8.8	7.8
03/25/13 - 03/31/13	168	5.5	8.1	7.1
04/01/13 - 04/07/13	168	5.3	9.8	7.1
04/08/13 - 04/14/13	168	4.6	9.6	7.0
04/15/13 - 04/21/13	168	4.8	9.3	6.8
04/22/13 - 04/28/13	168	4.4	7.7	6.4
04/29/13 - 05/05/13	168	3.1	9.0	5.7
05/06/13 - 05/12/13	168	2.8	9.9	5.8
05/13/13 - 05/19/13	168	0.9	8.9	5.1
05/20/13 - 05/26/13	168	1.1	8.5	4.8
05/27/13 - 06/02/13	60	1.1	5.8	3.7
06/03/13 - 07/07/13		NO DATA		
07/08/13 - 07/14/13	109	3.2	13.8	6.9
07/15/13 - 07/21/13	168	0.2	12.5	4.6
07/22/13 - 07/28/13	168	1.5	8.1	5.5
07/29/13 - 08/04/13	168	3.6	8.6	6.5
08/05/13 - 08/11/13	168	1.8	10.3	6.8
08/12/13 - 08/18/13	168	2.6	8.8	6.1
08/19/13 - 08/25/13	168	1.5	8.8	6.3
08/26/13 - 09/01/13	168	2.5	9.0	5.7
09/02/13 - 09/08/13	59	4.1	7.1	5.5
09/09/13 - 10/06/13		NO DATA		
10/07/13 - 10/13/13	108	5.6	7.7	6.7

TABLE A-13 (Continued): WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT HALSTED STREET ON THE
 LITTLE CALUMET RIVER DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
10/14/13 - 10/20/13	168	3.9	7.3	5.7
10/21/13 - 10/27/13	168	3.8	7.3	6.1
10/28/13 - 11/03/13	167	6.0	8.6	7.0
11/04/13 - 11/10/13	168	5.8	7.4	6.7
11/11/13 - 11/17/13	168	6.7	8.1	7.4
11/18/13 - 11/24/13	168	6.3	8.0	7.1
11/25/13 - 12/01/13	168	7.0	8.4	7.8
12/02/13 - 12/08/13	168	6.6	8.4	7.4
12/09/13 - 12/15/13	168	7.4	8.9	8.2
12/16/13 - 12/22/13	168	6.5	8.6	7.7
12/23/13 - 12/29/13	168	6.9	8.5	7.8
12/30/13 - 12/31/13	48	7.3	8.3	7.7

TABLE A-14: WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT ROUTE 83 ON THE
 CALUMET-SAG CHANNEL DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
01/01/13 - 01/06/13	144	8.6	9.7	9.1
01/07/13 - 01/13/13	168	8.3	9.8	9.1
01/14/13 - 01/20/13	168	6.9	8.9	8.1
01/21/13 - 01/27/13	168	8.5	10.5	9.7
01/28/13 - 02/03/13	168	8.7	10.0	9.3
02/04/13 - 02/10/13	168	8.8	9.8	9.2
02/11/13 - 02/17/13	168	8.5	9.9	9.2
02/18/13 - 02/24/13	168	8.8	10.3	9.5
02/25/13 - 03/03/13	168	7.4	9.8	8.4
03/04/13 - 03/10/13	168	7.4	10.8	8.9
03/11/13 - 03/17/13	168	8.6	11.0	10.0
03/18/13 - 03/24/13	167	8.4	10.2	9.5
03/25/13 - 03/31/13	168	8.1	9.6	8.7
04/01/13 - 04/07/13	168	7.5	10.8	9.1
04/08/13 - 04/14/13	168	7.1	9.6	8.0
04/15/13 - 04/21/13	168	7.1	8.9	7.8
04/22/13 - 04/28/13	168	6.2	8.0	7.5
04/29/13 - 05/05/13	168	5.0	6.7	5.8
05/06/13 - 05/12/13	168	3.8	8.2	6.3
05/13/13 - 05/19/13	168	4.3	8.2	5.8
05/20/13 - 05/26/13	168	1.5	6.5	3.8
05/27/13 - 06/02/13	168	2.7	6.8	4.4
06/03/13 - 06/09/13	168	1.9	7.1	4.8
06/10/13 - 06/16/13	168	3.7	6.7	4.9
06/17/13 - 06/23/13	168	2.0	5.2	3.7
06/24/13 - 06/30/13	168	2.0	4.2	3.0
07/01/13 - 07/07/13	168	3.1	6.9	4.9
07/08/13 - 07/14/13	168	2.3	12.6	6.0
07/15/13 - 07/21/13	168	5.5	11.7	7.4
07/22/13 - 07/28/13	168	2.9	6.5	4.7
07/29/13 - 08/04/13	168	3.3	6.0	4.5
08/05/13 - 08/11/13	168	2.0	7.0	4.3
08/12/13 - 08/18/13	168	3.4	7.7	5.5
08/19/13 - 08/25/13	168	2.5	8.8	5.3

TABLE A-14 (Continued): WEEKLY DISSOLVED OXYGEN SUMMARY STATISTICS
 AT ROUTE 83 ON THE
 CALUMET-SAG CHANNEL DURING 2013

Monitoring Dates	Number of DO Values	DO Concentration (mg/L)		
		Minimum	Maximum	Mean
08/26/13 - 09/01/13	168	2.6	7.5	5.3
09/02/13 - 09/08/13	168	1.5	6.0	4.1
09/09/13 - 09/15/13	168	4.3	9.9	6.3
09/16/13 - 09/22/13	168	3.2	5.9	4.7
09/23/13 - 09/29/13	168	4.4	6.3	5.2
09/30/13 - 10/06/13	168	4.4	6.3	5.3
10/07/13 - 10/13/13	168	4.2	6.0	5.3
10/14/13 - 10/20/13	168	5.3	6.4	5.8
10/21/13 - 10/27/13	168	5.7	7.1	6.4
10/28/13 - 11/03/13	168	5.3	8.6	6.8
11/04/13 - 11/10/13	168	4.7	7.0	6.4
11/11/13 - 11/17/13	168	5.2	7.4	6.4
11/18/13 - 11/24/13	168	4.8	7.9	6.5
11/25/13 - 12/01/13	168	6.7	8.1	7.5
12/02/13 - 12/08/13	168	7.6	8.5	8.1
12/09/13 - 12/15/13	168	8.1	9.9	9.3
12/16/13 - 12/22/13	168	8.4	9.9	9.4
12/23/13 - 12/29/13	168	8.5	9.7	9.3
12/30/13 - 12/31/13	48	9.3	9.5	9.4

TABLE A-15: SUMMARY STATISTICS FOR DISSOLVED OXYGEN MEASURED
DURING CROSS-SECTIONAL SURVEYS IN 2013

Waterway, Station, and Date	Water Depth ^a (ft.)			N ^b	Minimum (mg/L)	Maximum (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
	Left	Center	Right						
<u>North Shore Channel</u>									
<u>Foster Avenue</u>									
05/20/2013	4.5	9.5	3.0	9	8.51	8.65	8.59	0.06	0.70
08/16/2013	4.4	9.8	4.0	10	6.09	6.30	6.17	0.07	1.09
10/07/2013	4.9	8.1	5.5	10	6.84	7.08	6.93	0.09	1.23
<u>North Branch Chicago River</u>									
<u>Addison Street</u>									
06/04/2013	9.1	9.2	5.5	11	7.80	8.20	8.04	0.14	1.69
08/13/2013	8.5	9.4	3.8	10	6.40	7.25	6.60	0.25	3.83
10/08/2013	9.5	9.9	5.3	11	7.53	7.60	7.56	0.02	0.30
<u>Division Street</u>									
08/13/2013	11.4	17.1	11.4	12	5.73	6.33	5.88	0.17	2.90
10/08/2013	18.6	18.6	12.8	12	6.06	6.37	6.26	0.11	1.80
<u>Kinzie Street</u>									
06/04/2013	15.6	21.1	11.1	12	6.32	6.80	6.63	0.12	1.79
08/13/2013	17.1	23.4	8.9	12	5.67	6.23	5.84	0.16	2.75

TABLE A-15 (Continued): SUMMARY STATISTICS FOR DISSOLVED OXYGEN MEASURED DURING CROSS-SECTIONAL SURVEYS IN 2013

Waterway, Station, and Date	Water Depth ^a (ft.)			N ^b	Minimum (mg/L)	Maximum (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
	Left	Center	Right						
<u>Chicago River</u>									
<u>Clark Street</u>									
06/04/2013	15.3	25.4	13.4	12	7.47	8.15	7.75	0.24	3.12
08/13/2013	16.0	25.4	13.5	12	6.05	7.01	6.39	0.24	3.73
10/08/2013	16.6	24.7	14.2	12	5.88	7.20	6.77	0.36	5.28
<u>South Branch Chicago River</u>									
<u>Loomis Street</u>									
06/12/2013	15.0	22.5	17.8	12	5.71	5.98	5.78	0.07	1.28
08/22/2013	18.8	23.1	19.1	12	5.22	5.94	5.47	0.17	3.16
10/16/2013	18.0	22.2	18.9	12	6.42	6.55	6.47	0.04	0.62
<u>Bubbly Creek</u>									
<u>36th Street</u>									
06/12/2013	3.2	4.4	5.0	8	4.59	6.50	5.36	0.70	13.11
08/21/2013	2.3	4.6	5.0	8	4.26	8.23	6.13	1.37	22.30
10/17/2013	3.0	5.4	5.3	8	5.37	6.44	5.92	0.45	7.58
<u>Interstate Highway 55</u>									
06/12/2013	6.2	10.6	7.1	8	3.95	6.74	5.41	0.92	16.94
08/21/2013	5.8	10.9	5.5	10	3.33	5.28	4.42	0.77	17.32
10/17/2013	5.5	11.7	9.3	11	2.37	2.61	2.49	0.06	2.54

TABLE A-15 (Continued): SUMMARY STATISTICS FOR DISSOLVED OXYGEN MEASURED DURING CROSS-SECTIONAL SURVEYS IN 2013

Waterway, Station, and Date	Water Depth ^a (ft.)			N ^b	Minimum (mg/L)	Maximum (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
	Left	Center	Right						
<u>Chicago Sanitary and Ship Canal</u>									
<u>Cicero Avenue</u>									
06/12/2013	13.0	19.5	8.5	12	4.90	5.92	5.35	0.32	5.96
08/21/2013	12.7	19.4	8.7	12	5.42	8.16	7.08	0.88	12.50
10/16/2013	13.7	20.0	8.1	12	5.85	5.94	5.88	0.02	0.42
<u>B&O Railroad</u>									
05/29/2013	11.6	19.2	9.5	12	4.23	5.01	4.50	0.24	5.27
08/20/2013	10.9	21.7	8.5	12	6.82	7.04	6.90	0.08	1.10
10/29/2013	10.4	20.1	6.0	11	7.43	7.57	7.50	0.05	0.62
<u>Lockport Powerhouse</u>									
06/14/2013	28.8	31.3	32.2	12	4.46	4.71	4.60	0.08	1.70
08/09/2013	23.6	30.6	31.6	10	4.66	5.21	4.91	0.18	3.64
10/18/2013	28.9	28.2	30.4	12	5.11	5.22	5.17	0.04	0.72

TABLE A-15 (Continued): SUMMARY STATISTICS FOR DISSOLVED OXYGEN MEASURED DURING CROSS-SECTIONAL SURVEYS IN 2013

Waterway, Station, and Date	Water Depth ^a (ft.)			N ^b	Minimum (mg/L)	Maximum (mg/L)	Mean (mg/L)	Standard Deviation (mg/L)	Coefficient of Variation (%)
	Left	Center	Right						
<u>Little Calumet River</u>									
<u>C&WI Railroad</u>									
05/29/2013	9.8	15.6	10.1	12	5.23	7.30	6.37	0.78	12.20
08/20/2013	7.0	15.5	9.2	11	8.02	9.49	8.91	0.39	4.43
10/29/2013	8.5	13.8	8.9	12	10.03	10.60	10.38	0.21	2.06
<u>Halsted Street</u>									
05/29/2013	6.5	15.4	3.7	9	4.90	5.71	5.16	0.25	4.78
08/20/2013	9.5	14.0	4.2	11	7.54	8.28	7.98	0.25	3.11
10/29/2013	6.4	14.2	4.7	10	7.53	7.94	7.64	0.14	1.84
<u>Calumet-Sag Channel</u>									
<u>Route 83</u>									
05/29/2013	10.1	14.3	10.9	12	5.57	5.71	5.64	0.06	1.09
08/20/2013	13.2	15.0	10.7	12	6.16	6.90	6.40	0.17	2.68
10/29/2013	12.1	13.5	8.1	12	7.16	7.40	7.22	0.07	0.95

^aWater depth at the time of cross sectional survey. Exact measurement location may differ slightly during each event.

^bNumber of DO measurements across transects.