Exelon Generation®

Clinton Power Station
8401 Power Road
Clinton, IL 61727

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U.S. Nuclear Regulatory Commission
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Clinton Power Station, Unit 1
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Subject: Clinton Power Station 2014 Annual Radiological Environmental Operating Report

Exelon Generating Company, LLC (Exelon), Clinton Power Station is submitting the 2014 Annual Radiological Environmental Operating Report. This report is submitted in accordance with Technical Specification requirement 5.6.2, "Annual Radiological Environmental Operating Report," and covers the period from January 1, 2014 through December 31, 2014.

This reports provides the results of the Radiological Environmental Monitoring Program as specific in Section 5.0 and 7.1 of the Offsite Dose Calculation Manual.

There are no regulatory commitments contained within this letter.

Questions on this letter may be directed to Mr. Rick Bair, Chemistry Manager, at 217-937-3200.

Respectfully,

Mark M. Newcomer
Site Vice President

dra/cas

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector - Clinton Power Station
Office of Nuclear Facility Safety – Illinois Emergency Management Agency

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Docket No: 50-461

CLINTON POWER STATION

Annual Radiological Environmental Operating Report

1 January Through 31 December 2014

Prepared By
Teledyne Brown Engineering
Environmental Services

Clinton Power Station
Clinton, IL 61727

April 2015

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Table Of Contents

I. Summary and Conclusions 1

II. Introduction 3
- A. Objectives of the REMP 3
- B. Implementation of the Objectives 3

III. Program Description 4
- A. Sample Collection 4
- B. Sample Analysis 6
- C. Data Interpretation 6
- D. Program Exceptions 8
- E. Program Changes 12

IV. Results and Discussion 12
- A. Aquatic Environment 12
  - 1. Surface Water 12
  - 2. Drinking Water 13
  - 3. Well Water 13
  - 4. Fish 14
  - 5. Sediment 14
- B. Atmospheric Environment 15
  - 1. Airborne 15
    - a. Air Particulates 15
    - b. Airborne Iodine 16
  - 2. Terrestrial 16
    - a. Milk 16
    - b. Food Products 16
    - c. Grass 17
- C. Ambient Gamma Radiation 17
- D. Land Use Survey 17
- E. Errata Data 18
- F. Summary of Results – Inter-laboratory Comparison Program 18

V. References 21

Appendices

Appendix A Radiological Environmental Monitoring Report Summary

Tables

Table A-1 Radiological Environmental Monitoring Program Annual Summary for the Clinton Power Station, 2014

Appendix B Location Designation, Distance & Direction, and Sample Collection & Analytical Methods

Tables

Table B-1 Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Clinton Power Station, 2014

Table B-2 Radiological Environmental Monitoring Program - Summary of Sample Collection, Clinton Power Station, 2014

Figures

Figure B-1 Environmental Sampling Locations Within One Mile of the Clinton Power Station, 2014

Figure B-2 Environmental Sampling Locations Between One and Two Miles from the Clinton Power Station, 2014

Figure B-3 Environmental Sampling Locations Between Two and Five Miles from the Clinton Power Station, 2014

Figure B-4 Environmental Sampling Locations Greater Than Five Miles from the Clinton Power Station, 2014

Appendix C Data Tables and Figures - Primary Laboratory

Tables

Table C-I.1 Concentrations of I-131 in Surface Water Samples Collected in the Vicinity of Clinton Power Station, 2014.

Table C-I.2 Concentrations of Tritium in Surface Water Samples Collected in the Vicinity of Clinton Power Station, 2014.

Table C-I.3 Concentrations of Gamma Emitters in Surface Water Samples Collected in the Vicinity of Clinton Power Station, 2014.

Table C-II.1 Concentrations of Gross Beta in Drinking Water Samples Collected in the Vicinity of Clinton Power Station, 2014.

Table C-II.2	Concentrations of Tritium in Drinking Water Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-II.3	Concentrations of I-131 in Drinking Water Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-II.4	Concentrations of Gamma Emitters in Drinking Water Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-III.1	Concentrations of Tritium in Well Water Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-III.2	Concentrations of Gamma Emitters in Ground Water Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-IV.1	Concentrations of Gamma Emitters in Fish Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-V.1	Concentrations of Gamma Emitters in Sediment Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-VI.1	Concentrations of Gross Beta in Air Particulate Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-VI.2	Monthly and Yearly Mean Values of Gross Beta Concentrations (E-3 pCi/cu. meter) in Air Particulate Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-VI.3	Concentrations of Gamma Emitters in Air Particulate Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-VII.1	Concentrations of I-131 in Air Iodine Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-VIII.1	Concentrations of I-131 in Milk Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-VIII.2	Concentrations of Gamma Emitters in Milk Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-IX.1	Concentrations of Gamma Emitters in Vegetation Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-IX.2	Concentrations of Gamma Emitters in Grass Samples Collected in the Vicinity of Clinton Power Station, 2014.
Table C-X.1	Quarterly DLR Results for Clinton Power Station, 2014.
Table C-X.2	Mean Quarterly DLR Results for the Inner Ring, Outer Ring, Special Interest and Control Locations for Clinton Power Station, 2014.
Table C-X.3	Summary of the Ambient Dosimetry Program for Clinton Power Station, 2014.

Figures

Figure C-1 Mean Monthly Gross Beta Concentrations in Air Particulate Samples Collected in the Vicinity of CPS, 2014.

Figure C-2 Mean Quarterly Ambient Gamma Radiation Levels (DLR) in the Vicinity of CPS, 2014.

Appendix D Inter-Laboratory Comparison Program

Tables

Table D-1 Analytics Environmental Radioactivity Cross Check Program Teledyne Brown Engineering, 2014

Table D-2 ERA Environmental Radioactivity Cross Check Program Teledyne Brown Engineering, 2014

Table D-3 DOE's Mixed Analyte Performance Evaluation Program (MAPEP) Teledyne Brown Engineering, 2014

Appendix E Errata Data

Appendix F Annual Radiological Groundwater Protection Program Report (ARGPPR)

I. Summary and Conclusions

This report on the Radiological Environmental Monitoring Program (REMP) conducted for the Clinton Power Station (CPS) by Exelon Generation Company, LLC (Exelon) covers the period 1 January 2014 through 31 December 2014. During that time period, 1,569 analyses were performed on 1,462 samples. In assessing all the data gathered for this report and comparing these results with preoperational data, it was concluded that the operation of CPS had no adverse radiological impact on the environment.

There were zero (0) radioactive liquid releases from CPS during 2014. Releases of gaseous radioactive materials were accurately measured in plant effluents. There were no gaseous effluent releases that approached the limits specified in the CPS Offsite Dose Calculation Manual (ODCM). The highest calculated offsite dose received by a member of the public due to the release of gaseous effluents from CPS was 9.41 E-02 or 0.0941 mRem.

Surface, drinking, and well water samples were analyzed for concentrations of tritium and gamma emitting nuclides. Drinking water samples were also analyzed for concentrations of gross beta and I-131. Naturally occurring K-40 was detected at levels consistent with those detected in previous years. No fission or activation products were detected. No tritium or gross beta activity was detected and the required lower limit of detection (LLD) was met.

Fish and shoreline sediment samples were analyzed for concentrations of gamma emitting nuclides. No fission or activation products were detected in fish or shoreline sediment samples.

Air particulate samples were analyzed for concentrations of gross beta and gamma emitting nuclides. Cosmogenic Be-7 and naturally occurring K-40 were detected at levels consistent with those detected in previous years. No fission or activation products were detected.

High sensitivity I-131 analyses were performed on weekly air samples. All results were less than the lower limit of detection for I-131.

Cow milk samples were analyzed for concentrations of I-131 and gamma emitting nuclides. All results were below the required LLDs for I-131. Concentrations of naturally occurring K-40 were consistent with those detected in previous years. No fission or activation products were found.

Food product samples were analyzed for concentrations of gamma emitting nuclides. Concentrations of cosmogenically produced Be-7 and naturally occurring K-40 were consistent with those detected in previous years. No fission or activation products were detected.

Grass samples were analyzed for concentrations of gamma emitting nuclides. Concentrations of cosmogenically produced Be-7 and naturally occurring K-40 were consistent with those detected in previous years. No fission or activation

products were detected.

Environmental gamma radiation measurements were performed quarterly using Dosimeters of Legal Record (DLR). Levels detected were consistent with those observed in previous years.

II. Introduction

The Clinton Power Station (CPS), consisting of one approximately 1,140 MW gross electrical power output boiling water reactor is located in Harp Township, DeWitt County, Illinois. CPS is owned and operated by Exelon and became operational in 1987. Unit No. 1 went critical on 15 February 1987. The site encloses approximately 13,730 acres. This includes the 4,895 acre, man-made cooling lake and about 452 acres of property not owned by Exelon. The plant is situated on approximately 150 acres. The cooling water discharge flume – which discharges to the eastern arm of the lake – occupies an additional 130 acres. Although the nuclear reactor, supporting equipment and associated electrical generation and distribution equipment lie in Harp Township, portions of the aforementioned 13,730 acre plot reside within Wilson, Rutledge, DeWitt, Creek, Nixon and Santa Anna Townships.

A Radiological Environmental Monitoring Program (REMP) for CPS was initiated in 1987. The preoperational period for most media covers the periods May 1980 through 27 February 1987 and was summarized in a separate report. This report covers those analyses performed by Teledyne Brown Engineering (TBE) and Landauer on samples collected during the period 1 January 2014 through 31 December 2014.

A. Objectives 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.

III. Program Description

A. Sample Collection

This section describes the general collection methods used by Environmental Inc. (Midwest Labs) to obtain environmental samples for the CPS REMP in 2014. Sample locations and descriptions can be found in Tables B–1 and B–2, and Figures B–1 through B–3, Appendix B. The sampling methods used by Environmental Inc. (Midwest Labs) are listed in Table B-2.

Aquatic Environment

The aquatic environment was evaluated by performing radiological analyses on samples of surface water, drinking water, well water, fish, and shoreline sediment. Two gallon water samples were collected monthly from continuous samplers located at three surface water locations (CL-90, CL-91 and CL-99) and one drinking water location (CL-14). A monthly grab sample was obtained from one surface water location (CL-13). Quarterly samples were obtained from two well water locations (CL-7D and CL-12). All samples were collected in new unused plastic bottles, which were rinsed at least twice with source water prior to collection. Fish samples comprising the flesh of largemouth bass, crappie, carp, bluegill, channel catfish, and white bass, the species most commonly harvested from the lakes by sporting fishermen, were collected semiannually at two locations, CL-19 and CL-105. CL-105 was the control location. Shoreline sediment samples composed of recently deposited substrate were collected at two locations semiannually (CL-7B and CL-105 (control)).

Atmospheric Environment

The atmospheric environment was evaluated by performing radiological analyses on samples of air particulate, airborne iodine, milk, food produce and grass. Airborne iodine and particulate samples were collected and analyzed weekly at ten locations (CL-1, CL-2, CL-3, CL-4, CL-6, CL-7, CL-8, CL-11, CL-15 and CL-94). CL-11 was the control location. 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 filters were replaced weekly and sent to the laboratory for analysis.

Milk samples were collected biweekly at one location (CL-116) from May through October and monthly from November through April to coincide with the grazing season. All samples were collected in new unused

plastic bottles from the bulk tank at that location, preserved with sodium bisulfite and shipped promptly to the laboratory.

Food products were collected once a month from June through September at four locations (CL-114, CL-115, CL-117 and CL-118). The control location was CL-114. Various broadleaf vegetable samples were collected and placed in new unused plastic bags, and sent to the laboratory for analysis.

Grass samples were collected biweekly at four locations (CL-1, CL-2, CL-8 and CL-116) from May through October. CL-116 was the control location. All samples were collected in new unused plastic bags and sent to the laboratory for analysis.

Ambient Gamma Radiation

Direct radiation measurements were made using DLRs. Each location consisted of 2 dosimeter sets. The DLRs were exchanged quarterly and sent to Landauer for analysis. The DLR locations were placed around the CPS site as follows:

An inner ring consisting of 16 locations (CL-1, CL-5, CL-22, CL-23, CL-24, CL-34, CL-35, CL-36, CL-42 CL-43, CL-44, CL-45, CL-46, CL-47, CL-48 and CL-63).

An outer ring consisting of 16 locations (CL-51, CL-52, CL-53, CL-54, CL-55, CL-56, CL-57, CL-58, CL-60, CL-61, CL-76, CL-77, CL-78, CL-79, CL-80 and CL-81). CL-58MM was installed as part of a volunteer comparison study extending to approximately 5 miles from the site.

A special interest set consisting of seven locations (CL-37, CL-41, CL-49, CL-64, CL65, CL-74 and CL-75) representing special interest areas.

A supplemental set consisting of 14 locations (CL-2, CL-3, CL-4, CL-6, CL-7, CL-8, CL-15, CL-33, CL-84, CL-90, CL-91, CL-97, CL-99 and CL-114).

CL-11 represents the control location for all environmental DLRs.

The specific DLR 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 CPS, if any, would be most significant;

3. On hills free from local obstructions and within sight of the vents (where practical);

4. And near the closest dwelling to the HVAC and VG stacks in the prevailing downwind direction.

Each location has two DLRs in a vented PVC conduit located approximately three feet above ground level. The DLRs were exchanged quarterly and sent to Landauer 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 CPS REMP in 2014. 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 drinking water and air particulates.

2. Concentrations of gamma emitters in surface, drinking and well water, air particulates, milk, fish, grass, sediment and vegetables.

3. Concentrations of tritium in surface, drinking and well water.

4. Concentrations of I-131 in air, milk, drinking water and surface water.

5. Ambient gamma radiation levels at various on-site and off-site environs.

C. Data Interpretation

The radiological and direct radiation data collected prior to CPS becoming operational was used as a baseline with which these operational data were compared. For the purpose of this report, CPS 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) was 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 was intended as a before the fact estimate of a system (including instrumentation, procedure and sample type) and not as an after the fact criteria for the presence of activity. All analyses were designed to achieve the required CPS detection capabilities for environmental sample analysis.

2. Net Activity Calculation and Reporting of Results

Net activity for a sample was 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 resulting in a negative number. A minimum detectable concentration (MDC) was 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, well water, fish, sediment, and milk 14 nuclides, Be-7, K-40, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, Cs-134, Cs-137, Ba-140, La-140 and Ce-144 were reported.

For drinking water, grass, and vegetation 15 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, La-140 and Ce-144 were reported.

For air particulate 11 nuclides, Be-7, K-40, Co-60, Nb-95, Zr-95, Ru-103, Ru-106, Cs-134, Cs-137, Ce-141 and Ce-144, were reported.

The mean and standard deviation of the results were calculated. The standard deviation represents the variability of measured results for different samples rather than single analysis uncertainty.

D. Program Exceptions

The exceptions (Issue Reports, IRs) described below are those that are considered 'deviations' from the Radiological Environmental Monitoring Program as required by the Station's ODCM. By definition, 'deviations' are permitted as delineated within NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants", October 1978, and within Radiological Assessment Branch Technical Position, Revision 1, November 1979, which states.... "Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability, malfunction of automatic sampling equipment and other legitimate reasons".... The below section addresses the reporting requirements found within Section 7.1 of the Station's ODCM.

Exceptions/Anomalies

January 01, 2014, IR 1608889

During the weekly walkdown of liquid composite samplers it was discovered that sample collection of non-ODCM liquid compositor location CL-99 was not possible due to freezing of the North Fork Creek. This sampling unavailability is experienced during periods of sub-freezing temperatures due to the small body of water being sampled. Sample collection will be restored when the creek has thawed sufficiently.

January 08, 2014, IR 1608894

During a walkdown of liquid composite samplers it was discovered that sample collection of non-ODCM liquid compositor location CL-99 was not possible due to freezing of the North Fork Creek. This sampling unavailability is experienced during periods of sub-freezing temperatures due to the small body of water being sampled. Sample collection will be restored when the creek has thawed sufficiently.

May 07, 2014, IR 1657101

REMP program owner identified that the drinking water compositor CL-14 was not collecting composite samples as there was no flow through the compositor. The sampling line was flushed and flow was reestablished.

May 21, 2014, IR 1663766

While conducting a weekly compositor check for REMP location CL-91 it was discovered that the compositor was without power. A grab sample was obtained for the week; however the May composite sample will not meet the definition of a composite sample [sample aliquots shall be collected at time intervals that are very short (e.g., hourly) relative to the composite period (e.g., monthly) in order to assure obtaining a representative sample]. Power was restored to the compositor and was functioning properly when the vendor left the site.

August 27, 2014, IR 02473280

On Wednesday, 08/27/14 while performing the Vegetation Collections per ODCM Table 5.1-1.4.c, Sample Garden at CL-114 did not meet the minimum weight collection criteria for cabbage and was augmented with broady leaf vegetation.

September 24, 2014. IR 2386276

On Wednesday, 09/24/14 while performing Surface Water Collections, Water Compositor CL-91 was found not operating consistently, by not collecting a composite sample per ODCM Table 5.1-1.g Table Notation and Table 5.1-1.3.a. Although a replacement water compositor was available and replaced with the inoperable unit, a grab sample was also obtained to augment the weekly sample collection, meeting the monthly composite minimum volume.

On Wednesday, 09/24/14 while performing the Vegetation Collections per ODCM Table 5.1-1.4.c, Sample Garden at CL-114 did not meet the minimum weight collection criteria for cabbage and was augmented with broady leaf vegetation.

On Wednesday, 09/24/14 while performing the Vegetation Collections per ODCM Table 5.1-1.4.c, Sample Garden at CL-115 did not meet the minimum weight collection criteria for both cabbage and kale and was augmented with broady leaf vegetation.

On Wednesday, 09/24/14 while performing the Vegetation Collections per ODCM Table 5.1-1.4.c, Sample Garden at CL-117 did not meet the minimum weight collection criteria for cabbage and was augmented with broady leaf vegetation. The vegetation sample collection only occurs during the harvest season of June,

July, August and September.

November 5, 2014. IR 2407027

At 0030 hours on 11/05/14, Clinton lost the 12 kV 302 Loop that impacted ODCM Water Compositor CL-90 at 0.4 miles. Because the normally scheduled weekly surveillance is being performed today every Wednesday, the six hour and 28 minute gap in sampling meets the definition of exceptions pursuant to NUREG 0133 for the 'malfunctioning of sampling equipment' and other 'legitimate reasons'. Further, the gap identified, will not impact the detection capability of meeting the lower limits of detection LLD] of the sample. This will however be reported in the Annual Report pursuant to Tech Spec 5.6.3.

With a portable generator, ODCM Water Compositor CL-90 was restored to operable at 0717 hours. The sampling frequency is hourly intervals, feeding into a monthly composite. Because potentially, seven hourly intervals were missed, this meets the definition of exceptions pursuant to NUREG 0133 for the 'malfunctioning of sampling equipment' and other 'legitimate reasons'.

November 14, 2014. IR 2412724

At 0215 hours on 11/14/14 while executing WO 1490322-35 and CPS No. 3409.01, that completed the shutdown of the Service Building per eSOMS log entry made at 0620 hours on 11/14/14, Chemistry secured CL-14, ODCM Drinking Water Compositor.

At 1055 hours on 11/14/14, with power now restored to the Service Building, Chemistry returned to service, CL-14, ODCM Drinking Water Compositor back to service.

November 26, 2014 IR 02473354

During the weekly environmental monitoring surveillance for airborne iodine/particulate performed on 11/26/14, the sample collector found the indicated air sampling run time at ODCM station CL-3 to be low. In the absence of any surrounding power outages, it was determined that the sample timer was defective and was replaced. This IR was documented to address the LLDs were not obtainable due to the indicated low run time of the sample and insufficient sample volume collected.

Throughout 2014, the following IRs were generated to note minor gaps in the sample collection run times that although were not continuous, the sample collection volumes collected were more than sufficient to meet the required ODCM LLD reporting criteria. The expectation is to document these exceptions into the Corrective Action Program for trending to determine timer failures or external utility support for seeking reliable power delivery.

IR 1608616
IR 1614260
IR 1620397
IR 1623479
IR 1626538
IR 1629591
IR 1632572
IR 1648359
IR 1653938
IR 1678628

Missed Samples

February 19, 2014, IR 1623479

> During a walkdown of liquid composite samplers it was found that sample collection of non-ODCM liquid compositor location CL-99 was not possible due to freezing of the North Fork Creek. This sampling unavailability is experienced during periods of sub-freezing temperatures due to the small body of water being sampled. Sample collection will be restored when the creek has thawed sufficiently.

February 26, 2014, IR 1626538

> During a walkdown of liquid composite samplers, it was discovered that sample collection of non-ODCM liquid compositor location CL-99 was not possible due to freezing of the North Fork Creek. This sampling unavailability is experienced during periods of sub-freezing temperatures due to the small body of water being sampled. Sample collection was restored when the creek had thawed sufficiently.

September 25, 2014, IR 02463928

> The quarterly DLR surveillance was completed with dosimeters at all DLR locations collected. This was verified by the vendor sample

collector and the Program Manager upon completion prior to shipping to the dosimetry vendor Landauer. Landauer stated they did not perform the analysis for location CL-52, due to both the primary and the secondary dosimeter being absent from the package. There was no radiological impact to the environment as a result of the missing dosimeters when comparing the adjoining monitored meteorological sectors and their results and when further coupled with a comparison of the control station.

Program exceptions were reviewed to understand the causes of the exception and to return to ODCM sample compliance before the next sampling frequency period.

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

E. Program Changes

The corporate procedure CY-AA-170-1000 Radiological Environmental Monitoring Program and Meteorological Program Implementation was revised. The changes made were non-impactful and included additional guidance for clarification regarding REMP air sampling equipment.

IV. Results and Discussion

A. Aquatic Environment

1. Surface Water

Samples were taken hourly from a continuous compositor at three locations (CL-90, CL-91 and CL-99) on a monthly schedule and grab samples were taken monthly from one location (CL-13). The following analyses were performed.

Iodine-131

Monthly samples from location CL-90 were analyzed for I-131 activity (Table C-I.1, Appendix C). No I-131 was detected in any samples and the required LLD was met.

Tritium

Monthly samples from all locations were composited quarterly and

analyzed for tritium activity (Table C–I.2, Appendix C). No tritium was detected in any samples and the required LLD was met.

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides (Table C–I.3, Appendix C). Naturally occurring K-40 was found in six of 47 samples. The concentration ranged from 27 to 93 pCi/L. No other nuclides were detected and all required LLDs were met.

2. Drinking Water

Monthly samples were collected from a continuous compositor at one location (CL-14). The following analyses were performed:

Gross Beta

Monthly samples were analyzed for concentrations of gross beta (Tables C–II.1, Appendix C). No Gross beta was detected in any of the samples.

Tritium

Monthly samples were composited quarterly and analyzed for tritium activity (Table C–II.2, Appendix C). No tritium was detected in any samples and the required LLD was met.

Iodine-131

Monthly samples from location CL-14 were analyzed for I-131 activity (Table C-II.3, Appendix C). No I-131 was detected in any samples and the required LLD was met.

Gamma Spectrometry

Monthly samples were analyzed for gamma emitting nuclides (Table C–II.4, Appendix C). No nuclides were detected and all required LLDs were met.

3. Well Water

Quarterly grab samples were collected at two locations (CL-7D and CL-12, consisting of CL-12R [a raw water sample from this well] and CL-12T [same well water, but after treatment and available for

consumption]). The following analyses were performed:

Tritium

Samples from all locations were analyzed for tritium activity (Table C–III.1, Appendix C). No tritium was detected in any samples and the required LLD was met.

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides (Table C–III.2, Appendix C). Naturally occurring K-40 was found in one of four samples for location CL-7D at a concentration of 30 pCi/l. No other nuclides were detected in any of the samples and all required LLDs were met.

4. Fish

Fish samples comprised of carp, largemouth bass, bluegill, crappie, channel catfish, and white bass were collected at two locations (CL-19 and CL-105) semiannually. The following analysis was performed:

Gamma Spectrometry

The edible portion of fish samples from both locations was analyzed for gamma emitting nuclides (Table C–IV.1, Appendix C). Naturally occurring K-40 was found at both locations. No fission or activation products were found. No other nuclides were detected and the required LLDs were met.

5. Shoreline Sediment

Aquatic shoreline sediment samples were collected at CL-7B and CL-105 semiannually. The following analysis was performed:

Gamma Spectrometry

Shoreline sediment samples were analyzed for gamma emitting nuclides (Table C–V.1, Appendix C). Naturally occurring K-40 was detected in all samples. No fission or activation products were found. No other nuclides were detected and the required LLDs were met.

B. Atmospheric Environment

1. Airborne

a. Air Particulates

Continuous air particulate samples were collected from 10 locations on a weekly basis. The 10 locations were separated into three groups: Group I represents locations within one mile of the CPS site boundary (CL-2, CL-3, CL-4, CL-6, CL-15 and CL-94); Group II represents the locations at an intermediate distance within one to five miles of CPS (CL-1, CL-7 and CL-8); and Group III represents the control location greater than five miles from CPS (CL-11). The following analyses were performed:

Gross Beta

Weekly samples were analyzed for concentrations of beta emitters (Table C–VI.1 and C–VI.2 and Figure C–1, Appendix C).

Detectable gross beta activity was observed at all locations. Comparison of results among the three groups aid in determining the effects, if any, resulting from the operation of CPS. The results from the On-Site locations (Group I) ranged from 7 to 64 E–3 pCi/m^3 with a mean of 18 E–3 pCi/m^3. The results from the Intermediate Distance location (Group II) ranged from 7 to 41 E–3 pCi/m^3 with a mean of 18 E–3 pCi/m^3. The results from the Control locations (Group III) ranged from 8 to 32 E–3 pCi/m^3 with a mean of 19 E–3 pCi/m^3. Comparison of the 2014 air particulate data with previous years data indicate no effects from the operation of CPS (Figure C–5, Appendix C). In addition, a comparison of the weekly mean values for 2014 indicate no notable differences among the three groups.

Gamma Spectrometry

Weekly samples were composited quarterly and analyzed for gamma emitting nuclides (Table C–VI.3, Appendix C). Naturally occurring cosmogenically produced Be-7 due to cosmic ray activity was detected in 38 of 40 samples. No other nuclides were detected and all required LLDs were met.

b. Airborne Iodine

Continuous air samples were collected from 10 locations (CL-1, CL-2, CL-3, CL-4, CL-6, CL-7, CL-8, CL-11, CL-15 and CL-94) and analyzed weekly for I-131 (Table C-VII.1, Appendix C). All results were less than the MDC and the required LLD was met.

2. Terrestrial

a. Milk

Samples were collected from CL-116 biweekly May through October and monthly November through April to coincide with the grazing season. The following analyses were performed:

Iodine-131

Milk samples were analyzed for concentrations of I-131 (Table C–VIII.1, Appendix C). Iodine-131 was not detected in any of the samples. The required LLD was met.

Gamma Spectrometry

Each milk sample was analyzed for concentrations of gamma emitting nuclides (Table C–VIII.2, Appendix C). Naturally occurring K-40 activity was found in all samples. No other nuclides were detected and all required LLDs were met.

b. Food Products

Broadleaf vegetation samples were collected from four locations (CL-114, CL-115, CL-117 and CL-118) monthly June through September to coincide with the harvest season. The following analysis was performed:

Gamma Spectrometry

Each food product sample was analyzed for concentrations of gamma emitting nuclides (Table C–IX.1, Appendix C).

Cosmogenically produced Be–7 due to cosmic ray activity was detected in most samples. Naturally occurring K-40

activity was found in all samples. No other nuclides were detected and all required LLDs were met.

c. Grass

Samples were collected from four locations (CL-1, CL-2, CL-8, and CL-116) biweekly May through October. The following analysis was performed:

Gamma Spectrometry

Each grass sample was analyzed for concentrations of gamma emitting nuclides (Table C–IX.2, Appendix C).

Cosmogenically produced Be–7 due to cosmic ray activity and naturally occurring K-40 were in all samples. No other nuclides were detected and all required LLDs were met.

C. Ambient Gamma Radiation

Ambient gamma radiation levels were measured utilizing DLRs. Fifty-four DLR locations were established around the site. Results of DLR measurements are listed in Tables C–X.1 to C–X.3, Appendix C.

A total of 215 OSLD measurements were made in 2014. The average dose from the inner ring was 22.6 mRem/quarter. The average dose from the outer ring was 22.7 mRem/quarter. The average dose from the special interest group was 22.5 mRem/quarter. The average dose from the supplemental group was 21.2 mRem/quarter. The quarterly measurements ranged from 17.3 to 26.8 mRem/quarter.

The inner ring and outer ring measurements compared well to the Control Station, CL-11, which ranged from 20.6 mRem/quarter to 21.5 mRem/quarter with an average measurement of 21.0 mRem/quarter. A comparison of the Inner Ring and Outer Ring data to the Control Location data indicate that the ambient gamma radiation levels from all the locations were comparable. The historical ambient gamma radiation data from the control location were plotted along with similar data from the Inner and Outer Ring Locations (Figure C–2, Appendix C).

D. Land Use Survey

A Land Use Survey conducted during the July through October 2014 growing season around the Clinton Power Station (CPS) was performed by Environmental Inc. (Midwest Labs) for Exelon to comply with Clinton's

Offsite Dose Calculation Manual, section 5.2. The purpose of the survey was to document the nearest resident, milk producing animal and garden of greater than 538 m^2 in each of the sixteen 22 ½ degree sectors around the site. The distance and direction of all locations from the CPS Station HVAC vent stack were positioned using Global Positioning System (GPS) technology. There were no changes required to the CPS REMP as a result of this survey. The results of this survey are summarized below.

Distance in Kilometers from the CPS Station HVAC Vent Stack			
Sector	Residence (km)	Garden (km)	Milk Animal (km)
1 N	1.5	1.5	1.5
2 NNE	1.5	4.8	3.8
3 NE	2.1	> 8	> 8
4 ENE	2.9	2.9	6.6
5 E	1.7	1.7	> 8
6 ESE	5.1	5.3	> 8
7 SE	4.4	> 8	> 8
8 SSE	2.9	> 8	> 8
9 S	4.8	6.6	6.6
10 SSW	4.7	> 8	5.5
11 SW	1.2	5.9	> 8
12 WSW	3.6	3.7	5.5
13 W	2.0	3.2	> 8
14 WNW	2.6	2.6	> 8
15 NW	2.7	4.5	> 8
16 NNW	2.1	2.1	2.1

E. Errata Data

During the REMP NRC Inspection in 2014, it was observed by the Inspector and captured within IR #01685370, that the term TLD (Thermoluminescent Dosimeter) had been used throughout the 2013 AREOR, describing the dosimeter of legal record (DLR) as opposed to the OSLD (Optically Stimulated Luminescent Dosimeter) that is currently being used to obtain direct radiation exposure from the environment as required of the REMP program. In the current 2014 report, TLD has been replaced by DLR.

F. Summary of Results – Inter-Laboratory Comparison Program

The primary laboratory analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation and water matrices for 19 analytes (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 TBE's result 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 ± 20% of the reference value. Performance is acceptable with warning when a mean result falls in the range from ± 20% to ± 30% of the reference value (i.e., 20% < bias < 30%). If the bias is greater than 30%, the results are deemed not acceptable.

In reviewing our environmental inter-laboratory crosscheck programs, we identified 1) duplication of efforts on some matrices and isotopes and 2) that we are performing crosscheck samples on some matrices and isotopes that we do not perform for clients. Since the DOE MAPEP is designed to evaluate the ability of analytical facilities to correctly analyze for radiological constituents representative of those at DOE sites, the needed changes were made to the MAPEP program. Therefore, the following isotopes were removed from the MAPEP program:

Soil – gamma – will be provided by Analytics twice per year, starting in 2015. For 2014, one soil gamma is provided by MAPEP, the 2nd soil gamma is provided by Analytics.

AP – gamma – is currently provided by Analytics.

Water – gamma, H-3, Sr-90, uranium, gross alpha and gross beta currently provided by ERA.

MAPEP evaluates non-reported (NR) analyses as failed if they were reported in the previous series.

For the TBE laboratory, 163 out of 169 analyses performed met the specified acceptance criteria. Six analyses (Ni-63, K-40 and I-131 in water, and two Sr-90s and one Gross Alpha in AP samples) did not meet the specified acceptance criteria for the following reasons:

1. Teledyne Brown Engineering's MAPEP March 2014 Ni-63 in water result of 32.7 ± 1.69 Bq/L was overlooked when reporting the data but would have passed the acceptance range of 23.9 – 44.2 Bq/L. NCR 14-04
2. Teledyne Brown Engineering's MAPEP March 2014 K-40 in water result of 1.63 ± 2.49 Bq/L was overlooked when reporting the data but would have passed the false positive test. NCR 14-04
3. Teledyne Brown Engineering's ERA November 2014 I-131 in water result of 15.8 pCi/L was lower than the known value of 20.3 pCi/L, falling below the lower acceptance limit of 16.8. The result was evaluated as failed with a found to known ratio of 0.778. No cause could be found for the slightly low result. All previous ERA I-131 evaluations since 2004 have been acceptable. NCR 14-08
4. Teledyne Brown Engineering's MAPEP March 2014 Sr-90 in AP result of 0.822 Bq/sample was lower than the known value of 1.18 Bq/sample, falling below the lower acceptance limit of 0.83 Bq/sample. The rerun result was still low, but fell within the lower acceptance range of 0.836 Bq/sample. The rerun result was statistically the same number as the original result. No cause could be found for the slightly low results. NCR 14-04
5. Teledyne Brown Engineering's MAPEP September 2014 Sr-90 in AP result of 0.310 Bq/sample was lower than the known value of 0.703 Bq/sample. The gravimetric yield of 117% was very high (we normally see yields of 60% to 70%) and could account for the low activity. NCR 14-09
6. Teledyne Brown Engineering's MAPEP September 2014 Gr-Alpha in AP result of 0.153 Bq/sample was lower than the known value of 0.53 Bq/sample. The AP sample was counted on the wrong side. The AP was flipped over and recounted with acceptable results. NCR 14-09

V. References

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4. "Environmental Radioactivity," M. Eisenbud, 1987 (E187).
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6. Federal Radiation Council Report No. 1, "Background Material for the Development of Radiation Protection Standards," May 13, 1960.
7. International Commission on Radiation Protection, Publication 2, "Report of Committee II on Permissible Dose for Internal Radiation," (1959) with 1962 Supplement issued in ICRP Publication 6; Publication 9, "Recommendations on Radiation Exposure," (1965); ICRP Publication 7 (1965), amplifying specific recommendations of Publication 26 (1977).
8. International Commission on Radiation Protection, Publication No. 39 (1984), "Principles of Limiting Exposure to the Public to Natural Sources of Radiation".
9. "Radioactivity in the Environment: Sources, Distribution and Surveillance," Ronald L. Kathren, 1984.
10. National Council on Radiation Protection and Measurements, Report No. 22, "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and Water for Occupational Exposure," (Published as National Bureau of Standards Handbook 69, issued June 1959, superseding Handbook 52).
11. National Council on Radiation Protection and Measurements, Report No. 39, "Basic Radiation Protection Criteria," January 1971.
12. National Council on Radiation Protection and Measurements, Report No. 44, "Krypton-85 in the Atmosphere – Accumulation, Biological Significance, and Control Technology," July 1975.
13. National Council on Radiation Protection and Measurements, Report No. 91, "Recommendations on Limits for Exposure to Ionizing Radiation," June 1987.
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15. National Research Council, 1990, Committee on Biological Effects of Ionizing Radiation (BEIR V), Board on Radiation Effects Research on Life Sciences, "The Effects of Exposure to Low Levels of Ionizing Radiation".

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17. United States Nuclear Regulatory Commission, Regulatory Guide 4.13, "Performance, Testing and Procedural Specifications for Thermoluminescence Dosimetry: Environmental Applications, "Revision 1, July 1977.

18. United States Nuclear Regulatory Commission, Regulatory Guide 1.109, "Calculation of Annual Dose to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR Part 50, Appendix I, "Revision 1, October 1977.

19. United States Nuclear Regulatory Commission Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program," Revision 1, November 1979.

20. United States Nuclear Regulatory Commission, Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Norm Operations) – Effluent Streams and the Environment," Revision 1, February 1979.

21. Technical Specifications, Clinton Power Station, Unit No. 1, Docket No. 50-461, Office of Nuclear Reactor Regulation, 1986. Facility Operating License Number NPF-62.

22. Clinton Power Station, Updated Safety Analysis Report.

23. Clinton Power Station, Unit 1, Off-Site Dose Calculation Manual.

APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT SUMMARY

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2014

NAME OF FACILITY: CLINTON POWER STATION **DOCKET NUMBER: 50-461 2014**

LOCATION OF FACILITY: DEWITT COUNTY, IL **REPORTING PERIOD:**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (PCI/LITER)	I-131	12	1	<LLD	NA	-		0
	H-3	16	2000	<LLD	<LLD	-		0
	GAMMA	47						
	BE-7		NA	<LLD	<LLD	-		0
	K-40		NA	50 (3/24) (27/80)	68 (3/23) (52/93)	93 (1/11)	CL-99 CONTROL NORTH FORK ACCESS 3.5 MILES NNE OF SITE	0
	MN-54		15	<LLD	<LLD	-		0
	CO-58		15	<LLD	<LLD	-		0
	FE-59		30	<LLD	<LLD	-		0
	CO-60		15	<LLD	<LLD	-		0
	ZN-65		30	<LLD	<LLD	-		0

THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

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NAME OF FACILITY: CLINTON POWER STATION				DOCKET NUMBER: 50-461 2014				
LOCATION OF FACILITY: DEWITT COUNTY, IL				REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (PCI/LITER)	NB-95		15	<LLD	<LLD	-		0
	ZR-95		30	<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
	CE-144		NA	<LLD	<LLD	-		0
DRINKING WATER (PCI/LITER)	GR-B	12	4	<LLD	NA	-		0
	H-3	4	2000	<LLD	NA	-		0
	I-131	12	1	<LLD	NA	-		0

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DRINKING WATER (PCI/LITER)	GAMMA BE-7	12	NA	<LLD	NA	-		0
	K-40		NA	<LLD	NA	-		0
	MN-54		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
	CS-134		15	<LLD	NA	-		0

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LOCATION OF FACILITY: DEWITT COUNTY, IL **REPORTING PERIOD: 2014**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
DRINKING WATER (PCI/LITER)	CS-137		18	<LLD	NA	-		0
	BA-140		60	<LLD	NA	-		0
	LA-140		15	<LLD	NA	-		0
	CE-144		NA	<LLD	NA	-		0
WELL WATER (PCI/LITER)	H-3	12	2000	<LLD	NA	-		0
	GAMMA BE-7	12	NA	<LLD	NA	-		0
	K-40		NA	30 (1/12)	NA	30 (1/4)	CL-7D INDICATOR MASCOUTIN RECREATION AREA 2.3 MILES ESE OF SITE	0
	MN-54		15	<LLD	NA	-		0
	CO-58		15	<LLD	NA	-		0
	FE-59		30	<LLD	NA	-		0

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WELL WATER (PCI/LITER)	CO-60		15	<LLD	NA	-		0
	ZN-65		30	<LLD	NA	-		0
	NB-95		15	<LLD	NA	-		0
	ZR-95		30	<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
	CE-144		NA	<LLD	NA	-		0
FISH (PCI/KG WET)	GAMMA	16						
	BE-7		NA	<LLD	<LLD	-		0

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FISH (PCI/KG WET)	K-40		NA	3586 (8/8) (2218/4885)	3447 (8/8) (3073/4029)	3586 (8/8) (2218/4885)	CL-19 INDICATOR END OF DISCHARGE FLUME 3.4 MILES E OF SITE	0
	MN-54		130	<LLD	<LLD	-		0
	CO-58		130	<LLD	<LLD	-		0
	FE-59		260	<LLD	<LLD	-		0
	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

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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 LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
FISH (PCI/KG WET)	BA-140		NA	<LLD	<LLD	-		0
	LA-140		NA	<LLD	<LLD	-		0
	CE-144		NA	<LLD	<LLD	-		0
SEDIMENT (PCI/KG DRY)	GAMMA BE-7	4	NA	<LLD	<LLD	-		0
	K-40		NA	7644 (2/2) (7231/8056)	8574 (2/2) (7515/9633)	8574 (2/2) (7515/9633)	CL-105 CONTROL LAKE SHELBYVILLE 50 MILES S OF SITE	0
	MN-54		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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NAME OF FACILITY: CLINTON POWER STATION LOCATION OF FACILITY: DEWITT COUNTY, IL				DOCKET NUMBER: 50-461 2014 REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SEDIMENT (PCI/KG DRY)	ZN-65		NA	<LLD	<LLD	-		0
	NB-95		NA	<LLD	<LLD	-		0
	ZR-95		NA	<LLD	<LLD	-		0
	CS-134		150	<LLD	<LLD	-		0
	CS-137		180	<LLD	<LLD	-		0
	BA-140		NA	<LLD	<LLD	-		0
	LA-140		NA	<LLD	<LLD	-		0
	CE-144		NA	<LLD	<LLD	-		0
AIR PARTICULATE (E-3 PCI/CU.METER)	GR-B	520	10	18 (468/468) (7/64)	19 (52/52) (8/32)	19 (52/52) (10/64)	CL-3 INDICATOR CLINTON'S SECONDARY ACCESS ROAD 0.7 MILES NE OF SITE	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 LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIR PARTICULATE (E-3 PCI/CU.METER)	GAMMA	40						
	BE-7		NA	63 (34/36) (37/93)	57 (4/4) (48/64)	67 (4/4) (49/93)	CL-8 INDICATOR DEWITT CEMETERY 2.2 MILES E OF SITE	0
	K-40		NA	23 (1/36)	29 (1/4)	29 (1/4)	CL-11 CONTROL ILLINOIS POWER SUBSTATION 16 MILES S OF SITE	0
	CO-60		NA	<LLD	<LLD	-		0
	NB-95		NA	<LLD	<LLD	-		0
	ZR-95		NA	<LLD	<LLD	-		0
	RU-103		NA	<LLD	<LLD	-		0
	RU-106		NA	<LLD	<LLD	-		0
	CS-134		50	<LLD	<LLD	-		0
	CS-137		60	<LLD	<LLD	-		0

THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2014

NAME OF FACILITY: CLINTON POWER STATION				DOCKET NUMBER: 50-461 2014				
LOCATION OF FACILITY: DEWITT COUNTY, IL				REPORTING PERIOD: 2014				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIR PARTICULATE (E-3 PCI/CU.METER)	CE-141		NA	<LLD	<LLD	-		0
	CE-144		NA	<LLD	<LLD	-		0
AIR IODINE (E-3 PCI/CU.METER)	GAMMA I-131	520	70	<LLD	<LLD	-		0
MILK (PCI/LITER)	I-131	19	1	NA	<LLD	-		0
	GAMMA BE-7	19	NA	NA	<LLD	-		0
	K-40		NA	NA	1200 (19/19) (1034/1294)	1200 (19/19) (1034/1294)	CL-116 CONTROL PASTURE IN RURAL KENNEY 14 MILES WSW OF SITE	0
	MN-54		NA	NA	<LLD	-		0
	CO-58		NA	NA	<LLD	-		0
	FE-59		NA	NA	<LLD	-		0

THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2014

NAME OF FACILITY: CLINTON POWER STATION **DOCKET NUMBER: 50-461 2014**

LOCATION OF FACILITY: DEWITT COUNTY, IL **REPORTING PERIOD: 2014**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
MILK (PCI/LITER)	CO-60		NA	NA	<LLD	-		0
	ZN-65		NA	NA	<LLD	-		0
	NB-95		NA	NA	<LLD	-		0
	ZR-95		NA	NA	<LLD	-		0
	CS-134		15	NA	<LLD	-		0
	CS-137		18	NA	<LLD	-		0
	BA-140		60	NA	<LLD	-		0
	LA-140		15	NA	<LLD	-		0
	CE-144		NA	NA	<LLD	-		0

THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2014

NAME OF FACILITY: CLINTON POWER STATION **DOCKET NUMBER: 50-461 2014**
LOCATION OF FACILITY: DEWITT COUNTY, IL **REPORTING PERIOD: 2014**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
VEGETATION (PCI/KG WET)	GAMMA	48						
	BE-7		NA	547 (30/36) (156/1656)	464 (10/12) (205/922)	696 (9/12) (318/1656)	CL-115 INDICATOR SITE'S SECONDARY ACCESS ROAD 0.7 MILES NE OF SITE	0
	K-40		NA	5144 (36/36) (2725/8897)	5415 (12/12) (3581/8465)	5415 (12/12) (3581/8465)	CL-114 CONTROL CISCO 12.5 MILES SSE OF SITE	0
	MN-54		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

THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2014

NAME OF FACILITY: CLINTON POWER STATION **DOCKET NUMBER: 50-461 2014**

LOCATION OF FACILITY: DEWITT COUNTY, IL **REPORTING PERIOD:**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
VEGETATION (PCI/KG WET)	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
	CE-144		NA	<LLD	<LLD	-		0
GRASS (PCI/KG WET)	GAMMA	52						
	BE-7		NA	1956 (39/39) (371/5198)	1671 (13/13) (500/4173)	2545 (13/13) (518/5198)	CL-02 INDICATOR CLINTON'S MAIN ACCESS ROAD 0.7 MILES NNE OF SITE	0
	K-40		NA	5566 (39/39) (2380/8596)	5330 (13/13) (4129/6425)	6409 (13/13) (5212/8596)	CL-08 INDICATOR DEWITT CEMETERY 2.2 MILES E OF SITE	0
	MN-54		NA	<LLD	<LLD	-		0

THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2014

NAME OF FACILITY: CLINTON POWER STATION				DOCKET NUMBER: 50-461 2014				
LOCATION OF FACILITY: DEWITT COUNTY, IL				REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GRASS (PCI/KG WET)	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
	I-131		60	<LLD	<LLD	-		0
	CS-134		60	<LLD	<LLD	-		0
	CS-137		80	<LLD	<LLD	-		0

THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2014

NAME OF FACILITY: CLINTON POWER STATION				DOCKET NUMBER: 50-461 2014				
LOCATION OF FACILITY: DEWITT COUNTY, IL				REPORTING PERIOD:				
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GRASS (PCI/KG WET)	BA-140		NA	<LLD	<LLD	-		0
	LA-140		NA	<LLD	<LLD	-		0
	CE-144		NA	<LLD	<LLD	-		0
DIRECT RADIATION (MILLIREM/QTR.)	DLR-QUARTERLY	215	NA	22.3 (211/211) (17.3/26.8)	21.0 (4/4) (20.6/21.5)	24.4 (4/4) (22.7/25.9)	CL-23 INDICATOR 0.5 MILES ENE	0

THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

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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, Clinton Power Station, 2014

Location	Location Description	Distance & Direction From Site
A. Surface Water		
CI-13	Salt Creek Bridge on Rt. 10 (indicator)	3.6 miles SW
CL-90	Discharge Flume (indicator)	0.4 miles SE
CL-91	Parnell Boat Access (control)	6.1 miles ENE
CL-99	North Fork Access (control)	3.5 miles NNE
B. Drinking (Potable) Water		
CL-14	Station Plant Service Bldg (indicator)	Onsite
C. Well Water		
CL-7D	Mascoutin Recreation Area (indicator)	2.3 miles ESE
CL-12T	DeWitt Pump House (indicator)	1.6 miles E
CL-12R	DeWitt Pump House (indicator)	1.6 miles E
D. Milk - bi-weekly / monthly		
CL-116	Dement Dairy (control)	14 miles WSW
E. Air Particulates / Air Iodine		
CL-1	Camp Quest	1.8 miles W
CL-2	Clinton's Main Access Road	0.7 miles NNE
CL-3	Clinton's Secondary Access Road	0.7 miles NE
CL-4	Residence Near Recreation Area	0.8 miles SW
CL-6	Clinton's Recreation Area	0.7 miles WSW
CL-7	Mascoutin Recreation Area	2.3 miles SE
CL-8	DeWitt Cemetery	2.2 miles E
CL-11	Illinois Power Substation (control)	16 miles S
CL-15	Rt. 900N Residence	0.9 miles N
CL-94	Old Clinton Road	0.6 miles E
F. Fish		
CL-19	End of Discharge Flume (indicator)	3.4 miles E
CL-105	Lake Shelbyville (control)	50 miles S
G. Shoreline Sediment		
CL-7B	Clinton Lake (indicator)	2.1 miles SE
CL-105	Lake Shelbyville (control)	50 miles S
H. Food Products		
CL-114	Cisco (Control)	12.5 miles SSE
CL-115	Site's Secondary Access Road	0.7 miles NE
CL-117	Residence North of Site	0.9 miles N
CL-118	Site's Main Access Road	0.7 miles NNE
I. Grass		
CL-1	Camp Quest	1.8 miles W
CL-2	Clinton's Main Access Road	0.7 miles NNE
CL-8	DeWitt Cemetery	2.2 miles E
CL-116	Pasture in Rural Kenney (control)	14 miles WSW

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Clinton Power Station, 2014

Location	Location Description	Distance & Direction From Site
J.	Environmental Dosimetry - DLR	
	Inner Ring	
CL-1		1.8 miles W
CL-5		0.7 miles NNE
CL-22		0.6 miles NE
CL-23		0.5 miles ENE
CL-24		0.5 miles E
CL-34		0.8 miles WNW
CL-35		0.7 miles NW
CL-36		0.6 miles N
CL-42		2.8 miles ESE
CL-43		2.8 miles SE
CL-44		2.3 miles SSE
CL-45		2.8 miles S
CL-46		2.8 miles SSW
CL-47		3.3 miles SW
CL-48		2.3 miles WSW
CL-63		1.3 miles NNW
	Outer Ring	
CL-51		4.4 miles NW
CL-52		4.3 miles NNW
CL-53		4.3 miles E
CL-54		4.6 miles ESE
CL-55		4.1 miles SE
CL-56		4.1 miles SSE
CL-57		4.6 miles S
CL-58		4.3 miles SSW
CL-60		4.5 miles SW
CL-61		4.5 miles WSW
CL-76		4.6 miles N
CL-77		4.5 miles NNE
CL-78		4.8 miles NE
CL-79		4.5 miles ENE
CL-80		4.1 miles W
CL-81		4.5 miles WNW

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Clinton Power Station, 2014

Location	Location Description	Distance & Direction From Site
J.	Environmental Dosimetry – DLR (cont.)	
Special Interest		
CL-37		3.4 miles N
CL-41		2.4 miles E
CL-49		3.5 miles W
CL-64		2.1 miles WNW
CL-65		2.6 miles ENE
CL-74		1.9 miles W
CL-75		0.9 miles N
Supplemental		
CL-2		0.7 miles NNE
CL-3		0.7 miles NE
CL-4		0.8 miles SW
CL-6		0.8 miles WSW
CL-7		2.3 miles SE
CL-8		2.2 miles E
CL-15		0.9 miles N
CL-33		11.7 miles SW
CL-84		0.6 miles E
CL-90		0.4 miles SE
CL-91		6.1 miles ENE
CL-97		10.3 miles SW
CL-99		3.5 miles NNE
CL-114		12.5 miles SE
Control		
CL-11		16 miles S

TABLE B-2: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Clinton Power Station, 2014

Sample Medium	Analysis	Sampling Method	Analytical Procedure Number
Surface Water	Gamma Spectroscopy	Monthly composite from a continuous water compositor.	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., SPM-1 Sampling Procedure Manual
Surface Water	Tritium	Quarterly composite from a continuous water compositor.	TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation Env. Inc., SPM-1 Sampling Procedure Manual
Surface Water	I-131	Monthly composite from a continuous water compositor.	TBE, TBE-2012 Radioiodine in various matrices Env. Inc., SPM-1 Sampling Procedure Manual
Drinking Water	Gross Beta	Monthly composite from a continuous water compositor.	TBE, TBE-2008 Gross Alpha and/or gross beta activity in various matrices Env. Inc., SPM-1 Sampling Procedure Manual
Drinking Water	Gamma Spectroscopy	Monthly composite from a continuous water compositor.	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., SPM-1 Sampling Procedure Manual
Drinking Water	Tritium	Quarterly composite from a continuous water compositor.	TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation Env. Inc., SPM-1 Sampling Procedure Manual
Drinking Water	I-131	Quarterly composite from a continuous water compositor.	TBE, TBE-2031 Radioactive Iodine in Drinking Water Env. Inc., SPM-1 Sampling Procedure Manual
Well Water	Gamma Spectroscopy	Quarterly composite from a continuous water compositor.	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., SPM-1 Sampling Procedure Manual
Well Water	Tritium	Quarterly composite from a continuous water compositor.	TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation Env. Inc., SPM-1 Sampling Procedure Manual
Fish	Gamma Spectroscopy	Semi-annual samples collected via electroshocking or other techniques	TBE-2007 Gamma emitting radioisotope analysis Env. Inc., SPM-1 Sampling Procedure Manual
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., SPM-1 Sampling Procedure Manual
Air Particulates	Gamma Spectroscopy	Quarterly composite of each station	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., SPM-1 Sampling Procedure Manual
Air Iodine	Gamma Spectroscopy	One-week composite of continuous air sampling through charcoal filter	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., SPM-1 Sampling Procedure Manual
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., SPM-1 Sampling Procedure Manual
Milk	Gamma Spectroscopy	Bi-weekly grab sample when cows are on pasture. Monthly all other times	TBE-2007 Gamma emitting radioisotope analysis Env. Inc., SPM-1 Sampling Procedure Manual

TABLE B-2: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Clinton Power Station, 2014

Sample Medium	Analysis	Sampling Method	Analytical Procedure Number
Food Products	Gross Beta	Monthly grab June through September	TBE, TBE-2008 Gross Alpha and/or gross beta activity in various matrices Env. Inc., SPM-1 Sampling Procedure Manual
Food Products	Gamma Spectroscopy	Monthly grab June through September	TBE, TBE-2007 Gamma emitting radioisotopes analysis Env. Inc., SPM-1 Sampling Procedure Manual
Grass	Gamma Spectroscopy	Biweekly May through October	TBE, TBE-2007 Gamma emitting radioisotopes analysis Env. Inc., SPM-1 Sampling Procedure Manual
DLR	Optically Stimulated Luminescence Dosimetry	Quarterly DLRs comprised of two Al_2O_3:C Landauer Incorporated elements.	Landauer Incorporated

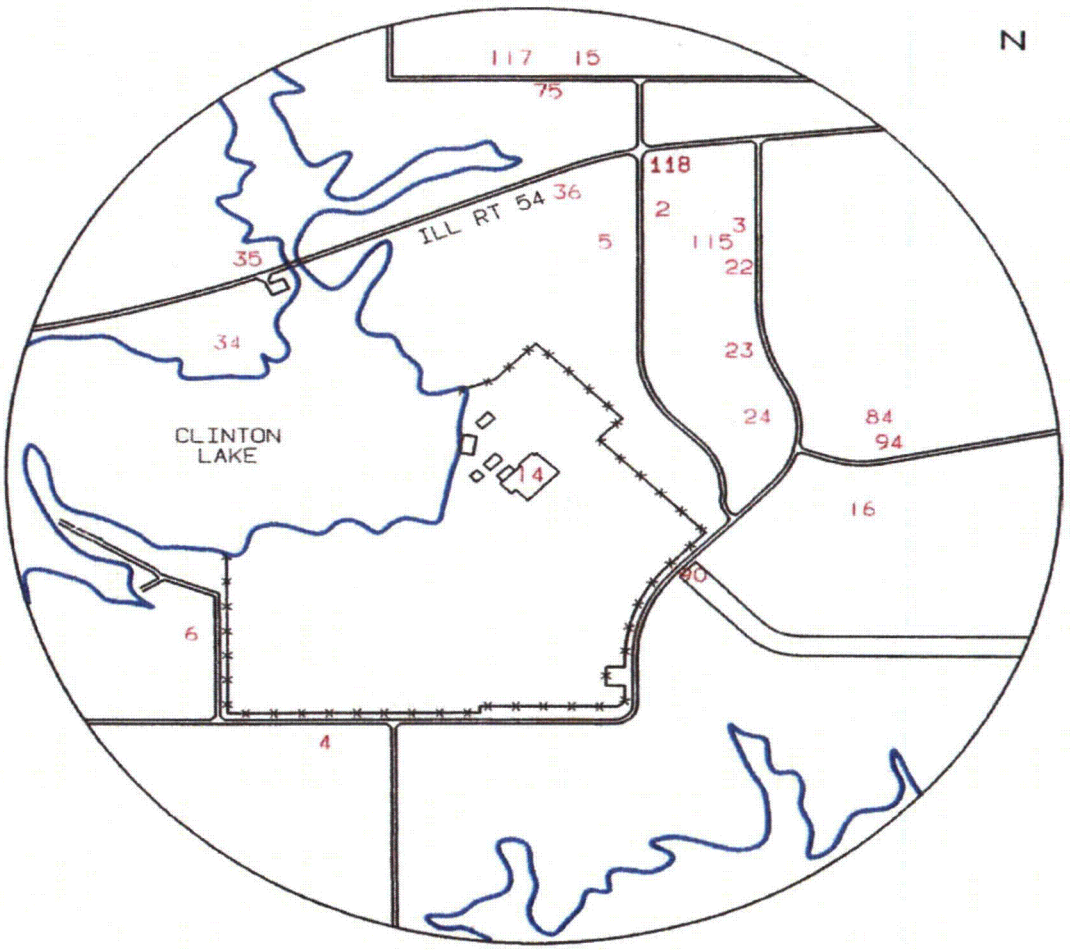

Figure B-1
Environmental Sampling Locations Within One
Mile of the Clinton Power Station, 2014

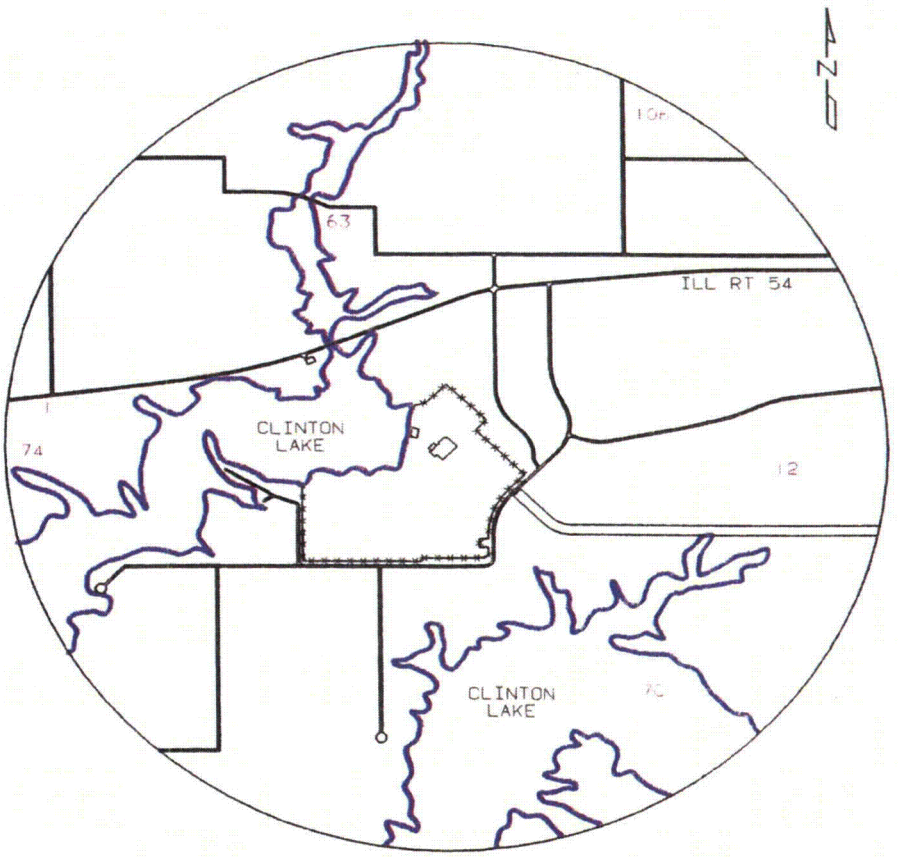

Figure B-2
Environmental Sampling Locations Between One and Two
Miles of the Clinton Power Station, 2014

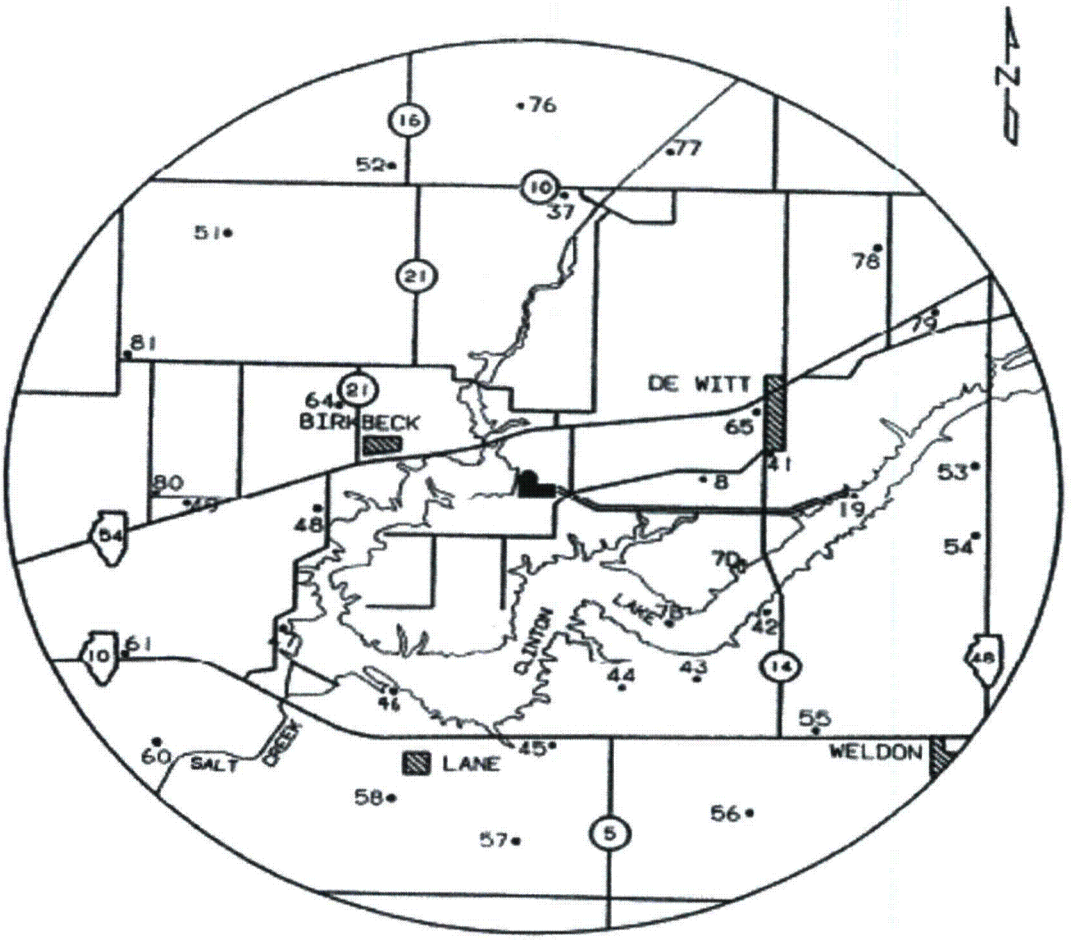

Figure B-3
Environmental Sampling Locations between Two and Five Miles from the Clinton Power Station, 2014

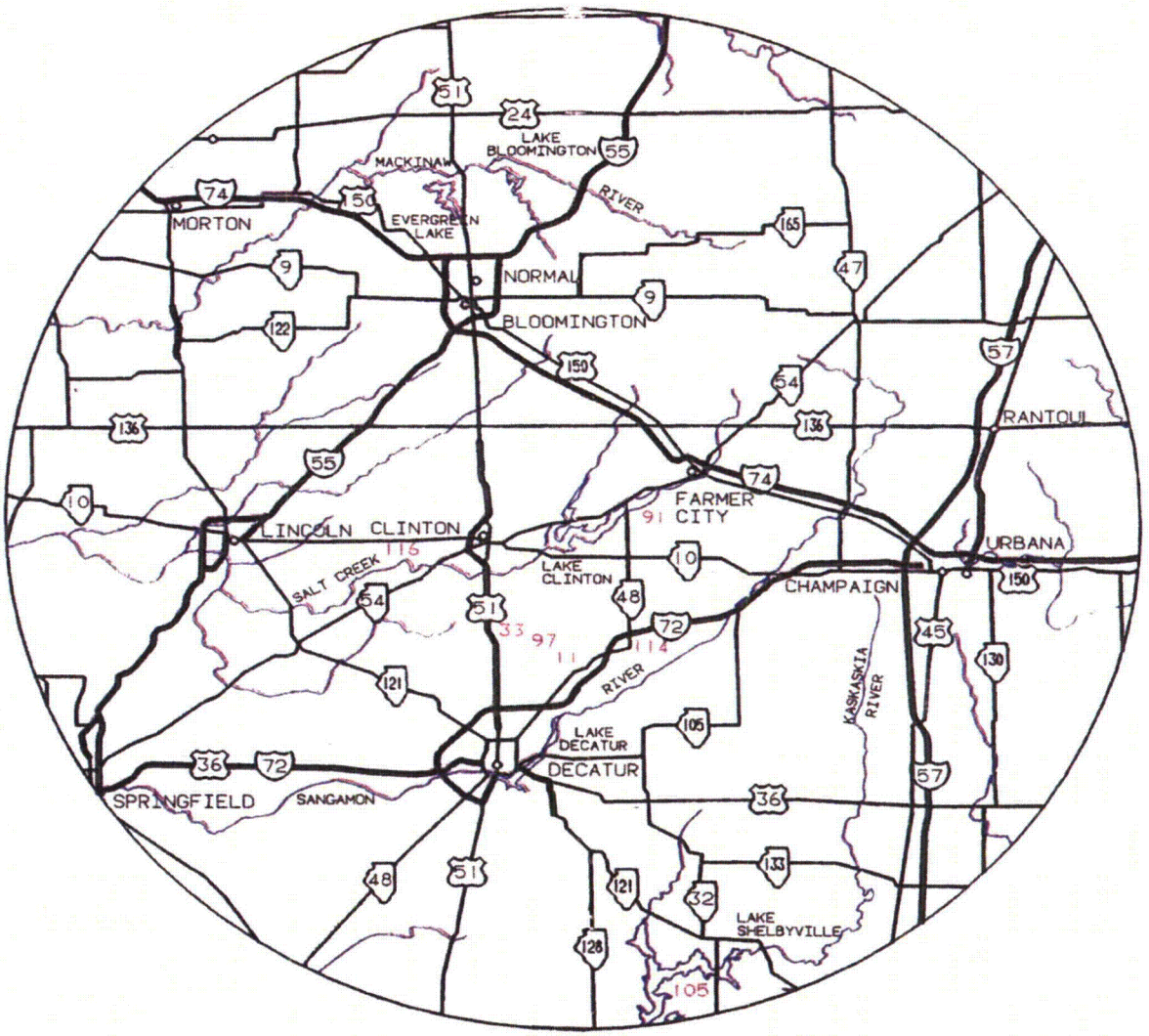

Figure B-4
Environmental Sampling Locations Greater Than Five Miles of the Clinton Power Station, 2014

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APPENDIX C

DATA TABLES AND FIGURES - PRIMARY LABORATORY

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Table C-I.1 **CONCENTRATIONS OF I-131 IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-90
12/26/13 - 01/29/14	< 0.7
01/29/14 - 02/26/14	< 0.8
02/26/14 - 03/26/14	< 0.7
03/26/14 - 04/30/14	< 0.7
04/30/14 - 05/28/14 (1)	< 0.8
05/28/14 - 06/25/14	< 0.5
06/25/14 - 07/30/14	< 0.5
07/30/14 - 08/27/14	< 0.5
08/27/14 - 09/24/14	< 0.5
09/24/14 - 10/29/14	< 0.5
10/29/14 - 11/26/14 (1)	< 0.5
11/26/14 - 12/31/14	< 0.8
MEAN	-

Table C-I.2 **CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-90	CL-13	CL-91	CL-99
12/26/13 - 03/26/14	< 189	< 189	< 188	< 189 (1)
03/26/14 - 06/25/14	< 187	< 187	< 185 (1)	< 184
06/25/14 - 09/24/14	< 183	< 183	< 184 (1)	< 183
09/24/14 - 12/31/14	< 189 (1)	< 184	< 186	< 187
MEAN	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-I.3 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD		Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-13	01/29/14 - 01/29/14		< 40	< 77	< 4	< 4	< 10	< 4	< 12	< 4	< 8	< 4	< 4	< 24	< 7	< 40
	02/26/14 - 02/26/14		< 39	< 75	< 4	< 4	< 10	< 5	< 8	< 5	< 8	< 4	< 4	< 24	< 12	< 28
	03/26/14 - 03/26/14		< 33	< 61	< 3	< 3	< 8	< 3	< 6	< 3	< 7	< 3	< 3	< 31	< 8	< 24
	04/30/14 - 04/30/14		< 20	41 ± 33	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 16	< 5	< 15
	05/28/14 - 05/28/14		< 56	< 63	< 5	< 6	< 14	< 6	< 11	< 6	< 12	< 6	< 7	< 23	< 10	< 43
	06/25/14 - 06/25/14		< 38	< 75	< 6	< 5	< 10	< 6	< 8	< 5	< 10	< 5	< 5	< 23	< 4	< 36
	07/30/14 - 07/30/14		< 40	< 75	< 4	< 4	< 10	< 4	< 9	< 6	< 9	< 5	< 5	< 31	< 10	< 35
	08/27/14 - 08/27/14		< 34	< 36	< 4	< 4	< 9	< 4	< 9	< 5	< 7	< 4	< 4	< 18	< 7	< 26
	09/24/14 - 09/24/14		< 44	< 84	< 5	< 5	< 10	< 5	< 8	< 6	< 8	< 5	< 5	< 34	< 10	< 39
	10/29/14 - 10/29/14		< 53	< 55	< 7	< 6	< 12	< 6	< 11	< 6	< 12	< 6	< 5	< 31	< 7	< 46
	11/26/14 - 11/26/14		< 49	< 88	< 5	< 4	< 11	< 5	< 11	< 5	< 11	< 4	< 5	< 30	< 7	< 39
	12/31/14 - 12/31/14		< 51	< 44	< 6	< 5	< 13	< 6	< 10	< 8	< 11	< 5	< 6	< 33	< 8	< 42
	MEAN		-	-	-	-	-	-	-	-	-	-	-	-	-	-
CL-90	12/26/13 - 01/29/14		< 42	< 102	< 4	< 4	< 10	< 4	< 8	< 5	< 9	< 5	< 6	< 24	< 6	< 38
	01/29/14 - 02/26/14		< 37	< 47	< 4	< 4	< 9	< 4	< 9	< 4	< 8	< 4	< 4	< 29	< 10	< 33
	02/26/14 - 03/26/14		< 25	< 67	< 2	< 2	< 6	< 3	< 4	< 3	< 4	< 2	< 2	< 23	< 7	< 17
	03/26/14 - 04/30/14		< 18	27 ± 27	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 14	< 5	< 14
	04/30/14 - 05/28/14	(1)	< 53	< 67	< 6	< 6	< 11	< 7	< 10	< 6	< 9	< 5	< 7	< 26	< 9	< 34
	05/28/14 - 06/25/14		< 46	< 62	< 5	< 5	< 9	< 5	< 9	< 6	< 7	< 5	< 6	< 22	< 6	< 42
	06/25/14 - 07/30/14		< 51	< 91	< 5	< 6	< 13	< 5	< 10	< 6	< 11	< 6	< 6	< 33	< 11	< 44
	07/30/14 - 08/27/14		< 41	80 ± 48	< 4	< 4	< 9	< 4	< 10	< 5	< 8	< 5	< 5	< 24	< 7	< 42
	08/27/14 - 09/24/14		< 43	< 38	< 4	< 4	< 10	< 3	< 9	< 5	< 7	< 5	< 4	< 29	< 9	< 34
	09/24/14 - 10/29/14		< 56	< 117	< 6	< 6	< 11	< 6	< 13	< 6	< 10	< 5	< 7	< 25	< 10	< 40
	10/29/14 - 11/26/14	(1)	< 42	< 91	< 4	< 3	< 9	< 5	< 7	< 5	< 8	< 5	< 4	< 26	< 6	< 37
	11/26/14 - 12/31/14		< 65	< 72	< 6	< 7	< 16	< 7	< 12	< 7	< 10	< 8	< 6	< 33	< 14	< 50
	MEAN		-	54 ± 75	-	-	-	-	-	-	-	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES
(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-I.3 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-91	12/26/13 - 01/29/14	< 42	< 46	< 5	< 5	< 10	< 4	< 10	< 4	< 8	< 5	< 5	< 23	< 8	< 40
	01/29/14 - 02/26/14	< 39	< 30	< 5	< 4	< 9	< 5	< 8	< 5	< 9	< 4	< 4	< 34	< 9	< 33
	02/26/14 - 03/26/14	< 27	< 53	< 3	< 3	< 6	< 3	< 5	< 3	< 5	< 3	< 3	< 25	< 7	< 21
	03/26/14 - 04/30/14	< 14	52 ± 27	< 1	< 1	< 3	< 2	< 2	< 2	< 3	< 1	< 1	< 10	< 3	< 12
	04/30/14 - 05/28/14 (1)	< 48	< 106	< 5	< 5	< 8	< 7	< 10	< 5	< 9	< 5	< 6	< 21	< 8	< 38
	05/28/14 - 06/25/14	< 35	< 46	< 4	< 4	< 10	< 5	< 8	< 5	< 8	< 4	< 5	< 20	< 7	< 35
	06/25/14 - 07/30/14	< 46	58 ± 46	< 5	< 5	< 11	< 5	< 10	< 5	< 10	< 5	< 5	< 32	< 10	< 40
	07/30/14 - 08/27/14	< 23	< 27	< 3	< 3	< 7	< 3	< 6	< 3	< 5	< 3	< 3	< 14	< 4	< 24
	08/27/14 - 09/24/14 (1)	< 39	< 36	< 4	< 4	< 7	< 3	< 7	< 5	< 8	< 4	< 4	< 32	< 7	< 37
	09/24/14 - 10/29/14	< 47	< 95	< 4	< 6	< 8	< 5	< 8	< 5	< 9	< 5	< 5	< 24	< 7	< 37
	10/29/14 - 11/26/14	< 44	< 86	< 4	< 5	< 10	< 4	< 8	< 4	< 9	< 4	< 5	< 26	< 8	< 39
	11/26/14 - 12/31/14	< 55	< 57	< 6	< 6	< 13	< 6	< 12	< 5	< 10	< 5	< 6	< 28	< 11	< 45
	MEAN	-	55 ± 9	-	-	-	-	-	-	-	-	-	-	-	-
CL-99	01/15/14 - 01/29/14 (1)	< 37	< 53	< 5	< 4	< 9	< 5	< 9	< 4	< 8	< 4	< 5	< 18	< 7	< 31
	01/29/14 - 02/26/14 (1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	03/12/14 - 03/26/14 (1)	< 30	< 71	< 3	< 3	< 9	< 4	< 7	< 4	< 6	< 3	< 3	< 29	< 7	< 18
	03/26/14 - 04/30/14	< 17	< 15	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 2	< 2	< 14	< 5	< 13
	04/30/14 - 05/28/14	< 42	< 87	< 4	< 5	< 9	< 5	< 10	< 4	< 9	< 4	< 5	< 23	< 6	< 37
	05/28/14 - 06/25/14	< 54	< 60	< 7	< 8	< 14	< 7	< 14	< 7	< 13	< 6	< 6	< 29	< 11	< 40
	06/25/14 - 07/30/14	< 33	< 97	< 6	< 5	< 12	< 5	< 8	< 4	< 8	< 5	< 6	< 30	< 15	< 32
	07/30/14 - 08/27/14	< 35	< 51	< 4	< 4	< 9	< 4	< 7	< 4	< 7	< 3	< 5	< 20	< 6	< 32
	08/27/14 - 09/24/14	< 39	< 42	< 4	< 4	< 10	< 4	< 9	< 5	< 7	< 4	< 4	< 28	< 11	< 35
	09/24/14 - 10/29/14	< 59	93 ± 55	< 7	< 6	< 14	< 7	< 10	< 6	< 11	< 7	< 8	< 32	< 9	< 88
	10/29/14 - 11/26/14	< 41	< 85	< 5	< 6	< 11	< 5	< 11	< 5	< 8	< 5	< 5	< 29	< 10	< 38
	11/26/14 - 12/31/14	< 60	< 56	< 5	< 6	< 13	< 5	< 13	< 6	< 12	< 7	< 6	< 33	< 10	< 56
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES
(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-II.1 **CONCENTRATIONS OF GROSS BETA IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD		CL-14
12/26/13 - 01/29/14		< 1.5
01/29/14 - 02/26/14		< 1.6
02/26/14 - 03/26/14		< 1.5
03/26/14 - 04/30/14		< 1.6
04/30/14 - 05/28/14	(1)	< 1.3
05/28/14 - 06/25/14		< 1.6
06/25/14 - 07/30/14		< 1.7
07/30/14 - 08/27/14		< 1.5
08/27/14 - 09/24/14		< 1.7
09/24/14 - 10/29/14		< 1.6
10/29/14 - 11/26/14	(1)	< 1.8
11/26/14 - 12/31/14		< 1.5
MEAN		-

Table C-II.2 **CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD		CL-14
01/15/14 - 03/26/14		< 188
03/26/14 - 06/25/14	(1)	< 184
06/25/14 - 09/24/14		< 185
09/24/14 - 12/31/14	(1)	< 190
MEAN		-

Table C-II.3 **CONCENTRATIONS OF I-131 IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD		CL-14
12/26/13 - 01/29/14		< 0.9
01/29/14 - 02/26/14		< 0.7
02/26/14 - 03/26/14		< 0.8
03/26/14 - 04/30/14		< 0.8
04/30/14 - 05/28/14	(1)	< 0.8
05/28/14 - 06/25/14		< 0.6
06/25/14 - 07/30/14		< 0.5
07/30/14 - 08/27/14		< 0.7
08/27/14 - 09/24/14		< 0.6
09/24/14 - 10/29/14		< 0.6
10/29/14 - 11/26/14	(1)	< 0.5
11/26/14 - 12/31/14		< 0.8
MEAN		-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-II.4 **CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD		Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-14	12/26/13 - 01/29/14		< 33	< 31	< 4	< 4	< 8	< 4	< 7	< 4	< 7	< 4	< 3	< 17	< 6	< 35
	01/29/14 - 02/26/14		< 54	< 110	< 6	< 7	< 12	< 7	< 11	< 7	< 12	< 7	< 7	< 32	< 11	< 39
	02/26/14 - 03/26/14		< 27	< 22	< 2	< 3	< 5	< 3	< 5	< 3	< 5	< 2	< 3	< 23	< 5	< 21
	03/26/14 - 04/30/14		< 21	< 22	< 2	< 3	< 6	< 3	< 5	< 3	< 4	< 2	< 2	< 18	< 6	< 12
	04/30/14 - 05/28/14	(1)	< 38	< 85	< 4	< 4	< 7	< 3	< 9	< 4	< 7	< 4	< 5	< 21	< 6	< 32
	05/28/14 - 06/25/14		< 63	< 133	< 6	< 8	< 15	< 8	< 12	< 9	< 15	< 6	< 8	< 28	< 12	< 52
	06/25/14 - 07/30/14		< 48	< 100	< 5	< 4	< 11	< 4	< 11	< 5	< 10	< 5	< 5	< 32	< 10	< 38
	07/30/14 - 08/27/14		< 33	< 32	< 4	< 4	< 8	< 4	< 9	< 4	< 7	< 4	< 4	< 20	< 5	< 27
	08/27/14 - 09/24/14		< 43	< 93	< 4	< 4	< 12	< 5	< 10	< 5	< 9	< 5	< 5	< 33	< 11	< 38
	09/24/14 - 10/29/14		< 71	< 56	< 6	< 7	< 11	< 7	< 10	< 7	< 12	< 7	< 7	< 30	< 11	< 57
	10/29/14 - 11/26/14	(1)	< 52	< 123	< 5	< 5	< 10	< 5	< 12	< 6	< 9	< 5	< 6	< 24	< 8	< 49
	11/26/14 - 12/31/14		< 50	< 44	< 5	< 6	< 13	< 5	< 13	< 7	< 13	< 6	< 6	< 25	< 15	< 32
	MEAN		-	-	-	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-III.1 **CONCENTRATIONS OF TRITIUM IN WELL WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-12R	CL-12T	CL-7D
03/26/14 - 03/26/14	< 168	< 164	< 168
06/25/14 - 06/25/14	< 165	< 167	< 165
09/24/14 - 09/24/14	< 180	< 179	< 178
12/31/14 - 12/31/14	< 178	< 183	< 182
MEAN	-	-	-

Table C-III.2 CONCENTRATIONS OF GAMMA EMITTERS IN WELL WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-12R	03/26/14	< 16	< 31	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 12	< 4	< 12
	06/25/14	< 63	< 63	< 5	< 7	< 12	< 6	< 16	< 7	< 12	< 7	< 8	< 33	< 11	< 52
	09/24/14	< 46	< 47	< 5	< 5	< 11	< 5	< 9	< 5	< 8	< 5	< 4	< 34	< 8	< 35
	12/31/14	< 68	< 76	< 8	< 8	< 14	< 8	< 15	< 8	< 14	< 8	< 8	< 37	< 10	< 51
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CL-12T	03/26/14	< 21	< 39	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 20	< 6	< 17
	06/25/14	< 50	< 97	< 7	< 6	< 12	< 5	< 13	< 6	< 10	< 6	< 6	< 27	< 6	< 52
	09/24/14	< 46	< 69	< 5	< 4	< 11	< 5	< 10	< 5	< 8	< 4	< 6	< 33	< 10	< 37
	12/31/14	< 68	< 90	< 7	< 6	< 13	< 8	< 17	< 7	< 10	< 7	< 5	< 28	< 13	< 50
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CL-7D	03/26/14	< 18	30 ± 27	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 15	< 4	< 15
	06/25/14	< 54	< 57	< 5	< 5	< 10	< 6	< 11	< 6	< 10	< 5	< 6	< 23	< 8	< 38
	09/24/14	< 46	< 53	< 5	< 5	< 11	< 4	< 9	< 6	< 9	< 4	< 5	< 37	< 11	< 38
	12/31/14	< 58	< 126	< 7	< 8	< 14	< 7	< 14	< 8	< 14	< 7	< 7	< 34	< 9	< 51
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-IV.1 **CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-105															
bluegill	05/05/14	< 763	4029 ± 1357	< 76	< 89	< 183	< 75	< 173	< 94	< 178	< 70	< 69	< 887	< 277	< 406
carp	05/05/14	< 643	3201 ± 815	< 68	< 60	< 129	< 58	< 126	< 84	< 155	< 61	< 71	< 830	< 265	< 440
crappie	05/05/14	< 789	3550 ± 1037	< 76	< 78	< 224	< 51	< 178	< 89	< 142	< 74	< 69	< 930	< 200	< 492
largemouth bass	05/05/14	< 458	3790 ± 847	< 47	< 58	< 134	< 57	< 83	< 60	< 84	< 43	< 39	< 605	< 240	< 232
bluegill	10/01/14	< 551	3073 ± 828	< 61	< 56	< 136	< 63	< 125	< 71	< 124	< 63	< 57	< 513	< 209	< 303
carp	10/01/14	< 511	3166 ± 818	< 55	< 57	< 143	< 63	< 109	< 63	< 102	< 51	< 53	< 442	< 126	< 311
largemouth bass	10/01/14	< 795	3315 ± 1131	< 73	< 81	< 172	< 71	< 179	< 97	< 141	< 66	< 85	< 632	< 225	< 442
white bass	10/01/14	< 627	3450 ± 1029	< 61	< 67	< 186	< 74	< 124	< 73	< 121	< 66	< 59	< 617	< 123	< 417
	MEAN	-	3447 ± 661	-	-	-	-	-	-	-	-	-	-	-	-
CL-19															
bluegill	05/05/14	< 892	3685 ± 1123	< 78	< 97	< 202	< 92	< 213	< 102	< 191	< 98	< 94	< 885	< 277	< 580
carp	05/05/14	< 864	4885 ± 1365	< 97	< 104	< 189	< 84	< 161	< 130	< 155	< 96	< 69	< 1151	< 287	< 539
channel catfish	05/05/14	< 596	2976 ± 854	< 61	< 68	< 119	< 57	< 145	< 76	< 115	< 59	< 59	< 772	< 170	< 291
largemouth bass	05/05/14	< 1012	4676 ± 1271	< 85	< 118	< 215	< 83	< 209	< 111	< 216	< 91	< 93	< 1091	< 273	< 679
bluegill	10/01/14	< 703	2536 ± 938	< 74	< 69	< 144	< 67	< 147	< 77	< 139	< 73	< 70	< 621	< 158	< 455
carp	10/01/14	< 758	4566 ± 1144	< 77	< 85	< 197	< 78	< 151	< 90	< 132	< 73	< 76	< 632	< 231	< 595
channel catfish	10/01/14	< 725	3145 ± 1085	< 83	< 95	< 188	< 64	< 159	< 44	< 135	< 66	< 80	< 608	< 292	< 437
largemouth bass	10/01/14	< 763	2218 ± 1351	< 93	< 84	< 255	< 106	< 207	< 124	< 164	< 91	< 70	< 739	< 211	< 529
	MEAN	-	3586 ± 2054	-	-	-	-	-	-	-	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-V.1 **CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/KG DRY ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-07B	05/05/14	< 375	8056 ± 996	< 42	< 43	< 109	< 42	< 72	< 47	< 81	< 40	< 49	< 262	< 52	< 272
	10/01/14	< 463	7231 ± 809	< 46	< 47	< 117	< 40	< 127	< 54	< 97	< 49	< 44	< 588	< 147	< 283
	MEAN	-	7644 ± 1167	-	-	-	-	-	-	-	-	-	-	-	-
CL-105	05/05/14	< 352	9633 ± 1013	< 40	< 40	< 90	< 38	< 110	< 48	< 84	< 43	< 45	< 233	< 77	< 240
	10/01/14	< 356	7515 ± 752	< 36	< 36	< 94	< 33	< 71	< 37	< 56	< 30	< 35	< 429	< 122	< 200
	MEAN	-	8574 ± 2995	-	-	-	-	-	-	-	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-VI.1 **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

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

COLLECTION PERIOD	GROUP I					
	CL-2	CL-3	CL-4	CL-6	CL-15	CL-94
01/01/14 - 01/08/14	24 ± 5	24 ± 5	21 ± 4	25 ± 5	22 ± 4	25 ± 5
01/08/14 - 01/15/14	25 ± 5	22 ± 5	22 ± 5	17 ± 4	18 ± 5	25 ± 5
01/15/14 - 01/22/14	18 ± 4	18 ± 4	18 ± 4	22 ± 5	22 ± 5	20 ± 4
01/22/14 - 01/29/14	14 ± 4	15 ± 4	12 ± 4	14 ± 4	16 ± 4	16 ± 4
01/29/14 - 02/05/14	24 ± 5	24 ± 5	21 ± 4	23 ± 5	25 ± 5	18 ± 4
02/05/14 - 02/12/14	25 ± 6	20 ± 5	23 ± 5	21 ± 5	23 ± 5	26 ± 5
02/12/14 - 02/19/14	28 ± 6	28 ± 5	26 ± 5	30 ± 5	27 ± 5	33 ± 5
02/19/14 - 02/26/14	19 ± 5	16 ± 4	18 ± 4	20 ± 5	17 ± 4	18 ± 4
02/26/14 - 03/05/14	33 ± 6	25 ± 5	29 ± 5	29 ± 5	27 ± 5	22 ± 4
03/05/14 - 03/12/14	21 ± 5	23 ± 5	19 ± 5	24 ± 5	18 ± 5	23 ± 5
03/12/14 - 03/19/14	12 ± 4	16 ± 4	15 ± 4	11 ± 4	18 ± 4	15 ± 4
03/19/14 - 03/26/14	17 ± 4	17 ± 4	16 ± 4	16 ± 4	12 ± 4	17 ± 4
03/26/14 - 04/02/14	14 ± 4	16 ± 4	19 ± 4	20 ± 5	18 ± 4	14 ± 4
04/02/14 - 04/09/14	17 ± 5	13 ± 4	11 ± 4	9 ± 4	10 ± 4	8 ± 4
04/09/14 - 04/16/14	15 ± 4	15 ± 4	16 ± 4	14 ± 4	14 ± 4	16 ± 4
04/16/14 - 04/23/14	18 ± 4	19 ± 5	14 ± 4	16 ± 4	16 ± 4	16 ± 4
04/23/14 - 04/30/14	8 ± 4	11 ± 4	11 ± 4	8 ± 4	11 ± 4	7 ± 4
04/30/14 - 05/07/14	13 ± 4	13 ± 4	10 ± 4	9 ± 4	10 ± 4	7 ± 4
05/07/14 - 05/14/14	16 ± 4	14 ± 4	21 ± 4	18 ± 4	14 ± 4	15 ± 4
05/14/14 - 05/21/14	10 ± 4	14 ± 4	15 ± 4	14 ± 4	12 ± 4	16 ± 4
05/21/14 - 05/28/14	19 ± 4	18 ± 4	18 ± 4	16 ± 4	17 ± 4	11 ± 4
05/28/14 - 06/04/14	18 ± 4	15 ± 4	17 ± 4	18 ± 4	18 ± 4	17 ± 4
06/04/14 - 06/11/14	17 ± 4	13 ± 4	15 ± 4	12 ± 4	11 ± 4	16 ± 4
06/11/14 - 06/18/14	21 ± 5	18 ± 5	17 ± 4	17 ± 4	16 ± 4	17 ± 4
06/18/14 - 06/25/14	13 ± 4	16 ± 5	13 ± 4	15 ± 4	11 ± 4	13 ± 4
06/25/14 - 07/02/14	14 ± 4	11 ± 4	9 ± 4	9 ± 4	10 ± 4	10 ± 4
07/02/14 - 07/09/14	14 ± 4	10 ± 4	11 ± 4	15 ± 4	19 ± 4	15 ± 4
07/09/14 - 07/16/14	14 ± 4	14 ± 4	16 ± 4	14 ± 4	15 ± 4	13 ± 4
07/16/14 - 07/23/14	27 ± 5	26 ± 5	23 ± 5	22 ± 4	28 ± 5	25 ± 5
07/23/14 - 07/30/14	12 ± 4	15 ± 4	15 ± 4	16 ± 4	14 ± 4	11 ± 4
07/30/14 - 08/06/14	26 ± 5	29 ± 5	27 ± 5	25 ± 5	25 ± 5	31 ± 5
08/06/14 - 08/13/14	22 ± 5	20 ± 4	28 ± 5	24 ± 5	21 ± 5	22 ± 4
08/13/14 - 08/20/14	24 ± 5	20 ± 5	22 ± 5	22 ± 5	18 ± 5	18 ± 5
08/20/14 - 08/27/14	20 ± 5	23 ± 5	21 ± 5	22 ± 5	14 ± 4	19 ± 5
08/27/14 - 09/03/14	17 ± 4	15 ± 4	19 ± 4	21 ± 5	18 ± 4	20 ± 4
09/03/14 - 09/10/14	17 ± 4	18 ± 5	15 ± 4	15 ± 4	19 ± 5	12 ± 4
09/10/14 - 09/17/14	11 ± 4	11 ± 4	11 ± 4	12 ± 4	10 ± 4	9 ± 4
09/17/14 - 09/24/14	21 ± 5	18 ± 5	18 ± 4	17 ± 5	22 ± 5	22 ± 5
09/24/14 - 10/01/14	22 ± 4	20 ± 4	22 ± 4	19 ± 4	25 ± 5	22 ± 5
10/01/14 - 10/08/14	15 ± 4	13 ± 4	13 ± 4	12 ± 4	11 ± 4	13 ± 4
10/08/14 - 10/15/14	16 ± 4	13 ± 4	12 ± 4	15 ± 4	12 ± 4	17 ± 4
10/15/14 - 10/22/14	15 ± 4	12 ± 4	13 ± 4	12 ± 4	11 ± 4	14 ± 4
10/22/14 - 10/29/14	22 ± 5	19 ± 5	18 ± 5	21 ± 5	16 ± 5	20 ± 5
10/29/14 - 11/05/14	12 ± 4	14 ± 4	13 ± 4	22 ± 5	16 ± 4	15 ± 4
11/05/14 - 11/12/14	13 ± 4	16 ± 4	17 ± 4	18 ± 4	16 ± 4	15 ± 4
11/12/14 - 11/19/14	18 ± 4	18 ± 4	22 ± 5	18 ± 4	19 ± 4	14 ± 4
11/19/14 - 11/26/14	21 ± 4	64 ± 11 (1)	23 ± 4	22 ± 4	28 ± 5	23 ± 4
11/26/14 - 12/03/14	28 ± 5	29 ± 5	27 ± 5	29 ± 5	21 ± 5	27 ± 5
12/03/14 - 12/10/14	34 ± 5	34 ± 5	39 ± 5	37 ± 5	38 ± 5	33 ± 5
12/10/14 - 12/17/14	25 ± 5	25 ± 5	24 ± 5	19 ± 4	20 ± 4	24 ± 5
12/17/14 - 12/24/14	23 ± 5	23 ± 5	22 ± 5	22 ± 5	20 ± 5	19 ± 5
12/24/14 - 12/31/14	19 ± 4	18 ± 4	19 ± 4	17 ± 4	18 ± 4	15 ± 4
MEAN	19 ± 11	19 ± 17	18 ± 11	18 ± 12	18 ± 12	18 ± 12

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VI.1 **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

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

COLLECTION PERIOD	GROUP II			GROUP III
	CL-1	CL-7	CL-8	CL-11
01/01/14 - 01/08/14	24 ± 5	20 ± 4	25 ± 5	24 ± 5
01/08/14 - 01/15/14	20 ± 5	20 ± 5	20 ± 5	21 ± 5
01/15/14 - 01/22/14	20 ± 4	20 ± 4	17 ± 4	24 ± 5
01/22/14 - 01/29/14	12 ± 4	15 ± 4	14 ± 4	13 ± 4
01/29/14 - 02/05/14	22 ± 5	23 ± 5	21 ± 5	24 ± 5
02/05/14 - 02/12/14	20 ± 4	22 ± 5	20 ± 4	24 ± 5
02/12/14 - 02/19/14	31 ± 5	28 ± 5	27 ± 5	28 ± 5
02/19/14 - 02/26/14	19 ± 5	21 ± 5	20 ± 5	19 ± 5
02/26/14 - 03/05/14	27 ± 5	27 ± 5	22 ± 4	31 ± 5
03/05/14 - 03/12/14	19 ± 5	19 ± 5	20 ± 5	17 ± 4
03/12/14 - 03/19/14	12 ± 4	16 ± 4	16 ± 4	17 ± 4
03/19/14 - 03/26/14	14 ± 4	16 ± 4	20 ± 4	21 ± 4
03/26/14 - 04/02/14	13 ± 4	14 ± 4	12 ± 4	14 ± 4
04/02/14 - 04/09/14	13 ± 4	11 ± 4	9 ± 4	10 ± 4
04/09/14 - 04/16/14	9 ± 4	10 ± 4	18 ± 4	18 ± 4
04/16/14 - 04/23/14	19 ± 5	16 ± 4	18 ± 4	18 ± 4
04/23/14 - 04/30/14	11 ± 4	7 ± 4	9 ± 4	10 ± 4
04/30/14 - 05/07/14	8 ± 4	10 ± 4	12 ± 4	16 ± 4
05/07/14 - 05/14/14	15 ± 4	18 ± 4	21 ± 4	15 ± 4
05/14/14 - 05/21/14	15 ± 4	11 ± 4	20 ± 4	14 ± 4
05/21/14 - 05/28/14	19 ± 4	14 ± 4	18 ± 4	16 ± 4
05/28/14 - 06/04/14	17 ± 4	17 ± 4	18 ± 4	18 ± 4
06/04/14 - 06/11/14	14 ± 4	13 ± 4	13 ± 4	15 ± 4
06/11/14 - 06/18/14	15 ± 4	18 ± 4	18 ± 5	14 ± 4
06/18/14 - 06/25/14	11 ± 4	13 ± 4	13 ± 4	14 ± 4
06/25/14 - 07/02/14	13 ± 4	11 ± 4	10 ± 4	11 ± 4
07/02/14 - 07/09/14	12 ± 4	14 ± 4	14 ± 4	11 ± 4
07/09/14 - 07/16/14	11 ± 4	13 ± 4	13 ± 4	14 ± 4
07/16/14 - 07/23/14	26 ± 5	23 ± 5	24 ± 5	28 ± 5
07/23/14 - 07/30/14	12 ± 4	11 ± 4	15 ± 4	18 ± 4
07/30/14 - 08/06/14	28 ± 5	25 ± 5	27 ± 5	32 ± 5
08/06/14 - 08/13/14	19 ± 4	22 ± 4	25 ± 5	31 ± 5
08/13/14 - 08/20/14	22 ± 5	15 ± 4	15 ± 4	24 ± 5
08/20/14 - 08/27/14	19 ± 5	16 ± 4	21 ± 5	15 ± 4
08/27/14 - 09/03/14	19 ± 4	13 ± 4	15 ± 4	16 ± 4
09/03/14 - 09/10/14	16 ± 4	12 ± 4	16 ± 4	14 ± 4
09/10/14 - 09/17/14	14 ± 4	11 ± 4	14 ± 4	8 ± 4
09/17/14 - 09/24/14	19 ± 5	18 ± 4	20 ± 5	23 ± 5
09/24/14 - 10/01/14	22 ± 4	22 ± 5	28 ± 5	25 ± 5
10/01/14 - 10/08/14	12 ± 4	13 ± 4	11 ± 4	14 ± 4
10/08/14 - 10/15/14	16 ± 4	12 ± 4	16 ± 4	9 ± 4
10/15/14 - 10/22/14	12 ± 4	12 ± 4	12 ± 4	14 ± 4
10/22/14 - 10/29/14	20 ± 5	19 ± 5	18 ± 5	17 ± 5
10/29/14 - 11/05/14	17 ± 4	15 ± 4	17 ± 4	15 ± 4
11/05/14 - 11/12/14	16 ± 4	13 ± 4	18 ± 4	12 ± 4
11/12/14 - 11/19/14	16 ± 4	19 ± 5	17 ± 5	22 ± 5
11/19/14 - 11/26/14	20 ± 4	21 ± 4	27 ± 5	26 ± 5
11/26/14 - 12/03/14	24 ± 5	24 ± 5	24 ± 5	26 ± 5
12/03/14 - 12/10/14	41 ± 5	32 ± 5	36 ± 5	31 ± 5
12/10/14 - 12/17/14	19 ± 4	21 ± 4	23 ± 4	24 ± 5
12/17/14 - 12/24/14	22 ± 5	24 ± 5	24 ± 5	20 ± 5
12/24/14 - 12/31/14	19 ± 4	15 ± 4	20 ± 4	19 ± 4
MEAN	18 ± 12	17 ± 11	18 ± 11	19 ± 13

Table C-VI.2 **MONTHLY AND YEARLY MEAN VALUES OF GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

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

GROUP I - ON-SITE LOCATIONS				GROUP II - INTERMEDIATE DISTANCE LOCATIONS				GROUP III - CONTROL LOCATIONS			
COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD
01/01/14 - 01/29/14	12	25	20 ± 8	01/01/14 - 01/29/14	12	25	19 ± 8	01/01/14 - 01/29/14	13	24	21 ± 11
01/29/14 - 02/26/14	16	33	23 ± 9	01/29/14 - 02/26/14	19	31	23 ± 8	01/29/14 - 02/26/14	19	28	24 ± 7
02/26/14 - 04/02/14	11	33	19 ± 11	02/26/14 - 04/02/14	12	27	18 ± 10	02/26/14 - 04/02/14	14	31	20 ± 13
04/02/14 - 04/30/14	7	19	13 ± 7	04/02/14 - 04/30/14	7	19	12 ± 8	04/02/14 - 04/30/14	10	18	14 ± 8
04/30/14 - 06/04/14	7	21	15 ± 7	04/30/14 - 06/04/14	8	21	15 ± 7	04/30/14 - 06/04/14	14	18	16 ± 3
06/04/14 - 07/02/14	9	21	14 ± 6	06/04/14 - 07/02/14	10	18	13 ± 5	06/04/14 - 07/02/14	11	15	14 ± 4
07/02/14 - 07/30/14	10	28	17 ± 11	07/02/14 - 07/30/14	11	26	16 ± 11	07/02/14 - 07/30/14	11	28	18 ± 15
07/30/14 - 09/03/14	14	31	22 ± 8	07/30/14 - 09/03/14	13	28	20 ± 9	07/30/14 - 09/03/14	15	32	23 ± 17
09/03/14 - 10/01/14	9	25	17 ± 9	09/03/14 - 10/01/14	11	28	17 ± 10	09/03/14 - 10/01/14	8	25	17 ± 16
10/01/14 - 10/29/14	11	22	15 ± 6	10/01/14 - 10/29/14	11	20	14 ± 6	10/01/14 - 10/29/14	9	17	13 ± 6
10/29/14 - 12/03/14	12	64	21 ± 19	10/29/14 - 12/03/14	13	27	19 ± 8	10/29/14 - 12/03/14	12	26	20 ± 13
12/03/14 - 12/31/14	15	39	24 ± 14	12/03/14 - 12/31/14	15	41	24 ± 16	12/03/14 - 12/31/14	19	31	24 ± 11
01/01/14 - 12/31/14	7	64	18 ± 13	01/01/14 - 12/31/14	7	41	18 ± 11	01/01/14 - 12/31/14	8	32	19 ± 13

Table C-VI.3 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

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

SITE	COLLECTION PERIOD	Be-7	K-40	Co-60	Nb-95	Zr-95	Ru-103	Ru-106	Cs-134	Cs-137	Ce-141	Ce-144
CL-1	01/01/14 - 04/02/14	43 ± 22	< 32	< 3	< 3	< 6	< 3	< 17	< 2	< 2	< 4	< 11
	04/02/14 - 07/02/14	67 ± 17	< 29	< 2	< 3	< 5	< 2	< 17	< 2	< 2	< 4	< 10
	07/02/14 - 10/01/14	75 ± 25	< 38	< 2	< 3	< 8	< 4	< 16	< 3	< 2	< 7	< 11
	10/01/14 - 12/31/14	37 ± 21	23 ± 20	< 2	< 3	< 5	< 3	< 21	< 2	< 2	< 5	< 10
	MEAN	56 ± 37	-	-	-	-	-	-	-	-	-	-
CL-11	01/01/14 - 04/02/14	53 ± 17	< 39	< 3	< 3	< 5	< 3	< 20	< 2	< 2	< 5	< 11
	04/02/14 - 07/02/14	63 ± 20	29 ± 24	< 2	< 4	< 5	< 3	< 24	< 3	< 2	< 4	< 11
	07/02/14 - 10/01/14	64 ± 24	< 46	< 2	< 3	< 6	< 5	< 27	< 3	< 2	< 7	< 12
	10/01/14 - 12/31/14	48 ± 17	< 35	< 1	< 2	< 4	< 3	< 9	< 1	< 2	< 4	< 7
	MEAN	57 ± 16	-	-	-	-	-	-	-	-	-	-
CL-15	01/01/14 - 04/02/14	59 ± 19	< 28	< 3	< 2	< 4	< 3	< 17	< 2	< 2	< 5	< 11
	04/02/14 - 07/02/14	85 ± 18	< 28	< 2	< 3	< 4	< 4	< 22	< 2	< 2	< 4	< 12
	07/02/14 - 10/01/14	71 ± 28	< 47	< 2	< 3	< 5	< 4	< 24	< 3	< 2	< 7	< 11
	10/01/14 - 12/31/14	50 ± 16	< 34	< 2	< 2	< 4	< 3	< 16	< 2	< 2	< 4	< 9
	MEAN	66 ± 30	-	-	-	-	-	-	-	-	-	-
CL-2	01/01/14 - 04/02/14	59 ± 27	< 38	< 3	< 3	< 5	< 3	< 25	< 2	< 2	< 5	< 13
	04/02/14 - 07/02/14	67 ± 28	< 45	< 3	< 3	< 6	< 3	< 21	< 3	< 2	< 4	< 11
	07/02/14 - 10/01/14	70 ± 25	< 37	< 3	< 4	< 6	< 4	< 19	< 3	< 2	< 7	< 11
	10/01/14 - 12/31/14	54 ± 26	< 53	< 4	< 5	< 8	< 6	< 32	< 3	< 4	< 8	< 17
	MEAN	63 ± 14	-	-	-	-	-	-	-	-	-	-
CL-3	01/01/14 - 04/02/14	46 ± 21	< 27	< 2	< 3	< 5	< 3	< 16	< 2	< 2	< 4	< 9
	04/02/14 - 07/02/14	70 ± 21	< 21	< 2	< 2	< 5	< 3	< 20	< 3	< 3	< 4	< 11
	07/02/14 - 10/01/14	79 ± 27	< 66	< 3	< 6	< 10	< 6	< 31	< 4	< 4	< 8	< 14
	10/01/14 - 12/31/14	53 ± 23	< 47	< 3	< 3	< 7	< 4	< 27	< 3	< 2	< 6	< 11
	MEAN	62 ± 30	-	-	-	-	-	-	-	-	-	-
CL-4	01/01/14 - 04/02/14	< 29	< 55	< 3	< 3	< 6	< 3	< 23	< 2	< 2	< 4	< 10
	04/02/14 - 07/02/14	64 ± 33	< 57	< 4	< 4	< 8	< 4	< 30	< 4	< 3	< 4	< 13
	07/02/14 - 10/01/14	60 ± 25	< 54	< 3	< 4	< 6	< 5	< 21	< 2	< 3	< 6	< 10
	10/01/14 - 12/31/14	75 ± 21	< 37	< 2	< 3	< 6	< 3	< 21	< 2	< 2	< 5	< 11
	MEAN	66 ± 15	-	-	-	-	-	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-VI.3 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

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

SITE	COLLECTION PERIOD	Be-7	K-40	Co-60	Nb-95	Zr-95	Ru-103	Ru-106	Cs-134	Cs-137	Ce-141	Ce-144
CL-6	01/01/14 - 04/02/14	51 ± 19	< 36	< 2	< 3	< 6	< 3	< 20	< 2	< 2	< 5	< 13
	04/02/14 - 07/02/14	92 ± 23	< 40	< 3	< 3	< 6	< 3	< 17	< 3	< 2	< 4	< 11
	07/02/14 - 10/01/14	67 ± 41	< 53	< 4	< 6	< 10	< 8	< 37	< 4	< 4	< 12	< 22
	10/01/14 - 12/31/14	45 ± 22	< 63	< 4	< 5	< 8	< 5	< 32	< 3	< 4	< 8	< 18
	MEAN	64 ± 42	-	-	-	-	-	-	-	-	-	-
CL-7	01/01/14 - 04/02/14	63 ± 19	< 28	< 2	< 3	< 4	< 3	< 18	< 3	< 2	< 4	< 11
	04/02/14 - 07/02/14	60 ± 20	< 28	< 2	< 2	< 4	< 3	< 16	< 2	< 2	< 4	< 10
	07/02/14 - 10/01/14	63 ± 24	< 36	< 2	< 4	< 6	< 4	< 21	< 2	< 2	< 6	< 10
	10/01/14 - 12/31/14	< 48	< 45	< 3	< 4	< 8	< 6	< 28	< 4	< 3	< 8	< 15
	MEAN	62 ± 4	-	-	-	-	-	-	-	-	-	-
CL-8	01/01/14 - 04/02/14	64 ± 21	< 32	< 2	< 4	< 6	< 3	< 26	< 2	< 2	< 4	< 10
	04/02/14 - 07/02/14	93 ± 29	< 44	< 4	< 3	< 6	< 5	< 26	< 2	< 3	< 6	< 16
	07/02/14 - 10/01/14	62 ± 17	< 32	< 2	< 3	< 5	< 4	< 15	< 2	< 2	< 6	< 8
	10/01/14 - 12/31/14	49 ± 16	< 26	< 1	< 2	< 3	< 3	< 16	< 2	< 1	< 4	< 7
	MEAN	67 ± 37	-	-	-	-	-	-	-	-	-	-
CL-94	01/01/14 - 04/02/14	44 ± 22	< 35	< 3	< 3	< 4	< 4	< 21	< 3	< 2	< 5	< 10
	04/02/14 - 07/02/14	69 ± 22	< 35	< 2	< 3	< 5	< 3	< 24	< 3	< 2	< 5	< 11
	07/02/14 - 10/01/14	61 ± 22	< 34	< 3	< 3	< 4	< 5	< 14	< 2	< 2	< 6	< 9
	10/01/14 - 12/31/14	74 ± 19	< 57	< 3	< 3	< 6	< 4	< 24	< 3	< 2	< 5	< 11
	MEAN	62 ± 27	-	-	-	-	-	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-VII.1 **CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

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

COLLECTION PERIOD	GROUP I					
	CL-2	CL-3	CL-4	CL-6	CL-15	CL-94
01/01/14 - 01/08/14	< 28	< 28	< 27	< 28	< 14	< 26
01/08/14 - 01/15/14	< 56	< 57	< 56	< 55	< 68	< 66
01/15/14 - 01/22/14	< 62	< 64	< 61	< 63	< 60	< 32
01/22/14 - 01/29/14	< 64	< 61	< 63	< 63	< 64	< 66
01/29/14 - 02/05/14	< 34	< 34	< 33	< 34	< 33	< 33
02/05/14 - 02/12/14	< 62	< 50	< 49	< 50	< 64	< 66
02/12/14 - 02/19/14	< 70	< 23	< 60	< 59	< 53	< 52
02/19/14 - 02/26/14	< 55	< 56	< 55	< 56	< 57	< 55
02/26/14 - 03/05/14	< 56	< 44	< 17	< 44	< 41	< 41
03/05/14 - 03/12/14	< 45	< 44	< 45	< 45	< 61	< 59
03/12/14 - 03/19/14	< 59	< 58	< 57	< 22	< 60	< 58
03/19/14 - 03/26/14	< 67	< 64	< 66	< 68	< 59	< 59
03/26/14 - 04/02/14	< 61	< 62	< 60	< 60	< 47	< 48
04/02/14 - 04/09/14	< 39	< 38	< 38	< 39	< 44	< 42
04/09/14 - 04/16/14	< 68	< 68	< 70	< 67	< 49	< 48
04/16/14 - 04/23/14	< 39	< 38	< 39	< 39	< 38	< 38
04/23/14 - 04/30/14	< 28	< 28	< 29	< 30	< 29	< 28
04/30/14 - 05/07/14	< 37	< 38	< 36	< 37	< 53	< 50
05/07/14 - 05/14/14	< 33	< 33	< 32	< 32	< 12	< 29
05/14/14 - 05/21/14	< 65	< 64	< 65	< 65	< 67	< 65
05/21/14 - 05/28/14	< 42	< 44	< 42	< 42	< 39	< 37
05/28/14 - 06/04/14	< 43	< 44	< 43	< 43	< 44	< 45
06/04/14 - 06/11/14	< 28	< 27	< 27	< 28	< 26	< 26
06/11/14 - 06/18/14	< 40	< 40	< 33	< 34	< 47	< 47
06/18/14 - 06/25/14	< 42	< 44	< 15	< 41	< 42	< 41
06/25/14 - 07/02/14	< 29	< 29	< 29	< 30	< 30	< 30
07/02/14 - 07/09/14	< 65	< 65	< 64	< 25	< 64	< 26
07/09/14 - 07/16/14	< 27	< 27	< 27	< 15	< 27	< 11
07/16/14 - 07/23/14	< 69	< 69	< 69	< 69	< 60	< 60
07/23/14 - 07/30/14	< 46	< 47	< 46	< 46	< 44	< 42
07/30/14 - 08/06/14	< 29	< 29	< 29	< 11	< 46	< 47
08/06/14 - 08/13/14	< 56	< 57	< 56	< 22	< 45	< 19
08/13/14 - 08/20/14	< 24	< 24	< 24	< 12	< 19	< 18
08/20/14 - 08/27/14	< 60	< 61	< 59	< 59	< 68	< 69
08/27/14 - 09/03/14	< 62	< 63	< 61	< 33	< 17	< 46
09/03/14 - 09/10/14	< 42	< 43	< 41	< 16	< 45	< 44
09/10/14 - 09/17/14	< 57	< 56	< 56	< 57	< 56	< 23
09/17/14 - 09/24/14	< 52	< 52	< 49	< 52	< 57	< 54
09/24/14 - 10/01/14	< 44	< 44	< 43	< 44	< 34	< 40
10/01/14 - 10/08/14	< 55	< 54	< 52	< 55	< 58	< 60
10/08/14 - 10/15/14	< 23	< 61	< 58	< 60	< 49	< 50
10/15/14 - 10/22/14	< 37	< 36	< 37	< 35	< 52	< 53
10/22/14 - 10/29/14	< 63	< 25	< 64	< 65	< 52	< 49
10/29/14 - 11/05/14	< 38	< 38	< 36	< 16	< 44	< 45
11/05/14 - 11/12/14	< 58	< 61	< 21	< 56	< 68	< 67
11/12/14 - 11/19/14	< 41	< 41	< 41	< 41	< 30	< 30
11/19/14 - 11/26/14	< 31	< 30 (1)	< 30	< 31	< 30	< 30
11/26/14 - 12/03/14	< 52	< 51	< 51	< 52	< 50	< 50
12/03/14 - 12/10/14	< 41	< 41	< 41	< 16	< 40	< 40
12/10/14 - 12/17/14	< 61	< 62	< 61	< 60	< 69	< 66
12/17/14 - 12/24/14	< 34	< 34	< 34	< 34	< 18	< 18
12/24/14 - 12/31/14	< 46	< 43	< 45	< 19	< 52	< 50
MEAN	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VII.1 **CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

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

COLLECTION PERIOD	GROUP II			GROUP III
	CL-1	CL-7	CL-8	CL-11
01/01/14 - 01/08/14	< 11	< 26	< 26	< 27
01/08/14 - 01/15/14	< 33	< 34	< 65	< 64
01/15/14 - 01/22/14	< 26	< 60	< 61	< 58
01/22/14 - 01/29/14	< 25	< 35	< 65	< 64
01/29/14 - 02/05/14	< 13	< 18	< 32	< 33
02/05/14 - 02/12/14	< 19	< 27	< 64	< 64
02/12/14 - 02/19/14	< 60	< 28	< 51	< 54
02/19/14 - 02/26/14	< 22	< 23	< 55	< 57
02/26/14 - 03/05/14	< 44	< 17	< 40	< 46
03/05/14 - 03/12/14	< 27	< 31	< 61	< 59
03/12/14 - 03/19/14	< 58	< 31	< 58	< 57
03/19/14 - 03/26/14	< 25	< 24	< 57	< 57
03/26/14 - 04/02/14	< 33	< 20	< 49	< 48
04/02/14 - 04/09/14	< 15	< 18	< 42	< 42
04/09/14 - 04/16/14	< 27	< 48	< 20	< 47
04/16/14 - 04/23/14	< 16	< 20	< 38	< 37
04/23/14 - 04/30/14	< 11	< 28	< 30	< 12
04/30/14 - 05/07/14	< 14	< 22	< 51	< 51
05/07/14 - 05/14/14	< 13	< 29	< 29	< 29
05/14/14 - 05/21/14	< 24	< 27	< 66	< 63
05/21/14 - 05/28/14	< 25	< 22	< 37	< 37
05/28/14 - 06/04/14	< 18	< 18	< 45	< 42
06/04/14 - 06/11/14	< 12	< 9	< 26	< 26
06/11/14 - 06/18/14	< 13	< 19	< 48	< 47
06/18/14 - 06/25/14	< 40	< 17	< 42	< 42
06/25/14 - 07/02/14	< 12	< 11	< 30	< 30
07/02/14 - 07/09/14	< 65	< 62	< 63	< 62
07/09/14 - 07/16/14	< 27	< 27	< 27	< 27
07/16/14 - 07/23/14	< 29	< 22	< 60	< 60
07/23/14 - 07/30/14	< 25	< 16	< 43	< 42
07/30/14 - 08/06/14	< 29	< 47	< 25	< 46
08/06/14 - 08/13/14	< 56	< 44	< 44	< 44
08/13/14 - 08/20/14	< 25	< 18	< 18	< 10
08/20/14 - 08/27/14	< 23	< 29	< 69	< 68
08/27/14 - 09/03/14	< 62	< 45	< 45	< 45
09/03/14 - 09/10/14	< 43	< 24	< 44	< 44
09/10/14 - 09/17/14	< 31	< 57	< 58	< 57
09/17/14 - 09/24/14	< 20	< 23	< 54	< 55
09/24/14 - 10/01/14	< 18	< 12	< 41	< 35
10/01/14 - 10/08/14	< 29	< 23	< 59	< 58
10/08/14 - 10/15/14	< 58	< 21	< 50	< 50
10/15/14 - 10/22/14	< 14	< 22	< 54	< 52
10/22/14 - 10/29/14	< 64	< 21	< 49	< 50
10/29/14 - 11/05/14	< 36	< 25	< 45	< 45
11/05/14 - 11/12/14	< 56	< 29	< 67	< 68
11/12/14 - 11/19/14	< 17	< 17	< 31	< 31
11/19/14 - 11/26/14	< 31	< 13	< 30	< 30
11/26/14 - 12/03/14	< 20	< 21	< 50	< 51
12/03/14 - 12/10/14	< 17	< 41	< 40	< 41
12/10/14 - 12/17/14	< 27	< 34	< 67	< 69
12/17/14 - 12/24/14	< 13	< 7	< 18	< 18
12/24/14 - 12/31/14	< 44	< 51	< 22	< 49
MEAN	-	-	-	-

Table C-VIII.1 **CONCENTRATIONS OF I-131 IN MILK SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CONTROL FARM CL-116
01/19/14	< 0.6
02/26/14	< 0.6
03/26/14	< 0.6
04/30/14	< 0.8
05/14/14	< 0.8
05/28/14	< 0.7
06/11/14	< 0.8
06/25/14	< 0.6
07/09/14	< 0.6
07/23/14	< 0.7
08/06/14	< 0.6
08/20/14	< 0.7
09/03/14	< 0.8
09/17/14	< 0.5
10/01/14	< 0.6
10/15/14	< 0.6
10/29/14	< 0.5
11/26/14	< 0.4
12/31/14	< 0.5
MEAN	-

Table C-VIII.2 **CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-116	01/19/14	< 49	1177 ± 121	< 4	< 5	< 14	< 6	< 9	< 6	< 9	< 4	< 5	< 57	< 15	< 36
	02/26/14	< 62	1224 ± 165	< 6	< 6	< 14	< 9	< 13	< 7	< 10	< 6	< 7	< 29	< 10	< 49
	03/26/14	< 44	1226 ± 104	< 4	< 5	< 11	< 4	< 12	< 5	< 8	< 5	< 5	< 31	< 9	< 38
	04/30/14	< 65	1122 ± 168	< 8	< 7	< 20	< 9	< 19	< 8	< 18	< 6	< 7	< 40	< 12	< 48
	05/14/14	< 51	1034 ± 136	< 6	< 7	< 15	< 6	< 15	< 7	< 11	< 6	< 7	< 27	< 8	< 36
	05/28/14	< 56	1287 ± 159	< 6	< 6	< 12	< 7	< 15	< 7	< 12	< 6	< 8	< 30	< 10	< 47
	06/11/14	< 65	1184 ± 171	< 8	< 8	< 17	< 9	< 20	< 8	< 14	< 7	< 8	< 41	< 10	< 57
	06/25/14	< 39	1227 ± 121	< 5	< 4	< 10	< 5	< 12	< 5	< 8	< 4	< 5	< 22	< 7	< 36
	07/09/14	< 48	1177 ± 118	< 5	< 5	< 13	< 5	< 13	< 5	< 8	< 5	< 6	< 28	< 7	< 45
	07/23/14	< 57	1240 ± 144	< 7	< 7	< 15	< 7	< 16	< 7	< 12	< 6	< 7	< 28	< 11	< 37
	08/06/14	< 45	1244 ± 155	< 5	< 5	< 14	< 7	< 14	< 6	< 9	< 6	< 7	< 32	< 8	< 46
	08/20/14	< 55	1099 ± 142	< 6	< 7	< 14	< 7	< 13	< 7	< 11	< 6	< 7	< 35	< 9	< 35
	09/03/14	< 42	1208 ± 98	< 5	< 5	< 11	< 5	< 10	< 5	< 9	< 4	< 5	< 33	< 10	< 39
	09/17/14	< 69	1266 ± 179	< 7	< 9	< 15	< 8	< 18	< 8	< 13	< 6	< 9	< 38	< 10	< 44
	10/01/14	< 56	1127 ± 140	< 6	< 7	< 18	< 7	< 14	< 7	< 11	< 5	< 6	< 42	< 11	< 31
	10/15/14	< 43	1242 ± 107	< 4	< 5	< 11	< 5	< 10	< 5	< 8	< 4	< 4	< 39	< 12	< 31
	10/29/14	< 60	1273 ± 192	< 7	< 7	< 20	< 10	< 20	< 8	< 14	< 7	< 7	< 38	< 14	< 53
	11/26/14	< 55	1294 ± 128	< 6	< 6	< 19	< 7	< 16	< 7	< 12	< 6	< 6	< 39	< 12	< 31
	12/31/14	< 45	1148 ± 123	< 7	< 6	< 14	< 7	< 15	< 6	< 12	< 6	< 6	< 28	< 9	< 32
	MEAN	-	1200 ± 139	-	-	-	-	-	-	-	-	-	-	-	-

Table C-IX.1

CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD		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	Ce-144
CL-114	06/25/14	Cabbage	344 ± 134	4166 ± 514	< 17	< 19	< 37	< 19	< 42	< 19	< 29	< 28	< 15	< 16	< 91	< 29	< 110
	06/25/14	Lettuce	498 ± 157	5928 ± 540	< 20	< 20	< 40	< 21	< 49	< 24	< 33	< 38	< 22	< 24	< 104	< 27	< 163
	06/25/14	Swiss Chard	253 ± 126	5181 ± 537	< 20	< 16	< 49	< 22	< 60	< 21	< 41	< 33	< 19	< 24	< 98	< 32	< 105
	07/30/14	Cabbage	< 152	3581 ± 393	< 18	< 18	< 42	< 18	< 41	< 19	< 28	< 50	< 14	< 16	< 112	< 38	< 108
	07/30/14	Kale	< 148	3716 ± 389	< 14	< 12	< 35	< 15	< 31	< 15	< 29	< 42	< 13	< 14	< 110	< 27	< 89
	07/30/14	Swiss Chard	467 ± 171	6411 ± 473	< 16	< 18	< 48	< 16	< 40	< 20	< 31	< 47	< 14	< 15	< 115	< 29	< 107
	08/27/14	Cabbage	322 ± 126	4782 ± 367	< 16	< 17	< 43	< 14	< 37	< 16	< 31	< 48	< 14	< 17	< 100	< 33	< 75
	08/27/14	Substituted velvet leaf (1)	751 ± 187	8465 ± 395	< 17	< 17	< 38	< 18	< 37	< 19	< 33	< 59	< 17	< 17	< 125	< 31	< 126
	08/27/14	Swiss Chard	433 ± 131	4585 ± 390	< 14	< 18	< 36	< 14	< 29	< 16	< 28	< 42	< 11	< 15	< 116	< 20	< 94
	09/24/14	Kale	205 ± 131	5373 ± 330	< 11	< 13	< 32	< 10	< 29	< 13	< 24	< 48	< 11	< 12	< 115	< 30	< 79
	09/24/14	Substituted Bean Greens (1)	922 ± 76	7159 ± 171	< 6	< 6	< 15	< 5	< 13	< 7	< 10	< 31	< 5	< 5	< 54	< 12	< 46
	09/24/14	Swiss chard	444 ± 115	5627 ± 331	< 10	< 11	< 31	< 9	< 29	< 11	< 22	< 57	< 10	< 11	< 93	< 26	< 83
	MEAN		464 ± 443	5415 ± 2867	-	-	-	-	-	-	-	-	-	-	-	-	-
CL-115	06/25/14	Cabbage	< 284	3307 ± 466	< 21	< 20	< 42	< 23	< 44	< 19	< 34	< 43	< 21	< 23	< 113	< 32	< 165
	06/25/14	Kale	< 252	4715 ± 541	< 27	< 23	< 52	< 22	< 49	< 22	< 40	< 49	< 22	< 22	< 96	< 38	< 198
	06/25/14	Lettuce	412 ± 209	4538 ± 538	< 19	< 20	< 45	< 26	< 50	< 23	< 43	< 42	< 24	< 26	< 118	< 23	< 164
	07/30/14	Cabbage	< 183	6378 ± 512	< 20	< 18	< 47	< 17	< 39	< 21	< 34	< 58	< 16	< 21	< 125	< 39	< 130
	07/30/14	Kale	318 ± 199	5562 ± 521	< 19	< 16	< 36	< 19	< 38	< 15	< 27	< 55	< 14	< 17	< 106	< 36	< 102
	07/30/14	Lettuce	391 ± 173	4492 ± 523	< 15	< 20	< 42	< 16	< 49	< 21	< 37	< 54	< 15	< 22	< 133	< 37	< 102
	08/27/14	Kale	462 ± 85	5710 ± 203	< 7	< 8	< 19	< 8	< 18	< 8	< 15	< 28	< 7	< 8	< 58	< 15	< 46
	08/27/14	Swiss Chard	413 ± 118	5420 ± 413	< 13	< 17	< 43	< 13	< 32	< 18	< 23	< 54	< 13	< 15	< 110	< 27	< 107
	08/27/14	Lettuce	732 ± 167	6417 ± 369	< 10	< 11	< 22	< 9	< 22	< 11	< 20	< 42	< 11	< 10	< 81	< 19	< 72
	09/24/14	Kale/Nightshade (comp) (1)	1307 ± 128	5896 ± 270	< 11	< 12	< 28	< 12	< 27	< 12	< 21	< 37	< 10	< 11	< 79	< 21	< 54
	09/24/14	Substituted Bean Greens (1)	1656 ± 92	4572 ± 170	< 7	< 9	< 20	< 7	< 18	< 8	< 15	< 43	< 7	< 7	< 73	< 16	< 57
	09/24/14	Swiss Chard	572 ± 71	6332 ± 181	< 6	< 7	< 17	< 6	< 15	< 7	< 12	< 30	< 5	< 6	< 54	< 13	< 40
	MEAN		696 ± 939	5278 ± 1921	-	-	-	-	-	-	-	-	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES
(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-IX.1

CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD		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	Ce-144
CL-117	06/25/14	Cabbage	< 288	3120 ± 550	< 22	< 20	< 57	< 33	< 66	< 24	< 39	< 46	< 22	< 27	< 116	< 25	< 180
	06/25/14	Lettuce	274 ± 178	3535 ± 483	< 20	< 23	< 48	< 21	< 56	< 20	< 34	< 37	< 19	< 22	< 94	< 31	< 135
	06/25/14	Swiss Chard	402 ± 202	7511 ± 735	< 30	< 25	< 74	< 31	< 71	< 27	< 51	< 43	< 26	< 25	< 130	< 40	< 124
	07/30/14	Cabbage	402 ± 160	3464 ± 398	< 16	< 18	< 39	< 21	< 37	< 18	< 27	< 57	< 15	< 17	< 122	< 31	< 118
	07/30/14	Lettuce	542 ± 229	4054 ± 429	< 11	< 10	< 22	< 10	< 26	< 13	< 23	< 50	< 12	< 11	< 80	< 30	< 100
	07/30/14	Swiss Chard	360 ± 127	5544 ± 424	< 13	< 15	< 38	< 12	< 36	< 14	< 24	< 50	< 13	< 15	< 93	< 23	< 98
	08/27/14	Cabbage	341 ± 157	4584 ± 295	< 12	< 15	< 32	< 12	< 28	< 15	< 25	< 58	< 12	< 14	< 113	< 24	< 185
	08/27/14	Swiss Chard	364 ± 124	5313 ± 405	< 14	< 14	< 38	< 15	< 38	< 16	< 27	< 54	< 12	< 14	< 119	< 36	< 93
	08/27/14	Kale	659 ± 93	5554 ± 235	< 11	< 11	< 29	< 12	< 25	< 12	< 21	< 38	< 10	< 11	< 83	< 24	< 48
	09/24/14	Kale	551 ± 80	4001 ± 152	< 6	< 7	< 17	< 6	< 14	< 7	< 12	< 36	< 6	< 6	< 60	< 16	< 46
	09/24/14	Substituted Marigolds	(1) 1512 ± 99	6787 ± 218	< 8	< 9	< 21	< 8	< 19	< 10	< 16	< 28	< 8	< 8	< 61	< 15	< 56
	09/24/14	Swiss Chard	369 ± 112	6185 ± 285	< 10	< 10	< 28	< 10	< 24	< 12	< 19	< 51	< 8	< 9	< 93	< 21	< 73
	MEAN		525 ± 692	4971 ± 2809	-	-	-	-	-	-	-	-	-	-	-	-	-
CL-118	06/25/14	Cabbage	156 ± 110	2879 ± 336	< 16	< 16	< 31	< 15	< 32	< 16	< 27	< 29	< 15	< 16	< 72	< 22	< 122
	06/25/14	Lettuce	512 ± 167	5979 ± 506	< 19	< 16	< 41	< 18	< 45	< 19	< 33	< 36	< 17	< 21	< 97	< 21	< 140
	06/25/14	Swiss Chard	435 ± 169	8897 ± 740	< 20	< 25	< 69	< 25	< 70	< 26	< 48	< 42	< 20	< 26	< 115	< 32	< 114
	07/30/14	Cabbage	< 173	2725 ± 374	< 17	< 17	< 45	< 11	< 40	< 19	< 35	< 54	< 16	< 19	< 117	< 36	< 107
	07/30/14	Lettuce	374 ± 170	5844 ± 427	< 16	< 18	< 45	< 15	< 35	< 18	< 32	< 60	< 16	< 17	< 124	< 26	< 110
	07/30/14	Swiss Chard	528 ± 220	8239 ± 547	< 15	< 17	< 48	< 14	< 37	< 19	< 28	< 55	< 13	< 14	< 115	< 17	< 107
	08/27/14	Cabbage	< 136	3296 ± 353	< 17	< 17	< 36	< 17	< 35	< 17	< 32	< 59	< 13	< 14	< 120	< 39	< 96
	08/27/14	Kale	324 ± 124	3496 ± 328	< 16	< 14	< 39	< 13	< 33	< 15	< 23	< 45	< 12	< 13	< 101	< 23	< 61
	08/27/14	Swiss Chard	347 ± 134	5114 ± 413	< 16	< 16	< 41	< 17	< 38	< 20	< 29	< 56	< 15	< 17	< 135	< 32	< 122
	09/24/14	Cabbage	706 ± 57	3953 ± 123	< 5	< 6	< 14	< 5	< 12	< 6	< 10	< 25	< 5	< 5	< 47	< 14	< 32
	09/24/14	Kale	569 ± 82	4615 ± 153	< 6	< 6	< 15	< 6	< 14	< 6	< 11	< 31	< 5	< 6	< 54	< 16	< 38
	09/24/14	Swiss Chard	409 ± 107	7161 ± 372	< 9	< 12	< 32	< 11	< 25	< 12	< 21	< 58	< 8	< 12	< 90	< 22	< 83
	MEAN		436 ± 304	5183 ± 4165	-	-	-	-	-	-	-	-	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES
(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-IX.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GRASS SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	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	Ce-144
CL-01	05/14/14	891 ± 351	5305 ± 613	< 28	< 25	< 57	< 30	< 50	< 28	< 51	< 45	< 27	< 29	< 123	< 32	< 230
	05/28/14	1903 ± 281	4921 ± 546	< 25	< 24	< 56	< 24	< 62	< 27	< 42	< 39	< 20	< 24	< 114	< 38	< 164
	06/11/14	1226 ± 226	3934 ± 542	< 25	< 22	< 55	< 25	< 62	< 25	< 45	< 50	< 24	< 31	< 152	< 33	< 183
	06/25/14	841 ± 228	5120 ± 554	< 23	< 25	< 53	< 27	< 58	< 26	< 48	< 39	< 25	< 26	< 124	< 37	< 173
	07/09/14	756 ± 265	6482 ± 599	< 12	< 16	< 52	< 14	< 38	< 12	< 24	< 46	< 13	< 15	< 118	< 17	< 64
	07/23/14	2728 ± 352	5885 ± 658	< 28	< 31	< 55	< 24	< 56	< 28	< 45	< 51	< 27	< 29	< 138	< 38	< 189
	08/06/14	734 ± 175	4972 ± 507	< 18	< 22	< 48	< 17	< 39	< 22	< 33	< 42	< 17	< 18	< 122	< 35	< 90
	08/20/14	693 ± 71	4901 ± 157	< 5	< 7	< 17	< 6	< 13	< 7	< 11	< 41	< 5	< 6	< 66	< 17	< 34
	09/03/14	1559 ± 180	4255 ± 317	< 15	< 16	< 39	< 15	< 38	< 19	< 29	< 49	< 14	< 15	< 118	< 34	< 97
	09/17/14	3124 ± 268	4548 ± 428	< 14	< 14	< 42	< 15	< 38	< 18	< 31	< 55	< 13	< 14	< 107	< 34	< 125
	10/01/14	914 ± 238	6400 ± 518	< 16	< 13	< 37	< 12	< 26	< 13	< 25	< 59	< 13	< 13	< 108	< 19	< 114
	10/15/14	3330 ± 231	3332 ± 317	< 13	< 13	< 34	< 12	< 29	< 17	< 23	< 56	< 13	< 13	< 111	< 34	< 94
	10/29/14	3177 ± 205	6086 ± 364	< 14	< 16	< 37	< 14	< 36	< 17	< 27	< 54	< 13	< 15	< 112	< 27	< 87
	MEAN	1683 ± 2086	5088 ± 1899	-	-	-	-	-	-	-	-	-	-	-	-	-
CL-02	05/14/14	2427 ± 296	6051 ± 549	< 19	< 20	< 48	< 20	< 44	< 20	< 38	< 31	< 19	< 21	< 97	< 26	< 149
	05/28/14	1265 ± 386	4519 ± 741	< 30	< 37	< 82	< 36	< 72	< 30	< 51	< 47	< 29	< 28	< 151	< 37	< 161
	06/11/14	903 ± 355	3900 ± 609	< 34	< 38	< 75	< 39	< 72	< 34	< 58	< 58	< 30	< 35	< 160	< 42	< 141
	06/25/14	518 ± 193	6311 ± 526	< 22	< 20	< 49	< 21	< 48	< 21	< 38	< 35	< 21	< 23	< 88	< 20	< 157
	07/09/14	2108 ± 223	4174 ± 327	< 17	< 17	< 39	< 17	< 34	< 18	< 33	< 58	< 16	< 17	< 117	< 35	< 103
	07/23/14	2652 ± 362	6584 ± 740	< 31	< 26	< 70	< 28	< 82	< 29	< 56	< 48	< 28	< 34	< 146	< 37	< 170
	08/06/14	2374 ± 261	4971 ± 443	< 18	< 19	< 39	< 16	< 40	< 21	< 30	< 47	< 17	< 18	< 113	< 36	< 141
	08/20/14	1905 ± 111	4959 ± 193	< 7	< 8	< 22	< 7	< 17	< 8	< 15	< 50	< 6	< 7	< 83	< 25	< 33
	09/03/14	3980 ± 293	6212 ± 413	< 14	< 15	< 37	< 15	< 34	< 16	< 30	< 49	< 14	< 16	< 104	< 25	< 89
	09/17/14	3211 ± 224	5155 ± 318	< 11	< 14	< 34	< 12	< 30	< 16	< 24	< 52	< 13	< 14	< 95	< 22	< 115
	10/01/14	2712 ± 298	6034 ± 449	< 13	< 16	< 34	< 18	< 30	< 17	< 30	< 51	< 14	< 13	< 115	< 26	< 102
	10/15/14	3834 ± 286	2380 ± 295	< 15	< 15	< 36	< 14	< 29	< 18	< 29	< 57	< 13	< 14	< 120	< 34	< 97
	10/29/14	5198 ± 236	6385 ± 350	< 13	< 15	< 31	< 13	< 31	< 15	< 27	< 54	< 13	< 14	< 103	< 26	< 106
	MEAN	2545 ± 2603	5203 ± 2468	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-IX.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GRASS SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	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	Ce-144
CL-08	05/14/14	406 ± 241	6892 ± 620	< 25	< 28	< 55	< 24	< 60	< 24	< 47	< 36	< 25	< 26	< 133	< 29	< 182
	05/28/14	493 ± 316	6005 ± 886	< 34	< 34	< 73	< 27	< 73	< 36	< 55	< 57	< 30	< 38	< 158	< 51	< 201
	06/11/14	1148 ± 318	5597 ± 623	< 27	< 28	< 56	< 31	< 62	< 33	< 44	< 55	< 26	< 27	< 117	< 35	< 197
	06/25/14	1568 ± 305	6423 ± 499	< 9	< 8	< 19	< 23	< 29	< 10	< 18	< 24	< 11	< 13	< 64	< 11	< 108
	07/09/14	2207 ± 226	6044 ± 419	< 16	< 14	< 39	< 16	< 32	< 19	< 33	< 59	< 17	< 15	< 125	< 23	< 125
	07/23/14	2378 ± 327	7579 ± 701	< 32	< 28	< 62	< 35	< 58	< 32	< 54	< 52	< 31	< 31	< 140	< 42	< 206
	08/06/14	1933 ± 252	5612 ± 478	< 18	< 21	< 53	< 18	< 45	< 23	< 38	< 51	< 20	< 18	< 102	< 37	< 124
	08/20/14	371 ± 70	6190 ± 177	< 7	< 8	< 20	< 7	< 17	< 8	< 14	< 51	< 7	< 7	< 81	< 22	< 43
	09/03/14	1711 ± 205	7045 ± 405	< 16	< 18	< 39	< 18	< 40	< 19	< 30	< 59	< 15	< 17	< 107	< 24	< 124
	09/17/14	2929 ± 260	5926 ± 454	< 17	< 20	< 44	< 20	< 45	< 20	< 36	< 60	< 15	< 21	< 128	< 31	< 126
	10/01/14	2593 ± 294	6192 ± 493	< 14	< 14	< 33	< 16	< 34	< 17	< 25	< 60	< 12	< 16	< 111	< 29	< 98
	10/15/14	1878 ± 229	5212 ± 389	< 17	< 20	< 47	< 19	< 45	< 21	< 31	< 58	< 15	< 16	< 125	< 36	< 79
	10/29/14	1693 ± 229	8596 ± 470	< 16	< 17	< 51	< 18	< 43	< 17	< 31	< 57	< 15	< 17	< 126	< 34	< 102
	MEAN	1639 ± 1662	6409 ± 1839	-	-	-	-	-	-	-	-	-	-	-	-	-
CL-116	05/14/14	699 ± 363	5693 ± 848	< 36	< 38	< 83	< 40	< 98	< 37	< 72	< 58	< 38	< 41	< 170	< 16	< 177
	05/28/14	1144 ± 241	4129 ± 524	< 18	< 18	< 51	< 19	< 29	< 25	< 33	< 39	< 22	< 21	< 93	< 24	< 135
	06/11/14	500 ± 221	4713 ± 675	< 28	< 27	< 62	< 33	< 70	< 26	< 49	< 40	< 27	< 31	< 121	< 27	< 163
	06/25/14	1134 ± 332	5343 ± 546	< 28	< 31	< 65	< 30	< 69	< 30	< 56	< 55	< 33	< 31	< 144	< 36	< 250
	07/09/14	1938 ± 200	5948 ± 374	< 16	< 17	< 37	< 16	< 36	< 18	< 32	< 59	< 15	< 15	< 124	< 36	< 120
	07/23/14	1483 ± 293	6405 ± 778	< 28	< 29	< 69	< 27	< 65	< 24	< 50	< 46	< 26	< 28	< 125	< 57	< 163
	08/06/14	1067 ± 200	5173 ± 499	< 20	< 22	< 47	< 21	< 53	< 24	< 35	< 56	< 18	< 22	< 121	< 26	< 125
	08/20/14	1307 ± 81	6020 ± 171	< 7	< 9	< 21	< 7	< 17	< 8	< 15	< 55	< 7	< 7	< 88	< 20	< 56
	09/03/14	1222 ± 157	4400 ± 339	< 14	< 14	< 38	< 13	< 36	< 16	< 28	< 45	< 13	< 14	< 103	< 29	< 72
	09/17/14	3059 ± 282	4754 ± 461	< 18	< 19	< 46	< 18	< 37	< 21	< 31	< 59	< 17	< 16	< 100	< 38	< 118
	10/01/14	1398 ± 276	6425 ± 587	< 16	< 21	< 46	< 16	< 31	< 16	< 26	< 54	< 14	< 16	< 104	< 28	< 93
	10/15/14	2597 ± 222	4382 ± 419	< 15	< 15	< 42	< 16	< 33	< 17	< 33	< 60	< 14	< 16	< 123	< 36	< 106
	10/29/14	4173 ± 209	5901 ± 302	< 12	< 13	< 30	< 14	< 27	< 14	< 24	< 48	< 12	< 13	< 95	< 26	< 88
	MEAN	1671 ± 2066	5330 ± 1593	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-X.1 QUARTERLY DLR RESULTS FOR CLINTON POWER STATION, 2014

RESULTS IN UNITS OF MILLIREM/QUARTER ± 2 STANDARD DEVIATIONS

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
CL-01	22.0 ± 1.7	21.2	21.5	22.2	23.1
CL-02	22.7 ± 1.5	22.1	22.3	22.5	23.8
CL-03	21.8 ± 2.7	20.9	20.9	21.7	23.8
CL-04	21.8 ± 1.9	20.8	22.0	21.4	23.0
CL-05	23.0 ± 3.5	21.3	23.2	22.0	25.3
CL-06	19.7 ± 2.0	18.3	19.9	19.9	20.7
CL-07	21.0 ± 2.4	20.0	20.7	20.5	22.7
CL-08	21.9 ± 2.9	20.1	21.8	22.0	23.6
CL-11	21.0 ± 0.8	20.6	20.7	21.0	21.5
CL-15	20.0 ± 2.1	19.0	19.4	20.2	21.4
CL-22	23.1 ± 3.0	21.8	23.1	22.4	25.2
CL-23	24.4 ± 3.3	22.7	23.2	25.7	25.9
CL-24	23.8 ± 2.0	22.4	23.8	24.1	24.8
CL-33	22.7 ± 2.4	21.5	22.7	22.2	24.3
CL-34	23.0 ± 2.6	21.3	23.2	23.0	24.5
CL-35	21.4 ± 2.9	19.9	21.1	21.0	23.4
CL-36	21.9 ± 3.2	20.1	21.8	21.6	24.0
CL-37	21.1 ± 4.1	18.4	21.7	21.0	23.3
CL-41	23.6 ± 3.7	21.4	23.3	23.7	25.9
CL-42	22.1 ± 3.9	19.6	22.8	21.8	24.2
CL-43	23.7 ± 2.1	22.8	23.3	23.5	25.2
CL-44	22.4 ± 4.4	19.9	22.2	22.0	25.3
CL-45	22.8 ± 5.6	19.4	22.6	23.0	26.2
CL-46	23.1 ± 3.6	20.5	23.5	23.9	24.5
CL-47	23.2 ± 4.3	20.4	23.4	23.2	25.7
CL-48	21.5 ± 5.8	17.3	22.1	22.4	24.1
CL-49	23.1 ± 3.7	20.6	24.1	22.7	24.8
CL-51	24.1 ± 3.0	22.8	24.0	23.3	26.2
CL-52	24.0 ± 5.0	22.0	23.3	(1)	26.8
CL-53	20.8 ± 1.8	20.0	21.3	20.0	21.8
CL-54	22.9 ± 5.0	19.9	23.0	22.8	26.0
CL-55	23.1 ± 3.7	20.6	25.0	23.0	23.7
CL-56	23.6 ± 3.4	21.1	24.1	24.3	24.8
CL-57	23.6 ± 2.1	22.4	24.0	23.0	24.8
CL-58	22.9 ± 4.5	21.2	23.1	21.3	26.0
CL-60	22.7 ± 2.4	22.3	23.0	21.4	24.2
CL-61	23.2 ± 2.9	21.7	23.8	22.4	24.9
CL-63	20.2 ± 3.6	18.1	20.3	19.8	22.5
CL-64	22.8 ± 1.6	23.3	21.9	22.3	23.6
CL-65	23.9 ± 3.9	21.9	23.1	24.2	26.5
CL-74	20.7 ± 1.8	20.0	20.6	20.2	22.0
CL-75	22.5 ± 4.3	20.1	22.0	22.4	25.3
CL-76	22.8 ± 4.9	19.9	24.2	21.7	25.4
CL-77	21.1 ± 2.7	19.3	22.1	20.7	22.1
CL-78	21.5 ± 3.0	20.2	21.2	20.9	23.6
CL-79	22.5 ± 4.2	20.2	22.0	22.4	25.3
CL-80	22.5 ± 4.0	19.8	23.6	22.4	24.3
CL-81	23.0 ± 2.4	21.6	22.9	22.8	24.5
CL-84	22.5 ± 4.9	19.7	22.6	22.0	25.6
CL-90	19.2 ± 2.6	18.5	18.6	18.6	21.2
CL-91	21.3 ± 1.6	20.6	20.7	21.9	22.1
CL-97	23.1 ± 2.8	22.0	23.1	22.1	25.0
CL-99	18.2 ± 2.2	17.6	17.7	17.5	19.8
CL-114	21.5 ± 3.1	20.5	21.1	20.7	23.8

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-X.2 MEAN QUARTLY DLR RESULTS FOR THE INNER RING, OUTER RING, SPECIAL INTEREST, SUPPLEMENTAL AND CONTROL LOCATIONS FOR CLINTON POWER STATION, 2014

RESULTS IN UNITS OF MILLIREM/QUARTER ± 2 STANDARD DEVIATIONS OF THE STATION DATA

COLLECTION PERIOD	INNER RING ± 2 S.D.	OUTER RING	SPECIAL INTEREST	SUPPLEMENTAL	CONTROL
JAN-MAR	20.5 ± 3.1	20.9 ± 2.2	20.8 ± 3.1	20.1 ± 2.7	20.6 ± 0.0
APR-JUN	22.6 ± 2.0	23.2 ± 2.1	22.4 ± 2.4	21.0 ± 3.2	20.7 ± 0.0
JUL-SEP	22.6 ± 2.7	22.2 ± 2.3	22.4 ± 2.8	20.9 ± 3.0	21.0 ± 0.0
OCT-DEC	24.6 ± 2.1	24.7 ± 2.8	24.5 ± 3.2	22.9 ± 3.4	21.5 ± 0.0

TABLE C-X.3 SUMMARY OF THE AMBIENT DOSIMETRY PROGRAM FOR CLINTON POWER STATION, 2014

RESULTS IN UNITS OF MILLIREM/QUARTER ± 2 STANDARD DEVIATION

LOCATION	SAMPLES ANALYZED	PERIOD MINIMUM	PERIOD MAXIMUM	PERIOD MEAN ± 2 S.D.	PRE-OP MEAN ± 2 S.D., ALL LOCATIONS
INNER RING	64	17.3	26.2	22.6 ± 3.8	
OUTER RING	63	19.3	26.8	22.7 ± 3.6	18.0 ± 2.4
SPECIAL INTEREST	28	18.4	26.5	22.5 ± 3.8	
SUPPLEMENTAL	56	17.5	25.6	21.2 ± 3.6	
CONTROL	4	20.6	21.5	21.0 ± 0.8	

INNER RING STATIONS - CL-01, CL-05, CL-22, CL-23, CL-24, CL-34, CL-35, CL-36, CL-42, CL-43, CL-44, CL-45, CL-46, CL-47, CL-48, CL-63

OUTER RING STATIONS - CL-51, CL-52, CL-53, CL-54, CL-55, CL-56, CL-57, CL-58, CL-60, CL-61, CL-76, CL-77, CL-78, CL-79, CL-80, CL-81

SPECIAL INTEREST STATIONS - CL-37, CL-41, CL-49, CL-64, CL-65, CL-74, CL-75

SUPPLEMENTAL STATIONS - CL-02, CL-03, CL-04, CL-06, CL-07, CL-08, CL-114, CL-15, CL-33, CL-84, CL-90, CL-91, CL-97, CL-99

CONTROL STATION - CL-11

FIGURE C-1
MEAN MONTHLY GROSS BETA CONCENTRATION IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF CPS, 2014

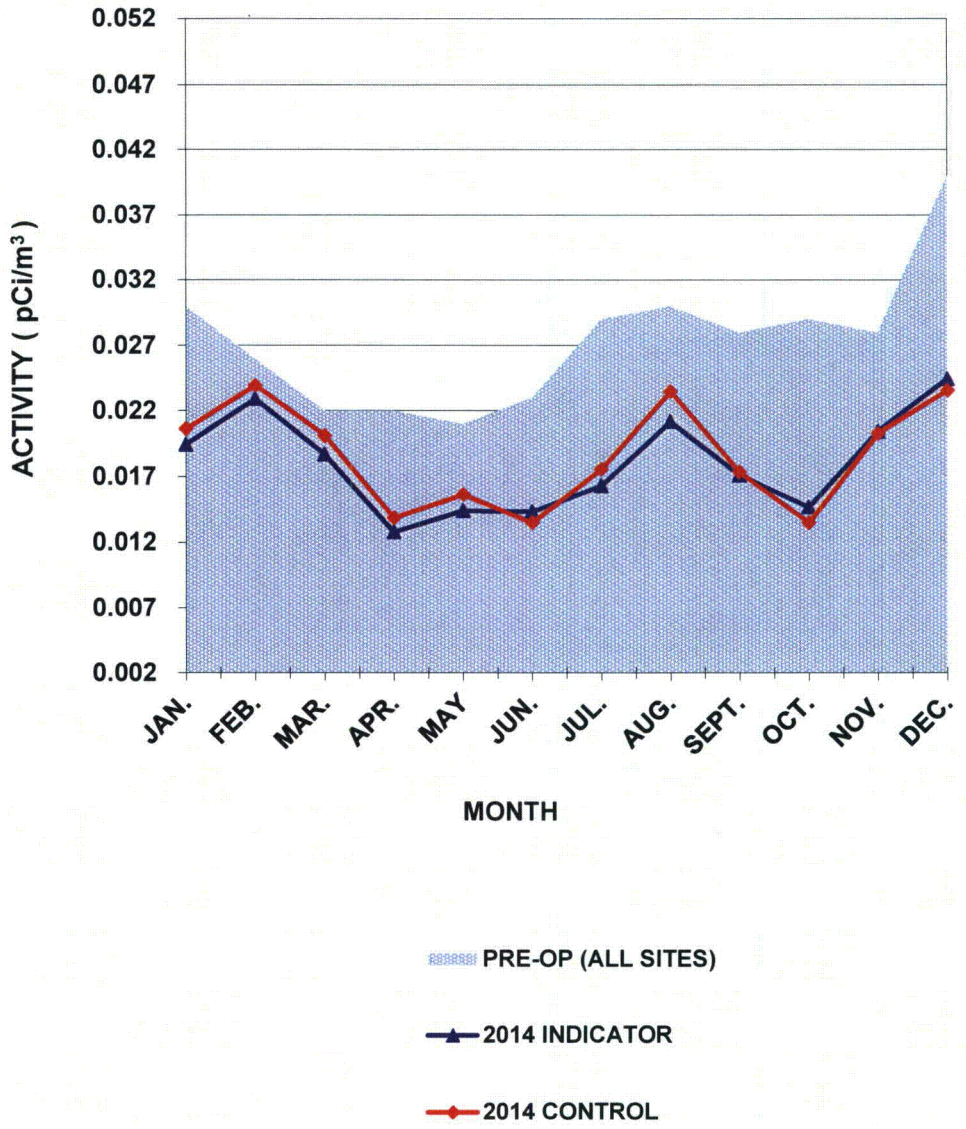
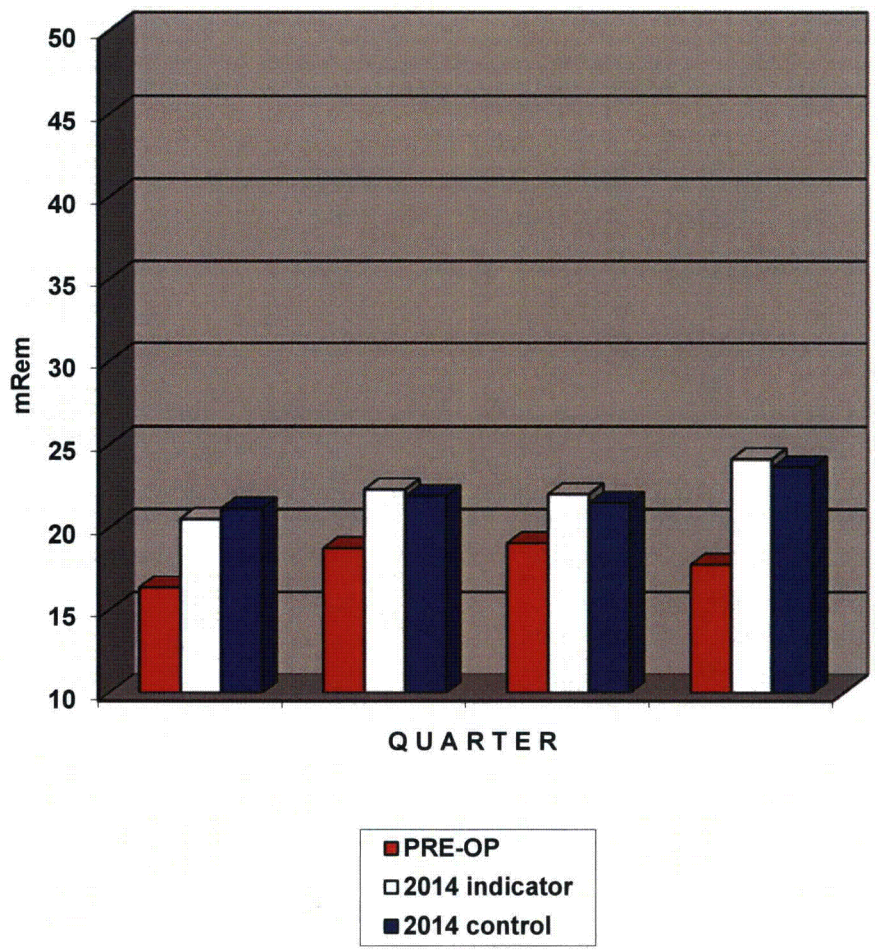


FIGURE C-2
MEAN QUARTERLY AMBIENT GAMMA RADIATION LEVELS (DLR) IN THE VICINITY OF CPS, 2014



APPENDIX D

INTER-LABORATORY COMPARISON PROGRAM

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TABLE D-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2014
(PAGE 1 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2014	E10854	Milk	Sr-89	pCi/L	95.1	91.7	1.04	A
			Sr-90	pCi/L	10.9	15.1	0.72	W
	E10855	Milk	I-131	pCi/L	96.6	98.5	0.98	A
			Ce-141	pCi/L	112	119	0.94	A
			Cr-51	pCi/L	449	491	0.91	A
			Cs-134	pCi/L	186	210	0.89	A
			Cs-137	pCi/L	250	253	0.99	A
			Co-58	pCi/L	248	268	0.93	A
			Mn-54	pCi/L	292	297	0.98	A
			Fe-59	pCi/L	230	219	1.05	A
			Zn-65	pCi/L	312	323	0.97	A
			Co-60	pCi/L	321	337	0.95	A
	E10857	AP	Ce-141	pCi	53.0	53.9	0.98	A
			Cr-51	pCi	232	223	1.04	A
			Cs-134	pCi	100	95.3	1.05	A
			Cs-137	pCi	122	115	1.06	A
			Co-58	pCi	122	121	1.01	A
			Mn-54	pCi	135	135	1.00	A
			Fe-59	pCi	111	99.3	1.12	A
			Zn-65	pCi	140	147	0.95	A
			Co-60	pCi	187	153	1.22	W
	E10856	Charcoal	I-131	pCi	74.1	76.4	0.97	A
	E10858	Water	Fe-55	pCi/L	2090	1760	1.19	A
June 2014	E10913	Milk	Sr-89	pCi/L	85.9	91.3	0.94	A
			Sr-90	pCi/L	13.8	14.5	0.95	A
	E10914	Milk	I-131	pCi/L	86.5	90.9	0.95	A
			Ce-141	pCi/L	111	124	0.90	A
			Cr-51	pCi/L	255	253	1.01	A
			Cs-134	pCi/L	147	162	0.91	A
			Cs-137	pCi/L	123	120	1.03	A
			Co-58	pCi/L	105	112	0.94	A
			Mn-54	pCi/L	155	156	0.99	A
			Fe-59	pCi/L	106	102	1.04	A
			Zn-65	pCi/L	251	252	1.00	A
			Co-60	pCi/L	218	224	0.97	A
	E10916	AP	Ce-141	pCi	95.1	92.6	1.03	A
			Cr-51	pCi	215	190	1.13	A
			Cs-134	pCi	122	122	1.00	A
			Cs-137	pCi	95.1	89.8	1.06	A
			Co-58	pCi	88.7	84.1	1.05	A
			Mn-54	pCi	115	116	0.99	A
			Fe-59	pCi	72.6	76.7	0.95	A
			Zn-65	pCi	193	189	1.02	A
			Co-60	pCi	179	168	1.07	A
	E10915	Charcoal	I-131	pCi	85.6	85.2	1.00	A
	E10917	Water	Fe-55	pCi/L	1680	1810	0.93	A

TABLE D-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2014
(PAGE 2 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
September 2014	E10946	Milk	Sr-89	pCi/L	90.7	96.9	0.94	A
			Sr-90	pCi/L	14.0	16.4	0.85	A
	E10947	Milk	I-131	pCi/L	92.0	97.6	0.94	A
			Ce-141	pCi/L	117	126	0.93	A
			Cr-51	pCi/L	281	288	0.98	A
			Cs-134	pCi/L	141	158	0.89	A
			Cs-137	pCi/L	186	193	0.96	A
			Co-58	pCi/L	137	143	0.96	A
			Mn-54	pCi/L	138	142	0.97	A
			Fe-59	pCi/L	162	158	1.03	A
			Zn-65	pCi/L	75.2	73.0	1.03	A
			Co-60	pCi/L	286	297	0.96	A
	E10949	AP	Ce-141	pCi	97.8	82.1	1.19	A
			Cr-51	pCi	212	188	1.13	A
			Cs-134	pCi	106	103	1.03	A
			Cs-137	pCi	131	126	1.04	A
			Co-58	pCi	85.7	93.0	0.92	A
			Mn-54	pCi	92.8	92.3	1.01	A
			Fe-59	pCi	113	103	1.10	A
			Zn-65	pCi	53.2	47.5	1.12	A
			Co-60	pCi	202	193	1.05	A
	E10948	Charcoal	I-131	pCi	83.9	89.8	0.93	A
	E10950	Water	Fe-55	pCi/L	2010	1720	1.17	A
	E10951	Soil	Ce-141	pCi/g	0.208	0.186	1.12	A
			Cr-51	pCi/g	0.398	0.425	0.94	A
			Cs-134	pCi/g	0.216	0.233	0.93	A
			Cs-137	pCi/g	0.398	0.365	1.09	A
			Co-58	pCi/g	0.197	0.211	0.93	A
			Mn-54	pCi/g	0.242	0.209	1.16	A
			Fe-59	pCi/g	0.238	0.233	1.02	A
			Zn-65	pCi/g	0.117	0.108	1.08	A
			Co-60	pCi/g	0.447	0.438	1.02	A
December 2014	E11078	Milk	Sr-89	pCi/L	85.7	95.7	0.90	A
			Sr-90	pCi/L	12.9	15.6	0.83	A
	E11079	Milk	I-131	pCi/L	85.9	95.1	0.90	A
			Ce-141	pCi/L	205	219	0.94	A
			Cr-51	pCi/L	402	406	0.99	A
			Cs-134	pCi/L	156	164	0.95	A
			Cs-137	pCi/L	194	198	0.98	A
			Co-58	pCi/L	122	130	0.94	A
			Mn-54	pCi/L	220	225	0.98	A
			Fe-59	pCi/L	183	175	1.05	A
			Zn-65	pCi/L	287	297	0.97	A
			Co-60	pCi/L	224	235	0.95	A

TABLE D-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2014
(PAGE 3 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December 2014	E11081	AP	Ce-141	pCi	96.4	102	0.95	A
			Cr-51	pCi	171	190	0.90	A
			Cs-134	pCi	73.1	76.9	0.95	A
			Cs-137	pCi	99.0	92.6	1.07	A
			Co-58	pCi	57.5	60.8	0.95	A
			Mn-54	pCi	107	105	1.02	A
			Fe-59	pCi	74.2	81.6	0.91	A
			Zn-65	pCi	144	139	1.04	A
			Co-60	pCi	114	110	1.04	A
	E11080	Charcoal	I-131	pCi	93.5	98.2	0.95	A
	E11082	Water	Fe-55	pCi/L	1760	1970	0.89	A

(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, 2014
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Limits	Evaluation (c)
May 2014	RAD-97	Water	Sr-89	pCi/L	38.25	36.7	27.5 - 43.6	A
			Sr-90	pCi/L	24.65	26.5	19.2 - 30.9	A
			Ba-133	pCi/L	89.1	87.9	74.0 - 96.7	A
			Cs-134	pCi/L	45.55	44.3	35.5 - 48.7	A
			Cs-137	pCi/L	91.15	89.1	80.2 - 101	A
			Co-60	pCi/L	65.10	64.2	57.8 - 73.1	A
			Zn-65	pCi/L	244	235	212 - 275	A
			Gr-A	pCi/L	45.65	61.0	31.9 - 75.8	A
			Gr-B	pCi/L	27.95	33.0	21.4 - 40.7	A
			I-131	pCi/L	23.75	25.7	21.3 - 30.3	A
			U-Nat	pCi/L	9.61	10.2	7.95 - 11.8	A
			H-3	pCi/L	8435	8770	7610 - 9650	A
	MRAD-20	Filter	Gr-A	pCi/filter	28.0	46.0	15.4 - 71.4	A
November 2014	RAD-99	Water	Sr-89	pCi/L	30.4	31.4	22.8 - 38.1	A
			Sr-90	pCi/L	18.6	21.8	15.6 - 25.7	A
			Ba-133	pCi/L	46.8	49.1	40.3 - 54.5	A
			Cs-134	pCi/L	88.0	89.8	73.7 - 98.8	A
			Cs-137	pCi/L	99.0	98.8	88.9 - 111	A
			Co-60	pCi/L	92.5	92.1	82.9 - 104	A
			Zn-65	pCi/L	325	310	279 - 362	A
			Gr-A	pCi/L	29.9	37.6	19.4 - 48.1	A
			Gr-B	pCi/L	27.5	27.4	17.3 - 35.3	A
			I-131	pCi/L	15.8	20.3	16.8 - 24.4	N (1)
			U-Nat	pCi/L	5.74	5.80	4.34 - 6.96	A
			H-3	pCi/L	6255	6880	5940 - 7570	A
	MRAD-21	Filter	Gr-A	pCi/filter	27.3	36.9	12.4 - 57.3	A

*(1) The **Iodine-131** was evaluated as failed with a ratio of 0.778. No cause could be found for the slighly low activity. TBE would evaluate this as acceptablle with warning. A rerun was not possible due to I-131 decay. All ERA Iodine-131 evaluations since 2004 have been acceptable. NCR 14-08*

(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, 2014
(PAGE 1 OF 2)

Month/Year	Identification Number	Media	Nuclide*	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2014	14-MaW30	Water	Am-241	Bq/L	0.764	0.720	0.504 - 0.936	A
			Cs-134	Bq/L	20.7	23.1	16.2 - 30 0	A
			Cs-137	Bq/L	28.0	28.9	20.2 - 37.6	A
			Co-57	Bq/L	26.5	27.5	19.3 - 35.8	A
			Co-60	Bq/L	15.6	16.0	11.2 - 20.8	A
			H-3**	Bq/L	NR	321	225 - 417	N (3)
			Mn-54	Bq/L	13.5	13.9	9.7 - 18.1	A
			Ni-63	Bq/L	NR	34.0	23.8 - 44.2	N (3)
			Pu-238	Bq/L	0.911	0.828	0.580 - 1.076	
			Pu-239/240	Bq/L	0.751	0.676	0.473 - 0.879	
			K-40	Bq/L	NR		(1)	N (3)
			Sr-90**	Bq/L	NR	8.51	5.96 - 11.06	N (3)
			U-234/233**	Bq/L	NR	0.225	0.158 - 0.293	N (3)
			U-238**	Bq/L	NR	1.45	1.02 - 1.89	N (3)
			Zn-65	Bq/L	-0.201		(1)	A
	14-MaS30	Soil	Cs-134	Bq/kg	2.02		(1)	A
			Cs-137	Bq/kg	1300	1238	867 - 1609	A
			Co-57	Bq/kg	1069	966	676 - 1256	A
			Co-60	Bq/kg	1.32	1.22	(2)	A
			Mn-54	Bq/kg	1510	1430	1001 - 1859	A
			K-40	Bq/kg	669	622	435 - 809	A
			Sr-90	Bq/kg	4.14		(1)	A
			Zn-65	Bq/kg	763	695	487 - 904	A
	14-RdF30	AP	Cs-134**	Bq/sample	NR	1.91	1.34 - 2.48	N (3)
			Cs-137**	Bq/sample	NR	1.76	1.23 - 2.29	N (3)
			Co-57**	Bq/sample	NR		(1)	N (3)
			Co-60**	Bq/sample	NR	1.39	0.97 - 1.81	N (3)
			Mn-54**	Bq/sample	NR		(1)	N (3)
			Sr-90	Bq/sample	0.8220	1.18	0.83 - 1.53	N (3)
			Zn-65**	Bq/sample	NR		(1)	N (3)
	14-GrF30	AP	Gr-A	Bq/sample	0.606	1.77	0.53 - 3.01	A
			Gr-B	Bq/sample	0.7507	0.77	0.39 - 1.16	A
	14-RdV30	Vegetation	Cs-134	Bq/sample	5.96	6.04	4.23 - 7.85	A
			Cs-137	Bq/sample	5.06	4.74	3.32 - 6.16	A
			Co-57	Bq/sample	11.8	10.1	7.1 - 13.1	A
			Co-60	Bq/sample	7.34	6.93	4.85 - 9.01	A
			Mn-54	Bq/sample	8.95	8.62	6.03 - 11.21	A
			Sr-90	Bq/sample	1.23	1.46	1.02 - 1.90	A
			Zn-65	Bq/sample	8.91	7.86	5.50 - 10.22	A

TABLE D-3 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING, 2014
(PAGE 2 OF 2)

Month/Year	Identification Number	Media	Nuclide*	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
September 2014	14-MaW31	Water	Am-241	Bq/L	0.705	0.88	0.62 - 1.14	A
			Cs-134***	Bq/L	NR		(1)	N (4)
			Cs-137***	Bq/L	NR	18.4	12.9 - 23.9	N (4)
			Co-57***	Bq/L	NR	24.7	17.3 - 32.1	N (4)
			Co-60***	Bq/L	NR	12.4	8.7 - 16.1	N (4)
			Mn-54***	Bq/L	NR	14.0	9.8 - 18.2	N (4)
			Ni-63	Bq/L	24.07	24.6	17.2 - 32.0	A
			Pu-238	Bq/L	0.591	0.618	0.433 - 0.803	A
			Pu-239/240	Bq/L	0.0153	0.0048	(2)	A
			K-40***	Bq/L	NR	161	113 - 209	N (4)
			Zn-65***	Bq/L	NR	10.9	7.6 - 14.2	N (4)
	14-MaS31	Soil	Cs-134***	Bq/kg	NR	622	435 - 809	N (4)
			Cs-137***	Bq/kg	NR		(1)	N (4)
			Co-57***	Bq/kg	NR	1116	781 - 1451	N (4)
			Co-60***	Bq/kg	NR	779	545 - 1013	N (4)
			Mn-54***	Bq/kg	NR	1009	706 - 1312	N (4)
			K-40***	Bq/kg	NR	824	577 - 1071	N (4)
			Sr-90	Bq/kg	694	858	601 - 1115	A
			Zn-65***	Bq/kg	NR	541	379 - 703	N (4)
	14-RdF31	AP	Sr-90	Bq/sample	0.310	0.703	0.492 - 0.914	N (4)
	14-GrF31	AP	Gr-A	Bq/sample	0.153	0.53	0.16 - 0.90	N (4)
			Gr-B	Bq/sample	0.977	1.06	0.53 - 1.59	A
September 2014	14-RdV31	Vegetation	Cs-134	Bq/sample	7.31	7.38	5.17 - 9.59	A
			Cs-137	Bq/sample	8.93	8.14	5.70 - 10.58	A
			Co-57	Bq/sample	10.8	9.2	6.4 - 12.0	A
			Co-60	Bq/sample	6.31	6.11	4.28 - 7.94	A
			Mn-54	Bq/sample	7.76	7.10	4.97 - 9.23	A
			Sr-90	Bq/sample	0.738	0.85	0.60 - 1.11	A
			Zn-65	Bq/sample	7.16	6.42	4.49 - 8.35	A

* The MAPEP cross check isotope list has been reduced due to duplication of effort or analysis not being performed for clients.

** These nuclides are no longer part of the TBE cross check program due to duplication of effort or analysis not being performed for clients. MAPEP evaluates non-reported analyses as failed if they were reported in the previous series.

*** All future gamma cross check samples for these isotopes will be provided by Analytics.

(1) False positive test.

(2) Sensitivity evaluation.

*(3) **Water, Ni-63** overlooked when reporting, but the result of 32.7 +- 1.69 would have passed the acceptance criteria. NCR 14-04*
***Water**, the non-detected **K-40** was overlooked when reporting, but would have passed the false positive test. NCR 14-04*
***AP, Sr-90** rerun was within the low range of the acceptqance criteria. The original and rerun results were statistically the same. No cause could be identified for the slightly low Sr-90 activity. NCR 14-04*
For non reported (NR) analyses, MAPEP evaluates as failed if they were reported in the previous series. NCR 14-04

*(4) **AP, Sr-90** gravimetric yield was very high at 117%. Could indicate larger than normal amounts of calcium in the AP. A second fuming HNO_3 separation would be required to remove the excess calcium. NCR 14-09*
***AP, Gr-Alpha** was counted on the wrong side. When flipped over and recounted the results were acceptable. NCR 14-09*
For non reported (NR) analyses, MAPEP evaluates as failed if they were reported in the previous series. NCR 14-09

(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., 2014
(Page 1 of 1)

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result b	ERA Result c	Control Limits	Acceptance
ERW-1384	04/07/14	Sr-89	40.29 ± 5.76	36.70	27.50 - 43.60	Pass
ERW-1384	04/07/14	Sr-90	24.08 ± 2.35	26.50	19.20 - 30.90	Pass
ERW-1385	04/07/14	Ba-133	78.23 ± 3.93	87.90	74.00 - 96.70	Pass
ERW-1385	04/07/14	Co-60	62.75 ± 3.53	64.20	57.80 - 73.10	Pass
ERW-1385	04/07/14	Cs-134	44.97 ± 3.99	44.30	35.50 - 48.70	Pass
ERW-1385	04/07/14	Cs-137	88.54 ± 4.93	89.10	80.20 - 101.00	Pass
ERW-1385	04/07/14	Zn-65	249.1 ± 10.44	235.0	212.0 - 275.0	Pass
ERW-1388	04/07/14	Gr. Alpha	56.70 ± 2.47	61.00	31.90 - 75.80	Pass
ERW-1388	04/07/14	Gr. Beta	32.10 ± 1.20	33.00	21.40 - 40.70	Pass
ERW-1391	04/07/14	I-131	25.52 ± 1.12	25.70	21.30 - 30.30	Pass
ERW-1394	04/07/14	Uranium	10.76 ± 0.74	10.20	7.95 - 11.80	Pass
ERW-1397	04/07/14	H-3	8982 ± 279	8770	7610 - 9650	Pass
ERW-5382	10/06/14	Sr-89	29.40 ± 5.32	31.40	22.80 - 38.10	Pass
ERW-5382	10/06/14	Sr-90	19.19 ± 1.85	21.80	15.60 - 25.70	Pass
ERW-5385	10/06/14	Ba-133	43.54 ± 4.54	49.10	40.30 - 54.50	Pass
ERW-5385	10/06/14	Cs-134	81.95 ± 7.49	89.80	73.70 - 98.80	Pass
ERW-5385	10/06/14	Cs-137	95.76 ± 5.50	98.80	88.90 - 111.00	Pass
ERW-5385	10/06/14	Co-60	90.25 ± 2.77	92.10	82.90 - 104.00	Pass
ERW-5385	10/06/14	Zn-65	327.4 ± 23.3	310.00	279.0 - 362.0	Pass
ERW-5388	10/06/14	Gr. Alpha	30.88 ± 8.05	37.60	19.40 - 46.10	Pass
ERW-5388	10/06/14	G. Beta	20.47 ± 4.75	27.40	17.30 - 35.30	Pass
ERW-5392	10/06/14	I-131	19.58 ± 2.35	20.30	16.80 - 24.40	Pass
ERW-5394	10/06/14	Uranium	5.51 ± 0.37	5.80	4.34 - 6.96	Pass
ERW-5397	10/06/14	H-3	6876 ± 383	6880	5940 - 7570	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.

TABLE D-5 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
ENVIRONMENTAL, INC., 2014
(Page 1 of 2)

			Concentration [a]			
Lab Code [b]	Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MAW-1140	02/01/14	Gr. Alpha	0.77 ± 0.06	0.85	0.26 - 1.44	Pass
MAW-1140	02/01/14	Gr. Beta	4.31 ± 0.08	4.19	2.10 - 6.29	Pass
MAW-1184	02/01/14	Fe-55	0.40 ± 3.20	0.00	-0.01 - 2.00	Pass
MAW-1184	02/01/14	H-3	345.10 ± 10.60	321.00	225.00 - 417.00	Pass
MAW-1184	02/01/14	Ni-63	32.40 ± 3.20	34.00	23.80 - 44.20	Pass
MAW-1184	02/01/14	Pu-238	1.28 ± 0.12	0.83	0.58 - 1.08	Fail (1)
MAW-1184	02/01/14	Pu-239/240	0.91 ± 0.10	0.68	0.47 - 0.88	Fail (1)
MAW-1184	02/01/14	Sr-90	7.00 ± 0.70	8.51	5.96 - 11.06	Pass
MAW-1184	02/01/14	U-233/234	0.20 ± 0.07	0.23	0.16 - 0.29	Pass
MAW-1184	02/01/14	U-238	1.25 ± 0.18	1.45	1.02 - 1.89	Pass
MAW-1184	02/01/14	Co-57	27.86 ± 0.38	27.50	19.30 - 35.80	Pass
MAW-1184	02/01/14	Co-60	15.99 ± 0.27	16.00	11.20 - 20.80	Pass
MAW-1184	02/01/14	Cs-134	21.85 ± 0.54	23.10	16.20 - 30.00	Pass
MAW-1184	02/01/14	Cs-137	28.74 ± 0.49	28.90	20.20 - 37.60	Pass
MAW-1184	02/01/14	K-40	1.80 ± 2.00	0.00	0.00 - 10.00	Pass
MAW-1184	02/01/14	Mn-54	14.06 ± 0.40	13.90	9.70 - 18.10	Pass
MAW-1184	02/01/14	Zn-65	0.00 ± 0.19	0.00	-0.01 - 0.00	Pass
MAVE-1148	02/01/14	Co-57	11.63 ± 0.19	10.10	7.10 - 13.10	Pass
MAVE-1148	02/01/14	Co-60	7.28 ± 0.18	6.93	4.85 - 9.01	Pass
MAVE-1148	02/01/14	Cs-134	6.29 ± 0.29	6.04	4.23 - 7.85	Pass
MAVE-1148	02/01/14	Cs-137	5.18 ± 0.20	4.74	3.32 - 6.16	Pass
MAVE-1148	02/01/14	Mn-54	9.22 ± 0.26	8.62	6.03 - 11.21	Pass
MAVE-1148	02/01/14	Zn-65	8.59 ± 0.40	7.86	5.50 - 10.22	Pass
MAAP-1151	02/01/14	Co-57	1.60 ± 0.05	0.00	NA	Fail (2)
MAAP-1151	02/01/14	Co-60	1.38 ± 0.08	1.39	0.97 - 1.81	Pass
MAAP-1151	02/01/14	Cs-134	1.75 ± 0.11	1.91	1.34 - 2.48	Pass
MAAP-1151	02/01/14	Cs-137	1.81 ± 0.10	1.76	1.23 - 2.29	Pass
MAAP-1151	02/01/14	Mn-54	0.01 ± 0.03	0.00	NA	Pass
MAAP-1151	02/01/14	Zn-65	-0.24 ± 0.09	0.00	-0.50 - 1.00	Pass
MAAP-1151	02/01/14	Sr-90	1.11 ± 0.14	1.18	0.83 - 1.53	Pass
MAAP-1154	02/01/14	Gr. Alpha	0.56 ± 0.06	1.77	0.53 - 3.01	Pass
MAAP-1154	02/01/14	Gr. Beta	0.98 ± 0.06	0.77	0.39 - 1.16	Pass
MASO-1146	02/01/14	Ni-63	4.80 ± 15.30	0.00	NA	Pass
MASO-1146	02/01/14	Co-57	1064.50 ± 3.60	966.00	676.00 - 1256.00	Pass
MASO-1146	02/01/14	Co-60	1.70 ± 0.50	1.22	(3)	Pass
MASO-1146	02/01/14	Cs-134	6.10 ± 1.80	0.00	NA	Fail (4)
MASO-1146	02/01/14	Cs-137	1364.30 ± 5.30	1238.00	867.00 - 1609.00	Pass
MASO-1146	02/01/14	K-40	728.90 ± 15.90	622.00	435.00 - 809.00	Pass
MASO-1146	02/01/14	Mn-54	1588.00 ± 6.00	1430.00	1001.00 - 1859.00	Pass
MASO-1146	02/01/14	Zn-65	763.50 ± 6.80	695.00	487.00 - 904.00	Pass
MASO-1146	02/01/14	Sr-90	1.23 ± 1.37	0.00	NA	Pass

TABLE D-5 **DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)**
ENVIRONMENTAL, INC., 2014

			Concentration [a]			
Lab Code [b]	Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MASO-4439	08/01/14	Ni-63	771.62 ± 23.29	980.00	686.00 - 1274.00	Pass
MASO-4439	08/01/14	Sr-90	778.34 ± 17.82	858.00	601.00 - 1115.00	Pass
MASO-4439	08/01/14	Cs-134	520.60 ± 7.09	622.00	435.00 - 809.00	Pass
MASO-4439	08/01/14	Co-57	1135.00 ± 7.40	1116.00	781.00 - 1451.00	Pass
MASO-4439	08/01/14	Co-60	768.20 ± 7.70	779.00	545.00 - 1013.00	Pass
MASO-4439	08/01/14	Mn-54	1050.70 ± 12.60	1009.00	706.00 - 1312.00	Pass
MASO-4439	08/01/14	Zn-65	407.89 ± 15.03	541.00	379.00 - 703.00	Pass
MAW-4431	08/01/14	Am-241	0.79 ± 0.08	0.88	0.62 - 1.14	Pass
MAW-4431	08/01/14	Cs-137	18.62 ± 0.54	18.40	12.90 - 23.90	Pass
MAW-4431	08/01/14	Co-57	24.85 ± 0.42	24.70	17.30 - 32.10	Pass
MAW-4431	08/01/14	Co-60	12.27 ± 0.38	12.40	8.70 - 16.10	Pass
MAW-4431	08/01/14	H-3	207.20 ± 10.60	208.00	146.00 - 270.00	Pass
MAW-4431	08/01/14	Fe-55	55.10 ± 14.80	31.50	22.10 - 41.00	Fail (5)
MAW-4431	08/01/14	Mn-54	14.36 ± 0.53	14.00	9.80 - 18.20	Pass
MAW-4431	08/01/14	Zn-65	11.46 ± 0.78	10.90	7.60 - 14.20	Pass
MAW-4493	08/01/14	Gr. Alpha	0.93 ± 0.07	1.40	0.42 - 2.38	Pass
MAW-4493	08/01/14	Gr. Beta	6.31 ± 1.35	6.50	3.25 - 9.75	Pass
MAAP-4433	08/01/14	Sr-90	0.74 ± 0.10	0.70	0.49 - 0.91	Pass
MAAP-4444	08/01/14	Sr-89	7.82 ± 0.52	9.40	6.60 - 12.20	Pass
MAAP-4444	08/01/14	Sr-90	0.76 ± 0.10	0.76	0.53 - 0.99	Pass
MAVE-4436	08/01/14	Cs-134	7.49 ± 0.18	7.38	5.17 - 9.59	Pass
MAVE-4436	08/01/14	Co-57	11.20 ± 0.19	9.20	6.40 - 12.00	Pass
MAVE-4436	08/01/14	Co-60	6.84 ± 0.17	6.11	4.28 - 7.94	Pass
MAVE-4436	08/01/14	Mn-54	8.11 ± 0.26	7.11	4.97 - 9.23	Pass
MAVE-4436	08/01/14	Zn-65	7.76 ± 0.43	6.42	4.49 - 8.35	Pass

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

[b] Laboratory codes as follows: MAW (water), MAAP (air filter), MASO (soil), MAVE (vegetation).

[c] 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.

(1) The high bias on the plutonium crosscheck samples was traced to contamination from a newly purchased standard. The results of reanalysis with replacement tracer purchased from NIST:

MAW-1184	Pu-238	0.68 ± 0.10	Bq / L
MAW-1184	Pu-239/240	0.66 ± 0.10	Bq / L

(2) Interference from Eu-152 resulted in misidentification of Co-57.

(3) Provided in the series for "sensitivity evaluation". MAPEP does not provide control limits.

(4) False positive test. Long sample counting time lead to interference from naturally occuring Bi-214 in sample matrix with a close spectral energy.

(5) Result of reanalysis Fe-55 32.63 ± 16.30 Bq/L

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APPENDIX E

ERRATA DATA

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There is no errata data for 2014.

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APPENDIX F

ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)

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Docket No: 50-461

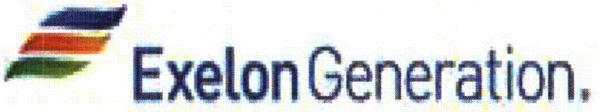
CLINTON POWER STATION

Annual Radiological Groundwater Protection Program Report

1 January through 31 December 2014

Prepared By

Teledyne Brown Engineering
Environmental Services



Clinton Power Station
Clinton, IL 61727

April 2015

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Table Of Contents

I. Summary and Conclusions 1

II. Introduction 3
A. Objectives of the RGPP 3
B. Implementation of the Objectives 3
C. Program Description 4
D. Characteristics of Tritium (H-3) 5

III. Program Description 5
A. Sample Analysis 5
B. Data Interpretation 6
C. Background Analysis 7
1. Background Concentrations of Tritium 7

IV. Results and Discussion 9
A. Program Exceptions 9
B. Program Changes 9
C. Groundwater Results 9
D. Surface Water Results 11
E. Precipitation Water Results 11
F. Recapture 11
G. Summary of Results – Inter-laboratory Comparison Program 12
H. Leaks, Spills, and Releases 12
I. Trends 12
J. Investigations 12
K. Actions Taken 12

Appendices

Appendix A Location Designation of the Annual Radiological Groundwater Protection Program Report (ARGPPR)

Tables

Table A-1 Radiological Groundwater Protection Program - Sampling Locations, Clinton Power Station, 2014

Figures

Routine Well Water and Surface Water Sample Locations for the Radiological Groundwater Protection Program, Clinton Power Station, 2014

Appendix B Data Tables of the Annual Radiological Groundwater Protection Program Report (ARGPPR)

Tables

Table B-I.1 Concentrations of Tritium, Strontium, Gross Alpha, and Gross Beta in Groundwater Samples Collected in the Vicinity of Clinton Power Station, 2014.

Table B-I.2 Concentrations of Gamma Emitters in Groundwater Samples Collected in the Vicinity of Clinton Power Station, 2014.

Table B-I.3 Concentrations of Hard-To-Detects in Groundwater Samples Collected in the Vicinity of Clinton Power Station, 2014.

Table B-II.1 Concentrations of Tritium in Surface Water Samples Collected in the Vicinity of Clinton Power Station, 2014.

Table B-II.2 Concentrations of Gamma Emitters in Surface Water Samples Collected in the Vicinity of Clinton Power Station, 2014.

Table B-III.1 Concentrations of Tritium in Precipitation Water Samples Collected in the Vicinity of Clinton Power Station, 2014.

I. Summary and Conclusions

In 2006, Exelon instituted a comprehensive program to evaluate the impact of station operations on groundwater and surface water in the vicinity of Clinton Power Station (CPS). This evaluation involved numerous station personnel and contractor support personnel. This report covers groundwater and surface water samples, collected outside of the Licensee required Off-Site Dose Calculation Manual (ODCM) requirements, both on and off station property in 2014. During that time period, 607 analyses were performed on 104 samples from 32 locations. The monitoring was conducted in four phases.

In assessing all the data gathered for this report, it was concluded that the operation of CPS had no adverse radiological impact on the environment, and there are no known active releases into the groundwater or surface water at CPS. No program changes occurred during the sampling year of 2014.

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 NUREG-1302 in any of the groundwater or surface water samples. In the case of tritium, Exelon specified that the independent laboratory achieve a lower limit of detection 10 times lower than that required by the United States Environmental Protection Agency (USEPA) regulation.

Strontium-89 was not detected in any samples above the LLD of 10 pCi/L. Strontium-90 was not detected in any samples above the LLD of 1 pCi/L.

Tritium was not detected in any of the groundwater, surface water, or precipitation water samples at concentrations greater than the United States Environmental Protection Agency (USEPA) drinking water standard (and the Nuclear Regulatory Commission Reporting Limit) of 20,000 pCi/L. Background levels of tritium were detected at concentrations greater than the self-imposed LLD of 200 pCi/L in two of 17 groundwater monitoring locations. The tritium concentrations ranged from 182 ± 119 pCi/L to 257 ± 132 pCi/L. Tritium was not detected in any surface water or precipitation water.

Gross Alpha and Gross Beta analyses in the dissolved and suspended fractions were performed on groundwater samples during the third quarter of sampling in 2014. Gross Alpha (dissolved) was not detected at any of the groundwater locations. Gross Alpha (suspended) was not detected at any of the groundwater locations. Gross Beta (dissolved) was detected in 15 of 17 groundwater locations. The concentrations ranged from 1.1 to 10.0 pCi/L. Gross Beta (suspended) was not detected at any of the groundwater locations.

Hard-To-Detect analyses were performed on two groundwater locations. 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 analyzed were not found at concentrations greater than their respective MDCs.

II. Introduction

The Clinton Power Station (CPS), consisting of one approximately 1,140 MW gross electrical power output boiling water reactor is located in Harp Township, DeWitt County, Illinois. CPS is owned and operated by Exelon and became operational in 1987. Unit No. 1 went critical on 15 February 1987. The site encloses approximately 13,730 acres. This includes the 4,895 acre, man-made cooling lake and about 452 acres of property not owned by Exelon. The plant is situated on approximately 150 acres. The cooling water discharge flume, which discharges to the eastern arm of the lake, occupies an additional 130 acres. Although the nuclear reactor, supporting equipment and associated electrical generation and distribution equipment lie in Harp Township, portions of the aforementioned 13,730 acre plot reside within Wilson, Rutledge, DeWitt, Creek, Nixon and Santa Anna Townships.

This report covers those analyses performed by Teledyne Brown Engineering (TBE) on samples collected in 2014.

A. Objectives of the Radiological Groundwater Protection Program (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 Clinton 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 Connestoga Rovers and Associates (CRA) and the results and conclusions were made available to state and federal regulators as well as the public in station specific reports.

2. The Clinton 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. Clinton Power Station will continue to perform routine sampling and radiological analysis of water from selected locations.

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

5. Clinton 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, A–3, and A–4 Appendix A.

Groundwater, Surface Water and Precipitation Water

Samples of water are collected, managed, transported and analyzed in accordance with approved procedures following regulatory methods. Groundwater, surface water, and precipitation 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, and shipment of samples, as well as in documentation of sampling events. Analytical laboratories are subject to internal quality assurance programs and 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.

D. Characteristics of Tritium (H-3)

Tritium (chemical symbol H-3) is a radioactive isotope of hydrogen. The most common form of tritium is tritium oxide, which is also called "tritiated water." The chemical properties of tritium are essentially those of ordinary hydrogen.

Tritiated water behaves the same as ordinary water in both the environment and the body. Tritium can be taken into the body by drinking water, breathing air, eating food, or absorption through skin. Once tritium enters the body, it disperses quickly and is uniformly distributed throughout the body. Tritium is excreted primarily through urine with a clearance rate characterized by an effective biological half-life of about 14 days. Within one month or so after ingestion, essentially all tritium is cleared. Organically bound tritium (tritium that is incorporated in organic compounds) can remain in the body for a longer period.

Tritium is produced naturally in the upper atmosphere when cosmic rays strike air molecules. Tritium is also produced during nuclear weapons explosions, as a by-product in reactors producing electricity, and in special production reactors, where the isotopes lithium-7 and/or boron-10 are activated to produce tritium. Like normal water, tritiated water is colorless and odorless. Tritiated water behaves chemically and physically like non-tritiated water in the subsurface, and therefore tritiated water will travel at the same velocity as the average groundwater velocity.

Tritium has a half-life of approximately 12.3 years. It decays spontaneously to helium-3 (3He). This radioactive decay releases a beta particle (low-energy electron). The radioactive decay of tritium is the source of the health risk from exposure to tritium. Tritium is one of the least dangerous radionuclides because it emits very weak beta radiation and leaves the body relatively quickly. Since tritium is almost always found as water, it goes directly into soft tissues and organs. The associated dose to these tissues is generally uniform and is dependent on the water content of the specific tissue.

III. Program Description

A. Sample Analysis

This section describes the general analytical methodologies used by TBE to analyze the environmental samples for radioactivity for the Clinton

Power Station RGPP in 2014.

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

1. Concentrations of gamma emitters in groundwater and surface water.

2. Concentrations of strontium in groundwater.

3. Concentrations of tritium in groundwater, surface water and precipitation water.

4. Concentrations 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 Clinton Power Station becoming operational were used as a baseline with which these operational data were compared. For the purpose of this report, Clinton Power Station was considered operational at initial criticality. Several factors were important in the interpretation of the data:

1. Lower Limit of Detection and Minimum Detectable Concentration

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

2. Laboratory Measurements Uncertainty

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

measurement value.

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

Analytical uncertainties are reported at the 95% confidence level in this report for reporting consistency with the AREOR.
Gamma spectroscopy results for each type of sample were grouped as follows:

For groundwater and surface water 13 nuclides, Be-7, K-40, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, Cs-134, Cs-137, Ba-140 and La-140 were reported.

C. Background Analysis

A pre-operational radiological environmental monitoring program (pre-operational REMP) was conducted to establish background radioactivity levels prior to operation of the Station. The environmental media sampled and analyzed during the pre-operational REMP were atmospheric radiation, fall-out, domestic water, surface water, marine life, milk, and vegetation. The results of the monitoring were detailed in the report entitled, Environmental Radiological Monitoring for Clinton Power Nuclear Power Station, Illinois Power Company, Annual Report 1987, May 1988.

The pre-operational REMP contained analytical results from samples collected from the surface water and groundwater.

1. Background Concentrations of Tritium

The purpose of the following discussion is to summarize background measurements of tritium in various media performed by others.

a. Tritium Production

Tritium is created in the environment from naturally occurring processes both cosmic and subterranean, as well as from anthropogenic (i.e., man-made) sources. In the upper atmosphere, "Cosmogenic" tritium is produced from the bombardment of stable nuclides and combines with oxygen to form tritiated water, which will then enter the hydrologic cycle. Below ground, "lithogenic" tritium is produced by the bombardment of natural lithium present in crystalline rocks by neutrons produced by the radioactive decay of naturally abundant uranium and thorium. Lithogenic production of tritium is usually negligible compared to other sources due to the limited abundance of lithium in rock. The lithogenic tritium is introduced directly to groundwater.

A major anthropogenic source of tritium and strontium-90 comes from the former atmospheric testing of thermonuclear weapons. Levels of tritium in precipitation increased significantly during the 1950s and early 1960s, and later with additional testing, resulting in the release of significant amounts of tritium to the atmosphere. The Canadian heavy water nuclear power reactors, other commercial power reactors, nuclear research and weapons production continue to influence tritium concentrations in the environment.

b. Precipitation Data

Precipitation samples are routinely collected at stations around the world for the analysis of tritium and other radionuclides. Two publicly available databases that provide tritium concentrations in precipitation are Global Network of Isotopes in Precipitation (GNIP) and USEPA's RadNet database. GNIP provides tritium precipitation concentration data for samples collected world wide from 1960 to 2006. RadNet provides tritium precipitation concentration data for samples collected at stations through out the U.S. from 1960 up to and including 2006. Based on GNIP data for sample stations located in the U.S. Midwest, tritium concentrations peaked around 1963. This peak, which approached 10,000 pCi/L for some stations, coincided with the atmospheric testing of thermonuclear weapons. Tritium concentrations in surface water showed a sharp decline up until 1975, followed by a gradual decline since that time. Tritium concentrations in Midwest precipitation have typically been

below 100 pCi/L since around 1980. Tritium concentrations in wells may still be above the 200 pCi/L detection limit from the external causes described above.

c. Surface Water Data

Tritium concentrations are routinely measured in Clinton Lake.

According to the USEPA, surface water data typically has an uncertainty ± 70 to 100 pCi/L 95% confidence bound on each given measurement. Therefore, the typical background data provided may be subject to measurement uncertainty of approximately ± 70 to 100 pCi/L.

The radio-analytical laboratory is counting tritium results to an Exelon specified LLD of 200 pCi/L. Typically, the lowest positive measurement will be reported within a range of 40 – 240 pCi/L or 140 ± 100 pCi/L. Clearly, these sample results cannot be distinguished as different from background at this concentration.

IV. Results and Discussion

A. Program Exceptions

1. Sample Anomalies

There were no samples anomalies in 2014.

2. Missed Samples

There were no missed samples in 2014.

B. Program Changes

There were no sampling program changes in 2014.

C. Groundwater Results

Groundwater

Baseline samples were collected from off-site wells during four (4) phases at the station. Analytical results are discussed below. No

anomalies were noted during the year.

Tritium

Samples from 17 locations were analyzed for tritium activity (Table B–I.1 Appendix B). Tritium values ranged from below the Exelon imposed LLD of 200 pCi/l to 257 pCi/l.

Strontium

Strontium-89 was not detected in any of the 17 samples analyzed and the required LLD of 10 pCi/L was met. Strontium-90 was also not detected in any of the 17 samples analyzed and the required LLD of 1 pCi/L was met. (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 were performed on groundwater samples during the third quarter of sampling in 2014. Gross Alpha (dissolved) was not detected at any of the groundwater locations. Gross Alpha (suspended) was not detected at any of the groundwater locations. Gross Beta (dissolved) was detected in 15 of 17 groundwater locations. The concentrations ranged from 1.1 to 10.0 pCi/L. Gross Beta (suspended) was not detected at any of the groundwater locations (Table B–I.1 Appendix B).

Gamma Emitters

Naturally occurring K-40 was detected in one sample at a concentration of 43 pCi/L. No other gamma emitting nuclides were detected (Table B–I.2, Appendix B).

Hard-To-Detect

Hard-To-Detect analyses were performed on two groundwater locations 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. Occasionally, the isotopes of U-234 and U-238 are detected at low levels and indistinguishable from background (Table B–I.3 Appendix B).

D. Surface Water Results

Surface Water

Baseline samples were collected from on-site surface waters during four (4) phases at the station. Analytical results are discussed below. No anomalies were noted during the year.

Tritium

Samples from seven locations were analyzed for tritium activity (Table B–II.1 Appendix B). Tritium was not detected at concentrations greater than the LLD.

Strontium

Strontium was not analyzed in 2014 (Table B–II.1 Appendix B).

Gamma Emitters

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

E. Precipitation Water Results

Precipitation Water

Precipitation water samples were collected during the third quarter of 2014. Analytical results are discussed below. No anomalies were noted during the year.

Tritium

Tritium was not detected at concentrations greater than the LLD (Table B–III.1 Appendix B).

F. Recapture

Clinton Power Station conducted recapture precipitation sampling and analysis per the Radiological Groundwater Protection Program. No consistent indication of recapture was identified.

G. Summary of Results – Inter-Laboratory Comparison Program

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

H. Leaks, Spills, and Releases

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

I. Trends

The historic low level tritium activity detected at MW-CL-14S and MW-CL-21S has continued to decrease over the course of 2014. All sampling well locations are currently indicating tritium levels less than the required LLD of 200 pCi/l. All wells will continue to be sampled in accordance with the RGPP.

J. Investigations

Currently no investigations are on-going.

K. Actions Taken

1. Compensatory Actions

   There have been no station events requiring compensatory actions at the Clinton Power Station in 2014.

2. Installation of Monitoring Wells

   No new wells were installed during the 2014.

3. Actions to Recover/Reverse Plumes

   No actions were required to recover or reverse groundwater plumes.

APPENDIX A

LOCATION DESIGNATION OF THE ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)

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TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations, Clinton Power Station, 2014

Site	Site Type
B-3	Monitoring Well
MW-CL-1	Monitoring Well
MW-CL-2	Monitoring Well
MW-CL-12I	Monitoring Well
MW-CL-13I	Monitoring Well
MW-CL-13S	Monitoring Well
MW-CL-14S	Monitoring Well
MW-CL-15I	Monitoring Well
MW-CL-15S	Monitoring Well
MW-CL-16S	Monitoring Well
MW-CL-17S	Monitoring Well
MW-CL-18I	Monitoring Well
MW-CL-18S	Monitoring Well
MW-CL-19S	Monitoring Well
MW-CL-20S	Monitoring Well
MW-CL-21S	Monitoring Well
MW-CL-22S	Monitoring Well
Sewage Treatment Plant	Surface Water
SW-CL-1	Surface Water
SW-CL-2	Surface Water
SW-CL-4	Surface Water
SW-CL-5	Surface Water
SW-CL-6	Surface Water
SW-CL-7	Surface Water
RG-2	Precipitation Water
RG-3	Precipitation Water
RG-15	Precipitation Water
RG-26	Precipitation Water
RG-N	Precipitation Water
RG-NE	Precipitation Water
RG-NNE	Precipitation Water
MPT-1	Precipitation Water

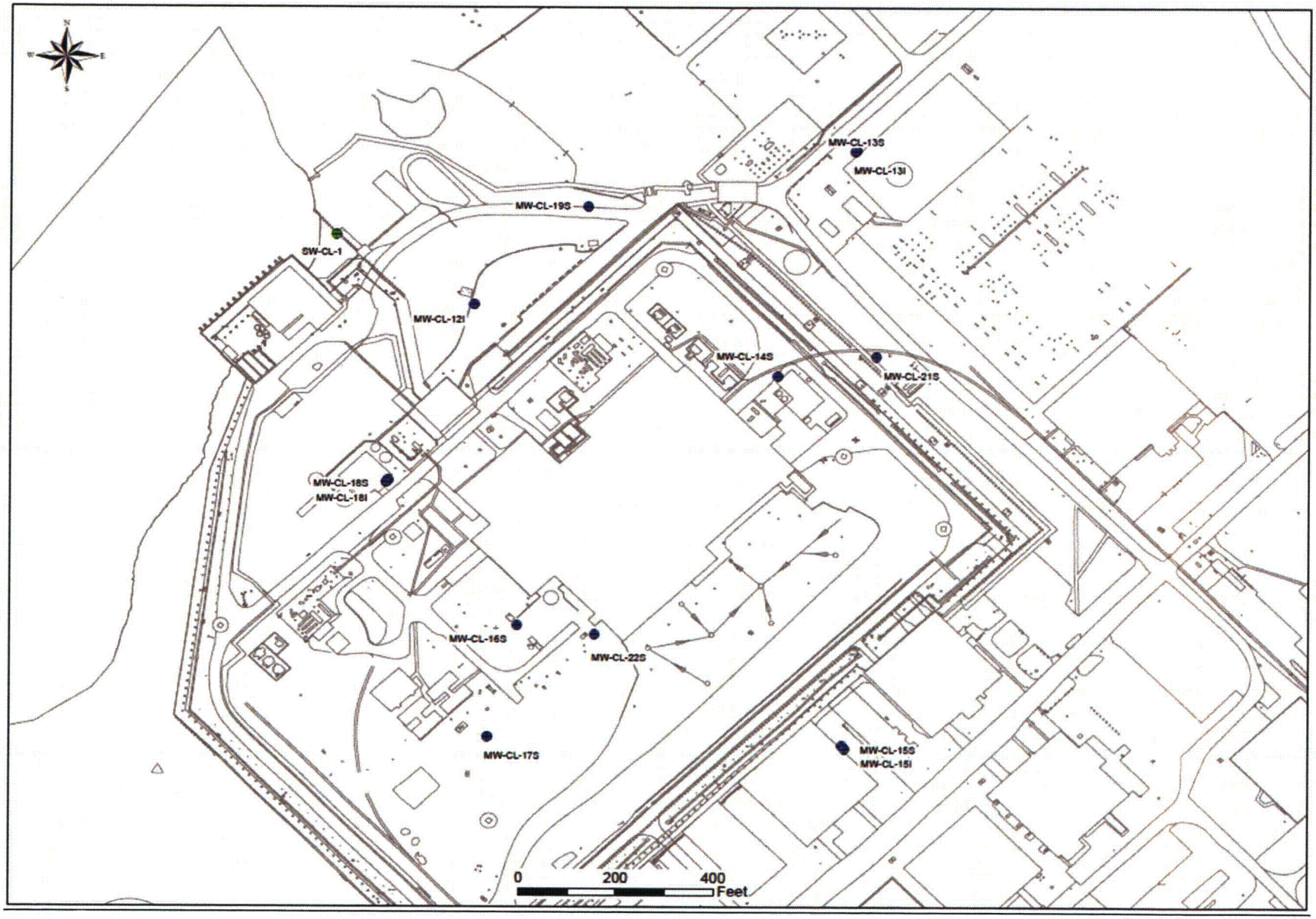

Figure A – 1
Onsite Sampling Locations at Clinton Power Station

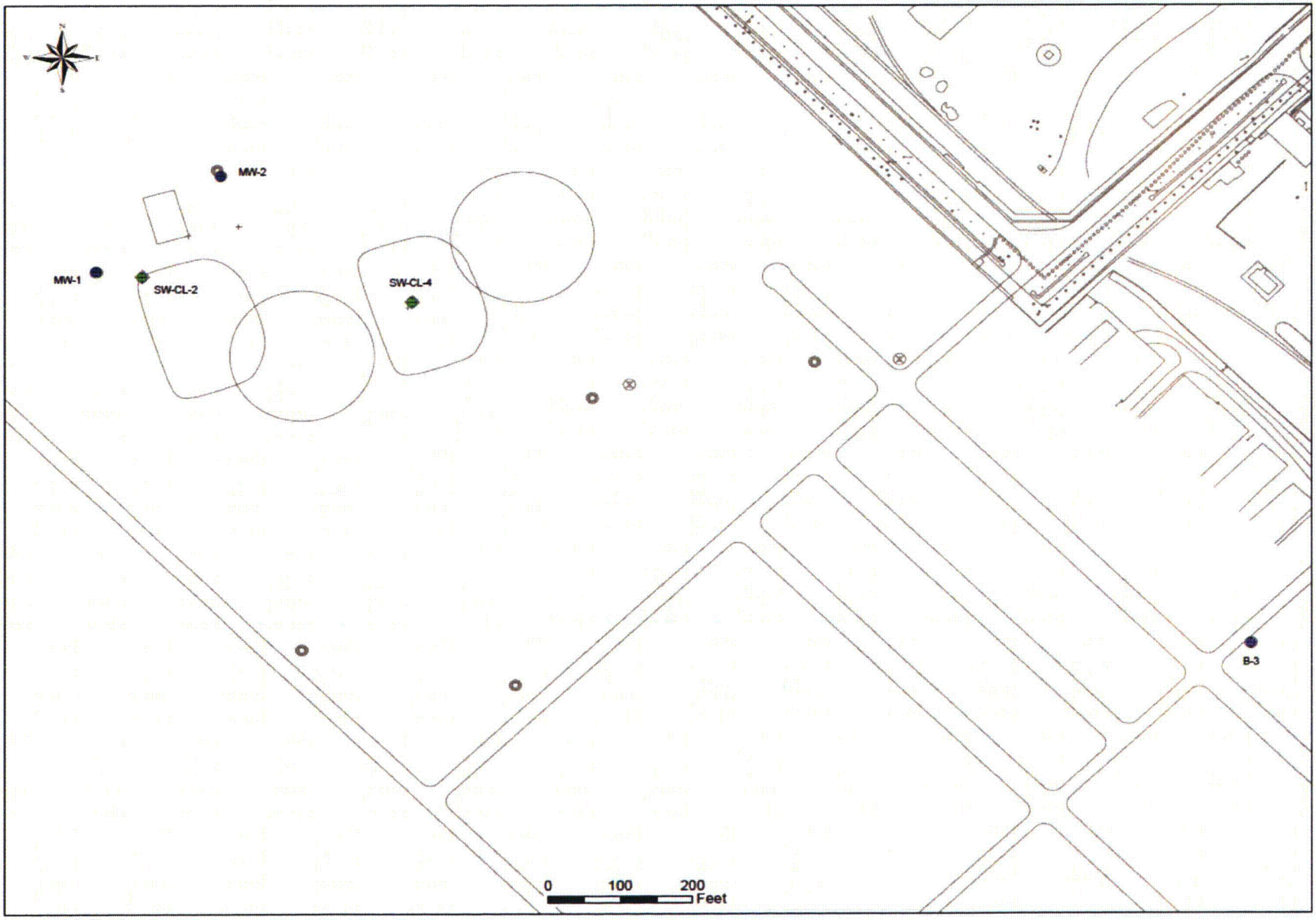

Figure A – 2
Sampling Locations South of Clinton Power Station

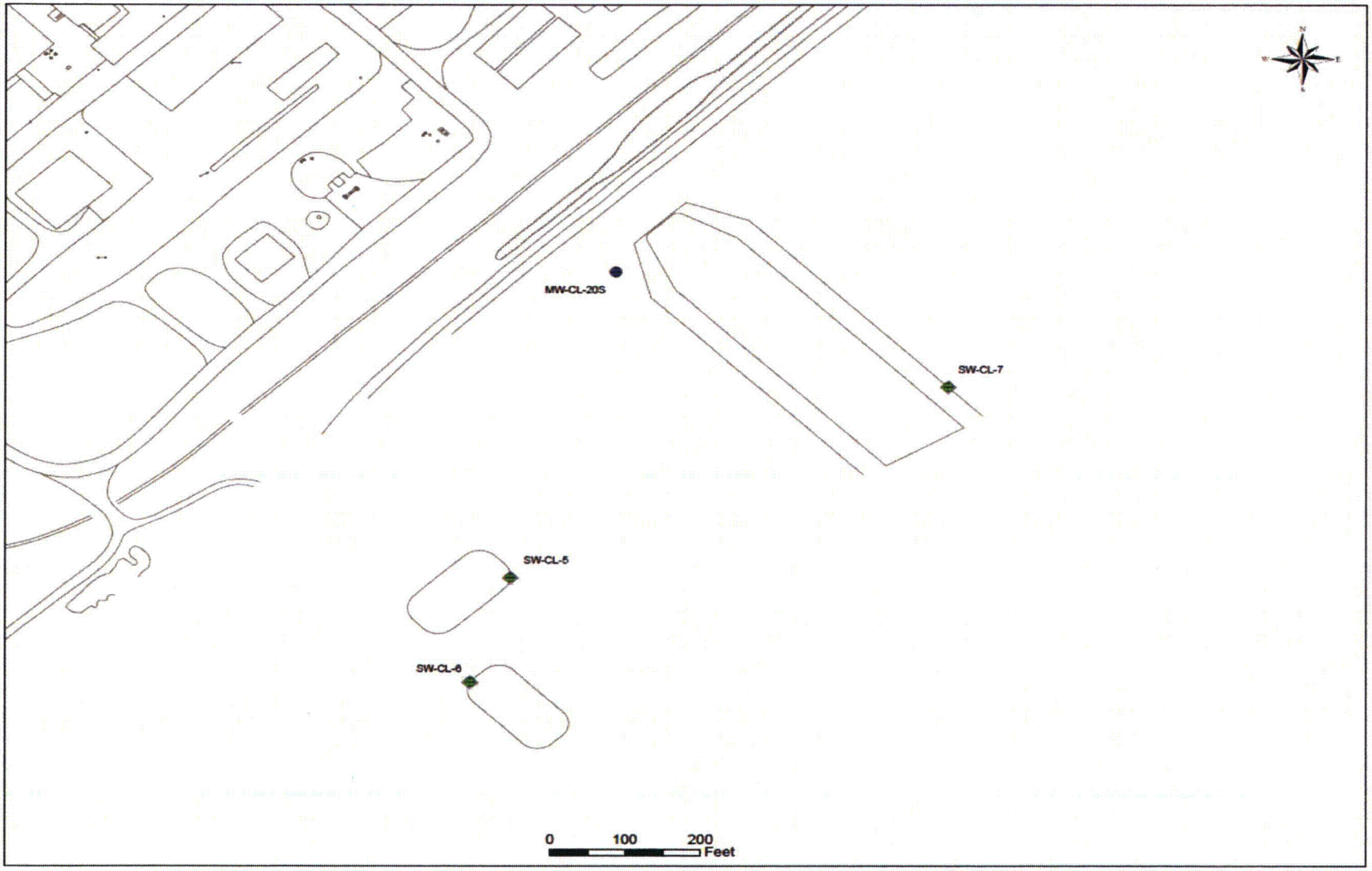

Figure A – 3
Sampling Locations East of Clinton Power Station

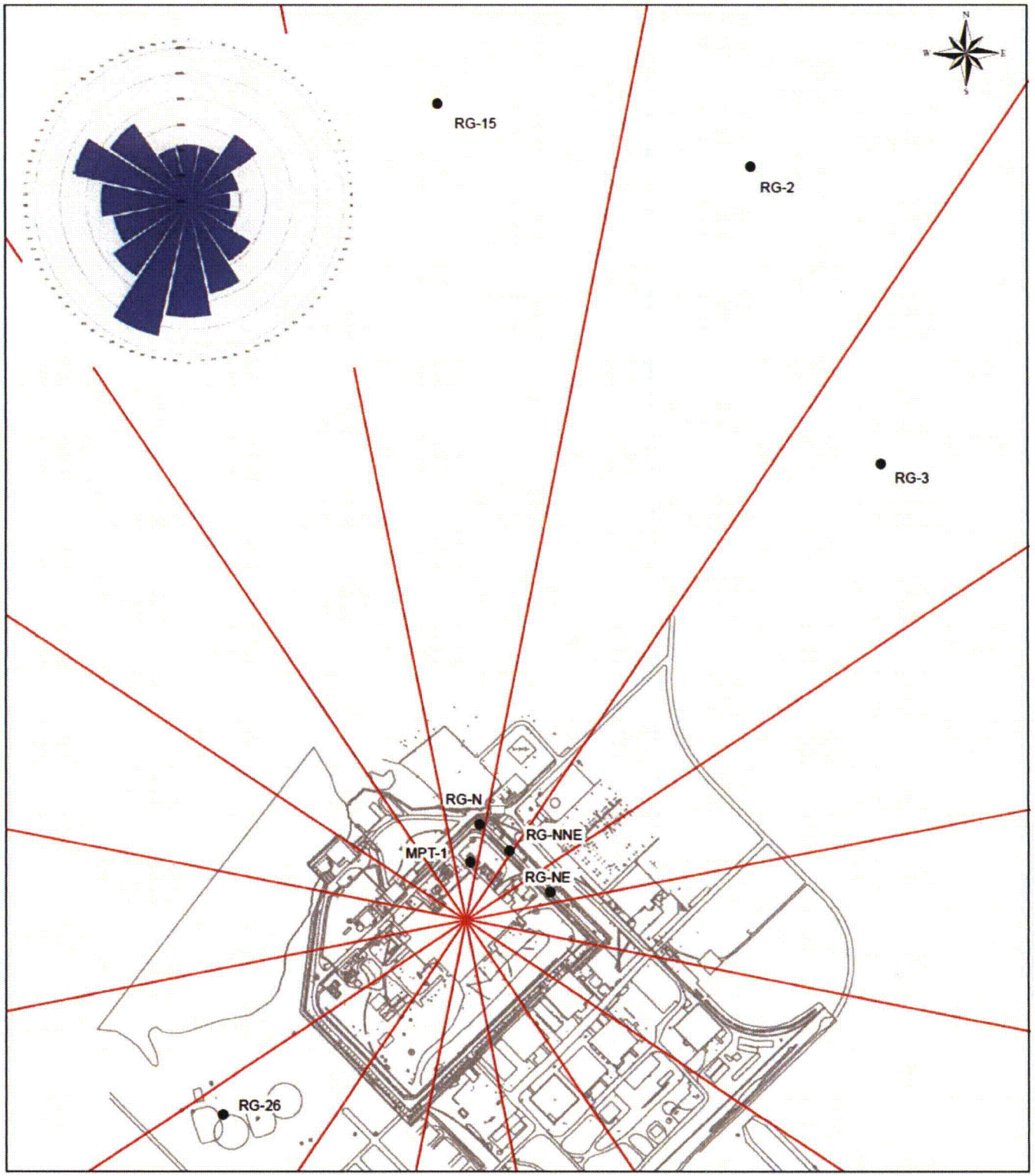

Figure A – 4
Recapture Sampling Locations of Clinton Power Station

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APPENDIX B

DATA TABLES OF THE ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)

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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 CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
B-3	02/25/14	< 192						
B-3	05/19/14	< 176						
B-3	08/18/14	< 160	< 3.4	< 0.5	< 1.1	< 0.4	2.3 ± 1.1	< 1.5
B-3	10/27/14	< 188						
MW-CL-1	02/25/14	< 193						
MW-CL-1	05/19/14	< 176						
MW-CL-1	08/18/14	< 159	< 6.8	< 0.8	< 1.5	< 0.4	2.6 ± 1.1	< 1.5
MW-CL-1	10/27/14	< 190						
MW-CL-12I	02/25/14	< 195						
MW-CL-12I	05/19/14	< 176						
MW-CL-12I	08/18/14	< 173	< 5.7	< 0.9	< 1.1	< 0.4	3.3 ± 1.1	< 1.5
MW-CL-12I	10/27/14	< 192						
MW-CL-13I	02/25/14	< 192						
MW-CL-13I	05/19/14	< 174						
MW-CL-13I	08/18/14	< 173	< 4.4	< 0.6	< 0.7	< 0.4	2.8 ± 1.1	< 1.5
MW-CL-13I	10/27/14	< 191						
MW-CL-13S	02/25/14	< 193						
MW-CL-13S	05/19/14	< 172						
MW-CL-13S	08/18/14	< 175	< 5.3	< 0.8	< 0.7	< 0.4	1.7 ± 1.0	< 1.5
MW-CL-13S	10/27/14	< 191						
MW-CL-14S	02/24/14	< 195						
MW-CL-14S	05/20/14	< 175						
MW-CL-14S	08/19/14	182 ± 119	< 3.6	< 0.7	< 1.3	< 1.1	10.0 ± 1.5	< 1.4
MW-CL-14S	10/28/14	257 ± 132						
MW-CL-15I	02/25/14	< 191						
MW-CL-15I	05/19/14	< 174						
MW-CL-15I	08/18/14	< 174	< 5.4	< 0.7	< 0.7	< 1.1	2.0 ± 1.0	< 1.4
MW-CL-15I	10/27/14	< 193						
MW-CL-15S	02/25/14	< 192						
MW-CL-15S	05/19/14	< 171						
MW-CL-15S	08/18/14	< 173	< 6.0	< 0.9	< 0.6	< 1.1	1.1 ± 0.7	< 1.4
MW-CL-15S	10/27/14	< 192						
MW-CL-16S	02/24/14	< 192						
MW-CL-16S	05/20/14	< 172						
MW-CL-16S	08/19/14	< 173	< 5.0	< 0.8	< 1.1	< 1.1	5.9 ± 1.2	< 1.4
MW-CL-16S	10/28/14	< 191						
MW-CL-17S	02/24/14	< 191						
MW-CL-17S	05/20/14	< 171						
MW-CL-17S	08/19/14	< 176	< 6.5	< 1.0	< 1.4	< 1.1	1.8 ± 1.1	< 1.4
MW-CL-17S	10/28/14	< 191						
MW-CL-18I	02/24/14	< 191						
MW-CL-18I	05/20/14	< 175						
MW-CL-18I	08/19/14	< 173	< 6.6	< 0.8	< 1.0	< 1.1	3.7 ± 1.1	< 1.4
MW-CL-18I	10/28/14	< 159						
MW-CL-18S	02/24/14	< 191						
MW-CL-18S	05/20/14	< 176						
MW-CL-18S	08/19/14	< 173	< 6.2	< 0.8	< 1.7	< 0.7	4.2 ± 1.4	< 1.6
MW-CL-18S	10/28/14	< 161						
MW-CL-19S	02/25/14	< 192						
MW-CL-19S	05/19/14	< 171						
MW-CL-19S	08/18/14	< 174	< 5.3	< 0.9	< 3.0	< 0.7	3.2 ± 1.5	< 1.6
MW-CL-19S	10/27/14	< 155						

TABLE B-I.1 **CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
MW-CL-2	02/25/14	< 193						
MW-CL-2	05/19/14	< 174						
MW-CL-2	08/18/14	< 162	< 5.5	< 0.7	< 1.0	< 0.4	< 1.5	< 1.5
MW-CL-2	10/27/14	< 191						
MW-CL-20S	02/25/14	< 192						
MW-CL-20S	05/19/14	< 174						
MW-CL-20S	08/18/14	< 170	< 5.8	< 1.0	< 1.1	< 0.7	3.0 ± 1.2	< 1.6
MW-CL-20S	10/27/14	< 161						
MW-CL-21S	02/25/14	202 ± 130						
MW-CL-21S	05/19/14	< 178						
MW-CL-21S	08/18/14	240 ± 121	< 5.4	< 0.9	< 0.8	< 0.7	< 1.6	< 1.6
MW-CL-21S	10/27/14	< 184						
MW-CL-22S	02/24/14	< 192						
MW-CL-22S	05/20/14	< 175						
MW-CL-22S	08/19/14	< 172	< 6.2	< 1.0	< 1.7	< 0.7	8.7 ± 1.4	< 1.6
MW-CL-22S	10/28/14	< 182						

Table B-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± SIGMA

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
B-3	08/18/14	< 35	< 30	< 3	< 4	< 8	< 4	< 9	< 4	< 7	< 3	< 4	< 27	< 7
MW-CL-1	08/18/14	< 44	< 85	< 4	< 4	< 9	< 4	< 8	< 5	< 8	< 4	< 4	< 32	< 10
MW-CL-12I	08/18/14	< 38	< 38	< 4	< 5	< 11	< 4	< 9	< 5	< 8	< 4	< 5	< 31	< 11
MW-CL-13I	08/18/14	< 30	< 32	< 3	< 4	< 9	< 4	< 7	< 4	< 6	< 3	< 3	< 25	< 8
MW-CL-13S	08/18/14	< 36	< 68	< 3	< 4	< 9	< 4	< 7	< 4	< 7	< 4	< 4	< 30	< 7
MW-CL-14S	02/24/14	< 37	< 67	< 4	< 4	< 8	< 4	< 7	< 4	< 7	< 4	< 4	< 31	< 7
MW-CL-14S	08/19/14	< 27	43 ± 26	< 3	< 3	< 6	< 2	< 5	< 3	< 5	< 3	< 3	< 20	< 6
MW-CL-15I	08/18/14	< 35	< 67	< 4	< 4	< 9	< 4	< 7	< 4	< 6	< 3	< 4	< 27	< 11
MW-CL-15S	08/18/14	< 35	< 29	< 3	< 4	< 8	< 3	< 7	< 3	< 6	< 3	< 3	< 24	< 8
MW-CL-16S	08/19/14	< 32	< 62	< 3	< 3	< 6	< 3	< 6	< 3	< 6	< 3	< 3	< 21	< 6
MW-CL-17S	08/19/14	< 36	< 35	< 4	< 4	< 7	< 4	< 8	< 4	< 8	< 4	< 4	< 29	< 8
MW-CL-18I	08/19/14	< 39	< 62	< 3	< 4	< 10	< 5	< 8	< 4	< 8	< 4	< 3	< 32	< 9
MW-CL-18S	08/19/14	< 40	< 75	< 4	< 5	< 10	< 4	< 8	< 5	< 7	< 4	< 4	< 31	< 8
MW-CL-19S	08/18/14	< 33	< 28	< 3	< 3	< 8	< 3	< 6	< 3	< 6	< 3	< 3	< 24	< 7
MW-CL-2	08/18/14	< 39	< 69	< 4	< 4	< 8	< 4	< 7	< 5	< 8	< 4	< 4	< 29	< 9
MW-CL-20S	08/18/14	< 26	< 61	< 3	< 3	< 6	< 3	< 5	< 3	< 5	< 3	< 3	< 22	< 8
MW-CL-21S	02/25/14	< 41	< 30	< 4	< 4	< 9	< 4	< 9	< 4	< 8	< 4	< 4	< 31	< 9
MW-CL-21S	08/18/14	< 38	< 75	< 3	< 4	< 8	< 3	< 7	< 4	< 7	< 4	< 4	< 28	< 9
MW-CL-21S	10/27/14	< 23	< 21	< 2	< 2	< 6	< 2	< 5	< 3	< 5	< 2	< 2	< 18	< 5
MW-CL-22S	08/19/14	< 40	< 38	< 4	< 4	< 10	< 3	< 8	< 5	< 8	< 4	< 5	< 31	< 9

TABLE B-I.3 **CONCENTRATIONS OF HARD TO DETECTS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Am-241	Cm-242	Cm-243/244	Pu-238	Pu-239/240	U-234	U-235	U-238	Fe-55	Ni-63
MW-CL-14S	08/19/14	< 0.03	< 0.03	< 0.14	< 0.03	< 0.05	< 0.03	< 0.04	< 0.05	< 184	< 4.2
MW-CL-21S	08/18/14	< 0.18	< 0.07	< 0.18	< 0.05	< 0.11	< 0.02	< 0.04	< 0.07	< 167	< 4.8

TABLE B-II.1 **CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
SW-CL-1	02/25/14	< 192
SW-CL-1	05/19/14	< 174
SW-CL-1	08/18/14	< 171
SW-CL-1	10/27/14	< 162
SW-CL-2	02/25/14	< 192
SW-CL-2	05/19/14	< 173
SW-CL-2	08/18/14	< 171
SW-CL-2	10/27/14	< 162
SW-CL-4	03/26/14	< 170
SW-CL-4	05/19/14	< 172
SW-CL-4	08/18/14	< 174
SW-CL-4	10/27/14	< 164
SW-CL-5	03/26/14	< 169
SW-CL-5	05/19/14	< 174
SW-CL-5	08/18/14	< 175
SW-CL-5	10/27/14	< 163
SW-CL-6	03/26/14	< 168
SW-CL-6	05/19/14	< 177
SW-CL-6	08/18/14	< 160
SW-CL-6	10/27/14	< 184
SW-CL-7	02/25/14	< 193
SW-CL-7	05/19/14	< 175
SW-CL-7	08/18/14	< 161
SW-CL-7	10/27/14	< 163
SEWAGE TREATMENT PLANT	02/25/14	< 196
SEWAGE TREATMENT PLANT	05/19/14	< 173
SEWAGE TREATMENT PLANT	08/18/14	< 158
SEWAGE TREATMENT PLANT	10/27/14	< 156

Table B-II.2 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014**

RESULTS IN UNITS OF PCI/LITER ± SIGMA

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
CL-SW-CL-1	08/18/14	< 39	< 38	< 4	< 4	< 8	< 4	< 8	< 3	< 7	< 4	< 4	< 30	< 9
CL-SW-CL-2	08/18/14	< 36	< 39	< 3	< 4	< 8	< 3	< 6	< 4	< 7	< 4	< 4	< 27	< 8
CL-SW-CL-4	08/18/14	< 38	< 68	< 3	< 4	< 10	< 5	< 7	< 4	< 7	< 4	< 4	< 28	< 10
CL-SW-CL-5	08/18/14	< 33	< 58	< 3	< 4	< 8	< 3	< 7	< 4	< 7	< 3	< 3	< 28	< 8
CL-SW-CL-6	08/18/14	< 34	< 24	< 3	< 3	< 8	< 3	< 7	< 3	< 7	< 3	< 3	< 25	< 9
CL-SW-CL-7	08/18/14	< 29	< 57	< 3	< 3	< 7	< 3	< 6	< 3	< 6	< 3	< 3	< 23	< 7
SEWAGE TREATMENT PLANT	08/18/14	< 27	< 23	< 2	< 3	< 7	< 3	< 5	< 3	< 5	< 3	< 3	< 22	< 8

TABLE B-III.1 CONCENTRATIONS OF TRITIUM IN PRECIPITATION WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2014

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
MPT-1	07/03/14	< 163
RG-15	07/03/14	< 166
RG-2	07/03/14	< 165
RG-26	07/03/14	< 167
RG-3	07/03/14	< 163
RG-N	07/03/14	< 167
RG-NE	07/03/14	< 165
RG-NNE	07/03/14	< 164

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