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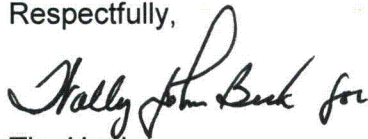
Quad Cities Nuclear Power Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: Annual Radiological Environmental Operating Report

Pursuant to Technical Specifications Section 5.6.2, enclosed is the 2011 Radiological Environmental Operating Report for Quad Cities Nuclear Power Station. This report contains the results of the radiological environmental and meteorological monitoring programs. In addition, the 2011 Radiological Groundwater Protection Program (RGPP) Report is included as Appendix E of the enclosure.

Should you have any questions concerning this letter, please contact Wally J. Beck at (309) 227-2800.

Respectfully,



Tim Hanley
Site Vice President
Quad Cities Nuclear Power Station

Enclosure: Annual Radiological Environmental Operating Report

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Quad Cities Nuclear Power Station

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Enclosure

Annual Radiological Environmental Operating Report

Docket No: 50-254
50-265

QUAD CITIES NUCLEAR POWER STATION UNITS 1 and 2

Annual Radiological
Environmental Operating Report

1 January Through 31 December 2011

Prepared By

Teledyne Brown Engineering
Environmental Services



Nuclear

Quad Cities Nuclear Power Station
Cordova, IL 61242

May 2012

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I. Summary and Conclusions

In 2011, the Quad Cities Generating Station released to the environment through the radioactive effluent liquid and gaseous pathways approximately 280 curies of noble gas, fission and activation products and approximately 72 curies of tritium. The dose from both liquid and gaseous effluents was conservatively calculated for the Maximum Exposed Member of the Public. The results of those calculations and their comparison to the allowable limits were as follows:

Gaseous and liquid radiation doses to members of the public at locations								
Effluents	Applicable Organ	Estimated Dose	Age Group	Location		% of Applicable Limit	Site Limit	Unit
				Distance (meters)	Direction (toward)			
Noble Gas	Gamma - Air Dose	1.35E-03	All	1029	NNE	6.75E-03	20	mRad
Noble Gas	Beta – Air Dose	6.94e-04	All	1029	NNE	1.74E-03	40	mRad
Iodine, Particulate & Tritium	Total Body	4.20E-02	Child	1029	NNE	4.20E-01	10	mrem
Iodine, Particulate & Tritium	Thyroid	1.00E+00	Infant	1029	NNE	3.33E+00	30	mrem
Liquid	Total Body	1.04E-03	Adult	Mississippi River		1.73E-02	6	mrem
Liquid	Liver	2.19E-03	Teen	Mississippi River		1.10E-02	20	mrem
Skyshine	Total Body	7.59E+00	All	800	N	3.04E+01	25	mrem
40CFR190	Total Body (Gas + Liq+ Skyshine)	7.63E+00	All	800	N	3.05E+01	25	mrem

The doses as a result of the radiological effluents released from the Quad Cities Generating Station were a very small percentage of the allowable limits, with the exception of 40CFR190 whole body radiation which was calculated to be 30.5% of the 25 mrem/yr limit.

This report on the Radiological Environmental Monitoring Program (REMP) conducted for the Quad Cities Nuclear Power Station (QCNPS) by Exelon covers the period 01 January 2011 through 31 December 2011. During that time period, 1529 analyses were performed on 1415 samples. In assessing all the data gathered for this report and comparing these results with preoperational data, it was concluded that the operation of QCNPS had no adverse radiological impact on the environment.

On March 11, 2011 an earthquake off the Japanese islands produced a massive tsunami that caused a nuclear accident at four of the six Fukushima Daiichi reactors. In planning for the potential radioactive plume reaching the United States, Exelon Nuclear increased the sampling frequency and added additional analyses of select media from pathways that were expected to be the most sensitive to any increase in ambient radiation levels. Low level I-131 analyses and gamma spectroscopy analyses were performed on air particulates, air

iodine, and milk, as appropriate.

The resulting radioactive plume was first detected in the environs of Quad Cities Nuclear Power Station on March 18, 2011. The final date of positive detection was April 08, 2011. The radionuclide identified was Iodine-131. Maximum activity levels found by media were $92.5E-3$ pCi/m³ for air iodine. Samples collected were compared to offsite control locations to verify that these positive detections were not attributable to licensed activities at Quad Cities Station. All other radionuclides analyzed were below the MDC (Minimum Detectable Concentration).

The radioactive half-life of I-131 is about 8 days. This short half-life allowed the effects of this radioactive plume to subside over about 3 weeks. As of April 09, 2011 no further impacts from the Fukushima Daiichi accident were evident.

Surface water samples were analyzed for concentrations of gross beta, tritium, iron, nickel and gamma emitting nuclides. Ground water samples were analyzed for concentrations of tritium and gamma emitting nuclides. No fission or activation products were detected. Gross beta activities detected were consistent with those detected in previous years and consistent with the control stations.

Fish (commercially and recreationally important species) and sediment samples were analyzed for concentrations of gamma emitting nuclides. No fission or activation products were detected in fish or sediment samples. Occasionally Cs-137 is detected at very low levels (just above LLD) in sediment and is not distinguishable from background levels.

Air particulate samples were analyzed for concentrations of gross beta and gamma emitting nuclides. No fission or activation products were detected.

High sensitivity I-131 analyses were performed on air samples. No I-131 was detected with the exception of 27 samples which were positive for I-131. These positive results are directly attributed to the Fukushima event in March of 2011.

Cow milk samples were analyzed for concentrations of I-131 and gamma emitting nuclides. No I-131 was detected. Concentrations of naturally occurring isotopes (K-40 approximately 1400 pCi/L) were consistent with those detected in previous years. No fission or activation products were detected.

Food product samples were analyzed for concentrations of gamma emitting nuclides. No fission or activation products were detected.

Environmental gamma radiation measurements were performed quarterly using thermoluminescent dosimeters. Levels detected were consistent with those observed in previous years.

II. Introduction

The Quad Cities Nuclear Power Station (QCNPS), consisting of two 2,957 MWth boiling water reactors 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 northwestern Illinois, approximately 182 miles west of Chicago, Illinois.

This report covers those analyses performed by Teledyne Brown Engineering (TBE), Mirion Technologies, and Environmental Inc. (Midwest Labs) on samples collected during the period 1 January 2011 through 31 December 2011.

A. Objective of the REMP

The objectives of the REMP are to:

1. Provide data on measurable levels of radiation and radioactive materials in the site environs.
2. Evaluate the relationship between quantities of radioactive material released from the plant and resultant radiation doses to individuals from principal pathways of exposure.

B. Implementation of the Objectives

The implementation of the objectives is accomplished by:

1. Identifying significant exposure pathways.
2. Establishing baseline radiological data of media within those pathways.
3. Continuously monitoring those media before and during Station operation to assess Station radiological effects (if any) on man and the environment.

C. Radiation and Radioactivity

All matter is made of atoms. An atom is the smallest part into which matter can be broken down and still maintain all its chemical properties. Nuclear radiation is energy, in the form of waves or particles that is given off by unstable, radioactive atoms. Radioactive material exists naturally and has always been a part of our environment. The earth's crust, for example, contains radioactive uranium, radium, thorium, and potassium. Some radioactivity is a result of nuclear weapons testing. Examples of radioactive fallout that is normally present in environmental samples are

cesium-137 and strontium-90. Some examples of radioactive materials released from a nuclear power plant are cesium-137, iodine-131, strontium-90, and cobalt-60. Radiation is measured in units of millirem; much like temperature is measured in degrees. A millirem is a measure of the biological effect of the energy deposited in tissue. The natural and man-made radiation dose received in one year by the average American is 300 to 400 mrem (References 2, 3, 4 in Table II.D-1 below). Radioactivity is measured in curies. A curie is that amount of radioactive material needed to produce 37,000,000,000 nuclear disintegrations per second. This is an extremely large amount of radioactivity in comparison to environmental radioactivity. That is why radioactivity in the environment is measured in picocuries. One picocurie is equal to one trillionth of a curie.

D. Sources of Radiation

As mentioned previously, naturally occurring radioactivity has always been a part of our environment. Table II D-1 shows the sources and doses of radiation from natural and man-made sources.

Table II.D-1

Radiation Sources and Corresponding Doses ⁽¹⁾

NATURAL		MAN-MADE	
Source	Radiation Dose (millirem/year)	Source	Radiation Dose (millirem/year)
Internal, inhalation ⁽²⁾	228	Medical ⁽³⁾	300
External, space	33	Consumer ⁽⁴⁾	13
Internal, ingestion	29	Industrial ⁽⁵⁾	0.3
External, terrestrial	21	Occupational	0.5
		Weapons Fallout	<1
		Nuclear Power Plants	<1
Approximate Total	311	Approximate Total	314

(1) Information from NCRP Reports 160 and 94

(2) Primarily from airborne radon and its radioactive progeny

(3) Includes CT (147 mrem), nuclear medicine (77 mrem), interventional fluoroscopy (43 mrem) and conventional radiography and fluoroscopy (33 mrem)

(4) Primarily from cigarette smoking (4.6 mrem), commercial air travel (3.4 mrem), building materials (3.5 mrem), and mining and agriculture (0.8 mrem)

(5) Industrial, security, medical, educational, and research

Cosmic radiation from the sun and outer space penetrates the earth's atmosphere and continuously bombards us with rays and charged particles. Some of this cosmic radiation interacts with gases and particles in the atmosphere, making them radioactive in turn. These radioactive byproducts from cosmic ray bombardment are referred to as cosmogenic radionuclides. Isotopes such as beryllium-7 and carbon-14 are formed in this way. Exposure to cosmic and cosmogenic sources of radioactivity results in about 33 mrem of radiation dose per year.

Additionally, natural radioactivity is in our body and in the food we eat (about 29 millirem/yr), the ground we walk on (about 21 millirem/yr) and the air we breathe (about 228 millirem/yr). The majority of a person's annual dose results from exposure to radon and thoron in the air we breathe. These gases and their radioactive decay products arise from the decay of naturally occurring uranium, thorium and radium in the soil and building products such as brick, stone, and concrete. Radon and thoron levels vary greatly with location, primarily due to changes in the concentration of uranium and thorium in the soil. Residents at some locations in Colorado, New York, Pennsylvania, and New Jersey have a higher annual dose as a result of higher levels of radon/thoron gases in these areas. In total, these various sources of naturally-occurring radiation and radioactivity contribute to a total dose of about 311 mrem per year.

In addition to natural radiation, we are normally exposed to radiation from a number of man-made sources. The single largest doses from man-made sources result from therapeutic and diagnostic applications of x-rays and radiopharmaceuticals. The annual dose to an individual in the U.S. from medical and dental exposure is about 300 mrem. Consumer products, such as televisions and smoke detectors, contribute about 13 mrem/yr. Much smaller doses result from weapons fallout (less than 1 mrem/yr) and nuclear power plants. Typically, the average person in the United States receives about 314 mrem per year from man-made sources.

III. Program Description

A. Sample Collection

Samples for the QCNPS REMP were collected for Exelon Nuclear by Environmental Inc. (Midwest Labs). This section describes the general sampling methods used by Environmental Inc. to obtain environmental samples for the QCNPS REMP in 2011. Sample locations and descriptions can be found in Table B-1 and Figures B-1 and B-2, Appendix B.

Aquatic Environment

The aquatic environment was evaluated by performing radiological analyses on samples of surface water, ground water, fish, and sediment. Surface water samples were collected weekly from two locations, Q-33 and Q-34 (Control). Ground water samples were collected quarterly from two locations, Q-35 and Q-36. All water samples were collected in new containers, which were rinsed with source water prior to collection.

Fish samples comprising the edible portions of commercially and recreationally important species were collected semiannually at two locations, Q-24 and Q-29 (Control). Sediment samples composed of recently deposited substrate were collected at two locations semiannually, Q-39 and Q-40 (Control).

Atmospheric Environment

The atmospheric environment was evaluated by performing radiological analyses on samples of air particulate, and airborne iodine. Airborne iodine and particulate samples were collected and analyzed at ten locations (Q-01, Q-02, Q-03, Q-04, Q-13, Q-16, Q-37, Q-38, Q-41 and Q-42). The control location was Q-42. Airborne iodine and particulate samples were obtained at each location, using a vacuum pump with charcoal and glass fiber filters attached. The pumps were run continuously and sampled air at the rate of approximately one cubic foot per minute. The air particulate filters and air iodine samples were replaced weekly and sent to the laboratory for analysis.

Terrestrial Environment

The terrestrial environment was evaluated by performing radiological analyses on samples of milk and food product. Milk samples were collected biweekly at one location (Q-26) from April through October, and monthly from November through March. All samples were collected in new plastic containers from the bulk tank, preserved with sodium bisulfite, and shipped promptly to the laboratory.

Food products were collected annually in July at five locations (Q-Quad 1 Control, Q-Quad 1, Q-Quad 2, Q-Quad 3, and Q-Quad 4). The control location was Q-Quad 1 - Control. Various types of broadleaf and root vegetables were collected and placed in new plastic bags, and sent to the laboratory for analysis.

Ambient Gamma Radiation

Direct radiation measurements were made using thermoluminescent

dosimeters (TLD). Each location consisted of 2 TLD sets. The TLD locations were placed on and around the QCNPS site as follows: An inner ring consisting of 15 locations (Q-101, Q-102, Q-103, Q-104, Q-105, Q-106, Q-107, Q-108, Q-109, Q-111, Q-112, Q-113, Q-114, Q-115 and Q-116). These TLD are located in 15 of the 16 meteorological sectors in the general area of the site boundary (approximately 0.1 – 3 miles from the site). There are no TLDs located in the SSW sector because this sector is located over water.

An outer ring consisting of 16 locations (Q-201, Q-202, Q-203, Q-204, Q-205, Q-206, Q-207, Q-208, Q-209, Q-210, Q-211, Q-212, Q-213, Q-214, Q-215 and Q-216). These TLDs are located in each of the 16 meteorological sectors (approximately 6.0 – 8.0 km from the site)

An other set consisting of nine locations (Q-01, Q-02, Q-03, Q-04, Q-13, Q-16, Q-37, Q-38 and Q-41). The locations are at each of the air sample stations around the site.

The balance of one location (Q-42) is the control site.

The specific TLD locations were determined by the following criteria:

1. The presence of relatively dense population;
2. Site meteorological data taking into account distance and elevation for each of the sixteen 22 1/2 degree sectors around the site, where estimated annual dose from QCNPS, if any, would be most significant;
3. On hills free from local obstructions and within sight of the stack (where practical);
4. Near the closest dwelling to the stack in the prevailing downwind direction.

The TLDs were exchanged quarterly and sent to Mirion Technologies for analysis.

B. Sample Analysis

This section describes the general analytical methodologies used by TBE and Environmental Inc. (Midwest Labs) to analyze the environmental samples for radioactivity for the QCNPS REMP in 2011 and the type of analyses. The analytical procedures used by the laboratories are listed in Table B-2.

In order to achieve the stated objectives, the current program includes the

following analyses:

1. Concentrations of beta emitters in surface water and air particulates.
2. Concentrations of gamma emitters in ground and surface water, air particulates, milk, fish, sediment and vegetation.
3. Concentrations of tritium in ground and surface water.
4. Concentrations of I-131 in air and milk.
5. Ambient gamma radiation levels at various site environs.
6. Concentrations of Fe-55 and Ni-63 in surface water.

C. Data Interpretation

The radiological and direct radiation 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. In addition, data were compared to previous years' operational data for consistency and trending. 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 defined as the smallest concentration of radioactive material in a sample that would yield a net count (above background) that would be detected with only a 5% probability of falsely concluding that a blank observation represents a "real" signal. The LLD is intended as an *a priori* (a before the fact) estimate of a system (including instrumentation, procedure and sample type) and not as an *a posteriori* (after the fact) criteria for the presence of activity. All analyses were designed to achieve the required QCNPS detection capabilities for environmental sample analysis.

The minimum detectable concentration (MDC) is defined above with the exception that the measurement is an *a posteriori* (after the fact) estimate of the presence of activity.

2. Net Activity Calculation and Reporting of Results

Net activity for a sample is calculated by subtracting background activity from the sample activity. Since the REMP measures extremely small changes in radioactivity in the environment, background variations may result in sample activity being lower

than the background activity effecting a negative number. An MDC is reported in all cases where positive activity was not detected. Gamma spectroscopy results for each type of sample were grouped as follows:

For surface water, groundwater and vegetation 12 nuclides, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Zr-95, Nb-95, I-131, Cs-134, Cs-137, Ba-140, and La-140 were reported.

For fish, sediment, air particulate and milk 11 nuclides, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, Cs-134, Cs-137 and Ba-140 and La-140 were reported.

For air iodine, one nuclide, I-131 was reported

Means and standard deviations of the results were calculated. The standard deviations represent the variability of measured results for different samples rather than single analysis uncertainty.

D. Program Exceptions

For 2011 the QCNPS REMP had a sample recovery rate in excess of 99%. Sample anomalies and missed samples are listed in the tables below:

Table D-1 LISTING OF SAMPLE ANOMALIES

Sample Type	Location Code	Collection Date	Reason
A/I	Q-16	01/21/11	Low reading of 164.8 hours due to power outage from ice storm.
A/I	Q-41	02/04/11	Pump running; meter stopped; estimated run time of 171.0 hours. Meter reset.
A/I	Q-03	02/11/11	Timer malfunction; timer replaced. Estimated run time of 168.6 hours.
A/I	Q-37	02/18/11	Timer malfunction; timer replaced. Estimated run time of 167.8 hours.
A/I	Q-03	02/18/11	Pump malfunction; pump replaced. Estimated flow rate of 62 CFH. Filter was white.

Table D-1 LISTING OF SAMPLE ANOMALIES (continued)

Sample Type	Location Code	Collection Date	Reason
A/I	Q-41	03/04/11	Low reading of 66.7 hours due to power outage from storms.
A/I	Q-42	03/04/11	Low reading of 94.7 hours due to power outage from storms.
A/I	Q-03	03/18/11	Low reading of 87.9 hours due to pump malfunction; pump removed for repair; pump replaced.
A/I	Q-37	04/01/11	Low reading of 164.1 hours due to power outage.
A/I	Q-03	04/08/11	Low reading of 33.3 hours due to possible lightning strike; ground fault reset.
A/I	Q-37	05/06/11	Low reading of 39.8 hours due to tripped ground fault; ground fault reset.
A/I	Q-03	05/06/11	Timer malfunction; Estimated time of 171.3 hours.
A/I	Q-03	05/13/11	Timer replaced; estimated time of 171.2 hours.
A/I	Q-03	05/27/11	Pump not running; reset ground fault.
A/I	Q-02	06/24/11	Low reading of 65.8 hours due to power outage from storm.
A/I	Q-37	07/15/11	Low reading of 68.7 hours due to tripped ground fault; possible lightning strike during storm.
A/I	Q-41	07/15/11	Low reading of 68.0 hours due to power outage from storm.
A/I	Q-38	07/22/11	Low reading of 168.0 hours due to power outage from storm. Estimated flowrate of 60 CFH.

Table D-1 LISTING OF SAMPLE ANOMALIES (continued)

Sample Type	Location Code	Collection Date	Reason
A/I	Q-02	08/05/11	Low reading of 65.7 hours possibly due to interrupted timer run. Filter appeared to have 7-day particulate accumulation. Estimated time of 168.6 hours.
A/I	Q-13	08/26/11	Low reading of 86.6 hours due to power outage from storm.
A/I	Q-41	08/26/11	Low reading of 86.8 hours due to power outage from storm.
A/I	Q-37	10/14/11	Pump off; low reading of 39.2 hours due to ground fault trip. Reset ground fault.
A/I	Q-42	10/21/11	Low reading of 165.8 hours due to power outage caused by auto accident.
A/I	Q-42	12/16/11	V_{\max} below 20; collector replaced pump on 12/17/11.

Table D-2 LISTING OF MISSED SAMPLES

Sample Type	Location Code	Collection Date	Reason
SW	Q-33	01/07/11 – 02/11/11	No sample; water frozen
SW	Q-34	01/07/11 – 02/11/11	No sample; water frozen
AI	Q-37	05/27/11	Air iodine cartridge damaged in removal from holder; charcoal particles lost.
A/I	Q-03	06/03/11	Low reading of 3.2 hours due to ground fault malfunction; not enough hours for viable sample; no particulate on filters.
A/I	Q-41	06/03/11	Low reading of 56.0 hours due to power outage from storm.

Table D-2 LISTING OF MISSED SAMPLES (continued)

Sample Type	Location Code	Collection Date	Reason
A/I	Q-03	06/10/11	Low reading of 48.1 hours due to pump malfunction; pump replaced on 06/08/11.
A/I	Q-04	07/29/11	Power out; low reading of 18.1 hours due to power outage from storm. Estimated flowrate of 60 CFH.
A/I	Q-13	07/29/11	Low reading of 13.8 hours due to power outage from storm.
A/I	Q-37	07/29/11	Pump off; low reading of 19.1 hours due to ground fault trip from storm. Reset ground fault.
A/I	Q-04	08/05/11	Low reading due to power restoration on 08/03/11.
A/I	Q-37	09/09/11	Pump off; low reading of 26.3 hours due to ground fault trip from storm. Reset ground fault.
A/I	Q-38	09/09/11	Pump off; low reading of 26.2 hours due to ground fault trip from storm. Reset ground fault.
A/I	Q-38	09/16/11	Low reading of 2.6 hours due to tripped ground fault. Reset ground fault.
A/I	Q-38	11/11/11	Low reading of 0.9 hours due to tripped ground fault. Reset ground fault.
A/I	Q-38	11/18/11	Low reading of 0.9 hours due to pump malfunction; collector replaced pump.

The overall sample recovery rate indicates that the appropriate procedures and equipment are in place to assure reliable program

implementation.

E. Program Changes

Starting in the second quarter of 2011, surface water samples are also being analyzed for Iron-55 and Nickel-63.

Air particulate/iodine control location Q-07 has been removed from the program for 2011. Air particulate/iodine location Q-42 has been installed as the new control location.

IV. Results and Discussion

A. Aquatic Environment

1. Surface Water

Samples were taken weekly and composited monthly at two locations (Q-33 and Q-34). Of these locations only Q-33, located downstream, could be affected by Quad Cities' effluent releases. The following analyses were performed.

Gross Beta

Samples from all locations were analyzed for concentrations of gross beta (Table C-1.1, Appendix C). Gross beta activity was detected in all 22 samples. The values ranged from 3.0 to 7.6 pCi/L. Concentrations detected were consistent with those detected in previous years and the control location (Figure C-1, Appendix C). The required LLD was met.

Tritium

Quarterly composites of weekly collections were analyzed for tritium activity (Table C-1.2, Appendix C). No tritium activity was detected (Figure C-2, Appendix C). The 2000 pCi/L OCDM and contractually required 200 pCi/L LLDs were met.

Iron and Nickel

Quarterly composites of monthly collections were analyzed for Fe-55 and Ni-63 (Table C-1.2, Appendix C). No Fe-55 or Ni-63 was detected. The required LLD was met.

Gamma Spectrometry

Samples from both locations were analyzed for gamma emitting nuclides (Table C-I.3, Appendix C). No nuclides were detected and all required LLDs were met.

2. Ground Water

Quarterly grab samples were collected at two locations (Q-35 and Q-36). Both locations could be affected by Quad Cities' effluent releases. The following analyses were performed:

Tritium

Quarterly grab samples from the locations were analyzed for tritium activity (Table C-II.1, Appendix C). No tritium activity was detected (Figure C-3, Appendix C). The 2000 pCi/L OCDM and contractually required 200 pCi/L LLDs were met.

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides (Table C-II.2, Appendix C). No nuclides were detected and all required LLDs were met.

3. Fish

Fish samples comprised of various commercially and recreationally important species were collected at two locations (Q-24 and Q-29) semiannually. Location Q-24 could be affected by Quad Cities' effluent releases. The following analysis was performed:

Gamma Spectrometry

The edible portion of fish samples from both locations was analyzed for gamma emitting nuclides (Table C-III.1, Appendix C). No nuclides were detected and all required LLDs were met.

4. Sediment

Aquatic sediment samples were collected at two locations (Q-39 and Q-40) semiannually. The location Q-39, located downstream, could be affected by Quad Cities' effluent releases. The following analysis was performed:

Gamma Spectrometry

Sediment samples from Q-39 and Q-40 were analyzed for gamma emitting nuclides (Table C-IV.1, Appendix C). No nuclides were detected and all required LLDs were met.

B. Atmospheric Environment

1. Airborne

a. Air Particulates

Continuous air particulate samples were collected from ten locations on a weekly basis. The ten locations were separated into three groups: Near-field samplers within 4 km (2.5 miles) of the site (Q-01, Q-02, Q-03 and Q-04), far-field samplers between 4 and 10 km (2.5 – 6.2 miles) from the site (Q-13, Q-16, Q-37, Q-38, Q-41) and the Control sampler between 10 and 30 km (6.2 – 18.6 miles) from the site (Q-42). The following analyses were performed:

Gross Beta

Weekly samples were analyzed for concentrations of beta emitters (Table C-V.1 and C-V.2, Appendix C).

Detectable gross beta activity was observed at all locations. Comparison of results among the four groups aid in determining the effects, if any, resulting from the operation of QCNPS. The results from the near-field locations (Group I) ranged from 6 to 41 E-03 pCi/m³ with a mean of 21 E-03 pCi/m³. The results from the far-field locations (Group II) ranged from 5 to 45 E-03 pCi/m³ with a mean of 21 E-03 pCi/m³. The results from the Control location (Group III) ranged from 8 to 38 E-03 pCi/m³ with a mean of 22 E-03 pCi/m³. Comparison of the 2011 air particulate data with previous year's data indicate no effects from the operation of QCNPS. In addition comparisons of the weekly mean values for 2011 indicate no notable differences among the three groups (Figures C-4 through C-6, Appendix C).

Gamma Spectrometry

Weekly samples were composited quarterly and analyzed for gamma emitting nuclides (Table C-V.3, Appendix C). No

nuclides were detected and all required LLDs were met. Additional sampling occurred in the weeks immediately following the Fukushima event in March of 2011. No nuclides were detected and all required LLDs were met.

b. Airborne Iodine

Continuous air samples were collected from ten locations (Q-01, Q-02, Q-03, Q-04, Q-13, Q-16, Q-37, Q-38 Q-41 and Q-42) and analyzed weekly for I-131 (Table C-VI.1, Appendix C). All results were less than the MDC with the exception of 27 samples which were positive for I-131. These positive results are directly attributed to the Fukushima event in March of 2011. The required LLD was met.

2. Terrestrial

a. Milk

Samples were collected from one location (Q-26) biweekly April through October and monthly November through March. The following analyses were performed:

Iodine-131

Milk samples from the location were analyzed for concentrations of I-131 (Table C-VII.1, Appendix C). No I-131 was detected and the LLD was met.

Gamma Spectrometry

Each milk sample was analyzed for concentrations of gamma emitting nuclides (Table C-VII.2, Appendix C). No nuclides were detected and all required LLDs were met.

b. Food Products

Food product samples were collected at four locations plus a control location (Q-Quad 1 - Control, Q-Quad 1, Q-Quad 2, Q-Quad 3, and Q-Quad 4) annually during growing season. Four locations, (Q-Quad 1, Q-Quad 2, Q-Quad 3 and Q-Quad 4) could be affected by Quad Cities' effluent releases. The following analysis was performed:

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides (Table C–VIII.1, Appendix C). No nuclides were detected and all required LLDs were met.

C. Ambient Gamma Radiation

Ambient gamma radiation levels were measured utilizing thermoluminescent dosimeters. Forty-one TLD locations were established around the site. Results of TLD measurements are listed in Tables C-IX.1 to C-IX.3, Appendix C.

Most of the TLD measurements were below 30 mR/quarter, with a range of 16 to 31 mR/quarter. A comparison of the Inner Ring, Outer Ring and Other data to the Control Location data, indicate that the ambient gamma radiation levels from all the locations were comparable.

D. Independent Spent Fuel Storage Installation

QCNPS commenced use of an Independent Spent Fuel Storage Installation (ISFSI) in Dec 2005. There were no measurable changes in ambient gamma and radiation level as a result of ISFSI operations.

E. Land Use Survey

A Land Use Survey conducted during August 2011 around QCNPS was performed by Environmental Inc. (Midwest Labs) for Exelon Nuclear to comply with the Quad Cities' Offsite Dose Calculation Manual. The purpose of the survey was to document the nearest resident and milk producing animals in each of the sixteen 22 ½ degree sectors around the site. The results from the land use census have not identified any locations, which yield a calculated dose or dose commitment, via the same pathway, that is at least 20% greater than at a location from which samples are currently being obtained. The results of this survey are summarized below.

Distance in Miles from QCNPS			
Sector	Residence Miles	Livestock Miles	Milk Farm Miles
N	0.6	2.7	-
NNE	3.8	3.1	-
NE	1.3	-	-
ENE	2.9	2.9	-
E	2.0	2.7	-
ESE	2.8	3.1	3.1
SE	2.5	3.2	-
SSE	1.1	3.6	6.6, 11.5
S	0.8	1.6	-
SSW	3.2	3.4	-
SW	2.9	3.3	-
WSW	2.2	2.7	-
W	2.6	4.3	4.6
WNW	2.7	3.8	-
NW	2.6	4.7	-
NNW	2.1	2.2	-

Of the above listed Milk Farms, only the farm located at 3.1 miles ESE of QCNPS, listed in the sample results section as Bill Stanley Dairy, has elected to participate in the QCNPS REMP program. Participation by local farmers is voluntary.

F. Errata Data

The following errors were noted during a review of the 2009 and 2010 Annual Radiological Environmental Operating Reports (AREOR):

1. For the 2009 AREOR: In Part I, "Summary and Conclusions", it is stated that "1,436 analyses were performed on 1,534 samples". These numbers were reversed. In reality, 1,534 analyses were performed on 1,436 samples. This is a documentation error only, and as such does not affect the sample results.
2. For the 2009 AREOR: In Part IV, "Results and Discussion", Section E, "Land Use Survey", it was noted that the milk farm identified at 11.5 miles SSE from QCNPS was listed in the incorrect sector. This milk farm is actually located in the ESE sector. This did not affect sample results as this farm has declined to participate in the REMP program.
3. For the 2010 AREOR: In Part I, "Summary and Conclusions", it is stated that "1,425 analyses were performed on 1,519 samples". These numbers were reversed. In reality, 1,519 analyses were performed on 1,425 samples. This is a documentation error only, and as such does not affect the sample results.

G. Summary of Results – Inter-Laboratory Comparison Program

The primary and secondary laboratories analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation and water matrices (Appendix D). The PE samples, supplied by Analytics Inc., Environmental Resource Associates (ERA) and DOE's Mixed Analyte Performance Evaluation Program (MAPEP), were evaluated against the following pre-set acceptance criteria:

1. Analytics Evaluation Criteria

Analytics' evaluation report provides a ratio of laboratory results and Analytics' known value. Since flag values are not assigned by Analytics, TBE-ES evaluates the reported ratios based on internal QC requirements, which are based on the DOE MAPEP criteria.

2. ERA Evaluation Criteria

ERA's evaluation report provides an acceptance range for control and warning limits with associated flag values. ERA's acceptance limits are established per the USEPA, NELAC, state specific PT program requirements or ERA's SOP for the Generation of Performance Acceptance Limits, as applicable. The acceptance limits are either determined by a regression equation specific to each analyte or a fixed percentage limit promulgated under the appropriate regulatory document.

3. DOE Evaluation Criteria

MAPEP's evaluation report provides an acceptance range with associated flag values.

The MAPEP defines three levels of performance: Acceptable (flag = "A"), Acceptable with Warning (flag = "W"), and Not Acceptable (flag = "N"). Performance is considered acceptable when a mean result for the specified analyte is $\pm 20\%$ of the reference value. Performance is acceptable with warning when a mean result falls in the range from $\pm 20\%$ to $\pm 30\%$ of the reference value (i.e., $20\% < \text{bias} < 30\%$). If the bias is greater than 30%, the results are deemed not acceptable.

For the primary laboratory, 14 out of 18 analytes met the specified acceptance criteria. Three analytes did not meet the specified acceptance criteria for the following reason:

1. Teledyne Brown Engineering's Analytics March 2011 Cr-51 in milk result of 398 pCi/L was higher than the known value of 298 pCi/L,

resulting in a found to known ratio of 1.34. NCR 11-13 was initiated to investigate this failure. There was a slightly high bias in all the gamma activities. The June gamma results in milk did not show a high bias. No further action was required.

2. Teledyne Brown Engineering's ERA May 2011 Gross Alpha in water result of 64.1 pCi/L was higher than the known value of 50.1 pCi/L, which exceeded the upper control limit of 62.9 pCi/L. NCR 11-08 was initiated to investigate this failure. The solids on the planchet exceeded 100 mg, which was beyond the range of the efficiency curve.

Teledyne Brown Engineering's MAPEP March 2011 Gross Alpha in air particulate result of 0.101 Bq/sample was lower than the known value of 0.659 Bq/sample, which exceeded the lower control limit of 0.198 Bq/sample. NCR 11-11 was initiated to investigate this failure. The air particulate filter was counted on the wrong side.

3. Teledyne Brown Engineering's ERA November 2011 Sr-89 in water result of 81.0 pCi/L was higher than the known value of 69.7 pCi/L, which exceeded the upper control limit of 77.9 pCi/L. NCR 11-16 was initiated to investigate this failure. The TBE reported value to known ratio of 1.16 fell within the acceptable range of $\pm 20\%$, which TBE considers acceptable.
4. Teledyne Brown Engineering's MAPEP March 2011 Sr-90 in soil, air particulate and vegetation were non-reports that were evaluated as failed. NCR 11-11 was initiated to investigate these failures. MAPEP evaluated the non-reports as failed due to not reporting a previously reported analyte.

For the secondary laboratory, Environmental, Inc., 12 out of 14 analytes met the specified acceptance criteria.

1. Environmental Inc.'s ERA October 2011 Cs-134 in water result of 38.8 pCi/L was higher than the known value of 33.4 pCi/L, which exceeded the upper control limit of 36.7 pCi/L. The sample was reanalyzed. The reanalyzed result of 32.9 was acceptable.
2. Environmental Inc.'s MAPEP February 2011 Sr-90 in air particulate result of 1.89 Bq/sample was higher than the known value of 1.36 Bq/sample, which exceeded the upper control limit of 1.77 Bq/sample. No errors were found in the calculation or procedure. The reanalyzed result of 1.73 Bq/sample was acceptable.
3. Environmental Inc.'s MAPEP August 2011 Sr-90 in soil result of 219.4 Bq/kg, less than the known value of 320 Bq/kg, was below the lower control limit of 224 Bq/kg. The sample was reanalyzed in triplicate through a strontium column. The reanalyzed result of 304.2 Bq/kg was acceptable.

The Inter-Laboratory Comparison Program provides evidence of “in control” counting systems and methods, and that the laboratories are producing accurate and reliable data.

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APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT SUMMARY

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**TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR
QUAD CITIES NUCLEAR POWER STATION, 2011**

NAME OF FACILITY: QUAD CITIES LOCATION OF FACILITY: CORDOVA IL				DOCKET NUMBER: 50-254 & 50-265 REPORTING PERIOD: ANNUAL 2011						
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION			
SURFACE WATER (PCI/LITER)	GR-B	22	4	4.7 (11/11) (3.0/6.9)	5.1 (11/11) (3.3/7.6)	5.1 (11/11) (3.3/7.6)	Q-34 CONTROL CAMANCHE - UPSTREAM 4.4 MILES NNE OF SITE			0
	H-3	8	2000	<LLD	<LLD	-				0
	FE-55	6	200	<LLD	<LLD	-				0
	NI-63	6	5	<LLD	<LLD	-				0
	GAMMA MN-54	22	15	<LLD	<LLD	-				0
	CO-58		15	<LLD	<LLD	-				0
	FE-59		30	<LLD	<LLD	-				0
	CO-60		15	<LLD	<LLD	-				0

MEAN AND RANGE BASED ON DETECTABLE MEASUREMENTS ONLY (M)
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

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NAME OF FACILITY: QUAD CITIES LOCATION OF FACILITY: CORDOVA IL				DOCKET NUMBER: 50-254 & 50-265 REPORTING PERIOD: ANNUAL 2011					
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
SURFACE WATER (PCI/LITER)	ZN-65		30	<LLD	<LLD	-			0
	NB-95		15	<LLD	<LLD	-			0
	ZR-95		30	<LLD	<LLD	-			0
	I-131		15	<LLD	<LLD	-			0
	CS-134		15	<LLD	<LLD	-			0
	CS-137		18	<LLD	<LLD	-			0
	BA-140		60	<LLD	<LLD	-			0
	LA-140		15	<LLD	<LLD	-			0

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MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
GROUND WATER (PCI/LITER)	H-3	8	2000	<LLD	NA	-			0
	GAMMA MN-54	8	15	<LLD	NA	-			0
	CO-58		15	<LLD	NA	-			0
	FE-59		30	<LLD	NA	-			0
	CO-60		15	<LLD	NA	-			0
	ZN-65		30	<LLD	NA	-			0
	NB-95		15	<LLD	NA	-			0
	ZR-95		30	<LLD	NA	-			0

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MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
GROUND WATER (PCI/LITER)	I-131		15	<LLD	NA	-			0
	CS-134		15	<LLD	NA	-			0
	CS-137		18	<LLD	NA	-			0
	BA-140		60	<LLD	NA	-			0
	LA-140		15	<LLD	NA	-			0
FISH (PCI/KG WET)	GAMMA MN-54	8	130	<LLD	<LLD	-			0
	CO-58		130	<LLD	<LLD	-			0
	FE-59		260	<LLD	<LLD	-			0

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MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
FISH (PCI/KG WET)	CO-60		130	<LLD	<LLD	-			0
	ZN-65		260	<LLD	<LLD	-			0
	NB-95		NA	<LLD	<LLD	-			0
	ZR-95		NA	<LLD	<LLD	-			0
	CS-134		130	<LLD	<LLD	-			0
	CS-137		150	<LLD	<LLD	-			0
	BA-140		NA	<LLD	<LLD	-			0
	LA-140		NA	<LLD	<LLD	-			0

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MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
SEDIMENT (PCI/KG DRY)	GAMMA MN-54	4	NA	<LLD	<LLD	-			0
	CO-58		NA	<LLD	<LLD	-			0
	FE-59		NA	<LLD	<LLD	-			0
	CO-60		NA	<LLD	<LLD	-			0
	ZN-65		NA	<LLD	<LLD	-			0
	NB-95		NA	<LLD	<LLD	-			0
	ZR-95		NA	<LLD	<LLD	-			0
	CS-134		150	150	<LLD	<LLD	-		0

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FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

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MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
SEDIMENT (PCI/KG DRY)	CS-137		180	<LLD	<LLD	-			0
	BA-140		NA	<LLD	<LLD	-			0
	LA-140		NA	<LLD	<LLD	-			0
AIR PARTICULATE (E-3 PCI/CU.METER)	GR-B	507	10	21 (450/455) (5/45)	22 (51/52) (8/38)	23 (50/51) (9/45)	Q-13 INDICATOR PRINCETON 4.7 MILES SW OF SITE		0
	GAMMA MN-54	40	NA	<LLD	<LLD	-			0
	CO-58		NA	<LLD	<LLD	-			0
	FE-59		NA	<LLD	<LLD	-			0
	CO-60		NA	<LLD	<LLD	-			0

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FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

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NAME OF FACILITY: QUAD CITIES LOCATION OF FACILITY: CORDOVA IL				DOCKET NUMBER: 50-254 & 50-265 REPORTING PERIOD: ANNUAL 2011					
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
AIR PARTICULATE (E-3 PCI/CU.METER)	ZN-65		NA	<LLD	<LLD	-			0
	NB-95		NA	<LLD	<LLD	-			0
	ZR-95		NA	<LLD	<LLD	-			0
	CS-134		50	<LLD	<LLD	-			0
	CS-137		60	<LLD	<LLD	-			0
	BA-140		NA	<LLD	<LLD	-			0
	LA-140		NA	<LLD	<LLD	-			0
AIR IODINE (E-3 PCI/CU.METER)	GAMMA I-131	504	70	70 (24/452) (40/138)	51 (3/52) (36/66)	95 (3/49) (69/138)	Q-03 INDICATOR ONSITE 3 0.6 MILES S OF SITE	0	

MEAN AND RANGE BASED ON DETECTABLE MEASUREMENTS ONLY (M)
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

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NAME OF FACILITY: QUAD CITIES LOCATION OF FACILITY: CORDOVA IL				DOCKET NUMBER: 50-254 & 50-265 REPORTING PERIOD: ANNUAL 2011					
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
MILK (PCI/LITER)	I-131	20	1	<LLD	NA	-			0
	GAMMA MN-54	20	NA	<LLD	NA	-			0
	CO-58		NA	<LLD	NA	-			0
	FE-59		NA	<LLD	NA	-			0
	CO-60		NA	<LLD	NA	-			0
	ZN-65		NA	<LLD	NA	-			0
	NB-95		NA	<LLD	NA	-			0
	ZR-95		NA	<LLD	NA	-			0

MEAN AND RANGE BASED ON DETECTABLE MEASUREMENTS ONLY (M)
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

**TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR
QUAD CITIES NUCLEAR POWER STATION, 2011**

NAME OF FACILITY: QUAD CITIES LOCATION OF FACILITY: CORDOVA IL				DOCKET NUMBER: 50-254 & 50-265 REPORTING PERIOD: ANNUAL 2011					
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
MILK (PCI/LITER)	CS-134		15	<LLD	NA	-			0
	CS-137		18	<LLD	NA	-			0
	BA-140		60	<LLD	NA	-			0
	LA-140		15	<LLD	NA	-			0
VEGETATION (PCI/KG WET)	GAMMA MN-54	10	NA	<LLD	<LLD	-			0
	CO-58		NA	<LLD	<LLD	-			0
	FE-59		NA	<LLD	<LLD	-			0
	CO-60		NA	<LLD	<LLD	-			0

MEAN AND RANGE BASED ON DETECTABLE MEASUREMENTS ONLY (M)
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

**TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR
QUAD CITIES NUCLEAR POWER STATION, 2011**

NAME OF FACILITY: QUAD CITIES LOCATION OF FACILITY: CORDOVA IL				DOCKET NUMBER: 50-254 & 50-265 REPORTING PERIOD: ANNUAL 2011					
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
VEGETATION (PCI/KG WET)	ZN-65		NA	<LLD	<LLD	-			0
	NB-95		NA	<LLD	<LLD	-			0
	ZR-95		NA	<LLD	<LLD	-			0
	I-131		60	<LLD	<LLD	-			0
	CS-134		60	<LLD	<LLD	-			0
	CS-137		80	<LLD	<LLD	-			0
	BA-140		NA	<LLD	<LLD	-			0
	LA-140		NA	<LLD	<LLD	-			0

MEAN AND RANGE BASED ON DETECTABLE MEASUREMENTS ONLY (M)
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

**TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR
QUAD CITIES NUCLEAR POWER STATION, 2011**

NAME OF FACILITY: QUAD CITIES				DOCKET NUMBER: 50-254 & 50-265					
LOCATION OF FACILITY: CORDOVA IL				REPORTING PERIOD: ANNUAL 2011					
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
DIRECT RADIATION (MILLI-ROENTGEN/QTR.)	TLD-QUARTERLY	332	NA	24 (324/324) (16/31)	24 (8/8) (18/28)	28 (4/4) (22/31)	Q-211-1 INDICATOR		0
							4.5 MILES SW		

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MEAN AND RANGE BASED ON DETECTABLE MEASUREMENTS ONLY (M)
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

APPENDIX B

LOCATION DESIGNATION, DISTANCE & DIRECTION, AND SAMPLE COLLECTION & ANALYTICAL METHODS

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TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Quad Cities Nuclear Power Station, 2011

Location	Location Description	Distance & Direction From Site
<u>A. Surface Water</u>		
Q-33	Cordova (indicator)	3.1 miles SSW
Q-34	Camanche, Upstream (control)	4.4 miles NNE
<u>B. Ground/Well Water</u>		
Q-35	McMillan Well (indicator)	1.5 miles S
Q-36	Cordova Well (indicator)	3.3 miles SSW
<u>C. Milk - bi-weekly / monthly</u>		
Q-26	Bill Stanley Dairy (indicator)	3.5 miles ESE
<u>D. Air Particulates / Air Iodine</u>		
Q-01	Onsite 1 (indicator)	0.5 miles N
Q-02	Onsite 2 (indicator)	0.4 miles ENE
Q-03	Onsite 3 (indicator)	0.6 miles S
Q-04	Nitrin (indicator)	1.7 miles NE
Q-13	Princeton (indicator)	4.7 miles SW
Q-16	Low Moor (indicator)	5.7 miles NNW
Q-37	Meredosia Road (indicator)	4.4 miles ENE
Q-38	Fuller Road (indicator)	4.7 miles E
Q-41	Camanche (indicator)	4.3 miles NNE
Q-42	LeClaire (control)	8.7 miles SSW
<u>E. Fish</u>		
Q-24	Pool #14 of Mississippi River, Downstream (indicator)	0.5 miles SW
Q-29	Mississippi River, Upstream (control)	1.0 miles N
<u>F. Sediment</u>		
Q-39	Cordova, Downstream on Mississippi River (indicator)	0.8 miles SSW
Q-40	North of Albany, Upstream on Mississippi River(control)	8.9 miles NE
<u>G. Food Products</u>		
Quadrant 1	Ken DeBaille	2.3 miles ENE
Quadrant 2	Dale Nimmic	3.0 miles ESE
Quadrant 3	Amy Johnston	1.8 miles S
Quadrant 4	Mike Fawcett	4.5 miles NW
Control	Charles Leavens	9.5 miles NE
<u>H. Environmental Dosimetry - TLD</u>		
<u>Inner Ring</u>		
Q-101-1		0.6 miles N
Q-101-2		0.9 miles N
Q-102-1		1.3 miles NNE
Q-102-3		1.4 miles NNE
Q-103-1 and -2		1.2 miles NE
Q-104-1		1.1 miles ENE
Q-104-2		0.9 miles ENE
Q-105-1 and -2		0.8 miles E
Q-106-2 and -3		0.7 miles ESE
Q-107-2		0.7 miles SE
Q-107-3		0.8 miles SE
Q-108-1		1.0 miles SSE
Q-108-2		0.9 miles SSE

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Quad Cities Nuclear Power Station, 2011

Location	Location Description	Distance & Direction From Site
<u>H. Environmental Dosimetry – TLD (continued)</u>		
<u>Inner Ring</u>		
Q-109-1		0.9 miles S
Q-109-2		1.2 miles S
Q-111-1		2.6 miles SW
Q-111-2		2.5 miles SW
Q-112-1		2.5 miles WSW
Q-112-2		2.2 miles WSW
Q-113-1 and -2		2.5 miles W
Q-114-1		2.1 miles WNW
Q-114-2		2.5 miles WNW
Q-115-1		2.6 miles NW
Q-115-2		2.3 miles NW
Q-116-1		2.3 miles NNW
Q-116-3		2.4 miles NNW
<u>Outer Ring</u>		
Q-202-1		4.4 miles NNE
Q-202-2		4.8 miles NNE
Q-203-1		4.7 miles NE
Q-203-2		5.0 miles NE
Q-204-1		4.7 miles ENE
Q-204-2		4.5 miles ENE
Q-205-1		4.7 miles E
Q-205-4		4.8 miles E
Q-206-1 and -2		4.8 miles ESE
Q-207-1 and -4		4.7 miles SE
Q-208-1		4.3 miles SSE
Q-208-2		4.9 miles SSE
Q-209-1 and -4		4.7 miles S
Q-210-1 and -4 *		4.1 miles SSW
Q-210-5		3.3 miles SSW
Q-211-1 and -2		4.5 miles SW
Q-212-1		5.4 miles WSW
Q-212-2		4.4 miles WSW
Q-213-1		4.3 miles W
Q-213-2		4.8 miles W
Q-214-1		4.7 miles WNW
Q-214-2		4.4 miles WNW
Q-215-1		5.0 miles NW
Q-215-2		4.2 miles NW
Q-216-1		4.6 miles NNW
Q-216-2		4.3 miles NNW
<u>Other</u>		
Q-01	Onsite 1 (indicator)	0.5 miles N
Q-02	Onsite 2 (indicator)	0.4 miles ENE
Q-03	Onsite 3 (indicator)	0.6 miles S
Q-04	Nitrin (indicator)	1.7 miles NE
Q-13	Princeton (indicator)	4.7 miles SW
Q-16	Low Moor (indicator)	5.7 miles NNW
Q-37	Meredosia Road (indicator)	4.4 miles ENE
Q-38	Fuller Road (indicator)	4.7 miles E
Q-41	Camanche (indicator)	4.3 miles NNE

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Quad Cities Nuclear Power Station, 2011

Location	Location Description	Distance & Direction From Site
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H. Environmental Dosimetry -- TLD (continued)

Control

Q-42	LeCLaire	8.7 miles SSW
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* Removed from ODCM in December 2006 and replaced by Q-210-5. Q-210-4 is for trending only

TABLE B-2: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Quad Cities Nuclear Power Station, 2011

Sample Medium	Analysis	Sampling Method	Analytical Procedure Number
Surface Water	Gamma Spectroscopy	Monthly composite from weekly grab samples	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Surface Water	Gross Beta	Monthly composite from weekly grab samples	TBE, TBE-2008 Gross Alpha and/or gross beta activity in various matrices Env. Inc., W(DS)-01 Determination of gross alpha and/or gross beta in water (dissolved solids or total residue)
Surface Water	Tritium	Quarterly composite from weekly grab samples	TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation Env. Inc., T-02 Determination of tritium in water (direct method)
Surface Water	Iron and Nickel	Quarterly composite from weekly grab samples	TBE, TBE-2006 Iron-55 in various matrices TBE, TBE-2013 Radionickel in various matrices
Ground Water	Gamma Spectroscopy	Quarterly grab samples	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Ground Water	Tritium	Quarterly grab samples	TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation Env. Inc., T-02 Determination of tritium in water (direct method)
Fish	Gamma Spectroscopy	Semi-annual samples collected via electroshocking or other techniques	TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Sediment	Gamma Spectroscopy	Semi-annual grab samples	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Air Particulates	Gross Beta	One-week composite of continuous air sampling through glass fiber filter paper	TBE, TBE-2008 Gross Alpha and/or gross beta activity in various matrices Env. Inc., AP-02 Determination of gross alpha and/or gross beta in air particulate filters
Air Particulates	Gamma Spectroscopy	Quarterly composite of each station	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Air Iodine	Gamma Spectroscopy	Weekly composite of continuous air sampling through charcoal filter	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., I-131-02 Determination of I-131 in charcoal canisters by gamma spectroscopy (batch method)
Milk	I-131	Bi-weekly grab sample when cows are on pasture. Monthly all other times	TBE, TBE-2012 Radioiodine in various matrices Env. Inc., I-131-01 Determination of I-131 in milk by an ion exchange
Milk	Gamma Spectroscopy	Bi-weekly grab sample when cows are on pasture. Monthly all other times	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Food Products	Gamma Spectroscopy	Annual grab samples	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
TLD	Thermoluminescence Dosimetry	Quarterly TLDs	Mirion Technologies

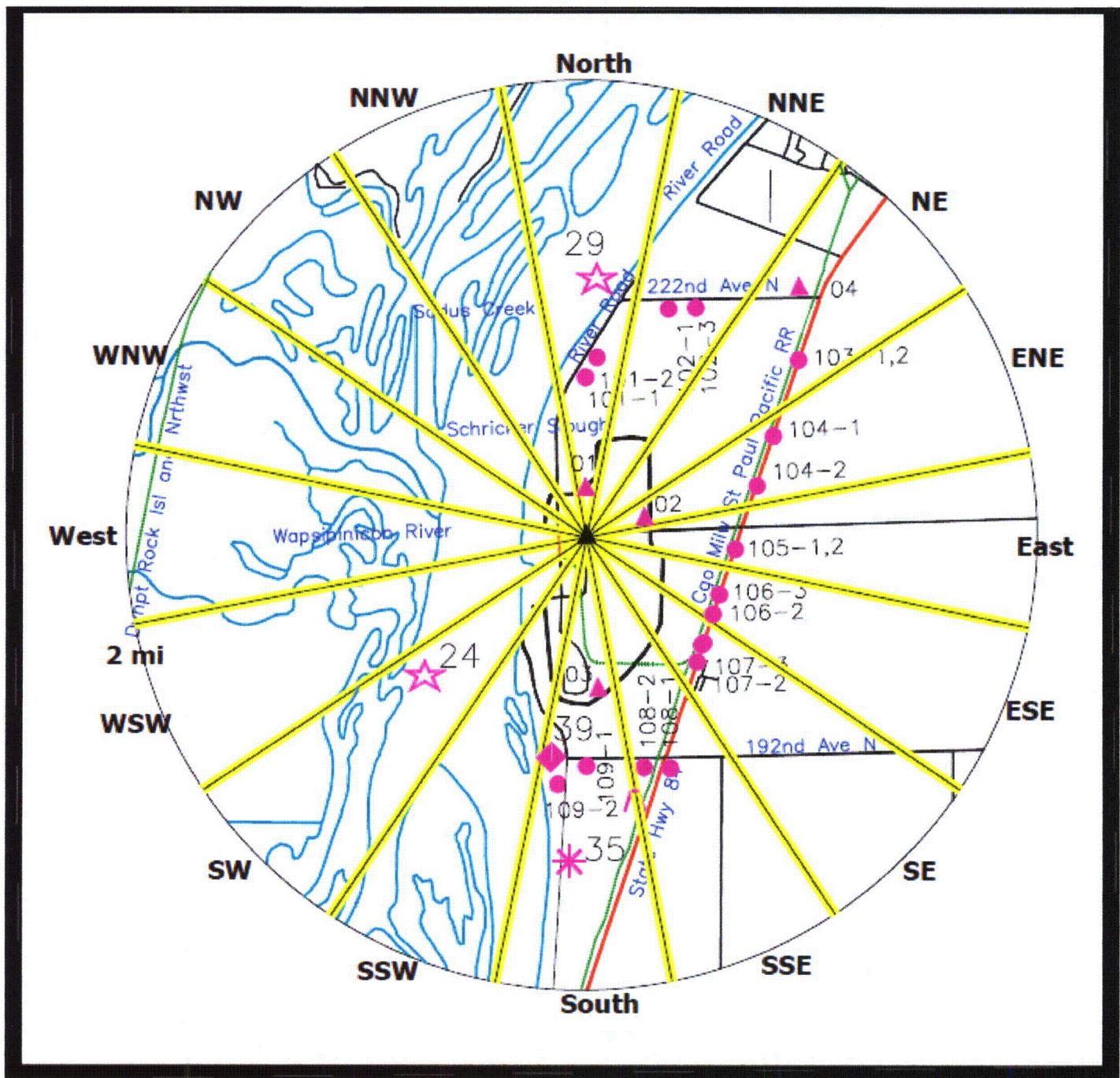


Figure B-1 Map
 Quad Cities REMP Sampling Locations – 2 Mile Radius, 2011



DRAWING RELEASE RECORD			HPSD APPROVAL	QUAD CITIES STATION FIGURE 6-1 REMP Sample Locations
REV.	DATE	DESCRIPTION		
0	4-17-98	ORIGINAL	FRED OST WILLIAM CARL	
1	1-99	1999 REVS		
2	2-99	1999 REVS	GSPRD APPRVL Frank Rescek	
3	3-22-04	2004 REVS	Scott Kirkland Jim Woodridge	
4	12-7-10	2010 REVS	David Basham Jim Woodridge	

EXELON GENERATION
CHICAGO ILLINOIS

DRAWN BY: KATHLEEN E. WILLIAMS

Figure B-1 Legend
 Quad Cities REMP Sampling Locations – 2 Mile Radius, 2011

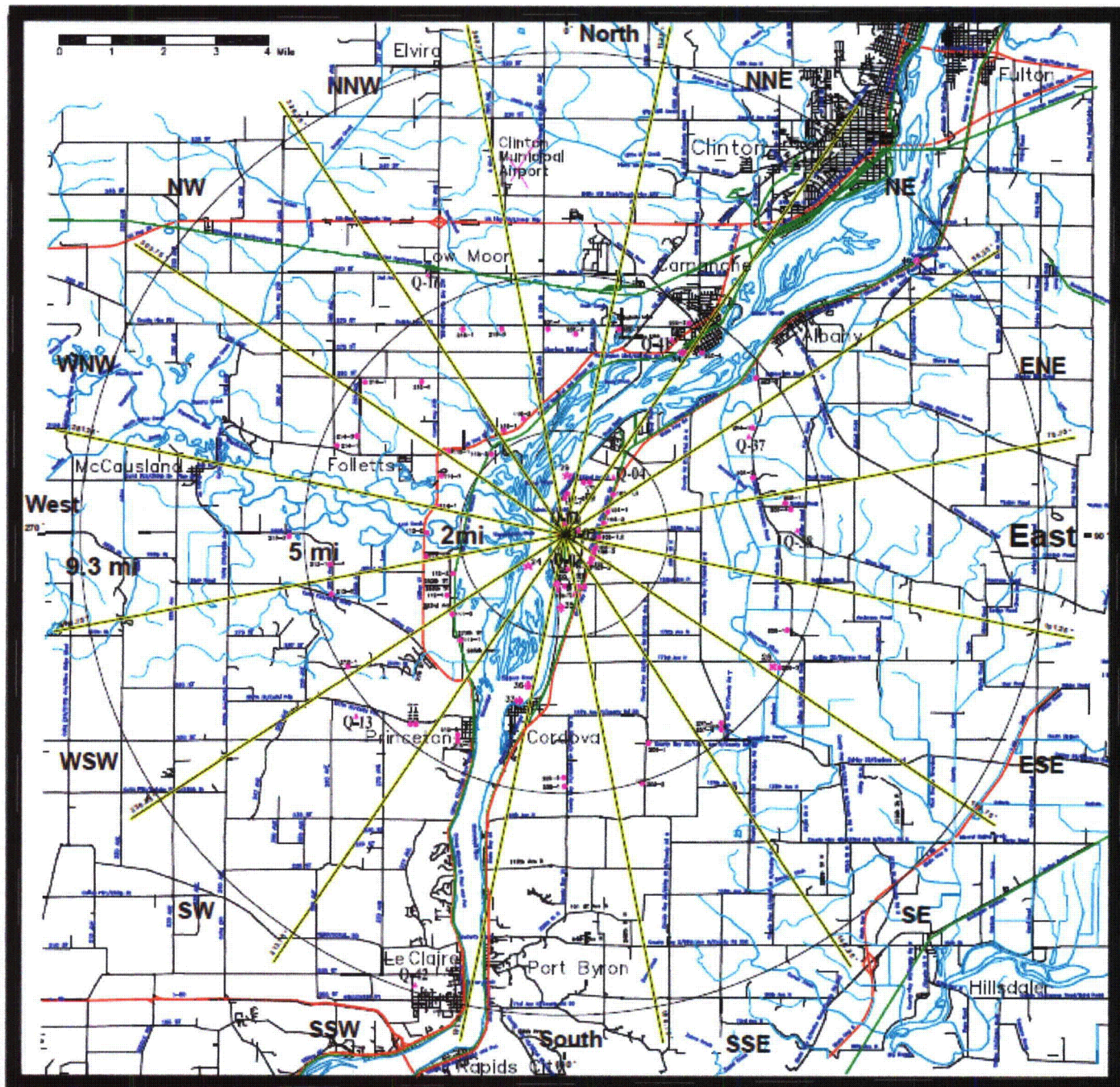


Figure B-2 Map
 Quad Cities REMP Sampling Locations – 9.3 Mile Radius, 2011

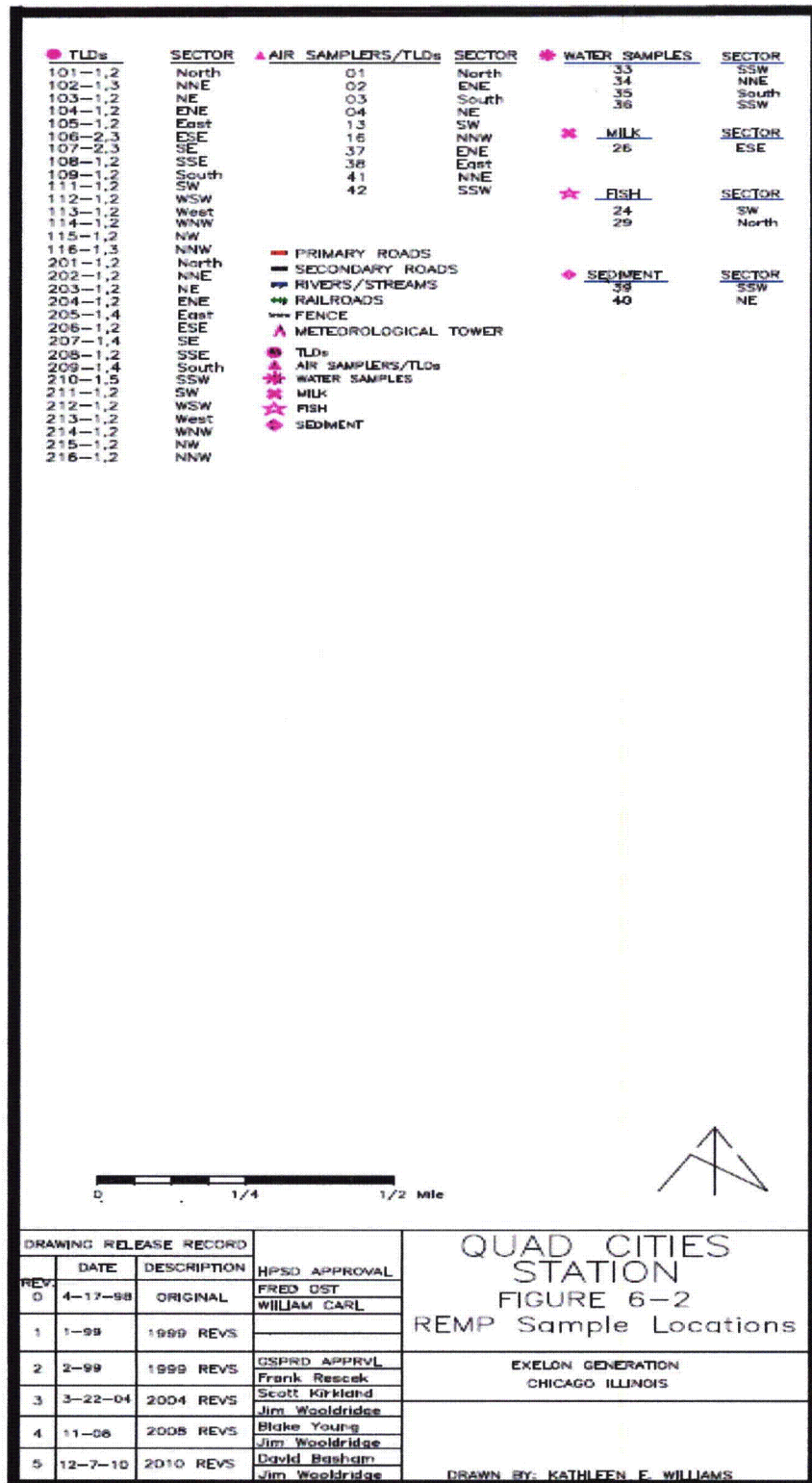


Figure B-2 Legend
 Quad Cities REMP Sampling Locations – 9.3 Mile Radius, 2011

APPENDIX C

DATA TABLES AND FIGURES PRIMARY LABORATORY

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TABLE C-I.1

CONCENTRATIONS OF GROSS BETA IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	Q-33	Q-34
01/01/11 - 01/28/11	(1)	(1)
02/18/11 - 02/25/11	5.5 ± 2.5	6.6 ± 2.7
03/04/11 - 03/25/11	4.4 ± 2.7	4.1 ± 1.9
04/01/11 - 04/29/11	3.7 ± 2.2	4.5 ± 2.3
05/06/11 - 05/27/11	6.9 ± 2.6	5.4 ± 2.6
06/03/11 - 06/24/11	4.0 ± 2.3	3.9 ± 2.2
07/01/11 - 07/29/11	5.5 ± 2.1	7.6 ± 2.2
08/05/11 - 08/26/11	6.8 ± 2.4	7.3 ± 2.5
09/02/11 - 09/30/11	3.6 ± 1.8	3.3 ± 1.7
10/06/11 - 10/27/11	3.0 ± 1.4	5.1 ± 1.5
11/04/11 - 11/25/11	4.8 ± 1.7	4.2 ± 1.8
12/02/11 - 12/30/11	4.0 ± 1.3	3.7 ± 1.3
MEAN	4.7 ± 2.6	5.1 ± 3.0

TABLE C-I.2

CONCENTRATIONS OF TRITIUM, IRON-55, AND NICKEL-63 IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	H-3	FE-55	NI-63
Q-33	02/15/11 - 03/25/11	< 162		
	04/01/11 - 06/24/11	< 167	< 176 (2)	< 3.6 (2)
	07/01/11 - 09/30/11	< 186	< 186	< 3.9
	10/06/11 - 12/30/11	< 183	< 168	< 3.8
	MEAN	-	-	-
Q-34	02/15/11 - 03/25/11	< 161		
	04/01/11 - 06/24/11	< 167	< 88 (2)	< 3.6 (2)
	07/01/11 - 09/30/11	< 185	< 157	< 3.9
	10/06/11 - 12/30/11	< 184	< 171	< 3.8
	MEAN	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION
 (2) SEE PROGRAM CHANGES SECTION FOR EXPLANATION

TABLE C-I.3

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES
COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
Q-33	01/01/11 - 01/28/11 (1)	-	-	-	-	-	-	-	-	-	-	-	-
	02/18/11 - 02/25/11	< 1	< 1	< 2	< 1	< 2	< 1	< 2	< 10	< 1	< 1	< 16	< 5
	03/04/11 - 03/25/11	< 1	< 2	< 5	< 1	< 3	< 2	< 4	< 11	< 1	< 1	< 45	< 14
	04/01/11 - 04/29/11	< 2	< 2	< 2	< 1	< 3	< 3	< 3	< 8	< 1	< 2	< 41	< 13
	05/06/11 - 05/27/11	< 1	< 1	< 3	< 1	< 1	< 1	< 2	< 14	< 1	< 1	< 16	< 5
	06/03/11 - 06/24/11	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 13	< 1	< 1	< 19	< 6
	07/01/11 - 07/29/11	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 8	< 2	< 2	< 16	< 6
	08/05/11 - 08/26/11	< 3	< 3	< 8	< 3	< 6	< 3	< 6	< 14	< 3	< 3	< 25	< 10
	09/02/11 - 09/30/11	< 5	< 7	< 12	< 5	< 13	< 7	< 13	< 15	< 6	< 7	< 44	< 11
	10/06/11 - 10/27/11	< 3	< 3	< 7	< 3	< 6	< 3	< 5	< 14	< 3	< 3	< 27	< 10
	11/04/11 - 11/25/11	< 1	< 1	< 2	< 1	< 2	< 1	< 2	< 12	< 1	< 1	< 14	< 4
	12/02/11 - 12/30/11	< 2	< 2	< 5	< 2	< 3	< 2	< 3	< 14	< 1	< 2	< 20	< 8
MEAN		-	-	-	-	-	-	-	-	-	-	-	-
Q-34	01/01/11 - 01/28/11 (1)	-	-	-	-	-	-	-	-	-	-	-	-
	02/18/11 - 02/25/11	< 1	< 1	< 2	< 1	< 2	< 1	< 2	< 10	< 1	< 1	< 14	< 4
	03/04/11 - 03/25/11	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 13	< 1	< 1	< 45	< 13
	04/01/11 - 04/29/11	< 2	< 2	< 4	< 1	< 4	< 2	< 4	< 9	< 1	< 2	< 48	< 13
	05/06/11 - 05/27/11	< 1	< 1	< 2	< 1	< 1	< 1	< 2	< 13	< 1	< 1	< 16	< 4
	06/03/11 - 06/24/11	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 14	< 1	< 2	< 20	< 7
	07/01/11 - 07/29/11	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 19	< 5
	08/05/11 - 08/26/11	< 3	< 3	< 8	< 3	< 6	< 4	< 5	< 13	< 3	< 3	< 25	< 10
	09/02/11 - 09/30/11	< 7	< 4	< 12	< 7	< 16	< 7	< 12	< 14	< 6	< 8	< 38	< 14
	10/06/11 - 10/27/11	< 2	< 3	< 6	< 3	< 6	< 3	< 5	< 15	< 2	< 3	< 27	< 9
	11/04/11 - 11/25/11	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 10	< 1	< 1	< 11	< 4
	12/02/11 - 12/30/11	< 1	< 2	< 3	< 1	< 3	< 2	< 3	< 13	< 1	< 1	< 19	< 6
MEAN		-	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-II.1

**CONCENTRATIONS OF TRITIUM IN GROUND WATER SAMPLES COLLECTED
IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011**

RESULTS IN UNITS OF PCI/LITER \pm 2 SIGMA

COLLECTION PERIOD	Q-35	Q-36
01/14/11 - 01/14/11	< 151	< 152
04/15/11 - 04/15/11	< 177	< 178
07/15/11 - 07/15/11	< 192	< 194
10/14/11 - 10/14/11	< 163	< 164
MEAN	-	-

TABLE C-II.2

**CONCENTRATIONS OF GAMMA EMITTERS IN GROUND WATER SAMPLES
COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011**

RESULTS IN UNITS OF PCI/LITER \pm 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
Q-35	01/14/11 - 01/14/11	< 3	< 3	< 6	< 3	< 5	< 4	< 5	< 13	< 2	< 3	< 24	< 7
	04/15/11 - 04/15/11	< 1	< 1	< 3	< 1	< 3	< 2	< 3	< 12	< 1	< 1	< 19	< 6
	07/15/11 - 07/15/11	< 5	< 5	< 12	< 4	< 8	< 5	< 9	< 12	< 5	< 5	< 26	< 9
	10/14/11 - 10/14/11	< 5	< 5	< 10	< 4	< 9	< 6	< 8	< 13	< 4	< 5	< 30	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
Q-36	01/14/11 - 01/14/11	< 3	< 3	< 7	< 3	< 6	< 4	< 6	< 13	< 3	< 3	< 27	< 9
	04/15/11 - 04/15/11	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 11	< 1	< 1	< 15	< 5
	07/15/11 - 07/15/11	< 4	< 4	< 10	< 4	< 10	< 5	< 7	< 11	< 4	< 4	< 26	< 8
	10/14/11 - 10/14/11	< 3	< 3	< 7	< 3	< 7	< 4	< 7	< 9	< 3	< 4	< 22	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

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TABLE C-III.1

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES
COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF PC/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
Q-24												
River Carpsucker	05/03/11	< 46	< 46	< 110	< 48	< 102	< 74	< 102	< 46	< 54	< 688	< 189
Walleye	05/03/11	< 32	< 29	< 66	< 37	< 59	< 38	< 66	< 26	< 19	< 410	< 99
Common Carp	10/26/11	< 52	< 58	< 126	< 61	< 105	< 67	< 118	< 55	< 55	< 573	< 159
Largemouth Bass	10/26/11	< 56	< 77	< 120	< 79	< 110	< 68	< 134	< 55	< 72	< 673	< 125
	MEAN	-	-	-	-	-	-	-	-	-	-	-
Q-29												
Common Carp	05/03/11	< 28	< 41	< 105	< 45	< 68	< 43	< 55	< 32	< 35	< 517	< 159
Freshwater Drum	05/03/11	< 34	< 39	< 73	< 47	< 72	< 28	< 58	< 32	< 33	< 412	< 131
Common Carp	10/26/11	< 50	< 39	< 96	< 63	< 89	< 38	< 90	< 38	< 46	< 494	< 113
Walleye	10/26/11	< 78	< 63	< 167	< 79	< 124	< 75	< 146	< 65	< 65	< 752	< 223
	MEAN	-	-	-	-	-	-	-	-	-	-	-

**TABLE C-IV.1 CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES
COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011**

RESULTS IN UNITS OF PC/KG DRY ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
Q-39	05/26/11	< 88	< 92	< 279	< 106	< 178	< 120	< 170	< 65	< 86	< 1260	< 450
	10/14/11	< 56	< 52	< 132	< 64	< 109	< 59	< 96	< 51	< 52	< 322	< 106
	MEAN	-	-	-	-	-	-	-	-	-	-	-
Q-40	05/26/11	< 28	< 30	< 106	< 37	< 83	< 40	< 70	< 21	< 35	< 499	< 174
	10/14/11	< 59	< 51	< 138	< 62	< 130	< 65	< 118	< 56	< 68	< 390	< 120
	MEAN	-	-	-	-	-	-	-	-	-	-	-

TABLE C-V.1 CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

COLLECTION PERIOD	GROUP I				GROUP II				GROUP III		
	Q-01	Q-02	Q-03	Q-04	Q-13	Q-16	Q-37	Q-38	Q-41	Q-42	
12/31/10 - 01/07/11	41 ± 4	34 ± 4	40 ± 4	41 ± 4	45 ± 5	37 ± 4	42 ± 4	35 ± 4	33 ± 4	37 ± 4	(1)
01/07/11 - 01/14/11	18 ± 5	17 ± 4	21 ± 5	20 ± 5	22 ± 5	18 ± 5	18 ± 4	13 ± 4	17 ± 5	19 ± 5	
01/14/11 - 01/21/11	34 ± 5	36 ± 5	38 ± 6	32 ± 5	40 ± 6	35 ± 6	34 ± 5	36 ± 6	33 ± 5	37 ± 6	
01/21/11 - 01/28/11	34 ± 4	31 ± 4	34 ± 4	38 ± 4	37 ± 4	36 ± 4	22 ± 4	37 ± 4	38 ± 4	38 ± 4	
01/28/11 - 02/04/11	18 ± 4	18 ± 4	18 ± 4	20 ± 4	18 ± 4	16 ± 4	20 ± 4	23 ± 5	13 ± 4	18 ± 4	
02/04/11 - 02/11/11	22 ± 5	24 ± 5	22 ± 5	19 ± 4	21 ± 5	23 ± 5	24 ± 5	25 ± 5	22 ± 5	19 ± 4	
02/11/11 - 02/18/11	21 ± 4	22 ± 4	< 4	22 ± 5	23 ± 5	22 ± 4	18 ± 4	26 ± 5	19 ± 4	22 ± 4	
02/18/11 - 02/25/11	14 ± 5	17 ± 5	11 ± 4	15 ± 5	14 ± 5	9 ± 4	14 ± 5	13 ± 5	15 ± 5	16 ± 5	
02/25/11 - 03/04/11	22 ± 5	24 ± 5	18 ± 4	23 ± 5	23 ± 5	21 ± 5	18 ± 4	24 ± 5	19 ± 9	24 ± 7	(2)
03/04/11 - 03/10/11	14 ± 4	10 ± 4	15 ± 4	16 ± 4	16 ± 5	16 ± 5	11 ± 4	12 ± 4	13 ± 5	15 ± 5	
03/10/11 - 03/18/11	7 ± 4	24 ± 5	39 ± 10 (2)	15 ± 5	19 ± 5	20 ± 5	25 ± 5	22 ± 5	18 ± 4	17 ± 4	
03/18/11 - 03/25/11	22 ± 5	27 ± 5	20 ± 5	29 ± 6	33 ± 6	24 ± 5	27 ± 5	31 ± 6	30 ± 6	27 ± 5	
03/25/11 - 04/01/11	33 ± 6	33 ± 6	34 ± 6	38 ± 6	38 ± 6	32 ± 6	33 ± 6 (2)	33 ± 6	35 ± 6	34 ± 6	
04/01/11 - 04/08/11	19 ± 4	14 ± 4	22 ± 15 (2)	19 ± 4	15 ± 4	18 ± 4	18 ± 4	19 ± 4	21 ± 4	23 ± 4	
04/08/11 - 04/15/11	15 ± 4	14 ± 4	14 ± 4	15 ± 4	13 ± 4	15 ± 4	17 ± 4	17 ± 4	18 ± 4	20 ± 5	
04/15/11 - 04/22/11	11 ± 4	19 ± 4	15 ± 4	18 ± 4	18 ± 4	13 ± 4	15 ± 4	17 ± 4	17 ± 4	14 ± 4	
04/22/11 - 04/29/11	< 5	6 ± 3	< 5	7 ± 4	< 5	5 ± 3	6 ± 3	6 ± 4	7 ± 4	< 5	
04/29/11 - 05/06/11	7 ± 3	11 ± 4	11 ± 4 (2)	10 ± 4	14 ± 4	11 ± 4	(2)	8 ± 4	10 ± 4	14 ± 4	
05/06/11 - 05/13/11	12 ± 4	11 ± 4	9 ± 4 (2)	10 ± 4	12 ± 4	9 ± 4	10 ± 4	11 ± 4	12 ± 4	12 ± 4	
05/13/11 - 05/19/11	8 ± 4	9 ± 4	10 ± 4	10 ± 4	9 ± 4	6 ± 4	9 ± 4	11 ± 4	9 ± 4	8 ± 4	
05/19/11 - 05/26/11	12 ± 4	12 ± 4	< 9	12 ± 4	11 ± 4	8 ± 4	10 ± 4	12 ± 4	12 ± 4	13 ± 4	
05/26/11 - 06/03/11	10 ± 4	8 ± 4	(2)	13 ± 4	19 ± 4	13 ± 4	14 ± 4	15 ± 4	(2)	14 ± 4	
06/03/11 - 06/10/11	23 ± 4	13 ± 4	(2)	24 ± 4	29 ± 5	26 ± 5	22 ± 4	22 ± 4	26 ± 5	15 ± 4	
06/10/11 - 06/17/11	13 ± 4	8 ± 4	16 ± 5	14 ± 5	16 ± 5	9 ± 4	10 ± 4	11 ± 4	10 ± 4	10 ± 4	
06/17/11 - 06/24/11	10 ± 3	25 ± 9 (2)	12 ± 4	10 ± 4	13 ± 4	13 ± 4	12 ± 4	11 ± 4	12 ± 4	15 ± 4	
06/24/11 - 07/01/11	15 ± 4	14 ± 4	13 ± 4	14 ± 4	16 ± 4	14 ± 4	15 ± 4	15 ± 4	16 ± 4	21 ± 4	
07/01/11 - 07/08/11	17 ± 4	16 ± 4	22 ± 5	20 ± 5	20 ± 5	23 ± 5	12 ± 4	17 ± 5	22 ± 5	16 ± 4	
07/08/11 - 07/15/11	23 ± 5	19 ± 4	17 ± 4	20 ± 5	15 ± 4	22 ± 5	27 ± 9 (2)	16 ± 4	34 ± 10 (2)	18 ± 4	
07/15/11 - 07/22/11	20 ± 4	24 ± 5	31 ± 5	29 ± 5	25 ± 5	30 ± 5	26 ± 5	29 ± 5 (2)	28 ± 5	26 ± 5	
07/22/11 - 07/29/11	15 ± 4	17 ± 4	16 ± 4	(2)	(2)	17 ± 4	(2)	15 ± 4	14 ± 4	17 ± 4	
07/29/11 - 08/05/11	31 ± 5	27 ± 5 (2)	22 ± 5	21 ± 7	36 ± 6	34 ± 6	31 ± 5	26 ± 5	32 ± 5	29 ± 5	
08/05/11 - 08/12/11	19 ± 5	18 ± 5	17 ± 5	16 ± 5	22 ± 5	21 ± 5	21 ± 5	17 ± 5	22 ± 5	24 ± 5	
08/12/11 - 08/19/11	18 ± 5	21 ± 5	23 ± 5	20 ± 5	22 ± 5	20 ± 5	18 ± 5	17 ± 5	22 ± 5	27 ± 5	
08/19/11 - 08/26/11	24 ± 4	20 ± 4	26 ± 5	27 ± 5	28 ± 8 (2)	24 ± 5	22 ± 4	24 ± 4	24 ± 7 (2)	25 ± 5	
08/26/11 - 09/02/11	25 ± 5	26 ± 5	25 ± 5	24 ± 5	30 ± 5	29 ± 5	31 ± 5	13 ± 4	30 ± 5	33 ± 5	
09/02/11 - 09/09/11	15 ± 4	17 ± 4	20 ± 5	22 ± 5	21 ± 5	21 ± 5	(2)	(2)	25 ± 5	20 ± 5	
09/09/11 - 09/16/11	16 ± 4	17 ± 4	17 ± 4	14 ± 4	21 ± 5	14 ± 4	16 ± 4	(2)	16 ± 4	14 ± 4	
09/16/11 - 09/23/11	21 ± 4	12 ± 4	21 ± 4	16 ± 4	24 ± 5	18 ± 4	17 ± 4	19 ± 4	18 ± 4	19 ± 4	
09/23/11 - 09/30/11	16 ± 4	14 ± 4	21 ± 4	17 ± 4	21 ± 4	20 ± 4	21 ± 4	16 ± 4	20 ± 4	20 ± 4	
09/30/11 - 10/06/11	33 ± 5	30 ± 5	33 ± 5	37 ± 5	28 ± 6	20 ± 5	32 ± 5	22 ± 5	26 ± 6	26 ± 6	
10/06/11 - 10/14/11	33 ± 5	35 ± 5	33 ± 5	23 ± 5	29 ± 5	28 ± 5	28 ± 5 (2)	(2)	30 ± 5	31 ± 5	
10/14/11 - 10/21/11	10 ± 4	9 ± 4	8 ± 4	6 ± 4	13 ± 4	8 ± 4	9 ± 4	7 ± 4	12 ± 4	12 ± 4 (2)	
10/21/11 - 10/27/11	30 ± 5	34 ± 5	30 ± 5	26 ± 4	36 ± 6	32 ± 6	20 ± 4	28 ± 5	34 ± 6	36 ± 6	
10/27/11 - 11/04/11	26 ± 5	28 ± 5	19 ± 5	18 ± 5	9 ± 4	16 ± 4	26 ± 5	12 ± 2	17 ± 4	23 ± 5	
11/04/11 - 11/11/11	25 ± 6	29 ± 6	23 ± 6	27 ± 6	27 ± 5	29 ± 5	37 ± 6	(2)	32 ± 6	30 ± 5	
11/11/11 - 11/17/11	26 ± 5	21 ± 5	13 ± 5	17 ± 5	11 ± 5	19 ± 5	25 ± 5	(2)	19 ± 6	24 ± 6	
11/17/11 - 11/25/11	20 ± 5	20 ± 5	20 ± 5	19 ± 5	22 ± 4	17 ± 4	15 ± 4	14 ± 4	21 ± 4	20 ± 4	
11/25/11 - 12/02/11	20 ± 4	15 ± 4	14 ± 4	16 ± 4	20 ± 4	17 ± 4	20 ± 4	17 ± 4	19 ± 4	15 ± 4	
12/02/11 - 12/09/11	23 ± 5	26 ± 6	20 ± 5	24 ± 5	26 ± 5	26 ± 5	33 ± 6	22 ± 5	25 ± 5	27 ± 5	
12/09/11 - 12/16/11	32 ± 5	30 ± 5	29 ± 5	31 ± 5	41 ± 6	35 ± 5	37 ± 5	27 ± 5	25 ± 5	29 ± 5 (2)	
12/16/11 - 12/23/11	35 ± 5	37 ± 5	31 ± 5	33 ± 5	36 ± 5	35 ± 5	26 ± 5	29 ± 5	32 ± 5	37 ± 5	
12/23/11 - 12/30/11	18 ± 4	16 ± 4	18 ± 5	19 ± 4	22 ± 5	20 ± 5	21 ± 5	16 ± 4	20 ± 5	16 ± 4	
MEAN	20 ± 16	20 ± 17	21 ± 16	20 ± 16	23 ± 18	20 ± 17	21 ± 17	19 ± 16	21 ± 16	22 ± 16	

* THE MEAN AND 2 STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

(1) SEE PROGRAM CHANGES SECTION FOR EXPLANATION

(2) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-V.2 MONTHLY AND YEARLY MEAN VALUES OF GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011
RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

GROUP I - NEAR-SITE LOCATIONS				GROUP II - FAR-FIELD LOCATIONS				GROUP III - CONTROL LOCATIONS			
COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD
12/31/10 - 01/28/11	17	41	32 ± 16	12/31/10 - 01/28/11	13	45	31 ± 19	12/31/10 - 01/28/11	19	38	32 ± 18
01/28/11 - 02/25/11	11	24	19 ± 7	01/28/11 - 02/25/11	9	26	19 ± 9	01/28/11 - 02/25/11	16	22	19 ± 5
02/25/11 - 04/01/11	7	39	23 ± 18	02/25/11 - 04/01/11	11	38	24 ± 15	02/25/11 - 04/01/11	15	34	23 ± 15
04/01/11 - 04/29/11	6	22	15 ± 9	04/01/11 - 04/29/11	5	21	14 ± 10	04/01/11 - 04/22/11	14	23	19 ± 9
04/29/11 - 06/03/11	7	13	10 ± 3	04/29/11 - 06/03/11	6	19	11 ± 5	04/29/11 - 06/03/11	8	14	12 ± 5
06/03/11 - 07/01/11	8	25	15 ± 10	06/03/11 - 07/01/11	9	29	16 ± 12	06/03/11 - 07/01/11	10	21	15 ± 9
07/01/11 - 07/29/11	15	31	20 ± 9	07/01/11 - 07/29/11	12	34	22 ± 13	07/01/11 - 07/29/11	16	26	19 ± 9
07/29/11 - 09/02/11	16	31	22 ± 8	07/29/11 - 09/02/11	13	36	25 ± 12	07/29/11 - 09/02/11	24	33	27 ± 7
09/02/11 - 09/30/11	12	22	17 ± 6	09/02/11 - 09/30/11	14	25	19 ± 6	09/02/11 - 09/30/11	14	20	18 ± 6
09/30/11 - 10/29/11	6	37	26 ± 22	09/30/11 - 11/04/11	7	36	22 ± 19	09/30/11 - 11/04/11	12	36	26 ± 18
10/29/11 - 12/03/11	13	29	21 ± 10	10/29/11 - 12/09/11	11	37	21 ± 13	11/04/11 - 12/09/11	15	30	23 ± 12
12/03/11 - 12/30/11	16	37	26 ± 13	12/03/11 - 12/30/11	16	41	28 ± 15	12/09/11 - 12/30/11	16	37	27 ± 21
12/31/10 - 12/30/11	6	41	21 ± 16	12/31/10 - 12/30/11	5	45	21 ± 17	12/31/10 - 12/30/11	8	38	22 ± 16

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES

TABLE C-V.3

CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES
COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
Q-01	12/31/10 - 04/01/11	< 4	< 4	< 13	< 4	< 9	< 5	< 6	< 3	< 4	< 182	< 79
	04/01/11 - 07/01/11	< 2	< 3	< 4	< 2	< 7	< 3	< 6	< 2	< 2	< 130	< 23
	07/01/11 - 09/30/11	< 3	< 3	< 6	< 2	< 4	< 3	< 4	< 2	< 2	< 78	< 38
	09/30/11 - 12/30/11	< 4	< 3	< 7	< 4	< 6	< 3	< 5	< 3	< 3	< 24	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-
Q-02	12/31/10 - 04/01/11	< 4	< 5	< 15	< 3	< 9	< 6	< 11	< 4	< 4	< 250	< 96
	04/01/11 - 07/01/11	< 2	< 3	< 11	< 3	< 7	< 4	< 5	< 2	< 2	< 109	< 40
	07/01/11 - 09/30/11	< 3	< 3	< 8	< 2	< 6	< 4	< 6	< 3	< 3	< 99	< 57
	09/30/11 - 12/30/11	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 2	< 2	< 16	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-
Q-03	12/31/10 - 04/01/11	< 3	< 5	< 13	< 3	< 11	< 6	< 8	< 4	< 3	< 254	< 75
	04/01/11 - 07/01/11	< 3	< 4	< 14	< 4	< 7	< 4	< 8	< 3	< 3	< 163	< 63
	07/01/11 - 09/30/11	< 4	< 5	< 10	< 3	< 7	< 4	< 8	< 4	< 3	< 129	< 52
	09/30/11 - 12/30/11	< 3	< 2	< 4	< 3	< 4	< 2	< 4	< 2	< 2	< 16	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-
Q-04	12/31/10 - 04/01/11	< 4	< 6	< 17	< 3	< 9	< 6	< 10	< 4	< 4	< 218	< 107
	04/01/11 - 07/01/11	< 2	< 3	< 9	< 2	< 7	< 3	< 6	< 2	< 2	< 114	< 62
	07/01/11 - 09/30/11	< 4	< 5	< 14	< 4	< 12	< 6	< 11	< 4	< 4	< 190	< 65
	09/30/11 - 12/30/11	< 2	< 2	< 5	< 2	< 7	< 2	< 4	< 2	< 2	< 20	< 5
	MEAN	-	-	-	-	-	-	-	-	-	-	-
Q-13	12/31/10 - 04/01/11	< 3	< 4	< 15	< 4	< 9	< 5	< 10	< 3	< 3	< 197	< 93
	04/01/11 - 07/01/11	< 2	< 4	< 10	< 2	< 8	< 4	< 7	< 3	< 2	< 139	< 50
	07/01/11 - 09/30/11	< 3	< 4	< 11	< 3	< 7	< 4	< 6	< 2	< 2	< 108	< 31
	09/30/11 - 12/30/11	< 2	< 3	< 4	< 3	< 7	< 3	< 5	< 3	< 2	< 22	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-

TABLE C-V.3

CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES
COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
Q-16	12/31/10 - 04/01/11	< 4	< 4	< 12	< 4	< 7	< 6	< 9	< 3	< 3	< 268	< 98
	04/01/11 - 07/01/11	< 3	< 5	< 16	< 3	< 10	< 6	< 11	< 4	< 3	< 251	< 53
	07/01/11 - 09/30/11	< 3	< 4	< 14	< 3	< 9	< 4	< 6	< 3	< 2	< 115	< 58
	09/30/11 - 12/30/11	< 2	< 3	< 7	< 3	< 7	< 3	< 6	< 3	< 3	< 21	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-
Q-37	12/31/10 - 04/01/11	< 3	< 5	< 16	< 3	< 8	< 5	< 11	< 3	< 3	< 213	< 80
	04/01/11 - 07/01/11	< 2	< 3	< 10	< 4	< 6	< 3	< 5	< 2	< 2	< 130	< 44
	07/01/11 - 09/30/11	< 4	< 6	< 14	< 4	< 10	< 6	< 11	< 4	< 3	< 154	< 42
	09/30/11 - 12/30/11	< 3	< 4	< 8	< 4	< 7	< 4	< 6	< 3	< 3	< 31	< 12
	MEAN	-	-	-	-	-	-	-	-	-	-	-
Q-38	12/31/10 - 04/01/11	< 4	< 5	< 15	< 4	< 8	< 6	< 12	< 3	< 4	< 244	< 86
	04/01/11 - 07/01/11	< 2	< 4	< 11	< 3	< 5	< 3	< 5	< 3	< 3	< 130	< 29
	07/01/11 - 09/30/11	< 3	< 3	< 9	< 2	< 8	< 4	< 9	< 3	< 3	< 141	< 51
	09/30/11 - 12/30/11	< 3	< 2	< 6	< 3	< 6	< 3	< 5	< 2	< 2	< 23	< 10
	MEAN	-	-	-	-	-	-	-	-	-	-	-
Q-41	12/31/10 - 04/01/11	< 3	< 5	< 16	< 5	< 10	< 5	< 11	< 4	< 3	< 240	< 65
	04/01/11 - 07/01/11	< 4	< 5	< 15	< 4	< 9	< 6	< 11	< 4	< 4	< 232	< 66
	07/01/11 - 09/30/11	< 3	< 6	< 12	< 4	< 9	< 5	< 9	< 4	< 3	< 162	< 53
	09/30/11 - 12/30/11	< 2	< 2	< 6	< 2	< 5	< 2	< 4	< 2	< 2	< 17	< 7
	MEAN	-	-	-	-	-	-	-	-	-	-	-

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TABLE C-V.3

**CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES
COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011**

RESULTS IN UNITS OF E-3 PCI/CU METER \pm 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
Q-42	03/10/11 - 03/18/11	< 21	< 16	< 44	< 18	< 41	< 24	< 32	< 19	< 18	< 86	< 38
	03/18/11 - 03/25/11	< 30	< 26	< 64	< 39	< 83	< 33	< 46	< 29	< 34	< 103	< 38
	03/25/11 - 04/01/11	< 28	< 27	< 48	< 32	< 66	< 29	< 47	< 32	< 23	< 98	< 40
	04/01/11 - 04/08/11	< 29	< 21	< 52	< 25	< 72	< 30	< 46	< 31	< 30	< 104	< 43
	12/31/10 - 04/01/11	< 4	< 6	< 18	< 2	< 10	< 6	< 9	< 3	< 4	< 219	< 117
	04/01/11 - 07/01/11	< 4	< 5	< 15	< 2	< 7	< 6	< 10	< 4	< 4	< 215	< 95
	07/01/11 - 09/30/11	< 4	< 3	< 13	< 3	< 9	< 4	< 8	< 3	< 3	< 111	< 54
	09/30/11 - 12/30/11	< 4	< 4	< 11	< 3	< 6	< 4	< 7	< 4	< 4	< 25	< 11
MEAN	-	-	-	-	-	-	-	-	-	-	-	-

BOLDED VALUES INDICATE ADDITIONAL SAMPLING DUE TO THE FUKUSHIMA EVENT

TABLE C-VI-1 CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

COLLECTION PERIOD	GROUP I				GROUP II				GROUP III	
	Q-01	Q-02	Q-03	Q-04	Q-13	Q-16	Q-37	Q-38	Q-41	Q-42
12/31/10 - 01/07/11	< 34	< 33	< 18	< 34	< 34	< 35	< 35	< 33	< 31	< 31 (1)
01/07/11 - 01/14/11	< 27	< 26	< 26	< 26	< 14	< 44	< 44	< 45	< 44	< 19
01/14/11 - 01/21/11	< 17	< 17	< 17	< 9	< 17	< 9	< 19	< 20	< 20	< 20
01/21/11 - 01/28/11	< 19	< 34	< 34	< 35	< 37	< 17	< 36	< 38	< 39	< 39
01/28/11 - 02/04/11	< 29	< 28	< 28	< 29	< 16	< 4	< 8	< 9	< 8	< 8
02/04/11 - 02/11/11	< 20	< 44	< 44	< 46	< 45	< 24	< 39	< 40	< 39	< 39
02/11/11 - 02/18/11	< 14	< 24	< 24	< 25	< 24	< 12	< 28	< 29	< 28	< 27
02/18/11 - 02/25/11	< 22	< 38	< 38	< 39	< 39	< 20	< 36	< 37	< 36	< 36
02/25/11 - 03/04/11	< 35	< 34	< 34	< 35	< 19	< 41	< 41	< 43	(2)	< 31 (2)
03/04/11 - 03/10/11	< 28	< 49	< 49	< 51	< 64	< 34	< 48	< 50	< 62	< 63
03/10/11 - 03/18/11	< 19	< 42	< 42 (2)	< 44	< 51	< 66	< 55	< 24	< 66	< 67
03/18/11 - 03/25/11	56 ± 36	79 ± 38	78 ± 30	73 ± 29	80 ± 41	78 ± 32	89 ± 29	93 ± 30	77 ± 27	66 ± 29
03/25/11 - 04/01/11	86 ± 26	74 ± 25	69 ± 30	63 ± 21	74 ± 26	57 ± 28	47 ± 28 (2)	80 ± 27	48 ± 32	52 ± 37
04/01/11 - 04/08/11	44 ± 20	58 ± 19	138 ± 80 (2)	48 ± 32	< 28	< 44	40 ± 22	< 39	54 ± 23	36 ± 21
04/08/11 - 04/15/11	< 36	< 29	< 39	< 35	< 22	< 39	< 29	< 28	< 36	< 35
04/15/11 - 04/22/11	< 20	< 46	< 46	< 48	< 49	< 35	< 62	< 63	< 64	< 65
04/22/11 - 04/29/11	< 34	< 59	< 59	< 61	< 57	< 23	< 56	< 58	< 54	< 54
04/29/11 - 05/06/11	< 37	< 65	< 64 (2)	< 67	< 67	< 31	(2)	< 57	< 57	< 57
05/06/11 - 05/13/11	< 67	< 36	< 65 (2)	< 67	< 68	< 58	< 55	< 57	< 58	< 25
05/13/11 - 05/19/11	< 57	< 57	< 57	< 59	< 43	< 65	< 48	< 49	< 28	< 66
05/19/11 - 05/26/11	< 65	< 63	(2)	< 11	< 70	< 28	< 63 (2)	< 25	< 28	< 28
05/26/11 - 06/03/11	< 69	< 67	(2)	< 69	< 59	< 54	< 61	< 63	(2)	< 30
06/03/11 - 06/10/11	< 60	< 60	(2)	< 60	< 41	< 41	< 58	< 60	< 41	< 42
06/10/11 - 06/17/11	< 45	< 45	< 47	< 47	< 46	< 65	< 64	< 66	< 66	< 62
06/17/11 - 06/24/11	< 27	< 69 (2)	< 28	< 26	< 29	< 16	< 58	< 60	< 60	< 59
06/24/11 - 07/01/11	< 62	< 62	< 64	< 64	< 28	< 41	< 40	< 41	< 41	< 23
07/01/11 - 07/08/11	< 34	< 34	< 35	< 35	< 19	< 18	< 41	< 42	< 42	< 42
07/08/11 - 07/15/11	< 32	< 57	< 59	< 59	< 57	< 33	< 53 (2)	< 23	< 54 (2)	< 22
07/15/11 - 07/22/11	< 40	< 40	< 41	< 41	< 23	< 24	< 53	< 56 (2)	< 56	< 57
07/22/11 - 07/29/11	< 21	< 48	< 50	(2)	(2)	< 25	(2)	< 59	< 58	< 58
07/29/11 - 08/05/11	< 20	< 47 (2)	< 48	(2)	< 49	< 22	< 49	< 50	< 51	< 51
08/05/11 - 08/12/11	< 8	< 15	< 15	< 15	< 8	< 25	< 45	< 46	< 46	< 46
08/12/11 - 08/19/11	< 57	< 57	< 59	< 51	< 45	< 45	< 27	< 57	< 50	< 49
08/19/11 - 08/26/11	< 10	< 24	< 25	< 25	< 50 (2)	< 12	< 20	< 21	< 41 (2)	< 21
08/26/11 - 09/02/11	< 41	< 41	< 43	< 41	< 22	< 59	< 60	< 26	< 59	< 59
09/02/11 - 09/09/11	< 15	< 27	< 28	< 27	< 28	< 11	(2)	(2)	< 25	< 25
09/09/11 - 09/16/11	< 19	< 35	< 36	< 35	< 34	< 45	< 46	(2)	< 19	< 45
09/16/11 - 09/23/11	< 56	< 56	< 57	< 56	< 33	< 59	< 56	< 58	< 59	< 33
09/23/11 - 09/30/11	< 24	< 56	< 57	< 55	< 54	< 59	< 63	< 65	< 61	< 33
09/30/11 - 10/06/11	< 20	< 47	< 49	< 47	< 62	< 27	< 49	< 50	< 65	< 65
10/06/11 - 10/14/11	< 22	< 39	< 41	< 39	< 36	< 22	< 58 (2)	(2)	< 52	< 52
10/14/11 - 10/21/11	< 22	< 40	< 41	< 40	< 41	< 18	< 43	< 45	< 45	< 45 (2)
10/21/11 - 10/27/11	< 25	< 11	< 26	< 25	< 39	< 37	< 46	< 47	< 70	< 69
10/27/11 - 11/04/11	< 24	< 57	< 59	< 57	< 55	< 27	< 48	< 50	< 47	< 28
11/04/11 - 11/11/11	< 38	< 39	< 22	< 38	< 34	< 7	< 20	(2)	< 18	< 18
11/11/11 - 11/17/11	< 22	< 51	< 52	< 51	< 65	< 25	< 38	(2)	< 48	< 48
11/17/11 - 11/25/11	< 51	< 51	< 52	< 28	< 44	< 20	< 56	< 58	< 50	< 49
11/25/11 - 12/02/11	< 21	< 38	< 40	< 38	< 48	< 23	< 45	< 47	< 56	< 56
12/02/11 - 12/09/11	< 64	< 64	< 66	< 64	< 31	< 25	< 53	< 55	< 46	< 46
12/09/11 - 12/16/11	< 24	< 57	< 58	< 57	< 57	< 29	< 54	< 54	< 55	< 54 (2)
12/16/11 - 12/23/11	< 23	< 37	< 38	< 37	< 37	< 18	< 34	< 34	< 34	< 35
12/23/11 - 12/30/11	< 18	< 33	< 34	< 32	< 36	< 24	< 57	< 57	< 58	< 58
MEAN	62 ± 43	70 ± 22	95 ± 75	61 ± 25	77 ± 8	67 ± 29	59 ± 53	86 ± 18	60 ± 31	51 ± 30

* THE MEAN AND 2 STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

(1) SEE PROGRAM CHANGES SECTION FOR EXPLANATION

(2) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-VII.1

**CONCENTRATIONS OF I-131 IN MILK SAMPLES COLLECTED
IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	INDICATOR FARM
	Q-26
01/07/11	< 0.7
02/04/11	< 0.7
03/04/11	< 0.7
04/01/11	< 1.0
04/15/11	< 0.3
05/06/11	< 0.5
05/20/11	< 0.6
06/03/11	< 0.7
06/17/11	< 0.5
07/01/11	< 0.7
07/15/11	< 0.8
07/29/11	< 0.9
08/12/11	< 0.6
08/26/11	< 0.6
09/09/11	< 0.6
09/23/11	< 0.6
10/07/11	< 0.6
10/21/11	< 0.9
11/05/11	< 0.8
12/03/11	< 0.4
MEAN	-

TABLE C-VII.2 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
Q-26	01/07/11	< 4	< 5	< 11	< 5	< 10	< 5	< 8	< 4	< 5	< 27	< 9
	02/04/11	< 4	< 5	< 12	< 5	< 12	< 5	< 8	< 4	< 4	< 36	< 13
	03/04/11	< 6	< 6	< 14	< 7	< 10	< 7	< 9	< 4	< 5	< 39	< 15
	04/01/11	< 2	< 2	< 5	< 2	< 4	< 2	< 3	< 2	< 2	< 20	< 6
	04/15/11	< 1	< 2	< 4	< 2	< 3	< 2	< 3	< 1	< 2	< 15	< 4
	05/06/11	< 6	< 7	< 15	< 8	< 15	< 7	< 13	< 6	< 7	< 38	< 12
	05/20/11	< 5	< 5	< 11	< 5	< 10	< 6	< 8	< 4	< 5	< 44	< 13
	06/03/11	< 8	< 8	< 17	< 11	< 17	< 9	< 16	< 9	< 8	< 38	< 13
	06/17/11	< 8	< 7	< 18	< 10	< 16	< 8	< 13	< 6	< 8	< 36	< 15
	07/01/11	< 6	< 6	< 12	< 7	< 11	< 7	< 10	< 6	< 6	< 34	< 12
	07/15/11	< 5	< 6	< 13	< 8	< 14	< 6	< 8	< 5	< 5	< 30	< 12
	07/29/11	< 7	< 9	< 16	< 8	< 15	< 7	< 12	< 6	< 9	< 44	< 11
	08/12/11	< 7	< 6	< 15	< 7	< 11	< 6	< 11	< 4	< 5	< 45	< 8
	08/26/11	< 6	< 6	< 16	< 5	< 15	< 7	< 13	< 7	< 7	< 43	< 14
	09/09/11	< 6	< 6	< 16	< 7	< 15	< 7	< 11	< 6	< 7	< 41	< 11
	09/23/11	< 6	< 7	< 14	< 8	< 13	< 6	< 10	< 6	< 7	< 37	< 13
	10/07/11	< 8	< 8	< 20	< 9	< 22	< 8	< 11	< 6	< 9	< 39	< 14
	10/21/11	< 9	< 9	< 20	< 10	< 20	< 10	< 15	< 8	< 10	< 45	< 12
	11/05/11	< 5	< 7	< 16	< 7	< 14	< 6	< 12	< 5	< 6	< 36	< 10
	12/03/11	< 5	< 5	< 10	< 6	< 13	< 6	< 8	< 5	< 6	< 25	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-

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TABLE C-VIII.1

CONCENTRATIONS OF GAMMA EMITTERS IN FOOD PRODUCT SAMPLES
COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
Q-CONTROL													
Onions	07/18/11	< 12	< 12	< 30	< 12	< 25	< 15	< 24	< 54	< 13	< 14	< 112	< 25
Rhubarb Leaves	07/18/11	< 14	< 15	< 32	< 16	< 32	< 16	< 23	< 56	< 11	< 13	< 99	< 28
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
Q-QUAD 1													
Kale	07/18/11	< 13	< 17	< 40	< 18	< 38	< 17	< 32	< 52	< 13	< 12	< 118	< 24
Potatoes	07/18/11	< 15	< 17	< 38	< 16	< 36	< 15	< 23	< 48	< 13	< 14	< 100	< 31
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
Q-QUAD 2													
Onions	07/18/11	< 14	< 15	< 39	< 21	< 30	< 16	< 29	< 55	< 14	< 21	< 114	< 35
Rhubarb leaves	07/18/11	< 13	< 15	< 31	< 14	< 30	< 14	< 23	< 47	< 13	< 13	< 104	< 27
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
Q-QUAD 3													
Onions	07/18/11	< 12	< 17	< 31	< 16	< 33	< 14	< 26	< 48	< 14	< 16	< 104	< 26
Spinach	07/18/11	< 46	< 56	< 154	< 67	< 115	< 68	< 96	< 46	< 48	< 56	< 506	< 147
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
Q-QUAD 4													
Cabbage	07/18/11	< 14	< 17	< 22	< 13	< 32	< 15	< 24	< 44	< 11	< 13	< 97	< 19
Potatoes	07/18/11	< 17	< 18	< 48	< 21	< 48	< 16	< 28	< 59	< 17	< 21	< 152	< 39
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

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TABLE C-IX.1 QUARTERLY TLD RESULTS FOR QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF MILLI-ROENTGEN/QUARTER \pm 2 STANDARD DEVIATIONS

STATION CODE	MEAN \pm 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
Q-01-1	23.3 \pm 7.2	24	26	18	25
Q-01-2	24.3 \pm 10.4	28	29	18	22
Q-02-1	23.5 \pm 7.4	24	28	19	23
Q-02-2	22.8 \pm 6.6	23	27	19	22
Q-03-1	22.3 \pm 9.1	23	28	17	21
Q-03-2	22.0 \pm 7.8	23	27	18	20
Q-04-1	24.8 \pm 7.7	27	27	19	26
Q-04-2	24.8 \pm 6.4	26	27	20	26
Q-13-1	23.8 \pm 7.9	27	27	19	22
Q-13-2	24.3 \pm 5.0	25	27	21	24
Q-16-1	21.5 \pm 6.2	22	24	17	23
Q-16-2	21.0 \pm 5.7	23	23	17	21
Q-37-1	26.3 \pm 6.0	27	29	22	27
Q-37-2	25.0 \pm 8.3	26	30	20	24
Q-38-1	24.8 \pm 9.1	26	30	19	24
Q-38-2	25.5 \pm 8.1	28	29	20	25
Q-41-1	22.5 \pm 6.8	24	26	18	22
Q-41-2	24.0 \pm 11.0	26	30	17	23
Q-42-1	24.5 \pm 9.0	25	27	18	28
Q-42-2	24.3 \pm 7.2	26	27	19	25
Q-101-1	23.0 \pm 9.1	26	27	17	22
Q-101-2	23.3 \pm 9.0	27	26	17	23
Q-102-1	26.5 \pm 10.4	28	28	19	31
Q-102-3	22.5 \pm 8.1	26	25	17	22
Q-103-1	23.5 \pm 8.4	23	28	18	25
Q-103-2	22.8 \pm 8.5	26	26	17	22
Q-104-1	22.3 \pm 6.6	23	26	18	22
Q-104-2	23.5 \pm 7.4	25	26	18	25
Q-105-1	23.8 \pm 6.8	25	28	21	21
Q-105-2	22.8 \pm 7.7	25	25	17	24
Q-106-2	23.5 \pm 8.7	26	25	17	26
Q-106-3	22.8 \pm 8.7	25	27	17	22
Q-107-2	22.3 \pm 7.5	23	26	17	23
Q-107-3	22.8 \pm 7.2	25	26	18	22
Q-108-1	23.0 \pm 9.4	25	28	17	22
Q-108-2	22.8 \pm 9.1	26	25	16	24
Q-109-1	23.8 \pm 7.9	27	27	19	22
Q-109-2	22.8 \pm 9.0	25	25	16	25
Q-111-1	23.0 \pm 6.9	24	26	18	24
Q-111-2	24.8 \pm 9.6	25	29	18	27
Q-112-1	24.5 \pm 10.6	25	31	18	24
Q-112-2	22.8 \pm 7.9	24	26	17	24
Q-113-1	23.3 \pm 9.0	26	27	17	23
Q-113-2	21.8 \pm 7.9	25	25	17	20
Q-114-1	22.5 \pm 6.2	23	25	18	24
Q-114-2	22.3 \pm 6.6	23	26	18	22
Q-115-1	22.5 \pm 7.7	24	26	17	23
Q-115-2	22.3 \pm 7.5	23	26	17	23
Q-116-1	24.3 \pm 6.2	24	27	20	26
Q-116-3	23.0 \pm 8.5	26	26	17	23

TABLE C-IX.1 QUARTERLY TLD RESULTS FOR QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF MILLI-ROENTGEN/QUARTER ± 2 STANDARD DEVIATIONS

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
Q-201-1	22.8 ± 8.4	24	27	17	23
Q-201-2	24.8 ± 9.1	26	30	19	24
Q-202-1	23.0 ± 4.9	25	25	20	22
Q-202-2	23.3 ± 6.2	25	26	19	23
Q-203-1	25.0 ± 6.7	27	27	20	26
Q-203-2	26.5 ± 10.1	30	29	19	28
Q-204-1	24.8 ± 7.2	27	28	20	24
Q-204-2	26.8 ± 6.6	29	29	22	27
Q-205-1	24.5 ± 8.1	27	28	19	24
Q-205-4	25.5 ± 8.1	28	29	20	25
Q-206-1	24.3 ± 7.2	25	27	19	26
Q-206-2	23.3 ± 7.7	25	27	18	23
Q-207-1	24.8 ± 9.1	27	28	18	26
Q-207-4	25.0 ± 9.1	29	28	19	24
Q-208-1	23.3 ± 7.0	25	27	19	22
Q-208-2	25.8 ± 8.5	25	29	20	29
Q-209-1	26.5 ± 9.3	27	28	20	31
Q-209-4	24.5 ± 9.0	27	28	18	25
Q-210-1	24.3 ± 7.2	26	27	19	25
Q-210-4	25.0 ± 7.1	28	27	20	25
Q-210-5	22.5 ± 7.6	25	25	17	23
Q-211-1	28.3 ± 8.4	31	30	22	30
Q-211-2	27.5 ± 8.7	30	30	21	29
Q-212-1	25.5 ± 7.4	27	28	20	27
Q-212-2	23.0 ± 6.9	26	24	18	24
Q-213-1	23.8 ± 7.2	27	26	19	23
Q-213-2	21.5 ± 5.8	22	25	18	21
Q-214-1	23.8 ± 6.8	24	27	19	25
Q-214-2	25.5 ± 5.3	28	27	22	25
Q-215-1	22.8 ± 6.8	24	26	18	23
Q-215-2	24.8 ± 7.2	24	28	20	27
Q-216-1	24.5 ± 7.4	27	26	19	26
Q-216-2	26.5 ± 6.0	28	28	22	28

TABLE C-IX.2 MEAN QUARTERLY TLD RESULTS FOR THE INNER RING, OUTER RING, OTHER AND CONTROL LOCATION FOR QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF MILLI-ROENTGEN/QUARTER
STANDARD DEVIATIONS OF THE STATION DATA

COLLECTION PERIOD	INNER RING ± 2 S.D.	OUTER RING	OTHER	CONTROL
JAN-MAR	24.9 ± 2.7	26.5 ± 4.0	25.1 ± 3.8	25.5 ± 1.4
APR-JUN	26.5 ± 2.8	27.4 ± 3.0	27.4 ± 3.9	27.0 ± 0.0
JUL-SEP	17.6 ± 2.1	19.4 ± 2.7	18.8 ± 2.9	18.5 ± 1.4
OCT-DEC	23.5 ± 4.2	25.2 ± 4.8	23.3 ± 3.9	26.5 ± 4.2

TABLE C-IX.3 SUMMARY OF THE AMBIENT DOSIMETRY PROGRAM FOR QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF MILLI-ROENTGEN/QUARTER

LOCATION	SAMPLES ANALYZED	PERIOD MINIMUM	PERIOD MAXIMUM	PERIOD MEAN ± 2 S.D.
INNER RING	120	16	31	23.1 ± 7.4
OUTER RING	132	17	31	24.6 ± 7.3
OTHER	72	17	30	23.7 ± 7.3
CONTROL	8	18	28	24.4 ± 7.6

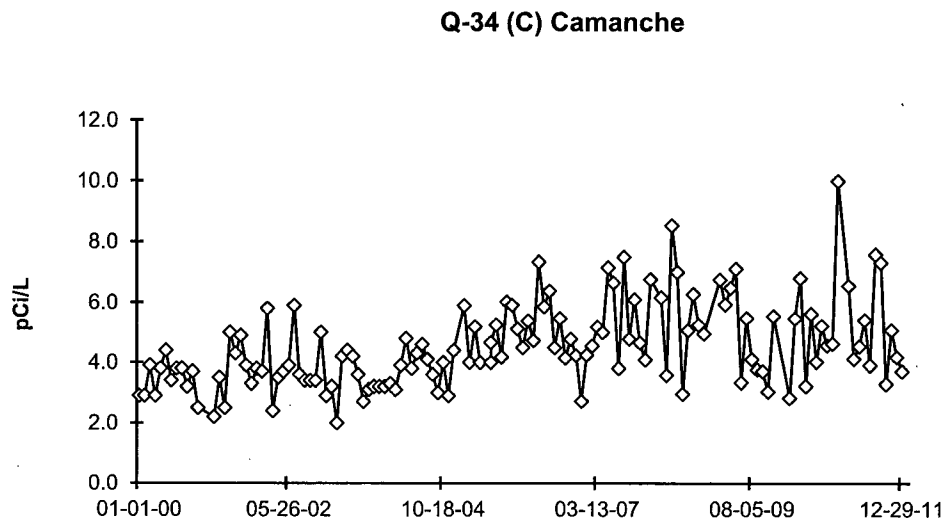
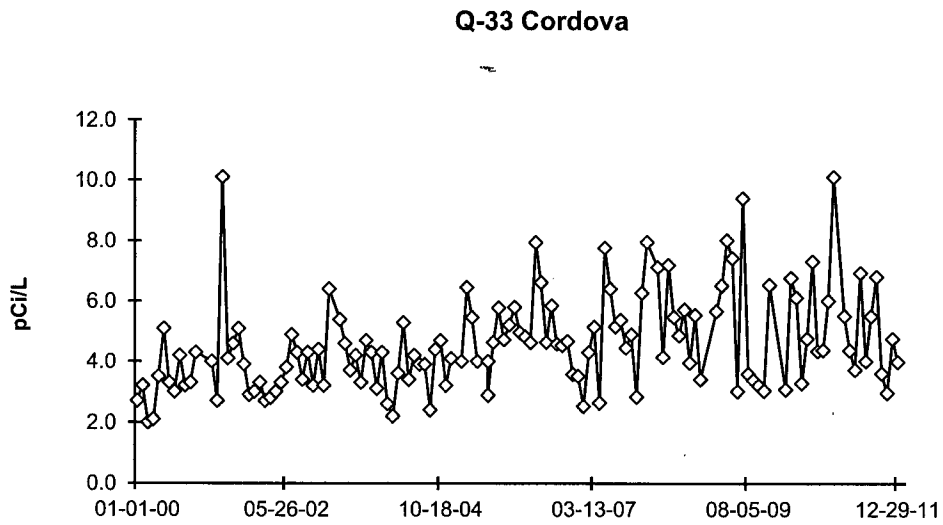
INNER RING STATIONS - Q-101-1, Q-101-2, Q-102-1, Q-102-3, Q-103-1, Q-103-2, Q-104-1, Q-104-2, Q-105-1, Q-105-2, Q-106-2, Q-106-3, Q-107-2, Q-107-3, Q-108-1, Q-108-2, Q-109-1, Q-109-2, Q-111-1, Q-111-2, Q-112-1, Q-112-2, Q-113-1, Q-113-2, Q-114-1, Q-114-2, Q-115-1, Q-115-2, Q-116-1, Q-116-3

OUTER RING STATIONS - Q-201-1, Q-201-2, Q-202-1, Q-202-2, Q-203-1, Q-203-2, Q-204-1, Q-204-2, Q-205-1, Q-205-4, Q-206-1, Q-206-2, Q-207-1, Q-207-4, Q-208-1, Q-208-2, Q-209-1, Q-209-4, Q-210-1, Q-210-4, Q-210-5, Q-211-1, Q-211-2, Q-212-1, Q-212-2, Q-213-1, Q-213-2, Q-214-1, Q-214-2, Q-215-1, Q-215-2, Q-216-1, Q-216-2

OTHER STATIONS - Q-01-1, Q-01-2, Q-02-1, Q-02-2, Q-03-1, Q-03-2, Q-04-1, Q-04-2, Q-13-1, Q-13-2, Q-16-1, Q-16-2, Q-37-1, Q-37-2, Q-38-1, Q-38-2, Q-41-1, Q-41-2

CONTROL STATIONS - Q-42-1, Q-42-2

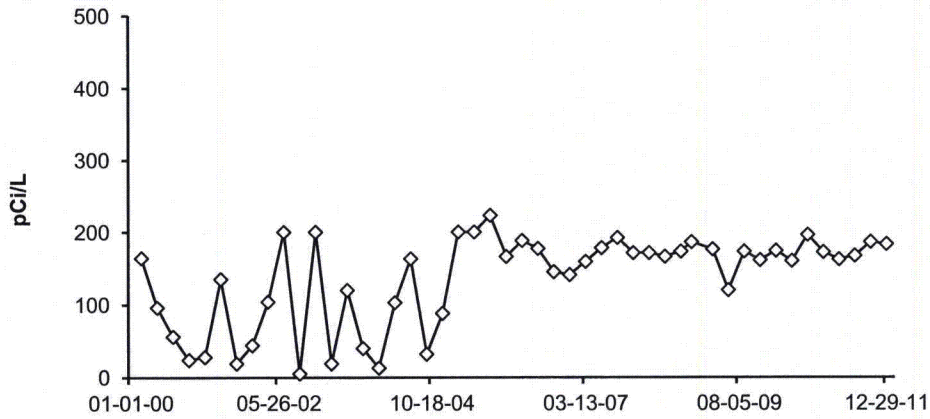
FIGURE C-1
Surface Water - Gross Beta - Stations Q-33 and Q-34 (C)
Collected in the Vicinity of QCNPS, 2000 - 2011



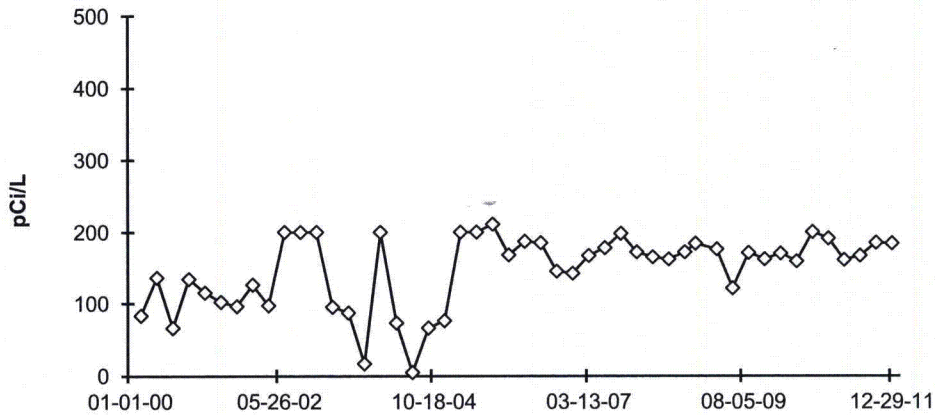
DUE TO VENDOR CHANGE, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JULY 2005

FIGURE C-2
Surface Water - Tritium - Stations Q-33 and Q-34 (C)
Collected in the Vicinity of QCNPS, 2000 - 2011

Q-33 Cordova



Q-34 (C) Camanche

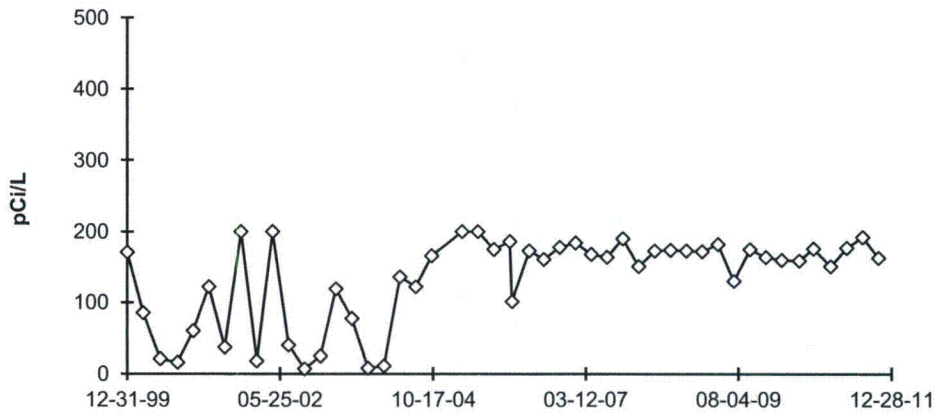


DUE TO VENDOR CHANGE, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JULY 2005

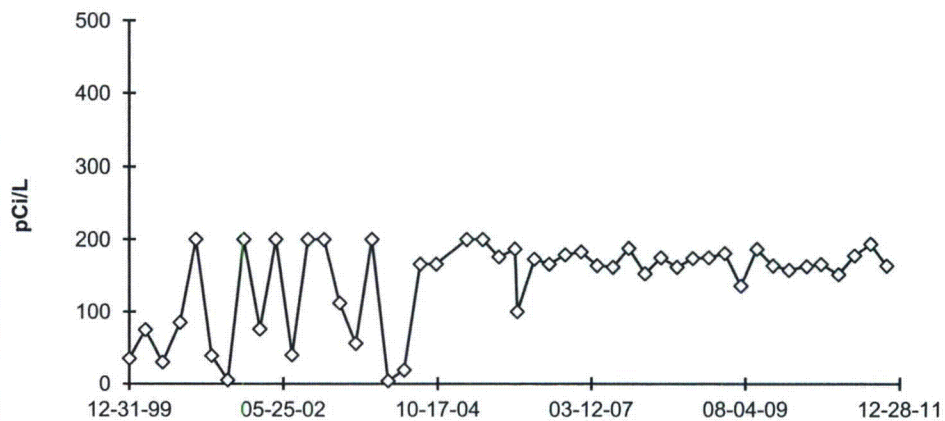
FIGURE C-3

Ground Water - Tritium - Stations Q-35 and Q-36 Collected in the Vicinity of QCNPS, 2000 - 2011

Q-35 McMillan Well



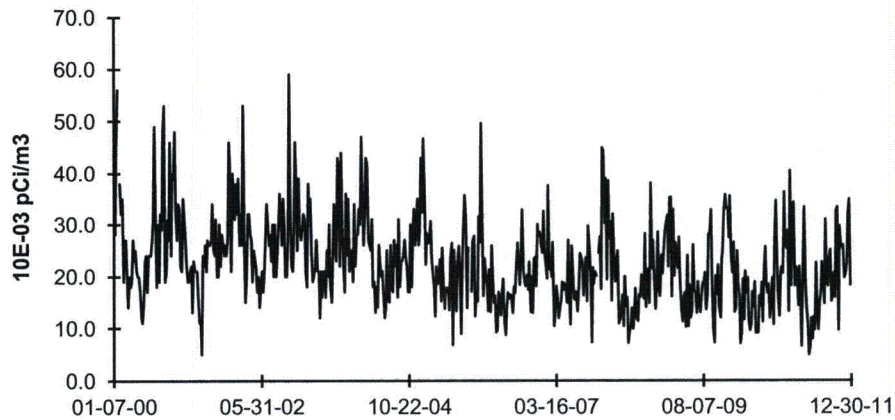
Q-36 Cordova Well



DUE TO VENDOR CHANGE, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC
VALUES AFTER JULY 2005

FIGURE C-4
Air Particulates - Gross Beta- Stations Q-01 and Q-02
Collected in the Vicinity of QCNPS, 2000 - 2011

Q-01 Onsite No. 1



Q-02 Onsite No. 2

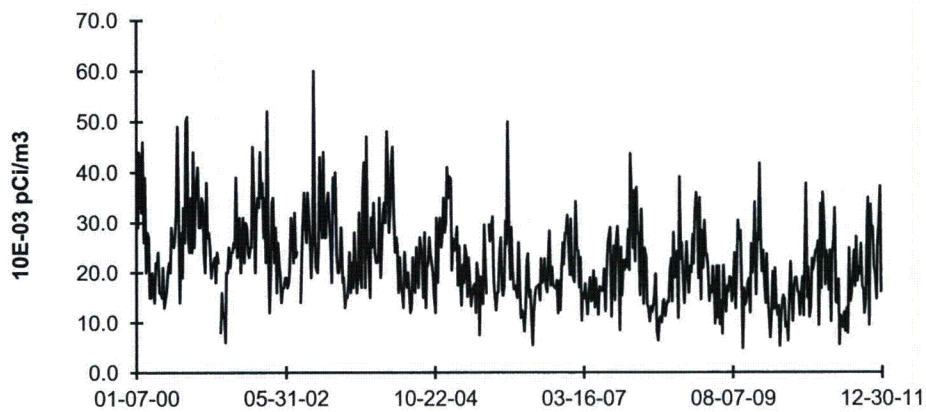
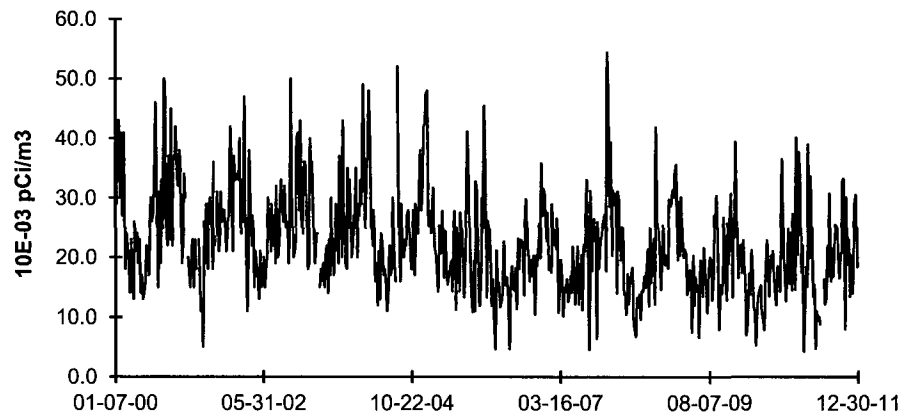


FIGURE C-5
Air Particulates - Gross Beta- Stations Q-03 and Q-04
Collected in the Vicinity of QCNPS, 2000 - 2011

Q-03 Onsite No. 3



Q-04 Nitrin

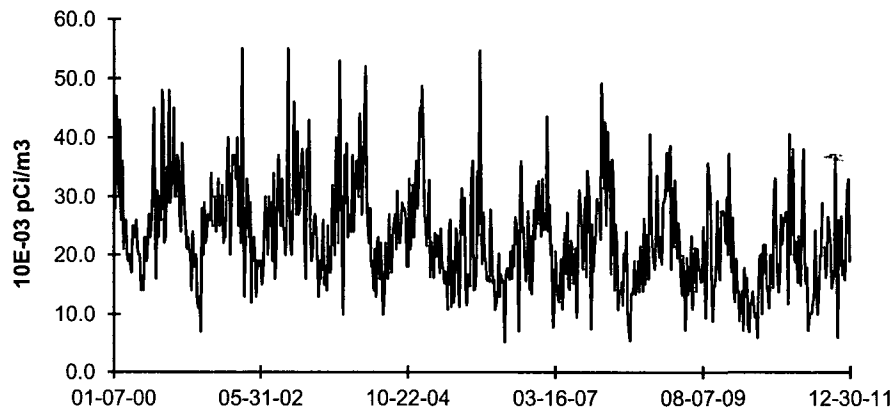
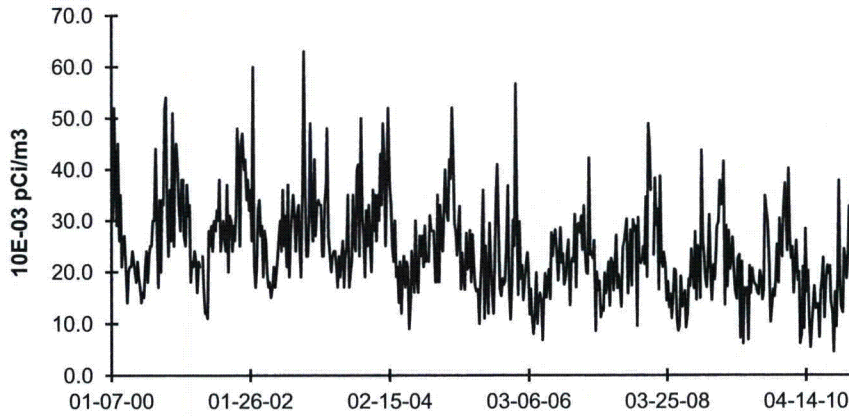


FIGURE C-6
Air Particulates - Gross Beta- Station Q-07 (C)
Collected in the Vicinity of QCNPS, 2000 - 2010

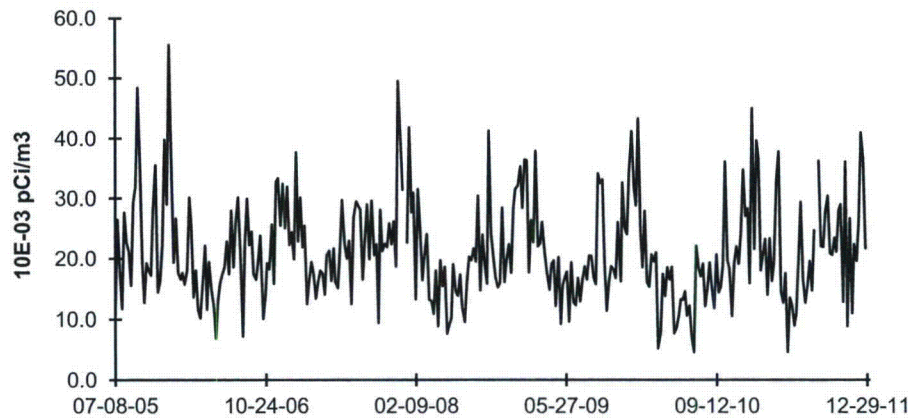
Q-07 (C) Clinton



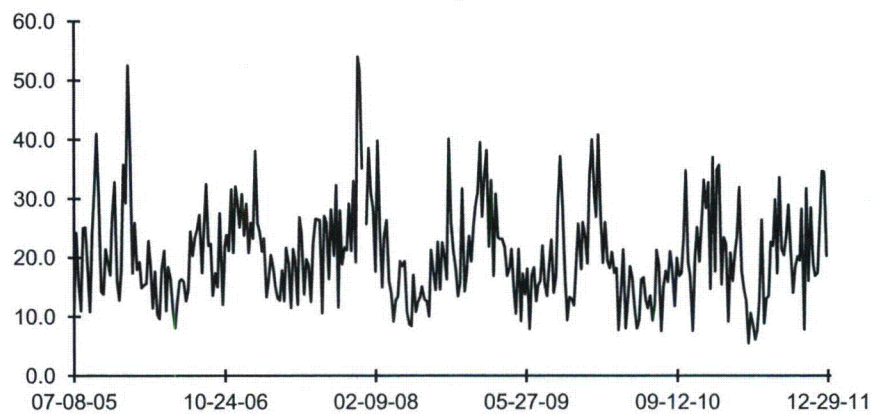
This location was removed from the program due to updated annual average meteorology.

FIGURE C-7
Air Particulates - Gross Beta- Stations Q-13 and Q-16
Collected in the Vicinity of QCNPS, 2005 - 2011

Q-13 Princeton



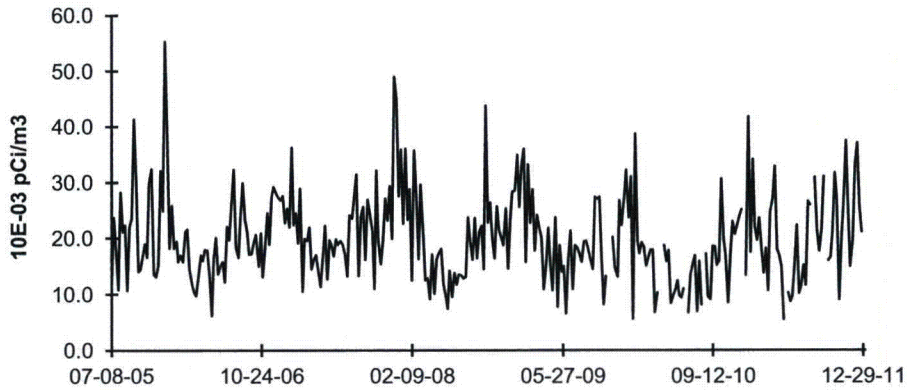
Q-16 Low Moor



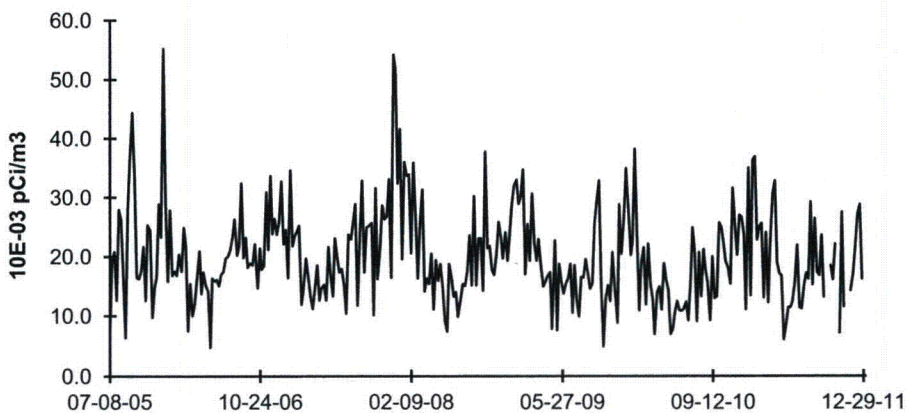
AIR PARTICULATE GROSS BETA ANALYSES OF FAR FIELD LOCATIONS STARTED IN JULY 2005

FIGURE C-8
Air Particulates - Gross Beta- Stations Q-37 and Q-38
Collected in the Vicinity of QCNPS, 2005 - 2011

Q-37 Meredosia Road



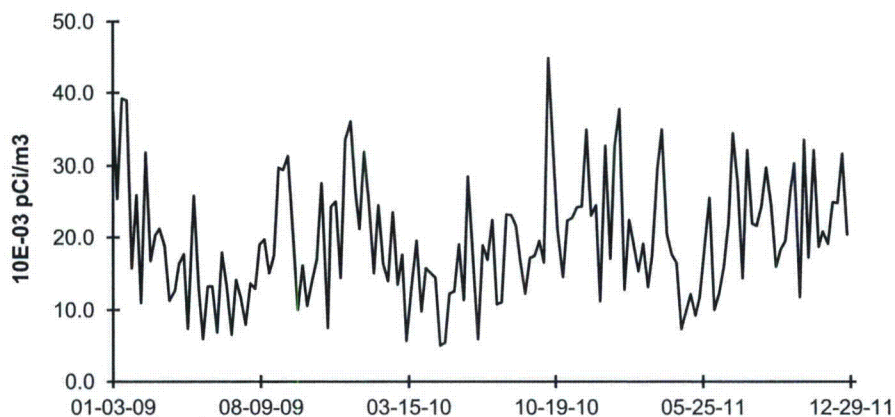
Q-38 Fuller Road



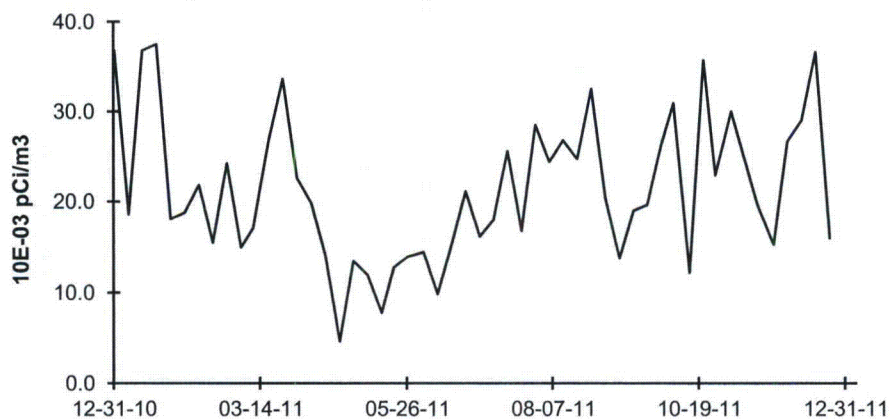
AIR PARTICULATE GROSS BETA ANALYSES OF FAR FIELD LOCATIONS STARTED IN JULY 2005

FIGURE C-9
Air Particulates - Gross Beta- Stations Q-41 and Q-42 (C)
Collected in the Vicinity of QCNPS, 2009 - 2011

Q-41 Camanche



Q-42 LeClaire (Control)



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APPENDIX D

INTER-LABORATORY COMPARISON PROGRAM

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TABLE D-1

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2011

(PAGE 1 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)			
March 2011	E7460-396	Milk	Sr-89	pCi/L	98.8	97.4	1.01	A			
			Sr-90	pCi/L	15.2	15.8	0.96	A			
March 2011	E7461-396	Milk	I-131	pCi/L	92.9	96.9	0.96	A			
			Ce-141	pCi/L	not provided by Analytics for this study						
			Cr-51	pCi/L	398	298	1.34	N (1)			
			Cs-134	pCi/L	130	130	1.00	A			
			Cs-137	pCi/L	232	205	1.13	A			
			Co-58	pCi/L	121	113	1.07	A			
			Mn-54	pCi/L	289	266	1.09	A			
			Fe-59	pCi/L	201	175	1.15	A			
			Zn-65	pCi/L	287	261	1.10	A			
			Co-60	pCi/L	186	172	1.08	A			
			March 2011	E7463-396	AP	Ce-141	pCi	not provided by Analytics for this study			
						Cr-51	pCi	243	215	1.13	A
						Cs-134	pCi	85.0	94.2	0.90	A
						Cs-137	pCi	168	148	1.14	A
						Co-58	pCi	89.2	81.8	1.09	A
Mn-54	pCi	171				192	0.89	A			
Fe-59	pCi	129				126	1.02	A			
Zn-65	pCi	159				189	0.84	A			
Co-60	pCi	132				124	1.06	A			
March 2011	E7462-396	Charcoal	I-131	pCi	96.5	96.3	1.00	A			
June 2011	E7851-396	Milk	Sr-89	pCi/L	96.7	103	0.94	A			
			Sr-90	pCi/L	13.8	15.6	0.88	A			
June 2011	E7852-396	Milk	I-131	pCi/L	110	103.0	1.07	A			
			Ce-141	pCi/L	68.1	79.9	0.85	A			
			Cr-51	pCi/L	186	206	0.90	A			
			Cs-134	pCi/L	164	190	0.86	A			
			Cs-137	pCi/L	140	138	1.01	A			
			Co-58	pCi/L	141	152	0.93	A			
			Mn-54	pCi/L	136	138	0.99	A			
			Fe-59	pCi/L	128	123	1.04	A			
			Zn-65	pCi/L	263	261	1.01	A			
			Co-60	pCi/L	189	195	0.97	A			
			June 2011	E7854-396	AP	Ce-141	pCi	49.9	42.9	1.16	A
						Cr-51	pCi	95.6	110	0.87	A
						Cs-134	pCi	104	102	1.02	A
Cs-137	pCi	83.8				74.0	1.13	A			
Co-58	pCi	90.7				81.3	1.12	A			
Mn-54	pCi	74.5				73.9	1.01	A			
Fe-59	pCi	62.0				66.1	0.94	A			
Zn-65	pCi	140				140	1.00	A			
Co-60	pCi	119				104	1.14	A			
June 2011	E7853-396	Charcoal	I-131	pCi	76.2	86.1	0.89	A			

TABLE D-1

ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2011

(PAGE 2 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)			
September 2011	E8070-396	Milk	Sr-89	pCi/L	102	90.8	1.12	A			
			Sr-90	pCi/L	13.2	14.7	0.90	A			
September 2011	E8071-396	Milk	I-131	pCi/L	74.2	89.2	0.83	A			
			Ce-141	pCi/L	66.9	66.7	1.00	A			
			Cr-51	pCi/L	249	226	1.10	A			
			Cs-134	pCi/L	116	128	0.91	A			
			Cs-137	pCi/L	106	114	0.93	A			
			Co-58	pCi/L	95.4	97.5	0.98	A			
			Mn-54	pCi/L	147	151	0.97	A			
			Fe-59	pCi/L	53.1	54.8	0.97	A			
			Zn-65	pCi/L	175	180	0.97	A			
			Co-60	pCi/L	150	157	0.96	A			
			September 2011	E8073-396	AP	Ce-141	pCi	66.6	67.5	0.99	A
						Cr-51	pCi	263	229	1.15	A
						Cs-134	pCi	139	130	1.07	A
						Cs-137	pCi	110	115	0.96	A
						Co-58	pCi	108	98.6	1.10	A
Mn-54	pCi	152				153	0.99	A			
Fe-59	pCi	57.5				55.5	1.04	A			
Zn-65	pCi	190				183	1.04	A			
Co-60	pCi	156				159	0.98	A			
September 2011	E8072-396	Charcoal	I-131	pCi	77.6	80.6	0.96	A			
December, 2011	E8230-396	Milk	Sr-89	pCi/L	93.3	93.1	1.00	A			
			Sr-90	pCi/L	12.7	15.4	0.82	A			
December, 2011	E8231-396	Milk	I-131	pCi/L	82.5	90.2	0.91	A			
			Ce-141	pCi/L	not provided by Analytics for this study						
			Cr-51	pCi/L	465	566	0.82	A			
			Cs-134	pCi/L	142	171	0.83	A			
			Cs-137	pCi/L	185	210	0.88	A			
			Co-58	pCi/L	177	221	0.80	A			
			Mn-54	pCi/L	208	241	0.86	A			
			Fe-59	pCi/L	164	183	0.90	A			
			Zn-65	pCi/L	259	291	0.89	A			
			Co-60	pCi/L	224	270	0.83	A			
			December, 2011	E8233-396	AP	Ce-141	pCi	not provided by Analytics for this study			
Cr-51	pCi	344				368	0.93	A			
Cs-134	pCi	105				111	0.95	A			
Cs-137	pCi	129				137	0.94	A			
Co-58	pCi	145				144	1.01	A			
Mn-54	pCi	137				157	0.87	A			
Fe-59	pCi	119				119	1.00	A			
Zn-65	pCi	145				190	0.76	W			
Co-60	pCi	168				176	0.95	A			

TABLE D-1

**ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2011**

(PAGE 3 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December 2011	E8232-396	Charcoal	I-131	pCi	100	89.5	1.12	A

(1) Sample appears to be biased high. Corrective Action evaluated after the 2nd Quarter Analytics PE sample; no action required. NCR 11-13

(a) Teledyne Brown Engineering reported result.

(b) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) Ratio of Teledyne Brown Engineering to Analytics results.

(d) Analytics evaluation based on TBE internal QC limits: A= Acceptable. Reported result falls within ratio limits of 0.80-1.20. W-Acceptable with warning. Reported result falls within 0.70-0.80 or 1.20-1.30. N = Not Acceptable. Reported result falls outside the ratio limits of < 0.70 and > 1.30.

TABLE D-2

ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2011

(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Control Limits	Evaluation (c)			
May 2011	RAD-85	Water	Sr-89	pCi/L	59.8	63.2	51.1 - 71.2	A			
			Sr-90	pCi/L	42.5	42.5	31.3 - 48.8	A			
			Ba-133	pCi/L	73.3	75.3	63.0 - 82.8	A			
			Cs-134	pCi/L	64.9	72.9	59.5 - 80.2	A			
			Cs-137	pCi/L	74.6	77.0	69.3 - 87.4	A			
			Co-60	pCi/L	87.8	88.8	79.9 - 100	A			
			Zn-65	pCi/L	103	98.9	89.0 - 118	A			
			Gr-A	pCi/L	64.1	50.1	26.1 - 62.9	N (1)			
			Gr-B	pCi/L	51.8	49.8	33.8 - 56.9	A			
			I-131	pCi/L	27.4	27.5	22.9 - 32.3	A			
			U-Nat	pCi/L	38.5	39.8	32.2 - 44.4	A			
			H-3	pCi/L	10057	10200	8870 - 11200	A			
				MRAD-14	Filter	Gr-A	pCi/filter	79.7	74.3	38.5 - 112	A
			November 2011	RAD-87	Water	Sr-89	pCi/L	81.0	69.7	56.9 - 77.9	N (2)
Sr-90	pCi/L	35.5				41.4	30.2 - 47.2	A			
Ba-133	pCi/L	90.7				96.9	81.8 - 106	A			
Cs-134	pCi/L	36.6				33.4	26.3 - 36.7	A			
Cs-137	pCi/L	44.7				44.3	39.4 - 51.7	A			
Co-60	pCi/L	118.7				119	107 - 133	A			
Zn-65	pCi/L	80.2				76.8	68.9 - 92.5	A			
Gr-A	pCi/L	34.2				53.2	27.8 - 66.6	A			
Gr-B	pCi/L	39.3				45.9	30.9 - 53.1	A			
I-131	pCi/L	22.9				27.5	22.9 - 32.3	A			
U-Nat	pCi/L	46.8				48.6	39.4 - 54.0	A			
H-3	pCi/L	15733				17400	15200 - 19100	A			
	MRAD-15	Filter				Gr-A	pCi/filter	44.6	58.4	30.3 - 87.8	A

(1) The solids on the planchet exceeded 100 mg, which was beyond the range of the efficiency curve. NCR 11-08

(2) Sr-89 TBE to known ratio of 1.16 fell within acceptable range of $\pm 20\%$. No action required. NCR 11-16

(a) Teledyne Brown Engineering reported result.

(b) The ERA known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) ERA evaluation: A=acceptable. Reported result falls within the Warning Limits. NA=not acceptable. Reported result falls outside of the Control Limits. CE=check for Error. Reported result falls within the Control Limits and outside of the Warning Limit.

TABLE D-3

DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING, 2011

(PAGE 1 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2011	11-MaW24	Water	Cs-134	Bq/L	19.1	21.5	15.1 - 28.0	A
			Cs-137	Bq/L	29.0	29.4	20.6 - 38.2	A
			Co-57	Bq/L	0.139		(1)	A
			Co-60	Bq/L	23.9	24.6	17.2 - 32.0	A
			H-3	Bq/L	265	243	170 - 316	A
			Mn-54	Bq/L	31.8	31.6	22.1 - 41.1	A
			K-40	Bq/L	94.8	91	64 - 118	A
			Sr-90	Bq/L	9.64	8.72	6.10 - 11.34	A
			Zn-65	Bq/L	-0.142		(1)	A
	11-GrW24	Water	Gr-A	Bq/L	0.767	1.136	0.341 - 1.931	A
			Gr-B	Bq/L	3.43	2.96	1.48 - 4.44	A
	11-MaS24	Soil	Cs-134	Bq/kg	612	680	476 - 884	A
			Cs-137	Bq/kg	772	758	531 - 985	A
			Co-57	Bq/kg	910	927	649 - 1205	A
			Co-60	Bq/kg	500	482	337 - 627	A
			Mn-54	Bq/kg	0.607		(1)	A
			K-40	Bq/kg	569	540	378 - 702	A
			Sr-90	Bq/kg	NR	160	112 - 208	N (2)
			Zn-65	Bq/kg	1497	1359	951 - 1767	A
	11-RdF24	AP	Cs-134	Bq/sample	3.26	3.49	2.44 - 4.54	A
			Cs-137	Bq/sample	2.36	2.28	1.60 - 2.96	A
			Co-57	Bq/sample	3.30	3.33	2.33 - 4.33	A
			Co-60	Bq/sample	0.0765		(1)	A
			Mn-54	Bq/sample	2.84	2.64	1.85 - 3.43	A
			Sr-90	Bq/sample	NR	1.36	0.95 - 1.77	N (2)
			Zn-65	Bq/sample	3.30	3.18	2.23 - 4.13	A
	11-GrF24	AP	Gr-A	Bq/sample	0.101	0.659	0.198 - 1.120	N (3)
			Gr-B	Bq/sample	1.23	1.323	0.662 - 1.985	A
	11-RdV24	Vegetation	Cs-134	Bq/sample	4.97	5.50	3.85 - 7.15	A
Cs-137			Bq/sample	0.0356		(1)	A	
Co-57			Bq/sample	10.8	9.94	6.96 - 12.92	A	
Co-60			Bq/sample	4.89	4.91	3.44 - 6.38	A	
Mn-54			Bq/sample	6.42	6.40	4.48 - 8.32	A	
Sr-90			Bq/sample	NR	2.46	1.72 - 3.20	N (2)	
Zn-65			Bq/sample	3.07	2.99	2.09 - 3.89	A	
September 2011	11-MaW25	Water	Cs-134	Bq/L	16.0	19.1	13.4 - 24.8	A
			Cs-137	Bq/L	0.0043		(1)	A
			Co-57	Bq/L	33.1	36.6	25.6 - 47.6	A
			Co-60	Bq/L	26.9	29.3	20.5 - 38.1	A
			H-3	Bq/L	1011	1014	710 - 1318	A
			Mn-54	Bq/L	23.2	25.0	17.5 - 32.5	A
			K-40	Bq/L	147	156	109 - 203	A
			Sr-90	Bq/L	15.8	14.2	9.9 - 18.5	A
			Zn-65	Bq/L	27.3	28.5	20.0 - 37.1	A

TABLE D-3

DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING, 2011

(PAGE 2 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
September 2011	11-GrW25	Water	Gr-A	Bq/L	0.894	0.866	0.260 - 1.472	A
			Gr-B	Bq/L	5.87	4.81	2.41 - 7.22	A
September 2011	11-MaS25	Soil	Cs-134	Bq/kg	-0.213		(1)	A
			Cs-137	Bq/kg	1110	979	685 - 1273	A
			Co-57	Bq/kg	1290	1180	826 - 1534	A
			Co-60	Bq/kg	731	644	451 - 837	A
			Mn-54	Bq/kg	987	848	594 - 1102	A
			K-40	Bq/kg	753	625	438 - 813	W
			Sr-90	Bq/kg	276	320	224 - 416	A
			Zn-65	Bq/kg	1870	1560	1092 - 2028	A
September 2011	11-RdF25	AP	Cs-134	Bq/sample	-0.043		(1)	A
			Cs-137	Bq/sample	3.09	2.60	1.82 - 3.38	A
			Co-57	Bq/sample	5.36	5.09	3.56 - 6.62	A
			Co-60	Bq/sample	3.41	3.20	2.24 - 4.16	A
			Mn-54	Bq/sample	0.067		(1)	A
			Sr-90	Bq/sample	1.84	1.67	1.17 - 2.17	A
			Zn-65	Bq/sample	5.17	4.11	2.88 - 5.34	W
	11-GrF25	AP	Gr-A	Bq/sample	0.0058		(1)	A
			Gr-B	Bq/sample	-0.01		(1)	A
	11-RdV25	Vegetation	Cs-134	Bq/sample	0.0081		(1)	A
			Cs-137	Bq/sample	4.94	4.71	3.30 - 6.12	A
			Co-57	Bq/sample	0.0639		(1)	A
			Co-60	Bq/sample	3.36	3.38	2.37 - 4.39	A
			Mn-54	Bq/sample	5.89	5.71	4.00 - 7.42	A
Sr-90			Bq/sample	1.31	1.26	0.88 - 1.64	A	
Zn-65	Bq/sample	6.54	6.39	4.47 - 8.31	A			

(1) False positive test.

(2) Evaluated as failed due to not reporting a previously reported analyte. NCR 11-11

(3) The filter for Gross Alpha was counted on the wrong side. Recounted on the correct side resulted in acceptable results. NCR 11-11

(a) Teledyne Brown Engineering reported result.

(b) The MAPEP known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) DOE/MAPEP evaluation: A=acceptable, W=acceptable with warning, N=not acceptable.

TABLE D-4

**ERA (a) STATISTICAL SUMMARY PROFICIENCY TESTING PROGRAM^a
ENVIRONMENTAL, INC., 2011**

(Page 1 of 1)

Lab Code	Date	Analysis	Concentration (pCi/L)			Acceptance
			Laboratory Result ^b	ERA Result ^c	Control Limits	
STW-1243	04/04/11	Sr-89	68.2 ± 5.8	63.2	51.1 - 71.2	Pass
STW-1243	04/04/11	Sr-90	44.3 ± 2.4	42.5	31.3 - 48.8	Pass
STW-1244	04/04/11	Ba-133	69.8 ± 3.9	75.3	63.0 - 82.8	Pass
STW-1244	04/04/11	Co-60	87.9 ± 3.8	88.8	79.9 - 100.0	Pass
STW-1244	04/04/11	Cs-134	69.5 ± 3.7	72.9	59.5 - 80.2	Pass
STW-1244	04/04/11	Cs-137	77.9 ± 5.3	77.0	69.3 - 87.4	Pass
STW-1244	04/04/11	Zn-65	105.2 ± 8.4	98.9	89.0 - 118.0	Pass
STW-1245	04/04/11	Gr. Alpha	41.5 ± 2.3	50.1	26.1 - 62.9	Pass
STW-1245	04/04/11	Gr. Beta	48.9 ± 1.8	49.8	33.8 - 56.9	Pass
STW-1246	04/04/11	I-131	26.6 ± 1.7	27.5	22.9 - 32.3	Pass
STW-1248	04/04/11	H-3	10322 ± 285	10200.0	8870 - 11200	Pass
STW-1256	10/07/11	Sr-89	68.7 ± 6.0	69.7	56.9 - 77.9	Pass
STW-1256	10/07/11	Sr-90	36.9 ± 2.4	41.1	30.2 - 47.2	Pass
STW-1257	10/07/11	Ba-133	88.2 ± 7.8	96.9	81.8 - 106.0	Pass
STW-1257	10/07/11	Co-60	116.5 ± 7.1	119.0	107.0 - 133.0	Pass
STW-1257 ^d	10/07/11	Cs-134	38.8 ± 8.0	33.4	26.3 - 36.7	Fail
STW-1257	10/07/11	Cs-137	45.6 ± 7.3	44.3	39.4 - 51.7	Pass
STW-1257	10/07/11	Zn-65	84.9 ± 15.4	76.8	68.9 - 92.5	Pass
STW-1258	10/07/11	Gr. Alpha	35.7 ± 3.8	53.2	27.8 - 66.6	Pass
STW-1258	10/07/11	Gr. Beta	36.1 ± 3.3	45.9	30.9 - 53.1	Pass
STW-1259	10/07/11	I-131	25.0 ± 1.1	27.5	22.9 - 32.3	Pass
STW-1261	10/07/11	H-3	17435 ± 382	17400	15200 - 19100	Pass

^a Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the crosscheck program for proficiency testing in drinking water conducted by Environmental Resources Associates (ERA).

^b Unless otherwise indicated, the laboratory result is given as the mean ± standard deviation for three determinations.

^c Results are presented as the known values, expected laboratory precision (1 sigma, 1 determination) and control limits as provided by ERA.

^d The sample was reanalyzed. Result of reanalysis was acceptable, 32.9 ± 7.4 pCi/L.

TABLE D-5

DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)^a
ENVIRONMENTAL, INC., 2011

(Page 1 of 2)

Concentration ^b						
Lab Code ^c	Date	Analysis	Laboratory result	Activity	Limits ^d	Acceptance
STW-1237	02/01/11	Co-57	< 0.2	0.00	-	Pass
STW-1237	02/01/11	Co-60	24.10 ± 0.40	24.60	17.20 - 32.00	Pass
STW-1237	02/01/11	Cs-134	19.80 ± 0.40	21.50	15.10 - 28.00	Pass
STW-1237	02/01/11	Cs-137	29.40 ± 0.50	29.40	20.60 - 38.20	Pass
STW-1237	02/01/11	H-3	238.90 ± 8.80	243.00	170.00 - 316.00	Pass
STW-1237	02/01/11	K-40	95.40 ± 3.10	91.00	64.00 - 118.00	Pass
STW-1237	02/01/11	Mn-54	32.50 ± 0.60	31.60	22.10 - 41.10	Pass
STW-1237	02/01/11	Sr-90	8.70 ± 0.70	8.72	6.10 - 11.34	Pass
STW-1237	02/01/11	Zn-65	< 0.5	0.00	-	Pass
STW-1238	02/01/11	Gr. Alpha	0.82 ± 0.07	1.14	0.34 - 1.93	Pass
STW-1238	02/01/11	Gr. Beta	2.82 ± 0.07	2.96	1.48 - 4.44	Pass
STVE-1239	02/01/11	Co-57	11.27 ± 0.21	9.94	6.96 - 12.92	Pass
STVE-1239	02/01/11	Co-60	4.95 ± 0.16	4.91	3.44 - 6.38	Pass
STVE-1239	02/01/11	Cs-134	5.18 ± 0.19	5.50	3.85 - 7.15	Pass
STVE-1239	02/01/11	Cs-137	< 0.09	0.00	-	Pass
STVE-1239	02/01/11	Mn-54	6.91 ± 0.25	6.40	4.48 - 8.32	Pass
STVE-1239	02/01/11	Zn-65	3.10 ± 0.32	2.99	2.09 - 3.89	Pass
STSO-1240	02/01/11	Co-57	984.10 ± 4.10	927.00	649.00 - 1205.00	Pass
STSO-1240	02/01/11	Co-60	540.70 ± 3.00	482.00	337.00 - 627.00	Pass
STSO-1240	02/01/11	Cs-134	726.70 ± 5.92	680.00	476.00 - 884.00	Pass
STSO-1240	02/01/11	Cs-137	883.10 ± 4.70	758.00	531.00 - 985.00	Pass
STSO-1240	02/01/11	K-40	622.70 ± 16.70	540.00	378.00 - 702.00	Pass
STSO-1240	02/01/11	Mn-54	-0.30 ± 1.00	0.00	-	Pass
STSO-1240	02/01/11	Zn-65	1671.00 ± 13.10	1359.00	951.00 - 1767.00	Pass
STAP-1241	02/01/11	Co-57	3.48 ± 0.06	3.33	2.33 - 4.33	Pass
STAP-1241	02/01/11	Co-60	0.00 ± 0.02	0.00	-0.10 - 0.10	Pass
STAP-1241	02/01/11	Cs-134	3.44 ± 0.27	3.49	2.44 - 4.54	Pass
STAP-1241	02/01/11	Cs-137	2.46 ± 0.27	2.28	1.60 - 2.96	Pass
STAP-1241	02/01/11	Gr. Alpha	0.39 ± 0.05	0.66	0.20 - 1.12	Pass
STAP-1241	02/01/11	Gr. Beta	1.54 ± 0.07	1.32	0.66 - 1.99	Pass
STAP-1241	02/01/11	Mn-54	2.90 ± 0.10	2.64	1.85 - 3.43	Pass
STAP-1241 ^e	02/01/11	Sr-90	1.89 ± 0.15	1.36	0.95 - 1.77	Fail
STAP-1241	02/01/11	Zn-65	3.80 ± 0.18	3.18	2.23 - 4.13	Pass
STVE-1250	08/01/11	Co-57	0.01 ± 0.02	0.00	-	Pass
STVE-1250	08/01/11	Co-60	3.57 ± 0.13	3.38	2.37 - 4.39	Pass
STVE-1250	08/01/11	Cs-134	-0.02 ± 0.04	0.00	-0.10 - 0.10	Pass
STVE-1250	08/01/11	Cs-137	5.28 ± 0.20	4.71	3.30 - 6.12	Pass
STVE-1250	08/01/11	Mn-54	6.48 ± 0.22	5.71	4.00 - 7.42	Pass
STVE-1250	08/01/11	Zn-65	7.35 ± 0.34	6.39	4.47 - 8.31	Pass

TABLE D-5

DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)^a
ENVIRONMENTAL, INC., 2011

(Page 2 of 2)

Lab Code ^c	Date	Analysis	Laboratory result	Concentration ^b		Acceptance
				Known Activity	Control Limits ^d	
STSO-1251	08/01/11	Co-57	1333.90 ± 4.20	1180.00	826.00 - 1534.00	Pass
STSO-1251	08/01/11	Co-60	701.30 ± 3.40	644.00	451.00 - 837.00	Pass
STSO-1251	08/01/11	Cs-134	0.71 ± 1.05	0.00	-	Pass
STSO-1251	08/01/11	Cs-137	1106.00 ± 5.60	979.00	685.00 - 1273.00	Pass
STSO-1251	08/01/11	K-40	749.20 ± 19.00	625.00	438.00 - 813.00	Pass
STSO-1251	08/01/11	Mn-54	984.30 ± 5.40	848.00	594.00 - 1102.00	Pass
STSO-1251 f	08/01/11	Sr-90	219.40 ± 16.70	320.00	224.00 - 416.00	Fail
STSO-1251	08/01/11	Zn-65	1639.90 ± 11.40	1560.00	1092.00 - 2028.00	Pass
STAP-1252	08/01/11	Co-57	5.06 ± 0.08	5.09	3.56 - 6.62	Pass
STAP-1252	08/01/11	Co-60	3.13 ± 0.09	3.20	2.24 - 4.16	Pass
STAP-1252	08/01/11	Cs-134	0.01 ± 0.03	0.00	-0.10 - 0.10	Pass
STAP-1252	08/01/11	Cs-137	2.61 ± 0.09	2.60	1.82 - 3.38	Pass
STAP-1252	08/01/11	Mn-54	0.01 ± 0.03	0.00	-0.10 - 0.10	Pass
STAP-1252	08/01/11	Sr-90	1.65 ± 0.16	1.67	1.17 - 2.17	Pass
STAP-1252	08/01/11	Zn-65	4.46 ± 0.23	4.11	2.88 - 5.34	Pass
STW-1254	08/01/11	Co-57	37.20 ± 0.50	36.60	25.60 - 47.60	Pass
STW-1254	08/01/11	Co-60	28.80 ± 0.40	29.30	20.50 - 38.10	Pass
STW-1254	08/01/11	Cs-134	18.00 ± 0.60	19.10	13.40 - 24.80	Pass
STW-1254	08/01/11	Cs-137	0.06 ± 0.13	0.00	-	Pass
STW-1254	08/01/11	H-3	1039.90 ± 17.90	1014.00	710.00 - 1318.00	Pass
STW-1254	08/01/11	K-40	161.40 ± 4.10	156.00	109.00 - 203.00	Pass
STW-1254	08/01/11	Mn-54	25.70 ± 0.50	25.00	17.50 - 32.50	Pass
STW-1254	08/01/11	Sr-90	15.60 ± 1.80	14.20	9.90 - 18.50	Pass
STW-1254	08/01/11	Zn-65	30.20 ± 0.90	28.50	20.00 - 37.10	Pass
STW-1255	08/01/11	Gr. Alpha	0.72 ± 0.12	0.87	0.26 - 1.47	Pass
STW-1255	08/01/11	Gr. Beta	4.71 ± 0.15	4.81	2.41 - 7.22	Pass

^a Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the Department of Energy's Mixed Analyte Performance Evaluation Program, Idaho Operations office, Idaho Falls, Idaho

^b Results are reported in units of Bq/kg (soil), Bq/L (water) or Bq/total sample (filters, vegetation).

^c Laboratory codes as follows: STW (water), STAP (air filter), STSO (soil), STVE (vegetation).

^d MAPEP results are presented as the known values and expected laboratory precision (1 sigma, 1 determination) and control limits as defined by the MAPEP. A known value of "zero" indicates an analysis was included in the testing series as a "false positive". MAPEP does not provide control limits.

^e No errors found in calculation or procedure, results of reanalysis; 1.73 Bq/filter.

^f The analyses were repeated through a strontium column; mean result of triplicate analyses, 304.2 Bq/kg.

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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 2011

Prepared By

Teledyne Brown Engineering
Environmental Services



Nuclear

Quad Cities Nuclear Power Station
Cordova, IL 61242

May 2012

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Table B-I.2 Concentrations of Gamma Emitters in Groundwater Samples Collected in the Vicinity of Quad Cities Nuclear Power Station, 2011.

Table B-I.3 Concentrations of Hard-To-Detects in Groundwater Samples Collected in the Vicinity of Quad Cities Nuclear Power Station, 2011.

Table B-II.1 Concentrations of Tritium and Strontium in Surface Water Samples Collected in the Vicinity of Quad Cities Nuclear Power Station, 2011.

Table B-II.2 Concentrations of Gamma Emitters in Surface Water Samples Collected in the Vicinity of Quad Cities Nuclear Power Station, 2011.

Table B-III.1 Concentrations of Tritium in Groundwater Samples Collected and Analyzed by Quad Cities Station Personnel, 2011.

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 2011 through 31 December 2011.

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 2011 Conestoga-Rovers & Associates (CRA) completed a five-year update hydrogeologic investigation report for the Station (*NEI 07-07, Hydrogeologic Investigation Report*, dated May 2011). 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. In 2011 the Station also performed a 5 year review and update of the site risk assessments of Systems, Structures, and Components (SSCs) that contain or could contain licensed material and for which there is a credible mechanism for licensed material to reach groundwater.

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 2011. During that time period, RGPP samples were collected from 40 locations.

2011 sample locations included thirty-three designated monitoring wells, two surface water monitoring points, 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, gross 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 207,000 pCi/L in a monitoring well. Tritium concentrations ranged from less than the LLD of 200 pCi/L to 679 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-90 was not detected at concentrations greater 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 second and third quarter sampling in 2011. Gross Alpha (dissolved) was detected in one groundwater sample at a concentration of 2.4 pCi/L. Gross Alpha (suspended) was not

detected at any of the groundwater locations. Gross Beta (dissolved) was detected in 8 of 9 groundwater locations. The concentrations ranged from 2.2 to 20.1 pCi/L. Gross Beta (suspended) was not detected at any of the groundwater locations.

Hard-To-Detect analyses was performed on one upgradient monitoring well location (MW-QC-107I) to establish background levels and 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.

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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 Northwestern Illinois, approximately 182 miles west of Chicago, Illinois.

A. Objectives 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 2011.

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 2011.

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 and surface water.
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 \pm 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 207,000 pCi/l. All samples obtained at the site boundaries were less than the detection limit of 200 pCi/L. The location most representative of potential offsite user of drinking water was <200 pCi/L.

Strontium

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 2011. Gross Alpha (dissolved) was detected in one groundwater sample at a concentration of 2.4 pCi/L. Gross Alpha (suspended) was not detected at any of the groundwater locations. Gross Beta (dissolved) was detected in 8 of 9 groundwater locations. The concentrations ranged from 2.2 to 20.1 pCi/L. Gross Beta (suspended) was not detected at any of the groundwater locations (Table B-I.1 Appendix B).

Gamma Emitters

No gamma emitting nuclides were detected (Table B-I.2, Appendix B)

Hard-To-Detect

Hard-To-Detect analyses were performed on one groundwater location and one sentinel well to establish background levels. 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 detected above the detection limit of 200 pCi/l in three of 8 samples. The concentrations ranged from 341 to 679 pCi/L (Table B-II.1 Appendix B).

Strontium

Strontium-90 was not detected above the Lower Limit of Detection (LLD) of 1.0 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 2011.

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, 2011

Site	Site Type	Well Designation	Minimum Sample Frequency
MW-QC-1	Monitoring Well	Plume	Quarterly
MW-QC-2	Monitoring Well	Plume	Quarterly
MW-QC-1011	Monitoring Well	Idle	Not Required
MW-QC-101S	Monitoring Well	Idle	Not Required
MW-QC-102D	Monitoring Well	Plume	Quarterly
MW-QC-102I	Monitoring Well	Plume	Quarterly
MW-QC-102S	Monitoring Well	Plume	Quarterly
MW-QC-103I	Monitoring Well	Detection	Quarterly
MW-QC-104S	Monitoring Well	Detection	Quarterly
MW-QC-105I	Monitoring Well	Plume	Quarterly
MW-QC-106I	Monitoring Well	Plume	Quarterly
MW-QC-106S	Monitoring Well	Plume	Quarterly
MW-QC-107I	Monitoring Well	Background	Annual
MW-QC-108D	Monitoring Well	Plume	Quarterly
MW-QC-108I	Monitoring Well	Plume	Quarterly
MW-QC-108S	Monitoring Well	Plume	Quarterly
MW-QC-109I	Monitoring Well	Plume	Quarterly
MW-QC-109S	Monitoring Well	Plume	Quarterly
MW-QC-110I	Monitoring Well	Idle	Not Required
MW-QC-111D1	Monitoring Well	Idle	Not Required
MW-QC-111D2	Monitoring Well	Idle	Not Required
MW-QC-111I	Monitoring Well	Idle	Not Required
MW-QC-112I	Monitoring Well	Plume	Quarterly
MW-QC-113I	Monitoring Well	Idle	Not Required
MW-QC-114I	Monitoring Well	Idle	Not Required
MW-QC-115S	Monitoring Well	Idle	Not Required
MW-QC-116S	Monitoring Well	Idle	Not Required
SURFACE WATER #1	Surface Water	Surface Water	Quarterly
SURFACE WATER #2	Surface Water	Surface Water	Quarterly
WELL #1	Production Well	Idle	Not Required
WELL #5	Production Well	Idle	Not Required
WELL #6 LITTLE FISH	Production Well	Idle	Not Required
WELL #7 BIG FISH WELL	Production Well	Plume	Quarterly
WELL #8 FIRE TRAINING WELL	Production Well	Idle	Not Required
WELL #9 Dry Cask Storage	Production Well	Background	Annual
WELL #10 FISH HOUSE WELL	Production Well	Idle	Not Required
WELL #11 SPRAY CANAL WELL	Production Well	Idle	Not Required
STP SAND POINT WELL	Production Well	Idle	Not Required
QC-GP-1	Sentinel Well	Plume	Quarterly
QC-GP-2	Sentinel Well	Plume	Quarterly
QC-GP-3	Sentinel Well	Idle	Not Required
QC-GP-4	Sentinel Well	Plume	Quarterly
QC-GP-5	Sentinel Well	Plume	Quarterly
QC-GP-6	Sentinel Well	Plume	Quarterly
QC-GP-7	Sentinel Well	Plume	Quarterly
QC-GP-8	Sentinel Well	Idle	Not Required
QC-GP-9	Sentinel Well	Plume	Quarterly
QC-GP-10	Sentinel Well	Detection	Quarterly
QC-GP-11	Sentinel Well	Detection	Quarterly
QC-GP-12	Sentinel Well	Detection	Quarterly
QC-GP-13	Sentinel Well	Plume	Quarterly
QC-GP-14	Sentinel Well	Detection	Quarterly
QC-GP-15	Sentinel Well	Elevated	Quarterly
QC-GP-16	Sentinel Well	Detection	Quarterly
QC-GP-17	Sentinel Well	Plume	Quarterly

Note: Idle designated wells are not required to be sampled as part of the RGPP

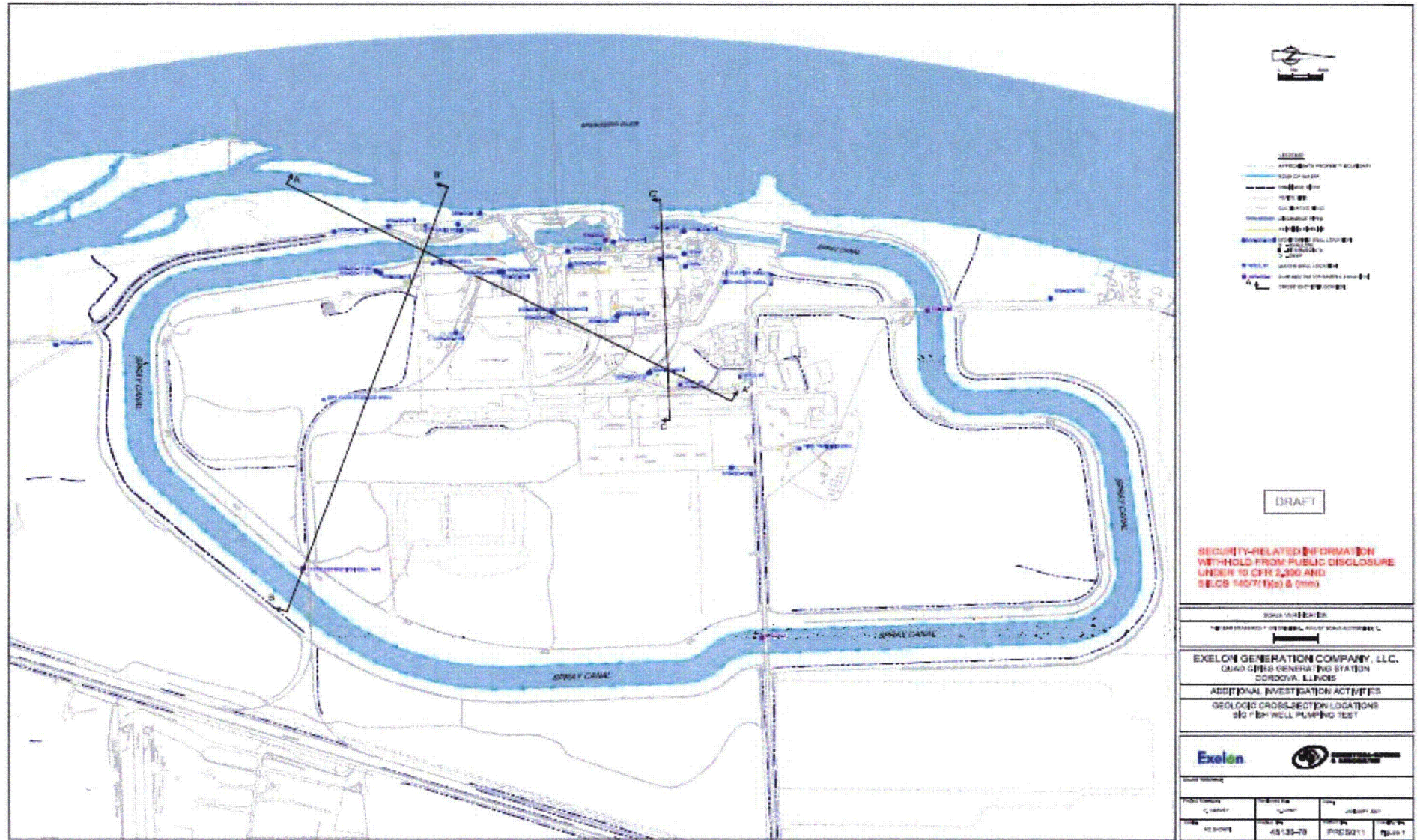


FIGURE A-1
 Sampling Locations Near the Site Boundary of the Quad Cities Nuclear Power Station, 2011

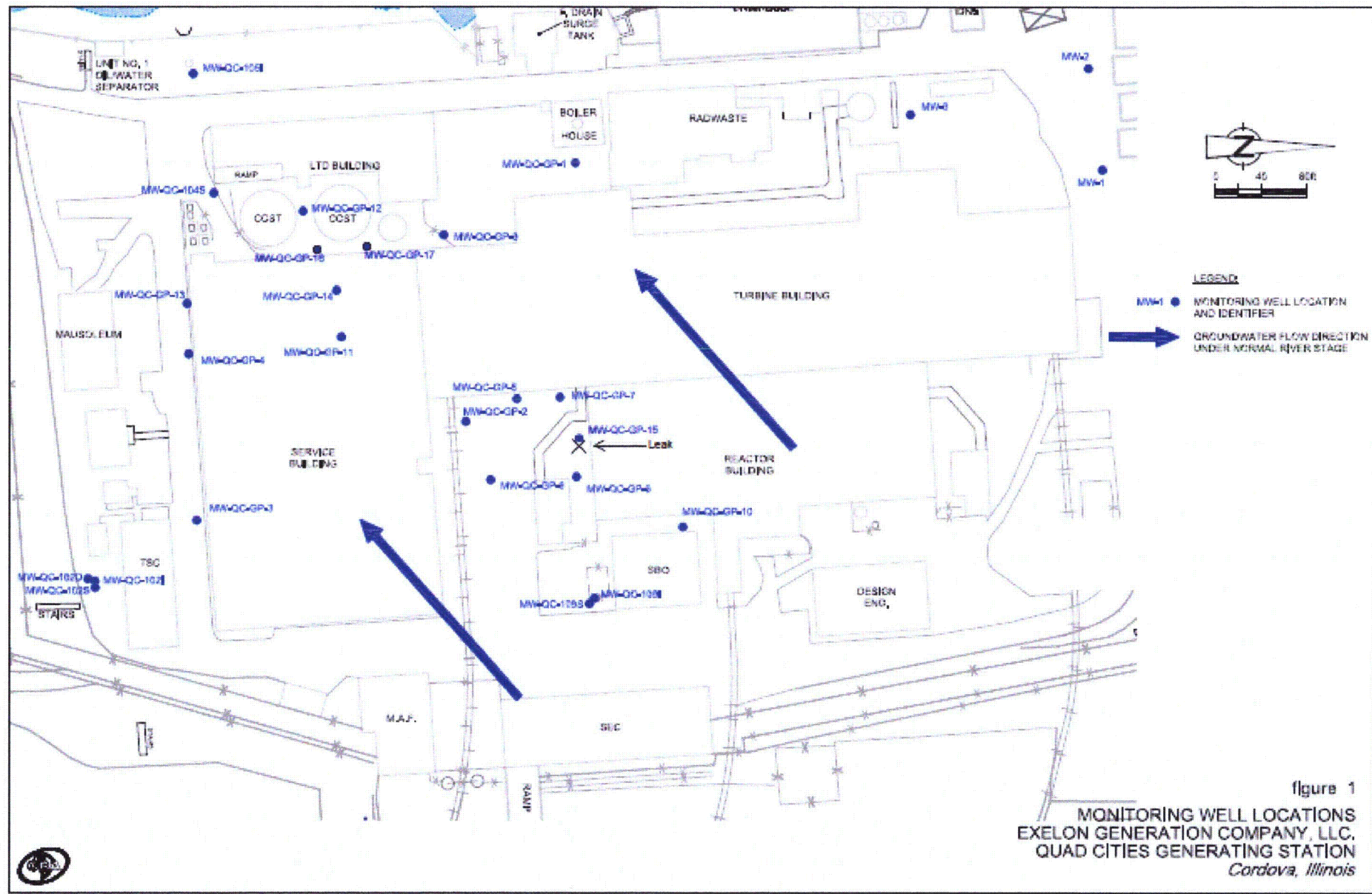


figure 1
 MONITORING WELL LOCATIONS
 EXELON GENERATION COMPANY, LLC.
 QUAD CITIES GENERATING STATION
 Cordova, Illinois

FIGURE A-2
 Sentinel Monitoring Point Locations, Quad Cities Nuclear Power Station, 2011

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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, 2011

RESULTS IN UNITS OF PCI/LITER \pm 2 SIGMA

SITE	COLLECTION DATE	H-3	SR-90	GR-A (DIS)	GR-A (SUS)	GR-B (DIS)	GR-B (SUS)
QC-GP-10	08/10/11		< 0.8	< 0.9	< 1.4	9.9 \pm 1.4	< 1.6
QC-GP-11	08/11/11		< 0.6	< 0.9	< 1.4	5.4 \pm 1.2	< 1.6
QC-GP-12	08/11/11		< 0.4	< 0.8	< 0.5	2.2 \pm 0.8	< 1.6
QC-GP-14	08/11/11		< 0.7	< 1.0	< 0.5	4.6 \pm 1.1	< 1.6
QC-GP-15	08/10/11		< 0.6	< 4.3	< 0.8	16.5 \pm 1.9	< 1.4
QC-GP-16	08/11/11		< 0.6	< 1.0	< 0.8	4.4 \pm 1.1	< 1.4
MW-QC-1	03/08/11	< 177					
MW-QC-1	05/24/11	< 181					
MW-QC-1	07/19/11	< 178					
MW-QC-1	11/08/11	< 182					
MW-QC-102D	03/08/11	2520 \pm 307					
MW-QC-102D	05/24/11	3330 \pm 382					
MW-QC-102D	07/19/11	3120 \pm 365					
MW-QC-102D	11/09/11	1880 \pm 240					
MW-QC-102I	03/08/11	602 \pm 137					
MW-QC-102I	05/24/11	457 \pm 139					
MW-QC-102I	07/19/11	461 \pm 139					
MW-QC-102I	11/09/11	355 \pm 121					
MW-QC-102S	03/08/11	< 177					
MW-QC-102S	05/24/11	< 185					
MW-QC-102S	07/19/11	< 186					
MW-QC-102S	11/09/11	< 166					
MW-QC-103I	03/08/11	< 179					
MW-QC-103I	05/24/11	< 183					
MW-QC-103I	07/19/11	< 184	< 0.7	< 1.2	< 0.5	12.3 \pm 1.4	< 1.6
MW-QC-103I	11/08/11	< 165					
MW-QC-104S	03/08/11	9420 \pm 990					
MW-QC-104S	05/24/11	1240 \pm 183					
MW-QC-104S	07/19/11	555 \pm 145	< 0.8	2.4 \pm 1.5	< 0.6	20.1 \pm 2.0	< 1.9
MW-QC-104S	11/08/11	489 \pm 130					
MW-QC-105I	03/08/11	85500 \pm 8570					
MW-QC-105I	05/24/11	< 184					
MW-QC-105I	07/19/11	407 \pm 121					
MW-QC-105I	11/08/11	10700 \pm 1110					
MW-QC-106I	03/08/11	< 179					
MW-QC-106I	05/24/11	< 184					
MW-QC-106I	07/19/11	< 167					
MW-QC-106I	11/08/11	< 162					
MW-QC-106S	03/08/11	< 178					
MW-QC-106S	05/24/11	< 182					
MW-QC-106S	07/19/11	< 175					
MW-QC-106S	11/08/11	< 166					
MW-QC-107I	05/23/11	< 185	< 0.7	< 1.2	< 0.6	< 1.8	< 2.0
MW-QC-108D	03/09/11	1480 \pm 208					
MW-QC-108D	05/25/11	1540 \pm 211					

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, 2011

RESULTS IN UNITS OF PCI/LITER \pm 2 SIGMA

SITE	COLLECTION DATE	H-3	SR-90	GR-A (DIS)	GR-A (SUS)	GR-B (DIS)	GR-B (SUS)
MW-QC-108D	07/20/11	1840 \pm 231					
MW-QC-108D	11/09/11	2300 \pm 278					
MW-QC-108I	03/09/11	< 183					
MW-QC-108I	05/25/11	3710 \pm 419					
MW-QC-108I	07/20/11	6730 \pm 712					
MW-QC-108I	11/09/11	529 \pm 130					
MW-QC-108S	03/09/11	< 176					
MW-QC-108S	05/25/11	< 184					
MW-QC-108S	07/20/11	399 \pm 129					
MW-QC-108S	11/09/11	< 168					
MW-QC-109I	03/08/11	< 179					
MW-QC-109I	05/24/11	266 \pm 129					
MW-QC-109I	07/19/11	< 161					
MW-QC-109I	11/08/11	< 167					
MW-QC-109S	03/08/11	< 178					
MW-QC-109S	05/24/11	< 184					
MW-QC-109S	07/19/11	< 162					
MW-QC-109S	11/08/11	< 167					
MW-QC-112I	03/07/11	< 178					
MW-QC-112I	05/23/11	< 188					
MW-QC-112I	07/18/11	< 161					
MW-QC-112I	11/07/11	< 167					
MW-QC-2	03/08/11	< 176					
MW-QC-2	05/24/11	< 185					
MW-QC-2	07/19/11	< 162					
MW-QC-2	11/08/11	< 172					

TABLE B-I.2

CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES
COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011

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	08/10/11	< 20	< 17	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 19	< 7
QC-GP-11	08/11/11	< 18	< 14	< 2	< 2	< 4	< 2	< 3	< 2	< 4	< 9	< 2	< 2	< 17	< 5
QC-GP-12	08/11/11	< 17	< 29	< 2	< 2	< 4	< 2	< 3	< 2	< 4	< 9	< 2	< 2	< 16	< 6
QC-GP-14	08/11/11	< 18	< 34	< 2	< 2	< 5	< 2	< 4	< 2	< 3	< 9	< 2	< 2	< 17	< 5
QC-GP-15	08/10/11	< 18	< 34	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 9	< 2	< 2	< 19	< 7
QC-GP-16	08/11/11	< 14	< 22	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 7	< 1	< 2	< 15	< 4
MW-QC-103I	07/19/11	< 30	< 27	< 3	< 3	< 7	< 3	< 6	< 4	< 5	< 13	< 3	< 3	< 25	< 8
MW-QC-104S	07/19/11	< 39	< 81	< 4	< 4	< 10	< 4	< 9	< 5	< 8	< 14	< 4	< 4	< 32	< 12
MW-QC-107I	05/23/11	< 33	< 31	< 3	< 4	< 9	< 3	< 7	< 4	< 6	< 15	< 4	< 4	< 29	< 9

TABLE B-1.3 CONCENTRATIONS OF HARD-TO-DETECTS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011

RESULTS IN UNITS OF PCI/LITER \pm 2 SIGMA

SITE	COLLECTION DATE	AM-241	CM-242	CM-243/244	PU-238	PU-239/240	U-233/234	U-235	U-238	FE-55	NI-63
QC-GP-15	08/10/11	< 0.14	< 0.07	< 0.13	< 0.17	< 0.06	< 0.09	< 0.03	< 0.04	< 73	< 4.4
MW-QC-1071	05/23/11	< 0.17	< 0.12	< 0.12	< 0.03	< 0.10	< 0.02	< 0.05	< 0.06	< 149	< 3.8

TABLE B-II.1

**CONCENTRATIONS OF TRITIUM AND STRONTIUM IN SURFACE WATER SAMPLES
COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011**

RESULTS IN UNITS OF PCI/LITER \pm 2 SIGMA

SITE	COLLECTION		H-3	SR-90
	DATE			
SURFACE WATER #1	03/07/11		< 179	
SURFACE WATER #1	05/23/11		< 181	
SURFACE WATER #1	07/18/11		373 \pm 121	< 0.9
SURFACE WATER #1	11/07/11		679 \pm 150	
SURFACE WATER #2	03/07/11		< 181	
SURFACE WATER #2	05/23/11		< 180	
SURFACE WATER #2	07/18/11		341 \pm 118	< 0.9
SURFACE WATER #2	11/07/11		< 189	

TABLE B-II.2

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES
COLLECTED IN THE VICINITY OF QUAD CITIES NUCLEAR POWER STATION, 2011

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	07/18/11	< 37	< 39	< 4	< 4	< 9	< 3	< 8	< 5	< 7	< 15	< 4	< 4	< 29	< 9
SURFACE WATER #2	07/18/11	< 34	< 70	< 3	< 4	< 7	< 3	< 8	< 4	< 7	< 14	< 4	< 3	< 28	< 8

TABLE B-III.1

**CONCENTRATIONS OF TRITIUM IN GROUNDWATER SAMPLES COLLECTED
AND ANALYZED BY QUAD CITIES STATION PERSONNEL, 2011**

RESULTS IN UNITS OF PCI/LITER

SITE	COLLECTION		AQUIFER
	DATE	ACTIVITY	
QC-GP-1	01/06/11	25,500	Shallow Aquifer
QC-GP-1	06/15/11	16,300	Shallow Aquifer
QC-GP-1	08/10/11	15,000	Shallow Aquifer
QC-GP-1	10/25/11	21,000	Shallow Aquifer
QC-GP-2	01/06/11	<2,000	Shallow Aquifer
QC-GP-2	04/06/11	<2,000	Shallow Aquifer
QC-GP-2	06/16/11	<2,000	Shallow Aquifer
QC-GP-2	08/10/11	<2,000	Shallow Aquifer
QC-GP-2	10/25/11	<2,000	Shallow Aquifer
QC-GP-3	06/15/11	<2,000	Shallow Aquifer
QC-GP-4	01/06/11	44,100	Shallow Aquifer
QC-GP-4	04/06/11	37,600	Shallow Aquifer
QC-GP-4	06/15/11	71,200	Shallow Aquifer
QC-GP-4	08/10/11	63,300	Shallow Aquifer
QC-GP-4	10/25/11	58,900	Shallow Aquifer
QC-GP-5	01/06/11	2,270	Shallow Aquifer
QC-GP-5	04/06/11	<2,000	Shallow Aquifer
QC-GP-5	06/16/11	15,800	Shallow Aquifer
QC-GP-5	08/10/11	<2,000	Shallow Aquifer
QC-GP-5	10/25/11	<2,000	Shallow Aquifer
QC-GP-6	01/06/11	<2,000	Shallow Aquifer
QC-GP-6	04/06/11	<2,000	Shallow Aquifer
QC-GP-6	06/16/11	<2,000	Shallow Aquifer
QC-GP-6	08/10/11	<2,000	Shallow Aquifer
QC-GP-6	10/25/11	<2,000	Shallow Aquifer
QC-GP-7	01/06/11	<2,000	Shallow Aquifer
QC-GP-7	04/06/11	<2,000	Shallow Aquifer
QC-GP-7	06/16/11	5,200	Shallow Aquifer
QC-GP-7	08/10/11	3,110	Shallow Aquifer
QC-GP-7	10/25/11	<2,000	Shallow Aquifer
QC-GP-9	01/06/11	45,100	Shallow Aquifer
QC-GP-9	04/06/11	<2,000	Shallow Aquifer
QC-GP-9	04/29/11	12,900	Shallow Aquifer
QC-GP-9	06/15/11	<2,000	Shallow Aquifer
QC-GP-9	08/10/11	<2,000	Shallow Aquifer
QC-GP-9	10/26/11	11,400	Shallow Aquifer
QC-GP-10	01/06/11	<2,000	Shallow Aquifer
QC-GP-10	04/06/11	<2,000	Shallow Aquifer
QC-GP-10	06/16/11	<2,000	Shallow Aquifer
QC-GP-10	08/10/11	<2,000	Shallow Aquifer
QC-GP-10	10/25/11	<2,000	Shallow Aquifer
QC-GP-11	01/06/11	2,710	Shallow Aquifer
QC-GP-11	04/07/11	<2,000	Shallow Aquifer
QC-GP-11	06/17/11	29,100	Shallow Aquifer
QC-GP-11	08/11/11	6,170	Shallow Aquifer
QC-GP-11	10/26/11	<2,000	Shallow Aquifer
QC-GP-12	01/06/11	<2,000	Shallow Aquifer
QC-GP-12	04/06/11	<2,000	Shallow Aquifer
QC-GP-12	06/17/11	<2,000	Shallow Aquifer
QC-GP-12	08/11/11	<2,000	Shallow Aquifer
QC-GP-12	10/26/11	<2,000	Shallow Aquifer
QC-GP-13	01/06/11	95,500	Shallow Aquifer

TABLE B-III.1

**CONCENTRATIONS OF TRITIUM IN GROUNDWATER SAMPLES COLLECTED
AND ANALYZED BY QUAD CITIES STATION PERSONNEL, 2011**

RESULTS IN UNITS OF PCI/LITER

SITE	COLLECTION DATE	ACTIVITY	AQUIFER
QC-GP-13	04/06/11	18,000	Shallow Aquifer
QC-GP-13	04/29/11	51,100	Shallow Aquifer
QC-GP-13	06/16/11	115,000	Shallow Aquifer
QC-GP-13	08/10/11	98,700	Shallow Aquifer
QC-GP-13	10/26/11	53,100	Shallow Aquifer
QC-GP-14	01/06/11	3,350	Shallow Aquifer
QC-GP-14	01/13/11	4,180	Shallow Aquifer
QC-GP-14	04/07/11	50,700	Shallow Aquifer
QC-GP-14	04/29/11	83,300	Shallow Aquifer
QC-GP-14	06/17/11	102,000	Shallow Aquifer
QC-GP-14	08/11/11	66,900	Shallow Aquifer
QC-GP-14	10/26/11	5,840	Shallow Aquifer
QC-GP-15	01/06/11	<2,000	Shallow Aquifer
QC-GP-15	04/06/11	<2,000	Shallow Aquifer
QC-GP-15	06/16/11	<2,000	Shallow Aquifer
QC-GP-15	08/10/11	<2,000	Shallow Aquifer
QC-GP-15	10/25/11	<2,000	Shallow Aquifer
QC-GP-16	01/06/11	97,700	Shallow Aquifer
QC-GP-16	04/06/11	207,000	Shallow Aquifer
QC-GP-16	04/29/11	14,400	Shallow Aquifer
QC-GP-16	06/17/11	81,700	Shallow Aquifer
QC-GP-16	08/11/11	113,000	Shallow Aquifer
QC-GP-16	10/26/11	115,000	Shallow Aquifer
QC-GP-17	01/06/11	51,100	Shallow Aquifer
QC-GP-17	01/13/11	66,400	Shallow Aquifer
QC-GP-17	04/06/11	93,500	Shallow Aquifer
QC-GP-17	04/29/11	5,180	Shallow Aquifer
QC-GP-17	06/17/11	54,000	Shallow Aquifer
QC-GP-17	08/11/11	34,200	Shallow Aquifer
QC-GP-17	10/26/11	68,900	Shallow Aquifer
MW-QC-105I	01/13/11	91,100	Shallow Aquifer
MW-QC-105I	04/07/11	<2000	Shallow Aquifer
Well #1	03/07/11	<200	
Well #1	06/16/11	<200	
Well #1	09/20/11	<200	
Well #5	03/07/11	<200	
Well #5	06/16/11	<200	
Well #5	09/20/11	<200	
Well #7	03/07/11	<200	
Well #7	06/16/11	<200	
Well #7	09/20/11	<200	
Well #7	12/06/11	<200	
Well #9	06/16/11	<200	
Well #9	09/20/11	<200	
Well #10	03/07/11	<200	
Well #10	06/16/11	<200	
Well #10	09/20/11	<200	