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U-603479
1A.120
April 25, 2001

Docket No. 50-461

10CFR50.36a

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

Subject: Clinton Power Station
Annual Radioactive Effluent Release Report

Dear Madam or Sir:

Attached is the Annual Radioactive Effluent Release Report for Clinton Power Station (CPS) for the period of January 1, 2000, through December 31, 2000. This submittal is provided in accordance with the requirements of section 5.6.3 of the CPS Technical Specifications.

Sincerely yours,

R F Swalton (for)

Michael J. Pacilio
Plant Manager

RSF/krk

Attachment

cc: NRC Clinton Licensing Project Manager
NRC Resident Office, V-690
Regional Administrator, Region III, USNRC
Illinois Department of Nuclear Safety

IE48
1/1

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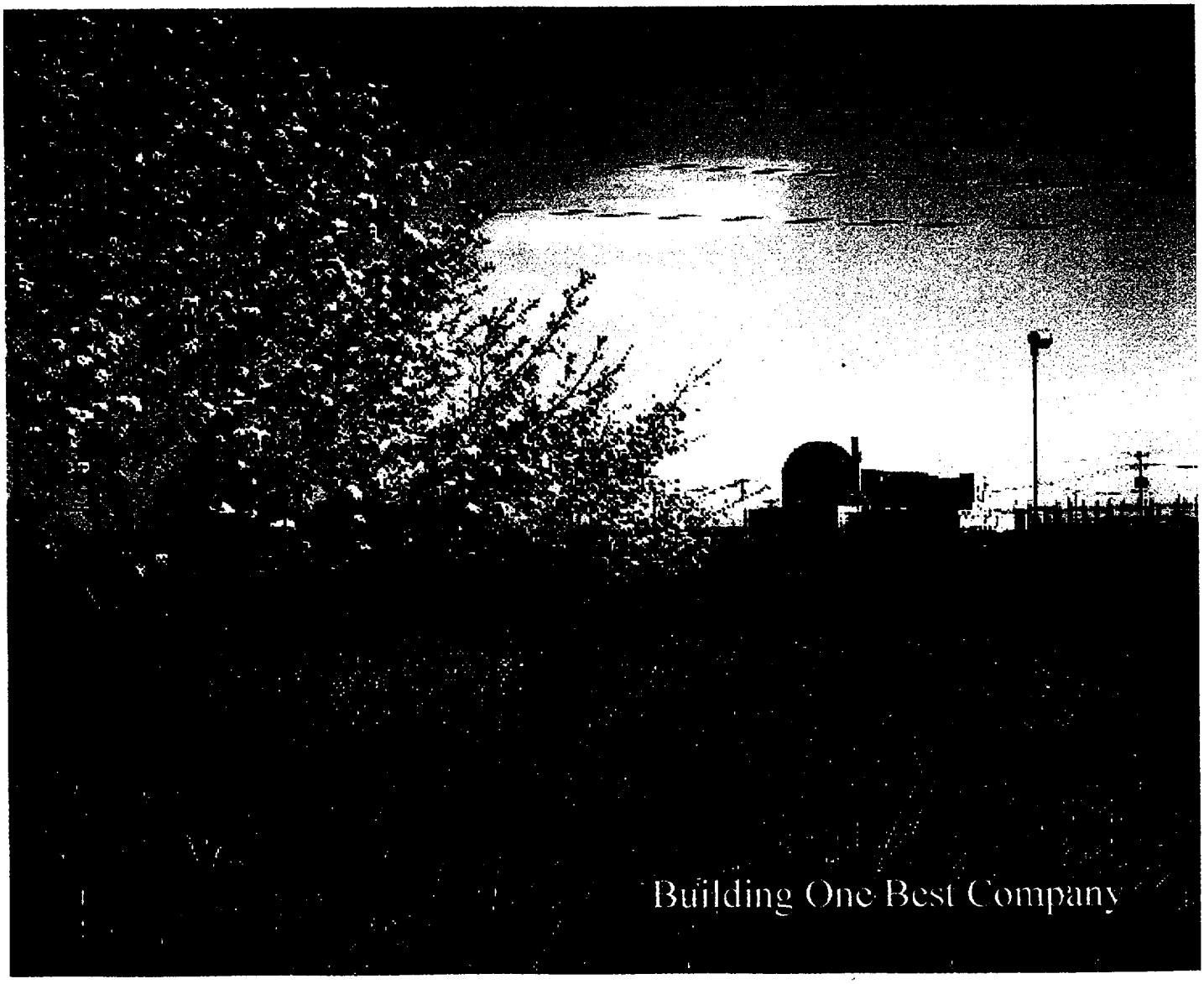
Clinton Power Station 2000 Annual Radioactive Effluent Release Report



January 1, 2000 -- December 31, 2000

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

FOR THE

CLINTON POWER STATION

Prepared by

Chemistry Department

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SECTION 1
EXECUTIVE SUMMARY

The Annual Radioactive Effluent Release Report is a detailed description of gaseous and liquid radioactive releases from the Clinton Power Station (CPS) and the resulting radiation doses for the period from January 1, 2000 through December 31, 2000. This report includes a detailed meteorological section that provides the weather history of the area during this period. This information is used to calculate the dose to the public.

The report also includes a summary of the amounts of radioactive material contained in solid waste that is packaged and shipped for offsite disposal at federally approved burial facilities. In addition, 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 per ODCM Remedial Requirements 2.7.1.b and 3.9.2.b.

The NRC requires that nuclear power stations be designed, constructed, and operated in such a way to maintain the amount of radioactive material in effluent releases to unrestricted areas As Low As Reasonably Achievable (ALARA). To assure these criteria are met, the NRC has established limits governing the release of radioactivity in effluents.

CPS operated in compliance with established federal limits during this report period. The maximum radiation dose delivered to the inhabitants of the area surrounding CPS, due to radioactivity released from the station, was 2.93E-3 mrem. The radiation dose to the public in the vicinity of CPS was calculated by using the concentration of radioactive nuclides in each release and the weather conditions at the time of the release. The dose from CPS gaseous effluents was only a small fraction of the limit for the maximum exposed member of the public. There were no liquid releases in 2000. Consequently, there was no dose to the public from the liquid pathway.

SECTION 2
INTRODUCTION

Clinton Power Station is located in Harp Township, DeWitt County approximately six miles east of the city of Clinton in east-central Illinois. Clinton Power Station is a 985 megawatt gross electrical power output boiling water reactor. The generating unit was supplied by General Electric, Sargent and Lundy Engineers served as architect-engineer, and Baldwin Associates was the constructor.

Construction of CPS began in the mid 1970's. Fuel load began in September of 1986 with initial criticality achieved on February 27, 1987. Commercial operation commenced in April 1987 and the reactor reached 100% power for the first time on September 15, 1987.

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

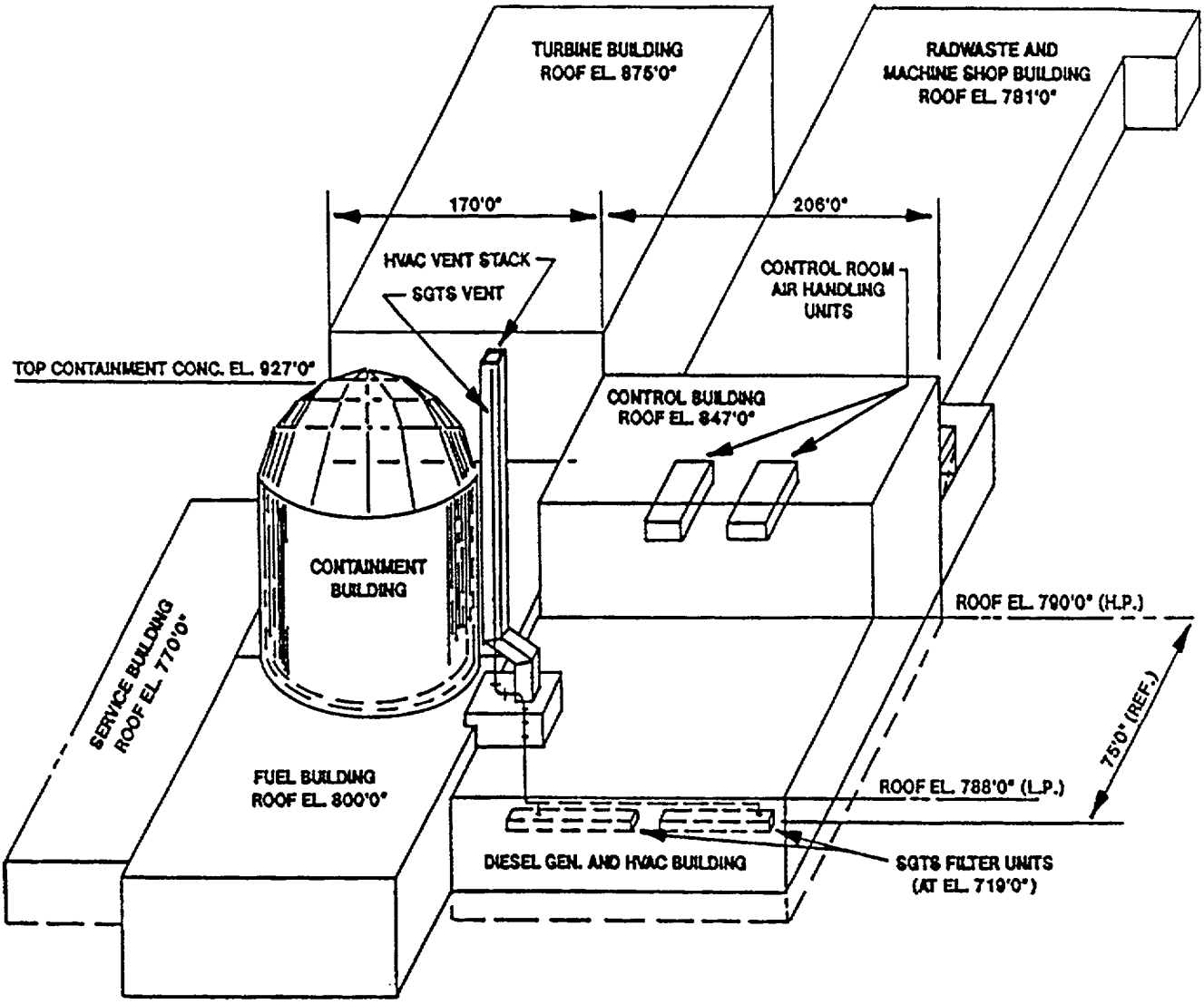
CPS releases liquid effluents in the batch mode. Each release is sampled and analyzed prior to release. Liquid effluents, (variable from 10-60 gallons per minute (GPM) or 50-300 GPM depending upon the amount of activity in the discharge), combine with Plant Service Water flow (minimum of approximately 5000 GPM) and Plant Circulating Water flow (0-567,000 GPM) in the seal well prior to entering the 3.4 mile discharge flume to Lake Clinton (see Figure 2).

Processing and Monitoring

CPS strictly controls effluents to ensure radioactivity released to the environment is minimal and does not exceed federal release limits. Effluent controls include the operation of radiation monitoring systems in the plant as well as offsite environmental sampling and analysis programs. 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 laboratory to identify the specific concentration of radionuclides being released. Sampling and analyses provide 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 basic purpose of the REMP program is to assess the radiological impact on the environment due to the operation of the Clinton Power Station. Implicit in this purpose is the federal regulatory 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 reactor criticality.

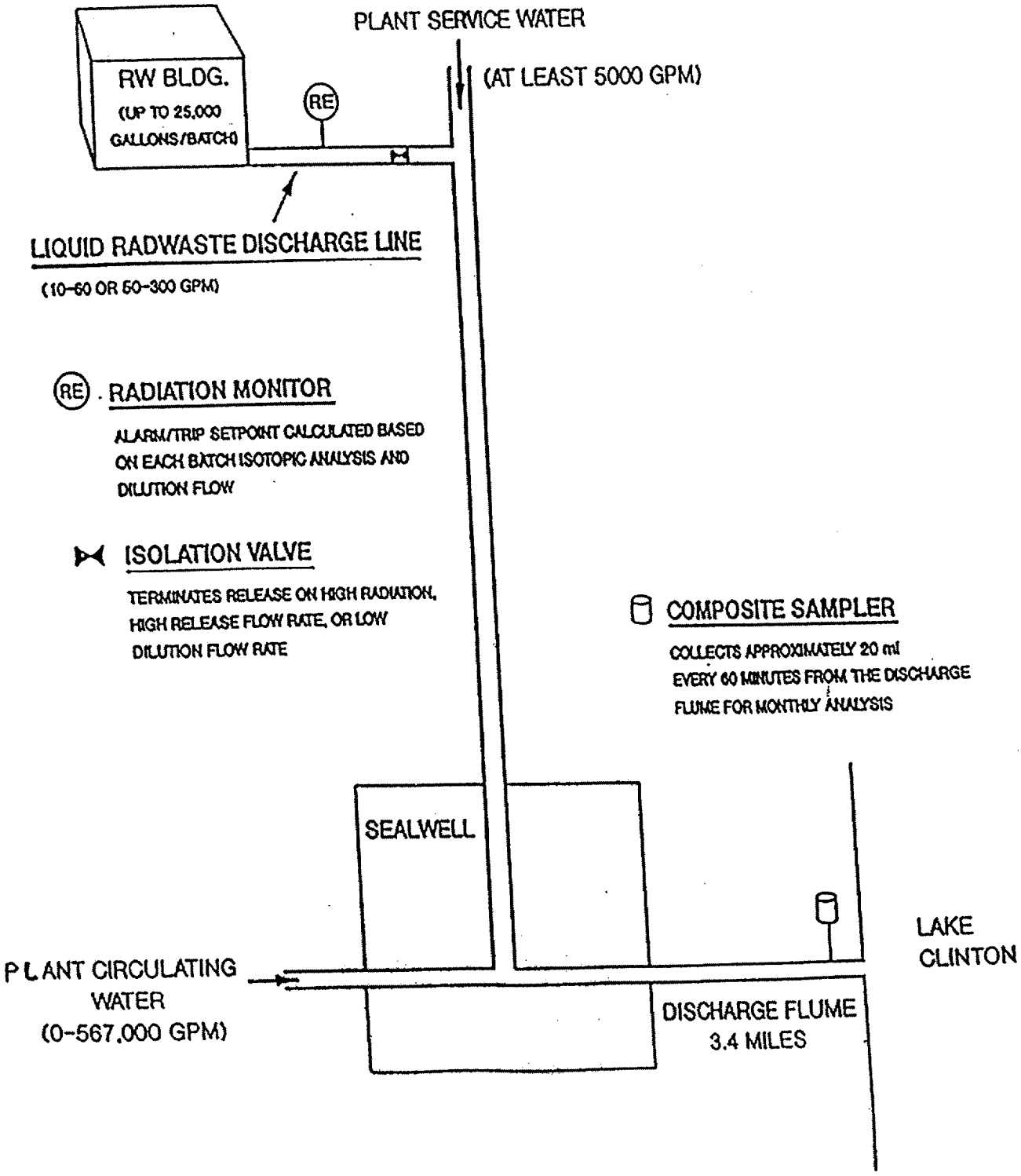
Figure 1
CPS AIRBORNE EFFLUENT RELEASE POINTS



	HVAC Exhaust Stack	SGTS Exhaust Stack
Release Point Height (m)	61	61
Building Height (m)	58	58
Release Point Geometry	Duct	Pipe
Release Point Area (m^2)	11.15	0.15
Release Point Diameter (m)	3.77*	0.44
Annual Average Flow Rate (m^3/sec)	111.71	1.89
Vertical Exit Velocity (m/sec)	10.02	12.49

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

Figure 2
CPS WATERBORNE EFFLUENTS RELEASE PATHWAY



Exposure Pathways

Radiological exposure pathways are the means by which people may become exposed to radioactivity released from nuclear facilities. The major pathways of concern are those which 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 meteorological characteristics of the area which will be defined by wind speed and wind direction at the time of the release. This information is used to evaluate how the radionuclides will be distributed in the area. The most important factor in evaluating the exposure pathway is the use of the environment by the people living around CPS. Factors such as location of homes in the area, use of cattle for milk and meat, and the growing of gardens for vegetable consumption are very important considerations in evaluating exposure pathways. Figure 3 illustrates the various effluent exposure pathways 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 the lake.

Dose Assessment

Whole body radiation involves the exposure of all organs in the human body to ionizing radiation. Most 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.

The radiation dose to people in the area surrounding CPS is calculated for each release using the concentrations of radioactive material and the weather conditions present at the time of the release. The dose is calculated in all sixteen geographical sectors surrounding CPS and takes into account the location of the nearest residents, vegetable gardens producing broad leaf vegetables, dairy and meat animals in all sectors. The calculated dose also uses the 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 drinks and how much air that 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 categories, 1) noble gases, and 2) I-131, I-133, H-3, and all radionuclides in particulate form with half-lives greater than eight days. Noble gases, such as xenon and krypton, are biologically and chemically non-reactive; these radionuclides cause external radiation exposure. I-131, I-133, H-3, and radionuclides in particulate form with half-lives greater than eight days are the major contributors to internal dose.

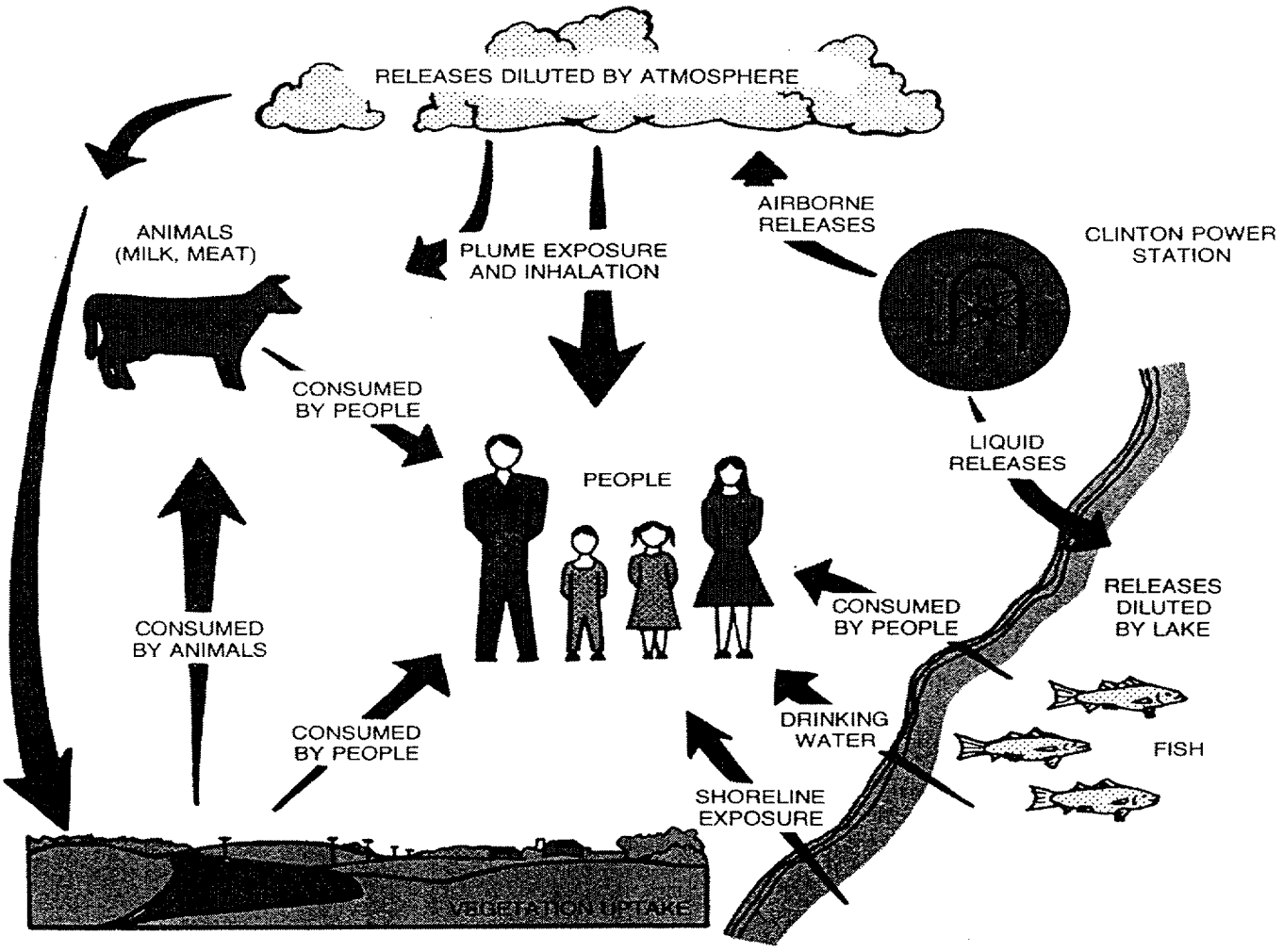
Liquid Effluents

Liquid effluents may come from two sources at CPS. The first source 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 source is from heat exchanger leaks found in closed cooling water systems that service radioactively contaminated systems. These releases are considered abnormal releases. As a matter of station management commitment, CPS strives to be a zero-liquid discharge plant.

Solid Waste Shipments

In order to reduce the radiation exposure to personnel and maintain the 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 plants to be designed, constructed and operated in such a way that the radioactivity in effluent releases to unrestricted areas is kept ALARA. To assure 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 Code of Federal Regulations (CFR), Title 10, Part 50, Appendix I (10CFR50 Appendix I), Title 10 of the Code of Federal Regulations, Part 20 (10CFR20), and Title 10 of the Code of Federal Regulations, Part 20, Appendix B, Table 2, Columns 1 and 2. Keeping releases within these operating limits demonstrates that the ALARA principle is being met. These ALARA limits are a fraction of the dose limits established by the Environmental Protection Agency (EPA). In its Environmental Dose Standard of 40CFR190, the EPA 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. In accordance with Title 10 of the Code of Federal Regulations (CFR), Part 20, the maximum permissible concentrations for gaseous effluents shall not exceed the values given in 10CFR20, Appendix B, Table 2, Column 1. 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 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 3000 mrem/year to the skin.

   b. I-131, I-133, H-3, and all radionuclides in particulate form with half-lives greater than eight days:

      - Less than or equal to 1500 mrem/year to any organ.

2. In accordance with Title 10 of the Code of Federal Regulations, Part 50, Appendix I, air dose due to noble gases released in gaseous effluents to areas at and beyond the site boundary shall be limited to the following:

   a. Less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation during any calendar quarter.

   b. Less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation during any calendar year.

3. In accordance with 10CFR50, Appendix I, dose to a member of the public (from ^{131}I, ^{133}I, ^{3}H and all radionuclides in particulate form with half-lives greater than eight 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 ten [10] times the concentrations specified in Title 10 of the Code of Federal Regulations, Part 20, Appendix B, Table 2, Column 2, 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 3000 mrem per year to the skin. These limits are based on dose calculations using actual isotopic concentrations in our effluent streams, and are not based upon gross count monitors. 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 in a given time period.

2. Tritium is 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 stack exhaust flow rates.

B. Iodines

Iodine is continuously collected on a charcoal cartridge filter via an isokinetic sampling assembly on each release point. Filters are normally exchanged once per week and analyzed on an HPGe system. The daily average flow rates for each release point are averaged for the duration of the sampling period and these results, along with isotopic concentrations, are used to determine 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 analyzed on an HPGe system. Flow rates and total activity are determined in the same manner as for iodines.

D. Liquid Effluents

Each tank of liquid radwaste is recirculated for at least 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 to ensure that a representative sample is obtained. Samples are analyzed on an HPGe system and release permits are generated based on the values obtained from the isotopic analysis and the most recent values for ^{3}H, gross alpha, ^{55}Fe, ^{89}Sr and ^{90}Sr. 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

$E_1 ... E_n$ = 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: January 1, 2000 - December 31, 2000
Continuous 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	0.00E+01	5.44E-03	30
2. Average release rate for period	µCi/sec	0.00E+01	0.00E+01	0.00E+01	6.85E-04	
3. Percent of ODCM Limit	%	*	*	*	*	
B. Iodines						
1. Total Iodine-131	Ci	1.29E-05	7.924E-05	3.98E-05	4.14E-5	31
2. Average release rate for period	µCi/sec	1.64E-06	1.01E-05	5.01E-06	5.21E-06	
3. Percent of ODCM Limit	%	*	*	*	*	
C. Particulates						
1. Particulates with half-lives >8 days	Ci	1.79E-04	1.90E-04	3.34E-04	2.22E-04	24
2. Average release rate for period	µCi/sec	2.27E-05	2.42E-05	4.20E-05	2.79E-05	
3. Percent of ODCM Limit	%	*	*	*	*	
4. Gross alpha radioactivity	Ci	8.41E-07	2.68E-07	1.35E-07	4.73E-07	
D. Tritium						
1. Total Release	Ci	1.00E+01	1.22E+01	1.16E+01	7.84E+00	105
2. Average release rate for period	µCi/sec	1.23E+00	1.56E+00	1.46E+00	9.86E-01	
3. Percent of ODCM Limit	%	*	*	*	*	

* 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	Quarter 1	% of Limit	Quarter 2	% of Limit	Quarter 3	% of Limit	Quarter 4	% of Limit
Gamma	5 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.59E-07	3.18E-06
Beta	10 mrad	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.04E-07	2.04E-06

Doses per Year

Type of Radiation	ODCM Limit	Year	% of Limit
Gamma	10 mrad	1.59E-07	1.59E-06
Beta	20 mrad	2.04E-07	1.02E-06

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

Doses per Quarter

Type of Radiation	ODCM Limit	Quarter 1	% of Limit	Quarter 2	% of Limit	Quarter 3	% of Limit	Quarter 4	% of Limit
Bone	7.5	1.51E-04	2.01E-03	3.70E-06	4.93E-05	8.25E-06	1.10E-04	5.34E-07	7.12E-06
Liver	7.5	1.02E-03	1.36E-02	4.19E-04	5.58E-03	3.94E-04	5.25E-03	2.67E-04	3.56E-03
TBody	7.5	1.06E-03	1.41E-02	4.19E-04	5.58E-03	3.97E-04	5.30E-03	3.56E-04	4.75E-03
Thyroid	7.5	1.04E-03	1.39E-02	8.80E-04	1.17E-02	5.67E-04	7.56E-03	4.38E-04	5.83E-03
Kidney	7.5	1.02E-03	1.36E-02	4.20E-04	5.60E-03	3.94E-04	5.26E-03	2.66E-04	3.55E-03
Lung	7.5	1.02E-03	1.36E-02	4.18E-04	5.57E-03	3.93E-04	5.25E-03	2.68E-04	3.57E-03
GI LLI	7.5	1.02E-03	1.36E-02	4.19E-04	5.59E-03	3.96E-04	5.28E-03	2.84E-04	3.79E-03

Doses per Year

Type of Radiation	ODCM Limit	Year	% of Limit
Bone	15	1.63E-04	1.09E-03
Liver	15	2.10E-03	1.40E-02
TBody	15	2.23E-03	1.48E-02
Thyroid	15	2.93E-03	1.95E-02
Kidney	15	2.10E-03	1.40E-02
Lung	15	2.10E-03	1.40E-02
GI LLI	15	2.12E-03	1.41E-02

TABLE 2

CLINTON POWER STATION
GASEOUS EFFLUENTS - Nuclides Released

YEAR: 2000

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]					
Xe-35	Ci	---	---	---	5.44E+03
Total	Ci	0.00E+01	0.00E+01	0.00E+01	5.44E+03
B. Iodines[1]					
I-131	Ci	1.29E-05	7.924E-05	3.98E-05	4.14E-5
I-133	Ci	6.89E-05	4.11E-04	2.14E-04	1.16E-04
Total	Ci	8.18E-05	4.90E-04	2.54E-04	1.57E-04
C. Particulates[1]					
Cd-109	Ci	---	2.40E-05	---	3.68E-07
Ce-139	Ci	---	---	6.72E-07	---
Ce-141	Ci	---	---	---	3.08E-08
Co-57	Ci	---	6.49E-06	3.80E-08	2.98E-08
Co-58	Ci	---	---	---	1.78E-06
Co-60	Ci	---	1.58E-06	1.34E-06	4.03E-05
Cr-51	Ci	1.76E-04	1.55E-04	3.21E-04	1.63E-04
Hg-203	Ci	---	---	3.23E-07	9.05E-08
Mn-54	Ci	---	9.26E-07	4.70E-06	1.61E-05
Sr/Y-90	Ci	2.13E-06	---	---	---
Sr-89	Ci	1.80E-06	5.55E-06	1.04E-07	7.45E+00
Gross Alpha	Ci	8.41E-07	2.67E-07	1.35E-07	4.72E-07
Others (specify)	Ci	---	---	---	---
As-76	Ci		7.48E-07	2.78E-05	
Mo-99	Ci	4.99E-05	3.34E-05	9.41E-05	4.43E-05
Na-24	Ci	---	---	8.78E-05	---
Nb-95m	Ci	---	3.52E-06	---	---
Tc-99m	Ci	3.83E-04	3.25E-04	9.74E-04	3.71E-04
Total for Period	Ci	6.11E-04	5.52E-04	1.52E-03	6.37E-04
D. Tritium[1]	Ci	1.00E+01	1.22E+01	1.16E+01	7.84E+00

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

[2] It should be noted that the lower the actual sample activity is with respect to background activity, the greater the counting error. Large errors are reported for the various components of CPS gaseous effluents because of consistently low sample activity.

TABLE 3

RADIOACTIVE GASEOUS WASTE LLD VALUES

TYPE OF ACTIVITY ANALYSIS	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[g]	≤1.00E-11
Gross Alpha[f]	≤1.00E-11

Table 3 Notations

[a]The LLD is 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 95% probability and with only 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, as counts per minute,

E is the counting efficiency, as counts per disintegration,

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

2.22×10^6 is the number of disintegrations per minute 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.

It should be recognized that 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

[g]Composite particulate sample analyzed quarterly

TABLE 4

WATERBORNE EFFLUENTS - Summation Of All Releases
Data Period: January 1, 2000 through December 31, 2000

There were no liquid radwaste releases from CPS in 2000.

	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	---
2. Average diluted concentration during period	µCi/ml	---	---	---	---	
3. Percent of ODCM Limit	%	---	---	---	---	
B. Tritium						
1. Total Release	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01	---
2. Average diluted concentration during period	µCi/ml	---	---	---	---	
3. Percent of ODCM Limit	%	---	---	---	---	
C. Dissolved and Entrained Gases						
1. Total Release	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01	---
2. Average diluted concentration during period	µCi/ml	---	---	---	---	
3. Percent of ODCM Limit	%	---	---	---	---	
D. Gross Alpha Radioactivity						
Gross alpha radioactivity	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01	---
E. Volume of Waste Released (prior to dilution)	Liters	---	---	---	---	---
F. Volume of dilution water used during period	Liters	---	---	---	---	---

TABLE 5
WATERBORNE EFFLUENTS - Nuclides Released [1]
Data Period: January 1, 2000 - December 31, 2000
All Modes

There were no liquid radwaste releases from CPS in 2000.

Continuous Mode		Batch Mode	X

Nuclide	Units	Quarter 1[2]	Quarter 2[2]	Quarter 3[2]	Quarter 4[2]
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	----	----	----	----
Sr-90	Ci	----	----	----	----
Cs-134	Ci	----	----	----	----
Cs-137	Ci	----	----	----	----
I-131	Ci	----	----	----	----
Co-58	Ci	----	----	----	----
Co-60	Ci	----	----	----	----
Fe-59	Ci	----	----	----	----
Zn-65	Ci	----	----	----	----
Mn-54	Ci	----	----	----	----
Cr-51	Ci	----	----	----	----
Zr/Ni-95	Ci	----	----	----	----
Mo-99	Ci	----	----	----	----
Tc-99m	Ci	----	----	----	----
Ba/La-140	Ci	----	----	----	----
Ce-141	Ci	----	----	----	----
Ce-144	Ci	----	----	----	----
Total	Ci	0.00E+01	0.00E+01	0.00E+01	0.00E+01
C. Dissolved and Entrained Noble Gases					
Xe-133	Ci	----	----	----	----
Xe-135	Ci	----	----	----	----
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 ECL calculations. For dissolved and entrained noble gases, the concentration is limited to 2.00E-04 μCi/ml total activity.

[2] An entry of 0.00E+01 does not represent the absence of a radionuclide but indicates that the MDA concentration of the nuclide was below the LLD value listed in Table 6.

TABLE 6

RADIOACTIVE LIQUID WASTE LLD VALUES

TYPE OF ACTIVITY ANALYSIS	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 LLD is defined, for purposes of these requirements, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with and only 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, as counts per minute,

Table 6 Notations (cont'd)

E is the counting efficiency, as counts per disintegration,

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

2.22×10^6 is the number of disintegrations per minute per μCi,

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.

It should be recognized that 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 5×10^{-6}. This list does not mean that only these nuclides are to be 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 no batch liquid or gaseous releases in 2000.

A. Batch Liquid Releases: 2000

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

B. Batch Gaseous Releases: 2000

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

ABNORMAL RELEASES

Information concerning abnormal radioactive liquid and gaseous releases is presented below for the year 2000. There were no abnormal or unplanned liquid or gaseous releases from CPS in 2000.

Liquid Releases

Number of Abnormal Liquid Releases: 0

Activity Released [Ci]

Nuclides	Activity [Ci]
---	---
---	---
---	---
---	---
---	---
---	---
Total	---

Gaseous Releases

Number of Abnormal Gaseous Releases: 0

Activity Released [Ci]

Nuclides	Activity [Ci]
---	---
---	---
---	---
---	---
---	---
---	---
Total	---

SECTION 5
SOLID WASTE DISPOSAL INFORMATION

During this reporting period there were thirty-four (34) radioactive waste shipments and no irradiated fuel shipments from CPS. In addition, the CPS ODCM requires reporting of the following information for solid waste shipped offsite during the report period:

1. **Container volume:** Class A waste 719 m^3 Class C waste 3.85 m^3.

2. **Total curie quantity:** Class A waste was 549 curies and Class C was 65.6 curies (determined by dose-to-curie and sample concentration methodology estimates).

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 or solidified in cement, and non-compacted dry active waste.

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 2000	July - December 2000	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3	6.07E+01	3.46E+01	25
	Ci	3.66E+02	2.47E+02	
b. Dry compactible waste, contaminated equipment, etc.	m^3	1.10E+02	5.17E+02	25
	Ci	2.04E-01	1.51E+00	
c. Irradiated components, control rods, etc.	m^3	0.00E+01	0.00E+01	0
	Ci	0.00E+01	0.00E+01	
d. Other Wastes	m^3	0.00E+01	0.00E+01	0
	Ci	0.00E+01	0.00E+01	

A.2. Estimate of major nuclide composition (by type of waste)

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

Waste Class	Nuclide Name	Percent Abundance	Curies
A	Mn-54	3.526	19.3
	Fe-55	79.094	433
	Fe-59	0.246	1.34
	Co-60	16.124	88.2
	Ni-63	0.651	3.56
	Other	0.360	1.96

Waste Class	Nuclide Name	Percent Abundance	Curies
C	Fe-55	74.814	49.1
	Co-60	22.439	14.7
	Other	2.747	1.80

2. Dry compactible waste, contaminated equipment, etc.

Waste Class	Nuclide Name	Percent Abundance	Curies
A	Fe-55	81.806	1.40
	Co-60	15.196	0.261
	Other	3.000	0.051

A.3. Solid Waste Disposition

January - June 2000

Number of Shipments	Mode of Transportation	Destination
1	Kindrick Trucking Company	ATG-QCEP
15	Kindrick Trucking Company	Barnwell Waste Management Facility
1	Kindrick Trucking Company	DSSI
1	Hittman Transport	ATG

July - December 2000

Number of Shipments	Mode of Transportation	Destination
1	Kindrick Trucking Company	ATG
1	Tag Transport, Inc.	ATG
7	Kindrick Trucking Company	Barnwell Waste Management Facility
5	Hittman Transport	GTS Duratek
1	Hittman Transport	GTS/Gallaher Road Facility
1	Kindrick Trucking Company	GTS/Gallaher Road Facility

B. Irradiated Fuel Shipments (Disposition)

Number of Shipments	Mode of Transportation	Destination
None	N/A	N/A

SECTION 6
DOSE MEASUREMENTS AND ASSESSMENTS

This section of the Effluent Report provides the dose received by receptors around Clinton Power Station 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 in this report. This section also lists doses to individuals who used areas inside the Site Boundary. This section also summarizes CPS's compliance with 40CFR190 requirements.

The assumptions used in determining dose values are as follows:

- All receptors within an 8 kilometer radius are included in the annual Land Use Census. This census determines what dose pathways are present as well as the distance of each receptor from the site.

- The annual average meteorological data for 1999 were used, in conjunction with the Land Use Census to determine the dose to each receptor within 8 kilometers.

- The doses for each receptor in each sector were determined using methodologies given in the ODCM.

- The activity used in these assessments is the total activity released by CPS for the year 2000 including radionuclides with half-lives less than 8 days and when dose pathway factors were available.

- The occupancy factor was taken into account when determining dose to individuals using areas inside the Site Boundary in non-residential areas. The occupancy factor is determined by dividing the number of hour of occupancy per year (taken from the ODCM) and dividing that value by the total number of hours 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: January 1, 2000 - December 31, 2000

This table lists doses to the likely most exposed member of the public (from radioactive effluents at CPS) in each sector. Maximum in this table refers to the dose likely to the most exposed member of the public in each sector.

RECEPTOR INFORMATION					AIRBORNE EFFLUENT DOSE				WATERBORNE EFFLUENT DOSE (mrem) [1]	
					Iodine and Particulates (mrem)		*Noble Gases (mrad)*			
Sector	Distance (km)	Pathways	Organ	Age	Organ	Total Body	Gamma	Beta	Organ	Total Body
N	1.5	GP, I, M, V	Th	A	2.22E-03	1.47E-03	8.94E-08	1.15E-07	0.00E+01	0.00E+01
NNE	3.76	GP, I, M, V	Th	A	6.92E-04	4.84E-04	2.98E-08	3.82E-08		
NE	3.46	GP, I, M, V	Th	A	6.50E-04	4.79E-04	2.98E-08	3.82E-08		
ENE	2.86	GP, I, V	Th	A	5.33E-04	4.24E-04	2.91E-08	3.73E-08		
E	3.95	GP, I, V	Th	A	3.43E-04	2.74E-04	1.89E-08	2.42E-08		
ESE	5.14	GP, I, V	Th	C	4.16E-04	3.40E-04	1.59E-08	2.04E-08		
SE	4.44	GP, I	Th	A	1.32E-04	1.24E-04	2.22E-08	2.84E-08		
SSE	4.45	GP, I, V	Th	C	5.86E-04	4.81E-04	2.25E-08	2.88E-08		
S	6.60	GP, I, V	Th	A	1.99E-04	1.71E-04	1.19E-08	1.53E-08		
SSW	5.14	GP, I, V	Th	A	2.47E-04	1.89E-04	1.29E-08	1.65E-08		
SW	1.17	GP, I	Th	A	4.26E-04	4.00E-04	7.28E-08	9.33E-08		
WSW	3.62	GP, I, V	Th	A	3.76E-04	3.11E-04	2.15E-08	2.76E-08		
W	2.63	GP, I, V	Th	T	5.63E-04	4.86E-04	3.05E-08	3.90E-08		
WNW	2.64	GP, I, V	Th	T	4.38E-04	3.80E-04	2.38E-08	3.05E-08		
NW	3.11	GP, I, V	Th	A	4.15E-04	3.28E-04	2.25E-08	2.88E-08		
NNW	3.76	GP, I, V	Th	A	5.81E-04	4.38E-04	2.98E-08	3.82E-08		

Key for Table 8

GP = Ground Plane	V = Vegetables	A = Adult
I = Inhalation	Th = Thyroid	T = Teen
M = Cows Meat	GI = Gastrointestinal Tract & Lower Large Intestine	C = Child

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

[1] There were no liquid radioactive waste discharges from CPS in 2000.

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 miles from the reactor, in locations representing the sixteen 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 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 Offsite Dose Calculation Manual 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 which 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. No other exposure pathways were identified by the **2000** Annual Land Use Census. All dose calculations were performed using the methodology contained in the CPS ODCM.

FIGURE 4
AREAS WITHIN THE CPS SITE BOUNDARY OPEN TO MEMBERS OF THE PUBLIC

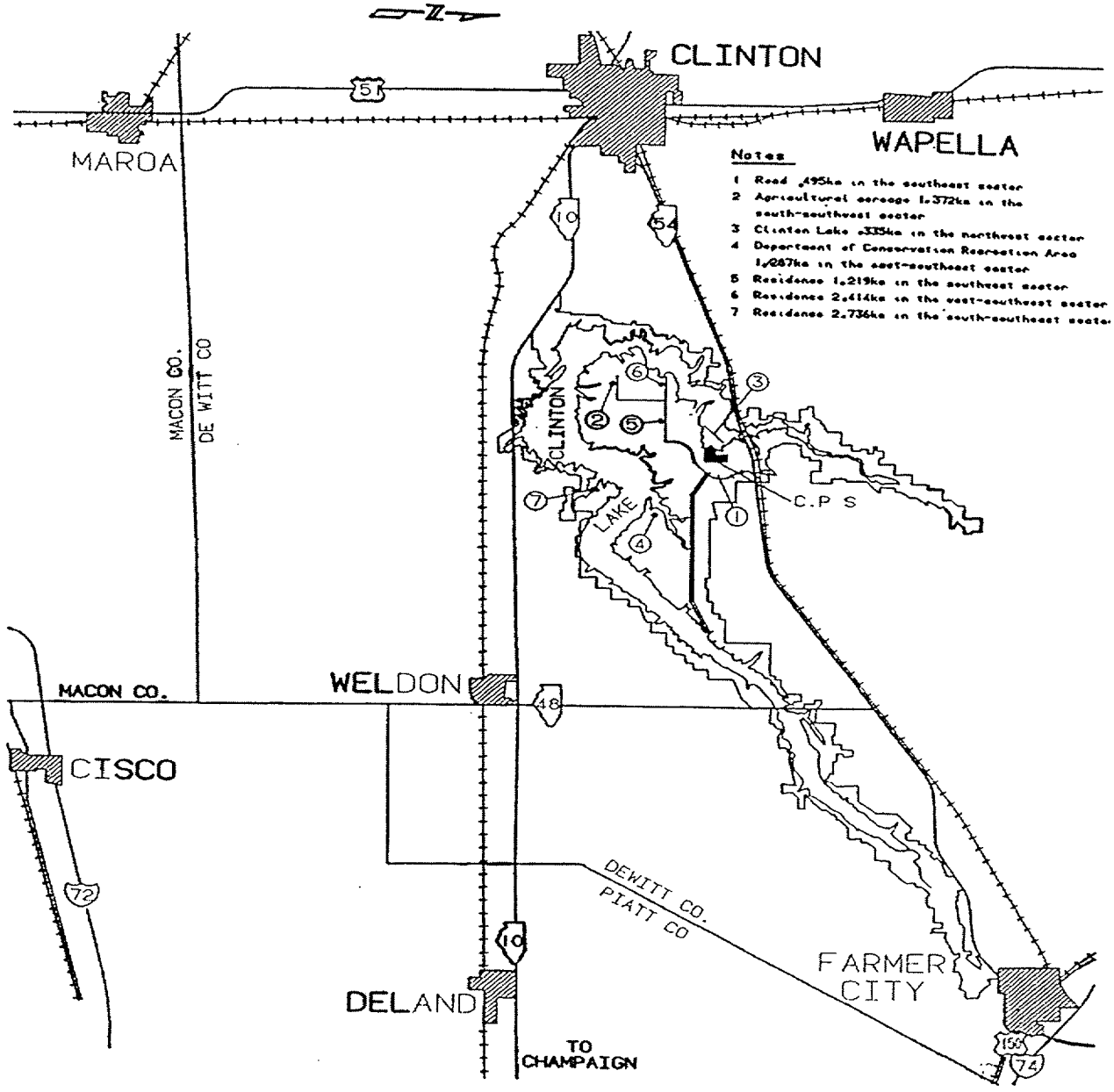


TABLE 9

CALCULATED DOSES TO MEMBERS OF THE PUBLIC DURING USE OF THE DEPARTMENT OF NATURAL RESOURCES RECREATION AREA IN THE EAST-SOUTHEAST SECTOR WITHIN THE CPS SITE BOUNDARY

Data Period: January 1, 2000 - December 31, 2000

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	6.53E-09	mrem/year
Skin Dose Rate (Noble Gases)	1.43E-08	mrem/year
Gamma Air Dose	6.29E-08	mrad
Beta Air Dose	8.06E-08	mrad
Total Body Dose (Particulates)	3.81E-04	mrem
Skin Dose (Particulates) [1]	7.39E-05	mrem

[1] Dose values include dose values due to release of iodines, particulates (with half lives >8 days), and tritium in gaseous effluents.

Highest Organ Dose by Age Group:

Teen Thyroid	4.10E-04	mrem
Adult Thyroid	4.01E-04	mrem
Child Thyroid	3.80E-04	mrem
Infant Thyroid	2.58E-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: January 1, 2000 - December 31, 2000

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	3.47E-08	mrem/Year
Skin Dose Rate (Noble Gases)	7.62E-08	mrem/Year
Gamma Air Dose	3.64E-07	mrad
Beta Air Dose	4.67E-07	mrad
Total Body Dose (Particulates)	2.17E-03	mrem
Skin Dose (Particulates) [1]	3.89E-04	mrem

[1] Dose values include dose values due to release of iodines, particulates (with half lives >8 days), and tritium in gaseous effluents.

Highest Organ Dose by Age Group:

Teen Thyroid	2.34E-03	mrem
Adult Thyroid	2.29E-03	mrem
Child Thyroid	2.17E-03	mrem
Infant Thyroid	1.46E-03	mrem

TABLE 11

CALCULATED DOSES FOR THE RESIDENTS IN THE SOUTH-SOUTHEAST SECTOR WITHIN THE CPS SITE BOUNDARY

Data Period: January 1, 2000 - December 31, 2000

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	1.25E-07	mrem/year
Skin Dose Rate (Noble Gases)	2.75E-07	mrem/year
Gamma Air Dose	3.64E-08	mrad
Beta Air Dose	4.67E-08	mrad
Total Body Dose (Particulates)	2.07E-04	mrem
Skin Dose (Particulates) [1]	2.72E-05	mrem

[1] Dose values include dose values due to release of iodines, particulates (with half lives >8 days), and tritium in gaseous effluents.

Highest Organ Dose by Age Group:

Adult Thyroid	2.19E-04	mrem
Teen	N/A [1]	mrem
Child	N/A [1]	mrem
Infant	N/A [1]	mrem

[1] No receptors of this age at this location

TABLE 12

CALCULATED DOSES FOR THE RESIDENTS IN THE SOUTHWEST SECTOR WITHIN THE CPS SITE BOUNDARY

Data Period: January 1, 2000 - December 31, 2000

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	2.73E-07	mrem/year
Skin Dose Rate (Noble Gases)	5.98E-07	mrem/year
Gamma Air Dose	7.28E-08	Mrad
Beta Air Dose	9.33E-08	Mrad
Total Body Dose (Particulates)	4.49E-04	Mrem
Skin Dose (Particulates) [1]	5.45E-05	Mrem

[1] Dose values include dose values due to release of iodines, particulates (with half lives >8 days), and tritium in gaseous effluents.

Highest Organ Dose by Age Group:

Adult Thyroid	4.38E-04	mrem
Teen	N/A [1]	mrem
Child	N/A [1]	mrem
Infant	N/A [1]	mrem

[1] No receptors of this age at this location

TABLE 13

CALCULATED DOSES TO MEMBERS OF THE PUBLIC DURING USE OF THE AGRICULTURAL ACREAGE IN THE SOUTH-SOUTHWEST SECTOR WITHIN THE CPS SITE BOUNDARY

Data Period: January 1, 2000 - December 31, 2000

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	2.18E-08	mrem/year
Skin Dose Rate (Noble Gases)	4.79E-08	mrem/year
Gamma Air Dose	2.98E-08	mrad
Beta Air Dose	3.82E-08	mrad
Total Body Dose (Particulates)	1.65E-04	mrem
Skin Dose (Particulates) [1]	1.63E-05	mrem

[1] Dose values include dose values due to release of iodines, particulates (with half lives >8 days), and tritium in gaseous effluents.

Highest Organ Dose by Age Group:

Teen Thyroid	1.79E-04	mrem
Adult Thyroid	1.74E-04	mrem
Child	N/A [1]	mrem
Infant	N/A [1]	mrem

[1] 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: January 1, 2000 - December 31, 2000

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	1.18E-07	mrem/Year
Skin Dose Rate (Noble Gases)	2.58E-07	mrem/Year
Gamma Air Dose	4.30E-07	mrad
Beta Air Dose	5.51E-07	mrad
Total Body Dose (Particulates)	2.38E-03	mrem
Skin Dose (Particulates) [1]	2.33E-04	mrem

[1] Dose values include dose values due to release of iodines, particulates (with half lives >8 days), and tritium in gaseous effluents.

Highest Organ Dose by Age Group:

Adult Thyroid	2.52E-03	mrem
Teen	N/A [1]	mrem
Child	N/A [1]	mrem
Infant	N/A [1]	mrem

[1] No receptors of this age at this location

TABLE 15

CALCULATED DOSES TO MEMBERS OF THE PUBLIC DURING USE OF CLINTON LAKE IN THE NORTHWEST SECTOR WITHIN THE CPS SITE BOUNDARY

Data Period: January 1, 2000 - December 31, 2000

DESCRIPTION	DOSE	UNITS
Total Body Dose Rate (Noble Gases)	3.25E-07	mrem/year
Skin Dose Rate (Noble Gases)	7.13E-07	mrem/year
Gamma Air Dose	6.29E-08	mrad
Beta Air Dose	8.06E-08	mrad
Total Body Dose (Particulates)	3.81E-04	mrem
Skin Dose (Particulates) [1]	7.39E-05	mrem

[1] Dose values include dose values due to release of iodines, particulates (with half lives >8 days), and tritium in gaseous effluents.

Highest Organ Dose by Age Group:

Teen Thyroid	4.10E-04	mrem
Adult Thyroid	4.01E-04	mrem
Child Thyroid	3.80E-04	mrem
Infant Thyroid	2.58E-04	mrem

SECTION 7
METEOROLOGICAL DATA AND DISPERSION ESTIMATES

The meteorological monitoring program began at the Clinton Power Station site on April 13, 1972. The meteorological system consists of a tower 199 feet high with two levels of instrumentation, at the 10-meter and 60-meter levels. Wind directions and speeds at the 10-meter and 60-meter levels are measured by a combined cup and vane sensor. The temperature at these levels is sensed by an aspirated dual temperature sensor. One-half of the dual sensor at each elevation is used for ambient temperature while the other half is used to provide a differential temperature between the 10-meter and 60-meter levels. Dew-point is measured at the 10-meter level with an aspirated dew-point sensor.

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

Clinton Power Station meteorological data is transmitted to the Main Control Room via a dedicated telephone line. There the signals are received and 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. Meteorological data is available via the microprocessors in the Main Control Room and the Technical Support Center.

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. See Table 18 for more detailed information on meteorology and dispersion data.

TABLE 16

METEOROLOGICAL DATA AVAILABILITY

Data Period: January 1, 2000 - December 31, 2000

PARAMETER	PERCENT OF VALID PARAMETER HOURS			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1. Wind Speed				
a. 10-Meter sensor	96.7	86.0	77.5	88.8
b. 60 Meter sensor	96.7	86.0	77.0	88.7
2. Wind Direction				
a. 10-Meter sensor	96.8	86.5	78.6	90.2
b. 60 Meter sensor	95.1	86.4	77.8	90.1
3. Temperature				
a. 10-Meter sensor	96.8	86.5	77.7	89.1
b. 60 Meter sensor	95.3	86.5	77.8	89.3
c. Temperature Difference (10m-60m)	95.2	86.3	78.8	89.6
4. Percent of hours for which valid 10-meter Wind Speed, Wind Direction, and Delta Temperature were available	96.4	86.3	78.2	89.4
5. Percent of hours for which valid 60-meter Wind Speed, Wind Direction, and Delta Temperature were available	95.6	86.3	77.9	89.4

Clinton Power Station achieved an 87% Meteorological Recoverable Data during the year which fell outside the minimum of 90% criteria as delineated in Regulatory Guide 1.23. This shortcoming has been documented on Condition Report 2-01-03-129. Although the backup meteorological tapes are being analyzed at the time of generating this report, an errata will be issued immediately upon any improvements toward exceeding the Regulatory Guide criteria.

TABLE 17

CLASSIFICATION OF ATMOSPHERIC STABILITY

Stability Classification	Pasquill Category	Defining Conditions
Extremely unstable	A	$-0.900<\Delta T\leq-0.019$
Moderately unstable	B	$-0.019<\Delta T\leq-0.017$
Slightly unstable	C	$-0.017<\Delta T\leq-0.015$
Neutral	D	$-0.015<\Delta T\leq-0.005$
Slightly stable	E	$-0.005<\Delta T< 0.015$
Moderately stable	F	$0.015<\Delta T< 0.040$
Extremely stable	G	$0.040<\Delta T< 0.900$
Invalid		$\Delta T\leq-0.900$ or $\Delta T>0.900$

ΔT = temperature difference in degrees Celsius per meter

TABLE 18

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Reporting Period: January 1, 2000 through December 31, 2000

The following table contains the joint wind frequency tables for CPS. The tables are segregated by detector height and quarter. All tabled values are hours.

TABLE 18

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: A **10 Meter Height** **Quarter: 1**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	2	0	0	0	0	2
SE	2	3	2	1	0	0	8
SSE	1	0	0	1	0	0	2
S	0	1	0	0	0	0	1
SSW	0	1	0	0	0	0	1
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	1	0	0	0	1
WNW	0	0	2	0	0	0	2
NW	0	0	1	1	0	0	2
NNW	0	0	0	0	0	0	0
TOTAL	3	7	6	3	0	0	19

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 106
VARIABLE DIRECTION 0

Stability Class: A **10 Meter Height** **Quarter: 2**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	4	3	2	0	0	9
NNE	0	0	3	4	0	0	7
NE	1	9	7	2	0	0	19
ENE	2	3	1	1	0	0	7
E	1	2	0	1	0	0	4
ESE	1	4	0	0	0	0	5
SE	1	6	1	2	0	0	10
SSE	4	3	2	3	0	1	13
S	0	11	23	6	3	0	43
SSW	0	10	16	3	0	0	29
SW	2	15	13	3	0	0	33
WSW	1	3	3	2	2	0	11
W	1	2	11	11	2	0	27
WNW	0	7	13	8	3	0	31
NW	0	5	9	3	0	0	17
NNW	0	2	1	2	0	0	5
TOTAL	14	86	106	53	10	1	270

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 292
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: A **10 Meter Height** **Quarter: 3**

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	2	0	0	0	2
NE	0	15	10	0	0	0	25
ENE	0	11	3	2	0	0	16
E	0	15	3	0	0	0	18
ESE	4	16	1	0	0	0	21
SE	0	15	6	1	0	0	22
SSE	1	17	5	0	0	0	23
S	0	17	18	1	0	0	36
SSW	2	13	14	0	0	0	29
SW	1	25	20	0	1	0	47
WSW	2	9	11	0	0	0	22
W	0	9	6	0	0	0	15
WNW	0	10	2	0	0	0	12
NW	0	5	9	1	0	0	15
NNW	0	0	2	0	0	0	2
TOTAL	10	177	112	5	1	0	305

PERIODS OF CALM(HOURS): 0 HOURS OF MISSING DATA: 466
VARIABLE DIRECTION 0

Stability Class: A **10 Meter Height** **Quarter: 4**

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	4	0	0	4
ENE	0	1	0	0	0	0	1
E	1	5	0	0	0	0	6
ESE	0	13	0	0	0	0	13
SE	1	6	2	0	0	0	9
SSE	1	5	0	0	0	0	6
S	0	7	4	1	0	0	12
SSW	0	2	21	2	0	0	25
SW	1	4	7	1	0	0	13
WSW	0	3	6	1	0	0	10
W	1	3	11	6	1	0	22
WNW	0	5	7	1	0	0	13
NW	0	1	9	1	0	0	11
NNW	0	0	1	1	0	0	2
TOTAL	5	55	68	18	1	0	147

PERIODS OF CALM(HOURS): 0 HOURS OF MISSING DATA: 216
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: B **10 Meter Height** **Quarter: 1**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	1	0	0	0	1
NE	0	1	1	0	0	0	2
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	2	0	0	0	0	2
SE	2	2	0	0	0	0	4
SSE	1	0	1	2	1	0	5
S	1	0	0	0	0	0	1
SSW	0	1	0	0	0	0	1
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	1	0	0	0	1
WNW	0	0	2	0	0	0	2
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	4	6	6	2	1	0	19

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 106
VARIABLE DIRECTION 0

Stability Class: B **10 Meter Height** **Quarter: 2**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	3	4	3	1	0	11
NNE	0	3	0	3	0	0	6
NE	2	1	1	0	0	0	4
ENE	1	2	2	1	0	0	6
E	0	1	1	0	0	0	2
ESE	2	1	0	0	0	0	3
SE	2	4	1	0	0	0	7
SSE	0	2	0	1	0	0	3
S	2	5	2	2	4	1	16
SSW	2	8	11	5	1	0	27
SW	1	1	8	2	1	0	13
WSW	1	1	3	1	0	0	6
W	1	3	3	1	0	0	8
WNW	0	1	8	1	0	0	10
NW	0	3	7	3	1	0	14
NNW	0	0	6	1	2	0	9
TOTAL	14	39	57	24	10	1	145

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 292
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: B **10 Meter Height** **Quarter: 3**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	7	6	0	0	0	13
ENE	1	4	1	0	0	0	6
E	2	1	0	0	0	0	3
ESE	1	5	0	0	0	0	6
SE	4	5	0	0	0	0	9
SSE	2	7	4	0	0	0	13
S	1	8	4	1	0	0	14
SSW	1	6	8	0	0	0	15
SW	1	10	0	0	0	0	11
WSW	1	2	6	0	0	0	9
W	0	3	2	0	0	0	5
WNW	1	7	0	0	0	0	8
NW	0	4	6	0	0	0	10
NNW	0	0	0	0	0	0	0
TOTAL	15	69	37	1	0	0	122

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 466
VARIABLE DIRECTION 0

Stability Class: B **10 Meter Height** **Quarter: 4**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	1	2	1	0	0	4
ENE	0	2	2	0	0	0	4
E	1	3	0	0	0	0	4
ESE	5	3	0	0	0	0	8
SE	0	5	2	0	0	0	7
SSE	0	4	7	0	0	0	11
S	1	1	2	1	0	0	5
SSW	0	3	6	1	0	0	10
SW	0	4	7	0	0	0	11
WSW	1	3	6	2	0	0	12
W	0	5	6	8	0	0	19
WNW	1	3	7	5	0	0	16
NW	0	3	6	2	0	0	11
NNW	0	0	1	0	0	0	1
TOTAL	9	40	54	20	0	0	123

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 216
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: C **10 Meter Height** **Quarter: 1**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	1	0	0	0	1
NNE	0	0	1	3	3	0	7
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	4	1	0	0	0	5
SE	0	4	4	0	0	0	8
SSE	0	4	2	2	0	0	8
S	0	0	1	0	0	0	1
SSW	1	0	0	0	0	0	1
SW	0	0	0	0	0	0	0
WSW	1	0	0	0	0	0	1
W	0	0	1	2	0	0	3
WNW	0	0	0	1	0	0	1
NW	1	0	0	0	0	0	1
NNW	0	0	0	0	0	0	0
TOTAL	3	12	11	8	3	0	37

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 106
VARIABLE DIRECTION 0

Stability Class: C **10 Meter Height** **Quarter: 2**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1	6	12	3	0	0	22
NNE	0	2	4	2	0	0	8
NE	0	2	2	0	0	0	4
ENE	1	1	3	0	0	0	5
E	0	0	0	0	0	0	0
ESE	3	1	1	0	0	0	5
SE	2	1	0	1	0	0	4
SSE	1	1	3	1	0	0	6
S	0	6	10	2	3	0	21
SSW	0	7	6	5	2	0	20
SW	1	2	8	3	0	0	14
WSW	0	3	0	0	0	0	3
W	0	1	8	0	0	0	9
WNW	0	1	6	2	0	0	9
NW	3	4	6	8	0	0	21
NNW	1	4	4	5	0	0	14
TOTAL	13	42	73	32	5	0	165

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 292
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: C **10 Meter Height** **Quarter: 3**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	1	1	0	0	2
NE	1	7	4	2	0	0	14
ENE	0	7	0	0	0	0	7
E	2	4	0	0	0	0	6
ESE	1	2	0	0	0	0	3
SE	1	5	2	0	0	0	8
SSE	2	5	4	0	0	0	11
S	0	4	7	0	0	0	11
SSW	1	2	3	1	0	0	7
SW	1	5	3	0	0	0	9
WSW	2	2	0	0	0	0	4
W	1	4	0	0	0	0	5
WNW	0	3	0	0	0	0	3
NW	0	4	1	0	0	0	5
NNW	0	1	1	0	0	0	2
TOTAL	12	55	26	4	0	0	97

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 466
VARIABLE DIRECTION 0

Stability Class: C **10 Meter Height** **Quarter: 4**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	1	1	0	0	2
NE	1	5	3	0	0	0	9
ENE	2	4	3	0	0	0	9
E	1	2	0	0	0	0	3
ESE	2	2	0	0	0	0	4
SE	0	4	6	0	0	0	10
SSE	0	4	4	0	0	0	8
S	1	2	2	0	0	0	5
SSW	0	2	7	0	0	0	9
SW	2	6	4	1	0	0	13
WSW	2	3	9	0	4	0	18
W	0	3	13	7	1	0	24
WNW	1	6	9	4	3	0	23
NW	0	9	3	5	0	0	17
NNW	0	2	1	0	0	0	3
TOTAL	12	54	65	18	8	0	157

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 216
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: D **10 Meter Height** **Quarter: 1**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	10	18	5	0	0	33
NNE	3	16	23	16	3	0	61
NE	2	16	18	5	4	0	45
ENE	5	3	4	0	0	0	12
E	2	7	0	0	0	0	9
ESE	10	33	7	0	0	0	50
SE	3	21	14	3	0	0	41
SSE	6	39	44	11	0	0	100
S	2	22	53	17	0	0	94
SSW	3	15	35	14	1	0	68
SW	4	4	4	1	0	0	13
WSW	2	1	1	0	0	0	4
W	3	3	20	16	3	0	45
WNW	2	7	40	37	10	0	96
NW	2	11	16	19	2	0	50
NNW	3	14	14	5	0	0	36
TOTAL	52	222	311	149	23	0	757

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 106
VARIABLE DIRECTION 0

Stability Class: D **10 Meter Height** **Quarter: 2**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	6	26	19	4	0	0	55
NNE	5	11	12	1	0	0	29
NE	2	12	9	1	0	0	24
ENE	2	8	8	2	0	0	20
E	6	16	3	0	0	0	25
ESE	7	10	2	0	0	0	19
SE	1	14	7	1	0	0	23
SSE	6	26	13	4	0	0	49
S	2	29	42	15	1	0	89
SSW	5	22	47	29	3	0	106
SW	5	14	19	8	1	1	48
WSW	1	13	11	2	0	0	27
W	5	16	8	4	1	0	34
WNW	2	10	13	10	1	0	36
NW	3	23	23	12	0	0	61
NNW	2	18	14	2	0	0	36
TOTAL	60	268	250	95	7	1	681

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 292
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: D **10 Meter Height** **Quarter: 3**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	11	28	1	0	0	40
NE	4	34	24	1	0	0	63
ENE	11	27	1	0	0	0	39
E	9	22	1	0	0	0	32
ESE	13	14	1	0	0	0	28
SE	3	33	10	0	0	0	46
SSE	8	34	23	0	0	0	65
S	0	32	21	5	0	0	58
SSW	1	24	12	1	0	0	38
SW	3	16	8	1	0	0	28
WSW	1	12	4	0	0	0	17
W	3	4	4	0	0	0	11
WNW	5	6	0	0	0	0	11
NW	2	8	5	0	0	0	15
NNW	0	5	5	0	0	0	10
TOTAL	63	282	147	9	0	0	501

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 466
VARIABLE DIRECTION 0

Stability Class: D **10 Meter Height** **Quarter: 4**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	3	10	11	1	0	0	25
NE	8	20	56	1	0	0	85
ENE	9	23	6	0	0	0	38
E	15	15	2	0	0	0	32
ESE	11	22	12	1	0	0	46
SE	12	27	16	0	0	0	55
SSE	4	15	11	0	0	0	30
S	3	16	27	7	0	0	53
SSW	4	19	33	1	0	0	57
SW	10	17	7	0	0	0	34
WSW	6	17	33	5	0	0	61
W	12	30	79	61	8	0	190
WNW	7	27	61	39	6	0	140
NW	2	23	19	7	0	0	51
NNW	1	6	10	2	0	0	19
TOTAL	107	287	383	125	14	0	916

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 216
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: E **10 Meter Height** **Quarter: 1**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	4	10	10	0	0	0	24
NNE	5	4	4	0	0	0	13
NE	3	13	3	1	0	0	20
ENE	11	16	5	0	0	0	32
E	9	17	3	0	0	0	29
ESE	10	17	2	0	0	0	29
SE	7	8	3	0	0	0	18
SSE	4	33	25	3	0	0	65
S	3	31	46	19	7	0	106
SSW	2	22	41	16	2	0	83
SW	0	11	20	5	0	0	36
WSW	3	11	14	5	0	0	33
W	4	16	34	14	1	0	69
WNW	4	31	20	6	2	0	63
NW	7	15	12	10	2	0	46
NNW	6	17	29	12	0	0	64
TOTAL	82	272	271	91	14	0	730

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 106
VARIABLE DIRECTION 0

Stability Class: E **10 Meter Height** **Quarter: 2**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	2	9	1	0	0	0	12
NNE	4	10	8	4	0	0	26
NE	6	11	2	0	0	0	19
ENE	8	10	1	0	0	0	19
E	5	9	0	0	0	0	14
ESE	16	2	1	0	0	0	19
SE	10	16	6	1	0	0	33
SSE	13	31	10	0	0	0	54
S	5	36	17	2	0	0	60
SSW	7	29	31	2	0	0	69
SW	4	10	8	1	0	0	23
WSW	5	8	3	1	0	0	17
W	5	16	6	1	0	0	28
WNW	1	7	7	1	0	0	16
NW	3	10	3	0	0	0	16
NNW	0	11	2	0	0	0	13
TOTAL	94	225	106	13	0	0	438

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 292
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: E **10 Meter Height** **Quarter: 3**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	6	15	0	0	0	0	21
NE	20	29	1	0	0	0	50
ENE	16	15	1	0	0	0	32
E	15	17	0	0	0	0	32
ESE	16	24	0	0	0	0	40
SE	7	32	2	0	0	0	41
SSE	13	42	2	0	0	0	57
S	7	65	7	1	0	0	80
SSW	5	33	11	0	0	0	49
SW	3	18	3	0	0	0	24
WSW	6	12	3	0	0	0	21
W	2	10	2	0	0	0	14
WNW	3	4	1	0	0	0	8
NW	2	10	0	0	0	0	12
NNW	2	12	2	0	0	0	16
TOTAL	123	338	35	1	0	0	497

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 466
VARIABLE DIRECTION 0

Stability Class: E **10 Meter Height** **Quarter: 4**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1	0	1	0	0	0	2
NNE	2	8	2	0	0	0	12
NE	5	9	2	0	0	0	16
ENE	4	6	0	0	0	0	10
E	12	15	2	0	0	0	29
ESE	15	5	1	0	0	0	21
SE	22	21	0	0	0	0	43
SSE	4	19	2	0	0	0	25
S	5	46	21	0	0	0	72
SSW	4	17	12	0	0	0	33
SW	7	14	1	0	0	0	22
WSW	4	24	6	0	0	0	34
W	4	11	8	0	0	0	23
WNW	2	18	12	0	0	0	32
NW	2	13	1	0	0	0	16
NNW	0	6	1	0	0	0	7
TOTAL	93	232	72	0	0	0	397

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 216
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: F **10 Meter Height** **Quarter: 1**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1	0	1	0	0	2
NNE	2	2	0	0	0	0	4
NE	6	6	5	0	0	0	17
ENE	2	24	16	1	0	0	43
E	5	16	11	0	0	0	32
ESE	1	3	1	0	0	0	5
SE	6	12	0	0	0	0	18
SSE	9	10	1	0	0	0	20
S	2	15	7	0	0	1	25
SSW	2	6	4	0	0	0	12
SW	2	13	14	4	0	0	33
WSW	4	7	17	13	3	0	44
W	4	14	0	2	0	0	20
WNW	3	14	5	0	0	0	23
NW	6	15	6	1	0	0	29
NNW	4	7	6	4	0	0	21
TOTAL	58	165	93	26	3	1	348

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 106
VARIABLE DIRECTION 0

Stability Class: F **10 Meter Height** **Quarter: 2**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	4	5	0	0	0	0	9
NNE	6	7	3	0	0	0	16
NE	5	4	0	0	0	0	9
ENE	2	0	0	0	0	0	2
E	4	1	0	0	0	0	5
ESE	2	0	0	0	0	0	2
SE	2	3	0	0	0	0	5
SSE	2	9	0	0	0	0	11
S	5	3	0	0	0	0	8
SSW	2	4	0	0	0	0	6
SW	2	3	0	0	0	0	5
WSW	2	7	1	0	0	0	10
W	1	3	1	0	0	0	5
WNW	5	2	0	0	0	0	7
NW	5	8	0	0	0	0	13
NNW	0	2	0	0	0	0	2
TOTAL	49	61	5	0	0	0	115

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 292
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: F **10 Meter Height** **Quarter: 3**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1	0	0	0	0	1
NNE	8	9	0	0	0	0	17
NE	14	5	0	0	0	0	19
ENE	8	1	0	0	0	0	9
E	10	1	0	0	0	0	11
ESE	8	1	0	0	0	0	9
SE	3	4	0	0	0	0	7
SSE	2	7	0	0	0	0	9
S	3	10	0	0	0	0	13
SSW	7	13	0	0	0	0	20
SW	4	4	0	0	0	0	8
WSW	3	1	0	0	0	0	4
W	4	0	0	0	0	0	4
WNW	1	1	0	0	0	0	2
NW	3	9	0	0	0	0	12
NNW	1	3	0	0	0	0	4
TOTAL	79	70	0	0	0	0	149

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 466
VARIABLE DIRECTION 0

Stability Class: F **10 Meter Height** **Quarter: 4**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	3	3	0	0	0	0	6
NE	8	7	0	0	0	0	15
ENE	2	6	0	0	0	0	8
E	4	1	0	0	0	0	5
ESE	8	0	0	0	0	0	8
SE	10	5	0	0	0	0	15
SSE	6	10	0	0	0	0	16
S	6	19	1	0	0	0	26
SSW	4	10	0	0	0	0	14
SW	3	4	0	0	0	0	7
WSW	0	4	0	0	0	0	4
W	4	10	0	0	0	0	14
WNW	6	3	0	0	0	0	9
NW	3	5	0	0	0	0	8
NNW	1	0	0	0	0	0	1
TOTAL	68	87	1	0	0	0	156

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 216
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: G **10 Meter Height** **Quarter: 1**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	3	2	0	0	0	0	5
NE	9	3	1	0	0	0	13
ENE	2	8	5	2	0	0	17
E	6	13	4	4	0	0	27
ESE	2	2	0	0	0	0	4
SE	5	3	0	0	0	0	8
SSE	5	3	0	0	0	0	8
S	0	3	0	0	0	0	3
SSW	0	0	0	0	0	0	0
SW	2	4	3	4	0	0	13
WSW	4	11	3	4	1	0	23
W	10	5	0	0	0	0	15
WNW	5	1	0	0	0	0	6
NW	3	16	1	0	0	0	20
NNW	2	3	1	0	0	0	6
TOTAL	58	77	18	14	1	0	168

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 106
VARIABLE DIRECTION 0

Stability Class: G **10 Meter Height** **Quarter: 2**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	2	2	0	0	0	0	4
NNE	2	3	0	0	0	0	5
NE	7	14	0	0	0	0	21
ENE	7	1	0	0	0	0	8
E	2	0	0	0	0	0	2
ESE	4	0	0	0	0	0	4
SE	3	3	0	0	0	0	6
SSE	1	2	0	0	0	0	3
S	1	2	0	0	0	0	3
SSW	1	2	0	0	0	0	3
SW	3	0	0	0	0	0	3
WSW	5	1	0	0	0	0	6
W	0	0	0	0	0	0	0
WNW	5	0	0	0	0	0	5
NW	0	4	0	0	0	0	4
NNW	1	0	0	0	0	0	1
TOTAL	44	34	0	0	0	0	78

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 292
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: G **10 Meter Height** **Quarter: 3**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	11	2	0	0	0	0	13
NE	11	1	0	0	0	0	12
ENE	2	0	0	0	0	0	2
E	4	0	0	0	0	0	4
ESE	3	0	0	0	0	0	3
SE	1	0	0	0	0	0	1
SSE	0	0	0	0	0	0	0
S	2	2	0	0	0	0	4
SSW	2	0	0	0	0	0	2
SW	5	0	0	0	0	0	5
WSW	5	0	0	0	0	0	5
W	0	0	0	0	0	0	0
WNW	9	2	0	0	0	0	11
NW	6	2	0	0	0	0	8
NNW	0	1	0	0	0	0	1
TOTAL	61	10	0	0	0	0	71

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 466
VARIABLE DIRECTION 0

Stability Class: G **10 Meter Height** **Quarter: 4**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	1	3	0	0	0	0	4
NE	9	6	0	0	0	0	15
ENE	4	0	0	0	0	0	4
E	4	0	0	0	0	0	4
ESE	5	0	0	0	0	0	5
SE	2	0	0	0	0	0	2
SSE	3	3	0	0	0	0	6
S	5	2	0	0	0	0	7
SSW	4	1	0	0	0	0	5
SW	6	5	0	0	0	0	11
WSW	6	1	0	0	0	0	7
W	6	0	0	0	0	0	6
WNW	4	2	0	0	0	0	6
NW	9	5	0	0	0	0	14
NNW	0	0	0	0	0	0	0
TOTAL	68	28	0	0	0	0	96

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 216
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: A **60 Meter Height** **Quarter: 1**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	1	1	1	0	0	0	3
SE	0	0	3	1	0	0	4
SSE	2	1	0	0	2	0	5
S	1	1	0	0	0	0	2
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	1	2	0	0	3
NW	0	0	0	2	0	0	2
NNW	0	0	0	0	0	0	0
TOTAL	4	3	5	5	2	0	19

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 143
VARIABLE DIRECTION 0

Stability Class: A **60 Meter Height** **Quarter: 2**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	5	1	0	0	6
NNE	0	2	4	3	1	0	10
NE	1	8	3	3	3	0	18
ENE	0	2	1	2	2	0	7
E	1	2	3	0	0	0	6
ESE	3	1	0	0	0	0	4
SE	2	6	1	3	1	1	14
SSE	2	1	1	0	4	2	10
S	0	6	15	13	8	1	43
SSW	1	7	16	5	1	1	31
SW	0	14	9	5	3	5	36
WSW	0	0	2	3	1	0	6
W	2	3	8	7	5	1	26
WNW	0	1	5	6	2	1	15
NW	0	3	7	8	6	0	24
NNW	0	2	4	4	4	0	14
TOTAL	12	58	84	63	41	12	270

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 293
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: A **60 Meter Height** **Quarter: 3**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	1	6	1	0	0	8
NE	0	6	9	5	0	0	20
ENE	0	7	12	4	0	0	23
E	0	11	7	0	0	0	18
ESE	3	10	0	1	0	0	14
SE	1	8	1	1	1	0	12
SSE	2	3	18	1	1	0	25
S	0	4	18	8	2	0	32
SSW	0	8	23	5	0	0	36
SW	1	11	28	9	0	0	49
WSW	1	7	11	3	0	0	22
W	0	7	7	3	0	0	17
WNW	0	5	4	1	0	0	10
NW	0	3	12	1	0	1	17
NNW	0	1	1	0	0	0	2
TOTAL	8	92	157	43	4	1	305

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 467
VARIABLE DIRECTION 0

Stability Class: A **60 Meter Height** **Quarter: 4**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	3	0	3
NE	0	0	0	0	1	0	1
ENE	0	0	2	0	0	0	2
E	0	6	3	1	0	0	10
ESE	0	7	5	0	0	0	12
SE	1	2	2	1	0	0	6
SSE	0	5	2	0	0	0	7
S	0	2	3	4	1	0	10
SSW	0	2	8	15	2	0	27
SW	0	2	3	6	1	0	12
WSW	0	1	5	3	1	0	10
W	1	1	9	5	3	4	23
WNW	1	0	3	5	1	0	10
NW	0	0	4	4	1	0	9
NNW	0	0	1	4	0	0	5
TOTAL	3	28	50	48	14	4	147

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 218
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: B **60 Meter Height** **Quarter: 1**

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	1	0	0	2	0	3
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	1	3	0	0	0	4
SE	2	0	0	0	0	0	2
SSE	0	0	0	1	0	2	3
S	0	2	0	0	0	0	2
SSW	0	0	0	0	0	0	0
SW	2	0	0	0	0	0	2
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	1	0	1
NW	0	0	0	2	0	0	2
NNW	0	0	0	0	0	0	0
TOTAL	4	4	3	3	3	2	19

PERIODS OF CALM(HOURS): 0 HOURS OF MISSING DATA: 143
VARIABLE DIRECTION 0

Stability Class: B **60 Meter Height** **Quarter: 2**

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1	4	6	1	1	13
NNE	0	1	1	2	0	0	4
NE	0	2	1	2	0	0	5
ENE	0	2	3	1	2	0	8
E	0	2	0	0	0	0	2
ESE	0	3	0	0	0	0	3
SE	2	2	1	0	0	0	5
SSE	1	1	3	0	0	0	5
S	1	2	2	4	4	6	19
SSW	3	2	7	10	1	1	24
SW	0	2	8	2	2	0	14
WSW	0	1	0	2	1	0	4
W	0	1	2	1	1	0	5
WNW	1	3	2	3	2	0	11
NW	0	1	6	4	2	0	13
NNW	1	1	1	4	2	1	10
TOTAL	9	27	41	41	18	9	145

PERIODS OF CALM(HOURS): 0 HOURS OF MISSING DATA: 293
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: B **60 Meter Height** **Quarter: 3**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	1	1	0	0	0	2
NE	0	4	2	2	3	0	11
ENE	0	3	1	1	0	0	5
E	0	2	3	0	0	0	5
ESE	0	4	0	0	0	0	4
SE	5	5	1	0	0	0	11
SSE	1	2	6	1	1	0	11
S	0	1	6	1	1	0	9
SSW	1	6	7	3	0	0	17
SW	1	4	4	2	0	0	11
WSW	1	2	6	1	0	0	10
W	0	2	4	0	0	0	6
WNW	0	6	1	0	0	0	7
NW	0	2	3	2	0	0	7
NNW	0	2	3	1	0	0	6
TOTAL	9	46	48	14	5	0	122

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 467
VARIABLE DIRECTION 0

Stability Class: B **60 Meter Height** **Quarter: 4**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	0	0	1	0	1
NE	0	0	2	1	1	0	4
ENE	0	0	1	2	0	0	3
E	0	3	3	0	0	0	6
ESE	0	4	2	0	0	0	6
SE	0	5	2	3	0	0	10
SSE	0	2	0	5	1	0	8
S	0	2	0	1	2	0	5
SSW	0	0	3	5	1	0	9
SW	0	0	4	5	1	0	10
WSW	1	0	6	5	2	0	14
W	1	0	6	4	3	6	20
WNW	0	1	4	6	3	0	14
NW	0	1	5	3	2	0	11
NNW	0	0	2	0	0	0	2
TOTAL	2	18	40	40	17	6	123

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 218
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: C **60 Meter Height** **Quarter: 1**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	2	0	0	2
NNE	0	0	0	0	5	1	6
NE	0	0	0	0	0	0	0
ENE	1	0	0	0	0	0	1
E	0	0	1	0	0	0	1
ESE	0	6	1	0	0	0	7
SE	0	2	4	0	0	0	6
SSE	0	0	2	3	1	1	7
S	0	1	1	0	0	0	2
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	1	0	0	0	0	0	1
W	0	0	0	1	2	0	3
WNW	0	0	0	1	0	0	1
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	2	9	9	7	8	2	37

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 143
VARIABLE DIRECTION 0

Stability Class: C **60 Meter Height** **Quarter: 2**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	4	11	6	0	0	21
NNE	0	0	4	2	2	0	8
NE	1	1	1	1	1	0	5
ENE	0	1	1	0	3	0	5
E	0	2	0	0	0	0	2
ESE	0	1	1	0	0	0	2
SE	0	3	0	1	1	0	5
SSE	0	2	1	0	0	0	3
S	0	3	5	6	4	3	21
SSW	0	0	12	7	4	2	25
SW	0	2	4	6	1	0	13
WSW	1	0	1	0	0	0	2
W	0	0	7	3	0	0	10
WNW	0	2	1	5	2	0	10
NW	4	3	1	5	1	0	14
NNW	0	1	0	11	6	0	18
TOTAL	6	25	50	53	25	5	164

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 293
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: C **60 Meter Height** **Quarter: 3**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	1	3	2	0	6
NE	0	5	2	1	1	0	9
ENE	0	6	1	0	0	0	7
E	0	5	1	0	0	0	6
ESE	0	2	1	0	0	0	3
SE	0	3	2	1	0	0	6
SSE	2	3	3	3	0	0	11
S	0	3	2	3	1	0	9
SSW	0	3	6	2	0	0	11
SW	0	4	6	0	0	0	10
WSW	1	0	1	0	0	0	2
W	1	2	3	0	0	0	6
WNW	0	1	1	0	0	0	2
NW	0	2	4	0	0	0	6
NNW	0	1	1	1	0	0	3
TOTAL	4	40	35	14	4	0	97

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 467
VARIABLE DIRECTION 0

Stability Class: C **60 Meter Height** **Quarter: 4**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	1	1	2	2	0	6
NE	0	0	4	1	1	0	6
ENE	0	1	5	2	0	0	8
E	0	1	3	0	0	0	4
ESE	0	2	1	0	0	0	3
SE	0	4	0	4	2	0	10
SSE	0	2	2	2	1	0	7
S	0	3	1	1	0	0	5
SSW	0	1	1	7	1	0	10
SW	1	3	5	5	1	0	15
WSW	1	0	1	8	0	4	14
W	0	3	6	8	4	4	25
WNW	0	2	5	9	0	1	17
NW	0	4	4	2	7	3	20
NNW	0	2	5	0	0	0	7
TOTAL	2	29	44	51	19	12	157

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 218
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: D **60 Meter Height** **Quarter: 1**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1	14	29	19	2	0	65
NNE	0	3	15	18	8	5	49
NE	4	10	20	9	5	1	49
ENE	0	0	2	0	0	0	2
E	1	6	8	0	0	0	15
ESE	5	24	12	1	0	0	42
SE	4	7	20	4	2	0	37
SSE	1	12	25	30	17	4	89
S	0	11	26	52	15	4	108
SSW	2	9	16	37	7	0	71
SW	0	7	4	3	2	0	16
WSW	1	0	0	0	0	0	1
W	1	5	7	19	10	1	43
WNW	1	4	9	35	13	2	64
NW	1	8	9	38	15	3	74
NNW	0	8	9	10	2	0	29
TOTAL	22	128	211	275	98	20	754

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 143
VARIABLE DIRECTION 0

Stability Class: D **60 Meter Height** **Quarter: 2**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	2	18	23	12	3	0	58
NNE	3	5	9	7	2	0	26
NE	1	4	12	8	0	0	25
ENE	0	1	6	10	3	0	20
E	3	4	2	11	1	0	21
ESE	2	10	5	2	0	0	19
SE	1	6	9	4	3	0	23
SSE	2	7	16	14	4	0	43
S	1	2	40	49	20	3	115
SSW	2	7	25	32	16	10	92
SW	1	6	19	16	6	0	48
WSW	0	8	9	5	1	0	23
W	3	11	11	5	2	3	35
WNW	0	2	11	10	2	0	25
NW	2	13	13	17	5	0	50
NNW	2	14	26	12	3	1	58
TOTAL	25	118	236	214	71	17	681

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 293
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: D **60 Meter Height** **Quarter: 3**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	6	7	25	4	0	42
NE	2	7	13	26	6	0	54
ENE	2	15	23	4	0	0	44
E	2	15	14	2	0	0	33
ESE	3	10	5	2	0	0	20
SE	4	11	15	2	2	0	34
SSE	1	9	30	19	3	0	62
S	0	8	38	17	8	1	72
SSW	0	7	18	11	0	1	37
SW	0	4	17	12	1	0	34
WSW	1	1	12	5	0	0	19
W	0	6	3	1	0	0	10
WNW	0	3	3	0	0	0	6
NW	1	4	5	6	0	0	16
NNW	2	5	7	2	1	0	17
TOTAL	18	111	210	134	25	2	500

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 467
VARIABLE DIRECTION 0

Stability Class: D **60 Meter Height** **Quarter: 4**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1	1	1	0	0	3
NNE	1	4	9	12	4	1	31
NE	1	7	19	18	32	1	78
ENE	3	10	8	16	3	0	40
E	1	11	11	3	4	0	30
ESE	6	12	19	11	0	0	48
SE	5	13	22	6	3	0	49
SSE	2	2	10	4	4	0	22
S	1	2	15	16	21	0	55
SSW	0	7	13	26	8	0	54
SW	2	7	16	9	1	0	35
WSW	2	10	11	35	10	1	69
W	7	16	22	55	63	20	183
WNW	2	9	14	46	26	9	106
NW	0	11	22	26	12	4	75
NNW	0	8	8	15	6	1	38
TOTAL	33	130	220	299	197	37	916

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 218
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: E **60 Meter Height** **Quarter: 1**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	5	7	18	14	1	0	45
NNE	1	2	7	1	0	0	11
NE	0	3	7	6	1	0	17
ENE	0	5	15	2	0	0	22
E	1	8	25	8	0	0	42
ESE	3	12	7	1	0	0	23
SE	1	7	4	1	2	0	15
SSE	1	5	11	29	8	0	54
S	2	7	17	50	23	11	110
SSW	1	7	14	44	20	3	89
SW	0	3	24	16	6	0	49
WSW	3	0	7	7	4	0	21
W	0	10	22	37	6	2	77
WNW	0	0	20	17	2	0	39
NW	1	7	18	18	4	0	48
NNW	0	5	13	19	6	0	43
TOTAL	19	88	229	270	83	16	705

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 143
VARIABLE DIRECTION 0

Stability Class: E **60 Meter Height** **Quarter: 2**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	3	9	1	0	0	13
NNE	2	3	9	8	7	1	30
NE	0	1	4	9	0	0	14
ENE	1	3	11	8	0	0	23
E	0	0	9	7	0	0	16
ESE	5	13	2	1	0	0	21
SE	1	6	5	2	0	0	14
SSE	0	5	35	16	0	0	56
S	2	6	30	34	5	0	77
SSW	0	5	27	28	5	0	65
SW	0	5	7	14	1	0	27
WSW	1	0	9	3	0	0	13
W	0	0	9	7	1	0	17
WNW	0	4	7	5	1	0	17
NW	1	3	7	7	0	0	18
NNW	1	1	12	3	0	0	17
TOTAL	14	58	192	153	20	1	438

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 293
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: E **60 Meter Height** **Quarter: 3**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1	4	3	0	0	8
NNE	2	4	12	3	0	0	21
NE	2	5	19	17	0	0	43
ENE	0	6	16	7	0	0	29
E	1	3	18	10	0	0	32
ESE	3	14	11	1	0	0	29
SE	1	10	22	4	0	0	37
SSE	1	8	41	7	1	0	58
S	0	4	48	34	2	1	89
SSW	0	3	27	17	0	0	47
SW	0	3	15	14	0	0	32
WSW	1	6	11	8	0	0	26
W	1	4	5	3	0	0	13
WNW	0	2	3	3	0	0	8
NW	0	3	2	0	0	0	5
NNW	0	3	14	3	0	0	20
TOTAL	12	79	268	134	3	1	497

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 467
VARIABLE DIRECTION 0

Stability Class: E **60 Meter Height** **Quarter: 4**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	6	9	1	0	16
NE	1	0	6	4	0	0	11
ENE	0	4	1	6	0	0	11
E	0	6	7	12	7	0	32
ESE	0	17	7	1	0	0	25
SE	1	5	14	5	0	0	25
SSE	0	2	21	13	5	0	41
S	0	2	9	38	7	0	56
SSW	0	0	12	21	5	0	38
SW	1	3	8	8	1	0	21
WSW	0	5	15	20	0	0	40
W	2	4	6	10	1	0	23
WNW	0	1	5	14	0	0	20
NW	0	0	13	12	0	0	25
NNW	0	3	5	3	0	0	11
TOTAL	5	52	135	176	27	0	395

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 218
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: F **60 Meter Height** **Quarter: 1**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	6	3	3	0	0	12
NNE	1	2	2	1	0	0	6
NE	0	0	6	5	1	0	12
ENE	0	0	7	25	2	0	34
E	4	0	15	22	4	0	45
ESE	3	2	2	1	0	0	8
SE	0	3	0	1	0	0	4
SSE	2	2	3	8	1	0	16
S	1	4	6	14	2	1	28
SSW	1	2	8	9	0	0	20
SW	1	2	7	17	6	0	33
WSW	0	0	11	22	7	2	42
W	0	1	9	3	2	0	15
WNW	1	6	8	2	0	0	17
NW	1	2	13	6	0	0	22
NNW	0	2	14	9	3	0	28
TOTAL	15	34	114	148	28	3	342

PERIODS OF CALM(HOURS): 0 HOURS OF MISSING DATA: 143
VARIABLE DIRECTION 0

Stability Class: F **60 Meter Height** **Quarter: 2**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	3	5	1	0	0	9
NNE	0	0	3	9	0	0	12
NE	0	2	2	3	1	0	8
ENE	0	3	2	1	0	0	6
E	0	2	1	0	0	0	3
ESE	1	0	2	0	0	0	3
SE	0	1	3	0	0	0	4
SSE	1	0	5	0	0	0	6
S	0	3	7	6	0	0	16
SSW	0	1	5	2	0	0	8
SW	0	1	2	3	0	0	6
WSW	0	0	5	4	0	0	9
W	0	2	0	2	0	0	5
WNW	0	1	2	0	0	0	3
NW	0	3	2	0	0	0	5
NNW	0	3	7	2	0	0	12
TOTAL	2	25	53	33	1	0	115

PERIODS OF CALM(HOURS): 0 HOURS OF MISSING DATA: 293
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: F **60 Meter Height** **Quarter: 3**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	2	0	0	2
NNE	0	2	6	5	0	0	13
NE	0	2	4	3	0	0	9
ENE	0	4	11	4	0	0	19
E	1	5	4	1	0	0	11
ESE	3	7	1	0	0	0	11
SE	0	4	3	0	0	0	7
SSE	0	1	0	1	0	0	2
S	0	1	12	4	0	0	17
SSW	0	3	5	3	0	0	11
SW	1	5	0	13	0	0	19
WSW	1	2	2	0	0	0	5
W	1	1	2	0	0	0	4
WNW	0	1	1	0	0	0	2
NW	0	0	3	2	0	0	5
NNW	1	1	7	3	0	0	12
TOTAL	8	39	61	41	0	0	149

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 467
VARIABLE DIRECTION 0

Stability Class: F **60 Meter Height** **Quarter: 4**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	2	0	0	0	0	2
NNE	0	0	1	4	0	0	5
NE	0	0	2	9	0	0	11
ENE	0	1	2	7	0	0	10
E	0	1	2	0	0	0	3
ESE	1	4	6	0	0	0	11
SE	0	0	7	1	0	0	8
SSE	0	0	8	2	0	0	10
S	0	0	13	18	0	0	31
SSW	0	1	3	11	1	0	16
SW	1	2	0	8	0	0	11
WSW	1	1	2	2	0	0	6
W	0	1	3	7	0	0	11
WNW	1	0	9	1	0	0	11
NW	1	0	3	0	0	0	4
NNW	0	1	4	1	0	0	6
TOTAL	5	14	65	71	1	0	156

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 218
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: G **60 Meter Height** **Quarter: 1**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1	2	0	0	0	3
NNE	0	2	0	1	0	0	3
NE	0	1	2	0	0	0	3
ENE	0	1	4	12	3	0	20
E	0	1	4	15	7	0	27
ESE	4	4	3	0	0	0	11
SE	1	1	1	1	0	0	4
SSE	0	2	1	1	0	0	4
S	0	0	7	5	0	0	12
SSW	0	2	0	2	0	0	4
SW	0	0	0	4	2	0	6
WSW	0	2	3	8	7	3	23
W	1	4	2	3	0	0	10
WNW	2	2	2	0	0	0	6
NW	0	3	7	1	0	0	11
NNW	2	6	5	5	0	0	18
TOTAL	10	32	43	58	19	3	165

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 143
VARIABLE DIRECTION 0

Stability Class: G **60 Meter Height** **Quarter: 2**

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	3	0	1	0	0	0	4
NNE	0	1	3	2	0	0	6
NE	1	1	1	9	1	0	13
ENE	1	1	6	1	0	0	9
E	0	1	6	0	0	0	7
ESE	1	3	1	0	0	0	5
SE	0	2	1	0	0	0	3
SSE	0	4	2	0	0	0	6
S	0	0	1	0	0	0	1
SSW	0	1	2	1	0	0	4
SW	0	0	4	1	0	0	5
WSW	0	1	0	0	0	0	1
W	0	0	2	0	0	0	2
WNW	0	1	2	0	0	0	3
NW	0	0	2	0	0	0	2
NNW	2	1	4	0	0	0	7
TOTAL	8	17	38	14	1	0	78

PERIODS OF CALM (HOURS): 0 HOURS OF MISSING DATA: 293
VARIABLE DIRECTION 0

TABLE 18 (cont'd)
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

Stability Class: G **60 Meter Height** **Quarter: 3**

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	1	0	0	1
NNE	0	0	3	2	0	0	5
NE	0	1	7	7	0	0	15
ENE	0	0	7	0	0	0	7
E	0	0	5	1	0	0	6
ESE	1	3	0	0	0	0	4
SE	0	1	2	0	0	0	3
SSE	0	0	0	0	0	0	0
S	0	1	1	0	0	0	2
SSW	0	1	1	1	0	0	3
SW	0	1	2	0	0	0	3
WSW	0	0	3	0	0	0	3
W	2	2	0	0	0	0	4
WNW	1	1	0	0	0	0	2
NW	1	3	1	0	0	0	5
NNW	0	6	2	0	0	0	8
TOTAL	5	20	34	12	0	0	71

PERIODS OF CALM(HOURS): 0 HOURS OF MISSING DATA: 467
VARIABLE DIRECTION 0

Stability Class: G **60 Meter Height** **Quarter: 4**

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	0	0	0	0	0
NNE	0	0	1	2	0	0	3
NE	0	0	3	6	0	0	9
ENE	0	0	2	0	0	0	2
E	0	0	5	1	0	0	6
ESE	0	5	3	0	0	0	8
SE	0	1	5	0	0	0	6
SSE	0	0	2	0	0	0	2
S	0	1	0	3	0	0	4
SSW	0	1	6	5	0	0	12
SW	0	0	0	3	0	0	3
WSW	0	0	3	9	0	0	12
W	1	1	3	0	0	0	5
WNW	0	2	1	0	0	0	3
NW	1	3	10	1	0	0	15
NNW	0	3	3	0	0	0	6
TOTAL	2	17	47	30	0	0	96

PERIODS OF CALM(HOURS): 0 HOURS OF MISSING DATA: 218
VARIABLE DIRECTION 0

SECTION 8
ODCM OPERATIONAL REQUIREMENT REPORTS

In accordance with ODCM sections 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 Radioactive Effluent Release Report.

During 2000, there were 3 instances when both radioactive liquid and gaseous effluent instrumentation channels were inoperable for more than 30 days. These instances are documented on the following pages.

1RIX-PR039 Shutdown Service Water Monitor

1RIX-PR039 Shutdown Service Water (SX) liquid process radiation monitor (PRM) was inoperable for 30.2 days.

Chronology:

On February 11, 2000 at 0230 hours, 1RIX-PR039 was declared inoperable due to the sample channel periodically cycling in and out of ALERT status.

On February 14, 2000 Condition Report (CR) 2-00-02-073-0 was written to document an unplanned entry into the ODCM due to the inoperability of 1RIX-PR039.

Prior to this event, an existing Maintenance Work Request (MWR) F16058 was generated on February 2, 2000 documenting numerous ALERT alarms over several weeks associated with 1RIX-PR039.

Troubleshooting resulted in the replacement of a new detector and when the monitor was restored Plant Operations was notified on March 11, 2000.

The monitor was declared operable on March 12, 2000 at 6:45 hours.

0RIX-PR002 Station HVAC Monitor

0RIX-PR002 Station HVAC gaseous process radiation monitor was inoperable for 68.2 days.

Chronology:

On January 27, 2000 at 8:45 hours, 0RIX-PR002 was declared inoperable due to the high range noble gas channel (#7) reading zero without the accompanying low-fail alarm condition. MWR #F18009 was generated on January 27, 2000 documenting this condition.

On February 11, 2000 CR #2-00-02-067-0 was written to document the placing of 0RIX-PR002 into service with the Main Control Room personnel unaware of 0RIX-PR002 being restrained by MWR F18009 and otherwise being inoperable.

After successful troubleshooting, both a channel functional test and source check surveillance were completed satisfactory. The monitor was restored and Plant Operations notified on March 30, 2000.

The monitor was declared operable on April 4, 2000 at 13:10 hours.

0RIX-PR002 Station HVAC Monitor

0RIX-PR002 Station HVAC process radiation monitor was inoperable for 64.9 days.

Chronology:

On September 30, 2000 at 18:28 hours, 0RIX-PR002 was declared inoperable due to the high range noble gas channel (#7) failing a source check surveillance. Maintenance Work Request F20910 was generated the same day documenting this condition.

On September 30, 2000 CR #2-00-09-115-0 was written to document the failed source check for 0RIX-PR002.

Troubleshooting revealed that a wire on a solder cup for the Digital Acquisition Module (DAM) was making intermittent contact. The wire was resoldered and the monitor was restored and Plant Operations notified on November 30, 2000.

The monitor was declared operable on December 3, 2000 at 18:03 hours.

SECTION 9
CHANGES TO RADIOACTIVE WASTE TREATMENT SYSTEMS

In accordance with the CPS ODCM section 7.2, licensee-initiated changes to the liquid, gaseous or solid radioactive waste treatment systems shall be reported in the Radioactive Effluent Release Report.

No changes to the Waste Treatment Systems were implemented during this reporting period.

SECTION 10
NEW LOCATIONS FOR DOSE CALCULATION AND/OR ENVIRONMENTAL MONITORING

The following is a summary of the 2000 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 instead of the name. This is being done to maintain the privacy of the residents.

1.0 Nearest Residence

The nearest resident identified in each of the 16 sectors are shown below. Changes are noted with an asterisk (*).

SECTOR	2000 RESIDENT (km)	AGE GROUP	1999 RESIDENT (km)	AGE GROUP
N	1.50	T A	1.50	T A
NNE	1.59	A	1.59	A
NE	2.07	C A	2.07	T A
ENE	2.86	A	2.86	A
E	1.67	A	1.67	A
ESE	5.14	C A	5.14	C A
SE	4.44	A	4.44	C A
SSE	2.90	A	2.90	A
S	4.78	A	4.78	A
SSW	4.68	A	4.68	A
SW	1.17	A	1.17	A
WSW	2.52	A	2.52	A
W	2.63	T A	2.63	T A
WNW	2.63	T A	2.63	A
NW	2.65	T A	2.65	T A
NNW	2.78	A	2.78	A

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

2.0 Broadleaf Garden Census

Over 100 gardens within 5 miles were located in the 16 sectors surrounding CPS. Specifically broad leaf vegetation was identified for this report. Other crops grown in this area were identified but will not be addressed in this report.

The nearest garden identified in each of the 16 sectors are shown below. Changes are noted with an asterisk (*).

	SECTOR	2000 GARDENS (km)	AGE GROUPS	1999 GARDENS (km)	AGE GROUPS
	N	1.50	T A	1.50	T A
*	NNE	4.61	A	3.76	A
	NE	3.46	A	3.46	T A
	ENE	4.22	A	4.22	A
*	E	1.67	A	3.95	A
	ESE	5.30	C A	5.30	C A
	SE	NONE	N/A	NONE	N/A
	SSE	4.45	C A	4.45	C A
*	S	4.84	A	6.60	A
*	SSW	>8	N/A	5.14	A
*	SW	5.87	A	5.61	C A
	WSW	3.62	A	3.62	A
	W	2.63	T A	2.63	T A
*	WNW	2.63	A	2.64	A
*	NW	4.70	C A	3.11	A
*	NNW	3.76	A	4.17	A

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

3.0 Milking Animal Census

Milking animals within 5 miles were located in 11 of the 16 sectors surrounding CPS. The cattle were used for nursing (nursing of calves) and were being used for meat production (both own use and to be sold). There were no residents that milked their animals for human consumption.

Milking animals were specifically identified for this report. Other livestock raised in this area were identified but will not be addressed in this report.

The nearest milking animals identified in each of the 16 sectors are shown below. Changes are noted with an asterisk (*).

	SECTOR	2000 MILKING ANIMALS (km)	AGE GROUPS	1999 MILKING ANIMALS (km)	AGE GROUPS
	N	1.50	T A	1.50	T A
	NNE	2.05	A	2.05	A
*	NE	5.53	A	3.46	T A
	ENE	7.74	A	7.74	A
*	E	1.67	A	NONE	N/A
	ESE	NONE	N/A	NONE	N/A
	SE	NONE	N/A	NONE	N/A
	SSE	NONE	N/A	NONE	N/A
	S	NONE	N/A	NONE	N/A
*	SSW	5.47	A	5.28	A
	SW	5.87	A	5.87	A
	WSW	5.53	A	5.53	A
*	W	3.31	T A	NONE	N/A
	WNW	NONE	N/A	NONE	N/A
	NW	3.85	A	3.85	A
	NNW	2.05	A	3.85	A

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

SECTION 11
CORRECTIONS TO DATA REPORTED IN PREVIOUS REPORTS

There are two corrections to the 1999 Effluent Report.

1. The statement in section 2, page 9 states "The radiation dose to people in the area surrounding CPS is calculated for each release using the concentrations of radioactive material and the weather conditions present at the time of the release" is inaccurate. The sentence should have been worded to indicate that annual average meteorological data is used at the time of the release to calculate radiation doses.

2. Table 2, page 17, footnote (1) references 10 CFR20 Appendix B, Column 2, but it should have referenced Column 1.

SECTION 12
CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

CPS is required to report any changes to the Offsite Dose Calculation Manual. One revision to the ODCM was issued in 2000 and is included in this section.