

*Protecting Our Water Environment*



*Metropolitan Water Reclamation District of Greater Chicago*

***MONITORING AND RESEARCH  
DEPARTMENT***

***REPORT NO. 14-33***

***TUNNEL AND RESERVOIR PLAN***

***DES PLAINES TUNNEL SYSTEM***

***ANNUAL GROUNDWATER MONITORING REPORT***

***FOR 2013***

***September 2014***

**Protecting Our Water Environment**

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September 26, 2014

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

Dear Ms. Willhite:

Subject: Tunnel and Reservoir Plan, Des Plaines Tunnel System, Annual  
Groundwater Monitoring Report for 2013

Attached are three copies of "Tunnel and Reservoir Plan, Des Plaines Tunnel System,  
Annual Groundwater Monitoring Report for 2013."

Very truly yours,

Thomas C. Granato, Ph.D.  
Director  
Monitoring and Research

TCG:PL:cm

Attachment

cc w/att: Ms. Sally K. Swanson (USEPA Region 5 - WC15J) - (2)

Dr. Zhang

Dr. Cox

Dr. Hundal

Dr. Lindo

cc w/o att: Mr. St. Pierre

Ms. Sharma

Mr. Cohen

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**TUNNEL AND RESERVOIR PLAN  
DES PLAINES TUNNEL SYSTEM  
ANNUAL GROUNDWATER MONITORING REPORT  
FOR 2013**

**Monitoring and Research Department**  
**Thomas C. Granato, Director**

**September 2014**

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## ANNUAL DATA FOR MONITORING WELLS

### Introduction

All monitoring wells are located along the 13A extension, south leg, middle leg, and north leg of the Des Plaines Tunnel System ([Figure 1](#)). These monitoring wells were sampled either three or six times during 2013. Monitoring wells QD-21 through -26, -28 through -32, -35, -36, and -38 through -60 are sampled three times per year, while QD-27, -33, -34, and -37 are sampled six times per year (Illinois Environmental Protection Agency [IEPA] memoranda July 9, 2004, and February 23, 2006).

All monitoring wells in the Des Plaines Tunnel System were sampled at the required frequencies during 2013. All required samples from Wells QD-40 and -41 were retrieved during 2013 with the use of a higher-capacity generator. During 2013, no samples were obtained from QD-40 and only one from QD-41.

Groundwater elevations in the monitoring wells were measured during each sampling event. However, there are no observation wells in the Des Plaines Tunnel System.

### Summary of Data for Monitoring Wells

The analytical data for groundwater sampled during 2013 from monitoring wells QD-21 through QD-60 are presented in [Table 1](#). Physical characteristics, such as elevation, groundwater temperature, and estimated time of recharge for each well between initial drawdown and sampling, are also included. Fecal coliform counts for all wells were non-detectable. Low counts were detected only once during the year in Wells QD-36 and -49 (80 and 35 MPN/100 mL, respectively). [Table 2](#) lists the descriptive statistics for groundwater data of monitoring wells QD-21 through QD-60 for the year 2013.

FIGURE 1: MAP OF MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM

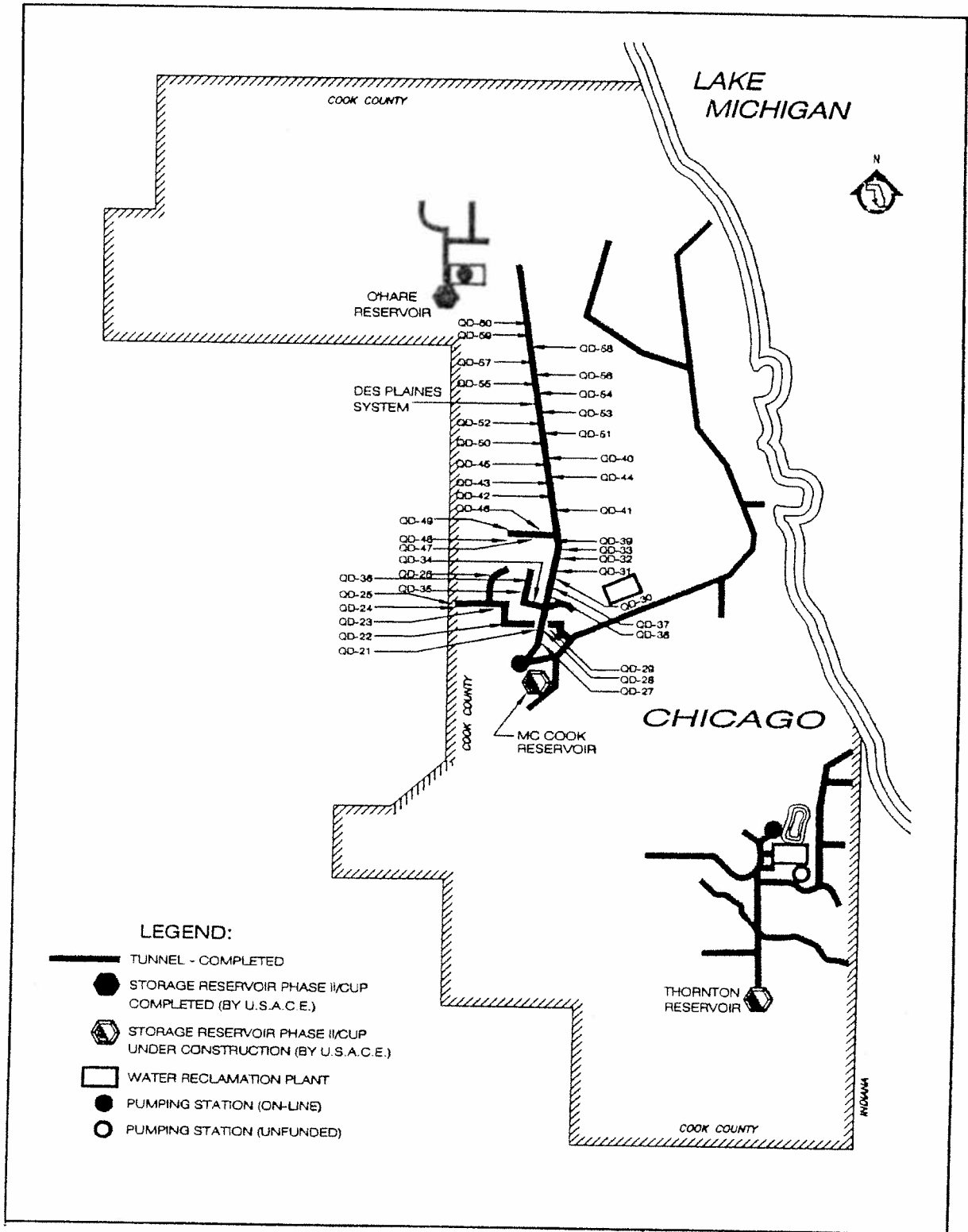




TABLE 1: ANALYSIS OF GROUNDWATER FROM MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN SAMPLED DURING 2013

Well	Sample Date	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform	Temp	Water Elevation <sup>2</sup>	Recharge Time
			mS/m	----- mg/L -----						MPN/100 mL	°C	ft.	hr.
QD-21	03/06/13	6.8	121	1,354	1	270	288	0.24	772	<1	11.2	-57	<4
QD-21	06/25/13	7.0	97	1,706	1	232	308	0.25	807	<1	18.0	-55	<4
QD-21	09/30/13	7.2	135	1,432	1	263	313	0.22	772	<1	13.5	-60	<4
QD-22	03/06/13	7.1	88	1,000	1	125	240	0.40	739	<1	11.8	-31	<4
QD-22	06/25/13	6.9	70	1,480	1	126	273	0.44	809	<1	21.1	-22	<4
QD-22	09/30/13	7.4	118	1,168	1	127	233	0.43	741	<1	13.2	-26	<4
QD-23	03/06/13	6.9	100	1,228	2	171	307	0.50	812	<1	12.1	-29	<4
QD-23	06/25/13	6.8	83	1,688	2	206	315	0.52	850	<1	19.1	-33	<4
QD-23	09/30/13	7.3	150	1,506	2	219	319	0.52	738	<1	13.6	-32	<4
QD-24	04/08/13	7.3	185	758	2	105	146	0.50	520	<1	12.5	15	<4
QD-24	06/26/13	7.1	72	1,124	3	14	198	0.71	665	1	13.7	22	<4
QD-24	09/30/13	7.5	84	904	2	112	160	0.53	497	<1	12.9	19	<4
QD-25	04/08/13	7.1	197	1,434	2	185	192	0.72	578	<1	12.0	30	<4
QD-25	06/26/13	7.1	110	1,504	2	421	176	0.73	565	<1	14.9	30	<4
QD-25	09/30/13	7.2	202	1,680	2	488	223	0.72	614	<1	11.3	28	<4
QD-26	04/18/13	7.0	60	546	<1	10	94	0.39	449	<1	16.1	-8	<4
QD-26	08/21/13	7.2	68	552	<1	11	99	0.35	420	<1	13.8	-108	<4
QD-26	10/24/13	7.5	66	540	1	11	97	0.36	411	<1	11.8	-14	<4

TABLE 1 (Continued): ANALYSIS OF GROUNDWATER FROM MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN SAMPLED DURING 2013

Well	Sample Date	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform	Temp	Water Elevation <sup>2</sup>	Recharge Time
			mS/m	----- mg/L -----						MPN/100 mL	°C	ft.	hr.
QD-27	01/24/13	7.0	70	1,256	15	340	41	27	529	<1	9.1	-222	<48
QD-27	03/28/13	7.6	211	1,198	16	320	39	30	554	<1	7.2	-200	<48
QD-27	06/06/13	7.0	168	1,312	18	363	26	31	516	10	12.6	-208	<48
QD-27	08/29/13	7.6	153	1,134	15	258	6	20	473	1	13.5	-205	<48
QD-27	09/25/13	7.3	155	1,234	15	340	44	28	485	<1	13.2	-219	<48
QD-27	12/12/13	7.1	169	1,050	14	265	7	23	456	<1	9.3	-227	<48
QD-28	04/08/13	7.1	161	1,136	1	253	192	0.59	579	<1	13.3	-119	<4
QD-28	08/07/13	7.2	123	1,164	2	201	271	0.45	726	<1	14.5	-111	<4
QD-28	09/30/13	7.8	126	1,246	1	254	202	0.63	605	<1	13.6	-122	<4
QD-29	04/08/13	6.9	130	1,106	2	134	244	0.45	703	<1	14.9	-156	<4
QD-29	08/07/13	6.9	120	1,178	1	130	197	0.61	591	<1	15.1	-157	<4
QD-29	09/30/13	7.2	109	1,134	2	146	227	0.44	678	<1	13.7	-158	<4
QD-30	03/07/13	6.8	107	1,140	1	126	314	0.31	737	<1	12.0	-113	<4
QD-30	10/10/13	7.1	122	1,190	1	122	313	0.30	725	<1	12.2	-117	<4
QD-30	12/12/13	7.2	26	1,132	1	127	307	0.31	700	<1	11.1	-116	<4
QD-31	03/07/13	7.1	130	956	<1	124	176	0.18	242	<1	11.5	-194	<4
QD-31	10/10/13	7.5	106	824	<1	112	171	0.24	261	<1	12.2	-196	<4
QD-31	12/12/13	7.7	103	826	<1	111	170	0.21	241	<1	9.8	-194	<4
QD-32	08/21/13	8.6	258	2,080	<1	529	233	0.27	33	<1	14.0	-206	<48
QD-32	09/11/13	8.4	259	2,004	<1	534	222	<0.10	25	<1	13.4	-214	<48
QD-32	10/24/13	8.4	239	2,004	<1	539	219	0.23	35	1	11.2	-211	<48

TABLE 1 (Continued): ANALYSIS OF GROUNDWATER FROM MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN SAMPLED DURING 2013

Well	Sample Date	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform	Temp	Water Elevation <sup>2</sup>	Recharge Time
			mS/m	----- mg/L -----						MPN/100 mL	°C	ft.	hr.
QD-33	01/24/13	7.8	49	1,640	<1	351	196	0.26	25	<1	11.0	-182	<48
QD-33	03/28/13	7.9	197	1,546	<1	333	194	0.23	35	<1	12.9	-184	<48
QD-33	06/06/13	8.3	196	1,744	<1	347	199	0.26	26	<1	12.5	-205	<48
QD-33	08/29/13	8.2	204	1,730	<1	345	193	0.26	27	<1	12.9	-192	<48
QD-33	09/25/13	8.3	200	1,600	1	352	192	0.48	18	<1	12.9	-185	<48
QD-33	12/12/13	8.3	196	1,644	<1	358	190	0.25	27	<1	10.7	-182	<48
QD-34	02/14/13	6.7	87	1,096	2	119	293	0.38	793	<1	12.3	-92	<4
QD-34	05/20/13	7.0	115	1,362	2	127	274	0.40	717	3	13.2	-95	<4
QD-34	08/01/13	7.0	114	1,340	2	127	271	0.41	724	<1	13.0	-94	<4
QD-34	09/04/13	7.0	121	1,276	2	130	261	0.43	711	<1	13.5	-102	<4
QD-34	10/23/13	7.2	111	1,074	2	135	262	0.40	679	1	12.3	-98	<4
QD-34	11/13/13	7.2	115	1,112	2	135	259	0.42	689	<1	7.1	-96	<4
QD-35	03/18/13	7.0	82	1,000	2	113	296	0.35	494	<1	9.6	-90	<4
QD-35	06/27/13	7.0	65	1,232	2	111	252	0.39	694	<1	14.3	-86	<4
QD-35	09/04/13	7.2	105	1,086	2	104	228	0.35	604	<1	13.2	-94	<4
QD-36	03/18/13	6.9	93	1,044	2	123	331	0.33	588	<1	11.6	-102	<48
QD-36	05/20/13	7.0	108	1,374	2	129	284	0.33	737	80	12.1	-103	<48
QD-36	06/27/13	7.0	78	1,384	2	127	292	0.39	750	<1	14.0	-91	<48
QD-36	09/04/13	7.0	123	1,390	2	119	303	0.36	770	<1	11.9	-105	<48
QD-37	01/24/13	7.8	60	1,458	<1	253	380	0.34	562	<1	10.9	-212	<48
QD-37	03/28/13	7.9	85	1,412	<1	242	369	0.34	595	<1	12.5	-198	<48

TABLE 1 (Continued): ANALYSIS OF GROUNDWATER FROM MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN SAMPLED DURING 2013

Well	Sample Date	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform	Temp	Water Elevation <sup>2</sup>	Recharge Time
			mS/m	----- mg/L -----						MPN/100 mL	°C	ft.	hr.
QD-37	06/06/13	7.7	135	1,460	<1	248	381	0.35	541	<1	11.9	-206	<48
QD-37	08/29/13	7.4	172	1,454	<1	234	351	0.14	307	<1	13.6	-203	<48
QD-37	09/25/13	7.7	83	1,452	1	245	376	0.34	578	<1	13.1	-212	<48
QD-37	12/11/13	8.1	170	1,460	<1	263	380	0.31	518	<1	12.8	-213	<48
9 QD-38	03/07/13	7.8	89	620	1	21	204	0.37	303	<1	11.9	-201	<48
QD-38	10/10/13	7.9	100	786	2	166	94	0.37	249	<1	12.9	-210	<48
QD-38	11/21/13	8.1	92	714	<1	145	104	0.60	241	<1	12.4	-209	<48
QD-39	02/28/13	7.9	82	806	<1	26	91	<0.10	20	<1	10.5	-140	<48
QD-39	10/10/13	8.4	94	796	<1	27	83	<0.10	17	1	11.7	-147	<48
QD-39	11/21/13	8.4	94	792	1	26	96	0.13	38	<1	11.8	-32	<48
QD-40	08/29/13	9.3	64	502	1	63	167	0.65	24	<1	13.2	-83	<48
QD-40	09/25/13	9.3	91	660	1	34	298	0.32	26	<1	12.9	-83	<48
QD-40	11/21/13	9.1	88	736	1	29	362	0.19	23	<1	12.2	-86	<48
QD-41	07/31/13	7.2	86	788	2	13	347	0.34	447	<1	13.0	-138	<48
QD-41	09/25/13	8.2	164	770	2	15	325	0.32	426	<1	12.3	-142	<48
QD-41	11/21/13	7.7	82	780	2	16	345	0.31	404	<1	12.4	-133	<48
QD-42	02/13/13	7.4	56	800	1	19	282	0.32	411	<1	11.9	-138	<48
QD-42	06/06/13	7.2	38	804	1	19	292	0.30	418	<1	13.0	-126	<48
QD-42	09/11/13	7.8	85	786	1	19	306	0.30	408	<1	14.4	-124	<48

TABLE 1 (Continued): ANALYSIS OF GROUNDWATER FROM MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN SAMPLED DURING 2013

Well	Sample Date	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform	Temp	Water Elevation <sup>2</sup>	Recharge Time
			mS/m	----- mg/L -----						MPN/100 mL	°C	ft.	hr.
QD-43	02/13/13	7.3	61	770	1	45	220	0.33	483	<1	11.0	-157	<4
QD-43	06/06/13	7.2	42	754	1	46	213	0.33	487	<1	14.8	-142	<4
QD-43	09/11/13	7.5	84	750	1	47	219	0.37	480	<1	12.9	-161	<4
QD-44	03/07/13	7.5	60	778	<1	158	92	0.39	228	<1	10.1	-19	<48
QD-44	06/06/13	7.5	37	646	1	17	205	0.36	351	<1	14.7	-6	<48
QD-44	09/11/13	7.8	61	586	1	19	215	0.36	304	<1	12.3	-23	<48
QD-45	03/07/13	7.7	64	586	1	20	213	0.23	317	<1	11.6	-17	<4
QD-45	06/06/13	8.1	44	580	1	16	210	0.36	106	<1	14.5	-4	<4
QD-45	09/11/13	8.6	66	586	1	17	232	0.35	104	<1	12.2	-19	<4
QD-46	02/14/13	7.9	63	600	1	11	115	0.22	76	<1	12.0	-171	<48
QD-46	08/14/13	8.0	72	600	<1		118	0.31	77	4	13.1	-184	<48
QD-46	12/19/13	7.7	70	596	1	12	130	0.24	62	<1	12.8	-174	<48
QD-47	02/28/13	7.5	52	526	<1	14	148	0.27	281	<1	12.8	2	<48
QD-47	08/21/13	7.9	62	508	1	15	154	0.29	245	<1	14.7	6	<48
QD-47	12/11/13	7.5	61	520	1	15	149	0.27	247	<1	13.1	-0.2	<48
QD-48	03/07/13	7.3	40	632	1	14	288	0.35	101	<1	12.7	-176	<48
QD-48	08/21/13	8.5	49	428	<1	<10	219	0.34	200	<1	14.9	-177	<48
QD-48	12/11/13	8.6	52	562	1	<10	248	0.16	261	<1	11.2	-177	<48
QD-49	02/28/13	7.8	60	648	2	19	204	0.60	405	35	11.5	-182	<48

TABLE 1 (Continued): ANALYSIS OF GROUNDWATER FROM MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN SAMPLED DURING 2013

Well	Sample Date	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform	Temp	Water Elevation <sup>2</sup>	Recharge Time
			mS/m	----- mg/L -----						MPN/100 mL	°C	ft.	hr.
QD-49	09/26/13	8.5	63	540	1	12	201	0.11	277	<1	13.6	-183	<48
QD-49	12/11/13	7.1	78	622	1	14	189	0.42	382	<1	12.8	-183	<48
QD-50	03/28/13	8.9	40	720	1	22	274	0.14	12	<1	13.0	-136	<48
QD-50	07/17/13	9.3	77	722	2	11	294	0.16	12	<1	14.0	-138	<48
QD-50	09/26/13	9.7	81	694	1	12	277	0.13	8	<1	13.2	-138	<48
QD-51	03/28/13	9.0	31	522	2	11	115	<0.10	7	<1	12.9	-120	<48
QD-51	07/17/13	8.5	60	588	2	11	121	0.12	5	<1	14.1	-112	<48
QD-51	09/26/13	9.4	66	528	1	12	109	<0.10	8	<1	12.2	-112	<48
QD-52	03/28/13	8.2	49	454	<1	18	136	0.14	20	<1	12.4	-84	<48
QD-52	07/17/13	9.0	59	544	1	14	146	0.14	21	<1	14.9	-100	<48
QD-52	09/26/13	8.9	61	486	1	16	136	0.13	18	<1	13.7	-106	<48
QD-53	03/28/13	8.7	64	628	<1	31	161	0.20	5	<1	12.1	-168	<48
QD-53	07/17/13	8.9	78	656	1	17	168	<0.10	10	<1	14.8	-166	<48
QD-53	09/26/13	9.1	74	586	1	18	170	<0.10	7	<1	14.3	-166	<48
QD-54	03/28/13	8.8	53	458	<1	15	140	0.23	35	<1	12.0	-30	<48
QD-54	07/31/13	8.4	57	442	1	21	140	0.32	44	<1	12.8	-28	<48
QD-54	11/14/13	8.9	51	430	1	20	138	0.25	40	<1	12.1	-28	<48
QD-55	03/28/13	9.0	46	462	<1	15	170	0.37	158	<1	11.4	-133	<48
QD-55	07/31/13	8.5	60	508	1	16	208	0.41	210	<1	12.1	-131	<48

TABLE 1 (Continued): ANALYSIS OF GROUNDWATER FROM MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN SAMPLED DURING 2013

Well <sup>1</sup>	Sample Date	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform	Temp	Water Elevation <sup>2</sup>	Recharge Time
			mS/m			----- mg/L -----				MPN/100 mL	°C	ft.	hr.
QD-55	11/14/13	8.8	54	462	<1	16	162	0.34	126	<1	12.0	-143	<48
QD-56	03/28/13	8.6	40	326	<1	10	15	0.24	45	<1	10.9	-64	<48
QD-56	07/31/13	8.4	39	316	<1	<10	13	0.23	49	<1	12.0	-66	<48
QD-56	11/14/13	8.8	34	300	<1	10	10	0.23	43	<1	11.9	-68	<48
QD-57	05/30/13	8.4	43	382	1	14	51	0.29	21	7	13.5	-95	<48
QD-57	07/31/13	8.6	45	378	<1	12	50	0.26	19	<1	11.3	-110	<48
QD-57	08/29/13	8.2	46	424	1	12	49	0.25	19	<1	14.2	-101	<48
QD-58	05/30/13	7.8	33	260	<1	11	<5	0.33	132	<1	13.7	-103	<48
QD-58	08/29/13	7.3	44	286	3	11	<5	0.32	122	<1	13.0	-99	<48
QD-58	12/19/13	8.1	33	268	<1	11	<5	0.32	123	<1	10.9	-107	<48
QD-59	05/30/13	8.8	43	386	<1	118	13	0.30	162	<1	12.0	-43	<48
QD-59	08/29/13	7.3	83	574	1	103	33	0.35	274	<1	12.1	-37	<48
QD-59	12/19/13	7.8	59	454	<1	104	41	0.37	270	<1	11.5	-46	<48
QD-60	05/30/13	7.7	45	450	<1	40	98	0.42	272	<1	12.9	-103	<48
QD-60	08/29/13	7.2	69	462	<1	42	92	0.39	269	<1	12.0	-112	<48
QD-60	12/19/13	8.0	49	428	<1	44	111	0.40	262	<1	11.9	-107	<48

<sup>1</sup>EC = electrical conductivity; TDS = total dissolved solids; TOC = total dissolved organic carbon.

<sup>2</sup>Relative to Chicago city datum (579.48 ft above mean sea level) at intersection of Madison and State Streets.

TABLE 2: DESCRIPTIVE STATISTICS FOR GROUNDWATER DATA OF MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2013

Well	Statistic	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform <sup>2</sup>
			mS/m	----- mg/L -----						MPN/100 mL
QD-21	Minimum	6.8	97	1,354	1	232	288	0.22	772	<1
	Mean	7.0	118	1,497	1	255	303	0.24	784	<1
	Maximum	7.2	135	1,706	1	270	313	0.25	807	<1
	Std. Dev.	0.2	19	185	0	20	13	0.02	20	NA <sup>3</sup>
	Median	7.0	121	1,432	1	263	308	0.24	772	<1
	Coeff. of Var. (%)	2.9	16	12	0	8	4	6.5	3	NA
QD-22	Minimum	6.9	70	1,000	1	125	233	0.40	739	<1
	Mean	7.1	92	1,216	1	126	248	0.42	763	<1
	Maximum	7.4	118	1,480	1	127	273	0.44	809	<1
	Std. Dev.	0.3	24	244	0.1	1	21	0.02	40	NA
	Median	7.1	88	1,168	1	126	240	0.43	741	<1
	Coeff. of Var. (%)	4.0	26	20	8	1	9	4.9	5	NA
QD-23	Minimum	6.8	83	1,228	2	171	307	0.50	738	<1
	Mean	7.0	111	1,474	2	199	313	0.51	800	<1
	Maximum	7.3	150	1,688	2	219	319	0.52	850	<1
	Std. Dev.	0.3	35	232	0.1	25	6	0.01	57	NA
	Median	6.9	100	1,506	2	206	315	0.52	812	<1
	Coeff. of Var. (%)	3.9	32	16	7	12	2	2.2	7	NA
QD-24	Minimum	7.1	72	758	2	14	146	0.50	497	<1
	Mean	7.3	114	929	2	77	168	0.58	561	<1



TABLE 2 (Continued): DESCRIPTIVE STATISTICS FOR GROUNDWATER DATA OF MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2013

Well	Statistic	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform <sup>2</sup>
			mS/m	----- mg/L -----						MPN/100 mL
QD-25	Maximum	7.5	185	1,124	3	112	198	0.71	665	<1
	Std. Dev.	0.2	62	184	0.4	55	27	0.11	91	NA
	Median	7.3	84	904	2	105	160	0.53	520	<1
	Coeff. of Var. (%)	2.8	54	20	17	71	16	20	16	NA
	Minimum	7.1	110	1,434	2	185	176	0.72	565	<1
	Mean	7.1	170	1,539	2	365	197	0.72	586	<1
	Maximum	7.2	202	1,680	2	488	223	0.73	614	<1
QD-26	Std. Dev.	0.1	52	127	0.3	159	24	0.01	25	NA
	Median	7.1	197	1,504	2	421	192	0.72	578	<1
	Coeff. of Var. (%)	0.8	31	8	16	44	12	0.80	4	NA
	Minimum	7.0	60	540	<1	10	94	0.35	411	<1
	Mean	7.2	64	546	1	11	96	0.37	427	<1
	Maximum	7.5	68	552	1	11	99	0.39	449	<1
	Std. Dev.	0.2	4	6	0.1	1	3	0.02	20	NA
QD-27	Median	7.2	66	546	1	11	97	0.36	420	<1
	Coeff. of Var. (%)	3.2	7	1	10	5	3	5.7	5	NA
	Minimum	7.0	70	1,050	14	258	6	20	456	<1
	Mean	7.3	154	1,197	15	314	27	27	502	1
	Maximum	7.6	211	1,312	18	363	44	31	554	10

TABLE 2 (Continued): DESCRIPTIVE STATISTICS FOR GROUNDWATER DATA OF MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2013

Well	Statistic	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform <sup>2</sup>
			mS/m	----- mg/L -----						MPN/100 mL
	Std. Dev.	0.3	46	93	1	43	17	4.5	37	NA
	Median	7.2	161	1,216	15	330	33	28	501	1
	Coeff. of Var. (%)	3.7	30	8	9	14	63	17	7	NA
QD-28	Minimum	7.1	123	1,136	1	201	192	0.45	579	<1
	Mean	7.3	137	1,182	2	236	221	0.56	637	<1
	Maximum	7.8	161	1,246	2	254	271	0.63	726	<1
	Std. Dev.	0.4	21	57	1	30	43	0.09	78	NA
	Median	7.2	126	1,164	1	253	202	0.59	605	<1
	Coeff. of Var. (%)	4.9	15	5	33	13	19	17	12	NA
QD-29	Minimum	6.9	109	1,106	1	130	197	0.44	591	<1
	Mean	7.0	120	1,139	2	137	223	0.50	657	<1
	Maximum	7.2	130	1,178	2	146	244	0.61	703	<1
	Std. Dev.	0.2	11	36	1	8	24	0.10	59	NA
	Median	6.9	120	1,134	2	134	227	0.45	678	<1
	Coeff. of Var. (%)	2.2	9	3	32	6	11	19	9	NA
QD-30	Minimum	6.8	26	1,132	1	122	307	0.30	700	<1
	Mean	7.1	85	1,154	1	125	311	0.31	721	<1
	Maximum	7.2	122	1,190	1	127	314	0.31	737	<1
	Std. Dev.	0.2	52	31	0	3	4	0.01	19	NA
	Median	7.1	107	1,140	1	126	313	0.31	725	<1
	Coeff. of Var. (%)	2.9	61	3	0	2	1	1.9	3	NA

TABLE 2 (Continued): DESCRIPTIVE STATISTICS FOR GROUNDWATER DATA OF MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2013

Well	Statistic	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform <sup>2</sup>
			mS/m	----- mg/L -----						MPN/100 mL
QD-31	Minimum	7.1	103	824	<1	111	170	0.18	241	<1
	Mean	7.4	113	869	<1	116	172	0.21	248	<1
	Maximum	7.7	130	956	<1	124	176	0.24	261	<1
	Std. Dev.	0.3	15	76	0	7	3	0.03	11	NA
	Median	7.5	106	826	<1	112	171	0.21	242	<1
	Coeff. of Var. (%)	3.7	13	9	0	6	2	14	5	NA
QD-32	Minimum	8.4	239	2,004	<1	529	219	0.23	25	<1
	Mean	8.5	252	2,029	<1	534	225	0.25	31	<1
	Maximum	8.6	259	2,080	<1	539	233	0.27	35	<1
	Std. Dev.	0.1	11	44	0	5	7	0.03	5	NA
	Median	8.4	258	2,004	<1	534	222	0.25	33	<1
	Coeff. of Var. (%)	1.3	4	2	0	1	3	11	17	NA
QD-33	Minimum	7.8	49	1,546	<1	333	190	0.23	18	<1
	Mean	8.1	173	1,651	1	348	194	0.29	26	<1
	Maximum	8.3	204	1,744	1	358	199	0.48	35	<1
	Std. Dev.	0.2	61	76	0	8	3	0.09	5	NA
	Median	8.2	196	1,642	<1	349	194	0.26	27	<1
	Coeff. of Var. (%)	2.9	35	5	0	2	2	32	21	NA
QD-34	Minimum	6.7	87	1,074	2	119	259	0.38	679	<1
	Mean	7.0	110	1,210	2	129	270	0.41	719	1
	Maximum	7.2	121	1,362	2	135	293	0.43	793	3

TABLE 2 (Continued): DESCRIPTIVE STATISTICS FOR GROUNDWATER DATA OF MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2013

Well	Statistic	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform <sup>2</sup>	
			mS/m	----- mg/L -----							MPN/100 mL
	Std. Dev.	0.2	12	131	0.2	6	13	0.02	40	NA	
	Median	7.0	114	1,194	2	129	266	0.41	714	<1	
	Coeff. of Var. (%)	2.6	11	11	9	5	5	4.3	6	NA	
QD-35	Minimum	7.0	65	1,000	2	104	228	0.35	494	<1	
	Mean	7.0	84	1,106	2	109	259	0.36	597	<1	
	Maximum	7.2	105	1,232	2	113	296	0.39	694	<1	
	Std. Dev.	0.1	20	117	0.3	5	34	0.02	100	NA	
	Median	7.0	82	1,086	2	111	252	0.35	604	<1	
	Coeff. of Var. (%)	2.1	24	11	12	4	13	6.4	17	NA	
QD-36	Minimum	6.9	78	1,044	2	119	284	0.33	588	<1	
	Mean	7.0	100	1,298	2	125	303	0.35	711	3	
	Maximum	7.0	123	1,390	2	129	331	0.39	770	80	
	Std. Dev.	0.1	19	169	0.1	4	21	0.03	83	NA	
	Median	7.0	100	1,379	2	125	298	0.35	744	1	
	Coeff. of Var. (%)	1.0	19	13	3	4	7	8.1	12	NA	
QD-37	Minimum	7.4	60	1,412	<1	234	351	0.14	307	<1	
	Mean	7.8	118	1,449	<1	248	373	0.30	517	<1	
	Maximum	8.1	172	1,460	1	263	381	0.35	595	<1	
	Std. Dev.	0.2	48	19	0.1	10	12	0.08	106	NA	
	Median	7.8	110	1,456	1	247	378	0.34	552	<1	
	Coeff. of Var. (%)	2.8	41	1	0.1	4	3	27	21	NA	

TABLE 2 (Continued): DESCRIPTIVE STATISTICS FOR GROUNDWATER DATA OF MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2013

Well	Statistic	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform <sup>2</sup>
			mS/m	----- mg/L -----						MPN/100 mL
QD-38	Minimum	7.8	89	620	1	21	94	0.37	241	<1
	Mean	7.9	94	707	1	111	134	0.45	264	<1
	Maximum	8.1	100	786	2	166	204	0.60	303	<1
	Std. Dev.	0.2	6	83	0.4	78	61	0.13	34	NA
	Median	7.9	92	714	1	145	104	0.37	249	<1
	Coeff. of Var. (%)	2.1	6	12	33	71	46	30	13	NA
QD-39	Minimum	7.9	82	792	1	26	83	<0.10	17	<1
	Mean	8.2	90	798	1	26	90	0.11	25	<1
	Maximum	8.4	94	806	1	27	96	0.13	38	<1
	Std. Dev.	0.3	7	7	0.1	1	6	0.02	11	NA
	Median	8.4	94	796	1	26	91	0.13	20	<1
	Coeff. of Var. (%)	3.2	8	1	8	2	7	18	45	NA
QD-40	Minimum	9.1	64	502	1	29	167	0.19	23	1
	Mean	9.3	81	633	1	42	276	0.39	24	<1
	Maximum	9.3	91	736	1	63	362	0.65	26	<1
	Std. Dev.	0.1	15	119	0.2	18	99	0.24	2	NA
	Median	9.3	88	660	1	34	298	0.32	24	<1
	Coeff. of Var. (%)	1.2	19	19	13	44	36	61	6	NA
QD-41	Minimum	7.2	82	770	2	13	325	0.31	404	<1
	Mean	7.7	110	779	2	15	339	0.32	426	<1
	Maximum	8.2	164	788	2	16	347	0.34	447	<1
	Std. Dev.	0.5	46	9	0.1	2	12	0.02	22	NA

TABLE 2 (Continued): DESCRIPTIVE STATISTICS FOR GROUNDWATER DATA OF MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2013

Well	Statistic	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform <sup>2</sup>	
			mS/m	----- mg/L -----							MPN/100 mL
	Median	7.7	86	780	2	15	345	0.32	426	<1	
	Coeff. of Var. (%)	6.1	42	1	4	10	4	4.7	5	NA	
QD-42	Minimum	7.2	38	786	1	19	282	0.30	408	<1	
	Mean	7.5	60	797	1	19	293	0.31	412	<1	
	Maximum	7.8	85	804	1	19	306	0.32	418	<1	
	Std. Dev.	0.3	24	9	0.1	0	12	0.01	5	NA	
	Median	7.4	56	800	1	19	292	0.30	411	<1	
	Coeff. of Var. (%)	4.3	40	1	5	0	4	3.8	1	NA	
QD-43	Minimum	7.2	42	750	1	45	213	0.33	480	<1	
	Mean	7.3	62	758	1	46	218	0.34	483	<1	
	Maximum	7.5	84	770	1	47	220	0.37	487	<1	
	Std. Dev.	0.2	21	11	0.1	1	4	0.02	4	NA	
	Median	7.3	61	754	1	46	219	0.33	483	<1	
	Coeff. of Var. (%)	2.3	34	1	11	2	2	6.7	1	NA	
QD-44	Minimum	7.5	37	586	1	17	92	0.36	228	<1	
	Mean	7.6	53	670	1	65	171	0.37	294	<1	
	Maximum	7.8	61	778	1	158	215	0.39	351	<1	
	Std. Dev.	0.2	14	98	0.1	81	69	0.02	62	NA	
	Median	7.5	60	646	1	19	205	0.36	304	<1	
	Coeff. of Var. (%)	2.6	26	15	13	125	40	4.7	21	NA	

TABLE 2 (Continued): DESCRIPTIVE STATISTICS FOR GROUNDWATER DATA OF MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2013

Well	Statistic	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform <sup>2</sup>
			mS/m	----- mg/L -----						MPN/100 mL
QD-45	Minimum	7.7	44	580	1	16	210	0.23	104	<1
	Mean	8.1	58	584	1	18	218	0.31	176	<1
	Maximum	8.6	66	586	1	20	232	0.36	317	<1
	Std. Dev.	0.5	12	3	0.1	2	12	0.07	122	NA
	Median	8.1	64	586	1	17	213	0.35	106	<1
	Coeff. of Var. (%)	6.0	21	1	5	12	6	23	70	NA
QD-46	Minimum	7.7	63	596	1	11	115	0.22	62	<1
	Mean	7.8	68	599	1	12	121	0.26	72	2
	Maximum	8.0	72	600	1	12	130	0.31	77	4
	Std. Dev.	0.2	5	2	0.1	1	8	0.05	8	NA
	Median	7.9	70	600	1	12	118	0.24	76	<1
	Coeff. of Var. (%)	1.9	7	0.4	10	6	7	18	12	NA
QD-47	Minimum	7.5	52	508	1	14	148	0.27	245	<1
	Mean	7.6	58	518	1	15	150	0.28	258	<1
	Maximum	7.9	62	526	1	15	154	0.29	281	<1
	Std. Dev.	0.2	5	9	0.1	1	3	0.01	20	NA
	Median	7.5	61	520	1	15	149	0.27	247	<1
	Coeff. of Var. (%)	3.2	9	2	13	4	2	4.2	8	NA
QD-48	Minimum	7.3	40	428	1	<10	219	0.16	101	<1
	Mean	8.2	47	541	1	<10	252	0.28	187	<1
	Maximum	8.6	52	632	1	14	288	0.35	261	<1

TABLE 2 (Continued): DESCRIPTIVE STATISTICS FOR GROUNDWATER DATA OF MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2013

Well	Statistic	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform <sup>2</sup>
			mS/m	----- mg/L -----						MPN/100 mL
	Std. Dev.	0.7	6	104	0.1	2	35	0.11	81	NA
	Median	8.5	49	562	1	14	248	0.34	200	<1
	Coeff. of Var. (%)	8.9	13	19	7	23	14	38	43	NA
QD-49	Minimum	7.1	60	540	1	12	189	0.11	277	<1
	Mean	7.8	67	603	1	15	198	0.38	355	3
	Maximum	8.5	78	648	2	19	204	0.60	405	35
	Std. Dev.	0.7	10	56	0.2	4	8	0.25	68	NA
	Median	7.8	63	622	1	14	201	0.42	382	1
	Coeff. of Var. (%)	9.3	15	9	14	24	4	66	19	NA
QD-50	Minimum	8.9	40	694	1	11	274	0.13	8	<1
	Mean	9.3	66	712	1	15	282	0.14	11	<1
	Maximum	9.7	81	722	2	22	294	0.16	12	<1
	Std. Dev.	0.4	23	16	0.2	6	11	0.02	2	NA
	Median	9.3	77	720	1	12	277	0.14	12	<1
	Coeff. of Var. (%)	4.4	34	2	15	41	4	11	22	NA
QD-51	Minimum	8.5	31	522	1	11	109	<0.10	5	<1
	Mean	9.0	52	546	1	11	115	0.11	7	<1
	Maximum	9.4	66	588	2	12	121	0.12	8	<1
	Std. Dev.	0.5	19	36	0.3	1	6	0.01	2	NA
	Median	9.0	60	528	2	11	115	0.12	7	<1
	Coeff. of Var. (%)	5.4	36	7	17	5	5	9	23	NA



TABLE 2 (Continued): DESCRIPTIVE STATISTICS FOR GROUNDWATER DATA OF MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2013

Well	Statistic	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform <sup>2</sup>
			mS/m	----- mg/L -----						MPN/100 mL
QD-52	Minimum	8.2	49	454	1	14	136	0.13	18	<1
	Mean	8.7	57	495	1	16	139	0.14	20	<1
	Maximum	9.0	61	544	1	18	146	0.14	21	<1
	Std. Dev.	0.4	6	46	0.1	2	6	0.01	2	NA
	Median	8.9	59	486	1	16	136	0.14	20	<1
	Coeff. of Var. (%)	4.9	11	9	7	13	4	4	8	NA
QD-53	Minimum	8.7	64	586	1	17	161	0.20	5	<1
	Mean	8.9	72	623	1	22	166	0.20	7	<1
	Maximum	9.1	78	656	1	31	170	0.20	10	<1
	Std. Dev.	0.3	3	14	0.1	3	1	0.05	5	NA
	Median	8.9	74	628	1	18	168	0.20	7	<1
	Coeff. of Var. (%)	3.1	4	2	6	15	1	24	61	NA
QD-54	Minimum	8.4	51	430	1	15	138	0.23	35	<1
	Mean	8.7	53	443	1	19	140	0.27	40	<1
	Maximum	8.9	57	458	1	21	140	0.32	44	<1
	Std. Dev.	0.3	7	27	0.1	1	25	0.04	42	NA
	Median	8.8	53	442	1	20	140	0.25	40	<1
	Coeff. of Var. (%)	3.3	13	6	10	3	18	13	107	NA
QD-55	Minimum	8.5	46	462	1	15	162	0.34	126	<1
	Mean	8.8	53	477	1	16	180	0.37	165	<1
	Maximum	9.0	60	508	1	16	208	0.41	210	<1
	Std. Dev.	0.2	3	13	0.1	0	2	0.01	3	NA

TABLE 2 (Continued): DESCRIPTIVE STATISTICS FOR GROUNDWATER DATA OF MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2013

Well	Statistic	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform <sup>2</sup>	
			mS/m	----- mg/L -----							MPN/100 mL
	Median	8.8	54	462	1	16	170	0.37	158	<1	
	Coeff. of Var. (%)	2.6	5	3	9	0	1	1.5	2	NA	
QD-56	Minimum	8.4	34	300	<1	10	10	0.23	43	<1	
	Mean	8.6	37	314	<1	10	13	0.23	46	<1	
	Maximum	8.8	40	326	<1	10	15	0.24	49	<1	
	Std. Dev.	0.2	1	25	0	1	1	0.02	1	NA	
	Median	8.6	39	316	<1	10	13	0.23	45	<1	
	Coeff. of Var. (%)	2.6	3	8	0	12	7	8.9	3	NA	
QD-57	Minimum	8.2	43	378	1	12	49	0.25	19	<1	
	Mean	8.4	45	395	1	13	50	0.27	20	2	
	Maximum	8.6	46	424	1	14	51	0.29	21	7	
	Std. Dev.	0.2	6	13	0.1	0	0.9	0.01	6	NA	
	Median	8.4	45	382	1	12	50	0.26	19	1	
	Coeff. of Var. (%)	2.5	14	3	10	0	2	2.2	28	NA	
QD-58	Minimum	7.3	33	260	3	11	<5	0.32	122	<1	
	Mean	7.7	36	271	3	11	<5	0.32	126	<1	
	Maximum	8.1	44	286	3	11	<5	0.33	132	<1	
	Std. Dev.	0.4	6	13	0.1	0	0	0.01	6	NA	
	Median	7.8	33	268	3	11	<5	0.32	123	<1	
	Coeff. of Var. (%)	5.3	17	5	4	0	0	1.8	4	NA	

TABLE 2 (Continued): DESCRIPTIVE STATISTICS FOR GROUNDWATER DATA OF MONITORING WELLS QD-21 THROUGH QD-60 IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2013

Well	Statistic	pH	EC <sup>1</sup>	TDS <sup>1</sup>	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Fecal Coliform <sup>2</sup>
			mS/m	----- mg/L -----					MPN/100 mL	
QD-59	Minimum	7.3	43	386	1	103	13	0.30	162	<1
	Mean	8.0	62	471	1	108	29	0.34	235	<1
	Maximum	8.8	83	574	1	118	41	0.37	274	<1
	Std. Dev.	0.8	20	95	0.1	8	15	0.04	64	NA
	Median	7.8	59	454	1	104	33	0.35	270	<1
	Coeff. of Var. (%)	9.5	32	20	9	8	50	11	27	NA
QD-60	Minimum	7.2	45	428	<1	40	92	0.39	262	<1
	Mean	7.6	54	447	<1	42	100	0.40	268	<1
	Maximum	8.0	69	462	<1	44	111	0.42	272	<1
	Std. Dev.	0.4	13	17	0	2	9	0.02	5	NA
	Median	7.7	49	450	<1	42	98	0.40	269	<1
	Coeff. of Var. (%)	5.3	23	4	0	5	9	3.8	2	NA

<sup>1</sup>EC = electrical conductivity; TDS = total dissolved solids; TOC = total dissolved organic carbon.

<sup>2</sup>Geometric mean calculated.

<sup>3</sup>Not applicable.