

Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago

***MONITORING AND RESEARCH
DEPARTMENT***

REPORT NO. 15-20

TUNNEL AND RESERVOIR PLAN

MAINSTREAM TUNNEL SYSTEM

ANNUAL GROUNDWATER MONITORING REPORT

FOR 2014

July 2015

Metropolitan Water Reclamation District of Greater Chicago
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**TUNNEL AND RESERVOIR PLAN MAINSTREAM TUNNEL SYSTEM
ANNUAL GROUNDWATER MONITORING
REPORT FOR 2014**

Monitoring and Research Department
Thomas C. Granato, Director

July 2015

Protecting Our Water Environment

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July 9, 2015

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, Mainstream Tunnel System, Annual
Groundwater Monitoring Report for 2014

Attached are three copies of the "Tunnel and Reservoir Plan, Mainstream Tunnel System,
Annual Groundwater Monitoring Report for 2014."

Very truly yours,



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

TCG:PL:cm

Attachment

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

Dr. Zhang

Dr. Cox

Dr. Hundal

Dr. Lindo

cc: Mr. St. Pierre

Ms. Sharma

Mr. Cohen

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ANNUAL DATA FOR MONITORING AND OBSERVATION WELLS

Introduction

The monitoring and observation wells are located along the length of the Mainstream Tunnel System between Morton Grove and Hodgkins, Illinois (Figures 1 and 2). The elevations for observation wells are measured at least six times per year, while the monitoring wells are sampled at various frequencies. Monitoring wells QM-53, -56, -58, -61, -66, -68 through -74, -76, -77, and -81 are sampled three times per year (Illinois Environmental Protection Agency [IEPA] memoranda dated July 9, 2004, and February 23, 2006). Monitoring wells QM-62 through -65, -67, -75, -78 through -80, and -82 are all sampled six times per year (IEPA memorandum dated July 9, 2004). Sampling of monitoring wells QM-51, -52, -54, -55, -57, and -60 was discontinued with the approval of the IEPA (memorandum dated May 4, 1994). Monitoring well QM-65 could not be sampled throughout the year due to a faulty pump. This well is scheduled for service. Similar to 2013, samples were retrieved from Well QM-66 in 2014. Monitoring well QM-59 has been dry since February 1995 and is no longer monitored. Monitoring of observation well OM-17 was discontinued with the approval of the IEPA (Appendix A).

Most monitoring wells in the Mainstream Tunnel System were sampled at the required frequencies. However, in a few instances, samples from specific wells could not be collected for various reasons. Monitoring wells QM-56 and -58 could not be sampled during 2014 because construction in the area rendered them inaccessible. The required six samples were retrieved during this year and last year from Wells QM-62 and -82, unlike previous years. Both wells were considered intermittently dry in the past.

Summary of Data

Monitoring Wells. The analytical data for groundwater sampled during 2014 from monitoring wells QM-53 through QM-82 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 (FC) counts in Wells QM-61, -62, -63, -64, and -67 were much higher than expected at various times during the year. Two wells (QM-62 and -63) were decontaminated using the standard procedure, and significant reductions in FC counts were observed in both wells. We are now in the process of decontaminating additional wells.

In October 2014, Wells QM-62 and -63 were selected for special evaluation by U.S. Geological Survey personnel. Following this evaluation, both wells were serviced and decontaminated. The pumps in both wells and PVC pipe in QM-63 were replaced. Table 2 lists the descriptive statistics for groundwater data of monitoring wells QM-53 through QM-82 for 2014.

Observation Wells. Measurement of groundwater elevations for observation wells OM-1 through -23 was attempted at the required frequencies. All measurements could not be performed as planned due to a number of factors limiting access to wells (Table 3, Footnote 3). Adjusted elevations

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

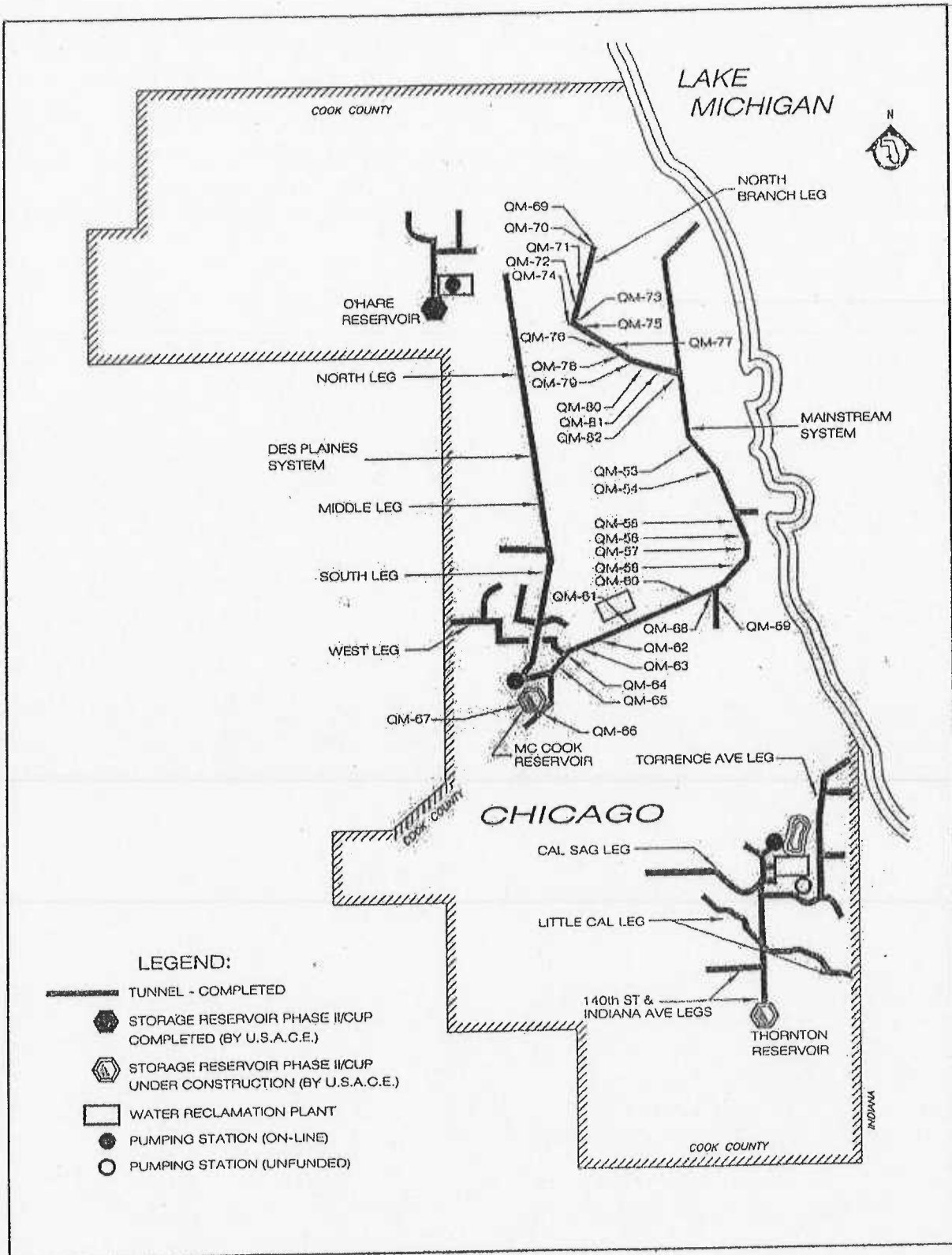


FIGURE 2: MAP OF OBSERVATION WELLS IN THE MAINSTREAM TUNNEL SYSTEM

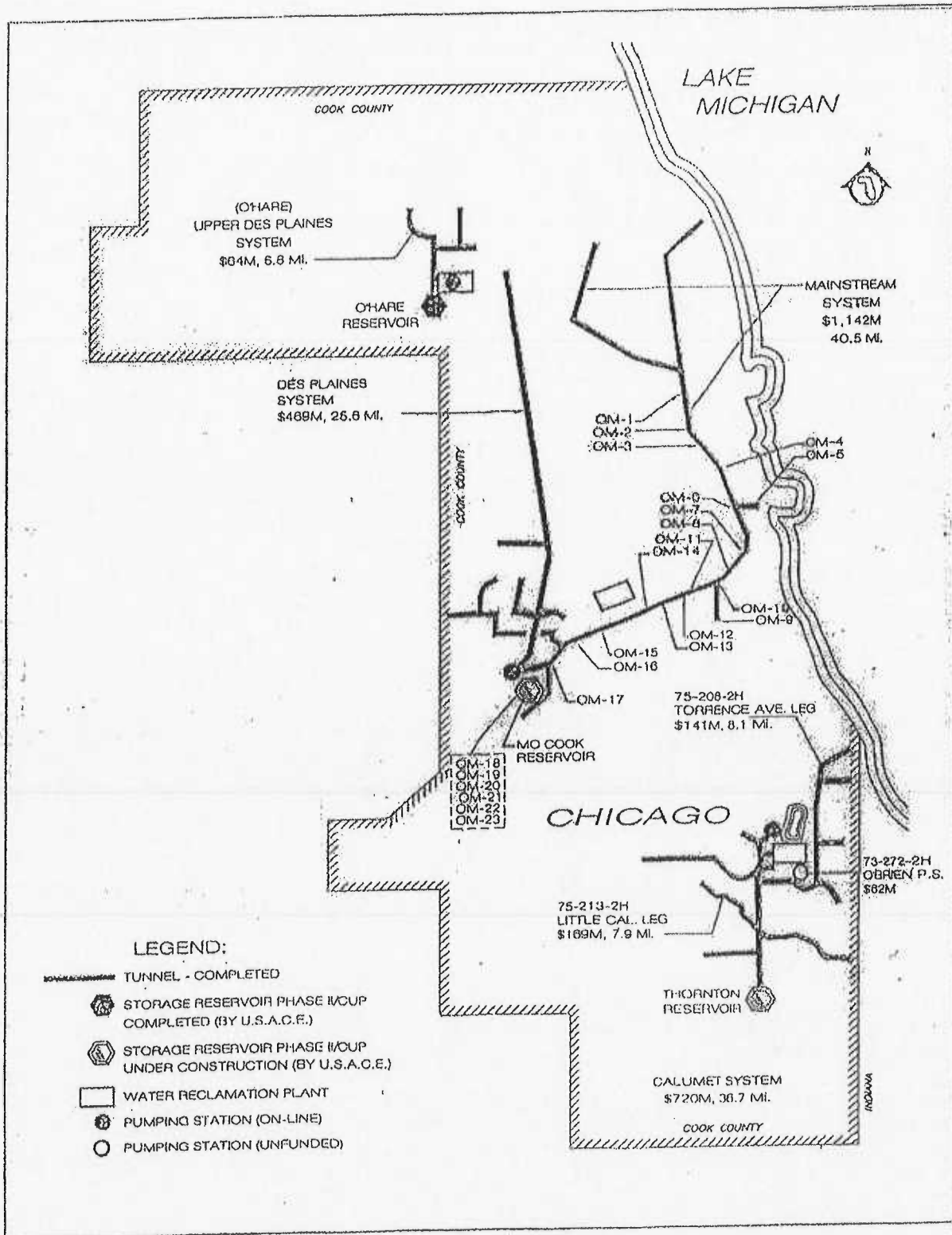


TABLE 1: ANALYSIS OF GROUNDWATER FROM MONITORING WELLS QM-53 THROUGH QM-82 IN THE MAINSTREAM TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN SAMPLED DURING 2014

| Well ¹ | Date Sampled | pH | EC ² | TDS ² | TOC ² | Cl ⁻ | SO ₄ ²⁻ | NH ₃ -N | Hardness | Fecal Coliform | Temp | Water Elevation ³ | Recharge Time |
|-------------------|--------------|------------------|-----------------|------------------|------------------|-----------------|-------------------------------|--------------------|----------|----------------|------|------------------------------|---------------|
| | | | mS/m | | | | mg/L | | | CFU/100 mL | °C | ft | hr |
| QM-53 | 03/13/14 | 8.1 | 23 | 202 | <1 | 15 | 36 | <0.10 | 146 | <1 | 10.9 | -47 | <48 |
| QM-53 | 06/25/14 | 8.4 | 23 | 240 | <1 | 15 | 36 | <0.10 | 141 | <1 | 12.6 | -23 | <48 |
| QM-53 | 12/18/14 | 7.9 | 24 | 190 | <1 | 15 | 33 | <0.10 | 146 | <1 | 10.9 | -37 | <48 |
| QM-61 | 04/02/14 | 6.9 | 106 | 340 | 1 | 64 | 25 | 0.36 | 120 | 12 | 13.3 | -169 | <4 |
| QM-61 | 06/19/14 | 7.9 | 48 | 394 | 1 | 65 | 29 | 0.42 | 142 | 3,400 | 16.8 | -152 | <4 |
| QM-61 | 09/15/14 | 8.8 | 46 | 392 | 1 | 76 | 33 | 0.55 | 174 | 18,000 | 14.2 | -150 | <4 |
| QM-62 | 01/15/14 | 7.0 | 141 | 712 | 2 | 214 | 63 | 1.0 | 255 | 16,200 | 13.0 | -149 | <48 |
| QM-62 | 03/13/14 | 7.1 | 91 | 442 | 2 | 97 | 35 | 0.68 | 179 | 1,100 | 10.7 | -195 | <48 |
| QM-62 | 04/09/14 | 7.4 | 48 | 376 | 1 | 51 | 45 | 0.55 | 166 | 24 | 14.4 | -179 | <48 |
| QM-62 | 09/17/14 | 7.9 | 44 | 364 | 1 | 65 | 15 | 0.77 | 160 | 8,500 | 16.1 | -171 | <48 |
| QM-62 | 10/20/14 | NAR ⁴ | NAR | NAR | NAR | 56 | NAR | NAR | NAR | 3,400 | NAR | -159 | <48 |
| QM-62 | 10/29/14 | 7.8 | 62 | 320 | 1 | 60 | 20 | 0.53 | 800 | 990 | 13.2 | -166 | <48 |
| QM-62 | 12/04/14 | 8.2 | 47 | 338 | 1 | 58 | 16 | 0.53 | 150 | 14 | 14.5 | -191 | <48 |
| QM-63 | 01/15/14 | 7.7 | 163 | 1,552 | 5 | 307 | 623 | 2.3 | 662 | 14,800 | 12.8 | -141 | <48 |
| QM-63 | 03/13/14 | 7.3 | 145 | 1,810 | 3 | 62 | 1,045 | 2.1 | 911 | 140 | 12.8 | -190 | <48 |
| QM-63 | 03/27/14 | 6.9 | 153 | 1,840 | 3 | 53 | 1,110 | 2.2 | 884 | 7 | 13.1 | -192 | <48 |
| QM-63 | 04/09/14 | 7.6 | 59 | 1,828 | 3 | 51 | 1,042 | 2.3 | 903 | <1 | 13.3 | -172 | <48 |
| QM-63 | 09/17/14 | 7.7 | 155 | 1,670 | 2 | 49 | 874 | 2.0 | 917 | 69 | 15.4 | -165 | <48 |

TABLE 1 (Continued): ANALYSIS OF GROUNDWATER FROM MONITORING WELLS QM-53 THROUGH QM-82 IN THE MAINSTREAM TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN SAMPLED DURING 2014

| Well ¹ | Date Sampled | pH | EC ² | TDS ² | TOC ² | Cl ⁻ | SO ₄ ²⁻ | NH ₃ -N | Hardness | Fecal Coliform | Temp | Water Elevation ³ | Recharge Time |
|-------------------|--------------|------|-----------------|------------------|------------------|-----------------|-------------------------------|--------------------|----------|----------------|------|------------------------------|---------------|
| | | | mS/m | | | | mg/L | | | CFU/100 mL | °C | ft | hr |
| QM-63 | 10/20/14 | NAR | NAR | NAR | NAR | 29 | NAR | NAR | NAR | 41,000 | NAR | -157 | <48 |
| QM-63 | 10/29/14 | 7.8 | 147 | 1,500 | 2 | 55 | 925 | 1.9 | 152 | 200 | 13.4 | -168 | <48 |
| QM-64 | 02/27/14 | 7.4 | 53 | 442 | 1 | 72 | 43 | 1.7 | 207 | 50 | 12.6 | -172 | <4 |
| QM-64 | 04/16/14 | 7.3 | 55 | 430 | 2 | 59 | 44 | 1.7 | 220 | 1 | 13.6 | -163 | <4 |
| QM-64 | 06/19/14 | 7.6 | 61 | 466 | 2 | 56 | 44 | 1.6 | 201 | 86 | 15.9 | -151 | <4 |
| QM-64 | 09/15/14 | 8.3 | 52 | 418 | 1 | 61 | 32 | 1.8 | 212 | 220 | 15.1 | -164 | <4 |
| QM-64 | 10/15/14 | 7.7 | 62 | 436 | 2 | 55 | 46 | 1.8 | 227 | 3,700 | 13.9 | -127 | <4 |
| QM-64 | 12/03/14 | 7.6 | 56 | 424 | 1 | 53 | 39 | 1.7 | 203 | 34 | 14.3 | -172 | <4 |
| QM-66 | 08/14/14 | 10.4 | 183 | 1,474 | 1 | 172 | 251 | 1.2 | 10 | <1 | 15.1 | -310 | <48 |
| QM-66 | 11/20/14 | 10.0 | 185 | 1,306 | <1 | 163 | 272 | 0.36 | 6 | <1 | 8.5 | -313 | <48 |
| QM-67 | 01/15/14 | 7.8 | 113 | 740 | 11 | 213 | 11 | 13 | 303 | 12,700 | 12.6 | -157 | <48 |
| QM-67 | 03/13/14 | 7.4 | 127 | 1,040 | 4 | 418 | 6 | 15 | 357 | 300 | 12.0 | -154 | <48 |
| QM-67 | 04/23/14 | 6.7 | 121 | 1,048 | 3 | 402 | 9 | 15 | 348 | 1,600 | 13.2 | -149 | <48 |
| QM-67 | 09/17/14 | 7.8 | 139 | 852 | 3 | 266 | 6 | 13 | 272 | 320 | 15.0 | -149 | <48 |
| QM-67 | 10/29/14 | 7.7 | 97 | 620 | 4 | 181 | 9 | 13 | 213 | 140 | 13.2 | -151 | <48 |
| QM-67 | 12/04/14 | 7.9 | 89 | 604 | 4 | 162 | 10 | 12 | 213 | 72 | 13.3 | -152 | <48 |

TABLE 1 (Continued): ANALYSIS OF GROUNDWATER FROM MONITORING WELLS QM-53 THROUGH QM-82 IN THE MAINSTREAM TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN SAMPLED DURING 2014

| Well ¹ | Date Sampled | pH | EC ² | TDS ² | TOC ² | Cl ⁻ | SO ₄ ²⁻ | NH ₃ -N | Hardness | Fecal Coliform | Temp | Water Elevation ³ | Recharge Time |
|-------------------|--------------|-----|-----------------|------------------|------------------|-----------------|-------------------------------|--------------------|----------|----------------|------|------------------------------|---------------|
| | | | mS/m | | | | mg/L | | | CFU/100 mL | °C | ft | hr |
| QM-68 | 03/13/14 | 7.9 | 33 | 246 | <1 | 26 | 38 | 0.57 | 198 | 4 | 11.7 | -126 | <48 |
| QM-68 | 06/25/14 | 7.4 | 34 | 300 | <1 | 25 | 37 | 0.62 | 184 | 210 | 14.5 | -94 | <48 |
| QM-69 | 05/29/14 | 8.2 | 37 | 326 | 1 | 34 | 40 | 0.92 | 142 | <1 | 12.6 | -33 | <48 |
| QM-69 | 08/14/14 | 8.2 | 38 | 294 | 1 | 35 | 35 | 0.89 | 150 | <1 | 11.6 | -38 | <48 |
| QM-69 | 11/25/14 | 8.3 | 36 | 292 | 1 | 36 | 43 | 0.91 | 146 | <1 | 10.4 | -28 | <48 |
| QM-70 | 03/06/14 | 7.8 | 38 | 330 | 1 | 48 | 52 | 0.39 | 156 | <1 | 10.8 | -52 | <48 |
| QM-70 | 06/26/14 | 7.8 | 41 | 368 | <1 | 49 | 48 | 0.41 | 147 | <1 | 13.4 | -53 | <48 |
| QM-70 | 09/25/14 | 8.2 | 41 | 338 | 1 | 50 | 47 | 0.45 | 156 | <1 | 12.6 | -52 | <48 |
| QM-71 | 03/06/14 | 7.4 | 56 | 494 | <1 | 127 | 68 | 0.45 | 221 | <1 | 11.3 | -60 | <48 |
| QM-71 | 06/26/14 | 8.0 | 54 | 626 | <1 | 126 | 64 | 0.46 | 192 | <1 | 13.2 | -54 | <48 |
| QM-71 | 09/25/14 | 8.1 | 59 | 510 | <1 | 127 | 61 | 0.48 | 200 | <1 | 12.0 | -62 | <48 |
| QM-72 | 05/29/14 | 7.8 | 50 | 462 | <1 | 128 | <5 | 0.38 | 210 | <1 | 12.4 | -75 | <48 |
| QM-72 | 08/14/14 | 8.6 | 50 | 412 | <1 | 126 | <5 | 0.38 | 214 | <1 | 12.5 | -90 | <48 |
| QM-72 | 11/25/14 | 8.1 | 49 | 396 | 1 | 127 | <5 | 0.39 | 216 | <1 | 10.7 | -86 | <48 |

TABLE 1 (Continued): ANALYSIS OF GROUNDWATER FROM MONITORING WELLS QM-53 THROUGH QM-82 IN THE MAINSTREAM TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN SAMPLED DURING 2014

| Well ¹ | Date Sampled | pH | EC ² | TDS ² | TOC ² | Cl ⁻ | SO ₄ ²⁻ | NH ₃ -N | Hardness | Fecal Coliform | Temp | Water Elevation ³ | Recharge Time |
|-------------------|--------------|-----|-----------------|------------------|------------------|-----------------|-------------------------------|--------------------|----------|----------------|------|------------------------------|---------------|
| | | | mS/m | | | | mg/L | | | CFU/100 mL | °C | ft | hr |
| QM-73 | 04/23/14 | 7.5 | 33 | 216 | <1 | 12 | 13 | 0.25 | 63 | <1 | 11.6 | -155 | <48 |
| QM-73 | 06/26/14 | 8.0 | 38 | 378 | 1 | 34 | <5 | 0.29 | 142 | <1 | 12.7 | -153 | <48 |
| QM-73 | 09/25/14 | 8.1 | 38 | 300 | 1 | 34 | <5 | 0.34 | 150 | <1 | 12.8 | -160 | <48 |
| QM-74 | 03/06/14 | 7.9 | 32 | 268 | 1 | 58 | <5 | 0.23 | 109 | <1 | 10.4 | -17 | <48 |
| QM-74 | 06/26/14 | 8.3 | 34 | 332 | 1 | 59 | <5 | 0.28 | 100 | <1 | 13.0 | -29 | <48 |
| QM-74 | 09/25/14 | 8.3 | 34 | 270 | 1 | 58 | <5 | 0.26 | 107 | <1 | 11.8 | -11 | <48 |
| QM-75 | 03/05/14 | 8.1 | 27 | 226 | <1 | 13 | 11 | 0.25 | 67 | 12 | 11.0 | -80 | <48 |
| QM-75 | 04/23/14 | 8.2 | 27 | 266 | 1 | 34 | <5 | 0.29 | 156 | 4 | 11.8 | -75 | <48 |
| QM-75 | 06/18/14 | 8.0 | 28 | 250 | <1 | 12 | 10 | 0.26 | 62 | 1 | 13.4 | -76 | <48 |
| QM-75 | 09/25/14 | 8.4 | 27 | 226 | <1 | 13 | 10 | 0.27 | 65 | 2 | 13.7 | -77 | <48 |
| QM-75 | 12/04/14 | 8.6 | 27 | 212 | 1 | 13 | 11 | 0.29 | 64 | <1 | 11.6 | -79 | <48 |
| QM-76 | 03/05/14 | 8.5 | 23 | 344 | <1 | 12 | 61 | 0.29 | 42 | <1 | 10.2 | -186 | <48 |
| QM-76 | 06/18/14 | 8.1 | 42 | 372 | 1 | 11 | 72 | 0.24 | 60 | <1 | 13.2 | -180 | <48 |
| QM-76 | 11/06/14 | 8.7 | 34 | 278 | <1 | 12 | 31 | 0.30 | 32 | <1 | 11.0 | -186 | <48 |
| QM-77 | 03/05/14 | 7.5 | 18 | 180 | <1 | 11 | <5 | 0.14 | 45 | 77 | 11.9 | -184 | <48 |
| QM-77 | 06/18/14 | 8.2 | 19 | 196 | <1 | 12 | <5 | 0.13 | 45 | 220 | 12.3 | -177 | <48 |
| QM-77 | 11/06/14 | 8.6 | 18 | 158 | <1 | 10 | <5 | 0.16 | 40 | 12 | 11.1 | -177 | <48 |

TABLE 1 (Continued): ANALYSIS OF GROUNDWATER FROM MONITORING WELLS QM-53 THROUGH QM-82 IN THE MAINSTREAM TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN SAMPLED DURING 2014

| Well ¹ | Date Sampled | pH | EC ² | TDS ² | TOC ² | Cl ⁻ | SO ₄ ²⁻ | NH ₃ -N | Hardness | Fecal Coliform | Temp | Water Elevation ³ | Recharge Time |
|-------------------|--------------|-----|-----------------|------------------|------------------|-----------------|-------------------------------|--------------------|----------|----------------|------|------------------------------|---------------|
| | | | mS/m | | | | mg/L | | | CFU/100 mL | °C | ft | hr |
| QM-78 | 01/16/14 | 7.8 | 34 | 290 | <1 | 15 | 41 | 0.11 | 11 | <1 | 10.1 | -164 | <48 |
| QM-78 | 03/05/14 | 8.5 | 32 | 332 | <1 | 12 | 43 | 0.11 | 9 | <1 | 9.6 | -165 | <48 |
| QM-78 | 04/24/14 | 8.0 | 42 | 282 | <1 | 10 | 41 | 0.30 | 9 | <1 | 12.1 | -162 | <48 |
| QM-78 | 10/01/14 | 9.0 | 35 | 290 | <1 | 11 | 36 | <0.10 | 9 | <1 | 12.8 | -155 | <48 |
| QM-78 | 11/06/14 | 8.9 | 33 | 284 | <1 | 11 | 44 | <0.10 | 8 | <1 | 10.9 | -158 | <48 |
| QM-78 | 12/04/14 | 9.1 | 32 | 286 | <1 | 11 | 46 | <0.10 | 10 | <1 | 10.9 | -158 | <48 |
| QM-79 | 01/16/14 | 8.0 | 34 | 302 | <1 | 15 | 18 | <0.10 | 14 | <1 | 10.8 | -146 | <48 |
| QM-79 | 04/24/14 | 8.2 | 41 | 280 | <1 | 14 | 19 | 0.10 | 14 | <1 | 12.3 | -150 | <48 |
| QM-79 | 06/25/14 | 9.0 | 34 | 284 | <1 | 15 | 14 | <0.10 | 11 | 1 | 14.3 | -132 | <48 |
| QM-79 | 10/01/14 | 8.8 | 31 | 278 | <1 | 15 | 14 | <0.10 | 12 | <1 | 12.3 | -138 | <48 |
| QM-79 | 11/06/14 | 9.0 | 32 | 270 | <1 | 17 | 20 | <0.10 | 11 | <1 | 10.8 | -139 | <48 |
| QM-79 | 12/04/14 | 9.0 | 34 | 278 | <1 | 16 | 20 | <0.10 | 12 | <1 | 10.8 | -153 | <48 |
| QM-80 | 01/29/14 | 7.9 | 23 | 174 | <1 | 13 | <5 | <0.10 | 22 | <1 | 11.0 | -149 | <48 |
| QM-80 | 03/05/14 | 8.3 | 21 | 192 | <1 | 13 | <5 | <0.10 | 23 | <1 | 10.5 | -141 | <48 |
| QM-80 | 04/24/14 | 7.9 | 31 | 188 | <1 | 12 | <5 | <0.10 | 22 | <1 | 11.9 | -134 | <48 |
| QM-80 | 10/01/14 | 8.9 | 24 | 196 | <1 | 13 | <5 | <0.10 | 22 | <1 | 13.1 | -143 | <48 |
| QM-80 | 11/06/14 | 8.7 | 23 | 184 | <1 | 13 | <5 | <0.10 | 20 | <1 | 11.5 | -142 | <48 |
| QM-80 | 12/04/14 | 8.7 | 22 | 172 | <1 | 13 | <5 | <0.10 | 22 | <1 | 11.5 | -139 | <48 |

TABLE 1 (Continued): ANALYSIS OF GROUNDWATER FROM MONITORING WELLS QM-53 THROUGH QM-82 IN THE MAINSTREAM TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN SAMPLED DURING 2014

| Well ¹ | Date Sampled | pH | EC ² | TDS ² | TOC ² | Cl ⁻ | SO ₄ ²⁻ | NH ₃ -N | Hardness | Fecal Coliform | Temp | Water Elevation ³ | Recharge Time |
|-------------------|--------------|-----|-----------------|------------------|------------------|-----------------|-------------------------------|--------------------|----------|----------------|------|------------------------------|---------------|
| | | | mS/m | | | | mg/L | | | CFU/100 mL | °C | ft | hr |
| QM-81 | 05/29/14 | 8.4 | 31 | 226 | <1 | 20 | 12 | 0.25 | 29 | <1 | 13.8 | -130 | <48 |
| QM-81 | 08/14/14 | 8.5 | 40 | 216 | <1 | 21 | 8 | <0.10 | 32 | <1 | 13.4 | -134 | <48 |
| QM-81 | 11/06/14 | 8.4 | 29 | 212 | <1 | 21 | 18 | <0.10 | 30 | <1 | 12.9 | -125 | <48 |
| QM-82 | 01/29/14 | 8.0 | 35 | 270 | 1 | 30 | 10 | 0.10 | 15 | <1 | 11.8 | -186 | <48 |
| QM-82 | 03/05/14 | 8.4 | 34 | 282 | 1 | 29 | 10 | <0.10 | 16 | <1 | 11.1 | -188 | <48 |
| QM-82 | 04/24/14 | 8.1 | 39 | 288 | 1 | 28 | 12 | 0.10 | 15 | <1 | 12.0 | -183 | <48 |
| QM-82 | 10/01/14 | 8.7 | 36 | 286 | 1 | 30 | 10 | <0.10 | 15 | <1 | 13.9 | -186 | <48 |
| QM-82 | 11/06/14 | 8.1 | 34 | 266 | 2 | 29 | 12 | <0.10 | 14 | <1 | 12.4 | -183 | <48 |
| QM-82 | 12/04/14 | 8.7 | 38 | 278 | 1 | 30 | 10 | <0.10 | 15 | <1 | 11.9 | -190 | <48 |

¹Two samples retrieved from QM-66 during 2014, well classified as intermittently dry.

²EC = electrical conductivity; TDS = total dissolved solids; TOC = total dissolved organic carbon.

³Relative to Chicago city datum (579.48 ft above mean sea level) at intersection of Madison and State Streets.

⁴No additional analyses required; pre-decontamination samples (10/20) tested for Cl and FC only. Post-decontamination testing done on regular samples.

TABLE 2: DESCRIPTIVE STATISTICS FOR GROUNDWATER DATA OF MONITORING WELLS QM-53 THROUGH QM-82 IN THE MAINSTREAM TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2014

| Well | Statistic | pH | EC ¹ | TDS ¹ | TOC ¹ | Cl ⁻ | SO ₄ ²⁻ | NH ₃ -N | Hardness | Fecal Coliform ² |
|-------|--------------------|----------------------------------|-----------------|------------------|------------------|-----------------|-------------------------------|--------------------|----------|-----------------------------|
| | | mS/m ----- mg/L ----- CFU/100 mL | | | | | | | | |
| QM-53 | Minimum | 7.9 | 23 | 190 | <1 | 15 | 33 | <0.10 | 141 | <1 |
| | Mean | 8.1 | 23 | 211 | <1 | 15 | 35 | <0.10 | 144 | <1 |
| | Maximum | 8.4 | 24 | 240 | <1 | 15 | 36 | <0.10 | 146 | <1 |
| | Std. Dev. | 0.2 | 0.4 | 26 | 0.0 | 0 | 1 | 0.00 | 3 | NA ³ |
| | Median | 8.1 | 23 | 202 | <1 | 15 | 36 | <0.10 | 146 | <1 |
| | Coeff. of Var. (%) | 2.9 | 2 | 12 | 0.0 | 0 | 4 | 0.00 | 2 | NA |
| QM-61 | Minimum | 6.9 | 46 | 340 | 1 | 64 | 25 | 0.36 | 120 | 12 |
| | Mean | 7.9 | 67 | 375 | 1 | 68 | 29 | 0.44 | 145 | 902 |
| | Maximum | 8.8 | 106 | 394 | 1 | 76 | 33 | 0.55 | 174 | 3,400 |
| | Std. Dev. | 1.0 | 34 | 31 | 0.0 | 7 | 4 | 0.10 | 27 | NA |
| | Median | 7.9 | 48 | 392 | 1 | 65 | 29 | 0.42 | 142 | 3,400 |
| | Coeff. of Var. (%) | 12 | 51 | 8 | 0.0 | 10 | 14 | 22 | 19 | NA |
| QM-62 | Minimum | 7.0 | 44 | 320 | 1 | 51 | 15 | 0.53 | 150 | 14 |
| | Mean | 7.6 | 72 | 425 | 1 | 91 | 32 | 0.68 | 182 | 777 |
| | Maximum | 8.2 | 141 | 712 | 2 | 214 | 63 | 1.0 | 255 | 16,200 |
| | Std. Dev. | 0.5 | 38 | 147 | 0.3 | 62 | 19 | 0.19 | 42 | NA |
| | Median | 7.6 | 55 | 370 | 1 | 63 | 28 | 0.62 | 166 | 1,100 |
| | Coeff. of Var. (%) | 6.1 | 53 | 34 | 22 | 69 | 59 | 28 | 23 | NA |