

Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago

***MONITORING AND RESEARCH
DEPARTMENT***

REPORT NO. 25-23

TUNNEL AND RESERVOIR PLAN

CALUMET TUNNEL SYSTEM

ANNUAL GROUNDWATER MONITORING REPORT

FOR 2024

July 2025



Metropolitan Water Reclamation District of Greater Chicago

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July 8, 2025

Ms. Joey Logan-Pugh
Chief
Bureau of Water
Illinois Environmental Protection Agency
2520 W. Iles Ave.
P. O. Box 19276
Springfield, IL 62794-9276

Dear Ms. Logan-Pugh:

Subject: Tunnel and Reservoir Plan Calumet Tunnel System Annual Groundwater
Monitoring Report for 2024

The report entitled “Tunnel and Reservoir Plan Calumet Tunnel System Annual Groundwater
Monitoring Report for 2024” is attached.

Very truly yours,

Albert Cox, Ph.D.
Environmental Monitoring and Research Manager
Monitoring and Research Department

AC:lf
Attachment
cc: Mr. Ryan Bahr (USEPA Region 5 - WC15J)
Mr. E. Podczerwinski
Dr. H. Zhang
cc w/o att: Mr. P. Desai
Mr. E. Staudacher

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**TUNNEL AND RESERVOIR PLAN
CALUMET TUNNEL SYSTEM
ANNUAL GROUNDWATER MONITORING REPORT
FOR 2024**

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TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	ii
LIST OF FIGURES	iii
LIST OF ABBREVIATIONS	iv
ANNUAL DATA FOR MONITORING AND OBSERVATION WELLS	1
Introduction	1
Groundwater Monitoring Program	1
Summary of Data	4
Monitoring Wells	4
Observation Wells	4

LIST OF TABLES

<u>Table No.</u>		<u>Page</u>
1	Analysis of Chemical and Physical Parameters and Fecal Coliform in Groundwater Sampled from Fill Event Monitoring Wells in the Calumet Tunnel System of the Tunnel and Reservoir Plan During 2024	5
2	Analysis of Chemical and Physical Parameters and Fecal Coliform in Groundwater Sampled from Annual Monitoring Wells in the Calumet Tunnel System of the Tunnel and Reservoir Plan During 2024	6
3	Groundwater Elevations for Observation Wells in the Calumet Tunnel System of the Tunnel and Reservoir Plan Measured During 2024	8

LIST OF FIGURES

<u>Figure No.</u>		<u>Page</u>
1	Map of Monitoring Wells in the Calumet Tunnel System	2
2	Map of Observation Wells in the Calumet Tunnel System	3
3	Minimum, Mean, and Maximum Water Elevation for Observation Wells OC-1 Through OC-11 in the Calumet Tunnel System of the Tunnel and Reservoir Plan Measured During 2024	9

LIST OF ABBREVIATIONS

Abbreviation	Definition
°C	degrees Celsius
CCD	Chicago City Datum
CFU	colony forming units
Cl ⁻	chloride
CTS	Calumet Tunnel System
District	Metropolitan Water Reclamation District of Greater Chicago
EC	electrical conductivity
FC	fecal coliform
IEPA	Illinois Environmental Protection Agency
L	liter
m	meter
mg	milligram
mL	milliliter
mS	millisiemens
NH ₃ -N	ammonia nitrogen
SO ₄ ²⁻	sulfate
TARP	Tunnel and Reservoir Plan
TDS	total dissolved solids
Temp.	temperature
TOC	total organic carbon

ANNUAL DATA FOR MONITORING AND OBSERVATION WELLS

Introduction

All monitoring and observation wells are located along the length of the Calumet Tunnel System (CTS). Four monitoring wells (QC-1, QC-2, QC-2-1, and QC-2-2) and 11 observation wells (OC-1 through OC-11) are located along the tunnel between Crawford Avenue and the Calumet Water Reclamation Plant. Seventeen monitoring wells (QC-3 through QC-19) are located between 140th Street and Indiana Avenue, nine (QC-20 through QC-28) are along Torrence Avenue, and nine (QC-29 through QC-37) are along the Little Calumet River (Figures 1 and 2). Monitoring well QC-3 was abandoned with the approval of the Illinois Environmental Protection Agency (IEPA).

The monitoring wells were sampled based on the modified groundwater monitoring program for the Metropolitan Water Reclamation District of Greater Chicago (District's) Tunnel and Reservoir Plan (TARP) as briefly described below.

Groundwater Monitoring Program

In a letter dated May 14, 2021, the IEPA approved a modified TARP groundwater monitoring program for the District's Calumet, Mainstream, Des Plaines, and Upper Des Plaines tunnel systems effective January 2021. The modification of the TARP groundwater monitoring program was based on the key findings from a three-year fill event-based groundwater monitoring study conducted by the District from 2017 to 2019, which were submitted to the IEPA in a report dated July 30, 2020.

Under the modified monitoring program, three CTS fill event-based monitoring wells (QC-2, QC-4, and QC-17) are sampled for two tunnel fill events per year, usually following storm events. Fecal coliforms (FC) in these wells were detected in 10 percent or more of samples during the period 1995–2013. The criterion that triggers fill event sampling is that the water level in the Thornton Composite Reservoir (TCR), which receives water from the CTS, reaches -280 feet Chicago City Datum (CCD). Sampling is conducted during the first week of each fill event. For the first fill event, samples are analyzed for all parameters including pH, temperature (Temp.), electrical conductivity (EC), total dissolved solids (TDS), hardness, ammonia nitrogen (NH₃-N), total organic carbon (TOC), chloride (Cl⁻), sulfate (SO₄²⁻), and FC. For the second fill event, samples are analyzed for FC only.

The other 28 wells associated with the CTS, referred to as annual monitoring wells, are sampled once per year. These wells had FC detected in less than 10 percent of samples during the period 1995–2013.

Eight of the monitoring wells (QC-1, QC-3, QC-8, QC-32, QC-33, QC-34, QC-36, and QC-37) were abandoned previously. Therefore, the monitoring requirement for this group of wells has been discontinued under the modified groundwater monitoring program.

FIGURE 1: MAP OF MONITORING WELLS IN THE CALUMET TUNNEL SYSTEM

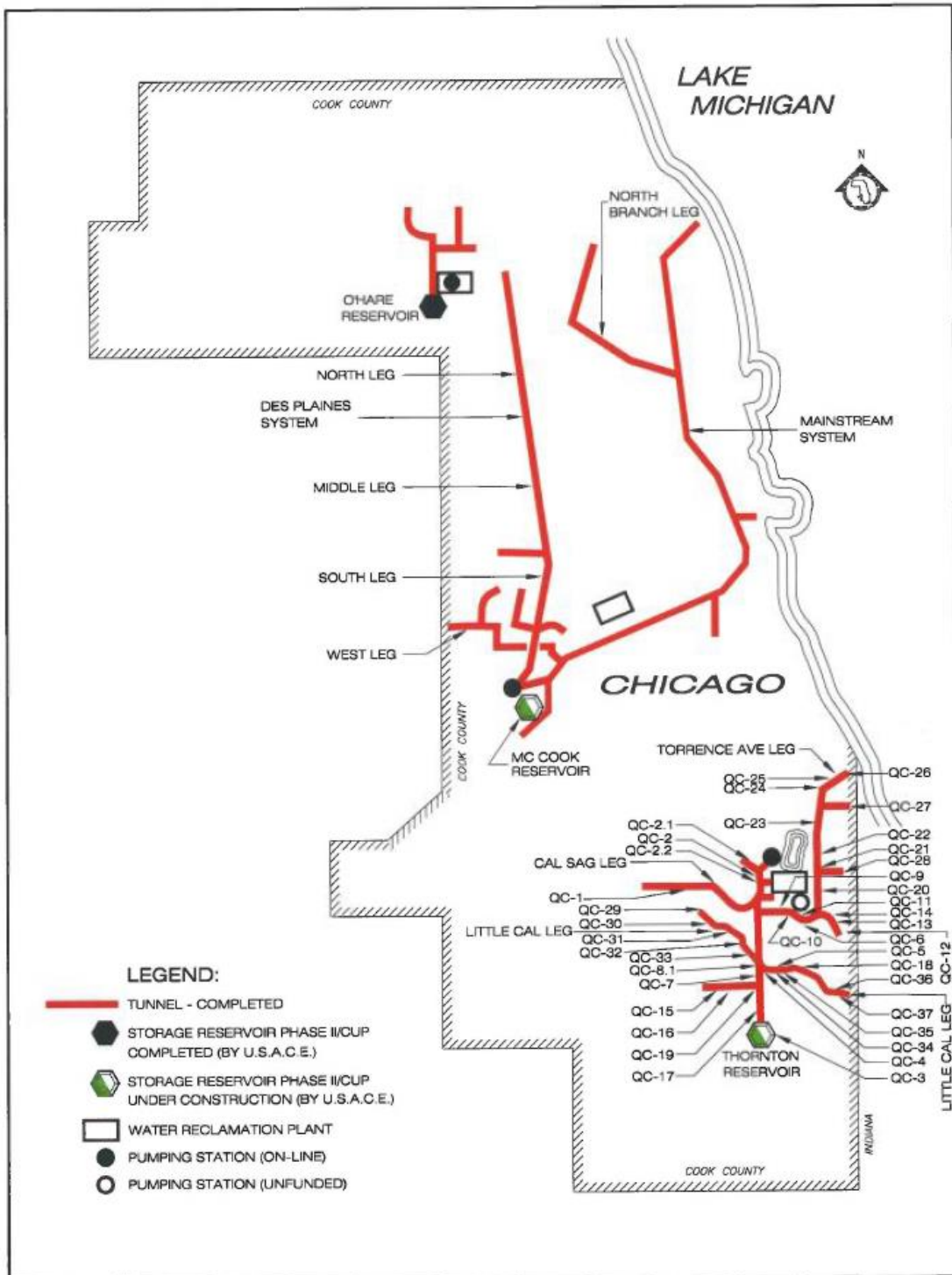
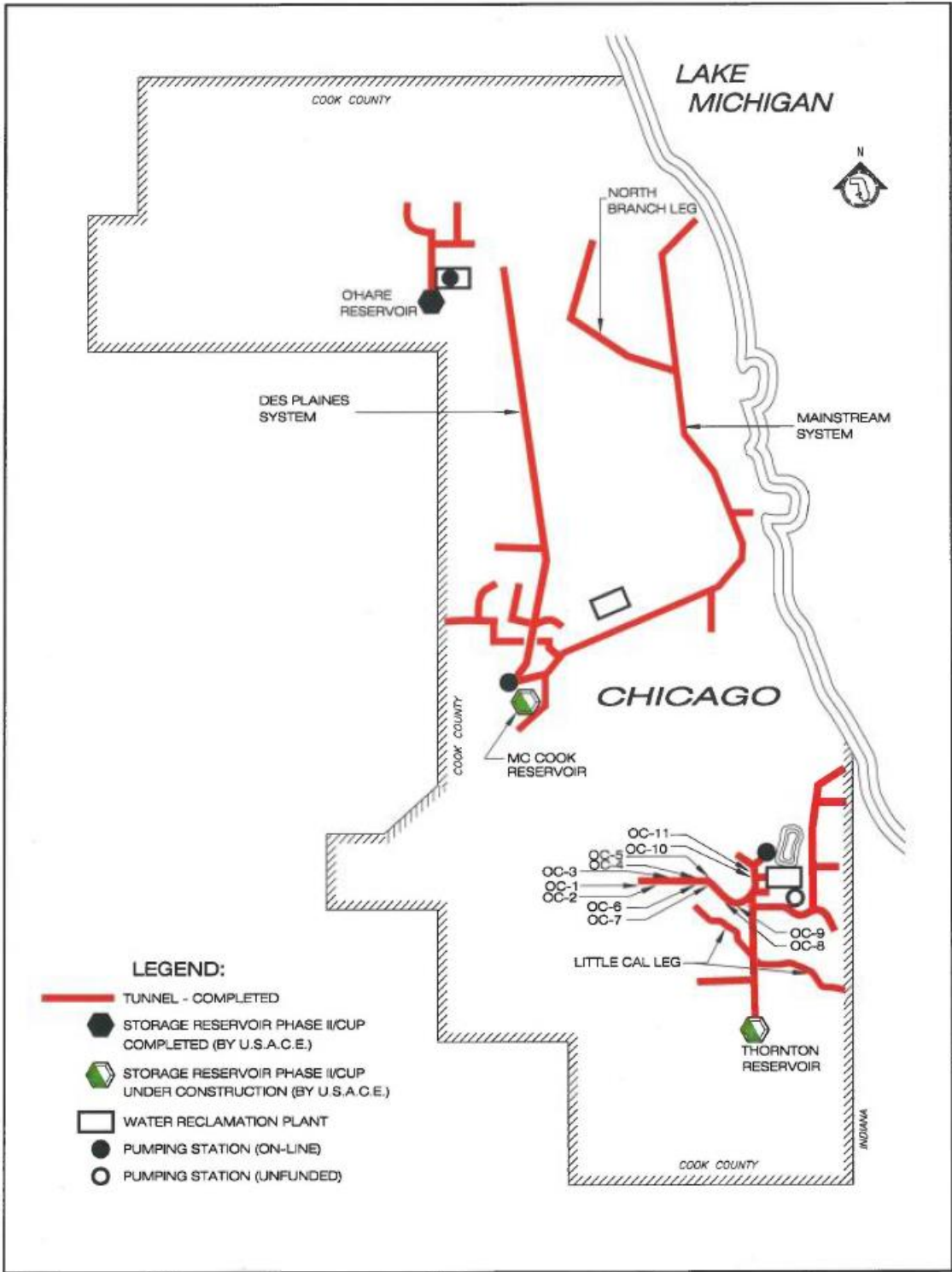


FIGURE 2: MAP OF OBSERVATION WELLS IN THE CALUMET TUNNEL SYSTEM



Groundwater elevations in the monitoring wells were measured at each sampling event. The elevations in the observation wells were measured twice per month.

Summary of Data

Monitoring Wells. For the first half of the year, monitoring wells QC 2, QC 4, and QC 17 were sampled on February 2, 2024, following the first fill event (January 26 to February 4, 2024) at the TCR. For the second half of the year, the three monitoring wells were sampled on July 25, following the eighth fill event at the TCR (July 15–17, 2024).

The groundwater analytical data and physical parameters for fill event-based monitoring wells QC 2, QC 4, and QC 17 are presented in [Table 1](#). During the two monitored fill events, FC was detected only at well QC-17 following the second fill event at 2 CFU/100 mL ([Table 1](#)).

The analytical data for groundwater from the wells sampled once per year are presented in [Table 2](#). Fecal coliforms were undetectable (<1 CFU/100 mL) in all sampled annual wells except wells QC-18 and QC-29.

Observation Wells. Groundwater elevations were measured for observation wells OC-1 through OC-11 twice per month. Water elevations were calculated relative to CCD (579.48 feet above mean sea level at the intersection of State and Madison Streets) and are presented in [Table 3](#). The minimum, mean, and maximum groundwater elevations for each well during the year are presented in [Figure 3](#).

TABLE 1: ANALYSIS OF CHEMICAL AND PHYSICAL PARAMETERS AND FECAL COLIFORM IN GROUNDWATER SAMPLED FROM FILL EVENT MONITORING WELLS IN THE CALUMET TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2024¹

Well	Sample Date	pH	EC mS/m	TDS	TOC	Cl ⁻	SO ₄ ²⁻	NH ₃ -N	Hardness	Temp. °C	Water Elevation ² feet	Fecal Coliform CFU/100 mL	Recharge Time hours
				-----mg/L-----									
QC-2	02/02/24	8.1	57	332	<5.0	23	34	<0.3	73	12.3	-318	<1	<48
	07/25/24	7.8	43	—	—	—	—	—	—	14.7	-318	<1	<48
QC-4	02/02/24	8.4	69	454	<5.0	8	14	<0.3	10	12.3	-220	<1	<48
	07/25/24	8.2	51	—	—	—	—	—	—	12.8	-227	<1	<48
QC-17	02/02/24	8.3	72	424	<5.0	9	150	0.4	105	12.4	-171	<1	<48
	07/25/24	7.5	59	—	—	—	—	—	—	13.0	-181	2	<48

¹Chemistry parameters need to be analyzed for first fill event only.

²Relative to Chicago City Datum (579.48 feet above mean sea level) at intersection of State and Madison Streets.

TABLE 2: ANALYSIS OF CHEMICAL AND PHYSICAL PARAMETERS AND FECAL COLIFORM IN GROUNDWATER
SAMPLED FROM ANNUAL MONITORING WELLS IN THE CALUMET TUNNEL SYSTEM OF THE TUNNEL AND
RESERVOIR PLAN DURING 2024

Well	Sample Date	pH	EC mS/m	TDS	TOC	Cl ⁻	SO ₄ ²⁻ mg/L	NH ₃ -N	Hardness	Temp. °C	Water Elevation ¹ feet	Fecal Coliform CFU/100 mL
QC-2-1	11/25/24	8.1	64	456	5.5	34	8	0.48	66	13.4	-298	<1
QC-2-2	02/08/24	8.6	43	310	<5.0	12	20	<0.30	39	14.0	-280	<1
QC-5	02/29/24	8.5	68	506	<5.0	49	11	<0.30	9	12.8	-217	<1
QC-6	02/29/24	8.4	58	430	<5.0	16	4	<0.30	16	13.4	-207	<1
QC-7	02/29/24	8.3	49	390	<5.0	11	1	<0.30	11	12.5	-145	<1
QC-9	02/08/24	8.0	51	272	<5.0	9	37	0.74	60	13.6	-236	<1
QC-10	05/02/24	8.4	51	370	<5.0	31	<1	<0.30	11	13.6	-168	<1
QC-11	05/02/24	8.3	38	290	<5.0	22	<1	<0.30	20	14.9	-189	<1
QC-12	07/03/24	8.2	91	730	<5.0	32	215	0.35	112	15.3	-225	<1
QC-13	07/03/24	8.1	50	360	<5.0	43	3	<0.30	30	15.5	-232	<1
QC-14	07/11/24	7.3	126	674	<5.0	148	1	0.33	155	15.4	-199	<1
QC-15	02/08/24	8.2	49	302	<5.0	13	<1	<0.30	11	13.4	-197	<1
QC-16	05/09/24	8.3	62	500	<5.0	22	81	<0.30	67	13.6	-257	<1
QC-18	05/09/24	9.0	44	358	<5.0	8	30	<0.30	8	12.7	-195	5
QC-19	05/09/24	8.5	55	438	<5.0	11	150	<0.30	106	12.8	-138	<1
QC-20	07/11/24	8.2	46	270	<5.0	19	4	<0.30	22	13.4	-244	<1
QC-21	04/11/24	8.5	43	286	<5.0	18	27	0.51	33	13.2	-237	<1
QC-22	04/11/24	8.2	31	202	<5.0	15	6	0.31	32	12.3	-234	<1
QC-23	04/11/24	8.9	41	296	<5.0	21	2	<0.30	7	12.4	-219	<1
QC-24	08/22/24	8.1	30	260	<5.0	27	<1	<0.30	16	13.1	-221	<1
QC-25	08/22/24	7.6	39	330	<5.0	13	54	<0.30	77	13.4	-220	<1
QC-26	11/14/24	8.8	32	246	<5.0	12	2	<0.30	9	12.8	-210	<1
QC-27	11/14/24	8.2	30	266	<5.0	33	<1	<0.30	23	13.2	-185	<1
QC-28	04/11/24	8.5	32	224	<5.0	13	<1	<0.30	15	13.2	-224	<1

TABLE 2 (Continued): ANALYSIS OF CHEMICAL AND PHYSICAL PARAMETERS AND FECAL COLIFORM IN GROUNDWATER SAMPLED FROM ANNUAL MONITORING WELLS IN THE CALUMET TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2024

Well	Sample Date	pH	EC mS/m	TDS	TOC	Cl ⁻	SO ₄ ²⁻	NH ₃ -N	Hardness	Temp. °C	Water Elevation ¹ feet	Fecal Coliform CFU/100 mL
				-----			mg/L-----					
QC-29	05/23/24	7.5	109	838	<5.0	159	195	0.89	382	13.8	-44	2
QC-30	05/23/24	8.4	64	538	<5.0	38	138	0.50	90	12.5	-101	<1
QC-31	05/23/24	7.8	68	564	<5.0	20	197	1.21	232	13.7	-35	<1
QC-35	05/23/24	8.7	111	856	<5.0	33	16	<0.30	22	15.7	-152	<1

¹Relative to Chicago City Datum (579.48 feet above mean sea level) at intersection of State and Madison Streets.

TABLE 3: GROUNDWATER ELEVATIONS FOR OBSERVATION WELLS IN THE CALUMET TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN MEASURED DURING 2024

Date	Observation Well No.											
	OC-1	OC-2	OC-3	OC-4	OC-5	OC-6	OC-7	OC-8	OC-8.1	OC-9	OC-10	OC-11
	Elevation (feet) ¹											
01/05/24	-39	-22	-152	-148	-147	-71	-209	-177	-206	-212	-227	-226
01/24/24	-39	-22	-152	-148	-147	-71	-209	-176	-207	-211	-225	-226
02/06/24	-38	-21	-151	-148	-146	-71	-209	-175	-207	-211	-227	-225
02/16/24	-39	-21	-152	-148	-147	-69	-209	-177	-207	-212	-227	-226
03/01/24	-39	-22	-152	-148	-147	-71	-209	-177	-207	-211	-225	-226
03/20/24	-39	-21	-152	-148	-147	-71	-209	-176	-207	-212	-227	-226
04/10/24	-39	-21	-152	-148	-146	-70	-209	-173	-207	-211	-227	-223
04/19/24	-39	-21	-152	-148	-146	-70	-206	-176	-207	-212	-228	-226
05/03/24	-39	-21	-152	-148	-147	-71	-209	-177	-205	-212	-227	-226
05/24/24	-39	-21	-152	-148	-146	-65	-209	-177	-207	-214	-228	-226
06/07/24	-39	-22	-152	-148	-146	-71	-209	-176	-211	-207	-216	-225
06/17/24	-39	-19	-151	-147	-146	-68	-209	-176	-206	-211	-223	-216
07/05/24	-40	-22	-148	-145	-146	-66	-209	-177	-206	-211	-226	-224
07/19/24	-39	-22	-150	-148	-133	-71	-209	-173	-205	-212	-226	-226
08/16/24	-40	-22	-152	-148	-147	-66	-209	-177	-206	-212	-227	-226
08/30/24	-37	-21	-150	-147	-146	-71	-205	-175	-206	-210	-226	-225
09/11/24	-41	-21	-151	-149	-146	-71	-209	-177	-206	-212	-228	-225
09/27/24	-40	-20	-152	-148	-147	-66	-209	-180	-204	-212	NA ²	-225
10/11/24	-41	-22	-152	-149	-147	-71	-211	-178	-207	-212	-228	-228
10/25/24	-41	-23	-152	-149	-147	-71	-209	-178	-206	-212	-228	-226
11/08/24	-40	-22	-150	-149	-147	-71	-210	-178	-206	-212	-226	-228
11/26/24	-41	-23	-152	-149	-147	-71	-210	-178	-206	-212	-228	-227
12/06/24	-40	-22	-152	-147	-147	-71	-210	-177	-206	-212	-222	-226
12/18/24	-40	-23	-152	-152	-147	-75	-212	-181	-206	-212	-226	-226

¹Relative to Chicago city datum (579.48 feet above mean sea level) at intersection of State and Madison Streets.

²No measurement was reported due to measurement error.

FIGURE 3: MINIMUM, MEAN, AND MAXIMUM WATER ELEVATION FOR OBSERVATION WELLS OC-1 THROUGH OC-11 IN THE CALUMET TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN MEASURED DURING 2024

