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January 01, 2018 – December 31, 2018

**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, 2018 through December 31, 2018. 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 2018, 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 4.69E-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 (3.13E-1%) for the maximum exposed member of the public. There were no liquid effluent releases in 2018. 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 2018 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*.

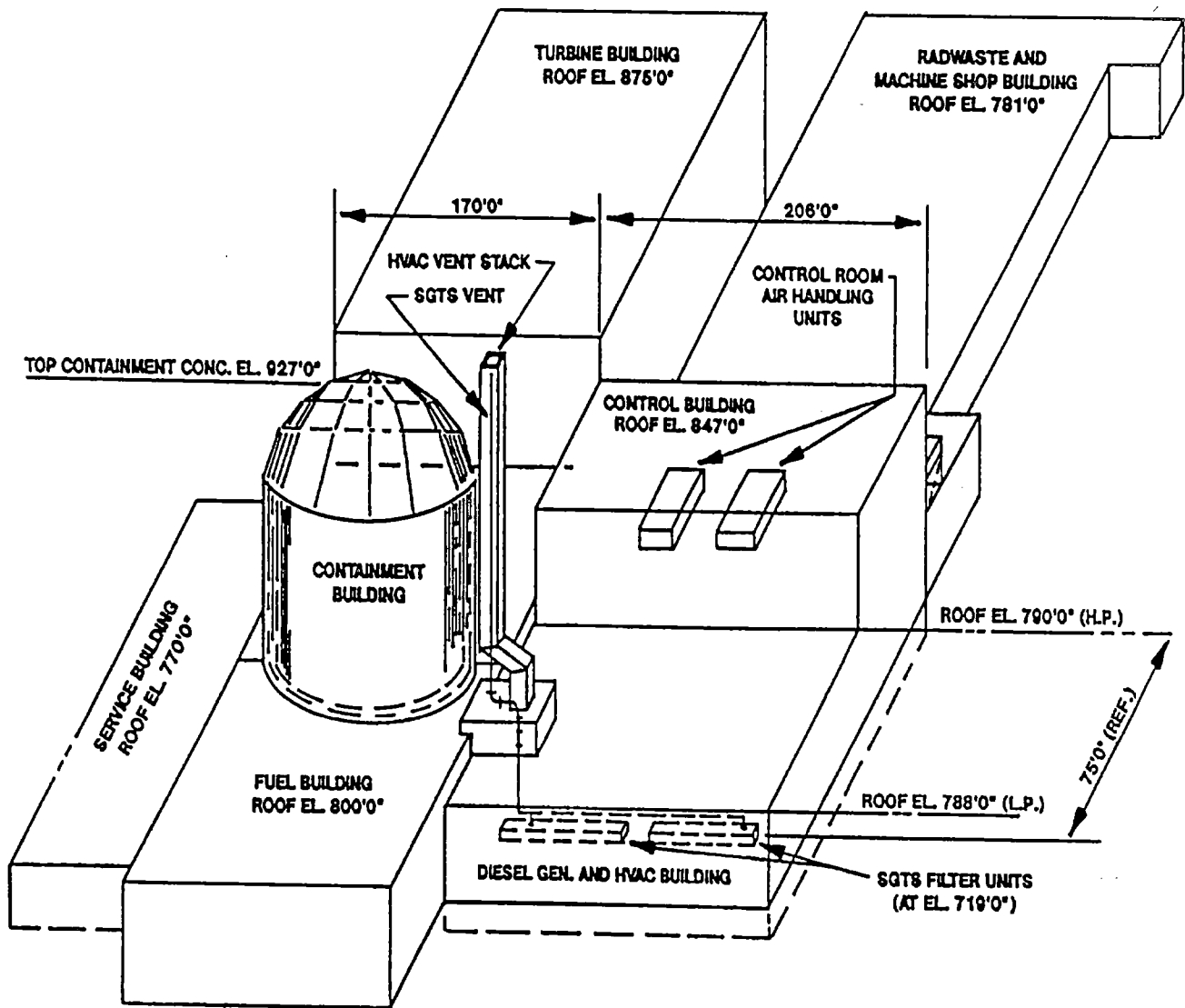
#### Processing and Monitoring

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

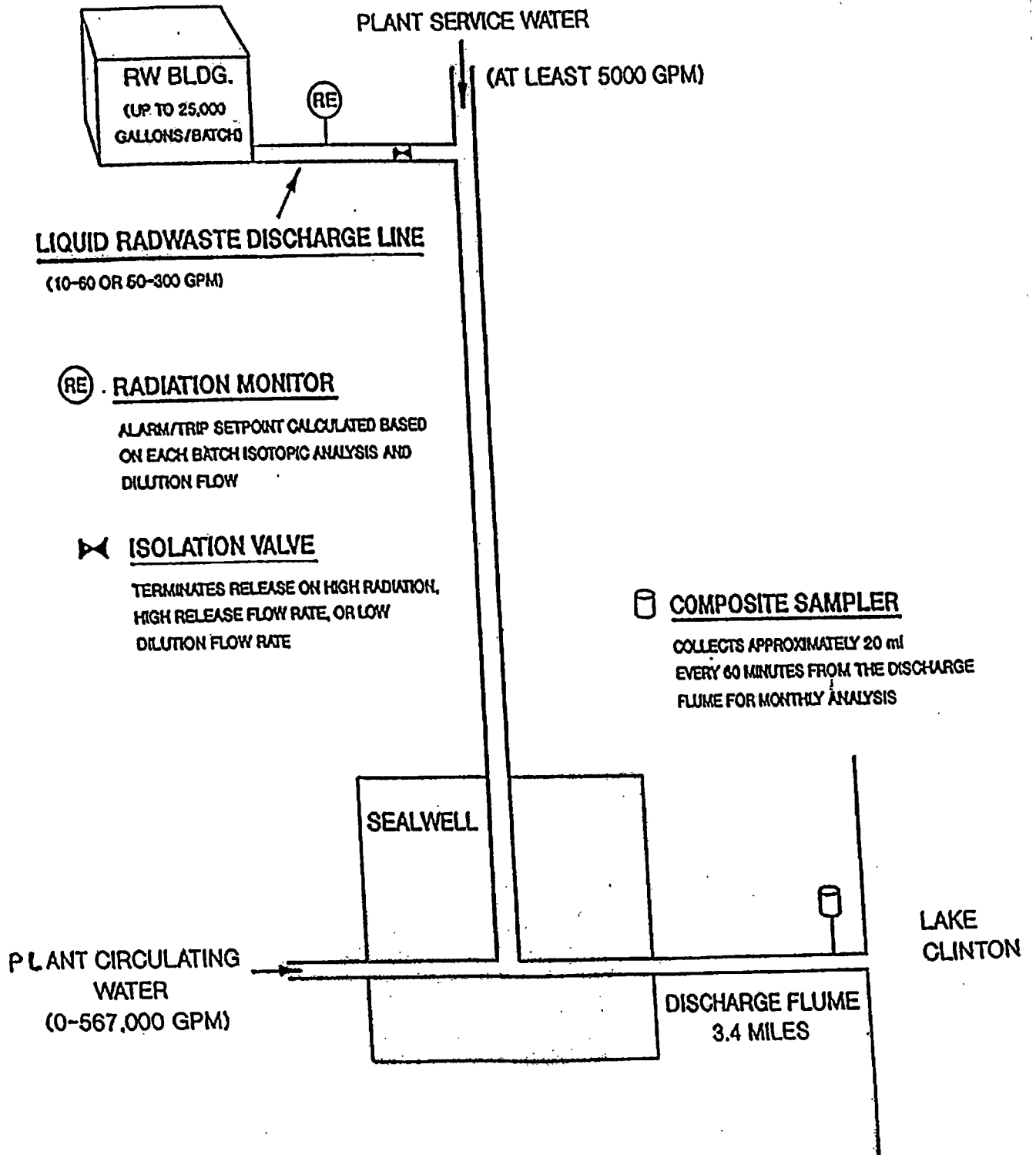


	<u>HVAC Exhaust Vent</u>	<u>SGTS Exhaust Vent</u>
Release Point Height (feet)	200	200
Building Height (feet)	190	190
Release Point Geometry	Duct	Pipe
Release Point Area (ft <sup>2</sup> )	120	2
Release Point Diameter (feet)	12*	1
Annual Average Flow Rate (ft <sup>3</sup> /sec)	2,738	73
Vertical Exit Velocity (feet/sec)	33	41

\* Effective  $2(A/\pi)^2$  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.

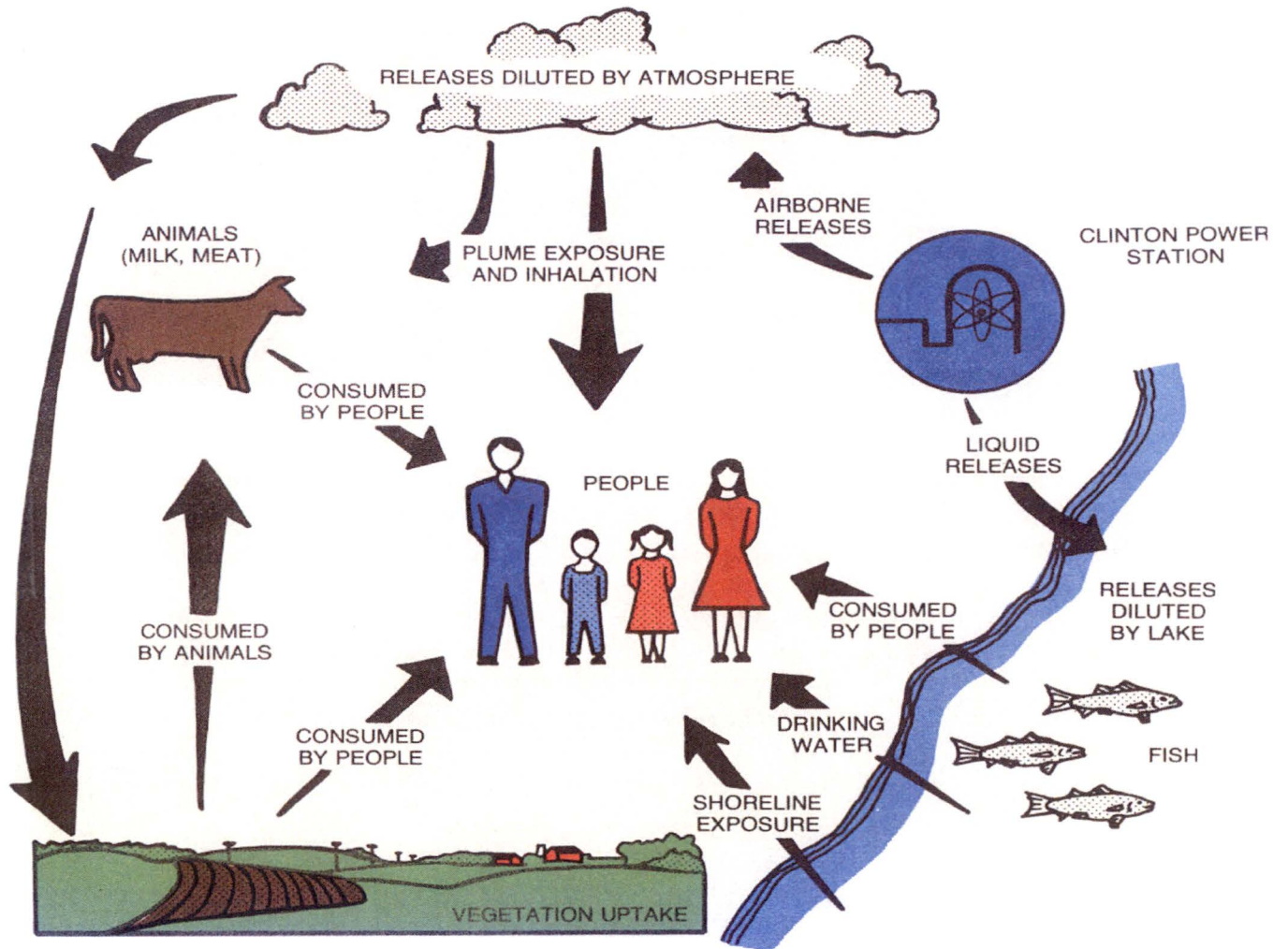
The total dose to organs from a given radionuclide also depends on the amount of activity in the organ and the amount of time that the radionuclide remains in the body. Some radionuclides remain for very short periods of time due to their rapid radioactive decay and/or elimination rate from the body, 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. Halogens  $I^{131}$ ,  $I^{133}$ ,  $H^3$ ,  $C^{14}$  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. 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 would be considered an abnormal release. As a matter of station management commitment, CPS strives to be a zero (0) radioactive liquid release plant. The last 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 our Station's Technical Specifications. Maintaining effluent releases within these operating limitations demonstrates compliance with ALARA principles. These 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.

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.

## 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 2018 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 321.1 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 H<sup>3</sup>, gross alpha, Fe<sup>55</sup>, Sr<sup>89</sup> and Sr<sup>90</sup>. 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, 2018 - December 31, 2018  
 Continuous Mixed Mode

		Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Est. Total Error, %
<b>A. Fission &amp; Activation Gases</b>							
1.	Total Release	Ci	2.66E+01	3.14E+01	1.08E+00	7.76E+00	3.00E+01
2.	Average release rate for period	μCi/sec	3.43E+00	3.99E+00	1.36E-01	9.76E-01	
3.	Percent of ODCM Limit	%	*	*	*	*	
<b>B. Iodines</b>							
1.	Total Iodine-131	Ci	1.50E-05	2.72E-05	5.98E-06	9.47E-06	3.10E+01
2.	Average release rate for period	μCi/sec	1.93E-06	3.46E-06	7.52E-07	1.19E-06	
3.	Percent of ODCM Limit	%	*	*	*	*	
<b>C. Particulates</b>							
1.	Particulates with half-lives >8 days	Ci	1.50E-05	1.21E-04	9.86E-05	7.42E-05	2.40E+01
2.	Average release rate for period	μCi/sec	1.93E-06	1.53E-05	1.24E-05	9.35E-06	
3.	Percent of ODCM Limit	%	*	*	*	*	
<b>D. Tritium</b>							
1.	Total Release	Ci	4.46E+00	5.08E+00	4.97E+00	4.84E+00	2.10E+01
2.	Average release rate for period	μCi/sec	5.73E-01	6.46E-01	6.26E-01	6.09E-01	
3.	Percent of ODCM Limit	%	*	*	*	*	
<b>E. Gross Alpha</b>							
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	
<b>F. Carbon-14</b>							
1.	Total Release	Ci	4.24E+00	3.15E+00	4.14E+00	3.90E+00	
2.	Average release Rate for period	μCi/sec	5.45E-01	4.01E-01	5.21E-01	4.91E-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 <sup>st</sup> Quarter	% of Limit	2 <sup>nd</sup> Quarter	% of Limit	3 <sup>rd</sup> Quarter	% of Limit	4 <sup>th</sup> Quarter	% of Limit
Gamma	5 mRad	1.23E-03	2.47E-02	1.45E-03	2.90E-02	5.01E-05	1.00E-03	3.59E-04	7.18E-03
Beta	10 mRad	4.35E-04	4.35E-03	5.12E-04	5.12E-03	1.77E-05	1.77E-04	1.27E-04	1.27E-03

Doses per Year (mRad)

Type of Radiation	ODCM Limit	Year	% of Limit
Gamma	10 mRad	3.09E-03	3.09E-02
Beta	20 mRad	1.09E-03	5.46E-03

**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 <sup>st</sup> Quarter	% of Limit	2 <sup>nd</sup> Quarter	% of Limit	3 <sup>rd</sup> Quarter	% of Limit	4 <sup>th</sup> Quarter	% of Limit
Bone	7.5 mRem	1.29E-02	1.72E-01	9.57E-03	1.28E-01	1.26E-02	1.68E-01	1.19E-02	1.58E-01
Liver	7.5 mRem	7.37E-05	9.83E-04	8.79E-05	1.17E-03	8.35E-05	1.11E-03	8.10E-05	1.08E-03
TBody	7.5 mRem	2.65E-03	3.53E-02	2.03E-03	2.71E-02	2.62E-03	3.49E-02	2.46E-03	3.28E-02
Thyroid	7.5 mRem	1.26E-04	1.68E-03	1.75E-04	2.33E-03	1.03E-04	1.37E-03	1.12E-04	1.49E-03
Kidney	7.5 mRem	7.37E-05	9.83E-04	8.59E-05	1.15E-03	8.24E-05	1.10E-03	8.02E-05	1.07E-03
Lung	7.5 mRem	7.35E-05	9.80E-04	8.46E-05	1.13E-03	8.25E-05	1.10E-03	8.02E-05	1.07E-03
GI LLI	7.5 mRem	7.49E-05	9.99E-04	9.74E-05	1.30E-03	9.04E-05	1.21E-03	8.67E-05	1.16E-03

Doses per Year (mRem)

Type of Organ	ODCM Limit	Dose	% of Limit
Bone	15 mRem	4.69E-02	3.13E-01
Liver	15 mRem	3.26E-04	2.17E-03
TBody	15 mRem	9.76E-03	6.51E-02
Thyroid	15 mRem	5.16E-04	3.44E-03
Kidney	15 mRem	3.22E-04	2.15E-03
Lung	15 mRem	3.21E-04	2.14E-03
GI LLI	15 mRem	3.49E-04	2.33E-03

**TABLE 2**  
**Gaseous Effluents - Nuclides Released**  
 Clinton Power Station  
 YEAR: 2018

<b>Mixed Mode Release</b>	<b>X</b>
Elevated Release	
Ground-Level Release	

<b>Continuous Mode</b>	<b>X</b>
Batch Mode	

	Units	Quarter 1 <sup>[1]</sup>	Quarter 2 <sup>[1]</sup>	Quarter 3 <sup>[1]</sup>	Quarter 4 <sup>[1]</sup>
<b>A. Fission Gases</b>					
Ar <sup>41</sup>	Ci	2.66E+01	3.14E+01	1.08E+00	7.76E+00
Total for Period	Ci	2.66E+01	3.14E+01	1.08E+00	7.76E+00
<b>B. Iodines</b>					
I <sup>131</sup>	Ci	1.50E-05	2.72E-05	5.98E-06	9.47E-06
I <sup>133</sup>	Ci	5.01E-05	9.04E-06	2.79E-05	1.56E-05
Total for Period	Ci	6.51E-05	3.63E-05	3.39E-05	2.51E-05
<b>C. Particulates</b>					
Na <sup>24</sup> [2]	Ci	<LLD	<LLD	4.15E-05	1.51E-05
Cr <sup>51</sup>	Ci	<LLD	8.40E-06	<LLD	<LLD
Mn <sup>54</sup>	Ci	7.84E-06	7.86E-05	5.59E-05	4.29E-05
Co <sup>57</sup>	Ci	5.55E-06	<LLD	<LLD	<LLD
Co <sup>58</sup>	Ci	<LLD	5.30E-06	6.84E-06	2.65E-05
Co <sup>60</sup>	Ci	1.63E-06	1.75E-05	1.05E-05	4.78E-06
Zn <sup>65</sup>	Ci	<LLD	1.07E-05	<LLD	<LLD
γ <sup>91m</sup> [2]	Ci	<LLD	<LLD	9.04E-04	<LLD
Mo <sup>99</sup> [2]	Ci	<LLD	<LLD	<LLD	8.71E-07
Tc <sup>99m</sup> [2]	Ci	<LLD	<LLD	<LLD	1.07E-05
Cd <sup>109</sup>	Ci	<LLD	<LLD	2.54E-05	<LLD
Total for Period	Ci	1.50E-05	1.21E-04	1.02E-03	1.01E-04
<b>D. Gross Alpha</b>					
Gross Alpha	Ci	<LLD	<LLD	<LLD	<LLD
<b>E. Tritium</b>					
Total for Period	Ci	4.46E+00	5.08E+00	4.97E+00	4.84E+00
<b>F. Carbon-14</b>					
Total for Period	Ci	4.24E+00	3.15E+00	4.14E+00	3.90E+00

<sup>[1]</sup> 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.

<sup>[2]</sup> 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 <sup>a</sup> (μCi/cc)
Principal Gamma Emitters, [Noble Gases] <sup>b,c</sup>	≤1.00E-04
H <sup>3</sup> <sup>c</sup>	≤1.00E-06
I <sup>131</sup> <sup>d</sup>	≤1.00E-12
I <sup>133</sup> <sup>d</sup>	≤1.00E-10
Principal Gamma Emitters, [Particulates] <sup>b,e</sup>	≤1.00E-11
Sr <sup>89</sup> , Sr <sup>90</sup> <sup>g</sup>	≤1.00E-11
Gross Alpha <sup>f</sup>	≤1.00E-11

Table 3 Notations:

<sup>a</sup> 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,

$\lambda$  is the radioactive decay constant for the particular radionuclide ( $\text{sec}^{-1}$ ) and

$\Delta t$  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  $\Delta t$  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.

<sup>b</sup> The principal gamma emitters for which the LLD specification applies include the following radionuclides: Kr<sup>87</sup>, Kr<sup>88</sup>, Xe<sup>133</sup>, Xe<sup>133m</sup>, Xe<sup>135</sup>, and Xe<sup>138</sup> in noble gas releases and Mn<sup>54</sup>, Fe<sup>59</sup>, Co<sup>58</sup>, Co<sup>60</sup>, Zn<sup>65</sup>, Mo<sup>99</sup>, I<sup>131</sup>, Cs<sup>134</sup>, Cs<sup>137</sup>, Ce<sup>141</sup>, and Ce<sup>144</sup> 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.

<sup>c</sup> Weekly grab sample and analysis

<sup>d</sup> Continuous charcoal sample analyzed weekly

<sup>e</sup> Continuous particulate sample analyzed weekly

<sup>f</sup> Composite particulate sample analyzed monthly

<sup>g</sup> Composite particulate sample analyzed quarterly

**TABLE 4**  
**Waterborne Effluents - Summation Of All Releases**  
 Data Period: January 01, 2018 – December 31, 2018  
 There were zero (0) liquid radwaste releases from CPS in 2018.

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Est. Total Error, %	
<b>A. Fission &amp; Activation Products<sup>[1]</sup></b>							
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>B. Tritium<sup>[1]</sup></b>							
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>C. Dissolved and Entrained Gases<sup>[1]</sup></b>							
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>D. Gross Alpha Radioactivity<sup>[1]</sup></b>							
	Gross alpha radioactivity	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
<b>E. Volume of Waste Released (prior to Dilution)</b>							
	Volume of Waste Released (prior to Dilution)	Liters	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A
<b>F. Volume of dilution water used during period</b>							
	Volume of dilution water used during period	Liters	0.00E+00	0.00E+00	0.00E+00	0.00E+00	N/A

<sup>[1]</sup> 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: 2018

There were zero (0) liquid radwaste releases from CPS in 2018.

Continuous Mode	
Batch Mode	

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
<b>A. Tritium</b>					
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
<b>B. Fission and Activation Products</b>					
Mn <sup>54</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co <sup>58</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe <sup>55</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe <sup>59</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co <sup>58</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co <sup>60</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zn <sup>65</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr <sup>89</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr <sup>90</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb <sup>95</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr <sup>95</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mo <sup>99</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I <sup>131</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs <sup>134</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs <sup>137</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ba <sup>140</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
La <sup>140</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce <sup>141</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce <sup>144</sup>	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
<b>C. Dissolved and Entrained Noble Gases</b>					
Kr <sup>85m</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr <sup>87</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr <sup>88</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe <sup>133</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe <sup>135</sup>	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe <sup>138</sup>	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) <sup>a</sup> (μCi/ml)
Principal Gamma Emitters <sup>b</sup>	≤5.00E-07
<sup>131</sup> I	≤1.00E-06
Dissolved and Entrained Gases (Gamma Emitters) <sup>c</sup>	≤1.00E-05
H <sup>3</sup>	≤1.00E-05
Gross Alpha	≤1.00E-07
Sr <sup>89</sup> , Sr <sup>90</sup>	≤5.00E-08
Fe <sup>55</sup>	≤1.00E-06

Table 6 Notations:

<sup>a</sup> 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:

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

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,

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

Table 6 Notations (continued):

$Y$  is the fractional radiochemical yield, when applicable,

$\lambda$  is the radioactive decay constant for the particular radionuclide ( $\text{sec}^{-1}$ ) and

$\Delta_t$  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  $\lambda t$  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.

<sup>b</sup> The principal gamma emitters for which the LLD requirement applies include the following radionuclides:  $\text{Mn}^{54}$ ,  $\text{Fe}^{59}$ ,  $\text{Co}^{58}$ ,  $\text{Co}^{60}$ ,  $\text{Zn}^{65}$ ,  $\text{Mo}^{99}$ ,  $\text{Cs}^{134}$ ,  $\text{Cs}^{137}$ , and  $\text{Ce}^{141}$ .  $\text{Ce}^{144}$  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.

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



## BATCH RELEASES

There were zero (0) liquid radwaste releases from CPS in 2018.

### A. Batch Liquid Releases: 2018

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: 2018

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 2018. There were no abnormal or unplanned liquid or gaseous releases from CPS in 2018.

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, 2018 through December 31, 2018 - 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: 2.22E+04 ft<sup>3</sup> / Class B Waste: 0.0 ft<sup>3</sup> / Class C Waste: 0.0 ft<sup>3</sup>

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

2. Total curie quantity: Class A Waste was 5.70E+01 curies and Class B Waste was 0.00E+00 curies (determined by dose-to-curie and sample concentration methodology estimates) and Class C Waste was 0.00E+00 curies in 2018.
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 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 2018	Est. Total Error, %
a.	Spent resins, filter sludges, evaporator bottoms, etc.	ft <sup>3</sup>	1.48E+03	2.50E+01
		Ci	5.25E+01	
b.	Dry compactable waste, contaminated equipment, etc.	ft <sup>3</sup>	2.05E+04	2.50E+01
		Ci	4.48E+00	
c.	Irradiated components, control rods, etc.	ft <sup>3</sup>	0.00E+00	2.50E+01
		Ci	0.00E+00	
d.	Other Wastes-Mixed	ft <sup>3</sup>	1.60E+02	2.50E+01
		Ci	1.52E-02	

\* 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 <sup>54</sup>	3.18E+01	1.67E+01
	Fe <sup>55</sup>	3.38E+01	1.77E+01
	Co <sup>60</sup>	2.41E+01	1.26E+01
	Ni <sup>63</sup>	1.21E+00	6.35E-01
	Zn <sup>65</sup>	7.09E+00	3.72E+00

2. Dry compactable waste, contaminated equipment, etc.

Waste Class	Nuclide Name	% Percent Abundance	Curies
A	Mn <sup>54</sup>	1.44E+01	6.42E-01
	Fe <sup>55</sup>	6.80E+01	3.03E+00
	Co <sup>60</sup>	1.52E+01	6.75E-01

3. Irradiated Components

Waste Class	Nuclide Name	% Percent Abundance	Curies
N/A	N/A	N/A	N/A

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

4. Mixed Waste

Waste Class	Nuclide Name	% Percent Abundance	Curies
A	Mn <sup>54</sup>	2.16E+01	3.28E-03
	Fe <sup>55</sup>	5.77E+01	8.77E-03
	Co <sup>60</sup>	1.73E+01	2.63E-03

A.3 Solid Waste Disposition:

**January – December 2018**

Number of Shipments	Mode of Transportation	Destination
6	Hittman Transport	Energy Solutions—Clive, UT Disposal Facility
15	Hittman Transport	Energy Solutions—Bear Creek, TN

B. Irradiated Fuel Shipments Disposition:

**January – December 2018**

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 2018 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 321.1 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 2018 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 2018 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, 2018 – December 31, 2018

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) <sup>[1]</sup>	
					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	2.86E-02	6.26E-05	6.06E-03	2.54E-03	8.97E-04	0.00E+00	0.00E+00
NNE	1.50	GP, I, V	B	A	1.10E-02	8.92E-05	2.59E-03	3.21E-03	1.13E-03		
NE	2.07	GP, I, V	B	A	4.29E-03	2.83E-05	1.01E-03	1.26E-03	4.43E-04		
ENE	2.86	GP, I, V	B	A	2.95E-03	1.59E-05	6.91E-04	8.63E-04	3.04E-04		
E	1.67	GP, I, V	B	A	4.39E-03	4.01E-05	1.04E-03	1.28E-03	4.52E-04		
ESE	5.14	GP, I, V	B	A	3.27E-03	1.37E-05	7.62E-04	9.58E-04	3.38E-04		
SE	4.44	GP, I, V	B	C	6.83E-03	1.70E-05	1.41E-03	1.14E-03	4.01E-04		
SSE	2.90	GP, I	B	A	5.33E-04	2.14E-05	1.60E-04	1.14E-03	4.03E-04		
S	4.78	GP, I, M, V	B	A	7.47E-03	8.60E-06	1.58E-03	6.64E-04	2.34E-04		
SSW	4.68	GP, I, M	B	C	8.98E-03	7.19E-06	1.82E-03	6.72E-04	2.37E-04		
SW	1.17	GP, I	B	A	1.06E-03	6.58E-05	3.32E-04	2.23E-03	7.85E-04		
WSW	3.62	GP, I, M, V	B	A	1.18E-02	1.20E-05	2.50E-03	1.05E-03	3.71E-04		
W	1.95	GP, I, V	B	C	5.52E-03	2.26E-05	1.14E-03	9.18E-04	3.24E-04		
WNW	2.63	GP, I, V	B	A	2.47E-03	1.04E-05	5.76E-04	7.23E-04	2.55E-04		
NW	2.65	GP, I	B	A	4.13E-04	1.26E-05	1.21E-04	8.93E-04	3.15E-04		
NNW	2.05	GP, I, M, V	B	A	1.45E-02	2.40E-05	3.06E-03	1.28E-03	4.53E-04		

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

<sup>[1]</sup>There were zero (0) liquid radwaste releases from CPS in 2018. All doses were within all regulatory limits, including limits from 40CFR190.

## **COMPLIANCE WITH 40CFR190 REQUIREMENTS**

Dosimeter of Legal Records (DLR) 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). The results from this effort indicated no excess dose to offsite areas.

Additionally, NUREG-0543, Methods for Demonstrating LWR Compliance with the EPA Uranium Fuel Cycle Standard (40 CFR PART 190) states in section IV, "As long as a nuclear plant site operates at a level below the Appendix I reporting requirements, no extra analysis is required to demonstrate compliance with 40 CFR Part 190." The organ and whole body doses reported in Table 8 are determined using 10CFR50 Appendix I methodology. The doses reported are well below the limits of Appendix I.

## **INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)**

No radioactive effluents were released from the Clinton Station ISFSI and 5 additional casks were placed on the pad for the period January 1, 2018 through December 31, 2018. 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.

CPS determines the 40CFR190 dose through direct measurement by the use of field dosimeters maintained and reported on as part of the Radiological Environmental Monitoring Program (REMP). 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. The results from the field dosimeters are reported in the Annual Radiological Environmental Operating Report (AREOR).

## **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*):

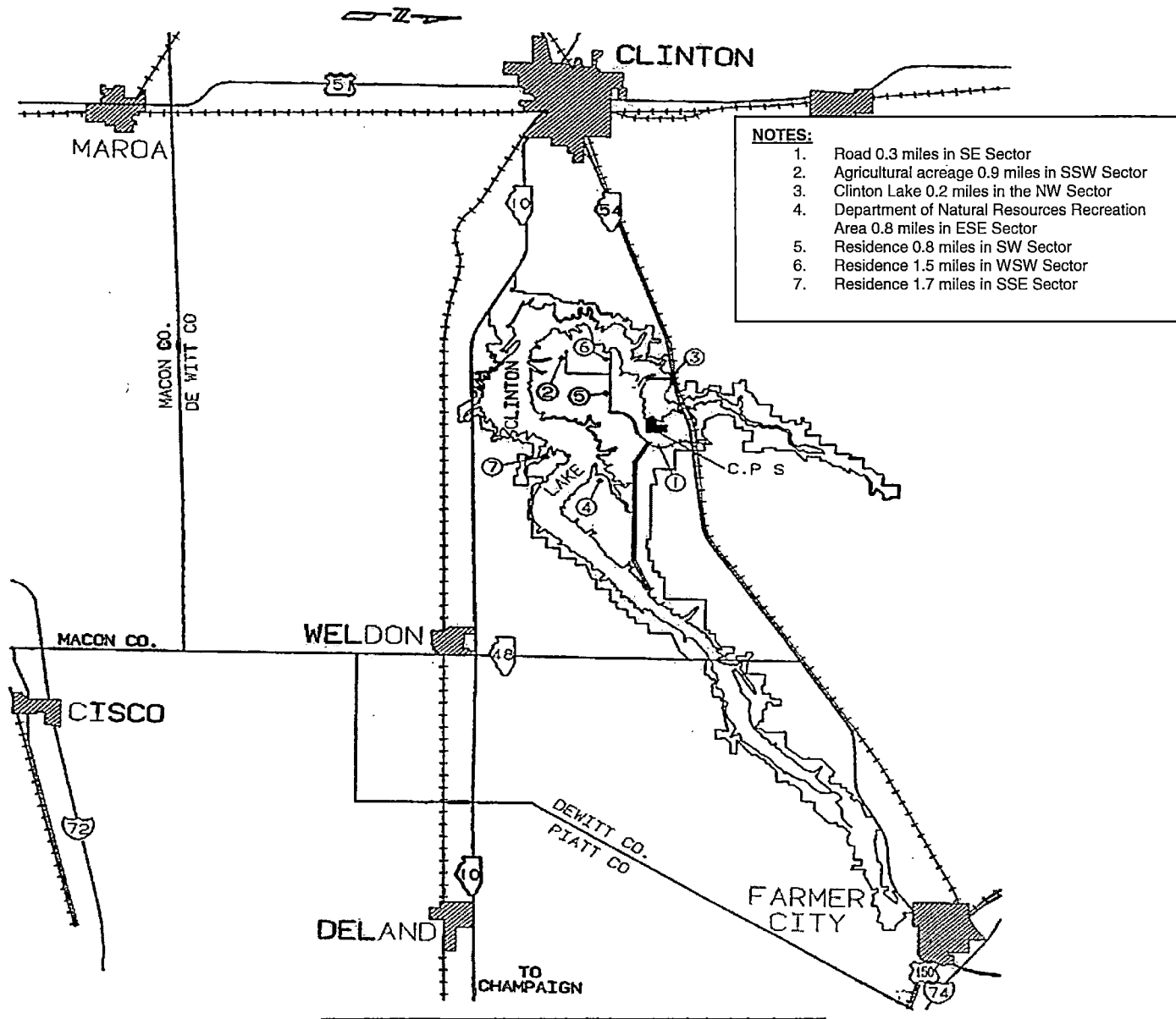


- 
- The Department of Natural Resources Recreation Area at 1.287 kilometers (0.8 miles) in the ESE sector
  - A road at 0.495 kilometers (0.3 miles) in the SE sector
  - A residence at 2.736 kilometers (1.7 miles) in the SSE sector
  - A residence at 1.219 kilometers (0.8 miles) in the SW sector
  - 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 2018 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, 2018 – December 31, 2018

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	5.99E-04	mRem/year
Skin Dose Rate (Noble Gases)	8.76E-04	mRem/year
Gamma Air Dose	6.25E-04	mRad
Beta Air Dose	2.21E-04	mRad
Total Body Dose <sup>[1]</sup>	1.46E-04	mRem
Skin Dose	2.30E-05	mRem

<sup>[1]</sup> 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	3.01E-04	mRem
Teen Bone	4.23E-04	mRem
Child Bone	5.77E-04	mRem
Infant Bone	NA <sup>[2]</sup>	mRem

<sup>[2]</sup> 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, 2018 –December 31, 2018

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	1.88E-04	mRem/year
Skin Dose Rate (Noble Gases)	2.75E-04	mRem/year
Gamma Air Dose	2.14E-04	mRad
Beta Air Dose	7.56E-05	mRad
Total Body Dose <sup>[1]</sup>	5.02E-05	mRem
Skin Dose	8.19E-06	mRem

<sup>[1]</sup> 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	1.03E-04	mRem
Teen Bone	1.45E-04	mRem
Child Bone	1.98E-04	mRem
Infant Bone	1.47E-04	mRem

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

Data Period: January 01, 2018 – December 31, 2018

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	1.12E-03	mRem/year
Skin Dose Rate (Noble Gases)	1.64E-03	mRem/year
Gamma Air Dose	1.18E-03	mRad
Beta Air Dose	4.16E-04	mRad
Total Body Dose <sup>[1]</sup>	2.58E-04	mRem
Skin Dose	2.33E-05	mRem

<sup>[1]</sup> 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	5.51E-04	mRem
Teen Bone	7.80E-04	mRem
Child Bone	1.07E-03	mRem
Infant Bone	7.94E-04	mRem

**TABLE 12**  
**Calculated Doses for the Residents in the Southwest Sector within the CPS Site Boundary**  
 Data Period: January 01, 2018 – December 31, 2018

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	2.04E-03	mRem/year
Skin Dose Rate (Noble Gases)	2.98E-03	mRem/year
Gamma Air Dose	2.15E-03	mRad
Beta Air Dose	7.58E-04	mRad
Total Body Dose <sup>[1]</sup>	4.88E-04	mRem
Skin Dose	6.30E-05	mRem

<sup>[1]</sup> 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	1.03E-03	mRem
Teen Bone	1.44E-03	mRem
Child Bone	1.97E-03	mRem
Infant Bone	1.46E-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, 2018 – December 31, 2018

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	1.21E-04	mRem/year
Skin Dose Rate (Noble Gases)	1.77E-04	mRem/year
Gamma Air Dose	1.28E-04	mRad
Beta Air Dose	4.49E-05	mRad
Total Body Dose <sup>[1]</sup>	2.36E-05	mRem
Skin Dose	3.72E-06	mRem

<sup>[1]</sup> 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	6.05E-05	mRem
Teen Bone	8.53E-05	mRem
Child Bone	NA <sup>[2]</sup>	mRem
Infant Bone	NA <sup>[2]</sup>	mRem

<sup>[2]</sup> 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, 2018 – December 31, 2018

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	1.12E-03	mRem/year
Skin Dose Rate (Noble Gases)	1.63E-03	mRem/year
Gamma Air Dose	1.18E-03	mRad
Beta Air Dose	4.15E-04	mRad
Total Body Dose <sup>[1]</sup>	2.55E-04	mRem
Skin Dose	2.02E-05	mRem

<sup>[1]</sup> 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	5.47E-04	mRem
Teen Bone	7.76E-04	mRem
Child Bone	1.06E-03	mRem
Infant Bone	7.90E-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, 2018 – December 31, 2018

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	1.13E-03	mRem/year
Skin Dose Rate (Noble Gases)	1.66E-03	mRem/year
Gamma Air Dose	1.18E-03	mRad
Beta Air Dose	4.18E-03	mRad
Total Body Dose <sup>[1]</sup>	2.62E-04	mRem
Skin Dose	2.73E-05	mRem

<sup>[1]</sup> 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	5.56E-04	mRem
Teen Bone	7.86E-04	mRem
Child Bone	1.08E-03	mRem
Infant Bone	N/A <sup>[2]</sup>	mRem

<sup>[2]</sup> 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, 2018 – December 31, 2018

PARAMETER	PERCENT OF VALID PARAMETER HOURS			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1. Wind Speed				
a. 10-Meter sensor	95.6%	100.0%	99.9%	100.0%
b. 60 Meter sensor	96.5%	100.0%	98.2%	100.0%
2. Wind Direction				
a. 10-Meter sensor	97.2%	100.0%	99.9%	100.0%
b. 60 Meter sensor	96.5%	100.0%	99.9%	100.0%
3. Temperature				
a. 10-Meter sensor	97.2%	100.0%	99.9%	100.0%
b. 60 Meter sensor	97.2%	100.0%	99.9%	100.0%
c. Temperature Difference (10m-60m)	97.2%	100.0%	99.9%	100.0%
4. Percent of hours for which valid 10-meter Wind Speed, Wind Direction, and Delta Temperature were available	96.8%	100.0%	99.9%	100.0%
5. Percent of hours for which valid 60-meter Wind Speed, Wind Direction, and Delta Temperature were available	96.9%	100.0%	99.5%	100.0%

Clinton Power Station was able to achieve 99.1% Meteorological Recoverable Data during 2018 exceeding the minimum criteria of 90% as delineated within Regulatory Guide 1.23.

**TABLE 17**  
**Classification of Atmospheric Stability**

<b>Stability Classification</b>	<b>Pasquill Category</b>	<b>Defining Conditions</b>
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	$4.0 <\Delta T \leq$ -----

$\Delta T$  = temperature difference in degrees Celsius per 100 meters

**TABLE 18**  
**Joint Wind Frequency Distribution by Stability Class**  
Reporting Period: January 01, 2018 – December 31, 2018

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 2018  
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	0	5	0	0	5
NNE	0	0	0	3	0	0	3
NE	0	0	3	3	0	0	6
ENE	0	0	2	0	0	0	2
E	0	0	6	2	0	0	8
ESE	0	2	3	0	0	0	5
SE	0	0	5	0	0	0	5
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	2	0	0	2
W	0	0	1	0	0	0	1
WNW	0	0	0	0	0	0	0
NW	0	0	5	6	0	0	11
NNW	0	0	3	1	0	0	4
Variable	0	0	0	0	0	0	0
Total	0	2	28	22	0	0	52

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: 60

Clinton Power Station

Period of Record: January - March 2018  
 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	2	1	0	0	3
NNE	0	2	1	1	0	0	4
NE	0	2	3	2	0	0	7
ENE	0	0	1	2	0	0	3
E	0	1	5	2	0	0	8
ESE	0	4	2	0	0	0	6
SE	0	1	1	0	0	0	2
SSE	0	0	0	0	0	0	0
S	0	0	3	0	0	0	3
SSW	0	0	0	4	0	0	4
SW	0	1	1	0	0	0	2
WSW	0	0	1	4	0	0	5
W	0	0	1	2	0	0	3
WNW	0	1	2	1	0	0	4
NW	0	2	8	7	0	0	17
NNW	0	4	2	1	0	0	7
Variable	0	0	0	0	0	0	0
Total	0	18	33	27	0	0	78

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: 60

Clinton Power Station

Period of Record: January - March 2018  
 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	4	2	0	0	7
NNE	0	1	0	0	0	0	1
NE	0	2	3	0	0	0	5
ENE	1	1	2	2	0	0	6
E	0	0	5	2	0	0	7
ESE	0	3	2	0	0	0	5
SE	0	5	1	0	0	0	6
SSE	0	3	3	1	0	0	7
S	0	3	6	0	0	0	9
SSW	0	1	1	2	0	0	4
SW	0	0	1	1	0	0	2
WSW	0	0	3	0	0	0	3
W	0	1	4	1	0	0	6
WNW	0	2	5	7	0	0	14
NW	1	3	11	11	0	0	26
NNW	0	2	3	1	0	0	6
Variable	0	0	0	0	0	0	0
Total	2	28	54	30	0	0	114

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: 60

Clinton Power Station

Period of Record: January - March 2018  
 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	1	12	30	18	0	0	61
NNE	4	13	35	7	0	0	59
NE	0	10	37	8	1	0	56
ENE	0	10	31	11	0	0	52
E	0	7	32	1	0	0	40
ESE	1	10	22	0	0	0	33
SE	3	10	4	1	0	0	18
SSE	2	22	24	11	0	0	59
S	0	12	25	35	0	0	72
SSW	0	3	29	36	7	0	75
SW	2	3	15	6	3	0	29
WSW	1	3	15	6	0	0	25
W	0	5	36	18	3	1	63
WNW	1	8	44	29	0	0	82
NW	2	14	59	23	1	0	99
NNW	0	11	44	24	0	0	79
Variable	0	0	0	0	0	0	0
Total	17	153	482	234	15	1	902

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 25  
 Hours of missing stability measurements in all stability classes: 60



Clinton Power Station

Period of Record: January - March 2018  
 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	17	5	2	0	0	30
NNE	3	12	7	1	0	0	23
NE	2	20	12	1	0	0	35
ENE	6	11	8	2	0	0	27
E	6	9	12	7	0	0	34
ESE	5	24	9	2	0	0	40
SE	4	22	9	0	0	0	35
SSE	0	14	19	1	0	0	34
S	3	33	44	27	5	0	112
SSW	2	15	46	49	21	0	133
SW	1	6	18	5	1	0	31
WSW	2	10	14	5	0	0	31
W	1	11	17	4	0	0	33
WNW	3	22	40	5	0	0	70
NW	5	14	26	0	0	0	45
NNW	4	20	19	2	0	0	45
Variable	0	0	0	0	0	0	0
Total	53	260	305	113	27	0	758

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 11  
 Hours of missing stability measurements in all stability classes: 60

Clinton Power Station

Period of Record: January - March 2018  
 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	5	1	0	0	0	0	6
NNE	3	2	1	0	0	0	6
NE	2	6	0	0	0	0	8
ENE	5	2	0	0	0	0	7
E	2	0	0	0	0	0	2
ESE	0	0	0	0	0	0	0
SE	4	8	0	0	0	0	12
SSE	0	5	0	0	0	0	5
S	0	12	11	1	0	0	24
SSW	0	2	2	1	0	0	5
SW	1	0	1	0	0	0	2
WSW	3	4	0	0	0	0	7
W	2	2	2	0	0	0	6
WNW	1	3	0	0	0	0	4
NW	4	14	0	0	0	0	18
NNW	3	4	0	0	0	0	7
Variable	0	0	0	0	0	0	0
Total	35	65	17	2	0	0	119

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: 60

Clinton Power Station

Period of Record: January - March 2018  
 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	1	0	0	0	0	1
NNE	0	0	0	0	0	0	0
NE	4	9	0	0	0	0	13
ENE	0	1	0	0	0	0	1
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	1	0	0	0	0	1
SSE	0	1	0	0	0	0	1
S	1	4	0	0	0	0	5
SSW	1	2	0	0	0	0	3
SW	1	2	0	0	0	0	3
WSW	0	1	0	0	0	0	1
W	0	0	0	0	0	0	0
WNW	2	1	0	0	0	0	3
NW	2	5	0	0	0	0	7
NNW	1	1	0	0	0	0	2
Variable	0	0	0	0	0	0	0
Total	12	29	0	0	0	0	41

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: 60

Clinton Power Station

Period of Record: January - March 2018  
 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	4	1	0	5
NNE	0	0	0	0	3	0	3
NE	0	0	0	3	3	0	6
ENE	0	0	2	0	0	0	2
E	0	0	1	3	3	1	8
ESE	0	0	4	1	0	0	5
SE	0	0	3	2	0	0	5
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	2	0	0	2
W	0	0	0	1	0	0	1
WNW	0	0	0	0	0	0	0
NW	0	0	1	7	4	0	12
NNW	0	0	1	2	0	0	3
Variable	0	0	0	0	0	0	0
Total	0	0	12	25	14	1	52

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: 60

Clinton Power Station

Period of Record: January - March 2018  
 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	1	1	1	1	0	4
NNE	0	1	0	0	0	0	1
NE	0	1	0	6	0	1	8
ENE	0	0	1	0	0	0	1
E	0	0	1	1	8	0	10
ESE	0	0	5	1	0	0	6
SE	0	1	0	1	0	0	2
SSE	0	0	0	0	0	0	0
S	0	0	2	1	0	0	3
SSW	0	1	0	2	2	0	5
SW	0	0	0	2	0	0	2
WSW	0	0	0	5	0	0	5
W	0	0	0	2	0	0	2
WNW	0	1	1	2	0	0	4
NW	0	3	2	9	4	0	18
NNW	0	1	2	2	0	0	5
Variable	0	0	0	0	0	0	0
Total	0	10	15	35	15	1	76

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 2  
 Hours of missing stability measurements in all stability classes: 60

Clinton Power Station

Period of Record: January - March 2018  
 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	1	2	4	0	0	7
NNE	0	1	0	0	0	0	1
NE	0	2	2	1	0	0	5
ENE	0	0	1	1	1	1	4
E	0	1	0	2	5	0	8
ESE	0	1	4	1	0	0	6
SE	0	4	0	1	0	0	5
SSE	0	1	1	3	1	0	6
S	0	4	2	5	0	0	11
SSW	0	0	1	0	2	0	3
SW	0	0	0	1	1	0	2
WSW	0	0	0	3	0	0	3
W	0	2	2	1	0	0	5
WNW	0	1	1	9	4	0	15
NW	1	1	6	11	6	0	25
NNW	0	1	4	1	1	0	7
Variable	0	0	0	0	0	0	0
Total	1	20	26	44	21	1	113

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: 60

Clinton Power Station

Period of Record: January - March 2018  
 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	4	7	30	17	4	62
NNE	1	3	11	27	1	0	43
NE	3	6	20	23	4	6	62
ENE	0	3	8	13	9	8	41
E	0	1	7	27	16	3	54
ESE	0	4	7	6	18	0	35
SE	0	7	9	2	3	0	21
SSE	1	10	20	16	16	0	63
S	0	6	5	24	28	14	77
SSW	1	1	10	26	19	10	67
SW	0	3	5	12	4	5	29
WSW	1	1	7	14	4	0	27
W	0	3	13	26	14	4	60
WNW	1	4	17	31	25	1	79
NW	1	6	28	38	22	8	103
NNW	0	2	19	41	23	3	88
Variable	0	0	0	0	0	0	0
Total	9	64	193	356	223	66	911

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 16  
 Hours of missing stability measurements in all stability classes: 60

Clinton Power Station

Period of Record: January - March 2018  
 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	19	3	2	0	30
NNE	0	4	14	7	1	0	26
NE	1	2	5	5	6	0	19
ENE	1	0	8	21	1	0	31
E	0	4	5	8	9	7	33
ESE	2	3	8	26	5	3	47
SE	1	9	25	6	0	0	41
SSE	0	3	6	16	11	1	37
S	0	6	11	37	27	31	112
SSW	0	2	10	36	50	31	129
SW	1	5	9	21	4	2	42
WSW	0	0	4	8	11	0	23
W	0	1	8	17	3	0	29
WNW	0	3	18	34	11	0	66
NW	0	5	14	31	2	0	52
NNW	1	2	15	23	1	0	42
Variable	0	0	0	0	0	0	0
Total	7	55	179	299	144	75	759

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 10  
 Hours of missing stability measurements in all stability classes: 60



Clinton Power Station

Period of Record: January - March 2018  
 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	2	1	0	0	6
NNE	0	1	1	2	0	0	4
NE	0	5	1	1	0	0	7
ENE	0	2	2	3	0	0	7
E	0	2	3	2	0	0	7
ESE	0	2	2	0	0	0	4
SE	0	0	0	0	0	0	0
SSE	1	0	5	5	0	0	11
S	0	1	2	14	4	1	22
SSW	0	0	2	6	2	0	10
SW	1	1	1	2	0	0	5
WSW	0	0	2	2	0	0	4
W	0	0	0	4	0	0	4
WNW	0	1	3	1	1	0	6
NW	0	1	1	4	0	0	6
NNW	0	1	7	6	0	0	14
Variable	0	0	0	0	0	0	0
Total	2	20	34	53	7	1	117

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 2  
 Hours of missing stability measurements in all stability classes: 60

Clinton Power Station

Period of Record: January - March 2018  
 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	1	3	0	0	4
NNE	0	1	2	1	0	0	4
NE	1	0	0	0	0	0	1
ENE	1	1	0	4	0	0	6
E	0	0	1	7	0	0	8
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	3	2	0	0	5
SW	0	0	1	2	0	0	3
WSW	0	0	0	1	0	0	1
W	0	1	0	1	0	0	2
WNW	0	0	1	0	0	0	1
NW	0	0	1	1	0	0	2
NNW	0	0	2	0	0	0	2
Variable	0	0	0	0	0	0	0
Total	2	3	13	23	0	0	41

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: 60

Clinton Power Station

Period of Record: April - June 2018  
 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	12	4	0	0	16
NNE	0	0	4	0	0	0	4
NE	0	0	2	2	0	0	4
ENE	0	1	4	1	0	0	6
E	0	2	2	0	0	0	4
ESE	0	2	3	0	0	0	5
SE	0	0	0	0	0	0	0
SSE	0	0	1	0	0	0	1
S	0	0	3	1	0	0	4
SSW	0	1	0	3	0	0	4
SW	0	0	0	2	0	0	2
WSW	0	0	0	2	0	0	2
W	0	0	0	2	0	0	2
WNW	0	0	1	2	0	0	3
NW	0	0	9	1	0	0	10
NNW	0	1	4	0	0	0	5
Variable	0	0	0	0	0	0	0
Total	0	7	45	20	0	0	72

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 2018  
 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	3	5	0	0	0	8
NNE	0	1	3	1	0	0	5
NE	0	0	3	0	0	0	3
ENE	0	3	5	1	0	0	9
E	0	7	7	0	0	0	14
ESE	0	5	1	0	0	0	6
SE	0	7	3	0	0	0	10
SSE	0	1	0	0	0	0	1
S	0	1	2	0	0	0	3
SSW	0	1	5	2	1	0	9
SW	0	1	5	7	0	0	13
WSW	0	0	7	1	0	0	8
W	0	0	12	1	0	0	13
WNW	0	1	3	4	1	0	9
NW	0	3	5	5	0	0	13
NNW	0	3	6	0	0	0	9
Variable	0	0	0	0	0	0	0
Total	0	37	72	22	2	0	133

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 2018  
 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	13	0	0	0	14
NNE	0	0	4	0	0	0	4
NE	1	5	1	1	0	0	8
ENE	1	9	0	0	0	0	10
E	0	8	7	0	0	0	15
ESE	0	5	4	0	0	0	9
SE	1	11	0	0	0	0	12
SSE	1	10	2	0	0	0	13
S	1	8	2	2	0	0	13
SSW	0	6	12	4	0	0	22
SW	0	5	7	4	0	0	16
WSW	0	2	10	1	0	0	13
W	0	8	5	4	0	0	17
WNW	0	4	6	4	2	0	16
NW	0	7	1	3	0	0	11
NNW	1	6	1	1	0	0	9
Variable	0	0	0	0	0	0	0
Total	6	95	75	24	2	0	202

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 2018  
 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	1	20	19	0	0	0	40
NNE	5	15	9	1	0	0	30
NE	6	27	20	2	0	0	55
ENE	6	26	22	0	0	0	54
E	8	20	16	1	0	0	45
ESE	7	13	4	0	0	0	24
SE	13	27	4	0	0	0	44
SSE	13	25	10	0	0	0	48
S	3	32	20	5	0	0	60
SSW	5	19	27	28	6	0	85
SW	5	16	20	10	0	0	51
WSW	2	17	14	3	0	0	36
W	5	26	8	5	1	0	45
WNW	2	21	10	33	18	0	84
NW	5	24	9	16	0	0	54
NNW	1	15	25	5	0	0	46
Variable	0	0	0	0	0	0	0
Total	87	343	237	109	25	0	801

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 2018  
 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	11	1	0	0	0	14
NNE	7	6	5	0	0	0	18
NE	4	40	21	0	0	0	65
ENE	8	53	21	0	0	0	82
E	9	30	1	0	0	0	40
ESE	15	26	0	0	0	0	41
SE	11	22	2	0	0	0	35
SSE	8	29	8	0	0	0	45
S	8	55	32	4	0	0	99
SSW	4	33	33	33	1	0	104
SW	9	31	4	5	0	0	49
WSW	4	20	5	3	0	0	32
W	8	20	3	0	0	0	31
WNW	4	18	3	1	0	0	26
NW	10	7	12	1	0	0	30
NNW	2	12	2	0	0	0	16
Variable	0	0	0	0	0	0	0
Total	113	413	153	47	1	0	727

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 2018  
 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	3	2	0	0	0	0	5
NNE	3	4	0	0	0	0	7
NE	8	15	0	0	0	0	23
ENE	8	4	0	0	0	0	12
E	4	6	0	0	0	0	10
ESE	8	2	0	0	0	0	10
SE	4	4	0	0	0	0	8
SSE	3	12	0	0	0	0	15
S	4	9	0	0	0	0	13
SSW	5	9	1	0	0	0	15
SW	8	7	0	0	0	0	15
WSW	8	11	1	0	0	0	20
W	2	2	1	0	0	0	5
WNW	5	2	0	0	0	0	7
NW	2	6	0	0	0	0	8
NNW	1	3	0	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	76	98	3	0	0	0	177

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 2018  
 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	1	1	0	0	0	0	2
NNE	2	1	0	0	0	0	3
NE	10	10	0	0	0	0	20
ENE	5	2	0	0	0	0	7
E	2	0	0	0	0	0	2
ESE	3	0	0	0	0	0	3
SE	0	0	0	0	0	0	0
SSE	2	1	0	0	0	0	3
S	5	2	0	0	0	0	7
SSW	2	2	0	0	0	0	4
SW	3	3	0	0	0	0	6
WSW	0	2	0	0	0	0	2
W	2	0	0	0	0	0	2
WNW	0	6	0	0	0	0	6
NW	2	2	0	0	0	0	4
NNW	1	0	0	0	0	0	1
Variable	0	0	0	0	0	0	0
Total	40	32	0	0	0	0	72

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 2018  
 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	11	1	0	14
NNE	0	0	1	2	0	0	3
NE	0	0	0	4	1	0	5
ENE	0	0	3	0	2	0	5
E	0	1	4	2	0	0	7
ESE	0	0	2	0	1	0	3
SE	0	0	0	0	0	0	0
SSE	0	0	1	0	0	0	1
S	0	0	1	4	0	0	5
SSW	0	0	1	1	1	0	3
SW	0	0	0	0	4	0	4
WSW	0	0	0	0	0	0	0
W	0	0	0	1	1	0	2
WNW	0	0	0	1	2	0	3
NW	0	0	5	4	1	0	10
NNW	0	0	2	5	0	0	7
Variable	0	0	0	0	0	0	0
Total	0	1	22	35	14	0	72

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 2018

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	7	1	0	0	8
NNE	0	1	2	2	0	0	5
NE	0	0	2	0	0	0	2
ENE	0	0	5	6	1	0	12
E	0	1	7	5	0	0	13
ESE	0	3	4	0	0	0	7
SE	0	4	5	0	0	0	9
SSE	0	0	0	0	0	0	0
S	0	1	2	1	1	0	5
SSW	0	0	5	1	1	1	8
SW	0	0	6	2	5	0	13
WSW	0	0	4	2	1	0	7
W	0	0	6	8	0	0	14
WNW	0	0	3	0	4	1	8
NW	0	0	6	3	5	0	14
NNW	0	1	5	2	0	0	8
Variable	0	0	0	0	0	0	0
Total	0	11	69	33	18	2	133

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 2018  
 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	8	6	0	0	14
NNE	0	0	1	3	0	0	4
NE	0	3	2	1	0	0	6
ENE	1	2	7	1	0	0	11
E	0	2	7	6	0	0	15
ESE	0	3	5	2	1	0	11
SE	0	5	8	0	0	0	13
SSE	1	5	4	2	0	0	12
S	0	4	2	3	2	0	11
SSW	0	3	10	9	3	0	25
SW	0	1	4	6	3	0	14
WSW	0	2	6	6	1	0	15
W	0	3	10	2	5	0	20
WNW	0	2	5	1	1	3	12
NW	0	5	1	1	3	0	10
NNW	0	5	3	1	0	0	9
Variable	0	0	0	0	0	0	0
Total	2	45	83	50	19	3	202

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 2018  
 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	8	15	12	1	0	36
NNE	1	7	12	5	1	0	26
NE	2	8	17	7	3	0	37
ENE	4	11	20	19	13	0	67
E	3	9	13	15	8	0	48
ESE	5	9	12	3	2	0	31
SE	2	19	26	3	0	0	50
SSE	6	15	15	9	0	0	45
S	1	15	18	12	11	5	62
SSW	1	11	19	25	20	8	84
SW	2	13	12	11	8	0	46
WSW	0	9	15	9	4	0	37
W	1	12	20	4	3	2	42
WNW	2	15	10	9	24	28	88
NW	1	21	8	10	11	0	51
NNW	2	6	23	15	5	0	51
Variable	0	0	0	0	0	0	0
Total	33	188	255	168	114	43	801

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 2018  
 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	3	14	1	0	0	18
NNE	2	2	1	7	0	0	12
NE	0	4	7	20	3	0	34
ENE	0	6	17	57	14	0	94
E	2	7	29	15	0	0	53
ESE	0	2	24	11	0	0	37
SE	1	15	27	3	0	0	46
SSE	0	6	25	21	4	0	56
S	0	7	34	40	16	3	100
SSW	1	3	17	28	27	13	89
SW	1	8	22	15	5	0	51
WSW	0	3	19	9	5	0	36
W	0	2	21	5	1	0	29
WNW	1	5	15	9	1	0	31
NW	0	8	5	11	3	0	27
NNW	0	2	10	1	1	0	14
Variable	0	0	0	0	0	0	0
Total	8	83	287	253	80	16	727

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 2018  
 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	3	1	0	0	6
NNE	0	1	2	1	0	0	4
NE	2	2	2	8	0	0	14
ENE	0	2	6	4	0	0	12
E	0	4	7	6	0	0	17
ESE	0	3	3	5	0	0	11
SE	1	6	5	0	0	0	12
SSE	0	0	4	0	0	0	4
S	0	0	7	11	0	0	18
SSW	0	4	7	2	0	0	13
SW	1	1	7	7	0	0	16
WSW	0	3	8	10	0	0	21
W	0	0	2	5	1	0	8
WNW	1	4	4	1	0	0	10
NW	2	0	5	1	0	0	8
NNW	0	0	1	2	0	0	3
Variable	0	0	0	0	0	0	0
Total	7	32	73	64	1	0	177

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 2018  
 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	1	1	0	0	2
NNE	0	0	2	1	0	0	3
NE	0	0	3	2	0	0	5
ENE	0	1	8	3	0	0	12
E	0	2	4	4	0	0	10
ESE	0	1	0	1	0	0	2
SE	1	1	0	0	0	0	2
SSE	0	0	1	0	0	0	1
S	0	1	1	1	0	0	3
SSW	0	2	4	2	0	0	8
SW	1	2	2	3	0	0	8
WSW	0	1	1	3	0	0	5
W	0	1	2	1	0	0	4
WNW	0	0	0	5	0	0	5
NW	0	0	0	2	0	0	2
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	2	12	29	29	0	0	72

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 2018  
 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	2	0	0	0	3
NE	0	1	5	4	0	0	10
ENE	0	5	3	0	0	0	8
E	0	1	0	0	0	0	1
ESE	0	1	0	0	0	0	1
SE	0	5	0	0	0	0	5
SSE	0	2	0	0	0	0	2
S	0	2	0	0	0	0	2
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	2	0	0	0	2
WNW	0	1	6	0	0	0	7
NW	0	0	5	2	0	0	7
NNW	0	0	10	0	0	0	10
Variable	0	0	0	0	0	0	0
Total	0	24	34	6	0	0	64

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: July - September 2018  
 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	3	1	0	0	0	4
NNE	0	0	6	0	0	0	6
NE	0	11	5	3	0	0	19
ENE	0	12	1	0	0	0	13
E	0	4	0	0	0	0	4
ESE	0	4	0	0	0	0	4
SE	0	6	0	0	0	0	6
SSE	0	5	0	0	0	0	5
S	0	4	0	0	0	0	4
SSW	0	6	3	1	0	0	10
SW	1	2	5	0	0	0	8
WSW	0	4	4	0	0	0	8
W	0	4	0	4	0	0	8
WNW	0	6	11	2	0	0	19
NW	0	4	9	0	0	0	13
NNW	0	4	5	0	0	0	9
Variable	0	0	0	0	0	0	0
Total	1	79	50	10	0	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: 3

Clinton Power Station

Period of Record: July - September 2018  
 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	1	0	0	0	5
NNE	0	8	3	0	0	0	11
NE	1	10	7	1	0	0	19
ENE	2	4	0	0	0	0	6
E	0	5	0	0	0	0	5
ESE	0	8	0	0	0	0	8
SE	0	6	0	0	0	0	6
SSE	1	3	2	0	0	0	6
S	0	7	4	0	0	0	11
SSW	0	7	16	2	0	0	25
SW	0	7	10	0	0	0	17
WSW	0	13	7	0	0	0	20
W	0	8	2	0	0	0	10
WNW	0	5	7	0	0	0	12
NW	0	6	8	1	0	0	15
NNW	0	10	4	0	0	0	14
Variable	0	0	0	0	0	0	0
Total	4	111	71	4	0	0	190

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: July - September 2018  
 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	14	19	0	0	0	36
NNE	1	12	16	4	0	0	33
NE	1	18	17	13	0	0	49
ENE	2	21	8	0	0	0	31
E	2	24	0	0	0	0	26
ESE	13	14	0	0	0	0	27
SE	6	17	2	0	0	0	25
SSE	10	37	7	0	0	0	54
S	6	29	35	6	0	0	76
SSW	3	18	54	20	0	0	95
SW	2	20	35	1	0	0	58
WSW	1	19	6	2	0	0	28
W	1	8	4	2	0	0	15
WNW	1	12	23	0	0	0	36
NW	2	25	21	0	0	0	48
NNW	1	10	17	2	0	0	30
Variable	0	0	0	0	0	0	0
Total	55	298	264	50	0	0	667

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: July - September 2018  
 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	3	27	2	0	0	0	32
NNE	4	39	7	0	0	0	50
NE	5	27	18	0	0	0	50
ENE	8	46	3	0	0	0	57
E	14	20	0	0	0	0	34
ESE	17	19	0	0	0	0	36
SE	16	24	0	0	0	0	40
SSE	15	44	2	0	0	0	61
S	14	76	18	2	0	0	110
SSW	7	54	47	5	0	0	113
SW	12	32	7	0	0	0	51
WSW	5	11	4	0	0	0	20
W	7	7	4	0	0	0	18
WNW	3	10	0	0	0	0	13
NW	7	26	4	0	0	0	37
NNW	6	23	4	0	0	0	33
Variable	0	0	0	0	0	0	0
Total	143	485	120	7	0	0	755

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: July - September 2018  
 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	8	1	0	0	0	0	9
NNE	8	14	0	0	0	0	22
NE	19	25	2	0	0	0	46
ENE	9	10	0	0	0	0	19
E	12	10	0	0	0	0	22
ESE	5	4	0	0	0	0	9
SE	5	2	0	0	0	0	7
SSE	10	4	0	0	0	0	14
S	8	5	0	0	0	0	13
SSW	8	12	0	0	0	0	20
SW	4	10	0	0	0	0	14
WSW	9	1	0	0	0	0	10
W	6	1	0	0	0	0	7
WNW	5	1	0	0	0	0	6
NW	10	12	0	0	0	0	22
NNW	10	4	0	0	0	0	14
Variable	0	0	0	0	0	0	0
Total	136	116	2	0	0	0	254

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: July - September 2018  
 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	5	0	0	0	0	0	5
NNE	6	4	0	0	0	0	10
NE	24	13	0	0	0	0	37
ENE	13	1	0	0	0	0	14
E	5	0	0	0	0	0	5
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	3	0	0	0	0	0	3
S	1	0	0	0	0	0	1
SSW	0	1	0	0	0	0	1
SW	5	1	0	0	0	0	6
WSW	3	0	0	0	0	0	3
W	8	0	0	0	0	0	8
WNW	15	3	0	0	0	0	18
NW	10	5	0	0	0	0	15
NNW	3	1	0	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	101	29	0	0	0	0	130

Hours of calm in this stability class: 5  
 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: July - September 2018  
 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	3	0	0	0	3
NNE	0	0	2	0	0	0	2
NE	0	0	3	2	4	0	9
ENE	0	1	8	0	0	0	9
E	0	0	2	0	0	0	2
ESE	0	2	0	0	0	0	2
SE	0	3	1	0	0	0	4
SSE	0	1	1	0	0	0	2
S	0	2	0	1	0	0	3
SSW	0	0	1	0	0	0	1
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	3	0	0	3
WNW	0	0	6	1	0	0	7
NW	0	0	3	2	2	0	7
NNW	0	0	10	0	0	0	10
Variable	0	0	0	0	0	0	0
Total	0	9	40	9	6	0	64

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: July - September 2018  
 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	1	2	0	0	0	3
NNE	0	0	1	3	0	0	4
NE	0	10	5	0	4	0	19
ENE	0	4	8	1	1	0	14
E	1	1	4	0	0	0	6
ESE	0	2	1	0	0	0	3
SE	0	7	1	0	0	0	8
SSE	0	2	2	0	0	0	4
S	0	2	2	0	0	0	4
SSW	0	0	6	3	0	0	9
SW	1	2	6	0	0	0	9
WSW	0	0	7	0	0	0	7
W	0	2	2	3	2	0	9
WNW	0	1	15	1	2	0	19
NW	0	2	12	0	0	0	14
NNW	0	1	7	0	0	0	8
Variable	0	0	0	0	0	0	0
Total	2	37	81	11	9	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: 3

Clinton Power Station

Period of Record: July - September 2018  
 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	3	1	1	0	0	5
NNE	0	2	6	2	0	0	10
NE	0	5	5	3	2	0	15
ENE	0	4	4	1	0	0	9
E	0	1	5	0	0	0	6
ESE	0	6	3	0	0	0	9
SE	0	4	2	0	0	0	6
SSE	0	1	4	2	0	0	7
S	0	3	5	2	0	0	10
SSW	0	3	17	3	1	0	24
SW	0	5	11	3	0	0	19
WSW	0	6	9	1	0	0	16
W	0	9	4	0	0	0	13
WNW	0	2	6	4	0	0	12
NW	0	3	8	2	1	0	14
NNW	0	5	9	0	1	0	15
Variable	0	0	0	0	0	0	0
Total	0	62	99	24	5	0	190

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: July - September 2018  
 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	11	9	16	1	0	37
NNE	0	4	9	7	0	0	20
NE	1	5	19	13	19	0	57
ENE	1	2	19	9	2	0	33
E	2	9	13	4	0	0	28
ESE	5	15	4	2	0	0	26
SE	5	22	7	4	0	0	38
SSE	3	11	26	14	1	0	55
S	2	11	24	24	13	0	74
SSW	3	10	27	25	10	1	76
SW	1	4	28	18	2	0	53
WSW	1	13	13	2	2	0	31
W	1	2	5	1	2	0	11
WNW	0	7	11	21	0	0	39
NW	0	11	20	13	0	0	44
NNW	0	5	6	20	1	0	32
Variable	0	0	0	0	0	0	0
Total	25	142	240	193	53	1	654

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 13  
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: July - September 2018  
 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	16	12	0	0	34
NNE	0	3	20	9	1	0	33
NE	0	3	27	17	0	0	47
ENE	1	5	35	23	3	0	67
E	1	5	13	10	0	0	29
ESE	0	8	22	13	0	0	43
SE	1	23	21	1	0	0	46
SSE	1	10	40	8	1	0	60
S	1	7	57	44	11	0	120
SSW	0	10	24	50	6	0	90
SW	0	9	21	18	0	0	48
WSW	2	7	11	8	0	0	28
W	0	5	5	4	0	0	14
WNW	0	3	8	1	0	0	12
NW	0	5	24	5	0	0	34
NNW	0	9	15	8	0	0	32
Variable	0	0	0	0	0	0	0
Total	7	118	359	231	22	0	737

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 18  
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: July - September 2018  
 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	2	5	0	0	0	8
NNE	0	3	4	4	0	0	11
NE	0	1	6	6	1	0	14
ENE	1	3	22	10	0	0	36
E	1	3	12	13	0	0	29
ESE	1	3	7	11	0	0	22
SE	0	5	6	0	0	0	11
SSE	2	7	6	0	0	0	15
S	1	3	9	0	0	0	13
SSW	0	5	9	5	0	0	19
SW	1	1	9	8	0	0	19
WSW	0	0	8	1	0	0	9
W	0	0	1	1	0	0	2
WNW	0	4	5	0	0	0	9
NW	0	1	7	0	0	0	8
NNW	1	3	19	0	0	0	23
Variable	0	0	0	0	0	0	0
Total	9	44	135	59	1	0	248

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 6  
 Hours of missing stability measurements in all stability classes: 3

Clinton Power Station

Period of Record: July - September 2018  
 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	2	2	0	0	0	0	4
NNE	1	1	1	0	0	0	3
NE	1	2	1	5	0	0	9
ENE	0	2	9	3	0	0	14
E	2	8	13	8	0	0	31
ESE	0	5	3	0	0	0	8
SE	0	2	1	0	0	0	3
SSE	0	1	0	0	0	0	1
S	1	6	1	0	0	0	8
SSW	1	5	0	0	0	0	6
SW	0	1	2	1	0	0	4
WSW	0	1	2	0	0	0	3
W	0	3	0	0	0	0	3
WNW	0	3	2	0	0	0	5
NW	0	4	19	0	0	0	23
NNW	0	3	7	0	0	0	10
Variable	0	0	0	0	0	0	0
Total	8	49	61	17	0	0	135

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: October - December 2018  
 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	2	0	0	0	2
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
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	0	0	0	0
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	0	0	2
NW	0	0	1	4	0	0	5
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	3	6	0	0	9

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: October - December 2018  
 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	3	0	0	0	3
NNE	0	0	1	0	0	0	1
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	3	1	0	0	0	4
ESE	0	0	0	0	0	0	0
SE	0	1	0	0	0	0	1
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	4	0	0	4
WSW	0	0	2	2	0	0	4
W	0	0	1	1	0	0	2
WNW	0	0	4	1	0	0	5
NW	0	0	5	1	0	0	6
NNW	0	0	2	0	0	0	2
Variable	0	0	0	0	0	0	0
Total	0	4	19	9	0	0	32

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: October - December 2018  
 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	4	0	0	0	5
NNE	0	1	4	0	0	0	5
NE	0	3	3	0	0	0	6
ENE	0	5	0	0	0	0	5
E	0	7	0	0	0	0	7
ESE	0	2	0	0	0	0	2
SE	0	2	1	0	0	0	3
SSE	0	3	2	0	0	0	5
S	0	2	6	0	0	0	8
SSW	0	1	3	0	0	0	4
SW	0	0	5	2	0	0	7
WSW	0	0	7	2	0	0	9
W	0	0	6	2	1	0	9
WNW	0	0	8	6	4	0	18
NW	0	1	10	1	0	0	12
NNW	0	2	5	0	0	0	7
Variable	0	0	0	0	0	0	0
Total	0	30	64	13	5	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: 0

Clinton Power Station

Period of Record: October - December 2018  
 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	6	14	36	0	1	0	57
NNE	1	12	26	2	1	0	42
NE	1	27	46	0	0	0	74
ENE	0	16	22	3	0	0	41
E	1	14	2	0	0	0	17
ESE	3	12	2	0	0	0	17
SE	2	18	24	0	0	0	44
SSE	3	22	24	7	0	0	56
S	5	27	48	15	0	0	95
SSW	0	20	32	16	0	0	68
SW	2	18	32	7	0	0	59
WSW	4	17	21	24	0	0	66
W	3	10	31	29	4	0	77
WNW	1	27	67	36	3	1	135
NW	1	37	56	13	7	1	115
NNW	2	22	51	15	7	0	97
Variable	0	0	0	0	0	0	0
Total	35	313	520	167	23	2	1060

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: October - December 2018  
 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	5	0	0	0	24
NNE	4	14	10	6	0	0	34
NE	7	18	20	3	0	0	48
ENE	6	17	11	2	0	0	36
E	7	24	9	3	0	0	43
ESE	5	26	4	0	0	0	35
SE	13	29	14	2	0	0	58
SSE	4	49	21	1	3	0	78
S	4	31	41	5	0	0	81
SSW	3	23	52	12	0	0	90
SW	2	19	23	1	0	0	45
WSW	0	17	19	0	0	0	36
W	2	18	15	2	0	0	37
WNW	7	29	18	2	0	0	56
NW	1	25	9	0	0	0	35
NNW	3	17	8	1	0	0	29
Variable	0	0	0	0	0	0	0
Total	69	374	279	40	3	0	765

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: October - December 2018  
 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	7	0	0	0	0	8
NNE	7	5	0	0	0	0	12
NE	5	17	1	0	0	0	23
ENE	5	7	0	0	0	0	12
E	4	3	0	0	0	0	7
ESE	3	1	0	0	0	0	4
SE	5	2	0	0	0	0	7
SSE	3	4	0	0	0	0	7
S	0	4	0	0	0	0	4
SSW	2	11	2	0	0	0	15
SW	1	6	0	0	0	0	7
WSW	5	10	0	0	0	0	15
W	4	2	0	0	0	0	6
WNW	5	11	1	0	0	0	17
NW	7	20	0	0	0	0	27
NNW	4	8	0	0	0	0	12
Variable	0	0	0	0	0	0	0
Total	61	118	4	0	0	0	183

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: 0

Clinton Power Station

Period of Record: October - December 2018  
 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	1	1	0	0	0	0	2
NNE	1	2	0	0	0	0	3
NE	5	6	0	0	0	0	11
ENE	0	0	0	0	0	0	0
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	1	1	0	0	0	0	2
S	0	0	0	0	0	0	0
SSW	1	0	0	0	0	0	1
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	1	2	0	0	0	0	3
WNW	5	1	0	0	0	0	6
NW	7	5	1	0	0	0	13
NNW	2	1	0	0	0	0	3
Variable	0	0	0	0	0	0	0
Total	24	19	1	0	0	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: 0

Clinton Power Station

Period of Record: October - December 2018  
 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	0	0	0	2
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
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	0	0	0	0
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	1	4	0	5
NW	0	0	0	1	1	0	2
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	2	2	5	0	9

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: October - December 2018

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	1	0	0	3
NNE	0	0	1	0	0	0	1
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	3	1	0	0	4
ESE	0	0	0	0	0	0	0
SE	0	1	0	0	0	0	1
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	1	0	1
SW	0	0	1	3	0	0	4
WSW	0	0	0	3	0	0	3
W	0	0	1	0	0	1	2
WNW	0	0	2	3	1	0	6
NW	0	0	0	4	1	0	5
NNW	0	0	1	1	0	0	2
Variable	0	0	0	0	0	0	0
Total	0	1	11	16	3	1	32

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: October - December 2018  
 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	1	4	0	0	5
NNE	0	1	0	3	0	0	4
NE	0	0	3	3	0	0	6
ENE	0	2	5	0	0	0	7
E	0	3	3	0	0	0	6
ESE	0	1	2	0	0	0	3
SE	0	1	2	0	0	0	3
SSE	0	0	5	0	0	0	5
S	0	2	3	4	0	0	9
SSW	0	0	2	1	1	0	4
SW	0	0	3	1	1	0	5
WSW	0	0	3	6	2	0	11
W	0	0	3	4	1	1	9
WNW	0	0	4	7	3	4	18
NW	0	0	4	6	1	0	11
NNW	0	0	3	3	0	0	6
Variable	0	0	0	0	0	0	0
Total	0	10	46	42	9	5	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: 0



Clinton Power Station

Period of Record: October - December 2018  
 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	5	26	30	1	2	66
NNE	2	8	15	14	1	2	42
NE	1	4	16	35	6	0	62
ENE	0	3	17	21	9	2	52
E	0	5	9	7	0	0	21
ESE	1	2	12	3	1	0	19
SE	1	9	21	17	4	0	52
SSE	4	12	20	15	17	2	70
S	0	13	22	31	15	4	85
SSW	1	6	17	26	5	5	60
SW	0	7	19	21	13	0	60
WSW	1	7	18	19	21	3	69
W	2	4	23	17	26	6	78
WNW	0	11	44	56	25	8	144
NW	1	15	35	31	9	7	98
NNW	0	5	25	31	13	8	82
Variable	0	0	0	0	0	0	0
Total	16	116	339	374	166	49	1060

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: October - December 2018  
 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	3	16	7	1	0	27
NNE	0	2	13	18	7	0	40
NE	1	4	10	8	11	1	35
ENE	1	0	8	17	4	1	31
E	1	1	12	20	6	4	44
ESE	0	1	19	16	1	0	37
SE	2	14	36	15	7	0	74
SSE	1	6	31	41	5	4	88
S	1	5	7	41	17	2	73
SSW	0	2	19	51	12	1	85
SW	0	0	12	31	2	0	45
WSW	0	2	6	21	6	0	35
W	0	1	9	24	3	0	37
WNW	1	3	14	26	3	0	47
NW	1	4	25	9	2	0	41
NNW	0	4	13	7	2	0	26
Variable	0	0	0	0	0	0	0
Total	9	52	250	352	89	13	765

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: October - December 2018  
 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	12	0	0	0	12
NNE	0	2	10	3	0	0	15
NE	0	0	9	5	2	0	16
ENE	0	3	10	6	0	0	19
E	0	2	5	0	0	0	7
ESE	0	6	2	0	0	0	8
SE	2	3	2	0	0	0	7
SSE	0	0	5	1	0	0	6
S	1	0	3	4	0	0	8
SSW	0	0	4	5	0	0	9
SW	0	0	2	9	0	0	11
WSW	0	0	3	6	0	0	9
W	0	0	7	6	0	0	13
WNW	1	1	4	9	0	0	15
NW	0	1	7	4	0	0	12
NNW	0	2	11	6	0	0	19
Variable	0	0	0	0	0	0	0
Total	4	20	96	64	2	0	186

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: October - December 2018  
 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	1	0	2	0	0	3
NNE	0	2	2	0	0	0	4
NE	0	2	1	0	1	0	4
ENE	0	0	1	2	0	0	3
E	0	1	5	0	0	0	6
ESE	1	1	1	0	0	0	3
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	2	1	1	0	0	0	4
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	1	0	0	0	0	1
W	0	0	0	2	0	0	2
WNW	0	1	0	3	0	0	4
NW	0	0	2	0	0	0	2
NNW	1	2	3	2	0	0	8
Variable	0	0	0	0	0	0	0
Total	4	12	16	11	1	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: 0

## 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 2018, 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 2018, there was one (1) instance of a missed ODCM required sample documented in IR 4133155 due to an equipment issue. A summary of the sample deviation is captured below.

May 01, 2018 -- Issue Report # 4133155  
CHEM UNABLE TO OBTAIN VR/VQ SAMPLE DUE TO EQUIP ISSUE

Per ODCM Table 4.4.1-1 Step C., during modes 4 and 5, a noble gas and tritium Grab sample is to be obtained upon initiation of flow through Drywell Purge (VQ) and High Volume Containment Ventilation (VR). Operations contacted Chemistry to obtain a noble gas and tritium sample per CY-CL-1024-35 due to starting up VR/VQ in Containment Vent Mode per CPS 3408.01. While preparing to obtain the sample, the 1VR04CB fan relays tripped (after approximately 30 minutes) causing Operations to shut down containment vent mode and start back up the continuous containment purge. Chemistry was unable to obtain the required noble gas and tritium sample prior to the system tripping due to the equipment issue.

## **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 2018 reporting period; therefore, there is no documentation required in the 2018 Annual Radioactive Effluent Release Report.

## SECTION 10

### NEW LOCATIONS FOR DOSE CALCULATION AND/OR ENVIRONMENTAL MONITORING

The following is a summary of the 2018 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	2018 RESIDENT (km)	AGE GROUP	2017 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	C/T/A	4.44	C/T/A
SSE	2.90	A	2.90	A
S	4.78	A	4.78	A
SSW	4.68*	C/A*	4.90	A
SW	1.17	A	1.17	A
WSW	3.62	A*	3.62	C/A
W	1.95	C/A*	1.95	C/T/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

Sixty-eight (68) gardens within a five (5) kilometer radius were located in the sixteen (16) geographical sectors surrounding CPS. Fifteen (15) 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	2018 GARDENS (km)	AGE GROUPS	2017 GARDENS (km)	AGE GROUPS
N	1.50	A	1.50	A
NNE	1.50*	A	4.78	A
NE	3.46	C/A*	3.46	A
ENE	4.22*	A	2.86	A
E	1.67	A	1.67	A
ESE	5.30*	C/A*	7.72	A
SE	7.80*	A*	>8	
SSE	>8		>8	
S	6.60	A	6.60	A
SSW	>8		>8	
SW	>8*		5.87	C/A
WSW	4.32*	C/T/A*	3.66	C/A
W	3.32*	A*	3.22	C/T/A
WNW	2.63*	A*	>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



### 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	2018 MILKING ANIMALS (km)	AGE GROUPS	2017 MILKING ANIMALS (km)	AGE GROUPS
N	1.50	A	1.50	A
NNE	>8		>8	
NE	>8		>8	
ENE	4.20	A	4.20	A
E	>8		>8	
ESE	>8		>8	
SE	7.10*	T/A*	>8	
SSE	>8		>8	
S	6.60	A	6.60	A
SSW	6.30*	C/T/A*	>8	
SW	>8		>8	
WSW	4.32*	A*	4.94	C/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 was an administrative change, documented under IR 4172392, identified in 2018 against a previously submitted Annual Radioactive Effluent Release Report resulting in an errata data submittal to the Commission.

September 12, 2018 -- Issue Report # 4172392  
ERRATA DATA SUBMITTAL TO CLINTON'S 2016 ARERR

During the preparation of Clinton's ANI visit, the ARERR preparer noticed that there is a conservative error in Table 1 of the 2016 ARERR.

The First Quarter 2016 Total Particulate effluent release, Table 1 Number C.1., is indicated as 3.89E-02 Curies. Dose rates should not include any particulates with half-lives less than 8 days as noted in the first column and in Section 3.4.1.1 of CY-CL-170-301, Clinton's ODCM. This 3.89E-02 curie number includes the curie content of cesium-138. Cs-138 has a 33.4-minute half live and should not have been included on Table 1. The correct value for 2016 Quarter 1's Particulates with half-lives greater than 8 days should be 2.61E-5 curies. The previously reported value is overly conservative and did not affect any further dose calculations.

The 2017 ARERR was reviewed and accurately did not include any particulates greater than 8 days.

There is also a transposition error under Table 1 Number D.1, the second quarter tritium total released. Table 1 states that 4.50 Ci were released when Table 2 of the 2016 ARERR states 4.55 Ci. The correct value of the second quarter 2016 Tritium released was 4.55 Ci as indicated in Table 2. This error did not affect any further dose calculations.

## CORRECTED 2016 TABLE 1:

**2016 TABLE 1**

Gaseous Effluents - Summation Of All Releases  
 Data Period: January 01, 2016 - December 31, 2016  
 Continuous Mixed Mode

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Est. Total Error, %
<b>A. Fission &amp; Activation Gases</b>						
1. Total Release	Ci	5.73E+00	5.20E+00	7.29E+00	9.12E+00	30
2. Average release rate for period	μCi/sec	9.15E-01	1.08E+00	9.93E-01	2.70E-01	
3. Percent of ODCM Limit	%	*	*	*	*	
<b>B. Iodines</b>						
1. Total Iodine-131	Ci	1.03E-05	1.49E-05	1.57E-06	0.00E+00	31
2. Average release rate for period	μCi/sec	1.44E-06	1.95E-06	2.09E-07	0.00E+00	
3. Percent of ODCM Limit	%	*	*	*	*	
<b>C. Particulates</b>						
1. Particulates with half-lives >8 days	Ci	2.61E-05	6.61E-05	0.00E+00	0.00E+00	24
2. Average release rate for period	μCi/sec	5.47E-03	9.99E-06	0.00E+00	0.00E+00	
3. Percent of ODCM Limit	%	*	*	*	*	
4. Gross alpha radioactivity	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
<b>D. Tritium</b>						
1. Total Release	Ci	5.69E+00	4.55E+00	4.02E+00	5.40E+00	21
2. Average release rate for period	μCi/sec	8.36E-01	8.01E-01	5.70E-01	6.76E-01	
3. Percent of ODCM Limit	%	*	*	*	*	
<b>E. Carbon-14</b>						
1. Total Release	Ci	4.322E+00	3.580E+00	4.180E+00	4.360E+00	
2. Average release Rate for period	μCi/sec	5.561E-01	5.561E-01	5.561E-01	5.560E-01	

\* Applicable limits are expressed in terms of dose.

## **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 2018.

U-604486

Subject: Clinton Power Station 2018 Annual Radioactive Effluent Release Report

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