Metropolitan Water Reclamation District of Greater Chicago

RESEARCH AND DEVELOPMENT DEPARTMENT

REPORT NO. 06-47

GROUNDWATER MONITORING REPORT

TUNNEL AND RESERVOIR PLAN
DES PLAINES TUNNEL SYSTEM
2005 ANNUAL REPORT

AUGUST 2006

Protecting Our Water Environment

Metropolitan Water Reclamation District of Greater Chicago

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August 8, 2006

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

Subject: Des Plaines TARP System Groundwater Monitoring Annual Report for the Year 2005

Dear Ms. Willhite:

Enclosed are three copies of the "Groundwater Monitoring Report, Tunnel and Reservoir Plan Des Plaines Tunnel System 2005 Annual Report."

Very truly yours,

Louis Kollias
Director
Research and Development

LK:JSJ:lmf
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GROUNDWATER MONITORING REPORT

TUNNEL AND RESERVOIR PLAN
DES PLAINES TUNNEL SYSTEM
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Research and Development Department
Louis Kollias, Director

August 2006

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Introduction

This report contains 2005 data for the TARP Des Plaines Tunnel System compiled from the monitoring of the 40 groundwater quality wells QD–21 through QD–60 located along the Des Plaines Tunnel alignment. The water quality monitoring wells are located along the 13A Extension, south leg, middle leg, and north leg of the Des Plaines Tunnel System. These water quality wells were sampled either three times per year or six times per year. Water quality wells QD–26, QD–39 through QD–49, and QD–52 through QD–60 were sampled three times per year (Illinois Environmental Protection Agency [IEPA] memorandum July 9, 2004). Water quality monitoring wells QD–21 through QD–25, QD–27 through QD–38, QD–50 and QD–51 were sampled six times per year (IEPA memorandum July 9, 2004).

Monitoring Data. Appendix AI contains a map showing all 40 water quality wells along the 13A extension, south leg, middle leg, and north leg of the Des Plaines Tunnel System.

Tables AII–1 and AII–2 in Appendix AII contain groundwater quality data for 2005 pertaining to the 40 water quality monitoring wells QD–21 through QD–60 in the Des Plaines Tunnel System.

All wells were sampled the required number of times with the following exceptions. Water quality monitoring well QD–29 could not be sampled on January 6, 2005, because snow blocked access to the well. Water quality well QD–32 could not be sampled on April 28, 2005, or August 9, 2005, because the pump was inoperable. Water quality monitoring well QD–35 could not be sampled on January 6, 2005, May 11, 2005, July 7, 2005, August 26, 2005, or September 8, 2005, because the pump was inoperable. Water quality well QD–40 could not be sampled on April 7, 2005, because the gate to the well was locked by the Forest Preserve Police. Water quality well QD–48 could not be sampled on March 31, 2005, because the pump was inoperable. Water quality well QD–49 could not be sampled on August 11, 2005, because there was insufficient water in the well to collect a sample. Water quality well QD–51 could not be sampled on February 17, 2005, due to snow blocking access to the well.

Summary of Data. Tables 1 through 8 contain summary statistics of the water quality parameters for 2005 for all 40 water quality wells QD–21 through QD–60 in the Des Plaines Tunnel System. These statistics are computed from the data collected from each well in 2005. The summary statistics include minimum, mean, maximum, standard deviation (Std. Dev.), median, and coefficient of variation (Coeff. Var.) for all nine water quality parameters analyzed during 2005. The nine water quality parameters are: chloride (Cl), conductivity (Cond.), fecal coliform (FC), hardness as $CaCO_3$ (Hard.), ammonia as NH_4^+–N, pH, sulfate (SO_4), total dissolved solids (TDS), and total organic carbon (TOC).

TABLE 1: SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–21 THROUGH QD–25*

Parameter		Well Number				
		QD–21	QD–22	QD–23	QD–24	QD–25
Cl, mg/L	Minimum	198	117	136	79	361
	Mean	257	132	142	101	370
	Maximum	316	140	151	132	381
	Std. Dev.	42	8	5	22	8
	Median	256	134	142	97	367
	Coeff. Var.	16	6	3	22	2
Cond., µmhos/cm	Minimum	820	730	627	635	930
	Mean	1408	995	961	898	1336
	Maximum	2013	1224	1366	1140	1712
	Std. Dev.	506	231	309	230	340
	Median	1459	1035	866	927	1343
	Coeff. Var.	36	23	32	26	25
FC, cfu/100 mL	Minimum	1	1	1	1	1
	Geo. Mean	1	1	1	1	1
	Maximum	1	1	1	1	1
	Geo. Std. Dev.	0	0	0	0	0
	Median	1	1	1	1	1
	Coeff. Var.	0	0	0	0	0
Hard., as $CaCO_3$, mg/L	Minimum	699	684	727	546	502
	Mean	763	728	754	582	570
	Maximum	819	754	776	638	624
	Std. Dev.	51	25	17	41	47
	Median	784	732	758	565	572
	Coeff. Var.	7	3	2	7	8
NH_4^+–N, mg/L	Minimum	0.14	0.32	0.40	0.37	0.60
	Mean	0.19	0.35	0.43	0.47	0.67
	Maximum	0.25	0.40	0.47	0.62	0.81
	Std. Dev.	0.04	0.03	0.03	0.10	0.08
	Median	0.19	0.34	0.42	0.43	0.64
	Coeff. Var.	22.24	8.35	6.09	21.24	11.91

TABLE 1 (Continued): SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–21 THROUGH QD–25*

Parameter		Well Number				
		QD–21	QD–22	QD–23	QD–24	QD–25
pH	Minimum	6.4	6.1	6.3	6.5	6.7
	Mean	7.2	7.1	7.1	7.3	7.3
	Maximum	7.6	7.5	7.6	7.8	7.7
	Std. Dev.	0.5	0.6	0.5	0.5	0.4
	Median	7.3	7.4	7.2	7.3	7.3
	Coeff. Var.	6.7	7.9	6.8	7.0	6.0
SO_4, mg/L	Minimum	241	262	284	166	175
	Mean	298	268	306	189	190
	Maximum	360	277	361	219	218
	Std. Dev.	46	6	28	23	17
	Median	311	267	298	183	185
	Coeff. Var.	16	2	9	12	9
TDS, mg/L	Minimum	1250	1044	1094	742	1234
	Mean	1407	1180	1201	928	1347
	Maximum	1516	1414	1444	1056	1488
	Std. Dev.	94	140	137	126	108
	Median	1415	1118	1136	945	1315
	Coeff. Var.	7	12	11	14	8
TOC, mg/L	Minimum	1	1	2	2	2
	Mean	2	2	3	3	3
	Maximum	2	2	4	5	4
	Std. Dev.	1	1	1	1	1
	Median	2	2	3	3	3
	Coeff. Var.	37	37	31	42	37

*For purposes of statistical evaluation, fecal coliform values less than 1 were set equal to 1.

TABLE 2: SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–26 THROUGH QD–30*

Parameter		Well Number				
		QD–26	QD–27	QD–28	QD–29	QD–30
Cl, mg/L	Minimum	21	264	260	115	126
	Mean	25	303	333	128	160
	Maximum	30	333	378	142	184
	Std. Dev.	5	29	41	12	20
	Median	24	308	337	129	160
	Coeff. Var.	18	9	12	10	13
Cond., µmhos/cm	Minimum	371	552	505	554	638
	Mean	553	1416	1302	934	1123
	Maximum	669	2005	1702	1155	1333
	Std. Dev.	159	586	548	285	264
	Median	618	1615	1621	1128	1209
	Coeff. Var.	29	41	42	30	24
FC, cfu/100 mL	Minimum	1	1	1	1	1
	Geo. Mean	1	2	1	1	1
	Maximum	1	12	1	2	1
	Geo. Std. Dev.	0	4	0	0.41	0
	Median	1	1	1	1	1
	Coeff. Var.	0	297	0	36	0
Hard., as $CaCO_3$, mg/L	Minimum	421	490	617	638	675
	Mean	426	504	722	658	726
	Maximum	432	514	782	672	765
	Std. Dev.	6	9	59	14	30
	Median	426	504	734	657	731
	Coeff. Var.	1	2	8	2	4
NH_4^+–N, mg/L	Minimum	0.30	19.62	0.52	0.32	0.32
	Mean	0.31	22.79	0.58	0.35	1.17
	Maximum	0.33	25.26	0.71	0.39	2.52
	Std. Dev.	0.02	2.02	0.07	0.03	0.94
	Median	0.31	22.92	0.57	0.35	0.76
	Coeff. Var.	4.88	8.85	12.49	7.82	80.80

TABLE 2 (Continued): SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–26 THROUGH QD–30*

Parameter		Well Number				
		QD–26	QD–27	QD–28	QD–29	QD–30
pH	Minimum	7.2	7.3	6.9	6.8	6.5
	Mean	7.4	7.5	7.2	7.4	7.3
	Maximum	7.8	7.6	7.9	8.0	7.5
	Std. Dev.	0.3	0.1	0.4	0.4	0.4
	Median	7.2	7.5	7.2	7.5	7.5
	Coeff. Var.	4.7	1.6	4.9	5.7	5.5
SO_4, mg/L	Minimum	109	46	205	235	330
	Mean	114	57	226	248	353
	Maximum	118	81	243	269	373
	Std. Dev.	5	13	13	14	18
	Median	115	54	224	239	354
	Coeff. Var.	4	22	6	6	5
TDS, mg/L	Minimum	572	1078	1256	1004	1114
	Mean	611	1182	1492	1103	1211
	Maximum	642	1248	1664	1242	1308
	Std. Dev.	36	66	155	89	72
	Median	620	1199	1474	1085	1219
	Coeff. Var.	6	6	10	8	6
TOC, mg/L	Minimum	1	14	1	1	1
	Mean	1	20	2	2	2
	Maximum	2	26	3	3	3
	Std. Dev.	1	5	1	1	1
	Median	1	18	2	2	1
	Coeff. Var.	43	26	54	38	62

*For purposes of statistical evaluation, fecal coliform values less than 1 were set equal to 1.

TABLE 3: SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–31 THROUGH QD–35*

Parameter		Well Number				
		QD–31	QD–32	QD–33	QD–34	QD–35
Cl, mg/L	Minimum	115	492	333	106	113
	Mean	119	514	358	116	113
	Maximum	122	531	385	142	113
	Std. Dev.	2	18	20	14	0
	Median	118	517	358	111	113
	Coeff. Var.	2	4	6	12	0
Cond., µmhos/cm	Minimum	525	1275	1235	567	539
	Mean	970	1972	1817	1031	539
	Maximum	1124	2294	2102	1272	539
	Std. Dev.	228	477	307	325	0
	Median	1059	2159	1886	1216	539
	Coeff. Var.	24	24	17	32	0
FC, cfu/100 mL	Minimum	1	1	1	1	1
	Geo. Mean	2	1	1	1	1
	Maximum	36	1	1	2	1
	Geo. Std. Dev.	14	0	0	1	0
	Median	1	1	1	1	1
	Coeff. Var.	786	0	0	118	0
Hard., As $CaCO_3$, mg/L	Minimum	222	27	24	729	605
	Mean	255	35	26	759	605
	Maximum	277	39	27	789	605
	Std. Dev.	20	6	1	20	0
	Median	263	38	27	762	605
	Coeff. Var.	8	16	5	3	0
NH_4^+–N, mg/L	Minimum	0.12	0.19	0.14	0.29	0.34
	Mean	0.18	0.20	0.19	0.31	0.34
	Maximum	0.25	0.23	0.23	0.33	0.34
	Std. Dev.	0.05	0.02	0.04	0.02	0.00
	Median	0.16	0.19	0.19	0.31	0.34
	Coeff. Var.	27.65	10.00	23.37	5.77	0.00

TABLE 3 (Continued): SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–31 THROUGH QD–35*

Parameter		Well Number				
		QD–31	QD–32	QD–33	QD–34	QD–35
pH	Minimum	6.8	6.8	6.8	6.6	7.5
	Mean	7.4	7.4	7.4	7.3	7.5
	Maximum	7.6	7.7	7.7	7.8	7.5
	Std. Dev.	0.3	0.4	0.3	0.4	0.0
	Median	7.5	7.6	7.5	7.3	7.5
	Coeff. Var.	3.9	5.6	4.2	5.8	0.0
SO_4, mg/L	Minimum	171	214	182	326	268
	Mean	187	218	200	345	268
	Maximum	235	228	246	375	268
	Std. Dev.	24	7	24	18	0
	Median	178	215	190	343	268
	Coeff. Var.	13	3	12	5	0
TDS, mg/L	Minimum	866	1906	1552	1130	1018
	Mean	922	2016	1648	1224	1018
	Maximum	964	2086	1700	1336	1018
	Std. Dev.	34	87	52	75	0
	Median	926	2036	1654	1200	1018
	Coeff. Var.	4	4	3	6	0
TOC, mg/L	Minimum	1	0**	0**	1	10
	Mean	2	1	1	2	10
	Maximum	3	3	1	3	10
	Std. Dev.	1	1	1	1	0
	Median	2	1	1	2	10
	Coeff. Var.	45	141	77	41	0

*For purposes of statistical evaluation, fecal coliform values less than 1 were set equal to 1.

**A zero value indicates that the test result was below the detection limit (DL). The DL for total organic carbon is 0.3 mg/L.

TABLE 4: SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–36 THROUGH QD–40*

Parameter		Well Number				
		QD–36	QD–37	QD–38	QD–39	QD–40
Cl, mg/L	Minimum	117	251	194	33	15
	Mean	126	273	203	39	23
	Maximum	135	310	215	42	30
	Std. Dev.	7	22	8	5	11
	Median	126	267	203	42	23
	Coeff. Var.	5	8	4	13	47
Cond., µmhos/cm	Minimum	541	533	565	763	525
	Mean	1036	1233	863	840	703
	Maximum	1318	1837	1152	990	880
	Std. Dev.	329	609	252	130	251
	Median	1183	1370	889	768	703
	Coeff. Var.	32	49	29	15	36
FC, cfu/100 mL	Minimum	1	1	1	1	1
	Geo. Mean	1	1	1	1	1
	Maximum	1	7	1	3	1
	Geo. Std. Dev.	0	2	0	1	0
	Median	1	1	1	1	1
	Coeff. Var.	0	177	0	80	0
Hard., As $CaCO_3$, mg/L	Minimum	728	298	214	18	21
	Mean	755	428	245	19	22
	Maximum	799	523	257	20	23
	Std. Dev.	32	88	16	1	1
	Median	739	449	251	19	22
	Coeff. Var.	4	21	7	5	6
NH_4^+–N, mg/L	Minimum	0.22	0.10	0.22	0.05	0.06
	Mean	0.30	0.64	0.31	0.07	0.11
	Maximum	0.55	2.94	0.36	0.09	0.16
	Std. Dev.	0.12	1.13	0.06	0.02	0.07
	Median	0.27	0.20	0.34	0.07	0.11
	Coeff. Var.	41.42	178.13	19.42	28.57	64.28

TABLE 4 (Continued): SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–36 THROUGH QD–40*

Parameter		Well Number				
		QD–36	QD–37	QD–38	QD–39	QD–40
pH	Minimum	6.1	6.6	7.0	7.4	7.7
	Mean	7.2	7.2	7.5	7.5	7.8
	Maximum	8.0	7.4	7.8	7.6	7.8
	Std. Dev.	0.7	0.3	0.3	0.1	0.1
	Median	7.4	7.4	7.5	7.5	7.8
	Coeff. Var.	9.3	4.5	4.3	1.3	0.9
SO_4, mg/L	Minimum	285	299	101	95	338
	Mean	312	344	106	97	365
	Maximum	346	358	111	101	392
	Std. Dev.	21	22	5	3	38
	Median	310	352	107	95	365
	Coeff. Var.	7	7	5	4	10
TDS, mg/L	Minimum	1130	1390	838	760	770
	Mean	1199	1434	906	821	780
	Maximum	1246	1492	970	870	790
	Std. Dev.	47	42	49	56	14
	Median	1209	1424	911	834	780
	Coeff. Var.	4	3	5	7	2
TOC, mg/L	Minimum	1	0**	0**	0**	1
	Mean	2	1	1	1	1
	Maximum	3	3	1	2	1
	Std. Dev.	1	1	0	1	0
	Median	2	1	1	1	1
	Coeff. Var.	41	77	49	100	0

*For purposes of statistical evaluation, fecal coliform values less than 1 were set equal to 1.

**A zero value indicates that the test result was below the detection limit (DL). The DL for total organic carbon is 0.3 mg/L.

TABLE 5: SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–41 THROUGH QD–45*

Parameter		Well Number				
		QD–41	QD–42	QD–43	QD–44	QD–45
Cl, mg/L	Minimum	22	18	35	14	17
	Mean	22	19	37	17	18
	Maximum	23	21	38	24	20
	Std. Dev.	1	2	2	6	2
	Median	22	19	37	14	18
	Coeff. Var.	3	8	4	33	8
Cond., µmhos/cm	Minimum	675	303	367	440	386
	Mean	822	622	570	607	465
	Maximum	898	879	810	705	540
	Std. Dev.	127	293	224	145	77
	Median	893	683	532	675	469
	Coeff. Var.	15	47	39	24	17
FC, cfu/100 mL	Minimum	1	1	1	1	1
	Geo. Mean	1	1	1	1	1
	Maximum	1	1	1	1	1
	Geo. Std. Dev.	0	0	0	0	0
	Median	1	1	1	1	1
	Coeff. Var.	0	0	0	0	0
Hard., as $CaCO_3$, mg/L	Minimum	447	384	411	234	85
	Mean	453	401	419	266	86
	Maximum	463	415	426	284	88
	Std. Dev.	9	16	8	28	2
	Median	448	403	419	281	86
	Coeff. Var.	2	4	2	11	2
NH_4^+–N, mg/L	Minimum	0.17	0.33	0.26	0.28	0.26
	Mean	0.25	0.34	0.28	0.30	0.29
	Maximum	0.30	0.36	0.30	0.33	0.33
	Std. Dev.	0.07	0.02	0.02	0.03	0.04
	Median	0.29	0.33	0.27	0.28	0.27
	Coeff. Var.	28.56	5.09	7.52	9.73	13.21

TABLE 5 (Continued): SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–41 THROUGH QD–45*

Parameter		Well Number				
		QD–41	QD–42	QD–43	QD–44	QD–45
pH	Minimum	7.2	7.5	7.3	6.8	7.5
	Mean	7.3	7.6	7.4	7.2	7.7
	Maximum	7.5	7.6	7.5	7.5	7.8
	Std. Dev.	0.2	0.1	0.1	0.4	0.2
	Median	7.3	7.6	7.5	7.4	7.7
	Coeff. Var.	2.1	0.8	1.6	5.2	2.0
SO_4, mg/L	Minimum	344	275	200	182	193
	Mean	357	275	203	195	206
	Maximum	376	276	206	203	216
	Std. Dev.	17	1	3	11	12
	Median	352	275	202	200	210
	Coeff. Var.	5	0	2	6	6
TDS, mg/L	Minimum	824	768	668	576	502
	Mean	837	772	692	580	557
	Maximum	844	778	728	582	596
	Std. Dev.	11	5	32	3	49
	Median	842	770	680	582	574
	Coeff. Var.	1	1	5	1	9
TOC, mg/L	Minimum	1	1	1	1	1
	Mean	1	1	1	2	2
	Maximum	2	2	2	2	2
	Std. Dev.	1	1	1	1	1
	Median	1	1	1	2	2
	Coeff. Var.	43	43	43	35	35

*For purposes of statistical evaluation, fecal coliform values less than 1 were set equal to 1.

TABLE 6: SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–46 THROUGH QD–50*

Parameter		Well Number				
		QD–46	QD–47	QD–48	QD–49	QD–50
Cl, mg/L	Minimum	12	16	15	14	12
	Mean	16	18	21	15	16
	Maximum	21	19	27	16	22
	Std. Dev.	5	2	8	1	4
	Median	15	18	21	15	14
	Coeff. Var.	29	9	40	9	26
Cond., µmhos/cm	Minimum	505	502	660	501	480
	Mean	652	599	728	584	689
	Maximum	745	652	795	667	829
	Std. Dev.	129	84	95	117	152
	Median	706	643	728	584	728
	Coeff. Var.	20	14	13	20	22
FC, cfu/100 mL	Minimum	1	1	1	1	1
	Geo. Mean	1	1	1	1	1
	Maximum	1	1	1	2	1
	Geo. Std. Dev.	0	0	0	1	0
	Median	1	1	1	1	1
	Coeff. Var.	0	0	0	46	0
Hard., as $CaCO_3$, mg/L	Minimum	77	237	214	258	5
	Mean	78	244	247	259	8
	Maximum	78	252	280	259	12
	Std. Dev.	1	8	47	1	2
	Median	78	244	247	259	8
	Coeff. Var.	1	3	19	0	30
NH_4^+–N, mg/L	Minimum	0.19	0.23	0.24	0.33	0.00**
	Mean	0.22	0.32	0.43	0.34	0.08
	Maximum	0.25	0.46	0.61	0.34	0.13
	Std. Dev.	0.03	0.13	0.26	0.01	0.05
	Median	0.23	0.26	0.43	0.34	0.09
	Coeff. Var.	13.68	39.48	61.56	2.11	59.01

TABLE 6 (Continued): SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–46 THROUGH QD–50*

Parameter		Well Number				
		QD–46	QD–47	QD–48	QD–49	QD–50
pH	Minimum	6.4	7.2	7.2	7.6	7.3
	Mean	7.0	7.4	7.5	7.7	7.7
	Maximum	7.4	7.6	7.8	7.7	8.7
	Std. Dev.	0.5	0.2	0.4	0.1	0.5
	Median	7.1	7.5	7.5	7.7	7.4
	Coeff. Var.	7.4	2.8	5.7	0.9	7.0
SO_4, mg/L	Minimum	124	149	221	211	116
	Mean	128	157	253	232	214
	Maximum	136	164	285	252	275
	Std. Dev.	7	8	45	29	64
	Median	125	157	253	232	236
	Coeff. Var.	5	5	18	13	30
TDS, mg/L	Minimum	610	484	534	460	538
	Mean	650	507	550	502	636
	Maximum	678	534	566	544	740
	Std. Dev.	36	25	23	59	72
	Median	662	502	550	502	629
	Coeff. Var.	5	5	4	12	11
TOC, mg/L	Minimum	1	1	2	1	1
	Mean	2	2	3	2	2
	Maximum	2	2	4	2	2
	Std. Dev.	1	1	1	1	1
	Median	2	2	3	2	2
	Coeff. Var.	35	35	47	47	31

*For purposes of statistical evaluation, fecal coliform values less than 1 were set equal to 1.

**A zero value indicates that the test result was below the detection limit (DL). The DL for ammonia nitrogen is 0.02 mg/L.

TABLE 7: SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–51 THROUGH QD–55*

Parameter		Well Number				
		QD–51	QD–52	QD–53	QD–54	QD–55
Cl, mg/L	Minimum	11	14	18	16	17
	Mean	12	15	19	17	17
	Maximum	12	16	19	19	17
	Std. Dev.	0	1	1	2	0
	Median	12	14	19	16	17
	Coeff. Var.	4	8	3	10	0
Cond., µmhos/cm	Minimum	476	463	570	376	405
	Mean	590	549	679	451	482
	Maximum	669	610	768	545	609
	Std. Dev.	92	76	101	86	111
	Median	634	573	700	432	431
	Coeff. Var.	16	14	15	19	23
FC, cfu/100 mL	Minimum	1	1	1	1	1
	Geo. Mean	1	1	1	1	1
	Maximum	1	1	1	1	1
	Geo. Std. Dev.	0	0	0	0	0
	Median	1	1	1	1	1
	Coeff. Var.	0	0	0	0	0
Hard., as $CaCO_3$, mg/L	Minimum	4	23	11	41	185
	Mean	5	24	13	41	201
	Maximum	7	24	14	42	231
	Std. Dev.	1	1	2	1	26
	Median	5	24	13	41	188
	Coeff. Var.	24	2	12	1	13
NH_4^+–N, mg/L	Minimum	0.00**	0.08	0.00**	0.19	0.33
	Mean	0.04	0.09	0.00	0.22	0.35
	Maximum	0.09	0.10	0.01	0.24	0.38
	Std. Dev.	0.03	0.01	0.01	0.03	0.03
	Median	0.04	0.09	0.00	0.23	0.35
	Coeff. Var.	84.78	11.11	173.21	12.03	7.12

TABLE 7 (Continued): SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–51 THROUGH QD–55*

Parameter		Well Number				
		QD–51	QD–52	QD–53	QD–54	QD–55
pH	Minimum	7.4	7.5	7.3	7.1	7.4
	Mean	7.9	7.6	7.5	7.5	7.4
	Maximum	8.8	7.8	7.6	7.8	7.5
	Std. Dev.	0.6	0.2	0.2	0.4	0.1
	Median	7.6	7.5	7.5	7.7	7.4
	Coeff. Var.	7.5	2.3	2.0	5.0	0.8
SO_4, mg/L	Minimum	112	121	135	136	196
	Mean	143	135	151	146	198
	Maximum	248	143	161	151	203
	Std. Dev.	59	12	14	8	4
	Median	118	141	158	150	196
	Coeff. Var.	41	9	9	6	2
TDS, mg/L	Minimum	536	394	520	430	462
	Mean	582	471	569	453	497
	Maximum	696	536	598	491	522
	Std. Dev.	66	72	42	33	31
	Median	554	482	588	438	508
	Coeff. Var.	11	15	7	7	6
TOC, mg/L	Minimum	1	2	2	1	2
	Mean	1	2	2	1	2
	Maximum	2	2	3	1	3
	Std. Dev.	0	0	1	0	1
	Median	1	2	2	1	2
	Coeff. Var.	37	0	25	0	25

*For purposes of statistical evaluation, fecal coliform values less than 1 were set equal to 1.

**A zero value indicates that the test result was below the detection limit (DL). The DL for ammonia nitrogen is 0.02 mg/L.

TABLE 8: SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–56 THROUGH QD–60*

Parameter		Well Number				
		QD–56	QD–57	QD–58	QD–59	QD–60
Cl, mg/L	Minimum	11	12	12	110	50
	Mean	14	13	25	112	53
	Maximum	18	15	49	113	58
	Std. Dev.	4	2	21	2	4
	Median	12	13	13	112	51
	Coeff. Var.	28	11	85	1	8
Cond., µmhos/cm	Minimum	316	350	208	410	351
	Mean	375	423	260	546	469
	Maximum	420	468	331	630	542
	Std. Dev.	53	64	64	119	103
	Median	388	452	240	598	515
	Coeff. Var.	14	15	25	22	22
FC, cfu/100 mL	Minimum	1	1	1	1	1
	Geo. Mean	1	1	1	1	1
	Maximum	1	1	1	1	1
	Geo. Std. Dev.	0	0	0	0	0
	Median	1	1	1	1	1
	Coeff. Var.	0	0	0	0	0
Hard., as $CaCO_3$, mg/L	Minimum	46	17	116	266	247
	Mean	47	18	117	276	252
	Maximum	47	18	118	282	261
	Std. Dev.	1	1	1	9	8
	Median	47	18	118	281	248
	Coeff. Var.	1	3	1	3	3
NH_4^+–N, mg/L	Minimum	0.21	0.22	0.30	0.33	0.33
	Mean	0.47	0.23	0.52	0.34	0.34
	Maximum	0.94	0.24	0.96	0.36	0.36
	Std. Dev.	0.41	0.01	0.38	0.02	0.02
	Median	0.26	0.23	0.31	0.34	0.33
	Coeff. Var.	86.77	4.35	72.27	4.45	5.09

TABLE 8 (Continued): SUMMARY STATISTICS OF THE 2005 DATA FOR THE WATER QUALITY MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM: WELLS QD–56 THROUGH QD–60*

Parameter		Well Number				
		QD–56	QD–57	QD–58	QD–59	QD–60
pH	Minimum	7.2	7.4	7.7	7.4	7.5
	Mean	7.4	7.5	7.7	7.5	7.5
	Maximum	7.6	7.6	7.7	7.6	7.6
	Std. Dev.	0.2	0.1	0.0	0.1	0.1
	Median	7.5	7.5	7.7	7.5	7.5
	Coeff. Var.	2.8	1.3	0.0	1.3	0.8
SO_4, mg/L	Minimum	6	56	1	64	98
	Mean	7	58	2	67	103
	Maximum	8	61	3	69	106
	Std. Dev.	1	3	1	3	4
	Median	8	58	2	69	105
	Coeff. Var.	16	4	50	4	4
TDS, mg/L	Minimum	336	380	180	494	410
	Mean	341	381	266	521	431
	Maximum	346	384	370	562	456
	Std. Dev.	5	2	96	36	23
	Median	342	380	248	508	426
	Coeff. Var.	1	1	36	7	5
TOC, mg/L	Minimum	1	1	0**	1	0**
	Mean	1	2	1	1	0
	Maximum	1	2	1	2	1
	Std. Dev.	0	1	1	1	1
	Median	1	2	1	1	0
	Coeff. Var.	0	35	87	43	173

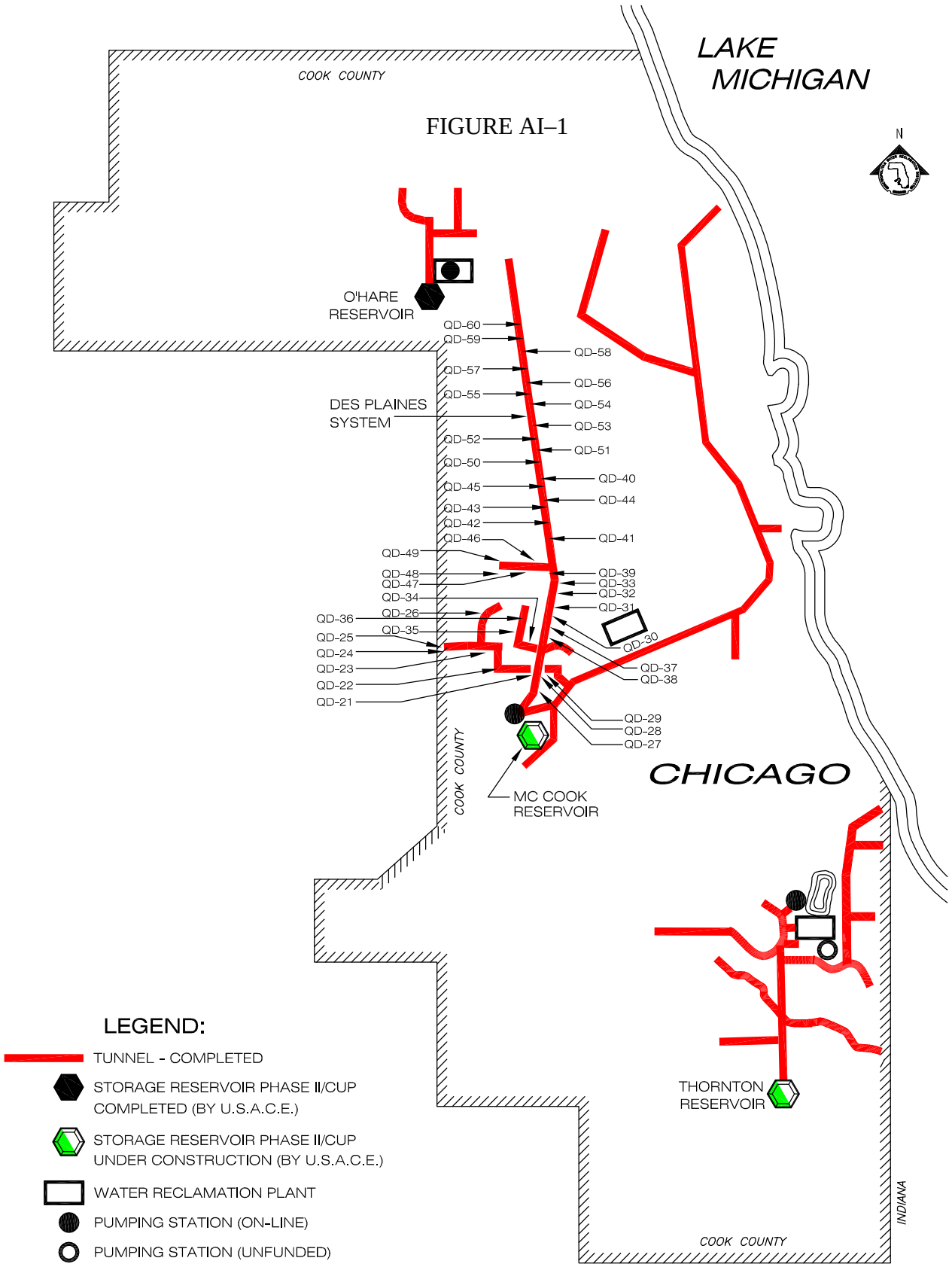
*For purposes of statistical evaluation, fecal coliform values less than 1 were set equal to 1.

**A zero value indicates that the test result was below the detection limit (DL). The DL for total organic carbon is 0.3 mg/L.

APPENDIX AI

LOCATION MAP OF GROUNDWATER QUALITY MONITORING WELLS
QD–21 THROUGH QD–60
IN THE DES PLAINES TUNNEL SYSTEM

FIGURE AI–1



DES PLAINES TUNNEL SYSTEM LOCATION MAP OF GROUNDWATER QUALITY MONITORING WELLS

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO

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APPENDIX AII

2005 GROUNDWATER QUALITY DATA
FOR MONITORING WELLS QD–21 THROUGH QD–60
IN THE DES PLAINES TUNNEL SYSTEM

TABLE AII–1: 2005 pH, CONDUCTIVITY, TEMPERATURE, HARDNESS, AMMONIA NITROGEN, AND CHLORIDE DATA FOR WATER QUALITY MONITORING WELLS QD–21 THROUGH QD–60 IN THE DES PLAINES TUNNEL SYSTEM

Well	Date of Sampling	pH[1]	Cond.[1] µmhos/cm	Temp. °C	Hard. as $CaCO_3$ mg/L	NH_4^+–N mg/L	Cl mg/L
QD–21	2/8/05	6.8	1573	12	701	0.23	245
QD–21	4/13/05	7.6	835	12	792	0.25	267
QD–21	6/8/05	7.4	820	14	699	0.20	198
QD–21	8/24/05	6.4	2013	13	776	0.16	232
QD–21	10/6/05	7.1	1863	13	819	0.14	285
QD–21	12/7/05	7.6	1345	12	793	0.17	316
QD–22	2/8/05	6.8	1190	12	740	0.40	129
QD–22	4/13/05	7.5	758	12	747	0.35	117
QD–22	6/8/05	7.5	730	14	754	0.34	138
QD–22	8/24/05	6.1	1186	13	723	0.32	137
QD–22	10/6/05	7.2	1224	12	684	0.33	131
QD–22	12/7/05	7.5	883	11	722	0.33	140
QD–23	2/8/05	6.8	627	12	753	0.47	141
QD–23	4/13/05	7.5	731	13	776	0.44	143
QD–23	6/8/05	7.2	800	14	765	0.42	151
QD–23	8/24/05	6.3	1310	13	762	0.41	140
QD–23	10/6/05	7.1	1366	14	727	0.40	142
QD–23	12/7/05	7.6	931	12	743	0.41	136
QD–24	2/8/05	6.9	1068	10	549	0.40	79
QD–24	4/13/05	7.8	635	11	630	0.62	122
QD–24	6/8/05	7.3	662	12	562	0.37	81
QD–24	8/24/05	6.5	1096	12	638	0.56	132
QD–24	10/6/05	7.3	1140	12	568	0.45	106
QD–24	12/7/05	7.8	785	10	546	0.41	87
QD–25	2/8/05	6.9	1519	10	568	0.70	381
QD–25	4/13/05	7.6	930	11	614	0.81	366
QD–25	6/8/05	7.7	1023	12	576	0.63	367
QD–25	8/24/05	6.7	1668	16	624	0.64	364
QD–25	10/6/05	7.0	1712	11	502	0.60	378
QD–25	12/7/05	7.6	1166	10	534	0.61	361

TABLE AII–1 (Continued): 2005 pH, CONDUCTIVITY, TEMPERATURE, HARDNESS, AMMONIA NITROGEN, AND CHLORIDE DATA FOR WATER QUALITY MONITORING WELLS QD–21 THROUGH QD–60 IN THE DES PLAINES TUNNEL SYSTEM

Well	Date of Sampling	pH[1]	Cond.[1] µmhos/cm	Temp. °C	Hard. as $CaCO_3$ mg/L	NH_4^+–N mg/L	Cl mg/L
QD–26	2/17/05	7.2	371	11	421	0.33	30
QD–26	4/14/05	7.2	669	12	432	0.30	24
QD–26	6/29/05	7.8	618	13	426	0.31	21
QD–27	2/17/05	7.5	870	11	512	24.43	325
QD–27	4/28/05	7.4	1796	12	506	23.07	277
QD–27	6/29/05	7.6	1840	13	514	25.26	293
QD–27	8/11/05	7.3	1433	13	502	19.62	264
QD–27	10/6/05	7.4	552	12	502	22.76	323
QD–27	11/30/05	7.6	2005	12	490	21.59	333
QD–28	1/6/05	6.9	1637	12	751	0.71	378
QD–28	3/16/05	7.9	1604	12	717	0.62	360
QD–28	5/11/05	7.2	1702	13	762	0.55	343
QD–28	7/7/05	7.0	693	13	782	0.58	326
QD–28	9/8/05	7.2	1668	15	700	0.52	331
QD–28	10/31/05	7.1	505	13	617	0.52	260
QD–29	1/6/05	Well could not be sampled					
QD–29	3/16/05	7.5	1133	12	672	0.39	142
QD–29	5/11/05	7.4	1155	13	638	0.36	139
QD–29	7/7/05	8.0	702	13	657	0.35	117
QD–29	9/8/05	6.8	1128	14	670	0.32	129
QD–29	10/31/05	7.5	554	13	654	0.33	115
QD–30	2/17/05	6.5	1327	11	739	0.32	158
QD–30	4/28/05	7.5	1168	12	675	0.72	126
QD–30	6/29/05	7.4	1020	13	727	0.80	151
QD–30	8/11/05	7.5	1333	12	717	2.19	162
QD–30	10/6/05	7.5	638	12	765	2.52	184
QD–30	11/30/05	7.5	1250	11	734	0.45	176
QD–31	2/17/05	6.8	1077	10	277	0.25	120
QD–31	4/28/05	7.4	1115	12	263	0.22	118
QD–31	6/29/05	7.5	935	12	265	0.17	115

TABLE AII–1 (Continued): 2005 pH, CONDUCTIVITY, TEMPERATURE, HARDNESS, AMMONIA NITROGEN, AND CHLORIDE DATA FOR WATER QUALITY MONITORING WELLS QD–21 THROUGH QD–60 IN THE DES PLAINES TUNNEL SYSTEM

Well	Date of Sampling	pH[1]	Cond.[1] µmhos/cm	Temp. °C	Hard. as $CaCO_3$ mg/L	NH_4^+–N mg/L	Cl mg/L
QD–31	8/11/05	7.4	1124	12	263	0.15	118
QD–31	10/6/05	7.5	525	12	222	0.12	122
QD–31	11/30/05	7.6	1041	11	242	0.15	118
QD–32	2/17/05	6.8	2294	9	38	0.23	506
QD–32	4/28/05			Well could not be sampled			
QD–32	6/29/05	7.7	2050	12	39	0.19	527
QD–32	8/9/05			Well could not be sampled			
QD–32	10/6/05	7.6	1275	11	27	0.12	492
QD–32	11/30/05	7.6	2267	11	37	0.19	531
QD–33	2/17/05	6.8	1917	10	27	0.23	385
QD–33	4/28/05	7.5	2015	12	27	0.23	340
QD–33	6/29/05	7.5	1775	12	26	0.21	361
QD–33	8/11/05	7.5	2102	12	27	0.14	333
QD–33	10/6/05	7.7	1235	12	25	0.14	376
QD–33	11/30/05	7.5	1855	11	24	0.16	355
QD–34	2/17/05	6.6	1198	11	757	0.33	142
QD–34	3/16/05	7.5	1234	12	766	0.33	117
QD–34	5/11/05	7.2	1272	13	767	0.31	111
QD–34	7/7/05	7.8	662	12	748	0.31	110
QD–34	9/8/05	7.0	1253	13	789	0.29	106
QD–34	10/31/05	7.4	567	13	729	0.29	107
QD–35	1/6/05			Well could not be sampled			
QD–35	5/11/05			Well could not be sampled			
QD–35	7/7/05			Well could not be sampled			
QD–35	8/26/05			Well could not be sampled			
QD–35	9/8/05			Well could not be sampled			
QD–35	10/31/05	7.5	539	12	605	0.34	113
QD–36	1/6/05	6.9	1184	11	733	0.27	135
QD–36	3/16/05	7.6	1181	11	799	0.26	132
QD–36	5/11/05	7.2	1289	12	728	0.23	127

TABLE AII–1 (Continued): 2005 pH, CONDUCTIVITY, TEMPERATURE, HARDNESS, AMMONIA NITROGEN, AND CHLORIDE DATA FOR WATER QUALITY MONITORING WELLS QD–21 THROUGH QD–60 IN THE DES PLAINES TUNNEL SYSTEM

Well	Date of Sampling	pH[1]	Cond.[1] µmhos/cm	Temp. °C	Hard. as $CaCO_3$ mg/L	NH_4^+–N mg/L	Cl mg/L
QD–36	7/7/05	8.0	703	12	739	0.27	117
QD–36	8/29/05	6.1	1318	13	792	0.22	122
QD–36	10/31/05	7.6	541	11	739	0.55	124
QD–37	2/17/05	7.0	540	11	477	2.94	286
QD–37	4/14/05	6.6	1748	12	495	0.21	251
QD–37	6/23/05	7.4	1040	13	298	0.10	310
QD–37	9/1/05	7.4	1837	13	421	0.19	262
QD–37	10/13/05	7.3	533	13	352	0.10	272
QD–37	12/1/05	7.4	1700	13	523	0.27	258
QD–38	2/17/05	7.0	565	10	257	0.36	215
QD–38	4/14/05	7.2	1085	12	254	0.33	208
QD–38	6/23/05	7.8	777	13	248	0.34	206
QD–38	9/1/05	7.5	1152	13	254	0.24	197
QD–38	10/13/05	7.5	600	12	214	0.22	200
QD–38	12/1/05	7.8	1000	11	245	0.34	194
QD–39	4/7/05	7.4	768	11	20	0.07	33
QD–39	6/23/05	7.6	763	13	19	0.09	42
QD–39	9/1/05	7.5	990	12	18	0.05	42
QD–40	4/7/05	Well could not be sampled					
QD–40	6/23/05	7.8	880	14	23	0.16	15
QD–40	10/13/05	7.7	525	13	21	0.06	30
QD–41	4/7/05	7.5	675	12	463	0.30	22
QD–41	7/28/05	7.3	893	13	447	0.29	23
QD–41	9/1/05	7.2	898	13	448	0.17	22
QD–42	4/7/05	7.6	683	12	415	0.36	19
QD–42	7/28/05	7.6	879	12	403	0.33	18
QD–42	9/29/05	7.5	303	12	384	0.33	21

TABLE AII–1 (Continued): 2005 pH, CONDUCTIVITY, TEMPERATURE, HARDNESS, AMMONIA NITROGEN, AND CHLORIDE DATA FOR WATER QUALITY MONITORING WELLS QD–21 THROUGH QD–60 IN THE DES PLAINES TUNNEL SYSTEM

Well	Date of Sampling	pH[1]	Cond.[1] µmhos/cm	Temp. °C	Hard. as $CaCO_3$ mg/L	NH_4^+–N mg/L	Cl mg/L
QD–43	4/7/05	7.5	532	11	411	0.30	35
QD–43	7/28/05	7.5	810	12	426	0.27	37
QD–43	9/29/05	7.3	367	12	419	0.26	38
QD–44	3/16/05	7.5	675	12	234	0.28	24
QD–44	6/15/05	7.4	440	12	284	0.33	14
QD–44	8/29/05	6.8	705	12	281	0.28	14
QD–45	3/31/05	7.7	540	11	88	0.27	17
QD–45	4/21/05	7.8	469	11	86	0.26	18
QD–45	9/29/05	7.5	386	11	85	0.33	20
QD–46	1/6/05	7.1	706	12	78	0.23	15
QD–46	6/15/05	7.4	505	13	78	0.25	12
QD–46	8/29/05	6.4	745	13	77	0.19	21
QD–47	3/31/05	7.6	502	13	252	0.26	18
QD–47	5/26/05	7.5	652	13	244	0.46	19
QD–47	8/11/05	7.2	643	13	237	0.23	16
QD–48	3/31/05	Well could not be sampled					
QD–48	5/26/05	7.8	795	13	214	0.61	27
QD–48	8/11/05	7.2	660	14	280	0.24	15
QD–49	3/31/05	7.7	501	12	258	0.33	14
QD–49	7/28/05	7.6	667	14	259	0.34	16
QD–49	8/11/05	Well could not be sampled					
QD–50	3/31/05	7.8	667	11	7	0.13	20
QD–50	4/14/05	7.4	541	11	5	0.06	14
QD–50	6/9/05	7.4	828	12	8	0.11	13
QD–50	8/4/05	8.7	480	13	8	0.10	12
QD–50	10/13/05	7.3	829	12	12	0.00[2]	22
QD–50	12/1/05	7.4	788	11	7	0.07	14

TABLE AII–1 (Continued): 2005 pH, CONDUCTIVITY, TEMPERATURE, HARDNESS, AMMONIA NITROGEN, AND CHLORIDE DATA FOR WATER QUALITY MONITORING WELLS QD–21 THROUGH QD–60 IN THE DES PLAINES TUNNEL SYSTEM

Well	Date of Sampling	pH[1]	Cond.[1] µmhos/cm	Temp. °C	Hard. as $CaCO_3$ mg/L	NH_4^+–N mg/L	Cl mg/L
QD–51	2/17/05			Well could not be sampled			
QD–51	4/14/05	8.2	506	12	7	0.09	12
QD–51	6/9/05	7.5	666	12	5	0.04	11
QD–51	8/4/05	8.8	476	12	5	0.05	12
QD–51	10/13/05	7.4	669	12	4	0.00[2]	12
QD–51	12/1/05	7.6	634	11	4	0.02	12
QD–52	3/31/05	7.5	573	12	24	0.10	16
QD–52	4/14/05	7.8	463	13	24	0.08	14
QD–52	6/9/05	7.5	610	15	23	0.09	14
QD–53	3/31/05	7.5	700	12	11	0.00[2]	18
QD–53	4/14/05	7.3	570	13	14	0.00[2]	19
QD–53	6/9/05	7.6	768	14	13	0.01	19
QD–54	3/31/05	7.1	545	12	41	0.19	19
QD–54	4/21/05	7.7	432	12	41	0.23	16
QD–54	6/16/05	7.8	376	12	42	0.24	16
QD–55	3/31/05	7.4	609	11	231	0.33	17
QD–55	4/21/05	7.5	431	12	188	0.35	17
QD–55	6/16/05	7.4	405	12	185	0.38	17
QD–56	4/7/05	7.2	388	10	46	0.21	18
QD–56	5/26/05	7.5	420	12	47	0.94	12
QD–56	6/16/05	7.6	316	11	47	0.26	11
QD–57	4/7/05	7.4	452	10	18	0.23	15
QD–57	5/26/05	7.5	468	12	18	0.22	13
QD–57	6/16/05	7.6	350	11	17	0.24	12
QD–58	5/26/05	7.7	240	12	118	0.30	12
QD–58	6/30/05	7.7	331	12	118	0.96	49
QD–58	7/21/05	7.7	208	12	116	0.31	13

TABLE AII–1 (Continued): 2005 pH, CONDUCTIVITY, TEMPERATURE, HARDNESS, AMMONIA NITROGEN, AND CHLORIDE DATA FOR WATER QUALITY MONITORING WELLS QD–21 THROUGH QD–60 IN THE DES PLAINES TUNNEL SYSTEM

Well	Date of Sampling	pH[1]	Cond.[1] µmhos/cm	Temp. °C	Hard. as $CaCO_3$ mg/L	NH_4^+–N mg/L	Cl mg/L
QD–59	4/7/05	7.4	598	11	282	0.33	110
QD–59	6/30/05	7.5	630	12	281	0.36	112
QD–59	7/21/05	7.6	410	13	266	0.34	113
QD–60	4/7/05	7.5	515	11	261	0.36	58
QD–60	6/30/05	7.5	542	12	247	0.33	50
QD–60	7/21/05	7.6	351	13	248	0.33	51

[1]Unfiltered samples, all others were filtered through 0.45 µm membrane.
[2]A zero value indicates that the test result was below the detection limit (DL). The DL for ammonia nitrogen is 0.02 mg/L.

TABLE AII–2: 2005 SULFATE, TOTAL ORGANIC CARBON, TOTAL DISSOLVED SOLIDS, FECAL COLIFORM, WATER ELEVATION, AND RECHARGE DATA FOR WATER QUALITY MONITORING WELLS QD–21 THROUGH QD–60 IN THE DES PLAINES TUNNEL SYSTEM

Well	Date of Sampling	SO_4 mg/L	TOC mg/L	TDS mg/L	FC[1] cfu/100 mL	Water Elevation[2] Feet	Recharge[3] Hours
QD–21	2/8/05	244	2	1250	<1	-77	<4
QD–21	4/13/05	309	2	1368	<1	-74	<4
QD–21	6/8/05	241	2	1398	<1	-75	<4
QD–21	8/24/05	313	1	1480	<1	-74	<4
QD–21	10/6/05	360	1	1516	<1	-76	<4
QD–21	12/7/05	318	1	1432	<1	-78	<4
QD–22	2/8/05	264	2	1100	<1	-36	<4
QD–22	4/13/05	269	2	1044	<1	-30	<4
QD–22	6/8/05	270	2	1414	<1	-32	<4
QD–22	8/24/05	277	1	1284	<1	-32	<4
QD–22	10/6/05	262	1	1110	<1	-37	<4
QD–22	12/7/05	264	1	1126	<1	-38	<4
QD–23	2/8/05	298	3	1140	<1	-43	<4
QD–23	4/13/05	291	4	1094	<1	-37	<4
QD–23	6/8/05	284	3	1444	<1	-39	<4
QD–23	8/24/05	361	2	1284	<1	-38	<4
QD–23	10/6/05	297	2	1132	<1	-37	<4
QD–23	12/7/05	302	2	1114	<1	-45	<4
QD–24	2/8/05	170	5	742	<1	21	<4
QD–24	4/13/05	219	4	1048	<1	14	<4
QD–24	6/8/05	172	3	996	<1	14	<4
QD–24	8/24/05	213	2	1056	<1	15	<4
QD–24	10/6/05	193	2	894	<1	16	<4
QD–24	12/7/05	166	2	834	<1	9	<4
QD–25	2/8/05	175	4	1302	<1	26	<4
QD–25	4/13/05	201	4	1258	<1	27	<4
QD–25	6/8/05	178	4	1488	<1	25	<4
QD–25	8/24/05	218	2	1470	<1	25	<4
QD–25	10/6/05	189	2	1328	<1	24	<4
QD–25	12/7/05	180	2	1234	<1	23	<4

TABLE AII–2 (Continued): 2005 SULFATE, TOTAL ORGANIC CARBON, TOTAL DISSOLVED SOLIDS, FECAL COLIFORM, WATER ELEVATION, AND RECHARGE DATA FOR WATER QUALITY MONITORING WELLS QD–21 THROUGH QD–60 IN THE DES PLAINES TUNNEL SYSTEM

Well	Date of Sampling	SO_4 mg/L	TOC mg/L	TDS mg/L	FC[1] cfu/100 mL	Water Elevation[2] Feet	Recharge[3] Hours
QD–26	2/17/05	109	2	642	<1	-18	<48
QD–26	4/14/05	115	1	620	<1	-19	<48
QD–26	6/29/05	118	1	572	<1	-19	<48
QD–27	2/17/05	52	26	1214	12	-193	<48
QD–27	4/28/05	81	26	1130	<1	-199	<48
QD–27	6/29/05	56	18	1184	<1	-199	<48
QD–27	8/11/05	46	17	1078	<1	-197	<48
QD–27	10/6/05	49	17	1248	<1	-197	<48
QD–27	11/30/05	55	14	1238	<1	-196	<48
QD–28	1/6/05	223	3	1504	<1	-127	<4
QD–28	3/16/05	205	3	1422	<1	-130	<4
QD–28	5/11/05	243	2	1444	<1	-129	<4
QD–28	7/7/05	237	1	1660	<1	-132	<4
QD–28	9/8/05	225	1	1664	<1	-129	<4
QD–28	10/31/05	221	1	1256	<1	-132	<4
QD–29	1/6/05			Well could not be sampled			
QD–29	3/16/05	239	3	1085	2	-188	<4
QD–29	5/11/05	235	3	1004	<1	-188	<4
QD–29	7/7/05	239	2	1122	<1	-187	<4
QD–29	9/8/05	256	2	1242	<1	-184	<4
QD–29	10/31/05	269	1	1060	<1	-187	<4
QD–30	2/17/05	330	3	1198	<1	-134	<48
QD–30	4/28/05	347	3	1114	1	-129	<48
QD–30	6/29/05	361	1	1258	<1	-134	<48
QD–30	8/11/05	336	1	1150	<1	-132	<48
QD–30	10/6/05	368	1	1240	<1	-133	<48
QD–30	11/30/05	373	1	1308	<1	-132	<48
QD–31	2/17/05	175	3	964	36	-184	<48
QD–31	4/28/05	235	1	934	<1	-192	<48

TABLE AII–2 (Continued): 2005 SULFATE, TOTAL ORGANIC CARBON, TOTAL DISSOLVED SOLIDS, FECAL COLIFORM, WATER ELEVATION, AND RECHARGE DATA FOR WATER QUALITY MONITORING WELLS QD–21 THROUGH QD–60 IN THE DES PLAINES TUNNEL SYSTEM

Well	Date of Sampling	SO_4 mg/L	TOC mg/L	TDS mg/L	FC[1] cfu/100 mL	Water Elevation[2] Feet	Recharge[3] Hours
QD–31	6/29/05	186	1	908	<1	-191	<48
QD–31	8/11/05	180	2	866	<1	-183	<48
QD–31	10/6/05	176	3	918	<1	-189	<48
QD–31	11/30/05	171	2	942	<1	-181	<48
QD–32	2/17/05	215	3	1906	<1	-128	<48
QD–32	4/28/05	Well could not be sampled					
QD–32	6/29/05	228	1	1986	<1	-129	<48
QD–32	8/9/05	Well could not be sampled					
QD–32	10/6/05	214	0[4]	2086	<1	-212	<48
QD–32	11/30/05	214	0[4]	2086	<1	-212	<48
QD–33	2/17/05	182	1	1700	<1	-132	<48
QD–33	4/28/05	246	1	1638	<1	-118	<48
QD–33	6/29/05	207	1	1650	<1	-106	<48
QD–33	8/11/05	191	0[4]	1552	<1	-168	<48
QD–33	10/6/05	184	1	1658	<1	-103	<48
QD–33	11/30/05	188	0[4]	1688	<1	-171	<48
QD–34	2/17/05	326	2	1210	2	-114	<4
QD–34	3/16/05	327	3	1190	<1	-115	<4
QD–34	5/11/05	346	2	1130	<1	-114	<4
QD–34	7/7/05	339	2	1290	<1	-115	<4
QD–34	9/8/05	354	1	1336	<1	-113	<4
QD–34	10/31/05	375	1	1190	<1	-116	<4
QD–35	1/6/05	Well could not be sampled					
QD–35	5/11/05	Well could not be sampled					
QD–35	7/7/05	Well could not be sampled					
QD–35	8/26/05	Well could not be sampled					
QD–35	9/8/05	Well could not be sampled					
QD–35	10/31/05	268	10	1018	<1	-111	<4

TABLE AII–2 (Continued): 2005 SULFATE, TOTAL ORGANIC CARBON, TOTAL DISSOLVED SOLIDS, FECAL COLIFORM, WATER ELEVATION, AND RECHARGE DATA FOR WATER QUALITY MONITORING WELLS QD–21 THROUGH QD–60 IN THE DES PLAINES TUNNEL SYSTEM

Well	Date of Sampling	SO_4 mg/L	TOC mg/L	TDS mg/L	FC[1] cfu/100 mL	Water Elevation[2] Feet	Recharge[3] Hours
QD–36	1/6/05	285	2	1160	<1	-111	<4
QD–36	3/16/05	320	3	1240	1	-124	<4
QD–36	5/11/05	310	2	1130	<1	-124	<4
QD–36	7/7/05	300	2	1246	<1	-121	<4
QD–36	8/29/05	309	1	1192	<1	-120	<4
QD–36	10/31/05	346	1	1226	<1	-123	<4
QD–37	2/17/05	358	2	1436	<1	-202	<48
QD–37	4/14/05	351	3	1412	<1	-206	<48
QD–37	6/23/05	299	0[4]	1478	<1	-209	<48
QD–37	9/1/05	352	1	1398	7	-206	<48
QD–37	10/13/05	349	1	1390	<1	-197	<48
QD–37	12/1/05	356	1	1492	<1	-196	<48
QD–38	2/17/05	111	1	930	<1	-172	<48
QD–38	4/14/05	111	1	970	<1	-171	<48
QD–38	6/23/05	102	0[4]	938	<1	-204	<48
QD–38	9/1/05	103	1	892	<1	-204	<48
QD–38	10/13/05	110	1	868	<1	-166	<48
QD–38	12/1/05	101	1	838	<1	-164	<48
QD–39	4/7/05	101	2	760	3	-140	<48
QD–39	6/23/05	95	0[4]	870	<1	-143	<48
QD–39	9/1/05	95	1	834	<1	-138	<48
QD–40	4/7/05			Well could not be sampled			
QD–40	6/23/05	338	1	790	<1	-85	<48
QD–40	10/13/05	392	1	770	<1	-66	<48
QD–41	4/7/05	344	2	844	<1	-132	<48
QD–41	7/28/05	376	1	842	<1	-129	<48
QD–41	9/1/05	352	1	824	<1	-129	<48

TABLE AII–2 (Continued): 2005 SULFATE, TOTAL ORGANIC CARBON, TOTAL DISSOLVED SOLIDS, FECAL COLIFORM, WATER ELEVATION, AND RECHARGE DATA FOR WATER QUALITY MONITORING WELLS QD–21 THROUGH QD–60 IN THE DES PLAINES TUNNEL SYSTEM

Well	Date of Sampling	SO_4 mg/L	TOC mg/L	TDS mg/L	FC[1] cfu/100 mL	Water Elevation[2] Feet	Recharge[3] Hours
QD–42	4/7/05	275	2	778	<1	-130	<48
QD–42	7/28/05	276	1	770	<1	-127	<48
QD–42	9/29/05	275	1	768	<1	-126	<48
QD–43	4/7/05	202	2	668	<1	-140	<48
QD–43	7/28/05	206	1	680	<1	-140	<48
QD–43	9/29/05	200	1	728	<1	-144	<48
QD–44	3/16/05	182	2	582	<1	-13	<4
QD–44	6/15/05	203	2	582	<1	-12	<4
QD–44	8/29/05	200	1	576	<1	-13	<4
QD–45	3/31/05	193	2	502	<1	-9	<48
QD–45	4/21/05	216	2	574	<1	-11	<48
QD–45	9/29/05	210	1	596	<1	-10	<48
QD–46	1/6/05	125	2	662	<1	-172	<4
QD–46	6/15/05	136	2	610	<1	-178	<4
QD–46	8/29/05	124	1	678	<1	-171	<4
QD–47	3/31/05	149	2	484	<1	1	<48
QD–47	5/26/05	164	2	534	<1	4	<48
QD–47	8/11/05	157	1	502	<1	4	<48
QD–48	3/31/05			Well could not be sampled			
QD–48	5/26/05	221	4	534	<1	-27	<48
QD–48	8/11/05	285	2	566	<1	-68	<48
QD–49	3/31/05	211	2	460	2	-94	<48
QD–49	7/28/05	252	1	544	<1	-175	<48
QD–49	8/11/05			Well could not be sampled			
QD–50	3/31/05	217	2	618	<1	-86	<48
QD–50	4/14/05	116	2	538	<1	-88	<48

TABLE AII–2 (Continued): 2005 SULFATE, TOTAL ORGANIC CARBON, TOTAL DISSOLVED SOLIDS, FECAL COLIFORM, WATER ELEVATION, AND RECHARGE DATA FOR WATER QUALITY MONITORING WELLS QD–21 THROUGH QD–60 IN THE DES PLAINES TUNNEL SYSTEM

Well	Date of Sampling	SO_4 mg/L	TOC mg/L	TDS mg/L	FC[1] cfu/100 mL	Water Elevation[2] Feet	Recharge[3] Hours
QD–50	6/9/05	254	2	692	<1	-86	<48
QD–50	8/4/05	275	1	640	<1	-87	<48
QD–50	10/13/05	158	2	588	<1	-133	<48
QD–50	12/1/05	265	1	740	<1	-133	<48
QD–51	2/17/05			Well could not be sampled			
QD–51	4/14/05	248	2	696	<1	-91	<48
QD–51	6/9/05	123	1	546	<1	-92	<48
QD–51	8/4/05	113	1	536	<1	-93	<48
QD–51	10/13/05	118	1	578	<1	-101	<48
QD–51	12/1/05	112	1	554	<1	-101	<48
QD–52	3/31/05	121	2	394	<1	-42	<48
QD–52	4/14/05	141	2	536	<1	-31	<48
QD–52	6/9/05	143	2	482	<1	-37	<48
QD–53	3/31/05	135	2	520	<1	-117	<48
QD–53	4/14/05	158	2	598	<1	-150	<48
QD–53	6/9/05	161	3	588	<1	-123	<48
QD–54	3/31/05	136	1	430	<1	-23	<48
QD–54	4/21/05	150	1	491	<1	-18	<48
QD–54	6/16/05	151	1	438	<1	-20	<48
QD–55	3/31/05	196	3	462	<1	-145	<48
QD–55	4/21/05	203	2	522	<1	-141	<48
QD–55	6/16/05	196	2	508	<1	-136	<48
QD–56	4/7/05	8	1	336	<1	-45	<48
QD–56	5/26/05	6	1	346	<1	-45	<48
QD–56	6/16/05	8	1	342	<1	-45	<48

TABLE AII–2 (Continued): 2005 SULFATE, TOTAL ORGANIC CARBON, TOTAL DISSOLVED SOLIDS, FECAL COLIFORM, WATER ELEVATION, AND RECHARGE DATA FOR WATER QUALITY MONITORING WELLS QD–21 THROUGH QD–60 IN THE DES PLAINES TUNNEL SYSTEM

Well	Date of Sampling	SO_4 mg/L	TOC mg/L	TDS mg/L	FC[1] cfu/100 mL	Water Elevation[2] Feet	Recharge[3] Hours
QD–57	4/7/05	58	2	380	<1	-95	<48
QD–57	5/26/05	61	2	380	<1	-94	<48
QD–57	6/16/05	56	1	384	<1	-98	<48
QD–58	5/26/05	1	1	248	<1	-103	<48
QD–58	6/30/05	3	1	370	<1	-100	<48
QD–58	7/21/05	2	0[4]	180	<1	-103	<48
QD–59	4/7/05	69	2	508	<1	-39	<48
QD–59	6/30/05	69	1	562	<1	-34	<48
QD–59	7/21/05	64	1	494	<1	-38	<48
QD–60	4/7/05	106	1	426	<1	-111	<48
QD–60	6/30/05	105	0[4]	456	<1	-98	<48
QD–60	7/21/05	98	0[4]	410	<1	-111	<48

[1]Unfiltered samples, all others were filtered through 0.45 µm membrane.
[2]Water level elevations are relative to Chicago City Datum.
[3]Refers to elapsed time after initial drawdown before the well recovered sufficiently for sampling.
[4]A zero value indicates that the test result was below the detection limit (DL). The DL for total organic carbon is 0.3 mg/L.