Clinton Power Station
8401 Power Road
Clinton, IL 61727

U-604117
April 29, 2013

10CFR50.36a

Document Control Desk
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

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

Subject: Clinton Power Station 2012 Annual Radioactive Effluent Release Report

Exelon Generating Company, LLC (Exelon), Clinton Power Station, is submitting the 2012 Annual Radioactive Effluent Release Report. This report is submitted in accordance with Technical Specification requirement 5.6.3, "Radioactive Effluent Release Report," and covers the period from January 1, 2012 through December 31, 2012.

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

There are no commitments contained in this letter.

Respectfully,

William G. Noll
Site Vice President
Clinton Power Station

RWC/blf

Attachment

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

IE48
NRR

Exelon Nuclear

01 January 2012 – 31 December 2012

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

CLINTON POWER STATION – DOCKET NUMBER 50-461

Prepared by:

Clinton Power Station

TABLE OF CONTENTS

SECTION	TITLE	PAGE
1	Executive Summary	5
2	Introduction	6
3	Supplemental Information	12
4	Radioactive Effluent Data	17
5	Solid Waste Disposal Information	28
6	Dose Measurements and Assessments	32
7	Meteorological Data and Dispersion Estimates	43
8	ODCM Operational Remedial Requirement Reports	103
9	Changes to Radioactive Waste Treatment Systems	104
10	New Locations for Dose Calculation and / or Environmental Monitoring	105
11	Corrections to Data Reported in Previous Reports	108
12	Changes to the Offsite Dose Calculation Manual	109

LIST OF TABLES

TABLE NUMBER	TITLE	PAGE
1	Gaseous Effluents – Summation of All Releases • 1A Air Doses Due to Gaseous Releases • 1B Doses to a Member of the Public Due to Radioiodines, Tritium and Particulates in Gaseous Releases	17 18 18
2	Gaseous Effluents – Nuclides Released	19
3	Radioactive Gaseous Waste LLD Values	20
4	Waterborne Effluents – Summation of All Releases	22
5	Waterborne Effluents – Nuclides Released	23
6	Radioactive Liquid Waste LLD Values	24
7	Solid Waste and Irradiated Fuel Shipments	29
8	Maximum Offsite Doses and Dose Commitments to Members of the Public In Each Sector	33
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	36
10	Calculated Doses to Members of the Public During Use of the Road in the Southeast Sector within the CPS Site Boundary	37
11	Calculated Doses for the Residents in the South-Southeast Sector within the CPS Site Boundary	38
12	Calculated Doses for the Residents in the Southwest Sector within the CPS Site Boundary	39
13	Calculated Doses to Members of the Public During Use of the Agricultural Acreage in the South-Southwest Sector within the CPS Site Boundary	40
14	Calculated Doses for the Residents in the West-Southwest Sector within the CPS Site Boundary	41
15	Calculated Doses to Members of the Public During Use of Clinton Lake in the Northwest Sector within the CPS Site Boundary	42
16	Meteorological Data Availability	44
17	Classification of Atmospheric Stability	45
18	Joint Wind Frequency Distribution by Stability Class	46

LIST OF FIGURES

FIGURE NUMBER	TITLE	PAGE
1	CPS Airborne Effluent Release Points	7
2	CPS Waterborne Effluents Release Pathway	8
3	Effluent Exposure Pathways	11
4	Areas Within the CPS Site Boundary Open to Members of the Public	35

SECTION 1

EXECUTIVE SUMMARY

The Annual Radioactive Effluent Release Report 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 01 January 2012 through 31 December 2012. This report also includes a detailed meteorological section providing weather history of the surrounding area during this period. This information 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] and exceptions to the CPS effluent monitoring program that must be reported in accordance with ODCM Remedial Requirements 2.7.1.b and 3.9.2.b.

The Report also includes a summary of events that are to be included per ODCM Remedial Requirements.

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 2012, CPS operations were well within these federally required limits. The maximum annual radiation dose delivered to the inhabitants of the area surrounding CPS - due to radioactivity released from the station – was 3.60E-02 [or 0.0360] mrem. 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 was only a small fraction of the limit for the maximum exposed member of the public. There were no liquid effluent releases in 2012. 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 (6) 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 27 February 1987. Commercial operation commenced in April 1987 and the reactor reached 100% power for the first time on 15 September 1987.

CPS releases airborne effluents via two (2) gaseous effluent release points to the environment. They are the Common Station Heating, Ventilating, and Air Conditioning [HVAC] Vent and the Standby Gas Treatment System [SGTS] Vent [see Figure 1]. Each gaseous effluent release point is continuously monitored through 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 2012 at CPS. Each release would have been sampled and analyzed prior to release. Depending upon the amount of activity in a release, liquid effluents would vary from 10 to 300 gallons per minute [GPM]. This volume is then further combined with both Plant Service Water flow [a minimum of approximately 5,000 GPM] along with Plant Circulating Water flow [0 to 567,000 GPM] in the seal well, just prior to entering the 3.4 mile discharge flume into Lake Clinton [see Figure 2].

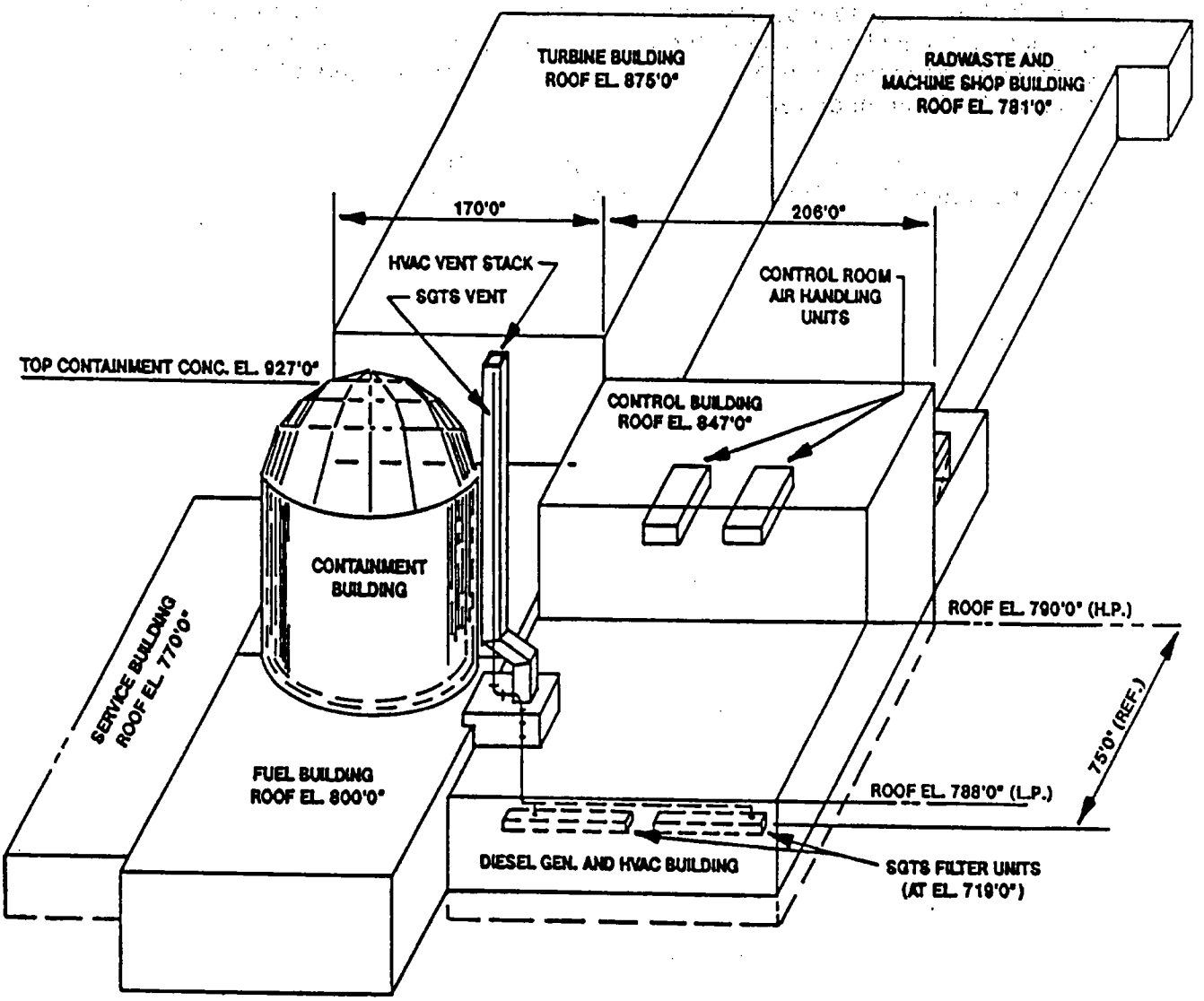
Processing and Monitoring

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 for 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

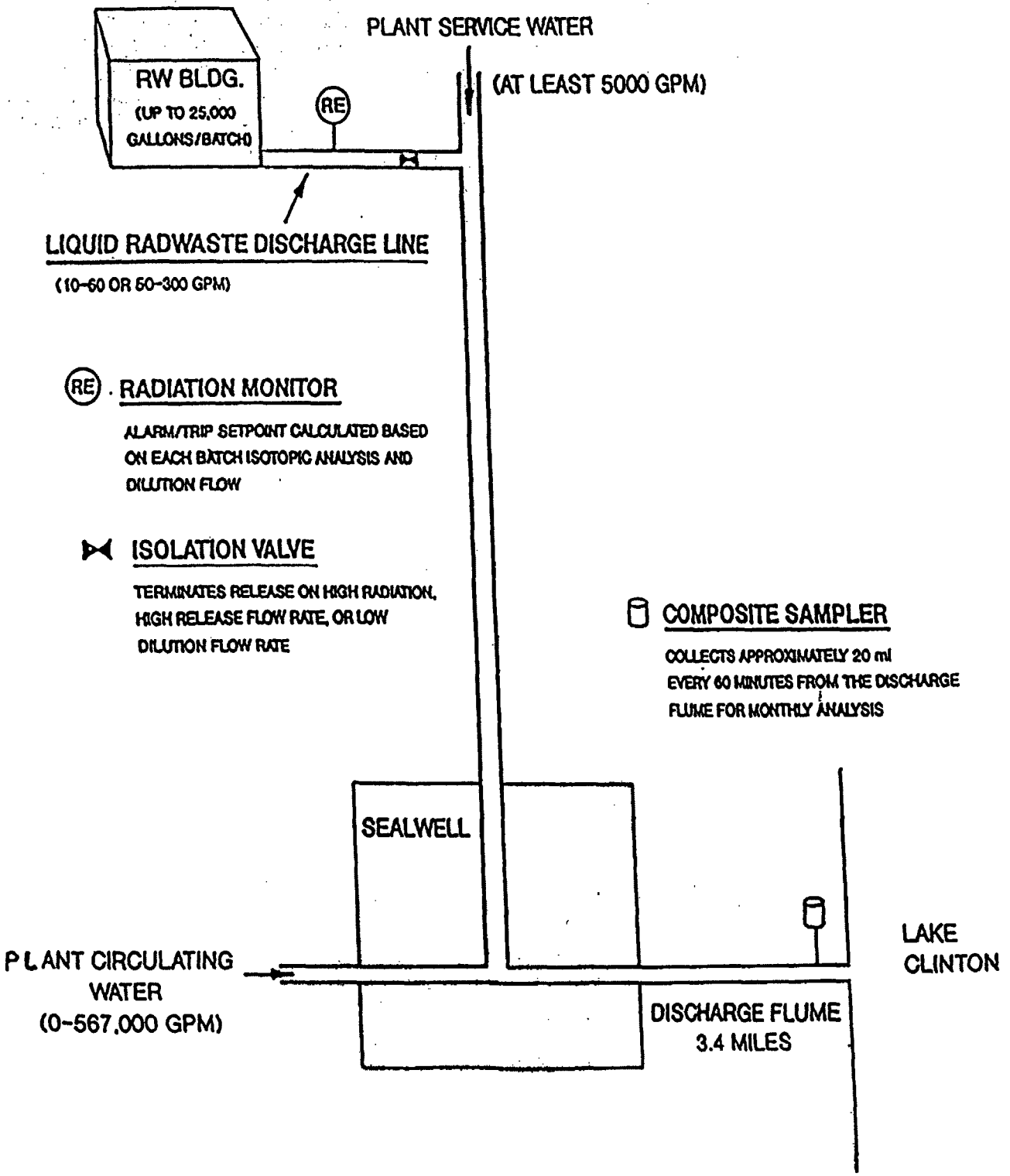


	HVAC Exhaust Vent	SGTS Exhaust Vent
Release Point Height (feet)	200	200
Building Height (feet)	190	190
Release Point Geometry	Duct	Pipe
Release Point Area (ft^2)	120	2
Release Point Diameter (feet)	12*	1
Annual Average Flow Rate (ft^3/sec)	2,738	73
Vertical Exit Velocity (feet/sec)	33	41

* 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 cesium collects in muscle and liver tissue, and radioactive strontium in mineralized bone.

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.

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 and 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

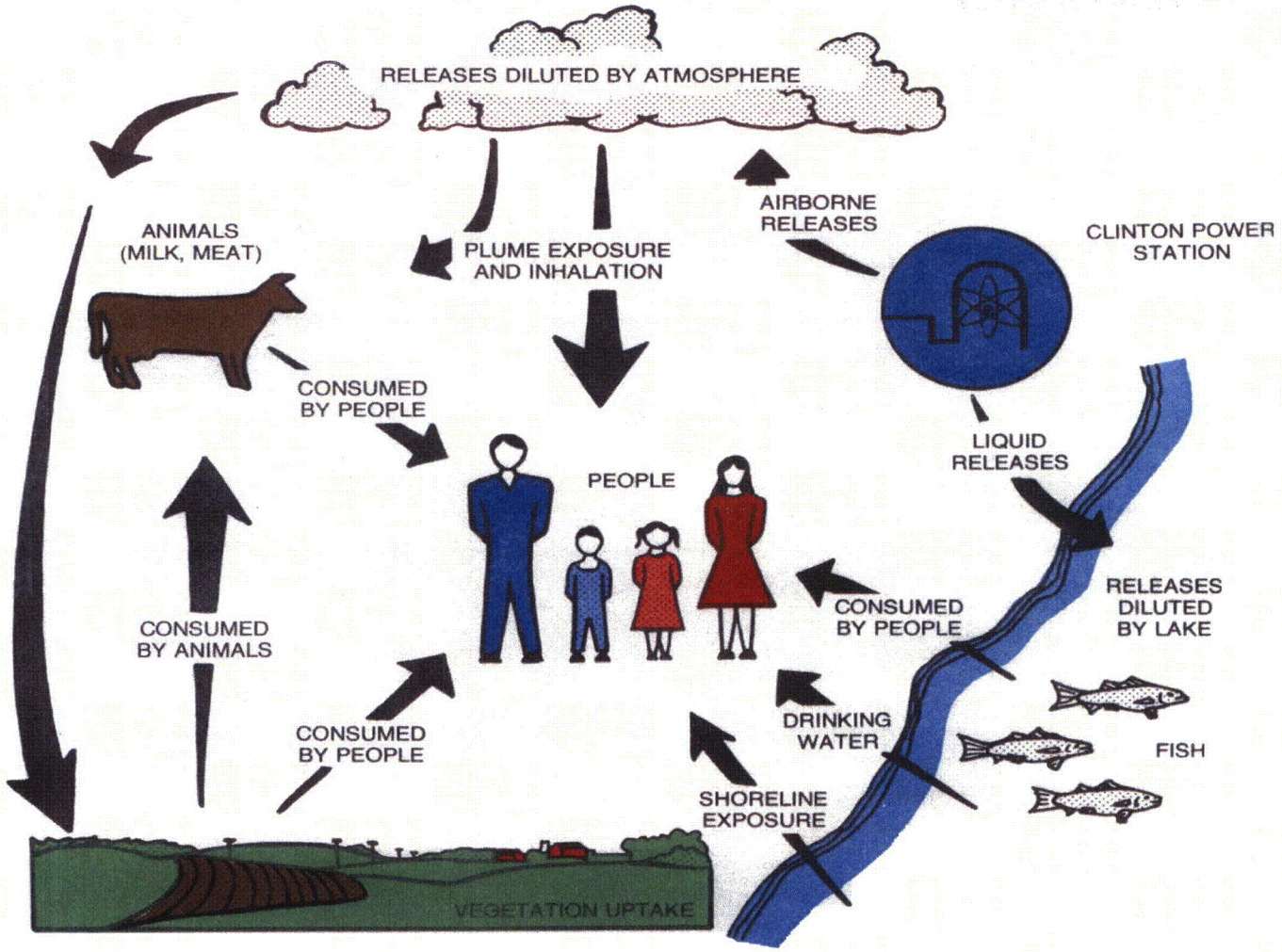
Liquid effluents may originate from two (2) sources at CPS. The first is effluent from the Radioactive Waste Treatment System. This water is demineralized prior to release. Samples are taken after the tank has been allowed to adequately recirculate. The second is from heat exchanger leaks found in closed 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.

FIGURE 3

EFFLUENT EXPOSURE PATHWAYS



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 are kept ALARA. To ensure these criteria are met, each license authorizing nuclear reactor operation includes the Offsite Dose Calculation Manual [ODCM] 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 5.5.1 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 for gaseous effluents shall not exceed the values provided within Section 5.5.4.g of Station 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 Title 10 of the Code of Federal Regulations, Part 50, Appendix I, (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 Title 10 of the Code of Federal Regulations, Part 50, Appendix I, (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 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 µCi/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 [E] 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 Electric Power Research Institute (EPRI) Technical Report 1021106, using the 2012 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 354.3 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 average 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 average 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-3, gross alpha, Fe-55, Sr-89 and Sr-90. 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.

IV. DESCRIPTION OF ERROR ESTIMATES

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

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

where: E_T = total percent error, and
$E_1 ... E_N$ = 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: 01 January 2012 – 31 December 2012
Continuous Mixed Mode

	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Est. Total Error, %
A. Fission & Activation Gases						
1. Total Release	Ci	**0.00E+01**	**0.00E+01**	**8.31E-01**	**0.00E+01**	30
2. Average release rate for period	µCi/sec	**0.00E+01**	**0.00E+01**	**1.05E-01**	**0.00E+01**	
3. Percent of ODCM Limit	%	*	*	*	*	
B. Iodines						
1. Total Iodine-131	Ci	**0.00E+01**	**0.00E+01**	**2.21E-06**	**4.17E-06**	31
2. Average release rate for period	µCi/sec	**0.00E+01**	**0.00E+01**	**2.78E-07**	**5.25E-07**	
3. Percent of ODCM Limit	%	*	*	*	*	
C. Particulates						
1. Particulates with half-lives >8 days	Ci	**2.18E-06**	**0.00E+01**	**0.00E+01**	**0.00E+01**	24
2. Average release rate for period	µCi/sec	**2.77E-07**	**0.00E+01**	**0.00E+01**	**0.00E+01**	
3. Percent of ODCM Limit	%	*	*	*	*	
4. Gross alpha radioactivity	Ci	**0.00E+01**	**0.00E+01**	**0.00E+01**	**0.00E+01**	
D. Tritium						
1. Total Release	Ci	**2.72E+00**	**4.11E+00**	**7.22E+00**	**7.00E+00**	21
2. Average release rate for period	µCi/sec	**3.45E-01**	**5.23E-01**	**9.08E-01**	**8.80E-01**	
3. Percent of ODCM Limit	%	*	*	*	*	
E. Carbon-14						
1. Total Release	Ci	**4.02E+00**	**4.02E+00**	**4.07E+00**	**4.07E+00**	
2. Average release Rate for period	µCi/sec	**5.11E-01**	**5.11E-01**	**5.12E-01**	**5.12E-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

Type of Radiation	ODCM Limit	1st Quarter	% of Limit	2nd Quarter	% of Limit	3rd Quarter	% of Limit	4th Quarter	% of Limit
Gamma	5 mrad	0.00E+01	0.00E+01	0.00E+01	0.00E+01	4.12E-05	8.23E-04	0.00E+01	0.00E+01
Beta	10 mrad	0.00E+01	0.00E+01	0.00E+01	0.00E+01	1.45E-05	1.45E-04	0.00E+01	0.00E+01

Doses per Year

Type of Radiation	ODCM Limit	Year	% of Limit
Gamma	10 mrad	4.12E-05	4.12E-04
Beta	20 mrad	1.45E-05	7.26E-05

TABLE 1B

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

Doses per Quarter

Type of Organ	ODCM Limit	Quarter 1	% of Limit	Quarter 2	% of Limit	Quarter 3	% of Limit	Quarter 4	% of Limit
Bone	7.5 mrem	9.02E-03	1.20E-01	8.94E-03	1.19E-01	9.04E-03	1.21E-01	9.04E-03	1.21E-01
Liver	7.5 mrem	3.90E-05	5.20E-04	5.91E-05	7.88E-04	1.04E-04	1.38E-03	1.01E-04	1.34E-03
TBody	7.5 mrem	3.40E-03	4.53E-02	1.84E-03	2.45E-02	1.90E-03	2.54E-02	1.90E-03	2.53E-02
Thyroid	7.5 mrem	3.91E-05	5.21E-04	5.91E-05	7.89E-04	1.10E-04	1.47E-03	1.13E-04	1.50E-03
Kidney	7.5 mrem	3.91E-05	5.21E-04	5.91E-05	7.89E-04	1.04E-04	1.39E-03	1.01E-04	1.34E-03
Lung	7.5 mrem	3.92E-05	5.22E-04	5.91E-05	7.89E-04	1.04E-04	1.38E-03	1.01E-04	1.34E-03
GI LLI	7.5 mrem	4.17E-05	5.56E-04	5.91E-05	7.89E-04	1.04E-04	1.38E-03	1.01E-04	1.34E-03

Doses per Year

Type of Organ	ODCM Limit	Year	% of Limit
Bone	15 mrem	3.60E-02	2.40E-01
Liver	15 mrem	3.03E-04	2.02E-03
TBody	15 mrem	7.50E-03	5.00E-02
Thyroid	15 mrem	3.21E-04	2.14E-03
Kidney	15 mrem	3.03E-04	2.02E-03
Lung	15 mrem	3.03E-04	2.02E-03
GI LLI	15 mrem	3.05E-04	2.04E-03

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.

TABLE 2

CLINTON POWER STATION
GASEOUS EFFLUENTS - Nuclides Released
YEAR: 2012

Mixed Mode Release	X
Elevated Release	
Ground-Level Release	

Continuous Mode	X
Batch Mode	

	Units	Quarter 1[2]	Quarter 2[2]	Quarter 3[2]	Quarter 4[2]
A. Fission Gases [1]					
Ar-41	Ci	<LLD	<LLD	8.31E-01	<LLD
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD
Xe-133m	Ci	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD
Total for Period	Ci	<LLD	<LLD	8.31E-01	<LLD
B. Iodines [1]					
I-131	Ci	<LLD	<LLD	2.21E-06	4.17E-06
I-133	Ci	<LLD	<LLD	<LLD	8.96E-07
I-135	Ci	<LLD	<LLD	<LLD	<LLD
Total for Period	Ci	<LLD	<LLD	2.21E-06	5.07E-06
C. Particulates [1]					
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	<LLD
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	<LLD
Zn-65	Ci	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	2.18E-06	<LLD	<LLD	<LLD
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	<LLD	<LLD
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD
Gross Alpha	Ci	<LLD	<LLD	<LLD	<LLD
Total for Period	Ci	2.18E-06	<LLD	<LLD	<LLD
D. Tritium [1]					
Total for Period	Ci	2.72E+00	4.11E+00	7.22E+00	7.00E+00
E. Carbon-14 [1]					
Total for Period	Ci	4.02E+00	4.02E+00	4.07E+00	4.07E+00

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

[2] 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.

ODCM required LLD values are listed in Table 6. All analyses met the required LLD's.

TABLE 3

RADIOACTIVE GASEOUS WASTE LLD VALUES

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

Table 3 Notations

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

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

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

Table 3 Notations (continued)

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, in counts per disintegration,

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

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

Y is the fractional radiochemical yield, when applicable,

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

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

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

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

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

[c]Weekly grab sample and analysis

[d]Continuous charcoal sample analyzed weekly

[e]Continuous particulate sample analyzed weekly

[f]Composite particulate sample analyzed monthly

TABLE 4

WATERBORNE EFFLUENTS - Summation Of All Releases
Data Period: 01 January 2012 through 31 December 2012

There were zero (0) liquid radwaste releases from CPS in 2012.

[redacted]	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Est. Total Error, %
A. Fission & Activation Products						
1. Total Release	Ci	**0.00E+01**	**0.00E+01**	**0.00E+01**	**0.00E+01**	N/A
2. Average diluted concentration during period	µCi/ml	0.00E+01	0.00E+01	0.00E+01	0.00E+01	
3. Percent of ODCM Limit	%	N/A	N/A	N/A	N/A	
B. Tritium						
1. Total Release	Ci	**0.00E+01**	**0.00E+01**	**0.00E+01**	**0.00E+01**	N/A
2. Average diluted concentration during period	µCi/ml	0.00E+01	0.00E+01	0.00E+01	0.00E+01	
3. Percent of ODCM Limit	%	N/A	N/A	N/A	N/A	
C. Dissolved and Entrained Gases						
1. Total Release	Ci	**0.00E+01**	**0.00E+01**	**0.00E+01**	**0.00E+01**	N/A
2. Average diluted concentration during period	µCi/ml	0.00E+01	0.00E+01	0.00E+01	0.00E+01	
3. Percent of ODCM Limit	%	N/A	N/A	N/A	N/A	
D. Gross Alpha Radioactivity						
Gross alpha radioactivity	Ci	**0.00E+01**	**0.00E+01**	**0.00E+01**	**0.00E+01**	N/A
E. Volume of Waste Released (prior to Dilution)	Liters	0.00E+01	0.00E+01	0.00E+01	0.00E+01	N/A
F. Volume of dilution water used during period	Liters	0.00E+01	0.00E+01	0.00E+01	0.00E+01	N/A

TABLE 5

WATERBORNE EFFLUENTS - Nuclides Released [1]
Data Period: 01 January 2012 – 31 December 2012
All Modes

There were zero (0) liquid radwaste releases from CPS in 2012.

Continuous Mode		**Batch Mode**	**X**

Nuclide	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4
A. Tritium					
H-3	Ci	**0.00E+01**	**0.00E+01**	**0.00E+01**	**0.00E+01**
B. Fission and Activation Products					
Sr-89	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Sr-90	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Cs-134	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Cs-137	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
I-131	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Co-58	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Co-60	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Fe-59	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Zn-65	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Mn-54	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Cr-51	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Zr/Nb-95	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Mo-99	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Tc-99m	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Ba/La-140	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Ce-141	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Ce-144	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Total	Ci	**0.00E+01**	**0.00E+01**	**0.00E+01**	**0.00E+01**
C. Dissolved and Entrained Noble Gases					
Xe-133	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Xe-135	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
Total	Ci	**0.00E+01**	**0.00E+01**	**0.00E+01**	**0.00E+01**

[1] A value corresponding to ten times the values found in 10CFR20 Appendix B, Table 2, Column 2 are 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 6

RADIOACTIVE LIQUID WASTE LLD VALUES

TYPE OF ACTIVITY ANALYSIS	ODCM Required Lower Limit of Detection (LLD) [a] (µCi/ml)
Principal Gamma Emitters [b]	≤5.00E-07
I-131	≤1.00E-06
Dissolved and Entrained Gases (Gamma Emitters) [c]	≤1.00E-05
H-3	≤1.00E-05
Gross Alpha	≤1.00E-07
Sr-89, Sr-90	≤5.00E-08
Fe-55	≤1.00E-06

Table 6 Notations

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

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

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

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 6 Notations (continued)

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,

Y is the fractional radiochemical yield, when applicable,

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

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

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

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

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

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

BATCH RELEASES

There were zero (0) liquid radwaste releases from CPS in 2012.

A. Batch Liquid Releases: 2012

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: 2012

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 2012. There were no abnormal or unplanned liquid or gaseous releases from CPS in 2012.

Liquid Releases:

Number of Abnormal Liquid Releases: Zero (0)

Activity Released [Ci]

Nuclides	Activity [Ci]
N/A	0.0
N/A	0.0
N/A	0.0
N/A	0.0
N/A	0.0
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
N/A	0.0
N/A	0.0
N/A	0.0
N/A	0.0
N/A	0.0
Total	0.0

SECTION 5

SOLID WASTE DISPOSAL INFORMATION

During this reporting period – 01 January 2012 through 31 December 2012 - there were Nineteen (19) radioactive waste shipments and zero (0) irradiated fuel shipments from CPS. In addition, the CPS ODCM requires reporting of the following information for solid waste shipped offsite during the above reporting period:

1. Container volume: Class A Waste: **1.47E+04** ft^3 / Class B Waste: **0.0** ft^3 / Class C Waste: **0.0** ft^3

   This total includes Dry Active Waste (DAW), resins, filter sludges and evaporator bottoms.

2. Total curie quantity: Class A Waste was **2.73E+02** curies and Class B Waste was **0.0** curies (determined by dose-to-curie and sample concentration methodology estimates) and Class C Waste was **0.0** curies in 2012.

3. Principal radionuclides: See A.2 for listing of measured radionuclides.

4. Source of waste and processing employed: Resins, filter sludges and evaporator bottoms dewatered, non-compacted dry active waste, Sealand bags, and a B-25 box.

5. Type of container: Type A and Strong Tight Container.

6. Solidification agent or absorbent: None.

Table 7

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

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

A.1. Type of Waste		Units	January – June 2012	July – December 2012	Est. Total Error, %
a.	Spent resins, filter sludges, evaporator bottoms, etc.	ft^3	1.43E+03	7.33E+02	25
		Ci	8.89E+00	2.62E+02	
b.	Dry compactable waste, contaminated equipment, etc.	ft^3	9.50E+03	2.60E+03	25
		Ci	8.57E-01	4.70E-01	
c.	Irradiated components, control rods, etc.	ft^3	0.00E+01	0.00E+01	25
		Ci	0.00E+01	0.00E+01	
d.	Other Wastes	ft^3	4.80E+02	0.00E+01	25
		Ci	6.94E-03	0.00E+01	

* 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	C-14	0.12	3.24E-01
	Mn-54	4.42	1.20E+01
	Fe-55	80.35	2.18E+02
	Co-60	13.33	3.62E+01
	Ni-63	0.86	2.32E+00
	Zn-65	0.58	1.57E+00
	Other	0.46	1.24E+00

2. Dry compactable waste, contaminated equipment, etc.

Waste Class	Nuclide Name	% Percent Abundance	Curies
A	Mn-54	22.39	2.97E-01
	Fe-55	36.70	4.87E-01
	Co-60	38.96	5.17E-01
	Ni-63	0.84	1.11E-02
	Zn-65	0.88	1.16E-02
	Other	0.24	3.20E-03

Table 7

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS [continued]

3. Other Wastes

Waste Class	Nuclide Name	% Percent Abundance	Curies
A	Mn-54	20.49	1.42E-03
[redacted]	Fe-55	37.23	2.58E-03
[redacted]	Co-60	40.45	2.81E-03
[redacted]	Ni-63	0.89	6.19E-05
[redacted]	Zn-65	0.77	5.34E-05
[redacted]	Other	0.17	1.16E-05

Table 7

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS [continued]

A.3. Solid Waste Disposition

January - June 2012

Number of Shipments	Mode of Transportation	Destination
4	Hittman Transport	Clive Disposal Facility (Containerized)
8	Hittman Transport	Duratek/Bear Creek

July - December 2012

Number of Shipments	Mode of Transportation	Destination
2	Hittman Transport	Barnwell Processing Facility
1	Hittman Transport	Clive Disposal Facility (Containerized)
4	Hittman Transport	Duratek/Bear Creek

B. Irradiated Fuel Shipments (Disposition)

Number of Shipments	Mode of Transportation	Destination
N/A	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 2012 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 328.1 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 2012 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, with the exception of dose due to C-14, which was calculated using methodology included in the EPRI Technical Report 1021106.

- 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 residences) 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: 01 January 2012 – 31 December 2012

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

RECEPTOR INFORMATION					AIRBORNE EFFLUENT DOSE					WATERBORNE EFFLUENT DOSE (mrem) [1]	
					Iodine and Particulates (mrem)			Noble Gases 6 (mrad)			
Sector	Distance (miles)	Pathways	Organ	Age	Total Body	Skin	Organ	Gamma	Beta	Total Body	Organ
N	0.9	GP, I, M, V	B	A	7.57E-03	1.09E-08	3.60E-02	3.60E-05	1.27E-05	0.00E+00	0.00E+00
NNE	2.3	GP, I, M	B	A	3.00E-03	3.25E-09	1.46E-02	1.98E-05	6.98E-06		
NE	4.3	GP, I, V	B	A	4.74E-04	6.17E-10	2.06E-03	6.81E-06	2.40E-06		
ENE	1.8	GP, I, V	B	C	1.03E-03	1.71E-09	4.56E-03	8.53E-06	3.01E-06		
E	1.0	GP, I, V	B	A	1.06E-03	5.52E-09	4.60E-03	1.51E-05	5.32E-06		
ESE	3.3	GP, I, V	B	A	7.19E-04	1.50E-09	3.12E-03	1.03E-05	3.64E-06		
SE	2.8	GP, I	B	A	1.10E-04	1.81E-09	4.04E-04	1.01E-05	3.56E-06		
SSE	2.7	GP, I, V	B	C	8.51E-04	1.13E-09	3.78E-03	7.08E-06	2.50E-06		
S	4.1	GP, I, M, V	B	A	1.37E-03	7.50E-10	6.54E-03	6.54E-06	2.31E-06		
SSW	2.9	GP, I	B	A	6.89E-05	9.61E-10	2.52E-04	6.30E-06	2.22E-06		
SW	3.5	GP, I, V	B	T	6.66E-04	9.53E-10	2.86E-03	9.43E-06	3.33E-06		
WSW	3.4	GP, I, M	B	A	8.07E-04	5.04E-10	3.93E-03	5.34E-06	1.88E-06		
W	2.0	GP, I, V	B	A	5.33E-04	1.01E-09	2.31E-03	7.64E-06	2.70E-06		
WNW	1.6	GP, I, V	B	A	6.09E-04	1.06E-09	2.65E-03	8.75E-06	3.08E-06		
NW	2.9	GP, I, V	B	T	6.81E-04	7.07E-10	2.93E-03	9.65E-06	3.40E-06		
NNW	1.3	GP, I, M, V	B	A	4.61E-03	4.27E-09	2.19E-02	2.19E-05	7.73E-06		

Key for Table 8

GP = Ground Plane	V = Vegetables	A = Adult
I = Inhalation	B = Bone	T = Teen
M = Cows Meat		I = Infant
		C = Child

[1] There were zero (0) liquid radwaste releases from CPS in 2012.

All doses were within all regulatory limits, including limits from 40CFR190.

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.

COMPLIANCE WITH 40CFR190 REQUIREMENTS

Thermoluminescent dosimeters [TLD] are stationed around CPS to measure the ambient gamma radiation field. Monitoring stations are placed near the site boundary 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 TLDs are reported in the Annual Radiological Environmental Monitoring Report [REMP]. 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 10 CFR 50 Appendix I methodology. The doses reported are well below the limits of Appendix I.

DOSE TO MEMBERS OF THE PUBLIC WITHIN THE SITE BOUNDARY

CPS ODCM section 7.2 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 3.4-4 (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 2012 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

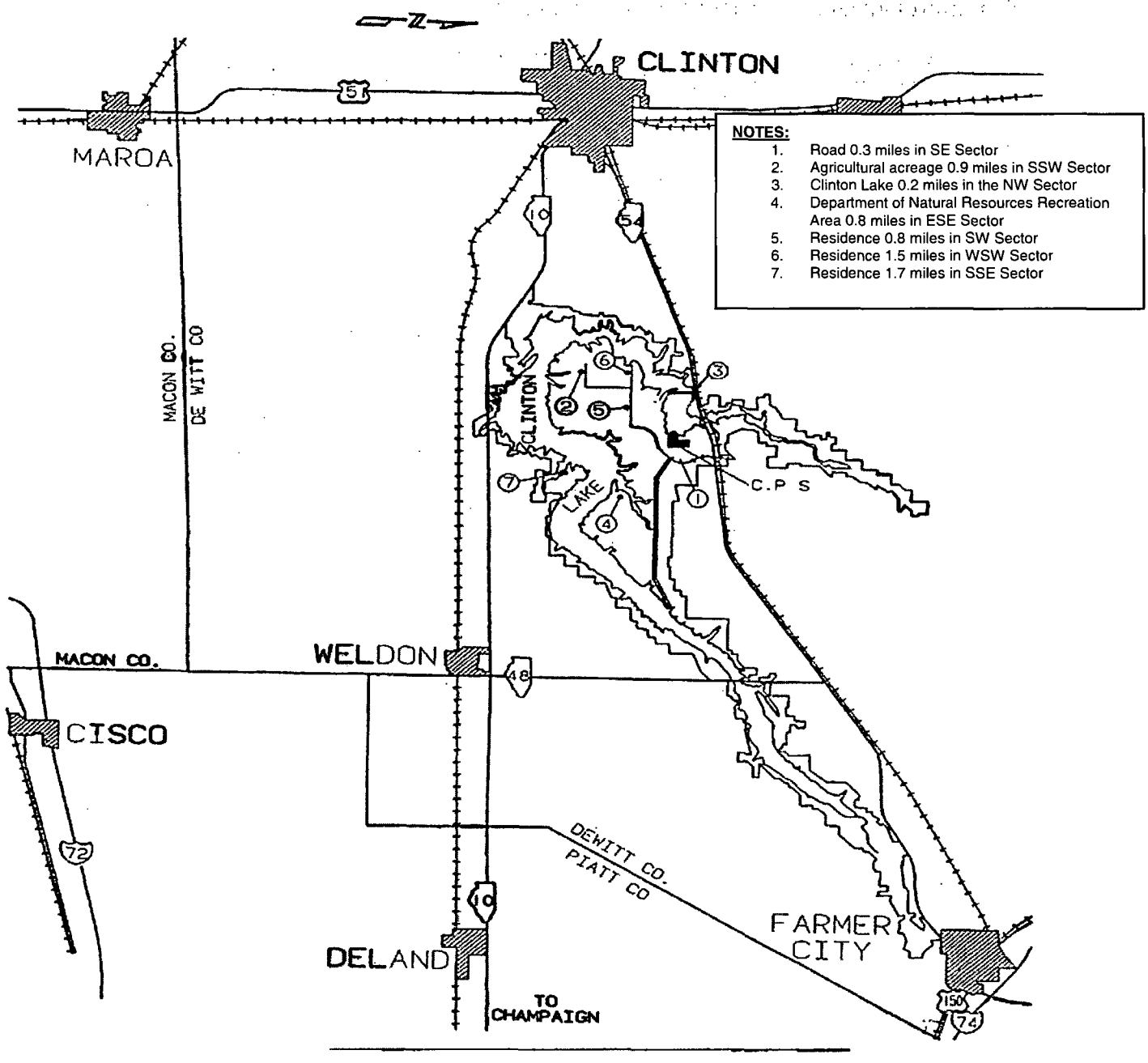


TABLE 9

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: 01 January 2012 – 31 December 2012

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	7.50E-06	mrem/year
Skin Dose Rate (Noble Gases)	1.10E-05	mrem/year
Gamma Air Dose	7.85E-06	mrad
Beta Air Dose	2.78E-06	mrad
Total Body Dose (Particulates)	1.40E-04	mrem
Skin Dose (Particulates) [1]	3.00E-09	mrem

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

Highest Organ Dose by Age Group:

Adult Bone	3.13E-04	mrem
Teen Bone	4.50E-04	mrem
Child Bone	6.20E-04	mrem
Infant Bone	4.58E-04	mrem

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: 01 January 2012 – 31 December 2012

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	2.31E-06	mrem/year
Skin Dose Rate (Noble Gases)	3.37E-06	mrem/year
Gamma Air Dose	2.63E-06	mrad
Beta Air Dose	9.27E-07	mrad
Total Body Dose (Particulates)	4.71E-05	mrem
Skin Dose (Particulates) [1]	1.04E-09	mrem

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

Highest Organ Dose by Age Group:

Adult Bone	1.05E-04	mrem
Teen Bone	1.51E-04	mrem
Child Bone	2.08E-04	mrem
Infant Bone	1.53E-04	mrem

TABLE 11

CALCULATED DOSES FOR THE RESIDENTS IN THE SOUTH-SOUTHEAST SECTOR
(2.736 kilometers) WITHIN THE CPS SITE BOUNDARY
Data Period: 01 January 2012 – 31 December 2012

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	9.11E-06	mrem/year
Skin Dose Rate (Noble Gases)	1.33E-05	mrem/year
Gamma Air Dose	9.60E-06	mrad
Beta Air Dose	3.39E-06	mrad
Total Body Dose (Particulates)	1.71E-04	mrem
Skin Dose (Particulates) [1]	2.10E-09	mrem

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

Highest Organ Dose by Age Group:

Adult Bone	3.84E-04	mrem
Teen Bone	5.50E-04	mrem
Child Bone	7.59E-04	mrem
Infant Bone	5.60E-04	mrem

TABLE 12

CALCULATED DOSES FOR THE RESIDENTS IN THE SOUTHWEST SECTOR (1.219 kilometers) WITHIN THE CPS SITE BOUNDARY
Data Period: 01 January 2012 – 31 December 2012

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	2.29E-05	mrem/year
Skin Dose Rate (Noble Gases)	3.35E-05	mrem/year
Gamma Air Dose	2.42E-05	mrad
Beta Air Dose	8.53E-06	mrad
Total Body Dose (Particulates)	4.33E-04	mrem
Skin Dose (Particulates) [1]	7.59E-09	mrem

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

Highest Organ Dose by Age Group:

Adult Bone	9.68E-04	mrem
Teen Bone	1.39E-03	mrem
Child Bone	1.91E-03	mrem
Infant Bone	1.41E-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: 01 January 2012 – 31 December 2012

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	1.60E-06	mrem/year
Skin Dose Rate (Noble Gases)	2.34E-06	mrem/year
Gamma Air Dose	1.68E-06	mrad
Beta Air Dose	5.94E-07	mrad
Total Body Dose (Particulates)	2.39E-05	mrem
Skin Dose (Particulates) [1]	6.55E-10	mrem

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

Highest Organ Dose by Age Group:

Adult Bone	6.74E-05	mrem
Teen Bone	9.65E-05	mrem
Child Bone	N/A [2]	mrem
Infant Bone	N/A [2]	mrem

[2] Dose 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: 01 January 2012 – 31 December 2012

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	7.72E-06	mrem/year
Skin Dose Rate (Noble Gases)	1.13E-05	mrem/year
Gamma Air Dose	8.13E-06	mrad
Beta Air Dose	2.87E-06	mrad
Total Body Dose (Particulates)	1.46E-04	mrem
Skin Dose (Particulates) [1]	1.63E-09	mrem

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

Highest Organ Dose by Age Group:

Adult Bone	3.25E-04	mrem
Teen Bone	4.66E-04	mrem
Child Bone	6.43E-04	mrem
Infant Bone	4.74E-04	mrem

TABLE 15

CALCULATED DOSES TO MEMBERS OF THE PUBLIC DURING USE OF CLINTON LAKE IN THE NORTHWEST SECTOR WITHIN THE CPS SITE BOUNDARY
Data Period: 01 January 2012 – 31 December 2012

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	1.89E-05	mrem/year
Skin Dose Rate (Noble Gases)	2.76E-05	mrem/year
Gamma Air Dose	1.97E-05	mrad
Beta Air Dose	6.95E-06	mrad
Total Body Dose (Particulates)	3.53E-04	mrem
Skin Dose (Particulates) [1]	3.73E-09	mrem

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

Highest Organ Dose by Age Group:

Adult Bone	7.91E-04	mrem
Teen Bone	1.13E-03	mrem
Child Bone	1.56E-03	mrem
Infant Bone	1.15E-03	mrem

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 is 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 microwave 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: 01 January 2012 – 31 December 2012

PARAMETER	PERCENT OF VALID PARAMETER HOURS (%)			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1. Wind Speed				
a. 10-Meter sensor	99.5	99.8	100.0	99.9
b. 60 Meter sensor	99.5	99.9	100.0	99.9
2. Wind Direction				
a. 10-Meter sensor	99.5	99.9	100.0	99.9
b. 60 Meter sensor	99.5	98.5	100.0	99.9
3. Temperature				
a. 10-Meter sensor	99.5	99.9	100.0	99.9
b. 60 Meter sensor	99.8	99.6	100.0	99.9
c. Temperature Difference (10m-60m)	99.5	99.9	100.0	99.9
4. Percent of hours for which valid 10-meter Wind Speed, Wind Direction, and Delta Temperature were available	99.5	99.8	100.0	99.9
5. Percent of hours for which valid 60-meter Wind Speed, Wind Direction, and Delta Temperature were available	99.5	98.5	100.0	99.9

Clinton Power Station was able to achieve 99.6% Meteorological Recoverable Data during 2012 exceeding the minimum criteria of 90% as delineated within Regulatory Guide 1.23.

TABLE 17

CLASSIFICATION OF ATMOSPHERIC STABILITY

Stability Classification	Pasquill Category	Defining Conditions
Extremely unstable	A	------ $< \Delta T \leq$ -1.042
Moderately unstable	B	-1.042 $< \Delta T \leq$ -0.933
Slightly unstable	C	-0.933 $< \Delta T \leq$ -0.823
Neutral	D	-0.823 $< \Delta T \leq$ -0.274
Slightly stable	E	-0.274 $< \Delta T \leq$ 0.823
Moderately stable	F	0.823 $< \Delta T \leq$ 2.195
Extremely stable	G	2.195 $< \Delta T \leq$ ------

ΔT = temperature difference in degrees Fahrenheit per 100 feet

TABLE 18

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Reporting Period: 01 January 2012 through 31 December 2012

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.

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: January - March 2012
Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	6	0	0	0	6
NNE	0	1	7	1	0	0	9
NE	0	2	3	0	0	0	5
ENE	0	2	5	0	0	0	7
E	0	0	1	0	0	0	1
ESE	0	2	2	0	0	0	4
SE	0	0	7	0	0	0	7
SSE	1	2	2	0	0	0	5
S	0	1	10	7	0	0	18
SSW	0	2	14	7	0	0	23
SW	0	3	4	0	2	0	9
WSW	0	3	2	0	0	0	5
W	1	4	8	3	0	0	16
WNW	0	1	7	18	0	0	26
NW	0	3	9	11	2	0	25
NNW	0	0	4	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	2	26	91	47	4	0	170

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: 11

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: January - March 2012
Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	4	1	0	0	5
NNE	0	0	1	0	0	0	1
NE	0	3	2	0	0	0	5
ENE	0	2	8	1	0	0	11
E	0	0	0	1	0	0	1
ESE	0	3	0	0	0	0	3
SE	0	0	3	0	0	0	3
SSE	0	2	0	1	0	0	3
S	0	3	6	7	1	0	17
SSW	0	3	7	5	3	0	18
SW	0	0	1	2	3	1	7
WSW	0	1	10	1	0	0	12
W	0	1	3	4	0	0	8
WNW	0	0	6	3	4	0	13
NW	0	5	2	2	0	0	9
NNW	0	1	0	1	0	0	2
Variable	0	0	0	0	0	0	0
Total	0	24	53	29	11	1	118

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: 11

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: January - March 2012
Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	2	5	1	0	0	8
NNE	0	3	0	0	0	0	3
NE	0	2	2	0	0	0	4
ENE	0	2	2	1	0	0	5
E	0	1	4	0	0	0	5
ESE	0	2	1	0	0	0	3
SE	0	2	3	0	0	0	5
SSE	0	2	4	3	0	0	9
S	1	1	6	4	4	0	16
SSW	0	1	4	8	4	0	17
SW	0	0	5	3	0	0	8
WSW	0	0	5	1	0	1	7
W	0	1	3	5	2	0	11
WNW	1	0	3	2	3	1	10
NW	0	3	5	5	3	0	16
NNW	0	0	4	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	2	22	56	33	16	2	131

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: 11

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: January - March 2012
Stability Class - Neutral - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	1	12	17	1	0	0	31
NNE	1	8	13	0	0	0	22
NE	1	15	31	9	0	0	56
ENE	0	7	22	11	0	0	40
E	0	8	15	1	0	0	24
ESE	1	21	9	0	0	0	31
SE	1	14	28	2	0	0	45
SSE	5	13	53	23	0	0	94
S	2	8	37	18	1	0	66
SSW	0	8	29	26	9	8	80
SW	0	6	22	7	0	0	35
WSW	1	5	17	11	7	1	42
W	1	7	35	50	19	2	114
WNW	0	12	45	37	36	1	131
NW	0	8	28	26	15	0	77
NNW	2	10	14	8	7	0	41
Variable	0	0	0	0	0	0	0
Total	16	162	415	230	94	12	929

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: 11

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: January - March 2012
Stability Class - Slightly Stable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	3	10	1	0	0	0	14
NNE	0	6	7	1	0	0	14
NE	3	12	6	0	0	0	21
ENE	1	10	3	0	0	0	14
E	3	17	5	0	0	0	25
ESE	9	27	2	0	0	0	38
SE	6	30	6	0	0	0	42
SSE	1	37	39	3	0	0	80
S	4	33	24	16	1	0	78
SSW	5	11	34	35	6	0	91
SW	5	10	30	14	0	0	59
WSW	6	8	8	3	0	0	25
W	3	12	13	7	1	0	36
WNW	3	14	15	2	0	0	34
NW	3	21	16	0	0	0	40
NNW	3	8	0	0	0	0	11
Variable	0	0	0	0	0	0	0
Total	58	266	209	81	8	0	622

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: 11

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: January - March 2012
Stability Class - Moderately Stable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	3	5	1	0	0	0	9
NNE	1	10	0	0	0	0	11
NE	2	10	0	0	0	0	12
ENE	4	8	0	0	0	0	12
E	2	2	0	0	0	0	4
ESE	1	7	0	0	0	0	8
SE	1	10	0	0	0	0	11
SSE	2	2	0	0	0	0	4
S	2	8	1	0	0	0	11
SSW	5	5	12	0	0	0	22
SW	3	8	1	0	0	0	12
WSW	2	10	1	0	0	0	13
W	3	13	0	0	0	0	16
WNW	1	11	0	0	0	0	12
NW	0	6	0	0	0	0	6
NNW	1	1	1	0	0	0	3
Variable	0	0	0	0	0	0	0
Total	33	116	17	0	0	0	166

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: 11

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: January - March 2012
Stability Class - Extremely Stable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

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

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: 11

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: January - March 2012
Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	1	5	0	0	6
NNE	0	0	2	4	0	0	6
NE	0	2	3	2	0	0	7
ENE	0	1	1	2	0	0	4
E	0	0	2	0	3	0	5
ESE	0	0	3	1	0	0	4
SE	0	0	1	6	0	0	7
SSE	0	1	1	1	0	0	3
S	0	2	4	6	8	0	20
SSW	0	4	5	12	3	0	24
SW	0	2	3	1	0	2	8
WSW	0	3	1	1	0	0	5
W	0	1	4	6	2	0	13
WNW	0	3	1	13	7	1	25
NW	0	1	3	12	8	2	26
NNW	0	1	1	4	1	0	7
Variable	0	0	0	0	0	0	0
Total	0	21	36	76	32	5	170

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: 11

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: January - March 2012
Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	1	1	4	0	0	6
NNE	0	0	0	0	0	0	0
NE	0	2	2	1	0	0	5
ENE	0	0	3	2	5	0	10
E	0	0	1	0	2	0	3
ESE	0	0	2	0	0	0	2
SE	0	0	2	2	0	0	4
SSE	0	2	0	0	1	0	3
S	0	2	2	3	4	5	16
SSW	0	2	4	8	2	3	19
SW	0	0	1	1	0	4	6
WSW	0	0	7	7	0	0	14
W	0	1	3	0	2	0	6
WNW	0	0	2	6	2	4	14
NW	0	3	2	2	2	0	9
NNW	0	0	0	0	1	0	1
Variable	0	0	0	0	0	0	0
Total	0	13	32	36	21	16	118

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: 11

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: January - March 2012
Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	6	3	0	0	9
NNE	0	1	0	0	0	0	1
NE	0	2	1	2	0	0	5
ENE	0	0	2	1	0	0	3
E	0	0	2	2	2	0	6
ESE	0	0	3	2	0	0	5
SE	0	1	3	1	0	0	5
SSE	0	1	1	3	2	0	7
S	1	0	2	4	2	8	17
SSW	0	1	1	7	4	5	18
SW	0	0	1	5	0	2	8
WSW	1	0	2	4	0	1	8
W	0	0	2	3	4	2	11
WNW	0	0	0	3	2	4	9
NW	0	0	5	2	5	3	15
NNW	0	0	4	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	2	6	35	42	21	25	131

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: 11

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: January - March 2012
Stability Class - Neutral - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	2	4	15	8	1	7	37
NNE	0	4	11	9	0	0	24
NE	1	2	12	17	7	2	41
ENE	0	2	8	13	20	5	48
E	1	2	2	19	8	1	33
ESE	0	2	12	13	3	0	30
SE	1	6	11	29	1	0	48
SSE	2	5	7	33	39	8	94
S	0	3	11	30	16	12	72
SSW	1	2	8	17	26	18	72
SW	0	1	11	20	6	1	39
WSW	0	1	14	8	9	4	36
W	0	5	16	22	37	26	106
WNW	0	3	8	33	31	51	126
NW	0	2	16	27	23	18	86
NNW	0	3	13	9	10	2	37
Variable	0	0	0	0	0	0	0
Total	8	47	175	307	237	155	929

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: 11

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: January - March 2012
Stability Class - Slightly Stable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	4	9	1	0	0	14
NNE	0	1	8	6	0	0	15
NE	0	1	3	7	0	0	11
ENE	0	1	4	14	1	0	20
E	1	1	3	13	1	0	19
ESE	0	3	7	19	4	0	33
SE	2	5	27	18	0	0	52
SSE	0	4	11	34	22	0	71
S	0	5	17	34	31	19	106
SSW	1	2	8	15	26	17	69
SW	1	1	7	29	23	2	63
WSW	1	2	7	4	9	1	24
W	1	6	7	14	8	1	37
WNW	1	3	3	14	12	0	33
NW	0	4	15	19	1	0	39
NNW	0	1	12	2	1	0	16
Variable	0	0	0	0	0	0	0
Total	8	44	148	243	139	40	622

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: 11

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: January - March 2012
Stability Class - Moderately Stable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	1	1	0	0	2
NNE	0	0	8	4	0	0	12
NE	0	1	5	0	0	0	6
ENE	0	1	10	6	0	0	17
E	0	2	3	2	0	0	7
ESE	0	0	2	1	0	0	3
SE	0	3	5	5	0	0	13
SSE	0	0	1	7	1	0	9
S	0	1	0	9	0	0	10
SSW	0	1	1	3	1	0	6
SW	1	1	5	2	10	0	19
WSW	0	1	3	7	0	0	11
W	1	2	3	12	0	0	18
WNW	0	0	4	9	0	0	13
NW	0	2	6	5	0	0	13
NNW	0	1	2	4	0	0	7
Variable	0	0	0	0	0	0	0
Total	2	16	59	77	12	0	166

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: 11

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: January - March 2012
Stability Class - Extremely Stable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

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

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: 11

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: April - June 2012
Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	5	32	7	0	0	44
NNE	0	6	19	5	2	0	32
NE	0	0	6	16	0	0	22
ENE	0	6	6	2	0	0	14
E	0	9	4	0	0	0	13
ESE	0	7	4	0	0	0	11
SE	0	6	7	0	0	0	13
SSE	0	13	7	2	0	0	22
S	1	11	16	2	0	0	30
SSW	0	5	26	8	0	0	39
SW	0	4	16	6	0	0	26
WSW	0	1	5	6	0	0	12
W	0	2	6	1	3	0	12
WNW	0	1	13	3	1	0	18
NW	0	3	19	15	0	0	37
NNW	0	7	6	4	0	0	17
Variable	0	0	0	0	0	0	0
Total	1	86	192	77	6	0	362

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: April - June 2012
Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	2	4	1	0	0	7
NNE	1	3	8	0	1	0	13
NE	0	3	2	2	0	0	7
ENE	0	7	1	0	0	0	8
E	0	4	4	0	0	0	8
ESE	1	3	2	0	0	0	6
SE	0	4	3	0	0	0	7
SSE	0	3	2	1	0	0	6
S	1	9	11	2	0	0	23
SSW	0	2	15	8	0	0	25
SW	1	5	11	2	0	0	19
WSW	0	4	2	1	0	0	7
W	1	4	5	0	0	0	10
WNW	0	2	5	1	1	0	9
NW	0	2	3	2	0	0	7
NNW	0	1	4	3	0	0	8
Variable	0	0	0	0	0	0	0
Total	5	58	82	23	2	0	170

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: April - June 2012
Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	2	1	0	0	3
NNE	1	2	3	1	1	0	8
NE	0	3	2	3	0	0	8
ENE	0	1	5	0	0	0	6
E	1	3	3	0	0	0	7
ESE	1	3	0	0	0	0	4
SE	0	1	0	0	0	0	1
SSE	0	8	1	1	0	0	10
S	0	8	4	2	1	0	15
SSW	0	2	12	3	0	0	17
SW	0	2	5	3	0	0	10
WSW	1	4	1	0	0	0	6
W	0	0	2	0	1	0	3
WNW	1	2	2	1	0	0	6
NW	1	1	7	0	0	0	9
NNW	1	2	4	1	0	0	8
Variable	0	0	0	0	0	0	0
Total	7	42	53	16	3	0	121

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: April - June 2012
Stability Class - Neutral - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	8	23	3	0	0	34
NNE	0	4	5	7	0	0	16
NE	3	16	33	21	0	0	73
ENE	0	8	23	0	0	0	31
E	3	14	19	0	0	0	36
ESE	1	22	11	0	0	0	34
SE	1	14	6	0	0	0	21
SSE	4	12	18	4	0	0	38
S	2	15	28	10	3	0	58
SSW	0	12	44	22	7	0	85
SW	4	8	18	2	0	0	32
WSW	0	5	8	2	5	0	20
W	2	5	11	2	0	0	20
WNW	0	9	7	3	0	0	19
NW	2	6	15	3	1	0	27
NNW	1	9	24	4	0	0	38
Variable	0	0	0	0	0	0	0
Total	23	167	293	83	16	0	582

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: April - June 2012
Stability Class - Slightly Stable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	1	14	9	0	0	0	24
NNE	1	11	6	2	0	0	20
NE	1	25	21	4	1	0	52
ENE	4	15	6	0	0	0	25
E	5	27	3	0	0	0	35
ESE	10	31	5	0	0	0	46
SE	3	49	0	0	0	0	52
SSE	4	45	7	0	0	0	56
S	6	40	25	4	0	0	75
SSW	1	18	55	12	0	0	86
SW	3	12	13	4	0	0	32
WSW	1	10	11	0	0	0	22
W	3	5	4	1	0	0	13
WNW	3	17	9	0	1	0	30
NW	2	6	7	2	0	0	17
NNW	1	12	9	0	0	0	22
Variable	0	0	0	0	0	0	0
Total	49	337	190	29	2	0	607

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: April - June 2012
Stability Class - Moderately Stable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	3	0	0	0	0	3
NNE	2	11	0	0	0	0	13
NE	2	34	4	0	0	0	40
ENE	4	13	0	0	0	0	17
E	5	10	0	0	0	0	15
ESE	4	17	0	0	0	0	21
SE	2	14	0	0	0	0	16
SSE	4	10	0	0	0	0	14
S	1	20	0	0	0	0	21
SSW	3	12	0	0	0	0	15
SW	4	5	0	0	0	0	9
WSW	3	5	5	0	0	0	13
W	6	4	0	0	0	0	10
WNW	7	10	0	0	0	0	17
NW	3	16	0	0	0	0	19
NNW	2	8	2	0	0	0	12
Variable	0	0	0	0	0	0	0
Total	52	192	11	0	0	0	255

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: April - June 2012
Stability Class - Extremely Stable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	4	2	0	0	0	0	6
NNE	3	1	0	0	0	0	4
NE	8	5	0	0	0	0	13
ENE	6	2	0	0	0	0	8
E	2	0	0	0	0	0	2
ESE	1	0	0	0	0	0	1
SE	1	0	0	0	0	0	1
SSE	2	0	0	0	0	0	2
S	2	0	0	0	0	0	2
SSW	5	0	0	0	0	0	5
SW	2	1	0	0	0	0	3
WSW	6	0	0	0	0	0	6
W	5	0	0	0	0	0	5
WNW	4	0	0	0	0	0	4
NW	7	7	0	0	0	0	14
NNW	1	0	0	0	0	0	1
Variable	0	0	0	0	0	0	0
Total	59	18	0	0	0	0	77

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: April - June 2012
Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	3	13	17	4	0	37
NNE	0	4	19	13	2	2	40
NE	0	0	0	2	16	0	18
ENE	0	1	5	3	9	0	18
E	0	2	8	3	1	0	14
ESE	0	1	7	5	0	0	13
SE	0	2	6	5	0	0	13
SSE	0	8	12	1	1	2	24
S	0	9	10	13	0	1	33
SSW	0	0	11	24	3	0	38
SW	0	2	6	9	4	0	21
WSW	0	1	0	10	2	0	13
W	0	0	2	4	1	2	9
WNW	0	1	6	8	2	3	20
NW	0	3	3	19	10	2	37
NNW	0	3	3	6	2	0	14
Variable	0	0	0	0	0	0	0
Total	0	40	111	142	57	12	362

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: April - June 2012
Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	1	3	0	0	4
NNE	0	1	8	2	0	1	12
NE	1	1	3	3	1	1	10
ENE	0	3	4	1	0	0	8
E	0	3	1	4	0	0	8
ESE	2	2	2	2	0	0	8
SE	0	1	5	1	0	0	7
SSE	0	1	3	1	2	0	7
S	0	7	4	9	2	2	24
SSW	0	1	5	9	6	1	22
SW	0	5	5	8	1	0	19
WSW	0	4	1	2	1	0	8
W	0	0	6	4	0	0	10
WNW	0	2	2	2	1	1	8
NW	0	2	0	3	1	1	7
NNW	0	1	1	4	2	0	8
Variable	0	0	0	0	0	0	0
Total	3	34	51	58	17	7	170

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: April - June 2012
Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	0	1	1	0	2
NNE	0	2	1	3	0	1	7
NE	0	2	0	2	3	0	7
ENE	0	2	1	2	2	0	7
E	1	2	1	1	2	0	7
ESE	1	2	1	1	0	0	5
SE	0	2	1	0	0	0	3
SSE	0	3	5	0	0	2	10
S	0	5	4	4	1	1	15
SSW	0	1	2	11	0	2	16
SW	0	0	2	5	2	0	9
WSW	0	2	2	1	0	0	5
W	1	1	0	2	0	1	5
WNW	0	1	1	1	1	0	4
NW	0	0	1	4	0	0	5
NNW	1	3	2	5	1	0	12
Variable	0	0	0	0	0	0	0
Total	4	28	24	43	13	7	119

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: 3

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: April - June 2012
Stability Class - Neutral - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	1	8	17	5	0	31
NNE	0	1	3	4	7	0	15
NE	0	3	5	12	23	12	55
ENE	2	4	8	9	19	1	43
E	1	2	6	20	10	1	40
ESE	0	2	12	11	8	0	33
SE	0	2	13	8	0	0	23
SSE	2	2	9	12	9	1	35
S	1	4	13	30	8	11	67
SSW	0	5	14	26	14	17	76
SW	1	4	8	16	1	1	31
WSW	0	1	4	7	3	5	20
W	1	1	7	7	2	1	19
WNW	0	5	7	8	3	1	24
NW	1	2	5	11	2	1	22
NNW	0	3	6	20	6	0	35
Variable	0	0	0	0	0	0	0
Total	9	42	128	218	120	52	569

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: April - June 2012
Stability Class - Slightly Stable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	2	2	21	1	0	26
NNE	0	1	3	13	1	0	18
NE	0	1	3	22	6	2	34
ENE	0	1	9	17	6	0	33
E	0	3	10	19	2	0	34
ESE	0	1	18	20	4	0	43
SE	0	5	47	5	0	0	57
SSE	0	2	25	25	2	0	54
S	0	3	21	61	9	4	98
SSW	1	2	3	32	29	4	71
SW	0	2	7	16	4	0	29
WSW	0	2	3	15	2	0	22
W	1	0	2	10	1	0	14
WNW	0	3	6	14	2	1	26
NW	0	3	4	13	1	0	21
NNW	0	1	4	11	0	0	16
Variable	0	0	0	0	0	0	0
Total	2	32	167	314	70	11	596

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: 3

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: April - June 2012
Stability Class - Moderately Stable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	1	0	3	3	0	0	7
NNE	1	1	5	1	0	0	8
NE	0	1	2	23	5	0	31
ENE	0	1	7	12	0	0	20
E	0	1	5	8	0	0	14
ESE	0	2	10	7	0	0	19
SE	0	1	22	0	0	0	23
SSE	0	1	5	6	1	0	13
S	0	2	6	20	0	0	28
SSW	1	0	12	10	0	0	23
SW	0	1	2	4	0	0	7
WSW	1	1	1	3	1	0	7
W	0	1	3	3	0	0	7
WNW	1	1	11	5	0	0	18
NW	0	1	6	5	0	0	12
NNW	0	1	3	12	0	0	16
Variable	0	0	0	0	0	0	0
Total	5	16	103	122	7	0	253

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: April - June 2012
Stability Class - Extremely Stable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	2	0	3	1	0	0	6
NNE	1	2	2	0	0	0	5
NE	0	0	2	0	0	0	2
ENE	2	0	4	4	0	0	10
E	0	0	3	1	0	0	4
ESE	1	0	5	0	0	0	6
SE	2	0	0	0	0	0	2
SSE	0	0	0	0	0	0	0
S	1	2	1	0	0	0	4
SSW	0	3	2	0	0	0	5
SW	0	4	2	0	0	0	6
WSW	0	2	1	1	0	0	4
W	0	0	3	1	0	0	4
WNW	0	4	4	0	0	0	8
NW	1	0	3	1	0	0	5
NNW	2	6	1	2	0	0	11
Variable	0	0	0	0	0	0	0
Total	12	23	36	11	0	0	82

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: July - September 2012
Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	6	16	6	0	0	28
NNE	0	5	16	1	0	0	22
NE	0	15	13	3	0	0	31
ENE	0	8	2	0	0	0	10
E	0	7	3	0	0	0	10
ESE	0	4	0	0	0	0	4
SE	0	20	3	0	0	0	23
SSE	1	19	3	0	0	0	23
S	0	32	12	3	0	0	47
SSW	1	12	17	6	0	0	36
SW	0	7	11	3	0	0	21
WSW	0	17	14	1	0	0	32
W	0	6	9	4	0	0	19
WNW	0	5	10	3	0	0	18
NW	0	20	15	6	0	0	41
NNW	0	9	17	5	0	0	31
Variable	0	0	0	0	0	0	0
Total	2	192	161	41	0	0	396

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: July - September 2012
Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	4	4	0	0	0	8
NNE	0	6	6	0	0	0	12
NE	0	4	3	0	0	0	7
ENE	0	4	0	0	0	0	4
E	1	3	0	0	0	0	4
ESE	0	5	0	0	0	0	5
SE	0	6	0	0	0	0	6
SSE	1	7	2	0	0	0	10
S	0	11	4	0	0	0	15
SSW	0	9	5	0	0	0	14
SW	0	3	3	1	0	0	7
WSW	0	3	6	1	0	0	10
W	0	3	3	0	0	0	6
WNW	0	4	1	0	0	0	5
NW	0	11	6	0	0	0	17
NNW	0	6	2	2	0	0	10
Variable	0	0	0	0	0	0	0
Total	2	89	45	4	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: 1

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: July - September 2012
Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	5	8	0	0	0	13
NNE	0	3	10	0	0	0	13
NE	1	8	4	0	0	0	13
ENE	0	3	0	0	0	0	3
E	1	2	0	0	0	0	3
ESE	1	2	0	0	0	0	3
SE	1	9	2	0	0	0	12
SSE	3	9	2	0	0	0	14
S	0	5	4	0	0	0	9
SSW	0	7	4	1	0	0	12
SW	0	3	4	0	0	0	7
WSW	0	2	1	0	0	0	3
W	0	5	3	0	0	0	8
WNW	0	3	4	0	0	0	7
NW	0	12	1	1	0	0	14
NNW	0	4	4	0	0	0	8
Variable	0	0	0	0	0	0	0
Total	7	82	51	2	0	0	142

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: July - September 2012
Stability Class - Neutral - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	15	43	5	0	0	63
NNE	2	11	21	1	0	0	35
NE	3	25	28	0	0	0	56
ENE	1	11	5	0	0	0	17
E	3	16	4	0	0	0	23
ESE	1	18	3	0	0	0	22
SE	1	16	6	0	0	0	23
SSE	5	20	7	0	0	0	32
S	2	27	8	1	0	0	38
SSW	4	16	15	4	0	0	39
SW	2	18	13	1	0	0	34
WSW	1	16	6	1	0	0	24
W	0	10	0	0	0	0	10
WNW	1	10	5	1	0	0	17
NW	1	18	18	0	0	0	37
NNW	0	13	16	1	0	0	30
Variable	0	0	0	0	0	0	0
Total	27	260	198	15	0	0	500

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: July - September 2012
Stability Class - Slightly Stable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	2	17	6	0	0	0	25
NNE	2	11	3	0	0	0	16
NE	4	20	11	0	0	0	35
ENE	10	15	1	0	0	0	26
E	9	6	1	0	0	0	16
ESE	5	28	1	0	0	0	34
SE	12	27	0	0	0	0	39
SSE	13	34	0	0	0	0	47
S	9	52	7	0	0	0	68
SSW	4	45	25	1	0	0	75
SW	3	35	11	0	0	0	49
WSW	2	6	4	0	0	0	12
W	1	3	3	0	0	0	7
WNW	2	8	1	0	0	0	11
NW	5	12	2	0	0	0	19
NNW	1	6	0	0	0	0	7
Variable	0	0	0	0	0	0	0
Total	84	325	76	1	0	0	486

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: July - September 2012
Stability Class - Moderately Stable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	5	4	0	0	0	0	9
NNE	5	8	0	0	0	0	13
NE	14	35	1	0	0	0	50
ENE	4	2	0	0	0	0	6
E	10	6	0	0	0	0	16
ESE	7	11	0	0	0	0	18
SE	6	7	0	0	0	0	13
SSE	6	17	0	0	0	0	23
S	5	25	1	0	0	0	31
SSW	3	21	3	0	0	0	27
SW	9	11	0	0	0	0	20
WSW	2	7	0	0	0	0	9
W	2	8	1	0	0	0	11
WNW	6	12	0	0	0	0	18
NW	5	15	0	0	0	0	20
NNW	3	2	0	0	0	0	5
Variable	0	0	0	0	0	0	0
Total	92	191	6	0	0	0	289

Hours of calm in this stability class: 4
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 1

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: July - September 2012
Stability Class - Extremely Stable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	9	1	0	0	0	0	10
NNE	8	7	0	0	0	0	15
NE	32	32	0	0	0	0	64
ENE	11	5	0	0	0	0	16
E	9	1	0	0	0	0	10
ESE	8	0	0	0	0	0	8
SE	2	2	0	0	0	0	4
SSE	3	1	0	0	0	0	4
S	7	0	0	0	0	0	7
SSW	3	4	0	0	0	0	7
SW	8	6	0	0	0	0	14
WSW	4	5	0	0	0	0	9
W	8	5	0	0	0	0	13
WNW	16	6	0	0	0	0	22
NW	16	14	0	0	0	0	30
NNW	8	1	0	0	0	0	9
Variable	1	0	0	0	0	0	1
Total	153	90	0	0	0	0	243

Hours of calm in this stability class: 7
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 1

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: July - September 2012
Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	1	10	16	2	0	29
NNE	0	4	3	9	0	0	16
NE	0	5	19	8	1	0	33
ENE	0	5	7	1	0	0	13
E	0	4	4	1	0	0	9
ESE	0	5	2	0	0	0	7
SE	0	13	14	0	0	0	27
SSE	0	14	5	1	0	0	20
S	0	12	20	10	4	1	47
SSW	0	6	15	8	4	0	33
SW	0	6	9	9	1	0	25
WSW	0	7	13	6	0	0	26
W	0	2	11	5	2	0	20
WNW	0	3	9	9	0	0	21
NW	0	6	18	9	5	0	38
NNW	0	4	13	12	3	0	32
Variable	0	0	0	0	0	0	0
Total	0	97	172	104	22	1	396

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: July - September 2012
Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	2	6	0	0	0	8
NNE	0	2	4	3	0	0	9
NE	0	4	4	2	0	0	10
ENE	0	5	0	0	0	0	5
E	0	1	1	0	0	0	2
ESE	0	4	2	0	0	0	6
SE	0	6	2	0	0	0	8
SSE	0	3	2	2	0	0	7
S	1	7	10	4	0	0	22
SSW	0	2	6	2	0	0	10
SW	0	0	3	2	0	0	5
WSW	0	1	4	3	1	0	9
W	0	2	1	3	0	0	6
WNW	0	3	3	0	0	0	6
NW	0	8	5	4	0	0	17
NNW	0	3	4	1	2	0	10
Variable	0	0	0	0	0	0	0
Total	1	53	57	26	3	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: 1

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: July - September 2012
Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	3	3	6	0	0	12
NNE	0	1	4	4	0	0	9
NE	0	3	10	1	0	0	14
ENE	1	5	0	0	0	0	6
E	0	2	0	0	0	0	2
ESE	0	2	1	0	0	0	3
SE	0	8	1	2	0	0	11
SSE	1	9	4	2	0	0	16
S	0	3	4	1	1	0	9
SSW	0	2	6	2	0	0	10
SW	0	2	4	1	0	0	7
WSW	0	3	1	0	0	0	4
W	0	4	1	3	0	0	8
WNW	0	2	3	2	0	0	7
NW	0	7	4	1	0	1	13
NNW	0	2	5	4	0	0	11
Variable	0	0	0	0	0	0	0
Total	2	58	51	29	1	1	142

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: July - September 2012
Stability Class - Neutral - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	2	2	23	30	7	1	65
NNE	1	4	7	17	0	0	29
NE	1	7	11	25	1	0	45
ENE	1	4	6	16	1	0	28
E	1	5	3	12	0	0	21
ESE	2	5	10	8	0	0	25
SE	2	9	12	5	0	0	28
SSE	2	5	11	7	0	0	25
S	1	6	27	8	1	1	44
SSW	1	9	8	11	5	0	34
SW	1	7	16	11	1	0	36
WSW	0	6	13	3	2	0	24
W	0	9	6	0	0	0	15
WNW	0	6	0	5	1	0	12
NW	1	10	7	10	0	0	28
NNW	0	7	12	21	1	0	41
Variable	0	0	0	0	0	0	0
Total	16	101	172	189	20	2	500

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: July - September 2012
Stability Class - Slightly Stable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	7	8	16	0	0	31
NNE	0	2	7	3	2	0	14
NE	0	2	6	18	0	0	26
ENE	0	4	8	11	0	0	23
E	1	5	3	4	0	0	13
ESE	2	4	11	4	0	0	21
SE	1	14	37	3	0	0	55
SSE	2	14	27	3	0	0	46
S	0	7	37	37	0	0	81
SSW	0	5	28	32	4	0	69
SW	0	1	23	22	0	0	46
WSW	0	3	12	7	0	0	22
W	0	2	2	2	1	0	7
WNW	1	1	3	3	0	0	8
NW	0	1	7	3	0	0	11
NNW	0	2	8	3	0	0	13
Variable	0	0	0	0	0	0	0
Total	7	74	227	171	7	0	486

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: July - September 2012
Stability Class - Moderately Stable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	4	1	0	0	5
NNE	1	3	3	4	0	0	11
NE	0	3	8	13	1	0	25
ENE	0	1	3	10	1	0	15
E	0	6	7	3	0	0	16
ESE	1	6	3	6	0	0	16
SE	0	10	10	0	0	0	20
SSE	1	6	13	4	0	0	24
S	1	3	14	20	0	0	38
SSW	0	3	15	12	0	0	30
SW	0	1	10	13	0	0	24
WSW	0	1	7	2	0	0	10
W	0	2	7	7	0	0	16
WNW	1	1	7	3	0	0	12
NW	0	2	6	0	0	0	8
NNW	0	7	15	1	0	0	23
Variable	0	0	0	0	0	0	0
Total	5	55	132	99	2	0	293

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: July - September 2012
Stability Class - Extremely Stable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	1	6	11	0	0	0	18
NNE	0	6	8	2	0	0	16
NE	0	3	11	2	2	0	18
ENE	2	3	10	12	0	0	27
E	1	4	20	4	0	0	29
ESE	1	6	3	2	0	0	12
SE	2	5	4	0	0	0	11
SSE	3	7	7	0	0	0	17
S	1	3	5	0	0	0	9
SSW	0	6	6	2	0	0	14
SW	0	1	8	6	0	0	15
WSW	0	2	3	1	0	0	6
W	0	4	6	3	0	0	13
WNW	5	4	9	1	0	0	19
NW	2	1	5	1	0	0	9
NNW	0	7	7	3	0	0	17
Variable	0	0	0	0	0	0	0
Total	18	68	123	39	2	0	250

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: October - December2012
Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	3	5	0	0	8
NNE	0	0	4	1	0	0	5
NE	0	0	1	0	0	0	1
ENE	0	0	2	0	0	0	2
E	0	0	3	0	0	0	3
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	2	0	0	0	2
S	0	0	1	0	0	0	1
SSW	0	0	5	4	0	0	9
SW	0	0	1	4	0	0	5
WSW	0	0	0	0	0	0	0
W	0	0	0	3	0	0	3
WNW	0	0	0	0	2	0	2
NW	0	0	4	9	0	0	13
NNW	0	0	1	0	0	0	1
Variable	0	0	0	0	0	0	0
Total	0	0	27	26	2	0	55

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: October - December2012
Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	1	1	2	0	0	4
NNE	0	1	3	1	0	0	5
NE	0	1	3	0	0	0	4
ENE	0	1	1	0	0	0	2
E	0	3	0	0	0	0	3
ESE	0	0	0	0	0	0	0
SE	0	3	0	0	0	0	3
SSE	0	5	2	2	0	0	9
S	0	3	9	0	0	0	12
SSW	0	3	6	5	0	0	14
SW	0	1	2	5	0	0	8
WSW	0	2	0	0	0	0	2
W	0	2	1	3	0	0	6
WNW	0	0	3	1	1	0	5
NW	0	0	3	4	0	0	7
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	26	34	23	1	0	84

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: October - December2012
Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	4	4	2	0	0	10
NNE	0	2	6	2	0	0	10
NE	0	0	7	0	0	0	7
ENE	0	0	1	0	0	0	1
E	0	1	0	0	0	0	1
ESE	0	1	1	0	0	0	2
SE	0	3	1	0	0	0	4
SSE	0	4	3	2	0	0	9
S	3	5	13	4	0	0	25
SSW	0	2	5	5	3	0	15
SW	0	3	7	1	0	0	11
WSW	0	4	2	1	0	0	7
W	0	4	7	0	1	0	12
WNW	0	6	6	1	3	0	16
NW	2	3	5	2	0	0	12
NNW	0	2	1	0	3	0	6
Variable	0	0	0	0	0	0	0
Total	5	44	69	20	10	0	148

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: October - December2012
Stability Class - Neutral - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	7	28	44	7	1	0	87
NNE	2	14	22	5	9	0	52
NE	1	22	14	6	2	0	45
ENE	0	9	16	0	0	0	25
E	2	8	25	0	0	0	35
ESE	1	10	5	0	0	0	16
SE	2	21	4	2	0	0	29
SSE	2	37	45	5	0	0	89
S	2	19	50	26	9	0	106
SSW	1	17	40	45	7	0	110
SW	1	16	30	11	7	0	65
WSW	2	9	14	9	1	0	35
W	3	10	16	14	3	1	47
WNW	6	30	51	54	22	7	170
NW	4	35	38	24	3	0	104
NNW	6	33	24	13	1	0	77
Variable	0	0	0	0	0	0	0
Total	42	318	438	221	65	8	1092

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: October - December2012
Stability Class - Slightly Stable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	1	12	28	2	0	0	43
NNE	0	13	24	1	0	0	38
NE	2	12	2	0	0	0	16
ENE	5	4	1	0	0	0	10
E	2	9	1	0	0	0	12
ESE	2	9	1	0	0	0	12
SE	7	27	2	0	0	0	36
SSE	4	51	23	1	0	0	79
S	3	47	79	12	0	0	141
SSW	1	27	62	7	0	0	97
SW	1	16	12	0	0	0	29
WSW	2	19	6	2	0	0	29
W	2	10	7	0	1	0	20
WNW	2	12	41	1	0	0	56
NW	1	3	9	0	0	0	13
NNW	1	5	7	0	0	0	13
Variable	0	0	0	0	0	0	0
Total	36	276	305	26	1	0	644

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: October - December2012
Stability Class - Moderately Stable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	5	0	1	0	0	0	6
NNE	1	5	0	0	0	0	6
NE	0	10	0	0	0	0	10
ENE	3	2	0	0	0	0	5
E	4	1	0	0	0	0	5
ESE	7	10	0	0	0	0	17
SE	4	13	0	0	0	0	17
SSE	2	17	1	0	0	0	20
S	3	7	2	0	0	0	12
SSW	3	7	1	0	0	0	11
SW	1	2	0	0	0	0	3
WSW	5	2	0	0	0	0	7
W	2	3	0	0	0	0	5
WNW	0	4	1	0	0	0	5
NW	3	6	0	0	0	0	9
NNW	0	0	2	0	0	0	2
Variable	0	0	0	0	0	0	0
Total	43	89	8	0	0	0	140

Hours of calm in this stability class: 2
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 3

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: October - December2012
Stability Class - Extremely Stable - 60m-10m Delta-T (F)
Winds Measured at 10 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	2	0	0	0	0	0	2
NNE	1	0	0	0	0	0	1
NE	1	7	0	0	0	0	8
ENE	0	2	0	0	0	0	2
E	1	0	0	0	0	0	1
ESE	4	0	0	0	0	0	4
SE	0	0	0	0	0	0	0
SSE	1	1	0	0	0	0	2
S	1	0	0	0	0	0	1
SSW	1	1	0	0	0	0	2
SW	2	0	0	0	0	0	2
WSW	0	0	0	0	0	0	0
W	3	0	0	0	0	0	3
WNW	0	0	0	0	0	0	0
NW	1	7	0	0	0	0	8
NNW	2	0	0	0	0	0	2
Variable	0	0	0	0	0	0	0
Total	20	18	0	0	0	0	38

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: October - December2012
Stability Class - Extremely Unstable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	0	6	2	0	8
NNE	0	0	0	4	1	0	5
NE	0	0	0	1	0	0	1
ENE	0	0	1	1	0	0	2
E	0	0	0	3	0	0	3
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	2	0	0	0	2
S	0	0	0	1	0	0	1
SSW	0	0	0	6	4	0	10
SW	0	0	0	3	1	0	4
WSW	0	0	0	0	0	0	0
W	0	0	0	0	3	0	3
WNW	0	0	0	0	1	2	3
NW	0	0	2	9	1	0	12
NNW	0	0	0	1	0	0	1
Variable	0	0	0	0	0	0	0
Total	0	0	5	35	13	2	55

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: October - December 2012
Stability Class - Moderately Unstable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	1	4	0	0	5
NNE	0	2	0	1	0	0	3
NE	0	0	1	4	0	0	5
ENE	0	0	0	1	0	0	1
E	0	0	4	0	0	0	4
ESE	0	0	0	0	0	0	0
SE	0	2	1	0	0	0	3
SSE	0	2	5	0	2	0	9
S	0	1	4	4	1	0	10
SSW	0	3	3	7	3	0	16
SW	0	0	2	3	3	0	8
WSW	0	0	2	0	0	0	2
W	0	2	0	1	3	0	6
WNW	0	0	1	3	0	1	5
NW	0	0	3	2	2	0	7
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	12	27	30	14	1	84

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: October - December2012
Stability Class - Slightly Unstable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	2	2	3	1	0	8
NNE	0	1	3	8	0	0	12
NE	0	0	3	4	0	0	7
ENE	0	0	1	0	0	0	1
E	0	0	1	0	0	0	1
ESE	0	0	1	1	0	0	2
SE	0	3	1	0	0	0	4
SSE	1	2	5	1	1	1	11
S	1	3	4	9	4	1	22
SSW	1	0	2	7	3	3	16
SW	0	0	6	3	1	0	10
WSW	0	4	1	3	1	0	9
W	0	4	7	1	0	1	13
WNW	0	3	5	1	1	3	13
NW	0	5	5	3	0	0	13
NNW	1	2	0	0	0	3	6
Variable	0	0	0	0	0	0	0
Total	4	29	47	44	12	12	148

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: October - December2012
Stability Class - Neutral - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	22	30	30	6	1	89
NNE	2	8	12	13	5	9	49
NE	0	8	17	6	5	4	40
ENE	0	2	7	16	2	0	27
E	0	3	9	20	9	0	41
ESE	0	3	4	5	3	0	15
SE	0	7	19	2	3	0	31
SSE	0	8	38	23	9	2	80
S	3	6	18	35	35	24	121
SSW	0	6	21	24	23	27	101
SW	2	5	14	29	7	6	63
WSW	0	3	13	11	9	2	38
W	0	6	9	19	6	5	45
WNW	2	2	39	36	47	35	161
NW	5	17	39	35	14	5	115
NNW	1	9	35	16	14	1	76
Variable	0	0	0	0	0	0	0
Total	15	115	324	320	197	121	1092

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: October - December2012
Stability Class - Slightly Stable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	1	8	18	11	1	39
NNE	1	1	7	32	3	0	44
NE	0	2	5	5	2	0	14
ENE	0	1	4	3	0	0	8
E	0	2	3	6	1	0	12
ESE	0	3	1	6	1	0	11
SE	0	10	22	2	0	0	34
SSE	0	2	23	39	3	1	68
S	0	1	13	79	38	10	141
SSW	0	3	16	63	23	1	106
SW	0	3	12	17	4	0	36
WSW	0	1	10	10	1	0	22
W	0	2	9	10	2	1	24
WNW	0	4	10	28	5	0	47
NW	0	0	6	19	1	0	26
NNW	1	2	3	7	0	0	13
Variable	0	0	0	0	0	0	0
Total	2	38	152	344	95	14	645

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: October - December2012
Stability Class - Moderately Stable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	6	2	0	0	0	8
NNE	0	0	0	1	0	0	1
NE	0	0	9	0	0	0	9
ENE	1	0	3	8	0	0	12
E	0	0	1	1	0	0	2
ESE	0	1	3	4	0	0	8
SE	0	0	8	1	0	0	9
SSE	0	7	11	7	0	0	25
S	0	2	2	19	0	0	23
SSW	1	2	4	9	0	0	16
SW	1	3	1	1	0	0	6
WSW	0	1	4	2	0	0	7
W	0	1	2	1	0	0	4
WNW	0	0	2	2	0	0	4
NW	0	1	1	2	0	0	4
NNW	0	0	1	2	0	0	3
Variable	0	0	0	0	0	0	0
Total	3	24	54	60	0	0	141

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

TABLE 18 (continued)

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Clinton Power Station

Period of Record: October - December2012
Stability Class - Extremely Stable - 60m-10m Delta-T (F)
Winds Measured at 60 Meters

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

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

SECTION 8

ODCM OPERATIONAL REMEDIAL REQUIREMENT REPORTS

In accordance with CPS ODCM section[s] 2.7.1 and 3.9.2, INOPERABLE radioactive liquid and gaseous effluent monitoring instrumentation channels remaining in an INOPERABLE condition for greater than 30 days shall be reported in the Annual Radioactive Effluent Release Report.

During the course of 2012, there were zero (0) instances when either a radioactive liquid or gaseous effluent instrumentation channel[s] was INOPERABLE for greater than any 30 day period.

During the course of 2012, there were no occurances where Surveillance requirements were not met.

SECTION 9

CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS

In accordance with Section 7.2 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.

The Process Control Program (PCP) for radioactive wastes is controlled by procedure RW-AA-100, with revision 8 (implemented in 2012) as the last revision.

All changes made to the document are denoted by "Revision Bars" in the right hand margin. No changes were made in the procedure impacting Clinton Power Station solid waste treatment systems. The changes were reviewed under the 10CFR Part 50.59 and the Plant Operational Review Committee processes. Revision 8 was approved on 7/18/2012. A copy of revision 8 to RW-AA-100 is attached to this report, along with the associated approval paperwork.

SECTION 10

NEW LOCATIONS FOR DOSE CALCULATION AND / OR ENVIRONMENTAL MONITORING

The following is a summary of the 2012 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	2012 RESIDENT (miles)	AGE GROUP	2011 RESIDENT (miles)	AGE GROUP
N	0.9	A	0.9	A
NNE	0.9	A	0.9	A
NE	1.3	A	1.3	A
ENE	1.8	C, A	1.8	C, A
E	1.0	A	1.0	A
ESE	3.2	A	3.2	A
SE	2.8	A	2.4	T, A
SSE	1.8	A	1.8	A
S	3.0	A	3.0	A
SSW	2.9	A	2.9	A
SW	3.5	T, A	0.7	A
WSW	2.2	A	2.2	A
W	1.2	C, T, A	1.2	C, T, A
WNW	1.6	C, A	1.6	A
NW	1.6	A	1.6	A
NNW	1.3	A	1.3	A

(**I**)nfant (**C**)hild (**T**)een (**A**)dult

2.0 Broadleaf Garden Census

Eighty-eight (88) gardens within a five (5) mile radius were located in the sixteen (16) geographical sectors surrounding CPS. Twenty-six (26) gardens contained broad leaf vegetation. 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	2012 GARDENS (miles)	AGE GROUPS	2011 GARDENS (miles)	AGE GROUPS
N	0.9	A	0.9	A
NNE	2.3	C, T, A	3.0	T, A
NE	4.3	A	2.1	A
ENE	1.8	C, A	1.8	C, A
E	1.0	A	2.5	C, A
ESE	3.3	A	3.3	A
SE	>5		4.4	C, A
SSE	2.7	C, A	2.8	A
S	4.1	A	4.1	A
SSW	>5		>5	
SW	3.5	T, A	3.6	C, A
WSW	2.3	A	2.3	A
W	2.0	A	2.0	C, A
WNW	1.6	A	1.6	A
NW	2.9	T, A	>5	
NNW	1.3	A	1.3	A

(**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 their offspring or used for meat production for their 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	2012 MILKING ANIMALS (miles)	AGE GROUPS	2011 MILKING ANIMALS (miles)	AGE GROUPS
N	0.9	A	0.9	A
NNE	2.3	A	2.3	A
NE	>5		>5	
ENE	>5		>5	
E	>5		>5	
ESE	>5		>5	
SE	>5		>5	
SSE	2.8	T, A	2.8	T, A
S	4.1	A	>5	
SSW	>5		>5	
SW	>5		>5	
WSW	3.4	A	3.4	A
W	>5		>5	
WNW	>5		>5	
NW	>5		>5	
NNW	1.3	A	1.3	A

(**I**)nfant (**C**)hild (**T**)een (**A**)dult

SECTION 11

CORRECTIONS TO DATA REPORTED IN PREVIOUS REPORTS

There were no administrative changes identified in 2012 against previously submitted Annual Radioactive Effluent Release Report[s] resulting in an errata data submittal to the Commission.

SECTION 12

CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

There were no changes to the Offsite Dose Calculation Manual in 2012.

PROCESS CONTROL PROGRAM FOR RADIOACTIVE WASTES

1. PURPOSE

1.1. The purpose of the Process Control Program (PCP) is to:

1.1.1. Establish the process and boundary conditions for the preparation of specific procedures for processing, sampling, analysis, packaging, storage, and shipment of solid radwaste in accordance with local, state, and federal requirements. **(CM-1)**

1.1.2. Establish parameters which will provide reasonable assurance that all Low Level Radioactive Wastes (LLRW), processed by the in-plant waste process systems on-site OR by on-site vendor supplied waste processing systems, meet the acceptance criteria to a Licensed Burial Facility, as required by 10CFR Part 20, 10CFR Part 61, 10CFR Part 71, 49CFR Parts 171-172, "Technical Position on Waste Form (Revision 1)" [1/91], "Low-Level Waste Licensing Branch Technical Position on Radioactive Waste Classification" [5/83], and the Station Technical Specifications, as applicable.

1.1.3. Provide reasonable assurance that waste placed in "on-site storage" meets the requirements as addressed within the Safety Analysis Reports for the low level radwaste storage facilities for dry and/or processed wet waste.

2. TERMS AND DEFINITIONS

2.1. **Process Control Program (PCP):** The program which contains the current formulas, sampling, analysis, tests, and determinations to be made to ensure that processing and packaging of solid radioactive waste based on demonstrated processing of actual or simulated wet solid wastes will be accomplished in such a way as to assure the waste meets the stabilization criteria specified in 10CFR Parts 20, 61 and 71, state regulations, and burial site requirements.

2.2. **Solidification:** Liquid waste processed to either an unstable or stable form per 10CFR61 requirements. Waste solidified does not have to meet the 300-year free standing monolith criteria. Approved formulas, samples and tests do not have to meet NRC approval for wastes solidified in a container meeting stability criteria (e.g. High Integrity Container).

2.3. **Stabilization:** Liquid waste processed to a "stable state" per 10CFR61 Requirements. Established formulas, samples, and tests shall be approved by the NRC in order to meet solidification "stabilization" criteria. This processing method is currently not available, because the NRC recognizes that waste packed in a High Integrity Container meets the 300-year stabilization criteria. In the event that this processing method becomes an acceptable method, then the NRC shall approve the stabilization formulas, samples, tests, etc.

2.4. **Solidification Media:** An approved media (e.g. Barnwell - vinyl ester styrene, cement, bitumen) when waste containing nuclides with greater than 5-year half lives is solidified in a container with activity greater than 1 micro curie/cc. Waste solidified in a HIC is approved by the commission meeting the 10CFR61 stabilization criteria, including 1% free standing liquids by volume when the waste is packaged to a "stable" form and ≤ 0.5% when waste is packaged to an "unstable" form. The formulas, sampling, analysis, and test do not require NRC approval, because the HIC meets the stability criteria.

2.4.1. Solidification to an unstable or stable state is performed by vendors, when applicable. Liquid waste solidified to meet stabilization criteria (10CFR61 and 01-91 Branch Technical Requirements) shall have documentation available that demonstrates that the process is approved by the NRC or disposal facility.

2.5. **Dewatering:** The process of removing fluids from liquid waste streams to produce a waste form that meets the requirements of 10CFR Part 61 and applicable burial site criteria, ≤0.5% by volume when the waste is packaged to an "unstable" state, or ≤1% by volume when the waste is packaged to a "stable" form.

2.6. **High Integrity Container (HIC):** A disposable container that is approved to the Requirements of 10CFR61. The use of HIC's is an alternative to solidification or encapsulation in a steel container to meet burial stability. HIC's are used to package dewatered liquid wastes, (e.g. filter cartridges, filter media, resin, sludges, etc), or dry active waste.

2.7. **Encapsulation:** The process of placing a component (e.g. cartridge filters or mechanical components) into a special purpose disposable container and then completely surrounding the waste material with an approved stabilization media, such as cement.

2.8. **Liquid Waste Processing Systems:** In-plant or vendor supplied processing systems consisting of equipment utilized for evaporation, filtration, demineralization, dewatering, compression dewatering, solidification, or reverse osmosis (RO) for the treatment of liquid wastes (such as Floor Drains, Chemical Drains and Equipment Drain inputs).

2.9. **Incineration, RVR, and/or Glass Vitrification of Liquid or Solid:** Dry or wet waste processed via incineration and/or thermal processing where the volume is reduced by thermal means meets 10CFR61 requirements.

2.10. **Compaction:** When dry wastes such as paper, wood, plastic, cardboard, incinerator ash, and etc. are volume reduced through the use of a compactor.

2.11. **Waste Streams:** Consist of but are not limited to

- Filter media (powdered, bead resin and fiber),
- Filter cartridges,
- Pre-coat body feed material,
- Contaminated charcoal,

- Fuel pool activated hardware,
- Oil Dry absorbent material added to a container to absorb liquids
- Fuel Pool Crud
- Sump and tank sludges,
- High activity filter cartridges,
- Concentrated liquids,
- Contaminated waste oil,
- Dried sewage or wastewater plant waste,
- Dry Active Waste (DAW): Waste such as filters, air filters, low activity cartridge filters, paper, wood, glass, plastic, cardboard, hoses, cloth, and metals, etc, which have become contaminated as a consequence of normal operating, housekeeping and maintenance activities.
- Other radioactive waste generated from cleanup of inadvertent contamination.

3. RESPONSIBILITIES

3.1. Implementation of this Process Control Program (PCP) is described in procedures at each station and is the responsibility of the each site to implement.

4. MAIN BODY

4.1. Process Control Program Requirements

4.1.1. A change to this PCP (Radioactive Waste Treatment Systems) may be made provided that the change is reported as part of the annual radioactive effluent release report, Regulatory Guide 1.21, and is approved by the Plant Operations Review Committee (PORC).

4.1.2. Changes become effective upon acceptance per station requirements.

4.1.3. A solidification media, approved by the burial site, may be **REQUIRED when** liquid radwaste is solidified to a stable/unstable state.

4.1.4. **When** processing liquid radwaste to meet solidification stability using a vendor supplied solidification system:

1. **If** the vendor has its own Quality Assurance (QA) Program, **then** the vendor shall **ADHERE** to its own QA Program and shall have **SUBMITTED** its process system topical report to the NRC or agreement state.

2. **If** the vendor does **not HAVE** its own Quality Assurance Program, **then** the vendor shall **ADHERE** to an approved Quality Assurance Topical Report standard belonging to the Station or to another approved vendor.

4.1.5. The vendor processing system(s) is/are controlled per the following:

1. A commercial vendor supplied processing system(s) may be **USED** for the processing of LLRW streams.

2. Vendors that process liquid LLRW at the sites shall **MEET** applicable Quality Assurance Topical Report and Augmented Quality Requirements.

4.1.6. Vendor processing system(s) operated at the site shall be **OPERATED and CONTROLLED** in accordance with vendor approved procedures or station procedures based upon vendor approved documents.

4.1.7. All waste streams processed for burial or long term on-site storage shall **MEET** the waste classification and characteristics specified in 10CFR Part 61.55, Part 61.56, the 5-83 Branch Technical Position for waste classification, and the applicable burial site acceptance criteria (for any burial site operating at the time the waste was processed).

4.1.8. An Exelon Nuclear plant may store waste at another Exelon Nuclear plant, provided formal NRC approval has been **RECEIVED** for the transfer of waste.

4.2. General Waste Processing Requirements

NOTE: On-site resin processing involves tank mixing and settling, transferring to the station or vendor processing system via resin water slurry or vacuuming into approved waste containers, and, when applicable, dewatering for burial.

4.2.1. Vendor resin beds may be **USED** for decontamination of plant systems, such as, SFP (Spent Fuel Pool), RWCU (reactor water cleanup), and SDC (Shut Down Cooling). These resins are **then PROCESSED** via the station or vendor processing system.

4.2.2. Various drains and sump discharges will be **COLLECTED** in tanks or suitable containers for processing treatment. Water from these tanks may be **SENT** through a filter, demineralizer, concentrator or vendor supplied processing systems.

4.2.3. Process waste (e.g. filter media, sludges, resin, etc) will be periodically **DISCHARGED** to the station or vendor processing system for onsite waste treatment **or PACKAGED** in containers for shipment to offsite vendor for volume reduction processing.

4.2.4. Process water (e.g. chemical, floor drain, equipment drain, etc.) may be **SENT** to either the site waste processing systems or vendor waste processing systems for further filtration, demineralization for plant re-use, or discharge.

4.2.5. All dewatering and solidification/stabilization will be **PERFORMED** by either utility site personnel or by on-site vendors **or** will be **PACKAGED and SHIPPED** to an off-site vendor low-level radwaste processing facility.

4.2.6. Dry Active Waste (DAW) will be **HANDLED and PROCESSED** per the following:

1. DAW will be **COLLECTED and SURVEYED and** may be **SORTED** for compactable and non-compactable wastes.

2. DAW may be packaged in containers to facilitate on-site pre-compaction and/or off-site vendor contract requirements.

3. DAW items may be **SURVEYED** for release onsite or offsite when applicable.

4. Contaminated filter cartridges will be **PLACED** into a HIC **or** will be **ENCAPSULATED** in an in-situ liner for disposal **or SHIPPED** to an offsite waste processor in drums, boxes or steel liners per the vendor site criteria for processing and disposal.

4.2.7. Filtering devices using pre-coat media may be **USED** for the removal of suspended solids from liquid waste streams. The pre-coat material or cartridges from these devices may be routinely **REMOVED** from the filter vessel and discharged to a Filter Sludge Tank or Liner/HIC. Periodically, the filter sludge may be **DISCHARGED** to the vendor processing system for waste treatment onsite **or PACKAGED** in containers for shipment to offsite vendor for volume reduction processing.

4.2.8. Activated hardware stored in the Spent Fuel Pools will be **PROCESSED** periodically using remote handling equipment **and** may then be **PUT** into a container for shipment or storage in the pool or loading the processed activated hardware into the Dry Cask storage system.

4.2.9. High Integrity Containers (HIC):

1. For disposal at Barnwell, vendors supplying HIC's to the station shall **PROVIDE** a copy of the HIC Certificate of Compliance, which details specific limitations on use of the HIC.

2. For disposal at Clive, vendors supplying HIC's to the station shall **PROVIDE** a copy of the HIC Certificate of Conformance, which details specific limitations on use of the HIC.

3. Vendors supplying HIC's to the station shall **PROVIDE** a handling procedure which establishes guidelines for the utilization of the HIC. These guidelines serve to protect the integrity of the HIC and ensure the HIC is handled in accordance with the requirements of the Certificate of Compliance or Certificate of Conformance.

4.2.10. Lubricants and oils contaminated as a consequence of normal operating and maintenance activities may be **PROCESSED** on-site (by incineration, for oils meeting 10CFR20.2004 and applicable state requirements, or by an approved vendor process) **or SHIPPED** offsite (for incineration or other acceptable processing method).

4.2.11. Former in-plant systems GE or Stock Drum Transfer Cart and Drum Storage Areas may be **USED** for higher dose DAW storage at Clinton, Dresden, Quad Cities, Braidwood and Byron.

4.2.13 Certain waste, including flowable solids from holding pond, oily waste separator, cooling tower basin and emergency spray pond, may be disposed of onsite under the provisions of a 10CFR20.2002 permit. Specific requirements associated with the disposal shall be incorporated into station implementing procedures. **(CM-2)**

4.3. Burial Site Requirements

4.3.1. Waste sent directly to burial shall **COMPLY** with the applicable parts of 49CFR171-172, 10CFR61, 10CFR71, and the acceptance criteria for the applicable burial site.

4.4. Shipping and Inspection Requirements

4.4.1. All shipping/storage containers shall be **INSPECTED**, as required by station procedures, for compliance with applicable requirements (Department of Transportation (DOT), Nuclear Regulatory Commission (NRC), station, on-site storage, and/or burial site requirements) prior to use.

4.4.2. Containers of solidified liquid waste shall be **INSPECTED** for solidification quality and/or dewatering requirements per the burial site, offsite vendor acceptance, or station acceptance criteria, as applicable.

4.4.3. Shipments sent to an off site processor shall be **INSPECTED** to ensure that the applicable processor's waste acceptance criteria are being met.

4.4.4. Shipments sent for off site storage shall **MEET** the storage site's waste acceptance criteria.

4.5. Inspection and Corrective Action

4.5.1. Inspection results that indicate non-compliance with applicable NRC, State, vendor, or site requirements shall be **IDENTIFIED and TRACKED** through the Corrective Action Program.

4.5.2. Administrative controls for preventing unsatisfactory waste forms from being released for shipment are described in applicable station procedures. **If** the provisions of the Process Control Program are not satisfied, **then SUSPEND** shipments of defectively packaged radioactive waste from the site. **(CM-1)**

4.5.3. **If** freestanding water or solidification **not** meeting program requirements is observed, **then** samples of the particular series of batches shall be **TAKEN** to determine the cause. Additional samples shall be **TAKEN**, as warranted, to ensure that **no** freestanding water is present and solidification requirements are maintained.

4.6. Procedure and Process Reviews

4.6.1. The Exelon Nuclear Process Control Program and subsequent changes (other than editorial/minor changes) shall be **REVIEWED and APPROVED** in accordance with the station procedures, plant-specific Technical Specifications (Tech Spec), Technical Requirements Manual (T&RM), Operation Requirements Manual (ORM), as applicable, for the respective station and LS-AA-106. Changes to the Licensees Controlled Documents, UFSAR, ORM, or TRM are controlled by the provisions of 10CFR 50.59.

4.6.2. Any changes to the PCP shall be reviewed to determine if reportability is required in the Annual Radiological Effluent Release Report (ARERR). The Radwaste Specialist shall ensure correct information is **SUBMITTED** to the ODCM program owner prior to submittal of the ARERR.

4.6.3. Station processes, applicable site-specific cask manual procedures, or other vendor waste processing/operating procedures shall be approved per RM-AA-102-1006. Procedures related to waste manifests, shipment inspections, and container activity determinations are **CONTROLLED** by Radiation Protection Standard Procedures (RP-AA-600 Series).

1. Site waste processing **IS CONTROLLED** by site operating procedures.

2. Liquid processed by vendor equipment shall be **PERFORMED** in accordance with vendor procedures.

4.7. Waste Types, Point of Generation, and Processing Method

Methods of processing and individual vendors may **CHANGE** due to changing financial and regulatory options. The table below is a representative sample. It is **not** intended be all encompassing.

WASTE STREAM	POINTS OF GENERATION	AVAILABLE WASTE PROCESSING METHODS
Bead Resin	Systems - Fuel Pool, Condensate, Reactor Water Cleanup, Blowdown, Equipment Drain, Chemical and Volume Control Systems, Floor Drain, Maximum Recycle, Blowdown, Boric Acid Recycling System, Vendor Supplied Processing Systems, and Portable Demin System	Dewatering, solidification to an unstable/stable state Thermal Processing Free Release to a Land Fill
Powdered Resin	Systems - (Condensate System, Floor Drain/Equipment Drain filtration, Fuel Pool)	Dewatering, solidification to an unstable/stable state Thermal Processing
Concentrated Waste	Waste generated from Site Evaporators resulting typically from the Floor Drain and Equipment Drain Systems	Solidification to an unstable/stable state Thermal Processing
Sludge	Sedimentation resulting from various sumps, condensers, tanks, cooling tower, emergency spray pond, holding pond, and oily waste separators	Dewatering, solidification to an unstable/stable state Thermal Processing Evaporation on-site or at an offsite processor On-site disposal per 10CFR20.2002 permit

WASTE STREAM	POINTS OF GENERATION	AVAILABLE WASTE PROCESSING METHODS
Filter cartridges	Systems - Floor/Equipment Drains, Fuel Pool; cartridge filters are typically generated from clean up activities within the fuel pool, torus, etc	Dewatering, solidification to an unstable/stable state Processed by a vendor for volume reduction
Dry Active Waste	Paper, wood, plastic, rubber, glass, metal, and etc. resulting from daily plant activities	Decon/Sorting for Free Release Compaction/Super-compaction Thermal Processing by Incineration or glass vitrification Sorting for Free Release Metal melting to an ingot
Contaminated Oil	Oil contaminated with radioactive materials from any in-plant system.	Solidification unstable state Thermal Processing by Incineration Free Release for recycling
Drying Bed Sludge	Sewage Treatment and Waste Water Treatment Facilities	Free release to a landfill or burial
Metals	See DAW	See DAW
Irradiated Hardware	Fuel Pool, Reactor Components	Volume Reduction for packaging efficiencies

5. DOCUMENTATION

5.1.1. Records of reviews performed shall be retained for the duration of the unit operating license. This documentation shall contain:

1. Sufficient information to support the change together with the appropriate analyses or evaluations justifying the change, and

2. A determination which documents that the change will maintain the overall conformance of waste products to Federal (10CFR61 and the Branch Technical Position), State, or other applicable requirements, including applicable burial site criteria.

6. REFERENCES

6.1. Technical Specifications:

6.1.1. The details contained in Current Tech Specs (CTS) or Improved Technical Specifications (ITS), as applicable, in regard to the Process Control Program (PCP), are to be relocated to the Licensee Controlled Documents. Some facilities have elected to relocate these details into the Operational Requirements Manual (ORM). Relocation of the description of the PCP from the CTS or ITS does **not** affect the safe operation of the facility. Therefore, the relocation details are **not** required to be in the CTS or the ITS to provide adequate protection of the public health and safety.

6.2. Writers' References:

6.2.1. Code of Federal Regulations: 10 CFR Part 20, Part 61, Part 71, 49 CFR Parts 171-172

6.2.2. Low Level Waste Licensing Branch Technical Position on Radioactive Waste Classification, May 1983

6.2.3. Technical Position on Waste Form (Revision 1), January 1991

6.2.4. Branch Technical Position on Concentration Averaging and Encapsulation, January 1995

6.2.5. 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

6.2.6. I.E. Circular 80.18, 10CFR 50.59 Safety Evaluation for Changes to Radioactive Waste Treatment Systems

6.3. Users' References:

6.3.1. Quality Assurance Program (QATR)

6.3.2. LS-AA-106, Plant Operations Review Committee

6.3.3. RM-AA-102-1006, Processing Vendor Documents

6.3.4. RP-AA-600 Series, Radioactive Material/Waste Shipments

6.3.5. CY-AA-170-2000, Annual Radioactive Effluent Release Report

6.4. Station Commitments:

6.4.1. Peach Bottom

CM-1, T03819, Letter from G.A. Hunger, Jr., dated Sept. 29 1994, transmitting TSCR 93-16 (Improved Technical Specifications).

6.4.2. Limerick

CM-2, T03896, 10CFR20.2002 permit granted to Limerick via letter dated July 10, 1996.

7. **ATTACHMENTS** - None

Document Site Approval Form
Page 1 of 2

AD-AA-101-F-01
Revision 4

See AD-AA-101 for the procedural requirements associated with this Form.
Desktop Instruction available on Intranet or through AD functional area.

Facility: CPS

Document Number: RW-AA-100 **Revision:** 8

Title: Process Control Program for Radioactive Wastes

Superseded Documents: N/A ☒ or List:

☐ Check this box if superseding a document containing commitments, notify the Commitment Tracking Coordinator per LS-AA-110 so the CTD can be updated as appropriate.

Environmental Review Applicability – Is an Environmental Review applicable per EN-AA-103? No ☒ or Yes ☐
If Yes, then attach Environmental Review documentation required per EN-AA-103.

Is this a Fleet Standard Document being processed with form AD-AA-101-F-09? No ☐ or Yes ☒ *If yes, then attach the completed form AD-AA-101-F-09, skip the following section, and go to Continuation A.*

Batch – Are multiple document creations/revisions/cancelations being issued to add/revise/cancel them for similar requirements? **No ☐ or Yes ☐** If Yes, then identify the highest level Document and Issue Type below.

Check only one Document Type:	**Check only one Issue Type:**	**Incorporated Site Items (EC, AR, PCR, etc):**
Level 1 - Continuous Use Procedure ☐	New ☐	
Level 2 - Reference Use Procedure ☐	Revision ☐	
Level 3 - Information Use Procedure ☐	Cancel Document ☐	
T&RM ☐	Cancel Revision ☐	
Form ☐	Non-Permanent ☐	
	Editorial Revision ☐	

Revision Summary:
(Attach additional description if required)

CONFIRM that **no** commitments (i.e., those steps annotated with CM-X) have been changed or deleted unless evaluated via completion of LS-AA-110 commitment change/deletion form and **INITIAL** [Preparer]: ____

Preparer _____ (Print) _____ (Date) _____ (Extension)

Validation – Is substantiating this document's usability via mockup, simulated performance, field walkdown, or bench top review required? **No ☐ or Yes ☐** *If Yes, then attach validation documentation.*
If Yes, then print name & sign for completed validation: _____

NOS Review – Excluding NDE, ISI, Peer Inspection or Independent Verification, is this document used to perform independent inspection for acceptance (including field installation inspections, fabrication inspections, receipt inspections, new fuel inspection, etc.), or for certification of Inspection personnel? **No ☐ or Yes ☐**
If Yes, then NOS Reviewer to print name & sign for acceptance: _____

Continuation A *- Is this a T&RM, Form, or Editorial Revision?* ***No ☒ or Yes ☐*** *If yes, then skip the following section and go Continuation B.*

Impact on Operating and Design Margins – N/A ☒ or explain: ____
(Attach additional description if required)

☒ **No** ☐ **Yes** **10CFR50.59 Applicable?** **Tracking Number:** _____
☒ **No** ☐ **Yes** **10CFR72.48 Applicable?**
☒ **No** ☐ **Yes** **Other Regulatory Process Applicable?** **Other Regulatory Process Number:** _____
☒ **No** ☐ **Yes** **Potential security impact per SY-AA-500-127?** **If Yes, then Security Reviewer acceptance documented by cross discipline review below**
☒ **No** ☐ **Yes** **Surveillance Coordinator Review Required?** **If Yes, then Surveillance Coordinator Review documented by cross discipline review below**

Cross Discipline Reviews: (list below)
N/A

Print	Signature	Date	Discipline or Org.

Attach additional if req'd

SQR Approval indicates that all required Cross-Disciplinary reviews have been performed and the reviewers have signed this form. This procedure is technically and functionally accurate for all functional areas. (See AD-AA-102)

SQR Approval: Keith Volker (Print and Sign) _____ 7/11/12 (Date) _____ (Discipline)

Continuation B *- Is this a T&RM, or Form?* ***No*** ☒ ***or Yes*** ☐ *If yes, then skip the following section and go Continuation C.*

PORC Required: ☐ **No** ☒ **Yes**	**If yes, then enter PORC Number** (after PORC Approved): 12-009
	R. Keith Taber / BKT — 7/18/2012
	Plant Manager Print and Sign (when required by procedure) — Date

Continuation C *- Is this an Editorial Revision?* ***No*** ☒ ***or Yes*** ☐ *If yes, then skip the following section and go to Continuation D.*

Applicable Site Contact/Site Change Agents (SME): Krampholz
- Responsible for Change Management information in ☐ this form or ☐ HU-AA-1101 Checklist (attached)
- Responsible to shepherd the document through site review, approval/authorization, and implementation.

Affected Functional Area(s) or Individuals:

Print	Signature	Date	Affected FA
Gary Krampholz		7/11/2012	Chem/Env

Attach additional if req'd

Resources needed to Implement Change: N/A (Only list, if other than Level of Effort.)
For ongoing impacts, estimate number of Full Time Equivalents (FTE). If additional resources are needed go to HU-AA-1101.

Communication Plan: N/A (e.g., e-mail, Site Paper, Supervisor Briefing, Voice Mail, etc.)

Training Required / Qualifications affected: ☒ **No** ☐ **Yes** If yes, list: _____
(e.g., Supervisory Briefing, Tailgate Briefing, Required Reading, Formal Training, recertification etc.)

Update to information infrastructure (e.g. PassPort, PIMS, EDMS workflows, etc.) required to support implementation (including updated forms loaded into PassPort): N/A

Controlled Document distribution (ref. RM-AA-102) or Records Retention Schedule (ref. RM-AA-101-1004) impacted: ☒ **No** ☐ **Yes** If yes, describe change and list Records Manager contacted: N/A

Continuation D *- If all procedurally required activities associated with this document revision have been completed and the document is ready for implementation, then SFAM to print name, sign & date for authorization to implement. Provide implementation date or, if the Implementation Date is blank or N/A then implementation will be upon the issuance by Records Management per RM requirements. Authorization below indicates the SFAM or a designee of the SFAM has verified the document does not alter or negatively impact compliance with regulatory requirements or station commitments.*

Interim Chg # : _____

Site Authorization:	Date	Impl. Date	Exp. Date
Thomas P. Vehec	7/25/12	7/26/12	
SFAM Print and Sign			

See AD-AA-101 for the procedural requirements associated with this Form.
Desktop Instruction available on Intranet or through AD functional area.

Document Number: RW-AA-100 **Revision:** 8

Title: Process Control Program for Radioactive Wastes

Superseded Fleet Standard Documents: N/A ☒ or List:

Batch – Are multiple document creations/revisions/cancelations being issued to add/revise/cancel them for similar requirements? No ☒ or Yes ☐ *If Yes, then identify the highest level Document and Issue Type below.*

Check only one Document Type:	**Check only one Issue Type:**	**Incorporated Fleet Items:**
Level 1 - Continuous Use Procedure ☐	New ☐	
Level 2 - Reference Use Procedure ☐	Revision ☒	
Level 3 - Information Use Procedure ☒	Editorial Revision ☐	
T&RM ☐	Cancel Document ☐	
Form ☐	Cancel Revision ☐	

Revision Summary: See attached Summary of Changes.
(Attach additional description if required)

CONFIRM that no commitments (i.e., those steps annotated with CM-X) have been changed or deleted unless evaluated via completion of LS-AA-110 commitment change/deletion form and **INITIAL** [Preparer]: RMC

Preparer	**Robert Claes** (Print)	**03/07/12** (Date)	**Cantera/6303372629** (Location and Ext)

Site Applicability and Contacts - Check box and provide name:

BRW ☒	Michael Gorga	DRE ☒	Sandy Livecchi	OYS ☒	Gonzalo Lamela	TMI ☒	Tamara Hanlon
BYR ☒	Norma Gordon	LAS ☒	Lynn Kofold-Durdan	PEA ☒	George Tharpe	ZIN ☐	
CPS ☒	Anthony Kilburn	LIM ☒	Linda Knapp	QDC ☒	Debra Cline	Other ☐	

Affected Functional Area (FA) - Check box & provide Corporate contact name if FA is affected by this revision:

AD ☐		ER ☐		NO ☐		RW ☐	
AR ☐		HR ☐		OP ☐		SA ☐	
BO ☐		HU ☐		OU ☐		SM ☐	
CC ☐		IT ☐		PC ☐		SY ☐	
CY ☐		LR ☐		PI ☐		TQ ☐	
EI ☐		LS ☐		PL ☐		WC ☐	
EN ☐		MA ☐		RM ☐		___ ☐	
EP ☐		NF ☐		RP ☐		___ ☐	

Validation – Is substantiating this document's usability via mockup, simulated performance, field walkdown, or bench top review required? No ☒ or Yes ☐ *If Yes, then attach validation documentation.*
If Yes, then print name & sign for completed validation:

NOS Review – Excluding NDE, ISI, Peer Inspection or Independent Verification, is this document used to perform independent inspection for acceptance (including field installation inspections, fabrication inspections, receipt inspections, new fuel inspection, etc.), or for certification of Inspection personnel? No ☒ or Yes ☐
If Yes, then NOS Reviewer to print name & sign for acceptance:

Common Training – Is common training material being provided? (Document in the change management how the common training material will be developed and provided to the sites or attach.) No ☒ or Yes ☐

Change Management provided in: HU-AA-1101 Change Checklist Attached ☐ or: As directed by SFAM ☒

CFAM Approval	**Miguel Azar/** (Print and Sign)	**03/07/12** (Date)	**Cantera/3240** (Location and Ext)

1. Step 4.1.8 suggested wording should read: "An Exelon Nuclear plant may store waste at another Exelon Nuclear plant, provided formal NRC approval has been received for the transfer of waste."
2. Add a step under section 4.4 "Shipment sent for off site storage shall meet the storage site's waste acceptance criteria
3. Add step 4.1.8 "It also possible to store waste from one nuclear plant at another nuclear plant, if formal NRC approval has been received."
4. Modify step 4.2.8 by adding the following words at the end of sentence "in the pool or loading the processed activated hardware into Dry Case storage system.

50.59 APPLICABILITY REVIEW FORM

LS-AA-104-1002
Revision 4

Activity/Document Number: RW-AA-100 **Revision Number:** 8

Title: Process Control Program for Radioactive Waste

Address the questions below for all aspects of the Activity. If the answer is yes for any portion of the Activity, apply the identified process(es) to that portion of the Activity. Note that it is not unusual to have more than one process apply to a given Activity. See Section 4 of the Resource Manual (RM) for additional guidance.

I.	Does the proposed Activity involve a change:		
	1. Technical Specifications or Facility Operating License (10CFR50.90)?	☒ NO ☐ YES	See Section 4.2.1.1 of the RM
	2. Conditions of License Quality Assurance program (10CFR50.54(a))? Security Plan (10CFR50.54(p))? Emergency Plan (10CFR50.54(q))?	☒ NO ☐ YES ☒ NO ☐ YES ☒ NO ☐ YES	See Section 4.2.1.2 of the RM
	3. Codes and Standards IST Program Plan (10CFR50.55a(f))? ISI Program Plan (10CFR50.55a(g))?	☒ NO ☐ YES ☒ NO ☐ YES	See Section 4.2.1.3 of the RM
	4. ECCS Acceptance Criteria (10CFR50.46)?	☒ NO ☐ YES	See Section 4.2.1.4 of the RM
	5. Specific Exemptions (10CFR50.12)?	☒ NO ☐ YES	See Section 4.2.1.5 of the RM
	6. Radiation Protection Program (10CFR20)?	☒ NO ☐ YES	See Section 4.2.1.6 of the RM
	7. Fire Protection Program (applicable UFSAR or operating license condition)?	☒ NO ☐ YES	See Section 4.2.1.7 of the RM
	8. Programs controlled by the Operating License or the Technical Specifications (such as the ODCM).	☐ NO ☒ YES	See Section 4.2.1.7 of the RM
	9. Environmental Protection Program	☒ NO ☐ YES	See Section 4.2.1.7 of the RM
	10. Other programs controlled by other regulations.	☒ NO ☐ YES	See Section 4.2.1 of the RM
II.	Does the proposed Activity involve maintenance which restores SSCs to their original condition or involve a temporary alteration supporting maintenance that will be in effect during at-power operations for 90 days or less?	☒ NO ☐ YES	See Section 4.2.2 of the RM
III.	Does the proposed Activity involve a change to the:		
	1. UFSAR (including documents incorporated by reference) that is limited to reformatting, simplification, removing excessive detail, or minor editorial changes as discussed in NEI 96-07 or NEI 98-03?	☒ NO ☐ YES	See Section 4.2.3 of the RM
	2. Managerial or administrative procedures governing the conduct of facility operations (subject to the control of 10CFR50, Appendix B)	☐ NO ☒ YES	See Section 4.2.4 of the RM
	3. Procedures for performing maintenance activities (subject to 10CFR50, Appendix B)?	☒ NO ☐ YES	See Section 4.2.4 of the RM
	4. Regulatory commitment not covered by another regulation based change process (see NEI 99-04)?	☒ NO ☐ YES	See Section 4.2.3/4.2.4 of the RM
IV.	Does the proposed Activity involve a change to the Independent Spent Fuel Storage Installation (ISFSI) (subject to control by 10 CFR 72.48)	☒ NO ☐ YES	See Section 4.2.6 of the RM

Check one of the following:

☒ **If** all aspects of the Activity are controlled by one or more of the above processes, **then** a 50.59 Screening is not required and the Activity may be implemented in accordance with its governing procedure.

☐ **If** any portion of the Activity is **not** controlled by one or more of the above processes, then process a 50.59 Screening for the portion not covered by any of the above processes. The remaining portion of the activity should be implemented in accordance with its governing procedure.

Signoff:

50.59 Screener/
50.59 Evaluator: E. Tiedemann (Print name) Sign: E Tiedemann (Signature) Date: 6/5/12
(Circle One)

50.59 REVIEW COVERSHEET FORM

LS-AA-104-1001
Revision 3
Page 1 of 1

Station/Unit(s): CPS Unit 1

Activity/Document Number: RW-AA-100 **Revision Number:** 8

Title: -Process Control Program for Radioactive Waste

NOTE: For 50.59 Evaluations, information on this form will provide the basis for preparing the biennial summary report submitted to the NRC in accordance with the requirements of 10 CFR 50.59(d)(2).

Description of Activity:
(Provide a brief, concise description of what the proposed activity involves.)
The procedure revision adds words about one Exelon Nuclear Plant may store radwaste at another Exelon Nuclear Plant, provided NRC approval has been received. Step added that a radwaste shipment shall meet the storage site's acceptance criteria. Added words that activated hardware may be stored in the pool or Dry Cask storage.

Reason for Activity:
(Discuss why the proposed activity is being performed.)
Periodic corporate procedure update.

Effect of Activity:
(Discuss how the activity impacts plant operations, design bases, or safety analyses described in the UFSAR.)
Administrative changes to procedure. No impact to the Process Control Program or the method of performing or controlling a system, structure or component design function.

Summary of Conclusion for the Activity's 50.59 Review:
(Provide justification for the conclusion, including sufficient detail to recognize and understand the essential arguments leading to the conclusion. Provide more than a simple statement that a 50.59 Screening, 50.59 Evaluation, or a License Amendment Request, as applicable, is not required.)
This is administrative changes to an administrative procedure, there is no change to how a system, structure, or component is operated or controlled.

Attachments:
Attach all 50.59 Review forms completed, as appropriate.

Forms Attached: (Check all that apply.)

- [X] **Applicability Review**
- [ ] **50.59 Screening** **50.59 Screening No.** _____ **Rev.** _____
- [ ] **50.59 Evaluation** **50.59 Evaluation No.** _____ **Rev.** _____