

Clinton Power Station 8401 Power Road Clinton, IL 61727

**U-604172** April 24, 2014

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 2013 Annual Radiological Environmental Operating Report

Exelon Generating Company, LLC (Exelon), Clinton Power Station is submitting the 2013 Annual Radiological Environmental Operating Report. This report is submitted in accordance with Technical Specification 5.6.2, "Annual Radiological Environmental Operating Report," and covers the period from January 1, 2013 through December 31, 2013.

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

There are no regulatory commitments contained within this letter.

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

Respectfully,

R Kig

B. Keith Taber Site Vice President Clinton Power Station

DRA/blf

Attachment

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





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## **CLINTON POWER STATION**

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Annual Radiological Environmental Operating Report

1 January Through 31 December 2013

Prepared By Teledyne Brown Engineering Environmental Services



Clinton Power Station Clinton, IL 61727

April 2014

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#### I. Summary and Conclusions

This report on the Radiological Environmental Monitoring Program (REMP) conducted for the Clinton Power Station (CPS) by Exelon Generation Company, LLC (Exelon) covers the period 1 January 2013 through 31 December 2013. During that time period, 1,596 analyses were performed on 1,468 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 2013. Releases of gaseous radioactive materials were accurately measured in plant effluents. There were no gaseous effluent releases that approached the limits specified in the CPS Offsite Dose Calculation Manual (ODCM). The highest calculated offsite dose received by a member of the public due to the release of gaseous effluents from CPS was 2.65 E-02 or 0.027 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 was detected at a level consistent with those detected in previous years. No fission or activation products were detected.

High sensitivity I-131 analyses were performed on weekly air samples. All results were less than the minimum detectable concentration for I-131.

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

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

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

#### products were detected.

Environmental gamma radiation measurements were performed quarterly using Optically Stimulated Luminescence Dosimeters (OSLD). Beginning in 2012, Exelon changed the type of dosimetry used for the Radiological Environmental Monitoring Program (REMP). Optically Stimulated Luminescent Dosimetry (OSLD) were deployed and Thermo-luminescent Dosimetry (TLD) were discontinued. A step change increase on the order of 10% has been observed as a result of the application of the alternate methodology. The relative comparison to control locations remains valid. OSLD technology is different than that used in a TLD but has the same purpose (to measure direct radiation).

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#### II. Introduction

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

A Radiological Environmental Monitoring Program (REMP) for CPS was initiated in 1987. The preoperational period for most media covers the periods May 1980 through 27 February 1987 and was summarized in a separate report. This report covers those analyses performed by Teledyne Brown Engineering (TBE) and Landauer on samples collected during the period 1 January 2013 through 31 December 2013.

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.

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# 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 2013. Sample locations and descriptions can be found in Tables B–1 and B–2, and Figures B–1 through B–3, Appendix B. The sampling methods used by Environmental Inc. (Midwest Labs) are listed in Table B-2.

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### Aquatic Environment

The aquatic environment was evaluated by performing radiological analyses on samples of surface water, drinking water, well water, fish, and shoreline sediment. Two gallon water samples were collected monthly from continuous samplers located at three surface water locations (CL-90, CL-91 and CL-99) and one drinking water location (CL-14). A monthly grab sample was obtained from one surface water locations (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. Shoreline sediment samples composed of recently deposited substrate were collected at two locations semiannually (CL-7B and CL-105 (control)).

Atmospheric Environment and the factor of the state of the second s

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The atmospheric environment was evaluated by performing radiological analyses on samples of air particulate, airborne iodine, milk, food produce and grass. Airborne iodine and particulate samples were collected and analyzed weekly at ten locations (CL-1, CL-2, CL-3, CL-4, CL-6, CL-7, CL-8, CL-11, CL-15 and CL-94). CL-11 was the control location. Airborne iodine and particulate samples were obtained at each location, using a vacuum pump with charcoal and glass fiber filters attached. The pumps were run continuously and sampled air at the rate of approximately one cubic foot per minute. The filters were replaced weekly and sent to the laboratory for analysis.

Milk samples were collected biweekly at one location (CL-116) from May through November and monthly from December through April to coincide with the grazing season. All samples were collected in new unused plastic bottles from the bulk tank at that location, preserved with sodium bisulfite and shipped promptly to the laboratory.

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

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

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a second seco Direct radiation measurements were made using Al<sub>2</sub>O<sub>3</sub>:C Optically Stimulated Luminescence Dosimetry (OSLD). Each location consisted of 2 OSLD sets. The OSLDs were exchanged guarterly and sent to Landauer for analysis. The OSLD locations were placed around the CPS site as follows: an additionation taken was set of a number of a and the second of the second second

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 and CL-63). All shows the second 

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

A special interest set consisting of seven locations (CL-37, CL-41, CL-49, CL-64, CL65, CL-74 and CL-75) representing special interest areas. 网络教师 的复数形式 化正式输出 化乙酰乙基乙酰乙基苯乙酰乙基 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

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case where the CL-11 represents the control location for all environmental TLDs. 

The specific OSLD locations were determined by the following criteria:

1. The presence of relatively dense population; an ann a said agus i sta lathais . Sa lathair lathaisean sean sa 

	2. Site meteorological data taking into account distance and elevation for each of the sixteen-22 1/2 degree sectors around the site,where estimated annual dose from CPS, if any, would be most significant;
	3. On hills free from local obstructions and within sight of the vents (where practical);
n Service Serv	4. And near the closest dwelling to the HVAC and VG stacks in the prevailing downwind direction.
	Each location has two OSLDs in a vented PVC conduit located approximately three feet above ground level. The OSLDs were exchanged quarterly and sent to Landauer for analysis.
В.	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 2013. The analytical procedures used by the laboratories are listed in Table B-2.
en e	In order to achieve the stated objectives, the current program includes the following analyses:
	1. Concentrations of beta emitters in drinking water and air particulates.
	2. Concentrations of gamma emitters in surface, drinking and well water, air particulates, milk, fish, grass, sediment and vegetables.
	3. Concentrations of tritium in surface, drinking and well water.
	4. Concentrations of I-131 in air, milk, drinking water and surface water.
	5. Ambient gamma radiation levels at various on-site and off-site environs.
C.	Data Interpretation
u Heighur U Heightur U Heightur	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

were compared. For the purpose of this report, CPS was considered operational at initial criticality. In addition, data were compared to

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previous years' operational data for consistency and trending. Several factors were important in the interpretation of the data:

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Lower Limit of Detection and Minimum Detectable Concentration

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The lower limit of detection (LLD) was defined as the smallest concentration of radioactive material in a sample that would yield a net count (above background) that would be detected with only a 5% probability of falsely concluding that a blank observation represents a "real" signal. The LLD was intended as a before the fact estimate of a system (including instrumentation, procedure and sample type) and not as an after the fact criteria for the presence of activity. All analyses were designed to achieve the required CPS detection capabilities for environmental sample analysis.

2. Net Activity Calculation and Reporting of Results

Net activity for a sample was calculated by subtracting background activity from the sample activity. Since the REMP measures extremely small changes in radioactivity in the environment, • • • background variations may result in sample activity being lower than the background activity resulting in a negative number. A minimum detectable concentration (MDC) was reported in all cases . • where positive activity was not detected.

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

For surface water, well water, fish, sediment, and milk 14 nuclides, Be-7, K-40, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, Cs-134, Cs-137, Ba-140, La-140 and Ce-144 were nen i en en i **reported**: in get el el transmut d'un el el

why and regetation 15 nuclides, Be-7, K-40, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, I-131, Cs-134, Cs-137, Ba-140, La-140 and Ce-144 were reported.

the second states to see the second second second For air particulate 11 nuclides, Be-7, K-40, Co-60, Nb-95, Zr-95, Ru-103, Ru-106, Cs-134, Cs-137, Ce-141 and Ce-144, were reported. Sec. Sec. 8

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. and the second second

#### D. **Program Exceptions**

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

#### Exceptions/Anomalies

### January 16, 2013. IR 1463444

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During weekly sampling activities ODCM air sampler CL-15 and non-ODCM air samplers CL-7, CL-8, and CL-94 were found to have timer shortages. Sampling locations CL-7 and CL-8 were short by nine hours and locations CL-15 and CL-94 were short by six hours. The timer shortages are an indication of power outages and loss of continuous sampling capability during the sampling period. These interruptions were likely the result of inclement winter weather. The second second problem is a subscription of the second sec second sec

January 23, 2013. IR 1524569

Sampling at non-ODCM liquid compositor location CL-99 was not possible due to freezing of the North Fork Creek. Grab sample was not attainable due to unsafe conditions. This prevented the January sample from CL-99 from meeting the definition of a composite sample. NAME OF A DESCRIPTION OF A

#### April 10, 2013. IR 1500173

During weekly sampling activities, ODCM continuous air sample station CL-8 was found without power. The power outage was likely due to electrical storms in the area. The local utility company was contacted to restore power.

#### May 15, 2013. IR 1514611

engen de la service de la s During weekly sampling activities, ODCM continuous air sample station CL-8 was found without power. The local utility company was contacted to restore power. The power outage was attributed to a faulty electrical transformer. 

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#### May 22, 2013. IR 1524546

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During weekly sampling activities ODCM air sampler CL-8 was found to have a timer shortage of four hours. The timer shortages are an indication of power outages and loss of continuous sampling capability during the sampling period. The power outage was attributed to electrical storms in the area.

#### May 29, 2013. IR 1519075

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During weekly sampling activities non-ODCM air sampler CL-1 was found to have a timer shortage of two hours. The timer shortages are an indication of power outages and loss of continuous sampling capability during the sampling period. The power outage was attributed to electrical storms in the area.

During weekly sampling activities ODCM air samplers CL-11 and CL-15 along with non-ODCM air samplers CL-7, CL-8, and CL-94 were found to have timer shortages. Sampling locations CL-7, CL-8, and CL-11 were short by sixteen hours. Sample location CL-15 was short by six hours and sample location CL-94 was short by eight hours. The timer shortages are an indication of power outages and loss of continuous sampling capability during the 400 State (1983) Managements and sampling period. Loss of power is attributed to electrical storms in (a) The second at the area. And the well of the dfunction of proceeding the multiplication of the second process of the second proces of the second process of the second process of the second pro

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#### June 12, 2013, IR 1616987

During sampling activities, the vendor technician found non-ODCM surface water compositor CL-99 incapable of sampling due to a set as a loss of power. The compositor was reset and normal collection service states and was recommenced. This issue prevented the June sample from CL-99 from meeting the definition of a composite sample.

June 26, 2013. IR 1529965

During sampling activities, the vendor technician found ODCM . . . . . . . surface water compositor CL-90 incapable of sampling due to a loss of power. Power was restored on 06/27/13. The compositor was reset and normal collection was recommenced. This issue prevented the June sample from CL-90 from meeting the definition of a composite sample.

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#### July 03, 2013. IR 1532191

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During weekly sampling activities non-ODCM air samplers CL-4 and CL-6 were found to have a timer shortages of two hours. Additionally non-ODCM surface water compositor CL-99 was found to have a shortage of two hours. The timer shortages are an indication of power outages and loss of continuous sampling capability during the sampling period. The power outage was attributed to electrical storms in the area.

#### July 17, 2013. IR 1537315 and 1617014

Contraction of the galaxies of March 2014 And 2014

During weekly sampling activities on 07/17/13, non-ODCM surface water compositor CL-99 was identified as not functioning properly. A redundant compositor was installed and proper functionality was verified the following sampling week. Because of the interruption, the July sample from CL-99 did not meet the definition of a composite sample.

August 07, 2013. IR 1617021 n an la state de la companya de la c

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During weekly sampling activities non-ODCM air samplers CL-6 was found to have a timer shortage of approximately 6 hours. The timer shortages are an indication of power outages and loss of continuous sampling capability during the sampling period. The power outage was attributed to electrical storms in the area.

September 19, 2013. IR 1561484 

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Due to emergent potable water work in the service building at Clinton Power Station, potable water compositor CL-14 was secured for approximately 1 hour. This issue prevented the September sample from CL-14 from meeting the definition of a composite sampler.

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#### September 25, 2013. IR 1563652

During weekly sampling activities non-ODCM air samplers CL-4 and CL-6 were found to have no power. The power outages resulted in a loss of continuous sampling capability during the sampling period. The power outage was attributed to electrical storms in the area.

#### September 25, 2013. IR1649272

During the monthly vegetation sampling, sufficient leafy vegetation was unobtainable for one of the three required samples due to late season unavailability. Tree leaves were substituted to supplement the obtainable sample.

October 23, 2013. IR 1575875

During weekly sampling activities non-ODCM air samplers CL-7 and CL-94 along with ODCM air samplers CL-8 and CL-15 were found to have a timer shortages of two hours. The timer shortages are an indication of power outages and loss of continuous sampling capability during the sampling period.

December 11, 2013. IR 1595805

During weekly sampling activities non-ODCM air samplers CL-6 was found without power. This represents a loss of continuous sampling capability during the sampling period. Also noted was the inability to collect sample from non-ODCM surface water compositor CL-99 due to freezing of sampling lines.

December 18, 2013. IR 1604301

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During weekly sampling activities non-ODCM air samplers CL-6 was found with a timer shortage of approximately 9 hours due to power outage identified on 12/18/13. Also noted was the inability to collect sample from non-ODCM surface water compositor CL-99 due to freezing of the North Fork Creek. This represents a loss of continuous sampling capability during the sampling period.

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December 26, 2013. IR 1608879

Sampling was not possible at air sampling location CL-7. The

sampler is located on the property of Mascoutin State Park and the park was closed for the holidays. The sampl was obtained on 12/27/13. This sampling time lies outside the grace period for sampling and is therefore considered a missed sample. 

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.

Ε. Program Changes

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

IV. Results and Discussion Aquatic Environment Α.

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

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lodine-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. 3 - F

#### 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. (i) A second building part of the second se second sec

Gamma Spectrometry

 $(x_{i}, y_{i}) = (x_{i}, y_{i}) + (x_{$ 

Samples from all locations were analyzed for gamma emitting nuclides (Table C-I.3, Appendix C). Naturally occurring K-40 was found in nine of 48 samples. The concentration ranged from 22 to 84 pCi/L. No other nuclides were detected and all required LLDs were met. All second states and second states and second states.

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2. Drinking Water

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

Gross Beta

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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. As a manufactor of the same same second A state of the sta

#### 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.

#### lodine-131

 $\omega = \left\{ \left\{ 1, \dots, 1 \right\} : \left\{ 1, \dots, 1 \right\} \right\}$ eration (Constant)

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. and the second second

#### Gamma Spectrometry

Monthly samples were analyzed for gamma emitting nuclides (Table C–II.4, Appendix C). Naturally occurring K-40 was detected in two samples. The concentrations ranged from 68 to 71 pCi/L. No other nuclides were detected and all required LLDs were met.

#### 3. Well Water

A gassing the 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:

#### <u>Tritium</u>

1.1

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.

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Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides (Table C–III.2, Appendix C). Naturally occurring K-40 was found in one of four samples for location CL-12T. The concentration was 67 pCi/l. No other nuclides were detected in any of the samples and all required LLDs were met.

4. Fish

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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). Naturally occurring K-40 was found at both locations. No fission or activation products were found. No other nuclides were detected and the required LLDs were met.

Shoreline Sediment

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

## Gamma Spectrometry

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

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#### Β. Atmospheric Environment

1. Airborne a. Air Particulates

Continuous air particulate samples were collected from 10 : 1 

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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:

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#### <u>Gross Beta</u>

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

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 53 E–3 pCi/m<sup>3</sup> with a mean of 20 E–3 pCi/m<sup>3</sup>. The results from the Intermediate Distance location (Group II) ranged from 7 to 57 E-3 pCi/m<sup>3</sup> with a mean of 20 E-3 pCi/m<sup>3</sup>. The results from the Control locations (Group III) ranged from 8 to 51 E–3 pCi/m<sup>3</sup> with a mean of 21 E–3 pCi/m<sup>3</sup>. Comparison of the 2013 air particulate data with previous years data indicate no effects from the operation of CPS (Figure C-5, Appendix C). In addition, a comparison of the weekly mean values for 2013 indicate no notable differences among the three groups.

other nuclides were detected and all required LLDs were

医静脉炎 医神经性病 医静脉管 化乙基乙基乙基乙基乙基乙基乙基乙基乙基乙基 Gamma Spectrometry en al de la regeneration de la companya de la comp where composited guarterly and analyzed for gamma emitting nuclides (Table C-VI.3, Appendix C). Naturally occurring cosmogenically produced Be-7 due to cosmic ray activity was detected in 38 of 40 samples. No

met.

Airborne lodine - b. 

> 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. ivilin A teacher and a teacher and a teacher and a teacher and a teacher a teacher a teacher a teacher a teacher a tea Samples were collected from CL-116 biweekly May through November and monthly December through April to coincide with the grazing season. The following analyses were performed: Contractions •<u>lodine-131</u>

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. and the second second second second

Gamma Spectrometry

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

Food Products b.

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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 were performed: an an tha an an the state of th

Gamma Spectrometry autoritation (1994) in the state of the stat

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

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

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

 $e^{-i\omega t} = e^{-i\omega t} \sqrt{2} e_{\mu} \left[ (1 + 1) e^{-i\omega t} + e^{-i\omega t$ c. Grass . • Samples were collected from four locations (CL-1, CL-2,

CL-8, and CL-116) biweekly May through October. The following analysis were performed:

#### Gamma Spectrometry

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

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

14. A

#### Ambient Gamma Radiations and another and a C:

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Ambient gamma radiation levels were measured utilizing OSLD (optically stimulated luminescence dosimeters). Fifty-four OSLD locations were established around the site. Results of OSLD measurements are listed in Tables C–X.1 to C–X.3, Appendix C.

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A total of 216 OSLD measurements were made in 2013. The average dose from the inner ring was 23.1 mR/quarter. The average dose from the outer ring was 23.2 mR/guarter. The average dose from the special interest group was 22.9 mR/quarter. The average dose from the supplemental group was 21.8 mR/guarter. The guarterly measurements ranged from 18.2 to 27.0 mR/guarter. ÷ .

The inner ring and outer ring measurements compared well to the Control Station, CL-11, which ranged from 20.5 mR/quarter to 23.3 mR/quarter with an average measurement of 21.5 mR/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).

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#### D. Land Use Survey

A Land Use Survey conducted during the June through September 2013 growing season around the Clinton Power Station (CPS) was performed by Environmental Inc. (Midwest Labs) for Exelon to comply with Clinton's Offsite Dose Calculation Manual, section 5.2. The purpose of the survey was to document the nearest resident, milk producing animal and garden of greater than 538 m<sup>2</sup> in each of the sixteen 22 ½ degree sectors around the site. The distance and direction of all locations from the CPS Station HVAC vent stack were positioned using Global Positioning System (GPS) technology. There were no changes required to the CPS REMP as a result of this survey. The results of this survey are summarized below.

Sector	Residence (km)	Garden (km)	Milk Animal (km)
1 N	1.5	1.5	1.5
2 NNE	1.5	4.8	4.8
3 NE		7.0	> 8
4 ENE	2.9	2.9	6.6
5 E	1.7	1.7	> 8
6 ESE	5.1	5.1	> 8
7 SE	4.4	7.1	> 8
'8 SSE	2.9	4.5	> 8
9 S	4.8	6.6	6.6
10 SSW	4.7	> 8	<sup>76</sup> 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

Teledyne Brown Engineering (TBE) provides data results [activity, uncertainty and minimum detectable concentration {MDC}]. We are required to calculate the MDC using a multiplier of 4.66.

ere de transferencia de la sectore  $MDA = \frac{4.66 \sqrt{\frac{\beta}{\Delta t}}}{2.22 (v)(y) (a)(\varepsilon)}$ 

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Where:

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- $\Delta t$  = counting time for sample (minutes)
- $\beta$  = background rate of instrument blank (cpm)

2.22 = dpm/pCi or : 2.22 x 10<sup>6</sup> dpm/μCi

- v = volume or mass of sample analyzed
- y = chemical yield
- $\varepsilon = \text{efficiency of the counter}$

The formulas for calculating the activity, uncertainty and MDC are contained in the software of the counting equipment. For the gamma system, when the new detector number 08 was added to the system in January 2012, the default value of 3.29 was used to calculated the MDCs on detector 08. The activity and uncertainty were not affected. The multiplier has been changed from 3.29 to the required 4.66.

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When the MDCs are recalculated using 4.66, the MDC values will increase by 41.6%. The greatest impact will be on the short-lived nuclides which have an LLD requirement, e.g. I-131, Ba-140 and La-140. Which means there could be some missed LLDs which will be identified in the Errata Data Appendix table of the 2013 annual report. This is not a reportable issue for the NRC. There is also the possibility that naturally produced nuclides that were detected would become a non-detect, e.g Th-228, Th-230, etc.

F. Summary of Results – Inter-Laboratory Comparison Program

The primary laboratory analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation and water matrices for 19 analytes (Appendix D). The PE samples, supplied by Analytics Inc., Environmental Resource Associates (ERA) and DOE's Mixed Analyte Performance Evaluation Program (MAPEP), were evaluated against the following pre-set acceptance criteria:

1. Analytics Evaluation Criteria

Analytics' evaluation report provides a ratio of TBE's result and Analytics' known value. Since flag values are not assigned by Analytics, TBE-ES evaluates the reported ratios based on internal QC requirements, which are based on the DOE MAPEP criteria. 2. ERA Evaluation Criteria  $(M_{1},M_{2},M_{$ 

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 accept Performance Acceptance Limits, as applicable. The acceptance in the second limits are either determined by a regression equation specific to each analyte or a fixed percentage limit promulgated under the appropriate regulatory document. 1. An the second se

DOE Evaluation Criteria 3.

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

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

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For the TBE laboratory, 178 out of 185 analyses performed met the specified acceptance criteria. Seven analyses (Sr-89 and Sr-90 in milk, Co-57, Zn-65 and Sr-90 in soil, Cs-134 in air particulate and Sr-90 in vegetation [two low warning in a row]) did not meet the specified acceptance criteria or internal QA requirements for the following reason:

Teledyne Brown Engineering's Analytics September 2013 Sr-89 in milk result of 63.9 pCi/L was lower than the known value of 96.0 pCi/L. The failure was a result of analyst error and was specific to the Analytics sample. Client samples for the associated time period were evaluated and no client samples were affected by this failure. NCR 13-15

2. Teledyne Brown Engineering's Analytics September 2013 Sr-90 in milk result of 8.88 pCi/L was lower than the known value of 13.2 pCi/L. The failure was a result of analyst error and was specific to the Analytics sample. Client samples for the associated time period were evaluated and no client samples were affected by this failure. NCR 13-15 

& 4. Teledyne Brown Engineering's MAPEP September 2013 Co-57 and Zn-65 in soil were evaluated as failing the false positive test. While MAPEP evaluated the results as failures, the gamma A CARACTER STATE software listed the results as non identified nuclides. The two The second second nuclides would never have been reported as detected nuclides to a . . . . . client. MAPEP does not allow laboratories to put in qualifiers for the submitted data nor "less than" results. MAPEP evaluates results based on the relationship between the activity and the uncertainty. MAPEP spiked the soil sample with an extremely large concentration of Eu-152, which was identified by the gamma software as an interfering nuclide, resulting in forced activity results that were evaluated by MAPEP as detected Co-57 and Zn-65. No client samples were affected by these failures. NCR 13-14

> Teledyne Brown Engineering's MAPEP September 2013 Sr-90 in soil result of 664 Bg/kg was higher than the known value of 460 Bg/kg, exceeding the upper control limit of 598 Bg/kg. An incorrect Sr-90 result was entered into the MAPEP database. The correct Sr-90 activity of 322 Bg/kg would have been evaluated as acceptable with warning. No client samples were affected by this failure. NCR 13-14 Carlo De Ma

Teledyne Brown Engineering's MAPEP September 2013 Cs-134 in air particulate activity of -0.570 Bg/sample was evaluated as a failed false positive test, based on MAPEP's evaluation of the result as a significant negative value at 3 standard deviations. A negative number would never have been reported as a detected nuclide to a client, therefore no client samples were affected by this failure. NCR 13-14 . . .

Teledyne Brown Engineering's MAPEP September 2013 Sr-90 in vegetation result was investigated due to two low warnings in a row. It appears the September sample was double spiked with carrier, resulting in a low activity. With a recovery of around 50% lower, the Sr-90 result would have fallen within the acceptance range. No client samples were affected by this issue. NCR 13-14 

> For the EIML laboratory, 89 of 92 analyses met the specified acceptance criteria. Three analyses (AP - Gross Alpha, Soil - Sr-90 and Co-57) did not meet the specified acceptance criteria for the following reasons:

1. Environmental Inc., Midwest Laboratory's MAPEP February 2013 air particulate gross alpha result of 0.14 Bg/total sample was lower than the known value of 1.20 Bq/total sample, exceeding the lower control limit of 0.36 Bg/total sample. The filter was recounted overnight. No significant activity could be detected.

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- Environmental Inc., Midwest Laboratory's MAPEP February 2013 soil Co-57 result of 408.40 Bq/kg was lower than the known value of 628.0 Bq/kg, exceeding the lower control limit of 440.0 Bq/kg. The sample was reanalyzed using additional fuming nitric separations. The reanalysis result of 574.4 fell within the control limits.
- 3. Environmental Inc., Midwest Laboratory's MAPEP August 2013 soil Co-57 result of 699.60 Bq/kg was higher than the known value of 0.00 Bq/kg, exceeding the upper control limit of 5.00 Bq/kg. Interference from Eu-152 resulted in misidentification of Co-57.

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

V. References

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### **APPENDIX A**

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### RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT SUMMARY

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NAME OF FACILITY: CLINTON POWER STATION				DOCKET NUMBER:		50-461 2013			
LOCATION OF FACILI	TH: DEWITT COUNT	I, IL		INDICATOR	CONTROL	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)	LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
SURFACE WATER (PCI/LITER)	1-131	12	1	<lld< td=""><td>NA</td><td></td><td></td><td>0</td></lld<>	NA			0	
	Н-3	16	2000	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
	GAMMA BE-7	48	NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
	K-40		NA	53 (3/24) (22/80)	62 (6/24) (35/84)	67 (3/12) (62/72)	CL-91 CONTROL PARNELL BOAT ACCESS 6.1 MILES ENE OF SITE	0	
	MN-54		15	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
	CO-58		15	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
	FE-59		30	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
	CO-60		15	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	

#### TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR **THE CLINTON POWER STATION, 2013**

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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#### TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR **THE CLINTON POWER STATION, 2013**

NAME OF FACILITY LOCATION OF FACILITY	NAME OF FACILITY: CLINTON POWER STATION OCATION OF FACILITY: DEWITT COUNTY, IL					50-461 2013			
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION	N WITH HIGHEST ANNUAL	MEAN (M)	
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
SURFACE WATER	ZN-65		30	<lľd< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lľd<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
(ICDEITER)				د. • •		• <u>-</u> •			
	NB-95		15	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
	ZR-95		30	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
	CS-134		15	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
	CS-137		18	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
	BA-140	<b></b> .	60	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
n - Arrent Andre (a. 1	LA-140		15	<lld< td=""><td><lu>LLD</lu></td><td></td><td></td><td> 0</td></lld<>	<lu>LLD</lu>			 0	
		. • .		i ai Na fa ci	· ·				
an a	CE-144	 	NA	<lld< td=""><td><lld '<="" td=""><td> s</td><td></td><td>• • 0</td></lld></td></lld<>	<lld '<="" td=""><td> s</td><td></td><td>• • 0</td></lld>	s		• • 0	
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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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#### TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR **THE CLINTON POWER STATION, 2013**

NAME OF FACILITY	NAME OF FACILITY: CLINTON POWER STATION LOCATION OF FACILITY: DEWITT COUNTY, IL					50-461 201	13		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	ÎNDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	N WITH HIGHEST ANNUAL M STATION # NAME DISTANCE AND DIRECTION	EAN (M) NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
DRINKING WATER (PCI/LITER)	GR-B	12	. 4	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0	
	H-3	4	2000	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0	
	I-131	12	1	<lld< td=""><td>NA<sub>.</sub></td><td>-</td><td></td><td>0</td></lld<>	NA <sub>.</sub>	-		0	
	GAMMA BE-7	12	NA	<lľď< td=""><td>NĂ</td><td>-</td><td></td><td>0</td></lľď<>	NĂ	-		0	
1	K-40		NA	69 (2/12) (68/71)	NA	69 (2/12) (68/71)	CL-14 INDICATOR STATION PLANT SERVICE BLDG ONSITE	ò	
in a state of the second s	MN-54		- · · · · · · · · · · · · · · · · · · ·	• <ĽLD	NA	• 14.7 P.F		0	
	CO-58		15 15	÷ ≺LLD	NA	La Roman A Transforma Maria (San La Roman Maria (San La Roman)		0 11	
na an an Artholog an Arthol Artholog an Artholog an Arthol Artholog an Artholog a Artholog an Artholog an	FE-59		30	<lld< td=""><td>NÁ</td><td></td><td></td><td>0</td></lld<>	NÁ			0	

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### TABLE A-1RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR<br/>THE CLINTON POWER STATION, 2013

NAME OF FACILITY		DOCKET NU REPORTING	JMBER: G PERIOD:	50-461 2013				
				INDICATOR	CONTROL	LOCATION	N 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)	CO-60		15	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0
	ŻN-65		30	<ĽLD	NA	-		0
	NB-95		15	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0
	ZR-95		30	ĊLLD	NA			0
	CS-134		15	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0
en al Secondaria de la composición de la comp	CS-137	<b>. </b> .	18	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0
salarge fan Solar Sel B Sel Solar (2010) Sel Seles	BA-140	• •.	60	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0
an a	LA-140	1 • • • • •	15	<lld< td=""><td>NA</td><td></td><td>. • •</td><td>· ~ ~ 0</td></lld<>	NA		. • •	· ~ ~ 0
i a at da a a a a	CE-144	· · ·	NA	<lld< td=""><td>NA</td><td>-</td><td>• • • • •</td><td>0</td></lld<>	NA	-	• • • • •	0

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

# TABLE A-1RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FORTHE CLINTON POWER STATION, 2013

NAME OF FACILITY LOCATION OF FACILITY		DOCKET NI	DOCKET NUMBER: 50-461 2013 REPORTING PERIOD:						
	TYPES OF	NUMBER OF	REQUIRED	INDICATOR LOCATIONS MEAN (M)	CONTROL LOCATION MEAN (M)	LOCATIO	LOCATION WITH HIGHEST ANNUAL MEAN ( MEAN (M) STATION # NU		
PATHWAY SAMPLED (UNIT OF MEASUREMENT)	ANALYSIS PERFORMED	ANALYSIS PERFORMED	LOWER LIMIT OF DETECTION (LLD)	(F) RANGE	(F) RANGE	(F) RANGE	NAME DISTANCE AND DIRECTION	NONROUTINE REPORTED MEASUREMENTS	
WELL WATER (PCI/LITER)	Н-3	12	2000	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0	
	GAMMA BE-7	12	NA	<lld< td=""><td>ŇA</td><td>-</td><td></td><td>0</td></lld<>	ŇA	-		0	
	K-40		NA	67 <sup>°°°</sup> (1/12)	NÁ	67 (1/4)	CL-12T INDICATOR DEWITT PUMP HOUSE 1.6 MILES E OF SITE	0	
	MN-54		15	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0	
	CO-58		15	<lld< td=""><td>ŃĂ</td><td>-</td><td></td><td>0</td></lld<>	ŃĂ	-		0	
	FE-59 -	·····		<lld< td=""><td>NA</td><td></td><td></td><td> 0</td></lld<>	NA			0	
			- * - * -		. 1			·	
an an taon an t Taon ang taon an	CO-60	· .	15	<lld< td=""><td>NA</td><td>1.</td><td></td><td>. 0</td></lld<>	NA	1.		. 0	
				•		·			
(a) Contracting the first sector of the s	ZN-65	•	30	<lld< td=""><td>NA</td><td>-</td><td><i></i> .</td><td>0</td></lld<>	NA	-	<i></i> .	0	
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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) 1. Set March & March & State of the set o

## TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FORTHE CLINTON POWER STATION, 2013

NAME OF FACIL	NAME OF FACILITY: CLINTON POWER STATION LOCATION OF FACILITY: DEWITT COUNTY, IL					50-461 201	13		
				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)	NB-95		15	<lld< td=""><td>NA .</td><td>-</td><td></td><td>0</td></lld<>	NA .	-		0	
	ZR-95		30	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0	
	CS-134		15	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0	
	CS-137		18	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0	
	BA-140		60	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0	
	LA-140	• · · ·	15	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0	
i posta i spira di Galeria di Galeria di Stato di Stato Galeria di Stato Galeria di Stato	CE-144	an di se an se se di an an se	NA	<lld< td=""><td>NA</td><td>-</td><td></td><td>0</td></lld<>	NA	-		0	
FISH (PCI/KG WET)	GAMMA BE-7	16	NA	<lld< td=""><td><lld< td=""><td></td><td></td><td>. 0</td></lld<></td></lld<>	<lld< td=""><td></td><td></td><td>. 0</td></lld<>			. 0	

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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 FORTHE CLINTON POWER STATION, 2013

I OCATION OF FACILITY	DEWITT COUNTY	STATION II		DOCKET NU REPORTING	DABER:	50-461 201		
				INDICATOR	CONTROL	LOCATION	N WITH HIGHEST ANNUAL 3	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	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
FISH (PCI/KG WET)	K-40		NA	3639 (8/8) (2920/4494)	3690 (8/8) (1324/6694)	3690 (8/8) (1324/6694)	CL-105 CONTROL LAKE SHELBYVILLE 50 MILES S OF SITE	0
	MN-54		130	<lld ·</lld 	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	CO-58		130	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	FE-59		260	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	CO-60		130	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
age and a State of the state of the state and the state of the	ZN-65		260	<lld< td=""><td><lld< td=""><td>- </td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>- </td><td></td><td>0</td></lld<>	- 		0
11 - Angelander Marine Marine Marine Marine	NB-95	tan Star Star	NA	<lld< td=""><td><lld< td=""><td>n ganaa Ta</td><td></td><td>. 0</td></lld<></td></lld<>	<lld< td=""><td>n ganaa Ta</td><td></td><td>. 0</td></lld<>	n ganaa Ta		. 0
	ZR-95		NA	<lld< td=""><td><lld ''<="" td=""><td>- ·</td><td>an an taon an an</td><td>· · · 0</td></lld></td></lld<>	<lld ''<="" td=""><td>- ·</td><td>an an taon an an</td><td>· · · 0</td></lld>	- ·	an an taon an	· · · 0
	CS-134	· ; '	130	<lld< td=""><td><lld< td=""><td>-</td><td></td><td> 0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td> 0</td></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)

		Т	HE CLINTON	POWER STA	TION, 2013			
NAME OF FACILITY LOCATION OF FACILITY	Y: CLINTON POWI Y: DEWITT COUN	ER STATION FY, IL		DOCKET NUMBER: REPORTING PERIOD: INDICATOR CONTROL		50-461 2013 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)	LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
FISH (PCI/KG WET)	CS-137		150	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	BÀ-140		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	LA-140		NA	<lĺd< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lĺd<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	CĖ-144		NA	<lld< td=""><td>&lt;ĽĹD</td><td>-</td><td></td><td>0</td></lld<>	<ĽĹD	-		0
SEDIMENT (PCI/KG DRY)	GAMMA BE-7	4	NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
i de Alexandre - Maria Alexandre - Alexandre - Alexandre -	- <b>K-4</b> 0 · · · ·		NA .	.7657. (2/2) (7632/7681)	.10282 (2/2) (7834/12730)	10282 (2/2) (7834/12730)	CL-105 CONTROL LAKE SHELBY VILLE 50 MILES S OF SITE	0
an Angelan (1995) Managarta	MN-54	· /·	NA	<lld< td=""><td><lld< td=""><td>÷ .</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>÷ .</td><td></td><td>0</td></lld<>	÷ .		0

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### TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR

(PCI/KG DRY)							
tuð að skipa ski Nar skipa skipa	CO-60		NA	<lld< th=""><th><lld< th=""><th>-</th><th>0</th></lld<></th></lld<>	<lld< th=""><th>-</th><th>0</th></lld<>	-	0
	ZN-65		NA	<lld< td=""><td><lld< td=""><td>-</td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td>0</td></lld<>	-	0
	NB-95		NA	<lld< td=""><td><lld< td=""><td>-</td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td>0</td></lld<>	-	0
	ZR-95		NA	<lld< td=""><td><lld< td=""><td><u>-</u></td><td>0</td></lld<></td></lld<>	<lld< td=""><td><u>-</u></td><td>0</td></lld<>	<u>-</u>	0
	. CS-134	<b>.</b> .	.150	<ĽLD	<lld< td=""><td></td><td>0</td></lld<>		0
Дайски с	CS-137		180	<lld< td=""><td><lld< td=""><td></td><td>0 '</td></lld<></td></lld<>	<lld< td=""><td></td><td>0 '</td></lld<>		0 '

### TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR **THE CLINTON POWER STATION, 2013**

MEAN (M)

<LLD

**DOCKET NUMBER:** 

**REPORTING PERIOD:** 

LOCATIONS LOCATION

MEAN (M)

(F)

RANGE

<LLD

50-461 2013

MEAN (M)

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<LLD

(F)

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RANGE

INDICATOR CONTROL LOCATION WITH HIGHEST ANNUAL MEAN (M)

STATION #

DISTANCE AND DIRECTION

NAME

NUMBER OF

NONROUTINE

REPORTED

MEASUREMENTS

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2 T 1 and the second 

NUMBER OF

ANALYSIS

10

PERFORMED OF DETECTION RANGE

REQUIRED

(LLD)

NA

LOWER LIMIT (F)

NAME OF FACILITY: CLINTON POWER STATION

TYPES OF

ANALYSIS

FE-59

BA-140

PERFORMED

LOCATION OF FACILITY: DEWITT COUNTY, IL

MEDIUM OR

(UNIT OF

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PATHWAY SAMPLED

MEASUREMENT)

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

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

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### TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FORTHE CLINTON POWER STATION, 2013

NAME OF FACILITY: LOCATION OF FACILITY:	CLINTON POWER S DEWITT COUNTY,	TATION IL		DOCKET NI REPORTINO	UMBER: G PERIOD:	50-461 201	:013			
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATIO	N WITH HIGHEST ANNUAL 3	MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS		
SEDIMENT (PCI/KG DRY)	LA-140		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0		
	CE-144		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0		
AIR PARTICULATE (E-3 PCI/CU.METER)	GR-B	520	10	20 (466/468) (7/57)	21 (52/52) (8/51)	21 (52/52) (9/51)	CL-94 INDICATOR OLD CLINTON ROAD 0.6 MILES E OF SITE	0		
	GAMMA BE-7	40	NA	70 (34/36) (35/103)	79 (4/4) (57/98)	88 (4/4) (53/103)	CL-4 INDICATOR RESIDENCE NEAR RECREATIO 0.8 MILES SW OF SITE	0 N AREA		
	K-40		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0		
	CO-60		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>- 0.</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>- 0.</td></lld<>	-		- 0.		
		: . 						· ·		
· · ·	NB-93		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0		
اق و دیکر در دیکر این در از این در این ۱۳۹۰ در میرد در میکیمیزین	ZR-95		NA	<lld< td=""><td><lld< td=""><td>• -</td><td>· · · · ·</td><td>0</td></lld<></td></lld<>	<lld< td=""><td>• -</td><td>· · · · ·</td><td>0</td></lld<>	• -	· · · · ·	0		

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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) n de la construcción de la constru Construcción de la construcción de l

#### TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2013

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NAME OF FACILITY LOCATION OF FACILITY	: CLINTON POWER : DEWITT COUNTY	STATION , IL		DOCKET NU REPORTING	LET NUMBER: 50-461 2013 RTING PERIOD:			
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	N WITH HIGHEST ANNUAL N STATION # NAME DISTANCE AND DIRECTION	AEAN (M) NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIR PARTICULATE (E-3 PCI/CU.METER)	RU-103		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	RU-106		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	ĊS-134		50	<lld< td=""><td><lld< td=""><td>-</td><td> •</td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td> •</td><td>0</td></lld<>	-	•	0
ta da anti-	CS-137		60	<lld< td=""><td><lld< td=""><td>4 - 4 -</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>4 - 4 -</td><td></td><td>0</td></lld<>	4 - 4 -		0
	CE-141		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
an an taon an t	CE-144	·· • ·· ·	NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
AIR IODINE (E-3 PCI/CU.METER)	GAMMA I-131	520	70,	<lld< td=""><td><lld< td=""><td>20 </td><td></td><td>, , 0</td></lld<></td></lld<>	<lld< td=""><td>20 </td><td></td><td>, , 0</td></lld<>	20 		, , 0
MILK (PCI/LITER)	1-131	20	I	NA	<lld< td=""><td>- **</td><td></td><td>0</td></lld<>	- **		0

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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, 2013**

NAME OF FACILITY	: CLINTON POWER	R STATION	<u> </u>	DOCKET N	UMBER:	50-461 201	3		
LOCATION OF FACILITY	: DEWITT COUNTY	7, IL		REPORTING	G PERIOD:	LOCATION WITH HIGHEST ANNUAL MEAN (M)			
				INDICATOR	CONTROL				
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
MILK (PCI/LITER)	GAMMA BE-7	20	NA	NA	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
	K-40		NA	NĂ	1242 (20/20) (1019/1412)	1242 (20/20) (1019/1412)	CL-116 CONTROL PASTURE IN RURAL KENNEY 14 MILES WSW OF SITE	0	
	MN-54		NĂ	ŇA	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
	CO-58		ŇÁ	NA	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
	FE-59		NA	NÁ	<llď< td=""><td>-</td><td></td><td>0</td></llď<>	-		0	
• 4 - 199	- CO-60		NA	NA -	<lld< td=""><td></td><td></td><td>0</td></lld<>			0	
en da anti- en a Anti- en a Anti- en a Anti- en a Anti- en a Anti-	ZN-65	·	NA	NA	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
				······································		· . ·	tut - egt	. `	
an a	NB-95	5 M 1	NA	NA	<lld< td=""><td>•</td><td></td><td>0</td></lld<>	•		0	

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

### TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FORTHE CLINTON POWER STATION, 2013

NAME OF FACILITY		DOCKET NUMBER: 50-461 2013							
LOCATION OF FACILITY	: DEWITT COUNTY,	, IL	.^	REPORTING	G PERIOD:				
				INDICATOR	CONTROL	LOCATION	NWITH HIGHEST ANNUAL	MEAN (M)	
			<b>BFOUBFB</b>	LOCATIONS	LOCATION				
MEDIUM OR	TYPES OF	NUMBER OF	REQUIRED	MEAN (M)	MEAN (M)	MEAN (M)	STATION #	NUMBER OF	
PATHWAY SAMPLED	ANALYSIS	ANALYSIS	LOWER LIMIT	(F) RANCE	(F) DANCE	(F) RANCE	NAME DISTANCE AND DIRECTION	NUNKUUTINE	
(UNIT OF MEASUPEMENT)	PERFORMED	PERFORMED		KANGE	KANGE	KANGE	DISTANCE AND DIRECTION	MEASUREMENTS	
MEASOREMENT)			(LLD)					MEASOREMENTS	
MILK	ZR-95		NA	NA	<lld< td=""><td>-</td><td>· · ·</td><td>0</td></lld<>	-	· · ·	0	
(PCI/LITER)									
	ČE 124		15	NÅ	<ud< td=""><td></td><td></td><td>0</td></ud<>			0	
	03-134		15	NA		-		0	
	CS-137		18	NA	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
	BA-140		60	NÁ	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
						• • • •	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1		
					ν.				
	LA-140		15	NA	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
	CE-144		NA	NA	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0	
and a comment of the second				-	· · · · · · · ·	··· · •	······		
* · · · · · · · ·			, - · ·						
VEGETATION	GAMMA	48	and at so	2.5	$(t_{i}) \in [t_{i}] \times [t_{i}]$	· .•	Х. (с		
(PCI/KG WET)	BE-7		NA	283	314	320	CL-118 INDICATOR	. 0	
·				(32/36)	(12/12)	(11/12)	SITE'S MAIN ACCESS ROAD		
				(73/731)	(46/653)	(96/582)	0.7 MILES NNE OF SITE		
at a second of the	K⊒40		NA	5053	5583	6166		0	
	<b>K-4</b> 0			(36/36)	(12/12)	(12/12)	SITE'S MAIN ACCESS ROAD	0	
	·			(2177/10940)	(2804/8335)	(2289/10940)	0.7 MILES NNE OF SITE		
	a an an an an	•	· · · ·	. e	÷.		:		

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-1RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR<br/>THE CLINTON POWER STATION, 2013

NAME OF FACILITY: CLINTON POWER STATION LOCATION OF FACILITY: DEWITT COUNTY, IL				DOCKET NUMBER: REPORTING PERIOD: INDICATOR CONTROL		50-461 2013 LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF N ANALYSIS PERFORMED P	IUMBER OF ANALYSIS ERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
VEGETATION	MN-54		NA	<lld< td=""><td><lld< td=""><td>-</td><td> ·· ·· ··</td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td> ·· ·· ··</td><td>0</td></lld<>	-	·· ·· ··	0
(PCI/KG WET)				· . **.	e provense en	1 <sup>1</sup> (	70	
· .	CÓ 69		NI A.			· .		0
	0-38		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	FE-59		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
			·	,				
	CO-60		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	ZN-65		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
· ·	NR 05		NA					0
	ND-75		na Na		<b>LLD</b>	-		
								·
	ZR-95		NA	<lld< td=""><td><lld< td=""><td>-</td><td>•</td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td>•</td><td>0</td></lld<>	-	•	0
								•• • • <del>.</del> .
			60	44 				10
201	I-131		60	<lld< td=""><td><lld td="" ·<=""><td></td><td>,</td><td>0</td></lld></td></lld<>	<lld td="" ·<=""><td></td><td>,</td><td>0</td></lld>		,	0
	ا 1 - کرر، 1 - ۲۰۰۰ مرکز از ۲۰۰۰ - مراکز از ۲۰۰۰ میلاد میلاد				· ·	2	· · · · ·	
	CS-134		. 60	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
:	THE MEAN AND 2 STAN RACTION OF DETECTABLE	IDARD DEVI	ATION VALUES A	RE CALCULATE	D USING THE I	- POSITIVE VA	tues Heses (F)	

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NAME OF FACILITY: CLINTON POWER STATION LOCATION OF FACILITY: DEWITT COUNTY, IL				DOCKET NUMBER: REPORTING PERIOD:		50-461 2013		
	·			INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION	WITH HIGHEST ANNUAL N	IEAN (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)	CS-137		80	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	BA-140		NA	<lld< td=""><td><lld< td=""><td></td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td></td><td></td><td>0</td></lld<>			0
	LA-140		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	CE-144		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
GRASS (PCI/KG WET)	GAMMA BE-7	52	NÁ	1635 (37/39) (221/3930)	1836 (13/13) (628/3244)	1836 (13/13) (628/3244)	CL-116 CONTROL PASTURE IN RURAL KENNEY 14 MILES WSW OF SITE	0
	K-40	<u></u>	NA -	5982 (39/39) (3416/10380)	5227 (13/13) (3568/6460)	6991 (13/13) (4895/10380)	CL-08 INDICATOR DEWITT CEMETERY 2.2 MILES E OF SITE	0
, to say the state	MN-54		NA	<lld< td=""><td><lld< td=""><td>- </td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>- </td><td></td><td>0</td></lld<>	- 		0
، د الدين مراجع معني محمد محمد محمد محمد محمد محمد محمد محم	CO-58	·.	NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0

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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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### TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FORTHE CLINTON POWER STATION, 2013

NAME OF FACILITY: CLINTON POWER STATION LOCATION OF FACILITY: DEWITT COUNTY, IL				DOCKET NUMBER: REPORTING PERIOD:		50-461 2013		
				INDICATOR	CONTROL	LOCATIO	N WITH HIGHEST ANNUAL	MEAN (M)
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF N ANALYSIS PERFORMED P	IUMBER OF ANALYSIS ERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GRASS (PCI/KG WET)	FE-59		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	CO-60		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	ZN-65		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
a formal a strange of the source of the sour	NB-95		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	ZR-95		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
· · · · · · · · · · · · · · · · · · ·	I-131 <sub>.</sub>		60	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
	CS-134		60	<lld< td=""><td><lld< td=""><td>•</td><td></td><td>.0</td></lld<></td></lld<>	<lld< td=""><td>•</td><td></td><td>.0</td></lld<>	•		.0
$(e_{1}, e_{2}) = 1 - e_{1}^{2} + e_{2}^{2} + e_{2}^{$	• •	ta di s	e da conserva					
1. (1.1973) (13)	CS-137		80	<lld< td=""><td><lld< td=""><td>- • •</td><td>an an a</td><td>• 0</td></lld<></td></lld<>	<lld< td=""><td>- • •</td><td>an an a</td><td>• 0</td></lld<>	- • •	an a	• 0
an a			· • • • • • • • • • • • • • • • • • • •			$C_{C}(\cdot)$	÷ ·	· · • •
	BA-140		NA	<li>LĻD</li>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
		·. •	: •1. :.	11. to the		Ζ.	· · · · · ·	
· F	THE MEAN AND 2 STAN RACTION OF DETECTABLE	NDARD DEVI MEASUREN	ATION VALUES A IENTS AT SPECI	RE CALCULATE	D USING THE	POSITIVE VA D IN PARENT	LUES HESES (F)	

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## TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2013

NAME OF FACILITY: CLINTON POWER STATION				DOCKET N	UMBER:	50-461 2013		
LOCATION OF FACILITY	<i>i</i> : <b>DEWITT COUNTY</b> ,	IL		<b>REPORTING PERIOD:</b>				
				INDICATOR	CONTROL	LOCATIO	N WITH HIGHEST ANNUAL	MEAN (M)
			DECUMPED	LOCATIONS	LOCATION		OT A TION #	
	I YPES OF	NUMBER OF	KEQUIKED	MEAN (M)	MEAN (M)	MEAN (M)	STATION # NAME	NONBOLITINE
UNIT OF	PERFORMED	PERFORMED	OF DETECTION	RANGE	RANGE	RANGE	DISTANCE AND DIRECTION	REPORTED
MEASUREMENT)	I EN ONVIED	TER ORALD	(LLD)	MINUE	NUNCL	Rance		MEASUREMENTS
GRASS	LA-140		NA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
(PCI/KG WET)								
	07.44				44.0			0
	CE-144		ŅA	<lld< td=""><td><lld< td=""><td>-</td><td></td><td>0</td></lld<></td></lld<>	<lld< td=""><td>-</td><td></td><td>0</td></lld<>	-		0
DIRECT RADIATION	OSLD-QUARTERLY	216	NA	23	22	25	CL-56 INDICATOR	0
(MILLI-ROENTGEN/QTR.)				(212/212)	(4/4)	(4/4)		
				(18.2/27.0)	(20.5/23.3)	(22.2/26.9)	4.1 MILES SSE	
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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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Surface Water           21-13         Salt Creek Bridge on Rt. 10 (indicator)         3.6 miles SW           21-90         Discharge Flume (indicator)         0.4 miles ENE           21-91         Parnell Boat Access (control)         3.5 miles NNE           21-99         North Fork Access (control)         3.5 miles NNE           21-14         Station Plant Service Bidg (indicator)         Onsite           Well Water          2.3 miles ESE           21-17         DeViti Pump House (indicator)         1.6 miles E           21-127         DeViti Pump House (indicator)         1.6 miles E           21-127         DeViti Pump House (indicator)         1.6 miles E           21-128         Dewith Pump House (indicator)         1.6 miles W           21-127         DeViti Pump House (indicator)         1.6 miles W           21-128         Dement Dairy (control)         14 miles WSW           21-128         Clinton's Secondary Access Road         0.7 miles NNE           21-2         Clinton's Secondary Access Road         0.7 miles SW           21-3         Clinton's Recreation Area         2.3 miles ESE           21-4         Residence Near Recreation Area         2.3 miles ESE           21-4         Residence Near Recreation Area         0.8 miles SW <th>ocation</th> <th>Location Description</th> <th>Distance &amp; Direction From Site</th>	ocation	Location Description	Distance & Direction From Site
Outlake Trate           Quilabe Trate	A Surfac	e Water	
21-13       Salt Creek Bridge on Rt. 10 (indicator)       3.6 miles SW         2L-90       Discharge Flume (indicator)       0.4 miles SE         2L-91       Parnell Boat Access (control)       3.5 miles NNE         2L-91       Parnell Boat Access (control)       3.5 miles SW         2L-91       Parnell Boat Access (control)       3.5 miles SW         2L-91       Parnell Boat Access (control)       3.5 miles SW         2L-14       Station Plant Service Bidg (indicator)       Onsite	A. Sunac		
2L-90       Discharge Flume (indicator)       0.4 miles SNE         2L-91       Paraell Boat Access (control)       6.1 miles ENE         2L-99       North Fork Access (control)       3.5 miles NNE	CI-13	Salt Creek Bridge on Rt. 10 (indicator)	3.6 miles SW
2L-91       Parnell Boat Access (control)       6.1 miles ENE         2L-99       North Fork Access (control)       3.5 miles NNE	CL-90	Discharge Flume (indicator)	0.4 miles SE
Drinking (Potable) Water         Drinking (Potable) Water         CL-14       Station Plant Service Bidg (indicator)       Onsite         Well Water         CL-7D       Mascoutin Recreation Area (indicator)       2.3 miles ESE         CL-7D       DeWitt Pump House (indicator)       1.6 miles E         CL-12R       DeWitt Pump House (indicator)       1.6 miles E         CL-12R       DeWitt Pump House (indicator)       1.6 miles E         Milk - bi-weekly / monthly       14 miles WSW         Air Particulates / Air Iodine       0.7 miles NNE         CL-1       Camp Quest       1.8 miles W         CL-2       Clinton's Secondary 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-7       Mascoutin Recreation Area       0.8 miles SW         CL-7       Mascoutin Recreation Area       0.9 miles N         CL-11       Illinois Power Substation (Control)       16 miles S         CL-11       Illinois Power Substation (Control)       16 miles S         CL-19       End of Discharge Flume (indicator)       3.4 miles E         CL-105       Lake Shelbyville (control)       50 miles S	CL-91	Parnell Boat Access (control)	6.1 miles ENE
Drinking (Potable) Water         CL-14       Station Plant Service Bldg (indicator)       Onsite         Well Water	CL-99	North Fork Access (control)	3.5 miles NNE
CL-14       Station Plant Service Bidg (indicator)       Onsite         Well Water       CL-7D       Mascoutin Recreation Area (indicator)       2.3 miles ESE         CL-7D       DeWitt Pump House (indicator)       1.6 miles E         CL-12R       DeWitt Pump House (indicator)       1.6 miles E         Milk - bi-weekly / monthly       1.6 miles V         CL-116       Dement Dairy (control)       14 miles WSW         Air Particulates / Air Iodine       1.8 miles W         CL-1       Camp Quest       1.8 miles NE         CL-3       Clinton's Main Access Road       0.7 miles NE         CL-4       Residence Near Recreation Area       0.8 miles SW         CL-7       Mascoutin Recreation Area       0.7 miles NE         CL-4       Residence Near Recreation Area       0.7 miles SE         CL-4       Residence Near Recreation Area       2.3 miles SE         CL-6       Clinton's Recreation Area       2.3 miles SE         CL-7       Mascoutin Recreation Area       0.7 miles NE         CL-11       Illinois Power Substation (Control)       16 miles S         CL-15       Rt. 900N Residence       0.9 miles N         CL-19       End of Discharge Flume (indicator)       3.4 miles E         CL-19       Lake Shelbyville (c	<u>3. Drinkir</u>	ng (Potable) Water	
Well Water         2.3 miles ESE           2.127         DeWitt Pump House (indicator)         2.3 miles ESE           2.128         DeWitt Pump House (indicator)         1.6 miles E           2.127         DeWitt Pump House (indicator)         1.6 miles E           2.128         DeWitt Pump House (indicator)         1.6 miles E	CL-14	Station Plant Service Bldg (indicator)	Onsite
2L-7D       Mascoutin Recreation Area (indicator)       2.3 miles ESE         2L-12T       DeWitt Pump House (indicator)       1.6 miles E         2L-12R       DeWitt Pump House (indicator)       1.6 miles E         Milk - bi-weekly / monthly       14 miles WSW         Air Particulates / Air Iodine       14 miles WSW         Air Particulates / Air Iodine       18 miles W         CL-11       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 NNE         CL-4       Residence Near Recreation Area       0.8 miles SW         CL-6       Clinton's Recreation Area       2.3 miles E         CL-1       Mascoutin Recreation Area       2.3 miles SE         CL-1       Illinois Power Substation (Control)       16 miles S         CL-11       Illinois Power Substation (Control)       16 miles S         CL-19       End of Discharge Flume (indicator)       3.4 miles E         CL-105       Lake Shelbyville (control)       50 miles S         CL-105       Lake Shelbyville (control)       50 miles S         CL-115       Site's Secondary Access Road       0.7 miles NE         CL-115       Site's Main Access Road       0.7 mile	C. Well V	Vater	
2L-12T       DeWitt Pump House (indicator)       1.6 miles E         2L-12R       DeWitt Pump House (indicator)       1.6 miles E	CL-7D	Mascoutin Recreation Area (indicator)	2.3 miles ESE
CL-12R       DeWitt Pump House (indicator)       1.6 miles E         Milk - bi-weekly / monthly	CL-12T	DeWitt Pump House (indicator)	1.6 miles E
Milk - bi-weekly / monthly         CL-116       Dement Dairy (control)       14 miles WSW         Air Particulates / Air Iodine         CL-11       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 NNE         CL-4       Residence Near Recreation Area       0.8 miles SW         CL-7       Mascoutin Recreation Area       0.7 miles NSW         CL-7       Mascoutin Recreation Area       0.7 miles NSW         CL-7       Mascoutin Recreation Area       0.7 miles SE         CL-8       DeWritt Cemetery       2.2 miles E         CL-11       Illinois Power Substation (Control)       16 miles S         CL-15       Rt. 900N Residence       0.9 miles N         CL-14       Old Clinton Road       0.6 miles E         CL-15       Rt 900N Residence       0.9 miles S         CL-19       End of Discharge Flume (indicator)       3.4 miles E         CL-105       Lake Shelbyville (control)       50 miles S         CL-105       Lake Shelbyville (control)       50 miles S         CL-105       Lake Shelbyville (control)       2.1 miles NE         CL-105       Lake Shelbyville (control)       0	CL-12R	DeWitt Pump House (indicator)	1.6 miles E
CL-116       Dement Dairy (control)       14 miles WSW         Air Particulates / Air Iodine       1.8 miles W         CL-1       Camp Quest       1.8 miles W         CL-2       Clinton's Main Access Road       0.7 miles NRE         CL-3       Clinton's Secondary Access Road       0.7 miles NWE         CL-4       Residence Near Recreation Area       0.8 miles SW         CL-6       Clinton's Recreation Area       0.7 miles WSW         CL-6       Clinton's Recreation Area       0.7 miles WSW         CL-7       Mascoutin Recreation Area       0.7 miles SU         CL-11       Illinois Power Substation (Control)       16 miles S         CL-15       Rt. 900N Residence       0.9 miles N         CL-16       Rt. 900N Residence       0.9 miles S         CL-175       Lake Shelbyville (control)       3.4 miles E         CL-19       End of Discharge Flume (indicator)       3.4 miles SE         CL-19       Lake Shelbyville (control)       50 miles S         .       .       .       .         .       .       .       .         .       .       .       .       .         .       .       .       .       .         .       .	<u>). Milk - I</u>	bi-weekly / monthly	
Air Particulates / Air Iodine         2L-1       Camp Quest       1.8 miles W         2L-2       Clinton's Main Access Road       0.7 miles NNE         2L-3       Clinton's Secondary Access Road       0.7 miles NNE         2L-4       Residence Near Recreation Area       0.8 miles SW         2L-4       Residence Near Recreation Area       0.8 miles SW         2L-6       Clinton's Recreation Area       2.3 miles SE         2L-7       Mascoutin Recreation Area       2.3 miles SE         2L-8       DeWitt Cemetery       2.2 miles E         2L-11       Illinois Power Substation (Control)       16 miles S         2L-14       Old Clinton Road       0.6 miles E         2L-15       Rt. 900N Residence       0.9 miles N         2L-94       Old Clinton Road       0.6 miles E         2L-15       Rt. 900N Residence       0.9 miles S         2L-16       Lake Shelbyville (control)       3.4 miles E         2L-105       Lake Shelbyville (control)       50 miles S         2L-78       Clinton Lake (indicator)       2.1 miles SE         2L-105       Lake Shelbyville (control)       50 miles S         2L-115       Site's Secondary Access Road       0.7 miles NNE         2L-117       Residen	CL-116	Dement Dairy (control)	14 miles WSW
2L-1       Camp Quest       1.8 miles W         2L-2       Clinton's Main Access Road       0.7 miles NNE         2L-3       Clinton's Secondary Access Road       0.7 miles NE         2L-4       Residence Near Recreation Area       0.8 miles SW         2L-6       Clinton's Recreation Area       0.7 miles NE         2L-7       Mascoutin Recreation Area       0.7 miles SE         2L-7       Mascoutin Recreation Area       2.3 miles SE         2L-8       DeWitt Cemetery       2.2 miles E         2L-11       Illinois Power Substation (Control)       16 miles S         2L-15       Rt. 900N Residence       0.9 miles N         2L-94       Old Clinton Road       0.6 miles E         Fish         2L-19       End of Discharge Flume (indicator)       3.4 miles SE         2L-105       Lake Shelbyville (control)       50 miles S         .       .       .       .         .       .       .       .         .       .       .       .         .       .       .       .         .       .       .       .         .       .       .       .         .       .       .       <	E. Air Pa	rticulates / Air Iodine	
CL-2       Clinton's Main Access Road       0.7 miles NNE         CL-3       Clinton's Secondary Access Road       0.7 miles NNE         CL-4       Residence Near Recreation Area       0.8 miles SW         CL-6       Clinton's Recreation Area       0.7 miles NSW         CL-7       Mascoutin Recreation Area       0.3 miles SE         CL-8       DeWitt Cemetery       2.2 miles E         CL-11       Illinois Power Substation (Control)       16 miles S         CL-14       Rt. 900N Residence       0.9 miles N         CL-94       Old Clinton Road       0.6 miles E	CL-1	Camp Quest	1.8 miles W
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         Fish         CL-19       End of Discharge Flume (indicator)         Shoreline Sediment         CL-7B       Clinton Lake (indicator)         CL-7B       Clinton Lake (indicator)         CL-7B       Clinton Lake (indicator)       2.1 miles SE         CL-105       Lake Shelbyville (control)       50 miles S         CL-114       Cisco (Control)       12.5 miles SSE         CL-114       Cisco (Control)       12.5 miles SSE         CL-117       Residence North of Site       0.9 miles N         CL-118       Site's Main Access Road       0.7 miles NNE         CL-11       Camp Quest <td>CL-2</td> <td>Clinton's Main Access Road</td> <td>0.7 miles NNE</td>	CL-2	Clinton's Main Access Road	0.7 miles NNE
2L-4       Residence Near Recreation Area       0.8 miles SW         2L-6       Clinton's Recreation Area       0.7 miles WSW         2L-7       Mascoutin Recreation Area       2.3 miles SE         2L-8       DeWitt Cemetery       2.2 miles E         2L-11       Illinois Power Substation (Control)       16 miles S         2L-15       Rt. 900N Residence       0.9 miles N         2L-94       Old Clinton Road       0.6 miles E         Fish         CL-19         End of Discharge Flume (indicator)         Shoreline Sediment         CL-7B         Clinton Lake (indicator)         Shoreline Sediment         CL-114         Clinton Lake (indicator)         Shoreline Sediment         CL-7B         Clinton Lake (indicator)         Shorelex Secondary Access Road         O.7 miles SE         CL-114         Cisco (Control)         Shoreline Section Access Road         O.7 miles NE         CL-117         Residence North of Site         C	CL-3	Clinton's Secondary Access Road	0.7 miles NE
2L-6       Clinton's Recreation Area       0.7 miles WSW         2L-7       Mascoutin Recreation Area       2.3 miles SE         2.17       Mascoutin Recreation Area       2.3 miles SE         2L-8       DeWitt Cemetery       2.2 miles E         2L-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	CL-4	Residence Near Recreation Area	0.8 miles SW
DL-7       Intestoculin Recreation Area       2.3 miles 3E         DL-8       DeWitt Cemetery       2.2 miles E         DL-11       Illinois Power Substation (Control)       16 miles S         DL-15       Rt. 900N Residence       0.9 miles N         DL-94       Old Clinton Road       0.6 miles E	CL-6	Clinton's Recreation Area	0.7 miles VVSVV
Description	CL-7	DeWitt Cemetery	2.3 miles SE 2.2 miles F
CL-15       Rt. 900N Residence       0.9 miles N         CL-94       Old Clinton Road       0.6 miles E	CL-11	Illinois Power Substation (Control)	16 miles S
CL-94       Old Clinton Road       0.6 miles E         Fish	CL-15	Rt. 900N Residence	0.9 miles N
Fish         CL-19       End of Discharge Flume (indicator) Lake Shelbyville (control)       3.4 miles E 50 miles S         Shoreline Sediment       50 miles S         CL-78       Clinton Lake (indicator) Lake Shelbyville (control)       2.1 miles SE 50 miles S         CL-78       Clinton Lake (indicator) Lake Shelbyville (control)       2.1 miles SE 50 miles S         CL-105       Clinton Lake (indicator) Lake Shelbyville (control)       2.1 miles SE 50 miles S         CL-114       Cisco (Control)       12.5 miles SSE 0.7 miles NE 0.7 miles NE 0.7 miles N         CL-117       Residence North of Site Site's Main Access Road       0.7 miles NNE         CL-118       Site's Main Access Road       0.7 miles NNE         CL-2       Clinton's Main Access Road       0.7 miles NNE         CL-2       Clinton's Main Access Road       0.7 miles NNE         CL-8       DeWitt Cemetery       2.2 miles E	CL-94	Old Clinton Road	0.6 miles E
CL-19       End of Discharge Flume (indicator)       3.4 miles E         CL-105       Lake Shelbyville (control)       50 miles S         .       Shoreline Sediment       2.1 miles SE         CL-7B       Clinton Lake (indicator)       2.1 miles SE         CL-105       Lake Shelbyville (control)       50 miles S         .       Food Products       50 miles S         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         CL-1         Camp Quest       1.8 miles W         CL-2       Clinton's Main Access Road       0.7 miles NNE         CL-2       Clinton's Main Access Road       0.7 miles NNE         CL-8       DeWitt Cemetery       2.2 miles E	F. Fish		
CL-105       Lake Shelbyville (control)       50 miles S         Shoreline Sediment       2.1 miles SE         CL-7B       Clinton Lake (indicator)       2.1 miles SE         CL-105       Lake Shelbyville (control)       50 miles S	CL-19	End of Discharge Flume (indicator)	3.4 miles E
Shoreline Sediment         CL-7B       Clinton Lake (indicator)       2.1 miles SE         CL-105       Lake Shelbyville (control)       50 miles S         Food Products       50         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         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-105	Lake Shelbyville (control)	50 miles S
CL-7B       Clinton Lake (indicator)       2.1 miles SE         CL-105       Lake Shelbyville (control)       50 miles S         Food Products       12.5 miles SSE         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         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	<u>G. Shorel</u>	ine Sediment	
CL-105       Lake Shelbyville (control)       50 miles S         Food Products       12.5 miles SSE         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         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-7B	Clinton Lake (indicator)	2.1 miles SE
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         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-105	Lake Shelbyville (control)	50 miles S
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         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	H. Food I	Products	
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         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-114	Cisco (Control)	12.5 miles SSE
CL-117       Residence North of Site       0.9 miles N         CL-118       Site's Main Access Road       0.7 miles NNE         Grass       Grass       0.7 miles NNE         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-115	Site's Secondary Access Road	0.7 miles NE
Grass     0.7 miles NNE       Grass     0.7 miles NNE       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-117	Residence North of Site	0.9 miles N
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	UL-118	Sile's Main Access Road	U.7 miles NNE
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	I. Grass		
CL-2         Clinton's Main Access Road         0.7 miles NNE           CL-8         DeWitt Cemetery         2.2 miles E	CL-1	Camp Quest	1.8 miles W
L-o Devviit Cemetery 2.2 miles E	CL-2	Clinton's Main Access Road	0.7 miles NNE
11 116 Booturo in Burgi Konnov 44 miles MOM		Devvitt Gemetery	2.2 miles E

#### TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Clinton Power Station, 2013

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Location	Location Description	Distance & Direction From Site	``
J. Env	vironmental Dosimetry - OSLD	; , , , , , , , , , , , , , , , , , , ,	
Inner Ring			
CL-1	· .	1.8 miles W	
CL-5	· ` ·	0.7 miles NNE	
CL-22	ډ	0.6 miles NE	
CL-23		0.5 miles ENE	
CL-24		0.5 miles E	
CL-34	· •	0.8 miles WNW	
CL-35	4 · •	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	- ` <i>.</i>	2.3 miles WSW	
CL-63		1.3 miles NNW	
	.×.		
Outer Ring			
	•		
CL-51		4.4 miles NW	
CL-52	24 - C.	4.3 miles NNW	•
CL-53		4.3 miles E	
CL-54	÷	4.6 miles ESE	
CL-55	200 Big 100	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, 2013 Power Station, 2013

Location	Location Description	Distance & Direction From Site
		riom site
. Envi	ronmental Dosimetry – OSLD (cont.)	
ecial 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	х.	1.9 miles W
CL-75		0.9 miles N
upplemental		
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
ontrol		
CL-11		16 miles S

### TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Clinton Power Station, 2013 Power Station, 2013

## TABLE B-2: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Clinton Power Station, 2013

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Surface Water         Gamma Spectroscopy         Monthly composite from a continuous water compositor.         TBE, TBE-2007 Gamma emitting radioisotope analysis           Surface         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2007 Gamma emitting radioisotope analysis           Surface         I-131         Monthly composite from a continuous water compositor.         TBE, TBE-2017 Radiolodine in various matrices           Drinking Water         Gross Beta         Monthly composite from a continuous water compositor.         TBE, TBE-2012 Radiolodine in various matrices           Drinking Water         Gamma         Monthly composite from a continuous water compositor.         TBE, TBE-2017 Radiolodine in various matrices           Drinking Water         Gamma         Monthly composite from a continuous water compositor.         TBE, TBE-2017 Gamma emitting radioisotope analysis           Drinking Water         Gamma         Monthly composite from a continuous water compositor.         TBE, TBE-2017 Gamma emitting radioisotope analysis           Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritum analysis in drinking water by liquid scintillation           Well Water         I-131         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritum analysis in drinking water by liquid scintillation           Well Water         Gamma Spectroscopy         Semi-annual sam	Sample Medium	Analysis	Sampling Method	Analytical Procedure Number
Water         Spectroscopy         from a continuous water compositor         Env. Inc., SPM-1 Sampling Procedure Manual           Surface         Tritium         Quarterly composite from a continuous water compositor.         The TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation           Surface         I-131         Monthly composite from a continuous         TBE, TBE-2012 Radiologine various matrices           Water         I-131         Monthly composite from a continuous         TBE, TBE-2012 Radiologine various matrices           Drinking         Gross Beta         Monthly composite from a continuous         TBE, TBE-2008 Gross-Alpha and/or gross beta activity in various matrices           Drinking         Gamma         Monthly composite from a continuous         TBE, TBE-2017 Gamma emitting radioisotope analysis           Drinking         Gamma         Monthly composite from a continuous         TBE, TBE-2013 Radioactive todine in Drinking water by liquid scintillation           Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2031 Radioactive todine in Drinking Water from a continuous water compositor.           Well Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2031 Radioactive todine in Drinking Water by liquid scintillation           Air         Gamma         Guarterly composite from a continuous water compositor.         TBE, TBE-2031 Radioactive tod	Surface	Gamma	Monthly composite	TBE, TBE-2007 Gamma emitting radioisotope analysis
water compositor.         Env. Inc., SPM-1 Sampling Procedure Manual           Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2012 Radiolodine in various matrices           Surface         I-131         Monthly composite from a continuous water compositor.         TBE, TBE-2012 Radiolodine in various matrices           Drinking         Gross Beta         Monthly composite from a continuous water compositor.         TBE, TBE-2018 Radiolodine in various matrices           Drinking         Gamma         Monthly composite from a continuous water compositor.         TBE, TBE-2018 Radiolodine in various matrices           Drinking         Gamma         Monthly composite from a continuous water compositor.         TBE, TBE-2017 Gamma emitting radiostope analysis           Drinking         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritum analysis in drinking water by liquid scintillation           Drinking         I-131         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritum analysis in drinking water by liquid scintillation           Weil Water         Gamma         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritum analysis in drinking water by liquid scintillation           Weil Water         Gamma         Semi-annual samples collected via electrostocking or other techniques         TBE, TBE-2007 Gamma emitting radiostope analysis fiber fitt	Water	Spectroscopy	from a continuous	
Surface Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritium analysis in drinking water by liquid scinililation           Surface Water         I-131         Monthly composite from a continuous water compositor.         TBE, TBE-2012 Radioiodine in various matrices           Drinking Water         Gross Beta         Monthly composite from a continuous water compositor.         TBE, TBE-2008 Gross Alpha and/or gross beta activity in various matrices           Drinking Water         Gamma         Monthly composite from a continuous water compositor.         TBE, TBE-2017 Radioiodine in various matrices           Drinking Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2017 Radioactive Idanual           Drinking Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2017 Radioactive Idanual           Drinking Water         I-131         Quarterly composite from a continuous water compositor.         TBE, TBE-2017 Radioactive Idanual           Drinking Water         I Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2017 Gamma emitting radioisotope analysis           Spectroscopy         Env. Inc., SPM-1 Sampling Procedure Manual         TBE, TBE-2007 Gamma emitting radioisotope analysis           Hilk         Gamma         Spectroscopy         Semi-anual samples do continuous air sampling through glass f			water compositor.	Env. Inc., SPM-1 Sampling Procedure Manual
Water         from a continuous water compositor.         scintillation           Surface         I-131         Monthly composite from a continuous water compositor.         TBE, TBE-2012 Radioiodine in various matrices           Drinking         Gross Beta         Monthly composite from a continuous water compositor.         TBE, TBE-2008 Gross Alpha and/or gross beta activity in various matrices           Drinking         Gamma         Monthly composite from a continuous water compositor.         TBE, TBE-2001 Gross Alpha and/or gross beta activity in various matrices           Drinking         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2001 Gross Alpha and/or gross beta activity in various matrices           Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation           Water         Gamma         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation           Well Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation           Well Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation           Fish         Gamma Spectroscopy         Semi-annual sa	Surface	Tritium	Quarterly composite	TBE, TBE-2011 Tritium analysis in drinking water by liquid
water compositor.         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           Drinking Water         Gross Beta         Monthly composite from a continuous water compositor.         TBE, TBE-2008 Gross Alpha and/or gross beta activity in various matrices           Drinking Water         Gamma         Monthly composite from a continuous water compositor.         TBE, TBE-2007 Gamma emitting radioisotope analysis in drinking water by liquid scintilation           Drinking Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritium analysis in drinking water by liquid scintilation           Drinking Water         1-131         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Radioactive lodine in Drinking Water           Well Water         Gamma Spectroscopy         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritium analysis in drinking water by liquid scintlation           Fish         Gamma Spectroscopy         Semi-annual sampling Procedure Manual         TBE, TBE-2007 Gamma emitting radioisotope analysis fiber filter paper           Air Particulates         Gross Beta         One-week composite or other techniques         TBE, TBE-2007 Gamma emitting radioisotope analysis electroshocking or other techniques           Air Particulates         Gamma Spectroscop	Water		from a continuous	scintillation
Surface         I-131         Monthly composite from a continuous water compositor.         TBE, TBE-2012 Radioiodine in various matrices           Drinking Water         Gross Beta         Monthly composite from a continuous water compositor.         TBE, TBE-2008 Gross Alpha and/or gross beta activity in various matrices           Drinking Water         Gamma         Monthly composite from a continuous water compositor.         TBE, TBE-2007 Gamma emitting radioisotope analysis from a continuous water compositor.           Drinking Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation           Drinking Water         I-131         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation           Well Water         Gamma Spectroscopy         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation           Well Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2007 Gamma emitting radioisotope analysis from a continuous water compositor.           Fish         Gamma Spectroscopy         Semi-annual samples collected via electroshocking or other techniques         TBE, TBE-2007 Gamma emitting radioisotope analysis           Air         Gamma Spectroscopy         One-week composite forom a continuous ar sampling through charcoal filter			water compositor.	
Surface Water         I-131         Monthly composite from a continuous water compositor.         TBE, TBE-2012 Radioiodine in various matrices           Drinking Water         Gross Beta         Monthly composite from a continuous water compositor.         TDE, TBE-2008 Gross 'Alpha and/or gross beta activity in various matrices           Drinking Water         Gamma Spectroscopy         Monthly composite from a continuous water compositor.         TDE, TBE-2007 Gamma emitting radioisotope analysis           Drinking Water         Tritium         Quarterly composite from a continuous water compositor.         TDE, TBE-2017 Radioactive lodine in Drinking water by liquid scintillation           Drinking Water         I-131         Quarterly composite from a continuous water compositor.         TDE, TBE-2031 Radioactive lodine in Drinking water by liquid scintillation           Well Water         Gamma Spectroscopy         Quarterly composite from a continuous water compositor.         TDE, TBE-2031 Radioactive lodine in Drinking Water from a continuous water compositor.           Fish         Gamma Spectroscopy         Semi-annual samples collected via electorshocking or other techniques         TDE, TBE-2007 Gamma emitting radioisotope analysis           Air Particulates         Gross Beta         One-week composite other techniques         TDE, TBE-2007 Gamma emitting radioisotope analysis           Air Particulates         Gross Beta         One-week composite other techniques         TDE, TBE-2007 Gamma emitting radioisotope analysis				Env. Inc., SPM-1 Sampling Procedure Manual
Water         from a continuous water compositor.         Env. Inc., SPM-1 Sampling Procedure Manual           Drinking Water         Gamma Spectroscopy         Monthly composite from a continuous water compositor.         TBE, TBE-2003 Gross Alpha and/or gross beta activity in various matrices           Drinking Water         Gamma Spectroscopy         Monthly composite from a continuous water compositor.         TBE, TBE-2007 Gamma emitting radioisotope analysis           Drinking Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation           Drinking Water         I-131         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Radioactive Iodine in Drinking Water from a continuous water compositor.           Well Water         Gamma Spectroscopy         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Radioactive Iodine in Drinking Water from a continuous water compositor.           Fish         Gamma Spectroscopy         Semi-annual samples collected via electroshocking or other techniques         TBE, TBE-2007 Gamma emitting radioisotope analysis           Air Particulates         Gross Beta One-week composite of continuous air sampling through glass fiber filter paper         TBE, TBE-2007 Gamma emitting radioisotope analysis           Air Particulates         Gamma Spectroscopy         One-week composite of continuous air sampling through each station         TBE, TBE-2007 Gamma emitting r	Surface	I-131	Monthly composite	TBE, TBE-2012 Radioiodine in various matrices
Joriking Water         Gross Beta         Water compositor. from a continuous water compositor.         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           Drinking Water         Gamma Spectroscopy         Monthly composite from a continuous water compositor.         TBE, TBE-2017 Gamma emitting radioisotope analysis           Drinking Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritum analysis in drinking water by liquid scintillation           Drinking Water         I-131         Quarterly composite from a continuous water compositor.         TBE, TBE-2031 Radioactive lodine in Drinking Water           Well Water         Gamma Spectroscopy         Quarterly composite from a continuous water compositor.         TBE, TBE-2001 Rampling Procedure Manual           Well Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2007 Gamma emitting radioisotope analysis collected via electroshocking or other techniques         TBE, TBE-2007 Gamma emitting radioisotope analysis           Fish         Gamma Spectroscopy         Semi-annual samples collected via electroshocking or other techniques         TBE-2007 Gamma emitting radioisotope analysis           Air         Gross Beta         One-week composite of continuous ariters         TBE-2007 Gamma emitting radioi	Water		from a continuous	
Drinking Water         Gross Beta         Monthly composite from a continuous water compositor.         TBE, TBE-2008 Gross Alpha and/or gross beta activity in various matrices           Drinking Water         Gamma         Monthly composite from a continuous water compositor.         TBE, TBE-2007 Gamma emitting radioisotope analysis           Drinking Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation           Drinking Water         I-131         Quarterly composite from a continuous water compositor.         TBE, TBE-2031 Radioactive Iodine in Drinking Water from a continuous water compositor.           Well Water         Gamma Spectroscopy         Quarterly composite from a continuous water compositor.         TBE, TBE-2017 Gamma emitting radioisotope analysis from a continuous water compositor.           Well Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2007 Gamma emitting radioisotope analysis collected via electroshocking or other techniques         TBE, TBE-2007 Gamma emitting radioisotope analysis collected via electroshocking or other techniques           Air Particulates         Gamma Spectroscopy         Seemi-annual samples collected via electroshocking or other techniques         TBE, TBE-2007 Gamma emitting radioisotope analysis           Air Particulates         Gamma Spectroscopy         Seemi-annual samples continuous air sampling through glass fiber filter paper         TBE, TBE-2007 Gamma emitting	. N	1	water compositor.	. Env. Inc., SPM-1 Sampling Procedure Manual
Water         from a continuous water compositor.         various matrices           Drinking Water         Gamma Spectroscopy         Monthly composite from a continuous         TBE, TBE-2007 Gamma emitting radioisotope analysis           Drinking Water         Tritium         Quarterly composite from a continuous         TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation           Drinking Water         I-131         Quarterly composite from a continuous         TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation           Drinking Water         I-131         Quarterly composite from a continuous         TBE, TBE-2017 Gamma emitting radioisotope analysis           Well Water         Gamma Spectroscopy         Quarterly composite from a continuous         TBE, TBE-2017 Gamma emitting radioisotope analysis           Well Water         Tritium         Quarterly composite from a continuous         TBE, TBE-2007 Gamma emitting radioisotope analysis           Well Water         Tritium         Quarterly composite from a continuous         TBE, TBE-2007 Gamma emitting radioisotope analysis           Fish         Gamma Spectroscopy         Semi-annual samples collected via electroshocking or other techniques         TBE-2007 Gamma emitting radioisotope analysis           Air Particulates         Gamma Spectroscopy         One-week composite of continuous air sampling through each station         TBE-2007 Gamma emititing radioisotope analysis	Drinking	Gross Beta	Monthly composite	TBE, TBE-2008 Gross Alpha and/or gross beta activity in
water compositor.         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           Drinking Water         Tritium         Quarterly composite from a continuous water compositor.         TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation           Drinking Water         I-131         Quarterly composite from a continuous         TBE, TBE-2031 Radioactive Iodine in Drinking Water from a continuous           Drinking Water         I-131         Quarterly composite from a continuous         TBE, TBE-2031 Radioactive Iodine in Drinking Water from a continuous           Well Water         Gamma Spectroscopy         Quarterly composite from a continuous         TBE, TBE-2007 Gamma emitting radioisotope analysis           Well Water         Tritium         Quarterly composite from a continuous         TBE, TBE-2007 Gamma emitting radioisotope analysis           Fish         Gamma Spectroscopy         Semi-annual samples collected via electroshocking or other techniques         TBE, TBE-2008 Gross Alpha and/or gross beta activity in various matrices           Air Particulates         Gamma Spectroscopy         One-week composite of continuous air sampling through glass fiber filter paper         TBE, TBE-2007 Gamma emitting radioisotope analysis           Air Iodine         Gamma Spectroscopy         One-week composite of continuous air sampl	Water		from a continuous	various matrices
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Water     from a continuous water compositor.     scintillation       Drinking Water     I-131     Quarterly composite from a continuous water compositor.     TBE, TBE-2031 Radioactive lodine in Drinking Water       Well Water     Gamma Spectroscopy     Quarterly composite from a continuous water compositor.     TBE, TBE-2007 Gamma emitting radioisotope analysis       Well Water     Tritium     Quarterly composite from a continuous water compositor.     TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation       Well Water     Tritium     Quarterly composite from a continuous water compositor.     TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation       Fish     Gamma Spectroscopy     Semi-annual samples collected via electroshocking or other techniques     TBE-2007 Gamma emitting radioisotope analysis       Air Particulates     Gross Beta     One-week composite of continuous air sampling through glass fiber filter paper     TBE, TBE-2007 Gamma emitting radioisotope analysis       Air lodine     Gamma Spectroscopy     Quarterly composite of continuous air sampling through glass fiber filter paper     TBE, TBE-2007 Gamma emitting radioisotope analysis       Air lodine     Gamma Spectroscopy     One-week composite of continuous air sampling through charcoal filter     TBE, TBE-2007 Gamma emitting radioisotope analysis       Milk     I-131     Bi-weekly grab sample when cows are on pasture. Monthly all other times     TBE, TBE-2012 Radioiodine in various matrices       Milk <t< td=""><td>Drinking</td><td>Tritium</td><td>Quarterly composite</td><td>TBE, TBE-2011 Tritium analysis in drinking water by liquid</td></t<>	Drinking	Tritium	Quarterly composite	TBE, TBE-2011 Tritium analysis in drinking water by liquid
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Spectroscopy when cows are on	Milk	Gamma	Bi-weekly grab sample	TBE-2007 Gamma emitting radioisotope analysis
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other times Env. Inc., SPM-1 Sampling Procedure Manual			other times	Env. Inc., SPM-1 Sampling Procedure Manual

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Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Clinton Power Station, 2013

	Sample Medium	Analysis	Sampling Method	i Ar	nalytical Procedure Nu	mber		
ì	Food Products	Gross Beta	Monthly grab, June through September	TBE, TBE-2008 various matrices	TBE, TBE-2008 Gross Alpha and/or gross beta activity i various matrices			
	Food Products	Gamma Spectroscopy	Monthly grab June through September	TBE, TBE-2007 Env. Inc., SPM-	Gamma emitting radioisot	isotopes analysis		
	Grass	Gamma Spectroscopy	Biweekly May through October	TBE, TBE-2007 Env. Inc., SPM-	Gamma emitting radioisof	opes analysis nual		
	OSLD	Optically Stimulated Luminescence Dosimetry	Quarterly OSLDs comprised of two Al <sub>2</sub> O <sub>3</sub> :C Landauer Incorporated elements	Landauër Incorr	porated.	 1 .		
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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, 2013

### RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-90
12/26/12 - 01/30/13	< 0.5
01/30/13 - 02/27/13	< 0.5
02/27/13 - 03/27/13	< 0.7
03/27/13 - 04/24/13	< 0.7
04/24/13 - 05/29/13	< 0.6
05/29/13 - 06/26/13	< 0.5 (1)
06/26/13 - 07/31/13	< 0.6
07/31/13 - 08/28/13	< 0.7
08/28/13 - 09/25/13	< 0.5
09/25/13 - 10/30/13	< 0.6
10/30/13 - 11/27/13	< 0.7
11/27/13 - 12/26/13	< 0.4

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### Table C-I.2CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES<br/>COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

### RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-90	CL-13	CL-91	CL-99
01/30/13 - 03/27/13	< 182	< 183	< 182	< 182 (1)
04/24/13 - 06/26/13	< 191 (1)	< 193	< 194	< 190 (1)
07/31/13 - 09/25/13	< 163	< 167	< 165	< 166 (1)
10/30/13 - 12/26/13	< 163	< 167	< 166	< 167 (1)
10/30/13 - 12/26/13 MEAN	< 163 -	< 167	< 166 -	< 167 (1

#### Table C-I.3

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### CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

#### RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-13	01/30/13 - 01/30/13	< 61	< 48	< 5	< 5	< 13	< 5	< 10	< 6	< 10	< 6	< 6	< 30	< 10	< 55
	02/27/13 - 02/27/13	< 28	< 77	< 3	< 3	< 7	< 3	< 7	< 3	< 6	< 3	< 3	< 12	< 6	< 24
	03/27/13 - 03/27/13	< 30	< 58	< 3	< 3	< 7	< 3	< 6	< 4	< 6	< 3	< 3	< 23	< 8	< 21
	04/24/13 - 04/24/13	< 34	57 ± 42	< 4	< 3	< 8	< 4	< 5	< 4	< 7	< 3	< 4	< 26	< 8	< 27
	05/29/13 - 05/29/13	< 32	< 44	< 4	<.4	< 7	< 4	< 8	< 4	< 7.	< 4	< 4	< 17	< 6	< 33
	06/26/13 - 06/26/13	< 17	< 29	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 2	< 2.	< 13	< 5	< 12
	07/31/13 - 07/31/13	< 33	< 81	< 4	< 4	< 6	< 4	< 8	< 4	<; 6	< 4	< 4	< 17	< 4	< 29
	08/28/13 - 08/28/13	< 15	22 ± 19	< 1	< 2	< 3.	< 1	< 3	< 2	< 3	< 1	< 1	< 15	< 5	< 12
	09/25/13 - 09/25/13	< 48	< 49	< 5	< 5	< 12	< 6	< 10	< 6	< 10	< 4	< 5	< 34	< 10	< 30
	10/30/13 - 10/30/13	< 35	< 31	< 4	< 4	< 7	< 4	< 8	< 4	< 8	< 4	< 4	< 28	< 7	< 30
	11/27/13 - 11/27/13	< 40	80 ± 51	< 4	< 4	< 10 <sub>.</sub>	< 5	< 9	< 5	< 7	< 4	< 4	< 31	< 11	< 41
	12/26/13 - 12/26/13	< 34	< 69	< 3	< 4	< 7	< 3	< 7	< 4	< 6	< 3	< 4	< 23	< 8	< 25
	MEAN	-	53 ± 58	-	-		-		-	-	-	_	-		-
CL-90	12/26/12 - 01/30/13	< 48	< 44	< 4	< 4	< 7	< 4	< 13	< 4	< 8	< 6	< 5	< 26	< 5	< 41
	01/30/13 - 02/27/13	< 33	< 72	< 3	< 3	< 8	< 4	< 7	< 4	< 7	< 3	< 4	< 16	< 6	< 25
	02/27/13 - 03/27/13	< 42	< 81	< 4	< 4	< 11	< 5	< 9	< 5	< 8	< 4	< 5	< 34	< 11	< 28
	03/27/13 - 04/24/13	< 35	< 65	< 3	< 3	< 7	< 3	< 7	< 4	< 6	< 3	< 4	< 28	< 7	< 29
	04/24/13 - 05/29/13	< 32	< 37	< 4	< 4	< 7	< 4	< 8	< 4	< 7	< 4	< 4	< 21	< 6	< 33
	05/29/13 - 06/26/13 (1)	< 15	< 32	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 1	< 2	< 12	< 4	< 11
	06/26/13 - 07/31/13	< 29	< 62	< 3	< 3	< 8	< 4	< 7	< 4	< 6	< 3	< 4	< 17	< 5	< 25
	07/31/13 - 08/28/13	< 22	< 38	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 23	< 6	< 19
	08/28/13 - 09/25/13	< 36	< 35	< 4	< 4	< 9	< 4	< 9	< 5	< 7	< 3	< 4	< 26	< 10	< 28
	09/25/13 - 10/30/13	< 37	< 56	< 2	< 4	< 12	< 5	< 7	< 3	< 8	< 4	< 4	< 29	< 8	< 23
	10/30/13 - 11/27/13	< 38	< 34	< 4	< 4	< 11	< 4	< 9	< 5	< 9	< 4	< 4	< 33	< 11	< 33
	11/27/13 - 12/26/13	< 34	< 77	< 3	< 4	< 8	< 3	< 7	< 4	< 7	< 3	< 4	< 25	< 7	< 32
	MEAN	- ``		<u>,</u> -	-	-	-	-	-	-	-		-	-	-
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(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

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#### Table C-I.3

#### CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES A COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

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**RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA** 

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-91	12/26/12 - 01/30/13	< 55	< 59	< 7	< 7	< 15	< 6	< 13	< 6	< 12	< 6	< 6	< 33	< 9	< 38
	01/30/13 - 02/27/13	< 33	< 43	< 4	< 4	< 8	< 4	< 8	< 4	< 7	< 3	< 4	< 16	< 5	< 31
	02/27/13 - 03/27/13	< 35	72 ± 47	< 4	< 4	< 10	< 4	< 9	< 5	< 8	< 4	< 4	< 29	< 10	< 31
	03/27/13 - 04/24/13	< 42	69 ± 51	< 4	< 5	< 9	< 4	< (9	< 5	< <u>9</u>	< 4	< 4	< 34	< 11	< 29
	04/24/13 - 05/29/13	< 61	< 72	< 7	< 8	< 14	< 6	< 16	< 8	< 13	< 7	< 7	< 30	< 10	< 35
	05/29/13 - 06/26/13	< .21	< 45	< 2	< 2	< 5	< 2	< 5	< 3	< 4	< 2	< 2	< .17	< 6	< 12
	.06/26/13 - 07/31/13	< 66	< 62	< 7	< 6	< 16	< 7	< 11	< 7	< 12	< 7	< 8	< 33	< 13	< 43
	07/31/13 - 08/28/13	< 17	< .16	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 17	< 6	< 12
	08/28/13 - 09/25/13	< 42	< 49	< 5	< 5	< 12	< 5	< 10	< 6	< 10	< 5	< 5	< 38	< 11	< 26
	09/25/13 - 10/30/13	< 34	< 38	< 4	< 4	< 10	< 4	< 8	< 4	< 7	< 4	< 4	< 26	< 7	< 28
	10/30/13 - 11/27/13	< 43	62 ± 50	< 4	< 4	< 9	< 5	< 8	< 5	< 8	< 4	< 5	< 28	< 9	< 29
	11/27/13 - 12/26/13	< 41	< .36	< 4	< 4	,< 9	< 4	< 7	< 5	< 7	< 4	< 4	< 31	< 8	< 37
	MEAN	. <del>-</del> .	67 ± 10	5 	ж. .Т.	-	<del>.</del>	-	` <u>-</u>	-	-	-	-	-`	- -
CL-99	$\frac{12}{26}$ - 01/30/13 (1)	< 42	< 65	< 4	< 5	< 10	: < 5	< 9	< 5	< 9	< 4	< 5	< 24	< 6	< 34
	01/30/13 - 02/27/13	< 30	48 ± 45	< 4	< 3	< 7	< 4	< 6	< 3	< 6	< 3	< 4	< 15	< 6	< 25
	02/27/13 - 03/27/13	< 42	< 35	< 4	< 4	< 9	< 4	< 8	< 4	< 7	< 4	< 4	< 30	< 10	< 34
	03/27/13 - 04/24/13	< 34	< 35	< 4	< 4	< 8	< 4	< 6	< 4	< 7	< 4	< 4	< 30	< 9	< 26
	04/24/13 05/29/13	< 46	< 43	< 5	< 5	< 10	< 5	< 10	< 5	< 9	< 4	< 6	< 25	< 9	< 42
	05/29/13 - 06/26/13 (1)	< 18	< 15	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 2	< 2	< 14	< 4	< 13
	06/26/13 - 07/31/13 (1)	< 50	· < 115	< 4	< 5	< 11	< 5	< 8	< 6	< 9	< 6	< 6	< 24	< 6	< 42
	07/31/13 - 08/28/13	< 18	35 ± 33	< 2	< 2	< 5	< 2	< .4	< 2	< 4	< 2	< 2	< 19	< 7	< 11
	08/28/13 - 09/25/13	< 40	84 ± 52	< 4	< 5	<.9	< 4	< 8	< 5	< 8	< 4	< 4	< 30	< 8	< 33
	09/25/13 - 10/30/13	< 36	< 70	< 3	< 4	< 8	< 4	< 8	< 4	< 8	< 4	< 4	< 24	< 7	< 29
	10/30/13 - 11/27/13	< 39	< .88	< 5	< 4	< 10	< 5	< 9	< .5	< 9	< 4	< 5	< 34	< 11	< 32
	11/27/13 - 12/11/13 (1)	< 14	< 27	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 1	< 1	< 21	< 7	< 9
	MEAN	-	56 ± 50	-	-	-		-	· 	-	-	-	-	-	. <b>-</b>
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(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-II.1

#### CONCENTRATIONS OF GROSS BETA IN DRINKING WATER SAMPLES **COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013**

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#### **RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA**

COLL PE	ECTION CL-14 RIOD	
12/26/12 01/30/13 02/27/13 03/27/13 04/24/13 05/29/13 06/26/13	- 01/30/13       < 2.1         - 02/27/13       < 2.3         - 03/27/13       < 1.7         - 04/24/13       < 1.5         - 05/29/13       < 1.9         - 06/26/13       < 2.1         - 07/31/13       < 2.0	
07/31/13 08/28/13 09/25/13 10/30/13 11/27/13	- 08/28/13       < 2.0	(1)
MEAN	-	

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#### Table C-II.2

#### CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES **COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013**

#### **RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA**

COLLECTION PERIOD	CL-14
12/26/12 - 03/27/13	< 185
03/27/13 - 06/26/13	< 194
06/26/13 - 09/25/13	< 166 (1)
09/25/13 - 12/11/13	< 183

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### Table C-II.3

### **CONCENTRATIONS OF I-131 IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013**

#### **RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA**

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

## Table C-II.4CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES<br/>COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

### RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

ITE	COLLECTION	Be-7	K-40	Mn-54	Có-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-14
1_14	12/26/12 - 01/30/13	< 53	< 60	< 5	< 5 ·	< 10	< 6	< 10	< 6	< 8	< 6	< 6	< 25	< 10	< 36
L-14	01/30/13 = 02/27/13	< 37	< 96	< 4	< 4	< 8	< 5	< 10	< 5	< 9	< 4	< 5	< 21	< 6	< 31
	02/27/13 - 03/27/13	< 31	< 35	< 3	< 4	< 8	< 3	< 5	< 4	< 6	< 3	< 3	< 26	< 8	< 26
	03/27/13 - 04/24/13	< 35	< 32	< 3	< 4	< 8	< 4	< 7	< 4	< 7	< 3	< 3	< 27	< 7	< 27
	04/24/13 - 05/29/13	< 46	71 ± 56	š < 5	< 5	< 11	< 5	< 10	< 5	< 9	< 5	< 5	< 26	< 8	< 37
	05/29/13 - 06/26/13	< 22	< 46	< 2	< 2	< 5	< 2	< 5	< 2	< 4	< 2	< 2	< 17	< 5	< 17
	06/26/13 - 07/31/13	< 35	< 76	< 4	< 4	< 7	< 4	< 7	< 4	< 7	< 4	< 5	< 19	< 6	< 36
	07/31/13 - 08/28/13	< 20	< 33	< 2	< 2	< 5	< 2	< 4 .	< 2	< 4	< 2	< 2	< 21	< 7	< 14
	08/28/13 - 09/25/13 (1)	< 38	< 76	< 4	< 5	< 10	< 4	< 8	< 4	< 9	< 4	< 4	< 30	< 10	< 35
	09/25/13 - 10/30/13	< 25	< 84	< 3	<-3	< 4	< 3	< 8	< 3	< 6	< 3	< 3	< 18	< 7	< 24
	10/30/13 - 11/27/13	< 48	68 ± 57	< 5	< 5	< 12	< 5	< 9	< 6	< 10	< 5	< 5	< 37	< 11	< 38
	11/27/13 - 12/26/13	< 33	< 20	< 3	< 3	< 8	< 3	< 6	<~`3	< 8	< 3	< 4	< 27	< 6	< 28
	MEAN	-	69 ± 4	_	21 A 2 A	-	-	"	- 	-	-	-	_	_	?
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# Table C-III.1CONCENTRATIONS OF TRITIUM IN WELL WATER SAMPLES<br/>COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

COLLECTION	CL-12R	CL-12T	CL-7D
PERIOD			
03/27/13 - 03/27/13	< 160	< 160	< 161
06/26/13 - 06/26/13	< 186	< 184	< 175
09/25/13 - 09/25/13	< 178	< 176	< 177
12/27/13 - 12/27/13	< 183	< 186	< 183

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#### RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

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#### Table C-III.2 CONCENTRATIONS OF GAMMA EMITTERS IN WELL WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

#### RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-12R	03/27/13	< 36	< 35	< 4	< 4	< 7	< 4	< 6	< 4	< 7	< 4	< 4	< 31	< 8	< 34
	06/26/13	< 18	< 15	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 14	< 4	< 14
	09/25/13	< 43	< 46	< 5	< 5	< 11	< 4	< 10	< 5	< 8	< 4	< 4	< 30	< 10	< 37
	12/26/13	< 44	< 39	< 4	< 5	< 9	< 4	< 8	< 5	< 8	< 4	< 5	< 29	< 7	< 36
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-	- - 
CL-12T	03/27/13	< 37	67 ± 53	< 3	< 5	< 7	< 4	< 8	< 4	< 8	< 4	< 4	< 29	< 9	< 20
	06/26/13	< 20	< 16	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 16	< 5	< 17
	09/25/13	< 36	< 74	< 4	< 4	< 10	< 4	< 7	< 4	< 7	< 4	< 4	< 28	< 11	< 30
	12/26/13	< 44	< 34	< 5	< 5	< 10	< 6	< 10	< 6	< 8	< 5	< 5	< 29	< 12	<_35
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-	, ×
CL-7D	03/27/13	< 39	< 37	< 4	< 4	< 9	< 4	< 8	< 4	< 6	< 4	< 4	< 28	< 9	< 29
	06/26/13	< 17	< 15	< 2	< 2	< 4	< 2	< 3	< 2	< 4	< 2	< 2	< 13	< 4	< 13
	09/25/13	< 44	< 42	< 4	< 4	< 9	< 5	< 9	< 5	< 8	< 4	< 4	< 31	< 9	< 34
	12/27/13	< 50	< 117	< 5	< 6	< 9	< 6	< 12	< 6	< 9	< 5	< 6	< 35	< 10	. < 29
	MEAN	-	-	-	-	-	-	-	-	-	-	: <sup>-</sup> .	- 	-	
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#### Table C-IV.1

#### CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES COLLECTED IN THE VICINITY **OF CLINTON POWER STATION, 2013** .

#### RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTI PERIOD	ON Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-105												-			
Bluegill	04/22/13	< 926	3058 ± 1090	< 92	< 86	< 175	< 77	< 143	< 88	< 171	< 75	< 80	< 937	< 161	< 591
Carp	04/22/13	< 689	4348 ± 878	< 58	< 57	< 157	< 54	< 127	< 71	< 125	< 65	< 63	< 699	< 185	< 418
Crappie	04/22/13	< 719	3475 ± 875	< 65	< 76	< 165	< 74	< 146	< 77	< 123	< 64	< 65	< 844	< 227	< 415
Largemouth Bass	04/22/13	< 398	4128 ± 882	< 48	< 41	< 136	< 50	< 99	< 56	< 69	< 33	< 49	< 566	< 209	< 230
Bluegill	10/01/13	< 777	2622 ± 698	< 70	< 83	< 199	< 84	< 148	< 74	< 140	< 57	< 73	< 1122	< 360	< 485
Carp	10/01/13	< 275	1324 ± 742	< 35	< 27	< 105	< 34	< 53	< 37	< 64	< 27	< 32	< 489	< 163	< 234
Crappie	10/01/13	< 1166	6694 ± 1402	< 86	< 124	< 216	< 108	< 174	< 134	< 211	< 77	< 99	< 1550	< 386	< 895
Largemouth bass	10/01/13	< 601	3874 ± 664	< 54	< 70	< 151	< 63	< 125	< 73	< 114	< 59	< 53	< 1017	< 248	< 359
	MEAN	-	3690 ± 3105	-	-	-	-	-	-	-	-	-	-	-	-
CL-19													•		
Bluegill	04/22/13	< 496	2920 ± 779	< 41	< 53	< 133	< 39	< 94	< 60	< 100	< 48	< 46	< 456	< 138	< 254
Carp	04/22/13	< 561	4404 ± 905	< 60	< 81	< 149	< 65	< 137	< 81	< 134	< 64	< 65	< 727	< 271	< 323
Channel Catfish	04/22/13	< 570	4102 ± 1048	< 57	< 66	< 128	< 57	< 123	< 64	< 126	< 49	< 53	< 577	< 195	< 240
Largemouth Bass	04/22/13	< 512	3656 ± 725	< 48	< 54	< 126	< 62	< 117	< 62	< 112	< 49	< 53	< 673	< 170	< 233
Bluegill	10/01/13	< 619	3039 ± 813	< 54	< 68	< 139	< 58	< 112	< 65	< 124	< 45	< 50	< 917	< 302	< 273
Carp	10/01/13	< 650	4494 ± 818	< 61	< 76	< 164	< 56	< 131	< 71	< 131	< 46	< 62	< 995	< 414	< 446
Channel Catfish	10/01/13	< 615	3056 ± 823	< 57	< 70	< 154	< 46	< 95	< 69	< 145	< 60	< 54	< 945	< 294	< 618
Largemouth Bass	10/01/13	< 687	3439 ± 1040	< 67	< 68	< 181	< 66	< 147	< 84	< 132	< 70	< 69	< 1149	< 418	< 338
· · · · ·	MEAN	-	3639 ± 1262	-	-	-	-	-	-	-	-	-	-	-	-
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## Table C-V.1CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES<br/>COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

#### RESULTS IN UNITS OF PCI/KG DRY ± 2 SIGMA

SITE		Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-07B	04/22/13	< 332	7632 ± 902	< 35	< 33	< 65	< 42	< 88	< 35	< 60	< 27	< 32	< 291	< 82	< 179
	10/01/13	< 498	7681 ± 857	< 49	< 50	< 144	< 45	< 114	< 61	< 103	< 41	< 45	< 933	< 265	< 264
	MEAN	-	7657 ± 69	-	-	-	-	-	-	-	-	-	-	-	-
CL-105	04/22/13	< 429	12730 ± 1106	6 < 47	< 43	< 106	< 62	< 107	< 54	< 90	< 38	< 44	< 301	< 93	< 307
	10/01/13	< 386	7834 ± 794	< 34	< 46	< 108	< 41	< 84	< 43	< 74	< 30	< 30	< 654	< 156	< 184
	MEAN	• ` • <u>•</u>	10282 ± 6924	kn −tu	-	-	-	-	-	-	-	-	-	-	-
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#### Table C-VI.1

#### CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES **COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013**

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

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COLLECTION		<u> </u>	GRO	DUP I			
PERIOD	CL-2	CL-3	CL-4	CL-6	CL-15	CL-94	1 · · ·
01/02/13 - 01/09/13	49 ± 6	47 ± 6	53 ± 6	51 ± 6	47 ± 6	51 ± 6	1 - A
01/09/13 - 01/16/13	24 ± 5	22 ± 5	20 ± 5	20 ± 4	22 ± 5	(1) 22 ±∶5	(1)
01/16/13 - 01/23/13	20 ± 5	23 ± 5	19 ± 5	22 ± 5	20 ± 5	21 ± 5	· ·
01/23/13 - 01/30/13	31 ± 5	37 ± 6	36 ± 6	39 ± 6	35 ± 6	$32 \pm 5$	
01/30/13 - 02/06/13	33 ± 5	$32 \pm 5$	32 ± 5	32 ± 5	28 ± 5	35 ± 5	·
02/06/13 - 02/13/13	20 ± 4	21 ± 4	24 ± 5	19 ± 4	22 ± 4	25 ± 5	
02/13/13 - 02/20/13	20 ± 4	19 ± 4	15 ± 4	21 ± 4	21 ± 4	20 ± 4	
02/20/13 - 02/27/13	15 ± 4	13 ± 4	18 ± 4	16 ± 5	13 ± 4	17 ± 5	
02/27/13 - 03/06/13	15 ± 4	9 ± 4	14 ± 4	14 ± 4	16 ± 4	13 ± 4	·
03/06/13 - 03/13/13	16 ± 4	15 ± 4'	14 ± 4	25 ± 5	14 ± 4	14 ± 4	
03/13/13 - 03/20/13	17 ± 5	21 ± 5	14 ± 5	16 ± 5	18 ± 5	22 ± 5	
03/20/13 - 03/27/13	12 ± 4	14 ± 4	14 ± 4	12 ± 4	12 ± 4	12 ± 4	
03/27/13 - 04/03/13	18 ± 4	17 ± 5	21 ± 5	15 ± 4 '	18 ± 4	20 ± 5	· ·
04/03/13 - 04/10/13	17 ± 4	17 ± 5	20 ± 5	19 ± 5	17 ± 4	23 ± 5	
04/10/13 - 04/17/13	12 ± 4	7 ± 4	10 ± 4	10 ± 4	7 ± 4	14 ± 4	
04/17/13 - 04/24/13	12 ± 4	11 ± 4	12 ± 4	14 ± 4	14 ± 4	14 ± 4	. :
04/24/13 - 05/01/13	16 ± 5	21 ± 5	19 ± 5	16 ± 5	18 ± 4	18 ± 5	
05/01/13 - 05/08/13	12 ± 4	14 ± 4	12 ± 4	13 ± 4	10 ± 4	14 ± 4	1
05/08/13 - 05/15/13	15 ± 5	11 ± 4	14 ± 4	18 ± 5	12 ± 4	11 ± 4	25
05/15/13 - 05/22/13	19 ± 4	18 ± 4	21 ± 4	23 ± 5	18 ± 4	21 ± 4	
05/22/13 - 05/29/13	10 ± 4	14 ± 4	8 ± 4	15 ± 4	7 ± 4	10 ± 4	. `
05/29/13 - 06/05/13	9 ± 4	8 ± 4	9 ± 4	< 6	10 ± 4	(1) 9±4	(1)
06/05/13 - 06/12/13	18 ± 5	16 ± 4	14 ± 4	21 ± 5	19 ± 5	21 ± 5	
06/12/13 - 06/19/13	14 ± 4	11 ± 4	11 ± 4	12 ± 4'	15 ± 4	17 ± 4	
06/19/13 - 06/26/13	13 ± 4	21 ± 5	21 ± 5	$23 \pm 5$	13 ± 4	18 ± 5	
06/26/13 - 07/03/13	15 ± 4	15 ± 4	15 ± 4	(1) 9 ± 4	(1) 12 ± 4	13 ± 4	-
07/03/13 - 07/10/13	8 ± 4	15 ± 5	11 ± 5	14 ± 5	11 ± 5 <sup>,</sup>	15 ± 5	2
07/10/13 - 07/17/13	13 ± 4	12 ± 4	11 ± 4	9 ± 3	14 ± 4	13 ± 4	• • •
07/17/13 - 07/24/13	15 ± 4	14 ± 4	13 ± 4	14 ± 4	15 ± 4	19 ± 4	
07/24/13 - 07/31/13	14 ± 4	14 ± 4	13 ± 4 -	10 ± 4	15 ± 4	17 ± 4	· •
07/31/13 - 08/07/13	21 ± 4	23 ± 5	24 ± 5	20 ± 4	(1) 19 ± 4	21 ± 4	
08/07/13 - 08/14/13	18 ± 4	19 ± 4	17 ± 4	20 ± 4	16 ± 4	16 ± 4	
08/14/13 - 08/21/13	$30 \pm 5$	25 ± 5	21 ± 4	15 ± 4	$24 \pm 5^{\circ}$	28 ± 5	• •
08/21/13 - 08/28/13	24 ± 5	20 ± 5	18 ± 5	21 ± 5	22 ± 5	21 ± 5 `	1.01.1
08/28/13 - 09/04/13	16 ± 4	23 ± 5	22 ± 5	20 ± 4	20 ± 4	26 ± 5	
09/04/13 - 09/11/13	36 ± 5	$30 \pm 5$	39 ± 5	31 ± 5	31 ± 5	33 ± 5	· · ·
09/11/13 - 09/18/13	15 ± 4	16 ± 4	15 ± 4	13 ± 4	17 ± 4	16 ± 5	
09/18/13 - 09/25/13	19 ± 5	20 ± 5	20 ± 5	(1) $22 \pm 5$	(1) 20 ± 5	22 ± 5	
09/25/13 - 10/02/13	$22 \pm 5$	$25 \pm 5$	29 ± 5	$24 \pm 5$	$26 \pm 5$	$25 \pm 5$	1
10/02/13 - 10/09/13	$21 \pm 4$	$20 \pm 4$	$15 \pm 4$	15 ± 4	$15 \pm 4$	$15 \pm 4$	
10/09/13 - 10/16/13	$24 \pm 5$	$22 \pm 5$	23 ± 4	$23 \pm 5$	22 ± 4	24 ± 5	
10/16/13 - 10/23/13	16 ± 4	14 ± 4	18 ± 4	19 ± 4	$15 \pm 4$	(1) $15 \pm 4$	(1)
10/23/13 - 10/30/13	20 ± 4	19 ± 4	$20 \pm 4$	$23 \pm 4$	21 ± 4	$20 \pm 4$	
10/30/13 - 11/06/13	$30 \pm 5$	$26 \pm 5$	$32 \pm 5$	$27 \pm 5$	$25 \pm 5$	23 ± 5	
11/06/13 - 11/13/13	14 ± 4	18 ± 4	17 ± 4	17 ± 4	14 ± 4	16 ± 4	
11/13/13 - 11/20/13	18 ± 5	11 ± 4	17 ± 4	14 ± 4	$14 \pm 4$	$12 \pm 4$	
11/20/13 - 11/27/13	16 ± 4	19 ± 4	19 ± 4	23 ± 5	22 ± 4	$24 \pm 5$	
11/27/13 - 12/04/13	38 ± 6	43 ± 6	43 ± 6	40 ± 6	36 ± 5	$40 \pm 6$	
12/04/13 - 12/11/13	29 ± 5	$32 \pm 5$	36 ± 5	34 ± 5	(1) 35 ± 5	$33 \pm 5$	a a ser a
12/11/13 - 12/18/13	$35 \pm 5$	40 ± 6	39 ± 6	35 ± 6	(1) 35 ± 5	31 ± 5	
12/18/13 - 12/26/13	29 ± 4	26 ± 4	28 ± 4	25 ± 4	22 ± 4	25 ± 4	
12/26/13 - 01/01/14	28 ± 6	$31 \pm 6$	$33 \pm 6$	26 ± 5	$29 \pm 6$	28 ± 6	
	00 / 17	00	04 - 40	<b>0</b> 0 · <b>1</b> -	40 40	04 - 15	
MEAN	20 ± 17	20 ± 17	21 ± 19	20 ± 17	19 ± 16	21 ± 16	

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

# Table C-VI.1CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES<br/>COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

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	RESULTS	IN UNITS O	FE-3 PCI/CU	METER ± 2	SIGMA	
COLLECTION		GROUP II	G	ROUP III		
PERIOD	CL-1	CL-7	CL-8	CL-11		
01/02/13 - 01/09/13	48 ± 6	57 ± 6	47 ± 6	51 ± 6	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
01/09/13 - 01/16/13	21 ± 5	23 ± 5 (1	19 ± 5 <sup>***</sup> (1)	20 ± 4	1	
01/16/13 - 01/23/13	$20 \pm 5$	22 + 5	22 ± 5	18 ± 4		
01/23/13 - 01/30/13	27 + 5	33 + 6	35 + 6	30 + 5		
01/20/13 - 01/30/13	$27 \pm 6$	31 + 5	35 + 5	32 + 5		••
01/30/13 - 02/00/13	20 ± 4	22 + 4	33 I 5	10 ± 4	• •	
02/00/13 - 02/13/13	$20 \pm 4$	$22 \pm 4$	$24 \pm 3$	$13 \pm 4$		
02/13/13 - 02/20/13	21 1 4	21 1 4.	10 1 5	20 ± 4		· · · · ·
02/20/13 - 02/27/13	14 ± 4	19 ± 5	19 ± 5	19 ± 4	· .	
02/27/13 - 03/06/13	19 ± 5	13 ± 4	9 ± 4	16 ± 4		· · · ·
03/06/13 - 03/13/13	14 ± 4	$12 \pm 4$	$14 \pm 4$	$13 \pm 4$		· .
03/13/13 - 03/20/13	$23 \pm 5$	17 ± 5	$14 \pm .5$	16 ± 5		
03/20/13 - 03/27/13	11 ± 4	14 ± 4	11 ± 4	14 ± 4	-	<b>'</b>
03/27/13 - 04/03/13	19 ± 4	17 ± 4	15 ± 4 ···	16 ± 4	1.7	
04/03/13 - 04/10/13	17 ± 4.	18 ± 4.	17 ± 7 (1)	22 ± 5	• 1	•. •
04/10/13 - 04/17/13	11 ± 4	9 ± 4	7 ± 4	8 ± 4	16 g	
04/17/13 - 04/24/13	10 ± 4	11 ± 4	10 ± 4	12 ± 4		: 1
04/24/13 - 05/01/13	15 ± 4	16 ± 5	18, ± 5	22 ± 5	· .	·
05/01/13 - 05/08/13	12 ± 4	12 ± 4	10 ± 4	13 ± 4		1 1 L
05/08/13 - 05/15/13	13 ± 4	12 ± 4	11,±5 ± (1)	19 ± 5		
05/15/13 - 05/22/13	23 ± 4	21 ± 4	15 ± 4 (1)	19 ± 4·	· · · ·	•
05/22/13 - 05/29/13	11 ± 4 (*	() 11 ± 4	11 ± 4	11 ± 4		
05/29/13 - 06/05/13	8 ± 4	< 6 (1)	$10 \pm 5$ (1)	10 ± 4 (1	)	
06/05/13 - 06/12/13	14 ± 4	16 ± 4	15 ± 4	14 ± 4		
06/12/13 - 06/19/13	11 ± 4 ·	8 ± 4	12 ± 4	$11 \pm 4$		ē.
06/19/13 - 06/26/13	13 ± 4	14 ± 4	17± 5	14 ± 4		
06/26/13 - 07/03/13	$14 \pm 4$	10 ± 4	11 ±.4	12 ± 4		
07/03/13 - 07/10/13	12 ± 5	12 ± 5	17 ± 5	11 ± 5		
07/10/13 - 07/17/13	12 ± 4	9±3	13 ± 4	13 ± 4	. ب	
07/17/13 - 07/24/13	$14 \pm 4$	$14 \pm 4$	14.±4,	18 ± 4		
07/24/13 - 07/31/13	13 ± 4	$11 \pm 4$	16 ± 4	15 ± 4		
07/31/13 - 08/07/13	17 ± 4	20 ± 4	20 ±.4	21 ± 4.		
08/07/13 - 08/14/13	20 ± 4	21 ± 4	21 ± 4	18 ± 4		
08/14/13 - 08/21/13	21 ± 4.	21 ± 4	28 ± 5	30 ± 5		
08/21/13 - 08/28/13	22 ± 5	18 ± 5	22 ± 5	21 ± 5	· · .	
08/28/13 - 09/04/13	18 ± 4	17 ± 4	21 ± 5	$20 \pm 4$	·	-1
09/04/13 - 09/11/13	$33 \pm 5$	$32 \pm 5$	37 ± 5	$38 \pm 5$		
09/11/13 - 09/18/13	$14 \pm 4$	11 ± 4	14 ± 4	16 ± 4		
09/18/13 - 09/25/13	15 ± 4	$22 \pm 5$	18 ± 4	23 ± 5		
09/25/13 - 10/02/13	$21 \pm 5$	19 ± 4	$23 \pm 5$	27 ± 5		
10/02/13 - 10/09/13	16 ± 4	15 ± 4	19 ± 4	19 ± 4		
10/09/13 - 10/16/13	24 + 5	24 + 5	24 + 5	26 + 5		
10/16/13 - 10/23/13	14 + 4	15 + 4 /1	$15 \pm 4$ (1)	16 + 4		
10/23/13 - 10/20/13	17 + 4	21 + 4	23 + 4	26 + 5		
10/20/13 - 11/06/13	27 + 5	26 + 5	23 + 5	30 + 5		
11/06/13 11/13/13	18 + 4	10 + 4	16 + 4	17 + 4		·
11/10/13 - 11/10/13	14 + 4	13 ± 4		15 ± 4	• •	
11/13/13 - 11/20/13	14 ± 4	19 ± 4	17·14	$13 \pm 4$		
11/20/13 - 11/2//13	22 1 4	10 ± 4	23 ± 4 ; 42 ± 6	2,1 ± 4 40 ± 6		·. ·
11/2//13 - 12/04/13	33 ± 0 27 ± 5 °	34 + 5	45 10	40 ± 0	•	
12/04/13 - 12/11/33	21 I J 44 + 6	34 ± 5	31 I 3 21 I E	30 <u>+</u> 5		
12/11/13 - 12/18/13	99 ± 0. 25 ± 4		31·± 3 94 ± 4	-+0 ± 0		
12/18/13 - 12/20/13	20 1 4	29 1 4	24 1 42	24 I 4 24 + 5		
12/20/13 - 01/04/14	79 I Ó	20 2 0	20 I Û	27 I U	•	
MEAN	10 + 17	10 + 19	20 + 17	21 + 17		· · · ·
	19 11	13 1 10	20 1 11	21 - 17		
		1 (1) (1) (1)		·· `.	** 4	•

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

#### $(x_1,y_1,\ldots,x_{n-1},\ldots,y_{$ MONTHLY AND YEARLY MEAN VALUES OF GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

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

GROUP I - ON-S	SITELOC	JATION	is	GROUP II - INTERMEDIA	TE DISTAN		LOCATIONS	GROUP III - CONTROL LOCATIONS					
COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION	MIN M	AX	MEAN ± 2SD		COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	
01/02/13 - 01/30/13	19	53	32 ± 24	01/02/13 01/30/13	19	57	31 ± 26	. (	01/02/13 - 01/30/13	· 18	51	29 ± 30	
1/30/13 - 02/27/13	13	35	22 ± 13	01/30/13 - 02/27/13	14	35	23 ± 13	C	01/30/13 - 02/27/13	19	32	22 ± 13	
2/27/13 - 04/03/13	9,	25	16 ± 7	02/27/13 - 04/03/13	9	23	15 ± 7	(	02/27/13 - 04/03/13	13	16	15 ± 3	
4/03/13 - 05/01/13	7	23	15 ± 9	04/03/13 - 05/01/13	7	18	13 ± 8	C	04/03/13 - 05/01/13	8	22	16 ± 13	
5/01/13 - 05/29/13	7.	23	14 ± 8	05/01/13 - 05/29/13	10	23	-13 ± 9	· (	05/01/13 - 05/29/13	.11	19	15 ± 9	
5/29/13 - 07/03/13	8.	23	·14 ± 9	05/29/13 - 07/03/13	8.	17	12 ± 6	. 0	05/29/13 - 07/03/13	10	14	12 ± 4	
7/03/13 - 07/31/13	8	19	13 ± 5	07/03/13 - 07/31/13	9	17	.13 ± 4	(	07/03/13 - 07/31/13	11	18	14 ± 6	
7/31/13 - 09/04/13	15	30	21 ± 7	07/31/13 - 09/04/13	17	28	20 ± 5	C	07/31/13 - 09/04/13	18	30	22 ± 9	
9/04/13 - 10/02/13	13	39	23 ± 14	09/04/13 - 10/02/13	11	37	22 ± 17	C	09/04/13 - 10/02/13	16	38	26 ± 19	
0/02/13 - 10/30/13	14	24	19 ± 7	10/02/13 - 10/30/13	14	24	19 ± 8	1	10/02/13 - 10/30/13	16	26	22 ± 10	
0/30/13 - 12/04/13	11	43	23 ± 20	10/30/13 - 12/04/13	13	43	24 ± 19	1	10/30/13 - 12/04/13	15	40	$24 \pm 2^{-1}$	
2/04/13 - 01/01/14	22	40	31 ± 9	12/04/13 - 01/01/14	24	44	30 ± 12	1	12/04/13 - 01/01/14	24	40	31 ± 16	
01/02/13 - 01/01/14	7 ·	53	20 ± 17	01/02/13 - 01/01/14	7	57	20 ± 17	c	01/02/13 - 01/01/14	8	51	21 ± 1	

Table C-VI.2

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#### · "我们认真你们就是你们的问题,你们就是你们的你们。"

#### Table C-VI.3 CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES **COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013**

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

SITE	COLLECTION PERIOD	Be-7	K-40	Co-60	Nb-95	Zr-95	Ru-103	Ru-106	Cs-134	Cs-137	Ce-141	Ce-144	
CL-1	01/02/13 - 04/03/13	54 ± 36	< 35	< 2	< 4	< 6	< 8	< 17	< 2	< 2	< 10	< 9	
	04/03/13 - 07/03/13	68 ± 22	< 43	< 2	< 3	< 4	< 3	< 23	< 2	< 3	< 5	< 10	
	07/03/13 - 10/02/13	89 ± 30	< 48	< 3	< 4	< 7	< 4	< 15 ·	< 2	< 2	< 6	< 14	
	10/02/13 - 01/01/14	62 ± 19	< 38	< 2	< 3	< 5	< 4	< 20	< 2	< 2	< 5	< 13	
	MEAN	68 ± 30	-	-	-	-	-	-	-	-	-	-	
CL-11	01/02/13 - 04/03/13	70 ± 44	< 62	< 3	< 7	< 12	< 11	< 31	< 4	< 4	< 14	< 15	
	04/03/13 - 07/03/13	90 ± 23	< 39	< 2	< 3	< 4	< 2	< 23	< 2	< 2	< 4	< 8	
	07/03/13 - 10/02/13	98 ± 29	< 50	< 3	< 5	< 7	< 4	< 25	< 3	< 3	< 7	< 15	
	10/02/13 - 01/01/14	57 ± 30	< 50	< 2	< 3	< 6	< 4	< 18	< 2	< 2	< 5	< 11	
	MEAN	79 ± 37	-	-	-	-	-	-	-	-	-	-	
CL-15	5 01/02/13 - 04/03/13	80 ± 29	< 42	< 2	< 4	< 9	< 5	< 18	< 2	< 2	< 12	< 10	
	.04/03/13 - 07/03/13	59 ± 27	< 21	< 3 :	< 3	< 5	< 3 🖯	< 18	< 2	< 2	< 7	< 16 ·	49 A.A.A.
	07/03/13 - 10/02/13	61 ± 21	< 43	< 3	< 3	< 6	< 5	< 23	< 3	< 2	< 7	< 12	
	. 10/02/13 - `01/01/14	35 ± 18	< 41	< 2	< 3	< 4	< 2	< 17	< 1	< 1	< 4	< 9	• •
	MEAN	59 ± 37	. <u>-</u> .	-	· -	. ··· <del>.</del>				. <b>.</b>	· . -	-	
	· · · · ·				н. <sub>1</sub> . а.	· · ·							
CL-2	01/02/13 - 04/03/13	< 80	< 27	< 4	< 5	< (10	< 10	< 23	< 3	. <b>&lt; 3</b> ·	< 14	< 16	
	04/03/13 - 07/03/13	84 ± 22	< 44	< 3	< 3	< 6	<.4	< 23	< 3 🚲	< 2 · .	< 6	< 15	
	07/03/13 - 10/02/13	:88 ± 24	< 35	< 3	- < 3	< 6	< 3	< 17	< 2	< 2	< 4	< 8	
	10/02/13 - 01/01/14	70 ± 27	< 54	< 4	< 4	< 8	< 4	< 20 .	< 3 .	. < 3	< 6	< 13 .	
	$\{ (x,y) \in \mathcal{X} \}$		tie in a	·				. *					
	MEAN	80 ± 19	- · .	<sup></sup>	<del>-</del> • •	. <sup>.</sup>	- :	-	-		<b>-</b> ·	-	
					Ne fille	E.	-						
CL-3	01/02/13 - 04/03/13	53 ± 32	< 37	< 2	< 4	< 9	< 5	< 20	< 2	< 2	< 10	< 9	
	04/03/13 07/03/13	79 ± 29	< 54	< 4	< 3	< 4	< 5	< 24	< 2	< 3	່ < 5	< 11	
	07/03/13 - 10/02/13	⊶47 ± 33	< 33	< 4	< 5	< 8	< 5	< 35	< 3	< 4	< 8	< 15	.÷.
	10/02/13 - 01/01/14	53 ± 41	< 31	< 4 <sub>.</sub>	< 5	< 9	< 6	<mark>ِ &lt; 2</mark> 7	< 4	< 4	< 8	< 17	;
	MEAN	58 ± 29	-	-	-		-	-	-	-	-	-	. · ·
					• . •	•	:						

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# Table C-VI.3CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES<br/>COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

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

SITE	COLLECTION PERIOD	Be-7	K-40	Co-60 Nb-9	95 Zr-95	Ru-103	Ru-106	Cs-134	Cs-137	Ce-141	Ce-144	
CL-4	01/02/13 - 04/03/13	100 ± 30	< 34	< 3 < 6	< 11	< 8	< 26	< 3	< 3	< 12	< 11	
	04/03/13 - 07/03/13	98 ± 32	< 71	< 4 < 3	< 9	< 5	< 34	< 4	< 3	< 6	< 14	
	07/03/13 - 10/02/13	103 ± 30	< 41	< 2 < 3	< 5	< 4	< 28	< 3	< 3	< 6	< 13	
	10/02/13 - 01/01/14	53 ± 19	< 39	< 1 < 2	< 6	< 4	< 16	< 2	< 2	< 5	< 11	
	MEAN	88 ± 47	-		-	<b>-</b> .	-	-	-	-	-	
				. · · · ·		1. a 		• •	- C.		·	:
CL-6	01/02/13 - 04/03/13	< 75	< 64	< 4 < 10	< 15	< 13	< 37	< 4	< 4 .	.< 14	< 15	•
	04/03/13 - 07/03/13	89 ± 27	< 39	< 3 < 3	< 6	< 3	< 24	< 2	< 3	< 5	< 11	·.
	07/03/13 - 10/02/13	60 ± 25	< 21	< 3 < 4	< 7	< 5	< 28	< 3	< 3	< 6	< 12	
	10/02/13 - 01/01/14 -	47 ± 20	< 32	< 2 < 3	< 7	< 4	< 25	, <b>&lt; 3</b> . ∕	< 3	< 5	< 12	
		66 1 43	·						. · · ·			• **
	WEAN	00 I 43			-	-	-	-	-	-	-	
CL-7	01/02/13 - 04/03/13	70 ± 33	< 40	< 2 < 4	< 9	. < .8	< 27	< 2	< 2	< 14	< 12	
	04/03/13 - 07/03/13	72 ± 25	< 52	< 3 < 4	< 6	< 3	< 26	< 3	< 3	< 5	< 11	
	07/03/13 - 10/02/13	85 ± 25	< 49	< 2 < 4	< 7	< 6	< 34	< 3	< 3	< 8	< 17	
	10/02/13 - 01/01/14	48 ± 19	< 39	< 3 < 3	< 3	< 3	< 13	< 2	< 2	< 4	< 10	•
	MEAN	69 ± 31	•		• <u>-</u> *		· · · ·	<u></u> .	-	-	-	
CL-8	01/02/13 - 04/03/13	94 ± 40	< 21	< 3 < 6	< 13	< 10	< 18	< 3	< 3	< 14	< 12	
	04/03/13 - 07/03/13	52 ± 26	< 63	< 4 < 5	< 8	< 4	< 27	< 4	< 3	< 8	< 17	
•	07/03/13 - 10/02/13	75 ± 21	< 37	< 3 < 3	< 6	< 4	< 21	<b>&lt; 3</b>	< 2	< 5	< 11	
	10/02/13 - 01/01/14	42 ± 18	< 38	< 2 < 3	< 6	< 4	< 21	< 3	< 2	< 5	< 12	5
	MEAN	66 ± 46	-		•	., -	-	-				
CL-94	01/02/13 - 04/03/13	63 ± 31	< 32	< 2 < 3	< 10	< 7	< 28	< 2	< 2	< 12	< 12	
	04/03/13 - 07/03/13	94 ± 27	< 37	- - - - - - - - - - - - - - - - - - -	< 4	< 2	< 19	< 2	< 2	< 4	< 13	
	07/03/13 - 10/02/13	82 ± 22	< 49	< 2 < 3	< 5	< 4	< 14	< 2	< 2	< 5	< 11	
	10/02/13 - 01/01/14	- 61 ± 30	< 31	< 3 < 4	< 8	< 5	< 35	< 4	< 3 · · ·	< 6	< 13	
	MEAN	75 ± 32			- ·	-		-	<b>.</b>	-	-	
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THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-VII.1

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#### CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

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

COLLECTION			GF	ROUP I			
PERIOD	CL-2	CL-3	CL-4	CL-6	CL-15	CL-94	
01/02/13 - 01/09/13	< 18	< 48	< 46	< 48	< 33	< 33	
01/09/13 - 01/16/13	< 32	< 32	< 33	< 32	< 42 (1)	< 42 (1)	. •
01/16/13 - 01/23/13	< 34	< 13	< 34	< 34	< 34 )	< 33 `	1
01/23/13 - 01/30/13	< 29	< 30	< 30	< 32	< 36	< 34	
01/30/13 - 02/06/13	< 37	< 37	< 14	< 36	< 31	< 31	
02/06/13 - 02/13/13	< 38	< 38	< 38	< 38	< 68	< 66	·.
02/13/13 - 02/20/13	< 25	< 26	< 25	< 9	< 30	< 30	
02/20/13 - 02/27/13	< 47	< 47	< 45	< 48	< 38	< 39	
02/27/13 - 03/06/13	< 33	< 34	< 36	< 37	< 27	< 27	
03/06/13 - 03/13/13	< 46	< 46	< 45	< 32	< 21	< 21	
03/13/13 - 03/20/13	< 34	< 36	< 34	< 35	< 42	< 42	
03/20/13 - 03/27/13	< 36	< 36	< 36	< 36	< 44	< 44	
03/27/13 - 04/03/13	< 47	< 49	< 47	< 48	< 44	< 44	
04/03/13 - 04/10/13	< 23	< 23	< 22	< 27	< 19	< 18	
04/10/13 - 04/17/13	< 30	< 31	< 30	< 30	< 18	< 48	
04/17/13 - 04/24/13	< 40	< 40	< 40	< 39	< 45	< 43	
04/24/13 - 05/01/13	< 41	< 42	< 40	< 41	< 40	< 18	
05/01/13 - 05/08/13	< 48	< 49	<.48	< 49	< 43.	< 43	
05/08/13 - 05/15/13	< 35	< 34	< 34	< 34	< 31	< 30	
05/15/13 - 05/22/13	< 52	< 52	< 52	< 52	< 45	< 44	
05/22/13 - 05/29/13	< 20	< 53	< 51	< 53	< 50	< 50	
05/29/13 - 06/05/13	< 51	< 50	< 50	< 51	< 43 (1)	< 42 (1)	
06/05/13 - 06/12/13	< 59	< 23	< 61	< 62	< 28 🐰	< 27	
06/12/13 - 06/19/13	< 49	< 49	< 49	< 49	< 49	< 48	
06/19/13 - 06/26/13	< 38	< 41	< 15	< 40	< 44	< 43	
06/26/13 - 07/03/13	< 49	< 49	< 50 (1)	, < 49 (1)	< 53	< 52	
07/03/13 - 07/10/13	< 65	< 65	< 65	< 27	< 66 <sup>`</sup>	< 66	
07/10/13 - 07/17/13	< 36	< 38	< 36	< 35	< 36	< 34	
07/17/13 - 07/24/13	< 45	< 45	< 45	< 47	< 50	< 50	
07/24/13 - 07/31/13	< 46	< 45	< 44	< 43	< 37	< 35	
07/31/13 - 08/07/13	< 55	< 56	< 56	, < 58 (1)	< 67	< 67	•
08/07/13 - 08/14/13	< 54	< 54	< 53	< 54	< 42	< 43	
08/14/13 - 08/21/13	< 57	< 58	< 55	< 21	< 53	< 52	
08/21/13 - 08/28/13	< 22	< 22	< 23	< 23	< 40	< 42	
08/28/13 - 09/04/13	< 52	< 52	< 53 ·	< 53	< 26	< 64	•
09/04/13 - 09/11/13	< 57	< 58	< 56	< 56	< 56	< 54	
09/11/13 - 09/18/13	< 17	< 17	< 18	< 18	< 18	< 12	
09/18/13 - 09/25/13	< 66	< 65	< 66 (1)	< 67 (1)	< 58	< 59	
09/25/13 - 10/02/13	< 63	< 65	< 61	< 64	< 63	< 63	анан салан сал Селан салан сал
10/02/13 - 10/09/13	< 46	< 46	< 44	< 46	< 48	< 49	
10/09/13 - 10/16/13	< 15	< 36	< 35	< 37	< 49	< 51	
10/16/13 - 10/23/13	< 51	< 50	< 49	° < 51	< 45 (1)	< 47 (1)	
10/23/13 - 10/30/13	<sub>_</sub> < 63	< 24	< 62	< 60	< 58	< 56	
10/30/13 - 11/06/13	. < 59	< 59	< 58 ·	< 59	< 54	< 55	
11/06/13 - 11/13/13	< 57	< 58	< 22	< 57	< 52	< 51	
11/13/13 - 11/20/13	< 61	< 61	< 60	< 60	< 58	< 55	
11/20/13 - 11/27/13	< 65	< 65	< 66	< 26	< 55	< 53	
11/27/13 12/04/13	< 11	< 31	< 30 .	< 30	< 25	< 26	
12/04/13 - 12/11/13	< 38	< 39	< 38 :	< 41 (1)	< 44	< 42	•
12/11/13 - 12/18/13	< 62	< 62	< 61	< 64 (1)	< 6 <u>6</u>	< 64	'
12/18/13 - 12/26/13	< 66	< 65	< 64	< 66	< 69	< 70	•
12/26/13 - 01/01/14	, < 33	< 33	< 31	. < 33	< 37	° ≤ 37	
	4			· · · · ·	<b>*</b> .	1	•
MEAN	-	1 6 IV	- ·	. 77		<b>.</b> -	••

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

## Table C-VII.1CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES<br/>COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

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

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COLLECTION		GROUP	П	GROUP III	· .	
PERIOD	CL-1	CL-7	CL-8	CL-11		÷.,
01/02/13 - 01/09/13	< 47	< 18	< 33	< 34		
01/09/13 - 01/16/13	< 17	< 19 (1)	< 43 (1)	< 40	States and the second	and the set
01/16/13 - 01/23/13	< 34	< 14	< 33	< 34		
01/23/13 - 01/30/13	< 29	< 32	< 31	< 34		
01/30/13 - 02/06/13	< 37	< 14	< 31	< 33		•
02/06/13 - 02/13/13	< 23	< 34	< 67	< 67		
02/13/13 - 02/20/13	< 25	< 13	< 30	< 30		
02/20/13 - 02/27/13	< 18	< 15	< 36	< 36		
02/27/13 - 03/06/13	< 33	< 16	< 37	< 28	ж. С	
03/06/13 - 03/13/13	< 46	< 32	< 32	< 21		
03/13/13 - 03/20/13	< 13	< 42	< 18	< 41		
03/20/13 - 03/27/13	< 22	< 23	< 44	< 45		
03/27/13 - 04/03/13	< 47	< 44	< 44	< 15		· .
04/03/13 - 04/10/13	< 22	< 26	< 33 (1)	< 27		• •
04/10/13 - 04/17/13	< 16	< 48	< 51	< 47		
04/17/13 - 04/24/13	< 22	< 23	< 44	< 43		
04/24/13 - 05/01/13	< 16	< 44	< 42	< 43		
05/01/13 - 05/08/13	< 17	< 19	< 43	< 42		
05/08/13 - 05/15/13	< 13	< 31	< 24 (1)	< 30		• •
05/15/13 - 05/22/13	< 20	< 19	< 48 (1)	< 44		4 - A 1
05/22/13 - 05/29/13	< 53 (1)	< 22	< 50	< 49	:	
05/29/13 - 06/05/13	< 19	< 19 (1)	< 46 (1)	< 44 (1)		
06/05/13 - 06/12/13	< 59	< 12	< 29 `´	< 28 )		
06/12/13 - 06/19/13	< 19	< 27	< 50	< 48		
06/19/13 - 06/26/13	< 40	< 18	< 45	< 43		
06/26/13 - 07/03/13	< 19	< 22	< 53	< 53		4
07/03/13 - 07/10/13	< 65	< 35	< 66	< 66		
07/10/13 - 07/17/13	< 14	< 15	< 36	< 37		
07/17/13 - 07/24/13	< 17	< 20	< 51	< 49		
07/24/13 - 07/31/13	< 18	< 16	< 36	< 35		
07/31/13 - 08/07/13	< 30	< 65	< 28	< 67		
08/07/13 - 08/14/13	< 29	< 18	< 42	< 42		
08/14/13 - 08/21/13	< 55	< 52	< 53	< 53		
08/21/13 - 08/28/13	< 8	< 15	< 42	< 42		
08/28/13 - 09/04/13	< 20	< 63	< 64	< 64		
09/04/13 - 09/11/13	< 24	< 28	< 55	< 54		
09/11/13 - 09/18/13	< 7	< 18	< 18	< 18		
09/18/13 - 09/25/13	< 27	< 31	< 58	< 57		
09/25/13 - 10/02/13	< 22	< 22	< 62	< 65		
10/02/13 - 10/09/13	< 25	< 26	< 48	< 48		
10/09/13 - 10/16/13	< 36	< 21	< 50	< 50		
10/16/13 - 10/23/13	< 20	< 19 (1)	< 46 (1)	< 45		
10/23/13 - 10/30/13	< 64	< 24	< 58	< 59		
10/30/13 - 11/06/13	< 23	< 23	< 55	< 55		
11/06/13 - 11/13/13	< 57	< 22	< 50	< 52		
11/13/13 - 11/20/13	< 24	< 24	< 58	< 56		
11/20/13 - 11/27/13	< 65	< 22	< 53	< 52		
11/27/13 - 12/04/13	< 29	< 11	< 26	< 25		
12/04/13 - 12/11/13	< 15	< 17	< 42	< 42		
12/11/13 - 12/18/13	< 34	< 27	< 65	< 64		
12/18/13 - 12/26/13	< 28	< 69	< 29	< 66		
12/26/13 - 01/01/14	< 19	< 13	< 38	< 38		
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 **COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013**

#### RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

	CONTROL FARM	1997 F. 4					
COLLECTION	CL-116			2 <b>a</b> - 1			
PERIOD							
01/30/13	< 0.9					:	
02/27/13	< 0.6						
03/27/13	< 0.8						-
04/24/13	< 0.5					••	
05/08/13	< 0.6	1 A.					
05/22/13	< 0.8		:			· · · ·	•
06/05/13	< 0.6	•				1	1 .
06/19/13	< 0.7					5 Z <sup>1</sup>	
07/03/13	< 0.7	÷.,					
07/17/13	< 0.9		۰.			$(0, \lambda) \in \Omega$	
07/31/13	< 0.7		:		·.		
08/14/13	< 0.8		· ,			· · · ·	
08/28/13	< 1.0	:			·:		
09/11/13	< 0.4			1 ·			,
09/25/13	< 0.5					·	
10/09/13	< 0.6	11 A		1.4		1	
10/23/13	< 0.7						
11/06/13	< 0.9	4	1 <sup>1</sup>			÷ .	· · ·
11/27/13	< 0.7		and the second	2.	2	1.15	
12/26/13	< 0.6	۰.	11 A. 1		<u>'</u>		
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Table C-VIII.2

#### **CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013**

#### RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-116	01/30/13	< 54	1293 ± 138	< 6	< 7	< 14	< 6	< 14	< 7	< 10	< 5	< 6	< 39	< 10	< 45
	02/27/13	< 48	1187 ± 125	< 6	< 6	< 12	< 8	< 11	< 6	< 10	< 5	< 6	< 28	< 7	< 43
	03/27/13	< 37	1261 ± 117	< 5	< 6	< 11	< 5	< 10	< 5	< 9	< 5	< 5	< 31	< 9	< 42
	04/24/13	< 58	1181 ± 121	< 6	. < 6	< 15	< 7	< 12	< 7	< 12	< 6	< 7	< 41	< 12	< 56
	05/08/13	< 60	1116 ± 125	< 5	< 6	< 17	< 7	< 14	< 6	< 12	< 5	< 5	< 50	< 15	< 31
	05/22/13	< 52	1195 ± 131	< 6	. < 6	< 14	. < 7	< 11	< 6	< 10	< 6	< 6	< 42	< 11	< 40
	06/05/13	< 41	1126 ± 107	< 4	<`5	< 10	< 5	< 11	< 5	< 8 '	< 4	< 5	< 25	< 7	< 34
	06/19/13	< 52 <sup>`</sup>	1201 ± 163	< 6	< 6	< 15	< 10	< 15	< 7	< 12	< 6	< 7	< 30	< 11	< 41
	07/03/13	< 36	1019 ± 105	< 5	< 5	< 9	< 5	< 10	< 5	< 7	< 4	< 4	< 30	< 9	< 33
	07/17/13	< 51	1346 ± 139	< 6 · .	< 5.:	< 13	< 8	. < 12	< 5	< 10	< 6	< 6	< 27	< 7 ·	< 40
	07/31/13	< 52	· 1412~± 131	< 6	< 5	< 13	< 7	·< 15	< 6	< 10%	< 5	< 7	< 30	< 9	< 48
	08/14/13	< 73	1374 ± 156	< 7	< 8	< 16	< 9	< 17	< 8	< 12	< 7	< 7	< 36	< 11	< 68
	08/28/13	< 49	1325 ± 120	< 6	< 6	< 15	< 7	< 13	< 6	< 10	< 5	< 7	< 41	< 11	< 40
	09/11/13	< 50	1322 ± 143	< 5	< 6	< 16	< 7	< 14	< 7	< 13	< 5	< 6	< 38	< 14 ·	< 35
	09/25/13	< 53	1067 ± 156	< 6	- < 6 -	< 15	· < 6	: < 15	< 7	< 11 <sup>°</sup>	< 5	< 6	< 42	< 12	< 39
	10/09/13	< 54	1214 ± 132	< 6	< 7	< 15	< 7	< 15	< 6	< 12	< 5	< 7	< 33	< 10	< 33
	10/23/13	< 58	1351 ± 124	< 6	< 7	< 15	< 6	< 15	< 7	< 12	< 6	< 6	< 50	< 12	< 48
	11/06/13	< 60	1188 ± 163	< 8	< 8 :	< 15	< 9	< 19	< 9	< 14	< 6	< 7	< 38	< 12	< 44
	·• 11/27/13	< 37	1322 ± 108	. < 4	< 5	< 11	< 5	< 8	< 4	< 7	< 3	< 4	< 35	< 11	< 28.
	12/26/13	< 50	1335 ± 122	< 5	< 5	< 13	< 7	< 13	< 7	< 10	< 5 <sup>.</sup>	< 6	< 38	· < 11	< 30
	MEAN	-	1242 ± 217	-	-	-	-	-	-	-	-	-	-	- '	-
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#### Table C-IX.1

#### CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES **COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013**

#### RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140	Ce-144
	PERIOD															
CL-114	06/26/13 Cabbage	462 ± 140	4836 ± 305	< 14	< 15	< 31	< 16	< 32	< 15	< 23	< 45	< 13	< 14	< 104	< 28	< 92
	06/26/13 Lettuce	353 ± 94	3755 ± 270	< 10	< 10	< 28	< 12	< 26	< 12	< 19	< 34	< 8	< 9	< 77	< 25	< 54
	06/26/13 Swiss Chard	541 ± 149	7816 ± 402	< 15	< 17	< 40	< 19	< 35	< 18	< 30	< 50	< 13	< 15	< 109	< 23	< 111
	07/31/13 Cabbage	197 ± 89	3372 ± 270	< 11	< 10	< 26	< 14	< 23	< 11	< 19	< 19	< 10	< 12	< 60	< 15	< 69
	07/31/13 Lettuce	293 ± 177	5415 ± 463	< 20	< 17	< 40	< 22	< 39	< 18	< 30	< 35	< 15	< 22	< 91	< 24	< 112
	07/31/13 Swiss Chard	392 ± 111	5332 ± 397	< 13	< 13	< 30	< 19	< 33	< 13	< 22	< 19	< 11	< 11	< 56	< 15	< 77
	08/28/13Cabbage	46 ± 27	2804 ± 102	< 4	< 4	< 11	< 5	< 10	< 5	< 8	< 19	< 4	< 4	< 35	< 10	< 28
	08/28/13 Kale	67 ± 41	3552 ± 130	< 5	< 6	< 14	< 7	< 12	< 6	< 11	< 23	< 5	< 5	< 46	< 13	< 34
	08/28/13 Swiss Chard	376 ± 58	8335 ± 195	< 5	< 6	< 17	< 8	< 15	< 6	< 11	< 23	< 4	< 5	< 44	< 12	< 31
	09/25/13 Cabbage	207 ± 93	6999 ± 292	< 8	< 10	< 23 ·	< 10	< 19	< 10	< 16	< 52	< 8 -	< 8	< 92 🗠	< 20	< 55
	09/25/13 Swiss Chard	181 ± 100	7630 ± 291	< 10	< 11	< 28	< 13	< 25	< 11	< 20	< 58	< 9	< 10 ,	< 103	< 31	< 55
	09/25/13 Tree leaves (1)	653 ± 156	7145 ± 286	<b>e</b> .9	< 10	< 24	< 10	< 20	< 11	< 19	< 55	< 9	< 10	< 96	. < 30	< 54
	MEĂN	314 ± 370	5583 ± 3904	- 	-	-	- ,	-	-		-	-	-	-	-	-
CL-115	06/26/13 Cabbage	357 ± 200	4931 ± 413	< 20	< 20	< 49	< 21	< 39	< 19	< 36	< 59	< 17	< 17	< 144	. < 38	< 87
	06/26/13 Lettuce	528 ± 135	^ 4372. ± 314	< 12	< 14	< 29 .	< 17	< 31	< 14	< 23	< 42	< 10.	< 13	< 92	< 25	<.71
	06/26/13 Swiss Chard	405 ± 128	7159 ± 402	< 13	< 13	< 37	< 20	< 35	< 14	< 25	< 48	< 12	< 13	< 95	< 28	< 93
	07/31/13 Cabbage	118 ± 74	2177 ± 207	< 9	< 8	< 22	< 13	< 19	< 8	<sup>°</sup> < 16	< 15	< 8	< 8	< 43	< 14	< 59
	07/31/13 Lettuce	305 ± 126	2840 ± 333	< 15	< 15	< 33	< 19	< 33	< 15	<sup>-</sup> < 30	< 26	< 13	< 13	< 80	< 18	< 81
	07/31/13 Swiss Chard	334 <sup>,</sup> ± 121	4495 ± 357	< <sup>,</sup> 13	< 14	< 34	< 18 🗸	< 34	< 13	< 26	< 22	< 11	< 13	< 74	< 20	< 88
	08/28/13 Cabbage / <	46	2680 ± 148	< 5	< 5	< 14	< 6	< 11	< 5	< 10	< 21	< 4	< 5	< 44	< 12	< 24
	08/28/13 Kale <	45	3993 ± 119	<.5	< 5	< 12	< 6	< 11	< 6	< 9	< 22	< 4	< 5	< 43	< 11	< 32
	08/28/13 Swiss Chard	114 ± 43	4958 ± 139	< 4	< 5	< 11	< 5	< 10	< 4	< 8	< 20	< 4	< 4	< 36	< 9	< 26
	09/25/13 Cabbage <	: 55	3714 ± 135	< 6	< 6	< 15	< 7	< 13	< 7	< 12	< 35	< 5	< 6	< 58	< 17	< 41
	09/25/13 Kale	202 ± 102	6148 ± 269	< 9	< 11	< 26	< 11	< 21	·< 11	< 19	< 52	< 8	< 9	< 94	< 28	< 43
	09/25/13 Swiss Chard	241. ± 52 " : )	5279 ± 159	< 5	< 6	< 16	< 7 ·	· < 13 ·	< 6	< 10	< 32	< 4	< 5	< 54	< 16	< 37
								. 7		· .						
	MEAN	289 ± 271	4396 ± 2893	2				-		-	-	- :	-	-		-
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NS SECTION FOR EXPLANATION

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(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

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

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### Table C-IX.1

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#### CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES **COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-117	06/26/13 Cabbage	194 ± 137	3265 ± 316	< 15	< 14	< 34	< 17	< 33	< 15	< 25	< 42	< 14	< 14	< 91	< 29	< 67
	06/26/13 Lettuce	731 ± 136	4873 ± 301	< 13	< 13	< 32	< 16	< 28	< 15	< 22	< 50	< 13	< 14	< 98	< 22	< 86
	06/26/13 Swiss Chard	285 ± 116	4304 ± 289	< 12	< 12	< 30	< 14	< 28	< 13	< 22	< 44	< 11	< 12	< 89	< 28	< 77
	07/31/13 Cabbage	276 ± 77	2852 ± 244	< 10	< 10	< 26	· < 11	< 21	< 11	< 20	< 18	< 9	< 11	< 48	< 16	< 59
	07/31/13 Lettuce	456 ± 181	5634 ± 504	< 19	< 22	< 49	< 30	< 51	< 24	< 40	< 47	< 23	< 25	< 120	< 22	< 192
	07/31/13 Swiss Chard	195 ± 86	4520 ± 275	< 9	< 9	< 22 ·	;< 13 🕔	< 25	< 9	< 17	< 17	<_8	< 10	< 48	< 14	< 68
	08/28/13 Cabbage	. 142 ± 65	4060 ± 151	< 5	< 5	< 14	< 6	< 11	< 6	< 10	< 23	< 5.	< 5	< 43	< 11	< 31
	08/28/13 Kale	101 ± 69	4825 ± 194	< 6	< 7	< 17	< 8	< 15	< 7	< 12	< 30	< 5	< 6	< 56	< 16	< 30
	08/28/13 Swiss Chard	79 ± 36	5704 ± 146	< 5	< 5	< 14	< 7	່< 13 ໌	< 5	< 9	< 20	< 4	< 4	< 37	< 11	< 26
	09/25/13 Cabbage	206 ± 68	5360 ± 167	<sup>`</sup> < 6	< 7	< 18	`< 7	< 15	< 7	< 12	< 51	< 5	< 6	< 77	< 20	< 41
	09/25/13 Kale	73 ± 38	4450 ± 127	< 5	< 6	< 15	< 7	< 12	·< 6	<ī10	< 39	<b>&lt; 4</b>	< 5	< 60	< 16	< 28
	09/25/13 Swish Chard	190 ± 60	5326 ± 156	<sup>`</sup> < 5	;< 6	< 18 🕓	< 7	< 13	< 7	< 11	.< 45	< 5	<.5	< 70	<.17	< 37
	2011 - A. C. A.												. 1			
:	MEAN	244 ± 373	4598 ± 1785	-		-	-	-	-				-	-	-	-
CL-118	06/26/13 Cabbage	< 102	2289 ± 199	< 9	< 11	< 22	< 10	< 22	< 10	< 20	< 34	< 10	< 10	< 76	< 18	< 57
	06/26/13 Lettuce	365 ± 118	3876 ± 316	< 15	< 14	< 31	< 15	< 32	< 15	< 23	< 46	< 12	< 13	< 97	< 30	< 80
	06/26/13 Swiss Chard	582 ± 154	10390 ± 416	< 14	< 14	< 41	< 19	< 37	< 15	< 27	< 50	< 13	< 14	< 106	< 30	< 93
	07/31/13 Cabbage	167 ± 83	2376 ± 225	< 7	.< 8	< 12	< 10	< 15	< 8	< 11	< 12	< 7	< 8	< 39	< 13	< 47
	07/31/13 Lettuce	406 ± 114	4183 ± 342	< 14	< 13	< 31	< 17	< 32	< 14	< 21	< 24	< <b>1</b> 1	< 11	< 57	< 14	< 66
	07/31/13 Swiss Chard	440 ± 129	6830 ± 398	< 12	< 14	< 34	< 18	< 31	< 13	< 21	< 24	< 10	< 13	< 63	< 14	< 75
	08/28/13 Cabbage	143 ± 57	4141 ± 154	'< 6	< 6	່< 15	< 7	< 14	< 6	< 12	< 29	< 5	< 6	< 55	< 14	< 40
	08/28/13 Lettuce	365 ± 104	8340 ± 287	< 11 🐳	< 11	< 29	< 14	< 27	< 12	< 20	< 37	< 9	< 11	< 81	< 19	< 70
	08/28/13 Swiss Chard	275 ± 54	10310 ± 233	< 6	< 7	.< 21	< 10	< 18	< 8	< 12	< 29	< 5	< 6	< 59	< 14	< 39
	09/25/13 Cabbage	96 ± 46	4011 ± 128	,< 5	< 6	< 16	< 6	< 12	< 6	< 11	< 44	< 5	< 5	< 67	< 17	< 34
	09/25/13 Kale	230 ± 44	6309 ± 134	.< 5	< 6	< 16	< 7	< 13	< 6	< 10	< 40	< 4	< 5	< <u>6</u> 3	< 17	< 28
	09/25/13 Swiss Chard	445 ± 79	10940 ± 235	< 7	< 8	< 21	< 10	< 19	< 8	< 14	< 41	< 6	< 7	< 77	< 18	< 45
	MEAN	319 ± 300	6166 ± 6333	-	-	· _	-	-	-	_	-	-	· - ·	· · -	·-	-
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مراجعه می از می از این از می از مینیا میشن می آنون از به از می زمان از محمد می و معرفی کند می از معرفی کند می از این از می از معرفی کند از معرفی میشن از این از می از معرفی می از معرفی می از معرفی کند می از معرفی از معرفی از این از معرفی می معرفی از معرفی می معرفی می از معرفی معرفی می معرفی معرفی معرفی می معرفی معرفی معرفی معرفی م

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#### **CONCENTRATIONS OF GAMMA EMITTERS IN GRASS SAMPLES** Table C-IX.2 **COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	' Ba-140	La-140	Ce-144
	PERIOD											_				
CL-01	05/08/13	765 ± 58	5810 ± 144	< 5	< 6	< 14	< 6	< 12	< 6	< 10	< 34	< 4	< 5	< 54	< 13	< 35
	05/22/13	648 ± 207	5569 ± 433	< 16	< 17	< 40	< 21	< 44	< 17	< 30	< 52	< 15	< 15	< 123	< 26	< 101
	06/05/13	1565 ± 258	4999 ± 499	< 20	< 17	< 53	< 25	< 44	< 22	< 39	< 44	< 18	< 22	< 121	< 27	< 137
	06/19/13	1329 ± 234	5654 ± 613	< 24	< 24	< 59	< 33	< 55	< 25	< 55	< 46	< 25	< 25	< 131	< 35	< 145
	07/03/13	3527 ± 193	7170 ± 310	< 11	< 12	< 29	< 15	< 27	< 13	< 23	< 41	< 11	< 12	< 86	< 25	< 75
	07/17/13	2266 ± 395	5116 ± 727	< 30	< 34	< 65	< 42	< 71	< 34	< 57	< 58	< 30	< 34	< 167	< 53	< 155
	07/31/13	1732 ± 256	3980 ± 459	< 21	< 20	< 49	< 23	< 46	< 25	< 39	< 46	< 22	< 24	< 103	< 28	< 144
	08/14/13	221 ± 162	5635 ± 474	< 18	< 19	< 49	< 26	< 42	< 16.	< 28	< 26	< 15	< 18	< 87	< 28	< 76
	08/28/13	<196	5544 ± 438	< 21	< 21	<b>&lt; 47</b> :	< 28	< 49	< 20	< 41	< 50	< 18	< 18	< 131	< 39	< 78
	· <sup>,</sup> 09/11/13 ··	547 ± 92	6774 ± 202	< 6	< 7	< 19	< 9 :	< 16	< 8	< 14	< 48	< 6 .	< 7	< 78⊶	< 19	< 43
	09/25/13	2727 ± 131	5234 ± 220	< 10	< 10 ·	< 24	< 11 ·	< 21	< 11	< 18 <sup>.</sup>	< 39 ····	< 10	< 10	< 77	< 20	< 70
	10/09/13	1272 ± 244	3570 ± 491	< 17	< 18	< 44	< 21	< 39	< 20	< 28	< 56	< 16	< 17	< 117	< 15	< 74
	10/23/13	2645 ± 131	3416 ± 184	< 9	< 10	< 22	< 10	< 19	< 10	< 17	< 56	< 8	< 8	< 88	< 27.	< 52
				• •	. •				÷.,							
	MEAN	1604 ± 2030	5267 ± 2213	<b>}</b>	- ·	- · .		-		-	<del>-</del> .	<b>-</b> .	-	<b>-</b> .	-	<b>.</b>
:			. :	• •			$\sim r$	:								• .
CL-02	05/08/13	527 ± 60	5493 ± 141	< 5	< 6	< 16	< 7	< 12	< 6	< 11	< 37	< 5	< 5	< 60	< 15	< 38
	05/22/13	1049 ± 152	5353 ± 314	< 14	< 14	< 31	< 17	< 33	< 15	< 23	< 44	< 13	< 13	< 97	< 28	< 86
	06/05/13	1292 ± 234 ··	4353 ± 495	< 20	< 20	< 52	< 31	< 54	< 26	< 44	< 48	< 23	< 24	< 124	< 30	< 144
	06/19/13	1490 ± 293	6149 ± 610	< 21	< 25	< 57	< 30	< 52	< 24	< 44	< 47 🗄	< 25	< 27	< 130	< 27	< 172
	07/03/13	2933 ± 164	5110 ± 266	< 12	< 12	< 30	< 14	< 25	< 14	< 22 <sup>°</sup>	< 43 <sup>·</sup>	< 11	< 12	< 86	< 25	< 82
	07/17/13	1868 ± 246	6398 ± 571	< 23	< 22	< 48	< 30	< 46	< 23	< 41	< 49	< 23	< 24	< 125	< 24	< 200
	07/31/13	2336 ± 290	3687 ± 503	< 26	< 28	< 59	< 28	< 56	< 27	< 33	< 44	< 22	< 25	< 135	< 39	< 130
	08/14/13	1233 ± 248	5391 ± 588	< 24	< 22	< 56	< 34 ···	< 58	< 25	< 37:	< 45	< 22	< 23	< 110	< 41	< 142
	08/28/13 <	< 260	6745 ± 621	< 25	< 23	< 69	< 26	< 61	< 27	< 49	< 60	< 22	< 26	< 163	< 43	< 129
	09/11/13	429 + 97	7403 ± 221	< 8	< 8	< 21	< 10	< 18	< 9	< 15	< 52	< 7	< 8	< 88	< 24	< 41
	09/25/13	2466 + 137	7449 + 258	< 10	< 10	< 26	< 13	< 25	< 11	< 19	< 37	< 9	< 10	< 74	< 20	< 59
	10/09/13	2748 + 263	5636 + 403	< 10	< 12	< 31	< 15	< 24	< 12	< 23	< 53	< 11	< 12	< 103	< 20	< 67
#	10/03/13	$2740 \pm 200$	4702 ± 223		~ 0	< 23		< 10	< 10	16	< 52	28	< 8	< 02	 < 21	< 55
	10/23/13	2000 I 102	4/92 I 223	<b>~ U</b>	- 3	- 20		- 13	• IV	- 10	. 52		· U	- 06	- 21	- 00
	MEAN	1727 ± 1695	5689 ± 2239	) _	-	-		-	_	-	-	-	-	-	-	-
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THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

# Table C-IX.2CONCENTRATIONS OF GAMMA EMITTERS IN GRASS SAMPLES<br/>COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-08	05/08/13	838 ± 50	5255 ± 118	< 4	< 4	< 13	< 6	< 11	< 5	< 8	< 26	< 4	< 4	< 44	< 11	< 23
	05/22/13	337 ± 179	4895 ± 403	< 19	< 19	< 44	< 20	< 40	< 19	< 32	< 52	< 16	< 18	< 138	< 31	< 78
	06/05/13	856 ± 198	5836 ± 489	< 20	< 17	< 40	< 26	< 46	< 22	< 30	< 37	< 19	< 17	< 97	< 26	< 116
	06/19/13	808 ± 294	5437 ± 619	< 31	< 31	< 80	< 34	< 66	< 32	< 55 -	< 54	< 27	< 28	< 148	< 55	< 130
	07/03/13	3930 ± 202	6851 ± 339	< 14	< 15	< 34	< 17	< 32	< 16	< 27	< 52	< 13	< 15	< 105	< 28	< 92
	07/17/13	2459 ± 274	8317 ± 609	< 23	< 24	< 57	< 29	< 63	< 27	< 41	< 49	< 22	< 24	< 121	< 31	< 166
	07/31/13	694 ± 193	5651 ± 499	< 21	< 21	< 44	< 28	< 43	< 19	< 32	< 35	< 18	< 19	< 96	< 30	< 126
	08/14/13	2126 ± 207	6383 ± 413	< 17	< 16	< 38	< 20	<b>&lt; 43</b>	< 18	< 30 .	< 32	,< 17	< 15	< 84	< 23	< 114
	08/28/13	578 ± 186	10380 ± 674	< 21	< 24	< 54	< 28	č-55 ·	< 20	<: 45	< 59	< 19	< 21	< 131	< 29 <sup>°</sup>	< 143
	09/11/13	583 ± 103	9937 ± 269	< 8	< 10	< 25	< 11	< 21	< 10	< 17	< 56	< 7	< 8	< 94	< 25	< 39
	09/25/13	2622 ± 167	8402 ± 313	< 13	< 14	< 29	< 15	< 29	< 15	< 25	< 53	< 13	< 14	< 109	< 24	< 96
	10/09/13	2020 ± 206	6664 ± 373	< 12	< 15	< 33	< 16	< 32	< 16	< 25	< 55	< 12	< 15	< 109	< 27	<·77
	10/23/13	2688 ± 147 ,	6874 ± 258	< 9.	< 10	< 25	< 11	< 21	.< 11	< 19	< 59	< 9.	< 10	< 100	< 24	< 64
	MEAN	1580 ± 2243	6991 ± 3530	-	-	-	-	-	-	-	-	-	-	-	-	
CL-116	05/08/13	819 ± 55	5488 ± 141	< 6	< <u>6</u>	< 17	< 7	< 14	< 6	< 11	< 34	< 5.	< 5	< 59,	< 16	< 27
	05/22/13	638 ± 170	4485 ± 321	< 14	< 16	< 35	<`19	< 33	< 16	< 28	< 48	< 15	< 14	< 108	< 27	< 94
	06/05/13	1340 ± 219	5232 ± 500	< 16	< 17	< 37	< 24	< 38	< 19	< 30	< 36	< 17	< 19	< 94	< 21	< 120
	06/19/13	1827 ± 320	6343 ± 617	< 23	< 26	< 56	< 36	< 74	< 25	< 47	< 44	< 25	< 24	< 129	< 33	< 178
	07/03/13	3144 ± 158	5229 ± 287	< 11	< 12	< 28	<u>&lt;</u> 13	< 26	< 12	< 20	< 41	< 11	< 11 · · ·	< 87	< 22	< 76
	07/17/13	3244 <sup>.</sup> ± 349	6118 ± 568	< 23	< 27 ·	< 66	< 32	< 65	< 28	< 47	< 51	< 25	< 26	< 130	< 36	< 126
	07/31/13	2200 ± 276	3849 ± 425	< 20	< 19 👘	< 41	< 17	< 44	< 21	< 32	< 38	< 21	< 20	< 97	< 32	< 136
	08/14/13	2896 ± 273	4723 ± 428	< 20	< 20	< 45	< 22	< 41	< 21	< 38	< 41	< 18	< 19	< 108	< 21	< 141
	08/28/13	628 ± 166	6124 ± 476	< 18	< 20	< 50	< 25	< 38	< 22	< 27	< 46	< 15	< 17	< 108	< 27	< 103
	09/11/13	707 ± 93	5447 ± 210	< 7	< 8	< 19	< 8	< 16	< 8	< 14	< 55	< 7	< 7	< 85.	< 20	< 45
	09/25/13	1504 ± 118	6460 ± 245	< 11	< 12	< 28	< 14	< 24	< 13	< 22	< 39	< 10	< 11	< 86	< 25	< 52
	10/09/13	2492 ± 197	4886 ± 335	< 11	< 11	< 27	< 12	< 25	< 11	< 19	< 48	< 10	< 10	< 92	< 29	< 63
	10/23/13	2433 ± 132	3568 ± 181	< 9	< 10	< 23	·< 9 ~ ~	< 19	< 10	< 18	< 59	< 8	< 9	< 96	< 24	< 69
	MEAN	1836 + 1941	5227 + 1831	-	-	-	-	-	-	-	-	-	-	-	-	-

#### Table C-X.1 QUARTERLY OSLD RESULTS FOR CLINTON POWER STATION, 2013

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

STATION	MEAN	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC	۲		
CODE	<u>± 2 S.D.</u>		, 					
CL-01	$22.5 \pm 2.7$	20.5	23.5	22.6	23.3			
CL-02	22.9 ± 2.8	21.4	24.5	22.1	23.4	· .		
CL-03	$22.7 \pm 2.2$	21.3	23.6	22.4	23.6			
CL-04	$22.3 \pm 2.1$	20.9	22.5	22.4	23.4		•	
CL-05	$22.1 \pm 5.3$	22.0	18.4	23.5	24.4			
CL-06	$20.7 \pm 3.0$	18.0	21.3	20.8	22.1		:	
UL-07	$21.1 \pm 2.4$	20.2	22.1	19.9	22.1			
	$22.7 \pm 2.8$	20.6	23.2 ,	23.6	23.4	8		
CL-11	21.5 ± 2.5	20.5	23.3	21.3	20.8			
CL-15	$21.0 \pm 3.3$	19.4	23.1	20.1	21.4			
CL-22	$23.8 \pm 2.9$	21.7	24.9	24.7	23.7		-	
CL-23	$24.5 \pm 4.1$	22.0	24.1	24.7	27.0			
CL-24	$24.1 \pm 3.7$	21.8	25.4	23.4	20:8	·4		
CL-33	23.9 ± 2.7	21.9	24.0	24.1	24.9			
CL-34	$24.3 \pm 2.5$	22.7	24.3	24.4	25.7	÷		
CL-35	$21.9 \pm 2.4$	20.1	22.0	· 22.2	22.0			
CL-30	$22.1 \pm 1.9$	21.1	22.0	21.8	23.4			
CL-37	$21.0 \pm 3.2$	19.9	22.9	20.5	23.0		1	
CL-41	$23.4 \pm 1.0$	22.2	23.5	23.0	24.0			
CL-42	$22.3 \pm 3.5$	20.5	23.0	21.2	23.8			
CL-43	$23.0 \pm 2.1$	22.2	24.2	23.5	24.0			ŀ
CL-44	$23.0 \pm 2.0$	2.1.3	24.0	23.2	22.9		•	٠.
CL-45	24.7 I 2.0	22.9	20.1	24.4	20.3	•		
CL 47	24.0 ± 3.0	22.1	20.5	24.9	24.0	•		
	23.0 ± 3.0	21.1	23.7	23.3	24.2			·
CL-40	$22.0 \pm 3.3$ $24.7 \pm 3.2$	20.3	24.4	23.1	25.5			
CL-51	$237 \pm 26$	22.7	25.0	23.6	23.0			
CL-52	233 + 24	21.8	23.8	22.0	24.6		. <del>2</del>	
CL-53	219 + 28	20.0	22.3	22.0	23.4	•		
CL-54	234 + 29	21.6	25.1	23.7	23.3	i		۰,
CL-55	23.7 + 3.4	21.5	24.2	23.4	25.6	•		
CL-56	$24.9 \pm 4.0$	22.2	26.9	24.5	25:8	. :		
CL-57	$24.4 \pm 3.4$	22.0	25.6	24.6	25.5	. :		
CL-58	$23.9 \pm 3.3$	22.0	25.6	23.0	24.8			
CL-60	23.6 ± 2.5	21.8	24.5	24.0	24.2			
CL-61	22.9 ± 3.1	21.0	24.0	22.4	24.3	· ·		
CL-63	20.6 ± 1.9	19.5	21.4	20.0	21.4			2
CL-64	23.3 ± 4.2	20.7	25.6	22.6	24.3			
CL-65	23.9 ± 2.7	22.3	25.3	23.3	24.7			
CL-74	20.9 ± 2.0	19.6	22.0	20.6	21.3			
CL-75	22.7 ± 2.7	- 20.7	23,8	23.0	. 23.3	•		
CL-76	23.2 ± 3.2	21.1	24.9	22.9	23.9	•		
CL-77	$22.3 \pm 3.5$	20.4	24.2	21.4	23.3	,		ċ
CL-78	22.2 ± 3.2	20.8	24.0	20.8	23.0			÷
CL-79	$23.0 \pm 2.0$	22.0	23.1	22.6	24.4			
CL-80	22.7 ± 3.3	20.4	24.2	22.8	. 23.4	:*		
CL-81	22.7 ± 2.9	20.9		. 22.2	24.0			
CL-84	23.2 ± 2.9	21.2	23.9	23.2	24.5			
CL-90	$19.6 \pm 2.3$	18.3	20.4	18.9	20.7	í		•
CL-91	$21.4 \pm 1.7$	20.3	22.0	21.0	22.1	:		
CL-97	$23.6 \pm 3.3$	22.2	25.5	22.2	24.3	÷.		
CL-99	19.2 ± 1.8	18.2	20.2	18.6	19.6			
UL-114	21.7 ± 2.1	20.5	21.1	22.7	22.5			
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# TABLE C-X.2MEAN QUARTLY OSLD RESULTS FOR THE INNER RING, OUTER RING,<br/>SPECIAL INTEREST, SUPPLEMENTAL AND CONTROL LOCATIONS FOR CLINTON<br/>POWER STATION, 2013

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

COLLECTION PERIOD	INNER RING ± 2 S.D.	OUTER RING	SPECIAL INTEREST	SUPPLEMENTAL	CONTROL
JAN-MAR	21.4 ± 2.0	21.3 ± 1.4	21.2 ± 2.5	20.4 ± 2.6	20.5 ± 0.0
APR-JUN	23.8 ± 3.9	24.5 ± 2.2	24.2 ± 3.3	22.7 ± 3.2	$23.3 \pm 0.0$
JUL-SEP OCT-DEC	23.2 ± 2.7 24.2 ± 2.9	22.9 ± 2.1 24.2 ± 1.7	$22.6 \pm 3.1$ $23.7 \pm 2.5$	21.6 ± 3.4 22.7 ± 3.0	21.3 ± 0.0 20.8 ± 0.0

# TABLE C-X.3SUMMARY OF THE AMBIENT DOSIMETRY PROGRAM FOR CLINTON<br/>POWER STATION, 2013

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

LOCATION	SAMPLES	PERIOD	PERIOD	PERIOD MEAN	PRE-OP MEAN,	
	ANALYZED	MINIMUM	MAXIMUM	± 2 S.D.	± 2 S.D., ALL LOCATIONS	
INNER RING	64	18.4	27.0	23.1 ± 3.6		
OUTER RING	64	20.0	26.9	23.2 ± 3.1	18.0 ± 2.4	
SPECIAL INTEREST	28	19.6	26.6	$22.9 \pm 3.6$	1	
SUPPLEMENTAL	. 56	18.2	25.5	21.8 ± 3.6		
CONTROL	4	20.5	23.3	$21.5 \pm 2.5$		
				•		

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 STATIONS - CL-11** 

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#### ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM TELEDYNE BROWN ENGINEERING, 2013 (PAGE 1 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2013	E10477	Milk	Sr-89	nCi/l	120	99.7	1.20	Δ
		<b>W</b> inte	Sr-90	pCi/L	9.21	11.0	0.84	A
	E10478	Milk	I-131	pCi/L	87.1	100	0.87	А
			Ce-141	pCi/L	186	187	0.99	A
			Cr-51	pCi/L	463	472	0.98	А
			Cs-134	pCi/L	201	214	0.94	Α
			Cs-137	pCi/L	262	266	0.98	А
			Co-58	pCi/L	200	208	0.96	Α
			Mn-54	pCi/L	215	208	1.03	Α
			Fe-59	, pCi/L	266	252	1.06	А
			Zn-65	pCi/L	311	301	1.03	Α
			Co-60	pCi/L	384	400	0.96	Α
	E10480	AP	Ce-141	pCi	95.3	95.6	1.00	А
			Cr-51	рСі	264	241	1.10	Α
			Cs-134	pCi	123	109	1.13	А
			Cs-137	pCi	142	136	1.04	А
			Co-58	pCi	112	106	1.06	Α
			Mn-54	рСі	115	106	1.08	А
			Fe-59	рСі	139	129	1.08	Α
			Zn-65	pCi	163	153	1.07	Α
			Co-60	pCi	212	204	1.04	А
	E10479	Charcoal	I-131	рСі	90.1	92.6	0.97	Α
	E10481	Water	Fe-55	pCi/L	1840	1890	0.97	А
June 2013	E10564	Milk	Sr-89	pCi/L	110	95.0	1.16	А
			Sr-90	pCi/L	15.8	17.0	0.93	Α
	E10545	Milk	I-131	pCi/L	92.6	95.5	0.97	А
			Ce-141	pCi/L	83.1	90.4	0.92	А
			Cr-51	pCi/L	253	250	1.01	А
			Cs-134	pCi/L	118	125	0.94	А
			Cs-137	pCi/L	143	151	0.95	А
			Co-58	pCi/L	87.1	94.0	0.93	А
			Mn-54	pCi/L	171	172	0.99	Α
			Fe-59	pCi/L	125	120	1.04	Α
			Zn-65	pCi/L	220	217	1.01	А
			Co-60	pCi/L	169	175	0.97	А
	E10547	AP	Ce-141	pCi	56.8	56.7	1.00	А
			Cr-51	pCi	168	157	1.07	Α
			Cs-134	рСі	85.2	78.4	1.09	Α
			Cs-137	рСі	101	94.6	1.07	А
			Co-58	рСі	62.7	58.9	1.06	А
			Mn-54	рСі	125	108	1.16	Α
			Fe-59	рСі	85.7	75.0	1.14	А
			Zn-65	рСі	169	136	1.24	W
			Co-60	рСі	116	110	1.05	A
	E10546	Charcoal	I-131	рСі	86.5	89.7	0.96	А

#### TABLE D-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM **TELEDYNE BROWN ENGINEERING, 2013**

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(PAGE 2 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d
June 2013	E10549	Water	Fe-55	pCi/L	1610	1610	1.00	Α
September 2013	F10646	Milk	Sr-89	pCi/l	63.9	96.0	0.67	N (1)
		i i i i i i i i i i i i i i i i i i i	Sr-90	pCi/L	8.88	13.2	0.67	N (1)
	E10647	Milk	I-131	pCi/L	93.9	98.3	0.96	А
			Ce-141	pCi/L				NA (2)
			Cr-51	pCi/L	272	277	0.98	A
			Cs-134	pCi/L	150	172	0.87	A
			Cs-137	pCi/L	125	131	0.95	A
			Co-58	pCI/L	105	108	0.97	A
			Mn-54	pCi/L	138	139	0.99	A
			Fe-59	pCI/L	125	130	0.96	A
			Zn-65	pCi/L	204	200	0.99	A
			C0-60	pCI/L	187	190	0.95	A
	E10672	AP	Ce-141	pCi				NA (2)
			Cr-51	pCi	208	223	0.93	A
			Cs-134	pCi	143	139	1.03	A
			Cs-137	pCi	106	105	1.01	A
			Co-58	pCi	97.0	86.5	1.12	A
			Mn-54	pCi	116	112	1.04	A
			Fe-59	pCi	98.6	105	0.94	A
			Zn-65	pCi ~Ci	219	214	1.02	A
			CO-60	pCi	166	158	1.05	А
	E10648	Charcoal	I-131	pCi	76.3	71.7	1.06	Α
	E10673	Water	Fe-55	pCi/L	1790	1690	1.06	А
December 2013	E10774	Milk	Sr-89	pCi/L	97.3	93.8	1.04	А
			Sr-90	pCi/L	13.3	12.9	1.03	Α
	E10775	Milk	I-131	pCi/L	89.7	96.1	0.93	А
			Ce-141	pCi/L	99.8	110	0.91	А
			Cr-51	pCi/L	297	297	1.00	Α
			Cs-134	pCi/L	129	142	0.91	А
			Cs-137	pCi/L	126	126	1.00	Α
			Co-58	pCi/L	116	112	1.04	Α
			Mn-54	pCi/L	167	168	0.99	A
			Fe-59	pCi/L	117	110	1.06	A
			Zn-65	pCi/L	757	741	1.02	A
			Co-60	pCı/L	141	147	0.96	A
	E10777	AP	Ce-141	pCi	85.1	88.0	0.97	Α
			Cr-51	pCi	278	238	1.17	Α
			Cs-134	pCi	123	114	1.08	Α
		19 - L. S. S. S. S.	Cs-137	pCi	102	101	1.01	A
			Co-58	pCi	84.4	89.9	0.94	A
			Mn-54	pCi	132	° 135	0.98	Α
	. •	e de la definición de la d	Fe-59	pCi	101	88.3	1.14	A
			ZN-65	pCi	506	595	0.85	A
			Co-60	pCi	118 👘	118	1.00	· A

#### ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM **TELEDYNE BROWN ENGINEERING, 2013**

(PAGE 3 OF 3)

Month/Year	Identificati Number	on	Matrix	Nuclide	F Units	Reported Knov Value (a) Value	vn Ratio (c) (b) TBE/Analytics	Evaluation (d)
December 2013	E10776		Charcoal	I-131	pCi	84.7 80.	5 1.05	А
	E10778		Water	Fe-55	pCi/L	2010 . 191	0 1.05	Α
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(1) . Milk, Sr-89/90 - The failure was due to analyst error. No client samples were affected by this failure. NCR 13-15 . .

(2) The sample was not spiked with Ce-141

(a) Teledyne Brown Engineering reported result. 1.20  $r_{i}^{\prime}r_{i}^{\prime}$ 

(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.

#### ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM **TELEDYNE BROWN ENGINEERING, 2013**

(PAGE 1 OF 1) .

	Identification		- 14		Re		Known	Acceptance	
Month/Year	Number	• .	Media	Nuclide	Units	Value (a)	Value (b)	Limits	Evaluation (c)
May 2012			Mater	C- 00		40.2	44.2	216 49 4	· •
iviay 2015	RAD-95		vvaler	51-69	pCi/L	40.3	41.3	31.0 - 40.4	A ^
•			· .	Sr-90		19.3	23.9	17.2 - 28.0	A
	•			Ba-133	pCI/L	81.9	82.1	69.0 - 90.3	A
N 4		• • •	:	Cs-134	pCi/L	40.9	42.8	34.2 - 47.1	A
	.1			CS-137	pCI/L	44.0	41.7	37.0 - 48.8	A
			•	Co-60	pCi/L	61.9	65.9	59.3 - 75.0	A
				Zn-65	pCi/L	202	189	1/0 - 222	A
: .			· · ·	Gr-A	pCi/L	34.2	40.8	21.1 - 51.9	A
		•		Gr-B	pCi/L	18.0	21.6	13.0 - 29.7	A
				1-131	pCi/L	23.8	23.8	19.7 - 28.3	A
				U-Nat	pCi/L	60.4	61.2	49.8 - 67.9	A
		·.		H-3	pCi/L	3970	4050	3450 - 4460	А
-	MRAD-18		Filter	Gr-A	pCi/filter	Lost during	g processin	g ·	
November 2013	RAD-95		Water	Sr-89	pCi/L	25.5	21.9	14.4 - 28.2	А
		•		Sr-90	pCi/L	14.3	18.1	12.8 - 21.5	Α
			÷.,	Ba-133	pCi/L	57.2	54.2	44.7 - 59.9	А
		2.11		Cs-134	pCi/L	83.3	86.7	71.1 - 95.4	А
		<i>:</i>		Cs-137	pCi/L	201	206	185 - 228	А
	. 5	1		Co-60	pCi/L	104	102	91.8 - 114	A
				Zn-65	pCi/L	361	333	300 - 389	А
				Gr-A	pCi/L	29.5	42.8	22.2 - 54.3	A
			• .	Gr-B	pCi/L	30.1	32.2	20.8 - 39.9	A
2		100		I-131	pCi/L	23.1	23.6	19.6 - 28.0	A
				U-Nat	pCi/L	5.53	6.24	47.0 - 7.44	A
	<i>i</i> .	2	•	H-3	nCi/l	17650	17700	15500 - 19500	A
		1.4		1. 1. 2					
	MRAD-19		Filter	Gr-A	pCi/filter	33.0	83.0	27.8 - 129	Α
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(a) ' Teledvne Brown	Engineering rer	norted re	sult	·					

(a) еюаупе вго i Engin ing reported

(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.

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#### DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP) TELEDYNE BROWN ENGINEERING, 2013

(PAGE 1 OF 2)

· · · · · ·	Identification	· · · · ·	2		Reported	Known	Acceptance	
Month/Year	Number	Media	Nuclide	Units	Value (a)	Value (b)	Range	Evaluation (c)
March 2013	13-MaW28	Water	Cs-134	Ba/I	21.0	24 4	17 1 - 31 7	. A
	···	, rater	Cs-137	Ba/L	0.0446		(1)	A
		· · ·	Co-57	Ba/L	28.3	30.9	21.6 - 40.2	A
			Co-60	Ba/L	18.2	19.56	13.69 - 25.43	A
,			H-3	Ba/L	506	507	355 - 659	A
•	:		Mn-54	Ba/L	25.7	27.4	19.2 - 35.6	A
	· ,	·	K-40	Bg/L	2.09		(1)	Α
		·, · ,.	Sr-90	Bg/L	10.5	10.5	7.4 - 13.7	Α
:	· · ·		Zn-65 🐺	Bq/L	29.2	30.4	21.3 - 39.5	Α
	13-GrW28	Water	Gr-A	Ba/L	2.74	2.31	0.69 - 3.93	А
N.	10		Gr-B	Bq/L	15.6	13.0	6.5 - 19.5	A
	13-MaS28	Soil	Cs-134	Ba/ka	859	887	621 - 1153	Α
	10 110020	001	Cs-137	Ba/ka	633	587	411 - 763	A
	·		Co-57	Ba/ka	0.256		(1)	A
			Co-60	Ba/ka	738	691	484 - 898	A
			Mn-54	Ba/ka	0.671		(1)	A
			K-40	Ba/ka	714	625.3	437.7 - 812.9	A
		•.	Sr-90	Ba/ka	442	628	440 - 816	Ŵ
· · ·	2		Zn-65	Bq/kg	1057	995	697 - 1294	A
	13 DdE28		Ce 134	Ba/sample	1 73	1 78	1 25 2 31	۸
•	13-Rurzo	AP	Cs-134	Bq/sample	1.73	1.76	1.20 - 2.01	A
			Co 57	Bq/sample	2.73	2.00	1.62 - 3.30	~
• •			Co 60	Bq/sample	0.0302	2.50	1.05 - 5.07	
	· · ·		Mn 54	Ba/sample:	1 36	1 26	2 98 - 5 54	<u>^</u>
· · · · ·			Sr 00	Ba/sample	4.30	4.20	2.90 - 5.54	
÷.,			Zn-65	Bq/sample	3.14	3.13	2.19 - 4.07	Â
	12 0-528		C= A	De la emple	0.767	1 20	0.36 0.04	^
	13-GF28	AP	Gr-A Gr-B	Bq/sample Bg/sample	0.767	0.85	0.36 - 2.04	A
				Dq/ddiffpic	0.011	0.00	0.40 1.20	~
	13-RdV28	Vegetation	Cs-134	Bq/sample	-0.197		(1)	A
			Cs-137	Bq/sample	7.39	6.87	4.81 - 8.93	A
			Co-57	Bq/sample	9.87	8.68	6.08 - 11.28	A
			Co-60	Bq/sample	6.08	5.85	4.10 - 7.61	A
			Mn-54	Bq/sample	-0.0104	1.04	(1)	A
			Sr-90	Bq/sample	1.28	1.64	1.15 - 2.13	vv
			20-00	Bq/sample	0.84	0.25	4.38 - 8.13	A
September 201	3 13-MaW29	Water	Cs-134	Bq/L	29.1	30.0	21.0 - 39.0	А
			Cs-137	Bq/L	34.5	31.6	22.1 - 41.1	А
			Co-57	Bq/L	0.0358		(1)	А
			Co-60	Bq/L	24.6	23.58	16.51 - 30.65	А
			H-3	Bq/L	2.45		(1)	А
			Mn-54	Bq/L	0.0337		(1)	А
			K-40	Bq/L	0.193		(1)	А
			Sr-90	Bq/L	9.12	7.22	5.05 - 9.39	• <u>.</u> . • W
		e de l'esta de	Zn-65	Bq/L .	··· 38.1	34.6	24.2 - 45.0	<b>A</b> .
	13-GrW29	Water	Gr-A	Bq/L	1.13	0.701	0.210 - 1.192	Α,
		·	Gr-B	Bq/L	.7.61	5.94	2.97 - 8.91	<b>A</b>

#### DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP) TELEDYNE BROWN ENGINEERING, 2013 (PAGE 2 OF 2)

Identification Reported Known Acceptance Value (a) Evaluation (c) Month/Year Units Value (b) Number Media Nuclide Range September 2013 13-MaS29 Soil Cs-134 Bq/kg 1150 1172 820 - 1524 А 684 - 1270 Cs-137 Bq/kg 1100 977 Α Co-57 Bq/kg 670 (1) N (2) Co-60 502 451 316 - 586 Bq/kg А Mn-54 Bq/kg 758 674 472 - 876 А 443 - 823 w K-40 Bq/kg 796 633 Sr-90 460 322 - 598 Bq/kg 664 N (2) Zn-65 Bq/kg 210 N (2) (1) 13-RdF29 AP Cs-134 Bq/sample -0.570 (1) N (2) Cs-137 Bg/sample 2.85 2.7 1.9 - 3.5 А Bo/sample 3.30 2.4 - 4.4А Co-57 3.4 1.6 - 3.0 Co-60 Bg/sample 2.41 2.3 А Mn-54 Bq/sample 3.65 3.5 2.5 - 4.6 А Sr-90 **Bq/sample** 1.40 1.81 1.27 - 2.35 W Zn-65 **Bq/sample** 2.90 2.7 1.9 - 3.5 А А AP 0.9 0.3 - 1.5 13-GrF29 Gr-A Bq/sample 0.872 А Bq/sample 1.63 0.82 - 2.45 Gr-B , , 1.57 13-RdV29 Vegetation Cs-134 Bq/sample 5.29 5.20 3.64 - 6.76 А Bq/sample 4.62 - 8.58 А Cs-137 7.48 6.60 Co-57 Bq/sample 0.0129 А (1) Co-60 Bq/sample 0.0523 (1) А Mn-54 Bg/sample 8.78 7.88 5.52 - 10.24 А Sr-90 Bq/sample 1.63 2.32 1.62 - 3.02 W (2) ŧ. 1.84 - 3.42 Zn-65 **Bq/sample** 3.18 2.63 W

(1) False positive test.

(2) Soil, Co-57 & Zn-65 identified by gamma software as not detected, MAPEP evaluated as failing the false positive test. A large concentration of Eu-152 was spiked into the sample, causing interference in the analysis. Gamma software recognized the interference and identified them as not detected. MAPEP does not allow clients to enter non-detect designation. NCR 13-04 Soil, Sr-90 - incorrect results were submitted to MAPEP. Actual result was 332 bq/kg, which is with the acceptance range. NCR 13-04 AP, Cs-134 - MAPEP evaluated the -0.570 as a failed false positive test. No client samples were affected by these failures. NCR 13-04 Vegetation, Sr-90 - it appears that the carrier was double spiked into the sample, resulting in the low activity for this sample. NCR 13-04

(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.

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# APPENDIX E

 $\mathbb{E}_{n}^{(1)}(x_{n}) = \mathbb{E}_{n}^{(1)}(x_{n}) = \mathbb{E}_{n}^{(1)}(x_{n})$ ERRATA DATA



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Due to an incorrect setting on gamma detector 08, 3.29 rather than 4.66 was used in the MDC calculation. Nonconformance 13-07 was initiated and corrective actions have been implemented to address this issue. All samples counted on detector 08 were reprocessed using the correct calculation. As a result, all MDCs for these samples have increased by 41.6%. The previously reported activities and uncertainties were not affected. In some cases, the increased MDC resulted in missed LLDs. All samples with MDCs affected by this issue are listed below. The samples with missed LLDs are shown in the table for 2011, 2012, and 2013. All other required LLDs were met.

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CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
4011 CL-1	9/28/2011	12/28/11	Air Particulate			·	
4011 CL-6	9/28/2011	12/28/11	Air Particulate				×
	<u> </u>	12/20/11		<u>ا</u>	1 · · ·	II	
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CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
CL-99	02/29/12	03/28/12	Surface Water	· · · ·		;	
2Q12 CL-3	03/28/12	06/27/12	Air Particulate				
2Q12 CL-4	03/28/12	06/27/12	Air Particulate				
CL-13	04/25/12	04/25/12	Surface Water				
CL-99	04/25/12	05/30/12	Surface Water	I-131	<15	<18.6	pCi/l
CL-01	05/09/12	05/09/12	Grass				
CL-02	05/09/12	05/09/12	Grass	I-131	<60	<78.03	pCi/Kg Wet
CL-08	05/09/12	05/09/12	Grass	I-131	<60	<77.13	pCi/Kg Wet
CL-116	05/09/12	05/09/12	Grass	I-131	<60	<82.32	pCi/Kg Wet
CL-08	05/23/12	05/23/12	Grass				
CL-MW-CL-21S	06/11/12	06/11/12	RGPP	I-131	<15	<18.73	pCi/l
CL-116	06/20/12	06/20/12	Grass	I-131	<60	<71.34	pCi/Kg Wet
3Q12 CL-6	06/27/12	09/26/12	Air Particulate				
CL-115 (Lettuce)	06/27/12		Vegetation				
CL-118 (Lettuce)	06/27/12		Vegetation				
CL-91	06/27/12	07/25/12	Surface Water				
CL-08	07/18/12	07/18/12	Grass				
CL-115 (Swiss Chard)	07/25/12	07/25/12	Vegetation				
CL-118 (Lettuce)	07/25/12	07/25/12	Vegetation	I-131	<60	<72.15	pCi/Kg Wet
CL-91	07/25/12	08/29/12	Surface Water				
CL-116	08/01/12	08/01/12	Grass				
CL-116	08/15/12	08/15/12	Grass	I-131	<60	<82.5	pCi/Kg Wet
CL-115 (Cabbage)	08/29/12		Vegetation				
CL-115 (Lettuce)	08/29/12		Vegetation	I-131	<60	<69.94	pCi/Kg Wet
CL-90	08/29/12	09/26/12	Surface Water	I-131	<15	<15.79	pCi/l
CL-MW-CL-14S	09/04/12	09/04/12	RGPP	I-131	<15	<16.02	pCi/l
CL-MW-CL-22S	09/04/12	09/04/12	RGPP				
SWTP	09/05/12	09/05/12	RGPP				
CL-08	09/12/12	09/12/12	Grass				
CL-116	09/12/12	09/12/12	Grass				
CL-116	09/12/12	09/12/12	Milk	BA-140	<60	<65.48	pCi/l
CL-116	09/12/12	09/12/12	Milk	LA-140	<15	<18.91	pCi/l
CL-08	09/26/12	09/26/12	Grass	I-131	<60	<66.77	pCi/Kg Wet
CL-12T	09/26/12	09/26/12	Ground Water	I-131	<15	<19.39	pCi/l
CL-12T	09/26/12	09/26/12	Ground Water	LA-140	<15	<15.02	pCi/l
CL-01	10/10/12	10/10/12	Grass				
CL-08	10/10/12	10/10/12	Grass				
CL-08	10/24/12	10/24/12	Grass				

	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
CL-14	10/31/12	11/28/12	Drinking Water			· · ·	
CL-14	11/28/12	12/26/12	Drinking Water				

	CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
· ·	CL-91	 12/26/12	01/30/13	Surface Water				
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## **APPENDIX F**

# ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)

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Docket No: 50-461

# **CLINTON POWER STATION**

Annual Radiological Groundwater Protection Program Report

1 January through 31 December 2013

## **Prepared By**

Teledyne Brown Engineering Environmental Services



Clinton Power Station Clinton, IL 61727

# April 2014

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#### 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 2013. During that time period, 240 analyses were performed on 108 samples from 32 locations. The monitoring was conducted in four phases.

In assessing all the data gathered for this report, it was concluded that the operation of CPS had no adverse radiological impact on the environment, and there are no known active releases into the groundwater or surface water at CPS. No program changes occurred during the sampling year of 2013.

Gamma-emitting radionuclides associated with licensed plant operations were not detected at concentrations greater than their respective Lower Limits of Detection (LLDs) as specified in NUREG-1302 in any of the groundwater or surface water samples. In the case of tritium, Exelon specified that the independent laboratory achieve a lower limit of detection 10 times lower than that required by the United States Environmental Protection Agency (USEPA) regulation.

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

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Tritium was not detected in any of the groundwater, surface water, or precipitation water samples at concentrations greater than the United States Environmental Protection Agency (USEPA) drinking water standard (and the Nuclear Regulatory Commission Reporting Limit) of 20,000 pCi/L. Background levels of tritium were detected at concentrations greater than the self-imposed LLD of 200 pCi/L in 3 of 17 groundwater monitoring locations. The tritium concentrations ranged from 198  $\pm$  122 pCi/L to 348  $\pm$  141 pCi/L. Tritium was not detected in any surface water or precipitation water.

Gross Alpha and Gross Beta analyses in the dissolved and suspended fractions were performed on groundwater samples during the third quarter of sampling in 2013. Gross Alpha (dissolved) was detected in two of the 17 groundwater locations. The concentrations ranged from 2.2 to 2.5 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 2.2 to 10.9 pCi/L. Gross Beta (suspended) was not detected in any of the groundwater locations.

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.

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#### 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 2013.

A. Objectives of the Radiological Groundwater Protection Program (RGPP)

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

- 1. Identify suitable locations to monitor and evaluate potential impacts from station operations before significant radiological impact to the environment and potential drinking water sources.
- 2. Understand the local hydrogeologic regime in the vicinity of the station and maintain up-to-date knowledge of flow patterns on the surface and shallow subsurface.
- 3. Perform routine water sampling and radiological analysis of water from selected locations.
- 4. Report new leaks, spills, or other detections with potential radiological significance to stakeholders in a timely manner.
- 5. Regularly assess analytical results to identify adverse trends.
- 6. Take necessary corrective actions to protect groundwater resources.
- B. Implementation of the Objectives

The objectives identified have been implemented at Clinton Power Station as discussed below:

- 1. Exelon and its consultant identified locations as described in the Phase 1 study. Phase 1 studies were conducted by Connestoga Rovers and Associates (CRA) and the results and conclusions were made available to state and federal regulators as well as the 1.11 public in station specific reports. المراجعة المتعلق المراجع
- 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. 化化学学会 化化学学会 医小子子 医小子 tite e.

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- Clinton Power Station will continue to perform routine sampling and 3: . . . radiological analysis of water from selected locations. [1] M. Constanting and C. Martin, and M. S. Santas, "A state of the state of the
  - 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.
  - Clinton Power Station staff and consulting hydrogeologist assess 5. analytical results on an ongoing basis to identify adverse trends. การหนึ่งการการหยุดการการเพิ่มมาในกรรก

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Program Description С. afri grifte kalende arte en kortek

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1999 Sample Collection States and State 10

Sample locations can be found in Table A-1 and Figures A-1 and A–2, 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 in the second 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)

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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 nontritiated 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 and the second seco

and EIML to analyze the environmental samples for radioactivity for the

Clinton Power Station RGPP in 2013.

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.

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

4. Concentrations of gross alpha and gross beta in groundwater.

5. Concentrations of Am-241 in groundwater.

6. Concentrations of Cm-242 and Cm-243/244 in groundwater.

7. Concentrations of Pu-238 and Pu-239/240 in groundwater.

8. Concentrations of U-234, U-235 and U-238 in groundwater.

9. Concentrations of Fe-55 in groundwater.

10. Concentrations of Ni-63 in groundwater.

B. Data Interpretation

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

1. Lower Limit of Detection and Minimum Detectable Concentration

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

2. <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.  $\{f_{i}^{(1)}, f_{i}^{(2)}, \dots, f_{i}^{(d)}\}$ 

> 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: ion Company and the data and a contraction and

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

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A pre-operational radiological environmental monitoring program (preoperational 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. . - i

 $\{\cdot,\cdot\}$ 1. Background Concentrations of Tritium

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

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# 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.

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#### 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

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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.

and the second Surface Water Data **C.** 

and the second Tritium concentrations are routinely measured in Clinton general sector sec

> 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  $\pm$  70 to 100 pCi/L.

and the second 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 and the second cannot be distinguished as different from background at this

concentration. an final sector of the sector IV. . . Results and Discussion and present we have the second stands we get a second of the

A. Program Exceptions

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#### 1. Sample Anomalies

and the second 1.12 There were no samples anomalies in 2013. Notes and the second second first second second second 1. States 2. Missed Samples in the second s second seco the second s There were no missed samples in 2013. Charles to the and the set of the Base Program Changes F. C. M. H. C. Marketter and M. M. Marketter, Phys. Rev. Lett. 81, 1990 (1997). There were no sampling program changes in 2013. When a property of the second states of the second states of the C., Groundwater Results and the second unare un die se Groundwater and etasse in terretoriser en ge STATISTICS STERNESS OF ANY STREET AND

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.

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#### <u>Tritium</u>

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 198 pCi/l to 348 pCi/l.

#### <u>Strontium</u>

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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 2013. Gross Alpha (dissolved) was detected in two of the 17 groundwater locations. The concentrations ranged from 2.2 to 2.5 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 2.2 to 10.9 pCi/L. Gross Beta (suspended) was not detected in any of the groundwater locations (Table B–I.1 Appendix B).

#### Gamma Emitters

Naturally occurring K-40 was detect in two samples. The concentrations ranged from 32 to 62 pCi/L. No other gamma emitting nuclides were detected (Table B–I.2, Appendix B).

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#### Hard-To-Detect

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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

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- 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

a se a secola de la caractería de la secola de la companya de la companya de la companya de la companya de la c Strontium was not analyzed in 2013 (Table B-II.1 Appendix B).

- <u>Gamma Emitters</u> .
- Received and the story press of growth
- No gamma emitting nuclides were detected (Table B–II.2, Appendix B). In the first state of the second state of the second
  - a salah sa kata da waxa kata sa alawa k
    - Precipitation Water Results E.
      - and the second of the second "Precipitation Water and the strength and the strength and the
        - - Precipitation water samples were collected during the first quarter of 2013. Analytical results are discussed below. No anomalies were noted during the year.

    - an an the state of the second s
      - Tritium was not detected at concentrations greater than the LLD (Table B–III.1 Appendix B).
  - ·Fsaf Recapture free set was seed as a set of the
- in the construction of the second second second second second
- Clinton Power Station conducted recapture precipitation sampling and analysis per the Radiological Groundwater Protection Program. No
  - consistent indication of recapture was identified.
  - the here we are a second from AFA and the second G. Summary of Results - Inter-Laboratory Comparison Program
    - . . . . . . Inter-Laboratory Comparison Program results for TBE are presented in

the Annual Radiological Environmental Operating Report.

H. Leaks, Spills, and Releases

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

I. Trends

The historic low level tritium activity detected at MW- CL-14S and MW-CL-21S has continued to decrease over the course of 2013. All sampling well locations are currently indicating tritium levels less than the required LLD of 200 pCi/l. All wells will continue to be sampled in accordance with the RGPP.

J. Investigations

Currently no investigations are on-going.

- K. Actions Taken
- 3. Compensatory Actions

<sup>\*</sup>There have been no station events requiring compensatory actions at the Clinton Power Station in 2013.

4. Installation of Monitoring Wells

No new wells were installed during the 2013.

5. Actions to Recover/Reverse Plumes

No actions were required to recover or reverse groundwater plumes.

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### 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, 2013

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

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Figure A – 2 Sampling Locations South of Clinton Power Station

A-3



A-4



Figure A – 4 Recapture Sampling Locations of Clinton Power Station

### **APPENDIX B**

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

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# TABLE B-I.1CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA AND GROSS BETA<br/>IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER<br/>STATION, 2013

#### RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION	H-3	SR-89	SR-90	GR-A (DIS)	GR-A (SUS)	GR-B (DIS)	GR-B (SUS)
	DATE							
B-3	03/11/13	< 194						
B-3	05/28/13	< 166						
B-3	08/26/13	< 189	< 3.6	< 0.6	$2.5 \pm 1.3$	< 0.9	4.4 ± 1.2	< 1.7
B-3	11/11/13	< 182						
MW-CL-1	03/11/13	< 193						
MW-CL-1	05/28/13	< 163						
MW-CL-1	08/26/13	< 197	< 4.5	< 0.8	< 1.7	< 0.9	3.3 ± 1.1	< 1.7
MW-CL-1	11/11/13	< 182						
MW-CL-12I	02/19/13	348 ± 141						
MW-CL-12I	03/11/13	< 175						
MW-CL-12I	05/28/13	< 168						
MW-CL-12I	08/26/13	< 175	< 4.1	< 0.8	< 1.4	< 0.9	7.6 ± 1.3	< 1.7
MW-CL-12I	11/11/13	< 181						
MW-CL-13I	03/11/13	< 176						
MW-CL-13I	05/28/13	< 169						
MW-CL-13I	08/26/13	< 189	< 4.5	< 0.7	< 1.3	< 0.8	3.3 ± 1.2	< 1.6
MW-CL-13I	11/11/13	< 183						
MW-CL-13S	03/11/13	< 181						
MW-CL-13S	05/28/13	< 180						
MW-CL-13S	08/26/13	< 189	< 4.2	< 0.7	< 1.2	< 0.8	2.7 ± 1.1	< 1.6
MW-CL-13S	11/11/13	< 182		,				
MW-CL-14S	02/19/13	343 ± 141						
MW-CL-14S	03/12/13	329 ± 126						
MW-CL-14S	05/29/13	198 ± 122						
MW-CL-14S	08/27/13	235 ± 131	< 4.2	< 0.6	< 2.0	< 0.8	5.9 ± 1.4	< 1.6
MW-CL-14S	11/12/13	< 181						
MW-CL-15I	03/11/13	< 176						
MW-CL-15I	05/28/13	< 180						
MW-CL-15I	08/26/13	< 194	< 4.3	< 0.7	< 1.3	< 0.8	< 1.7	< 1.6
MW-CL-15	11/11/13	< 183						
MW-CL-15S	03/11/13	< 194						
MW-CL-15S	05/28/13	< 183						
MW-CL-15S	08/26/13	< 197	< 4.4	< 0.7	< 0.8	< 0.8	< 1.2	< 1.6
MW-CL-15S	11/11/13	< 183						
MW-CL-16S	03/12/13	< 198						
MW-CL-16S	05/29/13	< 183						
MW-CL-16S	08/27/13	< 193	< 4.5	< 0.7	< 2.1	< 0.4	7.3 ± 1.4	< 1.7
MW-CL-16S	11/12/13	< 182						
MW-CL-17S	03/12/13	< 196						
MW-CL-17S	05/29/13	< 181						
MW-CL-17S	08/27/13	< 194	< 5.1	< 0.9	< 2.1	< 0.4	2.2 ± 1.2	< 1.7
MW-CL-17S	11/12/13	< 181						
MW-CL-18I	02/19/13	< 190						
MW-CL-18I	03/12/13	< 192						
MW-CL-18I	05/29/13	< 180						
MW-CL-18I	08/27/13	< 192	< 3.8	< 0.8	2.2 ± 1.2	< 0.4	3.9 ± 1.2	< 1.7
MW-CL-18I	11/12/13	< 183						
MW-CL-18S	02/19/13	< 188						
MW-CL-18S	03/12/13	< 195						
MW-CL-18S	05/29/13	< 179						

#### TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

SITE	COLLECTION	H-3	SR-89	SR-90	GR-A (DIS	6) GR-A (SUS)	GR-B (DIS)	GR-B (SUS)
	DATE .				$w_{i} \in \mathbb{R}^{n}$			
MW-CL-18S	08/27/13	< 195	< 4.1	< 0.8	< 1.9	< 0.4	3.9 ± 1.2	< 1.7
MW-CL-18S	11/12/13	< 184						
MW-CL-19S	03/11/13	< 191			· .			
MW-CL-19S	05/28/13	< 180	•			·		
MW-CL-19S	08/26/13	< 190	< 4.2	< 0.9	< 3.0	∶< 0.4	5.3 .± 1.5	< 1.7
MW-CL-19S	11/11/13	< 181					:	
MW-CL-2	03/11/13	< 192	· · ·	•			· .	
MW-CL-2	05/28/13	< 163			·	•	1	
MW-CL-2	08/26/13	< 188	< 4.3	< 0.7	< 1.9	< 0.9	3.0 ± 1.1	< 1.7
MW-CL-2	11/11/13	< 181			- • <sup>1</sup>			
MW-CL-20S	03/11/13	< 196						
MW-CL-20S	05/28/13	< 182	•			2	15	
MW-CL-20S	08/26/13	< 196	< 4.6	< 0.8	< 1.6	< 0.6	4.5 ± 1.2	< 1.9
MW-CL-20S	11/11/13	< 182	·				· ·	
MW-CL-21S	03/11/13	256 ± 132					÷.	
MW-CL-21S	05/28/13	< 179				: · ·		
MW-CL-21S	08/26/13	< 191	< 5.1	< 0.8	< 1.3	< 0.6	2.9 ± 1.1	< 1.9
MW-CL-21S	11/11/13	< 181				-	·	
MW-CL-22S	03/12/13	< 191						
MW-CL-22S	05/29/13	< 182			1	. •	:	
MW-CL-22S	08/27/13	< 194	< 4.4	< 0.9	< 1.8	< 0.6	10.9 ± 1.4	< 1.9
MW-CL-22S	11/12/13	< 183				ء معد ا		

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

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#### Table B-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013**

**RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA** 

#### SITE Zn-65 Nb-95 Zr-95 Cs-134 Cs-137 Ba-140 La-140 COLLECTION Be-7 K-40 Mn-54 Co-58 Fe-59 Co-60 DATE B-3 < 8 < 23 08/26/13 < 34 < 24 < 3 < 3 < 3 < 7 < 3 < 7 < 3 < 4 < 8 < 8 MW-CL-1 08/26/13 < 39 < 72 < 4 < 4 < 10 < 4 < 9 < 5 < 7 < 4 < 4 < 31 MW-CL-12 08/26/13 < 40 < 86 < 4 < 5 < 11 < 5 < 8 < 6 < 9 < 4 < 4 < 32 < 12 < 31 < 12 MW-CL-131 08/26/13 < 44 < 44 < 5 < 5 < 11 < 6 < 10 < 5 < 10 < 5 < 5 MW-CL-13S 08/26/13 < 33 < 27 < 3 < 3 < 8 < 3 < 7 < 3 < 6 < 3 < 3 < 22 < 7 MW-CL-14S 03/12/13 < 41 < 102 < 5 < 5 < 10 < 5 < 9 < 5 < 8 < 4 < 5 < 29 < 9 < 7 MW-CL-14S 05/29/13 < 40 < 70 < 4 < 4 < 8 < 4 < 6 < 4 < 7 < 4 **< 4** < 29 MW-CL-14S 08/27/13 < 47 < 41 < 4 < 5 < 12 < 4 < 11 < 6 < 8 < 5 < 5 <.33 < 11 < 4 < 29 < 8. MW-CL-15I 08/26/13 < 36 < 33 < 4 < 4 < 8 < 3 < 8 < 4 < 7 < 4 MW-CL-15S 08/26/13 < 31 < 57 < 4 < 4 < 8 < 3 < 7 < 4 < 7 < 3 < 3 <.25 < 8 < 2 < 5 MW-CL-16S 08/27/13 < 25 < 24 < 2 < 3 < 5 < 2 < 6 < 3 < 4 < 3 < .17 < 9 MW-CL-17S 08/27/13 < 30 < 33 < 3 < 3 < 7 < 4 < 6 < 4 < 5 < 3 < 4 < 22 < 4 < 27 < 9 MW-CL-18I 08/27/13 < 33 < 71 < 3 < 4 < 9 < 4 < 7 < 4 < 7 < 4 < 5 MW-CL-18S 08/27/13 < 22 32 ± 21 < 2 < 2 < 5 < 2 < 4 < 2 < 4 < 2 < 2 < 15 < 3 < 24 < 8... MW-CL-19S 08/26/13 < 28 < 48 < 3 < 3 < 7 < 3 < 6 < 3 < 6 < 3 <4 ∴ < 25 < 9 MW-CL-2 08/26/13 < 39 < 78 < 4 < 4 < 8 < 5 < 9 < 4 < 8 < 3 < 3 < 23 < 6<sup>1</sup> MW-CL-20S 08/26/13 < 30 < 67 < 3 < 3 े < 7 < 3 < 6 . ...., < 3 < 6 - : < 3 MW-CL-21S < 4 < 28 < 10 03/11/13 < 39 < 71 < 3 < 4 < 9 < 4 < 7 · < 4 < 8 < 3 < 4 < 29 < 10 MW-CL-21S 05/28/13 < 38 < 41 < 4 < 4 < 8 < 3 < 8 < 4 < 7 < 4 < 3 < 20 < 7 MW-CL-21S 08/26/13 < 27 < 29 < 3 < 3 < 6 < 3 < 6 < 3 < 5 < 3 Ξ.

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MW-CL-22S

08/27/13

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TABLE B-I.3CONCENTRATIONS OF HARD TO DETECTS IN GROUNDWATER SAMPLES<br/>COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION	AM-241	CM-242	CM-243/244	PU-238	PU-239/240	U-234	U-235	U-238	FE-55	NI-63	 
MW-CL-14S MW-CL-21S	08/27/13 08/26/13	< 0.18 < 0.08	< 0.06 < 0.02	< 0.12 < 0.04	< 0.12 < 0.04	< 0.20 < 0.11	< 0.17 < 0.06	< 0.12 < 0.06	< 0.17 < 0.06	< 62 < 76	< 4.2 < 4.3	
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#### TABLE B-II.1

#### CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

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#### **RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA**

	COLLECTION		
SITE	DATE	H-3	
SEWAGE TREATMENT PLANT	03/11/13	< 196	
SEWAGE TREATMENT PLANT	05/28/13	< 183	
SEWAGE TREATMENT PLANT	08/26/13	< 193	
SEWAGE TREATMENT PLANT	11/11/13	< 186	
SW-CL-1	03/11/13	< 190	
SW-CL-1	05/28/13	< 182	
SW-CL-1	08/26/13	< 194	
SW-CL-1	11/11/13	< 185	
SW-CL-2	03/11/13	< 195	
SW-CL-2	05/28/13	< 185	
SW-CL-2	08/26/13	< 188	
SW-CL-2	11/11/13	< 186	
SW-CL-4	03/11/13	< 196	
SW-CL-4	05/28/13	< 183	
SW-CL-4	08/26/13	< 190	
SW-CL-4	11/11/13	< 184	
SW-CL-5	03/11/13	< 193	
SW-CL-5	05/28/13	< 182	
SW-CL-5	08/26/13	< 185	
SW-CL-5	11/11/13	< 187	
SW-CL-6	03/11/13	< 190	
SW-CL-6	05/28/13	< 184	
SW-CL-6	08/26/13	< 193	
SW-CL-6	11/11/13	< 187	
SW-CL-7	03/11/13	< 195	
SW-CL-7	05/28/13	< 184	
SW-CL-7	08/26/13	< 191	
SW-CL-7	11/11/13	< 185	

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# Table B-II.2CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES<br/>COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013

SITE	COLLECTION DATE	I 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
SW-CL-1	08/26/13	< 29	< 23	< 3	< 3	< 7	< 3	< 6	< 3	< 6	< 3	< 3	< 22	< 6
SW-CL-2	08/26/13	< 30	< 26	< 3	< 3	< 6	< 3	< 6	< 3	< 5	< 3	< 3	< 21	< 7
SW-CL-4	08/26/13	< 21	< 20	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 17	< 6
SW-CL-5	08/26/13	< 30	< 31	< 3	< 3	< 8	< 3	< 6	< 4	< 6	< 3	< 3	< 24	< 7
SW-CL-6	08/26/13	< 32	< 70	< 3	< 3	< 8	< 3	< 6	< 3	< 6	< 3	< 3	< 25	.< 8
SW-CL-7	08/26/13	< 25	< 23	< 3	< 3	< 7	< 4	< 6	< 3	< 5	< 2	< 3	< 23	< 9
SEWAGE TRE	ATMENT PLANT 08/26/13	< 35	< 41	< 3	< 4	< 9	< 3	< 7	< 4	< 7	< 3	< 4	< 28	< 9

#### RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

#### TABLE B-III.1 CONCENTRATIONS OF TRITIUM IN PRECIPITATION WATER SAMPLES **COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2013**

#### RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

	COLLECTION	
SITE	DATE	H-3
MPT-1	02/27/13	< 179
RG-15	02/27/13	< 170
RG-2	02/27/13	< 171
RG-26	02/27/13	< 176
RG-3	02/27/13	< 180
RG-N	02/27/13	< 177
RG-NE	02/27/13	< 181
RG-NNE	02/27/13	< 178

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