PP&L Pennsylvania Power & Light Company
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FEB 29 1988

Mr. William T. Russell
Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
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SUSQUEHANNA STEAM ELECTRIC STATION
SEMI-ANNUAL RADIOACTIVE EFFLUENT
RELEASE REPORT
PLA-2993 FILE R41-2A

Docket Nos. 50-387/NPF-14
and 50-388/NPF-22

Dear Mr. Russell:

In accordance with 10CFR50.36a(a)(2) and the Susquehanna SES Unit 1 and 2 Technical Specifications, attached is the Semi-Annual Radioactive Effluent Release Report for SSES Units 1 and 2 covering the period July 1 through December 31, 1987.

Very truly yours,

H. W. Keiser
Vice President-Nuclear Operations

Attachment

cc: NRC Document Control Desk (original)
NRC Region I
Mr. F. I. Young, NRC Resident Inspector
Mr. M. C. Thadani, NRC Project Manager

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SUSQUEHANNA STEAM ELECTRIC STATION
SEMIANNUAL EFFLUENT & WASTE DISPOSAL REPORT
DATA PERIOD: JULY – DECEMBER 1987

Pennsylvania Power and Light Company
Two North Ninth Street
Allentown, Pennsylvania 18101

February 1988

SUSQUEHANNA STEAM ELECTRIC STATION
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
REPORT PERIOD: 07/01/87 - 12/31/87

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Pennsylvania Power & Light Company
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SECTION 1

INTRODUCTION AND SUPPLEMENTAL INFORMATION

INTRODUCTION

The Susquehanna Steam Electric Station (SSES) is located in Salem Township, Luzerne County, Pennsylvania. It is on the west bank of the Susquehanna River, 8 km northeast of Berwick. The Station consists of two boiling water reactor generating units, each with 1,050 MW net electrical capacity. The reactor and generating units were supplied by General Electric, while the Bechtel Corporation served as architect-engineer and constructor.

Construction of the Station began in the early 1970s. Fuel load began in Unit 1 in July of 1982. Initial criticality was achieved in the Unit 1 reactor on September 10, 1982. The reactor reached 100% power for the first time on February 4, 1983. Commercial operation of Unit 1 was declared on June 8, 1983. Initial criticality of Unit 2 occurred on May 8, 1984. Unit 2 was declared commercial on February 12, 1985.

Airborne effluents are released from the Susquehanna Station via five rooftop vents on the reactor building (see Figure 1). Each vent is continuously monitored, and a program of periodic sampling and analysis is conducted as specified in the plant Technical Specifications. All waterborne effluents are released in batch mode and are sampled and analyzed prior to release. Waterborne effluents from the site are released into the cooling tower blowdown line for dilution prior to release to the Susquehanna River (See Figure 2). Blowdown line flow rates are at least 5,000 gpm during periods of liquid radwaste release. The diluted effluent is introduced to the river by way of a perforated diffuser pipe placed on the river bed. The diffuser serves to rapidly and uniformly mix the station discharge with the main flow of the river.

This report presents a summary of the quantities of radioactive materials which were released from the Susquehanna Steam Electric Station during the period from July 1, 1987 to December 31, 1987. In addition, this report serves as a medium for notifying the US Nuclear Regulatory Commission staff of changes to PP&L's Offsite Dose Calculation Manual (ODCM) and Solid Waste Process Control Program (PCP) and documentation of any exceptions to the SSES effluent monitoring program which must be reported per Technical Specifications 3.3.7.10 and 3.3.7.11.

Table 1 contains supplemental information pertaining to effluents from the Susquehanna plant. Included are regulatory limits, sampling and analysis methods, and characterization of the number and duration of batch and abnormal releases, if any.

Table 2 contains a summation of all airborne releases, grouped into the radionuclide categories of gases, particulates, iodines, and tritium. Average release rates are presented and compared to the applicable limits. Table 3 presents the totals of specific radionuclides in airborne effluents.

Waterborne effluents are summarized in Table 4. Average diluted concentrations are presented and compared to the applicable limits. Table 5 presents the release quantities of specific radionuclides in waterborne effluents over the report period. Figure 4 presents the monthly discharge totals of liquid radwaste from SSES during 1987.

Tables 6 through 9 present a characterization of the solid radioactive waste shipped off site during the report period. Included are the volumes and curie contents associated with each type of solid waste. An estimate of major nuclide composition is presented for each waste type, as well as the number of waste shipments from the site, how they were transported, and their final destination.

Table 10 contains estimates of the errors associated with the measurements involved in quantifying effluents. Sampling errors, counting errors, and errors associated with determining effluent flow rates and volumes all contribute to the total error of effluent measurements. Error estimates are presented for each category of radionuclide detected in airborne and waterborne effluents and solid wastes during the report period.

Table 11 presents effluent data from previous report periods which was not available at preparation time for the associated semiannual report.

Section 3 of this report contains the meteorological data associated with the year 1987. Availability data for the SSES meteorological data are shown in Table 12. Meteorological data for the calendar year 1987 is presented in the form of joint wind frequency distributions by atmospheric stability class. These distributions are presented in Table 13. Figures 5 and 6 are wind rose plots for the SSES primary meteorological 10 meter and 60 meter sensors, respectively. Figure 7 presents the relative prevalences of the Pasquill stability classes for 1987. In addition, the meteorological data from the report year were used to generate annual average relative concentrations (X/Qs) and deposition rates (D/Qs). These values are presented in Table 14, and are required input for use of the GASPAR code for calculation of the doses resulting from airborne releases.

Section 4 of this report contains an assessment of the calculated doses attributed to the reported radiological effluents. The LADTAP II code was used for calculation of doses from waterborne effluents. The GASPAR code was used for calculation of doses from airborne effluents. The calculated doses and direct radiation estimates can be used to estimate the doses to maximally exposed members of the public. Table 15 summarizes maximum calculated doses and dose commitments to members of the public from waterborne and airborne effluents and direct radiation.

Section 5 of this report is reserved for documentation of changes to the Offsite Dose Calculation Manual and the Solid Waste Process Control Program.

Section 6 presents a listing of cases (if any) in which airborne or waterborne effluent monitoring instrumentation was declared inoperable and was not restored to operability within the time period specified in Technical Specification Table 3.3.7.10-1 or 3.3.7.11-1 Action Statements.

FIGURE 1 AIRBORNE EFFLUENT RELEASE POINTS- LOCATION AND DETAIL

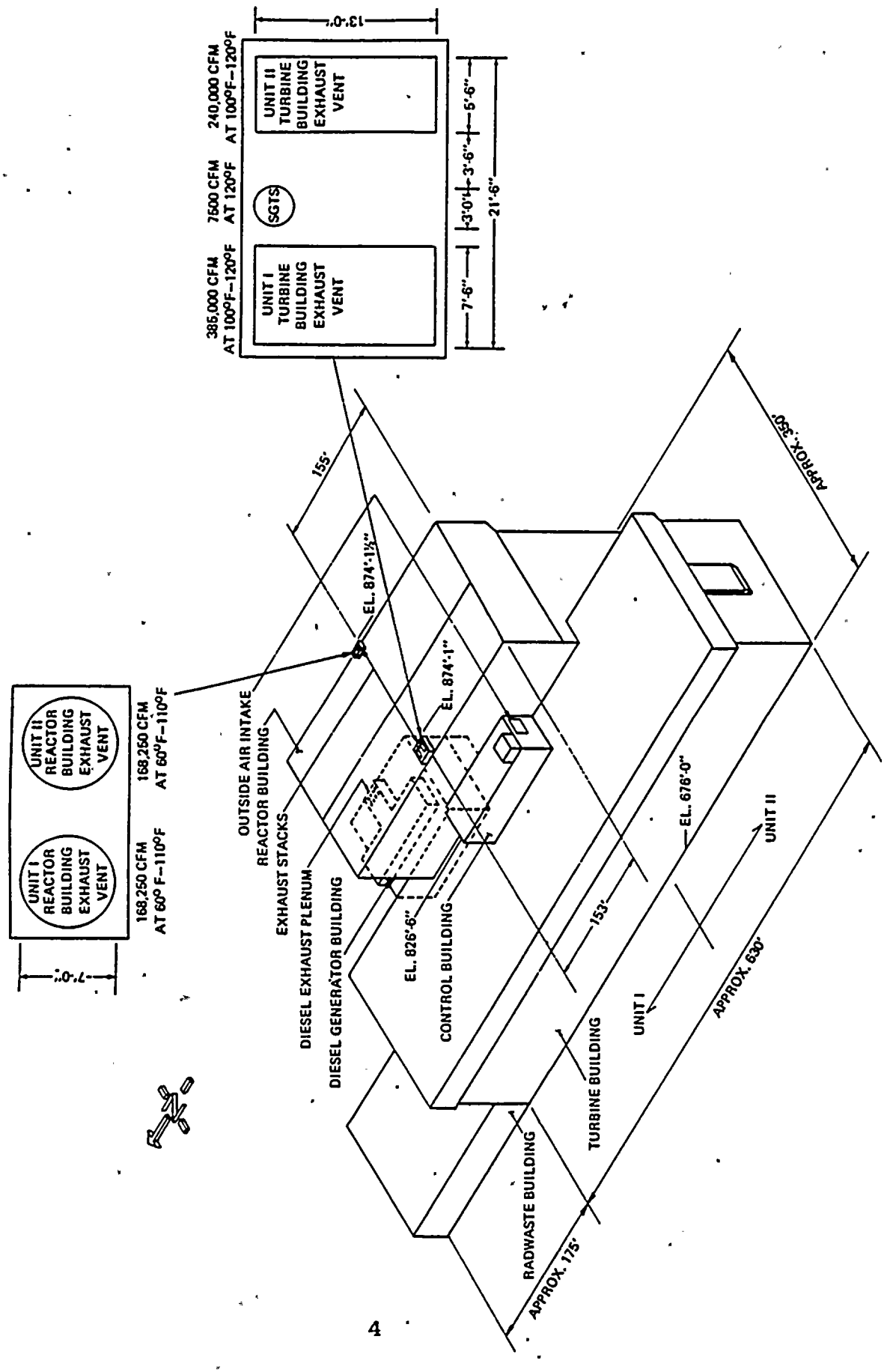


FIGURE 2 SSES WATERBORNE EFFLUENTS RELEASE PATHWAY

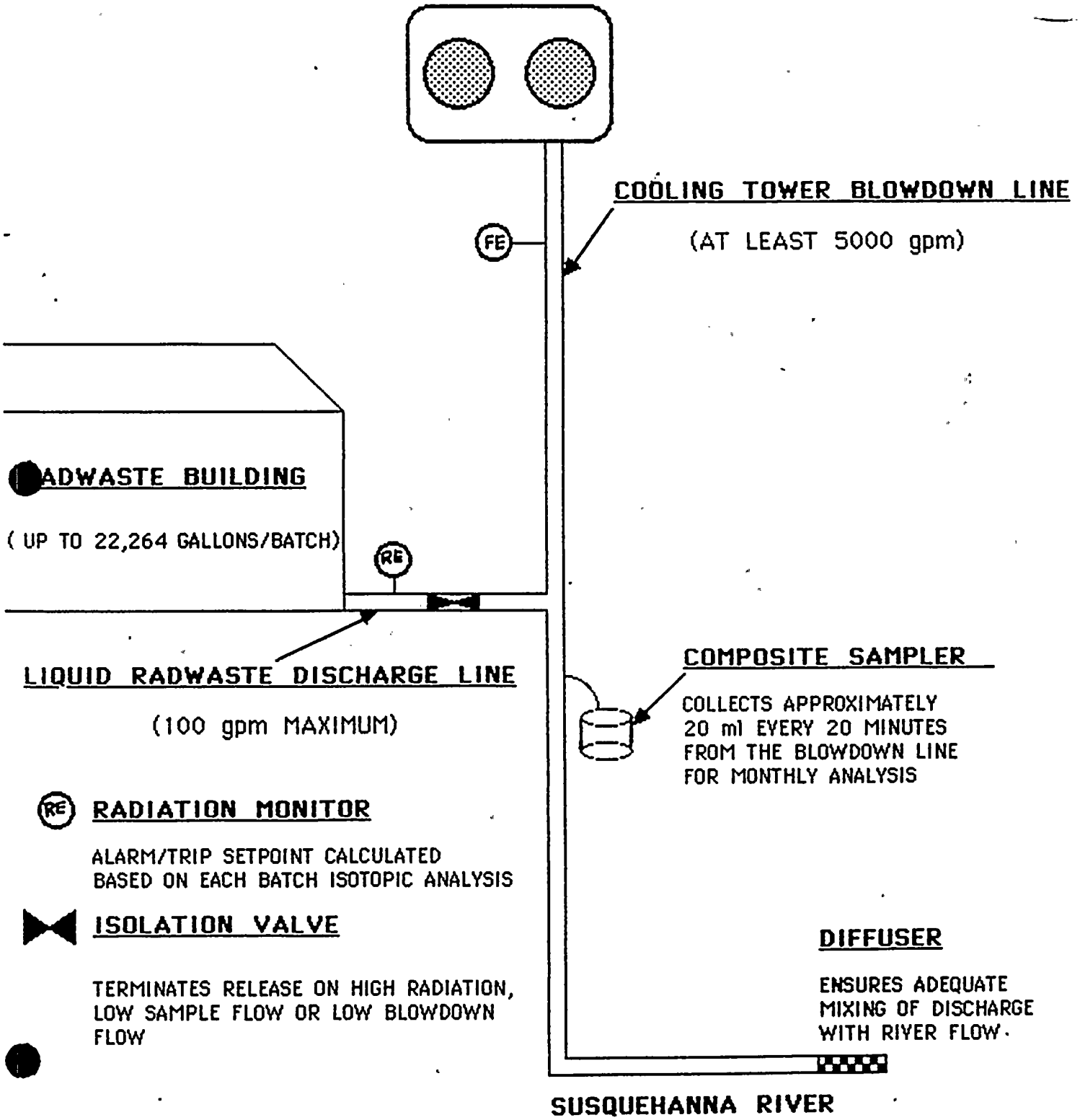


TABLE 1
SEMIANNUAL EFFLUENT & WASTE DISPOSAL REPORT
DATA PERIOD: JULY - DECEMBER 1987
SUPPLEMENTAL INFORMATION

1. Regulatory Limits

   a. Fission and Activation Gases: 0.851 Ci/minute (Release rate limit based on Technical Specification dose rate limit of 500 mrem/yr from noble gases). This number is calculated based on the expected mix of noble gas radionuclides presented in Table 4.4 of the SSES Final Environmental Statement, NUREG-0564.

   b. Iodine-131: 141 microcuries/minute (Release rate limit based on Technical Specification dose rate limit of 1500 mrem/yr from iodine-131, tritium, and particulates with half-lives greater than eight days).

   c. Particulates: 772 microcuries/minute (Release rate limit based on Technical Specification dose rate limit of 1500 mrem/yr from iodine-131, tritium, and particulates with half-lives greater than eight days). This number is calculated based on the expected mix of particulate radionuclides presented in Table 4.4 of the SSES Final Environmental Statement, NUREG-0564.

2. Maximum Permissible Concentrations

   The concentrations of radioactive materials in waterborne effluents are limited to the concentrations specified in 10CFR Part 20 Appendix B Table II, Column 2, for radionuclides other than dissolved or entrained noble gases.

   For dissolved or entrained noble gases, the concentrations are limited to the following values, as stated in the applicable Technical Specification:

Nuclide	MPC (uCi/ml)
^{85}Kr m	2 E-4
^{85}Kr	5 E-4
^{87}Kr	4 E-5
^{88}Kr	9 E-5
^{41}Ar	7 E-5
^{133}Xe m	5 E-4
^{133}Xe	6 E-4
^{135}Xe m	2 E-4
^{135}Xe	2 E-4

   These values are calculated using Equation 20 of ICRP Publication 2 (1959), adjusted for infinite cloud submersion in water.

3. Methods of Quantifying Effluents

   a. Fission and Activation Gases: Gas samples are routinely collected monthly and analyzed with a Ge(Li) detector system which incorporates a data reduction program to determine radionuclide composition in terms of specific activity. Data tapes from the continuous vent monitors are used to determine the average concentration of noble

gases. The Ge(Li) isotopic scan is used to convert the continuous vent monitor activity to actual activity based on the determined nuclide mixture. The vent and sample flow rates are continuously monitored, and the average flow rates for each vent are used to calculate the total activity released in a given time period. When the continuous monitors are out of service, manual grab samples are taken from each vent once each eight hours (once each four hours for the standby gas treatment vent).

b. Iodines: Iodine is continuously collected via an isokinetic sampling assembly in each vent. Filters are normally exchanged once per week and analyzed on a Ge(Li) system. The daily average flow rates for the vents and sample pumps are averaged for the duration of the sampling period, and a ratio of vent flow rate to sample flow rate is determined. The ratio is used to determine the total activity of each isotope released during the time period in question. When the continuous monitors are out of service, iodine is continuously collected on charcoal cartridges attached to air samplers which draw directly from the affected rooftop vent(s) or from alternate sampling ports available on the sample lines.

c. Particulates: Particulates are continuously collected via an isokinetic sampling assembly in each vent. Filters are normally exchanged once per week and analyzed on a Ge(Li) system. Flow rate corrections are performed as for iodines. When the continuous vent monitors are out of service, particulates are continuously sampled directly from the affected rooftop vent(s) or from alternate sampling ports available on the sample lines.

d. Waterborne Effluents: Each tank of liquid radwaste is sampled and analyzed for principle 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 a Ge(Li) system and release permits are generated based on the values obtained from the isotopic analysis and the most recent values for tritium, gross alpha, iron-55, and strontium-89 and -90. An aliquot based on release volume is saved and added to monthly and quarterly composite containers. The monthly tritium analysis is done in-house. The quarterly composite is sent to a vendor laboratory for iron-55, strontium-89 and -90, and gross alpha analyses.

The concentration of each radionuclide in each batch is decayed from the time of counting to the midpoint of the release period, and is then multiplied by the volume of the batch to determine the total quantity of each nuclide released in each batch. The isotopic totals for each are summed to determine the total source term for the report period.

4. Batch Releases

a. Waterborne

1. Number of Batch Releases:	171	
2. Total Time Period for Batch Releases:	3.42E+04	minutes
3. Maximum Time Period for a Batch Release:	2.85E+02	minutes
4. Average Time Period for a Batch Release:	2.00E+02	minutes
5. Minimum Time Period for a Batch Release:	2.50E+01	minutes
6. Average Stream Flow During Period of Release of Effluent into a Flowing Stream:	>5.65E+03	gpm (cooling tower blowdown)
	5.18E+06	gpm (Susq. River)

b. Airborne

1. Number of Batch Releases:	0
2. Total Time Period for Batch Releases:	NA
3. Maximum Time Period for a Batch Release:	NA
4. Average Time Period for a Batch Release:	NA
5. Minimum Time Period for a Batch Release:	NA

5. Abnormal Releases

a. Waterborne

1. Number of Releases:	0
2. Volume Released:	NA
3. Total Activity Released:	NA

b. Airborne

1. Number of Releases:	0
2. Total Activity Released:	NA

SECTION 2

EFFLUENT AND WASTE DISPOSAL DATA

TABLE 2
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT - 1987
AIRBORNE EFFLUENTS - SUMMATION OF ALL RELEASES

Nuclide Category	Unit	Third Quarter		Fourth Quarter	
A. Fission and Activation Gases					
1. Total Release[1]	Ci	1.81E+01		1.94E+01	
2. Average Release Rate for Period	uCi/sec	2.28E+00		2.44E+00	
3. Percent of Applicable Limit[2]	%	1.60E-02		1.72E-02	
B. Iodine-131					
1. Total Release	Ci		<2.26E-04		<1.70E-04
2. Average Release Rate for Period	uCi/sec		<2.84E-05		<2.14E-05
3. Percent of Applicable limit[2]	%		<1.21E-03		<9.10E-04
C. Particulates					
1. Particulates with Half-lives >8 Days Released	Ci	≥9.97E-05	<1.46E-03	≥1.69E-04	<1.32E-03*
2. Average Release Rate for Period	uCi/sec	≥1.25E-05	<1.84E-04	≥2.13E-05	<1.66E-04
3. Percent of Applicable Limit[2]	%	≥9.72E-05	<1.42E-03	≥1.65E-04	<1.29E-03
4. Gross Alpha Activity Released	Ci		<1.62E-06		<1.26E-06*
D. Tritium					
1. Total Release	Ci	≥9.34E+00	<1.45E+01	≥1.35E+01	<1.62E+01
2. Average Release Rate for Period	uCi/sec	≥1.18E+00	<1.82E+00	≥1.70E+00	<2.04E+00
3. Percent of Applicable Limit[3]	%	≥2.41E-02	<3.74E-02	≥3.48E-02	<4.18E-02

[1]Notation: The first value presented (≥) includes only activity positively detected at the 95% confidence level. The second value (<) includes detected activity plus the Lower Limit of Detection values of any samples in which activity was not detected at the 95% CL.
[2]Based on release rate limit derived from dose rate Technical Specification.
[3]Based on release rate corresponding to ^{3}H Maximum Permissible Concentration (2.0 E-07 uCi/cc) in unrestricted areas. A relative concentration of 4.1 E-05 sec/m^3 is assumed. The derived release rate limit is 4878 uCi/sec.
*Reported values are estimated based on third quarter 1987 sample analyses and fourth quarter 1987 ventilation exhaust rates.

TABLE 3
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT - 1987
AIRBORNE EFFLUENTS (Curies)[1]

Nuclide	Third Quarter		Fourth Quarter	
A. Gases				
^{133}Xe	1.81E+01		1.94E+01	
Total	1.81E+01		1.94E+01	
B. Iodines				
^{131}I		<2.26E-04		<1.70E-04
C. Particulates with Half-lives > 8 d				
^{51}Cr	5.07E-05			
^{54}Mn	≥3.59E-05	<1.44E-04	≥1.07E-04	<2.13E-04
^{59}Fe		<1.81E-04		<1.72E-04
^{58}Co		<9.14E-05	≥1.15E-05	<8.90E-05
^{60}Co	≥1.31E-05	<1.86E-04	≥5.05E-05	<1.96E-04
^{65}Zn		<2.53E-04		<2.10E-04
^{89}Sr	≥2.09E-08	<4.64E-06		<3.83E-06*
^{90}Sr		<3.50E-07		<2.90E-07*
^{134}Cs		<9.09E-05		<7.27E-05
^{137}Cs		<8.75E-05		<7.30E-05
^{141}Ce		<7.05E-05		<5.71E-05
^{144}Ce		<3.04E-04		<2.33E-04
Total	≥9.97E-05	<1.46E-03	≥1.69E-04	<1.32E-03

[1]Notation: The first value presented (≥) includes only activity positively detected at the 95% confidence level. The second value (<) includes detected activity plus the Lower Limit of Detection values of any samples in which activity was not detected at the 95% CL.
*Reported values are estimated based on third quarter 1987 sample analyses and fourth quarter 1987 ventilation exhaust rates.

TABLE 4
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT - 1987
WATERBORNE EFFLUENTS - SUMMATION OF ALL RELEASES

Nuclide Category	Unit	Third Quarter		Fourth Quarter	
A. Fission & Activation Products					
1. Total Release[1]	Ci	≥2.80E-02	<4.46E-02	≥3.28E-02	<4.85E-02*
2. Average Diluted Concentration	uCi/ml	≥7.34E-08	<1.17E-07	≥9.00E-08	<1.33E-07
3. Percent of Applicable Limit[2]	%	4.23E-03		8.33E-03	
B. Tritium					
1. Total Release	Ci	4.58E+00		3.56E+00	
2. Average Diluted Concentration	uCi/ml	1.20E-05		9.77E-06	
3. Percent of Applicable limit[3]	%	4.00E-01		3.26E-01	
C. Dissolved and Entrained Gases					
1. Total Release	Ci	≥6.03E-04	<1.08E-01	≥2.58E-04	<1.13E-01
2. Average Diluted Concentration	uCi/ml	≥1.58E-09	<2.83E-07	≥7.08E-10	<3.10E-07
3. Percent of Applicable Limit[4]	%	≥3.95E-03	<7.08E-01	≥1.77E-03	<7.76E-01
D. Gross Alpha Radioactivity Released	Ci		<2.67E-04		<2.82E-04*
E. Volume of Waste Released	gal. liters	1.42E+06 5.37E+06		1.39E+06 5.28E+06	
F. Volume of Dilution Water Used					
1. During Periods of Release	gal. liters	>9.94E+07 >3.76E+08		>9.50E+07 >3.59E+08	
2. Over Entire Period	gal. liters	>7.56E+08 >2.87E+09		>7.41E+08 >2.81E+09	

[1]Notation: The first value presented (≥) includes only activity positively detected at the 95% confidence level. The second value (<) includes detected activity plus the Lower Limit of Detection values of any samples in which activity was not detected at the 95% CL.
[2]Based on quarterly dose limits from liquid effluents.
[3]Based on the Maximum Permissible Concentration for ^{3}H in effluents to unrestricted areas (3.0 E-03 uCi/cc).
[4]Based on the most restrictive Maximum Permissible Concentration for a noble gas, 4.0 E-05 uCi/cc (^{87}Kr) from SSES Tech Spec Table 3.11.1.1-1.
*Reported values are estimated. Monthly and quarterly sample analyses were not available at time of report preparation.

TABLE 5
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT - 1987
WATERBORNE EFFLUENTS (Curies)[1]

Nuclide	Third Quarter		Fourth Quarter	
A. Tritium	4.58E+00		3.56E+00	
B. Fission and Activation Products				
^{51}Cr	2.13E-02		1.55E-02	
^{54}Mn	≥2.57E-03	<2.96E-03	≥7.24E-03	<7.44E-03
^{55}Fe		<5.45E-03		<5.28E-03*
^{59}Fe	≥3.55E-05	<9.93E-04	≥4.16E-04	<1.38E-03
^{58}Co	≥6.42E-04	<1.08E-03	≥8.48E-04	<1.25E-03
^{60}Co	≥2.43E-03	<2.98E-03	≥5.05E-03	<5.33E-03
^{65}Zn	≥7.47E-04	<1.96E-03	≥3.15E-03	<4.09E-03
^{76}Ag	2.47E-04			
^{89}Sr		<2.72E-04		<2.64E-04*
^{90}Sr		<4.90E-05		<4.75E-05*
^{99}Mo		<3.03E-03		<3.16E-03
^{110}Ag m	2.79E-05		6.04E-04	
^{131}I		<3.48E-04		<3.51E-04
^{134}Cs		<5.06E-04		<5.05E-04
^{137}Cs		<5.67E-04		<6.31E-04
^{141}Ce		<5.31E-04		<4.78E-04
^{144}Ce		<2.31E-03		<2.14E-03
Total	≥2.80E-02	<4.46E-02	≥3.28E-02	<4.85E-02
C. Dissolved and Entrained Gases				
^{41}Ar		<3.37E-05		<4.07E-05
^{85}Kr m		<1.06E-04		<1.01E-04
^{85}Kr		<1.04E-01		<1.09E-01
^{87}Kr		<2.19E-05		<2.35E-05
^{88}Kr		<1.70E-04		<1.70E-04
^{133}Xe m		<2.51E-03		<2.39E-03
^{133}Xe	≥2.47E-04	<1.13E-03	≥1.62E-04	<9.82E-04
^{135}Xe m		<1.05E-08		<1.24E-08
^{135}Xe	≥3.56E-04	<4.81E-04	≥9.59E-05	<2.68E-04
Total	≥6.03E-04	<1.08E-01	≥2.58E-04	<1.13E-01

[1]Notation: The first value presented (≥) includes only activity positively detected at the 95% confidence level. The second value (<) includes detected activity plus the Lower Limit of Detection values of any samples in which activity was not detected at the 95% CL.
*Reported values are estimated based on third quarter 1987 sample analyses and fourth quarter 1987 discharge volumes.

FIGURE 3

SUSQUEHANNA RIVER MONTHLY AVERAGE FLOW RATES
DATA PERIOD: 1987

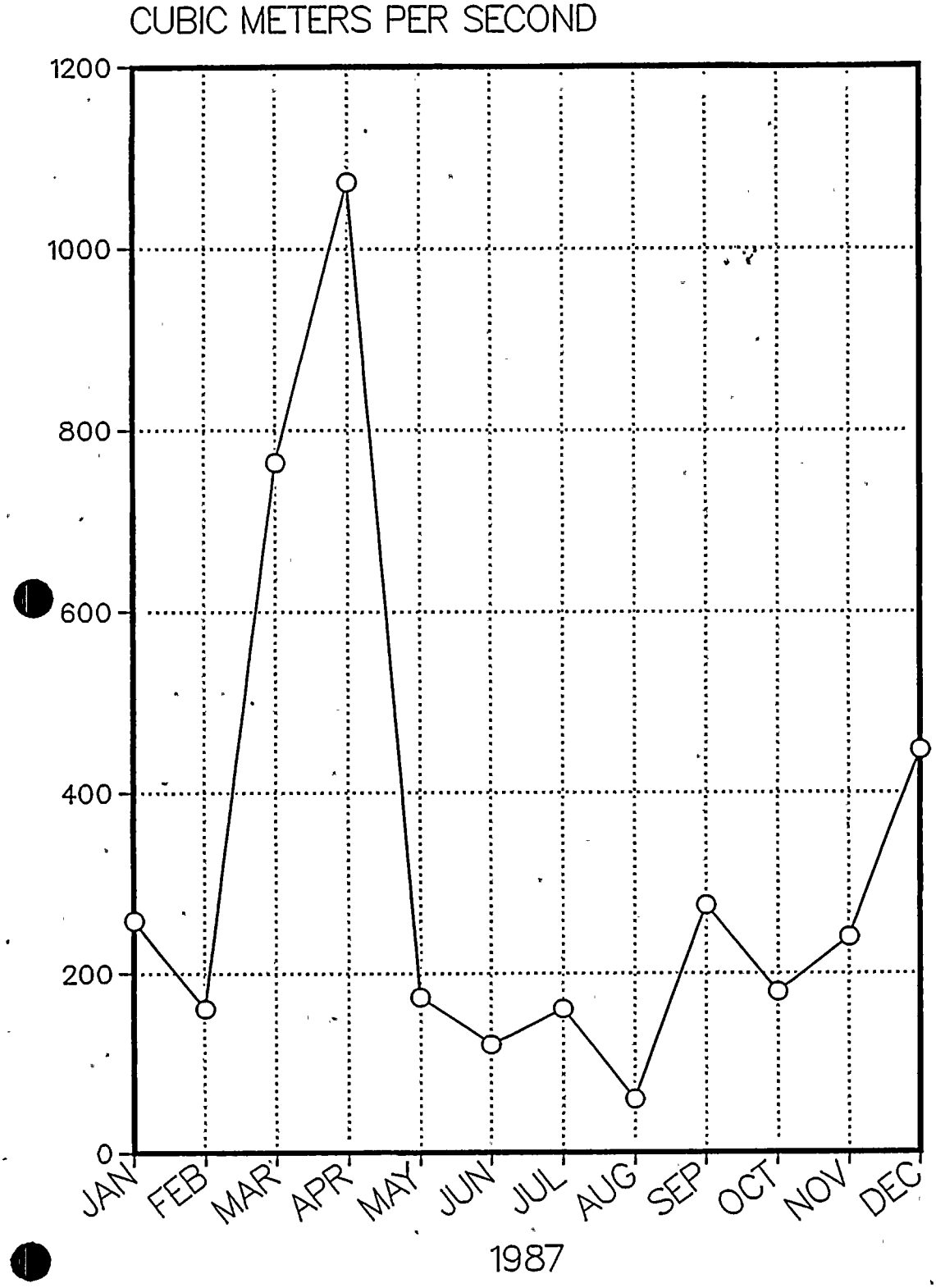


FIGURE 4

SUSQUEHANNA STEAM ELECTRIC STATION
MONTHLY LIQUID RADWASTE DISCHARGE TOTALS
DATA PERIOD: 1987

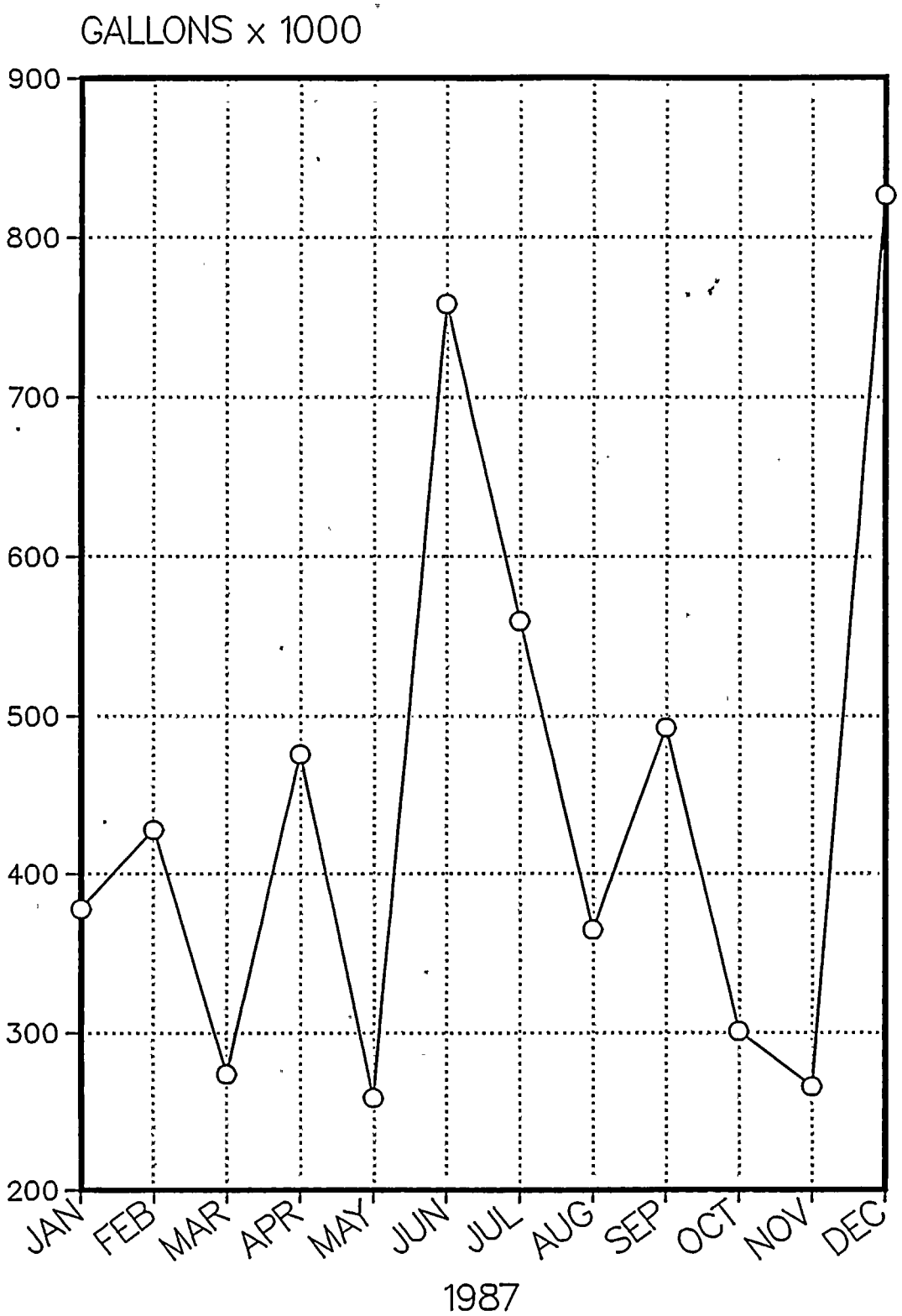


TABLE 6

SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
Data Period: July 1, 1987 - December 31, 1987

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL

Number of Shipments	Mode of Transportation	Destination
71	Truck	Barnwell, SC

B. IRRADIATED FUEL SHIPMENTS

Number of Shipments	Mode of Transportation	Destination
NONE	NOT APPLICABLE	NOT APPLICABLE

TABLE 7
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
SOLID RADIOACTIVE WASTE- CLASS A*
Data Period: July 1, 1987 - December 31, 1987

Source of Waste and Processing Employed (Waste Stream)	Condensate Demineralizer (Bead Resin)	Condensate Demineralizer (Bead Resin)	Reactor Water Clean-Up Fuel Pool Clean-Up (Powdex)	Condensate Demineralizer Regeneration (Evaporator Concentrates)
Container Volume (ft^3)	2454.2	3191.5	293.6	3378.6
Total Activity Content (Ci)	48.909	85.844	424	1.387
Above Determined By: a) measurement b) estimation c) measurement and correlation factors	C	C	C	C
Principle Radionuclides (Identity and Percent Composition)	Co-60 27 % Fe-55 21 % Mn-54 18 % Cr-51 14 % Zn-65 6 % Co-58 6 % C-14 5 % Ni-63 3 %	Co-60 28 % Mn-54 23 % Fe-55 22 % Zn-65 8 % Co-58 7 % C-14 5 % Cr-51 4 % Ni-63 4 %	Fe-55 50 % Mn-54 24 % Co-60 18 % Zn-65 4 % Co-58 1 % Cr-51 1 % Fe-59 1 % Ni-63 1 %	Fe-55 73 % H-3 9 % Co-60 6 % Ni-63 5 % Mn-54 5 % Cr-51 1 % C-14 1 %
Above Determined by: a) measurement b) estimation c) measurement and correlation factors	C	C	C	C
Type of Container	Carbon Steel Liner	Carbon Steel Liner	High Integrity Container	Carbon Steel Liner
Solidification Agent or Absorbent	Dewatered	Portland Cement	Dewatered	Portland Cement

* As defined in 10CFR Part 61.

TABLE 7
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
SOLID RADIOACTIVE WASTE- CLASS A*
Data Period: July 1, 1987 - December 31, 1987

Source of Waste and Processing Employed (Waste Stream)	Liquid RW Filters (Filter Media, Sludge, Evap. Concentrates)	Non-Compactable Trash	Compacted Trash	Compacted Trash
Container Volume (ft^3)	3024.3	1064	2557.5	6528
Total Activity Content (Ci)	698.74	0.120	2.287	1.264
Above Determined By: a) measurement b) estimation c) measurement and correlation factors	C	B	B	B
Principle Radionuclides (Identity and Percent Composition)	Fe-55 79 % Cr-51 7 % Mn-54 7 % Co-60 4 % Fe-59 1 % Co-58 1 % Zn-65 1 %	Fe-55 62 % Mn-54 16 % Co-58 11 % Co-60 11 %	Fe-55 62 % Mn-54 16 % Co-58 11 % Co-60 11 %	Fe-55 62 % Mn-54 16 % Co-58 11 % Co-60 11 %
Above Determined by: a) measurement b) estimation c) measurement and correlation factors	C	B	B	B
Type of Container	Carbon Steel Liner	Metal Box	55 Gallon 17H Drum	Metal Box
Solidification Agent or Absorbent	Portland Cement	N/A	N/A	N/A

* As defined in 10CFR Part 61.

TABLE 8
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
SOLID RADIOACTIVE WASTE- CLASS B*
Data Period: July 1, 1987 - December 31, 1987

Source of Waste and Processing Employed (Waste Stream)	* NO CLASS B WASTE GENERATED *			
Container Volume (ft^3)				
Total Activity Content (Ci)				
Above Determined By: a) measurement b) estimation c) measurement and correlation factors				
Principle Radionuclides (Identity and Percent Composition)				
Above Determined by: a) measurement b) estimation c) measurement and correlation factors				
Type of Container				
Solidification Agent or Absorbent				

* As defined in 10CFR Part 61.

TABLE 9
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
SOLID RADIOACTIVE WASTE- CLASS C*
Data Period: July 1, 1987 - December 31, 1987

Source of Waste and Processing Employed (Waste Stream)	* NO CLASS C WASTE GENERATED *			
Container Volume (ft^3)				
Total Activity Content (Ci)				
Above Determined By: a) measurement b) estimation c) measurement and correlation factors				
Principle Radionuclides (Identity and Percent Composition)				
Above Determined by: a) measurement b) estimation c) measurement and correlation factors				
Type of Container				
Solidification Agent or Absorbent				

* As defined in 10CFR Part 61.

TABLE 10
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
ESTIMATED TOTAL ERRORS ASSOCIATED WITH EFFLUENT MEASUREMENTS
Data Period: July 1, 1987 - December 31, 1987

Measurement	Estimated Total Error
1. Airborne Effluents	
a. Fission and Activiation Gases	15.9 %
b. I-131	13.3 %
c. Particulates	15.8 %
d. Tritium	5.7 %
2. Waterborne Effluents	
a. Fission and Activation Products	5.0 %
b. Tritium	3.3 %
c. Dissolved and Entrained Gases	8.4 %
3. Solid Wastes	
a. Condensate Demineralizers (Bead Resin - Dewatered)	15.1 %
b. Reactor Water Cean-up (Fuel Pool-Dewatered)	15.1 %
c. Condensate Demineralizers Regeneration (Evaporator Concentrated - Solidified)	15.1 %
d. Liquid RW Filters (Filter Media, Sludge and Evaporator Concentrates - Solidified)	15.1 %
e. Non-Compactable Trash	25 %
f. Compacted Trash	25 %

TABLE 11
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
DATA NOT REPORTED IN PREVIOUS SEMIANNUAL REPORT

All data needed for preparation of the previous report were recieved in time for incorporation into the tables. No estimated values were used in the January - June 1987 report.

SECTION 3

METEOROLOGICAL DATA AND DISPERSION ESTIMATES

METEOROLOGY AND DISPERSION DATA

Meteorological data have been collected at the Susquehanna SES site since the early 1970s. At the present time, the meteorological system is based on a 300-foot high tower located approximately 1,000 feet to the southeast of the plant. Wind sensors are mounted at the 10-meter and 60-meter elevations on this tower. Vertical temperature differential is measured with redundant sensor pairs between the 10m and 60m levels. Sigma theta (the standard deviation of horizontal wind direction) is measured at both levels. Dewpoint and ambient temperature sensors are present at the 10m level. Precipitation is measured at ground level.

A back-up meteorological tower was erected in 1982. It is a 10-meter tower providing alternate measurements of wind speed, wind direction, and sigma theta.

SSES meteorological data is transmitted to the plant control room, Technical Support Center, and Emergency Operations Facility for emergency response availability. The data is also transmitted via telephone line data-link to the PP&L corporate computer in Allentown. On the corporate computer, the data is available for preparation of summary reports, wind rose plots, and dispersion estimates.

Dispersion modeling for effluents from normal operation of SSES is done using ADSSES, a straight-line sector averaged Gaussian plume model designed to estimate average relative concentrations. The model was developed in accordance with Regulatory Guide 1.111. Wind directions for calm periods are distributed in accordance with the directional distribution by stability class of the lowest wind speed class.

ADSSES uses terrain correction factors to account for the temporal and spatial variations in the airflow in the region, since a straight-line trajectory model assumes that a constant mean wind transports and diffuses effluents (in the wind direction at the release point) within the entire region of interest. The SSES terrain correction factors presented on the seventh page of Table 14 were determined as the ratio between puff-advection dispersion estimates and straight-line dispersion estimates based on 1973-1976 meteorological data. The terrain correction factors are multiplied by the intermediate results of the straight-line model to approximate puff-advection model results.

TABLE 12

SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
METEOROLOGICAL DATA AVAILAILITY
Data Period: 1987

Parameter	Percent of Valid Hours During Period
1. Wind Speed	
a. All Sensors Combined	100.00 %
b. 10-meter Sensors	99.95 %
c. 60-meter Sensor	96.59 %
2. Wind Direction	
a. All Sensors Combined	100.00 %
b. 10-meter Sensors	99.95 %
c. 60-meter Sensor	95.57 %
3. Indicator of Atmospheric Stability	
a. Temperature Differential or Sigma Theta	99.87 %
b. Delta Temperature	99.41 %
c. Sigma Theta	99.35 %
4. Percent of hours for which valid 10m Wind Speed, 10m Wind Direction, and Delta Temperature were available	97.37 %
5. Percent of hours for which valid 60m Wind Speed, 60m Wind Direction, and Delta Temperature were available	95.38 %

SUSQUEHANNA
STEAM ELECTRIC STATION
WIND ROSE
DATA PERIOD: 01/01/87 – 12/31/87
TOWER: ON-SITE (P)
ELEVATION: 10M

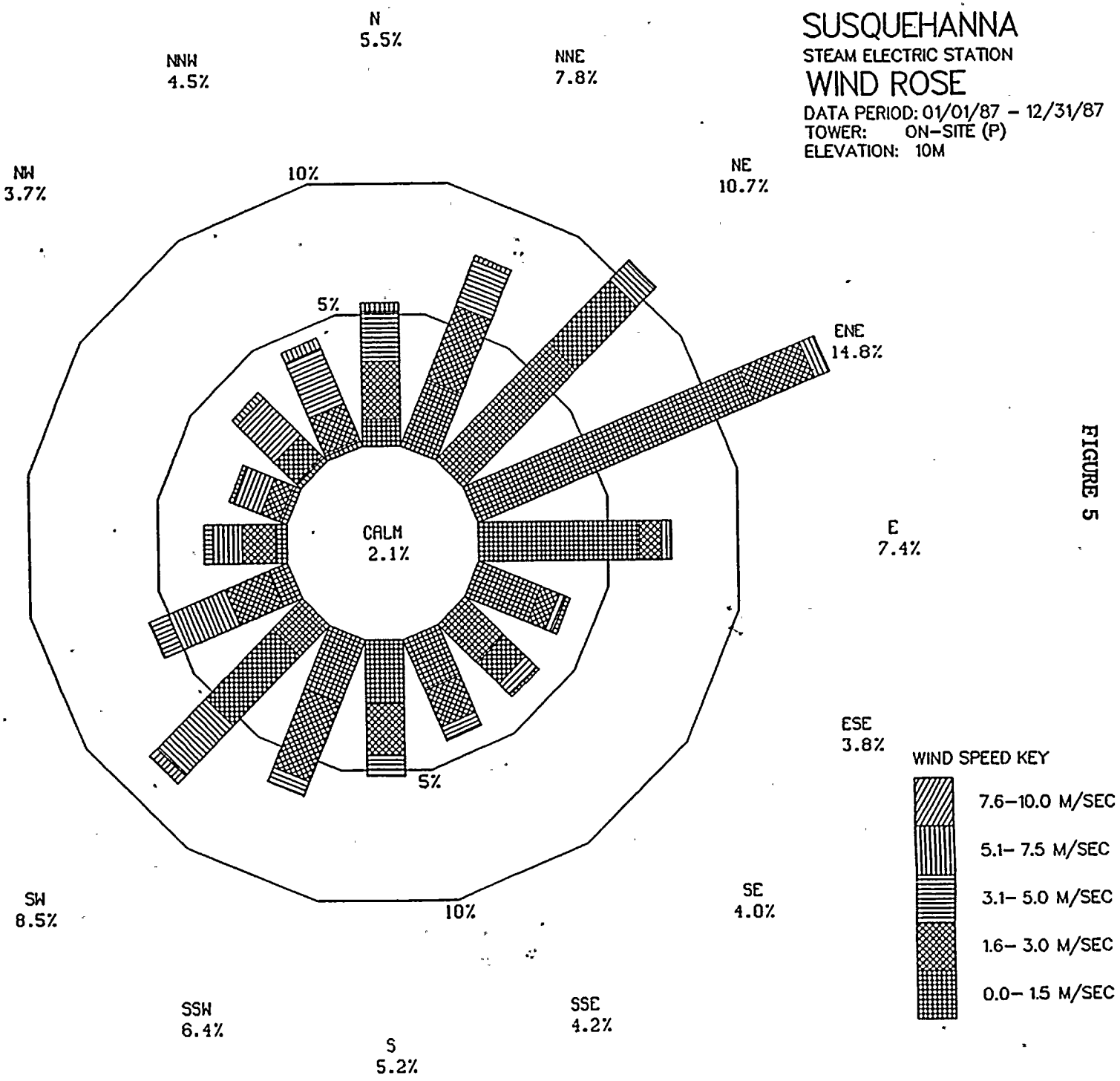


FIGURE 5

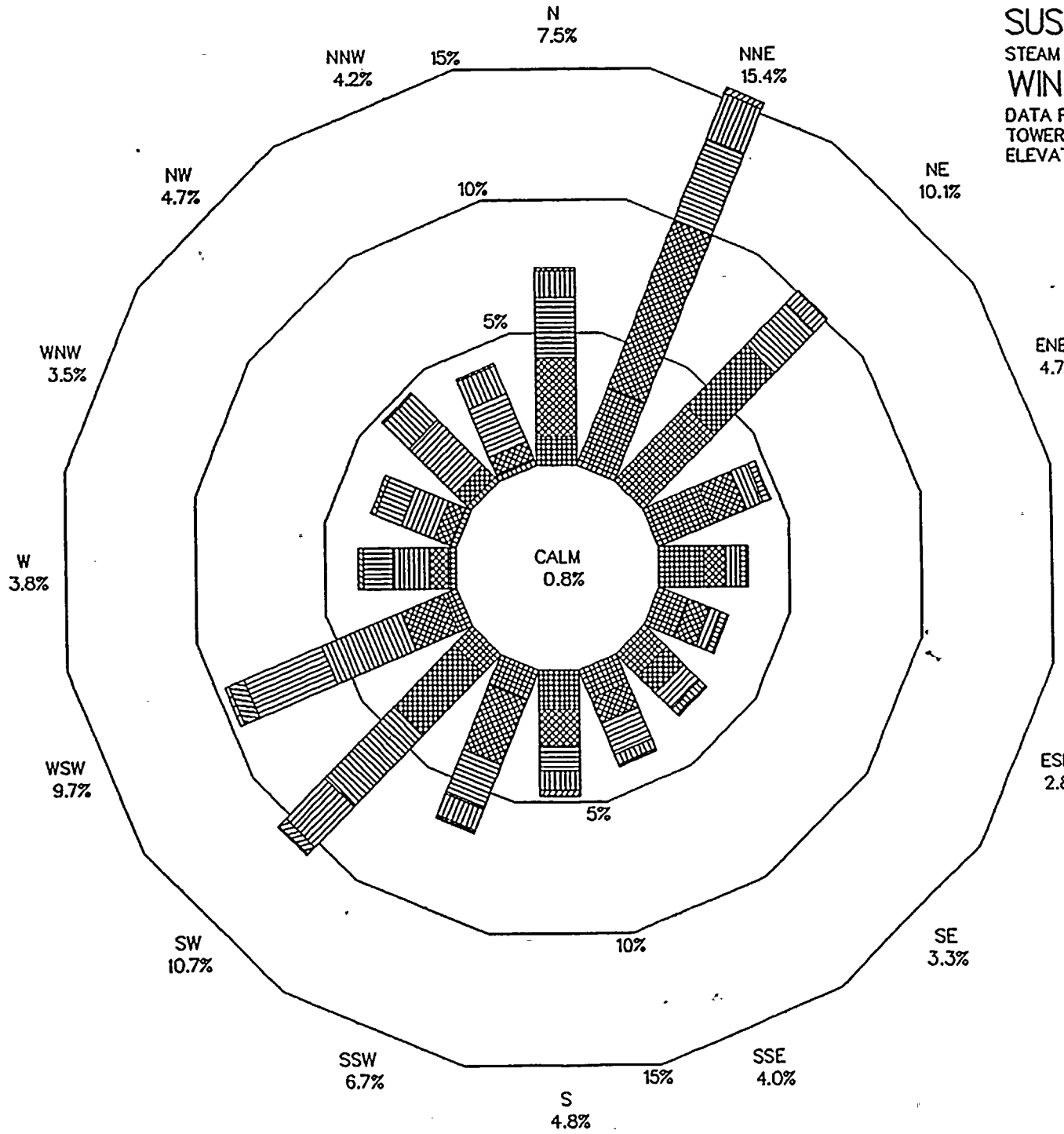
PP&L

SUSQUEHANNA

STEAM ELECTRIC STATION

WIND ROSE

DATA PERIOD: 01/01/87 – 12/31/87
TOWER: ON-SITE (P)
ELEVATION: 60M



WIND SPEED KEY

- 10.1– M/SEC
- 7.6–10.0 M/SEC
- 5.1– 7.5 M/SEC
- 3.1– 5.0 M/SEC
- 1.6– 3.0 M/SEC
- 0.0– 1.5 M/SEC

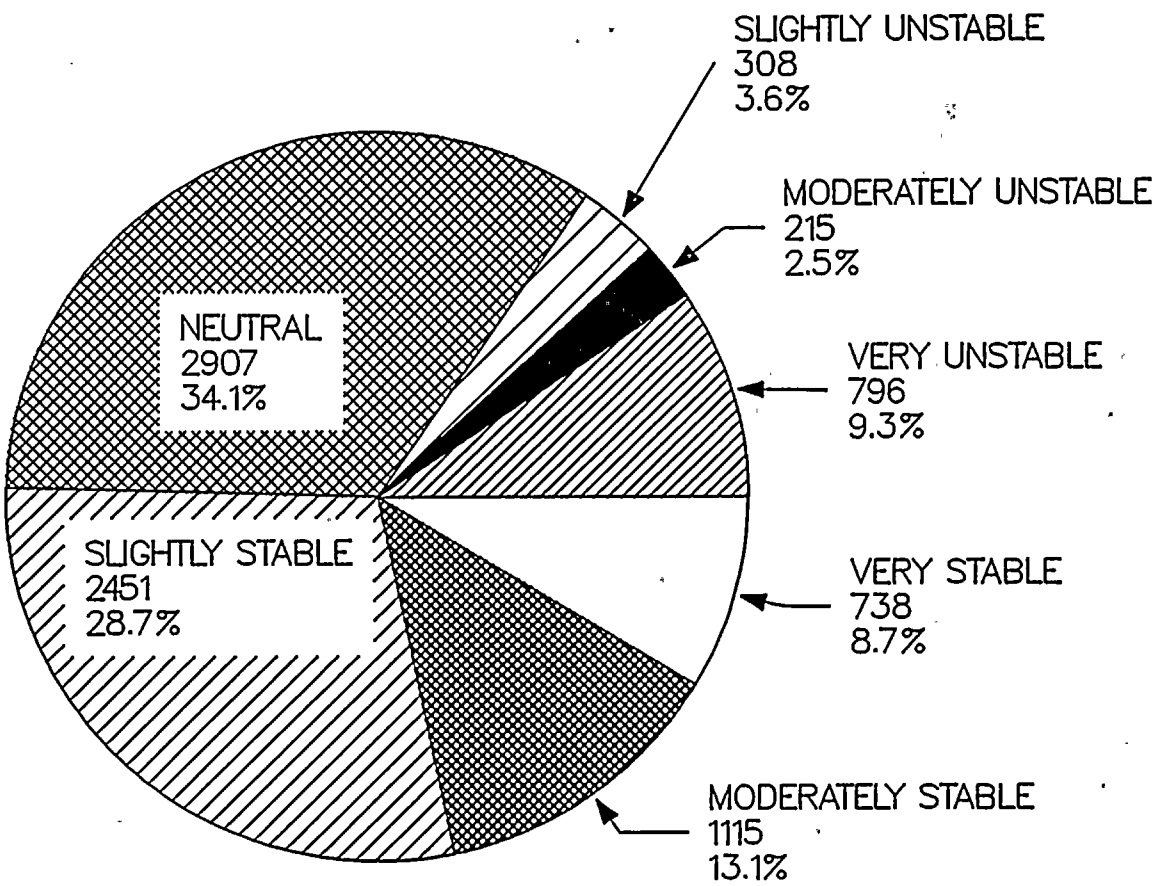
FIGURE 6

PP&L

FIGURE 7

Susquehanna Steam Electric Station
PASQUILL STABILITY CLASS PREVALENCES
Data Period: 1987

Based on Joint Wind Frequency Distributions at 10 Meters
(8530 Hourly Values)



JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 10M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	3 0.38 0.04	1 0.13 0.01	1 0.13 0.01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 0.63 0.06	2.10
NE	5 0.63 0.06	4 0.50 0.05	2 0.25 0.02	1 0.13 0.01	0 0.00 0.00	0 0.00 0.00	12 1.51 0.14	2.51
ENE	7 0.88 0.08	6 0.75 0.07	2 0.25 0.02	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	15 1.88 0.18	2.07
E	17 2.14 0.20	10 1.26 0.12	1 0.13 0.01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	28 3.52 0.33	1.45
ESE	12 1.51 0.14	11 1.38 0.13	1 0.13 0.01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	24 3.02 0.28	1.61
SE	7 0.88 0.08	15 1.88 0.18	10 1.26 0.12	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	32 4.02 0.38	2.48
SSE	19 2.39 0.22	21 2.64 0.25	6 0.75 0.07	1 0.13 0.01	0 0.00 0.00	0 0.00 0.00	47 5.90 0.55	2.04
S	20 2.51 0.23	47 5.90 0.55	25 3.14 0.29	2 0.25 0.02	0 0.00 0.00	0 0.00 0.00	94 11.81 1.10	2.36
SSW	25 3.14 0.29	100 12.56 1.17	27 3.39 0.32	1 0.13 0.01	0 0.00 0.00	0 0.00 0.00	153 19.22 1.79	2.26
SW	11 1.38 0.13	112 14.07 1.31	113 14.20 1.32	12 1.51 0.14	0 0.00 0.00	0 0.00 0.00	248 31.16 2.91	3.03
WSW	5 0.63 0.06	29 3.64 0.34	68 8.54 0.80	13 1.63 0.15	0 0.00 0.00	0 0.00 0.00	115 14.45 1.35	3.59
W	0 0.00 0.00	2 0.25 0.02	9 1.13 0.11	4 0.50 0.05	0 0.00 0.00	0 0.00 0.00	15 1.88 0.18	4.12
WNW	1 0.13 0.01	2 0.25 0.02	1 0.13 0.01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 0.50 0.05	2.69
NW	0 0.00 0.00	2 0.25 0.02	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 0.25 0.02	1.78
NNW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
N	2 0.25 0.02	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 0.25 0.02	1.30
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	134 16.83 1.57	362 45.48 4.24	266 33.42 3.12	34 4.27 0.40	0 0.00 0.00	0 0.00 0.00	796 100.00 9.33	2.68

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 10M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0 0.00 0.00	5 2.33 0.06	4 1.86 0.05	3 1.40 0.04	0 0.00 0.00	0 0.00 0.00	12 5.58 0.14	3.51
NE	6 2.79 0.07	15 6.98 0.18	2 0.93 0.02	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	23 10.70 0.27	2.17
ENE	1 0.47 0.01	7 3.26 0.08	1 0.47 0.01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	9 4.19 0.11	1.89
E	3 1.40 0.04	1 0.47 0.01	3 1.40 0.04	1 0.47 0.01	0 0.00 0.00	0 0.00 0.00	8 3.72 0.09	2.78
ESE	3 1.40 0.04	3 1.40 0.04	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 2.79 0.07	1.47
SE	3 1.40 0.04	4 1.86 0.05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 3.26 0.08	1.95
SSE	3 1.40 0.04	4 1.86 0.05	4 1.86 0.05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 5.12 0.13	2.61
S	2 0.93 0.02	3 1.40 0.04	3 1.40 0.04	1 0.47 0.01	0 0.00 0.00	0 0.00 0.00	9 4.19 0.11	2.68
SSW	4 1.86 0.05	19 8.84 0.22	1 0.47 0.01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	24 11.16 0.28	2.02
SW	3 1.40 0.04	17 7.91 0.20	22 10.23 0.26	3 1.40 0.04	0 0.00 0.00	0 0.00 0.00	45 20.93 0.53	3.33
WSW	2 0.93 0.02	7 3.26 0.08	20 9.30 0.23	4 1.86 0.05	0 0.00 0.00	0 0.00 0.00	33 15.35 0.39	3.82
W	1 0.47 0.01	7 3.26 0.08	9 4.19 0.11	2 0.93 0.02	0 0.00 0.00	0 0.00 0.00	19 8.84 0.22	3.48
WNW	0 0.00 0.00	1 0.47 0.01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 0.47 0.01	2.07
NW	1 0.47 0.01	0 0.00 0.00	3 1.40 0.04	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	4 1.86 0.05	3.15
NNW	0 0.00 0.00	1 0.47 0.01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 0.47 0.01	2.22
N	0 0.00 0.00	2 0.93 0.02	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 0.93 0.02	1.81
CALM	1 0.47 0.01						1 0.47 0.01	CALM
TOTAL	32 14.88 0.38	96 44.65 1.13	72 33.49 0.84	14 6.51 0.16	0 0.00 0.00	0 0.00 0.00	215 100.00 2.52	2.87

TABLE 13

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

SUSQUEHANNA STEAM ELECTRIC STATION METEOROLOGICAL REPORTS RUNDATE: 2/16/88

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 10M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	0	12	16	2	0	0	30	3.20
	0.00	3.90	5.19	0.65	0.00	0.00	9.74	
	0.00	0.14	0.19	0.02	0.00	0.00	0.35	
NE	2	22	11	1	0	0	36	2.69
	0.65	7.14	3.57	0.32	0.00	0.00	11.69	
	0.02	0.26	0.13	0.01	0.00	0.00	0.42	
ENE	2	10	2	0	0	0	14	2.22
	0.65	3.25	0.65	0.00	0.00	0.00	4.55	
	0.02	0.12	0.02	0.00	0.00	0.00	0.16	
E	5	4	0	0	0	0	9	1.59
	1.62	1.30	0.00	0.00	0.00	0.00	2.92	
	0.06	0.05	0.00	0.00	0.00	0.00	0.11	
ESE	3	3	0	1	0	0	7	2.09
	0.97	0.97	0.00	0.32	0.00	0.00	2.27	
	0.04	0.04	0.00	0.01	0.00	0.00	0.08	
SE	4	4	3	0	0	0	11	1.97
	1.30	1.30	0.97	0.00	0.00	0.00	3.57	
	0.05	0.05	0.04	0.00	0.00	0.00	0.13	
SSE	5	6	3	1	0	0	15	2.22
	1.62	1.95	0.97	0.32	0.00	0.00	4.87	
	0.06	0.07	0.04	0.01	0.00	0.00	0.18	
S	4	14	5	0	0	0	23	2.37
	1.30	4.55	1.62	0.00	0.00	0.00	7.47	
	0.05	0.16	0.06	0.00	0.00	0.00	0.27	
SSW	8	12	2	0	0	0	22	1.96
	2.60	3.90	0.65	0.00	0.00	0.00	7.14	
	0.09	0.14	0.02	0.00	0.00	0.00	0.26	
SW	3	26	17	3	0	0	49	2.96
	0.97	8.44	5.52	0.97	0.00	0.00	15.91	
	0.04	0.30	0.20	0.04	0.00	0.00	0.57	
WSW	3	7	18	4	0	0	32	3.61
	0.97	2.27	5.84	1.30	0.00	0.00	10.39	
	0.04	0.08	0.21	0.05	0.00	0.00	0.38	
W	1	5	6	3	0	0	15	3.63
	0.32	1.62	1.95	0.97	0.00	0.00	4.87	
	0.01	0.06	0.07	0.04	0.00	0.00	0.18	
WNW	0	2	5	1	0	0	8	4.09
	0.00	0.65	1.62	0.32	0.00	0.00	2.60	
	0.00	0.02	0.06	0.01	0.00	0.00	0.09	
NW	1	5	7	0	0	0	13	3.03
	0.32	1.62	2.27	0.00	0.00	0.00	4.22	
	0.01	0.06	0.08	0.00	0.00	0.00	0.15	
NNW	0	6	4	1	0	0	11	3.23
	0.00	1.95	1.30	0.32	0.00	0.00	3.57	
	0.00	0.07	0.05	0.01	0.00	0.00	0.13	
N	0	6	6	0	0	0	12	3.14
	0.00	1.95	1.95	0.00	0.00	0.00	3.90	
	0.00	0.07	0.07	0.00	0.00	0.00	0.14	
CALM	1						1	CALM
	0.32						0.32	
	0.01						0.01	
TOTAL	41	144	105	17	0	0	308	2.81
	13.31	46.75	34.09	5.52	0.00	0.00	100.00	
	0.48	1.69	1.23	0.20	0.00	0.00	3.61	

TABLE 13
JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 10M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	53	136	120	12	0	0	321	2.71
	1.82	4.68	4.13	0.41	0.00	0.00	11.04	
	0.62	1.59	1.41	0.14	0.00	0.00	3.76	
NE	52	131	61	2	0	0	246	2.38
	1.79	4.51	2.10	0.07	0.00	0.00	8.46	
	0.61	1.54	0.72	0.02	0.00	0.00	2.88	
ENE	57	55	43	1	0	0	156	2.22
	1.96	1.89	1.48	0.03	0.00	0.00	5.37	
	0.67	0.64	0.50	0.01	0.00	0.00	1.83	
E	55	27	19	5	0	0	106	2.03
	1.89	0.93	0.65	0.17	0.00	0.00	3.65	
	0.64	0.32	0.22	0.06	0.00	0.00	1.24	
ESE	46	29	14	8	0	0	97	2.14
	1.58	1.00	0.48	0.28	0.00	0.00	3.34	
	0.54	0.34	0.16	0.09	0.00	0.00	1.14	
SE	45	56	27	7	0	0	135	2.29
	1.55	1.93	0.93	0.24	0.00	0.00	4.64	
	0.53	0.66	0.32	0.08	0.00	0.00	1.58	
SSE	32	60	18	2	0	0	112	2.12
	1.10	2.06	0.62	0.07	0.00	0.00	3.85	
	0.38	0.70	0.21	0.02	0.00	0.00	1.31	
S	48	47	21	0	0	0	116	1.98
	1.65	1.62	0.72	0.00	0.00	0.00	3.99	
	0.56	0.55	0.25	0.00	0.00	0.00	1.36	
SSW	50	46	11	0	0	0	107	1.78
	1.72	1.58	0.38	0.00	0.00	0.00	3.68	
	0.59	0.54	0.13	0.00	0.00	0.00	1.25	
SW	43	73	44	13	1	0	174	2.68
	1.48	2.51	1.51	0.45	0.03	0.00	5.99	
	0.50	0.86	0.52	0.15	0.01	0.00	2.04	
WSW	24	51	71	43	2	0	191	3.61
	0.83	1.75	2.44	1.48	0.07	0.00	6.57	
	0.28	0.60	0.83	0.50	0.02	0.00	2.24	
W	8	58	68	21	0	0	155	3.34
	0.28	2.00	2.34	0.72	0.00	0.00	5.33	
	0.09	0.68	0.80	0.25	0.00	0.00	1.82	
WNW	13	38	87	10	0	0	148	3.40
	0.45	1.31	2.99	0.34	0.00	0.00	5.09	
	0.15	0.45	1.02	0.12	0.00	0.00	1.74	
NW	8	58	152	23	0	0	241	3.66
	0.28	2.00	5.23	0.79	0.00	0.00	8.29	
	0.09	0.68	1.78	0.27	0.00	0.00	2.83	
NNW	9	71	176	34	0	0	290	3.62
	0.31	2.44	6.05	1.17	0.00	0.00	9.98	
	0.11	0.83	2.06	0.40	0.00	0.00	3.40	
N	21	97	148	27	0	0	293	3.32
	0.72	3.34	5.09	0.93	0.00	0.00	10.08	
	0.25	1.14	1.74	0.32	0.00	0.00	3.43	
CALM	19						19	CALM
	0.65						0.65	
	0.22						0.22	
TOTAL	564	1033	1080	208	3	0	2907	2.84
	19.40	35.53	37.15	7.16	0.10	0.00	100.00	
	6.61	12.11	12.66	2.44	0.04	0.00	34.08	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 10M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	123	97	18	0	0	0	238	1.61
	5.02	3.96	0.73	0.00	0.00	0.00	9.71	
	1.44	1.14	0.21	0.00	0.00	0.00	2.79	
NE	182	86	11	0	0	0	279	1.36
	7.43	3.51	0.45	0.00	0.00	0.00	11.38	
	2.13	1.01	0.13	0.00	0.00	0.00	3.27	
ENE	225	33	3	0	0	0	261	1.00
	9.18	1.35	0.12	0.00	0.00	0.00	10.65	
	2.64	0.39	0.04	0.00	0.00	0.00	3.06	
E	136	19	3	1	0	0	159	1.06
	5.55	0.78	0.12	0.04	0.00	0.00	6.49	
	1.59	0.22	0.04	0.01	0.00	0.00	1.86	
ESE	82	20	10	4	0	0	116	1.43
	3.35	0.82	0.41	0.16	0.00	0.00	4.73	
	0.96	0.23	0.12	0.05	0.00	0.00	1.36	
SE	76	17	10	2	0	0	105	1.43
	3.10	0.69	0.41	0.08	0.00	0.00	4.28	
	0.89	0.20	0.12	0.02	0.00	0.00	1.23	
SSE	85	35	13	1	0	0	134	1.55
	3.47	1.43	0.53	0.04	0.00	0.00	5.47	
	1.00	0.41	0.15	0.01	0.00	0.00	1.57	
S	95	54	12	0	0	0	161	1.57
	3.88	2.20	0.49	0.00	0.00	0.00	6.57	
	1.11	0.63	0.14	0.00	0.00	0.00	1.89	
SSW	103	89	7	0	0	0	199	1.58
	4.20	3.63	0.29	0.00	0.00	0.00	8.12	
	1.21	1.04	0.08	0.00	0.00	0.00	2.33	
SW	64	87	33	3	0	0	187	2.11
	2.61	3.55	1.35	0.12	0.00	0.00	7.63	
	0.75	1.02	0.39	0.04	0.00	0.00	2.19	
WSW	31	59	30	1	0	0	121	2.29
	1.26	2.41	1.22	0.04	0.00	0.00	4.94	
	0.36	0.69	0.35	0.01	0.00	0.00	1.42	
W	26	38	5	1	0	0	70	1.88
	1.06	1.55	0.20	0.04	0.00	0.00	2.86	
	0.30	0.45	0.06	0.01	0.00	0.00	0.82	
WNW	10	22	7	1	0	0	40	2.24
	0.41	0.90	0.29	0.04	0.00	0.00	1.63	
	0.12	0.26	0.08	0.01	0.00	0.00	0.47	
NW	11	34	9	1	0	0	55	2.28
	0.45	1.39	0.37	0.04	0.00	0.00	2.24	
	0.13	0.40	0.11	0.01	0.00	0.00	0.64	
NNW	13	47	15	0	0	0	75	2.34
	0.53	1.92	0.61	0.00	0.00	0.00	3.06	
	0.15	0.55	0.18	0.00	0.00	0.00	0.88	
N	53	79	12	0	0	0	144	1.84
	2.16	3.22	0.49	0.00	0.00	0.00	5.88	
	0.62	0.93	0.14	0.00	0.00	0.00	1.69	
CALM	107						107	CALM
	4.37						4.37	
	1.25						1.25	
TOTAL	1315	816	198	15	0	0	2451	1.53
	53.65	33.29	8.08	0.61	0.00	0.00	100.00	
	15.42	9.57	2.32	0.18	0.00	0.00	28.73	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 10M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	39 3.50 0.46	9 0.81 0.11	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	48 4.30 0.56	1.10
NE	162 14.53 1.90	25 2.24 0.29	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	187 16.77 2.19	1.02
ENE	352 31.57 4.13	44 3.95 0.52	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	396 35.52 4.64	1.03
E	188 16.86 2.20	5 0.45 0.06	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	193 17.31 2.26	0.89
ESE	56 5.02 0.66	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	56 5.02 0.66	0.82
SE	35 3.14 0.41	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	35 3.14 0.41	0.77
SSE	34 3.05 0.40	2 0.18 0.02	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	36 3.23 0.42	0.91
S	36 3.23 0.42	2 0.18 0.02	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	38 3.41 0.45	1.03
SSW	30 2.69 0.35	10 0.90 0.12	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	40 3.59 0.47	1.18
SW	15 1.35 0.18	4 0.36 0.05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	19 1.70 0.22	1.31
WSW	3 0.27 0.04	3 0.27 0.04	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 0.54 0.07	1.41
W	0 0.00 0.00	1 0.09 0.01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1 0.09 0.01	1.67
WNW	3 0.27 0.04	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 0.27 0.04	1.01
NW	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
NNW	3 0.27 0.04	2 0.18 0.02	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 0.45 0.06	1.51
N	7 0.63 0.08	4 0.36 0.05	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	11 0.99 0.13	1.35
CALM	41 3.68 0.48						41 3.68 0.48	CALM
TOTAL	963 86.37 11.29	111 9.96 1.30	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	1115 100.00 13.07	0.97

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 10M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	14	1	0	0	0	0	15	0.80
	1.90	0.14	0.00	0.00	0.00	0.00	2.03	
	0.16	0.01	0.00	0.00	0.00	0.00	0.18	
NE	126	6	0	0	0	0	132	1.02
	17.07	0.81	0.00	0.00	0.00	0.00	17.89	
	1.48	0.07	0.00	0.00	0.00	0.00	1.55	
ENE	343	64	1	0	0	0	408	1.16
	46.48	8.67	0.14	0.00	0.00	0.00	55.28	
	4.02	0.75	0.01	0.00	0.00	0.00	4.78	
E	123	4	0	0	0	0	127	0.95
	16.67	0.54	0.00	0.00	0.00	0.00	17.21	
	1.44	0.05	0.00	0.00	0.00	0.00	1.49	
ESE	18	0	0	0	0	0	18	0.73
	2.44	0.00	0.00	0.00	0.00	0.00	2.44	
	0.21	0.00	0.00	0.00	0.00	0.00	0.21	
SE	10	0	0	0	0	0	10	0.91
	1.36	0.00	0.00	0.00	0.00	0.00	1.36	
	0.12	0.00	0.00	0.00	0.00	0.00	0.12	
SSE	4	0	0	0	0	0	4	0.82
	0.54	0.00	0.00	0.00	0.00	0.00	0.54	
	0.05	0.00	0.00	0.00	0.00	0.00	0.05	
S	5	0	0	0	0	0	5	0.93
	0.68	0.00	0.00	0.00	0.00	0.00	0.68	
	0.06	0.00	0.00	0.00	0.00	0.00	0.06	
SSW	5	0	0	0	0	0	5	0.76
	0.68	0.00	0.00	0.00	0.00	0.00	0.68	
	0.06	0.00	0.00	0.00	0.00	0.00	0.06	
SW	2	0	0	0	0	0	2	0.90
	0.27	0.00	0.00	0.00	0.00	0.00	0.27	
	0.02	0.00	0.00	0.00	0.00	0.00	0.02	
WSW	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
W	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
WNW	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
NW	2	0	0	0	0	0	2	0.80
	0.27	0.00	0.00	0.00	0.00	0.00	0.27	
	0.02	0.00	0.00	0.00	0.00	0.00	0.02	
NNW	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
N	2	0	0	0	0	0	2	0.86
	0.27	0.00	0.00	0.00	0.00	0.00	0.27	
	0.02	0.00	0.00	0.00	0.00	0.00	0.02	
CALM	8						8	CALM
	1.08						1.08	
	0.09						0.09	
TOTAL	654	75	1	0	0	0	738	1.06
	88.62	10.16	0.14	0.00	0.00	0.00	100.00	
	7.67	0.88	0.01	0.00	0.00	0.00	8.65	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

ALL CLASSES
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 10M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	232	261	159	17	0	0	669	2.19
	2.72	3.06	1.86	0.20	0.00	0.00	7.84	
	2.72	3.06	1.86	0.20	0.00	0.00	7.84	
NE	535	289	87	4	0	0	915	1.60
	6.27	3.39	1.02	0.05	0.00	0.00	10.73	
	6.27	3.39	1.02	0.05	0.00	0.00	10.73	
ENE	987	219	52	1	0	0	1259	1.25
	11.57	2.57	0.61	0.01	0.00	0.00	14.76	
	11.57	2.57	0.61	0.01	0.00	0.00	14.76	
E	527	70	26	7	0	0	630	1.20
	6.18	0.82	0.30	0.08	0.00	0.00	7.39	
	6.18	0.82	0.30	0.08	0.00	0.00	7.39	
ESE	220	66	25	13	0	0	324	1.53
	2.58	0.77	0.29	0.15	0.00	0.00	3.80	
	2.58	0.77	0.29	0.15	0.00	0.00	3.80	
SE	180	96	50	9	0	0	335	1.82
	2.11	1.13	0.59	0.11	0.00	0.00	3.93	
	2.11	1.13	0.59	0.11	0.00	0.00	3.93	
SSE	182	128	44	5	0	0	359	1.78
	2.13	1.50	0.52	0.06	0.00	0.00	4.21	
	2.13	1.50	0.52	0.06	0.00	0.00	4.21	
S	210	167	66	3	0	0	446	1.85
	2.46	1.96	0.77	0.04	0.00	0.00	5.23	
	2.46	1.96	0.77	0.04	0.00	0.00	5.23	
SSW	225	276	48	1	0	0	550	1.81
	2.64	3.24	0.56	0.01	0.00	0.00	6.45	
	2.64	3.24	0.56	0.01	0.00	0.00	6.45	
SW	141	319	229	34	1	0	724	2.67
	1.65	3.74	2.68	0.40	0.01	0.00	8.49	
	1.65	3.74	2.68	0.40	0.01	0.00	8.49	
WSW	68	156	207	65	2	0	498	3.27
	0.80	1.83	2.43	0.76	0.02	0.00	5.84	
	0.80	1.83	2.43	0.76	0.02	0.00	5.84	
W	36	111	97	31	0	0	275	3.03
	0.42	1.30	1.14	0.36	0.00	0.00	3.22	
	0.42	1.30	1.14	0.36	0.00	0.00	3.22	
WNW	27	65	100	12	0	0	204	3.15
	0.32	0.76	1.17	0.14	0.00	0.00	2.39	
	0.32	0.76	1.17	0.14	0.00	0.00	2.39	
NW	23	99	171	24	0	0	317	3.36
	0.27	1.16	2.00	0.28	0.00	0.00	3.72	
	0.27	1.16	2.00	0.28	0.00	0.00	3.72	
NNW	25	127	195	35	0	0	382	3.32
	0.29	1.49	2.29	0.41	0.00	0.00	4.48	
	0.29	1.49	2.29	0.41	0.00	0.00	4.48	
N	85	188	166	27	0	0	466	2.78
	1.00	2.20	1.95	0.32	0.00	0.00	5.46	
	1.00	2.20	1.95	0.32	0.00	0.00	5.46	
CALM	177						177	CALM
	2.08						2.08	
	2.08						2.08	
TOTAL	3703	2637	1722	288	3	0	8530	2.05
	43.41	30.91	20.19	3.38	0.04	0.00	100.00	
	43.41	30.91	20.19	3.38	0.04	0.00	100.00	

JOINT WIND FREQUENCY DISTRIBUTION FOR ALL WINDS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

ALL WINDS
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 10M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL WINDS

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	232	261	159	17	0	0	669	2.19
	2.71	3.05	1.86	0.20	0.00	0.00	7.83	
	2.71	3.05	1.86	0.20	0.00	0.00	7.83	
NE	535	289	87	4	0	0	915	1.60
	6.26	3.38	1.02	0.05	0.00	0.00	10.70	
	6.26	3.38	1.02	0.05	0.00	0.00	10.70	
ENE	990	219	52	1	0	0	1262	1.25
	11.58	2.56	0.61	0.01	0.00	0.00	14.76	
	11.58	2.56	0.61	0.01	0.00	0.00	14.76	
E	531	71	26	7	0	0	635	1.20
	6.21	0.83	0.30	0.08	0.00	0.00	7.43	
	6.21	0.83	0.30	0.08	0.00	0.00	7.43	
ESE	221	66	25	13	0	0	325	1.52
	2.59	0.77	0.29	0.15	0.00	0.00	3.80	
	2.59	0.77	0.29	0.15	0.00	0.00	3.80	
SE	181	98	51	9	0	0	339	1.83
	2.12	1.15	0.60	0.11	0.00	0.00	3.97	
	2.12	1.15	0.60	0.11	0.00	0.00	3.97	
SSE	182	129	44	5	0	0	360	1.78
	2.13	1.51	0.51	0.06	0.00	0.00	4.21	
	2.13	1.51	0.51	0.06	0.00	0.00	4.21	
S	210	168	66	3	0	0	447	1.86
	2.46	1.97	0.77	0.04	0.00	0.00	5.23	
	2.46	1.97	0.77	0.04	0.00	0.00	5.23	
SSW	225	276	48	1	0	0	550	1.81
	2.63	3.23	0.56	0.01	0.00	0.00	6.43	
	2.63	3.23	0.56	0.01	0.00	0.00	6.43	
SW	141	320	229	34	1	0	725	2.67
	1.65	3.74	2.68	0.40	0.01	0.00	8.48	
	1.65	3.74	2.68	0.40	0.01	0.00	8.48	
WSW	68	156	207	65	2	0	498	3.27
	0.80	1.82	2.42	0.76	0.02	0.00	5.83	
	0.80	1.82	2.42	0.76	0.02	0.00	5.83	
W	36	111	97	31	0	0	275	3.03
	0.42	1.30	1.13	0.36	0.00	0.00	3.22	
	0.42	1.30	1.13	0.36	0.00	0.00	3.22	
WNW	27	65	100	12	0	0	204	3.15
	0.32	0.76	1.17	0.14	0.00	0.00	2.39	
	0.32	0.76	1.17	0.14	0.00	0.00	2.39	
NW	23	99	171	25	0	0	318	3.37
	0.27	1.16	2.00	0.29	0.00	0.00	3.72	
	0.27	1.16	2.00	0.29	0.00	0.00	3.72	
NNW	25	127	195	36	0	0	383	3.33
	0.29	1.49	2.28	0.42	0.00	0.00	4.48	
	0.29	1.49	2.28	0.42	0.00	0.00	4.48	
N	86	188	166	27	0	0	467	2.78
	1.01	2.20	1.94	0.32	0.00	0.00	5.46	
	1.01	2.20	1.94	0.32	0.00	0.00	5.46	
CALM	177						177	CALM
	2.07						2.07	
	2.07						2.07	
TOTAL	3713	2643	1723	290	3	0	8549	2.05
	43.43	30.92	20.15	3.39	0.04	0.00	100.00	
	43.43	30.92	20.15	3.39	0.04	0.00	100.00	

TABLE 13

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

STABILITY CLASS: PASQUILL A
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 60M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	2	1	0	1	1	0	5	3.47
	0.25	0.13	0.00	0.13	0.13	0.00	0.63	
	0.02	0.01	0.00	0.01	0.01	0.00	0.06	
NE	7	10	5	3	0	0	25	2.56
	0.89	1.27	0.63	0.38	0.00	0.00	3.17	
	0.08	0.12	0.06	0.04	0.00	0.00	0.30	
ENE	13	9	3	0	0	0	25	1.65
	1.65	1.14	0.38	0.00	0.00	0.00	3.17	
	0.16	0.11	0.04	0.00	0.00	0.00	0.30	
E	8	3	0	0	0	0	11	1.42
	1.02	0.38	0.00	0.00	0.00	0.00	1.40	
	0.10	0.04	0.00	0.00	0.00	0.00	0.13	
ESE	2	5	0	1	0	0	8	2.16
	0.25	0.63	0.00	0.13	0.00	0.00	1.02	
	0.02	0.06	0.00	0.01	0.00	0.00	0.10	
SE	3	10	5	3	0	0	21	3.01
	0.38	1.27	0.63	0.38	0.00	0.00	2.66	
	0.04	0.12	0.06	0.04	0.00	0.00	0.25	
SSE	5	7	19	3	0	0	34	3.41
	0.63	0.89	2.41	0.38	0.00	0.00	4.31	
	0.06	0.08	0.23	0.04	0.00	0.00	0.41	
S	13	28	16	16	5	1	79	3.75
	1.65	3.55	2.03	2.03	0.63	0.13	10.03	
	0.16	0.34	0.19	0.19	0.06	0.01	0.95	
SSW	20	63	35	16	5	0	139	3.18
	2.54	7.99	4.44	2.03	0.63	0.00	17.64	
	0.24	0.75	0.42	0.19	0.06	0.00	1.66	
SW	4	63	117	69	2	0	255	4.12
	0.51	7.99	14.85	8.76	0.25	0.00	32.36	
	0.05	0.75	1.40	0.83	0.02	0.00	3.05	
WSW	1	21	53	66	6	0	147	4.79
	0.13	2.66	6.73	8.38	0.76	0.00	18.65	
	0.01	0.25	0.63	0.79	0.07	0.00	1.76	
W	0	1	7	16	1	0	25	5.34
	0.00	0.13	0.89	2.03	0.13	0.00	3.17	
	0.00	0.01	0.08	0.19	0.01	0.00	0.30	
WNW	2	2	2	2	0	0	8	3.13
	0.25	0.25	0.25	0.25	0.00	0.00	1.02	
	0.02	0.02	0.02	0.02	0.00	0.00	0.10	
NW	1	0	1	1	0	0	3	3.71
	0.13	0.00	0.13	0.13	0.00	0.00	0.38	
	0.01	0.00	0.01	0.01	0.00	0.00	0.04	
NNW	0	0	0	0	0	0	0	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
N	1	2	0	0	0	0	3	1.54
	0.13	0.25	0.00	0.00	0.00	0.00	0.38	
	0.01	0.02	0.00	0.00	0.00	0.00	0.04	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	82	225	263	197	20	1	788	3.81
	10.41	28.55	33.38	25.00	2.54	0.13	100.00	
	0.98	2.69	3.15	2.36	0.24	0.01	9.43	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

STABILITY CLASS: PASQUILL B
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 60M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 0.46 0.01	5 2.28 0.06	9 4.11 0.11	3 1.37 0.04	0 0.00 0.00	0 0.00 0.00	18 8.22 0.22	3.57
NE	5 2.28 0.06	8 3.65 0.10	9 4.11 0.11	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	22 10.05 0.26	2.63
ENE	2 0.91 0.02	4 1.83 0.05	1 0.46 0.01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	7 3.20 0.08	1.91
E	1 0.46 0.01	3 1.37 0.04	0 0.00 0.00	2 0.91 0.02	1 0.46 0.01	0 0.00 0.00	7 3.20 0.08	3.77
ESE	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0.00
SE	0 0.00 0.00	0 0.00 0.00	1 0.46 0.01	0 0.00 0.00	0 0.00 0.00	1 0.00 0.00	1 0.46 0.01	3.13
SSE	1 0.46 0.01	2 0.91 0.02	7 3.20 0.08	2 0.91 0.02	1 0.46 0.01	0 0.00 0.00	13 5.94 0.16	3.84
S	6 2.74 0.07	1 0.46 0.01	0 0.00 0.00	1 0.46 0.01	1 0.46 0.01	0 0.00 0.00	9 4.11 0.11	2.95
SSW	1 0.46 0.01	7 3.20 0.08	9 4.11 0.11	3 1.37 0.04	0 0.00 0.00	0 0.00 0.00	20 9.13 0.24	3.65
SW	5 2.28 0.06	8 3.65 0.10	19 8.68 0.23	14 6.39 0.17	1 0.46 0.01	2 0.91 0.02	49 22.37 0.59	4.23
WSW	0 0.00 0.00	5 2.28 0.06	13 5.94 0.16	19 8.68 0.23	3 1.37 0.04	1 0.46 0.01	41 18.72 0.49	5.23
W	0 0.00 0.00	3 1.37 0.04	7 3.20 0.08	5 2.28 0.06	2 0.91 0.02	0 0.00 0.00	17 7.76 0.20	5.03
WNW	0 0.00 0.00	0 0.00 0.00	1 0.46 0.01	2 0.91 0.02	1 0.46 0.01	0 0.00 0.00	4 1.83 0.05	5.73
NW	0 0.00 0.00	1 0.46 0.01	1 0.46 0.01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 0.91 0.02	3.09
NNW	0 0.00 0.00	3 1.37 0.04	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 1.37 0.04	1.97
N	0 0.00 0.00	3 1.37 0.04	0 0.00 0.00	0 0.00 0.00	2 0.91 0.02	0 0.00 0.00	5 2.28 0.06	4.53
CALM	1 0.46 0.01						1 0.46 0.01	CALM
TOTAL	22 10.05 0.26	53 24.20 0.63	77 35.16 0.92	51 23.29 0.61	12 5.48 0.14	3 1.37 0.04	219 100.00 2.62	4.01

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

STABILITY CLASS: PASQUILL C
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 60M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	1 0.33 0.01	12 3.91 0.14	28 9.12 0.34	7 2.28 0.08	1 0.33 0.01	0 0.00 0.00	49 15.96 0.59	3.88
NE	2 0.65 0.02	10 3.26 0.12	13 4.23 0.16	0 0.00 0.00	1 0.33 0.01	0 0.00 0.00	26 8.47 0.31	3.14
ENE	1 0.33 0.01	2 0.65 0.02	2 0.65 0.02	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 1.63 0.06	2.37
E	2 0.65 0.02	3 0.98 0.04	0 0.00 0.00	1 0.33 0.01	0 0.00 0.00	0 0.00 0.00	6 1.95 0.07	2.49
ESE	0 0.00 0.00	3 0.98 0.04	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 0.98 0.04	1.84
SE	1 0.33 0.01	2 0.65 0.02	2 0.65 0.02	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	5 1.63 0.06	2.57
SSE	2 0.65 0.02	3 0.98 0.04	6 1.95 0.07	2 0.65 0.02	1 0.33 0.01	0 0.00 0.00	14 4.56 0.17	3.56
S	2 0.65 0.02	10 3.26 0.12	5 1.63 0.06	2 0.65 0.02	2 0.65 0.02	0 0.00 0.00	21 6.84 0.25	3.42
SSW	4 1.30 0.05	9 2.93 0.11	5 1.63 0.06	5 1.63 0.06	0 0.00 0.00	0 0.00 0.00	23 7.49 0.28	3.33
SW	5 1.63 0.06	15 4.89 0.18	16 5.21 0.19	9 2.93 0.11	3 0.98 0.04	0 0.00 0.00	48 15.64 0.57	3.79
WSW	0 0.00 0.00	2 0.65 0.02	18 5.86 0.22	17 5.54 0.20	4 1.30 0.05	0 0.00 0.00	41 13.36 0.49	5.27
W	0 0.00 0.00	1 0.33 0.01	6 1.95 0.07	11 3.58 0.13	1 0.33 0.01	0 0.00 0.00	19 6.19 0.23	5.23
WNW	0 0.00 0.00	2 0.65 0.02	3 0.98 0.04	1 0.33 0.01	1 0.33 0.01	0 0.00 0.00	7 2.28 0.08	4.30
NW	0 0.00 0.00	2 0.65 0.02	6 1.95 0.07	6 1.95 0.07	0 0.00 0.00	0 0.00 0.00	14 4.56 0.17	4.43
NNW	1 0.33 0.01	1 0.33 0.01	6 1.95 0.07	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	8 2.61 0.10	3.59
N	1 0.33 0.01	6 1.95 0.07	5 1.63 0.06	6 1.95 0.07	0 0.00 0.00	0 0.00 0.00	18 5.86 0.22	3.79
CALM	0 0.00 0.00						0 0.00 0.00	CALM
TOTAL	22 7.17 0.26	83 27.04 0.99	121 39.41 1.45	67 21.82 0.80	14 4.56 0.17	0 0.00 0.00	307 100.00 3.67	3.91

TABLE 13

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

STABILITY CLASS: PASQUILL D
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 60M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	26	81	136	112	19	0	374	4.24
	0.90	2.80	4.70	3.87	0.66	0.00	12.94	
	0.31	0.97	1.63	1.34	0.23	0.00	4.48	
NE	48	57	97	45	3	0	250	3.44
	1.66	1.97	3.36	1.56	0.10	0.00	8.65	
	0.57	0.68	1.16	0.54	0.04	0.00	2.99	
ENE	21	24	32	24	1	0	102	3.46
	0.73	0.83	1.11	0.83	0.03	0.00	3.53	
	0.25	0.29	0.38	0.29	0.01	0.00	1.22	
E	14	19	17	10	1	0	61	3.23
	0.48	0.66	0.59	0.35	0.03	0.00	2.11	
	0.17	0.23	0.20	0.12	0.01	0.00	0.73	
ESE	15	25	22	14	3	0	79	3.38
	0.52	0.86	0.76	0.48	0.10	0.00	2.73	
	0.18	0.30	0.26	0.17	0.04	0.00	0.95	
SE	18	27	40	16	4	0	105	3.50
	0.62	0.93	1.38	0.55	0.14	0.00	3.63	
	0.22	0.32	0.48	0.19	0.05	0.00	1.26	
SSE	13	25	53	10	1	0	102	3.38
	0.45	0.86	1.83	0.35	0.03	0.00	3.53	
	0.16	0.30	0.63	0.12	0.01	0.00	1.22	
S	22	12	30	18	6	0	88	3.60
	0.76	0.42	1.04	0.62	0.21	0.00	3.04	
	0.26	0.14	0.36	0.22	0.07	0.00	1.05	
SSW	33	32	24	26	0	0	115	3.09
	1.14	1.11	0.83	0.90	0.00	0.00	3.98	
	0.39	0.38	0.29	0.31	0.00	0.00	1.38	
SW	18	63	50	34	14	2	181	3.92
	0.62	2.18	1.73	1.18	0.48	0.07	6.26	
	0.22	0.75	0.60	0.41	0.17	0.02	2.17	
WSW	10	44	80	110	36	10	290	5.24
	0.35	1.52	2.77	3.80	1.25	0.35	10.03	
	0.12	0.53	0.96	1.32	0.43	0.12	3.47	
W	10	19	73	54	9	0	165	4.49
	0.35	0.66	2.53	1.87	0.31	0.00	5.71	
	0.12	0.23	0.87	0.65	0.11	0.00	1.97	
WNW	6	21	74	78	12	0	191	4.88
	0.21	0.73	2.56	2.70	0.42	0.00	6.61	
	0.07	0.25	0.89	0.93	0.14	0.00	2.29	
NW	4	29	148	100	5	0	286	4.58
	0.14	1.00	5.12	3.46	0.17	0.00	9.89	
	0.05	0.35	1.77	1.20	0.06	0.00	3.42	
NNW	7	24	116	94	9	0	250	4.73
	0.24	0.83	4.01	3.25	0.31	0.00	8.65	
	0.08	0.29	1.39	1.13	0.11	0.00	2.99	
N	13	38	114	68	9	0	242	4.35
	0.45	1.31	3.94	2.35	0.31	0.00	8.37	
	0.16	0.45	1.36	0.81	0.11	0.00	2.90	
CALM	10						10	CALM
	0.35						0.35	
	0.12						0.12	
TOTAL	278	540	1106	813	132	12	2891	4.18
	9.62	18.68	38.26	28.12	4.57	0.42	100.00	
	3.33	6.46	13.24	9.73	1.58	0.14	34.60	

TABLE 13

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

SUSQUEHANNA STEAM ELECTRIC STATION METEOROLOGICAL REPORTS RUNDATE: 2/16/88

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

STABILITY CLASS: PASQUILL E
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 60M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	95	151	78	28	1	0	353	2.52
	4.04	6.43	3.32	1.19	0.04	0.00	15.02	
	1.14	1.81	0.93	0.34	0.01	0.00	4.23	
NE	114	79	46	6	1	0	246	1.99
	4.85	3.36	1.96	0.26	0.04	0.00	10.47	
	1.36	0.95	0.55	0.07	0.01	0.00	2.94	
ENE	51	50	20	1	0	0	122	1.98
	2.17	2.13	0.85	0.04	0.00	0.00	5.19	
	0.61	0.60	0.24	0.01	0.00	0.00	1.46	
E	39	24	28	6	5	0	102	2.65
	1.66	1.02	1.19	0.26	0.21	0.00	4.34	
	0.47	0.29	0.34	0.07	0.06	0.00	1.22	
ESE	27	25	15	6	1	0	74	2.46
	1.15	1.06	0.64	0.26	0.04	0.00	3.15	
	0.32	0.30	0.18	0.07	0.01	0.00	0.89	
SE	31	21	20	6	2	0	80	2.61
	1.32	0.89	0.85	0.26	0.09	0.00	3.40	
	0.37	0.25	0.24	0.07	0.02	0.00	0.96	
SSE	35	32	20	16	3	0	106	2.85
	1.49	1.36	0.85	0.68	0.13	0.00	4.51	
	0.42	0.38	0.24	0.19	0.04	0.00	1.27	
S	39	40	24	23	5	0	131	3.11
	1.66	1.70	1.02	0.98	0.21	0.00	5.57	
	0.47	0.48	0.29	0.28	0.06	0.00	1.57	
SSW	26	52	56	22	3	2	161	3.26
	1.11	2.21	2.38	0.94	0.13	0.09	6.85	
	0.31	0.62	0.67	0.26	0.04	0.02	1.93	
SW	37	79	83	46	13	0	258	3.60
	1.57	3.36	3.53	1.96	0.55	0.00	10.98	
	0.44	0.95	0.99	0.55	0.16	0.00	3.09	
WSW	27	68	94	56	5	0	250	3.71
	1.15	2.89	4.00	2.38	0.21	0.00	10.64	
	0.32	0.81	1.13	0.67	0.06	0.00	2.99	
W	14	34	22	10	2	0	82	2.99
	0.60	1.45	0.94	0.43	0.09	0.00	3.49	
	0.17	0.41	0.26	0.12	0.02	0.00	0.98	
WNW	11	24	32	6	0	0	73	3.08
	0.47	1.02	1.36	0.26	0.00	0.00	3.11	
	0.13	0.29	0.38	0.07	0.00	0.00	0.87	
NW	6	16	46	6	1	0	75	3.50
	0.26	0.68	1.96	0.26	0.04	0.00	3.19	
	0.07	0.19	0.55	0.07	0.01	0.00	0.90	
NNW	8	12	37	1	0	0	58	3.24
	0.34	0.51	1.57	0.04	0.00	0.00	2.47	
	0.10	0.14	0.44	0.01	0.00	0.00	0.69	
N	29	48	47	9	0	0	133	2.78
	1.23	2.04	2.00	0.38	0.00	0.00	5.66	
	0.35	0.57	0.56	0.11	0.00	0.00	1.59	
CALM	45						46	CALM
	1.91						1.96	
	0.54						0.55	
TOTAL	590	755	668	248	42	2	2350	2.83
	25.11	32.13	28.43	10.55	1.79	0.09	100.00	
	7.06	9.04	8.00	2.97	0.50	0.02	28.13	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

STABILITY CLASS: PASQUILL F
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 60M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	91	188	20	3	0	0	302	1.92
	8.39	17.33	1.84	0.28	0.00	0.00	27.83	
	1.09	2.25	0.24	0.04	0.00	0.00	3.61	
NE	81	59	12	0	0	0	152	1.59
	7.47	5.44	1.11	0.00	0.00	0.00	14.01	
	0.97	0.71	0.14	0.00	0.00	0.00	1.82	
ENE	50	15	1	0	0	0	66	1.19
	4.61	1.38	0.09	0.00	0.00	0.00	6.08	
	0.60	0.18	0.01	0.00	0.00	0.00	0.79	
E	40	13	0	0	0	0	53	1.15
	3.69	1.20	0.00	0.00	0.00	0.00	4.88	
	0.48	0.16	0.00	0.00	0.00	0.00	0.63	
ESE	35	7	0	0	0	0	42	1.09
	3.23	0.65	0.00	0.00	0.00	0.00	3.87	
	0.42	0.08	0.00	0.00	0.00	0.00	0.50	
SE	23	12	1	0	0	0	36	1.36
	2.12	1.11	0.09	0.00	0.00	0.00	3.32	
	0.28	0.14	0.01	0.00	0.00	0.00	0.43	
SSE	27	9	4	0	0	0	40	1.53
	2.49	0.83	0.37	0.00	0.00	0.00	3.69	
	0.32	0.11	0.05	0.00	0.00	0.00	0.48	
S	28	15	2	0	0	0	45	1.56
	2.58	1.38	0.18	0.00	0.00	0.00	4.15	
	0.34	0.18	0.02	0.00	0.00	0.00	0.54	
SSW	15	38	19	1	0	0	73	2.39
	1.38	3.50	1.75	0.09	0.00	0.00	6.73	
	0.18	0.45	0.23	0.01	0.00	0.00	0.87	
SW	8	35	24	5	0	0	72	2.91
	0.74	3.23	2.21	0.46	0.00	0.00	6.64	
	0.10	0.42	0.29	0.06	0.00	0.00	0.86	
WSW	4	9	14	4	0	0	31	3.44
	0.37	0.83	1.29	0.37	0.00	0.00	2.86	
	0.05	0.11	0.17	0.05	0.00	0.00	0.37	
W	0	1	1	0	0	0	2	3.82
	0.00	0.09	0.09	0.00	0.00	0.00	0.18	
	0.00	0.01	0.01	0.00	0.00	0.00	0.02	
WNW	0	6	2	0	0	0	8	2.51
	0.00	0.55	0.18	0.00	0.00	0.00	0.74	
	0.00	0.07	0.02	0.00	0.00	0.00	0.10	
NW	4	4	2	0	0	0	10	2.04
	0.37	0.37	0.18	0.00	0.00	0.00	0.92	
	0.05	0.05	0.02	0.00	0.00	0.00	0.12	
NNW	5	8	3	0	0	0	16	1.99
	0.46	0.74	0.28	0.00	0.00	0.00	1.47	
	0.06	0.10	0.04	0.00	0.00	0.00	0.19	
N	25	84	16	0	0	0	125	2.12
	2.30	7.74	1.47	0.00	0.00	0.00	11.52	
	0.30	1.01	0.19	0.00	0.00	0.00	1.50	
CALM	12						12	CALM
	1.11						1.11	
	0.14						0.14	
TOTAL	436	503	121	13	0	0	1085	1.86
	40.18	46.36	11.15	1.20	0.00	0.00	100.00	
	5.22	6.02	1.45	0.16	0.00	0.00	12.99	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

STABILITY CLASS: PASQUILL G
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 60M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	47 6.57 0.56	136 19.02 1.63	8 1.12 0.10	1 0.14 0.01	0 0.00 0.00	0 0.00 0.00	192 26.85 2.30	1.91
NE	69 9.65 0.83	55 7.69 0.66	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	124 17.34 1.48	1.46
ENE	51 7.13 0.61	11 1.54 0.13	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	62 8.67 0.74	1.22
E	39 5.45 0.47	6 0.84 0.07	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	45 6.29 0.54	1.09
ESE	24 3.36 0.29	7 0.98 0.08	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	31 4.34 0.37	1.30
SE	20 2.80 0.24	7 0.98 0.08	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	27 3.78 0.32	1.33
SSE	13 1.82 0.16	7 0.98 0.08	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	20 2.80 0.24	1.42
S	14 1.96 0.17	12 1.68 0.14	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	26 3.64 0.31	1.51
SSW	4 0.56 0.05	20 2.80 0.24	3 0.42 0.04	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	27 3.78 0.32	2.20
SW	5 0.70 0.06	14 1.96 0.17	7 0.98 0.08	1 0.14 0.01	0 0.00 0.00	0 0.00 0.00	27 3.78 0.32	2.48
WSW	3 0.42 0.04	1 0.14 0.01	3 0.42 0.04	1 0.14 0.01	0 0.00 0.00	0 0.00 0.00	8 1.12 0.10	3.02
W	1 0.14 0.01	1 0.14 0.01	1 0.14 0.01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	3 0.42 0.04	1.98
WNW	1 0.14 0.01	1 0.14 0.01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	2 0.28 0.02	1.59
NW	3 0.42 0.04	3 0.42 0.04	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	6 0.84 0.07	1.71
NNW	2 0.28 0.02	11 1.54 0.13	1 0.14 0.01	0 0.00 0.00	0 0.00 0.00	0 0.00 0.00	14 1.96 0.17	2.04
N	20 2.80 0.24	67 9.37 0.80	10 1.40 0.12	1 0.14 0.01	0 0.00 0.00	0 0.00 0.00	98 13.71 1.17	2.21
CALM	3 0.42 0.04						3 0.42 0.04	CALM
TOTAL	316 44.20 3.78	359 50.21 4.30	33 4.62 0.39	4 0.56 0.05	0 0.00 0.00	0 0.00 0.00	715 100.00 8.56	1.72

TABLE 13

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

ALL CLASSES
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 60M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL CLASSES

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	263	574	279	155	22	0	1293	2.85
	3.15	6.87	3.34	1.86	0.26	0.00	15.48	
	3.15	6.87	3.34	1.86	0.26	0.00	15.48	
NE	326	278	182	54	5	0	845	2.34
	3.90	3.33	2.18	0.65	0.06	0.00	10.11	
	3.90	3.33	2.18	0.65	0.06	0.00	10.11	
ENE	189	115	59	25	1	0	389	2.10
	2.26	1.38	0.71	0.30	0.01	0.00	4.66	
	2.26	1.38	0.71	0.30	0.01	0.00	4.66	
E	143	71	45	19	7	0	285	2.22
	1.71	0.85	0.54	0.23	0.08	0.00	3.41	
	1.71	0.85	0.54	0.23	0.08	0.00	3.41	
ESE	103	72	37	21	4	0	237	2.35
	1.23	0.86	0.44	0.25	0.05	0.00	2.84	
	1.23	0.86	0.44	0.25	0.05	0.00	2.84	
SE	96	79	69	25	6	0	275	2.69
	1.15	0.95	0.83	0.30	0.07	0.00	3.29	
	1.15	0.95	0.83	0.30	0.07	0.00	3.29	
SSE	96	85	109	33	6	0	329	2.89
	1.15	1.02	1.30	0.39	0.07	0.00	3.94	
	1.15	1.02	1.30	0.39	0.07	0.00	3.94	
S	124	118	77	60	19	1	399	3.08
	1.48	1.41	0.92	0.72	0.23	0.01	4.78	
	1.48	1.41	0.92	0.72	0.23	0.01	4.78	
SSW	103	221	151	73	8	2	558	3.06
	1.23	2.65	1.81	0.87	0.10	0.02	6.68	
	1.23	2.65	1.81	0.87	0.10	0.02	6.68	
SW	82	277	316	178	33	4	890	3.77
	0.98	3.32	3.78	2.13	0.39	0.05	10.65	
	0.98	3.32	3.78	2.13	0.39	0.05	10.65	
WSW	45	150	275	273	54	11	808	4.59
	0.54	1.80	3.29	3.27	0.65	0.13	9.67	
	0.54	1.80	3.29	3.27	0.65	0.13	9.67	
W	25	60	117	96	15	0	313	4.21
	0.30	0.72	1.40	1.15	0.18	0.00	3.75	
	0.30	0.72	1.40	1.15	0.18	0.00	3.75	
WNW	20	56	114	89	14	0	293	4.30
	0.24	0.67	1.36	1.07	0.17	0.00	3.51	
	0.24	0.67	1.36	1.07	0.17	0.00	3.51	
NW	18	55	204	113	6	0	396	4.25
	0.22	0.66	2.44	1.35	0.07	0.00	4.74	
	0.22	0.66	2.44	1.35	0.07	0.00	4.74	
NNW	23	59	163	95	9	0	349	4.20
	0.28	0.71	1.95	1.14	0.11	0.00	4.18	
	0.28	0.71	1.95	1.14	0.11	0.00	4.18	
N	89	248	192	84	11	0	624	3.21
	1.07	2.97	2.30	1.01	0.13	0.00	7.47	
	1.07	2.97	2.30	1.01	0.13	0.00	7.47	
CALM	71						72	CALM
	0.85						0.86	
	0.85						0.86	
TOTAL	1746	2518	2389	1393	220	18	8355	3.24
	20.90	30.14	28.59	16.67	2.63	0.22	100.00	
	20.90	30.14	28.59	16.67	2.63	0.22	100.00	

TABLE 13

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

JOINT WIND FREQUENCY DISTRIBUTION FOR ALL WINDS

DATA PERIOD (YY/MM/DD/HH): 87/01/01/01 - 87/12/31/24

ALL WINDS
DATA SOURCE: ON-SITE (P)
WIND SENSOR HEIGHT: 60M

KEY XXX NUMBER OF OCCURRENCES
XXX PERCENT OCCURRENCES THIS CLASS
XXX PERCENT OCCURRENCES ALL WINDS

WIND SECTOR	WIND SPEED CATEGORIES (METERS PER SECOND) 0.0-1.5	1.5-3.0	3.0-5.0	5.0-7.5	7.5-10.0	>10.0	TOTAL	MEAN SPEED
NNE	263	574	279	155	22	0	1293	2.85
	3.14	6.86	3.33	1.85	0.26	0.00	15.44	
	3.14	6.86	3.33	1.85	0.26	0.00	15.44	
NE	326	279	182	54	5	0	846	2.34
	3.89	3.33	2.17	0.65	0.06	0.00	10.11	
	3.89	3.33	2.17	0.65	0.06	0.00	10.11	
ENE	190	115	59	25	1	0	390	2.09
	2.27	1.37	0.70	0.30	0.01	0.00	4.66	
	2.27	1.37	0.70	0.30	0.01	0.00	4.66	
E	143	71	45	19	7	0	285	2.22
	1.71	0.85	0.54	0.23	0.08	0.00	3.40	
	1.71	0.85	0.54	0.23	0.08	0.00	3.40	
ESE	103	73	37	21	4	0	238	2.35
	1.23	0.87	0.44	0.25	0.05	0.00	2.84	
	1.23	0.87	0.44	0.25	0.05	0.00	2.84	
SE	98	80	71	25	6	0	280	2.69
	1.17	0.96	0.85	0.30	0.07	0.00	3.34	
	1.17	0.96	0.85	0.30	0.07	0.00	3.34	
SSE	98	85	109	33	6	0	331	2.88
	1.17	1.02	1.30	0.39	0.07	0.00	3.95	
	1.17	1.02	1.30	0.39	0.07	0.00	3.95	
S	125	118	77	60	19	1	400	3.07
	1.49	1.41	0.92	0.72	0.23	0.01	4.78	
	1.49	1.41	0.92	0.72	0.23	0.01	4.78	
SSW	103	221	151	73	8	2	558	3.06
	1.23	2.64	1.80	0.87	0.10	0.02	6.67	
	1.23	2.64	1.80	0.87	0.10	0.02	6.67	
SW	82	278	317	178	33	4	892	3.77
	0.98	3.32	3.79	2.13	0.39	0.05	10.65	
	0.98	3.32	3.79	2.13	0.39	0.05	10.65	
WSW	45	150	275	273	54	11	808	4.59
	0.54	1.79	3.28	3.26	0.65	0.13	9.65	
	0.54	1.79	3.28	3.26	0.65	0.13	9.65	
W	26	60	117	96	15	0	314	4.20
	0.31	0.72	1.40	1.15	0.18	0.00	3.75	
	0.31	0.72	1.40	1.15	0.18	0.00	3.75	
WNW	20	56	114	89	15	0	294	4.31
	0.24	0.67	1.36	1.06	0.18	0.00	3.51	
	0.24	0.67	1.36	1.06	0.18	0.00	3.51	
NW	18	55	204	114	6	0	397	4.26
	0.22	0.66	2.44	1.36	0.07	0.00	4.74	
	0.22	0.66	2.44	1.36	0.07	0.00	4.74	
NNW	23	59	163	95	9	0	349	4.20
	0.27	0.70	1.95	1.13	0.11	0.00	4.17	
	0.27	0.70	1.95	1.13	0.11	0.00	4.17	
N	89	249	192	84	11	0	625	3.20
	1.06	2.97	2.29	1.00	0.13	0.00	7.47	
	1.06	2.97	2.29	1.00	0.13	0.00	7.47	
CALM	71						72	CALM
	0.85						0.86	
	0.85						0.86	
TOTAL	1753	2523	2392	1394	221	18	8372	3.24
	20.94	30.14	28.57	16.65	2.64	0.22	100.00	
	20.94	30.14	28.57	16.65	2.64	0.22	100.00	

TABLE 13

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD : 01/01/87 TO 12/31/87

FIXED AND SPECIAL DISTANCES DISPERSION ANALYSIS
FOR CALENDAR YEAR 1987

** RADIOLOGICAL EFFLUENT DISPERSION PROGRAM ADSSES (CNDAP10)
SUSQUEHANNA STEAM ELECTRIC STATION; LUZERNE COUNTY, PA
PENNSYLVANIA POWER & LIGHT COMPANY; ALLENTOWN, PA

DATE 23-FEB-88 ADSSES DEVELOPED BY MODIFICATION OF D&M PROGRAM ANDIFF

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
0.5 MILES (.805 KM)															
8.3E-06	6.1E-06	3.8E-06	2.6E-06	2.0E-06	2.5E-06	3.4E-06	7.7E-06	1.2E-05	2.3E-05	4.0E-05	2.5E-05	1.1E-05	9.9E-06	7.6E-06	7.2E-06
7.6E-06	5.6E-06	3.5E-06	2.3E-06	1.8E-06	2.3E-06	3.1E-06	7.1E-06	1.1E-05	2.1E-05	3.7E-05	2.3E-05	9.9E-06	9.1E-06	7.0E-06	6.6E-06
2.6E-08	3.2E-08	2.4E-08	1.3E-08	1.0E-08	1.5E-08	2.1E-08	2.8E-08	3.1E-08	3.6E-08	4.7E-08	3.0E-08	1.7E-08	2.1E-08	1.8E-08	2.0E-08
8.3E-06	6.1E-06	3.8E-06	2.6E-06	2.0E-06	2.5E-06	3.4E-06	7.7E-06	1.2E-05	2.3E-05	4.0E-05	2.5E-05	1.1E-05	9.8E-06	7.6E-06	7.1E-06
8.3E-06	6.1E-06	3.8E-06	2.6E-06	2.0E-06	2.5E-06	3.4E-06	7.7E-06	1.2E-05	2.3E-05	4.0E-05	2.5E-05	1.1E-05	9.9E-06	7.6E-06	7.1E-06
7.6E-06	5.6E-06	3.5E-06	2.3E-06	1.8E-06	2.3E-06	3.1E-06	7.1E-06	1.1E-05	2.1E-05	3.7E-05	2.3E-05	9.8E-06	9.0E-06	6.9E-06	6.5E-06
7.6E-06	5.6E-06	3.5E-06	2.3E-06	1.8E-06	2.3E-06	3.1E-06	7.1E-06	1.1E-05	2.1E-05	3.7E-05	2.3E-05	9.9E-06	9.0E-06	7.0E-06	6.5E-06
805.	805.	805.	805.	805.	805.	805.	805.	805.	805.	805.	805.	805.	805.	805.	805.
1.5 MILES (2.41 KM)															
1.7E-06	1.3E-06	8.1E-07	4.6E-07	3.5E-07	4.9E-07	6.2E-07	1.5E-06	2.5E-06	5.0E-06	9.8E-06	4.4E-06	2.2E-06	2.1E-06	1.7E-06	1.5E-06
1.5E-06	1.1E-06	6.8E-07	3.9E-07	3.0E-07	4.1E-07	5.3E-07	1.3E-06	2.1E-06	4.2E-06	8.3E-06	3.7E-06	1.9E-06	1.7E-06	1.5E-06	1.3E-06
4.5E-09	5.6E-09	4.1E-09	1.9E-09	1.5E-09	2.6E-09	3.2E-09	4.4E-09	5.5E-09	6.8E-09	1.0E-08	4.5E-09	2.9E-09	3.6E-09	3.4E-09	3.3E-09
1.7E-06	1.3E-06	8.0E-07	4.6E-07	3.5E-07	4.9E-07	6.2E-07	1.5E-06	2.5E-06	4.9E-06	9.7E-06	4.3E-06	2.2E-06	2.0E-06	1.7E-06	1.5E-06
1.7E-06	1.3E-06	8.0E-07	4.6E-07	3.5E-07	4.9E-07	6.2E-07	1.5E-06	2.5E-06	5.0E-06	9.8E-06	4.4E-06	2.2E-06	2.1E-06	1.7E-06	1.5E-06
1.5E-06	1.1E-06	6.7E-07	3.9E-07	2.9E-07	4.1E-07	5.2E-07	1.3E-06	2.1E-06	4.1E-06	8.2E-06	3.7E-06	1.8E-06	1.7E-06	1.4E-06	1.2E-06
1.5E-06	1.1E-06	6.8E-07	3.9E-07	3.0E-07	4.1E-07	5.2E-07	1.3E-06	2.1E-06	4.2E-06	8.3E-06	3.7E-06	1.9E-06	1.7E-06	1.5E-06	1.3E-06
2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.
2.5 MILES (4.02 KM)															
8.9E-07	6.5E-07	4.1E-07	2.1E-07	1.4E-07	2.1E-07	2.9E-07	6.7E-07	1.1E-06	2.3E-06	5.0E-06	2.0E-06	9.9E-07	9.4E-07	8.2E-07	7.7E-07
7.2E-07	5.3E-07	3.3E-07	1.7E-07	1.2E-07	1.7E-07	2.3E-07	5.4E-07	9.2E-07	1.9E-06	4.0E-06	1.6E-06	8.0E-07	7.6E-07	6.6E-07	6.2E-07
2.0E-09	2.6E-09	1.9E-09	7.9E-10	5.7E-10	1.0E-09	1.3E-09	1.8E-09	2.3E-09	2.8E-09	4.4E-09	1.8E-09	1.1E-09	1.4E-09	1.4E-09	1.5E-09
8.7E-07	6.4E-07	4.0E-07	2.1E-07	1.4E-07	2.0E-07	2.8E-07	6.6E-07	1.1E-06	2.3E-06	4.9E-06	2.0E-06	9.6E-07	9.1E-07	8.0E-07	7.5E-07
8.8E-07	6.5E-07	4.1E-07	2.1E-07	1.4E-07	2.1E-07	2.8E-07	6.7E-07	1.1E-06	2.3E-06	5.0E-06	2.0E-06	9.8E-07	9.3E-07	8.2E-07	7.6E-07
7.0E-07	5.1E-07	3.2E-07	1.7E-07	1.1E-07	1.6E-07	2.3E-07	5.3E-07	9.0E-07	1.8E-06	3.9E-06	1.6E-06	7.7E-07	7.3E-07	6.4E-07	6.0E-07
7.1E-07	5.2E-07	3.3E-07	1.7E-07	1.2E-07	1.7E-07	2.3E-07	5.3E-07	9.2E-07	1.9E-06	4.0E-06	1.6E-06	7.9E-07	7.5E-07	6.6E-07	6.1E-07
4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.
3.5 MILES (5.63 KM)															
4.9E-07	3.8E-07	2.5E-07	1.2E-07	7.8E-08	9.7E-08	1.5E-07	3.4E-07	5.7E-07	1.3E-06	2.7E-06	1.1E-06	5.5E-07	5.4E-07	4.4E-07	4.2E-07
3.8E-07	2.9E-07	1.9E-07	8.9E-08	6.0E-08	7.5E-08	1.1E-07	2.6E-07	4.4E-07	9.9E-07	2.1E-06	8.3E-07	4.2E-07	4.2E-07	3.4E-07	3.3E-07
1.0E-09	1.4E-09	1.1E-09	4.0E-10	2.9E-10	4.4E-10	6.4E-10	8.2E-10	1.0E-09	1.3E-09	2.1E-09	8.4E-10	5.7E-10	7.5E-10	6.9E-10	7.6E-10
4.8E-07	3.7E-07	2.4E-07	1.1E-07	7.6E-08	9.5E-08	1.4E-07	3.3E-07	5.5E-07	1.2E-06	2.6E-06	1.0E-06	5.2E-07	5.2E-07	4.2E-07	4.1E-07
4.9E-07	3.7E-07	2.5E-07	1.1E-07	7.7E-08	9.7E-08	1.5E-07	3.4E-07	5.6E-07	1.3E-06	2.7E-06	1.1E-06	5.4E-07	5.4E-07	4.4E-07	4.2E-07
3.7E-07	2.8E-07	1.9E-07	8.7E-08	5.8E-08	7.4E-08	1.1E-07	2.5E-07	4.3E-07	9.5E-07	2.0E-06	8.0E-07	4.1E-07	4.0E-07	3.3E-07	3.1E-07
3.8E-07	2.9E-07	1.9E-07	8.9E-08	6.0E-08	7.5E-08	1.1E-07	2.6E-07	4.4E-07	9.7E-07	2.1E-06	8.2E-07	4.2E-07	4.2E-07	3.4E-07	3.2E-07
5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.

TOTAL OBS - 8760 TOTAL INV OBS - 59 CALMS LOWER LEVEL -183.00
KEY: ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD : 01/01/87 TO 12/31/87

FIXED AND SPECIAL DISTANCES DISPERSION ANALYSIS
FOR CALENDAR YEAR 1987

** RADIOLOGICAL EFFLUENT DISPERSION PROGRAM ADSSES (CNDAP10)
SUSQUEHANNA STEAM ELECTRIC STATION; LUZERNE COUNTY, PA
PENNSYLVANIA POWER & LIGHT COMPANY; ALLENTOWN, PA

DATE 23-FEB-88 ADSSES DEVELOPED BY MODIFICATION OF D&M PROGRAM ANDIFF

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
4.5 MILES (7.24 KM)															
3.4E-07	2.7E-07	1.8E-07	7.7E-08	4.5E-08	5.4E-08	7.9E-08	2.1E-07	3.4E-07	7.9E-07	1.8E-06	7.1E-07	3.6E-07	3.5E-07	3.1E-07	2.9E-07
2.6E-07	2.0E-07	1.4E-07	5.8E-08	3.4E-08	4.0E-08	5.9E-08	1.5E-07	2.6E-07	5.9E-07	1.4E-06	5.3E-07	2.7E-07	2.7E-07	2.3E-07	2.2E-07
6.6E-10	9.0E-10	7.3E-10	2.5E-10	1.6E-10	2.3E-10	3.2E-10	4.7E-10	5.7E-10	7.5E-10	1.2E-09	5.0E-10	3.4E-10	4.5E-10	4.5E-10	4.9E-10
3.3E-07	2.6E-07	1.7E-07	7.4E-08	4.3E-08	5.2E-08	7.7E-08	2.0E-07	3.3E-07	7.5E-07	1.7E-06	6.7E-07	3.4E-07	3.4E-07	3.0E-07	2.8E-07
3.4E-07	2.7E-07	1.8E-07	7.6E-08	4.4E-08	5.3E-08	7.8E-08	2.0E-07	3.4E-07	7.8E-07	1.8E-06	7.0E-07	3.6E-07	3.5E-07	3.1E-07	2.9E-07
2.5E-07	1.9E-07	1.3E-07	5.6E-08	3.3E-08	3.9E-08	5.8E-08	1.5E-07	2.4E-07	5.7E-07	1.3E-06	5.0E-07	2.6E-07	2.5E-07	2.2E-07	2.1E-07
2.5E-07	2.0E-07	1.3E-07	5.7E-08	3.3E-08	4.0E-08	5.9E-08	1.5E-07	2.5E-07	5.9E-07	1.3E-06	5.2E-07	2.7E-07	2.6E-07	2.3E-07	2.2E-07
7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.
7.5 MILES (12.07 KM)															
1.6E-07	1.3E-07	8.5E-08	3.4E-08	1.5E-08	1.7E-08	2.5E-08	7.7E-08	1.3E-07	3.3E-07	7.8E-07	2.8E-07	1.5E-07	1.5E-07	1.5E-07	1.8E-07
1.1E-07	8.9E-08	5.9E-08	2.4E-08	1.1E-08	1.2E-08	1.8E-08	5.3E-08	9.0E-08	2.3E-07	5.4E-07	2.0E-07	1.1E-07	1.1E-07	1.0E-07	1.3E-07
2.6E-10	3.6E-10	3.0E-10	9.7E-11	4.7E-11	6.1E-11	9.1E-11	1.5E-10	1.8E-10	2.5E-10	4.3E-10	1.6E-10	1.2E-10	1.6E-10	1.8E-10	2.6E-10
1.5E-07	1.2E-07	8.1E-08	3.2E-08	1.5E-08	1.6E-08	2.4E-08	7.2E-08	1.2E-07	3.0E-07	7.2E-07	2.6E-07	1.4E-07	1.4E-07	1.3E-07	1.7E-07
1.6E-07	1.3E-07	8.4E-08	3.4E-08	1.5E-08	1.6E-08	2.5E-08	7.5E-08	1.3E-07	3.2E-07	7.7E-07	2.7E-07	1.5E-07	1.5E-07	1.4E-07	1.8E-07
1.0E-07	8.3E-08	5.6E-08	2.2E-08	1.0E-08	1.1E-08	1.7E-08	5.0E-08	8.3E-08	2.1E-07	5.0E-07	1.8E-07	9.8E-08	9.9E-08	9.3E-08	1.2E-07
1.1E-07	8.7E-08	5.8E-08	2.3E-08	1.1E-08	1.1E-08	1.7E-08	5.3E-08	8.8E-08	2.2E-07	5.3E-07	1.9E-07	1.0E-07	1.0E-07	9.9E-08	1.3E-07
12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.
15.0 MILES (24.1 KM)															
2.7E-08	2.9E-08	2.8E-08	7.6E-09	3.5E-09	3.9E-09	5.4E-09	9.5E-09	2.3E-08	5.4E-08	1.2E-07	4.2E-08	3.0E-08	3.1E-08	2.8E-08	2.8E-08
1.7E-08	1.8E-08	1.7E-08	4.6E-09	2.2E-09	2.4E-09	3.3E-09	5.8E-09	1.4E-08	3.3E-08	7.4E-08	2.6E-08	1.8E-08	1.9E-08	1.7E-08	1.7E-08
3.2E-11	6.2E-11	7.4E-11	1.6E-11	8.3E-12	1.1E-11	1.5E-11	1.4E-11	2.4E-11	3.0E-11	4.7E-11	1.7E-11	1.7E-11	2.5E-11	2.5E-11	2.9E-11
2.3E-08	2.6E-08	2.5E-08	6.7E-09	3.2E-09	3.6E-09	5.0E-09	8.4E-09	2.0E-08	4.6E-08	1.0E-07	3.6E-08	2.5E-08	2.7E-08	2.4E-08	2.4E-08
2.6E-08	2.8E-08	2.7E-08	7.3E-09	3.4E-09	3.8E-09	5.3E-09	9.1E-09	2.2E-08	5.1E-08	1.2E-07	4.0E-08	2.8E-08	3.0E-08	2.6E-08	2.6E-08
1.4E-08	1.6E-08	1.5E-08	4.1E-09	2.0E-09	2.2E-09	3.1E-09	5.2E-09	1.2E-08	2.8E-08	6.4E-08	2.2E-08	1.5E-08	1.6E-08	1.4E-08	1.5E-08
1.6E-08	1.7E-08	1.7E-08	4.5E-09	2.1E-09	2.4E-09	3.3E-09	5.6E-09	1.3E-08	3.2E-08	7.1E-08	2.5E-08	1.7E-08	1.8E-08	1.6E-08	1.6E-08
24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.
25.0 MILES (40.2 KM)															
4.7E-09	4.0E-09	8.6E-09	2.1E-09	1.1E-09	5.6E-10	8.6E-10	1.6E-09	3.9E-09	1.2E-08	2.0E-08	5.1E-09	5.4E-09	4.2E-09	4.2E-09	6.4E-09
2.6E-09	2.2E-09	4.7E-09	1.2E-09	5.9E-10	3.1E-10	4.7E-10	8.5E-10	2.1E-09	6.9E-09	1.1E-08	2.8E-09	2.9E-09	2.3E-09	2.3E-09	3.5E-09
4.2E-12	6.5E-12	1.8E-11	3.6E-12	2.0E-12	1.3E-12	1.9E-12	1.7E-12	3.1E-12	5.1E-12	5.8E-12	1.5E-12	2.3E-12	2.5E-12	2.9E-12	5.0E-12
3.7E-09	3.3E-09	7.2E-09	1.8E-09	9.1E-10	4.9E-10	7.6E-10	1.3E-09	3.0E-09	9.7E-09	1.6E-08	3.9E-09	4.0E-09	3.2E-09	3.2E-09	5.0E-09
4.3E-09	3.8E-09	8.2E-09	2.0E-09	1.0E-09	5.4E-10	8.3E-10	1.5E-09	3.6E-09	1.2E-08	1.9E-08	4.7E-09	4.9E-09	3.9E-09	3.9E-09	5.9E-09
2.0E-09	1.8E-09	4.0E-09	9.6E-10	5.0E-10	2.7E-10	4.2E-10	7.1E-10	1.7E-09	5.3E-09	8.7E-09	2.2E-09	2.2E-09	1.8E-09	1.8E-09	2.7E-09
2.4E-09	2.1E-09	4.5E-09	1.1E-09	5.6E-10	2.9E-10	4.6E-10	8.1E-10	2.0E-09	6.3E-09	1.0E-08	2.6E-09	2.7E-09	2.1E-09	2.1E-09	3.3E-09
40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.

TOTAL OBS - 8760 TOTAL INV OBS - 59 CALMS LOWER LEVEL -183.00

KEY: ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD : 01/01/87 TO 12/31/87

FIXED AND SPECIAL DISTANCES DISPERSION ANALYSIS
FOR CALENDAR YEAR 1987

** RADIOLOGICAL EFFLUENT DISPERSION PROGRAM ADSSES (CNDAP10)
SUSQUEHANNA STEAM ELECTRIC STATION; LUZERNE COUNTY, PA
PENNSYLVANIA POWER & LIGHT COMPANY; ALLENTOWN, PA

DATE 23-FEB-88 ADSSES DEVELOPED BY MODIFICATION OF D&M PROGRAM ANDIFF

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
35.0 MILES (56.3 KM)															
1.2E-09	1.0E-09	2.2E-09	4.3E-10	1.5E-10	1.0E-10	1.8E-10	3.9E-10	6.6E-10	4.0E-09	4.2E-09	1.0E-09	3.6E-10	5.3E-10	1.5E-09	1.2E-09
6.2E-10	5.2E-10	1.1E-09	2.2E-10	7.4E-11	5.2E-11	9.2E-11	1.9E-10	3.3E-10	2.0E-09	2.1E-09	5.1E-10	1.8E-10	2.7E-10	7.5E-10	5.0E-10
9.1E-13	1.4E-12	3.0E-12	6.2E-13	2.3E-13	2.0E-13	3.4E-13	3.6E-13	4.3E-13	1.3E-12	9.7E-13	2.5E-13	1.3E-13	2.6E-13	8.3E-13	7.5E-13
9.0E-10	7.9E-10	1.8E-09	3.4E-10	1.2E-10	8.0E-11	1.5E-10	3.0E-10	4.8E-10	2.8E-09	3.1E-09	7.1E-10	2.5E-10	3.7E-10	1.0E-09	8.3E-10
1.1E-09	9.5E-10	2.1E-09	4.0E-10	1.4E-10	9.9E-11	1.7E-10	3.6E-10	6.0E-10	3.6E-09	3.8E-09	9.1E-10	3.2E-10	4.8E-10	1.3E-09	1.0E-09
4.5E-10	4.0E-10	8.9E-10	1.7E-10	5.9E-11	4.4E-11	7.8E-11	1.5E-10	2.4E-10	1.4E-09	1.5E-09	3.6E-10	1.3E-10	1.9E-10	5.2E-10	4.2E-10
5.6E-10	4.8E-10	1.0E-09	2.0E-10	6.9E-11	5.0E-11	8.7E-11	1.8E-10	3.0E-10	1.8E-09	1.9E-09	4.6E-10	1.6E-10	2.4E-10	6.7E-10	5.2E-10
56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.
45.0 MILES (72.4 KM)															
4.9E-10	3.5E-10	7.8E-10	1.4E-10	3.5E-11	1.5E-11	5.6E-11	1.7E-10	1.9E-10	1.6E-09	1.0E-09	2.5E-10	9.0E-11	1.3E-10	4.9E-10	3.3E-10
2.3E-10	1.7E-10	3.7E-10	6.5E-11	1.6E-11	7.0E-12	2.6E-11	7.9E-11	9.0E-11	7.4E-10	4.9E-10	1.2E-10	4.2E-11	6.1E-11	2.3E-10	1.5E-10
3.1E-13	4.0E-13	1.1E-12	1.7E-13	4.8E-14	2.5E-14	9.1E-14	1.3E-13	1.1E-13	4.5E-13	2.0E-13	5.1E-14	2.6E-14	5.4E-14	2.3E-13	1.8E-13
3.3E-10	2.5E-10	5.9E-10	1.0E-10	2.7E-11	1.2E-11	4.6E-11	1.2E-10	1.3E-10	1.0E-09	7.0E-10	1.6E-10	5.6E-11	8.3E-11	3.1E-10	2.2E-10
4.3E-10	3.2E-10	7.1E-10	1.3E-10	3.2E-11	1.4E-11	5.3E-11	1.5E-10	1.7E-10	1.4E-09	9.2E-10	2.2E-10	7.7E-11	1.1E-10	4.2E-10	2.9E-10
1.5E-10	1.2E-10	2.7E-10	4.8E-11	1.2E-11	5.6E-12	2.1E-11	5.7E-11	6.0E-11	4.8E-10	3.3E-10	7.5E-11	2.6E-11	3.9E-11	1.5E-10	1.0E-10
2.0E-10	1.5E-10	3.3E-10	5.9E-11	1.5E-11	6.5E-12	2.4E-11	7.1E-11	7.9E-11	6.5E-10	4.3E-10	1.0E-10	3.6E-11	5.3E-11	2.0E-10	1.3E-10
72405.	72405.	72405.	72405.	72405.	72405.	72405.	72405.	72405.	72405.	72405.	72405.	72405.	72405.	72405.	72405.
0.4 MILES (0.644 KM)															
1.1E-05	8.5E-06	5.3E-06	3.5E-06	2.9E-06	3.4E-06	4.5E-06	1.0E-05	1.6E-05	3.2E-05	5.5E-05	3.5E-05	1.5E-05	1.4E-05	1.0E-05	1.0E-05
9.8E-06	7.8E-06	4.9E-06	3.2E-06	2.7E-06	3.2E-06	4.1E-06	9.5E-06	1.5E-05	3.0E-05	5.1E-05	3.3E-05	1.4E-05	1.3E-05	9.3E-06	9.4E-06
3.4E-08	4.5E-08	3.4E-08	1.8E-08	1.6E-08	2.2E-08	2.8E-08	3.8E-08	4.5E-08	5.1E-08	6.3E-08	4.2E-08	2.4E-08	3.0E-08	2.5E-08	2.8E-08
1.1E-05	8.4E-06	5.3E-06	3.5E-06	2.9E-06	3.4E-06	4.5E-06	1.0E-05	1.6E-05	3.2E-05	5.5E-05	3.5E-05	1.5E-05	1.4E-05	1.0E-05	1.0E-05
1.1E-05	8.4E-06	5.3E-06	3.5E-06	2.9E-06	3.4E-06	4.5E-06	1.0E-05	1.6E-05	3.2E-05	5.5E-05	3.5E-05	1.5E-05	1.4E-05	1.0E-05	1.0E-05
9.8E-06	7.8E-06	4.9E-06	3.2E-06	2.7E-06	3.2E-06	4.1E-06	9.5E-06	1.5E-05	3.0E-05	5.1E-05	3.3E-05	1.4E-05	1.3E-05	9.2E-06	9.3E-06
9.8E-06	7.8E-06	4.9E-06	3.2E-06	2.7E-06	3.2E-06	4.1E-06	9.5E-06	1.5E-05	3.0E-05	5.1E-05	3.3E-05	1.4E-05	1.3E-05	9.3E-06	9.3E-06
644.	644.	644.	644.	644.	644.	644.	644.	644.	644.	644.	644.	644.	644.	644.	644.
0.6 MILES (0.965 KM)															
6.4E-06	4.8E-06	2.9E-06	2.0E-06	1.6E-06	1.9E-06	2.7E-06	6.0E-06	9.3E-06	1.8E-05	3.4E-05	2.0E-05	8.6E-06	7.7E-06	5.9E-06	5.6E-06
5.8E-06	4.4E-06	2.7E-06	1.8E-06	1.4E-06	1.7E-06	2.4E-06	5.5E-06	8.4E-06	1.7E-05	3.1E-05	1.8E-05	7.8E-06	7.0E-06	5.4E-06	5.1E-06
2.0E-08	2.5E-08	1.8E-08	9.5E-09	7.8E-09	1.1E-08	1.6E-08	2.1E-08	2.4E-08	2.9E-08	3.9E-08	2.4E-08	1.3E-08	1.6E-08	1.4E-08	1.5E-08
6.3E-06	4.8E-06	2.9E-06	2.0E-06	1.6E-06	1.9E-06	2.7E-06	6.0E-06	9.2E-06	1.8E-05	3.4E-05	2.0E-05	8.5E-06	7.7E-06	5.9E-06	5.6E-06
6.4E-06	4.8E-06	2.9E-06	2.0E-06	1.6E-06	1.9E-06	2.7E-06	6.0E-06	9.2E-06	1.8E-05	3.4E-05	2.0E-05	8.6E-06	7.7E-06	5.9E-06	5.6E-06
5.7E-06	4.3E-06	2.7E-06	1.8E-06	1.4E-06	1.7E-06	2.4E-06	5.4E-06	8.3E-06	1.6E-05	3.1E-05	1.8E-05	7.7E-06	6.9E-06	5.3E-06	5.1E-06
5.8E-06	4.4E-06	2.7E-06	1.8E-06	1.4E-06	1.7E-06	2.4E-06	5.4E-06	8.4E-06	1.7E-05	3.1E-05	1.8E-05	7.8E-06	7.0E-06	5.3E-06	5.1E-06
965.	965.	965.	965.	965.	965.	965.	965.	965.	965.	965.	965.	965.	965.	965.	965.

TOTAL OBS - 8760 TOTAL INV OBS - 59 CALMS LOWER LEVEL -183.00
KEY: ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD : 01/01/87 TO 12/31/87

FIXED AND SPECIAL DISTANCES DISPERSION ANALYSIS
FOR CALENDAR YEAR 1987

** RADIOLOGICAL EFFLUENT DISPERSION PROGRAM ADSSES (CNDAP10)
SUSQUEHANNA STEAM ELECTRIC STATION; LUZERNE COUNTY, PA
PENNSYLVANIA POWER & LIGHT COMPANY; ALLENTOWN, PA

DATE 23-FEB-88 ADSSES DEVELOPED BY MODIFICATION OF D&M PROGRAM ANDIFF

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
0.7 MILES (1.126 KM)															
5.3E-06	3.9E-06	2.4E-06	1.6E-06	1.2E-06	1.6E-06	2.2E-06	4.9E-06	7.5E-06	1.5E-05	2.7E-05	1.5E-05	6.6E-06	6.0E-06	5.0E-06	4.4E-06
4.8E-06	3.5E-06	2.2E-06	1.4E-06	1.1E-06	1.4E-06	2.0E-06	4.4E-06	6.7E-06	1.4E-05	2.4E-05	1.3E-05	5.9E-06	5.4E-06	4.5E-06	3.9E-06
1.6E-08	2.0E-08	1.4E-08	7.4E-09	6.0E-09	9.0E-09	1.3E-08	1.7E-08	1.9E-08	2.4E-08	3.2E-08	1.8E-08	1.0E-08	1.2E-08	1.1E-08	1.1E-08
5.3E-06	3.9E-06	2.4E-06	1.6E-06	1.2E-06	1.6E-06	2.2E-06	4.9E-06	7.4E-06	1.5E-05	2.7E-05	1.5E-05	6.5E-06	6.0E-06	5.0E-06	4.3E-06
5.3E-06	3.9E-06	2.4E-06	1.6E-06	1.2E-06	1.6E-06	2.2E-06	4.9E-06	7.4E-06	1.5E-05	2.7E-05	1.5E-05	6.6E-06	6.0E-06	5.0E-06	4.4E-06
4.7E-06	3.5E-06	2.1E-06	1.4E-06	1.1E-06	1.4E-06	2.0E-06	4.4E-06	6.6E-06	1.3E-05	2.4E-05	1.3E-05	5.8E-06	5.3E-06	4.5E-06	3.9E-06
4.7E-06	3.5E-06	2.1E-06	1.4E-06	1.1E-06	1.4E-06	2.0E-06	4.4E-06	6.7E-06	1.4E-05	2.4E-05	1.3E-05	5.9E-06	5.4E-06	4.5E-06	3.9E-06
1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.
0.8 MILES (1.287 KM)															
4.2E-06	3.2E-06	2.1E-06	1.3E-06	1.1E-06	1.4E-06	1.8E-06	4.0E-06	6.2E-06	1.3E-05	2.3E-05	1.2E-05	5.7E-06	5.4E-06	4.2E-06	3.8E-06
3.7E-06	2.9E-06	1.8E-06	1.2E-06	9.4E-07	1.2E-06	1.6E-06	3.6E-06	5.5E-06	1.1E-05	2.0E-05	1.0E-05	5.1E-06	4.8E-06	3.7E-06	3.3E-06
1.2E-08	1.6E-08	1.2E-08	6.0E-09	5.1E-09	8.0E-09	1.0E-08	1.3E-08	1.6E-08	1.9E-08	2.7E-08	1.4E-08	8.6E-09	1.1E-08	9.4E-09	9.6E-09
4.1E-06	3.2E-06	2.0E-06	1.3E-06	1.1E-06	1.4E-06	1.8E-06	4.0E-06	6.2E-06	1.2E-05	2.3E-05	1.2E-05	5.6E-06	5.4E-06	4.1E-06	3.7E-06
4.2E-06	3.2E-06	2.1E-06	1.3E-06	1.1E-06	1.4E-06	1.8E-06	4.0E-06	6.2E-06	1.3E-05	2.3E-05	1.2E-05	5.7E-06	5.4E-06	4.2E-06	3.7E-06
3.7E-06	2.8E-06	1.8E-06	1.2E-06	9.4E-07	1.2E-06	1.6E-06	3.6E-06	5.5E-06	1.1E-05	2.0E-05	1.0E-05	5.0E-06	4.8E-06	3.7E-06	3.3E-06
3.7E-06	2.9E-06	1.8E-06	1.2E-06	9.4E-07	1.2E-06	1.6E-06	3.6E-06	5.5E-06	1.1E-05	2.0E-05	1.0E-05	5.0E-06	4.8E-06	3.7E-06	3.3E-06
1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.
0.9 MILES (1.448 KM)															
3.6E-06	2.7E-06	1.7E-06	1.1E-06	8.7E-07	1.1E-06	1.5E-06	3.4E-06	5.2E-06	1.0E-05	2.1E-05	1.0E-05	4.8E-06	4.4E-06	3.7E-06	3.0E-06
3.2E-06	2.4E-06	1.5E-06	9.5E-07	7.7E-07	9.9E-07	1.4E-06	3.0E-06	4.6E-06	9.2E-06	1.8E-05	9.1E-06	4.2E-06	3.9E-06	3.2E-06	2.7E-06
1.0E-08	1.3E-08	9.6E-09	4.8E-09	4.1E-09	6.3E-09	8.5E-09	1.1E-08	1.3E-08	1.6E-08	2.4E-08	1.2E-08	7.1E-09	8.5E-09	8.0E-09	7.5E-09
3.6E-06	2.7E-06	1.7E-06	1.1E-06	8.6E-07	1.1E-06	1.5E-06	3.4E-06	5.1E-06	1.0E-05	2.1E-05	1.0E-05	4.8E-06	4.4E-06	3.6E-06	3.0E-06
3.6E-06	2.7E-06	1.7E-06	1.1E-06	8.7E-07	1.1E-06	1.5E-06	3.4E-06	5.2E-06	1.0E-05	2.1E-05	1.0E-05	4.8E-06	4.4E-06	3.6E-06	3.0E-06
3.2E-06	2.4E-06	1.5E-06	9.5E-07	7.6E-07	9.9E-07	1.4E-06	3.0E-06	4.5E-06	9.2E-06	1.8E-05	9.0E-06	4.2E-06	3.8E-06	3.2E-06	2.6E-06
3.2E-06	2.4E-06	1.5E-06	9.5E-07	7.6E-07	9.9E-07	1.4E-06	3.0E-06	4.5E-06	9.2E-06	1.8E-05	9.0E-06	4.2E-06	3.9E-06	3.2E-06	2.6E-06
1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.
1.0 MILES (1.609 KM)															
3.2E-06	2.3E-06	1.5E-06	8.8E-07	6.9E-07	9.6E-07	1.2E-06	2.9E-06	4.3E-06	9.0E-06	1.7E-05	8.3E-06	3.9E-06	3.7E-06	3.2E-06	2.5E-06
2.8E-06	2.0E-06	1.3E-06	7.7E-07	6.0E-07	8.4E-07	1.1E-06	2.5E-06	3.8E-06	7.9E-06	1.5E-05	7.3E-06	3.4E-06	3.2E-06	2.8E-06	2.2E-06
9.1E-09	1.1E-08	8.3E-09	3.8E-09	3.2E-09	5.3E-09	6.5E-09	9.1E-09	1.0E-08	1.3E-08	1.9E-08	9.4E-09	5.6E-09	6.9E-09	7.0E-09	6.2E-09
3.2E-06	2.2E-06	1.5E-06	8.7E-07	6.8E-07	9.5E-07	1.2E-06	2.9E-06	4.3E-06	8.9E-06	1.7E-05	8.2E-06	3.8E-06	3.6E-06	3.2E-06	2.5E-06
3.2E-06	2.3E-06	1.5E-06	8.8E-07	6.8E-07	9.6E-07	1.2E-06	2.9E-06	4.3E-06	9.0E-06	1.7E-05	8.3E-06	3.9E-06	3.6E-06	3.2E-06	2.5E-06
2.8E-06	2.0E-06	1.3E-06	7.6E-07	5.9E-07	8.3E-07	1.1E-06	2.5E-06	3.7E-06	7.8E-06	1.5E-05	7.2E-06	3.3E-06	3.2E-06	2.8E-06	2.2E-06
2.8E-06	2.0E-06	1.3E-06	7.7E-07	6.0E-07	8.3E-07	1.1E-06	2.5E-06	3.8E-06	7.8E-06	1.5E-05	7.2E-06	3.4E-06	3.2E-06	2.8E-06	2.2E-06
1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.

TOTAL OBS - 8760 TOTAL INV OBS - 59 CALMS LOWER LEVEL -183.00

KEY: ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD : 01/01/87 TO 12/31/87

FIXED AND SPECIAL DISTANCES DISPERSION ANALYSIS
FOR CALENDAR YEAR 1987

** RADIOLOGICAL EFFLUENT DISPERSION PROGRAM ADSSES (CNDAP10)
SUSQUEHANNA STEAM ELECTRIC STATION; LUZERNE COUNTY, PA
PENNSYLVANIA POWER & LIGHT COMPANY; ALLENTOWN, PA

DATE 23-FEB-88 ADSSES DEVELOPED BY MODIFICATION OF D&M PROGRAM ANDIFF

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
SITE BOUNDARY (INCLUDES PURCHASED FARM IN SW)-------															
9.1E-06	1.9E-06	1.6E-06	1.2E-06	2.1E-06	4.2E-06	5.2E-06	1.2E-05	1.4E-05	1.8E-05	3.0E-05	1.9E-05	6.8E-06	8.0E-06	1.0E-05	9.8E-06
8.4E-06	1.7E-06	1.4E-06	1.0E-06	2.0E-06	4.0E-06	4.9E-06	1.1E-05	1.3E-05	1.7E-05	2.7E-05	1.7E-05	6.1E-06	7.3E-06	9.5E-06	9.1E-06
2.9E-08	8.8E-09	8.7E-09	5.2E-09	1.1E-08	2.7E-08	3.3E-08	4.3E-08	3.8E-08	2.9E-08	3.4E-08	2.3E-08	1.0E-08	1.7E-08	2.5E-08	2.7E-08
9.1E-06	1.9E-06	1.6E-06	1.2E-06	2.1E-06	4.2E-06	5.2E-06	1.2E-05	1.4E-05	1.8E-05	2.9E-05	1.9E-05	6.8E-06	7.9E-06	1.0E-05	9.8E-06
9.1E-06	1.9E-06	1.6E-06	1.2E-06	2.1E-06	4.2E-06	5.2E-06	1.2E-05	1.4E-05	1.8E-05	2.9E-05	1.9E-05	6.8E-06	8.0E-06	1.0E-05	9.8E-06
8.3E-06	1.6E-06	1.4E-06	1.0E-06	2.0E-06	4.0E-06	4.8E-06	1.1E-05	1.3E-05	1.6E-05	2.6E-05	1.7E-05	6.1E-06	7.2E-06	9.4E-06	9.0E-06
8.4E-06	1.7E-06	1.4E-06	1.0E-06	2.0E-06	4.0E-06	4.9E-06	1.1E-05	1.3E-05	1.7E-05	2.6E-05	1.7E-05	6.1E-06	7.3E-06	9.5E-06	9.1E-06
737.	1834.	1553.	1290.	763.	549.	549.	549.	693.	965.	1070.	978.	1112.	875.	698.	661.
NEAREST DAIRY ANIMALS (PER 1987 LAND-USE CENSUS)----															
2.9E-07	2.3E-07	3.6E-07	7.7E-08	1.4E-07	1.9E-07	1.5E-07	2.7E-07	8.0E-07	6.7E-07	8.2E-06	5.9E-07	1.7E-06	3.0E-07	3.4E-07	2.6E-07
2.2E-07	1.7E-07	2.9E-07	5.8E-08	1.2E-07	1.5E-07	1.1E-07	2.1E-07	6.3E-07	4.9E-07	6.9E-06	4.4E-07	1.4E-06	2.2E-07	2.6E-07	1.9E-07
5.4E-10	7.5E-10	1.7E-09	2.5E-10	5.7E-10	9.1E-10	6.4E-10	6.4E-10	1.5E-09	6.1E-10	8.2E-09	4.1E-10	2.1E-09	3.7E-10	5.1E-10	4.2E-10
2.0E-07	2.2E-07	3.6E-07	7.4E-08	1.4E-07	1.9E-07	1.4E-07	2.7E-07	7.7E-07	6.3E-07	8.1E-06	5.6E-07	1.6E-06	2.8E-07	3.3E-07	2.5E-07
2.9E-07	2.3E-07	3.6E-07	7.6E-08	1.4E-07	1.9E-07	1.5E-07	2.7E-07	7.9E-07	6.6E-07	8.2E-06	5.9E-07	1.6E-06	2.9E-07	3.4E-07	2.6E-07
2.1E-07	1.6E-07	2.8E-07	5.6E-08	1.1E-07	1.5E-07	1.1E-07	2.0E-07	6.1E-07	4.7E-07	6.8E-06	4.2E-07	1.3E-06	2.1E-07	2.5E-07	1.8E-07
2.1E-07	1.7E-07	2.9E-07	5.7E-08	1.2E-07	1.5E-07	1.1E-07	2.1E-07	6.2E-07	4.8E-07	6.9E-06	4.3E-07	1.4E-06	2.2E-07	2.6E-07	1.9E-07
8045.	8045.	4344.	7241.	4020.	4180.	5630.	6280.	4827.	8045.	2735.	8045.	2896.	8045.	6758.	8045.
NEAREST GARDENS (PER 1987 LAND-USE CENSUS)----------															
2.8E-06	7.2E-07	1.6E-07	5.2E-07	1.4E-07	2.1E-06	2.4E-06	2.5E-06	3.2E-06	5.1E-06	1.4E-05	4.5E-06	1.0E-05	1.2E-06	9.1E-07	1.8E-06
2.4E-06	5.8E-07	1.2E-07	4.4E-07	1.1E-07	1.9E-06	2.1E-06	2.1E-06	2.8E-06	4.3E-06	1.2E-05	3.8E-06	9.3E-06	9.6E-07	7.4E-07	1.6E-06
7.7E-09	2.8E-09	6.5E-10	2.1E-09	5.3E-10	1.2E-08	1.4E-08	7.7E-09	7.4E-09	6.9E-09	1.5E-08	4.7E-09	1.6E-08	1.9E-09	1.6E-09	4.2E-09
2.8E-06	7.0E-07	1.6E-07	5.1E-07	1.3E-07	2.1E-06	2.4E-06	2.5E-06	3.2E-06	5.0E-06	1.4E-05	4.5E-06	1.0E-05	1.1E-06	8.9E-07	1.8E-06
2.8E-06	7.1E-07	1.6E-07	5.2E-07	1.3E-07	2.1E-06	2.4E-06	2.5E-06	3.2E-06	5.1E-06	1.4E-05	4.5E-06	1.0E-05	1.2E-06	9.1E-07	1.8E-06
2.4E-06	5.7E-07	1.2E-07	4.4E-07	1.1E-07	1.9E-06	2.1E-06	2.1E-06	2.7E-06	4.2E-06	1.2E-05	3.8E-06	9.3E-06	9.4E-07	7.2E-07	1.5E-06
2.4E-06	5.8E-07	1.2E-07	4.4E-07	1.1E-07	1.9E-06	2.1E-06	2.1E-06	2.7E-06	4.3E-06	1.2E-05	3.8E-06	9.3E-06	9.5E-07	7.3E-07	1.6E-06
1770.	3750.	7730.	2250.	4180.	920.	1060.	1770.	2000.	2380.	1870.	2370.	840.	3480.	3750.	2060.
NEAREST RESIDENCES (87 CENSUS)----------															
3.5E-06	7.2E-07	5.1E-07	5.2E-07	1.8E-06	3.7E-06	2.4E-06	2.5E-06	3.2E-06	5.1E-06	1.4E-05	1.3E-05	6.5E-06	4.8E-06	5.4E-06	1.7E-06
3.1E-06	5.8E-07	4.2E-07	4.4E-07	1.6E-06	3.4E-06	2.1E-06	2.1E-06	2.8E-06	4.3E-06	1.2E-05	1.2E-05	5.8E-06	4.2E-06	4.9E-06	1.5E-06
1.0E-08	2.8E-09	2.4E-09	2.1E-09	9.2E-09	2.4E-08	1.4E-08	7.7E-09	7.4E-09	6.9E-09	1.5E-08	1.5E-08	1.0E-08	9.4E-09	1.2E-08	4.0E-09
3.5E-06	7.0E-07	5.0E-07	5.1E-07	1.8E-06	3.7E-06	2.4E-06	2.5E-06	3.2E-06	5.0E-06	1.4E-05	1.3E-05	6.4E-06	4.7E-06	5.4E-06	1.7E-06
3.5E-06	7.1E-07	5.1E-07	5.2E-07	1.8E-06	3.7E-06	2.4E-06	2.5E-06	3.2E-06	5.1E-06	1.4E-05	1.3E-05	6.5E-06	4.8E-06	5.4E-06	1.7E-06
3.0E-06	5.7E-07	4.1E-07	4.4E-07	1.6E-06	3.4E-06	2.1E-06	2.1E-06	2.7E-06	4.2E-06	1.2E-05	1.1E-05	5.8E-06	4.2E-06	4.8E-06	1.5E-06
3.1E-06	5.8E-07	4.1E-07	4.4E-07	1.6E-06	3.4E-06	2.1E-06	2.1E-06	2.7E-06	4.3E-06	1.2E-05	1.2E-05	5.8E-06	4.2E-06	4.8E-06	1.5E-06
1500.	3750.	3410.	2250.	870.	610.	1060.	1770.	2000.	2380.	1870.	1220.	1140.	1380.	1050.	2140.

TOTAL OBS - 8760 TOTAL INV OBS - 59 CALMS LOWER LEVEL -183.00

KEY: ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD : 01/01/87 TO 12/31/87

FIXED AND SPECIAL DISTANCES DISPERSION ANALYSIS
FOR CALENDAR YEAR 1987

** RADIOLOGICAL EFFLUENT DISPERSION PROGRAM ADSSES (CNDAP10)
SUSQUEHANNA STEAM ELECTRIC STATION; LUZERNE COUNTY, PA
PENNSYLVANIA POWER & LIGHT COMPANY; ALLENTOWN, PA

DATE 23-FEB-88 ADSSES DEVELOPED BY MODIFICATION OF D&M PROGRAM ANDIFF

AFFECTED SECTORS

NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
LOW POPULATION ZONE RADIUS (3 MILES) ----------															
6.5E-07	4.9E-07	3.1E-07	1.5E-07	1.0E-07	1.4E-07	2.0E-07	4.7E-07	8.0E-07	1.7E-06	3.6E-06	1.5E-06	7.2E-07	7.0E-07	5.9E-07	5.6E-07
5.1E-07	3.8E-07	2.5E-07	1.2E-07	8.2E-08	1.1E-07	1.6E-07	3.7E-07	6.3E-07	1.3E-06	2.9E-06	1.1E-06	5.7E-07	5.5E-07	4.7E-07	4.4E-07
1.4E-09	1.8E-09	1.4E-09	5.5E-10	4.0E-10	6.5E-10	9.1E-10	1.2E-09	1.5E-09	1.9E-09	3.0E-09	1.2E-09	7.9E-10	1.0E-09	9.7E-10	1.1E-09
6.3E-07	4.7E-07	3.1E-07	1.5E-07	1.0E-07	1.4E-07	2.0E-07	4.6E-07	7.7E-07	1.6E-06	3.5E-06	1.4E-06	7.0E-07	6.8E-07	5.7E-07	5.4E-07
6.5E-07	4.8E-07	3.1E-07	1.5E-07	1.0E-07	1.4E-07	2.0E-07	4.6E-07	7.9E-07	1.7E-06	3.6E-06	1.4E-06	7.2E-07	6.9E-07	5.9E-07	5.6E-07
5.0E-07	3.7E-07	2.4E-07	1.2E-07	8.0E-08	1.1E-07	1.6E-07	3.6E-07	6.1E-07	1.3E-06	2.8E-06	1.1E-06	5.5E-07	5.3E-07	4.5E-07	4.3E-07
5.1E-07	3.8E-07	2.4E-07	1.2E-07	8.1E-08	1.1E-07	1.6E-07	3.7E-07	6.2E-07	1.3E-06	2.8E-06	1.1E-06	5.6E-07	5.5E-07	4.6E-07	4.4E-07
4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.

TOTAL OBS - 8760 TOTAL INV OBS - 59 CALMS LOWER LEVEL -183.00

KEY: ENTRY 1 RELATIVE CONCENTRATION - XOQ (S/M**3)
ENTRY 2 DEPLETED RELATIVE CONCENTRATION (S/M**3)
ENTRY 3 RELATIVE DEPOSITION RATE (1/M**2)
ENTRY 4 DECAYED XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 5 DECAYED XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 6 DEC+DPL XOQ (S/M**3) - HALF LIFE 2.26 DAYS
ENTRY 7 DEC+DPL XOQ (S/M**3) - HALF LIFE 8.00 DAYS
ENTRY 8 - DISTANCE IN METERS

TABLE 14

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

TABLE 14

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

RECIRCULATION/TERRAIN CORRECTION FACTORS

RING NAME	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
0.5 MILES (.805 KM)	2.35	2.21	2.38	2.32	2.58	2.43	2.68	2.44	2.27	1.92	1.82	2.32	2.56	3.00	2.50	2.15
1.5 MILES (2.41 KM)	2.42	2.33	2.50	2.08	2.24	2.44	2.44	2.33	2.41	2.14	2.33	2.10	2.60	3.10	2.79	2.19
2.5 MILES (4.02 KM)	2.58	2.50	2.72	2.06	2.00	2.25	2.43	2.20	2.33	2.06	2.40	1.96	2.41	2.95	2.75	2.37
3.5 MILES (5.63 KM)	2.32	2.36	2.73	1.86	1.78	1.75	2.08	1.82	1.88	1.77	2.03	1.64	2.13	2.75	2.38	2.11
4.5 MILES (7.24 KM)	2.31	2.41	2.87	1.80	1.50	1.41	1.63	1.60	1.61	1.55	1.89	1.51	2.00	2.56	2.41	2.08
7.5 MILES (12.07 KM)	2.19	2.38	2.84	1.69	1.10	0.93	1.12	1.24	1.25	1.27	1.60	1.18	1.72	2.28	2.31	2.70
15.0 MILES (24.1 KM)	0.96	1.41	2.46	1.00	0.68	0.59	0.65	0.40	0.57	0.52	0.60	0.44	0.84	1.19	1.13	1.04
25.0 MILES (40.2 KM)	0.32	0.38	1.50	0.56	0.42	0.17	0.21	0.13	0.19	0.23	0.19	0.10	0.29	0.31	0.33	0.47
35.0 MILES (56.3 KM)	0.13	0.15	0.60	0.18	0.09	0.05	0.07	0.05	0.05	0.11	0.06	0.03	0.03	0.06	0.18	0.13
45.0 MILES (72.4 KM)	0.07	0.07	0.29	0.08	0.03	0.01	0.03	0.03	0.02	0.06	0.02	0.01	0.01	0.02	0.08	0.05
0.4 MILES (0.644 KM)	2.13	2.17	2.37	2.31	2.71	2.45	2.56	2.35	2.30	1.90	1.73	2.29	2.55	3.00	2.35	2.17
0.6 MILES (0.965 KM)	2.35	2.27	2.37	2.32	2.58	2.44	2.71	2.46	2.36	2.04	2.05	2.43	2.67	3.06	2.53	2.20
0.7 MILES (1.126 KM)	2.45	2.31	2.42	2.32	2.53	2.46	2.77	2.50	2.38	2.14	2.10	2.37	2.58	3.00	2.69	2.15
0.8 MILES (1.287 KM)	2.35	2.33	2.53	2.33	2.67	2.70	2.82	2.50	2.43	2.18	2.20	2.29	2.74	3.30	2.73	2.25
0.9 MILES (1.448 KM)	2.43	2.33	2.50	2.27	2.60	2.59	2.83	2.53	2.39	2.17	2.38	2.38	2.75	3.18	2.83	2.14
1.0 MILES (1.609 KM)	2.50	2.25	2.57	2.15	2.39	2.57	2.59	2.46	2.31	2.16	2.30	2.23	2.57	3.07	2.91	2.08
SITE BOUNDARY (INCLU	2.26	2.31	2.53	2.05	2.54	2.37	2.34	2.09	2.18	2.04	2.10	2.39	2.63	2.74	2.74	2.20
NEAREST DAIRY ANIMAL	2.29	2.41	2.72	1.80	2.00	2.20	2.08	1.73	2.11	1.50	2.34	1.46	2.54	2.51	2.40	2.18
NEAREST GARDENS (PER	2.48	2.47	2.87	2.09	1.98	2.44	2.75	2.43	2.36	2.14	2.31	2.11	2.58	3.00	2.76	2.14
NEAREST RESIDENCES (	2.45	2.47	2.64	2.09	2.58	2.42	2.75	2.43	2.36	2.14	2.31	2.32	2.60	3.23	2.61	2.15
LOW POPULATION ZONE	2.45	2.43	2.73	1.96	1.89	2.00	2.26	2.01	2.11	1.92	2.22	1.80	2.27	2.85	2.57	2.24

DISTRIBUTION OF CALMS BY WIND SECTOR

PASQ CLASS	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N
A	0.022	0.037	0.052	0.127	0.090	0.052	0.142	0.149	0.187	0.082	0.037	0.0	0.008	0.0	0.0	0.015
B	0.0	0.188	0.031	0.094	0.094	0.094	0.094	0.063	0.125	0.094	0.063	0.031	0.0	0.031	0.0	0.0
C	0.0	0.049	0.049	0.122	0.073	0.098	0.122	0.098	0.195	0.073	0.073	0.024	0.0	0.024	0.0	0.0
D	0.094	0.092	0.101	0.098	0.082	0.080	0.057	0.085	0.089	0.076	0.043	0.014	0.023	0.014	0.016	0.037
E	0.094	0.138	0.171	0.103	0.062	0.058	0.065	0.072	0.078	0.049	0.024	0.020	0.008	0.008	0.010	0.040
F	0.041	0.169	0.365	0.195	0.058	0.036	0.035	0.037	0.031	0.016	0.003	0.0	0.003	0.0	0.003	0.007
G	0.021	0.193	0.525	0.188	0.027	0.015	0.006	0.008	0.008	0.003	0.0	0.0	0.0	0.003	0.0	0.003

HEIGHT OF VERTICAL MIXING LAYER = 1050.0 METERS
HEIGHT OF CONTAINMENT STRUCTURE = 60.4 METERS
THRESHOLD OF ANEMOMETER = 0.34 MPS
MET DATA FILE USED - MET87
HEADER FILES USED - FIXED , FLUID
OUTPUT FILES USED - APP01 , APP02

THERE WERE 5 SPECIAL RECEPTOR RINGS INCLUDED IN THIS RUN.

USER-SPECIFIED RECIRCULATION/TERRAIN CORRECTION FACTORS WERE APPLIED TO THE MODEL CALCULATIONS.

DEPLETION WAS APPLIED TO THE MODEL CALCULATIONS.

DEPOSITION WAS CALCULATED.

ALL OUTPUT DATA WERE WRITTEN TO THE GASPAR FORMAT FILE.

SECTION 4

DOSE MEASUREMENTS AND ASSESSMENTS

TABLE 15

SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
MAXIMUM* OFF-SITE DOSES AND DOSE COMMITMENTS
TO MEMBERS OF THE PUBLIC
Data Period: 1987

	DOSE*** (millirem)				
Source	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Year**
A. Waterborne Effluents	1 9.74E-05	5 3.28E-04	9 1.27E-04	13 2.50E-04	17 8.04E-04
B.Airborne Effluents i) Iodines & Particulates	2 1.99E-02	6 3.06E-02	10 1.92E-02	14 2.80E-02	18 9.75E-02
ii) Noble Gases	3 4.73E-03	7 3.11E-03	11 1.65E-03	15 1.77E-03	19 1.12E-02
C. Direct Radiation	4 0	8 0	12 0	16 0	20 0

Based on meteorological data provided in Section 3. Data for the entire year was used for the calculations for airborne effluents.

THERE ARE NO OTHER URANIUM FUEL CYCLE FACILITIES WITHIN 8 KM of SSES

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* "Maximum" means the largest fraction of the corresponding Appendix I dose design objective.

** "Maximum" dose for the year may not equal the sum of the quarterly maximum doses because the doses may be to different organs or may be at different receptor locations.

*** The numbered footnotes on the following page briefly explain how each maximum dose was calculated, including the organ and predominant pathway(s).

Footnotes for Table 15

1. Dose to the child total body, primarily by the drinking water and fish pathways. Calculated at the closest down-stream drinking water user on the Susquehanna River (Danville, PA) using the LADTAP II program.

2. Dose to the child liver via the vegetation, inhalation, and ground pathways. Calculated at the residence at 1.2 mi WSW using the GASPAR program.

3. Dose to the total body via the plume pathway. Calculated at the residence at 1.2 mi WSW using GASPAR. Total body doses are a higher fraction of the 5 mrem/yr design objective than the skin doses are of the 15 mrem/yr design objective.

4. Based on environmental thermoluminescent dosimeters placed near SSES in unrestricted areas (See "Method for TLD Data Analysis" on the following page).

5. See Footnote 1.

6. Same as Footnote 2, except the critical organ is the child thyroid.

7. See Footnote 3.

8. See Footnote 4.

9. See Footnote 1.

10. Same as Footnote 2, except the critical organ is the child GI-tract.

11. See Footnote 3.

12. See Footnote 4.

13. See Footnote 1.

14. Same as Footnote 2, except the critical organ is the child skin.

15. See Footnote 3.

16. See Footnote 4.

17. See Footnote 1.

18. Same as Footnote 2, except the critical organ is the child liver.

19. See Footnote 3.

20. See Footnote 4.

METHOD FOR TLD DATA ANALYSIS

The historical relationship between SSES Radiological Environmental Monitoring Program preoperational TLD locations and the routine 1987 indicator TLD locations was used to estimate radiation levels at the indicator locations.

Average quarterly TLD values for the preoperational period (1973 through the second quarter of 1982) were compared to individual 1987 indicator station responses by means of a paired Student's t-test.

In all cases the 1987 data was not significantly different from the preoperational average at the 95% confidence level. It can be concluded that radiation levels measured at the 1987 indicator locations* are not different than preoperational radiation levels. Direct radiation from SSES is therefore estimated to be 0 mR.

*1987 INDICATOR LOCATIONS: 1S2, 2S3, 3S4, 4S3, 5S7, 6S4, 6S9, 7S6, 8S2, 9S2, 10S1, 11S3, 12S3, 13S2, 14S5, 15S5, 16S1, 16S2, 6A4, 2B3, 8B2, 1D2, 3D1, 8D3, 9D1, 10D2, 4E1, 5E2, 6E1, 7E1, 11E1, 12E1, 13E4, 14E1, 2F1, 3F1, 15F1, 16F1.

DOSES TO MEMBERS OF THE PUBLIC WITHIN THE SITE BOUNDARY

SSES Technical Specification 6.9.1.11 requires that the Semiannual Effluent Release Reports include an assessment of the radiation dose from radioactive effluents to members of the public within the site boundary. Within the SSES site boundary there are two areas which are open to members of the public (See Figure 8):

- The Susquehanna Riverlands Recreation Area/ Energy Information Center
- A Residential Area in the Southeast Sector

In the area comprising the Riverlands recreation area, which surrounds the Energy Information Center, four pathways of radiation exposure can be identified; plume, ground, inhalation, and direct radiation. There are no significant exposure pathways from waterborne effluents in this area. Based on calendar year 1983, there are approximately 50,000 visitors to the Riverlands/Information Center complex each year. In order to facilitate dose calculations, it is assumed that each visitor stays in the area for one hour.

Thermoluminescent dosimeters are positioned near the information center and at another location within the Riverlands. Readings from 1987 indicate radiation levels are not significantly different than observed natural background (See "Methods of TLD Data Analysis" on page 58).

Use of the GASPAR code yields calculated doses for the Riverlands area for the report period. These doses are the total doses at the location from gaseous effluents during the report period. In order to compute doses to members of the public who stay for only short periods of time, these doses are converted to dose rates. Taking into account the estimated 50,000 person-hours of occupancy, the collective (man-rem) doses shown in Table 16 are calculated.

Doses at the residence at 0.379 mi SE are representative of the residential area in the southeast sector within the site boundary. The exposure pathways present in this area are plume, ground, vegetation, inhalation, and direct radiation. The calculated doses for this location are shown in Table 17. A thermoluminescent dosimeter placed at the residence at 0.379 mi in the SE sector indicated radiation levels that are not significantly different from background (See "Methods of TLD Data Analysis" on page 58).

FIGURE 8

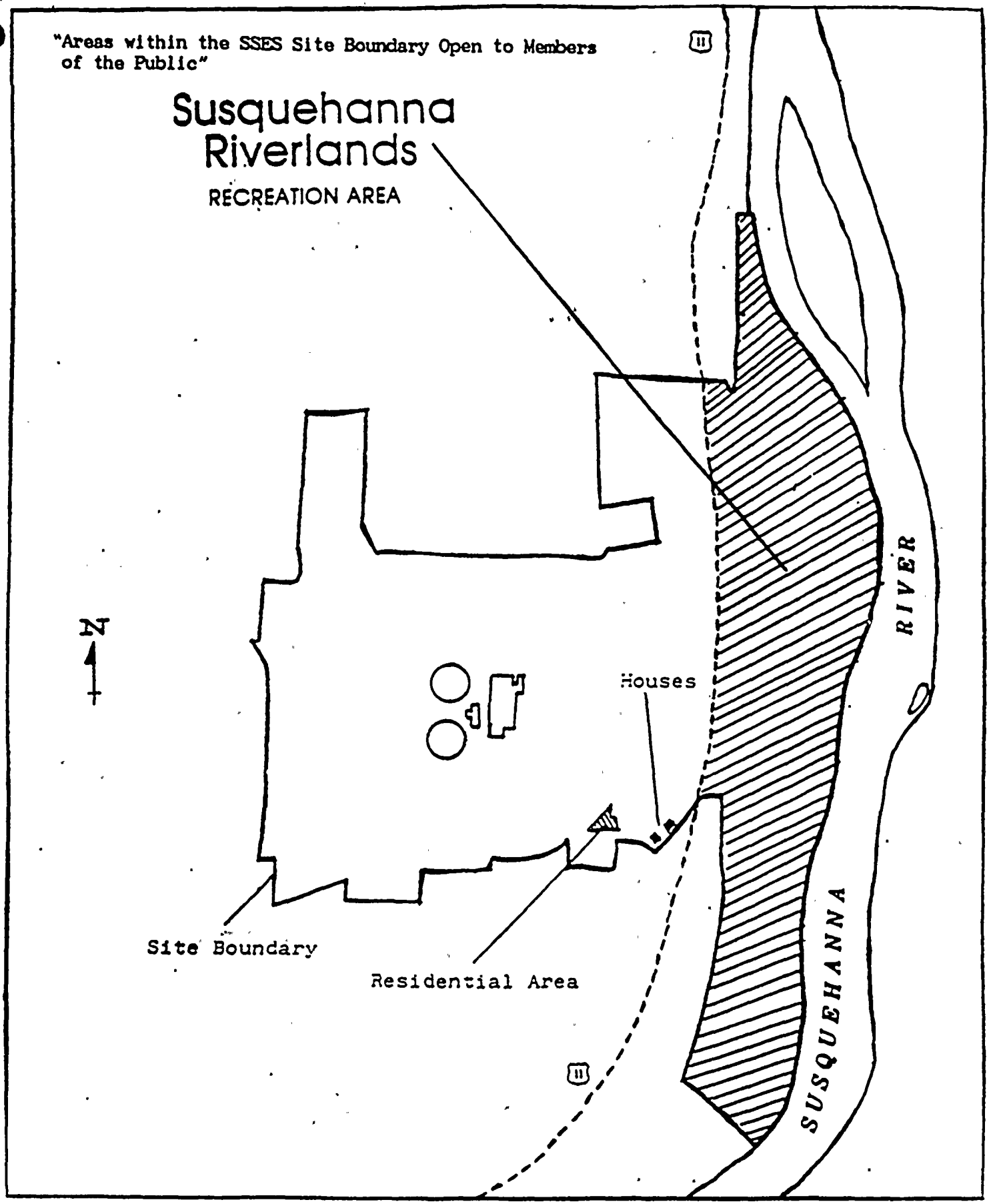
"Areas within the SSES Site Boundary Open to Members of the Public"
Susquehanna Riverlands
RECREATION AREA
11
N
Houses
RIVER
SUSQUEHANNA
Site Boundary
Residential Area
11

TABLE 16

CALCULATED COLLECTIVE DOSES TO MEMBERS OF THE PUBLIC WITHIN THE RIVERLANDS/INFORMATION CENTER COMPLEX*
Data Period: 1/1/87 - 12/31/87

Exposure Pathway	Organ(s)	Collective Dose (man-rem)
plume**	total body, GI-tract, bone, liver, kidney, thyroid	1.78E-08
	lung	1.88E-08
	skin	5.03E-08
ground**	total body, GI-tract, bone, liver, kidney, thyroid, lung	1.74E-08
	skin	2.05E-08
inhalation; four highest organ doses:		
	teen lung	4.38E-08
	adult lung	4.29E-08
	teen thyroid	4.20E-08
	teen GI-LLI	4.19E-08

* Dispersion factors used are for 0.7 miles NE; values can be found in Table 14.
** Doses via these pathways are not age-group dependent.

TABLE 17

CALCULATED DOSES FOR THE RESIDENTIAL AREA IN THE SOUTHEAST SECTOR WITHIN THE SSES SITE BOUNDARY
Data Period: 1/1/87 - 12/31/87

Exposure Pathway	Organ(s)	Dose (mrem)
plume*	total body, GI-tract, bone, liver, kidney, thyroid,	3.37E-03
	lung	3.54E-03
	skin	9.50E-03
ground*	total body, GI-tract, bone, liver, kidney, thyroid, lung	4.13E-03
	skin	4.85E-03
vegetation; four highest organ doses:		
	child liver	2.23E-02
	child GI-LLI	2.21E-02
	teen GI-LLI	1.47E-02
	adult GI-LLI	1.24E-02
inhalation; four highest organ doses:		
	teen lung	8.29E-03
	adult lung	8.12E-03
	teen thyroid	7.94E-03
	child lung	7.30E-03

* Doses via these pathways are not age-group dependent.

SECTION 5

CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL AND THE SOLID WASTE PROCESS CONTROL PROGRAM

CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

There were no revisions to the SSES OFFSITE DOSE CALCULATION MANUAL during the report period.

CHANGES TO THE SOLID WASTE PROCESS CONTROL PROGRAM

Revision 8 to SSES plant procedure AD-QA-311, SOLID WASTE PROCESS CONTROL PROGRAM, was prepared and approved during the report period. Copies of the affected pages are included following this page.

The changes made, as summarized on pages 2-3 of the revised procedure, do not reduce the overall conformance of the solidified waste product to existing criteria for solid wastes.

PROCEDURE COVER SHEET

PENNSYLVANIA POWER & LIGHT CO. SUSQUEHANNA STEAM ELECTRIC STATION	
SOLID RADIOACTIVE WASTE PROCESS CONTROL PROGRAM	AD-QA-311 Revision 8 Page 1 of 60

EFFECTIVE DATE 12/22/87 EXPIRATION DATE 12/22/89

REVISED EXPIRATION DATE _____

PROCEDURE TYPE: (Check only one) ✓ PORC ___ NON-PORC

REVIEW TYPE: (Check only one) ✓ PORC ___ ALTERNATE ___ EXPEDITED

PORC MTG. NO. 87-157

(N/A if NON-PORC or ALTERN. REV)

Prepared by Keith Mattern Date 12/10/87

Reviewed by André J. Dominguez Date 12/11/87

Recommended _____ Date 12/14/87
Section Head/Manager

Approved J A Blakesley Date 12/18/87

FORM AD-QA-101-1, Rev. 3, Page 1 of 1

PROCEDURE REVISION INDEX

Procedure No. AD-QA-311

Title: SOLID WASTE PROCESS CONTROL PROGRAM

Rev. No.	Description of Revision
8	Major revision. Revision included: a. Changed title of procedure. b. Changed title of Senior Project Engr Radwaste to Radwaste Operations Engineer. c. Changed title of Health Physics Radwaste Supervision to Health Physics Foreman-Radwaste. d. Changed general format of procedure section (6.0). e. Changed all reference, containing WNDC to WHNI. f. Added responsibilities for Radwaste Operations Engineer to ensure test data availability to support processing and substitute for Radwaste Supervisor in his absence. g. Added Chemistry Group responsibilities to store test solidification billet until liner burial. Implementing a program to support correlation factors use in 10CFR61 compliance. h. Added responsibilities to Solidification/Dewatering Vendor to have test data and equipment descriptions. i. Added responsibility of NQA to perform periodic audits of PCP and vendor QA program. j. Added Mixed Waste and Waste Stream to definitions. k. Revised Waste Type section to include description of waste streams, constituents, processing alternatives and limitations. Deleted Sump Sludge as separate Waste Type which is included as Mixed Solids and combined Solidified and Dewatered Bead Resin as one waste type. All references to powdered resin has been described in Powdered Resin section. l. Sampling/Analysis Requirement section upgraded to allow vendor personnel to take sample and specify equipment/method to determine radionuclide concentration. m. Re-formatted Radioactive Waste Solidification sections. n. Added requirement that NCR to be issued if a container fails to solidify.

PROCEDURE REVISION INDEX

Procedure No. AD-QA-311

Title: SOLID WASTE PROCESS CONTROL PROGRAM

Rev. No.	Description of Revision
8	Major revision. Revision included: o. Added requirement of temperature recording for exothermic reactions. p. Re-formatted Radioactive Waste Dewatering section. q. Combined all requirements for HIC's into one section. r. All forms revised to delete extraneous information, clarify document completion, make easier to read. s. Changed forms so they may be duplexed with instructions put on back. t. Deleted all reference of in-plant solidification system. u. Deleted requirement to record liner destination on process record. v. Miscellaneous typographical corrections and wording changes for clarity. x. Provided exception criteria for 30 hour cure time. y. Clarified Quality Control Group verification criteria for dewatering. z. Deleted responsibilities/requirements for the Chemistry Group to provide different type of solidification ratios. aa. An Unacceptable Solidified Waste (Unstable) is defined based on a three day cure time.

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ATTACHMENTS

1.0 PURPOSE

Provide administrative control, guidance and records for the solidification and dewatering of applicable forms of Radwaste for ultimate disposal. This procedure is the Process Control Program required by SSES Technical Specifications.

2.0 SCOPE

This procedure is applicable to SSES installed systems, temporary systems and equipment provided by vendors for solidification, dewatering and packaging of applicable waste forms.

3.0 REFERENCES

3.1 49 CFR 173

3.2 10 CFR 20,61,71

3.3 SSES Technical Specifications Section 3.11.3, 4.11.3.1 and 4.11.3.2.

3.4 Standard review plan 11.4

3.5 WHNI "Liner Dewatering Test Report" Report No. I-843-3.

3.6 WHNI report on Dewatering of Bead Ion Exchange Resin and Activated Carbon, report No. Std-R-03-001.

3.7 WHNI Process Control Program for Dewatering Ion-Excnange Resin and Activated Charcoal filter media to 1/2% drainable liquid, Report No. STD.-P-04-002.

3.8 WHNI Report on Dewatering of Bead Ion Exchange Resin and activated Carbon in Hittman Radlok 100 High Integrity containers, Report No. STD.-R-03-002

3.9 WHNI Procedure: Dewatering Hittman Radlok 100 containers with Rigid Underdrains to less than 1% Drainable Liquid, Report No. STD.-P-03-005.

3.10 WHNI procedure Dewatering Bead Ion exchange resin in Radloks with Flexible Underdrains to less than 1% Drainable Liquid, Report No. STD.-P-03-005.

3.11 WHNI Radioactive Waste Container General Specification, WHNI-S-L001.

3.12 Burial Site Criteria for Barnwell S.C.

3.13 Burial Site Criteria for Richland, Washington.

3.14 AD-QA-765, Solid Radwaste Program

3.15 AD-QA-605, Calibration of Installed Plant Instrumentation

3.16 CNSI Topical Report "Mobile Cement Solidification System" 4313-01354-01P-A

3.17 CNSI Topical Report "Polyethylene High Integrity Containers" CNSI-HIC-14571-01-P

3.18 CNSI Topical Report "CNSI Dewatering Control Process Containers Topical Report" CNSI-DW-11118-01-P

3.19 DHEC-HIC-PL-001 South Carolina Certificate of Compliance for CNSI High Integrity Containers

3.20 DHEC-HIC-PO-006 South Carolina Certificate of Compliance for CNSI Overpak High Integrity Containers

3.21 DHEC-HIC-FRP-003 South Carolina Certificate of Compliance for CNSI Fiberglass Reinforced Polyester 24 Inch Pressure Vessel as a High Integrity Container

3.22 CNSI FO-AD-002 Operating Guidelines for use of Polyethylene High Integrity Containers

3.23 CNSI FO-AS-004 Operating Guidelines for use of Fiberglass Reinforced Plastic High Integrity Containers

3.24 CNSI FO-OP-019 Polyethylene High Integrity Container Overpak Handling Procedure

3.25 WHNI STD-D-03-009 USERS MANUAL for HNDC RADLOK-100, RADLOK-200 and RADLOK-500 containers

3.26 WHNI STD-D-03-008 USERS MANUAL for HNDC RADLOK-55 container

3.27 DHEC-HIC-PL-005 South Carolina Certificate of Compliance for WHNI RADLOK-100 and RADLOK-200 containers.

3.28 DHEC-HIC-PL-004 South Carolina Certificate of Compliance for WHNI RADLOK-55 container

3.29 DHEC-HIC-PL-0014 South Carolina Certificate of Compliance for WHNI RADLOK-500

3.30 NDI-QA-6.5.1 Radwaste Program

3.31 AD-QA-210, Procurement Control Activities

3.32 NTP-QA-42.3, Radwaste Worker Training

3.33 NTP-QA-41.2, Chemistry Technician Certification Training

3.34 HP-TP-800, Shipment of Radioactive Material

4.0 RESPONSIBILITIES

4.1 Radwaste Operations Engineer responsibilities:

4.1.1 Ensure procedures are adequate to provide for proper solidification and dewatering of waste.

4.1.2 Ensure test data or rational is available to justify applicable solidification and dewatering functions of each waste type or any combination to address burial and regulatory agencies requirements.

4.1.3 Evaluate services provided by various vendors to ensure that contracted solidification and dewatering operations are performed in the most efficient and economical method as required by applicable regulatory agencies.

4.1.4 Perform the duties of Radwaste Supervisor as specified in this procedure in his absence.

4.2 Shift Supervision shall assume the responsibility of the Radwaste Supervisor and Radwaste Operations Engineer in their absence.

4.3 Radwaste Supervisor responsibilities:

4.3.1 Ensure Solidification/Dewatering Equipment is operated in accordance with approved operating procedures including vendor supplied equipment.

4.3.2 Ensure the appropriate waste solidification and dewatering records are generated.

4.3.3 Interface with station support groups to ensure proper implementation of process controls programs.

4.3.4 Interface with contractor personnel involved in solid waste processing activities including:

a. Ensure that test data is available to justify specific functions.

b. Ensure applicable vendor procedures and revisions are incorporated into the applicable plant procedure and approved by PORC.

4.3.5 Ensure Solidification and Dewatering operations are carried out in an ALARA manner.

4.3.6 Interface with HP Foreman-Radwaste for liner and cask selection for solid waste shipping activities.

4.3.7 Ensures proper marking of containers prior to filling.

4.3.8 Maintains a log of batch processes for test solidification requirements.

4.3.9 Ensure Radwaste solidification personnel are adequately trained per NTP-QA-42.3.

4.3.10 Determine classification of waste to be processed.

4.3.11 Ensure that waste streams loaded into High Integrity Containers are sampled and evaluated for radionuclide and chemical composition applicable to the use of High Integrity Containers.

4.3.12 Ensure proper selection of High Integrity Containers for the waste stream being processed and packaged.

4.3.13 Ensure proper inspections and documentation are complete prior to use of a High Integrity Container and container is properly used up to the point of transfer to Health Physics.

4.3.14 Complete and process High Integrity Container General Certification statement to ensure the container is used properly.

4.4 Chemistry Group responsibilities:

4.4.1 Perform required sampling analysis in accordance with approved chemistry procedures.

4.4.2 Perform test solidification if required. Store the test solidification billet until associated liner is buried.

4.4.3 Provide the Isotopic mix and concentration of isotopes detected in the material sampled for solidification or dewatering.

4.4.4 Complete Chemistry portion of the Solidification Record Sheet. (Attachment A) and Dewatering Record Sheet (Attachment B).

4.4.5 Ensures personnel are adequately trained per NTP-QA-41.2.

4.4.6 Provide sampling and analysis support as necessary for the use of High Integrity Containers.

4.4.7 Implement a program in accordance with 10CFR61 to establish correlation factors from isotopic analysis to determine required radionuclide concentrations in each waste stream.

4.5 Health Physics Foreman Radwaste responsibilities:

4.5.1 Determine the type and specification of casks which may be required.

4.5.2 Completing applicable portions of the Solidification or Dewatering Record Sheet.

4.5.3 Process the Solidification and Dewatering Record Sheets.

4.5.4 Storage of packaged solidified and dewatered material outside the Radwaste facility.

4.5.5 Determine curie content of solidified and dewatered material.

4.5.6 Final disposition of solidified and dewatered material.

4.5.7 Ensures SSES is a registered user of applicable High Integrity Containers.

4.5.8 Ensures personnel involved with radioactive waste handling have received Radwaste Worker training per AD-QA-765.

4.5.9 Radioactive material evaluation of product acceptability for disposal at specific burial sites.

4.5.10 Assure specific approval is requested and obtained for the use of High Integrity Containers as required by applicable regulatory agencies.

4.6 Quality Control Group responsibilities:

4.6.1 Ensure process controls are adhered to.

4.6.2 Review of Solidification and Dewatering Record Sheets.

4.6.3 Inspection of Liners and High Integrity Containers as required by applicable procedures.

4.6.4 Ensure process controls are adhered to by verification of test solidifications, waste volumes, solidification agent additions, product acceptability checks, processing sequence and acceptance criteria.

4.7 I&C Supervisor is responsible for ensuring that periodic calibrations and inspections are performed as required.

4.8 Auxiliary Systems Operator is responsible for operating the plant solid and liquid radwaste equipment in accordance with approved operating procedures as directed by the Radwaste Supervisor and Assistant Unit Supervisor.

4.9 Solidification/Dewatering Services Vendor responsibilities:

4.9.1 Provide solidification and/or dewatering services in accordance with a valid contract for said services and provide test data or make same available for PP&L review during vendor audits to demonstrate that their services and equipment meet the applicable regulatory and burial site limitations for the function they are providing.

4.9.2 Provide training documentation to demonstrate that the personnel being provided, to conduct the applicable service, are in fact trained and knowledgeable in the applicable functions.

4.9.3 Provide procedures that are or can be placed into the SSES procedure format for the functions being provided.

4.9.4 Ensure an approved Quality Assurance Program exists that covers the services being provided. The vendor shall work within the SSES Quality Assurance Program when applicable.

4.9.5 Complete applicable sections of Attachments A,B and C as required for each liner processed.

4.9.6 Ensure prequalification test data for each waste form shall be submitted to the Nuclear Regulatory Commission.

4.9.7 Provide a equipment/process description that is used in processing waste.

4.10 Nuclear Quality Assurance responsibilities:

4.10.1 Receipt inspection of High Integrity Containers and document review to ensure conformance.

4.10.2 Ensure Certificate of Compliance (C of C) is received with the High Integrity Container.

4.10.3 Perform periodic audit on the implementation of this program and review of the Solidification/Dewatering Services vendor QA program.

4.11 Materials Section responsibilities:

4.11.1 Ensure High Integrity Containers are not exposed to ultra violet light (sunlight).

4.11.2 Ensure proper material certification is complete prior to issuance of High Integrity Containers to the plant for use.

4.11.3 Completion of applicable portions of Form AD-QA-311-4, Attachment D.

5.0 DEFINITIONS

5.1 Batch - The total volume of waste contained in a waste mixing tank, spent resin tank concentrates tank or phase separator that has been sampled for solidification.

5.2 Solidification - A conversion of radioactive materials from liquid and solid systems to a monolithic immobilized solid with definite volume and shape, bounded by a stable surface of distinct outline on all sides (free standing), with a free water content of less than 0.5% by volume.

5.3 Waste Type - A category of waste from one or several waste streams which may be Evaporator Concentrates, Powdered Resin, Filter Sludges, Bead Resins, etc. or a combination of each.

5.4 Waste Pre-Conditioning - The physical or chemical adjustment of the waste to bring it within an established envelope to assure solidification.

5.5 Curing Time - The time allowed for the solidified product to set prior to transporting or capping the liner.

5.6 Mixing Ratio - The ratio of waste to cement and additives required for satisfactory solidification.

5.7 Test Solidification - The mixing of waste(s) and solidification agents in the labratory to support selection of mixing ratios and provide insurance for final product acceptability.

5.8 Dewatered - The removal of water from solid material to a point where less than 1% for HIC's and 0.5% for steel liners by volume remains as required by the burial site license.

5.9 Liner - The physical container in which the solidification product is deposited.

5.10 High Integrity Container (HIC) - An approved container for burial that has an expected life of 300 years and provides the stability to meet burial requirements.

5.11 Low Specific Activity - Material in which the activity is essentially uniformly distributed and in which the estimated average concentration per gram of contents does not exceed the specification as stated in 49 CFR 173.403 (N).

5.12 Stable and Unstable Waste Forms - Shall be defined as stated in 10CFR Part 61.

5.13 Mixed Waste - A mixture of radioactive and hazardous waste.

5.14 Waste Stream - A defined byproduct of a process system or component.

5.15 Mixing Recipe - The amount of waste, cement and additives mixed to solidify waste.

6.0 PROCEDURES

6.1 Waste Types - The following waste types shall be processed in accordance with this procedure or in combinations as defined. The waste should be dewatered whenever possible to minimize burial volume or solidified.

6.1.1 Evaporator Concentrates

a. The following processes waste streams are concentrated with the Radwaste Evaporators and are considered Evaporator Concentrates:

(1) Condensate Demineralizer regeneration effluent

(2) Decon Shop drains

(3) Chemistry Laboratory sink drains

(4) Auxiliary Boiler blowdown effluent

b. The constituents of these waste streams may include the following:

(1) Tri-Sodium Phosphate

(2) Sodium Sulfate

(3) Phosphoric Acid

(4) Sulfuric Acid

(5) Sodium Hydroxide

(6) Decontamination solutions

(7) Negligible amounts of reagent chemicals used for chemistry analysis

c. Evaporator Concentrates in the range of 0-25 weight percent sodium sulfate (equivalent) shall be solidified in a liner for final disposal.

d. Evaporator Concentrates shall not be mixed with any other waste type in final processing.

6.1.2 Mixed Solids

a. The following process waste streams are collected either in the Waste Mix Tanks, Waste Sludge Phase Separator or transferred directly to a liner and are considered Mixed Solids:

(1) LRW Filter material and drain liquid

(2) Sump Sludge

(3) Ultrasonic Resin Cleaner Sludge

b. The constituents of these waste streams may include the following:

(1) Diatomaceous Earth

(2) Powdered Resins

(3) Fibrous material

(4) Carbon material

(5) Corrosion products

(6) Various solids and dirt in small concentrations

c. Mixed Solids may be solidified or dewatered for final disposal in either steel liners or High Integrity Containers.

d. Each waste stream shall be processed separately.

6.1.3 Powdered Resin

a. The Reactor Water Cleanup System and Fuel Pool Cooling and Cleanup System filter/demineralizer waste are collected in the RWCU Phase Separator and should be allowed to decay for 60 days. This waste type is considered Powdered Resin.

b. The constituents of these waste streams may include anion and cation powdered resin, corrosion and dirt removed from the primary coolant.

c. Powdered Resin shall be dewatered in High Integrity Containers. If this waste must be solidified, a LCO is in effect for this waste stream and the action statement must be performed. (Note LCO entered in 1985).

6.1.4 Bead Resin

a. Resins from the Condensate Demineralizers and Liquid Radwaste Demineralizer are collected in the Spent Resin Tank which is considered to be Bead Resin.

b. The constituents of these waste streams may include various types of anion, cation and mixed bead resin.

c. Bead Resin may be solidified or dewatered for final disposal in either steel liners or High Integrity Containers.

d. Bead Resin may be used to demineralize Chemical Waste in expoxied steel liners. The Bead Resin may be solidified or dewatered for final disposal.

6.1.5 Cartridge Filters

a. Cartridge Filters from various plant systems are collected and may be disposed of by emplacement in a cement matrix in a steel drum/liner or in a High Integrity Container.

b. Cartridge Filters to be solidified for final disposal shall not be mixed with any other waste type.

c. Cartridge Filters to be placed in High Integrity Containers shall be dried or have absorbant material included to ensure there is not more than 1% free standing water.

6.1.6 Oily Waste

a. Contaminated Oily Waste generated at the facility should initially be processed by a decontamination system. If oil cannot be decontaminated then the oil should be solidified for final disposal.

b. Oily Waste may be solidified on a routine basis to a maximum of 12% oil as a contaminate to other waste forms provided the following are adhered to:

(1) An emulsification agent is added at the required concentrations.

(2) The Liner affected is NOT SHIPPED TO the Barnwell, S.C. Disposal Facility.

c. Oily Waste may be solidified without the use of emulsifier at concentrations less than 3% oil by volume.

d. Oily Waste less than 1% by volume of unintentional oil may be shipped to the Barnwell Disposal Facility. The non-oil portion of the waste must be water or other approved aqueous wastes.

e. Oily Waste at concentrations 12% to 40% may be solidified in cement provided the following are adhered to:

(1) An emulsification agent is added at the required concentrations.

(2) The Liner used for oil solidification is not shipped to the Barnwell disposal facility.

6.1.7 A Waste Type that is combined with a known amount of Hazardous Waste or "Mixed Waste" shall not be processed for final disposal unless concurrence is obtained from the burial sites, Environmental Protection Agency and U.S. Nuclear Regulatory Commission.

6.1.8 Various other materials not specifically identified as waste types will be evaluated for solidification or dewatering on a case by case basis.

6.2 Sampling/Analysis Requirements

6.2.1 Samples shall be obtained and analyzed for each batch of waste if possible.

6.2.2 Samples of the waste shall be taken in its state prior to processing for final disposal. Bead Resin used for chemical demineralization shall be sampled after the resin has been used in the process.

6.2.3 Deviations from the sampling requirement shall be approved by the Chemistry Supervisor.

6.2.4 The tank to be sampled shall be recirculated for a minimum of one hour prior to sampling.

6.2.5 A Chemistry Technician or another qualified individual shall obtain the required samples after the specified recirculation time is complete.

6.2.6 Material to be solidified may also be recirculated and sampled from mobile solidification equipment.

6.2.7 Radionuclide concentration will be determined by gamma spectromentry and correlations factors.

6.3 Radioactive Waste Solidification

6.3.1 General Requirements

a. Solidification processing shall be conducted by qualified SSES or vendor personnel.

b. The solidification process shall be operated in accordance with approved operating procedures. Procedures shall define specific waste types, amounts of solidification agent and additives or method for determination.

6.3.2 Waste Preconditioning

a. Waste preconditioning will be determined by chemistry analysis during batch sampling.

b. Preconditioning of waste will be performed if required prior to determining mix ratios.

c. Waste preconditioning is required when any of the following conditions exist:

(1) A high or low pH condition, as determined by the test solidification procedure.

(2) Liquid content of the batch is too low or too high, out of the acceptable envelope for solidification.

(3) Solids content of the batch is too low or too high, out of the acceptable envelope for solidification.

d. Waste preconditioning will be performed in accordance with approved procedures as recommended by Chemistry Group.

e. Upon completion of waste preconditioning, Chemistry Group will obtain additional samples as required to determine mixing ratios.

6.3.3 Determination of Mixing Ratios

a. Determination of mixing ratios shall be performed for each waste batch to be processed.

b. Deviation from the recommended mixing ratios shall be approved by the Chemistry Supervisor.

c. Chemistry Group determines the following:

(1) Density of the waste samples.

(2) Specific gravity of Sodium Sulfate Solution.

(3) Percent settled solids.

d. Chemistry Group shall perform test solidification of waste as required in section 6.3.4.

e. Chemistry Group determines mixing ratios to ensure proper solidification.

f. Chemistry Group shall provide an isotopic analysis which will be attached to the Solidification Record Sheet. (Form AD-QA-311-1)

g. Chemistry Group shall provide the projected curie concentration to the Radwaste Supervisor.

6.3.4 Test Solidification

a. Test solidification shall be performed to support waste mixing ratios as follows:

(1) At least every tenth (10th) Batch of the same waste type.

(2) When sample analysis fall outside the normal envelope established indicating a change in the waste type.

(3) When it is believed that some unexpected or abnormal contaminant may be present.

(4) When requested by the Chemistry Supervisor or Radwaste Supervisor.

b. Upon failure of a test solidification, additional samples will be obtained and testing will continue until a successful test solidification has been completed with revised mixing ratios as determined by Chemistry. Test solidifications shall be performed on each subsequent batch of the same waste type until at least three (3) consecutive initial test solidifications demonstrate acceptability.

c. Quality Control shall verify test solidification acceptability and indicate the acceptability on the surveillance documentation. The acceptability requirements shall be defined in an established procedure.

d. Extra sample volume for backup test which may be required shall be disposed of after liner shipment.

e. Test solidification billets should be disposed of after the liner is buried.

f. Test solidifications may be performed with waste from samples obtained by the Chemistry Group as follows:

(1) Direct sampling of the liner after mixing.

(2) Sampling of the tank to be transferred.

(3) Sampling of the solids in the liner and the liquid for hydration, then mixed to the ratios that exist in the liner.

g. Test Solidification Procedures shall be developed for each specific waste type.

6.3.5 Curing Time

a. A minimum of 30 hours shall be allowed for curing prior to capping or transporting the container. If the liner contains an unstable waste form, this requirement may be wavied by the Radwaste Supervisor.

b. The liner may be moved during the first hour after solidification but must remain undisturbed for the remaining 29 hours.

c. Deviations from the minimum required curing time shall be approved by the Radwaste Supervisor and justifications documented in the remarks section of Solidification Data Sheet. (Form AD-QA-311-1)

d. A temperature recorder should be used to monitor the exothermic reaction. The temperature profiles will be used for information only.

6.3.6 Solidification Product Quality

a. Solidification product quality is assured by use of the predetermined mixing ratios of waste, cement and additive. Liquid to be used for solidification may be demineralized water or liquid radwaste.

b. Mixing ratios are based on laboratory testing non-radioactive waste materials.

c. Mixing ratios are re-enforced by the following:

(1) Test solidifications performed periodically as stated in 6.3.4.

(2) Visually and physically checking at least every fifth (5th) container of the same waste type.

d. Container checks shall consist of:

(1) A visual check of the solidified product for water on the surface of the product.

(2) Physically poking the surface of the solidified product with a rigid unyielding device prior to capping (Nominal penetration is acceptable).

e. Quality Control shall verify acceptability of the solidified product when containers are checked.

f. Deviation from the container checking requirement shall be approved by the Radwaste Operations Engineer.

6.3.7 Handling of Unacceptable Solidified Waste Containers.

a. If a solidified waste container does not meet the acceptability requirements (except for freestanding water) a Non-Conformance Report (NCR) shall be issued.

b. If the reason for unacceptability is free standing water:

(1) The free standing water will be removed or

(2) Extra cement/additive will be added to solidify the free water.

c. If portions or all of the product did not solidify after three days for unstable waste:

(1) The waste container will be capped and placed in a storage location in the Radwaste facility and periodically checked until such a time that the product is acceptable or

(2) Additional solidification agents may be added to achieve satisfactory solidification, as determined by the Radwaste Supervisor.

d. Specific instructions shall be established for handling unacceptable solidified waste container on a case by case basis.

e. Quality Control shall verify acceptability of the solidified product in accordance with 6.3.6.d.

f. If the product solidifies prematurely prior to completing the addition of the required amount of cement and additive as calculated on the solidification calculation sheet for the specific procedure used, the following is required:

(1) Chemistry Group shall perform a test solidification at the actual ratio of cement and waste in the liner, provided Chemistry Group has sufficient sample volume remaining to complete this item.

(2) Quality Control shall check the product for acceptability in accordance with 6.3.6.d of this procedure.

(3) The liner may be shipped provided the subsequent test solidification and/or product quality checks are acceptable to Quality Control and concurrence of the Radwaste Supervisor obtained.

(4) The above apply only if the Radwaste Supervisor and the HP Foreman-Radwaste agree that the waste can be re-classified as "Class A unstable" in accordance with 10CFR61 and the burial site criteria.

g. If the product is a class which requires stability as defined in 10CFR Part 61 and does not solidify properly in accordance with the specific operating procedure, the following are required.

(1) An evaluation of the liner shall be made by the following personnel.

(a) Radwaste Supervisor

(b) HP Radwaste Supervision

(c) Solidification vendor - Operations

(d) Solidification vendor - Engineering

(2) Burial sites shall be contacted and requirements for receipt of the liner in question shall be defined.

(3) Alternative packaging/processing shall be evaluated.

(4) Recommendations for final disposition shall be made to the Radwaste Operations Engineer.

(5) Records shall be kept and documentation supportive of the final disposition attached to the liner document package.

(6) The liner may be shipped after Q.C. review of documentation is complete and burial site concurrence is received in letter form.

6.3.8 Capping of Solidified Waste Containers

a. At a minimum the requirements of 6.3.5 of this procedure shall be met prior to capping the container.

b. If the container contents are within the requirements of Low Specific Activity (LSA) ensure one of the following:

(1) The container must be shipped within (10) ten days after sealing.

(2) If a container has been sealed for longer than (10) days, it shall be opened, vented, and then closed and shipped within (10) ten days.

c. If the container exceeds the limits for Low Specific Activity and contains water and/or organic substances which could radiolytically generate combustible gases, determination must be made by test and measurements of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:

(1) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume of the container gas void; or

(2) The container and shipping cask cavity must be inerted with a dilutent to assure that oxygen is limited to less than 5% by volume in those portions of the package which could have hydrogen greater than 5%.

6.3.9 Solidification Agent Control

a. Portland Cement - ASTM C-150 Type I shall be used for the mobile solidification process.

b. Other solidification agents may be used only after acceptable testing of the agent has been completed that demonstrates acceptable solidification.

c. Documented Certification is not required for materials received in bags provided material verification can be obtained as follows:

(1) Cement is acceptable provided the bag containing the cement indicates that the cement is Portland Type I.

(2) Sodium Silicate is acceptable provided the bag containing the additive indicates Anhydrous Sodium Metasilicate and is a product of PQ Corporation.

(3) Other additives are acceptable provided the bag containing the additive is clearly marked indicating the type of additive.

d. Other additives may be used for enhancement of the solidification process as specified in the operating procedure and documented on the solidification record sheet.

6.3.10 Radioactive Waste Solidification Records

A Solidification Record Sheet (Form AD-QA-311-1) shall be completed for each liner filled with solidification products.

Guidelines for completing the Solidification Record Sheet are attached to each part of the form. Parts of the form shall be completed by the following responsible individuals or groups:

a. The Radwaste Supervisor is responsible for initiating this form.

b. Part I, Solidification Record Sheet cover page, shall be completed by the Radwaste Supervisor.

Part II, Sampling and Pre-Solidification Analysis shall be completed by Chemistry Group.

Part III, Container Selection shall be completed by the Radwaste Supervisor.

Part IV, System Preparation and Processing shall be completed by vendor personnel and the Radwaste Supervisor.

Part V, Solidified Liner Data shall be completed by the HP Technician, and HP Foreman Radwaste.

c. Quality Control shall provide verification as required in the Solidification Record Sheet.

6.4 Radioactive Waste Dewatering

6.4.1 General Requirements

a. Dewatering of Radioactive Waste shall be performed by a qualified SSES or vendor personnel.

b. Dewatering of Radioactive Waste shall be performed in accordance with approved operating procedures.

c. Dewatering procedures shall be based on documented test data that has demonstrated the ability to achieve drainable water limits as specified by burial sites and applicable regulatory agencies.

d. High Integrity Containers must be used for the disposal of unsolidified solid waste when the concentration of radionuclides with half lives greater than 5 years exceeds 1 µCi/cc.

6.4.2 Dewatered Product Control

a. The final dewatered final product shall contain less than 1% free standing water for High Integrity Containers and 1/2% for steel liners. Quality Control checks will be performed on the process steps.

b. Deviation from the container checking requirement shall be approved by the Radwaste Operations Engineer.

6.4.3 Radioactive Waste Dewatering Records

A Dewatering Record Sheet (Attachment B, Form AD-QA-311-2) shall be completed for each container filled with dewatered resins. Guides for completing the Dewatering Record Sheet are attached to each part of the form. Parts of the form shall be completed by the following responsible individuals or groups:

a. The Radwaste Supervisor is responsible for initiating this form and completing Part I.

b. Part II Sampling and Pre Dewatering Analysis shall be completed by the Chemistry Group

c. Part III Container Selection shall be completed by the Radwaste Supervisor.

d. Part IV Dewatering operation documentation shall be completed by the qualified person completing the various operations.

e. Part V Dewatered container data shall be completed by the HP technicians, and HP Foreman Radwaste as applicable.

f. Quality Control personnel shall provide verification as required by the Dewatering Record Sheet.

6.4.4 High Integrity Containers (HIC)

a. Storage of High Integrity Containers

(1) High Integrity Containers (HIC) stored in direct sunlight or in areas where there is a strong source of ultraviolet radiation must be filled within one year of the manufacturing date.

(2) High Integrity Containers stored away from any sources of ultraviolet radiation must be filled within two years of the manufacturing date, or specific guidance from the vendor must be obtained.

(3) Once filled a High Integrity Container may be stored in an approved storage facility for up to (5) five years prior to burial.

(4) Short exposures (i.e., several hours) to sunlight, such as occurring during shipment and on site transfer need not be counted when determining total ultraviolet exposure.

b. Uses of High Integrity Containers

(1) High Integrity Containers may be used to package the following waste materials for burial at the Barnwell, South Carolina low level waste burial site:

- Bead ion exchange resin
- Powdered ion exchange resin
- Activated carbon, powdered carbon, diatamaceous earth and other granular or fiberous Filter material
- Cartridge filter elements
- Filter sludge
- Sand blasting grit and crud
- Stabilized incinerator ash
- Other dewatered and dry material provided concurrence is received by the container vendor and burial site.

(2) Prior to using a High Integrity Container, procedures shall be established to define the specific requirement that shall be met during the use of the container.

The procedure shall contain:

- Documentation requirements that specific conditions have been met such as inspection and exposure to degrading conditions.
- Instructions as to how to handle the container and properly close the container.
- Instructions for the on-site storage of loaded containers for ultimate shipment for disposal.

(3) The procedures shall provide a method for documenting required information relevant to the container from initial receipt to shipping for disposal.

Required information shall be based upon the container certificate of compliance and disposal site requirements.

Retention and utilization of the documentation shall be defined in the procedures.

The procedures shall establish specific Quality Control inspection requirements.

(4) The HP Foreman-Radwaste shall assure that SSES is an authorized user of High Integrity Containers (HIC) used at SSES for the purpose of Radwaste disposal prior to the use of a specific type HIC.

(5) Prior to the first shipment of a specific type of High Integrity Container, authorization shall be requested and received from the applicable regulatory agency governing the use of the container in question at the disposal site of concern.

c. High Integrity Container Limitations

(1) High Integrity Containers are approved for use provided the following physical limitations of the waste are met:

(a)	Bulk density	: 0.7 to 2.5 gms/cc
(b)	pH	: 4 to 11
(c)	Loading temperature	: $\leq$150°F
(d)	Radlok 100 loaded weight	: 10500 lb
(e)	Radlok 200 loaded weight	: 5500 lb
(f)	Radlok 55 loaded weight	: 950 lb
(g)	CNSI 14-195 loaded weight	: 12200 lb
(h)	CNSI 14-170 loaded weight	: 10800 lb

(i) CNSI 8-120 loaded weight : 7500 lb

(j) CNSI 6-80 loaded weight : 5000 lb

(k) CNSI 24-INCH FRP loaded weight: 1600 lb

(l) Radlok 500 loaded weight : 9500 lb.

(2) The maximum concentration of radionuclides with half lives greater than (5) five years that may be disposed of in a High Integrity Container is 350 µCi/cc.

(3) The following chemicals are prohibited and may not be disposed of in High Integrity Containers.

(a) Aqua Regia

(b) Bromine

(c) Chromic/Sulfuric Acid

(d) Fuming Sulfuric Acid

(e) Nitric Acid >50% concentration

(f) Organic peroxides

(g) Phenol-concentrated

(h) Acetone

(i) Butane

(j) Carbon Disulphide

(k) Chloroform

(l) Ethyl Ether

(m) Ethylene Dichloride

(n) Methylene Chloride

(o) Methyl Ethyl Ketone

(p) Propane

(q) Pentane

d. Closure of High Integrity Containers

(1) Closure of High Integrity Containers shall be completed in accordance with approved procedures.

(2) If the container contents are within the limits of Low Specific Activity ensure the following:

(a) The container is shipped within (10) ten days after sealing; or

(b) If the container has been sealed for longer than (10) ten days, it shall be opened, vented, and then closed and shipped within (10) days.

(3) If the container exceeds the limits for Low Specific Activity or contains water and/or organic substances which could radiolytically generate combustible gases, determination must be made by test and measurements of a representative package such that the following criteria are met over a period of time that is twice the expected shipment time:

(a) The hydrogen generated must be limited to a molar quantity that would be no more than 5% by volume of the container gas void; or

(b) The container and shipping cask cavity must be inerted with a dilutent to assure that oxygen is limited to $\leq$5% by volume in those portions of the package which could have hydrogen greater than 5%.

6.5 Container Inspections

Quality Control shall inspect the containers to be used for solidification and dewatering.

6.5.1 This inspection shall assure High Integrity Containers are acceptable for use in accordance with the Certificate of Compliance.

6.5.2 This inspection shall assure that prior to use, the containers to be used for solidification or dewatering are intact and their internals are free of any visual damage that would prevent them from performing their intended function.

6.6 Waste Container Space Utilization

6.6.1 Waste volume shall be maximized within the guidelines of the specific operating procedures to minimize potential void space at the top of the waste container after solidification or dewatering is complete.

6.6.2 Specific waste volumes committed to by the vendor shall be met or otherwise justified as to why the waste volumes were not achieved.

6.6.3 Attachment C will be completed by vendor personnel and shall be used to track the waste volumes achieved in each individual liner.

6.7 Changes to the Solid Radioactive Waste Process Control Program

6.7.1 Any changes to the Solid Radioactive Waste Process Control Program shall be provided in the semiannual Radioactive Effluent Release Report filed with the NRC.

6.7.2 Any changes to the Solid Radioactive Waste Process Control Program shall be approved by the Plant Operations Review Committee (PORC).

6.8 Equipment calibrations shall be in accordance with AD-QA-605, Calibration of Installed Plant Instrumentation.

7.0 RECORDS

7.1 The Solidification Record Sheet or Dewatering Record Sheet and the attached Isotopic Analysis shall be forwarded to the HP Foreman - Radwaste for retention until such time as the liner identified on the Record Sheet is shipped for final disposition.

7.2 When the identified liner is shipped the Solidification Record Sheet or Dewatering Record Sheet and other documents concerning the Shipment shall be forwarded to the DCC for retention.

SOLIDIFICATION RECORD SHEET

Part I: Cover Page

1. Liner Identification Number _____
2. Waste Type _____ (Powdered Resin cannot be entered)
3. Batch No. _____
4. Waste Volume _____ ft^3
5. Test Solidification required? YES NO (circle one)
6. Approval for use _____
   Radwaste Supervisor

Part I: Cover Page Instructions

a. Step 1 - Enter PP&L liner identification number.

b. Step 2 - Enter waste type to be processed. Powdered Resin cannot be entered due to L.C.O. in 1985 on test solidification.

c. Step 3 - Enter the batch number associated with this process; this is obtained from the Radwaste Supervisor's log book for this waste type.

d. Step 4 - Enter the volume of waste in the container to be solidified.

e. Step 5 - Identify if a test solidification is required based on the information contained in the Radwaste Supervisor's log book for this waste type.

f. Step 6 - Radwaste Supervisor signature indicates approval for sampling and test solidification if required.

SOLIDIFICATION RECORD SHEET

Part II: Sampling and Pre-Solidification Analysis

1. Tank/Liner sampled_____ Waste Volume _____ft³
2. Sample Number _____
3. Waste Type[1] _____
   a. Wet WT. % settled solids _____
   b. WT. % Sodium Sulfate _____
   c. % Water by volume _____
   d. pH _____
4. Waste sample density _____ gm/ml
5. Oil Content (check a or b, or enter % by volume in c)
   a. None _____
   b. Less than 1% _____
   c. % oil _____
6. Isotopic Analysis Attached _____ By
7. Specific activity of sample _____ µCi/gm
8. Test Solidification density _____ gm/cc

[1] Include nomenclature of type of Waste Type, i.e. bead resin, powdered resin, mixed solids, oil, or combination, etc,

Part II: Sampling and Pre-Solidification Analysis Instructions

NOTE: If any of these steps or part of a step is not required by the specific test solidification procedures mark it as N.A.

a. Step 1 - Identify which tank/liner that is to be processed and the volume.

b. Step 2 - Enter sample number.

c. Step 3 - Enter the waste type, wet weight percent settled solids, weight percent sodium sulfate, the percent water by volume of the sample, and pH of the sample waste.

d. Step 4 - Enter the density of the sample taken from the tank. Be sure to use the density of the whole sample not just of the liquid phase.

e. Step 5 - Check off the quantity of oil in the sample by noting either "none", less than one percent, or indicating the percentage of oil.

f. Step 6 - Chemistry Technician initials indicating that a copy of the isotopic analysis is attached.

g. Step 7 - Based on the isotopic analysis attached enter the specific activity.

h. Step 8 - Determine test solidification density and enter results.

i. Step 9 - Enter waste volume, cement volume, Sodium Silicate quantity and type and volume of other additives.

j. Step 10- Chemistry Technician initials indicating the test solidification is completed and Quality Control acceptability results.

k. Step 11- Enter the number of hours the test solidification needed to cure.

l. Step 12- Chemistry Supervision reviews the data and signs, withdate and time, indicating the test solidification has been performed properly.

9. Mixing Recipe

Waste _____ ft^3

Cement _____ lbs/ft^3 of waste

Sodium Silicate _____ lb/ft^3 of waste

Other additive

_____ _____ liters/gals.

_____ _____ liters/gals.

_____ _____ liters/gals.

10. Test Solidification Completed _____ Acceptable YES NO (circle one)
By

11. Cure time required _____ hours.

12. The above tank/liner has been analyzed and is acceptable for solidification at the indicated mixing ratios.

_____ _____ _____
Chemistry Supervision Date Time

Part II cont'd
Instructions

k. Step 12 - Enter the actual curing time of test solidification.

l. Step 13 - Chemistry Supervision shall sign with the date and time indicating that the waste in the identified tank/liner has been sampled and analyzed in accordance with approved procedures and is acceptable for solidification at the indicated mixing recipe.

SOLIDIFICATION RECORD SHEET

PART III: Container Selection

1. Estimated Liner Dose rates _____ mr/hr on contact

   _____ mr/hr at 2 meters

2. Projected Curie Concentration _____ µCi/gm

3. Waste Classification/Stability _____

4. Liner type used _____
   Type

5. Type cask to be used _____
   Type

6. PP&L Liner Identificiation Number _____

7. The above specified liner and cask have been determined appropriate for the solidified waste based on projected curie loading and dose rates

_____ _____ _____
Radwaste Supervisor Date Time

Part III: Container Selection Instructions

a. Step 1 - Based on the isotopic analysis of the waste to be solidified provide the estimated dose rates for the bare liner on contact and at a distance from the surface of 2 meters.

b. Step 2 - Enter the projected curie concentration of the solidified waste.

c. Step 3 - Enter the expected waste classification and stability requirement based on the isotopic analysis per 10CFR part 61.

d. Step 4 - Identify the type of liner to be used.

e. Step 5 - Enter the appropriate cask designation to be used for shipment. More than one designation may be entered.

f. Step 6 - Enter the PP&L liner identification number.

g. Step 7 - The Radwaste Supervisor or his designee shall sign, with date and time, that the cask(s) and cask liner identified above are appropriate for the waste to be solidified.

SOLIDIFICATION RECORD SHEET

Part IV: System Preparation and Processing

1. Liner Serial Number _____

2. PP&L Liner Identification Number stenciled on liner _____ Liner ID. No. _____ Confirm

3. Liner properly positioned and ALARA consideration made _____ Confirm

4. Pretransfer requirements:

   a. Operating procedure to be used OP-068-___, Rev.__ _____ Confirm _____ Verify

   b. Fill Head Installed and Properly Secured _____ Confirm _____ Verify

   c. The following checks are complete. _____ Confirm _____ Verify

      (1) All transfer lines properly connected/secured.
      (2) All transfer lines inspected for visible signs of wear.
      (3) Transfer line drain valves checked closed and capped.
      (4) Proper transfer valve opened.
      (5) Three way valve in "Fill" position.
      (6) Communications established.

   d. Dewatering Hose Connected to Pump Skid Suction if required _____ Confirm _____ Verify

   e. High Level Alarm Probe Installed and Tested _____ Confirm _____ Verify

   f. Liner apron installed _____ Confirm _____ Verify

   g. Temperature monitoring instrumentation installed _____ Confirm _____ Verify

5. Authorization to commence processing

_____ Radwaste Supervisor _____ Date _____ Time

6. Post Transfer requirements:

   a. Transfer Lines Flushed and All Valves Secured — Confirm ____ Verify ____

   b. Fill Head Removed — Confirm ____ Verify ____

   c. High Level Alarm Probe Removed and Plug Replaced if required — Confirm ____ Verify ____

   d. Inspection Plate Secured — Confirm ____ Verify ____

7. Solidification parameters

	Calculated	Actual
Waste in liner		_____ ft^3
Cement to be added to liner	_____ lbs	_____ lbs
Sodium Silicate to be added to liner	_____ lbs	_____ lbs
Other additive added to liner		
Type _____	_____	_____ lbs/ft^3/gallons
Type _____	_____	_____ lbs/ft^3/gallons
Calcium Hydroxide to be added to liner	_____ lbs	_____ lbs

Vendor Technician	Date	Time	QC Verification
_____	_____	_____	_____

8. Pre-Solidification requirements

CAUTION

FOR SOLIDIFICATION OF WASTE CONTAINERS WHICH WERE PREVIOUSLY USED, AND EMPTIED BY SLUCING SUCH AS SODIUM SULFATE, A SEPARATE BATCH NUMBER SHALL BE ASSIGNED AND WILL REQUIRE SAMPLING FOR TEST SOLIDIFICATION AND ISOTOPIC ANALYSIS.

   a. Mixer Head Drive Assembly Installed and Secured — Confirm ____

   b. Flexcon Cement Feed Properly Installed — Confirm ____

   c. Hopper Installed and Slide Gate Opened — Confirm ____

   d. Cement Discharge Brushed Out — Confirm ____

   e. Cement Feed Ball Valve Opened — Confirm ____

9. Authorization to commence solidification

_____ _____ _____
Radwaste Supervisor Date Time

10. Solidification Processing Data:
    a. Time processing started _____ _____ Confirm

    b. Time processing stopped _____ _____ Confirm

    c. Hydraulic Pressure at _____psig _____ Confirm

11. Post Solidification requirements:

    a. Mixer Head Drive Assembly Removed from Liner and Installed in Stand _____ Confirm

    b. Vacuum Filter Cleaned and Emptied _____ Confirm

12. Liner check for complete solidification and visible/drainable water.

    a. Penetration check (6.3.6.d) _____ QC Verification/Date/Time

    b. Visible water (6.3.6.d) _____ QC Verification/Date/Time

13. Curing time _____hrs. (A minimum of 30 hrs is required.)

14. Container Volume Usage

    100 x (Solidified Waste Vol.____ft^3 ÷ Available Waste Vol____ft^3) = ____%.

15. Supervisory review and Health Physics notification.

    Liner #_____ meets the following criteria:

    a. TYPE: A, B, C (circle one)

    b. Classification: STABLE UNSTABLE (circle one)

    c. ≥85% Container volume utilized: YES NO (circle one)

_____ _____ _____
Radwaste Supervisor Date Time

Part IV: System Preparation and Processing Instruction

NOTE: Processing vendor personnel shall complete all confirm and verify signoffs.

a. Step 1 - Enter the serial number of liner to be used.

b. Step 2 - Record the PP&L liner identification number and confirm it is stenciled on the liner. (This must be the same as the number in Part III step 6).

c. Step 3 - Confirm that the liner is properly positioned and ALARA consideration has been made for shielding, spills and expected dose rates.

d. Step 4 - Confirm and verify pre-waste transfer requirements have been performed.

e. Step 5 - Radwaste Supervisor signs step indicating authorization to commence waste transfer.

f. Step 6 - Confirm and verify post transfer requirements have been performed.

g. Step 7 - Enter solidification parameters.

h. Step 8 - Confirm presolidification requirements have been performed.

i. Step 9 - Radwaste Supervisor signs step indicating authorization to commence solidification.

j. Step 10 - Enter Solidification Processing Data.

k. Step 11 - Confirm Post Solidification requirements.

l. Step 12 - QC verification for hardness/solidification by manual penetration tests and visual observation for water in the liner.

m. Step 13 - The actual curing time prior to capping shall be entered here.

n. Step 14 - Calculate the Container Volume Usage. If usage is less than 85%, the burial sites shall be notified.

o. Step 15 - Radwaste Supervisor will indicate the expected type of waste classification based on the isotopic analysis, the waste classification process used and if 85% or greater of the liner volume was utilized. He then signs the step indicating the release of the liner to the Health Physics Group.

SOLIDIFICATION RECORD SHEET

Part V: Filled Liner Data

1. Liner Identification No. _____

2. Liner Radiation Levels

   a. Top _____mr/hr
   Bottom _____mr/hr
   4 Quadrants 1 _____mr/hr
   2 _____mr/hr
   3 _____mr/hr
   4 _____mr/hr

   b. Smearable Activity _____dpm/100cm²

   c. Container washdown / decon performed _____
   Yes/NR

   d. Smearable activity after washdown/decon _____dpm/100cm²
   (attach radiological survey form)

   e. Liner ready for transfer to storage or shipment.

   _____ _____ _____
   HP Technician Date Time

3. Liner Capped _____/_____/_____
   Date Time By

4. Shipment #_____

5. Destination _____

   _____ _____ _____
   HP Foreman-Radwaste Date Time

   _____ _____ _____
   Quality Control Review Date Time

6. REMARKS:

Part V: Filled Liner Data Instructions

a. Step 1 - Enter the PP&L liner identification number

b. Step 2 - Complete the liner radiological data and attach the survey form to Solidification Record Sheet. If washdown is not required, enter "NR".

c. Step 2e - Health Physics shall verify and sign, with date and time, that the liner is ready for transfer to storage or for transfer directly to a shipping cask for transportation to a licensed burial site.

d. Step 3 - Enter date and time liner capped.

e. Step 4 - Enter the transportation shipment number.

f. Step 5 - Enter the destination (i.e. burial site, LLRWHF, etc.) of the liner. Health Physics and QC shall sign, with date and time, that his procedure has been properly followed.

g. Step 6 - Enter any remarks that may be related to this filled liner.

DEWATERING RECORD SHEET

Part I: Cover Page

1. Liner Identification Number _____

2. Waste Type _____

3. Waste Volume _____ ft^3

4. For High Integrity Containers, documentation package complete per section 6.4.4.b(2) of this procedure. (QC acceptance tag, letter from storeroom, etc.) _____

5. Approval for use. _____
Radwaste Supervisor

Part I: Cover Page Instructions

a. Step 1 - Enter the liner identification number from Radwaste Supervisor Log Book.

b. Step 2 - Enter the waste identification (i.e., Bead resin, Powdex, carbon, etc..)

c. Step 3 - Enter the volume of waste in the container to be processed.

d. Step 4 - Initial to ensure all documents are brought together.

e. Step 5 - Radwaste Supervisor signature indicates approval of the High Integrity Container to be used and the dewatering process to continue.

DEWATERING RECORD SHEET

Part II: Sampling and Pre-Dewatering Analysis

1. Tank/Liner sampled _____ Waste Volume _____ ft^3

2. Sample Number _____

3. Waste Type _____

   a. pH of liquid contained within solids if a Carbon Steel liner is used _____ pH

   b. Oil Content (check one)

      None _____

      less than 1% _____

4. Isotopic Analysis attached _____
   By

5. Specific activity of Dewatered Sample _____ µCi/gm

6. Sample density _____ gm/cc

The above tank/liner containing solids has been sampled and found to contain the isotopes and specific activities as indicated on the attached data sheets.

_____	_____	_____
Chemistry Supervision	Date	Time

Part II Sampling and Pre-Dewatering Analysis Instructions

a. Step 1 - Identify which tank/liner that is to be processed and the volume.

b. Step 2 - Enter sample number.

c. Step 3 - Enter waste type, pH and oil determination results.

f. Step 4 - Chemistry Technician initials indicating the isotopic analysis is attached.

g. Step 5 - Based on the isotopic analysis attached, enter the specific activity.

h. Step 6 - Determine sample density and enter results.

i. Step 7 - Chemistry Supervision shall sign with the date and time indicating that the identified tank/liner has been sampled and analyzed in accordance with approved procedures.

DEWATERING RECORD SHEET

Part III: Container Selection

1. Estimated Liner Dose Rates _____mr/hr on contact

   _____mr/hr at 2 meters

2. Projected Curie Loading _____ µCi/gm

3. Waste Classification/Stability _____

4. Liner type used _____
   Type

5. Type cask to be used _____
   Type

6. PP&L Liner Identification Number _____.

7. The above specified container and cask have been determined appropriate for the dewatered waste based on projected curie loading and dose rates.

_____	_____	_____
Radwaste Supervisor	Date	Time

Part III Container Selection Instructions

a. Step 1 - Based on the isotopic analysis of the material to be dewatered provide the estimated dose rates for the bare container on contact and at a distance of 2 meters from the surface.

b. Step 2 - Enter the projected curie concentration on the dewatered waste.

c. Step 3 - Enter the expected waste classification and stability requirements based on the isotopic analysis per 10CFR part 61 (i.e., A, B or C).

d. Step 4 - Identify the type of container to be used.

e. Step 5 - Enter the appropriate cask designation to be used for shipment. More than one designation may be used.

f. Step 6 - Enter the PP&L liner identification number.

g. Step 7 - The Radwaste Supervisor or his designee shall sign, with date and time, that the cask(s) and container identified above are appropriate for the waste to be dewatered.

DEWATERING RECORD SHEET

Part IV: System Preparation and Processing

1. Liner Serial Number _____

2. PP&L Liner Identification Number stenciled on liner — Confirm

3. Liner Properly Positioned and ALARA considerations made. — Confirm Verify

4. Pretransfer requirements

   a. Operating procedure to be used OP-068-___, Rev. __ — Confirm Verify

   b. Fill Head Installed and Properly Secured if required — Confirm Verify

   c. The following checks are complete. — Confirm Verify

      (1) All transfer lines properly connected/secured.
      (2) All transfer lines inspected for visible signs of wear.
      (3) Transfer line drain valves checked closed and capped.
      (4) Proper transfer valve opened.
      (5) Three way valve in "FILL" position.
      (6) Communications established with Radwaste Operator.

   d. Dewatering Hose Connected to Pump Skid Suction — Confirm Verify

   e. High Level Alarm Probe Installed and Tested — Confirm Verify

   f. Liner apron installed — Confirm Verify

   g. Temperature monitoring instrumentation installed — Confirm Verify

5. Authorization to commence processing.

_____ Radwaste Supervisor _____ Date _____ Time

6. Post Transfer Requirements

   a. Transfer Lines Flushed and All Valves Secured — Confirm ____ Verify ____

   b. Fill Head Removed if required — Confirm ____ Verify ____

   c. High Level Alarm Probe Removed and Plug Replaced if required — Confirm ____ Verify ____

   d. Inspection Plate Secured if required — Confirm ____ Verify ____

7. Authorization to commence dewatering.

   _____ Radwaste Supervisor _____ Date _____ Time

8. Attach the complete specific operating procedure check off sheet for the specific dewatering container being used. (QC verification is performed in accordance with the procedure.) _____ By

9. Container Volume Usage

   100 x (Solidified Waste Vol. ____ft^3 ÷ Available Waste Vol. ____ft^3) = ____%

10. Supervisory review and Health Physics notification.

    Liner #_____ meets the following criteria:

    a. TYPE: A, B, C (circle one)

    b. Classification: STABLE UNSTABLE (circle one)

    c. >85% Container Volume Utilized: YES/NO (circle one) (applicable to steel liners only)

    _____ Radwaste Supervisor _____ Date _____ Time

Part IV Dewatering Operations Documentation

NOTE: Processing vendor personnel shall complete all confirm and verify signoffs.

a. Step 1 - Record Liner Serial Number.

b. Step 2 - Confirm liner serial number is stenciled on container.

c. Step 3 - Confirm and verify that container is positioned so radiation exposure spills would be contained.

d. Step 4 - Confirm and verify pre-transfer requirements are completed.

e. Step 5 - Radwaste Supervisor signs step indicating authorization to commence transfer.

f. Step 6 - Confirm and verify Post-transfer requirements have been performed.

g. Step 7 - Radwaste Supervisor signs step indicating authorization to commence dewatering.

h. Step 8 - Confirm any procedure checklist and data forms used are attached.

i. Step 9 - Calculate the Container Volume Usage. If usage is less than 85% the burial sites shall be notified.

j. Step 10 - Radwaste Supervisor will indicate the expected type of waste classification based on isotopic analysis, the waste classification process used and if 85% or greater of the liner volume was utilized. He then signs the step indicating the release of the container to the Health Physics Group.

DEWATERED RECORD SHEET

Part V: Dewatered Container Data

1. Liner Identification No. _____

2. Container Radiation Levels

   a. Top _____ mr/hr

      Bottom _____ mr/hr

      4 Quadrants 1 _____ mr/hr
      2 _____ mr/hr
      3 _____ mr/hr
      4 _____ mr/hr

   b. Smearable Activity _____ dpm/100cm²

   c. Container washdown/decon performed _____
      Yes/No

   d. Smearable activity after washdown/decon
      _____ dpm/100cm²
      (attach radiological survey form)

   e. Liner ready for transfer to storage or shipment

      _____ _____ _____
      HP Technician Date Time

3. Liner capped or sealed _____/_____/_____
   Date Time By

4. Shipment # _____

5. Destination _____

   _____ _____ _____
   HP Foreman-Radwaste Date Time

   _____ _____ _____
   Quality Control Review Date Time

6. REMARKS:

Part V: Dewatered Container Data Instructions

a. Step 1 - Enter the PP&L liner identification number.

b. Step 2 - Complete the radiological data and attach the survey form to Dewatering Record Sheet. If washdown is not required enter "NR".

c. Step 3 - Enter date and time container is capped or sealed.

d. Step 4 - Enter the transportation shipment number.

e. Step 5 - Enter the destination (i.e. burial site, LLRWHF, etc.) of the liner. Health Physics and QC shall review and sign that the procedure has been properly verified.

f. Step 6 - Enter any comments of remarks that may be related to the filled container.

SUSQUEHANNA GUARANTEED WASTE VOLUME RECORD

1. Date _____ Liner number _____

2. Waste Type _____

3. Liner Type _____

4. Burial Volume _____

5. Waste Volume _____inches in container

6. Useable Liner Volume _____ft^3

7. Guaranteed Minimum Waste Volume _____ft^3

8. Waste Volume Attained
   _____inches x _____ft^3/inch = _____ft^3

9. Waste Volume Container Usage

   100 x (Waste Vol. ____ft^3 ÷ Guaranteed Min. Waste Vol.____ft^3) = ____%

10. Remarks:

11. Signature _____
    Solidification Vendor Representative

12. Signature _____
    Radwaste Supervisor

INSTRUCTIONS
SUSQUEHANNA GUARANTEED WASTE VOLUME RECORD

a. Step 1 - Enter the date and PP&L Liner Identification number.

b. Step 2 - Enter the type of waste processed.
(i.e., Waste Mix tank, Phase Separator, etc..)

c. Step 3 - Enter liner type used.

d. Step 4 - Enter burial volume associated with this liner.

e. Step 5 - Enter the Q.C. verified waste volume from
FORM AD-QA-311-1 or 2.

f. Step 6 - Enter usable liner volume for liner specified in Step 3.

g. Step 7 - Enter Guaranteed Minimum Waste Volume in inches
(measured from top of liner) and cubic feet.

h. Step 8 - Enter waste volume attained in inches (measured from bottom
of liner) and calculate cubic feet.

i. Step 9 - Calculate the waste volume container usage

j. Step 10 - Remarks - this section is used to explain all
waste shortages or waivers to guarantee.

k. Step 11 - The solidification vendor representative signs indicating
all the information contained on this document
is correct.

l. Step 12 - The Radwaste Supervisor signs indicating agreement with
the information contained on this documents.

HIGH INTEGRITY CONTAINER U.V. EXPOSURE TRACKING RECORD SHEET

1. Container serial number _____
2. Date of receipt _____
3. Date of manufacture _____
4. Hours of U.V. exposure at time of receipt _____
5. Receipt inspection complete (Date) _____
6. Material tag (Green) attached _____ By
7. Hours of U.V. exposure since receipt _____
8. Date of issuance to plant _____
9. Received by _____
10. Date of receipt _____
11. Date of filling (within 2 yrs of Mfg. Date) _____
12. Date of shipment (within 5 yrs of Mfg. Date) _____
13. Hours of U.V. exposure since delivery to plant _____
14. Total hours of U.V. exposure

_____ + _____ + _____ = _____

Item 4 Item 7 Item 13

_____ _____
Radwaste Supervisor Date

INSTRUCTIONS
HIGH INTEGRITY CONTAINER U.V. EXPOSURE TRACKING RECORD SHEET

a. Step 1 - Enter container vendor serial number from Certificate of Compliance or Receipt Inspection Report.

b. Step 2 - Enter date of receipt.

c. Step 3 - Enter date of manufacture.

d. Step 4 - Enter hours of ultra violet light exposure from C of C.

e. Step 5 - Enter date NQA completes receipt inspection.

f. Step 6 - Check to ensure material tag is attached.

g. Step 7 - Enter hours of ultra violet (sunlight) light exposure the container received since receipt prior to delivery to plant.

h. Step 8 - Enter date of issuance to the plant.

i. Step 9 - Person in plant receiving container signs for receipt of container at plant.

j. Step 10 - Enter date of receipt at plant.

k. Step 11 - Enter date container is filled with waste. Must be within 2 years of manufacture date.

l. Step 12 - Enter date container is shipped for burial. Must be within 5 years of date of manufacture.

m. Step 13 - Enter hours of ultra violet exposure since delivery to plant.

n. Step 14 - Enter total hours of ultra violet exposure. Add items Step 4, Step 7 and Step 13.

o. Person completing form signs, dates and attaches this form to the dewatering record sheet if applicable.

SECTION 6

REPORTS OF EXCEPTION TO THE SSES EFFLUENT MONITORING PROGRAM

There were no instances during the report period in which airborne or waterborne effluent monitoring instrumentation was declared inoperable and was not restored to operability within the time period specified in Technical Specification Table 3.3.7.10-1 or 3.3.7.11-1 Action Statements.