Clinton Power Station
8401 Power Road
Clinton, IL 61727

U-604277
April 29, 2016

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Clinton Power Station, Unit 1
Facility Operating License No. NPF-62
NRC Docket No. 50-461

Subject: Clinton Power Station 2015 Annual Radiological Environmental Operating Report

Exelon Generating Company, LLC (Exelon), Clinton Power Station is submitting the 2015 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, 2015 through December 31, 2015.

This report provides the results of the Radiological Environmental Monitoring Program as specific in Section 3/4 and 6.1 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,

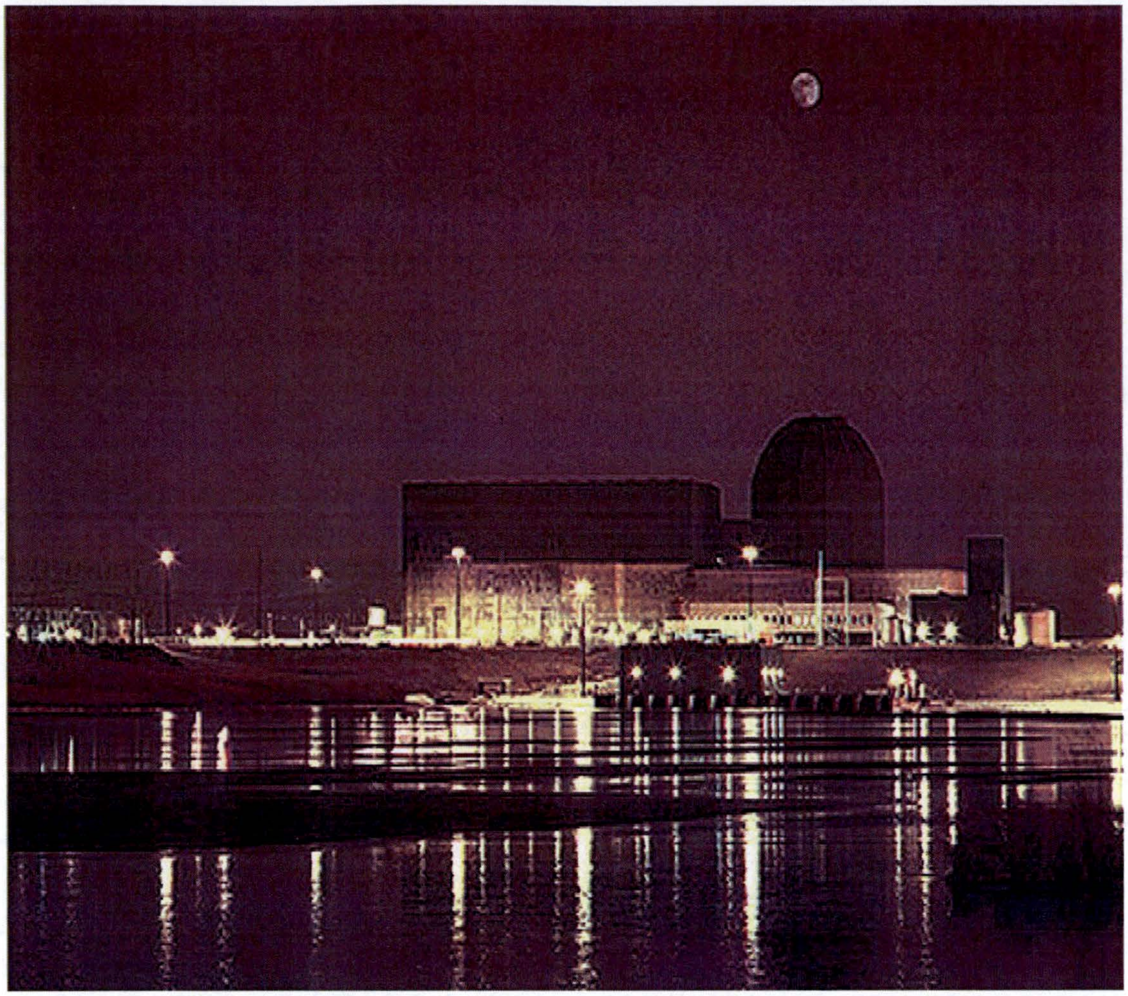
Theodore R. Stoner
Site Vice President
Clinton Power Station

dra/bsz

Attachments:
Annual Radiological Environmental Operating Report

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

IE25
NRR



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Docket No: 50-461

CLINTON POWER STATION

Annual Radiological Environmental Operating Report

January 1 Through December 31, 2015

Prepared By

Teledyne Brown Engineering
Environmental Services

Exelon Generation.

Clinton Power Station
Clinton, IL 61727

April 2016

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Appendices

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 January 1, 2015 through December 31, 2015. During that time period, 1,590 analyses were performed on 1,463 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 2015. 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 in 2015 due to the release of gaseous effluents from CPS was 2.53 E-03 or 0.00253 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.

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

High sensitivity I-131 analyses and gamma analyses were performed on cow milk samples. 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 February 15, 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 February 27, 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 January 1, 2015 through December 31, 2015.

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 2015. Sample locations and descriptions can be found in Tables B–1 and B–2, and Figures B–1 through B–4, 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 composite 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 and channel catfish, 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, which is located about 50 miles upwind of the station. 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, which is located 16 miles upwind of the station. 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 an independent laboratory for analysis.

Milk samples were collected biweekly at one location (CL-116) from May through October to coincide with the grazing season, and monthly from November through April. All samples were collected in new unused plastic bottles from the bulk tank at the dairy farm, 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, which is located 12.5 miles upwind of the station. 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, which is located 14 miles WSW of the station. 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, CL-65, 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 meteorological sectors around the site, where estimated annual dose from CPS, if detected, would be most significant;

3. On hills free from local obstructions and within sight of the HVAC and VG stacks (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 2015. 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 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" value. 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: 12 nuclides, 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: 13 nuclides, 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: 9 nuclides, 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 6.0 of the Station's ODCM.

Exceptions/Anomalies

January 14, 2015, IR 02437296

While performing the ODCM weekly inspection the upstream non-ODCM Water Compositor Sampler, CL-99, was found not running. North Fork Creek was found to be at a low level and frozen due to below zero temperatures.

March 04, 2015, IR 02463282

While performing the ODCM weekly inspection the upstream non-ODCM Water Compositor Sampler, CL-99, was found not running. North Fork Creek was found to be at a low level and frozen due to below zero temperatures.

March 11, 2015, IR 02468075

While performing the ODCM weekly inspection the upstream non-ODCM Water Compositor Sampler, CL-99, was found not running. North Fork Creek was found to be at a low level and frozen due to below zero temperatures.

May 07, 2015, IR 02497332

While performing the ODCM weekly air sample collection and equipment verification activities on May 06, 2015, vendor Environmental Inc., Midwest Laboratories (EIML) discovered that the ODCM air samplers CL-2 and CL-3 had no power. In the absence of any severe storms or power outages, it was indeterminate as to why there was no power. However, the minimum sample volume was reached.

July 01, 2015, IR 02522637

At 1244 hours on 07/01/15 while performing weekly checks of ODCM Water Compositors, CL-90 was found with its ground fault interrupter (GFI) 'tripped' and observed to have less than the weekly composite sample collection volume for the monthly analysis. A supplemental 'grab' sample from the process stream was collected and added to the monthly collection container. The GFI was reset and CL-90 was returned to service.

July 15, 2015, IR 02528489

While performing the weekly inspection on 07/15/15 of ODCM Water Compositors, CL-99 was found not running with the GFI 'tripped' and the sample collection container tipped over inside of the Dog House enclosure. The last weekly inspection performed on July 08, 2015 revealed both as found and as left conditions as being satisfactory. During this 7 day window, Murray and Trettel, our fleetwide meteorological vendor, reported that Lincoln County had 4.5 inches, Bloomington had 4.6 inches and DeWitt County had 4 inches of rain which all contributed to the North Fork Creek flooding. This flooding contributed to the 'as found' condition noted.

August 19, 2015, IR 02543695

At 1046 hours on 08/19/15 while performing weekly checks of ODCM Water Compositors, CL-90 was found with its GFI 'tripped' and observed to have less than the weekly composite sample collection volume for the monthly analysis. A supplemental 'grab' sample from the process stream was collected and added to the monthly collection container. The GFI was reset and CL-90 was returned to service.

August 21, 2015, IR 02545496

During the execution of Work Order #1614812-05 for the recently scheduled Potable Water Outage that commenced at 0325 hours, 08/21/15 the potable water was secured, drained and potable water pumps were placed in Manual OFF. This prevented ODCM Water Compositor CL-14 from obtaining hourly composite water samples throughout the duration of the Potable Water Outage that was restored to service at 1800 hours on 08/22/15.

November 14, 2015, IR 02588060

During the execution of Clearance Order #129314 and de-energized Circuit 302 per WO 1863079-06 for the recently scheduled outage, potable water was secured at 0006 hours on 11/14/15. This prevented ODCM Water Compositor CL-14 from obtaining hourly composite water sample throughout the duration of the Potable Water Outage that was restored to service at 2055 hours on 11/14/15.

November 18, 2015, IR 02589324

During the weekly checks of ODCM Water compositors on 11/15/15, at 12:35, CL-90 was found with its GFI 'tripped'. The breaker was reset but the GFI 'tripped' after the initial reset. There was standing water within the doghouse enclosure, which contributed to the GFI tripping both times.

Throughout 2015, the following IRs were generated to document Program exceptions that were entered into the corrective action program for trending purposes.

Missed Samples

May 13, 2015, IR 02500319

The ODCM air samplers CL-2 and CL-3 lost power on 05/06/15 (IR #02497332). A portable generator was placed to supply power to CL-2 & CL-3 air monitoring stations. The minimum sample volume was not reached for that sampling period.

June 03, 2015, IR 02512981

While performing the weekly ODCM Surveillance on Wednesday, June 10, 2015 for the collection of particulate and iodine filters and cartridges, the sample collector noted that upon arrival at CL-7, the sample pump was not running. Instead of the typical run time of approximately 168 hours, the timer registered 2 hours and 6 minutes. The minimum volume was not reached for that sampling period.

June 13, 2015, IR 02515452

The ODCM air samplers CL-2 and CL-3 lost power some time on or before June 13, 2015 at 0230 hours when first observed by a Station Security Officer (IR #02514143). Both air sample stations now have back-up generator power, returning both sample stations to service. Minimum sample volume was not collected for that sampling period.

July 29, 2015, IR 02534576

During the Weekly Sample Collection Surveillance it was discovered that the two (2) recently changed out Environmental DLRs for CL-51, placed there on June 25, 2015 as part of the 3rd Quarter Exchange, were found missing. The adjacent farm field's culvert had appeared to be recently mowed. A search was conducted of the surrounding area. There was no sign of the DLRs, the PVC sample holder or the stanchion pole that it was connected to.

August 20, 2015, IR 02546978

While performing the Weekly OCDM Surveillance on Wednesday, 08/26/15 for the collection of particulate filters and iodine cartridges, it was discovered that there was no electrical power to CL-8. Instead of the typical run time of approximately 168 hours, the timer registered 19 hours and 36 minutes. The minimum volume was not reached for that sample.

September 24, 2015, IR 02560026

During the 4th Quarter Exchange of Environmental DLRs, it was discovered the CL-46 dosimeters placed on 06/25/15 as part of the 3rd Quarter Exchange were found missing. The adjacent farm field had appeared to be recently mowed. A search was conducted of the surrounding area. There was no sign of the DLRs or the PVC sample holder, but the stanchion pole was found lying in the field.

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

There were no changes to the program in 2015.

IV. Results and Discussion

A. Aquatic Environment

1. Surface Water

Composite samples were taken hourly 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). No plant produced radionuclides were detected and all required LLDs were met.

2. Drinking Water

Monthly composite samples were taken hourly 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 plant produced radionuclides 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). No plant produced radionuclides were detected and all required LLDs were met.

4. Fish

Fish samples comprised of carp, largemouth bass, bluegill, crappie and channel catfish 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). No plant produced radionuclides were detected and all 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). No plant produced radionuclides were detected and all 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 43 E–3 pCi/m^3 with a mean of 19 E–3 pCi/m^3. The results from the Intermediate Distance location (Group II) ranged from 6 to 42 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 7 to 36 E–3 pCi/m^3 with a mean of 19 E–3 pCi/m^3. Comparison of the 2015 air particulate data with previous years' data indicate no measurable impact from the operation of CPS. 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). No plant produced radionuclides 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 to coincide with the grazing season, and monthly November through April. 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 plant produced radionuclides 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). No plant produced radionuclides 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). No plant produced radionuclides 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 214 OSLD measurements were made in 2015. The average dose from the inner ring was 23.4 mRem/quarter. The average dose from the outer ring was 23.8 mRem/quarter. The average dose from the special interest group was 23.1 mRem/quarter. The average dose from the supplemental group was 22.1 mRem/quarter. The quarterly measurements ranged from 17.3 to 28.0 mRem/quarter.

The inner ring and outer ring measurements compared well to the Control Station, CL-11, which ranged from 19.9 mRem/quarter to 23.6

mRem/quarter with an average measurement of 21.9 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 2015 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 8.0. 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 the Land Use 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	1.5	> 8
3 NE	2.1	3.5	> 8
4 ENE	2.9	2.9	> 8
5 E	1.7	1.7	> 8
6 ESE	5.1	5.3	> 8
7 SE	4.4	> 8	> 8
8 SSE	2.9	4.3	> 8
9 S	4.8	4.8	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	4.7	> 8
16 NNW	2.1	2.1	2.1

E. Errata Data

There was no errata data for 2015.

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 25 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.

For the TBE laboratory, 129 out of 139 analyses performed met the specified acceptance criteria. Ten analyses (AP - Cr-51, U-234/233, Gr A, Sr-90; Soil Sr-90; Water - Ni-3, Sr-89, Sr-90, and U natural; Vegetation

Sr-90 samples) did not meet the specified acceptance criteria for the following reasons:

Note: The Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP) samples are created to mimic conditions found at DOE sites which do not resemble typical environmental samples obtained

1. Teledyne Brown Engineering's Analytics' June 2015 air particulate Cr-51 result of 323 ± 45.5 pCi was higher than the known value of 233 pCi with a ratio of 1.39. The upper ratio of 1.30 (acceptable with warning) was exceeded. The air particulate sample is counted at a distance above the surface of the detector to avoid detector summing which could alter the results. Chromium-51 has the shortest half-life (27.7 days) and the lowest gamma energy (320.08 keV) of this mixed nuclide sample. Additionally, Cr-51 has only one gamma energy and also has a low intensity (9.38 gamma photons produced per 100 disintegrations). This geometry produces a larger error for the Cr-51 and other gamma emitters as any distance from the detector decreases the counting rate and the probability of accurately detecting the nuclide energy. Taking into consideration the uncertainty, the activity of Cr-51 overlaps with the known value at a ratio of 1.19, which would statistically be considered acceptable. NCR 15-18

2. Teledyne Brown Engineering's MAPEP March 2015 soil Sr-90 result of 286 Total Bq/kg was lower than the known value of 653 Bq/kg, exceeding the lower acceptance range of 487 Bq/kg. The failure was due to incomplete digestion of the sample. Incomplete digestion of samples causes some of the sample to be left behind and is not present in the digested sample utilized for analysis. The procedure has been updated to include a more robust digestion using stirring during the heating phase. The MAPEP September 2014 soil Sr-90 series prior to this study was evaluated as acceptable with a result of 694 and an acceptance range of 601 – 1115 Bq/kg. The MAPEP September 2015 series soil Sr-90 after this study was evaluated as acceptable with a result of 429 and an acceptance range of 298 – 553 Bq/kg. We feel the issue is specific to the March 2015 MAPEP sample. NCR 15-13

3. Teledyne Brown Engineering's MAPEP March 2015 air particulate U-234/233 result of 0.0211 ± 0.0120 Bq/sample was higher than the known value of 0.0155 Bq/sample, exceeding the upper acceptance range of 0.0202 Bq/sample. Although evaluated as a failure, taking into consideration the uncertainty, TBE's result would overlap with the known value, which is statistically considered

acceptable. MAPEP spiked the sample with significantly more U-238 activity (a found to known ratio of 0.96) than the normal U-234/233. Due to the extremely low activity, it was difficult to quantify the U-234/233. NCR 15-13

4. Teledyne Brown Engineering's MAPEP March 2015 air particulate gross alpha result of 0.448 Bq/sample was lower than the known value of 1.77 Bq/sample, exceeding the lower acceptance range of 0.53 Bq/sample. The instrument efficiency used for gross alpha is determined using a non-attenuated alpha standard. The MAPEP filter has the alphas embedded in the filter, requiring an attenuated efficiency. When samples contain alpha particles that are embedded in the sample media, due to the size of the alpha particle, some of the alpha particles are absorbed by the media and cannot escape to be counted. When the sample media absorbs the alpha particles this is known as self-absorption or attenuation. The calibration must include a similar configuration/media to correct for the attenuation. In order to correct the low bias, TBE will create an attenuated efficiency for MAPEP air particulate filters. The MAPEP September series air particulate gross alpha result of 0.47 Bq/sample was evaluated as acceptable with a range of 0.24 – 1.53 Bq/sample. Unlike the MAPEP samples, air particulate Gross alpha analyses for power plants are not evaluated as a direct count sample. Power plant air particulate filters for gross alpha go through an acid digestion process prior to counting and the digested material is analyzed. NCR 15-13

5. Teledyne Brown Engineering's MAPEP September water Ni-63 result of 11.8 ± 10.8 Bq/L was higher than the known value of 8.55 Bq/L, exceeding the upper acceptance range of 11.12 Bq/L. The Ni-63 half-life is approximately 100 years. Nickel-63 is considered to be a "soft" or low energy beta emitter, which means that the beta energy is very low. The maximum beta energy for Ni-63 is approximately 65 keV, much lower than other more common nuclides such as Co-60 (maximum beta energy of 1549 keV). The original sample was run with a 10 mL aliquot which was not sufficient for the low level of Ni-63 in the sample. The rerun aliquot of 30 mL produced an acceptable result of 8.81 Bq/L. NCR 15-21

6. Teledyne Brown Engineering's MAPEP September air particulate Sr-90 result of 1.48 Bq/sample was lower than the known value of 2.18 Bq/sample, exceeding the lower acceptance range of 1.53 Bq/sample. In the past, MAPEP has added substances (unusual compounds found in DOE complexes) to various matrices that have resulted in incomplete removal of the isotope of interest for

the laboratories analyzing the cross checks. TBE suspects that this may be the cause of this error. Many compounds, if not properly accounted for or removed in the sample matrix, can cause interferences to either indicate lower activity or higher activity. TBE will no longer analyze the air particulate Sr-90 through MAPEP but will participate in the Analytics cross check program to perform both Sr-89 and Sr-90 in the air particulate matrix. NCR 15-21

7. Teledyne Brown Engineering's MAPEP September vegetation Sr-90 result of 0.386 Bq/sample was lower than the known value of 1.30 Bq/sample, exceeding the lower acceptance range of 0.91 Bq/sample. In the past, MAPEP has added substances (unusual compounds found in DOE complexes) to various matrices that have resulted in incomplete removal of the isotope of interest for the laboratories analyzing the cross checks. TBE suspects that this maybe the cause of this error. Many compounds, if not properly accounted for or removed in the sample matrix, can cause interferences to either indicate lower activity or higher activity. Results from previous performance evaluations were reviewed and shown to be acceptable. NCR 15-21

8. & 9. Teledyne Brown Engineering's ERA May water Sr-89/90 results of 45.2 and 28.0 pCi/L, respectively were lower than the known values of 63.2 and 41.9 pCi/L, respectively, exceeding the lower acceptance limits of 51.1 and 30.8 pCi/L, respectively. The yields were on the high side of the TBE acceptance range, which indicates the present of excess calcium contributed to the yield, resulting in low results. NCR 15-09

10. Teledyne Brown Engineering's ERA November water Uranium natural result of 146.9 pCi/L was higher than the known value of 56.2 pCi/L, exceeding the upper acceptance limit of 62.4 pCi/L. The technician failed to dilute the original sample, but used the entire 12 mL sample. When the results were recalculated without the dilution and using the 12 mL aliquot, the result of 57.16 agreed with the assigned value of 56.2. NCR 15-19

For the EIML laboratory, 90 of 94 analyses met the specified acceptance criteria. Four analyses (Water – Co-57, Fe-55; AP – Co-57; Soil – Sr-90) did not meet the specified acceptance criteria for the following reasons:

1. The Environmental Inc., Midwest Laboratory's MAPEP February 2015 water Co-57 result of 10.2 Bq/L was lower than the known value of 29.9 Bq/L, exceeding the lower control limit of 20.9 Bq/L. The reported value should have been 27.84, which would have

been evaluated as acceptable. A data entry error resulted in a non-acceptable result.

2. The Environmental Inc., Midwest Laboratory's MAPEP February 2015 AP Co-57 result of 0.04 Bq/sample was lower than the known value of 1.51 Bq/ sample, exceeding the lower control limit of 1.06 Bq/sample. The reported value should have been 1.58 Bq/sample, which would have been evaluated as acceptable. A data entry error resulted in a non-acceptable result.

3. The Environmental Inc., Midwest Laboratory's MAPEP August 2015 soil Sr-90 result of 231 Bq/kg was lower than the known value of 425 Bq/kg, exceeding the lower control limit of 298 Bq/kg. The incomplete separation of calcium from strontium caused a failed low result. The reanalysis result of 352 Bq/kg fell within acceptance criteria.

4. The Environmental Inc., Midwest Laboratory's MAPEP August 2015 water Fe-55 result of 4.2 Bq/L was lower than the known value of 13.1 Bq/L, exceeding the lower control limit of 9.2 Bq/L. The known activity was below the routine laboratory detection limits for the available aliquot fraction.

V. References

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Operations) – Effluent Streams and the Environment," Revision 1, February 1979.

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APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT SUMMARY

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2015

NAME OF FACILITY: CLINTON POWER STATION
LOCATION OF FACILITY: DEWITT COUNTY, IL
DOCKET NUMBER: 50-461
REPORTING PERIOD: 2015

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
SURFACE WATER (PCI/LITER)	I-131	12	1	<LLD	NA	-		0
	H-3	16	2000	<LLD	<LLD	-		0
	GAMMA	48						
	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
	NB-95		15	<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, 2015

NAME OF FACILITY: CLINTON POWER STATION **DOCKET NUMBER: 50-461**
LOCATION OF FACILITY: DEWITT COUNTY, IL **REPORTING PERIOD: 2015**

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
SURFACE WATER (PCI/LITER)	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

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2015

NAME OF FACILITY: CLINTON POWER STATION LOCATION OF FACILITY: DEWITT COUNTY, IL				DOCKET NUMBER: REPORTING PERIOD:		50-461 2015		
				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
DRINKING WATER (PCI/LITER)	I-131	12	1	<LLD	NA	-		0
	GAMMA	12						
	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

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NAME OF FACILITY: CLINTON POWER STATION **DOCKET NUMBER:** 50-461
LOCATION OF FACILITY: DEWITT COUNTY, IL **REPORTING PERIOD:** 2015

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
DRINKING WATER (PCI/LITER)	CS-134		15	<LLD	NA	-		0
	CS-137		18	<LLD	NA	-		0
	BA-140		60	<LLD	NA	-		0
	LA-140		15	<LLD	NA	-		0
	CE-144		NA	<LLD	NA	-		0
WELL WATER (PCI/LITER)	H-3	12	2000	<LLD	NA	-		0
	GAMMA	12						
	MN-54		15	<LLD	NA	-		0
	CO-58		15	<LLD	NA	-		0

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2015

NAME OF FACILITY:	CLINTON POWER STATION	DOCKET NUMBER:	50-461
LOCATION OF FACILITY:	DEWITT COUNTY, IL	REPORTING PERIOD:	2015

				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
WELL WATER (PCI/LITER)	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
	CS-137		18	<LLD	NA	-		0
	BA-140		60	<LLD	NA	-		0

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2015

NAME OF FACILITY: CLINTON POWER STATION DOCKET NUMBER: 50-461
LOCATION OF FACILITY: DEWITT COUNTY, IL REPORTING PERIOD: 2015

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
WELL WATER (PCI/LITER)	LA-140		15	<LLD	NA	-		0
	CE-144		NA	<LLD	NA	-		0
FISH (PCI/KG WET)	GAMMA	16						
	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

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2015

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

LOCATION OF FACILITY: DEWITT COUNTY, IL — REPORTING PERIOD: 2015

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
FISH (PCI/KG WET)	ZR-95		NA	<LLD	<LLD	-		0
	CS-134		130	<LLD	<LLD	-		0
	CS-137		150	<LLD	<LLD	-		0
	BA-140		NA	<LLD	<LLD	-		0
	LA-140		NA	<LLD	<LLD	-		0
	CE-144		NA	<LLD	<LLD	-		0
SEDIMENT (PCI/KG DRY)	GAMMA	4						
	MN-54		NA	<LLD	<LLD	-		0
	CO-58		NA	<LLD	<LLD	-		0

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LOCATION OF FACILITY: DEWITT COUNTY, IL **REPORTING PERIOD:** 2015

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
SEDIMENT (PCI/KG DRY)	FE-59		NA	<LLD	<LLD	-		0
	CO-60		NA	<LLD	<LLD	-		0
	ZN-65		NA	<LLD	<LLD	-		0
	NB-95		NA	<LLD	<LLD	-		0
	ZR-95		NA	<LLD	<LLD	-		0
	CS-134		150	<LLD	<LLD	-		0
	CS-137		180	<LLD	<LLD	-		0
	BA-140		NA	<LLD	<LLD	-		0

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NAME OF FACILITY: CLINTON POWER STATION | **DOCKET NUMBER: 50-461**
LOCATION OF FACILITY: DEWITT COUNTY, IL | **REPORTING PERIOD: 2015**

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
SEDIMENT (PCI/KG DRY)	LA-140		NA	<LLD	<LLD	-		0
	CE-144		NA	<LLD	<LLD	-		0
AIR PARTICULATE (E-3 PCI/CU.METER)	GR-B	514	10	19 (462/462) (6/43)	19 (52/52) (7/36)	20 (50/50) (9/43)	CL-3 INDICATOR CLINTON'S SECONDARY ACCESS ROAD 0.7 MILES NE OF SITE	0
	GAMMA	40						
	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

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2015

NAME OF FACILITY: CLINTON POWER STATION **DOCKET NUMBER:** 50-461
LOCATION OF FACILITY: DEWITT COUNTY, IL **REPORTING PERIOD:** 2015

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
AIR PARTICULATE (E-3 PCI/CU.METER)	CS-134		50	<LLD	<LLD	-		0
	CS-137		60	<LLD	<LLD	-		0
	CE-141		NA	<LLD	<LLD	-		0
	CE-144		NA	<LLD	<LLD	-		0
AIR IODINE (E-3 PCI/CU.METER)	GAMMA	514						
	I-131		70	<LLD	<LLD	-		0
MILK (PCI/LITER)	I-131	19	1	NA	<LLD	-		0
	GAMMA	19						
	MN-54		NA	NA	<LLD	-		0
	CO-58		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, 2015

NAME OF FACILITY:	CLINTON POWER STATION	DOCKET NUMBER:	50-461
LOCATION OF FACILITY:	DEWITT COUNTY, IL	REPORTING PERIOD:	2015

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
MILK (PCI/LITER)	FE-59		NA	NA	<LLD	-		0
	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

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, 2015

NAME OF FACILITY: CLINTON POWER STATION — DOCKET NUMBER: 50-461
LOCATION OF FACILITY: DEWITT COUNTY, IL — REPORTING PERIOD: 2015

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
MILK (PCI/LITER)	LA-140		15	NA	<LLD	-		0
	CE-144		NA	NA	<LLD	-		0
VEGETATION (PCI/KG WET)	GAMMA	48						
	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

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, 2015

NAME OF FACILITY: CLINTON POWER STATION				DOCKET NUMBER: 50-461				
LOCATION OF FACILITY: DEWITT COUNTY, IL				REPORTING PERIOD: 2015				
				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
VEGETATION (PCI/KG WET)	ZR-95		NA	<LLD	<LLD	-		0
	I-131		60	<LLD	<LLD	-		0
	CS-134		60	<LLD	<LLD	-		0
	CS-137		80	<LLD	<LLD	-		0
	BA-140		NA	<LLD	<LLD	-		0
	LA-140		NA	<LLD	<LLD	-		0
	CE-144		NA	<LLD	<LLD	-		0
GRASS (PCI/KG WET)	GAMMA	52						
	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, 2015

NAME OF FACILITY: CLINTON POWER STATION **DOCKET NUMBER:** 50-461
LOCATION OF FACILITY: DEWITT COUNTY, IL **REPORTING PERIOD:** 2015

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
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

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, 2015

NAME OF FACILITY: CLINTON POWER STATION — **DOCKET NUMBER:** 50-461
LOCATION OF FACILITY: DEWITT COUNTY, IL — **REPORTING PERIOD:** 2015

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
GRASS (PCI/KG WET)	CS-137		80	<LLD	<LLD	-		0
	BA-140		NA	<LLD	<LLD	-		0
	LA-140		NA	<LLD	<LLD	-		0
	CE-144		NA	<LLD	<LLD	-		0
DIRECT RADIATION (MILLIREM/QTR.)	DLR-QUARTERLY	214	NA	23.2 (210/210) (17.3/28.0)	21.9 (4/4) (19.9/23.6)	25.3 (3/3) (24.3/26.3)	CL-51 INDICATOR 4.4 MILES NW	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, 2015

Location	Location Description	Distance & Direction From Site
A. Surface Water		
Cl-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, 2015

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, 2015

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, 2015

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, 2015

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

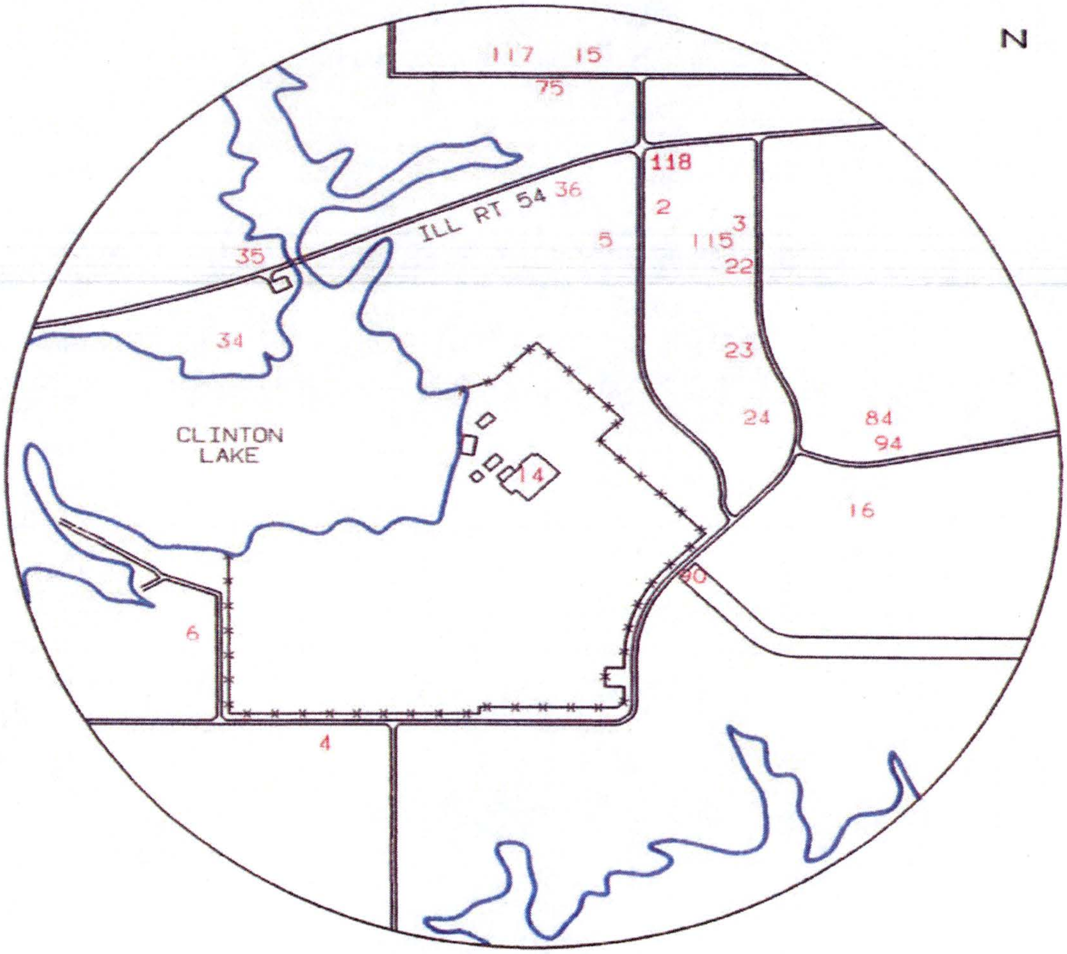

Figure B-1
Environmental Sampling Locations Within One
Mile of the Clinton Power Station, 2015

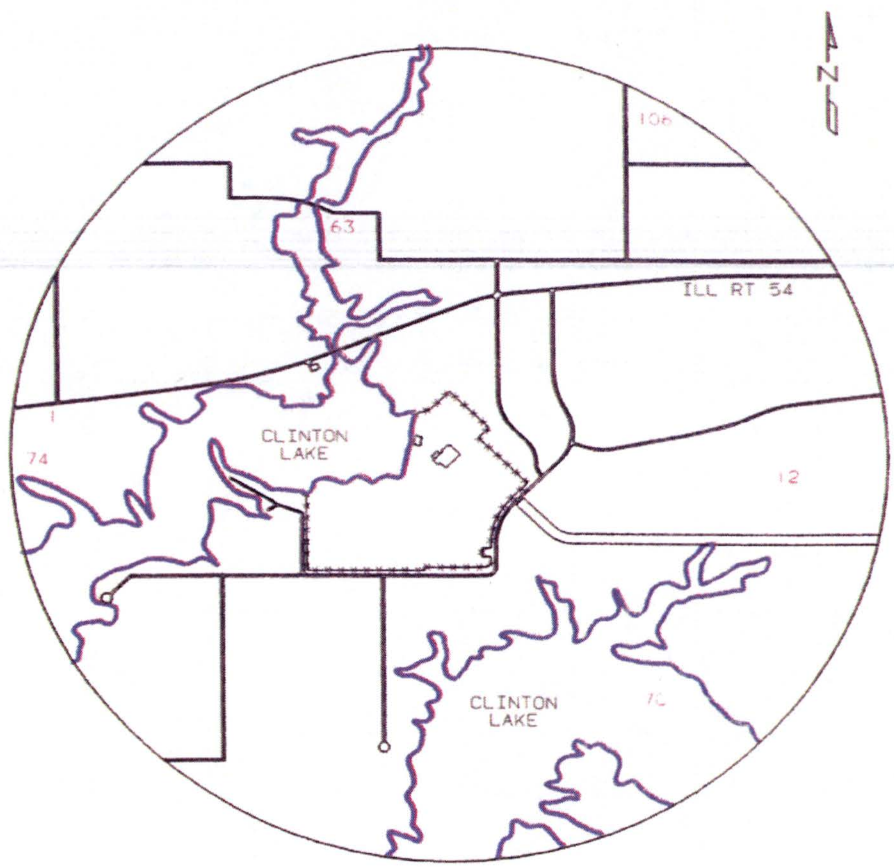

Figure B-2
Environmental Sampling Locations Between One and Two
Miles of the Clinton Power Station, 2015

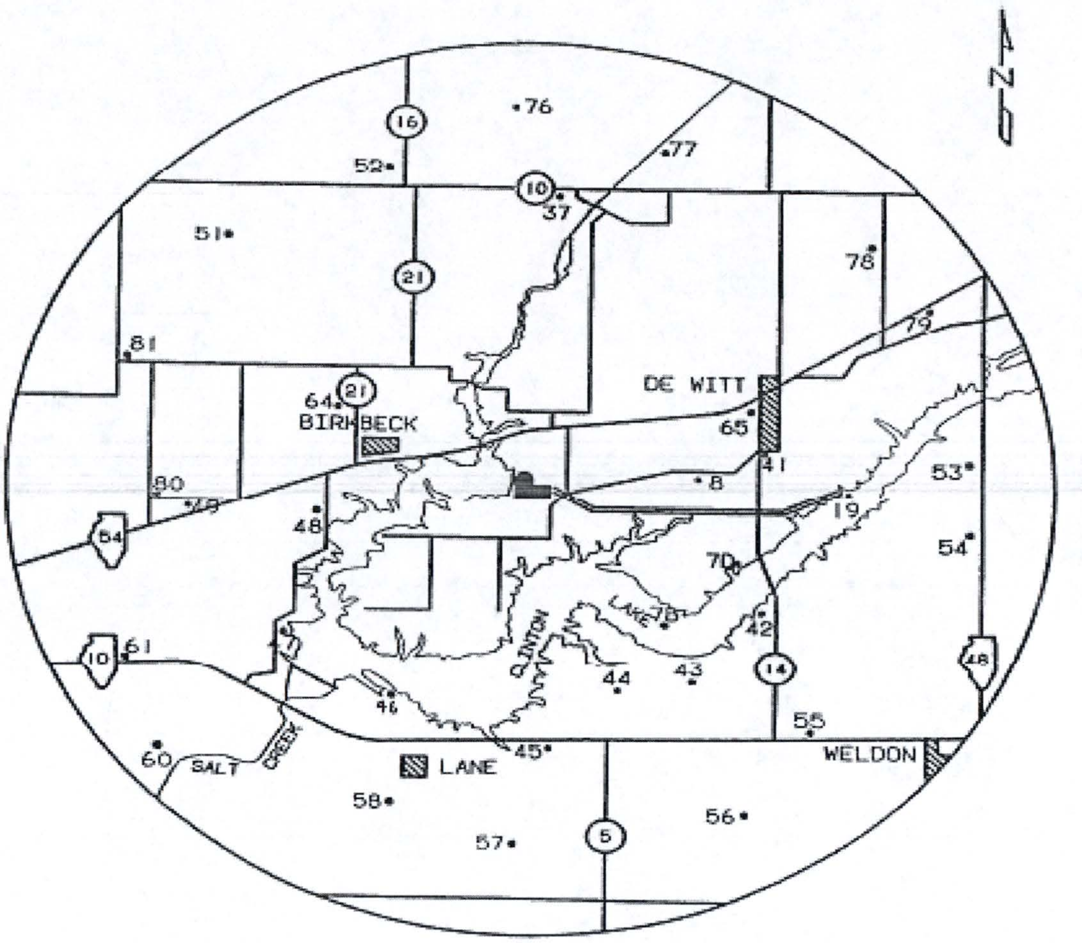

Figure B-3
Environmental Sampling Locations between Two and Five Miles from the Clinton Power Station, 2015

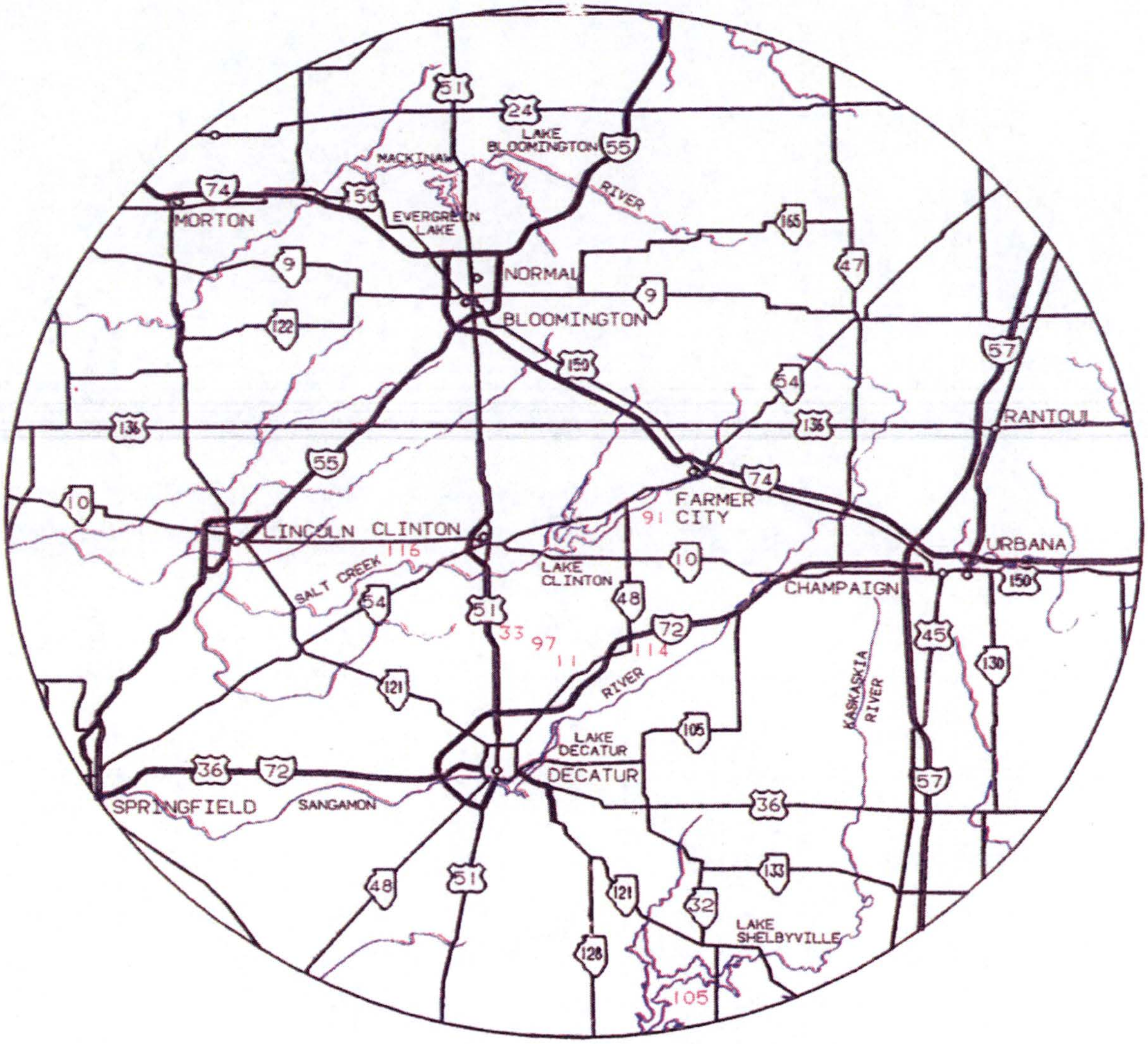

Figure B-4
Environmental Sampling Locations Greater Than Five
Miles of the Clinton Power Station, 2015

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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, 2015**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-90
12/31/14 - 01/28/15	< 0.6
01/28/15 - 02/25/15	< 0.3
02/25/15 - 03/25/15	< 0.7
03/25/15 - 04/29/15	< 0.4
04/29/15 - 05/27/15	< 0.2
05/27/15 - 06/24/15	< 0.9
06/24/15 - 07/29/15	< 0.3
07/29/15 - 08/26/15	< 0.8
08/26/15 - 09/30/15	< 0.6
09/30/15 - 10/28/15	< 0.7
10/28/15 - 11/25/15	< 0.8
11/25/15 - 12/30/15	< 0.6
MEAN	-

Table C-I.2 **CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-90	CL-13	CL-91	CL-99
01/28/15 - 03/25/15	< 196	< 196	< 199	< 198 (1)
04/29/15 - 06/24/15	< 192	< 188	< 189	< 191
07/29/15 - 09/30/15	< 195	< 198	< 197	< 196
10/28/15 - 12/30/15	< 188	< 187	< 188	< 189
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, 2015**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-13	01/28/15 - 01/28/15	< 6	< 6	< 12	< 6	< 12	< 6	< 11	< 6	< 6	< 26	< 9	< 36
	02/25/15 - 02/25/15	< 4	< 4	< 8	< 4	< 7	< 5	< 7	< 4	< 4	< 21	< 5	< 33
	03/25/15 - 03/25/15	< 3	< 4	< 8	< 3	< 7	< 3	< 6	< 3	< 3	< 27	< 8	< 28
	04/29/15 - 04/29/15	< 7	< 7	< 12	< 6	< 13	< 8	< 15	< 6	< 7	< 28	< 6	< 50
	05/27/15 - 05/27/15	< 7	< 8	< 15	< 7	< 19	< 10	< 15	< 8	< 9	< 38	< 10	< 43
	06/24/15 - 06/24/15	< 6	< 9	< 17	< 6	< 8	< 10	< 13	< 8	< 7	< 34	< 11	< 60
	07/29/15 - 07/29/15	< 7	< 6	< 14	< 7	< 13	< 7	< 11	< 5	< 6	< 29	< 11	< 52
	08/26/15 - 08/26/15	< 5	< 7	< 16	< 8	< 18	< 6	< 11	< 7	< 8	< 32	< 10	< 59
	09/30/15 - 09/30/15	< 7	< 6	< 13	< 8	< 12	< 8	< 12	< 7	< 8	< 31	< 12	< 49
	10/28/15 - 10/28/15	< 6	< 7	< 14	< 8	< 9	< 6	< 9	< 5	< 6	< 27	< 7	< 43
	11/25/15 - 11/25/15	< 5	< 5	< 12	< 5	< 5	< 5	< 8	< 4	< 5	< 24	< 4	< 37
	12/30/15 - 12/30/15	< 5	< 6	< 10	< 4	< 12	< 5	< 10	< 4	< 6	< 25	< 13	< 44
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
CL-90	12/31/14 - 01/28/15	< 5	< 5	< 10	< 6	< 12	< 5	< 9	< 5	< 5	< 30	< 10	< 40
	01/28/15 - 02/25/15	< 4	< 4	< 7	< 4	< 6	< 4	< 6	< 3	< 4	< 18	< 5	< 30
	02/25/15 - 03/25/15	< 4	< 5	< 9	< 5	< 8	< 4	< 7	< 4	< 4	< 28	< 12	< 31
	03/25/15 - 04/29/15	< 7	< 7	< 17	< 6	< 18	< 9	< 13	< 8	< 8	< 31	< 11	< 51
	04/29/15 - 05/27/15	< 6	< 8	< 16	< 7	< 14	< 8	< 12	< 7	< 8	< 39	< 14	< 55
	05/27/15 - 06/24/15	< 7	< 6	< 13	< 7	< 17	< 7	< 12	< 7	< 8	< 39	< 9	< 53
	06/24/15 - 07/29/15	< 6	< 5	< 10	< 5	< 12	< 6	< 10	< 6	< 6	< 24	< 9	< 44
	07/29/15 - 08/26/15	< 3	< 3	< 7	< 4	< 5	< 4	< 6	< 3	< 4	< 18	< 6	< 30
	08/26/15 - 09/30/15	< 6	< 8	< 9	< 7	< 11	< 6	< 8	< 5	< 5	< 27	< 12	< 46
	09/30/15 - 10/28/15	< 5	< 7	< 12	< 6	< 13	< 6	< 11	< 6	< 6	< 36	< 5	< 49
	10/28/15 - 11/25/15	< 6	< 5	< 12	< 6	< 12	< 6	< 10	< 5	< 5	< 34	< 11	< 47
	11/25/15 - 12/30/15	< 5	< 6	< 14	< 7	< 12	< 6	< 12	< 6	< 7	< 35	< 11	< 44
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

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

Table C-I.3 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-91	12/31/14 - 01/28/15	< 6	< 5	< 12	< 4	< 12	< 7	< 8	< 5	< 6	< 28	< 11	< 45
	01/28/15 - 02/25/15	< 6	< 7	< 13	< 8	< 12	< 5	< 7	< 6	< 6	< 32	< 7	< 58
	02/25/15 - 03/25/15	< 3	< 3	< 7	< 3	< 6	< 3	< 5	< 3	< 3	< 25	< 6	< 30
	03/25/15 - 04/29/15	< 6	< 6	< 13	< 7	< 14	< 8	< 16	< 7	< 9	< 41	< 9	< 63
	04/29/15 - 05/27/15	< 6	< 7	< 10	< 5	< 12	< 6	< 8	< 5	< 6	< 24	< 8	< 41
	05/27/15 - 06/24/15	< 5	< 7	< 13	< 5	< 13	< 6	< 12	< 6	< 7	< 29	< 12	< 51
	06/24/15 - 07/29/15	< 4	< 4	< 8	< 4	< 8	< 5	< 8	< 4	< 4	< 18	< 5	< 34
	07/29/15 - 08/26/15	< 5	< 3	< 7	< 4	< 11	< 5	< 9	< 5	< 5	< 23	< 8	< 38
	08/26/15 - 09/30/15	< 7	< 7	< 18	< 7	< 18	< 8	< 14	< 8	< 8	< 41	< 11	< 69
	09/30/15 - 10/28/15	< 6	< 8	< 12	< 8	< 12	< 6	< 12	< 6	< 8	< 30	< 14	< 41
	10/28/15 - 11/25/15	< 5	< 5	< 9	< 4	< 11	< 6	< 8	< 5	< 5	< 28	< 8	< 43
	11/25/15 - 12/30/15	< 6	< 6	< 16	< 6	< 14	< 8	< 13	< 5	< 7	< 31	< 12	< 39
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
CL-99	12/31/14 - 01/28/15	< 3	< 4	< 9	< 5	< 8	< 5	< 7	< 5	< 5	< 24	< 9	< 37
	01/28/15 - 02/25/15	< 6	< 6	< 9	< 5	< 10	< 6	< 9	< 5	< 6	< 28	< 9	< 45
	02/25/15 - 03/25/15	< 3	< 3	< 6	< 3	< 6	< 3	< 6	< 4	< 4	< 26	< 4	< 35
	03/25/15 - 04/29/15	< 9	< 8	< 19	< 11	< 18	< 9	< 12	< 9	< #	< 45	< 13	< 52
	04/29/15 - 05/27/15	< 5	< 7	< 15	< 6	< 14	< 6	< 7	< 6	< 6	< 31	< 7	< 47
	05/27/15 - 06/24/15	< 6	< 6	< 13	< 8	< 17	< 9	< 15	< 8	< 8	< 31	< 14	< 41
	06/24/15 - 07/29/15	< 4	< 3	< 8	< 3	< 8	< 4	< 6	< 4	< 4	< 20	< 7	< 30
	07/29/15 - 08/26/15	< 6	< 5	< 12	< 5	< 14	< 5	< 10	< 5	< 7	< 28	< 8	< 43
	08/26/15 - 09/30/15	< 6	< 8	< 16	< 8	< 17	< 10	< 12	< 7	< 7	< 36	< 13	< 67
	09/30/15 - 10/28/15	< 6	< 6	< 11	< 6	< 15	< 7	< 12	< 7	< 7	< 33	< 10	< 55
	10/28/15 - 11/25/15	< 6	< 7	< 14	< 8	< 14	< 6	< 12	< 6	< 8	< 35	< 10	< 39
	11/25/15 - 12/30/15	< 7	< 7	< 18	< 10	< 16	< 9	< 12	< 9	< 8	< 41	< 11	< 69
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

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

Table C-II.1 **CONCENTRATIONS OF GROSS BETA IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-14
12/31/14 - 01/28/15	< 1.4
01/28/15 - 02/25/15	< 1.5
02/25/15 - 03/25/15	< 1.5
03/25/15 - 04/29/15	< 1.6
04/29/15 - 05/27/15	< 1.3
05/27/15 - 06/24/15	< 1.5
06/24/15 - 07/29/15	< 1.4
07/29/15 - 08/26/15	< 1.6
08/26/15 - 09/30/15	< 1.5
09/30/15 - 10/28/15	< 1.5
10/28/15 - 11/25/15	< 1.5
11/25/15 - 12/30/15	< 1.5
MEAN	-

Table C-II.2 **CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-14
12/31/14 - 03/25/15	< 199
03/25/15 - 06/24/15	< 187
06/24/15 - 09/30/15	< 199
09/30/15 - 12/30/15	< 187
MEAN	-

Table C-II.3 **CONCENTRATIONS OF I-131 IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-14
12/31/14 - 01/28/15	< 0.3
01/28/15 - 02/25/15	< 0.4
02/25/15 - 03/25/15	< 0.3
03/25/15 - 04/29/15	< 0.4
04/29/15 - 05/27/15	< 0.3
05/27/15 - 06/24/15	< 0.4
06/24/15 - 07/29/15	< 0.4
07/29/15 - 08/26/15	< 0.9
08/26/15 - 09/30/15	< 0.7
09/30/15 - 10/28/15	< 0.6
10/28/15 - 11/25/15	< 0.7
11/25/15 - 12/30/15	< 0.6
MEAN	-

Table C-II.4 **CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-14	12/31/14 - 01/28/15	< 4	< 5	< 11	< 4	< 8	< 4	< 9	< 4	< 4	< 18	< 6	< 37
	01/28/15 - 02/25/15	< 6	< 5	< 13	< 6	< 10	< 7	< 11	< 5	< 6	< 27	< 7	< 48
	02/25/15 - 03/25/15	< 3	< 4	< 8	< 4	< 7	< 4	< 8	< 3	< 4	< 23	< 7	< 31
	03/25/15 - 04/29/15	< 8	< 8	< 18	< 8	< 21	< 10	< 14	< 8	< 8	< 33	< 12	< 61
	04/29/15 - 05/27/15	< 5	< 6	< 9	< 6	< 9	< 7	< 12	< 6	< 6	< 32	< 6	< 52
	05/27/15 - 06/24/15	< 9	< 7	< 18	< 8	< 15	< 8	< 15	< 8	< 10	< 41	< 5	< 67
	06/24/15 - 07/29/15	< 5	< 5	< 11	< 5	< 11	< 4	< 8	< 4	< 6	< 27	< 8	< 41
	07/29/15 - 08/26/15	< 7	< 8	< 15	< 7	< 13	< 7	< 12	< 6	< 8	< 33	< 11	< 59
	08/26/15 - 09/30/15	< 5	< 5	< 14	< 5	< 13	< 7	< 12	< 6	< 5	< 30	< 10	< 44
	09/30/15 - 10/28/15	< 5	< 6	< 11	< 6	< 11	< 5	< 8	< 6	< 5	< 28	< 7	< 46
	10/28/15 - 11/25/15	< 4	< 4	< 9	< 4	< 9	< 5	< 8	< 4	< 5	< 21	< 7	< 34
	11/25/15 - 12/30/15	< 4	< 8	< 16	< 4	< 10	< 9	< 12	< 6	< 8	< 43	< 12	< 51
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-III.1 **CONCENTRATIONS OF TRITIUM IN WELL WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-12R	CL-12T	CL-7D
03/25/15 - 03/25/15	< 182	< 181	< 180
06/24/15 - 06/24/15	< 164	< 164	< 160
09/30/15 - 09/30/15	< 185	< 187	< 186
12/30/15 - 12/30/15	< 196	< 196	< 192
MEAN	-	-	-

Table C-III.2 **CONCENTRATIONS OF GAMMA EMITTERS IN WELL WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-12R	03/25/15	< 5	< 6	< 10	< 5	< 10	< 5	< 10	< 5	< 6	< 39	< 13	< 38
	06/24/15	< 9	< 7	< 12	< 7	< 17	< 9	< 13	< 5	< 6	< 32	< 12	< 62
	09/30/15	< 8	< 4	< 17	< 4	< 14	< 5	< 11	< 6	< 7	< 36	< 10	< 54
	12/30/15	< 4	< 7	< 15	< 6	< 12	< 8	< 10	< 5	< 7	< 32	< 10	< 49
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
CL-12T	03/25/15	< 5	< 5	< 10	< 4	< 9	< 5	< 8	< 5	< 5	< 32	< 8	< 37
	06/24/15	< 10	< 9	< 17	< 10	< 20	< 10	< 15	< 8	< 9	< 46	< 13	< 80
	09/30/15	< 5	< 8	< 14	< 6	< 13	< 9	< 14	< 7	< 7	< 38	< 8	< 47
	12/30/15	< 8	< 6	< 15	< 5	< 17	< 8	< 15	< 6	< 8	< 43	< 8	< 57
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
CL-7D	03/25/15	< 4	< 4	< 9	< 3	< 6	< 4	< 8	< 3	< 4	< 23	< 7	< 30
	06/24/15	< 7	< 9	< 17	< 7	< 20	< 9	< 20	< 8	< 9	< 36	< 13	< 51
	09/30/15	< 7	< 8	< 18	< 5	< 12	< 8	< 14	< 7	< 6	< 36	< 12	< 54
	12/30/15	< 6	< 5	< 10	< 5	< 12	< 6	< 9	< 5	< 6	< 24	< 7	< 40
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-IV.1 **CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-105													
Bluegill	04/23/15	< 51	< 53	< 109	< 48	< 99	< 56	< 104	< 50	< 70	< 519	< 178	< 385
Carp	04/23/15	< 63	< 71	< 105	< 60	< 159	< 57	< 126	< 52	< 60	< 500	< 153	< 312
Channel Catfish	04/23/15	< 44	< 41	< 118	< 41	< 94	< 56	< 96	< 41	< 53	< 386	< 124	< 273
Largemouth Bass	04/23/15	< 102	< 98	< 228	< 83	< 205	< 115	< 188	< 91	< 87	< 841	< 194	< 524
bluegill	10/05/15	< 39	< 38	< 73	< 40	< 82	< 37	< 61	< 34	< 36	< 186	< 52	< 189
carp	10/05/15	< 46	< 50	< 97	< 49	< 98	< 49	< 79	< 47	< 46	< 237	< 74	< 200
crappie	10/05/15	< 63	< 55	< 112	< 65	< 160	< 70	< 88	< 61	< 55	< 295	< 72	< 323
largemouth bass	10/05/15	< 70	< 65	< 136	< 62	< 117	< 71	< 93	< 39	< 65	< 243	< 46	< 381
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
CL-19													
Bluegill	04/23/15	< 73	< 85	< 217	< 101	< 163	< 87	< 155	< 79	< 79	< 802	< 142	< 499
Carp	04/23/15	< 74	< 86	< 174	< 76	< 146	< 76	< 180	< 67	< 70	< 657	< 225	< 421
Channel Catfish	04/23/15	< 57	< 75	< 163	< 74	< 163	< 78	< 140	< 67	< 60	< 500	< 181	< 354
Largemouth Bass	04/23/15	< 63	< 74	< 159	< 61	< 123	< 75	< 122	< 70	< 51	< 564	< 107	< 410
bluegill	10/05/15	< 56	< 82	< 156	< 61	< 132	< 75	< 120	< 83	< 62	< 389	< 130	< 392
carp	10/05/15	< 69	< 50	< 117	< 63	< 144	< 29	< 122	< 64	< 74	< 431	< 101	< 404
channel catfish	10/05/15	< 66	< 78	< 144	< 77	< 97	< 90	< 123	< 70	< 83	< 408	< 83	< 332
largemouth bass	10/05/15	< 88	< 83	< 177	< 84	< 190	< 92	< 136	< 74	< 90	< 476	< 124	< 510
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

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, 2015

RESULTS IN UNITS OF PCI/KG DRY ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-07B	04/23/15	< 40	< 49	< 135	< 40	< 99	< 55	< 89	< 33	< 41	< 761	< 171	< 241
	10/05/15	< 69	< 63	< 140	< 80	< 108	< 68	< 136	< 60	< 72	< 336	< 69	< 322
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
CL-105	04/23/15	< 44	< 49	< 123	< 45	< 106	< 59	< 101	< 38	< 44	< 748	< 198	< 312
	10/05/15	< 76	< 92	< 217	< 121	< 173	< 62	< 153	< 84	< 80	< 417	< 93	< 400
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

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. 2015**

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
12/31/14 - 01/07/15	20 ± 4		20 ± 5		21 ± 5	21 ± 5	21 ± 5	18 ± 4
01/07/15 - 01/14/15	19 ± 4		20 ± 4		20 ± 4	18 ± 4	20 ± 4	16 ± 4
01/14/15 - 01/21/15	26 ± 5		31 ± 5		23 ± 5	30 ± 5	26 ± 5	28 ± 5
01/21/15 - 01/28/15	13 ± 4		14 ± 4		14 ± 4	11 ± 4	14 ± 4	14 ± 4
01/28/15 - 02/04/15	19 ± 4		17 ± 4		17 ± 4	18 ± 4	18 ± 4	20 ± 5
02/04/15 - 02/11/15	29 ± 5		28 ± 5		31 ± 5	25 ± 5	27 ± 5	24 ± 5
02/11/15 - 02/18/15	23 ± 4		24 ± 5		23 ± 4	24 ± 5	22 ± 4	27 ± 5
02/18/15 - 02/25/15	35 ± 5		43 ± 6		41 ± 5	40 ± 6	37 ± 5	37 ± 5
02/25/15 - 03/04/15	23 ± 5		23 ± 5		24 ± 5	22 ± 5	14 ± 4	16 ± 4
03/04/15 - 03/11/15	18 ± 4		17 ± 4		15 ± 4	17 ± 4	19 ± 4	14 ± 4
03/11/15 - 03/18/15	16 ± 4		13 ± 4		12 ± 4	15 ± 4	15 ± 4	15 ± 4
03/18/15 - 03/25/15	15 ± 4		17 ± 4		16 ± 4	17 ± 4	14 ± 4	16 ± 4
03/25/15 - 04/01/15	14 ± 4		15 ± 4		15 ± 4	14 ± 4	14 ± 4	17 ± 4
04/01/15 - 04/08/15	9 ± 4		11 ± 4		10 ± 4	13 ± 4	11 ± 4	13 ± 4
04/08/15 - 04/15/15	17 ± 4		18 ± 4		13 ± 4	16 ± 4	16 ± 4	17 ± 4
04/15/15 - 04/22/15	13 ± 4		16 ± 4		19 ± 4	16 ± 4	17 ± 4	18 ± 4
04/22/15 - 04/29/15	9 ± 3		11 ± 4		15 ± 4	13 ± 4	12 ± 4	12 ± 4
04/29/15 - 05/06/15	16 ± 4		14 ± 4		15 ± 4	17 ± 4	17 ± 4	18 ± 4
05/06/15 - 05/13/15	9 ± 6	(1)	< 9	(1)	12 ± 4	7 ± 4	9 ± 4	9 ± 4
05/13/15 - 05/20/15	11 ± 4		9 ± 4		7 ± 4	9 ± 4	8 ± 4	9 ± 4
05/20/15 - 05/27/15	30 ± 8		32 ± 8		18 ± 4	17 ± 4	16 ± 4	18 ± 4
05/27/15 - 06/03/15	13 ± 4		12 ± 4		14 ± 4	13 ± 4	12 ± 4	9 ± 4
06/03/15 - 06/10/15	16 ± 4		16 ± 4		20 ± 4	22 ± 4	18 ± 4	17 ± 4
06/10/15 - 06/17/15	< 23	(1)	< 20	(1)	13 ± 4	14 ± 4	15 ± 4	14 ± 4
06/17/15 - 06/24/15	11 ± 4		13 ± 4		13 ± 4	12 ± 4	11 ± 4	11 ± 4
06/24/15 - 07/01/15	13 ± 4		11 ± 4		10 ± 4	8 ± 4	10 ± 4	11 ± 4
07/01/15 - 07/08/15	13 ± 4		12 ± 4		12 ± 4	14 ± 4	12 ± 4	15 ± 4
07/08/15 - 07/15/15	10 ± 3		9 ± 4		8 ± 3	14 ± 4	10 ± 4	14 ± 4
07/15/15 - 07/22/15	16 ± 5		14 ± 4		13 ± 4	16 ± 4	12 ± 4	20 ± 4
07/22/15 - 07/29/15	18 ± 4		24 ± 5		17 ± 4	22 ± 5	21 ± 5	17 ± 4
07/29/15 - 08/05/15	20 ± 4		18 ± 4		21 ± 4	20 ± 4	20 ± 4	20 ± 4
08/05/15 - 08/12/15	21 ± 4		24 ± 4		20 ± 4	21 ± 4	23 ± 4	23 ± 4
08/12/15 - 08/19/15	29 ± 5		29 ± 5		29 ± 5	29 ± 5	26 ± 5	21 ± 5
08/19/15 - 08/26/15	17 ± 4		17 ± 4		16 ± 4	13 ± 4	18 ± 4	17 ± 4
08/26/15 - 09/02/15	36 ± 5		31 ± 5		31 ± 5	34 ± 5	33 ± 5	39 ± 5
09/02/15 - 09/09/15	35 ± 5		35 ± 5		36 ± 5	33 ± 5	28 ± 5	39 ± 5
09/09/15 - 09/16/15	15 ± 4		13 ± 4		15 ± 4	17 ± 4	15 ± 4	16 ± 4
09/16/15 - 09/23/15	19 ± 5		20 ± 5		24 ± 5	17 ± 4	18 ± 4	21 ± 5
09/23/15 - 09/30/15	30 ± 5		25 ± 5		24 ± 5	24 ± 5	27 ± 5	26 ± 5
09/30/15 - 10/07/15	12 ± 4		9 ± 4		11 ± 4	13 ± 4	13 ± 4	12 ± 4
10/07/15 - 10/14/15	22 ± 5		21 ± 5		21 ± 5	27 ± 5	21 ± 5	25 ± 5
10/14/15 - 10/21/15	16 ± 4		18 ± 4		21 ± 4	20 ± 4	14 ± 4	19 ± 4
10/21/15 - 10/28/15	17 ± 4		21 ± 4		20 ± 4	21 ± 4	19 ± 4	20 ± 4
10/28/15 - 11/04/15	19 ± 5		14 ± 4		17 ± 4	16 ± 4	16 ± 4	19 ± 5
11/04/15 - 11/11/15	25 ± 5		27 ± 5		20 ± 4	24 ± 5	18 ± 4	21 ± 4
11/11/15 - 11/18/15	27 ± 5		23 ± 4		26 ± 5	26 ± 5	27 ± 5	24 ± 4
11/18/15 - 11/25/15	17 ± 4		16 ± 4		19 ± 4	18 ± 4	16 ± 4	15 ± 4
11/25/15 - 12/02/15	16 ± 4		16 ± 4		17 ± 4	18 ± 4	19 ± 4	15 ± 4
12/02/15 - 12/09/15	34 ± 5		33 ± 5		37 ± 6	37 ± 5	35 ± 5	33 ± 5
12/09/15 - 12/16/15	17 ± 5		18 ± 5		20 ± 5	20 ± 5	18 ± 5	20 ± 5
12/16/15 - 12/23/15	22 ± 5		28 ± 5		19 ± 4	25 ± 5	24 ± 5	20 ± 4
12/23/15 - 12/30/15	15 ± 4		16 ± 4		18 ± 4	22 ± 4	18 ± 4	17 ± 4
MEAN	19 ± 14		20 ± 15		19 ± 14	19 ± 14	18 ± 13	19 ± 14

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES
(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. 2015**

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

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

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, 2015**

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
12/31/14 - 01/28/15	11	31	20 ± 11	12/31/14 - 01/28/15	9	28	19 ± 11	12/31/14 - 01/28/15	11	28	19 ± 14
01/28/15 - 02/25/15	17	43	27 ± 16	01/28/15 - 02/25/15	13	42	26 ± 19	01/28/15 - 02/25/15	16	36	26 ± 17
02/25/15 - 04/01/15	12	24	16 ± 6	02/25/15 - 04/01/15	13	20	17 ± 5	02/25/15 - 04/01/15	13	20	16 ± 5
04/01/15 - 04/29/15	9	19	14 ± 6	04/01/15 - 04/29/15	10	20	14 ± 7	04/01/15 - 04/29/15	11	17	14 ± 6
04/29/15 - 06/03/15	7	32	14 ± 12	04/29/15 - 06/03/15	8	19	12 ± 8	04/29/15 - 06/03/15	7	17	12 ± 9
06/03/15 - 07/01/15	8	22	14 ± 7	06/03/15 - 07/01/15	10	19	13 ± 6	06/03/15 - 07/01/15	13	18	15 ± 4
07/01/15 - 07/29/15	8	24	15 ± 8	07/01/15 - 07/29/15	8	22	14 ± 9	07/01/15 - 07/29/15	9	20	14 ± 10
07/29/15 - 09/02/15	13	39	24 ± 13	07/29/15 - 09/02/15	14	37	24 ± 14	07/29/15 - 09/02/15	16	34	23 ± 15
09/02/15 - 09/30/15	13	39	24 ± 15	09/02/15 - 09/30/15	11	38	23 ± 16	09/02/15 - 09/30/15	18	34	24 ± 14
09/30/15 - 10/28/15	9	27	18 ± 9	09/30/15 - 10/28/15	6	27	18 ± 11	09/30/15 - 10/28/15	11	23	18 ± 10
10/28/15 - 12/02/15	14	27	20 ± 8	10/28/15 - 12/02/15	14	24	19 ± 7	10/28/15 - 12/02/15	16	24	20 ± 8
12/02/15 - 12/30/15	15	37	24 ± 15	12/02/15 - 12/30/15	15	36	23 ± 15	12/02/15 - 12/30/15	17	32	23 ± 13
12/31/14 - 12/30/15	7	43	19 ± 14	12/31/14 - 12/30/15	6	42	18 ± 14	12/31/14 - 12/30/15	7	36	19 ± 13

Table C-VI.3 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

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

SITE	COLLECTION PERIOD	Co-60	Nb-95	Zr-95	Ru-103	Ru-106	Cs-134	Cs-137	Ce-141	Ce-144
CL-1	12/31/14 - 04/01/15	< 2	< 6	< 8	< 7	< 32	< 4	< 3	< 9	< 13
	04/01/15 - 07/01/15	< 3	< 4	< 7	< 5	< 23	< 3	< 2	< 7	< 12
	07/01/15 - 09/30/15	< 3	< 3	< 5	< 3	< 21	< 2	< 2	< 5	< 10
	09/30/15 - 12/30/15	< 5	< 4	< 9	< 5	< 34	< 4	< 4	< 6	< 14
	MEAN	-	-	-	-	-	-	-	-	-
CL-11	12/31/14 - 04/01/15	< 3	< 3	< 6	< 6	< 18	< 3	< 2	< 7	< 12
	04/01/15 - 07/01/15	< 2	< 5	< 9	< 8	< 32	< 4	< 4	< 10	< 17
	07/01/15 - 09/30/15	< 2	< 3	< 6	< 4	< 21	< 2	< 2	< 5	< 9
	09/30/15 - 12/30/15	< 5	< 4	< 8	< 5	< 36	< 4	< 4	< 6	< 15
	MEAN	-	-	-	-	-	-	-	-	-
CL-15	12/31/14 - 04/01/15	< 6	< 9	< 10	< 8	< 46	< 4	< 5	< 12	< 15
	04/01/15 - 07/01/15	< 3	< 2	< 6	< 4	< 18	< 3	< 3	< 5	< 11
	07/01/15 - 09/30/15	< 3	< 3	< 7	< 5	< 25	< 3	< 3	< 8	< 16
	09/30/15 - 12/30/15	< 2	< 3	< 5	< 3	< 25	< 2	< 2	< 5	< 12
	MEAN	-	-	-	-	-	-	-	-	-
CL-2	12/31/14 - 04/01/15	< 5	< 3	< 6	< 4	< 17	< 3	< 2	< 8	< 13
	04/01/15 - 07/01/15	< 2	< 3	< 4	< 4	< 16	< 3	< 2	< 6	< 11
	07/01/15 - 09/30/15	< 3	< 3	< 5	< 4	< 23	< 3	< 3	< 6	< 11
	09/30/15 - 12/30/15	< 3	< 3	< 5	< 4	< 26	< 2	< 3	< 4	< 11
	MEAN	-	-	-	-	-	-	-	-	-
CL-3	12/31/14 - 04/01/15	< 8	< 9	< 15	< 10	< 37	< 5	< 5	< 12	< 17
	04/01/15 - 07/01/15	< 3	< 4	< 8	< 6	< 21	< 3	< 3	< 7	< 12
	07/01/15 - 09/30/15	< 3	< 4	< 6	< 4	< 25	< 3	< 3	< 5	< 10
	09/30/15 - 12/30/15	< 4	< 4	< 6	< 5	< 21	< 4	< 3	< 6	< 16
	MEAN	-	-	-	-	-	-	-	-	-

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, 2015**

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

SITE	COLLECTION PERIOD	Co-60	Nb-95	Zr-95	Ru-103	Ru-106	Cs-134	Cs-137	Ce-141	Ce-144
CL-4	12/31/14 - 04/01/15	< 5	< 4	< 10	< 7	< 24	< 3	< 3	< 9	< 17
	04/01/15 - 07/01/15	< 3	< 4	< 6	< 5	< 23	< 2	< 2	< 6	< 10
	07/01/15 - 09/30/15	< 2	< 4	< 6	< 3	< 18	< 2	< 2	< 5	< 10
	09/30/15 - 12/30/15	< 2	< 2	< 4	< 3	< 18	< 2	< 2	< 4	< 8
	MEAN	-	-	-	-	-	-	-	-	-
CL-6	12/31/14 - 04/01/15	< 3	< 6	< 13	< 10	< 42	< 5	< 5	< 15	< 23
	04/01/15 - 07/01/15	< 3	< 4	< 4	< 4	< 21	< 3	< 2	< 7	< 10
	07/01/15 - 09/30/15	< 4	< 6	< 8	< 5	< 33	< 4	< 4	< 6	< 10
	09/30/15 - 12/30/15	< 2	< 3	< 3	< 3	< 20	< 2	< 2	< 4	< 9
	MEAN	-	-	-	-	-	-	-	-	-
CL-7	12/31/14 - 04/01/15	< 4	< 4	< 8	< 6	< 26	< 3	< 3	< 6	< 14
	04/01/15 - 07/01/15	< 4	< 6	< 11	< 9	< 37	< 4	< 4	< 10	< 14
	07/01/15 - 09/30/15	< 3	< 4	< 6	< 4	< 24	< 3	< 2	< 7	< 15
	09/30/15 - 12/30/15	< 3	< 3	< 6	< 3	< 19	< 3	< 2	< 5	< 10
	MEAN	-	-	-	-	-	-	-	-	-
CL-8	12/31/14 - 04/01/15	< 4	< 5	< 9	< 7	< 21	< 3	< 3	< 10	< 16
	04/01/15 - 07/01/15	< 3	< 4	< 7	< 5	< 25	< 3	< 2	< 7	< 13
	07/01/15 - 09/30/15	< 3	< 6	< 11	< 6	< 38	< 4	< 3	< 10	< 23
	09/30/15 - 12/30/15	< 3	< 3	< 4	< 3	< 21	< 2	< 2	< 5	< 12
	MEAN	-	-	-	-	-	-	-	-	-
CL-94	12/31/14 - 04/01/15	< 3	< 5	< 8	< 7	< 29	< 4	< 3	< 10	< 14
	04/01/15 - 07/01/15	< 2	< 2	< 4	< 3	< 17	< 1	< 1	< 4	< 7
	07/01/15 - 09/30/15	< 2	< 2	< 5	< 3	< 20	< 2	< 2	< 6	< 10
	09/30/15 - 12/30/15	< 2	< 2	< 5	< 4	< 25	< 2	< 3	< 4	< 12
	MEAN	-	-	-	-	-	-	-	-	-

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, 2015**

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
12/31/14 - 01/07/15	< 38	< 38	< 37	< 38	< 43	< 43
01/07/15 - 01/14/15	< 60	< 60	< 60	< 62	< 63	< 64
01/14/15 - 01/21/15	< 40	< 41	< 40	< 40	< 16	< 37
01/21/15 - 01/28/15	< 33	< 33	< 34	< 33	< 60	< 33
01/28/15 - 02/04/15	< 41	< 44	< 42	< 43	< 52	< 52
02/04/15 - 02/11/15	< 38	< 39	< 39	< 39	< 32	< 18
02/11/15 - 02/18/15	< 69	< 69	< 68	< 69	< 66	< 65
02/18/15 - 02/25/15	< 54	< 54	< 54	< 55	< 45	< 45
02/25/15 - 03/04/15	< 23	< 24	< 23	< 23	< 22	< 22
03/04/15 - 03/11/15	< 58	< 61	< 59	< 61	< 44	< 44
03/11/15 - 03/18/15	< 19	< 47	< 47	< 47	< 34	< 44
03/18/15 - 03/25/15	< 39	< 40	< 39	< 40	< 52	< 52
03/25/15 - 04/01/15	< 44	< 17	< 45	< 45	< 37	< 36
04/01/15 - 04/08/15	< 53	< 56	< 54	< 54	< 56	< 56
04/08/15 - 04/15/15	< 64	< 64	< 64	< 60	< 26	< 25
04/15/15 - 04/22/15	< 58	< 59	< 58	< 58	< 63	< 62
04/22/15 - 04/29/15	< 41	< 44	< 42	< 23	< 20	< 44
04/29/15 - 05/06/15	< 44	< 45	< 42	< 42	< 53	< 52
05/06/15 - 05/13/15	< 33 (1)	< 31 (1)	< 48	< 47	< 48	< 47
05/13/15 - 05/20/15	< 64	< 65	< 62	< 63	< 36	< 37
05/20/15 - 05/27/15	< 46	< 46	< 25	< 20	< 28	< 27
05/27/15 - 06/03/15	< 66	< 69	< 67	< 66	< 68	< 68
06/03/15 - 06/10/15	< 69	< 68	< 67	< 40	< 66	< 65
06/10/15 - 06/17/15	< 88 (1)	< 77 (1)	< 38	< 15	< 40	< 18
06/17/15 - 06/24/15	< 58	< 60	< 58	< 23	< 64	< 64
06/24/15 - 07/01/15	< 19	< 55	< 52	< 52	< 44	< 44
07/01/15 - 07/08/15	< 61	< 26	< 64	< 62	< 23	< 59
07/08/15 - 07/15/15	< 53	< 56	< 56	< 56	< 47	< 46
07/15/15 - 07/22/15	< 35	< 61	< 59	< 59	< 61	< 58
07/22/15 - 07/29/15	< 30	< 31	< 12	< 31	< 37	< 37
07/29/15 - 08/05/15	< 26	< 63	< 64	< 63	< 53	< 53
08/05/15 - 08/12/15	< 47	< 50	< 20	< 50	< 34	< 33
08/12/15 - 08/19/15	< 31	< 32	< 31	< 12	< 37	< 39
08/19/15 - 08/26/15	< 45	< 45	< 18	< 45	< 49	< 46
08/26/15 - 09/02/15	< 24	< 59	< 58	< 58	< 38	< 39
09/02/15 - 09/09/15	< 34	< 35	< 34	< 44	< 34	< 34
09/09/15 - 09/16/15	< 37	< 37	< 37	< 49	< 42	< 41
09/16/15 - 09/23/15	< 44	< 46	< 43	< 44	< 52	< 54
09/23/15 - 09/30/15	< 43	< 44	< 43	< 43	< 56	< 56
09/30/15 - 10/07/15	< 62	< 63	< 62	< 24	< 59	< 61
10/07/15 - 10/14/15	< 63	< 63	< 61	< 63	< 54	< 55
10/14/15 - 10/21/15	< 64	< 67	< 67	< 28	< 15	< 39
10/21/15 - 10/28/15	< 30	< 31	< 30	< 30	< 49	< 48
10/28/15 - 11/04/15	< 63	< 64	< 62	< 64	< 40	< 41
11/04/15 - 11/11/15	< 68	< 69	< 69	< 69	< 55	< 55
11/11/15 - 11/18/15	< 45	< 47	< 47	< 48	< 51	< 49
11/18/15 - 11/25/15	< 67	< 68	< 67	< 65	< 65	< 65
11/25/15 - 12/02/15	< 36	< 35	< 35	< 35	< 39	< 38
12/02/15 - 12/09/15	< 55	< 54	< 54	< 37	< 14	< 37
12/09/15 - 12/16/15	< 59	< 59	< 59	< 55	< 23	< 56
12/16/15 - 12/23/15	< 54	< 54	< 54	< 53	< 55	< 54
12/23/15 - 12/30/15	< 49	< 48	< 47	< 46	< 47	< 45
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, 2015

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

COLLECTION	GROUP II			GROUP III
PERIOD	CL-1	CL-7	CL-8	CL-11
12/31/14 - 01/07/15	< 15	< 18	< 44	< 43
01/07/15 - 01/14/15	< 34	< 34	< 65	< 63
01/14/15 - 01/21/15	< 15	< 37	< 37	< 37
01/21/15 - 01/28/15	< 18	< 60	< 60	< 60
01/28/15 - 02/04/15	< 23	< 27	< 51	< 50
02/04/15 - 02/11/15	< 16	< 32	< 32	< 32
02/11/15 - 02/18/15	< 27	< 27	< 66	< 66
02/18/15 - 02/25/15	< 24	< 16	< 47	< 45
02/25/15 - 03/04/15	< 10	< 8	< 22	< 22
03/04/15 - 03/11/15	< 22	< 18	< 43	< 43
03/11/15 - 03/18/15	< 47	< 56	< 35	< 36
03/18/15 - 03/25/15	< 17	< 27	< 51	< 51
03/25/15 - 04/01/15	< 44	< 20	< 36	< 35
04/01/15 - 04/08/15	< 21	< 24	< 57	< 56
04/08/15 - 04/15/15	< 64	< 60	< 58	< 60
04/15/15 - 04/22/15	< 25	< 22	< 65	< 63
04/22/15 - 04/29/15	< 43	< 45	< 44	< 44
04/29/15 - 05/06/15	< 44	< 42	< 42	< 53
05/06/15 - 05/13/15	< 48	< 19	< 47	< 47
05/13/15 - 05/20/15	< 63	< 60	< 37	< 37
05/20/15 - 05/27/15	< 25	< 20	< 8	< 20
05/27/15 - 06/03/15	< 68	< 67	< 67	< 67
06/03/15 - 06/10/15	< 69	(1)	< 15	< 25
06/10/15 - 06/17/15	< 39	< 43	< 41	< 44
06/17/15 - 06/24/15	< 60	< 27	< 64	< 62
06/24/15 - 07/01/15	< 51	< 24	< 44	< 44
07/01/15 - 07/08/15	< 65	< 59	< 58	< 60
07/08/15 - 07/15/15	< 23	< 16	< 46	< 45
07/15/15 - 07/22/15	< 59	< 60	< 30	< 59
07/22/15 - 07/29/15	< 31	< 37	< 36	< 15
07/29/15 - 08/05/15	< 63	< 54	< 52	< 23
08/05/15 - 08/12/15	< 51	< 13	< 34	< 34
08/12/15 - 08/19/15	< 31	< 16	< 37	< 37
08/19/15 - 08/26/15	< 46	< 47	< 170 (1)	< 48
08/26/15 - 09/02/15	< 58	< 15	< 54	< 37
09/02/15 - 09/09/15	< 35	< 44	< 42	< 33
09/09/15 - 09/16/15	< 38	< 48	< 49	< 42
09/16/15 - 09/23/15	< 17	< 23	< 53	< 53
09/23/15 - 09/30/15	< 17	< 24	< 55	< 55
09/30/15 - 10/07/15	< 61	< 24	< 60	< 59
10/07/15 - 10/14/15	< 25	< 22	< 54	< 54
10/14/15 - 10/21/15	< 66	< 39	< 39	< 39
10/21/15 - 10/28/15	< 12	< 50	< 20	< 48
10/28/15 - 11/04/15	< 27	< 20	< 43	< 41
11/04/15 - 11/11/15	< 27	< 21	< 55	< 55
11/11/15 - 11/18/15	< 26	< 20	< 50	< 50
11/18/15 - 11/25/15	< 29	< 33	< 64	< 64
11/25/15 - 12/02/15	< 14	< 40	< 15	< 38
12/02/15 - 12/09/15	< 54	< 21	< 36	< 36
12/09/15 - 12/16/15	< 58	< 22	< 56	< 56
12/16/15 - 12/23/15	< 21	< 23	< 54	< 55
12/23/15 - 12/30/15	< 19	< 44	< 46	< 18
MEAN	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VIII.1 **CONCENTRATIONS OF I-131 IN MILK SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CONTROL FARM CL-116
01/28/15	< 0.3
02/25/15	< 0.3
03/25/15	< 0.6
04/29/15	< 0.1
05/13/15	< 0.9
05/27/15	< 0.5
06/10/15	< 0.9
06/24/15	< 0.5
07/08/15	< 0.8
07/22/15	< 0.4
08/05/15	< 0.6
08/19/15	< 0.7
09/02/15	< 0.8
09/16/15	< 0.6
09/30/15	< 0.8
10/14/15	< 0.6
10/28/15	< 0.6
11/25/15	< 0.9
12/30/15	< 1.0
MEAN	-

Table C-VIII.2 **CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	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	01/28/15	1295 ± 138	< 6	< 6	< 15	< 7	< 13	< 6	< 9	< 5	< 6	< 30	< 8	< 34
	02/25/15	1426 ± 167	< 6	< 7	< 14	< 7	< 20	< 7	< 11	< 6	< 6	< 28	< 10	< 45
	03/25/15	1007 ± 141	< 5	< 5	< 15	< 6	< 12	< 6	< 9	< 5	< 6	< 28	< 8	< 35
	04/29/15	1345 ± 149	< 5	< 6	< 16	< 7	< 12	< 5	< 11	< 5	< 6	< 27	< 9	< 41
	05/13/15	1277 ± 123	< 8	< 8	< 19	< 8	< 21	< 9	< 16	< 9	< 9	< 47	< 11	< 65
	05/27/15	1203 ± 205	< 11	< 7	< 18	< 9	< 19	< 9	< 17	< 9	< 9	< 36	< 11	< 47
	06/10/15	1282 ± 211	< 9	< 8	< 26	< 7	< 23	< 9	< 13	< 7	< 8	< 56	< 9	< 64
	06/24/15	1378 ± 197	< 9	< 9	< 20	< 11	< 21	< 10	< 17	< 9	< 10	< 42	< 15	< 48
	07/08/15	1344 ± 168	< 6	< 6	< 18	< 9	< 17	< 6	< 9	< 5	< 7	< 28	< 5	< 42
	07/22/15	1242 ± 158	< 6	< 7	< 18	< 8	< 18	< 6	< 13	< 7	< 8	< 32	< 9	< 44
	08/05/15	1464 ± 217	< 9	< 10	< 16	< 9	< 23	< 9	< 18	< 9	< 10	< 40	< 13	< 48
	08/19/15	1025 ± 195	< 9	< 8	< 14	< 10	< 23	< 9	< 17	< 9	< 10	< 35	< 10	< 68
	09/02/15	1490 ± 233	< 11	< 7	< 22	< 8	< 21	< 10	< 16	< 9	< 9	< 42	< 11	< 79
	09/16/15	1158 ± 170	< 7	< 8	< 20	< 8	< 19	< 9	< 16	< 8	< 8	< 37	< 10	< 68
	09/30/15	1187 ± 211	< 9	< 9	< 19	< 9	< 21	< 10	< 18	< 9	< 10	< 46	< 13	< 56
	10/14/15	1107 ± 174	< 7	< 8	< 20	< 9	< 22	< 8	< 14	< 8	< 8	< 33	< 10	< 49
	10/28/15	1159 ± 141	< 7	< 6	< 12	< 6	< 18	< 5	< 11	< 7	< 6	< 25	< 9	< 48
	11/25/15	1296 ± 157	< 7	< 7	< 17	< 7	< 21	< 8	< 11	< 7	< 8	< 35	< 12	< 49
	12/30/15	1445 ± 180	< 8	< 7	< 15	< 8	< 16	< 9	< 15	< 7	< 8	< 36	< 10	< 61
	MEAN	1270 ± 282	-	-	-	-	-	-	-	-	-	-	-	-

Table C-IX.1

CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD		Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-114	06/24/15	Cabbage	< 6	< 6	< 15	< 6	< 13	< 6	< 10	< 18	< 6	< 6	< 41	< 11	< 37
	06/24/15	Lettuce	< 16	< 20	< 38	< 19	< 39	< 18	< 31	< 60	< 15	< 17	< 109	< 15	< 117
	06/24/15	Swiss Chard	< 18	< 18	< 42	< 17	< 39	< 20	< 32	< 59	< 17	< 19	< 125	< 43	< 86
	07/29/15	Cabbage	< 9	< 11	< 23	< 9	< 19	< 11	< 17	< 60	< 9	< 10	< 101	< 22	< 68
	07/29/15	Lettuce	< 6	< 7	< 18	< 6	< 15	< 7	< 13	< 36	< 6	< 6	< 60	< 16	< 40
	07/29/15	Swiss Chard	< 11	< 13	< 33	< 12	< 29	< 13	< 23	< 59	< 10	< 11	< 113	< 35	< 52
	08/26/15	Cabbage	< 31	< 33	< 80	< 37	< 75	< 30	< 47	< 50	< 30	< 37	< 170	< 49	< 166
	08/26/15	Lettuce	< 18	< 26	< 49	< 25	< 47	< 24	< 43	< 49	< 22	< 26	< 120	< 27	< 173
	08/26/15	Swiss Chard	< 42	< 37	< 86	< 39	< 82	< 43	< 57	< 59	< 34	< 26	< 167	< 49	< 228
	09/30/15	Cabbage	< 23	< 24	< 54	< 20	< 51	< 20	< 40	< 46	< 22	< 23	< 105	< 36	< 149
	09/30/15	Kale	< 23	< 26	< 61	< 23	< 59	< 25	< 42	< 50	< 24	< 27	< 123	< 24	< 179
	09/30/15	Swiss Chard	< 27	< 39	< 107	< 40	< 101	< 41	< 59	< 59	< 34	< 38	< 156	< 44	< 244
	MEAN		-	-	-	-	-	-	-	-	-	-	-	-	-
CL-115	06/24/15	Cabbage	< 14	< 14	< 33	< 15	< 27	< 16	< 22	< 49	< 15	< 14	< 99	< 30	< 86
	06/24/15	Lettuce	< 16	< 18	< 36	< 18	< 36	< 19	< 29	< 51	< 13	< 17	< 109	< 26	< 91
	06/24/15	Swiss Chard	< 14	< 17	< 31	< 17	< 34	< 16	< 30	< 54	< 14	< 16	< 107	< 27	< 105
	07/29/15	Cabbage	< 8	< 8	< 21	< 7	< 18	< 10	< 15	< 57	< 8	< 8	< 90	< 23	< 57
	07/29/15	Lettuce	< 6	< 7	< 17	< 6	< 15	< 7	< 12	< 34	< 5	< 6	< 62	< 15	< 37
	07/29/15	Swiss Chard	< 7	< 8	< 18	< 7	< 16	< 8	< 13	< 39	< 6	< 7	< 67	< 20	< 47
	08/26/15	Cabbage	< 34	< 34	< 78	< 34	< 94	< 33	< 65	< 59	< 34	< 35	< 193	< 49	< 236
	08/26/15	Lettuce	< 26	< 26	< 68	< 34	< 68	< 31	< 46	< 46	< 22	< 28	< 116	< 32	< 160
	08/26/15	Swiss Chard	< 30	< 35	< 80	< 31	< 81	< 38	< 52	< 60	< 30	< 36	< 169	< 47	< 252
	09/30/15	Cabbage	< 29	< 19	< 65	< 26	< 57	< 28	< 47	< 45	< 21	< 26	< 140	< 40	< 153
	09/30/15	Kale	< 20	< 32	< 67	< 29	< 65	< 27	< 48	< 55	< 27	< 25	< 132	< 44	< 204
	09/30/15	Swiss Chard	< 21	< 25	< 59	< 28	< 38	< 23	< 50	< 42	< 24	< 20	< 124	< 13	< 143
	MEAN		-	-	-	-	-	-	-	-	-	-	-	-	-

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

Table C-IX.1 **CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD		Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-117	06/24/15	Cabbage	< 13	< 11	< 26	< 11	< 29	< 14	< 22	< 39	< 11	< 12	< 86	< 21	< 77
	06/24/15	Lettuce	< 12	< 16	< 34	< 13	< 34	< 16	< 28	< 37	< 13	< 14	< 101	< 26	< 68
	06/24/15	Swiss Chard	< 15	< 19	< 39	< 17	< 36	< 18	< 32	< 51	< 16	< 17	< 117	< 39	< 93
	07/29/15	Cabbage	< 10	< 12	< 26	< 10	< 23	< 12	< 20	< 55	< 9	< 10	< 96	< 29	< 57
	07/29/15	Lettuce	< 4	< 5	< 12	< 4	< 10	< 5	< 9	< 27	< 4	< 4	< 43	< 13	< 25
	07/29/15	Swiss Chard	< 6	< 7	< 16	< 6	< 14	< 7	< 12	< 39	< 6	< 6	< 65	< 17	< 40
	08/26/15	Cabbage	< 32	< 33	< 67	< 26	< 68	< 33	< 59	< 56	< 29	< 29	< 170	< 52	< 209
	08/26/15	Lettuce	< 33	< 31	< 81	< 37	< 80	< 39	< 63	< 51	< 39	< 32	< 160	< 30	< 219
	08/26/15	Swiss Chard	< 24	< 23	< 46	< 18	< 39	< 29	< 37	< 43	< 20	< 25	< 116	< 32	< 178
	09/30/15	Cabbage	< 27	< 24	< 54	< 26	< 48	< 27	< 49	< 41	< 21	< 24	< 108	< 23	< 142
	09/30/15	Kale	< 24	< 23	< 51	< 23	< 51	< 26	< 39	< 41	< 23	< 20	< 104	< 25	< 154
	09/30/15	Swiss Chard	< 31	< 29	< 75	< 32	< 81	< 34	< 60	< 58	< 26	< 30	< 145	< 51	< 212
	MEAN		-	-	-	-	-	-	-	-	-	-	-	-	-
CL-118	06/24/15	Cabbage	< 17	< 20	< 36	< 18	< 39	< 20	< 32	< 60	< 17	< 20	< 130	< 35	< 86
	06/24/15	Lettuce	< 15	< 17	< 37	< 16	< 35	< 16	< 34	< 44	< 14	< 16	< 100	< 36	< 89
	06/24/15	Swiss Chard	< 15	< 19	< 38	< 18	< 27	< 16	< 33	< 51	< 13	< 15	< 110	< 38	< 97
	07/29/15	Cabbage	< 8	< 9	< 22	< 8	< 19	< 10	< 16	< 54	< 7	< 8	< 91	< 22	< 57
	07/29/15	Lettuce	< 6	< 6	< 17	< 6	< 15	< 7	< 12	< 39	< 5	< 6	< 64	< 16	< 37
	07/29/15	Swiss Chard	< 8	< 8	< 25	< 9	< 22	< 11	< 18	< 55	< 7	< 9	< 92	< 22	< 55
	08/26/15	Cabbage	< 18	< 21	< 53	< 22	< 56	< 23	< 41	< 37	< 22	< 19	< 123	< 26	< 133
	08/26/15	Lettuce	< 40	< 33	< 77	< 33	< 87	< 43	< 53	< 59	< 37	< 38	< 173	< 30	< 196
	08/26/15	Swiss Chard	< 25	< 23	< 65	< 35	< 71	< 31	< 49	< 42	< 21	< 31	< 115	< 28	< 168
	09/30/15	Cabbage	< 23	< 22	< 54	< 28	< 49	< 24	< 44	< 44	< 22	< 26	< 108	< 34	< 152
	09/30/15	Kale	< 26	< 22	< 55	< 27	< 49	< 26	< 43	< 42	< 21	< 25	< 110	< 25	< 143
	09/30/15	Swiss Chard	< 27	< 21	< 73	< 33	< 75	< 32	< 65	< 56	< 29	< 34	< 150	< 40	< 213
	MEAN		-	-	-	-	-	-	-	-	-	-	-	-	-

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

Table C-IX.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GRASS SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-01	05/13/15	< 13	< 15	< 34	< 15	< 32	< 15	< 23	< 43	< 12	< 14	< 81	< 24	< 82
	05/27/15	< 16	< 17	< 37	< 20	< 37	< 17	< 31	< 35	< 15	< 16	< 90	< 26	< 104
	06/10/15	< 29	< 29	< 64	< 24	< 72	< 29	< 41	< 44	< 24	< 28	< 129	< 42	< 127
	06/24/15	< 10	< 12	< 26	< 9	< 24	< 11	< 21	< 53	< 10	< 11	< 93	< 23	< 86
	07/08/15	< 13	< 13	< 30	< 14	< 33	< 13	< 24	< 23	< 12	< 14	< 58	< 17	< 93
	07/22/15	< 15	< 14	< 29	< 14	< 34	< 16	< 22	< 26	< 12	< 15	< 73	< 15	< 103
	08/05/15	< 11	< 13	< 30	< 12	< 27	< 13	< 23	< 49	< 10	< 12	< 91	< 29	< 71
	08/19/15	< 35	< 29	< 64	< 26	< 70	< 27	< 52	< 39	< 28	< 29	< 144	< 20	< 163
	09/02/15	< 38	< 38	< 66	< 34	< 73	< 36	< 59	< 59	< 31	< 32	< 159	< 51	< 174
	09/16/15	< 22	< 24	< 45	< 22	< 48	< 22	< 35	< 41	< 21	< 22	< 102	< 26	< 155
	09/30/15	< 25	< 27	< 61	< 29	< 70	< 30	< 52	< 55	< 27	< 30	< 139	< 37	< 212
	10/14/15	< 28	< 28	< 69	< 36	< 72	< 29	< 48	< 50	< 24	< 30	< 129	< 41	< 184
	10/28/15	< 17	< 15	< 45	< 17	< 52	< 20	< 33	< 42	< 17	< 23	< 113	< 26	< 148
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-
CL-02	05/13/15	< 15	< 16	< 37	< 12	< 33	< 16	< 29	< 51	< 14	< 16	< 107	< 25	< 109
	05/27/15	< 14	< 15	< 33	< 14	< 37	< 13	< 25	< 29	< 12	< 15	< 78	< 20	< 75
	06/10/15	< 31	< 29	< 64	< 24	< 66	< 30	< 57	< 55	< 24	< 33	< 125	< 31	< 170
	06/24/15	< 6	< 7	< 15	< 6	< 15	< 7	< 12	< 27	< 5	< 6	< 54	< 13	< 44
	07/08/15	< 15	< 14	< 35	< 18	< 28	< 15	< 26	< 25	< 11	< 15	< 64	< 19	< 90
	07/22/15	< 27	< 28	< 57	< 25	< 58	< 31	< 50	< 49	< 25	< 30	< 142	< 31	< 197
	08/05/15	< 14	< 14	< 37	< 14	< 33	< 15	< 26	< 55	< 13	< 14	< 114	< 25	< 95
	08/19/15	< 31	< 20	< 57	< 29	< 63	< 28	< 46	< 39	< 24	< 29	< 122	< 21	< 171
	09/02/15	< 30	< 31	< 55	< 24	< 62	< 31	< 40	< 54	< 28	< 31	< 150	< 50	< 172
	09/16/15	< 31	< 34	< 73	< 36	< 85	< 35	< 68	< 54	< 32	< 33	< 162	< 34	< 228
	09/30/15	< 32	< 25	< 76	< 33	< 62	< 31	< 51	< 56	< 21	< 33	< 157	< 35	< 208
	10/14/15	< 18	< 17	< 40	< 16	< 45	< 20	< 29	< 29	< 17	< 19	< 86	< 20	< 107
	10/28/15	< 20	< 24	< 51	< 30	< 49	< 25	< 40	< 35	< 22	< 28	< 118	< 32	< 129
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-IX.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GRASS SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-08	05/13/15	< 17	< 16	< 41	< 14	< 39	< 18	< 33	< 59	< 14	< 17	< 117	< 31	< 103
	05/27/15	< 18	< 15	< 42	< 19	< 44	< 18	< 35	< 37	< 17	< 19	< 91	< 33	< 108
	06/10/15	< 29	< 30	< 71	< 32	< 80	< 32	< 61	< 57	< 32	< 34	< 140	< 33	< 177
	06/24/15	< 8	< 9	< 21	< 7	< 19	< 9	< 16	< 37	< 8	< 8	< 68	< 19	< 57
	07/08/15	< 16	< 17	< 31	< 18	< 33	< 15	< 26	< 28	< 14	< 16	< 76	< 15	< 115
	07/22/15	< 22	< 28	< 50	< 28	< 58	< 21	< 34	< 42	< 21	< 26	< 114	< 33	< 152
	08/05/15	< 12	< 13	< 32	< 12	< 28	< 14	< 25	< 51	< 11	< 11	< 99	< 25	< 81
	08/19/15	< 27	< 28	< 64	< 23	< 63	< 30	< 49	< 46	< 27	< 30	< 133	< 37	< 177
	09/02/15	< 30	< 25	< 70	< 31	< 66	< 22	< 40	< 46	< 27	< 29	< 128	< 30	< 162
	09/16/15	< 26	< 27	< 49	< 26	< 59	< 27	< 45	< 41	< 27	< 27	< 120	< 25	< 171
	09/30/15	< 29	< 30	< 81	< 36	< 83	< 40	< 57	< 59	< 35	< 34	< 164	< 51	< 209
	10/14/15	< 18	< 17	< 37	< 19	< 39	< 20	< 32	< 31	< 18	< 18	< 85	< 24	< 127
	10/28/15	< 23	< 25	< 51	< 18	< 61	< 24	< 41	< 40	< 24	< 23	< 116	< 32	< 164
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-
CL-116	05/13/15	< 9	< 9	< 26	< 9	< 22	< 10	< 17	< 33	< 9	< 10	< 70	< 20	< 69
	05/27/15	< 9	< 10	< 21	< 12	< 20	< 9	< 18	< 15	< 9	< 8	< 50	< 13	< 54
	06/10/15	< 25	< 27	< 61	< 31	< 50	< 29	< 49	< 49	< 26	< 28	< 145	< 32	< 211
	06/24/15	< 10	< 10	< 27	< 9	< 23	< 11	< 19	< 43	< 9	< 10	< 81	< 21	< 62
	07/08/15	< 16	< 13	< 34	< 15	< 29	< 18	< 26	< 29	< 15	< 16	< 76	< 21	< 109
	07/22/15	< 30	< 20	< 57	< 28	< 62	< 25	< 43	< 42	< 23	< 30	< 115	< 28	< 142
	08/05/15	< 13	< 14	< 32	< 13	< 30	< 15	< 26	< 60	< 12	< 14	< 114	< 25	< 101
	08/19/15	< 35	< 29	< 71	< 36	< 83	< 30	< 57	< 60	< 30	< 33	< 152	< 46	< 195
	09/02/15	< 27	< 29	< 68	< 27	< 85	< 29	< 61	< 54	< 27	< 29	< 126	< 45	< 166
	09/16/15	< 25	< 22	< 48	< 23	< 55	< 30	< 43	< 40	< 19	< 28	< 117	< 32	< 214
	09/30/15	< 34	< 30	< 42	< 29	< 62	< 26	< 54	< 52	< 29	< 28	< 153	< 44	< 220
	10/14/15	< 32	< 30	< 79	< 34	< 73	< 31	< 62	< 58	< 33	< 29	< 157	< 39	< 246
	10/28/15	< 22	< 21	< 49	< 14	< 47	< 22	< 35	< 39	< 20	< 23	< 99	< 18	< 162
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-X.1 QUARTERLY DLR RESULTS FOR CLINTON POWER STATION, 2015

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	22.7 ± 3.1	23.0	20.9	22.2	24.6
CL-02	23.6 ± 3.6	24.7	23.1	21.3	25.3
CL-03	23.7 ± 3.5	24.4	22.9	21.8	25.8
CL-04	22.5 ± 2.8	22.9	21.8	21.0	24.2
CL-05	23.9 ± 3.1	24.6	22.4	22.8	25.7
CL-06	20.9 ± 2.9	21.4	20.1	19.4	22.7
CL-07	22.2 ± 1.9	22.8	21.5	21.2	23.2
CL-08	22.9 ± 4.0	24.3	21.3	21.1	24.9
CL-11	21.9 ± 3.0	22.0	22.0	19.9	23.6
CL-15	20.7 ± 2.9	21.0	19.8	19.4	22.6
CL-22	23.3 ± 3.3	23.7	22.7	21.5	25.4
CL-23	24.2 ± 2.1	24.5	23.7	23.0	25.4
CL-24	24.3 ± 2.3	25.2	23.4	23.1	25.3
CL-33	24.1 ± 2.5	23.6	24.2	22.8	25.7
CL-34	25.1 ± 2.8	24.3	25.0	23.9	27.1
CL-35	22.2 ± 3.0	23.8	20.7	21.1	23.1
CL-36	23.4 ± 3.7	24.2	22.3	21.4	25.5
CL-37	21.7 ± 2.5	22.7	20.1	21.2	22.6
CL-41	24.5 ± 2.2	24.5	23.8	23.5	26.0
CL-42	23.0 ± 2.9	23.1	22.3	21.6	25.0
CL-43	23.8 ± 2.4	24.5	23.3	22.4	25.1
CL-44	23.4 ± 2.3	23.9	22.9	22.0	24.6
CL-45	24.4 ± 5.2	24.4	23.2	21.9	28.0
CL-46	23.3 ± 2.8	24.2	21.7	(1)	24.1
CL-47	23.9 ± 3.8	23.6	23.6	21.8	26.4
CL-48	22.7 ± 3.2	22.6	21.9	21.4	25.0
CL-49	23.8 ± 3.7	24.1	22.6	22.3	26.3
CL-51	25.3 ± 2.0	25.4	24.3	(1)	26.3
CL-52	24.7 ± 5.5	25.7	23.1	21.9	28.0
CL-53	22.0 ± 2.9	21.6	21.6	20.8	24.1
CL-54	24.2 ± 4.0	25.4	22.7	22.4	26.4
CL-55	23.9 ± 4.1	24.0	23.1	21.9	26.7
CL-56	24.3 ± 3.6	24.4	23.9	22.2	26.6
CL-57	25.0 ± 1.1	24.5	25.0	24.7	25.8
CL-58	24.2 ± 3.7	25.2	23.6	21.9	26.1
CL-60	24.2 ± 3.2	24.2	24.5	22.1	26.0
CL-61	23.9 ± 3.9	24.0	22.8	22.2	26.6
CL-63	21.5 ± 3.8	21.8	21.0	19.2	23.8
CL-64	23.1 ± 3.2	23.0	22.6	21.4	25.2
CL-65	24.3 ± 3.4	25.2	22.8	23.0	26.3
CL-74	21.5 ± 3.9	22.6	20.8	19.0	23.4
CL-75	23.3 ± 3.6	23.6	22.2	21.6	25.6
CL-76	24.5 ± 3.4	24.8	23.7	22.7	26.7
CL-77	22.4 ± 3.4	23.4	20.9	21.0	24.2
CL-78	22.1 ± 4.3	23.8	22.1	19.0	23.3
CL-79	24.0 ± 4.5	24.6	22.9	21.6	26.8
CL-80	23.4 ± 3.3	23.6	22.5	21.9	25.7
CL-81	23.7 ± 4.6	24.5	23.0	20.9	26.3
CL-84	23.0 ± 2.2	22.9	22.8	21.9	24.5
CL-90	20.1 ± 2.8	21.2	19.2	18.6	21.3
CL-91	21.3 ± 2.9	22.6	20.1	20.0	22.5
CL-97	23.0 ± 2.1	22.7	23.1	21.9	24.4
CL-99	19.3 ± 2.8	20.2	19.1	17.3	20.4
CL-114	22.3 ± 2.1	23.2	21.4	21.4	23.3

(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, 2015

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	23.8 ± 1.7	24.3 ± 2.0	23.7 ± 2.0	22.7 ± 2.7	22.0 ± 0.0
APR-JUN	22.6 ± 2.3	23.1 ± 2.1	22.1 ± 2.5	21.5 ± 3.2	22.0 ± 0.0
JUL-SEP	22.0 ± 2.2	21.8 ± 2.4	21.7 ± 2.9	20.7 ± 3.0	19.9 ± 0.0
OCT-DEC	25.3 ± 2.4	26.0 ± 2.4	25.1 ± 3.0	23.6 ± 3.3	23.6 ± 0.0

TABLE C-X.3 SUMMARY OF THE AMBIENT DOSIMETRY PROGRAM FOR CLINTON POWER STATION, 2015

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	63	19.2	28.0	23.4 ± 3.3	
OUTER RING	63	19.0	28.0	23.8 ± 3.8	18.0 ± 2.4
SPECIAL INTEREST	28	19.0	26.3	23.1 ± 3.7	
SUPPLEMENTAL	56	17.3	25.8	22.1 ± 3.8	
CONTROL	4	19.9	23.6	21.9 ± 3.0	

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

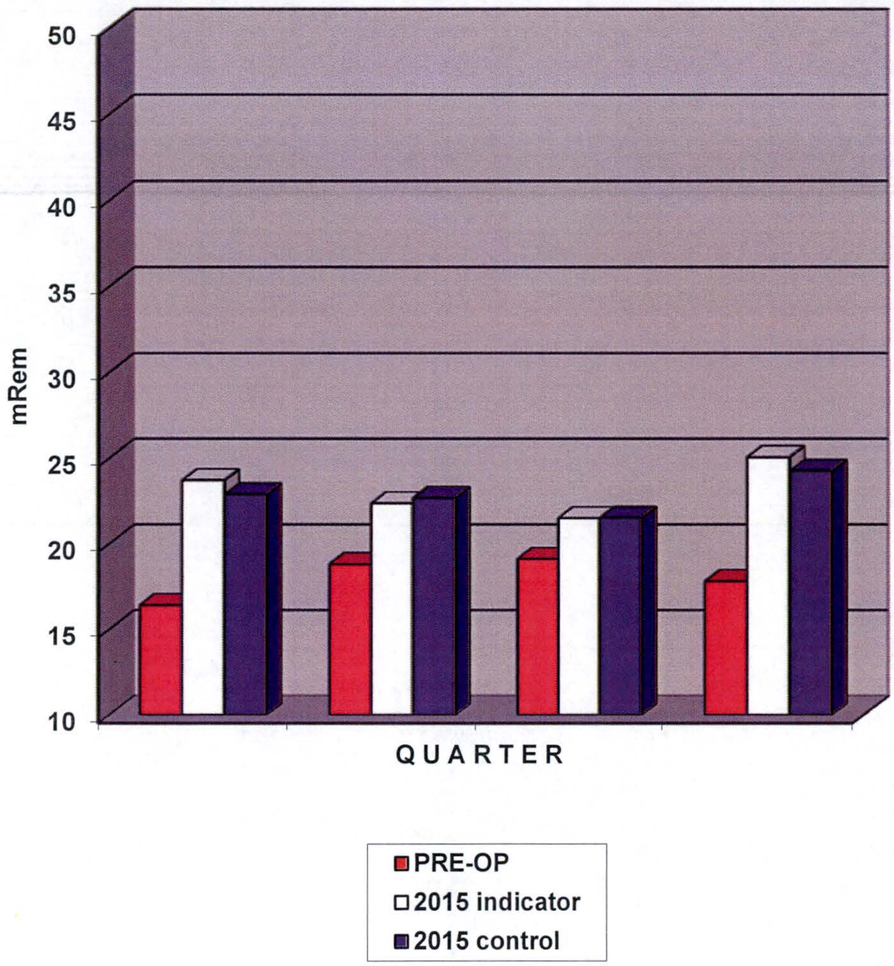
SPECIAL INTEREST STATIONS - CL-37, CL-41, CL-49, CL-64, CL-65, CL-74, CL-75

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, 2015

FIGURE C-2
MEAN QUARTERLY AMBIENT GAMMA RADIATION LEVELS (DLR) IN THE VICINITY OF CPS, 2015



APPENDIX D

INTER-LABORATORY COMPARISON PROGRAM

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Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2015	E11181	Milk	Sr-89	pCi/L	88.9	97.2	0.91	A
			Sr-90	pCi/L	12.2	17.4	0.70	W
	E11182	Milk	I-131	pCi/L	61.3	65.1	0.94	A
			Ce-141	pCi/L	104	113	0.92	A
			Cr-51	pCi/L	265	276	0.96	A
			Cs-134	pCi/L	138	154	0.90	A
			Cs-137	pCi/L	205	207	0.99	A
			Co-58	pCi/L	178	183	0.97	A
			Mn-54	pCi/L	187	188	0.99	A
			Fe-59	pCi/L	182	177	1.03	A
			Zn-65	pCi/L	345	351	0.98	A
			Co-60	pCi/L	379	405	0.94	A
	E11184	AP	Ce-141	pCi	107	85.0	1.26	W
			Cr-51	pCi	261	224	1.17	A
			Cs-134	pCi	74.6	77.0	0.97	A
			Cs-137	pCi	99.6	102	0.98	A
			Co-58	pCi	99.8	110	0.91	A
			Mn-54	pCi	99.2	96.9	1.02	A
			Fe-59	pCi	109	119	0.92	A
			Zn-65	pCi	188	183	1.03	A
			Co-60	pCi	200	201	1.00	A
	E11183	Charcoal	I-131	pCi	82.9	85.4	0.97	A
	E11185	Water	Fe-55	pCi/L	1950	1900	1.03	A
June 2015	E11234	Milk	Sr-89	pCi/L	94.9	92.6	1.02	A
			Sr-90	pCi/L	14.3	12.7	1.13	A
	E11238	Milk	I-131	pCi/L	93.2	95.9	0.97	A
			Ce-141	pCi/L	Not provided for this study			
			Cr-51	pCi/L	349	276	1.26	W
			Cs-134	pCi/L	165	163	1.01	A
			Cs-137	pCi/L	143	125	1.14	A
			Co-58	pCi/L	82.0	68.4	1.20	A
			Mn-54	pCi/L	113	101	1.12	A
			Fe-59	pCi/L	184	151	1.22	W
			Zn-65	pCi/L	269	248	1.08	A
			Co-60	pCi/L	208	193	1.08	A
	E11237	AP	Ce-141	pCi	Not provided for this study			
			Cr-51	pCi	323	233	1.39	N (1)
			Cs-134	pCi	139	138	1.01	A
			Cs-137	pCi	111	106	1.05	A
			Co-58	pCi	54.0	57.8	0.93	A
			Mn-54	pCi	96.8	84.9	1.14	A
			Fe-59	pCi	162	128	1.27	W
			Zn-65	pCi	198	210	0.94	A
			Co-60	pCi	178	163	1.09	A
	E11236	Charcoal	I-131	pCi	93.9	80	1.17	A

TABLE D-1 **ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM**
TELEDYNE BROWN ENGINEERING, 2015
(PAGE 2 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
June 2015	E11238	Water	Fe-55	pCi/L	1890	1790	1.06	A
September 2015	E11289	Milk	Sr-89	pCi/L	95.7	99.1	0.97	A
			Sr-90	pCi/L	15.4	16.4	0.94	A
	E11290	Milk	I-131	pCi/L	94.9	99.9	0.95	A
			Ce-141	pCi/L	228	213	1.07	A
			Cr-51	pCi/L	499	538	0.93	A
			Cs-134	pCi/L	208	212	0.98	A
			Cs-137	pCi/L	270	255	1.06	A
			Co-58	pCi/L	275	263	1.05	A
			Mn-54	pCi/L	320	290	1.10	A
			Fe-59	pCi/L	255	226	1.13	A
			Zn-65	pCi/L	392	353	1.11	A
			Co-60	pCi/L	350	330	1.06	A
	E11292	AP	Ce-141	pCi	104	85.1	1.22	W
			Cr-51	pCi	262	215	1.22	W
			Cs-134	pCi	86.1	84.6	1.02	A
			Cs-137	pCi	93	102	0.91	A
			Co-58	pCi	106	105	1.01	A
			Mn-54	pCi	117	116	1.01	A
			Fe-59	pCi	94.8	90.2	1.05	A
			Zn-65	pCi	160	141	1.13	A
			Co-60	pCi	146	132	1.11	A
	E11291	Charcoal	I-131	pCi	85.9	81.7	1.05	A
	E11293	Water	Fe-55	pCi/L	2090	1800	1.16	A
	E11294	Soil	Ce-141	pCi/kg	209	222	0.94	A
			Cr-51	pCi/kg	463	560	0.83	A
			Cs-134	pCi/kg	231	221	1.05	A
			Cs-137	pCi/kg	311	344	0.90	A
			Co-58	pCi/kg	245	274	0.89	A
			Mn-54	pCi/kg	297	302	0.98	A
			Fe-59	pCi/kg	248	235	1.06	A
			Zn-65	pCi/kg	347	368	0.94	A
			Co-60	pCi/kg	328	344	0.95	A
December 2015	E11354	Milk	Sr-89	pCi/L	96.2	86.8	1.11	A
			Sr-90	pCi/L	14.8	12.5	1.18	A
	E11355	Milk	I-131	pCi/L	95.1	91.2	1.04	A
			Ce-141	pCi/L	117	129	0.91	A
			Cr-51	pCi/L	265	281	0.94	A
			Cs-134	pCi/L	153	160	0.96	A
			Cs-137	pCi/L	119	115	1.03	A
			Co-58	pCi/L	107	110	0.97	A
			Mn-54	pCi/L	153	145	1.06	A
			Fe-59	pCi/L	117	108	1.08	A
			Zn-65	pCi/L	261	248	1.05	A
			Co-60	pCi/L	212	213	1.00	A

TABLE D-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2015
(PAGE 3 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December 2015	E11357	AP	Ce-141	pCi	89.9	84.0	1.07	A
			Cr-51	pCi	215	184	1.17	A
			Cs-134	pCi	103	105	0.98	A
			Cs-137	pCi	76.6	74.8	1.02	A
			Co-58	pCi	76.2	71.9	1.06	A
			Mn-54	pCi	91.4	94.4	0.97	A
			Fe-59	pCi	78.6	70.3	1.12	A
			Zn-65	pCi	173	162	1.07	A
			Co-60	pCi	138	139	0.99	A
	E11422	AP	Sr-89	pCi	98.0	96.9	1.01	A
			Sr-90	pCi	10.0	14.0	0.71	W
	E11356	Charcoal	I-131	pCi	74.9	75.2	1.00	A
	E11358	Water	Fe-55	pCi/L	2160	1710	1.26	W
	E11353	Soil	Ce-141	pCi/kg	252	222	1.14	A
			Cr-51	pCi/kg	485	485	1.00	A
			Cs-134	pCi/kg	319	277	1.15	A
			Cs-137	pCi/kg	292	276	1.06	A
			Co-58	pCi/kg	193	190	1.02	A
			Mn-54	pCi/kg	258	250	1.03	A
			Fe-59	pCi/kg	218	186	1.17	A
			Zn-65	pCi/kg	457	429	1.07	A
			Co-60	pCi/kg	381	368	1.04	A

(1) AP Cr-51 - Cr-51 has the shortest half-life and the weakest gamma energy of the mixed nuclide sample, which produces a large error. Taking into account the error, the lowest value would be 119% of the reference value, which would be considered acceptable. NCR 15-18

(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 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING, 2015
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide*	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2015	15-MaW32	Water	Am-241	Bq/L	0.632	0.654	0.458 - 0.850	A
			Ni-63	Bq/L	2.5		(1)	A
			Pu-238	Bq/L	0.0204	0.0089	(2)	A
			Pu-239/240	Bq/L	0.9	0.8	0.582 - 1.082	A
	15-MaS32	Soil	Ni-63	Bq/kg	392	448.0	314 - 582	A
			Sr-90	Bq/kg	286	653	487 - 849	N (3)
	15-RdF32	AP	Sr-90	Bq/sample	-0.0991		(1)	A
			U-234/233	Bq/sample	0.0211	0.0155	0.0109 - 0.0202	N (3)
			U-238	Bq/sample	0.095	0.099	0.069 - 0.129	A
	15-GrF32	AP	Gr-A	Bq/sample	0.448	1.77	0.53 - 3.01	N (3)
			Gr-B	Bq/sample	0.7580	0.75	0.38 - 1.13	A
	15-RdV32	Vegetation	Cs-134	Bq/sample	8.08	7.32	5.12 - 9.52	A
			Cs-137	Bq/sample	11.6	9.18	6.43 - 11.93	W
			Co-57	Bq/sample	-0.0096		(1)	A
			Co-60	Bq/sample	6.53	5.55	3.89 - 7.22	A
			Mn-54	Bq/sample	0.0058		(1)	A
			Sr-90	Bq/sample	0.999	1.08	0.76 - 1.40	A
			Zn-65	Bq/sample	-0.108		(1)	A
September 2015	15-MaW33	Water	Am-241	Bq/L	1.012	1.055	0.739 - 1.372	A
			Ni-63	Bq/L	11.8	8.55	5.99 - 11.12	N (4)
			Pu-238	Bq/L	0.727	0.681	0.477 - 0.885	A
			Pu-239/240	Bq/L	0.830	0.900	0.630 - 1.170	A
	15-MaS33	Soil	Ni-63	Bq/kg	635	682	477 - 887	A
			Sr-90	Bq/kg	429	425	298 - 553	A
	15-RdF33	AP	Sr-90	Bq/sample	1.48	2.18	1.53 - 2.83	N (4)
			U-234/233	Bq/sample	0.143	0.143	0.100 - 0.186	A
			U-238	Bq/sample	0.149	0.148	0.104 - 0.192	A
	15-GrF33	AP	Gr-A	Bq/sample	0.497	0.90	0.27 - 1.53	A
			Gr-B	Bq/sample	1.34	1.56	0.78 - 2.34	A
	15-RdV33	Vegetation	Cs-134	Bq/sample	6.10	5.80	4.06 - 7.54	A
			Cs-137	Bq/sample	0.0002		(1)	A
			Co-57	Bq/sample	8.01	6.62	4.63 - 8.61	W
			Co-60	Bq/sample	4.97	4.56	3.19 - 5.93	A
			Mn-54	Bq/sample	8.33	7.68	5.38 - 9.98	A
			Sr-90	Bq/sample	0.386	1.30	0.91 - 1.69	N (4)
			Zn-65	Bq/sample	6.07	5.46	3.82 - 7.10	A

(1) False positive test.

(2) Sensitivity evaluation.

(3) Soil Sr-90 - incomplete digestion of the sample resulted in low results; AP U-234/233 - extremely low activity was difficult to quantify AP Gr-A - the MAPEP filter has the activity embedded in the filter. To corrected the low bias, TBE will create an attenuated efficiency for MAPEP samples. NCR 15-13

(4) Water Ni-63 extremely low activity was difficult to quantify; AP & Vegetation Sr-90 was lost during separation, possible from substance added by MAPEP NCR 15-21.

(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-3 ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM

TELEDYNE BROWN ENGINEERING, 2015

(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Limits	Evaluation (c)
May 2015	RAD-101	Water	Sr-89	pCi/L	45.2	63.2	51.1 - 71.2	N (1)
			Sr-90	pCi/L	28.0	41.9	30.8 - 48.1	N (1)
			Ba-133	pCi/L	80.6	82.5	63.9 - 90.8	A
			Cs-134	pCi/L	71.7	75.7	61.8 - 83.3	A
			Cs-137	pCi/L	187	189	170 - 210	A
			Co-60	pCi/L	85.7	84.5	76.0 - 95.3	A
			Zn-65	pCi/L	197	203	183 - 238	A
			Gr-A	pCi/L	26.1	42.6	22.1 - 54.0	A
			Gr-B	pCi/L	28.8	32.9	21.3 - 40.6	A
			I-131	pCi/L	23.5	23.8	19.7 - 28.3	A
			U-Nat	pCi/L	6.19	6.59	4.99 - 7.83	A
			H-3	pCi/L	3145	3280	2770 - 3620	A
November 2015	RAD-103	Water	Sr-89	pCi/L	40.9	35.7	26.7 - 42.5	A
			Sr-90	pCi/L	29.3	31.1	22.7 - 36.1	A
			Ba-133	pCi/L	31.5	32.5	25.9 - 36.7	A
			Cs-134	pCi/L	59.65	62.3	50.6 - 68.5	A
			Cs-137	pCi/L	156	157	141 - 175	A
			Co-60	pCi/L	70.6	71.1	64.0 - 80.7	A
			Zn-65	pCi/L	145	126	113 - 149	A
			Gr-A	pCi/L	38.2	51.6	26.9 - 64.7	A
			Gr-B	pCi/L	42.0	36.6	24.1 - 44.2	A
			I-131	pCi/L	24.8	26.3	21.9 - 31.0	A
			U-Nat	pCi/L	146.90	56.2	45.7 - 62.4	N (2)
			H-3	pCi/L	21100	21300	18700 - 23400	A

(1) Yield on the high side of our acceptance range indicates possibility of calcium interference. NCR 15-09

(2) Technician failed to dilute original sample. If diluted, the result would have been 57.1, which fell within the acceptance limits. NCR 15-19

(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-4 ERA (a) STATISTICAL SUMMARY PROFICIENCY TESTING PROGRAM[a]

ENVIRONMENTAL, INC., 2015

(Page 1 of 1)

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result [b]	ERA Result [c]	Control Limits	Acceptance
ERW-1444	04/06/15	Sr-89	59.71 ± 5.44	63.20	51.10 - 71.20	Pass
ERW-1444	04/06/15	Sr-90	43.41 ± 2.43	41.90	30.80 - 48.10	Pass
ERW-1448	04/06/15	Ba-133	77.75 ± 4.69	82.50	69.30 - 90.80	Pass
ERW-1448	04/06/15	Cs-134	68.82 ± 3.08	75.70	61.80 - 83.30	Pass
ERW-1448	04/06/15	Cs-137	- 191.92 ± 5.9	189	- 170.00 - 210.0	Pass
ERW-1448	04/06/15	Co-60	85.05 ± 4.59	84.50	76.00 - 95.30	Pass
ERW-1448	04/06/15	Zn-65	- 195.97 ± 12.0	203	- 183.00 - 238.0	Pass
ERW-1450	04/06/15	Gr. Alpha	34.05 ± 1.90	42.60	22.10 - 54.00	Pass
ERW-1450	04/06/15	G. Beta	26.93 ± 1.12	32.90	21.30 - 40.60	Pass
ERW-1453	04/06/15	I-131	22.47 ± 0.83	23.80	19.70 - 28.30	Pass
ERW-1456	04/06/15	Uranium	5.98 ± 0.31	6.59	4.99 - 7.83	Pass
ERW-1461	04/06/15	H-3	3,254 ± 180	3280	2,770 - 3620	Pass
ERW-5528	10/05/15	Sr-89	34.76 ± 0.06	35.70	26.70 - 42.50	Pass
ERW-5528	10/05/15	Sr-90	29.23 ± 0.06	31.10	22.70 - 36.10	Pass
ERW-5531	10/05/15	Ba-133	30.91 ± 0.53	32.50	25.90 - 36.70	Pass
ERW-5531	10/05/15	Cs-134	57.40 ± 2.57	62.30	50.69 - 68.50	Pass
ERW-5531	10/05/15	Cs-137	- 163.12 ± 4.8	157	- 141.00 - 175.0	Pass
ERW-5531	10/05/15	Co-60	73.41 ± 1.72	71.10	64.00 - 80.70	Pass
ERW-5531	10/05/15	Zn-65	- 138.94 ± 5.7	126	- 113.00 - 149.0	Pass
ERW-5534	10/05/15	Gr. Alpha	29.99 ± 0.08	51.60	26.90 - 64.70	Pass
ERW-5534	10/05/15	G. Beta	27.52 ± 0.04	36.60	24.10 - 44.20	Pass
ERW-5537	10/05/15	I-131	25.54 ± 0.60	26.30	21.90 - 31.00	Pass
ERW-5540	10/05/15	Uranium	53.30 ± 0.55	56.20	45.70 - 62.40	Pass
ERW-5543	10/05/15	H-3	21,260 ± 351	21,300	18,700 - 23400.0	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.

			Concentration [a]			
Lab Code [b]	Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MASO-975	02/01/15	Ni-63	341 ± 18	448	314 - 582	Pass
MASO-975	02/01/15	Sr-90	523 ± 12	653	457 - 849	Pass
MASO-975	02/01/15	Cs-134	533 ± 6	678	475 - 881	Pass
MASO-975	02/01/15	Cs-137	0.8 ± 2.5	0.0	NA [c]	Pass
MASO-975	02/01/15	Co-57	0.5 ± 1	0.0	NA [c]	Pass
MASO-975	02/01/15	Co-60	741 ± 8	817	572 - 1062	Pass
MASO-975	02/01/15	Mn-54	1,153 ± 9	1,198	839 - 1557	Pass
MASO-975	02/01/15	Zn-65	892 ± 18	1064	745 - 1383	Pass
MAW-969	02/01/15	Am-241	0.650 ± 0.078	0.654	0.458 - 0.850	Pass
MAW-969	02/01/15	Cs-134	21.09 ± 0.25	23.5	16.5 - 30.6	Pass
MAW-969	02/01/15	Cs-137	19.63 ± 0.34	19.1	13.4 - 24.8	Pass
MAW-969 [d]	02/01/15	Co-57	10.2 ± 0.4	29.9	20.9 - 38.9	Fail
MAW-969	02/01/15	Co-60	0.02 ± 0.05	0.00	NA [c]	Pass
MAW-969	02/01/15	H-3	569 ± 13	563	394 - 732	Pass
MAW-969	02/01/15	Fe-55	6.00 ± 6.60	6.88	4.82 - 8.94	Pass
MAW-969	02/01/15	Mn-54	0.02 ± 0.07	0.00	NA [c]	Pass
MAW-969	02/01/15	Ni-63	2.9 ± 3	0.00	NA [c]	Pass
MAW-969	02/01/15	Zn-65	16.54 ± 0.85	18.3	12.8 - 23.8	Pass
MAW-969	02/01/15	Pu-238	0.02 ± 0.03	0.01	NA [e]	Pass
MAW-969	02/01/15	Pu-239/240	0.81 ± 0.10	0.83	0.58 - 1.08	Pass
MAW-969	02/01/15	Sr-90	9.40 ± 1.30	9.48	6.64 - 12.32	Pass
MAW-950	02/01/15	Gr. Alpha	0.66 ± 0.05	1.07	0.32 - 1.81	Pass
MAW-950	02/01/15	Gr. Beta	2.72 ± 0.06	2.79	1.40 - 4.19	Pass
MAAP-978	02/01/15	Cs-134	1.00 ± 0.04	1.15	0.81 - 1.50	Pass
MAAP-978	02/01/15	Cs-137	0.004 ± 0.023	0.00	NA [c]	Pass
MAAP-978 e	02/01/15	Co-57	0.04 ± 0.04	1.51	1.06 - 1.96	Fail
MAAP-978	02/01/15	Co-60	0.01 ± 0.02	0.00	NA [c]	Pass
MAAP-978	02/01/15	Mn-54	1.11 ± 0.08	1.02	0.71 - 1.33	Pass
MAAP-978	02/01/15	Zn-65	0.83 ± 0.10	0.83	0.58 - 1.08	Pass
MAAP-981	02/01/15	Sr-89	38.12 ± 1.01	47.5	33.3 - 61.8	Pass
MAAP-981	02/01/15	Sr-90	1.22 ± 0.13	1.06	0.74 - 1.38	Pass
MAAP-984	02/01/15	Gr. Alpha	0.59 ± 0.06	1.77	0.53 - 3.01	Pass
MAAP-984	02/01/15	Gr. Beta	0.95 ± 0.07	0.75	0.38 - 1.13	Pass
MAVE-972	02/01/15	Cs-134	6.98 ± 0.13	7.32	5.12 - 9.52	Pass
MAVE-972	02/01/15	Cs-137	9.73 ± 0.21	9.18	6.43 - 11.93	Pass
MAVE-972	02/01/15	Co-57	0.01 ± 0.04	0.00	NA [c]	Pass
MAVE-972	02/01/15	Co-60	3.89 ± 0.20	5.55	3.89 - 7.22	Pass
MAVE-972	02/01/15	Mn-54	0.04 ± 0.07	0.00	NA [c]	Pass
MAVE-972	02/01/15	Zn-65	0.09 ± 0.12	0.00	NA [c]	Pass

TABLE D-5 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
ENVIRONMENTAL, INC., 2015

			Concentration [a]			
Lab Code [b]	Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MASO-4903	08/01/15	Ni-63	556 ± 18	682	477 - 887	Pass
MASO-4903 f	08/01/15	Sr-90	231 ± 7	425	298 - 553	Fail
MASO-4903 f	08/01/15	Sr-90	352 ± 10	425	298 - 553	Pass
MASO-4903	08/01/15	Cs-134	833 ± 10	1,010	707 - 1313	Pass
MASO-4903	08/01/15	Cs-137	808 ± 11	809.00	566 - 1052	Pass
MASO-4903	08/01/15	Co-57	1,052 ± 10	1,180	826 - 1534	Pass
MASO-4903	08/01/15	Co-60	2 ± 2	1.3	NA [e]	Pass
MASO-4903	08/01/15	Mn-54	1,331 ± 13	1,340	938 - 1742	Pass
MASO-4903	08/01/15	Zn-65	686 ± 15	662	463 - 861	Pass
MAW-5007	08/01/15	Cs-134	16.7 ± 0.4	23.1	16.2 - 30	Pass
MAW-5007	08/01/15	Cs-137	-0.36 ± 0.13	0	NA [c]	Pass
MAW-5007	08/01/15	Co-57	21.8 ± 0.4	20.8	14.6 - 27	Pass
MAW-5007	08/01/15	Co-60	17.3 ± 0.3	17.1	12 - 22.2	Pass
MAW-5007	08/01/15	H-3	227.5 ± 8.9	216	151 - 281	Pass
MAW-5007 g	08/01/15	Fe-55	4.2 ± 14.1	13.1	9.2 - 17	Fail
MAW-5007	08/01/15	Mn-54	16.6 ± 0.5	15.6	10.9 - 20.3	Pass
MAW-5007	08/01/15	Ni-63	9.1 ± 2.6	8.55	5.99 - 11.12	Pass
MAW-5007	08/01/15	Zn-65	15.5 ± 0.9	13.9	9.7 - 18.1	Pass
MAW-5007	08/01/15	Sr-90	4.80 ± 0.50	4.80	3.36 - 6.24	Pass
MAW-5007	08/01/15	Gr. Alpha	0.41 ± 0.04	0.43	0.13 - 0.73	Pass
MAW-5007	08/01/15	Gr. Beta	3.45 ± 0.07	3.52	1.76 - 5.28	Pass
MAAP-4911	08/01/15	Sr-89	3.55 ± 0.67	3.98	2.79 - 5.17	Pass
MAAP-4911	08/01/15	Sr-90	0.94 ± 0.16	1.05	0.74 - 1.37	Pass
MAAP-4907	08/01/15	Gr. Alpha	0.30 ± 0.04	0.90	0.27 - 1.53	Pass
MAAP-4907	08/01/15	Gr. Beta	1.85 ± 0.09	1.56	0.78 - 2.34	Pass
MAVE-4901	08/01/15	Cs-134	5.56 ± 0.16	5.80	4.06 - 7.54	Pass
MAVE-4901	08/01/15	Cs-137	-0.02 ± 0.06	0.00	NA [c]	Pass
MAVE-4901	08/01/15	Co-57	7.74 ± 0.18	6.62	4.63 - 8.61	Pass
MAVE-4901	08/01/15	Co-60	4.84 ± 0.15	4.56	3.19 - 5.93	Pass
MAVE-4901	08/01/15	Mn-54	8.25 ± 0.25	7.68	5.38 - 9.98	Pass
MAVE-4901	08/01/15	Zn-65	5.78 ± 0.29	5.46	3.82 - 7.10	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.

[d] Lab result was 27.84. Data entry error resulted in a non-acceptable result.

[e] Lab result was 1.58. Data entry error resulted in a non-acceptable result.

f The incomplete separation of calcium from strontium caused a failed low result. The result of reanalysis acceptable.

g The known activity was below the routine laboratory detection limits for the available aliquot fraction.

APPENDIX E

ERRATA DATA

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There is no errata data for 2015.

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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

January 1 through December 31, 2015

Prepared By

Teledyne Brown Engineering
Environmental Services

Exelon Generation.

Clinton Power Station
Clinton, IL 61727

April 2016

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Table Of Contents

Appendices

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 2015. During that time period, 246 analyses were performed on 97 samples from 24 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 2015.

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. Strontium-90 was not detected in any samples.

Tritium was not detected in any of the groundwater or surface 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 four of 17 groundwater monitoring locations. The tritium concentrations ranged from 176 ± 106 pCi/L to 365 ± 136 pCi/L. Tritium was not detected in any surface water. Precipitation samples were not analyzed during 2015.

Gross Alpha and Gross Beta analyses in the dissolved and suspended fractions were performed on groundwater samples during the third quarter of sampling in 2015. Naturally occurring Gross Alpha (dissolved) was detected in one of 17 groundwater locations at a concentration of 1.2 ± 0.8 pCi/L. 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 1.9 to 11.9 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 2015.

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 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 2015.

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

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

2. Concentrations of strontium in groundwater.

3. Concentrations of tritium in groundwater and surface water.

4. 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. <u>Lower Limit of Detection and Minimum Detectable Concentration</u>

   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. <u>Laboratory Measurements Uncertainty</u>

   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

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 2015.

2. Missed Samples

   There were no missed samples in 2015.

B. Program Changes

There were no sampling program changes in 2015.

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 365 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 2015. Naturally occurring Gross Alpha (dissolved) was detected in one of 17 groundwater locations at a concentration of 1.2 ± 0.8 pCi/L. 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 1.9 to 11.9 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 and no plant produced radionuclides 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 2015 (Table B–II.1 Appendix B).

Gamma Emitters

Naturally occurring K-40 was detected and no plant produced radionuclides were detected (Table B–II.2, Appendix B).

E. Precipitation Water Results

Precipitation Water

Precipitation water samples were not collected during 2015.

F. Recapture

Recapture samples were not required in 2015.

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. Errata Data

The 2014 ARGPP incorrectly reported 607 analyses in the Summary and Conclusion section. The number of analyses in 2014 should have been reported as 253 (IR 02635324).

I. Leaks, Spills, and Releases

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

J. Trends

MW-CL-14S had a slight trend upward from <200 pCi/L to 241, 300 and 365 pCi/L respectively in 2015. However, the 1st Quarter of 2016 revealed MW-CL-14S has trended back to 218 pCi/L. Additionally, MW-CL-21S, after it too experienced a slight trend from 219 pCi/L to 287 pCi/L in 2015, has now had consecutive values of 189 pCi/L in the 4th Quarter of 2015 and 191 pCi/L from our 1st Quarter of 2016. All sampling well locations are currently indicating tritium levels that are less than the ODCM LLD of 2,000 pCi/l. All wells will continue to be sampled in accordance with the RGPP in 2016.

K. Investigations

Currently no investigations are on-going.

L. Actions Taken

1. Compensatory Actions

There have been no station events requiring compensatory actions at the Clinton Power Station in 2015.

2. Installation of Monitoring Wells

No new wells were installed during the 2015.

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, 2015

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

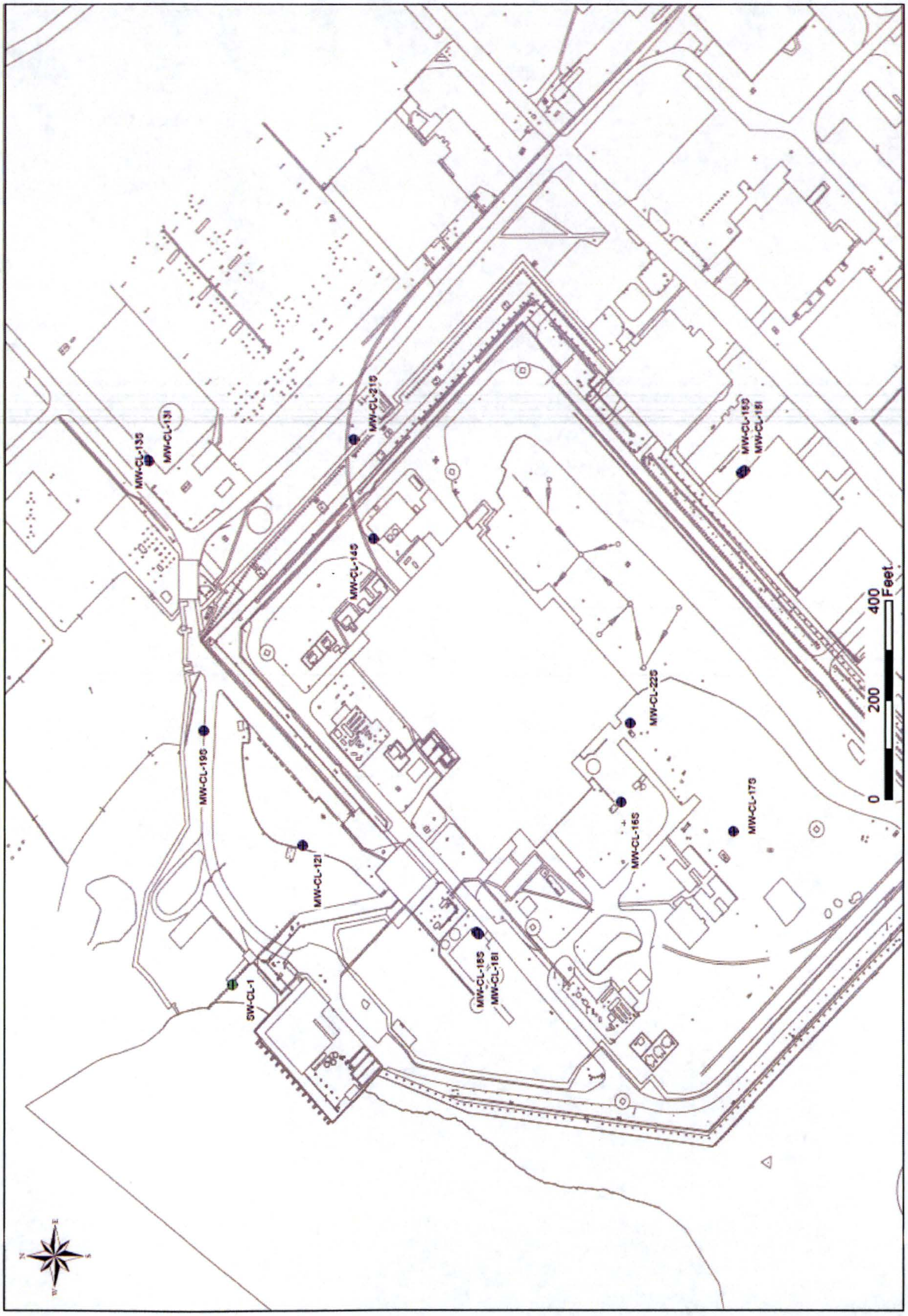

Figure A – 1
Onsite Sampling Locations at Clinton Power Station

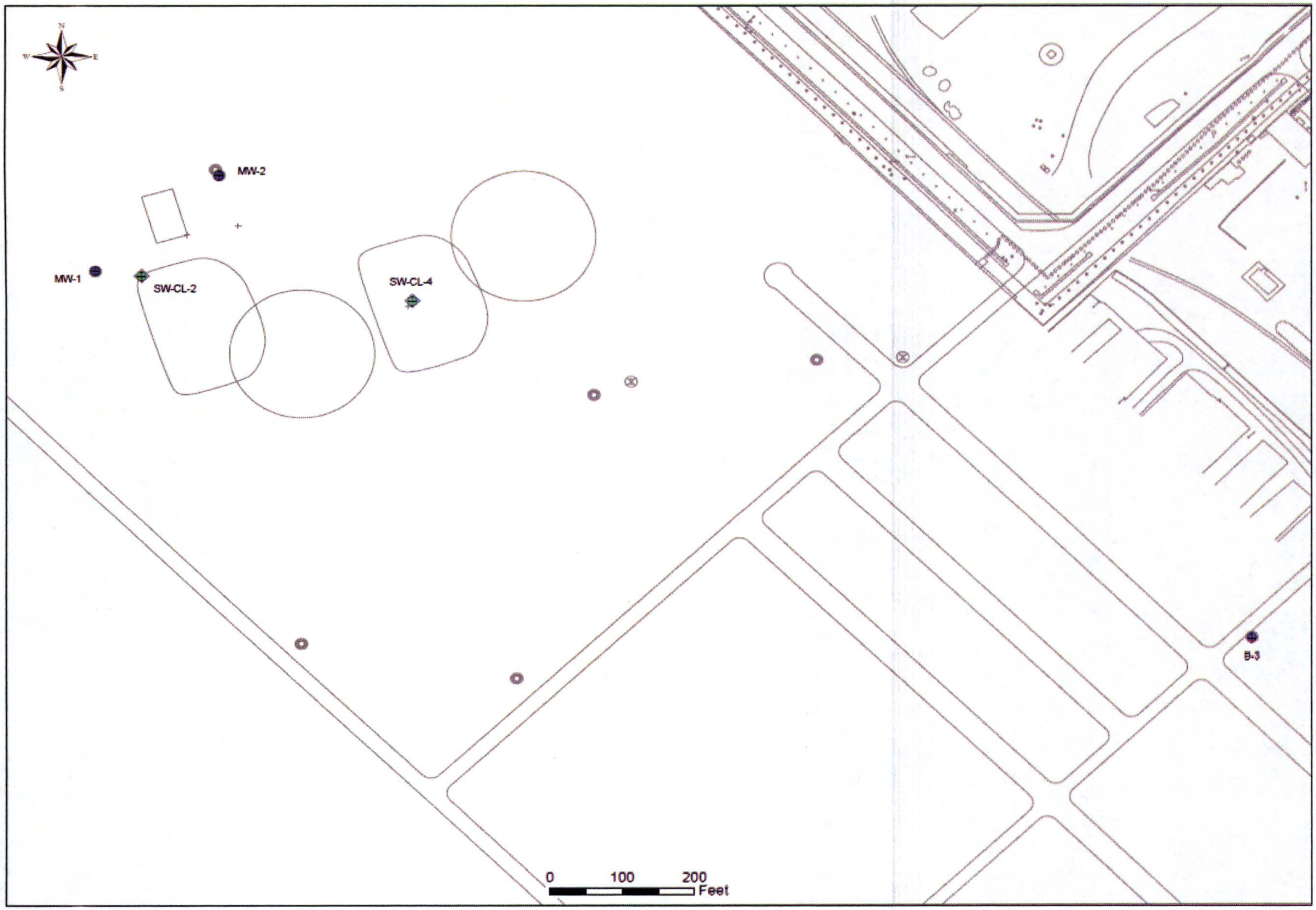

Figure A – 2
Sampling Locations South of Clinton Power Station

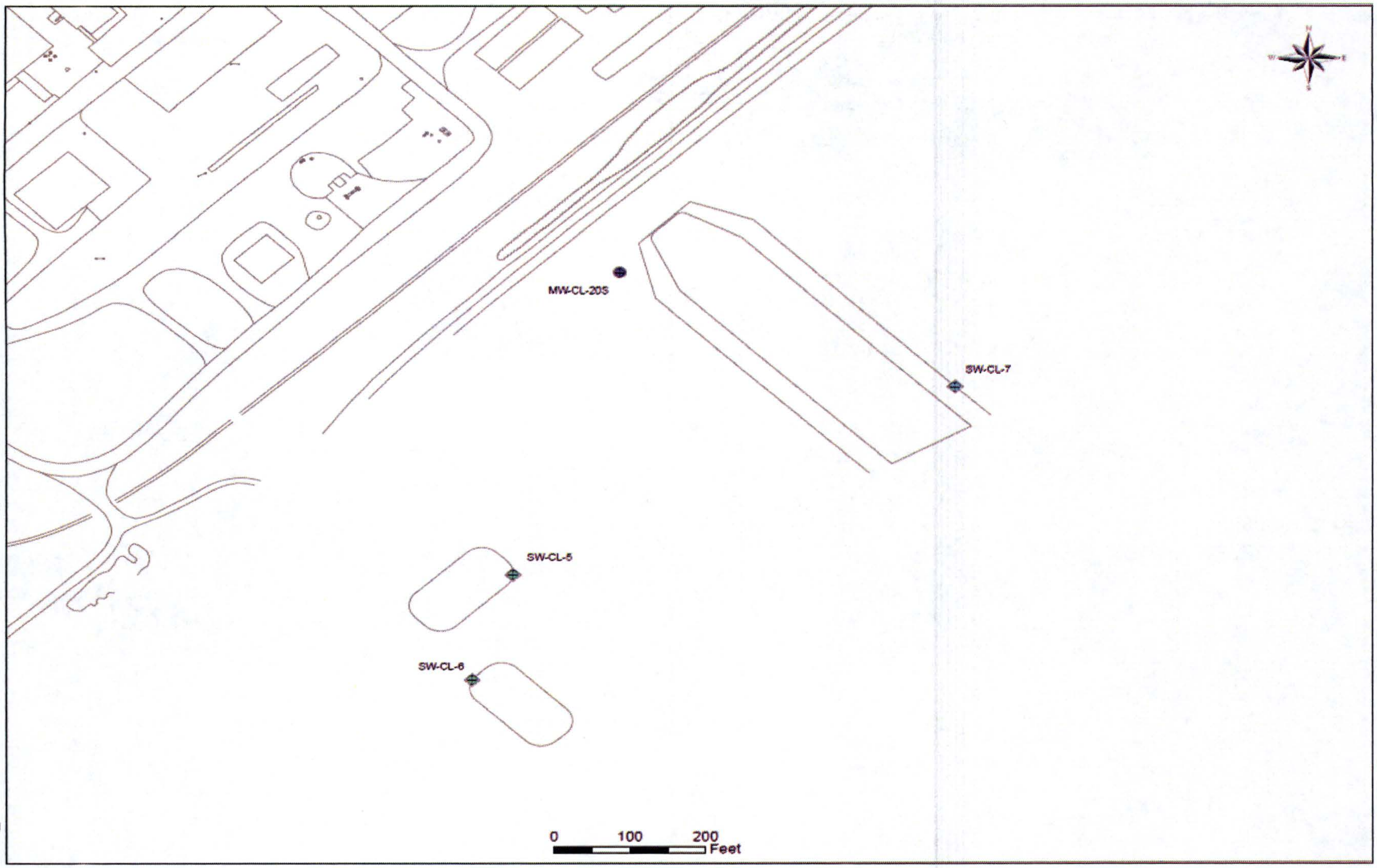

Figure A – 3
Sampling Locations East of Clinton Power Station

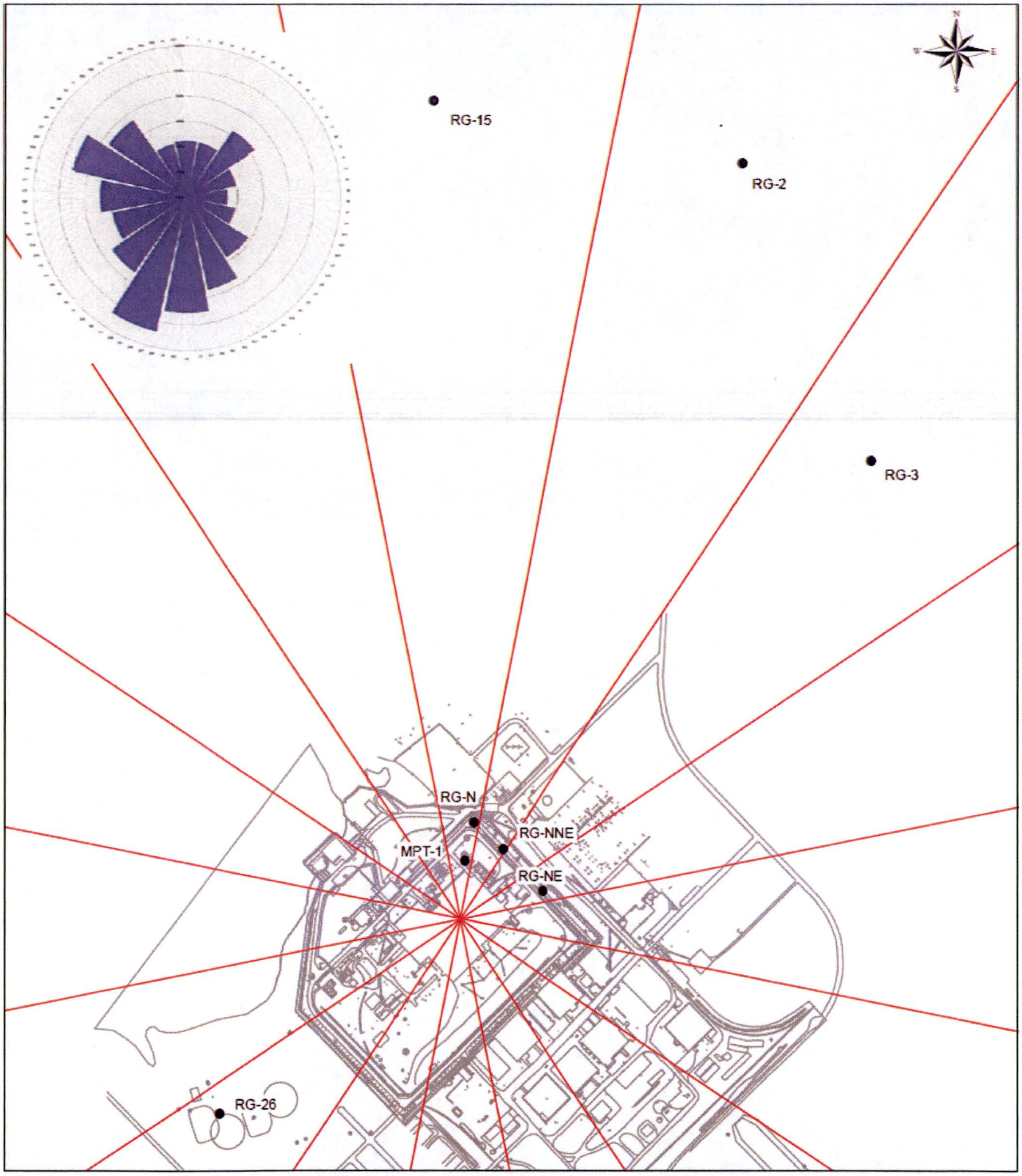

Figure A – 4
Recapture Sampling Locations of Clinton Power Station

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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, 2015**

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	02/09/15	< 157						
B-3	05/26/15	< 194						
B-3	08/17/15	< 180	< 5.2	< 0.6	1.2 ± 0.8	< 1.1	3.2 ± 1.0	< 1.6
B-3	11/02/15	< 196						
MW-CL-1	02/09/15	< 156						
MW-CL-1	05/26/15	< 195						
MW-CL-1	08/17/15	< 179	< 5.4	< 0.6	< 0.9	< 1.1	2.1 ± 0.9	< 1.6
MW-CL-1	11/02/15	< 187						
MW-CL-12I	02/09/15	< 178						
MW-CL-12I	05/26/15	< 196						
MW-CL-12I	08/17/15	< 191	< 5.6	< 0.6	< 0.9	< 1.1	4.9 ± 1.0	< 1.6
MW-CL-12I	11/02/15	322 ± 134						
MW-CL-13I	02/09/15	< 154						
MW-CL-13I	05/26/15	< 193						
MW-CL-13I	08/17/15	< 187	< 4.0	< 0.6	< 0.7	< 1.1	3.2 ± 1.1	< 1.6
MW-CL-13I	11/02/15	< 187						
MW-CL-13S	02/09/15	< 157						
MW-CL-13S	05/26/15	< 193						
MW-CL-13S	08/17/15	< 199	< 4.7	< 0.6	< 0.6	< 1.1	2.7 ± 1.0	< 1.6
MW-CL-13S	11/02/15	220 ± 128						
MW-CL-14S	02/09/15	< 156						
MW-CL-14S	07/22/15	241 ± 128						
MW-CL-14S	08/18/15	300 ± 126	< 6.9	< 0.8	< 1.3	< 1.1	11.9 ± 1.6	< 1.6
MW-CL-14S	11/03/15	365 ± 136						
MW-CL-15I	02/09/15	< 156						
MW-CL-15I	05/26/15	< 193						
MW-CL-15I	08/17/15	< 174	< 5.7	< 0.7	< 0.7	< 0.5	1.9 ± 1.0	< 1.7
MW-CL-15I	11/02/15	< 193						
MW-CL-15S	02/09/15	< 155						
MW-CL-15S	05/26/15	< 193						
MW-CL-15S	08/17/15	< 197						
MW-CL-15S	09/29/15		< 5.2	< 0.6	< 0.9	< 0.8	< 0.9	< 1.6
MW-CL-15S	11/02/15	< 185						
MW-CL-16S	02/09/15	< 186						
MW-CL-16S	05/27/15	< 189						
MW-CL-16S	08/18/15	< 180						
MW-CL-16S	09/29/15		< 5.6	< 0.7	< 2.3	< 0.8	8.7 ± 1.4	< 1.6
MW-CL-16S	11/03/15	< 188						
MW-CL-17S	02/09/15	< 159						
MW-CL-17S	05/27/15	< 194						
MW-CL-17S	08/18/15	< 180	< 5.3	< 0.7	< 1.9	< 0.5	3.4 ± 1.1	< 1.6
MW-CL-17S	11/03/15	< 188						
MW-CL-18I	02/09/15	< 154						
MW-CL-18I	05/27/15	< 194						
MW-CL-18I	08/18/15	< 198	< 5.5	< 0.6	< 1.2	< 0.5	4.2 ± 1.1	< 1.6
MW-CL-18I	11/03/15	< 186						

TABLE B-I.1 **CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

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-18S	02/09/15	< 156						
MW-CL-18S	05/27/15	< 193						
MW-CL-18S	08/18/15	< 189	< 4.5	< 0.8	< 2.1	< 0.5	4.4 ± 1.2	< 1.6
MW-CL-18S	11/03/15	< 188						
MW-CL-19S	02/09/15	< 155						
MW-CL-19S	05/26/15	< 194						
MW-CL-19S	08/17/15	< 174	< 4.5	< 0.7	< 2.5	< 0.6	6.7 ± 1.5	< 1.7
MW-CL-19S	11/02/15	< 190						
MW-CL-2	02/09/15	< 154						
MW-CL-2	05/26/15	< 195						
MW-CL-2	08/17/15	< 180	< 5.2	< 0.6	< 1.2	< 1.1	3.9 ± 1.1	< 1.6
MW-CL-2	11/02/15	< 188						
MW-CL-20S	02/09/15	< 154						
MW-CL-20S	05/26/15	< 198						
MW-CL-20S	08/17/15	< 175	< 6.3	< 0.5	< 1.2	< 0.5	2.8 ± 1.1	< 1.6
MW-CL-20S	11/02/15	< 188						
MW-CL-21S	02/09/15	176 ± 106						
MW-CL-21S	05/26/15	219 ± 130						
MW-CL-21S	08/17/15	287 ± 124						
MW-CL-21S	09/29/15	< 197	< 5.3	< 0.8	< 1.8	< 0.8	< 1.5	< 1.6
MW-CL-21S	11/02/15	< 189						
MW-CL-22S	02/09/15	< 179						
MW-CL-22S	05/27/15	< 194						
MW-CL-22S	08/18/15	< 180						
MW-CL-22S	09/29/15		< 4.4	< 0.7	< 2.3	< 0.9	11.2 ± 1.5	< 1.6
MW-CL-22S	11/03/15	< 192						

Table B-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

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	08/17/15	< 36	< 29	< 3	< 4	< 7	< 4	< 6	< 4	< 6	< 3	< 4	< 29	< 8
MW-CL-1	08/17/15	< 38	< 36	< 4	< 5	< 10	< 4	< 8	< 5	< 8	< 4	< 4	< 28	< 13
MW-CL-12I	08/17/15	< 38	< 37	< 4	< 4	< 8	< 3	< 7	< 4	< 7	< 4	< 4	< 28	< 10
MW-CL-13I	08/17/15	< 41	68 ± 37	< 4	< 4	< 10	< 3	< 8	< 4	< 7	< 4	< 4	< 30	< 9
MW-CL-13S	08/17/15	< 37	< 77	< 4	< 4	< 11	< 4	< 8	< 4	< 8	< 4	< 4	< 30	< 11
MW-CL-14S	02/09/15	< 42	< 68	< 4	< 5	< 9	< 4	< 9	< 5	< 8	< 4	< 4	< 33	< 10
MW-CL-14S	08/18/15	< 38	< 51	< 4	< 5	< 11	< 5	< 9	< 5	< 9	< 4	< 4	< 31	< 12
MW-CL-15I	08/17/15	< 38	< 30	< 4	< 4	< 8	< 4	< 8	< 4	< 7	< 3	< 3	< 28	< 9
MW-CL-15S	09/29/15	< 73	< 148	< 6	< 8	< 16	< 8	< 11	< 5	< 11	< 6	< 8	< 34	< 14
MW-CL-16S	09/29/15	< 79	< 154	< 11	< 9	< 19	< 9	< 19	< 11	< 17	< 7	< 12	< 45	< 12
MW-CL-17S	08/18/15	< 36	< 32	< 4	< 4	< 9	< 4	< 9	< 5	< 8	< 3	< 4	< 27	< 9
MW-CL-18I	08/18/15	< 35	< 72	< 5	< 4	< 10	< 4	< 6	< 4	< 5	< 3	< 4	< 26	< 8
MW-CL-18S	08/18/15	< 16	< 32	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 1	< 2	< 17	< 5
MW-CL-19S	08/17/15	< 21	< 47	< 2	< 2	< 6	< 2	< 5	< 3	< 4	< 2	< 2	< 24	< 7
MW-CL-2	08/17/15	< 32	< 26	< 3	< 4	< 7	< 3	< 6	< 4	< 7	< 3	< 4	< 32	< 9
MW-CL-20S	08/17/15	< 18	< 18	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 18	< 6
MW-CL-21S	02/09/15	< 31	< 58	< 3	< 3	< 9	< 3	< 7	< 4	< 8	< 3	< 4	< 25	< 8
MW-CL-21S	05/26/15	< 15	< 30	< 1	< 2	< 4	< 2	< 3	< 2	< 3	< 1	< 2	< 13	< 4
MW-CL-21S	09/29/15	< 57	< 87	< 7	< 7	< 19	< 7	< 14	< 9	< 16	< 8	< 7	< 34	< 12
MW-CL-22S	09/29/15	< 80	< 95	< 8	< 6	< 23	< 7	< 20	< 9	< 17	< 9	< 10	< 43	< 9

TABLE B-I.3 **CONCENTRATIONS OF HARD TO DETECTS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

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

THERE WERE NO HARD TO DETECTS ANALYZED IN 2015

TABLE B-II.1 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
SW-CL-1	02/09/15	< 186
SW-CL-1	05/26/15	< 194
SW-CL-1	08/17/15	< 174
SW-CL-1	11/02/15	< 189
SW-CL-2	02/09/15	< 179
SW-CL-2	05/26/15	< 195
SW-CL-2	08/17/15	< 177
SW-CL-2	11/02/15	< 190
SW-CL-4	02/09/15	< 180
SW-CL-4	05/26/15	< 188
SW-CL-4	08/17/15	< 176
SW-CL-4	11/02/15	< 191
SW-CL-5	02/09/15	< 182
SW-CL-5	05/26/15	< 194
SW-CL-5	08/17/15	< 173
SW-CL-5	11/02/15	< 191
SW-CL-6	02/09/15	< 177
SW-CL-6	05/26/15	< 194
SW-CL-6	08/17/15	< 174
SW-CL-6	11/02/15	< 188
SW-CL-7	02/09/15	< 183
SW-CL-7	05/26/15	< 195
SW-CL-7	08/17/15	< 181
SW-CL-7	11/02/15	< 194
SEWAGE TREATMENT PLANT	02/09/15	< 182
SEWAGE TREATMENT PLANT	05/26/15	< 192
SEWAGE TREATMENT PLANT	08/17/15	< 177
SEWAGE TREATMENT PLANT	11/02/15	< 193

Table B-II.2 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2015**

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-14
CL-SW-CL-1	08/17/15	< 21	< 18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 22	< 7
CL-SW-CL-2	08/17/15	< 17	40 + 26	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 1	< 2	< 17	< 5
CL-SW-CL-4	08/17/15	< 16	< 12	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 1	< 2	< 17	< 4
CL-SW-CL-5	08/17/15	< 18	< 47	< 1	< 2	< 4	< 2	< 3	< 2	< 4	< 2	< 2	< 21	< 6
CL-SW-CL-6	08/17/15	< 18	65 + 31	< 2	< 2	< 5	< 2	< 3	< 2	< 4	< 1	< 2	< 18	< 6
CL-SW-CL-7	08/17/15	< 15	< 15	< 1	< 1	< 4	< 2	< 3	< 2	< 3	< 1	< 1	< 16	< 6
SEWAGE TREATMENT PLANT	08/17/15	< 17	< 17	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 20	< 6