APPENDIX E

ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)

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Docket No: 50-254
50-265

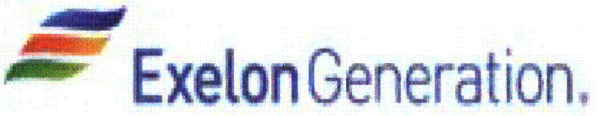
QUAD CITIES NUCLEAR POWER STATION
UNITS 1 and 2

Annual Radiological
Groundwater Protection Program Report

1 January Through 31 December 2012

Prepared By

Teledyne Brown Engineering
Environmental Services



Quad Cities Nuclear Power Station
Cordova, IL 61242

May 2013

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Appendices

I. Summary and Conclusions

This report on the Radiological Groundwater Protection Program (RGPP) conducted for the Quad Cities Nuclear Power Station (QCNPS) by Exelon Nuclear covers the period 01 January 2012 through 31 December 2012.

In 2006, Exelon undertook a Fleetwide Assessment of groundwater at and in the vicinity of its nuclear power generating facilities for the presence of radionuclides. The data collected from the Quad Cities Station as part of the Fleetwide Assessment was summarized in a report entitled "Hydrogeologic Investigation Report, Fleetwide Assessment, Quad Cities Generation Station, Cordova, Illinois", dated September 2006. This report was submitted to the Illinois Environmental Protection Agency (IEPA) in September 2006. The Quad Cities Hydrogeologic Investigation Report concluded that tritium had not migrated off Site at detectable concentrations.

Following the Fleetwide Assessment, Exelon continued groundwater monitoring for radionuclides at the Site. As a result of this monitoring, Exelon detected higher than expected tritium levels in the vicinity of the station's Service Building and Turbine Building. Quad Cities undertook supplemental investigative activities to determine and characterize the source of the tritium. These investigative activities included completion of an aquifer pumping test, installation of sentinel monitoring wells in the vicinity of the Service Building and Turbine Building, and several additional rounds of hydraulic monitoring and groundwater sampling. The collected groundwater data was utilized to assist with an extensive underground piping inspection program to locate the source of the tritium.

In May 2008, during the underground piping inspection program, Exelon located a small leak in the Unit 1 Residual Heat Removal (RHR) suction line located near the Service Building/ Turbine Building area. The line was isolated and through further testing, Exelon determined it to be a source of the monitored tritium levels. In June 2008, the line was repaired, thereby eliminating this source of tritiated water.

In a letter dated June 5, 2008, Exelon informed the Illinois Environmental Protection Agency (IEPA) of its plan to prepare a Migration Control Plan (MCP) to minimize migration of the tritium plume offsite. The MCP was submitted to the IEPA July 17, 2008. The MCP listed Monitored Natural Attenuation as the preferred remediation option.

In 2012 Conestoga-Rovers & Associates (CRA) completed a five-year update hydrogeologic investigation report for the Station (*NEI 07-07, Hydrogeologic Investigation Report*, dated November 2012). The referenced report summarized station activities since the 2006 hydrogeologic investigation report, including

changes at the Station as well as RGPP sampling activities and groundwater flow.

A 2011 change to the RGPP consisted of designating wells into categories. Well designation categories include background, detection, elevated, long-term shut down, plume and idle. The RGPP also requires the sampling of surface water locations that may be impacted due to a spill or release.

This report covers groundwater samples, collected from the environment on station property in 2012. During that time period, RGPP samples were collected from 41 locations.

2012 sample locations included thirty-four designated monitoring wells, two surface water monitoring points and five production wells (three of which are used for site drinking water). Sample frequency and analysis varies with well designation. Typical frequency/analysis include quarterly for tritium and annually for gamma, gross alpha, gross beta, strontium, select transuranics and Fe-55/Ni-63. Samples from seventeen of the designated monitoring wells and two surface water sample points were collected by a contractor (Environmental Inc.) and analyzed by a contract lab (Teledyne Brown). The remaining sample locations are collected by site personnel and analyzed for tritium/gamma onsite by station personnel or by Teledyne Brown for tritium/gamma and other parameters

Tritium concentrations ranged from less than the LLD of 200 pCi/L at the site boundaries up to 118,000 pCi/L in a monitoring well. Tritium concentrations were less than the LLD of 200 pCi/L in surface water monitoring locations.

Gamma-emitting radionuclides associated with licensed plant operations were not detected at concentrations greater than their respective Lower Limits of Detection (LLDs) as specified in the Offsite Dose Calculation Manual (ODCM) in any of the groundwater samples. In the case of tritium, Exelon specified that its laboratories achieve a lower limit of detection 10 times lower than that required by federal regulation. Most of the tritium that was detected in groundwater at the Station is on the south and west side of the Reactor/Turbine buildings.

Strontium-89 was not detected at concentrations greater than the Lower Limit of Detection (LLD) of 10.0 pCi/L. Strontium-90 was not detected at concentrations great than the Lower Limit of Detection (LLD) of 1.0 pCi/L.

Gross Alpha and Gross Beta analyses in the dissolved and suspended fractions were performed on groundwater samples during the first quarter sampling in 2012. Gross Alpha (dissolved) was not detected at any of the groundwater locations. Gross Alpha (suspended) was not detected at any of the groundwater locations. Gross Beta (dissolved) was detected in 8 of 8 groundwater locations. The concentrations ranged from 3.0 to 17.6 pCi/L. Gross Beta (suspended) was detected in one groundwater sample at a concentration of 3.7pCi/L.

Hard-To-Detect analyses was performed on one monitoring well designated as "elevated" (QC-GP-15). The analyses included Fe-55, Ni-63, Am-241, Cm-242, Cm-243/244, Pu-238, Pu-239/240, U-234, U-235 and U-238. All hard-to-detect nuclides were not detected at concentrations greater than their respective MDCs.

In assessing all the data gathered for this report, it was concluded that the operation of QCNPS had no adverse radiological impact on the environment offsite of QCNPS.

II. Introduction

The Quad Cities Nuclear Power Station (QCNPS), consisting of two 2957 MWth boiling water reactor owned and operated by Exelon Corporation, is located in Cordova, Illinois along the Mississippi River. Unit No. 1 went critical on 16 March 1972. Unit No. 2 went critical on 02 December 1973. The site is located in northern Illinois, approximately 182 miles west of Chicago, Illinois.

A. Objective of the RGPP

The long-term objectives of the RGPP are as follows:

1. Identify suitable locations to monitor and evaluate potential impacts from station operations before significant radiological impact to the environment and potential drinking water sources.

2. Understand the local hydrogeologic regime in the vicinity of the station and maintain up-to-date knowledge of flow patterns on the surface and shallow subsurface.

3. Perform routine water sampling and radiological analysis of water from selected locations.

4. Report new leaks, spills, or other detections with potential radiological significance to stakeholders in a timely manner.

5. Regularly assess analytical results to identify adverse trends.

6. Take necessary corrective actions to protect groundwater resources.

B. Implementation of the Objectives

The objectives identified have been implemented at Quad Cities Nuclear Power Station as discussed below:

1. Exelon and its consultant identified locations as described in the

Phase 1 study. Phase 1 studies were conducted by Conestoga Rovers and Associates (CRA) and the results and conclusions were made available to state and federal regulators in station specific reports.

2. The Quad Cities Nuclear Power Station reports describe the local hydrogeologic regime. Periodically, the flow patterns on the surface and shallow subsurface are updated based on ongoing measurements.

3. Quad Cities Nuclear Power Station will continue to perform routine sampling and radiological analysis of water from selected locations.

4. Quad Cities Nuclear Power Station has implemented procedures to identify and report leaks, spills, or other detections with potential radiological significance in a timely manner.

5. Quad Cities Nuclear Power Station staff and consulting hydrogeologist assess analytical results on an ongoing basis to identify adverse trends.

C. Program Description

1. Sample Collection

Sample locations can be found in Table A-1 and Figures A-1 & A-2, Appendix A.

Groundwater and Surface Water

Samples of water are collected, managed, transported and analyzed in accordance with approved procedures following regulatory methods. Both groundwater and surface water are collected. Sample locations, sample collection frequencies and analytical frequencies are controlled in accordance with approved station procedures. Contractor and/or station personnel are trained in the collection, preservation management, analysis and shipment of samples, as well as in documentation of sampling events. Analytical laboratories are subject to internal quality assurance programs, inter-laboratory cross-check programs, as well as nuclear industry audits. Station personnel review and evaluate all analytical data deliverables after initial review by the contractor.

Analytical data results are reviewed by both station personnel and an independent hydrogeologist for adverse trends or changes to hydrogeologic conditions.

III. Program Description

This section covers those analyses performed by Teledyne Brown Engineering (TBE) on samples collected in 2012.

A. Sample Analysis

This section describes the general analytical methodologies used by TBE and station personnel to analyze the environmental samples for radioactivity for the Quad Cities Nuclear Power Station RGPP in 2012.

In order to achieve the stated objectives, the current program includes the following analyses:

1. Concentrations of gamma emitters in groundwater and surface water.
2. Concentrations of strontium in groundwater.
3. Concentrations of tritium in groundwater and surface water.
4. Concentration of gross alpha and gross beta in groundwater.
5. Concentrations of Am-241 in groundwater.
6. Concentrations of Cm-242 and Cm-243/244 in groundwater.
7. Concentrations of Pu-238 and PU-239/240 in groundwater.
8. Concentrations of U-234, U-235 and U-238 in groundwater.
9. Concentrations of Fe-55 in groundwater.
10. Concentrations of Ni-63 in groundwater.

B. Data Interpretation

The radiological data collected prior to Quad Cities Nuclear Power Station becoming operational were used as a baseline with which these operational data were compared. For the purpose of this report, Quad Cities Nuclear Power Station was considered operational at initial criticality. Several factors were important in the interpretation of the data:

1. Lower Limit of Detection and Minimum Detectable Concentration

The lower limit of detection (LLD) is specified by federal regulation as a minimum sensitivity value that must be achieved routinely by the analytical parameter.

2. Laboratory Measurements Uncertainty

The estimated uncertainty in measurement of tritium in environmental samples is frequently on the order of 50% of the measurement value.

Statistically, the exact value of a measurement is expressed as a range with a stated level of confidence. The convention is to report results with a 95% level of confidence. The uncertainty comes from calibration standards, sample volume or weight measurements, sampling uncertainty and other factors. Exelon reports the uncertainty of a measurement created by statistical process (counting error) as well as all sources of error (Total Propagated Uncertainty or TPU). Each result has two values calculated. Exelon reports the TPU by following the result with plus or minus ± the estimated sample standard deviation, as TPU, that is obtained by propagating all sources of analytical uncertainty in measurements.

Analytical uncertainties are reported at the 95% confidence level in this report for reporting consistency with the Annual Radiological Environmental Operating Report (AREOR).

Gamma spectroscopy results for each type of sample were grouped as follows:

For groundwater and surface water 14 nuclides, Be-7, K-40, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, I-131, Cs-134, Cs-137, Ba-140 and La-140 were reported.

IV. Results and Discussion

A. Groundwater Results

Groundwater

Samples were collected from on-site wells in accordance with the station radiological groundwater protection program. Analytical results and anomalies are discussed below.

Tritium

Samples from all locations were analyzed for tritium activity (Table B–I.1 & B-III.1 Appendix B). Tritium values ranged from the detection limit to 118,000 pCi/l. All samples obtained at the site boundaries were less then the detection limit of 200 pCi/L. The

location most representative of potential offsite user of drinking water was <200 pCi/L.

Strontium

Strontium-89 was not detected above the Lower Limit of Detection of 10.0 pCi/L. Strontium-90 was not detected above the Lower Limit of Detection (LLD) of 1.0 pCi/L (Table B–I.1 Appendix B)

Gross Alpha and Gross Beta (dissolved and suspended)

Gross Alpha and Gross Beta analyses in the dissolved and suspended fractions performed on groundwater samples during the second and third quarter sampling in 2012. Gross Alpha (dissolved) was not detected in any of the groundwater locations. Gross Alpha (suspended) was not detected at any of the groundwater locations. Gross Beta (dissolved) was detected in eight of eight groundwater locations. The concentrations ranged from 3.0 to 17.6 pCi/L. Gross Beta (suspended) was detected in one groundwater sample at a concentration of 3.7 pCi/L (Table B-I.1 Appendix B).

Gamma Emitters

No gamma emitting nuclides were detected other than naturally occurring K-40 in one sample at a concentration of 63 pCi/L (Table B–I.2, Appendix B).

Hard-To-Detect

Hard-To-Detect analyses were performed on one groundwater location. The analyses included Fe-55, Ni-63, Am-241, Cm-242, Cm-243/244, Pu-238, Pu-239/240, U-234, U-235 and U-238. All hard-to-detect nuclides were not detected at concentrations greater than their respective MDCs (Table B–I.3 Appendix B).

B. Surface Water Results

Surface Water

Tritium

Samples from two locations were analyzed for tritium activity. Tritium was not detected above the detection limit of 200 pCi/l. (Table B–II.1 Appendix B).

Gamma Emitters

No gamma emitting nuclides were detected (Table B–II.2, Appendix B).

C. Summary of Results – Inter-Laboratory Comparison Program

Inter-Laboratory Comparison Program results for TBE are presented in the Annual Radiological Environmental Operating Report.

D. Leaks, Spills, and Releases

No leaks, spills or releases were identified during the year.

E. Trends

Overall, groundwater tritium concentrations have been decreasing over time at the Station.

F. Investigations

Currently no investigations are on-going.

G. Actions Taken

1. Compensatory Actions

   There have been no station events requiring compensatory actions at the Quad Cities Nuclear Power Station in 2012.

2. Actions to Recover/Reverse Plumes

   No actions were required to recover or reverse groundwater plumes. Quad Cities Station Migration Control Plan (MCP) continues to employ Monitored Natural Attenuation for remediation of H-3 plume.

APPENDIX A

LOCATION DESIGNATION

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TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations, Quad Cities Nuclear Power Station, 2012

Site	Site Type
MW-QC-1	Monitoring Well
MW-QC-2	Monitoring Well
MW-QC-102D	Monitoring Well
MW-QC-102I	Monitoring Well
MW-QC-102S	Monitoring Well
MW-QC-103I	Monitoring Well
MW-QC-104S	Monitoring Well
MW-QC-105I	Monitoring Well
MW-QC-106I	Monitoring Well
MW-QC-106S	Monitoring Well
MW-QC-107I	Monitoring Well
MW-QC-108D	Monitoring Well
MW-QC-108I	Monitoring Well
MW-QC-108S	Monitoring Well
MW-QC-109I	Monitoring Well
MW-QC-109S	Monitoring Well
MW-QC-112I	Monitoring Well
SURFACE WATER #1	Surface Water
SURFACE WATER #2	Surface Water
WELL #1	Production Well
WELL #5	Production Well
WELL #7 BIG FISH WELL	Production Well
WELL #9 DRY CASK STORAGE	Production Well
WELL #10 FISH HOUSE WELL	Production Well
QC-GP-1	Sentinel Well
QC-GP-2	Sentinel Well
QC-GP-3	Sentinel Well
QC-GP-4	Sentinel Well
QC-GP-5	Sentinel Well
QC-GP-6	Sentinel Well
QC-GP-7	Sentinel Well
QC-GP-8	Sentinel Well
QC-GP-9	Sentinel Well
QC-GP-10	Sentinel Well
QC-GP-11	Sentinel Well
QC-GP-12	Sentinel Well
QC-GP-13	Sentinel Well
QC-GP-14	Sentinel Well
QC-GP-15	Sentinel Well
QC-GP-16	Sentinel Well
QC-GP-17	Sentinel Well

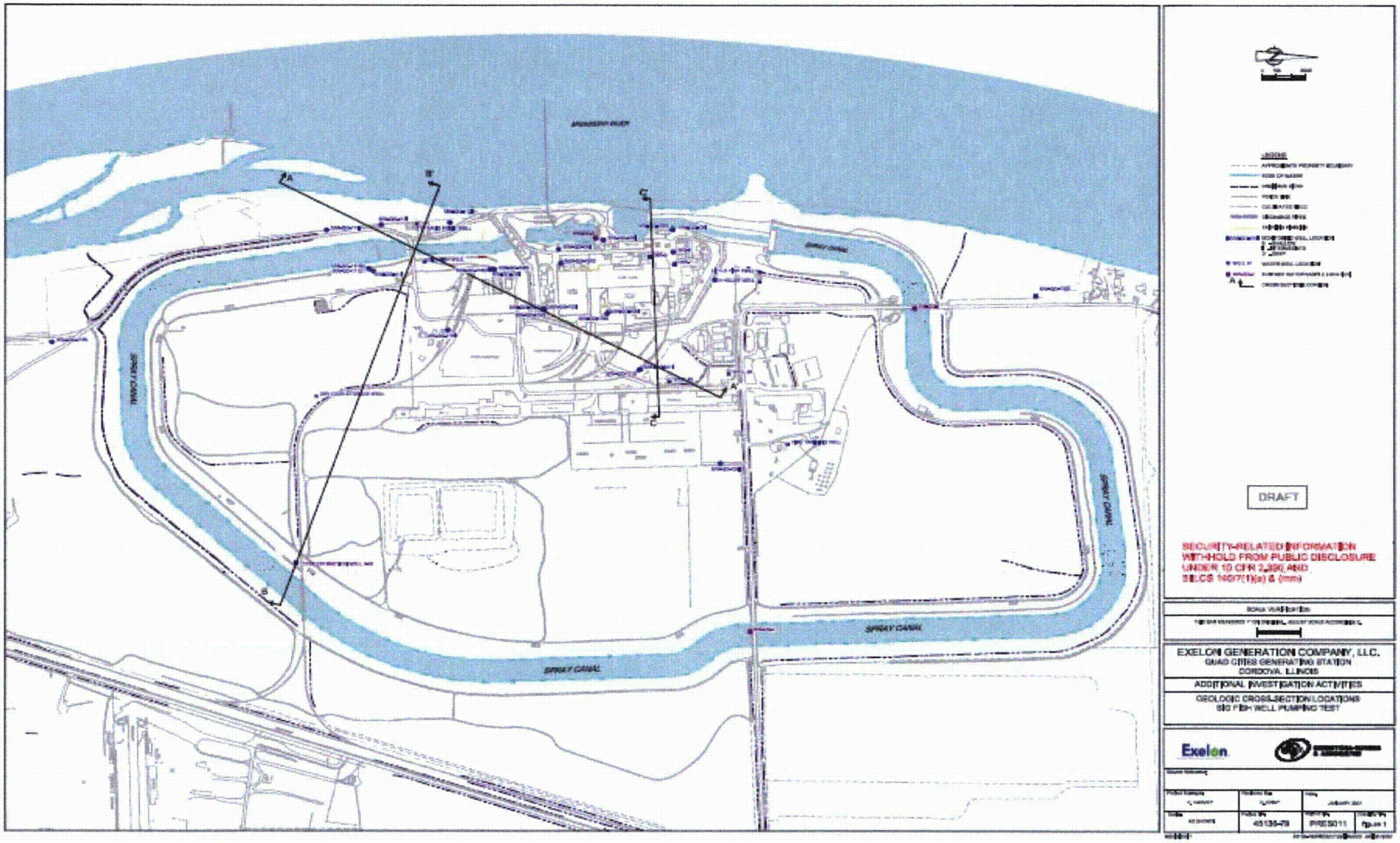

FIGURE A-1
Sampling Locations Near the Site Boundary of the Quad Cities Nuclear Power Station, 2012

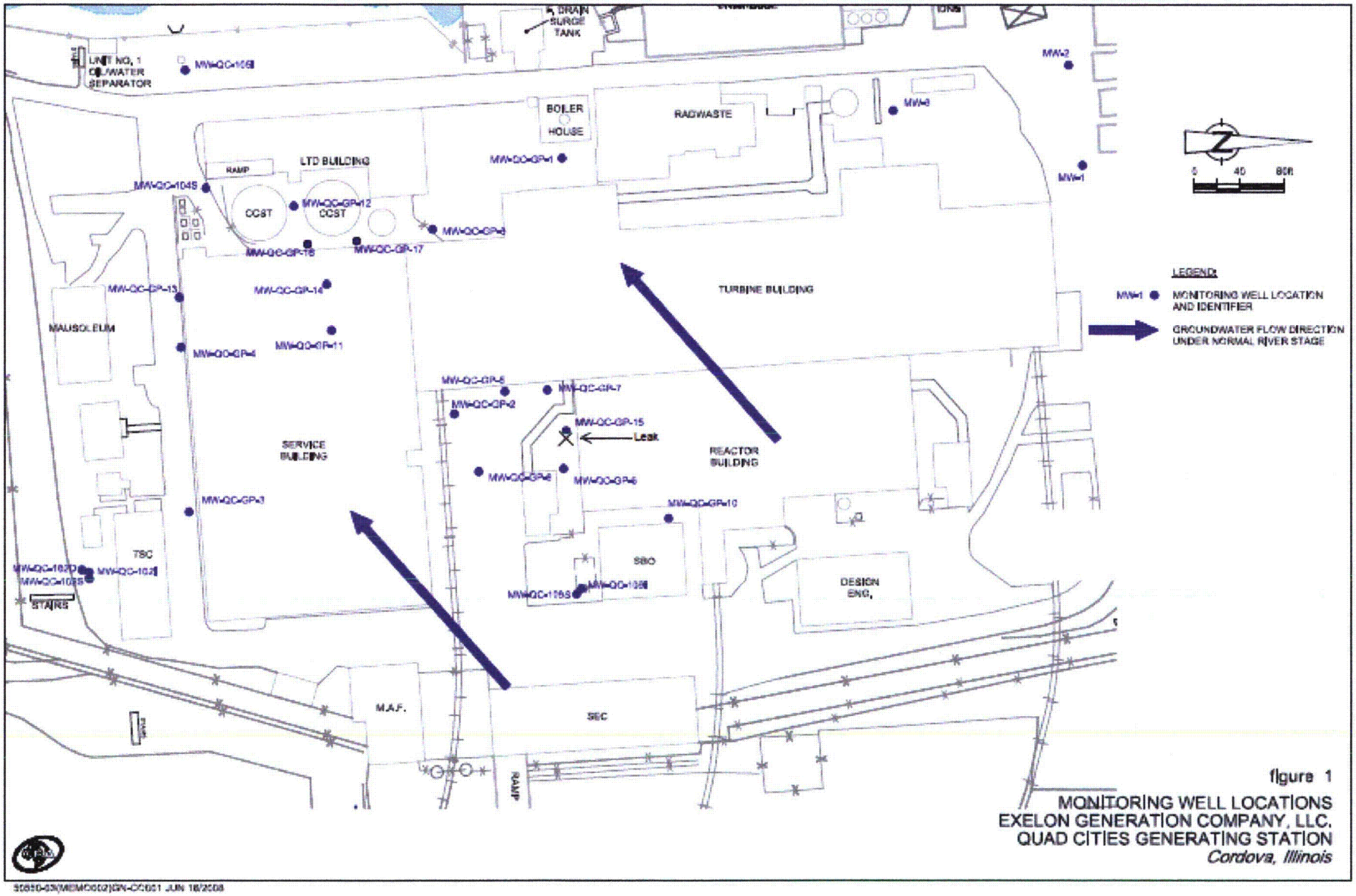

FIGURE A-2
Sentinel Monitoring Point Locations, Quad Cities Nuclear Power Station, 2012

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APPENDIX B

DATA TABLES

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TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2012

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (DIS)	Gr-A (SUS)	Gr-B (DIS)	Gr-B (SUS)
QC-GP-10	03/05/12	< 172	< 5.0	< 0.7	< 1.5	< 1.1	11.8 ± 1.6	< 2.0
QC-GP-11	03/07/12	484 ± 131	< 4.5	< 0.7	< 2.0	< 1.1	6.4 ± 1.3	< 2.0
QC-GP-12	03/05/12	< 173	< 4.9	< 0.6	< 0.8	< 1.1	3.0 ± 0.8	< 2.0
QC-GP-14	03/07/12	1310 ± 189	< 4.8	< 0.7	< 2.7	< 1.1	7.6 ± 1.5	< 2.0
QC-GP-15	03/07/12	454 ± 132	< 4.2	< 0.7	< 2.7	< 2.2	17.6 ± 4.9	< 1.2
QC-GP-16	03/05/12	111000 ± 11100	< 4.1	< 0.8	< 1.3	< 1.1	6.5 ± 1.2	3.7 ± 1.5
MW-QC-1	03/06/12	< 179						
MW-QC-1	05/14/12	< 178						
MW-QC-1	07/31/12	< 185						
MW-QC-1	10/16/12	< 198						
MW-QC-102D	03/06/12	1540 ± 210						
MW-QC-102D	05/14/12	1260 ± 184						
MW-QC-102D	07/31/12	1750 ± 233						
MW-QC-102D	10/16/12	1630 ± 213						
MW-QC-102I	03/06/12	354 ± 125						
MW-QC-102I	05/14/12	343 ± 126						
MW-QC-102I	07/31/12	338 ± 120						
MW-QC-102I	10/16/12	366 ± 134						
MW-QC-102S	03/06/12	< 173						
MW-QC-102S	05/14/12	< 177						
MW-QC-102S	07/31/12	< 159						
MW-QC-102S	10/16/12	< 188						
MW-QC-103I	03/06/12	< 177	< 2.7	< 0.7	< 1.4	< 0.7	8.9 ± 1.3	< 1.8
MW-QC-103I	05/14/12	< 182						
MW-QC-103I	07/31/12	< 164						
MW-QC-103I	10/16/12	< 163						
MW-QC-104S	03/06/12	4840 ± 530	< 2.2	< 0.6	< 1.6	< 0.5	13.6 ± 1.5	< 1.7
MW-QC-104S	05/14/12	2370 ± 294						
MW-QC-104S	07/31/12	370 ± 122						
MW-QC-104S	10/16/12	216 ± 123						
MW-QC-105I	03/06/12	33300 ± 3360						
MW-QC-105I	05/14/12	17900 ± 1840						
MW-QC-105I	07/31/12	< 162						
MW-QC-105I	10/16/12	266 ± 134						
MW-QC-106I	03/06/12	< 172						
MW-QC-106I	05/14/12	< 180						
MW-QC-106I	07/31/12	< 193						
MW-QC-106I	10/16/12	< 175						
MW-QC-106S	03/06/12	< 173						
MW-QC-106S	05/14/12	< 180						
MW-QC-106S	07/31/12	< 165						
MW-QC-106S	10/16/12	< 188						
MW-QC-107I	03/05/12	< 177						
MW-QC-108D	03/07/12	2000 ± 255						

TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2012

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (DIS)	Gr-A (SUS)	Gr-B (DIS)	Gr-B (SUS)
MW-QC-108D	05/15/12	2750 ± 328						
MW-QC-108D	08/01/12	3000 ± 344						
MW-QC-108D	10/17/12	2980 ± 345						
MW-QC-108I	03/07/12	< 177						
MW-QC-108I	05/15/12	< 182						
MW-QC-108I	08/01/12	1950 ± 242						
MW-QC-108I	10/17/12	486 ± 140						
MW-QC-108S	03/07/12	< 197						
MW-QC-108S	05/15/12	< 179						
MW-QC-108S	08/01/12	< 172						
MW-QC-108S	10/17/12	< 189						
MW-QC-109I	03/06/12	< 175						
MW-QC-109I	05/14/12	< 181						
MW-QC-109I	07/31/12	< 185						
MW-QC-109I	10/16/12	< 200						
MW-QC-109S	03/06/12	< 175						
MW-QC-109S	05/14/12	< 180						
MW-QC-109S	07/31/12	< 166						
MW-QC-109S	10/16/12	< 183						
MW-QC-112I	03/05/12	< 178						
MW-QC-112I	05/13/12	< 179						
MW-QC-112I	07/30/12	< 184						
MW-QC-112I	10/15/12	< 199						
MW-QC-2	03/06/12	< 179						
MW-QC-2	05/14/12	< 182						
MW-QC-2	07/31/12	< 185						
MW-QC-2	10/16/12	< 195						

TABLE B-I.2

CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2012

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
QC-GP-10	03/05/12	< 33	< 62	< 3	< 4	< 8	< 3	< 7	< 4	< 6	< 13	< 3	< 3	< 28	< 8
QC-GP-11	03/07/12	< 37	< 42	< 4	< 4	< 9	< 4	< 9	< 5	< 7	< 13	< 3	< 4	< 27	< 9
QC-GP-12	03/05/12	< 30	< 28	< 3	< 4	< 7	< 3	< 7	< 3	< 6	< 13	< 3	< 3	< 24	< 8
QC-GP-14	03/07/12	< 28	< 19	< 3	< 3	< 6	< 2	< 5	< 4	< 5	< 10	< 2	< 2	< 20	< 6
QC-GP-15	03/07/12	< 32	63 ± 42	< 3	< 3	< 7	< 3	< 7	< 3	< 6	< 13	< 3	< 4	< 28	< 8
QC-GP-15	07/17/12	< 44	< 72	< 4	< 5	< 9	< 6	< 9	< 5	< 8	< 14	< 4	< 5	< 30	< 9
QC-GP-16	03/05/12	< 27	< 26	< 2	< 3	< 6	< 3	< 5	< 3	< 5	< 13	< 2	< 3	< 22	< 8
MW-QC-103I	03/06/12	< 29	< 32	< 3	< 3	< 7	< 3	< 6	< 3	< 5	< 7	< 3	< 3	< 18	< 6
MW-QC-104S	03/06/12	< 43	< 40	< 4	< 4	< 10	< 4	< 9	< 5	< 9	< 10	< 4	< 4	< 23	< 7
MW-QC-107I	03/05/12	< 31	< 62	< 3	< 4	< 8	< 4	< 7	< 4	< 7	< 9	< 4	< 4	< 20	< 8
WELL #9 DRY CASK STORAGE	06/29/12	< 16	< 14	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 9	< 1	< 2	< 15	< 5

TABLE B-I.3 **CONCENTRATIONS OF HARD TO DETECTS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2012**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Am-241	Cm-242	Cm-243/244	Pu-238	Pu-239/240	U-234	U-235	U-238	Fe-55	Ni-63
QC-GP-15	03/07/12	< 0.11	< 0.06	< 0.06	< 0.15	< 0.10	< 0.12	< 0.07	< 0.10	< 179	< 3.18

TABLE B-II.1 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2012

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
SURFACE WATER #1	03/05/12	< 179
SURFACE WATER #1	05/13/12	< 180
SURFACE WATER #1	07/30/12	< 184
SURFACE WATER #1	10/15/12	< 197
SURFACE WATER #2	03/05/12	< 177
SURFACE WATER #2	05/13/12	< 180
SURFACE WATER #2	07/30/12	< 181
SURFACE WATER #2	10/15/12	< 199

TABLE B-II.2 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2012**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
SURFACE WATER #1	03/05/12	< 34	< 35	< 3	< 4	< 9	< 3	< 7	< 4	< 6	< 8	< 4	< 4	< 20	< 7
SURFACE WATER #2	03/05/12	< 36	< 34	< 4	< 4	< 8	< 4	< 8	< 4	< 7	< 10	< 4	< 4	< 25	< 7

TABLE B-III.1 **CONCENTRATIONS OF TRITIUM IN GROUNDWATER SAMPLES COLLECTED AND ANALYZED BY QUAD CITIES STATION PERSONNEL, 2012**

RESULTS IN UNITS OF PCI/LITER

SITE	COLLECTION DATE	ACTIVITY	AQUIFER
QC-GP-1	03/08/12	23,500	Shallow Aquifer
QC-GP-1	05/17/12	16,600	Shallow Aquifer
QC-GP-1	07/18/12	15,100	Shallow Aquifer
QC-GP-1	10/22/12	16,700	Shallow Aquifer
QC-GP-2	03/08/12	<2,000	Shallow Aquifer
QC-GP-2	05/18/12	<2,000	Shallow Aquifer
QC-GP-2	07/17/12	<2,000	Shallow Aquifer
QC-GP-2	10/23/12	<2,000	Shallow Aquifer
QC-GP-3	07/17/12	<2,000	Shallow Aquifer
QC-GP-4	03/08/12	53,800	Shallow Aquifer
QC-GP-4	05/17/12	34,400	Shallow Aquifer
QC-GP-4	07/17/12	47,000	Shallow Aquifer
QC-GP-4	10/22/12	50,400	Shallow Aquifer
QC-GP-5	03/08/12	<2,000	Shallow Aquifer
QC-GP-5	05/18/12	<2,000	Shallow Aquifer
QC-GP-5	07/17/12	<2,000	Shallow Aquifer
QC-GP-5	10/23/12	<2,000	Shallow Aquifer
QC-GP-6	03/08/12	<2,000	Shallow Aquifer
QC-GP-6	05/18/12	<2,000	Shallow Aquifer
QC-GP-6	07/17/12	<2,000	Shallow Aquifer
QC-GP-6	10/23/12	<2,000	Shallow Aquifer
QC-GP-7	03/08/12	<2,000	Shallow Aquifer
QC-GP-7	05/18/12	<2,000	Shallow Aquifer
QC-GP-7	07/17/12	<2,000	Shallow Aquifer
QC-GP-7	10/23/12	<2,000	Shallow Aquifer
QC-GP-8	07/17/12	<2,000	Shallow Aquifer
QC-GP-9	03/05/12	<2,000	Shallow Aquifer
QC-GP-9	05/17/12	<2,000	Shallow Aquifer
QC-GP-9	07/18/12	5,850	Shallow Aquifer
QC-GP-9	10/23/12	26,400	Shallow Aquifer
QC-GP-10	03/05/12	<2,000	Shallow Aquifer
QC-GP-10	05/18/12	<2,000	Shallow Aquifer
QC-GP-10	07/18/12	<2,000	Shallow Aquifer
QC-GP-10	10/23/12	<2,000	Shallow Aquifer
QC-GP-11	03/07/12	<2,000	Shallow Aquifer
QC-GP-11	05/17/12	<2,000	Shallow Aquifer
QC-GP-11	07/17/12	<2,000	Shallow Aquifer
QC-GP-11	10/24/12	<2,000	Shallow Aquifer
QC-GP-12	03/05/12	<2,000	Shallow Aquifer
QC-GP-12	05/17/12	<2,000	Shallow Aquifer
QC-GP-12	07/18/12	<2,000	Shallow Aquifer
QC-GP-12	10/23/12	<2,000	Shallow Aquifer
QC-GP-13	03/08/12	41,100	Shallow Aquifer
QC-GP-13	05/18/12	14,500	Shallow Aquifer
QC-GP-13	07/17/12	20,000	Shallow Aquifer
QC-GP-13	10/24/12	19,000	Shallow Aquifer
QC-GP-14	03/07/12	<2,000	Shallow Aquifer
QC-GP-14	05/17/12	8,700	Shallow Aquifer
QC-GP-14	07/18/12	12,200	Shallow Aquifer
QC-GP-14	10/23/12	5,330	Shallow Aquifer
QC-GP-15	03/07/12	<2,000	Shallow Aquifer
QC-GP-15	05/18/12	<2,000	Shallow Aquifer
QC-GP-15	07/17/12	<2,000	Shallow Aquifer
QC-GP-15	10/23/12	<2,000	Shallow Aquifer

TABLE B-III.1 **CONCENTRATIONS OF TRITIUM IN GROUNDWATER SAMPLES COLLECTED AND ANALYZED BY QUAD CITIES STATION PERSONNEL, 2012**

RESULTS IN UNITS OF PCI/LITER

SITE	COLLECTION DATE	ACTIVITY	AQUIFER
QC-GP-16	03/05/12	118,000	Shallow Aquifer
QC-GP-16	05/17/12	55,300	Shallow Aquifer
QC-GP-16	07/18/12	14,200	Shallow Aquifer
QC-GP-16	10/22/12	23,800	Shallow Aquifer
QC-GP-17	03/08/12	3,240	Shallow Aquifer
QC-GP-17	05/17/12	33,700	Shallow Aquifer
QC-GP-17	07/18/12	<2,000	Shallow Aquifer
QC-GP-17	10/22/12	6,680	Shallow Aquifer
Well #1	06/01/12	<200	
Well #1	12/18/12	<200	
Well #5	12/14/12	<200	
Well #7	03/07/12	<200	
Well #7	05/31/12	<200	
Well #7	07/30/12	<200	
Well #7	12/14/12	<200	
Well #9	06/01/12	<200	
Well #10	12/14/12	<200	