

January 01, 2019 – December 31, 2019

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

CLINTON POWER STATION – DOCKET NUMBER 50-461

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SECTION 1

EXECUTIVE SUMMARY

The Annual Radioactive Effluent Release Report (ARERR) is a detailed description of gaseous and liquid radioactive effluents released from Clinton Power Station (CPS) and the resulting radiation doses for the period of January 01, 2019 through December 31, 2019. This report also includes a detailed meteorological section providing weather history of the surrounding area during this period. The information in the ARERR is used to calculate the offsite dose to our public.

The report also includes a summary of the amounts of radioactive material contained in solid waste that is packaged and shipped to a federally approved disposal/burial facility offsite. Additionally, this report notifies the U.S. Nuclear Regulatory Commission (NRC) staff of changes to CPS's Offsite Dose Calculation Manual (ODCM), as well as exceptions to the CPS effluent monitoring program and a summary of events that must be reported in accordance with ODCM Section 6.2.

The NRC requires that nuclear power facilities be designed, constructed and operated in such a manner as to maintain radioactive effluent releases to unrestricted areas As Low As Reasonably Achievable (ALARA). To ensure compliance with this criterion, the NRC has established limitations governing the release of radioactivity in effluents.

During 2019, CPS operations were well within these federally required limits. The maximum annual radiation dose delivered to the inhabitants of the area surrounding CPS, due to radioactivity released from the station, was 3.89E-02 mRem (millirem). The radiation dose to the public in the vicinity of CPS was calculated by using the concentration of radioactive nuclides from each gaseous effluent release coupled with historical weather conditions. The dose from CPS gaseous radioactive effluents is only a small fraction of the limit (2.59E-01%) for the maximum exposed member of the public. There were no liquid effluent releases in 2019. As such, there was no dose received by the public from the liquid radioactive effluent pathway.

SECTION 2

INTRODUCTION

CPS is located in Harp Township, DeWitt County approximately six miles east of the city of Clinton in east-central Illinois. CPS is a ~1,140 megawatt gross electrical power output boiling water reactor. Initial fuel load commenced in September of 1986 with initial criticality of the reactor occurring on February 27, 1987. Commercial operation commenced in April 1987 and the reactor reached 100% power for the first time on September 15, 1987.

CPS releases airborne effluents via two gaseous effluent release points to the environment. They are the Common Station Heating, Ventilating, and Air Conditioning (HVAC) Vent Stack and the Standby Gas Treatment System (SGTS) Vent as shown in *Figure 1*. Each gaseous effluent release point is continuously monitored consisting of a surveillance program of periodic sampling and analysis as specified in the ODCM.

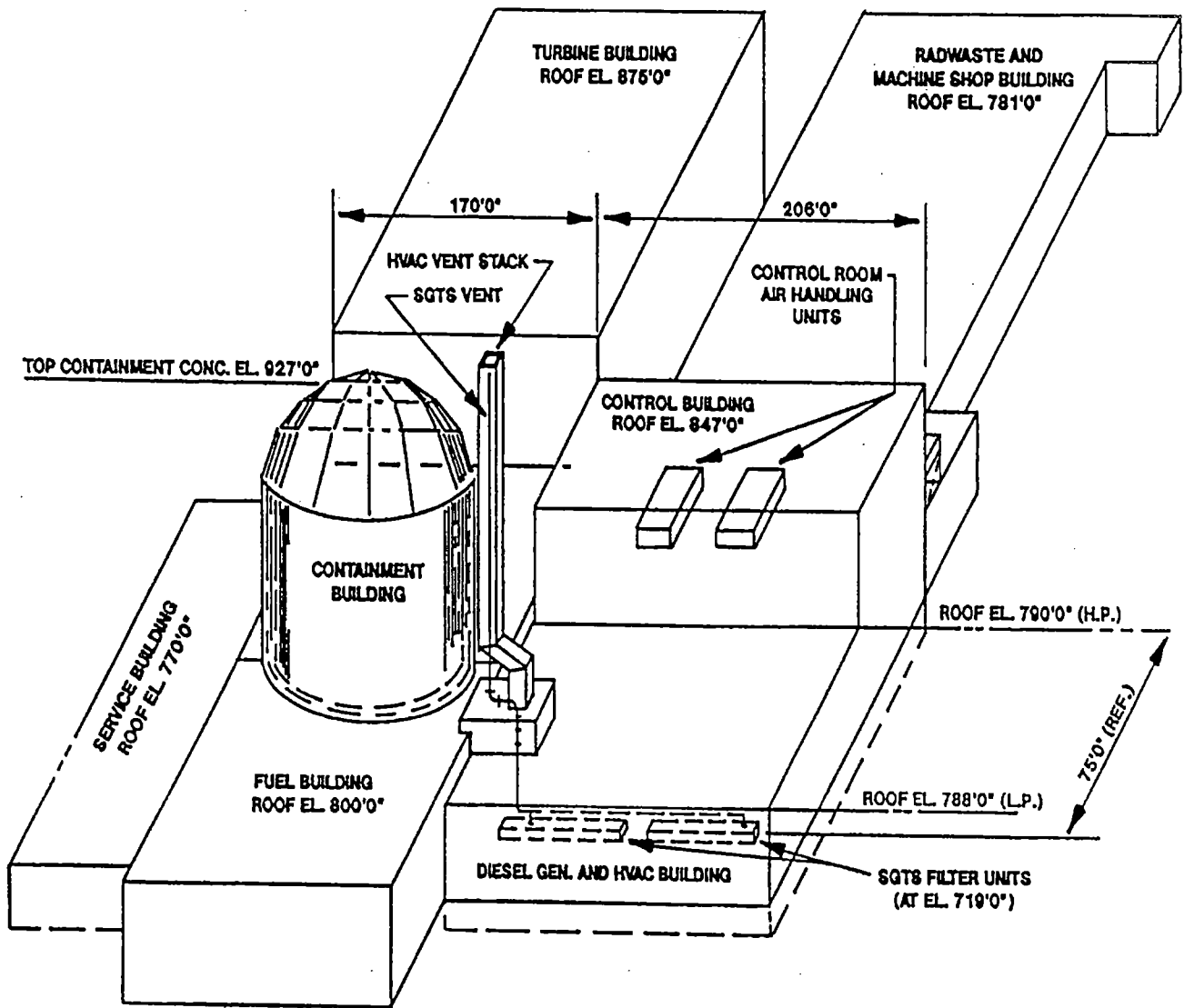
CPS is licensed to release radioactive liquid effluents in a batch mode, however there were no radioactive liquid releases in 2019 at CPS. Each release would have been sampled and analyzed prior to release if this were to occur. Depending upon the amount of activity in a release, liquid effluents would vary from 10 to 300 gallons per minute (GPM). This volume is further combined with both Plant Service Water flow, which is a minimum of approximately 5,000 GPM, along with Plant Circulating Water flow, another 0 to 567,000 GPM, in the seal well, just prior to entering the 3.4-mile discharge flume into Lake Clinton as depicted in *Figure 2*.

Processing and Monitoring

CPS strictly controls effluents to ensure radioactivity released to the environment is maintained ALARA and does not exceed federal release limit criteria. Effluent controls include the operation of radiation monitoring systems within the plant as well as an offsite environmental analysis program. In-plant radiation monitoring systems are used to provide a continuous indication of radioactivity in effluent streams. Some are also used to collect particulate and radioiodine samples. Radioactive effluent related samples are analyzed in a controlled laboratory environment to identify the specific concentration of those radionuclides being released. Sampling and analysis provides a more sensitive and precise method of determining effluent composition to complement the information provided by real-time radiation monitoring instruments.

Beyond the plant itself, a Radiological Environmental Monitoring Program (REMP) is maintained in accordance with Federal Regulations. The purpose of the REMP program is to assess the radiological impact on the environment due to the operation of CPS. Implicit in this charter is the license requirement to trend and assess radiation exposure rates and radioactivity concentrations that may contribute to dose to the public. The program consists of two phases; pre-operational and operational. During the pre-operational phase of the program, the baseline for the local radiation environment was established. The operational phase of the program includes the objective of making confirmatory measurements to verify that the in-plant controls for the release of radioactive material are functioning as designed. Assessment of the operational impact of CPS on the environment is based on data collected since initial criticality of the reactor.

FIGURE 1
CPS AIRBORNE EFFLUENT RELEASE POINTS

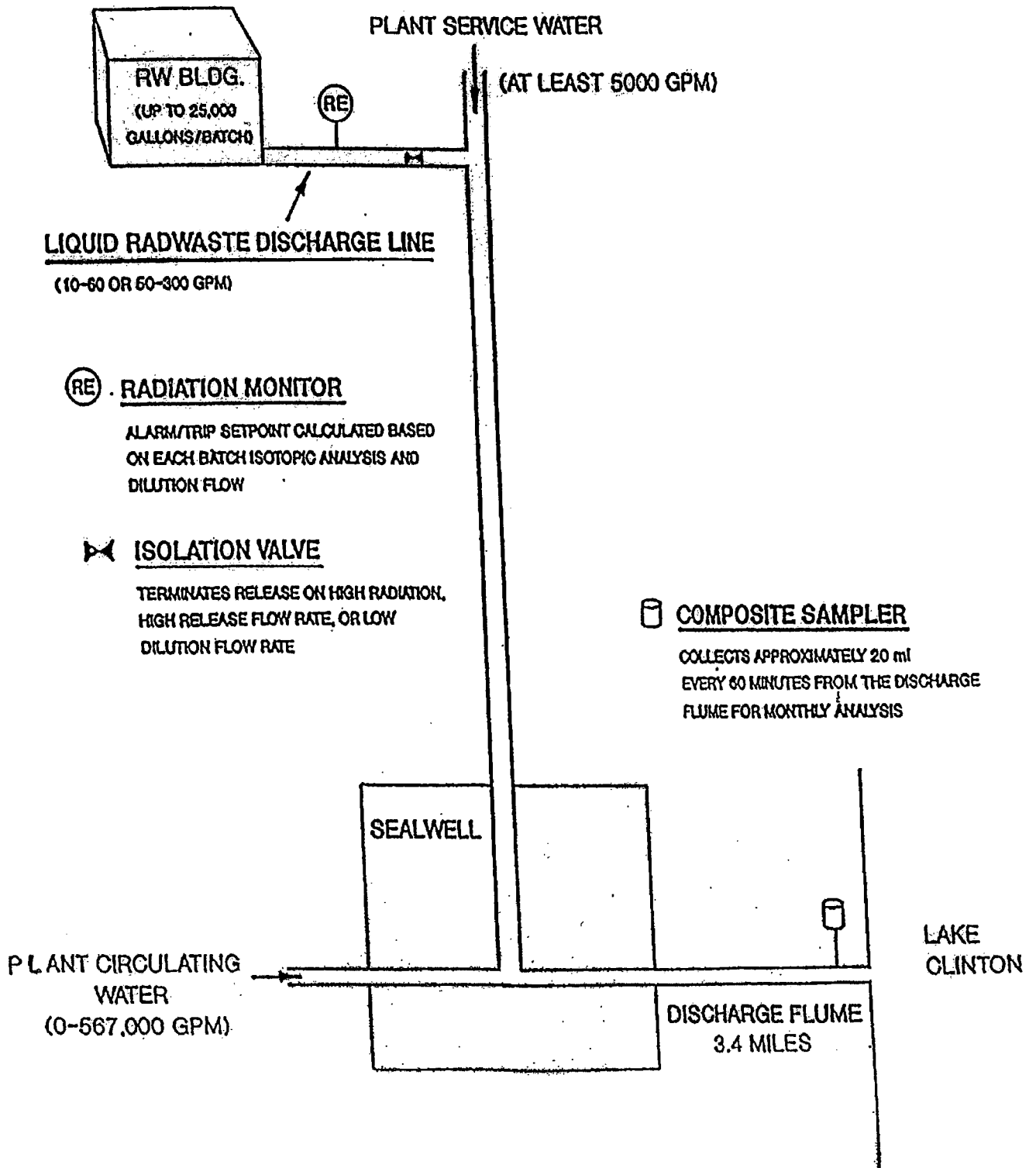


	<u>HVAC Exhaust Vent</u>	<u>SGTS Exhaust Vent</u>
Release Point Height (feet)	200	200
Building Height (feet)	190	190
Release Point Geometry	Duct	Pipe
Release Point Area (ft ²)	120	2
Release Point Diameter (feet)	12*	1
Annual Average Flow Rate (ft ³ /sec)	3,945	67
Vertical Exit Velocity (feet/sec)	33	41

* Effective $2(A/\pi)^{1/2}$ diameter

FIGURE 2

CPS WATERBORNE EFFLUENTS RELEASE PATHWAY



Exposure Pathways

A radiological exposure pathway is the vehicle by which the public may become exposed to radioactivity released from nuclear facilities. The major pathways of concern are those that could cause the highest calculated radiation dose. These pathways are determined from the type and amount of radioactivity released, the environmental transport mechanism and how the plant environs are used (i.e., residence, gardens, etc.). The environmental transport mechanism includes the historical meteorological characteristics of the area that are defined by wind speed and wind direction. This information is used to evaluate how the radionuclides will be distributed within the surrounding area. The most important factor in evaluating the exposure pathway is the use of the environment by the public living around CPS. Factors such as location of homes in the area, use of cattle for milk and the growing of gardens for vegetable consumption are important considerations when evaluating exposure pathways. *Figure 3* illustrates the effluent exposure pathways that were considered.

The radioactive gaseous effluent exposure pathways include direct radiation, deposition on plants and soil and inhalation by animals and humans. The radioactive liquid effluent exposure pathways include fish consumption and direct exposure from Clinton Lake.

Dose Assessment

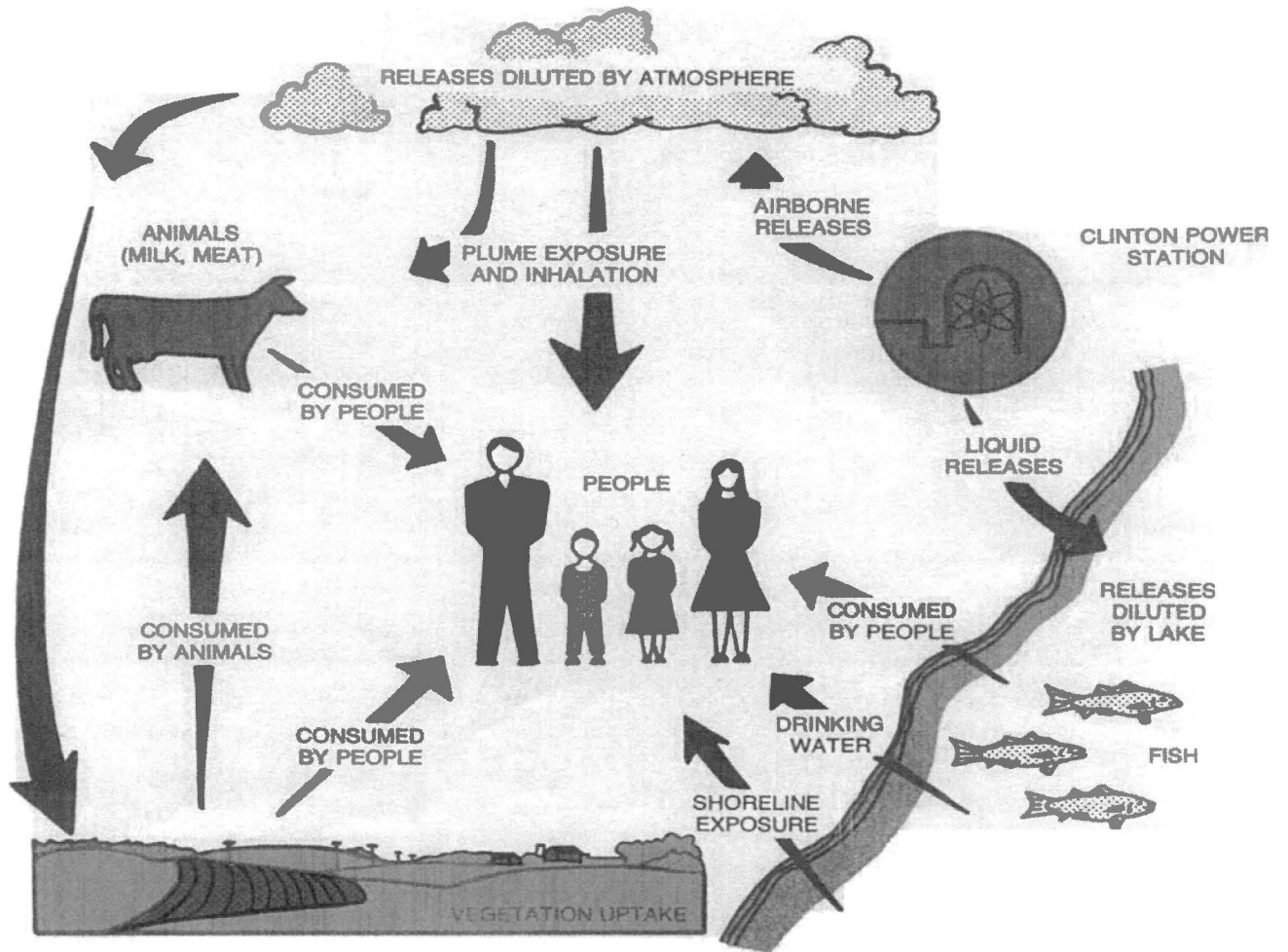
Whole body radiation involves the exposure of all organs in the human body to ionizing radiation. Most naturally occurring background radiation exposures consist of whole body exposure although specific organs can receive radiation exposure from distinct radionuclides. These radionuclides enter the body through inhalation and ingestion and seek different organs depending on the nuclide. For example, radioactive iodine selectively concentrates in the thyroid, radioactive strontium in mineralized bone, and radioactive cesium collects in muscle and liver tissue.

The total dose to organs from a given radionuclide also depends on the amount of activity in the organ and the amount of time that the radionuclide remains in the body. Some radionuclides remain for very short periods of time due to their rapid radioactive decay and/or elimination rate from the body, while others may remain longer.

Radiation dose to the public in the area surrounding CPS is calculated for each release using historical weather conditions coupled with the concentrations of radioactive material present. The dose is calculated for all sixteen geographical sectors surrounding CPS and includes the location of the nearest residents, vegetable gardens producing broad leaf vegetables and dairy animals in all sectors. The calculated dose also uses the scientific concept of a "maximum exposed individual" and "standard man," and the maximum use factors for the environment, such as how much milk an average person consumes and how much air a person breathes in a year.

Section 6 contains more detailed information on dose to the public.

FIGURE 3
EFFLUENT EXPOSURE PATHWAYS



Gaseous Effluents

Gaseous effluent radioactivity released from CPS is classified into two (2) categories. The first category is noble gases. The second category consists of I^{131} , I^{133} , H^3 , C^{14} and all radionuclides in particulate form with radioactive half-lives greater than eight (8) days. Noble gases - such as xenon and krypton - are biologically and chemically non-reactive. As such, these radionuclides - specifically Kr^{85m} , Xe^{133} and Xe^{135} - are the major contributors to external doses. I^{131} , I^{133} , H^3 , C^{14} and radionuclides in particulate form with radioactive half-lives greater than eight (8) days are the major contributors to internal doses.

Liquid Effluents

Liquid effluents may originate from two (2) sources at CPS. The first is effluent from the Radioactive Waste Treatment System. This water is demineralized prior to release, and samples are taken after the tank has been allowed to adequately recirculate. The second is from heat exchanger leaks found in closed cooling water systems that service radioactively contaminated systems. This second source would be considered an abnormal release if to occur. As a matter of station management commitment, CPS strives to be a zero (0) radioactive liquid release plant. The last radioactive liquid release occurred in September of 1992.

Solid Waste Shipments

To reduce the radiation exposure to personnel and maintain the federally required ALARA concept, the NRC and the Department of Transportation (DOT) have established limits on the types of radioactive waste and the amount of radioactivity that may be packaged and shipped offsite for burial or disposal. To ensure that CPS is complying with these regulations, the types of waste and the radioactivity present are reported to the NRC.

SECTION 3

SUPPLEMENTAL INFORMATION

I. REGULATORY LIMITS

The NRC requires nuclear power facilities to be designed, constructed and operated in such a way that the radioactivity in effluent releases to unrestricted areas is kept ALARA. To ensure these criteria are met, each license authorizing nuclear reactor operation includes the Offsite Dose Calculation Manual governing the release of radioactive effluents. The ODCM designates the limits for release of effluents, as well as the limits for doses to the general public from the release of radioactive liquids and gases. These limits are taken from Title 10 of the Code of Federal Regulations, Part 50, Appendix I (10CFR50 Appendix I), Title 10 of the Code of Federal Regulations, Part 20.1301 (10CFR20.1301) and Section 5.5.4 of Clinton Station's Technical Specifications. Maintaining effluent releases within these operating limitations demonstrates compliance with ALARA principles.

Specific limit information is given below.

A. Gaseous Effluents

1. The maximum permissible concentrations to limit doses for gaseous effluents shall not exceed the values provided within Section 5.5.4.g of Station's Technical Specifications. To ensure these concentrations are not exceeded, dose rates due to radioactive materials released in gaseous effluents from the site to areas at and beyond the site area boundary shall be limited to the following:
 - a. Noble gases
 - Less than or equal to 500 mRem/year to the total body.
 - Less than or equal to 3,000 mRem/year to the skin.
 - b. I^{131} , I^{133} , H^3 , C^{14} , and all radionuclides in particulate form with radioactive half-lives greater than eight (8) days:
 - Less than or equal to 1,500 mRem/year to any organ.
2. In accordance with 10CFR50 Appendix I, air dose due to noble gases released in gaseous effluents to areas at and beyond the site boundary shall be limited to the following:
 - a. Less than or equal to 5 mRad for gamma radiation and less than or equal to 10 mRad for beta radiation during any calendar quarter.
 - b. Less than or equal to 10 mRad for gamma radiation and less than or equal to 20 mRad for beta radiation during any calendar year.
3. In accordance with 10CFR50 Appendix I, dose to a member of the public (from I^{131} , I^{133} , H^3 , C^{14} , and all radionuclides in particulate form with radioactive half-

lives greater than eight (8) days) in gaseous effluents released to areas at and beyond the site boundary shall be limited to the following values:

- a. Less than or equal to 7.5 mRem to any organ, during any calendar quarter.
- b. Less than or equal to 15 mRem to any organ, during any calendar year.

B. Liquid Effluents

1. The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to the values provided within Section 5.5.4.b of Station's Technical Specifications for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2.0E-04 $\mu\text{Ci/ml}$ total activity.
2. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released to unrestricted areas shall be limited to:
 - a. Less than or equal to 1.5 mRem to the total body and less than or equal to 5 mRem to any organ during any calendar quarter.
 - b. Less than or equal to 3 mRem to the total body and less than or equal to 10 mRem to any organ during any calendar year.

The above gaseous and liquid effluent limits are just a fraction of the dose limits established by the Environmental Protection Agency (EPA) found within Environmental Dose Standard Title 40, Code of Federal Regulations, Part 190 (40CFR190). The EPA has established dose limits for members of the public in the vicinity of a nuclear power plant. These dose limits are:

- Less than or equal to 25 mRem per year to the total body.
- Less than or equal to 75 mRem per year to the thyroid.
- Less than or equal to 25 mRem per year to any other organ.

II. AVERAGE ENERGY

The CPS ODCM limits the dose equivalent rates due to the release of fission and activation gases to less than or equal to 500 mRem per year to the total body and less than or equal to 3,000 mRem per year to the skin. These limits are based on dose calculations using actual isotopic concentrations from our effluent release streams and not based upon the gross count rate from our monitoring systems. Therefore, the average beta and gamma energies for gaseous effluents as described in Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," are not applicable.

III. MEASUREMENT AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

A. Fission and Activation Gases

1. Gas samples are collected weekly and are counted on a high purity germanium detector (HPGe) for principal gamma emitters. The HVAC and SGTS release points are continuously monitored and the average release flow rates for each release point are used to calculate the total activity released during a given time period.
2. Tritium is also collected by passing a known volume of the sample stream through a gas washer containing a known quantity of demineralized water. The collected samples are distilled and analyzed by liquid scintillation. The tritium released was calculated for each release point from the measured tritium concentration, the volume of the sample, the tritium collection efficiency, and the respective stack exhaust flow rates.
3. Carbon-14 release values were estimated using the methodology included in the EPRI Technical Report 1021106, using the 2019 Clinton Power Station specific parameters of normalized Carbon-14 production rate of 5.049 Ci/GWt-yr, a gaseous release fraction of 0.99, a Carbon-14 carbon dioxide fraction of 0.95, a reactor power rating of 3473 MWt, and equivalent full power operation of 320.2 days.

B. Iodines

Iodine is continuously collected on a silver zeolite cartridge filter via an isokinetic sampling assembly from each release point. Filters are normally exchanged once per week and then analyzed on an HPGe system. The flow rates for each release point are averaged over the duration of the sampling period and these results - along with specific isotopic concentrations - are then used to determine the total activity released during the time period in question.

C. Particulates

Particulates are continuously collected on a filter paper via an isokinetic sampling assembly on each release point. Filters are normally exchanged once per week and then analyzed on an HPGe system. The flow rates for each release point are averaged over the duration of the sampling period and these results - along with specific isotopic concentrations - are then used to determine the total activity released during the time period in question.

D. Liquid Effluents

Each tank of liquid radwaste is recirculated for at least two (2) tank volumes, sampled and analyzed for principal gamma emitters prior to release. Each sample tank is recirculated for a sufficient amount of time prior to sampling ensuring that a representative sample is obtained. Samples are then analyzed on an HPGe system and liquid release permits are generated based upon the values obtained from the isotopic analysis and the most recent values for H³, gross alpha, Fe⁵⁵, Sr⁸⁹ and Sr⁹⁰. An aliquot based on release volume is saved and added to composite containers. The concentrations of composited isotopes and the volumes of the releases associated with these composites establish the proportional relationships that are then utilized for calculating the total activity released for these isotopes. However, there has not been a radioactive liquid release since September of 1992.

IV. DESCRIPTION OF ERROR ESTIMATES

Estimates of measurement and analytical error for gaseous and liquid effluents are calculated as follows:

$$E_T = \sqrt{[(E_1)^2 + (E_2)^2 + \dots + (E_n)^2]}$$

where: E_T = total percent error
 $E_1 \dots E_n$ = percent error due to calibration standards, laboratory analysis, instruments, sample flow, etc.

SECTION 4

RADIOACTIVE EFFLUENT DATA

TABLE 1

Gaseous Effluents - Summation Of All Releases

Data Period: January 01, 2019 - December 31, 2019

Continuous Mixed Mode

		Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Est. Total Error, %
A. Fission & Activation Gases							
1.	Total Release	Ci	5.83E+00	7.46E+00	1.63E+02	1.11E+01	3.00E+01
2.	Average release rate for period	μCi/sec	7.49E-01	9.49E-01	2.05E+01	1.40E+00	
3.	Percent of ODCM Limit	%	*	*	*	*	
B. Iodines							
1.	Total Iodine-131	Ci	1.48E-05	1.80E-05	5.06E-05	1.89E-06	3.10E+01
2.	Average release rate for period	μCi/sec	1.90E-06	2.29E-06	6.36E-06	2.37E-07	
3.	Percent of ODCM Limit	%	*	*	*	*	
C. Particulates							
1.	Particulates with half-lives >8 days	Ci	2.70E-06	4.38E-06	1.50E-04	6.88E-05	2.40E+01
2.	Average release rate for period	μCi/sec	3.47E-07	5.57E-07	1.88E-05	8.66E-06	
3.	Percent of ODCM Limit	%	*	*	*	*	
D. Tritium							
1.	Total Release	Ci	6.17E+00	6.23E+00	9.27E+00	8.32E+00	2.10E+01
2.	Average release rate for period	μCi/sec	7.93E-01	7.92E-01	1.17E+00	1.05E+00	
3.	Percent of ODCM Limit	%	*	*	*	*	
E. Gross Alpha							
1.	Total Release	Ci	<LLD	<LLD	<LLD	<LLD	
2.	Average release rate for period	μCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
F. Carbon-14							
1.	Total Release	Ci	4.24E+00	4.27E+00	3.39E+00	3.49E+00	
2.	Average release Rate for period	μCi/sec	5.56E-01	5.57E-01	5.57E-01	5.56E-01	

* Applicable limits are expressed in terms of dose. See Tables 1A and 1B of this report.

TABLE 1A
Air Doses Due to Gaseous Releases

Doses per Quarter (mRad)

Type of Radiation	ODCM Limit	1 st Quarter	% of Limit	2 nd Quarter	% of Limit	3 rd Quarter	% of Limit	4 th Quarter	% of Limit
Gamma	5 mRad	2.70E-04	5.39E-03	3.48E-04	6.91E-03	7.23E-03	1.45E-01	5.14E-04	1.03E-02
Beta	10 mRad	9.51E-05	9.51E-04	1.22E-04	1.22E-03	2.53E-03	02.53E-03	1.81E-04	1.81E-04

Doses per Year (mRad)

Type of Radiation	ODCM Limit	Year	% of Limit
Gamma	10 mRad	8.36E-03	8.36E-02
Beta	20 mRad	2.92E-03	1.46E-02

TABLE 1B
Doses to a Member of the Public Due to Radioiodines, Tritium, Carbon-14, and Particulates in Gaseous Releases

Doses per Quarter (mRem)

Organ	ODCM Limit	1 st Quarter	% of Limit	2 nd Quarter	% of Limit	3 rd Quarter	% of Limit	4 th Quarter	% of Limit
Bone	7.5 mRem	1.08E-02	1.44E-01	1.09E-02	1.45E-01	8.62E-03	1.15E-01	8.62E-03	1.15E-01
Liver	7.5 mRem	1.02E-04	1.36E-03	1.03E-04	1.37E-03	1.57E-04	2.09E-03	1.39E-04	1.85E-03
TBody	7.5 mRem	2.25E-03	3.01E-02	2.27E-03	3.02E-02	1.90E-03	2.53E-02	3.71E-03	4.95E-02
Thyroid	7.5 mRem	1.53E-04	2.04E-03	1.66E-04	2.21E-03	3.25E-04	4.33E-03	1.43E-04	1.91E-03
Kidney	7.5 mRem	1.02E-04	1.36E-03	1.03E-04	1.37E-03	1.55E-04	2.07E-03	1.38E-04	1.84E-03
Lung	7.5 mRem	1.02E-04	1.36E-03	1.03E-04	1.37E-03	1.54E-04	2.05E-03	1.37E-04	1.83E-03
GI LLI	7.5 mRem	1.02E-04	1.36E-03	1.03E-04	1.37E-03	1.64E-04	2.19E-03	1.43E-04	1.91E-03

Doses per Year (mRem)

Type of Organ	ODCM Limit	Dose	% of Limit
Bone	15 mRem	3.89E-02	2.59E-01
Liver	15 mRem	5.00E-04	3.33E-03
TBody	15 mRem	1.01E-02	6.75E-02
Thyroid	15 mRem	7.88E-04	5.25E-03
Kidney	15 mRem	4.97E-04	3.32E-03
Lung	15 mRem	4.95E-04	3.30 E-03
GI LLI	15 mRem	5.12E-04	3.41 E-03

TABLE 2
Gaseous Effluents - Nuclides Released
 Clinton Power Station
 YEAR: 2019

Mixed Mode Release	X
Elevated Release	
Ground-Level Release	

Continuous Mode	X
Batch Mode	

	Units	Quarter 1 ^[1]	Quarter 2 ^[1]	Quarter 3 ^[1]	Quarter 4 ^[1]
A. Fission Gases					
Xe ¹³⁵	Ci	<LLD	<LLD	1.28E+00	<LLD
Kr ^{85m}	Ci	<LLD	<LLD	5.26E+00	<LLD
Xe ¹³³	Ci	<LLD	<LLD	6.71E+00	<LLD
Kr ⁸⁸	Ci	<LLD	<LLD	8.77E+00	<LLD
Ar ⁴¹	Ci	5.83E+00	7.46E+00	1.41E+02	1.11E+01
Total for Period	Ci	5.83E+00	7.46E+00	1.63E+02	1.11E+01
B. Iodines					
I ¹³¹	Ci	1.48E-05	1.80E-05	6.40E-05	<LLD
I ¹³³	Ci	3.59E-05	6.21E-05	5.06E-05	1.88E-06
Total for Period	Ci	5.07E-05	8.01E-05	1.15E-04	1.88E-06
C. Particulates					
Co ⁶⁰	Ci	7.44E-08	<LLD	6.58E-06	3.56E-06
Y ^{91m} ^[2]	Ci	4.38E-04	<LLD	<LLD	<LLD
Nb ⁹⁵	Ci	<LLD	2.84E-08	<LLD	<LLD
Ce ¹⁴¹	Ci	2.62E-06	1.01E-07	<LLD	<LLD
Cr ⁵¹	Ci	<LLD	2.70E-07	<LLD	1.08E-05
Mn ⁵⁴	Ci	<LLD	3.98E-06	1.14E-04	4.90E-05
Na ²⁴ ^[2]	Ci	3.33E-05	3.10E-05	<LLD	<LLD
Cd ¹⁰⁹	Ci	<LLD	<LLD	1.05E-05	<LLD
Cs ¹³⁸ ^[2]	Ci	<LLD	<LLD	3.13E-01	<LLD
Co ⁵⁸	Ci	<LLD	<LLD	1.53E-06	1.47E-06
Zn ⁶⁵	Ci	<LLD	<LLD	3.27E-06	3.97E-06
Total for Period	Ci	4.74E-04	3.54E-05	3.13E-01	6.88E-05
D. Gross Alpha					
Gross Alpha	Ci	<LLD	<LLD	<LLD	<LLD
E. Tritium					
Total for Period	Ci	6.17E+00	6.23E+00	9.27E+00	8.32E+00
F. Carbon-14					
Total for Period	Ci	4.24E+00	4.27E+00	3.39E+00	3.49E+00

^[1] The lower the value of the actual sample activity - with respect to background activity - the greater the counting error. Proportionally, large errors are reported for the various components of CPS gaseous effluents because of their consistent low sample activity.

^[2] Half-life is less than 8 days, therefore not included in Table 1 Summation.

TABLE 3
Radioactive Gaseous Waste LLD Values

TYPE OF ACTIVITY ANALYSIS	Lower Limit of Detection ^a (μCi/cc)
Principal Gamma Emitters, [Noble Gases] ^{b,c}	≤1.00E-04
H ³ ^c	≤1.00E-06
I ¹³¹ ^d	≤1.00E-12
I ¹³³ ^d	≤1.00E-10
Principal Gamma Emitters, [Particulates] ^{b,e}	≤1.00E-11
Sr ⁸⁹ , Sr ⁹⁰ ^g	≤1.00E-11
Gross Alpha ^f	≤1.00E-11

Table 3 Notations:

^a The Lower Limit of Detection (LLD) as defined for purposes of these specifications, as an "a priori" determination of the smallest concentration of radioactive material in a sample that will yield a net count - above system background - that will be detected with a 95% probability and with a low (5%) probability of incorrectly concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66 \cdot s_b}{E \cdot V \cdot 2.22 \times 10^6 \cdot Y \cdot e^{-\lambda \Delta t}}$$

Where:

LLD is the "a priori" lower limit of detection as defined above, as μCi per unit mass or volume,

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate, in counts per minute (cpm),

Table 3 Notations (continued):

E is the counting efficiency, in counts per disintegration,

V is the sample size in units of mass or volume,

2.22E+06 is the number of disintegrations per minute (dpm) per microcurie,

Y is the fractional radiochemical yield, when applicable,

λ is the radioactive decay constant for the particular radionuclide (sec^{-1}) and

Δt for plant effluents is the elapsed time between the midpoint of sample collection and the time of counting (sec).

Typical values of E, V, Y, and Δt should be used in the calculation.

The LLD is defined as an *a priori* (before the fact) limit representing the capability of a measurement system and not as an *a posteriori* (after the fact) limit for a particular measurement.

^b The principal gamma emitters for which the LLD specification applies include the following radionuclides: Kr^{87} , Kr^{88} , Xe^{133} , $\text{Xe}^{133\text{m}}$, Xe^{135} , and Xe^{138} in noble gas releases and Mn^{54} , Fe^{59} , Co^{58} , Co^{60} , Zn^{65} , Mo^{99} , I^{131} , Cs^{134} , Cs^{137} , Ce^{141} , and Ce^{144} in iodine and particulate releases. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable - together with those of the above nuclides - shall also be analyzed and reported in the Radioactive Effluent Release Report.

^c Weekly grab sample and analysis

^d Continuous charcoal sample analyzed weekly

^e Continuous particulate sample analyzed weekly

^f Composite particulate sample analyzed monthly

^g Composite particulate sample analyzed quarterly

TABLE 4
Waterborne Effluents - Summation Of All Releases
 Data Period: January 01, 2019 – December 31, 2019
 There were zero (0) liquid radwaste releases from CPS in 2019.

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Est. Total Error, %	
A. Fission & Activation Products^[1]							
1.	Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
2.	Average diluted concentration during period	µCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
3.	Percent of ODCM Limit	%	N/A	N/A	N/A	N/A	
B. Tritium^[1]							
1.	Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
2.	Average diluted concentration during period	µCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
3.	Percent of ODCM Limit	%	N/A	N/A	N/A	N/A	
C. Dissolved and Entrained Gases^[1]							
1.	Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
2.	Average diluted concentration during period	µCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
3.	Percent of ODCM Limit	%	N/A	N/A	N/A	N/A	
D. Gross Alpha Radioactivity^[1]							
	Gross alpha radioactivity	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
E. Volume of Waste Released (prior to Dilution)							
	Volume of Waste Released (prior to Dilution)	Liters	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
F. Volume of dilution water used during period							
	Volume of dilution water used during period	Liters	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A

^[1] A value corresponding to ten times the values found in 10CFR20 Appendix B, Table 2, Column 2 is used for all Effluent Concentration Limit (ECL) calculations. For dissolved and entrained noble gases, the concentration is limited to 2.00E-04 µCi/ml total activity.

TABLE 5
Waterborne Effluents - Nuclides Released
Clinton Power Station

YEAR: 2019

There were zero (0) liquid radwaste releases from CPS in 2019.

Continuous Mode	
Batch Mode	

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
A. Tritium					
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B. Fission and Activation Products					
Mn ⁵⁴	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co ⁵⁸	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe ⁵⁵	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe ⁵⁹	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co ⁵⁸	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co ⁶⁰	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn ⁶⁵	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr ⁸⁹	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr ⁹⁰	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb ⁹⁵	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr ⁹⁵	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mo ⁹⁹	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I ¹³¹	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs ¹³⁴	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs ¹³⁷	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ba ¹⁴⁰	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
La ¹⁴⁰	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce ¹⁴¹	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce ¹⁴⁴	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C. Dissolved and Entrained Noble Gases					
Kr ^{85m}	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr ⁸⁷	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr ⁸⁸	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe ¹³³	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe ¹³⁵	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe ¹³⁸	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 6
Radioactive Liquid Waste LLD Values

TYPE OF ACTIVITY ANALYSIS	Lower Limit of Detection (LLD) ^a ($\mu\text{Ci/ml}$)
Principal Gamma Emitters ^b	$\leq 5.00\text{E-}07$
^{131}I	$\leq 1.00\text{E-}06$
Dissolved and Entrained Gases (Gamma Emitters) ^c	$\leq 1.00\text{E-}05$
H^3	$\leq 1.00\text{E-}05$
Gross Alpha	$\leq 1.00\text{E-}07$
$\text{Sr}^{89}, \text{Sr}^{90}$	$\leq 5.00\text{E-}08$
Fe^{55}	$\leq 1.00\text{E-}06$

Table 6 Notations:

^a The Lower Limit of Detection (LLD) as defined for purposes of these specifications, as an "a priori" determination of the smallest concentration of radioactive material in a sample that will yield a net count - above system background - that will be detected with a 95% probability and with only a 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$\text{LLD} = \frac{4.66 \cdot s_b}{E \cdot V \cdot 2.22 \times 10^6 \cdot Y \cdot e^{-\lambda \Delta t}}$$

Where:

LLD is the "a priori" lower limit of detection as defined above, as μCi per unit mass or volume,

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate, in counts per minute (cpm),

E is the counting efficiency, as counts per disintegration,

V is the sample size in units of mass or volume,

$2.22\text{E}+06$ is the number of disintegrations per minute (dpm) per microcurie,

Table 6 Notations (continued):

Y is the fractional radiochemical yield, when applicable,

λ is the radioactive decay constant for the particular radionuclide (sec^{-1}) and

Δ_t for plant effluents is the elapsed time between the midpoint of sample collection and the time of counting (sec).

Typical values of E , V , Y , and λt should be used in the calculation.

The LLD is defined as an *a priori* (before the fact) limit representing the capability of a measurement system and not as an *a posteriori* (after the fact, MDA) limit for a particular measurement.

^b The principal gamma emitters for which the LLD requirement applies include the following radionuclides: Mn^{54} , Fe^{59} , Co^{58} , Co^{60} , Zn^{65} , Mo^{99} , Cs^{134} , Cs^{137} , and Ce^{141} . Ce^{144} shall also be measured, but with an LLD of $5.0\text{E}-06$. This list does not mean that only these nuclides are detected and reported. Other gamma peaks that are measurable - together with those of the above nuclides - shall also be analyzed and reported in the Radioactive Effluent Release Report.

^c Dissolved and entrained gases are: Xe^{133} , Xe^{135} , Xe^{138} , $\text{Kr}^{85\text{m}}$, Kr^{87} and Kr^{88} .

BATCH RELEASES

There were zero (0) liquid radwaste releases from CPS in 2019.

A. Batch Liquid Releases: 2019

- | | |
|---|-----|
| 1. Number of batch releases: | 0 |
| 2. Total time period for batch releases: | N/A |
| 3. Maximum time period for batch release: | N/A |
| 4. Average time period for batch release: | N/A |
| 5. Minimum time period for batch release: | N/A |
| 6. Average stream flow during periods of release: | N/A |
| 7. Total waste volume: | N/A |
| 8. Total dilution volume: | N/A |

B. Batch Gaseous Releases: 2019

- | | |
|---|-----|
| 1. Number of batch releases: | 0 |
| 2. Total time period for batch releases: | N/A |
| 3. Maximum time period for batch release: | N/A |
| 4. Average time period for batch release: | N/A |
| 5. Minimum time period for batch release: | N/A |

ABNORMAL RELEASES

Information concerning abnormal radioactive liquid and gaseous releases is presented below for the year 2019. There were no abnormal or unplanned liquid or gaseous releases from CPS in 2019.

Liquid Releases:

Number of Abnormal Liquid Releases: Zero (0)

Activity Released [Ci]

Nuclides	Activity [Ci]
N/A	0.0
Total	0.0

Gaseous Releases:

Number of Abnormal Gaseous Releases: Zero (0)

Activity Released [Ci]

Nuclides	Activity [Ci]
N/A	0.0
Total	0.0

SECTION 5

SOLID WASTE DISPOSAL INFORMATION

During this reporting period –January 01, 2019 through December 31, 2019 - there were twenty-one (21) radioactive waste shipments and zero (0) irradiated fuel shipments from CPS. In addition, the CPS ODCM requires reporting of the following information for solid waste shipped offsite during the above reporting period:

1. Container volume:

Class A Waste: $1.90\text{E}+04$ ft³ / Class B Waste: 0.0 ft³ / Class C Waste: $4.31\text{E}+00$ ft³

This total includes Dry Active Waste (DAW), resins, filter sludges, evaporator bottoms, control rod blades, and other low level waste such as mixed waste.

2. Total curie quantity: Class A Waste was $7.20\text{E}+01$ curies and Class B Waste was $0.00\text{E}+00$ curies and Class C Waste was $3.81\text{E}+03$ curies in 2019 (determined by dose-to-curie and sample concentration methodology estimates).
3. Principal radionuclides: See Table 7-A.2 for listing of measured radionuclides.
4. Source of waste and processing employed: Non-compacted dry active waste, resins, filter sludges and evaporator bottoms dewatered.
5. Type of container: General Design and Type B Containers.
6. Solidification agent or absorbent: None.

TABLE 7
Solid Waste and Irradiated Fuel Shipments

A.1 Estimate of Solid Waste Shipped Offsite for Burial or Disposal: [**NOT** irradiated fuel]

A.1 Type of Waste		Units	January – December 2019	Est. Total Error, %
a.	Spent resins, filter sludges, evaporator bottoms, etc.	ft ³	2.30E+03	2.50E+01
		Ci	6.82E+01	
b.	Dry compactable waste, contaminated equipment, etc.	ft ³	1.67E+04	2.50E+01
		Ci	3.90E+00	
c.	Irradiated components, control rods, etc. (not fuel)	ft ³	4.26E+00	2.50E+01
		Ci	3.81E+03	
d.	Other Wastes-Mixed	ft ³	1.79E-04	2.50E+01
		Ci	1.61E-06	

* Total curie quantity and principal radionuclides were determined by measurements.

A.2 Estimate of Major Nuclide Composition (by type of waste):

1. Spent resins, filters, evaporator bottoms, etc.

Waste Class	Nuclide Name	% Percent Abundance	Curies
A	Mn ⁵⁴	39.06	2.65E+01
	Fe ⁵⁵	30.20	2.05E+01
	Fe ⁵⁹	1.19	8.06E-01
	Co ⁶⁰	20.96	1.42E+01
	Ni ⁶³	1.05	7.09E-01
	Zn ⁶⁵	4.85	3.29E+00

2. Dry compactable waste, contaminated equipment, etc.

Waste Class	Nuclide Name	% Percent Abundance	Curies
A	Cr ⁵¹	1.89	7.96E-02
	Mn ⁵⁴	28.30	1.19E+00
	Fe ⁵⁵	46.06	1.94E+00
	Fe ⁵⁹	1.08	7.57E-02
	Co ⁶⁰	18.40	7.73E-01
	Zn ⁶⁵	1.33	5.59E-02
C	Mn ⁵⁴	58.98	1.20E-02
	Fe ⁵⁵	16.54	3.36E-03
	Co ⁶⁰	21.24	4.31E-03
	Sn ⁶⁵	1.20	2.43E-04

**TABLE 7 (continued)
Solid Waste and Irradiated Fuel Shipments**

3. Irradiated Components

Waste Class	Nuclide Name	% Percent Abundance	Curies
C	Fe ⁵⁵	24.82	9.47E+02
	Co ⁶⁰	71.32	2.72E+03
	Ni ⁶³	2.38	9.08E+01
	Sb ¹²⁵	1.24	4.72E+01

4. Mixed Waste

Waste Class	Nuclide Name	% Percent Abundance	Curies
C	Pu ²³⁹	100	1.61E-06

A.3 Solid Waste Disposition:

January – December 2019

Number of Shipments	Mode of Transportation	Destination
9	Hittman Transport	Energy Solutions—Clive, UT Disposal Facility
11	Hittman Transport	Energy Solutions—Bear Creek, TN
1	Hittman Transport	Waste Control Specialist – Andrews, TX

B. Irradiated Fuel Shipments Disposition:

January – December 2019

Number of Shipments	Mode of Transportation	Destination
0	N/A	N/A

SECTION 6

DOSE MEASUREMENTS AND ASSESSMENTS

This section of the Annual Effluent Release Report provides the dose received by receptors around CPS from gaseous and liquid effluents. The dose to the receptor that would have received the highest dose in each sector (defined as the Critical Receptor for that sector) is listed within this report. This section also provides the dose to individuals who were inside the Site Boundary. This section also summarizes CPS's compliance with the requirements found within 40CFR190.

The 2019 maximum expected annual dose from Carbon-14 released from CPS has been calculated using the methodology included in the EPRI Technical Report 1021106 using the maximum gross thermal capacity maintained for 320.2 days of equivalent full power operation.

The assumptions used in determining dose values are as follows:

- All receptors within a five (5) mile radius are included in the Annual Land Use Census. This Annual Census determines what dose pathways are present as well as the distance of each receptor from the site.
- The annual average meteorological data for 2019 was used in conjunction with the Annual Land Use Census to determine the dose to each receptor within five (5) miles.
- The doses for each receptor from each sector were determined using methodologies given in the ODCM.
- The activity used in these assessments is the total activity released by CPS for the year 2019 not including radionuclides with half-lives less than eight (8) days and when dose pathway factors were available.
- The occupancy factor was taken into consideration by calculating the dose to individuals using areas inside the Site Boundary in non-residential areas. The occupancy factor is determined by dividing the number of hour(s) of occupancy per year (taken from the ODCM) and dividing that value by the total number of hour(s) per year.
- Dose to individuals using areas inside the Site Boundary (that are not residents) was calculated using the Ground Plane and Inhalation pathways.

TABLE 8
Maximum Offsite Doses and Dose Commitments
To Members of the Public in Each Sector
 Data Period: January 01, 2019 – December 31, 2019

This table illustrates the dose that a member from the public would most likely be exposed to from radioactive effluents in each sector from CPS. These values represent the maximum dose likely to expose a member of the public in each sector.

RECEPTOR INFORMATION					AIRBORNE EFFLUENT DOSE					WATERBORNE EFFLUENT DOSE (mRem) ^[1]	
					Iodines and Particulates (mRem)			Noble Gases (mRad)			
Sector	Distance (km)	Pathways	Organ	Age	Organ	Skin	Total Body	Gamma	Beta	Organ	Total Body
N	1.50	GP, I, M, V	B	A	2.39E-02	2.37E-05	5.18E-03	5.76E-03	2.76E-03	0.00E+00	0.00E+00
NNE	1.50	GP, I	B	A	1.30E-03	3.54E-05	4.39E-04	7.63E-03	3.66E-03		
NE	2.07	GP, I, V	B	A	4.89E-03	1.51E-05	1.23E-03	3.90E-03	1.87E-03		
ENE	2.86	GP, I, V	B	A	3.72E-03	8.68E-06	9.31E-04	2.97E-03	1.42E-03		
E	1.67	GP, I, V	B	A	5.12E-03	2.35E-05	1.29E-03	4.08E-03	1.95E-03		
ESE	5.14	GP, I, V	B	A	3.82E-03	6.51E-06	9.53E-04	3.05E-03	1.46E-03		
SE	4.44	GP, I	B	A	4.66E-04	6.90E-06	1.55E-04	2.77E-03	1.33E-03		
SSE	2.90	GP, I	B	A	4.16E-04	8.80E-06	1.39E-04	2.46E-03	1.18E-03		
S	4.78	GP, I, M	B	A	5.68E-03	4.06E-06	1.19E-03	1.86E-03	8.90E-04		
SSW	4.68	GP, I	B	A	3.59E-04	4.04E-06	1.18E-04	2.14E-03	1.03E-03		
SW	1.17	GP, I	B	A	8.85E-04	2.37E-05	2.99E-04	5.21E-03	2.50E-03		
WSW	3.62	GP, I, M, V	B	A	8.17E-03	4.59E-05	1.80E-03	1.96E-03	9.41E-04		
W	1.95	GP, I	B	T	1.48E-03	1.10E-05	2.79E-04	3.01E-03	1.44E-03		
WNW	2.63	GP, I	B	A	4.88E-04	6.23E-05	1.94E-04	2.62E-03	1.26E-03		
NW	2.65	GP, I, V	B	A	3.21E-03	5.89E-06	8.03E-04	2.57E-03	1.23E-03		
NNW	2.05	GP, I, M, V	B	A	1.44E-02	1.05E-05	3.11E-03	3.46E-03	1.66E-03		

Key for Table 8

Pathways	Organ	Age
GP = Ground Plane	B = Bone	A = Adult
I = Inhalation		T = Teen
M = Meat		I = Infant
V = Vegetation		C = Child

^[1]There were zero (0) liquid radwaste releases from CPS in 2019. All doses were within all regulatory limits, including limits from 40CFR190.

COMPLIANCE WITH 40CFR190 REQUIREMENTS

Dosimeter of Legal Records (DLRs) are stationed around CPS to measure the ambient gamma radiation field. Monitoring stations are placed near the site boundary, which includes the Independent Spent Fuel Storage Installation (ISFSI) pad, and approximately five (5) miles from the reactor, in locations representing the sixteen (16) compass sectors. Other locations are chosen to measure the radiation field at places of special interest such as nearby residences, meeting places and population centers. Control sites are located further than ten (10) miles from the site, in areas that should not be affected by plant operations. The results from the field dosimeters are reported in the Annual Radiological Environmental Operating Report (AREOR) and indicated no excess dose to offsite areas. The organ and whole body doses reported in the above tables are determined using 10CFR50 Appendix I methodology, which encompasses the limits of 40CFR190. The requirement requires the preparation and submittal of a Special Report whenever the calculated doses from plant generated radioactive effluents and direct radiation exceed 25 mRem to the total body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mRem. During 2019, Clinton Power Station operated at 4.05E-02% of the 40CFR190 total body limit, 1.56E-01% of the 40CFR190 organ limit and 1.05E-3% 40CFR190 thyroid limit.

INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)

No radioactive effluents were released from the Clinton Station ISFSI and no additional casks were placed on the pad for the period January 1, 2019 through December 31, 2019. Over the long term, as more storage modules containing dry shielded canisters of spent fuel are placed on the ISFSI pad, it is expected that ISFSI operations will become the prominent contributor to dose limits in this section. ISFSI dose contribution is in the form of direct radiation as no liquid or gas releases are expected to occur from the ISFSI canisters. The CPS 10CFR72.212 Report prepared in accordance with 10CFR72 requirements assumes a certain array of storage modules exists on the pad. The dose contribution from this array of casks combination with historical uranium fuel cycle operations prior to ISFSI operations was analyzed to be within 40CFR190 and 10CFR72.104 limits and is documented in Holtec Report No. HI-2135750, Site Boundary Dose Rate Calculations for HI-STORM FW System for Clinton Power Station.

DOSE TO MEMBERS OF THE PUBLIC WITHIN THE SITE BOUNDARY

CPS Offsite Dose Calculation Manual section 6.2 requires that the Radioactive Effluent Release Report include an assessment of the radiation doses from radioactive liquids and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the SITE BOUNDARY. Within the CPS site boundary there are seven areas that are open to members of the public as identified by CPS ODCM Table 5-3 (see *Figure 4*):

-
- The Department of Natural Resources Recreation Area at 1.287 kilometers (0.8 miles) in the ESE sector
 - A road at 0.495 kilometers (0.3 miles) in the SE sector
 - A residence at 2.736 kilometers (1.7 miles) in the SSE sector
 - A residence at 1.219 kilometers (0.8 miles) in the SW sector
 - Agricultural acreage at 1.372 kilometers (0.9 miles) in the SSW sector
 - A residence at 2.414 kilometers (1.5 miles) in the WSW sector

- A portion of Clinton Lake at 0.335 kilometers (0.2 miles) in the NW sector

At all of the above locations, the plume, inhalation and ground-plane exposure pathways are used for dose calculations. The 2019 Annual Land Use Census identified no other exposure pathways. All dose calculations were performed using the methodology contained in the CPS ODCM, with the exception of dose due to C-14, which was calculated using methodology included in the EPRI Technical Report 1021106.

FIGURE 4

AREAS WITHIN THE CPS SITE BOUNDARY OPEN TO MEMBERS OF THE PUBLIC

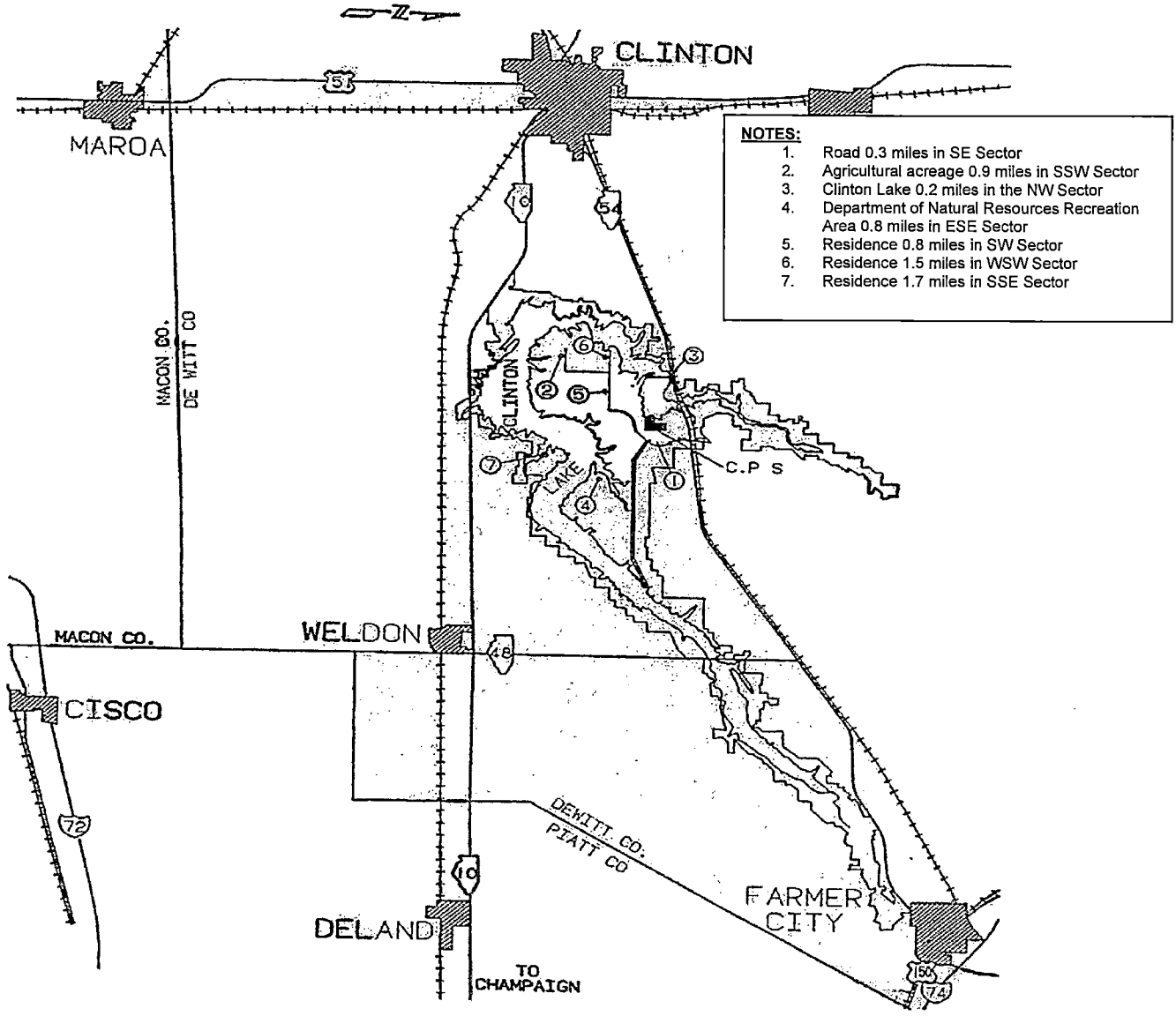


TABLE 9
Calculated Doses to Members of the Public During Use of the Department of Natural Resources Recreation Area in the East-Southeast Sector within the CPS Site Boundary
 Data Period: January 01, 2019 – December 31, 2019

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	1.03E-03	mRem/year
Skin Dose Rate (Noble Gases)	2.83E-03	mRem/year
Gamma Air Dose	1.84E-03	mRad
Beta Air Dose	8.84E-04	mRad
Total Body Dose ^[1]	1.60E-04	mRem
Skin Dose	1.14E-05	mRem

^[1] Dose includes the dose values resulting from the release of iodines, particulates (with half lives >8 days), tritium, and C-14 in gaseous effluents.

Highest Organ Dose by Age Group:

Adult Bone	3.16E-04	mRem
Teen Bone	4.48E-04	mRem
Child Bone	6.15E-04	mRem
Infant Bone	NA ^[2]	mRem

^[2] Dose(s) are calculated only for the age groups likely to be in the field.

TABLE 10
Calculated Doses to Members of the Public During Use of the Road in the Southeast Sector
within the CPS Site Boundary
 Data Period: January 01, 2019 –December 31, 2019

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	3.82E-04	mRem/year
Skin Dose Rate (Noble Gases)	5.61E-04	mRem/year
Gamma Air Dose	4.74E-04	mRad
Beta Air Dose	2.27E-04	mRad
Total Body Dose ^[1]	4.13E-05	mRem
Skin Dose	3.18E-06	mRem

^[1] Dose includes the dose values resulting from the release of iodines, particulates (with half lives >8 days), tritium, and C-14 in gaseous effluents.

Highest Organ Dose by Age Group:

Adult Bone	8.12E-05	mRem
Teen Bone	1.15E-04	mRem
Child Bone	1.58E-04	mRem
Infant Bone	1.17E-04	mRem

TABLE 11
Calculated Doses for the Residents in the South-Southeast Sector within the CPS Site
Boundary

Data Period: January 01, 2019 – December 31, 2019

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	2.21E-03	mRem/year
Skin Dose Rate (Noble Gases)	3.24E-03	mRem/year
Gamma Air Dose	2.53E-03	mRad
Beta Air Dose	1.21E-03	mRad
Total Body Dose ^[1]	2.15E-04	mRem
Skin Dose	9.56E-06	mRem

^[1] Dose includes the dose values resulting from the release of iodines, particulates (with half lives >8 days), tritium, and C-14 in gaseous effluents.

Highest Organ Dose by Age Group:

Adult Bone	4.28E-04	mRem
Teen Bone	6.09E-04	mRem
Child Bone	8.38E-03	mRem
Infant Bone	6.20E-04	mRem

TABLE 12
Calculated Doses for the Residents in the Southwest Sector within the CPS Site Boundary
 Data Period: January 01, 2019 – December 31, 2019

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	4.39E-03	mRem/year
Skin Dose Rate (Noble Gases)	6.44E-03	mRem/year
Gamma Air Dose	5.02E-03	mRad
Beta Air Dose	2.41E-03	mRad
Total Body Dose ^[1]	4.29E-04	mRem
Skin Dose	2.27E-05	mRem

^[1] Dose includes the dose values resulting from the release of iodines, particulates (with half lives >8 days), tritium, and C-14 in gaseous effluents.

Highest Organ Dose by Age Group:

Adult Bone	8.53E-04	mRem
Teen Bone	1.21E-03	mRem
Child Bone	1.67E-03	mRem
Infant Bone	1.23E-03	mRem

TABLE 13
Calculated Doses to Members of the Public During Use of the Agricultural Acreage in the
South-Southwest Sector within the CPS Site Boundary
 Data Period: January 01, 2019 – December 31, 2019

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	3.52E-04	mRem/year
Skin Dose Rate (Noble Gases)	5.17E-04	mRem/year
Gamma Air Dose	4.03E-04	mRad
Beta Air Dose	1.93E-04	mRad
Total Body Dose ^[1]	2.88E-05	mRem
Skin Dose	2.11E-06	mRem

^[1] Dose includes the dose values resulting from the release of iodines, particulates (with half lives >8 days), tritium, and C-14 in gaseous effluents.

Highest Organ Dose by Age Group:

Adult Bone	6.86E-05	mRem
Teen Bone	9.74E-05	mRem
Child Bone	NA ^[2]	mRem
Infant Bone	NA ^[2]	mRem

^[2] Dose(s) are calculated only for the age groups likely to be in the field

TABLE 14
Calculated Doses for the Residents in the West-Southwest Sector within the CPS Site
Boundary
 Data Period: January 01, 2019 – December 31, 2019

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	2.05E-03	mRem/year
Skin Dose Rate (Noble Gases)	3.01E-03	mRem/year
Gamma Air Dose	2.35E-03	mRad
Beta Air Dose	1.13E-03	mRad
Total Body Dose ^[1]	1.98E-04	mRem
Skin Dose	7.61E-06	mRem

^[1] Dose includes the dose values resulting from the release of iodines, particulates (with half lives >8 days), tritium, and C-14 in gaseous effluents.

Highest Organ Dose by Age Group:

Adult Bone	3.96E-04	mRem
Teen Bone	5.64E-04	mRem
Child Bone	7.76E-04	mRem
Infant Bone	5.74E-04	mRem

TABLE 15
Calculated Doses to Members of the Public During Use of Clinton Lake in the Northwest Sector
within the CPS Site Boundary

Data Period: January 01, 2019 – December 31, 2019

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	3.07E-03	mRem/year
Skin Dose Rate (Noble Gases)	4.51E-03	mRem/year
Gamma Air Dose	3.50E-03	mRad
Beta Air Dose	1.68E-03	mRad
Total Body Dose ^[1]	2.96E-04	mRem
Skin Dose	1.26E-05	mRem

^[1] Dose includes the dose values resulting from the release of iodines, particulates (with half lives >8 days), tritium, and C-14 in gaseous effluents.

Highest Organ Dose by Age Group:

Adult Bone	5.90E-04	mRem
Teen Bone	8.41E-04	mRem
Child Bone	1.16E-03	mRem
Infant Bone	N/A ^[2]	mRem

^[2] Dose(s) are calculated only for the age groups likely to be in the field

SECTION 7

METEOROLOGICAL DATA AND DISPERSION ESTIMATES

On 13 April 1972, the meteorological monitoring program commenced at the Clinton Power Station site. The meteorological system consists of a tower 199 feet high with two (2) levels of instrumentation at the 10-meter and 60-meter elevations. A combined cup and vane sensor measures wind direction and wind speed(s) at the 10-meter and 60-meter levels. An aspirated dual temperature sensor senses the temperatures at these levels. One-half of the dual sensors at each elevation are used for ambient temperature while the other half are used to provide a differential temperature between the 10-meter and 60-meter levels.

Meteorological monitoring instruments have been placed on the Clinton Power Station backup meteorological tower at the 10-meter level to serve as a backup to the primary meteorological tower.

Clinton Power Station meteorological data is transmitted to the Main Control Room (MCR) via a dedicated communication link. Once the signals are received at the MCR, they are then converted to a 4 to 20 milliamp signal and fed individually to a microprocessor and chart recorders. The microprocessor is part of the Clinton Power Station Radiation Monitoring System (RMS). Meteorological data is available via the microprocessors in the Main Control Room and the Technical Support Center (TSC).

Dispersion modeling for effluents for normal operation of Clinton Power Station is a straight-line, sector-averaged Gaussian plume model designed to estimate average relative concentration at various receptor points. The model was developed in accordance with routine release analysis procedures specified in Regulatory Guide 1.111. For joint frequency input data, periods of calm are distributed in accordance with a directional distribution. For hourly input data, periods of calm are the previous hour's wind direction. Periods of calm are assigned a wind speed value of half the specified instrument threshold value. Reference Table 18 for more detailed information on meteorology and dispersion data.

TABLE 16
Meteorological Data Availability
 Data Period: January 01, 2019 – December 31, 2019

PARAMETER	PERCENT OF VALID PARAMETER HOURS			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1. Wind Speed				
a. 10-Meter sensor	99.9%	100.0%	99.8%	100.0%
b. 60 Meter sensor	98.4%	100.0%	99.8%	100.0%
2. Wind Direction				
a. 10-Meter sensor	99.9%	100.0%	99.8%	100.0%
b. 60 Meter sensor	99.9%	100.0%	99.8%	100.0%
3. Temperature				
a. 10-Meter sensor	99.9%	98.0%	99.8%	100.0%
b. 60 Meter sensor	99.9%	100.0%	99.8%	100.0%
c. Temperature Difference (10m-60m)	99.9%	100.0%	99.8%	100.0%
4. Percent of hours for which valid 10-meter Wind Speed, Wind Direction, and Delta Temperature were available	99.9%	100.0%	99.8%	100.0%
5. Percent of hours for which valid 60-meter Wind Speed, Wind Direction, and Delta Temperature were available	99.4%	100.0%	99.8%	100.0%

Clinton Power Station was able to achieve 99.8% Meteorological Recoverable Data during 2019 exceeding the minimum criteria of 90% as delineated within Regulatory Guide 1.23.

TABLE 17
Classification of Atmospheric Stability

Stability Classification	Pasquill Category	Defining Conditions
Extremely unstable	A	----- $<\Delta T \leq -1.9$
Moderately unstable	B	$-1.9 <\Delta T \leq -1.7$
Slightly unstable	C	$-1.7 <\Delta T \leq -1.5$
Neutral	D	$-1.5 <\Delta T \leq -0.5$
Slightly stable	E	$-0.5 <\Delta T \leq 1.5$
Moderately stable	F	$1.5 <\Delta T \leq 4.0$
Extremely stable	G	$4.0 <\Delta T \leq$ -----

ΔT = temperature difference in degrees Celsius per 100 meters

TABLE 18
Joint Wind Frequency Distribution by Stability Class
Reporting Period: January 01, 2019 – December 31, 2019

The following table contains the joint wind frequency tables for CPS. The tables are segregated by sensor elevation and calendar quarter. All tabled values are in hours.

Clinton Power Station

Period of Record: January - March 2019
Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	5	1	0	0	6
NNE	0	0	1	4	0	0	5
NE	0	0	0	0	0	0	0
ENE	0	2	5	0	0	0	7
E	0	1	4	0	0	0	5
ESE	0	0	0	0	0	0	0
SE	0	8	1	0	0	0	9
SSE	0	0	0	0	0	0	0
S	0	0	1	0	0	0	1
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	2	3	0	0	5
NW	0	0	2	0	0	0	2
NNW	0	0	4	1	0	0	5
Variable	0	0	0	0	0	0	0
Total	0	11	25	9	0	0	45

Hours of calm in this stability class: 0
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: January - March 2019
 Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	1	2	1	0	0	4
NNE	0	0	0	2	0	0	2
NE	0	0	0	0	0	0	0
ENE	0	2	4	0	0	0	6
E	0	1	5	0	0	0	6
ESE	0	2	2	0	0	0	4
SE	0	0	0	0	0	0	0
SSE	0	0	1	0	0	0	1
S	0	0	4	0	0	0	4
SSW	0	0	3	0	0	0	3
SW	0	0	3	0	0	0	3
WSW	0	0	1	1	0	0	2
W	0	0	1	6	0	3	10
WNW	0	2	4	3	0	0	9
NW	0	0	4	4	0	0	8
NNW	0	1	3	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	0	9	37	17	0	3	66

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: January - March 2019
 Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	5	0	0	0	5
NNE	0	1	1	0	0	0	2
NE	0	1	3	0	0	0	4
ENE	0	3	2	0	0	0	5
E	0	2	3	0	0	0	5
ESE	0	6	3	0	0	0	9
SE	0	3	1	0	0	0	4
SSE	0	2	2	0	0	0	4
S	0	0	2	0	0	0	2
SSW	0	0	3	0	0	0	3
SW	0	0	2	0	0	0	2
WSW	0	1	3	3	0	0	7
W	0	0	2	13	1	1	17
WNW	0	1	5	18	3	1	28
NW	0	5	9	2	0	0	16
NNW	0	2	4	2	0	0	8
Variable	0	0	0	0	0	0	0
Total	0	27	50	38	4	2	121

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: January - March 2019
 Stability Class - Neutral - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	5	23	20	11	4	0	63
NNE	5	21	19	10	7	0	62
NE	4	18	25	19	0	0	66
ENE	2	22	39	0	0	0	63
E	0	46	55	1	0	0	102
ESE	2	69	18	1	0	0	90
SE	2	32	30	1	0	0	65
SSE	3	11	27	10	0	0	51
S	1	3	12	11	1	0	28
SSW	1	4	23	9	2	0	39
SW	0	2	14	4	0	1	21
WSW	1	10	33	9	9	5	67
W	1	8	26	27	31	10	103
WNW	0	19	46	70	39	0	174
NW	4	22	44	14	10	0	94
NNW	2	33	56	10	0	0	101
Variable	0	0	0	0	0	0	0
Total	33	343	487	207	103	16	1189

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: January - March 2019
 Stability Class - Slightly Stable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	7	5	0	0	0	14
NNE	4	16	5	1	0	0	26
NE	11	26	5	2	0	0	44
ENE	6	8	8	2	0	0	24
E	9	19	6	1	0	0	35
ESE	7	22	3	1	0	0	33
SE	3	14	9	2	0	0	28
SSE	1	24	30	4	0	0	59
S	1	14	39	11	0	0	65
SSW	1	16	17	4	0	0	38
SW	3	19	13	4	1	0	40
WSW	1	11	24	5	0	0	41
W	2	10	18	11	3	1	45
WNW	4	14	33	4	0	1	56
NW	2	11	7	2	0	0	22
NNW	5	7	3	0	0	0	15
Variable	0	0	0	0	0	0	0
Total	62	238	225	54	4	2	585

Hours of calm in this stability class: 1
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: January - March 2019
 Stability Class - Moderately Stable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	3	0	0	0	0	4
NNE	7	1	0	0	0	0	8
NE	3	3	0	0	0	0	6
ENE	4	0	0	0	0	0	4
E	3	3	0	0	0	0	6
ESE	6	2	0	0	0	0	8
SE	8	0	0	0	0	0	8
SSE	1	5	0	0	0	0	6
S	1	11	11	0	0	0	23
SSW	2	5	0	0	0	0	7
SW	0	4	0	0	0	0	4
WSW	1	6	2	0	0	0	9
W	1	3	1	0	0	0	5
WNW	1	4	3	0	0	0	8
NW	2	3	0	0	0	0	5
NNW	1	0	0	0	0	0	1
Variable	0	0	0	0	0	0	0
Total	42	53	17	0	0	0	112

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: January - March 2019
 Stability Class - Extremely Stable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	1	1	0	0	0	0	2
NE	0	3	0	0	0	0	3
ENE	1	2	0	0	0	0	3
E	1	0	0	0	0	0	1
ESE	1	0	0	0	0	0	1
SE	0	2	0	0	0	0	2
SSE	1	6	0	0	0	0	7
S	0	1	1	0	0	0	2
SSW	0	0	0	0	0	0	0
SW	1	0	0	0	0	0	1
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	2	2	0	0	0	0	4
NW	4	3	0	0	0	0	7
NNW	2	3	0	0	0	0	5
Variable	0	0	0	0	0	0	0
Total	14	23	1	0	0	0	38

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: January - March 2019
 Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	6	0	0	6
NNE	0	0	0	1	4	0	5
NE	0	0	0	0	0	0	0
ENE	0	0	2	4	1	0	7
E	0	0	2	3	0	0	5
ESE	0	0	1	0	0	0	1
SE	0	0	8	0	0	0	8
SSE	0	0	0	0	0	0	0
S	0	0	1	0	0	0	1
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	2	3	0	5
NW	0	0	1	2	0	0	3
NNW	0	0	1	3	0	0	4
Variable	0	0	0	0	0	0	0
Total	0	0	16	21	8	0	45

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: January - March 2019
 Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	1	1	1	0	3
NNE	0	0	0	1	1	0	2
NE	0	0	0	0	0	0	0
ENE	0	0	1	2	1	0	4
E	0	0	6	3	0	0	9
ESE	0	0	3	0	0	0	3
SE	0	0	0	1	0	0	1
SSE	0	0	0	0	0	0	0
S	0	0	2	3	0	0	5
SSW	0	0	2	0	0	0	2
SW	0	0	0	3	0	0	3
WSW	0	0	0	2	0	0	2
W	0	0	0	2	5	3	10
WNW	0	1	1	3	2	1	8
NW	0	1	4	2	4	0	11
NNW	0	0	2	1	0	0	3
Variable	0	0	0	0	0	0	0
Total	0	2	22	24	14	4	66

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: January - March 2019
 Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	4	0	0	4
NNE	0	0	1	0	0	0	1
NE	0	1	2	2	0	0	5
ENE	0	0	3	1	1	0	5
E	0	1	4	2	0	0	7
ESE	0	1	4	4	0	0	9
SE	0	2	2	0	0	0	4
SSE	0	1	1	1	0	0	3
S	0	0	0	2	0	0	2
SSW	0	0	3	0	0	0	3
SW	0	0	0	2	0	0	2
WSW	0	0	1	4	1	0	6
W	0	0	1	4	8	5	18
WNW	0	0	6	4	11	6	27
NW	0	2	6	5	2	0	15
NNW	0	1	4	4	0	0	9
Variable	0	0	0	0	0	0	0
Total	0	9	38	39	23	11	120

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 1
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: January - March 2019
 Stability Class - Neutral - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	11	24	23	5	0	65
NNE	5	6	19	8	7	1	46
NE	0	9	14	16	16	4	59
ENE	0	5	14	20	15	0	54
E	1	3	33	57	14	1	109
ESE	0	10	47	39	6	0	102
SE	1	16	30	25	4	0	76
SSE	1	5	13	11	11	1	42
S	0	2	4	10	12	4	32
SSW	0	0	12	17	0	4	33
SW	0	0	5	15	2	2	24
WSW	1	1	14	27	9	17	69
W	0	1	21	15	22	46	105
WNW	0	4	21	39	38	57	159
NW	3	13	23	40	10	8	97
NNW	0	15	32	32	2	0	81
Variable	0	0	0	0	0	0	0
Total	14	101	326	394	173	145	1153

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 36
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: January - March 2019
 Stability Class - Slightly Stable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	4	6	7	0	0	18
NNE	2	3	11	8	2	0	26
NE	1	2	12	20	0	0	35
ENE	0	5	4	7	5	0	21
E	0	4	18	8	3	1	34
ESE	1	4	19	5	5	1	35
SE	0	10	14	7	7	0	38
SSE	0	5	13	28	17	4	67
S	0	3	7	19	26	4	59
SSW	0	2	6	23	4	0	35
SW	1	4	14	10	8	2	39
WSW	0	2	11	24	6	1	44
W	0	3	10	12	9	10	44
WNW	0	3	8	31	8	1	51
NW	3	3	15	6	1	0	28
NNW	3	2	5	2	0	0	12
Variable	0	0	0	0	0	0	0
Total	12	59	173	217	101	24	586

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: January - March 2019
 Stability Class - Moderately Stable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	2	1	0	0	3
NNE	0	2	2	2	0	0	6
NE	1	1	1	1	0	0	4
ENE	0	2	1	0	1	0	4
E	0	4	2	0	0	0	6
ESE	1	5	3	1	0	0	10
SE	0	5	6	0	0	0	11
SSE	0	0	3	4	1	0	8
S	0	0	1	6	8	0	15
SSW	0	1	2	4	2	0	9
SW	0	0	3	6	0	0	9
WSW	0	0	1	6	0	0	7
W	0	1	1	5	0	0	7
WNW	0	0	1	3	1	0	5
NW	0	1	2	2	0	0	5
NNW	0	0	2	1	0	0	3
Variable	0	0	0	0	0	0	0
Total	2	22	33	42	13	0	112

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: January - March 2019
 Stability Class - Extremely Stable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	3	1	0	0	4
NNE	0	1	7	0	0	0	8
NE	0	1	0	2	0	0	3
ENE	0	0	0	2	0	0	2
E	0	0	1	0	0	0	1
ESE	1	1	0	1	0	0	3
SE	0	1	1	0	0	0	2
SSE	0	1	0	1	1	0	3
S	0	0	0	4	2	0	6
SSW	0	1	1	0	0	0	2
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	1	0	0	1
NW	1	0	0	2	0	0	3
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	2	6	13	14	3	0	38

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: April - June 2019
 Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	3	5	0	0	8
NNE	0	0	0	0	0	0	0
NE	0	0	4	0	0	0	4
ENE	0	0	0	0	0	0	0
E	0	0	4	2	0	0	6
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	1	1	0	0	2
SSW	0	0	0	1	0	0	1
SW	0	0	0	1	1	0	2
WSW	0	0	0	0	1	0	1
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	2	1	3	0	6
NNW	0	0	4	4	1	0	9
Variable	0	0	0	0	0	0	0
Total	0	0	18	15	6	0	39

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Clinton Power Station

Period of Record: April - June 2019
 Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	4	2	0	0	6
NNE	0	0	0	0	0	0	0
NE	0	0	6	0	0	0	6
ENE	0	0	3	0	0	0	3
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	1	1	0	0	0	2
S	0	1	7	2	0	0	10
SSW	0	0	1	4	0	0	5
SW	0	0	0	2	4	0	6
WSW	0	0	3	0	0	0	3
W	0	0	1	0	0	0	1
WNW	0	0	2	0	0	0	2
NW	0	2	7	6	0	0	15
NNW	0	2	3	3	0	0	8
Variable	0	0	0	0	0	0	0
Total	0	6	38	19	4	0	67

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Clinton Power Station

Period of Record: April - June 2019
 Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	2	0	0	0	0	2
NNE	0	1	1	1	1	0	4
NE	0	1	7	2	0	0	10
ENE	0	1	3	0	0	0	4
E	0	0	2	1	0	0	3
ESE	0	2	4	0	0	0	6
SE	0	0	1	0	0	0	1
SSE	0	6	1	0	0	0	7
S	0	1	8	4	0	0	13
SSW	0	6	7	13	0	0	26
SW	0	5	6	6	1	0	18
WSW	0	0	12	4	3	0	19
W	0	1	4	1	0	0	6
WNW	0	0	4	1	0	0	5
NW	0	1	8	2	0	0	11
NNW	0	0	4	3	0	0	7
Variable	0	0	0	0	0	0	0
Total	0	27	72	38	5	0	142

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Clinton Power Station

Period of Record: April - June 2019
 Stability Class - Neutral - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	3	25	25	12	3	0	68
NNE	4	24	16	7	10	0	61
NE	2	45	42	10	0	0	99
ENE	1	18	34	3	1	0	57
E	2	15	22	15	0	0	54
ESE	9	11	16	6	0	0	42
SE	1	22	17	0	0	0	40
SSE	3	19	20	3	0	0	45
S	2	29	42	17	1	0	91
SSW	2	24	45	43	3	0	117
SW	2	22	31	14	0	0	69
WSW	5	19	21	7	1	0	53
W	2	14	12	9	1	0	38
WNW	2	22	33	4	0	0	61
NW	9	22	38	14	0	0	83
NNW	4	12	11	12	0	0	39
Variable	0	0	0	0	0	0	0
Total	53	343	425	176	20	0	1017

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Clinton Power Station

Period of Record: April - June 2019
 Stability Class - Slightly Stable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	4	9	3	9	0	0	25
NNE	3	19	8	4	0	0	34
NE	9	17	18	2	0	0	46
ENE	5	17	12	0	0	0	34
E	4	28	10	0	0	0	42
ESE	8	26	4	0	0	0	38
SE	10	29	3	0	0	0	42
SSE	1	26	27	0	0	0	54
S	5	37	31	7	0	0	80
SSW	2	38	44	9	0	0	93
SW	3	30	24	3	1	0	61
WSW	6	22	15	2	0	0	45
W	2	20	5	5	0	0	32
WNW	6	20	15	0	0	0	41
NW	4	13	8	1	0	0	26
NNW	5	6	6	0	0	0	17
Variable	0	0	0	0	0	0	0
Total	77	357	233	42	1	0	710

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Clinton Power Station

Period of Record: April - June 2019
 Stability Class - Moderately Stable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	1	0	0	0	0	2
NNE	6	0	0	0	0	0	6
NE	6	4	1	0	0	0	11
ENE	3	2	0	0	0	0	5
E	4	1	0	0	0	0	5
ESE	1	0	0	0	0	0	1
SE	3	3	0	0	0	0	6
SSE	5	5	0	0	0	0	10
S	1	12	0	0	0	0	13
SSW	2	9	0	0	0	0	11
SW	6	9	0	0	0	0	15
WSW	1	9	0	0	0	0	10
W	9	6	0	0	0	0	15
WNW	7	9	0	0	0	0	16
NW	4	5	1	0	0	0	10
NNW	2	1	0	0	0	0	3
Variable	0	0	0	0	0	0	0
Total	61	76	2	0	0	0	139

Hours of calm in this stability class: 1
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Clinton Power Station

Period of Record: April - June 2019
 Stability Class - Extremely Stable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	0	0	0	0	0	2
NNE	4	0	0	0	0	0	4
NE	5	5	0	0	0	0	10
ENE	2	0	0	0	0	0	2
E	0	0	0	0	0	0	0
ESE	2	0	0	0	0	0	2
SE	1	1	0	0	0	0	2
SSE	2	1	0	0	0	0	3
S	3	1	0	0	0	0	4
SSW	2	2	0	0	0	0	4
SW	5	3	0	0	0	0	8
WSW	7	0	0	0	0	0	7
W	7	0	0	0	0	0	7
WNW	5	2	0	0	0	0	7
NW	1	1	0	0	0	0	2
NNW	4	0	0	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	52	16	0	0	0	0	68

Hours of calm in this stability class: 1
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Clinton Power Station

Period of Record: April - June 2019
 Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	2	1	5	0	8
NNE	0	0	0	0	0	0	0
NE	0	0	0	4	0	0	4
ENE	0	0	0	0	0	0	0
E	0	0	1	2	3	0	6
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	1	2	0	0	3
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	1	2	3
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	1	1
NW	0	0	0	2	1	2	5
NNW	0	0	3	1	3	2	9
Variable	0	0	0	0	0	0	0
Total	0	0	7	12	13	7	39

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Clinton Power Station

Period of Record: April - June 2019
 Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	2	2	2	0	6
NNE	0	0	0	0	0	0	0
NE	0	0	2	3	0	0	5
ENE	0	0	1	2	1	0	4
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	3	0	0	0	3
S	0	1	1	8	3	0	13
SSW	0	0	0	1	0	0	1
SW	0	0	0	0	2	4	6
WSW	0	0	0	3	0	0	3
W	0	0	0	1	0	0	1
WNW	0	0	2	1	0	0	3
NW	0	0	4	4	3	2	13
NNW	0	0	6	0	3	0	9
Variable	0	0	0	0	0	0	0
Total	0	1	21	25	14	6	67

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Clinton Power Station

Period of Record: April - June 2019
 Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	2	0	0	0	2
NNE	0	0	2	1	0	1	4
NE	0	0	3	7	0	0	10
ENE	0	0	1	0	2	0	3
E	0	0	0	1	2	0	3
ESE	0	0	2	6	0	0	8
SE	0	1	1	0	0	0	2
SSE	0	4	1	1	1	0	7
S	0	0	5	5	4	0	14
SSW	0	1	9	12	6	0	28
SW	0	1	3	6	3	2	15
WSW	0	0	5	10	1	2	18
W	0	0	3	3	0	0	6
WNW	0	0	3	0	1	0	4
NW	0	0	4	5	1	1	11
NNW	0	0	3	2	1	1	7
Variable	0	0	0	0	0	0	0
Total	0	7	47	59	22	7	142

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Clinton Power Station

Period of Record: April - June 2019
 Stability Class - Neutral - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	13	21	20	7	6	68
NNE	2	13	9	4	3	13	44
NE	4	18	31	23	17	3	96
ENE	0	10	21	21	18	4	74
E	1	6	4	13	22	11	57
ESE	1	7	9	13	7	7	44
SE	0	10	18	16	1	0	45
SSE	2	18	6	19	6	4	55
S	0	9	21	35	23	10	98
SSW	0	10	22	34	30	5	101
SW	4	10	24	21	7	2	68
WSW	0	11	15	16	8	2	52
W	3	6	12	6	7	2	36
WNW	0	13	17	29	4	0	63
NW	4	11	20	28	11	0	74
NNW	4	10	7	7	13	1	42
Variable	0	0	0	0	0	0	0
Total	26	175	257	305	184	70	1017

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Clinton Power Station

Period of Record: April - June 2019
 Stability Class - Slightly Stable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	6	9	4	7	2	28
NNE	1	0	8	6	3	1	19
NE	0	6	17	10	2	0	35
ENE	0	2	12	32	3	0	49
E	1	5	11	22	3	0	42
ESE	0	5	28	11	1	0	45
SE	0	13	24	2	0	0	39
SSE	0	5	17	30	16	0	68
S	1	4	33	28	12	9	87
SSW	0	3	27	38	12	1	81
SW	0	4	17	26	6	1	54
WSW	0	0	11	23	8	0	42
W	3	3	19	8	7	0	40
WNW	1	4	17	15	0	0	37
NW	1	4	12	12	1	0	30
NNW	0	4	4	5	1	0	14
Variable	0	0	0	0	0	0	0
Total	8	68	266	272	82	14	710

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Clinton Power Station

Period of Record: April - June 2019
 Stability Class - Moderately Stable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	3	3	0	0	0	6
NNE	0	1	1	0	0	0	2
NE	0	0	2	0	0	0	2
ENE	0	1	9	1	0	0	11
E	1	2	4	0	0	0	7
ESE	0	1	4	0	0	0	5
SE	0	6	2	0	0	0	8
SSE	0	1	0	3	0	0	4
S	0	1	6	5	0	0	12
SSW	0	0	8	7	0	0	15
SW	0	0	7	2	0	0	9
WSW	0	0	6	8	1	0	15
W	0	4	7	1	0	0	12
WNW	0	0	13	2	0	0	15
NW	0	3	5	5	0	0	13
NNW	0	2	2	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	1	25	79	34	1	0	140

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Clinton Power Station

Period of Record: April - June 2019
 Stability Class - Extremely Stable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	0	0	0	0	0	1
NNE	0	3	0	0	0	0	3
NE	0	1	2	0	0	0	3
ENE	0	2	3	1	0	0	6
E	0	0	5	0	0	0	5
ESE	1	1	0	0	0	0	2
SE	0	1	0	0	0	0	1
SSE	1	1	1	0	0	0	3
S	1	1	0	1	0	0	3
SSW	0	2	3	4	0	0	9
SW	0	2	4	3	0	0	9
WSW	0	1	4	0	0	0	5
W	0	3	3	0	0	0	6
WNW	1	3	1	2	0	0	7
NW	0	1	2	1	0	0	4
NNW	1	0	1	0	0	0	2
Variable	0	0	0	0	0	0	0
Total	6	22	29	12	0	0	69

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 0

Clinton Power Station

Period of Record: July - September 2019

Stability Class - Extremely Unstable - 60m-10m Delta-T (F)

Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	4	0	0	0	0	4
NNE	0	1	4	1	0	0	6
NE	0	5	1	0	0	0	6
ENE	0	3	1	0	0	0	4
E	0	0	1	0	0	0	1
ESE	0	1	0	0	0	0	1
SE	0	4	0	0	0	0	4
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	10	0	0	0	10
SW	0	0	10	0	0	0	10
WSW	0	0	0	0	0	0	0
W	0	2	3	0	0	0	5
WNW	0	1	7	1	0	0	9
NW	0	3	6	0	0	0	9
NNW	0	6	12	0	0	0	18
Variable	0	0	0	0	0	0	0
Total	0	30	55	2	0	0	87

Hours of calm in this stability class: 0

Hours of missing wind measurements in this stability class: 0

Hours of missing stability measurements in all stability classes: 4

Clinton Power Station

Period of Record: July - September 2019
 Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	11	4	0	0	0	15
NNE	0	6	1	0	0	0	7
NE	0	7	0	0	0	0	7
ENE	0	5	3	0	0	0	8
E	0	2	2	0	0	0	4
ESE	0	4	1	0	0	0	5
SE	0	4	1	0	0	0	5
SSE	0	3	1	0	0	0	4
S	0	1	3	2	0	0	6
SSW	0	3	14	2	0	0	19
SW	0	0	7	0	0	0	7
WSW	0	0	1	2	0	0	3
W	0	3	11	2	0	0	16
WNW	0	2	7	1	0	0	10
NW	0	9	7	0	0	0	16
NNW	0	7	4	0	0	0	11
Variable	0	0	0	0	0	0	0
Total	0	67	67	9	0	0	143

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 4

Clinton Power Station

Period of Record: July - September 2019
 Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	4	2	0	0	0	6
NNE	0	4	2	1	0	0	7
NE	0	5	1	0	0	0	6
ENE	0	3	1	0	0	0	4
E	0	9	1	0	0	0	10
ESE	0	7	3	0	0	0	10
SE	0	8	1	0	0	0	9
SSE	1	7	1	0	0	0	9
S	0	10	2	0	0	0	12
SSW	0	5	10	1	0	0	16
SW	0	5	15	0	0	0	20
WSW	0	4	3	1	0	0	8
W	0	6	6	1	0	0	13
WNW	0	7	7	0	0	0	14
NW	0	14	6	0	0	0	20
NNW	0	6	5	0	0	0	11
Variable	0	0	0	0	0	0	0
Total	1	104	66	4	0	0	175

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 4

Clinton Power Station

Period of Record: July - September 2019
 Stability Class - Neutral - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	3	11	6	0	0	0	20
NNE	3	25	8	1	0	0	37
NE	2	21	8	0	0	0	31
ENE	3	8	6	0	0	0	17
E	0	17	1	0	0	0	18
ESE	2	14	0	0	0	0	16
SE	4	15	0	0	0	0	19
SSE	6	40	11	1	0	0	58
S	2	42	18	5	0	0	67
SSW	3	31	57	16	0	0	107
SW	2	26	35	3	0	0	66
WSW	3	16	10	1	0	0	30
W	1	17	6	0	0	0	24
WNW	3	28	11	0	0	0	42
NW	5	28	4	0	0	0	37
NNW	1	16	3	0	0	0	20
Variable	0	0	0	0	0	0	0
Total	43	355	184	27	0	0	609

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 4

Clinton Power Station

Period of Record: July - September 2019
 Stability Class - Slightly Stable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	6	21	3	0	0	0	30
NNE	2	32	3	0	0	0	37
NE	4	43	1	0	0	0	48
ENE	1	17	1	0	0	0	19
E	10	32	1	0	0	0	43
ESE	14	24	0	0	0	0	38
SE	12	24	1	0	0	0	37
SSE	12	29	4	0	0	0	45
S	11	92	17	0	0	0	120
SSW	9	80	55	3	0	0	147
SW	11	31	6	1	0	0	49
WSW	11	17	4	0	0	0	32
W	12	23	6	0	0	0	41
WNW	17	28	0	1	0	0	46
NW	12	28	2	0	0	0	42
NNW	1	17	1	0	0	0	19
Variable	0	0	0	0	0	0	0
Total	145	538	105	5	0	0	793

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 4

Clinton Power Station

Period of Record: July - September 2019
 Stability Class - Moderately Stable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	4	1	0	0	0	7
NNE	7	22	0	0	0	0	29
NE	13	33	0	0	0	0	46
ENE	5	4	0	0	0	0	9
E	11	4	0	0	0	0	15
ESE	9	1	0	0	0	0	10
SE	5	1	0	0	0	0	6
SSE	3	6	0	0	0	0	9
S	4	17	0	0	0	0	21
SSW	7	18	0	0	0	0	25
SW	10	14	1	0	0	0	25
WSW	12	7	0	0	0	0	19
W	10	6	0	0	0	0	16
WNW	7	1	0	0	0	0	8
NW	14	11	0	0	0	0	25
NNW	5	2	0	0	0	0	7
Variable	0	0	0	0	0	0	0
Total	124	151	2	0	0	0	277

Hours of calm in this stability class: 3
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 4

Clinton Power Station

Period of Record: July - September 2019
 Stability Class - Extremely Stable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	4	0	0	0	0	0	4
NNE	12	1	0	0	0	0	13
NE	18	15	0	0	0	0	33
ENE	3	0	0	0	0	0	3
E	3	0	0	0	0	0	3
ESE	1	0	0	0	0	0	1
SE	3	0	0	0	0	0	3
SSE	5	1	0	0	0	0	6
S	2	0	0	0	0	0	2
SSW	2	2	0	0	0	0	4
SW	3	2	0	0	0	0	5
WSW	5	1	0	0	0	0	6
W	5	0	0	0	0	0	5
WNW	4	0	0	0	0	0	4
NW	14	1	0	0	0	0	15
NNW	6	0	0	0	0	0	6
Variable	0	0	0	0	0	0	0
Total	90	23	0	0	0	0	113

Hours of calm in this stability class: 4
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 4

Clinton Power Station

Period of Record: July - September 2019
 Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	1	3	1	0	0	5
NNE	0	0	1	3	0	0	4
NE	0	0	5	0	0	0	5
ENE	0	0	5	1	0	0	6
E	0	0	0	1	0	0	1
ESE	0	1	1	0	0	0	2
SE	0	3	0	0	0	0	3
SSE	0	0	0	0	0	0	0
S	0	0	0	1	0	0	1
SSW	0	0	5	7	0	0	12
SW	0	0	2	5	0	0	7
WSW	0	0	0	0	0	0	0
W	0	0	6	1	0	0	7
WNW	0	0	3	4	0	0	7
NW	0	0	6	3	0	0	9
NNW	0	1	12	5	0	0	18
Variable	0	0	0	0	0	0	0
Total	0	6	49	32	0	0	87

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 4

Clinton Power Station

Period of Record: July - September 2019
 Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	6	8	1	0	0	15
NNE	0	1	4	0	0	0	5
NE	0	3	4	0	0	0	7
ENE	0	1	3	3	0	0	7
E	0	2	1	1	0	0	4
ESE	0	3	2	2	0	0	7
SE	0	3	0	0	0	0	3
SSE	0	2	2	1	0	0	5
S	0	1	2	3	2	0	8
SSW	0	2	8	8	1	0	19
SW	0	0	0	5	0	0	5
WSW	0	0	1	1	1	0	3
W	0	0	12	2	0	0	14
WNW	0	2	4	3	2	0	11
NW	0	5	5	2	0	0	12
NNW	0	5	11	2	0	0	18
Variable	0	0	0	0	0	0	0
Total	0	36	67	34	6	0	143

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 4

Clinton Power Station

Period of Record: July - September 2019
 Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	2	4	1	0	0	7
NNE	0	2	4	2	0	0	8
NE	0	4	1	0	0	0	5
ENE	0	3	1	1	0	0	5
E	0	3	4	0	0	0	7
ESE	0	4	5	5	0	0	14
SE	0	6	0	0	0	0	6
SSE	1	5	5	2	0	0	13
S	0	9	1	1	0	0	11
SSW	0	0	9	5	0	0	14
SW	0	4	10	7	0	0	21
WSW	0	0	4	2	0	0	6
W	0	3	10	0	1	0	14
WNW	0	3	6	5	0	0	14
NW	0	9	8	1	0	0	18
NNW	0	6	4	2	0	0	12
Variable	0	0	0	0	0	0	0
Total	1	63	76	34	1	0	175

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 4

Clinton Power Station

Period of Record: July - September 2019
 Stability Class - Neutral - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	3	6	13	4	0	0	26
NNE	1	10	14	1	0	0	26
NE	0	5	16	3	0	0	24
ENE	0	5	6	10	1	0	22
E	0	1	8	8	0	0	17
ESE	1	5	10	3	0	0	19
SE	4	16	5	0	0	0	25
SSE	4	22	28	8	1	0	63
S	1	11	34	13	6	2	67
SSW	2	12	28	41	14	0	97
SW	1	11	29	24	2	0	67
WSW	2	9	16	5	0	0	32
W	2	7	11	4	0	0	24
WNW	1	11	17	8	0	0	37
NW	0	21	15	2	0	0	38
NNW	2	10	12	1	0	0	25
Variable	0	0	0	0	0	0	0
Total	24	162	262	135	24	2	609

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 4

Clinton Power Station

Period of Record: July - September 2019
 Stability Class - Slightly Stable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	6	19	10	0	0	36
NNE	0	6	22	5	0	0	33
NE	1	0	7	29	0	0	37
ENE	0	1	15	9	0	0	25
E	0	1	13	13	0	0	27
ESE	1	4	29	13	0	0	47
SE	3	13	21	1	0	0	38
SSE	0	19	29	14	0	0	62
S	1	9	50	49	2	1	112
SSW	2	6	56	70	4	0	138
SW	0	7	31	13	2	0	53
WSW	0	7	11	13	0	0	31
W	3	7	16	15	0	0	41
WNW	0	11	34	5	0	1	51
NW	3	7	26	4	0	0	40
NNW	2	7	6	7	0	0	22
Variable	0	0	0	0	0	0	0
Total	17	111	385	270	8	2	793

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 4

Clinton Power Station

Period of Record: July - September 2019
 Stability Class - Moderately Stable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	2	7	1	1	0	11
NNE	0	3	8	15	0	0	26
NE	1	1	4	19	0	0	25
ENE	0	2	6	17	0	0	25
E	0	4	6	5	0	0	15
ESE	1	3	7	1	0	0	12
SE	2	2	7	0	0	0	11
SSE	2	4	1	0	0	0	7
S	0	2	10	2	0	0	14
SSW	0	6	11	13	0	0	30
SW	0	4	16	8	1	0	29
WSW	2	3	12	6	0	0	23
W	2	5	5	2	0	0	14
WNW	0	7	7	1	0	0	15
NW	2	2	6	1	0	0	11
NNW	1	3	7	1	0	0	12
Variable	0	0	0	0	0	0	0
Total	13	53	120	92	2	0	280

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 4

Clinton Power Station

Period of Record: July - September 2019
 Stability Class - Extremely Stable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	2	2	0	0	0	5
NNE	1	2	1	0	0	0	4
NE	0	3	4	2	0	0	9
ENE	0	1	2	4	0	0	7
E	3	3	11	7	0	0	24
ESE	2	6	3	0	0	0	11
SE	2	1	2	0	0	0	5
SSE	1	2	0	0	0	0	3
S	1	5	3	0	0	0	9
SSW	1	4	1	0	0	0	6
SW	1	3	2	0	0	0	6
WSW	0	0	1	2	0	0	3
W	1	5	2	1	0	0	9
WNW	2	5	1	0	0	0	8
NW	0	0	0	0	0	0	0
NNW	1	1	6	0	0	0	8
Variable	0	0	0	0	0	0	0
Total	17	43	41	16	0	0	117

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 4

Clinton Power Station

Period of Record: October - December 2019
 Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	1	1	0	0	2
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	2	0	0	0	2
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	1	0	0	0	1
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	1	0	0	1
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	2	0	0	0	2
NNW	0	1	2	0	0	0	3
Variable	0	0	0	0	0	0	0
Total	0	1	8	2	0	0	11

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 1

Clinton Power Station

Period of Record: October - December 2019
 Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	1	1	0	0	0	2
NNE	0	1	0	2	0	0	3
NE	0	0	2	0	0	0	2
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	3	1	0	0	0	4
SE	0	2	1	0	0	0	3
SSE	0	0	2	0	0	0	2
S	0	0	2	0	0	0	2
SSW	0	0	0	1	0	0	1
SW	0	0	1	3	0	0	4
WSW	0	0	2	2	2	0	6
W	0	0	0	3	0	0	3
WNW	0	0	3	1	0	0	4
NW	0	0	5	0	0	0	5
NNW	0	0	3	0	0	0	3
Variable	0	0	0	0	0	0	0
Total	0	7	23	12	2	0	44

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 1

Clinton Power Station

Period of Record: October - December 2019
 Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	1	1	1	0	0	3
NNE	0	2	5	1	0	0	8
NE	0	0	1	0	0	0	1
ENE	0	1	0	0	0	0	1
E	0	0	0	0	0	0	0
ESE	0	1	0	0	0	0	1
SE	0	4	2	0	0	0	6
SSE	0	2	5	0	0	0	7
S	0	1	10	5	0	0	16
SSW	0	0	8	8	0	0	16
SW	0	0	7	5	0	0	12
WSW	0	2	4	1	0	0	7
W	0	1	2	1	0	0	4
WNW	0	0	9	8	0	0	17
NW	0	6	5	4	0	0	15
NNW	0	6	1	0	0	0	7
Variable	0	0	0	0	0	0	0
Total	0	27	60	34	0	0	121

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 1

Clinton Power Station

Period of Record: October - December 2019
 Stability Class - Neutral - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	26	23	23	0	0	74
NNE	0	23	30	4	0	0	57
NE	0	14	18	2	0	0	34
ENE	0	8	5	0	0	0	13
E	0	20	4	0	0	0	24
ESE	0	19	4	0	0	0	23
SE	0	14	7	0	0	0	21
SSE	3	19	22	2	0	0	46
S	2	13	55	18	0	0	88
SSW	0	22	56	41	1	0	120
SW	0	10	15	12	0	0	37
WSW	1	12	18	28	11	3	73
W	0	9	25	23	7	6	70
WNW	1	24	50	42	8	0	125
NW	2	40	49	21	0	0	112
NNW	0	19	44	9	0	0	72
Variable	0	0	0	0	0	0	0
Total	11	292	425	225	27	9	989

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 1

Clinton Power Station

Period of Record: October - December 2019
 Stability Class - Slightly Stable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	18	10	1	0	0	30
NNE	0	9	5	1	3	0	18
NE	1	21	2	0	0	0	24
ENE	1	11	3	0	0	0	15
E	1	14	5	0	0	0	20
ESE	2	26	13	0	0	0	41
SE	6	47	18	1	0	0	72
SSE	4	53	24	6	0	0	87
S	3	35	56	9	0	0	103
SSW	1	25	62	13	0	0	101
SW	4	20	22	6	1	0	53
WSW	2	24	29	4	1	0	60
W	3	19	13	7	0	0	42
WNW	4	31	18	1	1	0	55
NW	2	19	5	1	0	0	27
NNW	0	7	9	0	0	0	16
Variable	0	0	0	0	0	0	0
Total	35	379	294	50	6	0	764

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 1

Clinton Power Station

Period of Record: October - December 2019
 Stability Class - Moderately Stable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	2	0	0	0	0	2
NNE	7	3	0	0	0	0	10
NE	4	3	0	0	0	0	7
ENE	0	5	0	0	0	0	5
E	3	2	0	0	0	0	5
ESE	3	3	0	0	0	0	6
SE	5	4	1	0	0	0	10
SSE	2	10	2	0	0	0	14
S	4	18	8	0	0	0	30
SSW	3	25	4	0	0	0	32
SW	4	8	0	0	0	0	12
WSW	6	6	0	0	0	0	12
W	1	3	0	0	0	0	4
WNW	3	7	0	0	0	0	10
NW	4	9	0	0	0	0	13
NNW	3	1	0	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	52	109	15	0	0	0	176

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 1

Clinton Power Station

Period of Record: October - December 2019
 Stability Class - Extremely Stable - 60m-10m Delta-T (F)
 Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	2	1	0	0	0	0	3
NE	5	9	0	0	0	0	14
ENE	1	0	0	0	0	0	1
E	9	2	0	0	0	0	11
ESE	4	0	0	0	0	0	4
SE	5	3	0	0	0	0	8
SSE	0	5	0	0	0	0	5
S	2	6	0	0	0	0	8
SSW	1	6	0	0	0	0	7
SW	1	4	0	0	0	0	5
WSW	4	0	3	0	0	0	7
W	3	1	3	10	1	0	18
WNW	2	1	0	0	0	0	3
NW	2	1	0	0	0	0	3
NNW	4	0	0	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	45	39	6	10	1	0	101

Hours of calm in this stability class: 1
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 1

Clinton Power Station

Period of Record: October - December 2019
 Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	1	2	0	0	3
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	2	0	0	0	2
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	1	0	0	1
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	1	0	1
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	2	0	0	2
NNW	0	0	0	2	0	0	2
Variable	0	0	0	0	0	0	0
Total	0	0	3	7	1	0	11

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 1

Clinton Power Station

Period of Record: October - December 2019
 Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	2	0	0	0	2
NNE	0	0	0	1	1	0	2
NE	0	0	2	0	0	0	2
ENE	0	0	1	0	0	0	1
E	0	0	0	0	0	0	0
ESE	0	0	4	0	0	0	4
SE	0	0	2	0	0	0	2
SSE	0	0	2	1	0	0	3
S	0	0	0	2	0	0	2
SSW	0	0	0	0	1	0	1
SW	0	0	0	0	3	0	3
WSW	0	0	1	2	2	2	7
W	0	0	0	0	2	0	2
WNW	0	0	0	4	1	0	5
NW	0	0	1	4	0	0	5
NNW	0	0	1	2	0	0	3
Variable	0	0	0	0	0	0	0
Total	0	0	16	16	10	2	44

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 1

Clinton Power Station

Period of Record: October - December 2019
 Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	2	1	0	0	3
NNE	0	0	4	1	1	0	6
NE	0	0	1	1	0	0	2
ENE	0	0	1	1	0	0	2
E	0	0	0	0	0	0	0
ESE	0	0	1	0	0	0	1
SE	0	1	4	0	0	0	5
SSE	0	1	7	0	0	0	8
S	0	0	6	3	5	0	14
SSW	0	1	6	2	7	1	17
SW	0	0	2	6	4	0	12
WSW	0	1	4	2	1	0	8
W	0	0	1	1	0	0	2
WNW	0	0	3	9	5	0	17
NW	0	2	9	2	3	0	16
NNW	0	2	5	1	0	0	8
Variable	0	0	0	0	0	0	0
Total	0	8	56	30	26	1	121

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 1

Clinton Power Station

Period of Record: October - December 2019
 Stability Class - Neutral - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	9	20	12	18	4	63
NNE	0	14	22	11	8	0	55
NE	0	3	12	18	9	0	42
ENE	0	3	11	4	2	0	20
E	0	3	10	6	0	0	19
ESE	0	5	12	6	0	0	23
SE	0	10	11	6	0	0	27
SSE	1	5	14	11	6	2	39
S	1	6	26	37	16	1	87
SSW	1	6	22	51	30	7	117
SW	0	8	10	16	8	0	42
WSW	0	5	10	14	18	24	71
W	2	5	9	27	11	13	67
WNW	0	8	30	33	29	22	122
NW	0	17	38	34	21	0	110
NNW	0	10	26	38	11	0	85
Variable	0	0	0	0	0	0	0
Total	5	117	283	324	187	73	989

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 1

Clinton Power Station

Period of Record: October - December 2019
 Stability Class - Slightly Stable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	14	11	0	0	25
NNE	0	1	8	10	0	4	23
NE	0	0	8	5	0	1	14
ENE	0	0	4	15	0	0	19
E	0	2	5	11	0	0	18
ESE	0	0	3	18	1	0	22
SE	0	4	40	26	3	0	73
SSE	0	6	33	35	8	4	86
S	0	2	13	57	15	6	93
SSW	1	0	18	77	18	2	116
SW	0	1	12	39	8	1	61
WSW	0	2	8	29	13	2	54
W	0	4	18	20	11	0	53
WNW	0	2	22	15	5	1	45
NW	2	3	27	11	2	0	45
NNW	0	1	8	8	0	0	17
Variable	0	0	0	0	0	0	0
Total	3	28	241	387	84	21	764

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 1

Clinton Power Station

Period of Record: October - December 2019
 Stability Class - Moderately Stable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	1	1	0	0	0	3
NNE	0	3	2	1	0	0	6
NE	1	2	5	0	0	0	8
ENE	0	0	1	2	0	0	3
E	0	5	3	2	0	0	10
ESE	0	1	2	1	0	0	4
SE	0	1	8	0	0	0	9
SSE	0	3	4	4	0	0	11
S	1	0	3	12	8	0	24
SSW	0	1	5	26	1	0	33
SW	0	0	3	14	0	0	17
WSW	0	0	6	7	0	0	13
W	0	0	5	1	0	0	6
WNW	0	1	4	2	0	0	7
NW	1	0	7	5	0	0	13
NNW	1	2	4	2	0	0	9
Variable	0	0	0	0	0	0	0
Total	5	20	63	79	9	0	176

Hours of calm in this stability class: 0
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 1

Clinton Power Station

Period of Record: October - December 2019
 Stability Class - Extremely Stable - 60m-10m Delta-T (F)
 Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	1	1	0	0	0	3
NNE	1	0	1	0	0	0	2
NE	0	1	1	1	0	0	3
ENE	1	1	1	2	1	0	6
E	0	0	3	2	0	0	5
ESE	0	3	2	1	0	0	6
SE	0	6	3	0	0	0	9
SSE	0	1	5	0	0	0	6
S	1	0	1	5	0	0	7
SSW	0	2	3	3	0	0	8
SW	1	1	0	11	0	0	13
WSW	1	0	0	6	0	0	7
W	0	1	0	6	7	2	16
WNW	0	1	1	0	0	1	3
NW	0	0	2	0	0	0	2
NNW	0	4	1	0	0	0	5
Variable	0	0	0	0	0	0	0
Total	6	22	25	37	8	3	101

Hours of calm in this stability class: 1
 Hours of missing wind measurements in this stability class: 0
 Hours of missing stability measurements in all stability classes: 1

SECTION 8

ODCM OPERATIONAL REMEDIAL REQUIREMENT REPORT

In accordance with CPS ODCM 3.1.1 Action G.1, 3.2.1 Action F.1, and 3.2.2 Action G.1; NON-FUNCTIONAL radioactive liquid and gaseous effluent monitoring instrumentation channels remaining in a NON-FUNCTIONAL condition for greater than the designated time shall be reported in the Annual Radioactive Effluent Release Report. During the course of 2019, there were zero (0) instances where a radioactive liquid or gaseous effluent monitoring instrumentation channel remained in a NON-FUNCTIONAL condition for greater than the designated clock requirement.

Throughout 2019, there was two (2) instances of missed ODCM required samples documented in Issue Reports 4220189 and 4222110 and two (2) instances of delayed ODCM required sampling recorded in Issue Reports 4280491 and 4282609. A summary of the sample deviations are captured below.

February 13, 2019 -- Issue Report # 4220189 MISSED ODCM NG & TRITIUM SAMPLE DUE TO EQUIPMENT MALFUNCTION

During the 06:19 VG run on 2/13/2019, the system was shut down due to an equipment issue causing oscillations prior to the ODCM required NG and tritium grab sample to be obtained. A noble gas and tritium grab sample are to be obtained for each release in accordance with the Station ODCM's, CY-CL-170-301 Table 4.4.1-1 B. During this short run, the low-range and high-range Noble Gas activity monitors remained steady and did not alarm giving the station reasonable reassurance that noble gases were orders of magnitude below alarm values. RP set up a portable noble gas air monitoring station in secondary containment at 755' Fuel Building at 09:14, and analysis results showed no noble gases were present in the area at this time. Also, after the issues that were causing the oscillations were fixed, VG was ran again for PMT and a valid noble gas and tritium sample were obtained at 15:04 on 2/13/2019 with expected values.

February 20, 2019 -- Issue Report # 4222110 1RIX-PR036 COMP. GRAB SAMPLE ANALYSIS MISSED

On 2/20/19 IMD performed a channel calibration on 1RIX-PR036 which puts chemistry in a 9 hour compensatory grab sampling during the calibration. The first compensatory grab sample was due to be sampled and analyzed by 19:35. The compensatory sample was obtained at 17:39 and analysis results were reported to Operations at 18:17. At approximately 23:35, the on-shift duty chemistry technician was preparing the count room for the nightly checks where he discovered that a compensatory grab sample for 1RIX-PR036 was ran on Gamma Detector 'C' which was not calibrated to analyze 4L liquid Marinelli's. This resulted in a missed ODCM required sample because the sample was not obtained and analyzed within the ODCM requirements. Upon discovery, another sample was immediately obtained and analyzed while the original sample was reanalyzed on a calibrated detector. Both analyzes resulted in anticipated results.

September 17, 2019 -- Issue Report 4280491 ODCM HVAC SAMPLE DELAYED

An HVAC noble gas and tritium sample is required in Modes 4 and 5 upon initiation of flow without delay in a controlled manner for drywell purge and high volume containment

ventilation per the Station's ODCM. Operations started Containment/Drywell Purge Mode per CPS 3408.01, Section 8.1.1.5 on 09/17/2019 03:05, but communication issues concluded that no sample was required at that time. After further review of the ODCM, it was determined that an HVAC noble gas and tritium sample was actually required. Chemistry management immediately directed a technician to sample HVAC for noble gas and tritium. The sample was obtained approximately 10 hours after containment/drywell purge was started, but sample results were as expected.

September 26, 2019 – Issue Report 4282609
ODCM HVAC TRITIUM NOT SAMPLED WITHOUT DELAY

An HVAC noble gas and tritium sample is required in Modes 4 and 5 upon initiation of flow without delay in a controlled manner for drywell purge and high volume containment ventilation per the Station's ODCM. On 09/26/2019 at 03:48, Operations started Containment/Drywell Purge Mode per CPS 3408.01, section 8.2.1.4 however, chemistry was not contacted to obtain the HVAC noble gas and tritium samples. Before Operations shutdown Containment/Drywell Purge Mode, a HVAC noble gas sample happened to be obtained on 09/26/2019 at 04:11 and thus was without delay. However, the HVAC tritium sample was not obtained until approximately 6 hours after the fact. The delayed tritium sample results were as anticipated.

SECTION 9

CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS

In accordance with Section 6.2 of the CPS ODCM, licensee-initiated changes to the liquid, gaseous or solid radioactive waste treatment systems shall be reported in the Annual Radioactive Effluent Release Report.

There were no permanent changes to the Radioactive Waste Treatment Systems during the course of the 2019 reporting period; therefore, there is no documentation required in the 2019 Annual Radioactive Effluent Release Report.

SECTION 10

NEW LOCATIONS FOR DOSE CALCULATION AND/OR ENVIRONMENTAL MONITORING

The following is a summary of the 2019 Annual Land Use Census. It shows changes in locations for dose calculations and/or environmental monitoring identified by the Annual Land Use Census. The distance of the receptor is being listed in the report in lieu of the name of the resident. This is being done to maintain and respect the privacy of the residents.

1.0 Nearest Residence

The nearest residents identified in each of the sixteen (16) sectors are shown below.

SECTOR	2019 RESIDENT (km)	AGE GROUP	2018 RESIDENT (km)	AGE GROUP
N	1.50	A	1.50	A
NNE	1.50	A	1.50	A
NE	2.07	A	2.07	A
ENE	2.86	A	2.86	A
E	1.67	A	1.67	A
ESE	5.14	A	5.14	A
SE	4.44	A*	4.44	C/T/A
SSE	2.90	A	2.90	A
S	4.78	A	4.78	A
SSW	4.68	A*	4.68	C/A
SW	1.17	A	1.17	A
WSW	3.62	A	3.62	A
W	1.95	T/A*	1.95	C/A
WNW	2.63	A	2.63	A
NW	2.65	A	2.65	A
NNW	2.05	A	2.05	A

*Indicates any changes from the previous year

(I)nfant

(C)hild

(T)een

(A)dult

2.0 Broadleaf Garden Census

Fifty-seven (57) gardens within a five (5) kilometer radius were located in the sixteen (16) geographical sectors surrounding CPS. Thirteen (13) gardens contained broad leaf vegetation, which were specifically identified for this report. Although other crops were identified within these areas, they are not addressed as part of this report.

The nearest gardens greater than fifty (50) square-meters and producing broadleaf vegetation identified in each of the sixteen (16) geographical sectors are shown below.

SECTOR	2019 GARDENS (km)	AGE GROUPS	2018 GARDENS (km)	AGE GROUPS
N	1.50	A	1.50	A
NNE	>8*		1.50	A
NE	3.46	A*	3.46	C/A
ENE	4.29*	A	4.22	A
E	1.67	A	1.67	A
ESE	7.72*	A*	5.30	C/A
SE	>8*		7.80	A
SSE	>8		>8	
S	>8*		6.60	A
SSW	>8		>8	
SW	>8		>8	
WSW	4.32	C/T/A	4.32	C/T/A
W	>8*		3.32	A
WNW	>8*		2.63	A
NW	4.70*	A*	>8	
NNW	2.05	A	2.05	A

*Indicates any changes from the previous year

(I)nfant

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(A)dult

3.0 Milking Animal Census

Milking animals within the sixteen (16) geographical sectors were located within five (5) miles surrounding CPS. These milking animals were either used for the nursing of the animal's offspring or used for meat production for the resident's own personal use and sold commercially. There were no residents that milked their animals for human consumption.

Milking animals were specifically identified for this report. Although other livestock were identified within these areas, they are not addressed as part of this report.

The nearest milking animals identified in each of the sixteen (16) geographical sectors are shown below.

SECTOR	2019 MILKING ANIMALS (km)	AGE GROUPS	2018 MILKING ANIMALS (km)	AGE GROUPS
N	1.50	A	1.50	A
NNE	>8		>8	
NE	>8		>8	
ENE	>8*		4.20	A
E	>8		>8	
ESE	>8		>8	
SE	>8*		7.10	T/A
SSE	>8		>8	
S	6.60	A	6.60	A
SSW	>8*		6.30	C/T/A
SW	>8		>8	
WSW	4.32	C/A/T*	4.32	A
W	>8		>8	
WNW	>8		>8	
NW	>8		>8	
NNW	2.05	A	2.05	A

*Indicates any changes from the previous year

(I)nfant

(C)hild

(T)een

(A)dult

SECTION 11

CORRECTIONS TO DATA REPORTED IN PREVIOUS REPORTS

There were no administrative changes identified in 2019 against previously submitted Annual Radioactive Effluent Release Reports resulting in an errata data submittal to the Commission.

SECTION 12

CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

The Offsite Dose Calculation Manual was last revised in December of 2015. Revision 25 of the ODCM is not included with this submittal since no updates were made in 2019.