Exelon Generation.

January 01, 2020 – December 31, 2020

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

CLINTON POWER STATION – DOCKET NUMBER 50-461

Prepared by:

Teledyne Brown Engineering Environmental Services

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Appendices

I. Summary and Conclusions

This report on the Radiological Environmental Monitoring Program (REMP) conducted for the Clinton Power Station (CPS) by Exelon Generation Company, LLC (Exelon) covers the period January 1, 2020 through December 31, 2020. During that time period, 1,556 analyses were performed on 1,430 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 2020. Releases of gaseous radioactive materials were accurately measured in plant effluents. There were no gaseous effluent releases that approached the limits specified in the CPS Offsite Dose Calculation Manual (ODCM). The highest calculated offsite dose received by a member of the public in 2020 due to the release of gaseous effluents from CPS was 3.92E-02 or 0.0392 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 iodine-131 (I-131). 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. No fission or activation products were detected.

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

High sensitivity I-131 analyses and gamma analyses were performed on cow milk samples. All results were below the required LLDs for I-131. Concentrations of naturally-occurring K-40 were consistent with those detected in previous years. No fission or activation products were found.

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

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

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

II. Introduction

The Clinton Power Station (CPS), consisting of one approximately 1,140 MW gross electrical power output boiling water reactor is located in Harp Township, DeWitt County, Illinois. CPS is owned and operated by Exelon and became operational in 1987. Unit No. 1 went critical on February 27, 1987. The site encloses approximately 13,730 acres. This includes the 4,895 acre, man-made cooling lake and about 452 acres of property not owned by Exelon. The plant is situated on approximately 150 acres. The cooling water discharge flume – which discharges to the eastern arm of the lake – occupies an additional 130 acres. Although the nuclear reactor, supporting equipment and associated electrical generation and distribution equipment lie in Harp Township, portions of the aforementioned 13,730 acre plot reside within Wilson, Rutledge, DeWitt, Creek, Nixon and Santa Anna Townships.

A Radiological Environmental Monitoring Program (REMP) for CPS was initiated in 1987. The preoperational period for most media covers the periods May 1980 through February 27, 1987 and was summarized in a separate report. This report covers those analyses performed by Teledyne Brown Engineering (TBE) and Landauer on samples collected during the period January 1, 2020 through December 31, 2020.

A. Objectives of the REMP

The objectives of the REMP are to:

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

B. Implementation of the Objectives

The implementation of the objectives is accomplished by:

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

III. Program Description

A. Sample Collection

This section describes the general collection methods used by Environmental Inc. Midwest Labs (EIML) to obtain environmental samples for the CPS REMP in 2020. Sample locations and descriptions can be found in Tables B–1 and B–2, and Figures B–1 through B–4, Appendix B. The sampling methods used by Environmental Inc. (Midwest Labs) are listed in Table B-2.

Aquatic Environment

The aquatic environment was evaluated by performing radiological analyses on samples of surface water, drinking water, well water, fish, and shoreline sediment. Two gallon water samples were collected monthly and quarterly from composite samplers located at three surface water locations (CL-90, CL-91 and CL-99) and one drinking water location (CL-14). A monthly grab sample was obtained from one surface water location (CL-13). Quarterly samples were obtained from two well water locations (CL-7D and CL-12). All samples were collected in new unused plastic bottles, which were rinsed at least twice with source water prior to collection. Fish samples comprising the flesh of largemouth bass, channel catfish, bluegill, carp, and white crappie, the species most commonly harvested from the lakes by sporting fishermen, were collected semiannually at two locations, CL-19 and CL-105. CL-105 was the control location, which is located about 50 miles upwind of the station. Shoreline sediment samples composed of recently deposited substrate were collected at two locations semiannually (CL-07B and CL-105 (control)).

Atmospheric Environment

The atmospheric environment was evaluated by performing radiological analyses on samples of air particulate, airborne iodine, milk, food produce and grass. Airborne iodine and particulate samples were collected and analyzed weekly and quarterly at ten locations (CL-1, CL-2, CL-3, CL-4, CL-6, CL-7, CL-8, CL-11, CL-15 and CL-94). CL-11 was the control location, which is located 16 miles upwind of the station. Airborne iodine and particulate samples were obtained at each location, using a vacuum pump with charcoal and glass fiber filters attached. The pumps were run continuously and sampled air at the rate of approximately one cubic foot per minute. The filters were replaced weekly and sent to an independent laboratory for analysis.

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

Food products were collected once a month from June through September

at three locations (CL-114, CL-115 and CL-118). The control location was CL-114, which is located 12.5 miles upwind of the station. Various broadleaf vegetable samples were collected and placed in new unused plastic bags and sent to the laboratory for analysis.

Grass samples were collected biweekly at four locations (CL-01, CL-02, CL-08 and CL-116) from May through October. CL-116 was the control location, which is located 14 miles WSW of the station. All samples were collected in new unused plastic bags and sent to the laboratory for analysis.

Ambient Gamma Radiation

Direct radiation measurements were made using DLRs. Each location consisted of 2 dosimeter sets in a vented PVC conduit located a few feet off the ground. The DLRs were exchanged quarterly and sent to Landauer for analysis. The DLR locations were placed around the CPS site as follows:

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

An outer ring consisting of 16 locations (CL-51, CL-52, CL-53, CL-54, CL-55, CL-56, CL-57, CL-58, CL-60, CL-61, CL-76, CL-77, CL-78, CL-79, CL-80 and CL-81).

A special interest set consisting of seven locations (CL-37, CL-41, CL-49, CL-64, CL-65, CL-74 and CL-75) representing special interest areas.

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

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

The specific DLR locations were determined by the following criteria:

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

B. Sample Analysis

This section describes the general analytical methodologies used by TBE and Environmental Inc. (Midwest Labs) to analyze and collect environmental samples for radioactivity for the CPS REMP in 2020. The

analytical procedures used by the laboratories are listed in Table B-2.

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

1. Concentrations of beta emitters in drinking water, air particulates and vegetables
2. Concentrations of gamma emitters in surface, drinking and well water, air particulates, milk, fish, grass, sediment and vegetables
3. Concentrations of tritium in surface, drinking and well water
4. Concentrations of I-131 in air, milk, drinking water and surface water
5. Ambient gamma radiation levels at various off-site environs

C. Data Interpretation

The radiological and direct radiation data collected prior to CPS becoming operational was used as a baseline with which these operational data were compared. For the purpose of this report, CPS was considered operational at initial criticality. In addition, data were compared to previous years' operational data for consistency and trending. Several factors were important in the interpretation of the data:

1. Lower Limit of Detection and Minimum Detectable Concentration

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

2. Net Activity Calculation and Reporting of Results

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

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

   For surface water, drinking water, well water, fish, and sediment: 12 nuclides, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, Cs-134, Cs-137, Ba-140, La-140 and Ce-144 were reported

For milk: 13 nuclides, K-40, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, Cs-134, Cs-137, Ba-140, La-140 and Ce-144 were reported

For grass and vegetation: 13 nuclides, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, I-131, Cs-134, Cs-137, Ba-140, La-140 and Ce-144 were reported

For air particulate: 9 nuclides, Co-60, Nb-95, Zr-95, Ru-103, Ru-106, Cs-134, Cs-137, Ce-141 and Ce-144 were reported

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

D. Program Exceptions

The exceptions (Issue Reports, IRs) described below are those that are considered 'deviations' from the Radiological Environmental Monitoring Program as required by the Station's ODCM. By definition, 'deviations' are permitted as delineated within NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants", October 1978, and within Radiological Assessment Branch Technical Position, Revision 1, November 1979, which states.... "Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability, malfunction of automatic sampling equipment and other legitimate reasons...." The below section addresses the reporting requirements found within Section 6.0 of the Station's ODCM.

Exceptions/Anomalies

1. IR 4341468 ODCM/REMP Samples Impacted By COVID-19 Pandemic

   a. Delayed sampling date on biannual fish sampling at CL-105 and CL-19 (ODCM) - also due to low lake temperatures.

   b. Delayed sampling date on biannual sediment sampling at CL-19 (ODCM).

   Attempts to acquire these samples were unsuccessful due to the additional controls put in place by IDNR to response to the COVID-19 pandemic. These samples were obtained and analyzed per the schedule once the additional controls were lifted in May 2020.

2. IR 4352577 ODCM Garden CL-117 Not Available for Sampling

   06/24/2020 - the farmer (owner) elected not to grow a garden this year or in future years. CL-117 is located approximately 0.9 miles North of the plant. Gardens CL-114, CL-115 and CL-118 are still available for sampling.

3. IR 4362103 ODCM: July REMP Anomalies

   07/15/2020 - during the weekly sample surveillance, the Environmental, Inc. sampling vendor identified the timers on CL-7 (non-ODCM), CL-8 (ODCM) and CL-94 (non-ODCM) were short, indicating power outages at some point during the sampling week. Significant storms had gone through the area during the week, which could have potentially caused these outages. The samplers and timers were back up and running as expected. The samples were sufficient for analyses but were not continuous as required by the ODCM.

4. IR 4382237 ODCM: August and September REMP Anomalies

   a. 08/05/2020 - During the weekly air sampling surveillance, two AP and charcoal filters were mislabeled by the Environmental, Inc. vendor. The vendor laboratory, Teledyne Brown Engineering (TBE), received 2 AP filters labeled as CL-7 and 2 charcoal filters labeled as CL-6. Since the samples are too similar to distinguish between, they were analyzed as samples A and B and were reported as CL-7.

   b. August 2020 - during the monthly ODCM vegetation sampling, the Environmental, Inc. vendor only obtained one type of vegetation from gardens CL-114, CL-115 and CL-118. Enough sample was obtained from CL-115 and CL-118 for two separate analyses but both samples were of the kale variety. This was a backup sampling vendor who did not reach out to the station point of contact for guidance to determine that three separate types of vegetation are required from each location.

   c. 09/23/20 - during the weekly ODCM air sampling surveillance, the Environmental, Inc. vendor identified that the timers on CL-7 (non-ODCM) and CL-8 (ODCM) were short, indicating power outages at some point during the sampling week. The samplers and timers were back up and running as expected. The samples were sufficient for analysis, but the sample collections were not continuous as required by the ODCM.

   d. September 2020 - during the monthly ODCM vegetation sampling, the Environmental, Inc. vendor noted that there was only one type of broadleaf vegetation available for sampling instead of the required three type at garden CL-115. Corn leaves were collected as a substitute for CL-115. There was no third option available for CL-115, so additional broccoli was collected for analysis. CL-118 had 3 types of vegetation, but not enough straight kale for analysis. Therefore, a mixture of kale and cabbage was collected as a substitute for only kale. There were no issues identified at the control garden, CL-114.

Throughout 2020, the following IRs were generated to document program

exceptions that were entered into the corrective action program for trending purposes.

Missed Samples

1. IR 4341468 REMP/ODCM Sampling Impacted By COVID-19 Pandemic

   a. 03/05/2020 - quarterly groundwater at CL-7D (ODCM) was not collected.

   b. 03/26/2020 and 06/26/2020 - quarterly TLD exchange at CL-07 (non-ODCM) was not performed.

   c. 03/18/2020 - 04/29/2020 - weekly air particulate/charcoal filter samples at CL-07 (non-ODCM) not obtained.

2. IR 4362103 ODCM: July REMP Anomalies

   07/29/2020 - during the monthly ODCM vegetation sampling, the Environmental, Inc. sampling vendor noted that only 2 different types of broadleaf vegetation were available for sampling instead of the required 3 types at gardens CL-115 and CL-118. All varieties of cabbage and lettuce had died, most likely due to the extreme heat and root rot. There were no issues identified at the control garden, CL-114. Will attempt to obtain additional vegetation, but it is unlikely to be found due to the lateness of the planting season.

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

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

E. Program Changes

3. IR 4352577 ODCM: REMP Garden CL-117 Not Available for Sampling

   The farmer who owns the land that Garden CL-117 (located approximately 0.9 miles North of the plant) has elected to not grow a garden this year or future years, so it has been evaluated to remove CL-117 from the REMP program.

IV. Results and Discussion

A. Aquatic Environment

1. Surface Water

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

Iodine-131

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

Tritium

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

Gamma Spectrometry

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

2. Drinking Water

Monthly composite samples were taken hourly at one location (CL-14). The following analyses were performed:

Gross Beta

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

Tritium

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

Iodine-131

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

Gamma Spectrometry

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

3. Well Water

Quarterly grab samples were collected at two locations (CL-07D and CL-12, consisting of CL-12R [a raw water sample from this well] and CL-12T [same well water, but after treatment and available for consumption]). The following analyses were performed:

Tritium

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

Gamma Spectrometry

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

4. Fish

Fish samples comprised of largemouth bass, channel catfish, bluegill, carp and white crappie 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. No plant-produced radionuclides were detected and all required LLDs were met. (Table C–IV.1, Appendix C)

5. Shoreline Sediment

Aquatic shoreline sediment samples were collected at CL-07B and CL-105 semiannually. The following analysis was performed:

Gamma Spectrometry

Shoreline sediment samples were analyzed for gamma-emitting nuclides. No plant-produced radionuclides were detected and all required LLDs were met. (Table C–V.1, Appendix C)

B. Atmospheric Environment

1. Airborne

a. Air Particulates

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

Gross Beta

Weekly samples were analyzed for concentrations of beta emitters (Table C–VI.1 and C–VI.2 and Figure C–1, Appendix C). Detectable gross beta activity was observed at all locations. Comparison of results among the three groups aid in determining the effects, if any, resulting from the operation of CPS. The results from the On-Site locations (Group I) ranged from 7 to 36 E–3 pCi/m^3 with a mean of 17 E–3 pCi/m^3. The results from the Intermediate Distance location (Group II) ranged from 8 to 33 E–3 pCi/m^3 with a mean of 17 E–3 pCi/m^3. The results from the Control location (Group III) ranged from 8 to 33 E–3 pCi/m^3 with a mean of 17 E–3 pCi/m^3. Comparison of the 2020 air particulate data with previous years' data indicate no measurable impact from the operation of CPS. In addition, a comparison of the weekly mean values for 2020 indicate no notable differences among the three groups.

Gamma Spectrometry

Weekly samples were composited quarterly and analyzed for gamma-emitting nuclides. No plant-produced radionuclides were detected and all required LLDs were met.
(Table C–VI.3, Appendix C)

b. Airborne Iodine

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

2. Terrestrial

a. Milk

Samples were collected from CL-116 biweekly May through

October to coincide with the grazing season, and monthly November through April. The following analyses were performed:

Iodine-131

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

Gamma Spectrometry

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

b. Food Products

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

Gamma Spectrometry

Each food product sample was analyzed for concentrations of gamma-emitting nuclides. No plant-produced radionuclides were detected and all required LLDs were met.
(Table C–IX.1, Appendix C)

c. Grass

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

Gamma Spectrometry

Each grass sample was analyzed for concentrations of gamma-emitting nuclides. No plant-produced radionuclides were detected and all required LLDs were met.
(Table C–IX.2, Appendix C)

C. Ambient Gamma Radiation

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

A total of 214 OSLD measurements were made in 2020. The average dose from the inner ring was 19.6 mRem/quarter. The average dose from the outer ring was 19.8 mRem/quarter. The average dose from the special

interest group was 19.5 mRem/quarter. The average dose from the supplemental group was 18.6 mRem/quarter. The quarterly measurements ranged from 15.1 to 23.4 mRem/quarter.

The inner ring and outer ring measurements compared well to the Control Station, CL-11, which ranged from 15.8 to 18.6 mRem/quarter with an average measurement of 17.4 mRem/quarter. A comparison of the Inner Ring and Outer Ring data to the Control Location data indicate that the ambient gamma radiation levels from all the locations were comparable. The historical ambient gamma radiation data from the control location were plotted along with similar data from the Inner and Outer Ring Locations (Figure C–2, Appendix C).

D. Independent Spent Fuel Storage Installation (ISFSI)

Ambient gamma radiation levels were measured utilizing DLRs. Fifty-four DLR locations were established around the site, which encompasses the ISFSI pad. ISFSI dose contribution is in the form of direct radiation as no liquid or gas releases are expected to occur. Results of DLR measurements are listed in Table C-X.1, Appendix C.

E. Land Use Survey

The Annual Land Use Survey conducted during the growing season around the Clinton Power Station (CPS) was performed by Environmental Inc. (Midwest Labs) for Exelon to comply with Clinton's Offsite Dose Calculation Manual, section 8.0. The report to CPS was dated November 20, 2020. The purpose of the survey was to document the nearest resident, milk-producing animal and garden of greater than 50 m^2 in each of the sixteen 22 ½ degree sectors around the site. The distance and direction of all locations from the CPS Station HVAC vent stack were positioned using Global Positioning System (GPS) technology. There were no changes required to the CPS REMP as a result of the Land Use Survey. The results of this survey are summarized below:

Sector	Distance in Kilometers from the CPS Station HVAC Vent Stack		
	Residence (km)	Garden (km)	Milk Animal (km)
1 N	1.50	1.50	1.50
2 NNE	1.50	1.50	> 8
3 NE	2.07	3.46	> 8
4 ENE	2.86	4.22	> 8
5 E	1.67	1.67	> 8
6 ESE	5.14	> 8	> 8
7 SE	3.90	> 8	> 8
8 SSE	2.90	> 8	> 8
9 S	4.78	> 8	6.60
10 SSW	4.68	> 8	> 8
11 SW	1.17	5.61	> 8
12 WSW	3.62	3.66	4.32
13 W	1.95	> 8	3.29
14 WNW	2.63	> 8	> 8
15 NW	2.65	> 8	> 8
16 NNW	2.05	2.05	2.05

F. Errata Data

There was no errata data for 2020.

G. Summary of Results – Inter-Laboratory Comparison Program

The TBE Laboratory analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation, and water matrices for various analytes. The PE samples supplied by Analytics Inc., Environmental Resource Associates (ERA) and Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP), were evaluated against the following pre-set acceptance criteria:

A. 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 evaluates the reported ratios based on internal QC requirements based on the DOE MAPEP criteria.

B. ERA Evaluation Criteria

ERA's evaluation report provides an acceptance range for control and warning limits with associated flag values. ERA's acceptance limits are established per the USEPA, National Environmental Laboratory Accreditation Conference (NELAC), state-specific Performance Testing (PT) program requirements or ERA's SOP for the Generation of Performance Acceptance Limits, as applicable. The acceptance limits are either determined by a regression

equation specific to each analyte or a fixed percentage limit promulgated under the appropriate regulatory document.

C. DOE Evaluation Criteria

MAPEP's evaluation report provides an acceptance range with associated flag values. MAPEP defines three levels of performance:

- Acceptable (flag = "A") - result within ± 20% of the reference value
- Acceptable with Warning (flag = "W") - result falls in the ± 20% to ± 30% of the reference value
- Not Acceptable (flag = "N") – bias is greater than 30% of the reference value

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

For the TBE laboratory, 126 out of 133 analyses performed met the specified acceptance criteria. Seven analyses did not meet the specified acceptance criteria for the following reasons and were addressed through the TBE Corrective Action Program. A summary is found below:

1. The MAPEP February 2020 AP U-233/234 and U-238 results were evaluated as *Not Acceptable*. The reported value for U-233/234 was 0.0416 ± 0.0102 Bq/sample and the known result was 0.075 Bq/sample (acceptance range 0.053 - 0.098). The reported value for U-238 was 0.0388 ± 0.00991 Bq/sample and the known result was 0.078 Bq/sample (acceptance range 0.055 - 0.101). This sample was run as the workgroup duplicate and had RPD's of 10.4% (U-234) and 11.7% (U-238). After the known results were obtained, the sample was relogged. The filter was completely digested with tracer added originally; the R1 results were almost identical. It was concluded that the recorded tracer amount was actually double, causing the results to be skewed. Lab worksheets have been modified to verify actual tracer amount vs. LIMS data. TBE changed vendors for this cross-check to ERA MRAD during the 2nd half of 2020. Results were acceptable at 97.8% for U-234 and 106% for U-238. (NCR 20-13)

2. The Analytics September 2020 milk Sr-89 result was evaluated as *Not Acceptable*. The reported value was 62.8 pCi/L and the known result was 95.4 (66%). All QC data was reviewed and there were no anomalies. This was the first failure for milk Sr-89 since 2013 and there have only been 3 upper/lower boundary warnings since that time.

It is believed that there may have been some Sr-89 loss during sample prep. The December 2020 result was at 92% of the known. (NCR 20-19)

3. The ERA October 2020 water I-131 result was evaluated as *Not Acceptable*. The reported value was 22.9 pCi/L and the known result was 28.2 (acceptance range 23.5 - 33.1). The reported result was 81% of the known, which passes TBE QC criteria. This was the first failure for water I-131. (NCR 20-17)

4. The ERA October 2020 water Gross Alpha and Gross Beta results were evaluated as *Not Acceptable*. The reported/acceptable values and ranges are as follows:

	Reported	Known	Range
Gross Alpha	40.0	26.2	13.3 - 34.7
Gross Beta	47.5	69.1	48.0 - 76.0

All QC data was reviewed with no anomalies and a cause for failure could not be determined. This was the first failure for water Gross Beta. A Quick Response follow-up cross-check was analyzed as soon as possible with acceptable results at 96.8% for Gross Alpha and 102% for Gross Beta. (NCR 20-13)

5. The MAPEP August 2020 soil Ni-63 result was evaluated as *Not Acceptable*. The reported value was 438 ± 21.1 Bq/kg and the known result was 980 Bq/kg (acceptance range 686 - 1274). It is believed that some Ni-63 loss occurred during the sample prep step. (NCR 20-20)

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

1. American National Standards Institute, Inc., "Performance, Testing and Procedural Specifications for Thermoluminescent Dosimetry," ANSI N545-1975.
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APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT SUMMARY

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2020

NAME OF FACILITY:	**CLINTON POWER STATION**			**DOCKET NUMBER:**		**50-461**		
LOCATION OF FACILITY:	**DEWITT COUNTY IL**			**REPORTING PERIOD:**		**2020**		
				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)*	**I-131 (LOW LVL)**	12	**1**	<LLD	NA			0
	H-3	16	**2000**	<LLD	<LLD	-		0
	GAMMA	48						
	MN-54		**15**	<LLD	<LLD	-		0
	CO-58		**15**	<LLD	<LLD	-		0
	FE-59		**30**	<LLD	<LLD	-		0
	CO-60		**15**	<LLD	<LLD	-		0
	ZN-65		**30**	<LLD	<LLD	-		0
	NB-95		**15**	<LLD	<LLD	-		0
	ZR-95		**30**	<LLD	<LLD	-		0
	CS-134		**15**	<LLD	<LLD	-		0
	CS-137		**18**	<LLD	<LLD	-		0
	BA-140		**60**	<LLD	<LLD	-		0
	LA-140		**15**	<LLD	<LLD	-		0
	CE-144		**NA**	<LLD	<LLD	-		0
DRINKING WATER *(PCI/LITER)*	**GR-B**	12	**4**	<LLD	*NA*	-		0
	H-3	4	**2000**	<LLD	*NA*	-		0
	I-131 (LOW LVL)	12	**1**	<LLD	*NA*	-		0
	GAMMA	12						
	MN-54		**15**	<LLD	*NA*	-		0
	CO-58		**15**	<LLD	*NA*	-		0
	FE-59		**30**	<LLD	*NA*	-		0
	CO-60		**15**	<LLD	*NA*	-		0
	ZN-65		**30**	<LLD	*NA*	-		0
	NB-95		**15**	<LLD	*NA*	-		0
	ZR-95		**30**	<LLD	*NA*	-		0
	CS-134		**15**	<LLD	*NA*	-		0
	CS-137		**18**	<LLD	*NA*	-		0
	BA-140		**60**	<LLD	*NA*	-		0
	LA-140		**15**	<LLD	*NA*	-		0
	CE-144		*NA*	<LLD	*NA*	-		0

(**M**) The Mean Values are calculated using the positive values. (**F**) Fraction of detectable measurement are indicated in parentheses.

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2020

NAME OF FACILITY:	**CLINTON POWER STATION**			**DOCKET NUMBER:**		**50-461**		
LOCATION OF FACILITY:	**DEWITT COUNTY IL**			**REPORTING PERIOD:**		**2020**		
				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
WELL WATER *(PCI/LITER)*	**H-3**	11	**2000**	<LLD	*NA*	-		0
	GAMMA	11						
	MN-54		**15**	<LLD	*NA*	-		0
	CO-58		**15**	<LLD	*NA*	-		0
	FE-59		**30**	<LLD	*NA*	-		0
	CO-60		**15**	<LLD	*NA*	-		0
	ZN-65		**30**	<LLD	*NA*	-		0
	NB-95		**15**	<LLD	*NA*	-		0
	ZR-95		**30**	<LLD	*NA*	-		0
	CS-134		**15**	<LLD	*NA*	-		0
	CS-137		**18**	<LLD	*NA*	-		0
	BA-140		**60**	<LLD	*NA*	-		0
	LA-140		**15**	<LLD	*NA*	-		0
	CE-144		*NA*	<LLD	*NA*	-		0
FISH *(PCI/KG WET)*	**GAMMA**	16						
	MN-54		**130**	<LLD	<LLD	-		0
	CO-58		**130**	<LLD	<LLD	-		0
	FE-59		**260**	<LLD	<LLD	-		0
	CO-60		**130**	<LLD	<LLD	-		0
	ZN-65		**260**	<LLD	<LLD	-		0
	NB-95		*NA*	<LLD	<LLD	-		0
	ZR-95		*NA*	<LLD	<LLD	-		0
	CS-134		**130**	<LLD	<LLD	-		0
	CS-137		**150**	<LLD	<LLD	-		0
	BA-140		*NA*	<LLD	<LLD	-		0
	LA-140		*NA*	<LLD	<LLD	-		0
	CE-144		*NA*	<LLD	<LLD	-		0

(**M**) The Mean Values are calculated using the positive values. (**F**) Fraction of detectable measurement are indicated in parentheses.

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2020

NAME OF FACILITY:	CLINTON POWER STATION			DOCKET NUMBER:	50-461			
LOCATION OF FACILITY:	DEWITT COUNTY IL			REPORTING PERIOD:	2020			
				INDICATOR LOCATIONS	CONTROL LOCATION	LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)*	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	MEAN (M) (F) *RANGE*	MEAN (M) (F) *RANGE*	MEAN (M) (F) *RANGE*	**STATION # NAME** DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SEDIMENT	**GAMMA**	4						
(PCI/KG DRY)	*MN-54*		*NA*	<LLD	<LLD	-		0
	CO-58		*NA*	<LLD	<LLD	-		0
	FE-59		*NA*	<LLD	<LLD	-		0
	CO-60		*NA*	<LLD	<LLD	-		0
	ZN-65		*NA*	<LLD	<LLD	-		0
	NB-95		*NA*	<LLD	<LLD	-		0
	ZR-95		*NA*	<LLD	<LLD	-		0
	CS-134		**150**	<LLD	<LLD	-		0
	CS-137		**180**	<LLD	<LLD	-		0
	BA-140		*NA*	<LLD	<LLD	-		0
	LA-140		*NA*	<LLD	<LLD	-		0
	CE-144		*NA*	<LLD	<LLD	-		0
AIR PARTICULATE	**GR-B**	511	**10**	17 (459/459) *7 - 36*	17 (52/52) *8 - 33*	18 (52/52) *7 - 34*	CL-94 INDICATOR OLD CLINTON ROAD 0.6 MILES E OF SITE	0
(E-3 PCI/CU.METER)								
	GAMMA	40						
	CO-60		*NA*	<LLD	<LLD	-		0
	NB-95		*NA*	<LLD	<LLD	-		0
	ZR-95		*NA*	<LLD	<LLD	-		0
	RU-103		*NA*	<LLD	<LLD	-		0
	RU-106		*NA*	<LLD	<LLD	-		0
	CS-134		**50**	<LLD	<LLD	-		0
	CS-137		**60**	<LLD	<LLD	-		0
	CE-141		*NA*	<LLD	<LLD	-		0
	CE-144		*NA*	<LLD	<LLD	-		0
AIR IODINE	**GAMMA**	511						
(E-3 PCI/CU.METER)	*I-131*		**70**	<LLD	<LLD	-		0

(**M**) The Mean Values are calculated using the positive values. (**F**) Fraction of detectable measurement are indicated in parentheses.

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2020

NAME OF FACILITY:	**CLINTON POWER STATION**			**DOCKET NUMBER:**		**50-461**		
LOCATION OF FACILITY:	**DEWITT COUNTY IL**			**REPORTING PERIOD:**		**2020**		
				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
MILK *(PCI/LITER)*	**I-131 (LOW LVL)**	19	**1**	*NA*	<LLD	-		0
	GAMMA	19						
	K-40		*NA*	*NA*	1110 (19/19) *818 - 1311*	1110 (19/19) *818 - 1311*	CL-116 CONTROL DEMENT DAIRY 14 MILES WSW OF SITE	0
	MN-54		*NA*	*NA*	<LLD	-		0
	CO-58		*NA*	*NA*	<LLD	-		0
	FE-59		*NA*	*NA*	<LLD	-		0
	CO-60		*NA*	*NA*	<LLD	-		0
	ZN-65		*NA*	*NA*	<LLD	-		0
	NB-95		*NA*	*NA*	<LLD	-		0
	ZR-95		*NA*	*NA*	<LLD	-		0
	CS-134		**15**	*NA*	<LLD	-		0
	CS-137		**18**	*NA*	<LLD	-		0
	BA-140		**60**	*NA*	<LLD	-		0
	LA-140		**15**	*NA*	<LLD	-		0
	CE-144		*NA*	*NA*	<LLD	-		0
VEGETATION *(PCI/KG WET)*	**GAMMA**	32						
	MN-54		*NA*	<LLD	<LLD	-		0
	CO-58		*NA*	<LLD	<LLD	-		0
	FE-59		*NA*	<LLD	<LLD	-		0
	CO-60		*NA*	<LLD	<LLD	-		0
	ZN-65		*NA*	<LLD	<LLD	-		0
	NB-95		*NA*	<LLD	<LLD	-		0
	ZR-95		*NA*	<LLD	<LLD	-		0
	I-131		**60**	<LLD	<LLD	-		0
	CS-134		**60**	<LLD	<LLD	-		0
	CS-137		**80**	<LLD	<LLD			0
	BA-140		*NA*	<LLD	<LLD	-		0
	LA-140		*NA*	<LLD	<LLD	-		0
	CE-144		*NA*	<LLD	<LLD	-		0

(**M**) The Mean Values are calculated using the positive values. (**F**) Fraction of detectable measurement are indicated in parentheses.

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE CLINTON POWER STATION, 2020

NAME OF FACILITY:	**CLINTON POWER STATION**	**DOCKET NUMBER:**	**50-461**
LOCATION OF FACILITY:	**DEWITT COUNTY IL**	**REPORTING PERIOD:**	**2020**

MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)*	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	**INDICATOR LOCATIONS** MEAN (M) (F) *RANGE*	**CONTROL LOCATION** MEAN (M) (F) *RANGE*	**LOCATION WITH HIGHEST ANNUAL MEAN (M)** MEAN (M) (F) *RANGE*	**STATION #** **NAME** DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GRASS	**GAMMA**	52						
(PCI/KG WET)	*MN-54*		*NA*	<LLD	<LLD	-		0
	CO-58		*NA*	<LLD	<LLD	-		0
	FE-59		*NA*	<LLD	<LLD	-		0
	CO-60		*NA*	<LLD	<LLD	-		0
	ZN-65		*NA*	<LLD	<LLD	-		0
	NB-95		*NA*	<LLD	<LLD	-		0
	ZR-95		*NA*	<LLD	<LLD	-		0
	I-131		**60**	<LLD	<LLD	-		0
	CS-134		**60**	<LLD	<LLD	-		0
	CS-137		**80**	<LLD	<LLD	-		0
	BA-140		*NA*	<LLD	<LLD	-		0
	LA-140		*NA*	<LLD	<LLD	-		0
	CE-144		*NA*	<LLD	<LLD	-		0
DIRECT RADIATION	**OSLD-QUARTERLY**	214	*NA*	19.4 (210/210) *15.1 - 23.4*	17.5 (4/4) *15.8 - 18.6*	21.4 (4/4) *19.8 - 23.4*	CL-45 INDICATOR 2.8 MILES S	0
(MILLI-ROENTGEN/QTR.)								

(**M**) The Mean Values are calculated using the positive values. (**F**) Fraction of detectable measurement are indicated in parentheses.

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APPENDIX B

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

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TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction
Clinton Power Station, 2020

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

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction
Clinton Power Station, 2020

Location	Location Description	Distance & Direction From Site
J. Environmental Dosimetry - DLR		
Inner Ring		
CL-1		1.8 miles W
CL-5		0.7 miles NNE
CL-22		0.6 miles NE
CL-23		0.5 miles ENE
CL-24		0.5 miles E
CL-34		0.8 miles WNW
CL-35		0.7 miles NW
CL-36		0.6 miles N
CL-42		2.8 miles ESE
CL-43		2.8 miles SE
CL-44		2.3 miles SSE
CL-45		2.8 miles S
CL-46		2.8 miles SSW
CL-47		3.3 miles SW
CL-48		2.3 miles WSW
CL-63		1.3 miles NNW
Outer Ring		
CL-51		4.4 miles NW
CL-52		4.3 miles NNW
CL-53		4.3 miles E
CL-54		4.6 miles ESE
CL-55		4.1 miles SE
CL-56		4.1 miles SSE
CL-57		4.6 miles S
CL-58		4.3 miles SSW
CL-60		4.5 miles SW
CL-61		4.5 miles WSW
CL-76		4.6 miles N
CL-77		4.5 miles NNE
CL-78		4.8 miles NE
CL-79		4.5 miles ENE
CL-80		4.1 miles W
CL-81		4.5 miles WNW
Special Interest		
CL-37		3.4 miles N
CL-41		2.4 miles E
CL-49		3.5 miles W
CL-64		2.1 miles WNW
CL-65		2.6 miles ENE
CL-74		1.9 miles W
CL-75		0.9 miles N

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction
Clinton Power Station, 2020

Location	Location Description	Distance & Direction From Site
J. Environmental Dosimetry - DLR (cont'd)		
Supplemental		
CL-2		0.7 miles NNE
CL-3		0.7 miles NE
CL-4		0.8 miles SW
CL-6		0.8 miles WSW
CL-7		2.3 miles SE
CL-8		2.2 miles E
CL-15		0.9 miles N
CL-33		11.7 miles SW
CL-84		0.6 miles E
CL-90		0.4 miles SE
CL-91		6.1 miles ENE
CL-97		10.3 miles SW
CL-99		3.5 miles NNE
CL-114		12.5 miles SE
Control		
CL-11		16 miles S

TABLE B-2: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Clinton Power Station, 2020

Sample Medium	Analysis	Sampling Method	Analytical Procedure Number
Surface Water	Gamma Spectroscopy	Monthly grab and; composite from a continuous water compositor	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis Env. Inc., SPM-1 Sampling Procedure Manual
Surface Water	Tritium	Quarterly composite from a continuous water compositor	TBE, TBE-2011 Tritium Analysis in Drinking Water by Liquid Scintillation Env. Inc., SPM-1 Sampling Procedure Manual
Surface Water	I-131	Monthly composite from a continuous water compositor	TBE, TBE-2012 Radioiodine in Various Matrices Env. Inc., SPM-1 Sampling Procedure Manual
Drinking Water	Gross Beta	Monthly composite from a continuous water compositor	TBE, TBE-2008 Gross Alpha and/or Gross Beta Activity in Various Matrices Env. Inc., SPM-1 Sampling Procedure Manual
Drinking Water	Gamma Spectroscopy	Monthly composite from a continuous water compositor	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis Env. Inc., SPM-1 Sampling Procedure Manual
Drinking Water	Tritium	Quarterly composite from a continuous water compositor	TBE, TBE-2011 Tritium Analysis in Drinking Water by Liquid Scintillation Env. Inc., SPM-1 Sampling Procedure Manual
Drinking Water	I-131	Monthly composite from a continuous water compositor	TBE, TBE-2012 Radioiodine in Various Matrices Env. Inc., SPM-1 Sampling Procedure Manual
Well Water	Gamma Spectroscopy	Quarterly composite from a continuous water compositor	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis Env. Inc., SPM-1 Sampling Procedure Manual
Well Water	Tritium	Quarterly composite from a continuous water compositor	TBE, TBE-2011 Tritium Analysis in Drinking Water by Liquid Scintillation Env. Inc., SPM-1 Sampling Procedure Manual
Fish	Gamma Spectroscopy	Semi-annual samples collected via electroshocking or other techniques	TBE-2007 Gamma-Emitting Radioisotope Analysis Env. Inc., SPM-1 Sampling Procedure Manual
Sediment	Gamma Spectroscopy	Semi-annual grab samples	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis Env. Inc., SPM-1 Sampling Procedure Manual
Air Particulates	Gross Beta	One-week composite of continuous air sampling through glass fiber filter paper	TBE, TBE-2008 Gross Alpha and/or Gross Beta Activity in Various Matrices Env. Inc., SPM-1 Sampling Procedure Manual
Air Particulates	Gamma Spectroscopy	Quarterly composite of each station	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis Env. Inc., SPM-1 Sampling Procedure Manual
Air Iodine	Gamma Spectroscopy	One-week composite of continuous air sampling through charcoal filter	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis Env. Inc., SPM-1 Sampling Procedure Manual
Milk	I-131	Bi-weekly grab sample when cows are on pasture. Monthly all other times	TBE, TBE-2012 Radioiodine in Various Matrices Env. Inc., SPM-1 Sampling Procedure Manual
Milk	Gamma Spectroscopy	Bi-weekly grab sample when cows are on pasture. Monthly all other times	TBE-2007 Gamma-Emitting Radioisotope Analysis Env. Inc., SPM-1 Sampling Procedure Manual
Food Products	Gross Beta	Monthly grab June through September	TBE, TBE-2008 Gross Alpha and/or Gross Beta Activity in Various Matrices Env. Inc., SPM-1 Sampling Procedure Manual
Food Products	Gamma Spectroscopy	Monthly grab June through September	TBE, TBE-2007 Gamma-Emitting Radioisotopes Analysis Env. Inc., SPM-1 Sampling Procedure Manual
Grass	Gamma Spectroscopy	Biweekly May through October	TBE, TBE-2007 Gamma-Emitting Radioisotopes Analysis Env. Inc., SPM-1 Sampling Procedure Manual
DLR	Thermo-Luminescence Dosimetry	Quarterly DLRs comprised of two Al_2O_3:C Landauer Incorporated elements	Landauer Incorporated

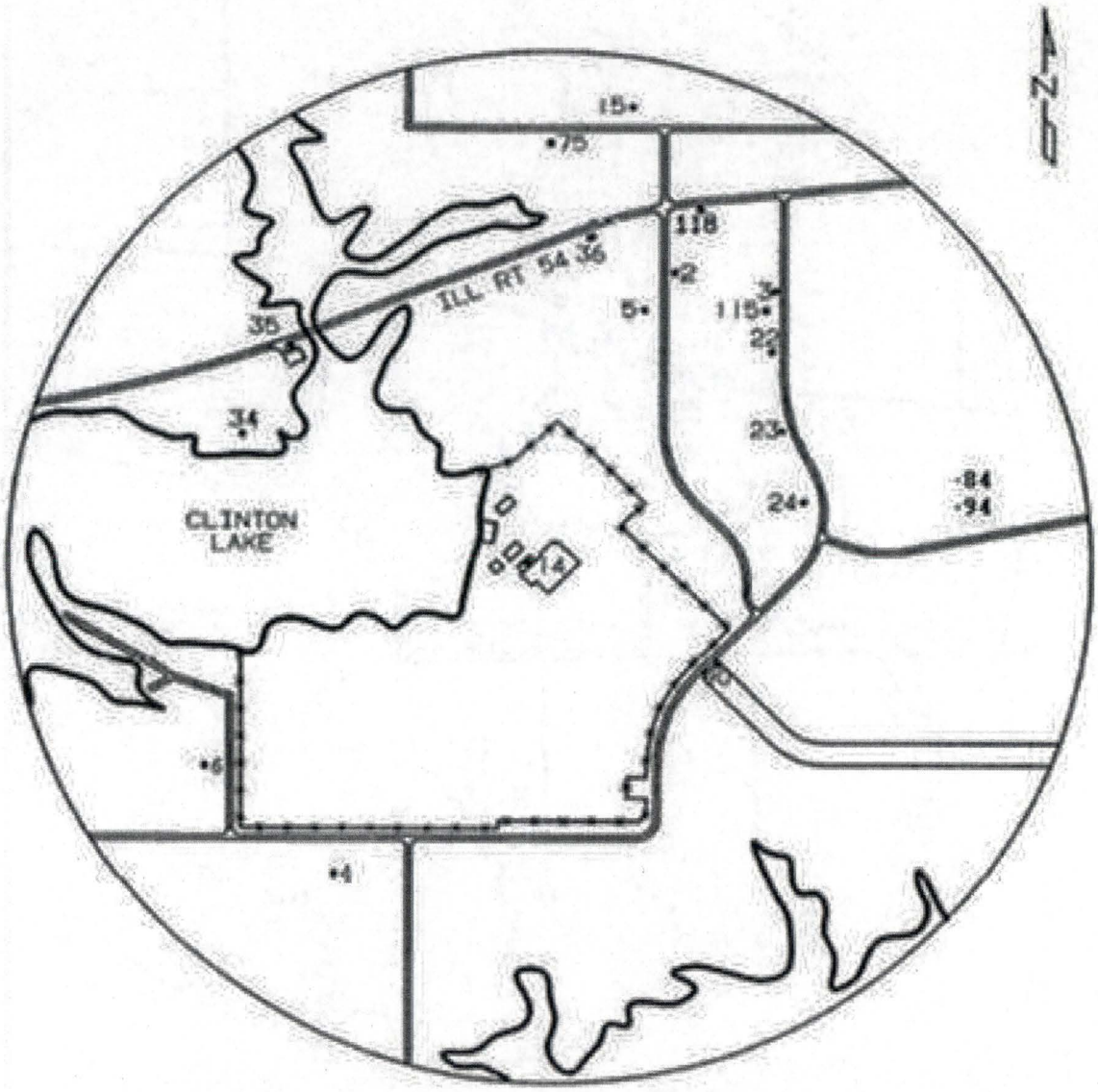

Figure B-1
Environmental Sampling Locations Within One
Mile of the Clinton Power Station, 2020

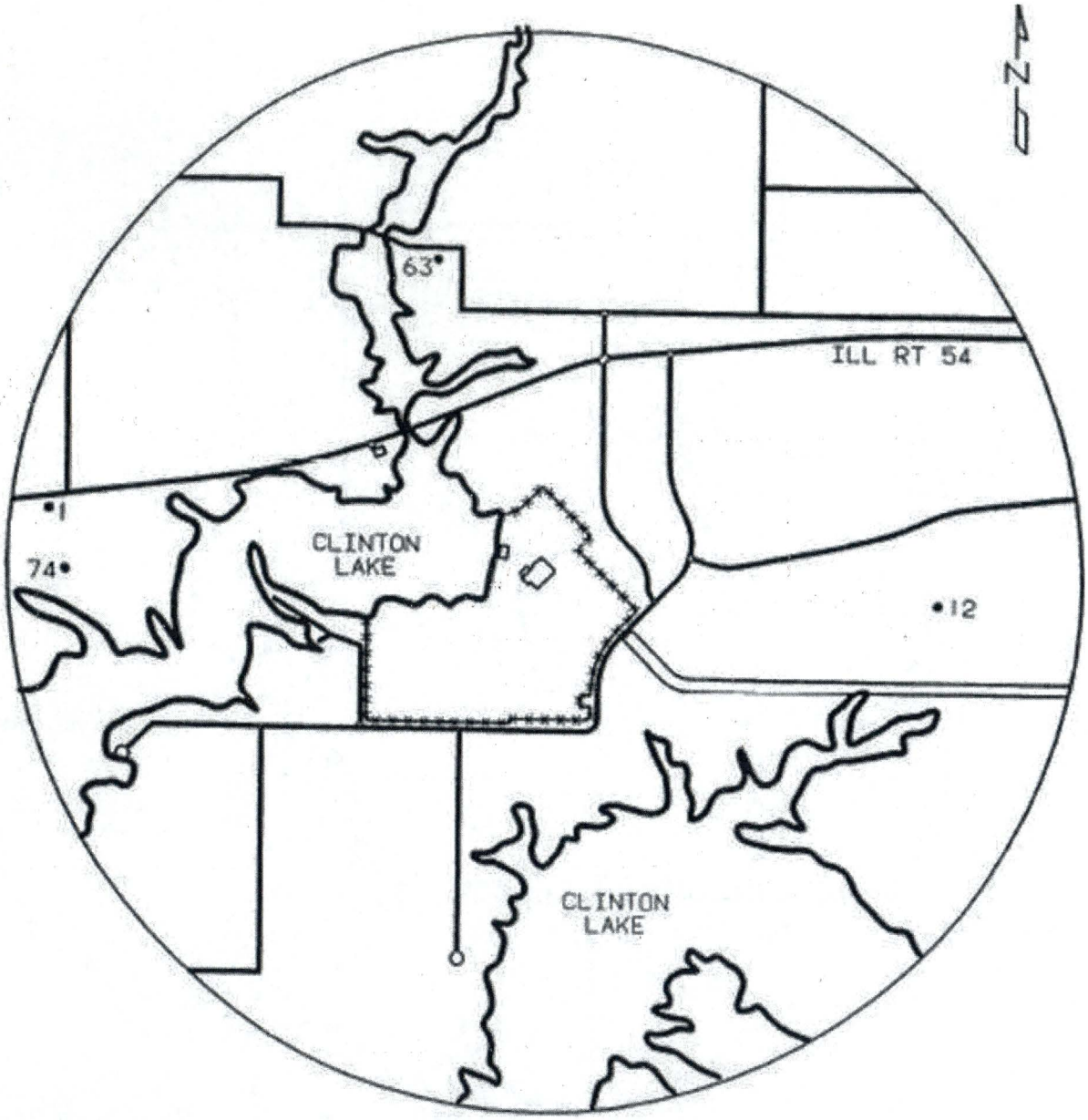

Figure B-2
Environmental Sampling Locations Between One and Two
Miles of the Clinton Power Station, 2020

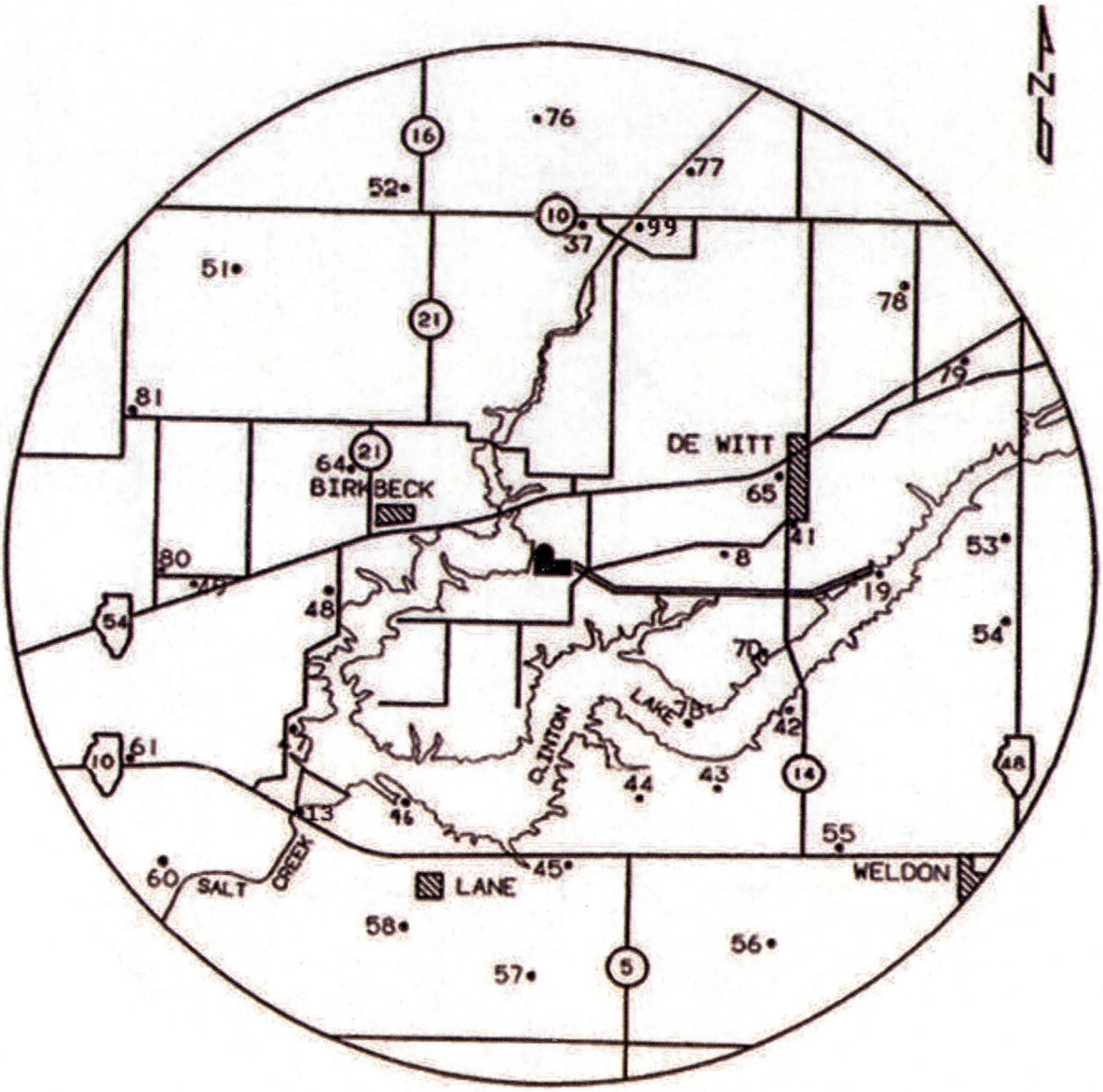

Figure B-3
Environmental Sampling Locations between Two and Five
Miles of the Clinton Power Station, 2020

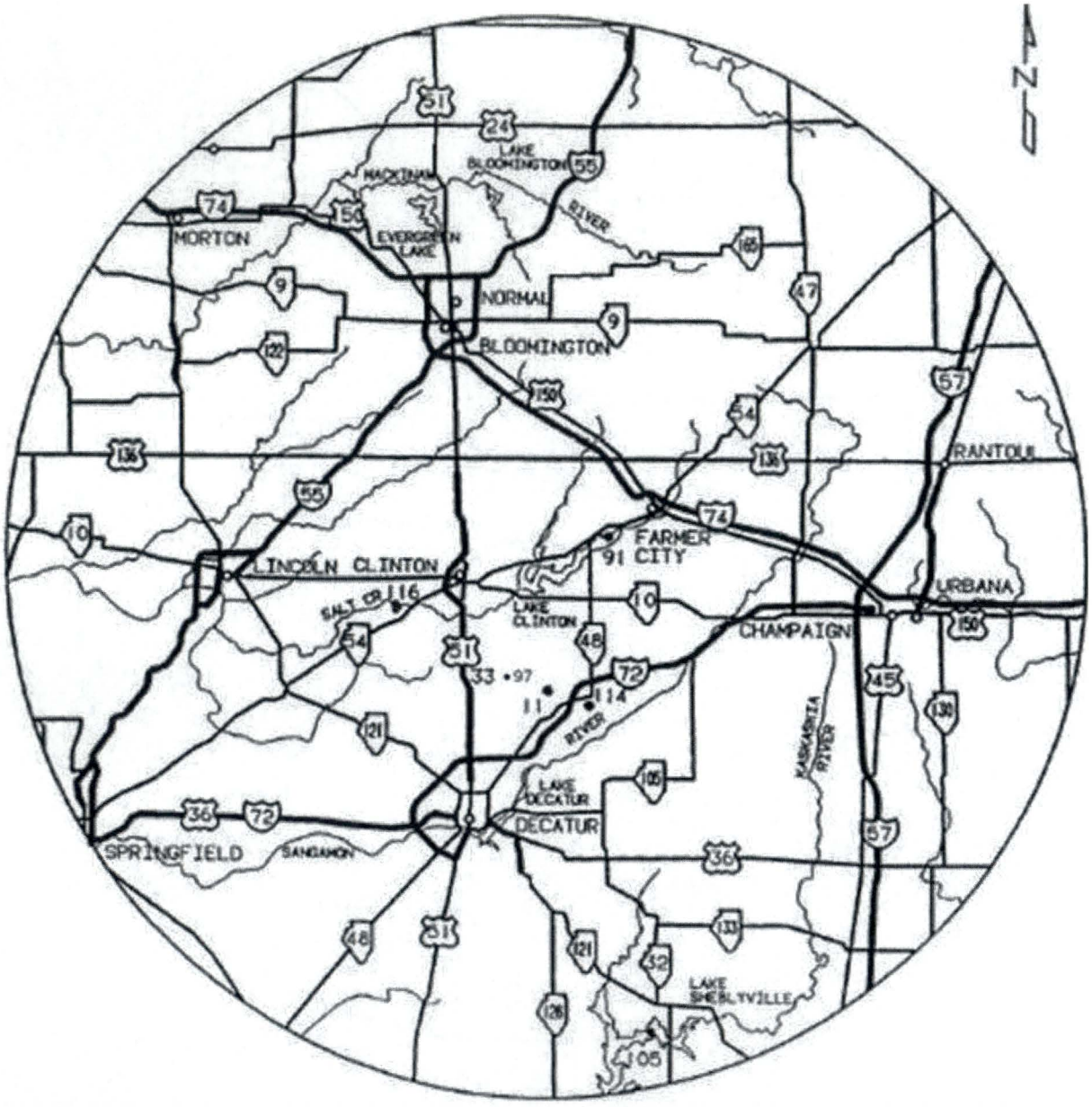

Figure B-4
Environmental Sampling Locations Greater Than Five
Miles of the Clinton Power Station, 2020

APPENDIX C

DATA TABLES AND FIGURES

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Table C-I.1 **CONCENTRATIONS OF I-131 IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-90
12/26/19 - 01/29/20	< 0.6
01/29/20 - 02/26/20	< 0.5
02/26/20 - 03/25/20	< 0.7
03/25/20 - 04/29/20	< 0.5
04/29/20 - 05/27/20	< 0.6
05/27/20 - 06/24/20	< 0.7
06/24/20 - 07/29/20	< 0.7
07/29/20 - 08/26/20	< 0.9
08/26/20 - 09/30/20	< 0.9
09/30/20 - 10/28/20	< 0.7
10/28/20 - 11/25/20	< 0.9
11/25/20 - 12/30/20	< 0.9
MEAN	-

Table C-I.2 **CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-13	CL-90	CL-91	CL-99
01/29/20 - 03/25/20	< 196	< 193	< 192	< 194
04/29/20 - 06/24/20	< 178	< 179	< 179	< 178
07/29/20 - 09/30/20	< 183	< 199	< 179	< 185
10/28/20 - 12/30/20	< 187	< 184	< 183	< 189
MEAN	-	-	-	-

Table C-I.3

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-13	01/29/20 - 01/29/20	< 7	< 4	< 11	< 6	< 13	< 7	< 11	< 6	< 6	< 23	< 10	< 44
	02/26/20 - 02/26/20	< 7	< 6	< 10	< 9	< 16	< 9	< 10	< 8	< 7	< 32	< 10	< 41
	03/25/20 - 03/25/20	< 7	< 9	< 15	< 7	< 15	< 6	< 13	< 8	< 7	< 34	< 12	< 43
	04/29/20 - 04/29/20	< 8	< 7	< 12	< 7	< 22	< 10	< 14	< 10	< 9	< 38	< 11	< 48
	05/27/20 - 05/27/20	< 7	< 6	< 10	< 8	< 14	< 6	< 10	< 10	< 8	< 29	< 8	< 51
	06/24/20 - 06/24/20	< 4	< 6	< 12	< 6	< 11	< 6	< 9	< 5	< 5	< 20	< 7	< 38
	07/29/20 - 07/29/20	< 6	< 6	< 14	< 9	< 16	< 7	< 11	< 7	< 7	< 39	< 13	< 52
	08/26/20 - 08/26/20	< 8	< 7	< 10	< 6	< 8	< 7	< 11	< 8	< 9	< 25	< 12	< 45
	09/30/20 - 09/30/20	< 3	< 4	< 8	< 3	< 8	< 4	< 6	< 5	< 4	< 18	< 6	< 27
	10/28/20 - 10/28/20	< 7	< 6	< 16	< 10	< 12	< 7	< 12	< 7	< 8	< 38	< 9	< 52
	11/25/20 - 11/25/20	< 7	< 8	< 14	< 6	< 15	< 8	< 11	< 7	< 7	< 36	< 11	< 49
	12/30/20 - 12/30/20	< 8	< 8	< 16	< 9	< 11	< 7	< 13	< 6	< 7	< 34	< 12	< 45
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
CL-90	12/26/19 - 01/29/20	< 5	< 6	< 12	< 7	< 11	< 6	< 11	< 6	< 6	< 28	< 11	< 37
	01/29/20 - 02/26/20	< 6	< 7	< 15	< 9	< 20	< 7	< 13	< 9	< 6	< 31	< 11	< 43
	02/26/20 - 03/25/20	< 4	< 5	< 13	< 7	< 10	< 7	< 10	< 7	< 5	< 28	< 10	< 51
	03/25/20 - 04/29/20	< 8	< 5	< 13	< 7	< 13	< 7	< 11	< 9	< 7	< 30	< 9	< 49
	04/29/20 - 05/27/20	< 8	< 8	< 17	< 5	< 17	< 8	< 13	< 9	< 9	< 33	< 12	< 61
	05/27/20 - 06/24/20	< 5	< 6	< 12	< 7	< 13	< 6	< 9	< 7	< 6	< 26	< 5	< 38
	06/24/20 - 07/29/20	< 7	< 6	< 11	< 11	< 17	< 9	< 11	< 8	< 7	< 22	< 11	< 40
	07/29/20 - 08/26/20	< 6	< 5	< 14	< 6	< 13	< 4	< 9	< 4	< 6	< 29	< 10	< 41
	08/26/20 - 09/30/20	< 4	< 4	< 8	< 4	< 9	< 4	< 7	< 4	< 5	< 18	< 6	< 27
	09/30/20 - 10/28/20	< 6	< 7	< 10	< 7	< 18	< 7	< 10	< 9	< 7	< 31	< 14	< 46
	10/28/20 - 11/25/20	< 5	< 4	< 17	< 8	< 12	< 6	< 11	< 6	< 7	< 27	< 13	< 38
	11/25/20 - 12/30/20	< 7	< 7	< 11	< 10	< 8	< 6	< 11	< 9	< 8	< 30	< 15	< 43
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-I.3

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-91	12/26/19 - 01/29/20	< 7	< 7	< 13	< 8	< 17	< 7	< 12	< 8	< 8	< 27	< 10	< 38
	01/29/20 - 02/26/20	< 6	< 7	< 12	< 9	< 14	< 7	< 11	< 8	< 7	< 29	< 11	< 41
	02/26/20 - 03/25/20	< 5	< 6	< 15	< 8	< 14	< 7	< 14	< 8	< 8	< 28	< 12	< 43
	03/25/20 - 04/29/20	< 7	< 7	< 12	< 6	< 13	< 6	< 14	< 8	< 8	< 31	< 10	< 43
	04/29/20 - 05/27/20	< 6	< 7	< 16	< 3	< 13	< 8	< 13	< 7	< 8	< 26	< 14	< 44
	05/27/20 - 06/24/20	< 6	< 6	< 9	< 6	< 11	< 5	< 7	< 7	< 4	< 25	< 8	< 40
	06/24/20 - 07/29/20	< 6	< 7	< 15	< 6	< 12	< 6	< 12	< 5	< 5	< 27	< 8	< 43
	07/29/20 - 08/26/20	< 8	< 6	< 8	< 8	< 14	< 9	< 11	< 9	< 9	< 31	< 10	< 42
	08/26/20 - 09/30/20	< 3	< 5	< 8	< 6	< 6	< 5	< 7	< 5	< 5	< 20	< 8	< 29
	09/30/20 - 10/28/20	< 7	< 7	< 16	< 8	< 12	< 7	< 11	< 6	< 8	< 29	< 10	< 44
	10/28/20 - 11/25/20	< 7	< 6	< 10	< 7	< 9	< 7	< 13	< 7	< 6	< 27	< 8	< 42
	11/25/20 - 12/30/20	< 5	< 7	< 17	< 6	< 13	< 7	< 11	< 7	< 7	< 28	< 14	< 44
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
CL-99	12/26/19 - 01/29/20	< 5	< 6	< 11	< 6	< 10	< 5	< 8	< 6	< 5	< 23	< 6	< 40
	01/29/20 - 02/26/20	< 9	< 7	< 13	< 8	< 17	< 8	< 13	< 9	< 8	< 35	< 10	< 54
	02/26/20 - 03/25/20	< 7	< 6	< 16	< 7	< 14	< 8	< 12	< 7	< 7	< 34	< 8	< 54
	03/25/20 - 04/29/20	< 7	< 7	< 13	< 10	< 14	< 8	< 11	< 9	< 7	< 41	< 14	< 46
	04/29/20 - 05/27/20	< 8	< 6	< 14	< 7	< 14	< 7	< 13	< 9	< 9	< 33	< 9	< 49
	05/27/20 - 06/24/20	< 5	< 6	< 14	< 7	< 13	< 6	< 10	< 9	< 3	< 27	< 10	< 46
	06/24/20 - 07/29/20	< 7	< 8	< 18	< 8	< 17	< 8	< 14	< 7	< 8	< 32	< 8	< 45
	07/29/20 - 08/26/20	< 6	< 7	< 12	< 4	< 11	< 8	< 10	< 8	< 7	< 30	< 11	< 41
	08/26/20 - 09/30/20	< 5	< 5	< 8	< 6	< 9	< 4	< 8	< 4	< 5	< 19	< 6	< 28
	09/30/20 - 10/28/20	< 6	< 7	< 11	< 5	< 14	< 8	< 9	< 7	< 6	< 28	< 10	< 52
	10/28/20 - 11/25/20	< 6	< 7	< 9	< 8	< 11	< 7	< 10	< 7	< 5	< 27	< 12	< 42
	11/25/20 - 12/30/20	< 6	< 7	< 15	< 7	< 13	< 8	< 12	< 7	< 7	< 30	< 12	< 41
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-II.1 **CONCENTRATIONS OF GROSS BETA IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-14
12/26/19 - 01/29/20	< 1.9
01/29/20 - 02/26/20	< 1.7
02/26/20 - 03/25/20	< 1.6
03/25/20 - 04/29/20	< 1.5
04/29/20 - 05/27/20	< 2.0
05/27/20 - 06/24/20	< 1.5
06/24/20 - 07/29/20	< 1.8
07/29/20 - 08/26/20	< 1.8
08/26/20 - 09/30/20	< 1.6
09/30/20 - 10/28/20	< 1.8
10/28/20 - 11/25/20	< 1.5
11/25/20 - 12/30/20	< 1.8
MEAN	-

Table C-II.2 **CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-14
12/26/19 - 03/25/20	< 194
03/25/20 - 06/24/20	< 178
06/24/20 - 09/30/20	< 183
09/30/20 - 12/30/20	< 187
MEAN	-

Table C-II.3 **CONCENTRATIONS OF I-131 IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-14
12/26/19 - 01/29/20	< 0.7
01/29/20 - 02/26/20	< 0.9
02/26/20 - 03/25/20	< 0.7
03/25/20 - 04/29/20	< 0.7
04/29/20 - 05/27/20	< 0.7
05/27/20 - 06/24/20	< 0.7
06/24/20 - 07/29/20	< 0.8
07/29/20 - 08/26/20	< 0.8
08/26/20 - 09/30/20	< 0.7
09/30/20 - 10/28/20	< 0.8
10/28/20 - 11/25/20	< 0.8
11/25/20 - 12/30/20	< 0.9
MEAN	-

Table C-II.4

CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-14	12/26/19 - 01/29/20	< 5	< 3	< 9	< 5	< 9	< 5	< 8	< 7	< 6	< 23	< 9	< 34
	01/29/20 - 02/26/20	< 6	< 6	< 11	< 8	< 12	< 6	< 8	< 6	< 7	< 28	< 14	< 36
	02/26/20 - 03/25/20	< 7	< 7	< 16	< 9	< 14	< 8	< 13	< 8	< 8	< 33	< 11	< 45
	03/25/20 - 04/29/20	< 6	< 7	< 12	< 6	< 11	< 5	< 11	< 8	< 5	< 27	< 9	< 41
	04/29/20 - 05/27/20	< 8	< 8	< 15	< 8	< 14	< 8	< 13	< 8	< 8	< 37	< 5	< 62
	05/27/20 - 06/24/20	< 6	< 6	< 12	< 7	< 13	< 6	< 10	< 8	< 6	< 27	< 8	< 48
	06/24/20 - 07/29/20	< 5	< 5	< 10	< 5	< 12	< 7	< 11	< 6	< 6	< 27	< 8	< 45
	07/29/20 - 08/26/20	< 7	< 7	< 10	< 7	< 13	< 5	< 13	< 7	< 8	< 21	< 11	< 45
	08/26/20 - 09/30/20	< 4	< 3	< 8	< 4	< 7	< 4	< 6	< 4	< 4	< 17	< 6	< 28
	09/30/20 - 10/28/20	< 6	< 7	< 12	< 6	< 9	< 6	< 12	< 9	< 7	< 28	< 11	< 45
	10/28/20 - 11/25/20	< 6	< 6	< 15	< 10	< 15	< 5	< 10	< 7	< 6	< 28	< 9	< 42
	11/25/20 - 12/30/20	< 6	< 5	< 13	< 6	< 12	< 7	< 11	< 7	< 7	< 32	< 11	< 45
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-III.1 **CONCENTRATIONS OF TRITIUM IN WELL WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CL-07D	CL-12R	CL-12T
03/25/20 - 03/25/20	*(1)*	< 181	< 182
06/24/20 - 06/24/20	< 184	< 177	< 186
09/30/20 - 09/30/20	< 180	< 179	< 181
12/30/20 - 12/30/20	< 182	< 188	< 182
MEAN	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-III.2

CONCENTRATIONS OF GAMMA EMITTERS IN WELL WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-07D	03/25/20 *(1)*												
	06/24/20	< 6	< 6	< 14	< 7	< 14	< 7	< 13	< 8	< 8	< 28	< 9	< 39
	09/30/20	< 5	< 4	< 9	< 4	< 11	< 5	< 8	< 5	< 4	< 19	< 6	< 28
	12/30/20	< 7	< 8	< 17	< 8	< 14	< 9	< 14	< 8	< 6	< 29	< 11	< 57
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
CL-12R	03/25/20	< 9	< 10	< 14	< 11	< 20	< 10	< 13	< 10	< 9	< 41	< 13	< 67
	06/24/20	< 6	< 5	< 10	< 7	< 12	< 6	< 11	< 7	< 5	< 22	< 11	< 39
	09/30/20	< 4	< 4	< 9	< 6	< 10	< 4	< 7	< 5	< 5	< 16	< 9	< 37
	12/30/20	< 8	< 6	< 13	< 4	< 17	< 6	< 12	< 8	< 7	< 28	< 10	< 48
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
CL-12T	03/25/20	< 8	< 6	< 14	< 8	< 12	< 9	< 10	< 9	< 8	< 25	< 5	< 46
	06/24/20	< 5	< 5	< 11	< 5	< 11	< 6	< 10	< 6	< 5	< 24	< 4	< 38
	09/30/20	< 5	< 6	< 11	< 6	< 11	< 6	< 9	< 6	< 5	< 23	< 10	< 39
	12/30/20	< 7	< 6	< 16	< 8	< 14	< 7	< 12	< 8	< 7	< 36	< 13	< 47
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-IV.1

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-19													
Largemouth Bass	05/04/20	< 67	< 55	< 96	< 69	< 80	< 59	< 90	< 51	< 71	< 176	< 33	< 249
Channel Catfish	05/04/20	< 78	< 70	< 118	< 67	< 169	< 58	< 121	< 83	< 77	< 241	< 68	< 326
Bluegill	05/04/20	< 62	< 44	< 98	< 51	< 118	< 61	< 109	< 61	< 70	< 229	< 82	< 269
Carp	05/04/20	< 51	< 46	< 104	< 51	< 95	< 47	< 92	< 65	< 60	< 238	< 61	< 264
Largemouth Bass	10/05/20	< 86	< 77	< 96	< 73	< 139	< 73	< 119	< 76	< 79	< 228	< 64	< 318
Channel Catfish	10/05/20	< 58	< 66	< 111	< 70	< 123	< 54	< 134	< 71	< 75	< 257	< 87	< 356
Bluegill	10/05/20	< 71	< 50	< 85	< 55	< 134	< 52	< 91	< 77	< 45	< 200	< 18	< 256
Carp	10/05/20	< 66	< 51	< 144	< 52	< 134	< 71	< 111	< 71	< 62	< 307	< 86	< 377
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
CL-105													
Largemouth Bass	05/04/20	< 84	< 70	< 151	< 100	< 223	< 84	< 136	< 95	< 85	< 278	< 142	< 372
White Crappie	05/04/20	< 53	< 54	< 77	< 52	< 110	< 52	< 92	< 44	< 50	< 208	< 48	< 235
Bluegill	05/04/20	< 42	< 38	< 78	< 47	< 97	< 44	< 78	< 45	< 42	< 167	< 55	< 247
Carp	05/04/20	< 56	< 66	< 141	< 73	< 152	< 72	< 127	< 88	< 52	< 259	< 70	< 326
Largemouth Bass	10/05/20	< 69	< 49	< 180	< 61	< 155	< 67	< 117	< 76	< 60	< 277	< 73	< 359
White Crappie	10/05/20	< 49	< 44	< 115	< 57	< 133	< 41	< 101	< 55	< 52	< 210	< 34	< 223
Bluegill	10/05/20	< 62	< 67	< 97	< 58	< 104	< 67	< 121	< 55	< 67	< 302	< 79	< 366
Carp	10/05/20	< 60	< 61	< 117	< 42	< 121	< 57	< 104	< 65	< 65	< 249	< 70	< 351
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-V.1

CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-07B	05/04/20	< 42	< 41	< 113	< 51	< 111	< 40	< 81	< 48	< 49	< 210	< 87	< 261
	10/05/20	< 38	< 34	< 85	< 49	< 68	< 43	< 69	< 39	< 36	< 148	< 49	< 188
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
CL-105	05/04/20	< 44	< 40	< 113	< 60	< 123	< 52	< 85	< 65	< 53	< 182	< 67	< 269
	10/05/20	< 60	< 50	< 127	< 60	< 142	< 64	< 83	< 64	< 57	< 210	< 59	< 251
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-VI.1 **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020**

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

COLLECTION PERIOD	GROUP I					
	CL-2	CL-3	CL-4	CL-6	CL-15	CL-94
01/01/20 - 01/08/20	13 ± 4	14 ± 4	18 ± 4	11 ± 4	15 ± 4	14 ± 4
01/08/20 - 01/15/20	11 ± 4	12 ± 4	12 ± 4	13 ± 4	13 ± 4	9 ± 4
01/15/20 - 01/22/20	25 ± 5	29 ± 5	29 ± 5	31 ± 5	27 ± 5	27 ± 5
01/22/20 - 01/29/20	14 ± 4	19 ± 4	16 ± 4	19 ± 4	17 ± 4	14 ± 4
01/29/20 - 02/05/20	12 ± 4	9 ± 4	11 ± 4	15 ± 4	12 ± 4	14 ± 4
02/05/20 - 02/12/20	12 ± 4	14 ± 4	16 ± 4	16 ± 4	13 ± 4	14 ± 4
02/12/20 - 02/19/20	13 ± 4	16 ± 4	16 ± 4	14 ± 4	13 ± 4	18 ± 4
02/19/20 - 02/26/20	19 ± 4	23 ± 5	22 ± 4	20 ± 4	17 ± 4	19 ± 4
02/26/20 - 03/04/20	15 ± 4	15 ± 4	17 ± 4	16 ± 4	14 ± 4	14 ± 4
03/04/20 - 03/11/20	9 ± 4	10 ± 4	12 ± 4	13 ± 4	11 ± 4	10 ± 4
03/11/20 - 03/18/20	7 ± 3	10 ± 4	11 ± 4	10 ± 4	8 ± 3	7 ± 3
03/18/20 - 03/25/20	15 ± 4	16 ± 4	16 ± 4	11 ± 4	11 ± 4	15 ± 4
03/25/20 - 04/01/20	13 ± 4	17 ± 4	13 ± 4	14 ± 4	14 ± 4	14 ± 4
04/01/20 - 04/08/20	15 ± 4	17 ± 4	15 ± 4	13 ± 4	13 ± 4	14 ± 4
04/08/20 - 04/15/20	15 ± 4	18 ± 4	17 ± 4	22 ± 4	16 ± 4	17 ± 4
04/15/20 - 04/22/20	16 ± 4	19 ± 4	18 ± 4	17 ± 4	18 ± 4	19 ± 4
04/22/20 - 04/29/20	16 ± 4	15 ± 4	14 ± 4	17 ± 4	16 ± 4	11 ± 4
04/29/20 - 05/06/20	10 ± 4	14 ± 4	12 ± 4	14 ± 4	14 ± 4	12 ± 4
05/06/20 - 05/13/20	12 ± 3	12 ± 3	10 ± 3	14 ± 4	13 ± 3	12 ± 3
05/13/20 - 05/20/20	10 ± 4	7 ± 4	11 ± 4	12 ± 4	11 ± 4	11 ± 4
05/20/20 - 05/27/20	16 ± 4	16 ± 4	15 ± 4	18 ± 4	13 ± 3	18 ± 4
05/27/20 - 06/03/20	13 ± 4	15 ± 4	13 ± 4	14 ± 4	13 ± 4	16 ± 4
06/03/20 - 06/10/20	13 ± 4	16 ± 4	16 ± 4	14 ± 4	13 ± 4	17 ± 4
06/10/20 - 06/17/20	11 ± 4	9 ± 4	14 ± 4	13 ± 4	14 ± 4	16 ± 4
06/17/20 - 06/24/20	14 ± 4	18 ± 4	16 ± 4	19 ± 4	19 ± 4	19 ± 4
06/24/20 - 07/01/20	13 ± 4	15 ± 4	13 ± 4	15 ± 4	11 ± 4	14 ± 4
07/01/20 - 07/08/20	25 ± 5	22 ± 5	24 ± 5	27 ± 5	25 ± 5	29 ± 5
07/08/20 - 07/15/20	13 ± 4	14 ± 4	12 ± 4	15 ± 4	11 ± 4	15 ± 4
07/15/20 - 07/22/20	23 ± 5	18 ± 4	18 ± 4	21 ± 4	19 ± 4	19 ± 4
07/22/20 - 07/29/20	14 ± 4	16 ± 4	15 ± 4	12 ± 4	16 ± 4	17 ± 4
07/29/20 - 08/05/20	13 ± 4	10 ± 4	11 ± 4	*(1)*	14 ± 4	11 ± 4
08/05/20 - 08/12/20	17 ± 4	22 ± 5	20 ± 4	21 ± 4	25 ± 5	19 ± 4
08/12/20 - 08/19/20	19 ± 4	23 ± 4	22 ± 4	21 ± 4	25 ± 4	22 ± 4
08/19/20 - 08/26/20	24 ± 5	24 ± 5	24 ± 5	25 ± 5	28 ± 5	34 ± 5
08/26/20 - 09/02/20	12 ± 4	19 ± 4	17 ± 4	13 ± 4	18 ± 4	18 ± 4
09/02/20 - 09/09/20	15 ± 4	18 ± 4	16 ± 4	16 ± 4	16 ± 4	17 ± 4
09/09/20 - 09/16/20	17 ± 4	18 ± 4	17 ± 4	21 ± 4	20 ± 4	20 ± 4
09/16/20 - 09/23/20	23 ± 5	27 ± 5	26 ± 5	28 ± 5	25 ± 5	29 ± 5
09/23/20 - 09/30/20	14 ± 4	16 ± 4	14 ± 4	18 ± 4	16 ± 4	18 ± 4
09/30/20 - 10/07/20	15 ± 4	17 ± 4	11 ± 4	16 ± 4	18 ± 4	15 ± 4
10/07/20 - 10/14/20	22 ± 4	18 ± 4	18 ± 4	20 ± 4	22 ± 4	23 ± 4
10/14/20 - 10/21/20	15 ± 4	21 ± 5	21 ± 5	18 ± 4	20 ± 4	22 ± 5
10/21/20 - 10/28/20	16 ± 4	15 ± 4	17 ± 4	17 ± 4	16 ± 4	14 ± 4
10/28/20 - 11/04/20	23 ± 5	28 ± 5	22 ± 5	25 ± 5	28 ± 5	28 ± 5
11/04/20 - 11/11/20	13 ± 4	20 ± 5	17 ± 4	20 ± 5	16 ± 4	20 ± 4
11/11/20 - 11/18/20	18 ± 4	20 ± 4	17 ± 4	17 ± 4	25 ± 5	24 ± 5
11/18/20 - 11/25/20	17 ± 5	20 ± 5	18 ± 5	16 ± 5	18 ± 5	22 ± 5
11/25/20 - 12/02/20	18 ± 5	19 ± 5	19 ± 5	14 ± 4	15 ± 4	22 ± 5
12/02/20 - 12/09/20	28 ± 5	27 ± 5	25 ± 5	24 ± 5	30 ± 5	30 ± 5
12/09/20 - 12/16/20	36 ± 5	34 ± 5	31 ± 5	28 ± 5	34 ± 5	31 ± 5
12/16/20 - 12/23/20	28 ± 5	28 ± 5	29 ± 5	28 ± 5	30 ± 5	32 ± 5
12/23/20 - 12/30/20	11 ± 3	11 ± 3	13 ± 4	15 ± 4	15 ± 4	11 ± 3
MEAN ± 2 STD DEV	16 ± 11	18 ± 11	17 ± 10	18 ± 10	18 ± 12	18 ± 13

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

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VI.1 **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020**

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

COLLECTION PERIOD	GROUP II			GROUP III
	CL-1	CL-7	CL-8	CL-11
01/01/20 - 01/08/20	13 ± 4	16 ± 4	14 ± 4	13 ± 4
01/08/20 - 01/15/20	15 ± 4	12 ± 4	10 ± 4	14 ± 4
01/15/20 - 01/22/20	28 ± 5	28 ± 5	30 ± 5	26 ± 5
01/22/20 - 01/29/20	16 ± 4	16 ± 4	14 ± 4	18 ± 4
01/29/20 - 02/05/20	19 ± 4	13 ± 4	13 ± 4	14 ± 4
02/05/20 - 02/12/20	10 ± 4	14 ± 4	10 ± 4	14 ± 4
02/12/20 - 02/19/20	15 ± 4	16 ± 4	18 ± 4	14 ± 4
02/19/20 - 02/26/20	20 ± 4	20 ± 4	25 ± 5	22 ± 4
02/26/20 - 03/04/20	14 ± 4	14 ± 4	17 ± 4	21 ± 4
03/04/20 - 03/11/20	11 ± 4	13 ± 4	13 ± 4	11 ± 4
03/11/20 - 03/18/20	11 ± 4	*(1)*	10 ± 4	9 ± 4
03/18/20 - 03/25/20	12 ± 4	*(1)*	15 ± 4	12 ± 4
03/25/20 - 04/01/20	13 ± 4	*(1)*	13 ± 4	17 ± 4
04/01/20 - 04/08/20	13 ± 4	*(1)*	13 ± 4	15 ± 4
04/08/20 - 04/15/20	15 ± 4	*(1)*	18 ± 4	15 ± 4
04/15/20 - 04/22/20	16 ± 4	*(1)*	16 ± 4	16 ± 4
04/22/20 - 04/29/20	14 ± 4	*(1)*	17 ± 4	16 ± 4
04/29/20 - 05/06/20	10 ± 4	*(1)*	12 ± 4	11 ± 4
05/06/20 - 05/13/20	11 ± 3	11 ± 3	9 ± 3	12 ± 3
05/13/20 - 05/20/20	11 ± 4	8 ± 4	14 ± 4	8 ± 4
05/20/20 - 05/27/20	15 ± 4	16 ± 4	16 ± 4	14 ± 3
05/27/20 - 06/03/20	13 ± 4	14 ± 4	12 ± 4	14 ± 4
06/03/20 - 06/10/20	13 ± 4	13 ± 4	14 ± 4	15 ± 4
06/10/20 - 06/17/20	10 ± 4	13 ± 4	14 ± 4	16 ± 4
06/17/20 - 06/24/20	17 ± 4	19 ± 4	17 ± 4	15 ± 4
06/24/20 - 07/01/20	13 ± 4	10 ± 4	15 ± 4	14 ± 4
07/01/20 - 07/08/20	24 ± 5	19 ± 5	33 ± 5	28 ± 5
07/08/20 - 07/15/20	12 ± 4	12 ± 4	15 ± 4	18 ± 4
07/15/20 - 07/22/20	17 ± 4	18 ± 4	17 ± 4	19 ± 4
07/22/20 - 07/29/20	13 ± 4	16 ± 4	15 ± 4	17 ± 4
07/29/20 - 08/05/20	12 ± 4	12 ± 4	14 ± 4	11 ± 4
08/05/20 - 08/12/20	19 ± 4	19 ± 4	22 ± 5	19 ± 4
08/12/20 - 08/19/20	21 ± 4	16 ± 4	22 ± 4	22 ± 4
08/19/20 - 08/26/20	27 ± 5	25 ± 5	20 ± 4	25 ± 5
08/26/20 - 09/02/20	17 ± 4	13 ± 4	17 ± 4	18 ± 4
09/02/20 - 09/09/20	19 ± 4	17 ± 4	18 ± 4	14 ± 4
09/09/20 - 09/16/20	20 ± 4	17 ± 4	18 ± 4	21 ± 4
09/16/20 - 09/23/20	28 ± 5	27 ± 5	30 ± 5	28 ± 5
09/23/20 - 09/30/20	13 ± 4	18 ± 4	16 ± 4	13 ± 4
09/30/20 - 10/07/20	14 ± 4	13 ± 4	14 ± 4	13 ± 4
10/07/20 - 10/14/20	19 ± 4	19 ± 4	21 ± 4	27 ± 5
10/14/20 - 10/21/20	21 ± 5	17 ± 4	21 ± 4	15 ± 4
10/21/20 - 10/28/20	15 ± 4	16 ± 4	16 ± 4	13 ± 4
10/28/20 - 11/04/20	23 ± 5	28 ± 5	25 ± 5	29 ± 5
11/04/20 - 11/11/20	14 ± 4	15 ± 4	17 ± 4	15 ± 4
11/11/20 - 11/18/20	19 ± 4	16 ± 4	19 ± 4	16 ± 4
11/18/20 - 11/25/20	19 ± 5	18 ± 5	19 ± 5	18 ± 5
11/25/20 - 12/02/20	18 ± 5	17 ± 4	20 ± 5	21 ± 5
12/02/20 - 12/09/20	32 ± 5	26 ± 5	27 ± 5	30 ± 5
12/09/20 - 12/16/20	32 ± 5	30 ± 5	32 ± 5	28 ± 5
12/16/20 - 12/23/20	28 ± 5	28 ± 5	25 ± 5	33 ± 5
12/23/20 - 12/30/20	12 ± 4	12 ± 3	14 ± 4	13 ± 4
MEAN ± 2 STD DEV	17 ± 11	17 ± 11	17 ± 11	17 ± 12

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

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VI.2

MONTHLY AND YEARLY MEAN VALUES OF GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

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

GROUP I - ON-SITE LOCATIONS				GROUP II - INTERMEDIATE DISTANCE LOCATIONS				GROUP III - CONTROL LOCATIONS			
COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD
01/01/20 - 01/29/20	9	31	18 ± 14	01/01/20 - 01/29/20	10	30	18 ± 14	01/01/20 - 01/29/20	13	26	18 ± 12
01/29/20 - 03/04/20	9	23	15 ± 6	01/29/20 - 03/04/20	10	25	16 ± 8	01/29/20 - 03/04/20	14	22	17 ± 8
03/04/20 - 04/01/20	7	17	12 ± 6	03/04/20 - 04/01/20	10	15	12 ± 3	03/04/20 - 04/01/20	9	17	12 ± 7
04/01/20 - 04/29/20	11	22	16 ± 5	04/01/20 - 04/29/20	13	18	15 ± 4	04/01/20 - 04/29/20	15	16	16 ± 1
04/29/20 - 06/03/20	7	18	13 ± 5	04/29/20 - 06/03/20	8	16	12 ± 5	04/29/20 - 06/03/20	8	14	12 ± 5
06/03/20 - 07/01/20	9	19	15 ± 5	06/03/20 - 07/01/20	10	19	14 ± 5	06/03/20 - 07/01/20	14	16	15 ± 2
07/01/20 - 07/29/20	11	29	18 ± 10	07/01/20 - 07/29/20	12	33	17 ± 12	07/01/20 - 07/29/20	17	28	20 ± 10
07/29/20 - 09/02/20	10	34	20 ± 11	07/29/20 - 09/02/20	12	27	18 ± 9	07/29/20 - 09/02/20	11	25	19 ± 10
09/02/20 - 09/30/20	14	29	19 ± 9	09/02/20 - 09/30/20	13	30	20 ± 11	09/02/20 - 09/30/20	13	28	19 ± 14
09/30/20 - 11/04/20	11	28	19 ± 9	09/30/20 - 11/04/20	13	28	19 ± 9	09/30/20 - 11/04/20	13	29	19 ± 16
11/04/20 - 12/02/20	13	25	19 ± 6	11/04/20 - 12/02/20	14	20	17 ± 3	11/04/20 - 12/02/20	15	21	17 ± 5
12/02/20 - 12/30/20	11	36	25 ± 16	12/02/20 - 12/30/20	12	32	25 ± 15	12/02/20 - 12/30/20	13	33	26 ± 17
01/01/20 - 12/30/20	7	36	17 ± 11	01/01/20 - 12/30/20	8	33	17 ± 11	01/01/20 - 12/30/20	8	33	17 ± 12

Table C-VI.3 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020**

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

SITE	COLLECTION PERIOD	Co-60	Nb-95	Zr-95	Ru-103	Ru-106	Cs-134	Cs-137	Ce-141	Ce-144
CL-1	01/01/20 - 04/01/20	< 2	< 2	< 4	< 3	< 16	< 1	< 2	< 3	< 10
	04/01/20 - 07/01/20	< 2	< 2	< 4	< 2	< 18	< 2	< 2	< 4	< 12
	07/01/20 - 09/30/20	< 2	< 3	< 5	< 3	< 18	< 2	< 2	< 5	< 8
	09/30/20 - 12/30/20	< 2	< 2	< 3	< 1	< 16	< 2	< 2	< 3	< 8
	MEAN	-	-	-	-	-	-	-	-	-
CL-2	01/01/20 - 04/01/20	< 2	< 2	< 3	< 1	< 17	< 3	< 2	< 2	< 8
	04/01/20 - 07/01/20	< 2	< 2	< 2	< 2	< 14	< 2	< 1	< 2	< 9
	07/01/20 - 09/30/20	< 3	< 3	< 5	< 3	< 19	< 2	< 2	< 5	< 9
	09/30/20 - 12/30/20	< 2	< 2	< 3	< 2	< 18	< 2	< 1	< 3	< 8
	MEAN	-	-	-	-	-	-	-	-	-
CL-3	01/01/20 - 04/01/20	< 3	< 2	< 3	< 2	< 14	< 2	< 2	< 2	< 8
	04/01/20 - 07/01/20	< 2	< 2	< 4	< 2	< 19	< 2	< 2	< 3	< 8
	07/01/20 - 09/30/20	< 3	< 4	< 7	< 5	< 16	< 3	< 2	< 6	< 10
	09/30/20 - 12/30/20	< 3	< 2	< 4	< 2	< 17	< 2	< 1	< 2	< 6
	MEAN	-	-	-	-	-	-	-	-	-
CL-4	01/01/20 - 04/01/20	< 2	< 3	< 4	< 3	< 21	< 3	< 2	< 3	< 10
	04/01/20 - 07/01/20	< 3	< 2	< 5	< 3	< 21	< 2	< 2	< 3	< 10
	07/01/20 - 09/30/20	< 2	< 3	< 4	< 3	< 15	< 2	< 2	< 4	< 7
	09/30/20 - 12/30/20	< 3	< 2	< 5	< 2	< 20	< 3	< 2	< 3	< 10
	MEAN	-	-	-	-	-	-	-	-	-
CL-6	01/01/20 - 04/01/20	< 2	< 2	< 3	< 2	< 14	< 2	< 2	< 2	< 6
	04/01/20 - 07/01/20	< 2	< 3	< 5	< 3	< 21	< 3	< 2	< 3	< 10
	07/01/20 - 09/30/20	< 2	< 3	< 5	< 3	< 19	< 2	< 2	< 5	< 11
	09/30/20 - 12/30/20	< 4	< 3	< 7	< 4	< 28	< 4	< 3	< 4	< 11
	MEAN	-	-	-	-	-	-	-	-	-

Table C-VI.3 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020**

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

SITE	COLLECTION PERIOD	Co-60	Nb-95	Zr-95	Ru-103	Ru-106	Cs-134	Cs-137	Ce-141	Ce-144
CL-7	01/01/20 - 04/01/20	< 5	< 5	< 7	< 5	< 41	< 5	< 4	< 5	< 18
	04/01/20 - 07/01/20	< 7	< 7	< 11	< 6	< 51	< 6	< 5	< 6	< 22
	07/01/20 - 09/30/20	< 2	< 3	< 4	< 3	< 17	< 2	< 2	< 4	< 8
	09/30/20 - 12/30/20	< 2	< 3	< 3	< 2	< 18	< 2	< 2	< 2	< 9
	MEAN	-	-	-	-	-	-	-	-	-
CL-8	01/01/20 - 04/01/20	< 2	< 2	< 4	< 2	< 15	< 2	< 2	< 2	< 7
	04/01/20 - 07/01/20	< 1	< 2	< 3	< 2	< 14	< 2	< 2	< 2	< 8
	07/01/20 - 09/30/20	< 3	< 2	< 5	< 3	< 18	< 2	< 2	< 4	< 9
	09/30/20 - 12/30/20	< 2	< 2	< 3	< 2	< 17	< 2	< 2	< 2	< 8
	MEAN	-	-	-	-	-	-	-	-	-
CL-11	01/01/20 - 04/01/20	< 2	< 2	< 3	< 2	< 15	< 2	< 2	< 2	< 7
	04/01/20 - 07/01/20	< 2	< 2	< 3	< 2	< 15	< 2	< 2	< 2	< 8
	07/01/20 - 09/30/20	< 2	< 3	< 6	< 4	< 21	< 2	< 2	< 5	< 9
	09/30/20 - 12/30/20	< 2	< 3	< 4	< 3	< 16	< 2	< 2	< 3	< 11
	MEAN	-	-	-	-	-	-	-	-	-
CL-15	01/01/20 - 04/01/20	< 2	< 2	< 4	< 2	< 21	< 2	< 2	< 2	< 8
	04/01/20 - 07/01/20	< 2	< 2	< 3	< 2	< 22	< 2	< 2	< 4	< 13
	07/01/20 - 09/30/20	< 2	< 4	< 4	< 3	< 20	< 3	< 3	< 5	< 11
	09/30/20 - 12/30/20	< 2	< 2	< 3	< 2	< 18	< 2	< 2	< 2	< 7
	MEAN	-	-	-	-	-	-	-	-	-
CL-94	01/01/20 - 04/01/20	< 2	< 2	< 3	< 2	< 18	< 2	< 2	< 2	< 7
	04/01/20 - 07/01/20	< 2	< 2	< 4	< 2	< 16	< 2	< 2	< 2	< 8
	07/01/20 - 09/30/20	< 3	< 4	< 6	< 5	< 26	< 3	< 3	< 6	< 12
	09/30/20 - 12/30/20	< 2	< 3	< 5	< 3	< 22	< 3	< 2	< 3	< 10
	MEAN	-	-	-	-	-	-	-	-	-

Table C-VII.1 **CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020**

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

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

Table C-VII.1 **CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020**

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

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

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VIII.1 CONCENTRATIONS OF I-131 IN MILK SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CONTROL FARM CL-116
01/29/20	< 0.6
02/26/20	< 0.5
03/25/20	< 0.7
04/29/20	< 0.7
05/13/20	< 0.7
05/27/20	< 0.7
06/10/20	< 0.8
06/24/20	< 0.7
07/08/20	< 0.8
07/22/20	< 0.6
08/05/20	< 0.8
08/19/20	< 0.9
09/02/20	< 0.7
09/16/20	< 0.8
09/30/20	< 0.8
10/14/20	< 0.9
10/28/20	< 0.7
11/25/20	< 0.9
12/30/20	< 0.8
MEAN	-

Table C-VIII.2

CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-116	01/29/20	1224 ± 150	< 6	< 7	< 17	< 8	< 14	< 7	< 10	< 8	< 8	< 26	< 9	< 44
	02/26/20	1086 ± 188	< 8	< 8	< 18	< 8	< 17	< 9	< 11	< 9	< 9	< 33	< 10	< 60
	03/25/20	1167 ± 169	< 8	< 9	< 15	< 9	< 17	< 7	< 16	< 10	< 9	< 30	< 10	< 51
	04/29/20	1311 ± 196	< 9	< 8	< 18	< 9	< 17	< 11	< 15	< 6	< 9	< 40	< 10	< 61
	05/13/20	1290 ± 167	< 7	< 8	< 14	< 8	< 16	< 7	< 11	< 9	< 9	< 26	< 10	< 51
	05/27/20	1159 ± 156	< 7	< 5	< 14	< 9	< 16	< 7	< 11	< 7	< 6	< 34	< 8	< 48
	06/10/20	1008 ± 188	< 8	< 8	< 16	< 7	< 19	< 7	< 13	< 10	< 7	< 27	< 9	< 57
	06/24/20	1248 ± 158	< 7	< 7	< 17	< 7	< 13	< 7	< 15	< 9	< 8	< 33	< 6	< 51
	07/08/20	1164 ± 150	< 6	< 7	< 15	< 8	< 16	< 7	< 11	< 6	< 7	< 21	< 8	< 40
	07/22/20	1221 ± 147	< 7	< 8	< 15	< 8	< 15	< 6	< 10	< 7	< 7	< 29	< 8	< 45
	08/05/20	1085 ± 177	< 9	< 8	< 16	< 10	< 18	< 8	< 14	< 8	< 9	< 35	< 11	< 43
	08/19/20	1204 ± 189	< 6	< 7	< 20	< 7	< 18	< 9	< 13	< 6	< 10	< 44	< 10	< 59
	09/02/20	1301 ± 170	< 8	< 8	< 17	< 8	< 13	< 8	< 13	< 6	< 7	< 37	< 8	< 50
	09/16/20	898 ± 145	< 7	< 8	< 15	< 7	< 15	< 7	< 13	< 10	< 7	< 34	< 10	< 54
	09/30/20	1097 ± 123	< 6	< 4	< 11	< 6	< 12	< 5	< 9	< 5	< 5	< 20	< 5	< 36
	10/14/20	818 ± 161	< 7	< 6	< 15	< 8	< 20	< 9	< 10	< 8	< 7	< 31	< 11	< 45
	10/28/20	1032 ± 137	< 6	< 6	< 13	< 7	< 13	< 8	< 11	< 7	< 7	< 29	< 10	< 44
	11/25/20	887 ± 163	< 7	< 7	< 21	< 9	< 15	< 9	< 15	< 11	< 8	< 33	< 9	< 63
	12/30/20	885 ± 157	< 7	< 7	< 17	< 9	< 11	< 8	< 13	< 8	< 8	< 38	< 8	< 54
	MEAN ± 2 STD DEV	1110 ± 305	-	-	-	-	-	-	-	-	-	-	-	-

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

Table C-IX.1

CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-114														
Kale	06/24/20	< 34	< 34	< 72	< 34	< 66	< 33	< 59	< 49	< 36	< 36	< 128	< 36	< 185
Cabbage	06/24/20	< 26	< 24	< 61	< 32	< 60	< 28	< 50	< 37	< 30	< 26	< 107	< 41	< 126
Broccoli	06/24/20	< 24	< 24	< 50	< 26	< 49	< 22	< 42	< 31	< 23	< 23	< 90	< 27	< 123
Broccoli	07/29/20	< 37	< 25	< 65	< 36	< 85	< 33	< 44	< 45	< 36	< 27	< 136	< 38	< 184
Cabbage	07/29/20	< 26	< 34	< 64	< 44	< 69	< 32	< 49	< 43	< 35	< 32	< 144	< 43	< 157
Kale	07/29/20	< 40	< 35	< 91	< 38	< 74	< 41	< 59	< 52	< 32	< 34	< 174	< 45	< 208
(1)	08/26/20													
Cabbage	08/26/20	< 23	< 28	< 55	< 29	< 53	< 31	< 46	< 35	< 32	< 32	< 115	< 39	< 167
Cabbage	09/30/20	< 19	< 21	< 44	< 25	< 46	< 26	< 36	< 29	< 19	< 21	< 83	< 23	< 123
Kale	09/30/20	< 42	< 21	< 104	< 37	< 70	< 25	< 64	< 43	< 46	< 30	< 177	< 60	< 193
Broccoli	09/30/20	< 26	< 30	< 50	< 25	< 64	< 29	< 47	< 32	< 25	< 28	< 102	< 34	< 139
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-
CL-115														
Broccoli	06/24/20	< 25	< 26	< 49	< 31	< 65	< 25	< 42	< 35	< 27	< 26	< 103	< 31	< 120
Broccoli	06/24/20	< 25	< 25	< 57	< 21	< 58	< 20	< 37	< 29	< 26	< 27	< 107	< 35	< 118
Cabbage	06/24/20	< 23	< 26	< 37	< 22	< 38	< 22	< 35	< 28	< 26	< 23	< 94	< 27	< 122
Broccoli	07/29/20	< 31	< 29	< 70	< 25	< 59	< 26	< 52	< 45	< 32	< 24	< 121	< 27	< 143
Broccoli	07/29/20	< 33	< 29	< 88	< 39	< 88	< 42	< 57	< 52	< 35	< 35	< 177	< 58	< 208
Cabbage	07/29/20	< 31	< 30	< 59	< 40	< 75	< 30	< 57	< 47	< 34	< 36	< 142	< 41	< 177
Kale	08/26/20	< 36	< 31	< 72	< 36	< 67	< 34	< 52	< 44	< 36	< 33	< 151	< 29	< 182
Kale	08/26/20	< 41	< 39	< 71	< 43	< 86	< 42	< 71	< 55	< 48	< 44	< 154	< 49	< 231
Broccoli	09/30/20	< 27	< 29	< 65	< 35	< 78	< 28	< 45	< 45	< 34	< 35	< 104	< 31	< 197
Broccoli	09/30/20	< 47	< 41	< 105	< 54	< 94	< 48	< 86	< 52	< 46	< 45	< 138	< 65	< 244
Corn	09/30/20	< 25	< 29	< 73	< 37	< 83	< 31	< 50	< 41	< 33	< 32	< 153	< 18	< 163
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-
CL-117	*(1)*													
CL-118														
Broccoli	06/24/20	< 37	< 31	< 62	< 39	< 94	< 39	< 57	< 48	< 39	< 34	< 144	< 51	< 200
Broccoli	06/24/20	< 23	< 23	< 48	< 25	< 49	< 22	< 38	< 34	< 24	< 24	< 97	< 19	< 110
Kale	06/24/20	< 27	< 23	< 53	< 26	< 55	< 25	< 39	< 33	< 26	< 26	< 105	< 34	< 128
Broccoli	07/29/20	< 39	< 34	< 73	< 44	< 79	< 40	< 44	< 50	< 41	< 41	< 136	< 30	< 176
Kale	07/29/20	< 32	< 36	< 63	< 38	< 54	< 33	< 56	< 46	< 31	< 34	< 131	< 40	< 187
Kale	07/29/20	< 38	< 26	< 48	< 42	< 74	< 36	< 48	< 46	< 32	< 29	< 156	< 57	< 163
Kale	08/26/20	< 55	< 40	< 104	< 46	< 105	< 54	< 79	< 59	< 53	< 47	< 218	< 69	< 263
Kale	08/26/20	< 35	< 36	< 62	< 38	< 80	< 36	< 62	< 48	< 44	< 41	< 134	< 44	< 204
Kale	09/30/20	< 31	< 39	< 62	< 27	< 82	< 28	< 51	< 43	< 38	< 30	< 135	< 34	< 203
Cabbage/Kale	09/30/20	< 38	< 42	< 82	< 45	< 104	< 48	< 66	< 58	< 46	< 42	< 197	< 34	< 210
Broccoli	09/30/20	< 38	< 32	< 75	< 38	< 88	< 33	< 59	< 53	< 41	< 39	< 159	< 56	< 232
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-IX.2

CONCENTRATIONS OF GAMMA EMITTERS IN GRASS SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-01	05/13/20	< 27	< 22	< 60	< 28	< 70	< 30	< 39	< 29	< 32	< 25	< 111	< 13	< 182
	05/27/20	< 26	< 23	< 62	< 26	< 61	< 22	< 48	< 31	< 30	< 25	< 114	< 36	< 170
	06/10/20	< 32	< 32	< 73	< 48	< 84	< 29	< 59	< 34	< 33	< 26	< 114	< 37	< 178
	06/24/20	< 26	< 33	< 62	< 28	< 69	< 32	< 59	< 46	< 38	< 27	< 135	< 36	< 180
	07/08/20	< 37	< 33	< 80	< 33	< 85	< 39	< 50	< 46	< 32	< 34	< 120	< 39	< 210
	07/22/20	< 21	< 25	< 52	< 34	< 77	< 33	< 56	< 33	< 24	< 28	< 97	< 28	< 137
	08/05/20	< 28	< 25	< 50	< 32	< 66	< 26	< 47	< 39	< 37	< 31	< 109	< 40	< 186
	08/19/20	< 39	< 40	< 93	< 39	< 102	< 42	< 69	< 40	< 53	< 36	< 123	< 36	< 206
	09/02/20	< 37	< 32	< 66	< 35	< 96	< 38	< 61	< 39	< 41	< 39	< 159	< 24	< 237
	09/16/20	< 20	< 20	< 42	< 22	< 49	< 23	< 39	< 30	< 25	< 26	< 97	< 27	< 136
	09/30/20	< 22	< 24	< 53	< 24	< 45	< 23	< 39	< 35	< 24	< 22	< 102	< 27	< 138
	10/14/20	< 20	< 23	< 56	< 27	< 59	< 27	< 32	< 31	< 25	< 26	< 112	< 33	< 152
	10/28/20	< 31	< 32	< 72	< 45	< 75	< 35	< 48	< 48	< 41	< 37	< 152	< 43	< 186
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-
CL-02	05/13/20	< 39	< 41	< 60	< 53	< 107	< 38	< 73	< 41	< 43	< 45	< 131	< 33	< 240
	05/27/20	< 31	< 30	< 68	< 29	< 64	< 30	< 57	< 37	< 30	< 25	< 137	< 41	< 167
	06/10/20	< 29	< 33	< 71	< 30	< 74	< 32	< 60	< 35	< 32	< 30	< 113	< 32	< 206
	06/24/20	< 23	< 23	< 46	< 25	< 60	< 24	< 45	< 36	< 31	< 23	< 113	< 31	< 131
	07/08/20	< 35	< 30	< 69	< 31	< 77	< 32	< 43	< 46	< 39	< 35	< 136	< 33	< 205
	07/22/20	< 28	< 26	< 60	< 25	< 59	< 26	< 41	< 42	< 29	< 21	< 98	< 17	< 182
	08/05/20	< 34	< 38	< 60	< 34	< 74	< 29	< 50	< 43	< 39	< 35	< 133	< 49	< 197
	08/19/20	< 38	< 32	< 81	< 32	< 68	< 36	< 64	< 49	< 39	< 42	< 181	< 49	< 218
	09/02/20	< 40	< 41	< 91	< 42	< 106	< 35	< 62	< 41	< 48	< 36	< 143	< 25	< 245
	09/16/20	< 24	< 20	< 49	< 23	< 45	< 24	< 37	< 28	< 24	< 22	< 92	< 18	< 138
	09/30/20	< 31	< 32	< 85	< 41	< 89	< 41	< 65	< 56	< 41	< 43	< 168	< 32	< 258
	10/14/20	< 19	< 17	< 41	< 22	< 43	< 18	< 33	< 19	< 20	< 18	< 68	< 18	< 100
	10/28/20	< 40	< 30	< 48	< 36	< 78	< 34	< 39	< 43	< 32	< 34	< 137	< 41	< 183
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-IX.2

CONCENTRATIONS OF GAMMA EMITTERS IN GRASS SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140	Ce-144
CL-08	05/13/20	< 26	< 26	< 56	< 26	< 65	< 31	< 41	< 29	< 30	< 27	< 97	< 31	< 147
	05/27/20	< 27	< 23	< 59	< 23	< 62	< 21	< 43	< 35	< 29	< 27	< 83	< 28	< 166
	06/10/20	< 36	< 31	< 71	< 26	< 84	< 26	< 46	< 32	< 28	< 32	< 116	< 29	< 189
	06/24/20	< 32	< 25	< 70	< 27	< 56	< 32	< 42	< 43	< 36	< 30	< 123	< 34	< 126
	07/08/20	< 24	< 25	< 64	< 27	< 70	< 33	< 46	< 41	< 27	< 32	< 117	< 37	< 165
	07/22/20	< 26	< 27	< 67	< 29	< 53	< 24	< 44	< 35	< 25	< 26	< 119	< 34	< 161
	08/05/20	< 36	< 33	< 66	< 42	< 74	< 37	< 55	< 53	< 37	< 32	< 146	< 45	< 226
	08/19/20	< 29	< 32	< 70	< 26	< 76	< 30	< 52	< 40	< 38	< 36	< 123	< 28	< 179
	09/02/20	< 32	< 33	< 73	< 32	< 100	< 34	< 71	< 36	< 39	< 27	< 128	< 30	< 184
	09/16/20	< 23	< 22	< 47	< 29	< 62	< 25	< 40	< 33	< 27	< 25	< 97	< 26	< 139
	09/30/20	< 34	< 36	< 79	< 39	< 89	< 40	< 63	< 51	< 40	< 39	< 140	< 40	< 258
	10/14/20	< 38	< 33	< 61	< 33	< 77	< 33	< 54	< 48	< 38	< 30	< 122	< 26	< 211
	10/28/20	< 24	< 30	< 81	< 35	< 59	< 36	< 57	< 51	< 37	< 35	< 127	< 29	< 216
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-
CL-116	05/13/20	< 26	< 27	< 67	< 34	< 73	< 25	< 56	< 31	< 36	< 25	< 109	< 35	< 165
	05/27/20	< 29	< 32	< 70	< 34	< 63	< 26	< 50	< 41	< 33	< 26	< 128	< 36	< 154
	06/10/20	< 29	< 30	< 75	< 35	< 61	< 31	< 55	< 38	< 36	< 30	< 89	< 25	< 184
	06/24/20	< 35	< 30	< 85	< 40	< 90	< 37	< 53	< 46	< 37	< 32	< 140	< 47	< 176
	07/08/20	< 27	< 25	< 45	< 28	< 66	< 25	< 42	< 41	< 30	< 26	< 131	< 34	< 177
	07/22/20	< 28	< 23	< 42	< 23	< 57	< 23	< 34	< 27	< 18	< 27	< 95	< 37	< 116
	08/05/20	< 34	< 28	< 69	< 35	< 63	< 32	< 48	< 43	< 33	< 31	< 118	< 39	< 155
	08/19/20	< 32	< 33	< 80	< 44	< 90	< 31	< 56	< 45	< 40	< 41	< 156	< 40	< 187
	09/02/20	< 29	< 36	< 61	< 36	< 91	< 33	< 48	< 30	< 34	< 29	< 98	< 15	< 161
	09/16/20	< 19	< 17	< 41	< 20	< 45	< 20	< 33	< 26	< 21	< 19	< 82	< 18	< 102
	09/30/20	< 30	< 28	< 64	< 42	< 65	< 32	< 63	< 47	< 36	< 38	< 111	< 28	< 206
	10/14/20	< 16	< 16	< 33	< 17	< 36	< 16	< 28	< 19	< 18	< 17	< 62	< 20	< 95
	10/28/20	< 42	< 31	< 68	< 34	< 75	< 32	< 57	< 40	< 31	< 38	< 96	< 19	< 184
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-X.1 QUARTERLY DLR RESULTS FOR CLINTON POWER STATION, 2020

Location	Qtr 1 (mrem)	Qtr 2 (mrem)	Qtr 3 (mrem)	Qtr 4 (mrem)	Normalized Annual Dose, M_A (mrem/yr)	B_A [1]	B_A + MDD_A [2]	Annual Facility Dose, F_A (mrem)
CL-01	17.7	19.2	21.3	19.1	77.3	74.0	83.6	ND
CL-02	19.5	18.6	21.9	19.6	79.6	76.7	86.2	ND
CL-03	18.3	20.1	20.8	19.6	78.8	74.7	84.2	ND
CL-04	18.6	18.4	20.3	18.5	75.8	72.8	82.3	ND
CL-05	18.5	18.6	20.0	20.8	77.9	76.5	86.0	ND
CL-06	16.4	18.6	18.5	17.5	71.0	65.8	75.3	ND
CL-07	*(3)*	*(3)*	21.5	18.6	40.1	69.5	79.0	ND
CL-08	18.1	18.9	19.2	18.3	74.5	74.0	83.5	ND
CL-11	17.3	18.2	18.6	15.8	69.9	69.3	78.8	ND
CL-15	16.3	16.7	19.0	16.1	68.1	66.3	75.8	ND
CL-22	19.4	20.0	21.5	21.0	81.9	77.6	87.1	ND
CL-23	18.2	19.9	21.8	22.4	82.3	81.5	91.0	ND
CL-24	18.6	20.6	23.0	21.2	83.4	80.5	90.0	ND
CL-33	18.9	19.9	21.1	20.7	80.6	79.2	88.7	ND
CL-34	18.0	18.0	21.8	19.2	77.0	77.5	87.0	ND
CL-35	17.6	17.9	19.0	18.3	72.8	71.6	81.1	ND
CL-36	18.7	17.4	21.0	19.8	76.9	74.2	83.7	ND
CL-37	17.8	18.3	19.1	18.4	73.6	71.1	80.6	ND
CL-41	18.1	21.1	22.8	21.0	83.0	79.4	88.9	ND
CL-42	17.8	19.1	19.4	18.3	74.6	74.2	83.7	ND
CL-43	18.6	21.6	21.3	21.1	82.6	79.7	89.2	ND
CL-44	18.3	18.9	20.5	19.9	77.6	75.4	84.9	ND
CL-45	19.8	21.3	23.4	21.0	85.5	80.6	90.1	ND
CL-46	18.5	18.2	19.8	18.6	75.1	73.0	82.5	ND
CL-47	18.4	20.5	20.5	22.2	81.6	79.4	88.9	ND
CL-48	17.3	20.5	20.9	19.4	78.1	74.2	83.7	ND
CL-49	19.6	21.0	22.6	18.9	82.1	79.8	89.3	ND
CL-51	19.2	21.7	22.2	20.4	83.5	76.6	86.1	ND
CL-52	19.5	20.8	21.3	22.0	83.6	75.6	85.1	ND
CL-53	17.0	19.9	20.8	19.4	77.1	71.9	81.4	ND
CL-54	19.5	19.6	22.2	19.7	81.0	78.0	87.5	ND
CL-55	19.7	21.6	21.0	19.3	81.6	78.7	88.2	ND
CL-56	19.0	21.0	22.4	21.2	83.6	81.0	90.5	ND
CL-57	19.7	20.8	20.0	20.2	80.7	81.5	91.0	ND
CL-58	18.0	20.9	19.8	21.3	80.0	79.1	88.6	ND
CL-60	19.9	19.4	19.4	17.7	76.4	79.0	88.5	ND
CL-61	18.7	20.0	19.5	20.7	78.9	78.1	87.6	ND
CL-63	16.0	18.0	17.7	17.2	68.9	66.6	76.1	ND
CL-64	18.5	21.1	20.9	20.3	80.8	75.9	85.4	ND
CL-65	20.0	21.0	21.1	20.8	82.9	80.5	90	ND
CL-74	17.9	17.8	18.0	16.3	70	68	77.5	ND
CL-75	16.2	20.6	19.0	19.0	74.8	75.7	85.2	ND
CL-76	19.6	20.8	20.9	19.7	81	78.7	88.2	ND
CL-77	17.9	17.7	18.9	18.9	73.4	72.2	81.7	ND
CL-78	18.2	18.2	18.9	20.3	75.6	72	81.5	ND
CL-79	17.3	20.3	19.6	20.1	77.3	77.1	86.6	ND
CL-80	18.7	19.1	19.0	17.8	74.6	75.5	85	ND
CL-81	18.9	20.6	21.0	20.4	80.9	76.8	86.3	ND
CL-84	19.7	17.2	19.1	20.8	76.8	76.3	85.8	ND
CL-90	15.7	15.2	16.3	15.2	62.4	62.2	71.7	ND
CL-91	17.4	18.6	18.7	18.5	73.2	69.5	79	ND
CL-97	20.1	22.1	20.4	21.3	83.9	77.6	87.1	ND
CL-99	15.1	16.2	16.2	16.9	64.4	60.6	70.1	ND
CL-114	16.5	18.9	20.7	20.0	76.1	72.3	81.8	ND

[1] **Baseline background dose (B_A):** The estimated mean background radiation dose at each field monitoring location annually based on historical measurements, excluding any dose contribution from the monitored facility

[2] **Minimum differential dose (MDD_A):** The smallest amount of facility related dose at each monitored location annually above the baseline background dose that can be reliably detected by an environmental dosimetry system

(3) SEE PROGRAM EXCEPTIONS FOR EXPLANATION

FIGURE C-1
MEAN MONTHLY GROSS BETA CONCENTRATION IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF CPS, 2020

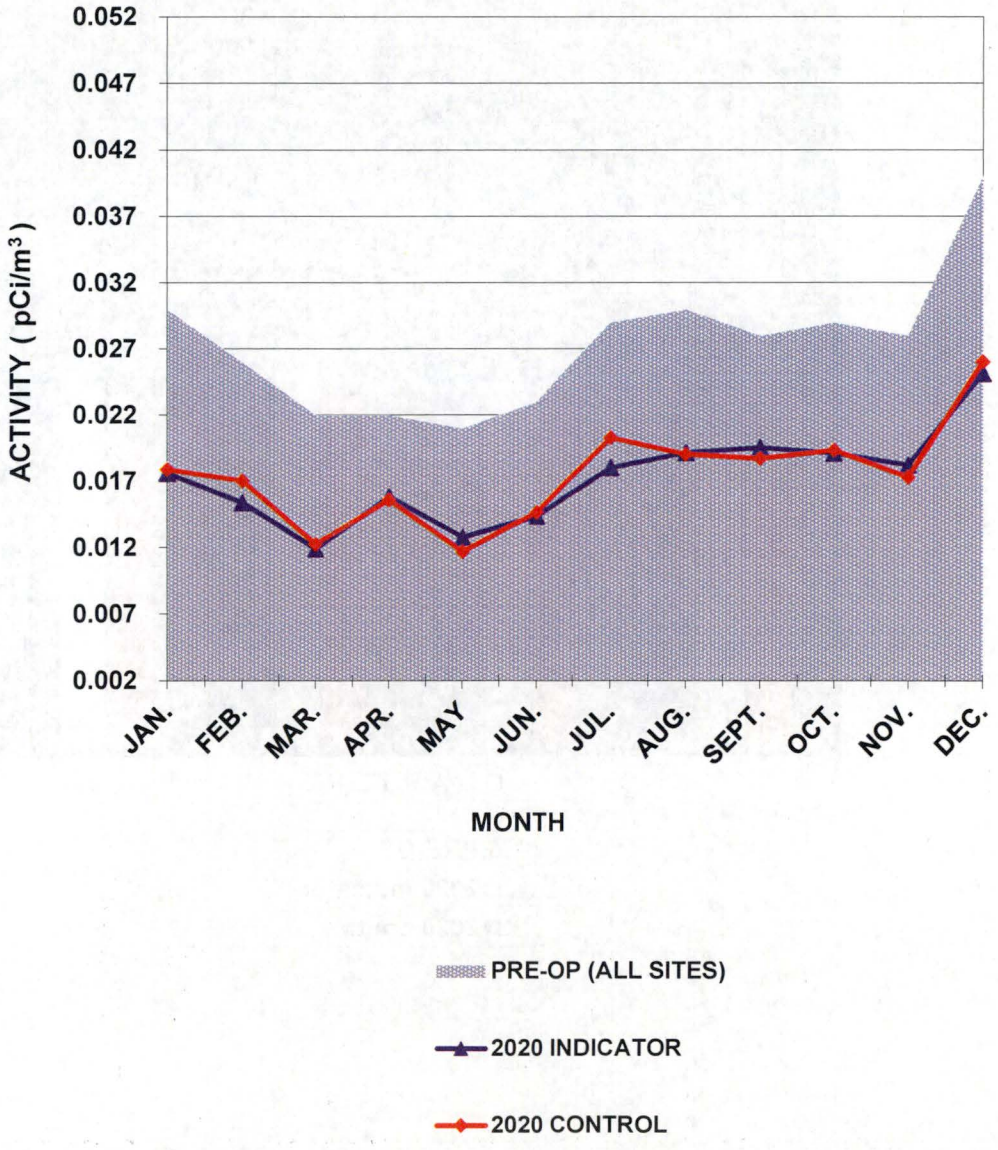
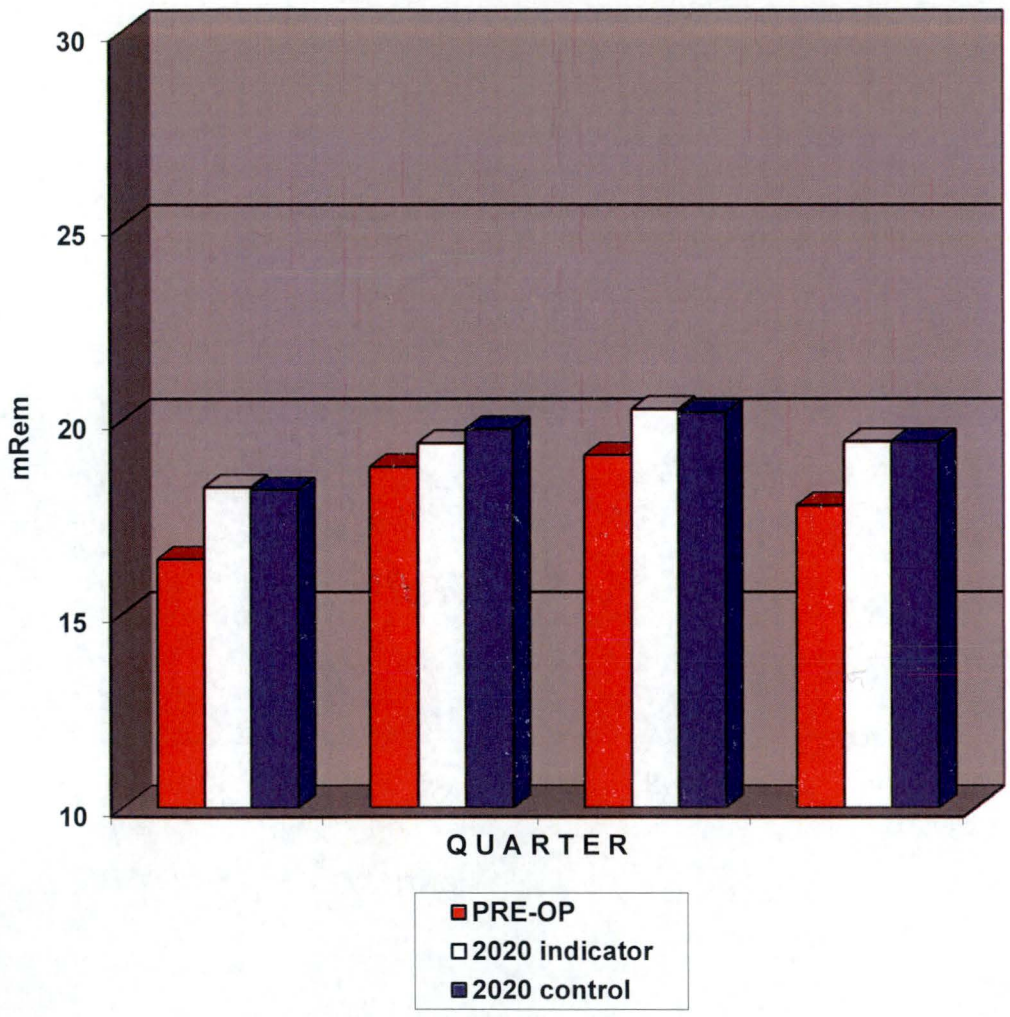


FIGURE C-2
MEAN QUARTERLY AMBIENT GAMMA RADIATION LEVELS (DLR)
IN THE VICINITY OF CPS, 2020



APPENDIX D

INTER-LABORATORY COMPARISON PROGRAM

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Table D-1 **Analytics Environmental Radioactivity Cross Check Program**
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Value	Known Value [a]	Ratio of TBE to Known Result	Evaluation [b]
September 2020	E13247	Milk	Sr-89	pCi/L	62.8	95.4	0.66	N[1]
			Sr-90	pCi/L	12.0	12.8	0.94	A
	E13248	Milk	Ce-141	pCi/L	156	150	1.04	A
			Co-58	pCi/L	172	180	0.96	A
			Co-60	pCi/L	369	379	0.97	A
			Cr-51	pCi/L	372	372	1.00	A
			Cs-134	pCi/L	171	200	0.85	A
			Cs-137	pCi/L	241	250	0.96	A
			Fe-59	pCi/L	217	200	1.08	A
			I-131	pCi/L	84.6	95.0	0.89	A
			Mn-54	pCi/L	175	180	0.97	A
			Zn-65	pCi/L	252	270	0.93	A
	E13249	Charcoal	I-131	pCi	70.2	75.8	0.93	A
	E13250	AP	Ce-141	pCi	101	101	1.00	A
			Co-58	pCi	111	120	0.92	A
			Co-60	pCi	249	254	0.98	A
			Cr-51	pCi	287	249	1.15	A
			Cs-134	pCi	114	134	0.85	A
			Cs-137	pCi	159	168	0.95	A
			Fe-59	pCi	127	134	0.95	A
			Mn-54	pCi	114	121	0.94	A
			Zn-65	pCi	168	181	0.93	A
	E13251	Soil	Ce-141	pCi/g	0.241	0.191	1.26	W
			Co-58	pCi/g	0.211	0.228	0.93	A
			Co-60	pCi/g	0.466	0.481	0.97	A
			Cr-51	pCi/g	0.450	0.472	0.95	A
			Cs-134	pCi/g	0.273	0.254	1.07	A
			Cs-137	pCi/g	0.370	0.390	0.95	A
			Fe-59	pCi/g	0.233	0.254	0.92	A
			Mn-54	pCi/g	0.217	0.229	0.95	A
			Zn-65	pCi/g	0.368	0.343	1.07	A
	E13252	AP	Sr-89	pCi	79.9	100.0	0.80	A
			Sr-90	pCi	12.1	13.4	0.90	A

(a) 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

(b) 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

*(1) See **NCR 20-19***

Table D-1 **Analytics Environmental Radioactivity Cross Check Program**
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Value	Known Value [(a)]	Ratio of TBE to Known Result	Evaluation [(b)]
December 2020	E13254	Milk	Sr-89	pCi/L	82.2	89.7	0.92	A
			Sr-90	pCi/L	12.4	13.0	0.96	A
	E13255	Milk	Ce-141	pCi/L	91.1	100	0.91	A
			Co-58	pCi/L	77.5	84.3	0.92	A
			Co-60	pCi/L	147	152	0.97	A
			Cr-51	pCi/L	259	253	1.02	A
			Cs-134	pCi/L	97.1	108	0.90	A
			Cs-137	pCi/L	117	127	0.92	A
			Fe-59	pCi/L	114	112	1.02	A
			I-131	pCi/L	84.3	91.9	0.92	A
			Mn-54	pCi/L	137	143	0.96	A
			Zn-65	pCi/L	175	190	0.92	A
	E13256	Charcoal	I-131	pCi	70.2	78.2	0.90	A
	E13257A	AP	Ce-141	pCi	67.4	74.6	0.90	A
			Co-58	pCi	57.9	62.9	0.92	A
			Co-60	pCi	108	113	0.95	A
			Cr-51	pCi	162	189	0.86	A
			Cs-134	pCi	68.1	80.4	0.85	A
			Cs-137	pCi	82.4	95.0	0.87	A
			Fe-59	pCi	80.5	83.7	0.96	A
			Mn-54	pCi	102	107	0.95	A
			Zn-65	pCi	115	142	0.81	A
	E13258	Soil	Ce-141	pCi/g	0.167	0.170	0.98	A
			Co-58	pCi/g	0.125	0.143	0.87	A
			Co-60	pCi/g	0.245	0.257	0.95	A
			Cr-51	pCi/g	0.393	0.429	0.92	A
			Cs-134	pCi/g	0.147	0.183	0.80	A
			Cs-137	pCi/g	0.260	0.288	0.90	A
			Fe-59	pCi/g	0.199	0.190	1.05	A
			Mn-54	pCi/g	0.229	0.243	0.94	A
			Zn-65	pCi/g	0.320	0.322	0.99	A
	E13259	AP	Sr-89	pCi	85.0	78.6	1.08	A
			Sr-90	pCi	13.1	11.4	1.15	A

(a) 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

(b) Analytics evaluation based on TBE internal QC limits:

A = Acceptable - reported result falls within ratio limits of 0.80-1.20

W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30

N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

Table D-2 **DOE's Mixed Analyte Performance Evaluation Program (MAPEP)**
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Value	Known Value [a]	Acceptance Range	Evaluation [b]
February 2020	20-GrF42	AP	Gross Alpha	Bq/sample	0.676	1.24	0.37 - 2.11	A
			Gross Beta	Bq/sample	2.03	2.00	1.00 - 3.00	A
	20-MaS42	Soil	Ni-63	Bq/kg	0.01		*(1)*	A
			Sr-90	Bq/kg	348	340	238 - 442	A
	20-MaW42	Water	Ni-63	Bq/L	11.6	11.1	7.8 - 14.4	A
			Pu-238	Bq/L	0.926	0.94	0.66 - 1.22	A
			Pu-239/240	Bq/L	0.712	0.737	0.516 - 0.958	A
	20-RdF42	AP	U-234/233	Bq/sample	0.0416	0.075	0.053 - 0.098	N(3)
			U-238	Bq/sample	0.0388	0.078	0.055 - 0.101	N(3)
	20-RdV42	Vegetation	Cs-134	Bq/sample	3.23	3.82	2.67 - 4.97	A
			Cs-137	Bq/sample	2.64	2.77	1.94 - 3.60	A
			Co-57	Bq/sample	0.0281		*(1)*	A
			Co-60	Bq/sample	2.62	2.79	1.95 - 3.63	A
			Mn-54	Bq/sample	4.3	4.58	3.21 - 5.95	A
			Sr-90	Bq/sample	0.396	0.492	0.344 - 0.640	A
			Zn-65	Bq/sample	3.93	3.79	2.65 - 4.93	A
August 2020	20-GrF43	AP	Gross Alpha	Bq/sample	0.267	0.528	0.158 - 0.898	A
			Gross Beta	Bq/sample	0.939	0.915	0.458 - 1.373	A
	20-MaS43	Soil	Ni-63	Bq/kg	438	980	686 - 1274	N(4)
			Tc-99	Bq/kg	1.11		*(1)*	A
	20-MaW43	Water	Ni-63	Bq/L	0.175		*(1)*	A
			Tc-99	Bq/L	8.8	9.4	6.6 - 12.2	A
	20-RdV43	Vegetation	Cs-134	Bq/sample	3.635	4.94	3.46 - 6.42	W
			Cs-137	Bq/sample	0.0341		*(1)*	A
			Co-57	Bq/sample	5.855	6.67	4.67 - 8.67	W
			Co-60	Bq/sample	3.122	4.13	2.89 - 5.37	W
			Mn-54	Bq/sample	4.524	5.84	4.09 - 7.59	A
			Sr-90	Bq/sample	1.01	1.39	0.97 - 1.81	W
			Zn-65	Bq/sample	4.706	6.38	4.47 - 8.29	W

(a) 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

(b) DOE/MAPEP evaluation:

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

(1) False positive test

*(3) See **NCR 20-13***

*(4) See **NCR 20-20***

Table D-3 **ERA Environmental Radioactivity Cross Check Program**
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Value	Known Value [a]	Acceptance Limits	Evaluation [b]
March 2020	MRAD-32	Water	Am-241	pCi/L	52.5	45.3	31.1 - 57.9	A
			Fe-55	pCi/L	155	152	89.3 - 221	A
			Pu-238	pCi/L	34.0	36.4	21.9 - 47.2	A
			Pu-239	pCi/L	30.9	33.6	20.8 - 41.4	A
April 2020	RAD-121	Water	Ba-133	pCi/L	41.8	41.8	34.0- 46.7	A
			Cs-134	pCi/L	42.9	46.3	37.1 - 50.9	A
			Cs-137	pCi/L	226	234	211 - 259	A
			Co-60	pCi/L	52.4	50.3	45.3 - 57.9	A
			Zn-65	pCi/L	83.3	86.8	78.1 - 104	A
			GR-A	pCi/L	20.1	23.6	11.9 - 31.6	A
			GR-B	pCi/L	45.6	60.5	41.7 - 67.2	A
			U-Nat	pCi/L	18.45	18.6	14.9 - 20.9	A
			H-3	pCi/L	14200	14100	12300 - 15500	A
			Sr-89	pCi/L	58.0	60.1	48.3 - 67.9	A
			Sr-90	pCi/L	34.1	44.7	33.0 - 51.2	A
			I-131	pCi/L	27.4	28.9	24.1 - 33.8	A
September 2020	MRAD-33	Soil	Sr-90	pCi/Kg	4360	4980	1550 - 7760	A
		AP	Fe-55	pCi/Filter	189	407	149 - 649	A
			U-234	pCi/Filter	17.9	18.3	13.6 - 21.4	A
			U-238	pCi/Filter	19.1	18.1	13.7 - 21.6	A
		Water	Am-241	pCi/L	160	176	121 - 225	A
			Fe-55	pCi/L	299	298	175 - 433	A
			Pu-238	pCi/L	200	191	115 - 247	A
			Pu-239	pCi/L	105	100	61.9 - 123	A
October 2020	RAD-123	Water	Ba-133	pCi/L	37.1	37.0	29.8 - 41.6	A
			Cs-134	pCi/L	50.6	52.7	42.5 - 58.0	A
			Cs-137	pCi/L	131	131	118 - 146	A
			Co-60	pCi/L	62.9	60.5	54.4 - 69.1	A
			Zn-65	pCi/L	167	162	146 - 191	A
			GR-A	pCi/L	40.0	26.2	13.3 - 34.7	N[1]
			GR-B	pCi/L	47.5	69.1	48.0 - 76.0	N[1]
			U-Nat	pCi/L	17.2	20.3	16.3 - 22.7	A
			H-3	pCi/L	23800	23200	20,300 - 25,500	A
			Sr-89	pCi/L	41.1	43.3	33.4 - 50.5	A
			Sr-90	pCi/L	28.5	30.2	22.0 - 35.0	A
			I-131	pCi/L	22.9	28.2	23.5 - 33.1	N[2]
November 2020	QR111920K	Water	GR-A	pCi/L	50.7	52.4	27.3 - 65.6	A
			GR-B	pCi/L	24.9	24.3	15.0 - 32.3	A

(a) 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.

(b) ERA evaluation:
A = Acceptable - Reported value falls within the Acceptance Limits
N = Not Acceptable - Reported value falls outside of the Acceptance Limits

*(1) See **NCR 20-18***

*(2) See **NCR 20-17***

APPENDIX E

ERRATA DATA

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There was no errata data for 2020.

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APPENDIX F

ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)

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ARGPPR Table Of Contents

ARGPPR Appendices

I. Summary and Conclusions

In 2006, Exelon instituted a comprehensive program to evaluate the impact of station operations on groundwater and surface water in the vicinity of Clinton Power Station (CPS). This evaluation involved numerous station personnel and contractor support personnel. This report covers groundwater and surface water samples, collected outside of the Licensee required Off-Site Dose Calculation Manual (ODCM) requirements, both on and off station property in 2020. During that time period, 101 analyses were performed on 57 samples from 37 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 2020.

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 ten times lower than that required by the United States Environmental Protection Agency (USEPA) regulation.

Strontium-89 (Sr-89) was not detected in any samples. Strontium-90 (Sr-90) was not detected in any samples.

Tritium was not detected in any of the groundwater or surface water samples at concentrations greater than the United States Environmental Protection Agency (USEPA) drinking water standard (and the Nuclear Regulatory Commission Reporting Limit) of 20,000 pCi/L. Background levels of tritium were detected at concentrations greater than the self-imposed LLD of 200 pCi/L in two of seventeen groundwater monitoring locations. The tritium concentrations ranged from 239 ± 123 pCi/L to 303 ± 124 pCi/L. Tritium was not detected in any surface water or precipitation water samples.

Hard-to-Detect analyses of iron-55 (Fe-55) and nickel-63 (Ni-63) were performed on ten groundwater locations. Hard-to-Detects may also include americium-241 (Am-241), cerium-242 (Cm-242), cerium-243/244 (Cm-243/244), plutonium-238 (Pu-238), plutonium-239/240 (Pu-239/240), uranium-234 (U-234), uranium-235 (U-235) and uranium-238 (U-238). The nuclides analyzed were not detected in any samples.

II. Introduction

The Clinton Power Station (CPS), consisting of one approximately 1,140 MW gross electrical power output boiling water reactor is located in Harp Township, DeWitt County, Illinois. CPS is owned and operated by Exelon and became operational in 1987. Unit No. 1 went critical on February 27, 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 2020.

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

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

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

B. Implementation of the Objectives

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

1. Exelon and its consultant identified locations as described in the Phase 1 study. Phase 1 studies were conducted by Connestoga Rovers and Associates (CRA) and the results and conclusions were made available to state and federal regulators as well as the public in station specific reports.

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

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

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

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

C. Program Description

1. Sample Collection

Sample locations can be found in Table A–1 and Figures A–1, A–2, A–3, and A–4 Appendix A.

Groundwater, Surface Water and Precipitation Water

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

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

D. Characteristics of Tritium (H-3)

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

Tritiated water behaves the same as ordinary water in both the environment and the body. Tritium can be taken into the body by drinking

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

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

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

III. Program Description

A. Sample Analysis

This section describes the general analytical methodologies used by TBE to analyze the environmental samples for radioactivity for the Clinton Power Station RGPP in 2020. In order to achieve the stated objectives, the current program includes the following analyses:

1. Concentrations of gamma emitters in groundwater
2. Concentrations of strontium in groundwater
3. Concentrations of tritium in groundwater, surface water and precipitation samples
4. Concentrations of Fe-55 in groundwater
5. Concentrations of Ni-63 in groundwater

B. Data Interpretation

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

1. Lower Limit of Detection and Minimum Detectable Concentration

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

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

2. Laboratory Measurements Uncertainty

   The estimated uncertainty in measurement of tritium in environmental samples is frequently on the order of 50% of the measurement value. Statistically, the exact value of a measurement is expressed as a range with a stated level of

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

Analytical uncertainties are reported at the 95% confidence level in this report for reporting consistency with the AREOR.

C. Background Analysis

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

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

1. Background Concentrations of Tritium

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

a. Tritium Production

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

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

b. Precipitation Data

Precipitation samples are routinely collected at stations around the world for the analysis of tritium and other radionuclides. Two publicly available databases that provide tritium concentrations in precipitation are Global Network of Isotopes in Precipitation (GNIP) and USEPA's RadNet database. GNIP provides tritium precipitation concentration data for samples collected world wide from 1960 to 2006. RadNet provides tritium precipitation concentration data for samples collected at stations through out the U.S. from 1960 up to and including 2006. Based on GNIP data for sample stations located in the U.S. Midwest, tritium concentrations peaked around 1963. This peak, which approached 10,000 pCi/L for some stations, coincided with the atmospheric testing of thermonuclear weapons. Tritium concentrations in surface water showed a sharp decline up until 1975, followed by a gradual decline since that time. Tritium concentrations in Midwest precipitation have typically been below 100 pCi/L since around 1980. Tritium concentrations in wells may still be above the 200 pCi/L detection limit from the external causes described above.

c. Surface Water Data

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

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

IV. Results and Discussion

A. Program Exceptions

1. Sample Anomalies

There were no sample anomalies in 2020.

2. Missed Samples

The 2nd quarter 2020 RGPP sampling round was cancelled due to the COVID-19 pandemic. Therefore, no RGPP sampling activities were completed between April and June 2020.

B. Program Changes

Exelon-specific RGPP procedures were fully rewritten to enhance the programs. Program changes include, but are not limited to, additional precipitation samples, reformed sample frequencies and altered LLD limitations.

C. Groundwater Results

Groundwater

Baseline samples were collected from off-site wells during three (3) phases at the station. Analytical results are discussed below:

Tritium

Samples from seventeen locations were analyzed for tritium activity. Tritium values ranged from below the Exelon-imposed LLD of 200 pCi/l to 303 pCi/l. (Table B–I.1 Appendix B)

Strontium

Sr-89 was not detected in any of the samples analyzed and the required LLD of 10 pCi/L was met. Sr-90 was also not detected in any of the samples analyzed and the required LLD of 1 pCi/L was met. (Table B-I.1 Appendix B)

Gamma Emitters

No plant-produced radionuclides were detected. (Table B–I.2, Appendix B)

Hard-to-Detect

Hard-to-Detect analyses for Fe-55 and Ni-63 were performed on ten groundwater locations. Neither Fe-55 nor Ni-63 was detected in any of the samples analyzed. (Table B–I.3 Appendix B)

D. Surface Water Results

Baseline samples were collected from on-site surface waters during one (1) phase at the station. Analytical results are discussed below.

Tritium

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

E. Precipitation Water Results (Recapture)

Precipitation water samples from 14 locations were analyzed for tritium activity. Tritium was not detected in any sample greater than the LLD.
(Table B-III.1, Appendix B)

F. Summary of Results – Inter-Laboratory Comparison Program

Inter-Laboratory Comparison Program results for TBE are presented in Section IV, Part G in the Annual Radiological Environmental Operating Report.

G. Errata Data

There was no Errata Data for 2020.

H. Leaks, Spills, and Releases

There were no leaks, spills or releases in 2020.

I. Trends

No trends have been identified in 2020.

J. Investigations

Currently no investigations are on-going.

K. Actions Taken

1. Compensatory Actions

   There have been no station events requiring compensatory actions at the Clinton Power Station in 2020.

2. Installation of Monitoring Wells

   No new wells were installed during the 2020.

3. Actions to Recover/Reverse Plumes

   No actions were required to recover or reverse groundwater plumes.

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APPENDIX A

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

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TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations, Clinton Power Station, 2020

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
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
1	Precipitation Water
2	Precipitation Water
3	Precipitation Water
4	Precipitation Water
5	Precipitation Water
6	Precipitation Water
7	Precipitation Water
RG-N	Precipitation Water
RG-N-UNL	Precipitation Water
RG-NNW	Precipitation Water
RG-S	Precipitation Water
RG-SE	Precipitation Water
RG-WNW	Precipitation Water
RG-WSW	Precipitation Water

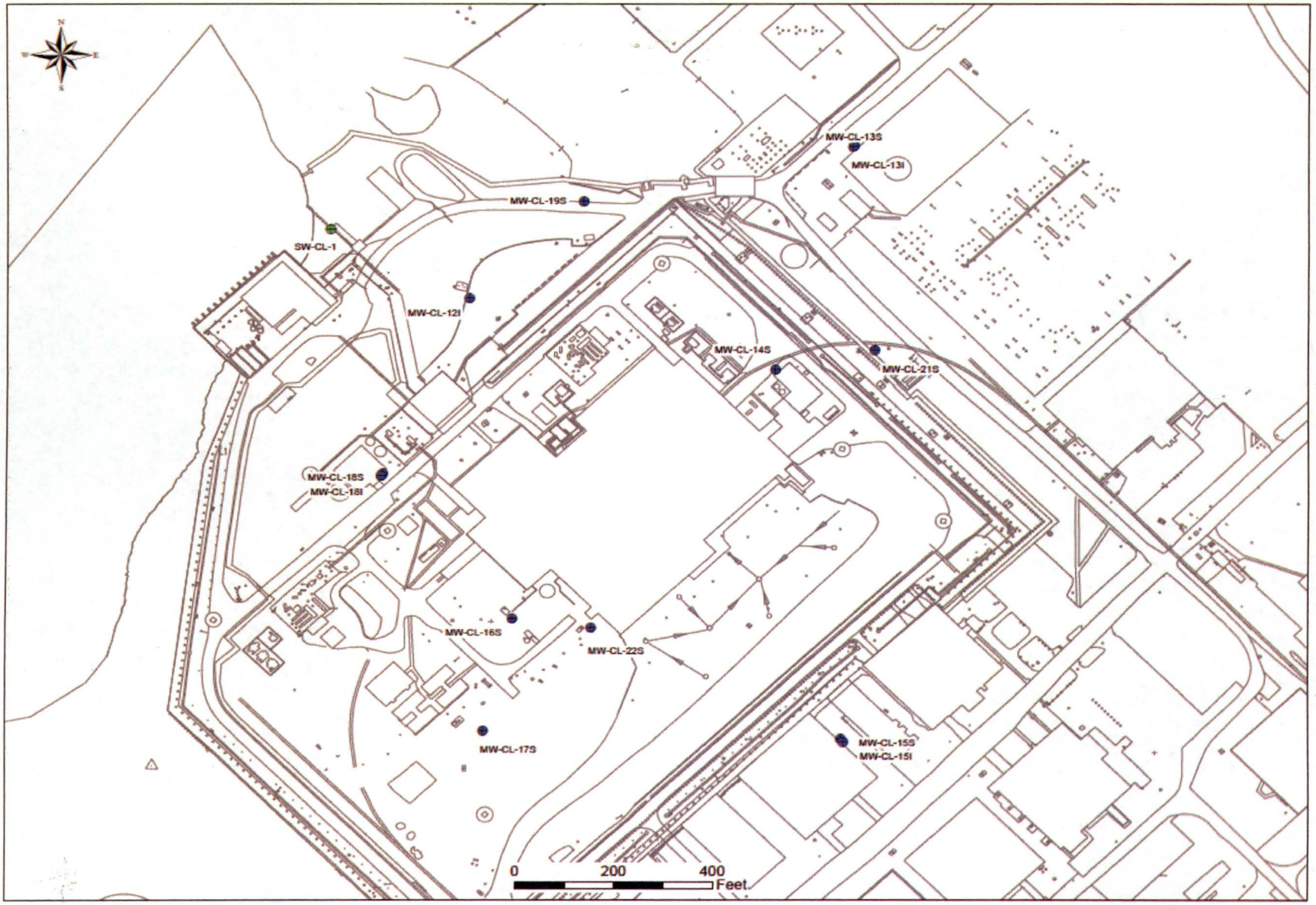

Figure A – 1
Onsite Sampling Locations at Clinton Power Station

Figure A – 2
Sampling Locations South of Clinton Power Station

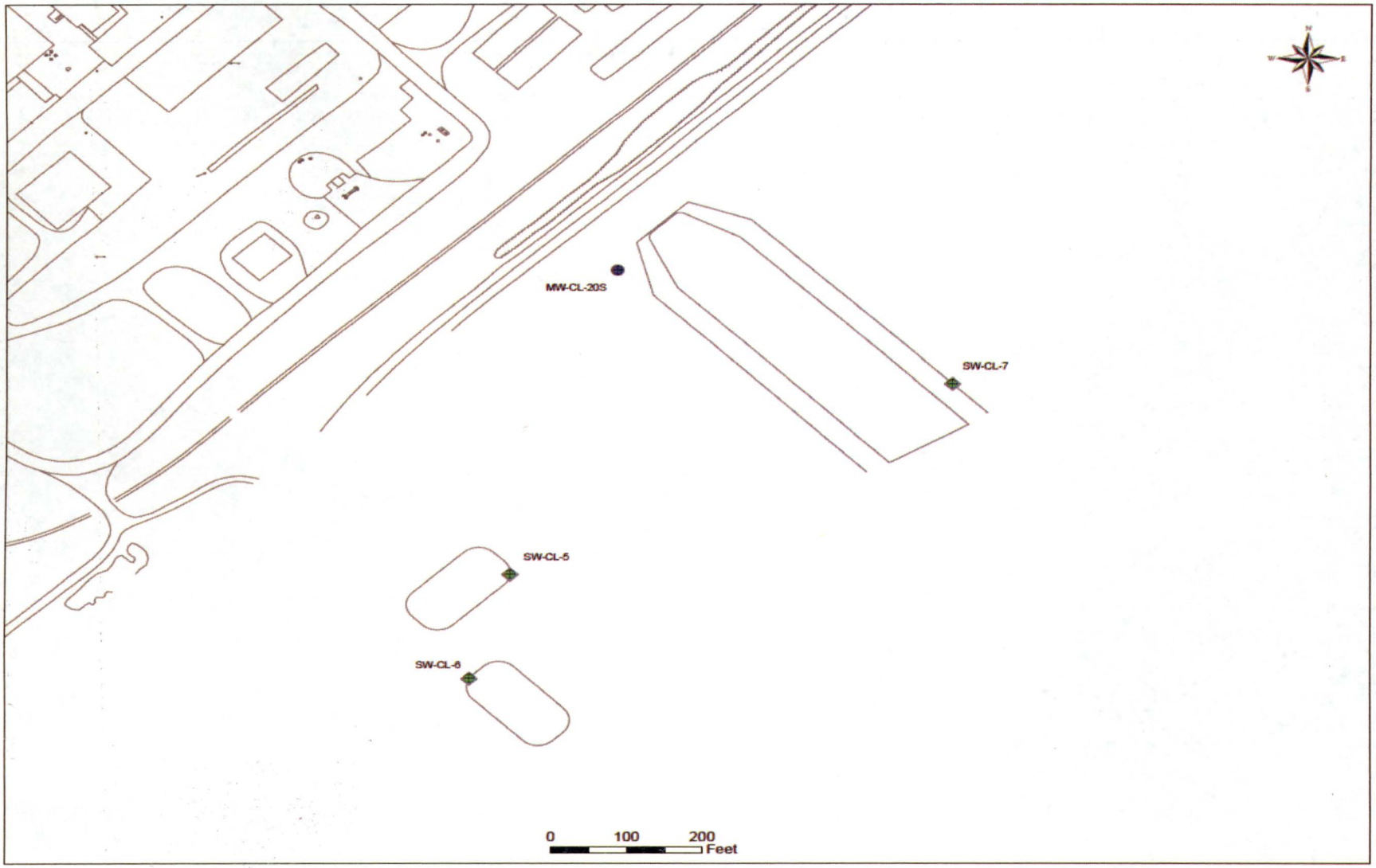

Figure A – 3
Sampling Locations East of Clinton Power Station

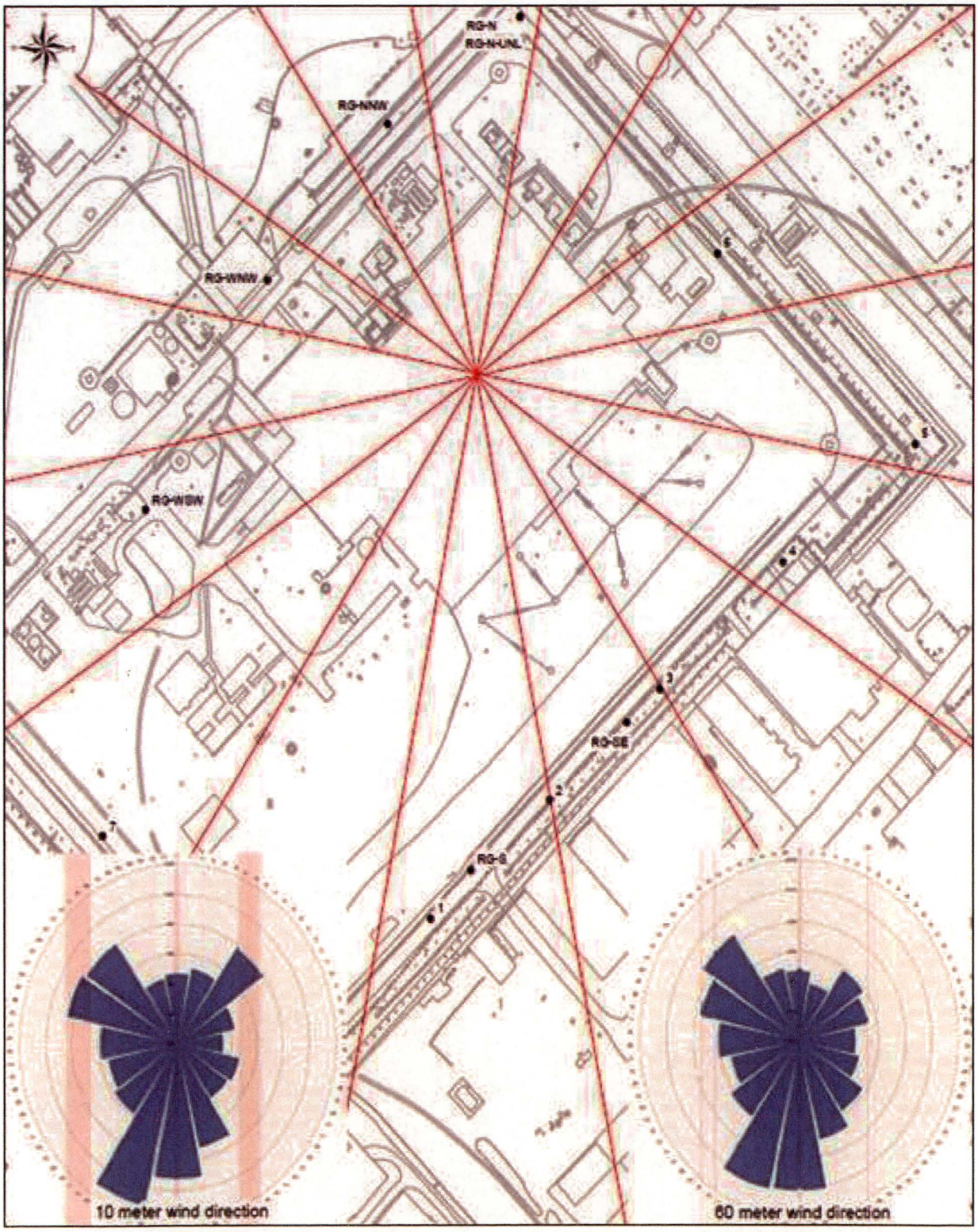

Figure A – 4
Recapture Sampling Locations of Clinton Power Station

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APPENDIX B

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

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TABLE B-I.1 CONCENTRATIONS OF TRITIUM AND STRONTIUM IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90
B-3	03/11/20	< 184		
MW-CL-1	03/11/20	< 183		
MW-CL-2	03/11/20	< 180		
MW-CL-12I	03/13/20	< 181		
MW-CL-12I	07/10/20	< 191	< 6.0	< 0.8
MW-CL-12I	10/28/20	< 185		
MW-CL-13I	03/13/20	< 179		
MW-CL-13S	03/13/20	< 178		
MW-CL-13S	07/10/20	< 188	< 8.0	< 0.9
MW-CL-13S	10/28/20	< 184		
MW-CL-14S	03/12/20	303 ± 124		
MW-CL-14S	07/10/20	< 191	< 5.3	< 0.8
MW-CL-14S	10/29/20	239 ± 123		
MW-CL-15I	03/11/20	< 177		
MW-CL-15S	03/11/20	< 181		
MW-CL-16S	03/12/20	< 182		
MW-CL-16S	07/10/20	< 193	< 6.7	< 0.8
MW-CL-16S	10/29/20	< 184		
MW-CL-17S	03/12/20	< 182		
MW-CL-17S	07/10/20	< 188	< 5.5	< 0.8
MW-CL-17S	10/29/20	< 180		
MW-CL-18I	03/12/20	< 180		
MW-CL-18I	07/10/20	< 187	< 7.5	< 0.8
MW-CL-18I	10/29/20	< 184		
MW-CL-18S	03/12/20	< 176		
MW-CL-18S	07/10/20	< 187	< 5.0	< 1.0
MW-CL-18S	10/29/20	< 186		
MW-CL-19S	03/13/20	< 182		
MW-CL-19S	07/10/20	< 187	< 6.4	< 0.6
MW-CL-19S	10/28/20	< 182		
MW-CL-20S	03/11/20	< 185		
MW-CL-21S	03/13/20	< 187		
MW-CL-21S	07/10/20	< 198	< 7.1	< 1.0
MW-CL-21S	10/28/20	< 179		
MW-CL-22S	03/12/20	< 185		
MW-CL-22S	07/10/20	< 197	< 4.6	< 0.8
MW-CL-22S	10/29/20	< 182		

Table B-I.2

CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/LITER + SIGMA

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
MW-CL-13I	03/13/20	< 50	< 101	< 5	< 6	< 14	< 6	< 11	< 5	< 11	< 6	< 6	< 32	< 10
MW-CL-13S	03/13/20	< 28	< 44	< 4	< 4	< 7	< 4	< 7	< 4	< 7	< 3	< 4	< 17	< 7
MW-CL-14S	03/12/20	< 52	< 107	< 6	< 8	< 9	< 9	< 16	< 8	< 10	< 6	< 8	< 33	< 13
MW-CL-21S	03/13/20	< 38	< 73	< 4	< 4	< 6	< 4	< 8	< 4	< 7	< 4	< 4	< 20	< 6

TABLE B-I.3

CONCENTRATIONS OF HARD TO DETECTS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Am-241	Cm-242	Cm-243/244	Pu-238	Pu-239/240	U-234	U-235	U-238	Fe-55	Ni-63
MW-CL-12I	07/10/20									< 114	< 4.6
MW-CL-13S	07/10/20									< 74	< 4.9
MW-CL-14S	07/10/20									< 93	< 4.9
MW-CL-16S	07/10/20									< 135	< 4.8
MW-CL-17S	07/10/20									< 147	< 5.0
MW-CL-18I	07/10/20									< 106	< 5.0
MW-CL-18S	07/10/20									< 93	< 4.6
MW-CL-19S	07/10/20									< 92	< 4.9
MW-CL-21S	07/10/20									< 96	< 4.8
MW-CL-22S	07/10/20									< 85	< 4.2

TABLE B-II.1 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
SW-CL-1	03/13/20	< 185
SW-CL-2	03/11/20	< 185
SW-CL-4	03/11/20	< 185
SW-CL-5	03/11/20	< 183
SW-CL-6	03/11/20	< 185
SW-CL-7	03/11/20	< 187

TABLE B-III.1 CONCENTRATIONS OF TRITIUM IN PRECIPITATION WATER SAMPLES COLLECTED IN THE VICINITY OF CLINTON POWER STATION, 2020

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
1	08/06/20	< 183
2	08/06/20	< 180
3	08/06/20	< 185
4	08/06/20	< 183
5	08/06/20	< 180
6	08/06/20	< 184
7	08/06/20	< 188
RG-N	12/02/20	< 546
RG-N-UNL	12/02/20	< 216
RG-NNW	12/02/20	< 215
RG-S	12/02/20	< 197
RG-SE	12/02/20	< 618
RG-WNW	12/02/20	< 544
RG-WSW	12/02/20	< 314

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