

*Protecting Our Water Environment*



*Metropolitan Water Reclamation District of Greater Chicago*

*MONITORING AND RESEARCH  
DEPARTMENT*

*REPORT NO.09-35*

*TUNNEL AND RESERVOIR PLAN  
UPPER DES PLAINES TUNNEL SYSTEM  
2008 ANNUAL GROUNDWATER MONITORING REPORT*

*JUNE 2009*

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June 8, 2009

Ms. Marcia Willhite, Chief  
Bureau of Water  
Illinois Environmental Protection Agency  
P. O. Box 19276  
Springfield, IL 62794-9276

Dear Ms. Willhite:

Subject: Tunnel and Reservoir Plan, Upper Des Plaines Tunnel System, 2008 Annual Groundwater Monitoring Report

Enclosed are three copies of "Tunnel and Reservoir Plan, Upper Des Plaines Tunnel System, 2008 Annual Groundwater Monitoring Report."

Very truly yours,

Louis Kollias  
Director  
Monitoring and Research

LK:HZ:lmf  
Enclosures

cc w/enc: Ms. Sally K. Swanson (USEPA Region V—WC15J) (2)  
Mr. Sobanski  
Dr. Granato  
Dr. O'Connor  
Dr. Zhang  
Mr. MacDonald  
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cc w/o enc: Mr. Jamjun  
Mr. Cohen

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TUNNEL AND RESERVOIR PLAN  
UPPER DES PLAINES TUNNEL SYSTEM  
2008 ANNUAL GROUNDWATER MONITORING REPORT

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## **INTRODUCTION**

This report contains groundwater quality monitoring data for the year 2008 for the Tunnel and Reservoir Plan (TARP) Upper Des Plaines (UDP) Tunnel System. This system consists of two subsystems, UDP 20 and UDP 21. UDP 20 contains six water quality monitoring wells, MW-1 through MW-6, while UDP 21 contains three water quality monitoring wells, MW-7 through MW-9. These nine water quality monitoring wells are sampled six times per year with the exception of MW-1, which is sampled three times per year (IEPA memo July 9, 2004). Water levels were monitored once every two weeks as required.

## MONITORING DATA

Appendix AI contains a location map of nine water quality monitoring wells, MW-1 through MW-9 for the TARP UDP System. Table AII-1 in Appendix AII contains groundwater elevation data for the year 2008 for monitoring wells MW-1 through MW-6 for the UDP 20 Tunnel System, and Table AII-2 contains groundwater elevation data for the same period for monitoring wells MW-7 through MW-9 for the UDP 21 Tunnel System.

Tables AIII-1 and AIII-2 in Appendix AIII contain water quality data for the UDP 20 monitoring wells. Tables AIII-3 and AIII-4 in Appendix AIII contain water quality data for the UDP 21 monitoring wells.

All of the wells in the UDP Tunnel System were visited for the required number of samples. However, in some instances the wells could not be sampled. Water quality monitoring well MW-2 could not be sampled on February 14, 2008, because snow blocked access to the well, or on May 29, 2008, June 30, 2008, or July 23, 2008, due to an electrical problem with the pump. Water quality monitoring well MW-6 could not be sampled on February 21, 2008, because access to the well was blocked by piles of snow.



## SUMMARY OF DATA

### Monitoring Wells Water Level Elevation Data

In Figure 1, the 2008 groundwater level elevation data for monitoring wells MW-1 through MW-6 of the UDP 20 Tunnel System have been plotted. In this figure, mean, minimum, and maximum water level elevations of all six monitoring wells are plotted to show the fluctuations in the water level elevations during 2008.

Similarly, in Figure 2, the 2008 groundwater elevation data for monitoring wells MW-7 through MW-9 of the UDP 21 Tunnel System have been plotted. Also, mean, minimum, and maximum water level elevations of all three monitoring wells are plotted to show the fluctuations in the water level elevation during 2008.

### Water Quality Monitoring Wells Data

Table 1 contains summary statistics of the water quality parameters for the year 2008 for the UDP 20 Tunnel System, and Table 2 contains summary statistics of the water quality parameters for the same period for the UDP 21 Tunnel System. The summary statistics are computed from the water quality data collected in 2008 from water quality monitoring wells MW-1 through MW-6 (UDP 20), and MW-7 through MW-9 (UDP 21). The summary statistics include minimum, mean, maximum, standard deviation (Std. Dev.), median, and coefficient of variation (Coeff. Var.) for the values of eight of the nine water quality parameters analyzed for 2008. The eight water quality parameters are: chloride (Cl), conductivity (Cond.), hardness as CaCO<sub>3</sub> (Hard.), ammonia nitrogen (NH<sub>3</sub>-N), pH, sulfate (SO<sub>4</sub>), total dissolved solids (TDS), and total organic carbon (TOC). For the ninth parameter, fecal coliform (FC), the minimum, geometric mean (Geo. Mean), maximum, and median are included. Median values were calculated using the Microsoft<sup>®</sup> Excel function MEDIAN. In instances where an even number of samples were collected and analyzed, the reported median is the average of the two numbers in the middle of the series.

FIGURE 1: 2008 MINIMUM, MEAN, AND MAXIMUM WATER LEVEL ELEVATIONS FOR THE UPPER DES PLAINES 20 TUNNEL SYSTEM MONITORING WELLS

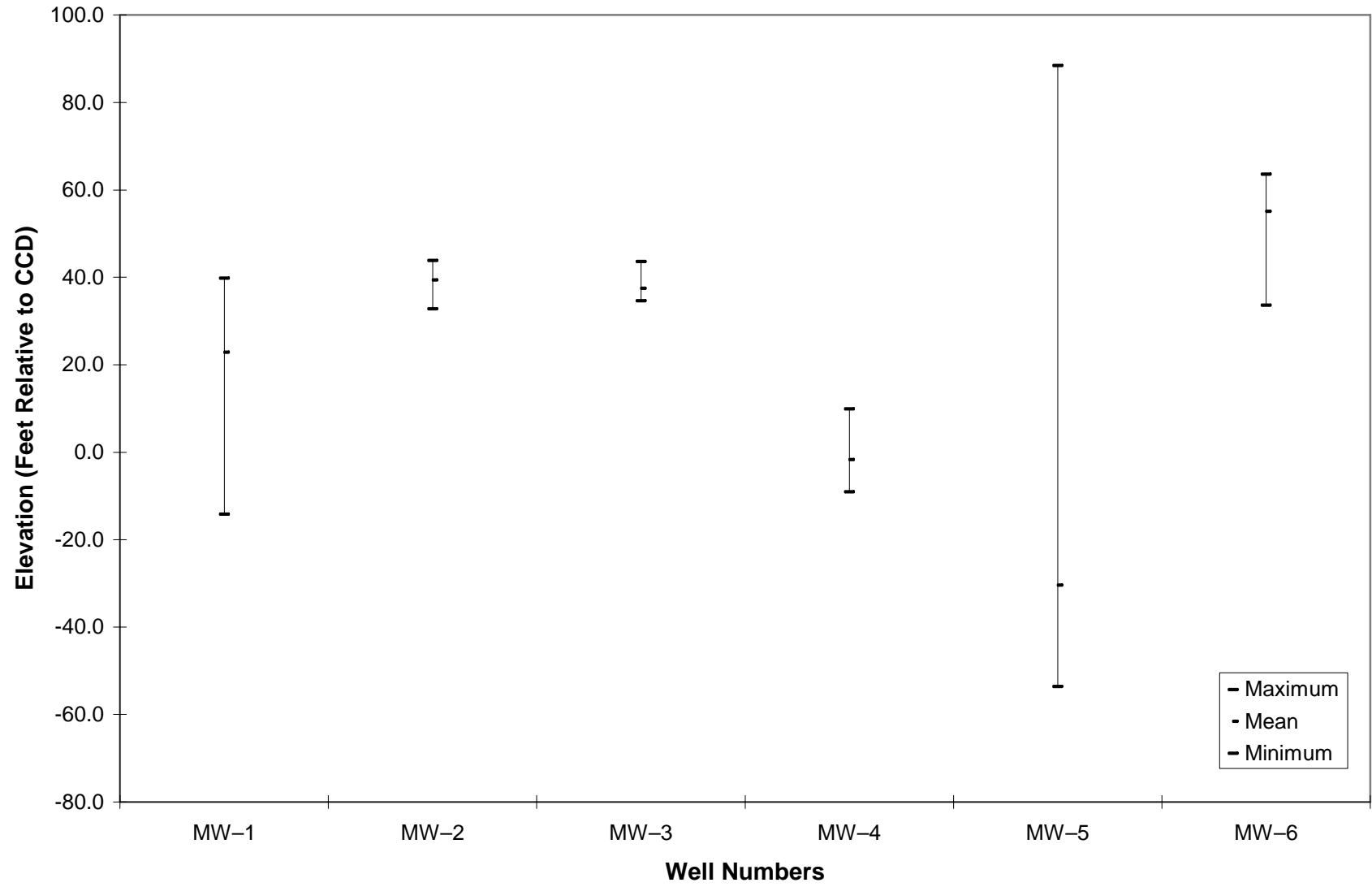


FIGURE 2: 2008 MINIMUM, MEAN, AND MAXIMUM WATER LEVEL ELEVATIONS FOR THE UPPER DES PLAINES 21 TUNNEL SYSTEM MONITORING WELLS

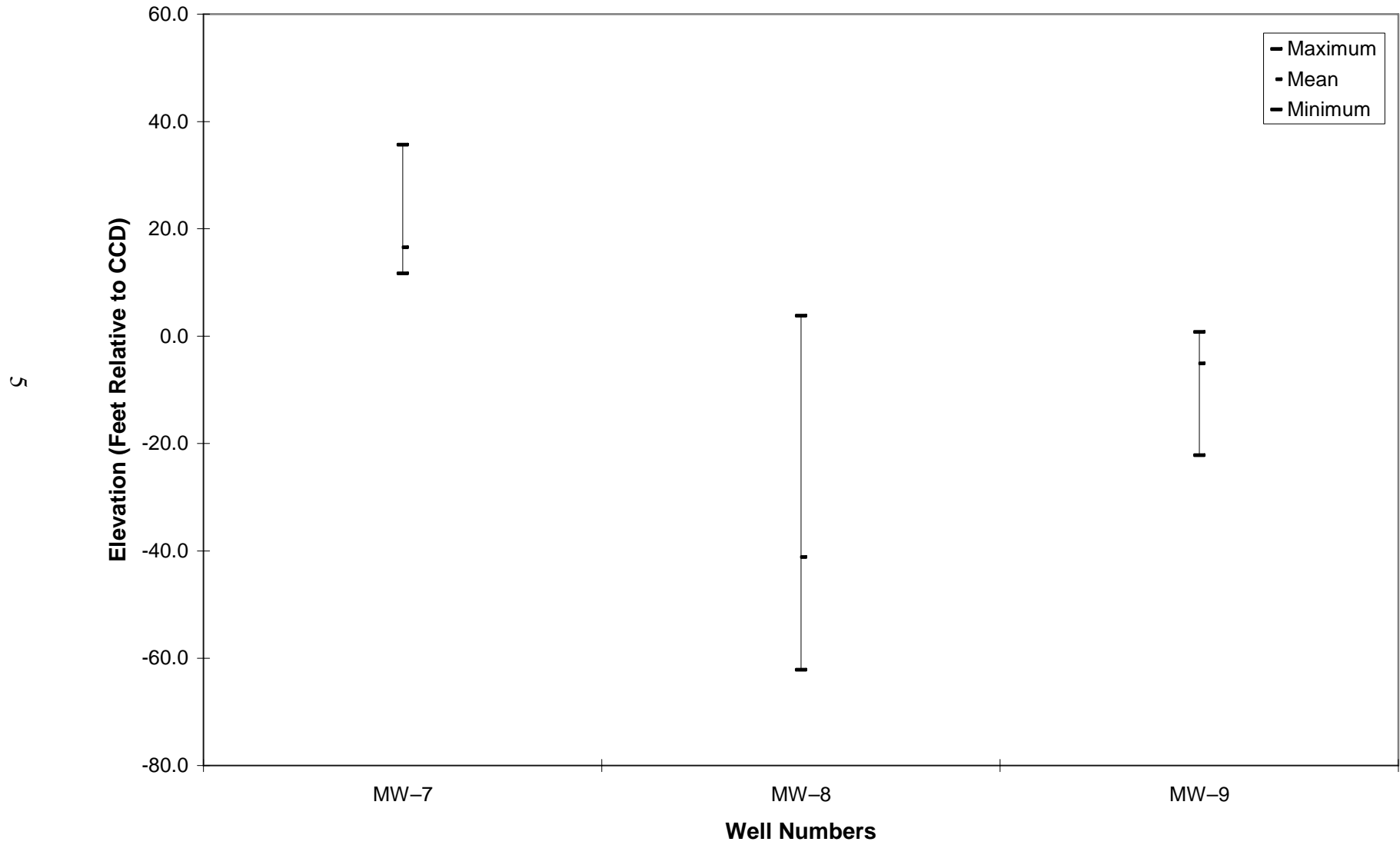


TABLE 1: SUMMARY STATISTICS FOR 2008 WATER QUALITY DATA  
FOR THE MONITORING WELLS IN UPPER DES PLAINES 20 TUNNEL SYSTEM:  
WELLS MW-1 THROUGH MW-6

Parameter <sup>1</sup>		Well Number					
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6
Cl mg/L	Minimum	25	36	10	50	119	34
	Mean	27	37	12	60	139	37
	Maximum	29	37	14	68	176	45
	Std. Dev.	2	1	2	7	20	4
	Median	28	37	11	60	133	35
	Coeff. Var. (%)	8	2	14	12	15	12
FC cfu/100 mL	Minimum	1	1	1	1	1	1
	Geomean	1	3	1	1	2	1
	Maximum	1	10	3	2	9	4
	Median	1	6	1	1	1	1
SO <sub>4</sub> mg/L	Minimum	367	369	420	357	261	313
	Mean	368	390	436	372	301	337
	Maximum	369	411	447	382	334	396
	Std. Dev.	1	30	12	10	27	34
	Median	368	390	438	375	305	327
	Coeff. Var. (%)	0	8	3	3	9	10
NH <sub>3</sub> -N mg/L	Minimum	0.25	0.55	0.32	0.04	0.02	0.47
	Mean	0.30	0.56	0.33	0.08	0.04	0.50
	Maximum	0.37	0.57	0.35	0.11	0.12	0.57
	Std. Dev.	0.06	0.01	0.01	0.03	0.04	0.04
	Median	0.27	0.56	0.33	0.07	0.02	0.49
	Coeff. Var. (%)	21.67	2.53	3.52	35.53	96.50	8.00
TOC mg/L	Minimum	1.0	1.0	1.0	1.0	1.0	1.0
	Mean	1.0	1.0	1.0	1.0	1.0	1.0
	Maximum	1.0	1.0	1.0	1.0	1.0	1.0
	Std. Dev.	0.0	0.0	0.0	0.0	0.0	0.0
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	Coeff. Var. (%)	0.0	0.0	0.0	0.0	0.0	0.0

TABLE 1 (Continued): SUMMARY STATISTICS FOR 2008 WATER QUALITY DATA FOR THE MONITORING WELLS IN UPPER DES PLAINES 20 TUNNEL SYSTEM: WELLS MW-1 THROUGH MW-6

Parameter <sup>1</sup>		Well Number					
		MW-1	MW-2	MW-3	MW-4	MW-5	MW-6
TDS mg/L	Minimum	810	900	794	906	856	746
	Mean	823	901	839	1,200	908	805
	Maximum	838	902	880	2,486	984	944
	Std. Dev.	14	1	32	632	43	81
	Median	820	901	843	927	902	772
	Coeff. Var. (%)	2	0	4	53	5	10
Hard. mg/L as CO <sub>3</sub>	Minimum	406	434	403	490	250	336
	Mean	424	440	424	518	324	385
	Maximum	435	445	431	541	381	527
	Std. Dev.	16	8	10	18	48	81
	Median	432	440	428	519	327	343
	Coeff. Var. (%)	4	2	2	4	15	21
Cond. µmhos/cm	Minimum	467	592	548	612	805	330
	Mean	612	735	855	994	1,116	709
	Maximum	809	877	1,130	1,330	1,433	985
	Std. Dev.	177	202	251	276	235	262
	Median	561	735	899	969	1,096	791
	Coeff. Var. (%)	29	27	29	28	21	37
pH unit	Minimum	7.5	7.3	7.4	7.5	7.4	7.4
	Mean	7.6	7.6	7.6	7.6	7.7	7.6
	Maximum	7.7	7.8	7.9	7.8	8.2	7.8
	Std. Dev.	0.1	0.4	0.2	0.2	0.3	0.1
	Median	7.5	7.6	7.5	7.6	7.7	7.5
	Coeff. Var. (%)	1.1	4.7	2.3	2.0	3.8	2.0

<sup>1</sup>For purposes of statistical evaluation, any value less than the appropriate MDL or LOQ was set equal to the value of the MDL or LOQ.

TABLE 2: SUMMARY STATISTICS FOR 2008 WATER QUALITY DATA  
FOR THE MONITORING WELLS IN UPPER DES PLAINES 21 TUNNEL SYSTEM:  
WELLS MW-7 THROUGH MW-9

Parameter <sup>1</sup>		Well Number		
		MW-7	MW-8	MW-9
Cl mg/L	Minimum	31	36	28
	Mean	38	62	35
	Maximum	46	131	44
	Std. Dev.	6	35	6
	Median	37	49	35
	Coeff. Var. (%)	15	58	17
FC cfu/100 mL	Minimum	1	1	1
	Geomean	4	4	1
	Maximum	6,000	94	1
	Median	1	3	1
SO <sub>4</sub> mg/L	Minimum	312	146	339
	Mean	378	264	347
	Maximum	416	327	357
	Std. Dev.	43	66	7
	Median	397	285	348
	Coeff. Var. (%)	11	25	2
NH <sub>3</sub> -N mg/L	Minimum	0.48	0.02	0.30
	Mean	0.53	0.03	0.40
	Maximum	0.62	0.07	0.43
	Std. Dev.	0.05	0.02	0.05
	Median	0.52	0.02	0.42
	Coeff. Var. (%)	10.06	66.67	12.21
TOC mg/L	Minimum	1.0	1.0	1.0
	Mean	1.0	1.0	1.0
	Maximum	1.0	1.0	1.0
	Std. Dev.	0.0	0.0	0.0
	Median	1.0	1.0	1.0
	Coeff. Var. (%)	0.0	0.0	0.0

TABLE 2 (Continued): SUMMARY STATISTICS FOR 2008 WATER QUALITY DATA  
FOR THE MONITORING WELLS IN UPPER DES PLAINES 21 TUNNEL SYSTEM:  
WELLS MW-7 THROUGH MW-9

Parameter <sup>1</sup>		Well Number		
		MW-7	MW-8	MW-9
TDS mg/L	Minimum	796	556	736
	Mean	909	671	776
	Maximum	996	798	802
	Std. Dev.	68	105	22
	Median	907	652	780
	Coeff. Var. (%)	8	16	3
Hard. mg/L as CO <sub>3</sub>	Minimum	375	152	353
	Mean	479	297	370
	Maximum	523	399	386
	Std. Dev.	56	88	14
	Median	500	305	368
	Coeff. Var. (%)	12	30	4
Cond. µmhos/cm	Minimum	507	366	398
	Mean	850	548	571
	Maximum	1,190	825	850
	Std. Dev.	248	154	153
	Median	873	533	568
	Coeff. Var. (%)	29	28	27
pH unit	Minimum	7.3	7.5	7.7
	Mean	7.5	8.0	7.8
	Maximum	7.7	8.8	8.0
	Std. Dev.	0.1	0.5	0.1
	Median	7.5	7.9	7.7
	Coeff. Var. (%)	1.8	5.9	1.3

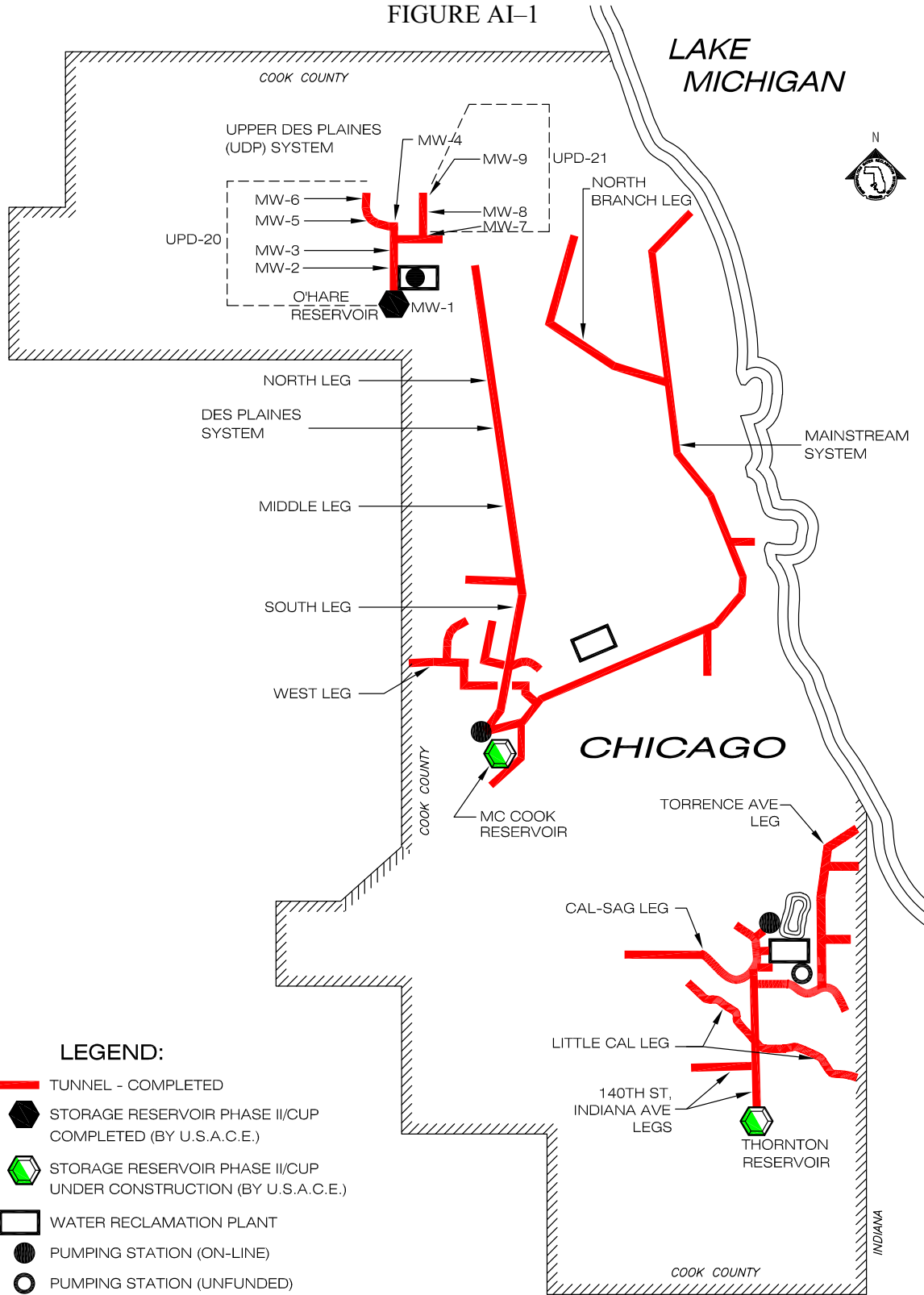
<sup>1</sup>For purposes of statistical evaluation, any value less than the appropriate MDL or LOQ was set equal to the value of the MDL or LOQ.

APPENDIX AI

LOCATION MAP OF GROUNDWATER QUALITY MONITORING WELLS  
MW-1 THROUGH MW-6 (UPPER DES PLAINES 20), AND  
MW-7 THROUGH MW-9 (UPPER DES PLAINES 21)  
IN THE UPPER DES PLAINES TUNNEL SYSTEM



FIGURE AI-1



**UPPER DES PLAINES TUNNEL SYSTEM  
LOCATION MAP OF GROUNDWATER  
QUALITY MONITORING WELLS**

METROPOLITAN WATER RECLAMATION  
DISTRICT OF GREATER CHICAGO

APPENDIX AII

2008 GROUNDWATER LEVEL ELEVATION DATA  
FOR MONITORING WELLS MW-1 THROUGH MW-6 (UPPER DES PLAINES 20),  
AND MW-7 THROUGH MW-9 (UPPER DES PLAINES 21)  
IN THE UPPER DES PLAINES TUNNEL SYSTEM

TABLE AII-1: 2008 GROUNDWATER LEVEL ELEVATION\* DATA FOR MONITORING WELLS MW-1 THROUGH MW-6 IN THE UPPER DES PLAINES 20 TUNNEL SYSTEM

Date	Monitoring Well					
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6
	-----feet-----					
1/11/08	23.8	41.3	36.6	-3.1	-36.6	60.1
1/25/08	-10.2	36.8	38.6	1.9	88.4	57.6
2/8/08	**	**	**	**	**	**
2/22/08	**	**	**	**	**	**
3/7/08	28.8	40.8	36.6	-3.1	-31.6	55.6
3/21/08	28.8	40.8	36.6	-3.1	-31.6	56.6
3/28/08	28.8	40.8	36.6	-3.1	-36.6	60.6
4/4/08	28.8	38.8	37.6	-3.1	-53.6	33.6
4/18/08	32.8	39.8	38.6	-1.1	-36.6	34.6
5/2/08	28.8	41.8	36.6	-3.1	-47.6	34.6
5/16/08	28.8	36.8	34.6	-1.1	-44.6	56.6
5/30/08	30.8	40.8	38.6	-1.1	-46.6	55.6
6/13/08	28.8	38.8	36.6	-2.1	-37.6	57.6
6/27/08	30.8	43.8	43.6	-9.1	-50.6	63.6
7/11/08	-10.2	37.8	36.6	-1.1	-49.6	58.6
7/25/08	28.8	43.8	36.6	-2.1	-36.6	57.6
8/8/08	26.8	37.8	37.6	-2.1	-49.6	57.6
8/22/08	39.8	38.8	36.6	9.9	-46.6	57.6
9/5/08	28.8	38.8	36.6	-2.1	-44.6	57.6
9/19/08	35.8	38.8	38.6	6.9	-3.6	58.6
10/3/08	-10.2	38.8	37.6	0.9	-36.6	58.6
10/17/08	27.8	39.8	38.6	-5.1	-53.6	56.6
10/31/08	29.8	32.8	35.6	-5.1	-34.6	59.6
11/14/08	27.8	35.8	38.6	-1.1	-46.6	58.6
11/28/08	28.8	39.8	36.6	-4.1	-50.6	56.6
12/12/08	-14.2	40.8	38.6	-4.1	88.4	58.6
Minimum	-14.2	32.8	34.6	-9.1	-53.6	33.6
Mean	22.9	39.4	37.5	-1.7	-30.4	55.1
Maximum	39.8	43.8	43.6	9.9	88.4	63.6

\*Relative to Chicago City Datum.

\*\*No sample, access blocked by snow and ice cover.

TABLE AII-2: 2008 GROUNDWATER LEVEL ELEVATION\* DATA FOR MONITORING WELLS MW-7 THROUGH MW-9 IN THE UPPER DES PLAINES 21 TUNNEL SYSTEM

Date	Monitoring Well		
	MW-7	MW-8	MW-9
	-----feet-----		
1/11/08	14.7	-38.2	-5.2
1/25/08	14.7	-52.2	-20.2
2/8/08	**	**	**
2/22/08	**	**	**
3/7/08	13.7	-48.2	**
3/21/08	14.7	-47.2	-4.2
3/28/08	14.7	3.8	-4.2
4/4/08	35.7	-34.2	-5.2
4/18/08	14.7	-48.2	-1.2
5/2/08	16.7	-33.2	-0.2
5/16/08	17.7	-53.2	-3.2
5/30/08	17.7	-40.2	-5.2
6/13/08	16.7	-32.2	-0.2
6/27/08	17.7	-23.2	-1.2
7/11/08	11.7	-62.2	-5.2
7/25/08	15.7	-52.2	-2.2
8/8/08	17.7	-44.2	-6.2
8/22/08	16.7	-33.2	0.8
9/5/08	16.7	-30.2	0.8
9/19/08	21.7	-52.2	-3.2
10/3/08	13.7	-42.2	-8.2
10/17/08	14.7	-42.2	-8.2
10/31/08	12.7	-45.2	-4.2
11/14/08	14.7	-42.2	-4.2
11/28/08	16.7	-41.2	-22.2
12/12/08	14.7	-54.2	-4.2
Minimum	11.7	-62.2	-22.2
Mean	16.5	-41.2	-5.1
Maximum	35.7	3.8	0.8

\*Relative to Chicago City Datum.

\*\*No sample, access blocked by snow and ice cover.

APPENDIX AIII

2008 GROUNDWATER QUALITY DATA FOR MONITORING WELLS MW-1  
THROUGH MW-6 (UPPER DES PLAINES 20), AND MW-7 THROUGH MW-9  
(UPPER DES PLAINES 21) IN THE UPPER DES PLAINES TUNNEL SYSTEM

TABLE AIII-1: 2008 CHLORIDE, FECAL COLIFORM, SULFATE, AMMONIA NITROGEN, TOTAL ORGANIC CARBON, AND TOTAL DISSOLVED SOLIDS DATA FOR WATER QUALITY MONITORING WELLS MW-1 THROUGH MW-6 IN THE UPPER DES PLAINES 20 TUNNEL SYSTEM

Well	Date of Sampling	Cl <sup>1</sup> mg/L	FC <sup>1,2</sup> cfu/100 mL	SO <sub>4</sub> <sup>1</sup> mg/L	NH <sub>3</sub> -N <sup>1</sup> mg/L	TOC <sup>1</sup> mg/L	TDS mg/L
MW-1	4/10/08	29	<1	367	0.37	<1.0	838
MW-1	7/10/08	25	<1	369	0.27	<1.0	810
MW-1	11/19/08	28	<1	368	0.25	<1.0	820
MW-2	2/14/08			Well could not be sampled			
MW-2	5/29/08			Well could not be sampled			
MW-2	6/30/08			Well could not be sampled			
MW-2	7/23/08			Well could not be sampled			
MW-2	9/17/08	37	10	369	0.57	<1.0	902
MW-2	11/13/08	36	<1	411	0.55	<1.0	900
MW-3	4/3/08	13	<1	447	0.32	<1.0	834
MW-3	5/8/08	14	<1	426	0.32	<1.0	794
MW-3	6/26/08	11	<1	420	0.33	<1.0	814
MW-3	7/31/08	10	<1	433	0.33	<1.0	880
MW-3	9/11/08	10	3	447	0.35	<1.0	862
MW-3	11/19/08	11	<1	443	0.34	<1.0	852
MW-4	4/3/08	64	<1	380	0.10	<1.0	910
MW-4	5/8/08	65	<1	372	0.08	<1.0	906
MW-4	6/26/08	56	<1	357	0.11	<1.0	914
MW-4	7/31/08	50	<1	366	0.06	<1.0	1,046
MW-4	9/11/08	56	2	378	0.06	<1.0	940
MW-4	11/19/08	68	<1	382	0.04	<1.0	2,486
MW-5	4/3/08	133	<1	334	0.12	<1.0	916
MW-5	5/8/08	119	1	321	<0.02	<1.0	886
MW-5	6/26/08	127	<1	298	0.02	<1.0	890
MW-5	7/31/08	176	9	280	<0.02	<1.0	984
MW-5	9/11/08	149	6	261	<0.02	<1.0	856
MW-5	11/19/08	132	1	313	0.05	<1.0	914
MW-6	2/21/08			Well could not be sampled			
MW-6	5/29/08	35	<1	396	0.49	<1.0	944
MW-6	7/1/08	37	<1	330	0.57	<1.0	804
MW-6	10/29/08	35	4	313	0.47	<1.0	758

TABLE AIII-1 (Continued): 2008 CHLORIDE, FECAL COLIFORM, SULFATE, AMMONIA NITROGEN, TOTAL ORGANIC CARBON, AND TOTAL DISSOLVED SOLIDS DATA FOR WATER QUALITY MONITORING WELLS MW-1 THROUGH MW-6 IN THE UPPER DES PLAINES 20 TUNNEL SYSTEM

Well	Date of Sampling	Cl <sup>1</sup> mg/L	FC <sup>1,2</sup> cfu/100 mL	SO <sub>4</sub> <sup>1</sup> mg/L	NH <sub>3</sub> -N <sup>1</sup> mg/L	TOC <sup>1</sup> mg/L	TDS mg/L
MW-6	11/25/08	45	1	318	0.49	<1.0	746
MW-6	12/3/08	34	<1	327	0.48	<1.0	772

<sup>1</sup>The method detection limit (MDL) or limit of quantification (LOQ) is 10 mg/L for Cl (LOQ), 2.0 mg/L for SO<sub>4</sub> (LOQ), 0.02 mg/L for NH<sub>3</sub>-N (MDL), 1.0 mg/L for TOC (LOQ), and 40 mg/L for TDS (LOQ). The detection limit for the FC analysis using the membrane filter method varies based on the actual sample volume analyzed.

<sup>2</sup>Unfiltered samples, all others were filtered through 0.45 μm membrane.

TABLE AIII-2: 2008 HARDNESS, CONDUCTIVITY, pH, TEMPERATURE, ELEVATION, AND RECHARGE DATA FOR WATER QUALITY MONITORING WELLS MW-1 THROUGH MW-6 IN THE UPPER DES PLAINES 20 TUNNEL SYSTEM

Well	Date of Sampling	Hard. mg/L	Cond. <sup>1</sup> µmhos/cm	pH <sup>1</sup> unit	Temp. °C	Elevation <sup>2</sup> Feet	Recharge <sup>3</sup> Hours
MW-1	4/10/08	432	467	7.5	13.5	6	<48
MW-1	7/10/08	435	809	7.7	14.5	3	<48
MW-1	11/19/08	406	561	7.5	12.7	3	<48
MW-2	2/14/08			Well could not be sampled			
MW-2	5/29/08			Well could not be sampled			
MW-2	6/30/08			Well could not be sampled			
MW-2	7/23/08			Well could not be sampled			
MW-2	9/17/08	445	877	7.3	17.7	40	<48
MW-2	11/13/08	434	592	7.8	13.4	40	<48
MW-3	4/3/08	424	890	7.5	14.2	38	<48
MW-3	5/8/08	427	1,090	7.5	14.0	38	<48
MW-3	6/26/08	431	907	7.5	15.7	39	<48
MW-3	7/31/08	428	562	7.4	15.3	36	<48
MW-3	9/11/08	428	1,130	7.9	16.0	37	<48
MW-3	11/19/08	403	548	7.6	13.9	37	<48
MW-4	4/3/08	507	947	7.5	13.7	-5	<48
MW-4	5/8/08	526	1,283	7.8	14.0	-5	<48
MW-4	6/26/08	531	990	7.5	14.2	-3	<48
MW-4	7/31/08	541	612	7.5	13.7	-5	<48
MW-4	9/11/08	512	1,330	7.8	15.0	-6	<48
MW-4	11/19/08	490	802	7.7	13.2	-9	<48
MW-5	4/3/08	381	1,087	7.4	11.9	-51	<48
MW-5	5/8/08	364	1,331	7.9	14.0	-53	<48
MW-5	6/26/08	338	1,105	7.6	15.6	-51	<48
MW-5	7/31/08	297	936	7.5	14.2	-55	<48
MW-5	9/11/08	250	1,433	8.2	15.0	-52	<48
MW-5	11/19/08	316	805	7.7	13.5	-54	<48
MW-6	2/21/08			Well could not be sampled			
MW-6	5/29/08	527	873	7.5	13.6	56	<4
MW-6	7/1/08	378	791	7.5	14.8	60	<4
MW-6	10/29/08	336	566	7.4	13.0	60	<4



TABLE AIII-2 (Continued): 2008 HARDNESS, CONDUCTIVITY, pH, TEMPERATURE, ELEVATION, AND RECHARGE DATA FOR WATER QUALITY MONITORING WELLS MW-1 THROUGH MW-6 IN THE UPPER DES PLAINES 20 TUNNEL SYSTEM

Well	Date of Sampling	Hard. mg/L	Cond. <sup>1</sup> µmhos/cm	pH <sup>1</sup> unit	Temp. °C	Elevation <sup>2</sup> Feet	Recharge <sup>3</sup> Hours
MW-6	11/25/08	343	330	7.8	13.0	61	<4
MW-6	12/3/08	341	985	7.6	12.3	59	<48

<sup>1</sup>Unfiltered samples, all others were filtered through 0.45 µm membrane.

<sup>2</sup>Water level elevations are relative to Chicago City Datum.

<sup>3</sup>Refers to elapsed time after initial drawdown before the well recovered sufficiently for sampling.

TABLE AIII-3: 2008 CHLORIDE, FECAL COLIFORM, SULFATE, AMMONIA NITROGEN, TOTAL ORGANIC CARBON, AND TOTAL DISSOLVED SOLIDS DATA FOR WATER QUALITY MONITORING WELLS MW-7 THROUGH MW-9 IN THE UPPER DES PLAINES 21 TUNNEL SYSTEM

Well	Date of Sampling	Cl <sup>1</sup> mg/L	FC <sup>1,2</sup> cfu/100 mL	SO <sub>4</sub> <sup>1</sup> mg/L	NH <sub>3</sub> -N <sup>1</sup> mg/L	TOC <sup>1</sup> mg/L	TDS mg/L
MW-7	2/14/08	43	<1	416	0.48	<1.0	906
MW-7	5/29/08	37	<1	336	0.50	<1.0	796
MW-7	6/30/08	33	<1	387	0.53	<1.0	960
MW-7	7/23/08	31	<1	408	0.62	<1.0	908
MW-7	9/17/08	46	>6,000	312	0.54	<1.0	890
MW-7	11/13/08	36	<1	406	0.48	<1.0	996
MW-8	4/10/08	131	<1	146	0.03	<1.0	556
MW-8	5/8/08	65	<1	308	<0.02	<1.0	786
MW-8	7/10/08	53	<1	292	<0.02	<1.0	698
MW-8	9/11/08	45	94	327	<0.02	<1.0	798
MW-8	11/19/08	40	14	235	0.07	<1.0	584
MW-8	12/11/08	36	4	278	<0.02	<1.0	606
MW-9	4/10/08	36	<1	346	0.41	<1.0	786
MW-9	5/8/08	44	<1	340	0.40	<1.0	782
MW-9	7/10/08	38	<1	339	0.30	<1.0	736
MW-9	9/11/08	30	<1	357	0.42	<1.0	770
MW-9	11/19/08	33	<1	351	0.42	<1.0	802
MW-9	12/11/08	28	<1	350	0.43	<1.0	778

<sup>1</sup>The method detection limit (MDL) or limit of quantification (LOQ) is 10 mg/L for Cl (LOQ), 2.0 mg/L for SO<sub>4</sub> (LOQ), 0.02 mg/L for NH<sub>3</sub>-N (MDL), 1.0 mg/L for TOC (LOQ), and 40 mg/L for TDS (LOQ). The detection limit for the FC analysis using the membrane filter method varies based on the actual sample volume analyzed.

<sup>2</sup>Unfiltered samples, all others were filtered through 0.45 µm membrane.

TABLE AIII-4: 2008 HARDNESS, CONDUCTIVITY, pH, TEMPERATURE, ELEVATION, AND RECHARGE DATA FOR WATER QUALITY MONITORING WELLS MW-7 THROUGH MW-9 IN THE UPPER DES PLAINES 21 TUNNEL SYSTEM

Well	Date of Sampling	Hard. mg/L	Cond. <sup>1</sup> µmhos/cm	pH <sup>1</sup> unit	Temp. °C	Elevation <sup>2</sup> Feet	Recharge <sup>3</sup> Hours
MW-7	2/14/08	523	825	7.5	14.0	16	<4
MW-7	5/29/08	375	1,010	7.7	14.3	14	<4
MW-7	6/30/08	518	507	7.6	13.7	15	<4
MW-7	7/23/08	510	1,190	7.3	15.9	16	<4
MW-7	9/17/08	490	921	7.5	17.3	26	<4
MW-7	11/13/08	460	644	7.4	13.8	14	<4
MW-8	4/10/08	152	466	8.0	14.1	-52	<48
MW-8	5/8/08	361	562	7.8	13.8	-56	<48
MW-8	7/10/08	333	825	7.6	14.3	-62	<48
MW-8	9/11/08	399	562	7.5	15.3	-57	<48
MW-8	11/19/08	258	504	8.1	13.3	-62	<48
MW-8	12/11/08	277	366	8.8	13.2	-61	<48
MW-9	4/10/08	371	472	7.7	14.0	-4	<48
MW-9	5/8/08	386	570	7.8	13.9	-1	<48
MW-9	7/10/08	353	850	7.7	13.9	-2	<48
MW-9	9/11/08	385	565	7.7	14.2	-4	<48
MW-9	11/19/08	359	572	7.7	14.1	-3	<48
MW-9	12/11/08	364	398	8.0	13.9	-4	<48

<sup>1</sup>Unfiltered samples, all others were filtered through 0.45 µm membrane.

<sup>2</sup>Water level elevations are relative to Chicago City Datum.

<sup>3</sup>Refers to elapsed time after initial drawdown before the well recovered sufficiently for sampling.