SUSQUEHANNA STEAM ELECTRIC STATION
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
REPORT PERIOD: 07/01/84 - 12/31/84

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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 the station discharge with the main flow of the river. Figure 3 presents monthly average flow rates for the Susquehanna River at the SSES Biological Laboratory.

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, 1984 to December 31, 1984. This report also includes meteorological data and dispersion estimates for the calendar year 1984, and assessments of the doses to members of the public both within the site boundary and in unrestricted areas. In addition, this report serves as a medium for notifying the US Nuclear Regulatory Commission staff of changes to PP&L's Off-Site 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 Susquehanna. 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 waste from SSES during 1984.

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 1984. Availability statistics for the SSES meteorological data are shown in Table 12. Meteorological data for the calendar year 1984 is presented in the form of joint wind frequency distributions by atmospheric stability class. These distributions are presented as Table 13. Figures 5 and 6 are wind rose plots for the SSES primary meteorological tower 10 m and 60 m sensors, respectively. Figure 7 presents the relative prevalences of the Pasquill stability classes for 1984. 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. These 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 Off-Site Dose Calculation Manual and the Solid Waste Process Control Program. The July 9, 1984 revised pages of the ODCM are presented with changes noted. A revised copy of the administrative procedure which describes the Process Control Program is included along with a statement of the purpose and nature of the changes.

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.

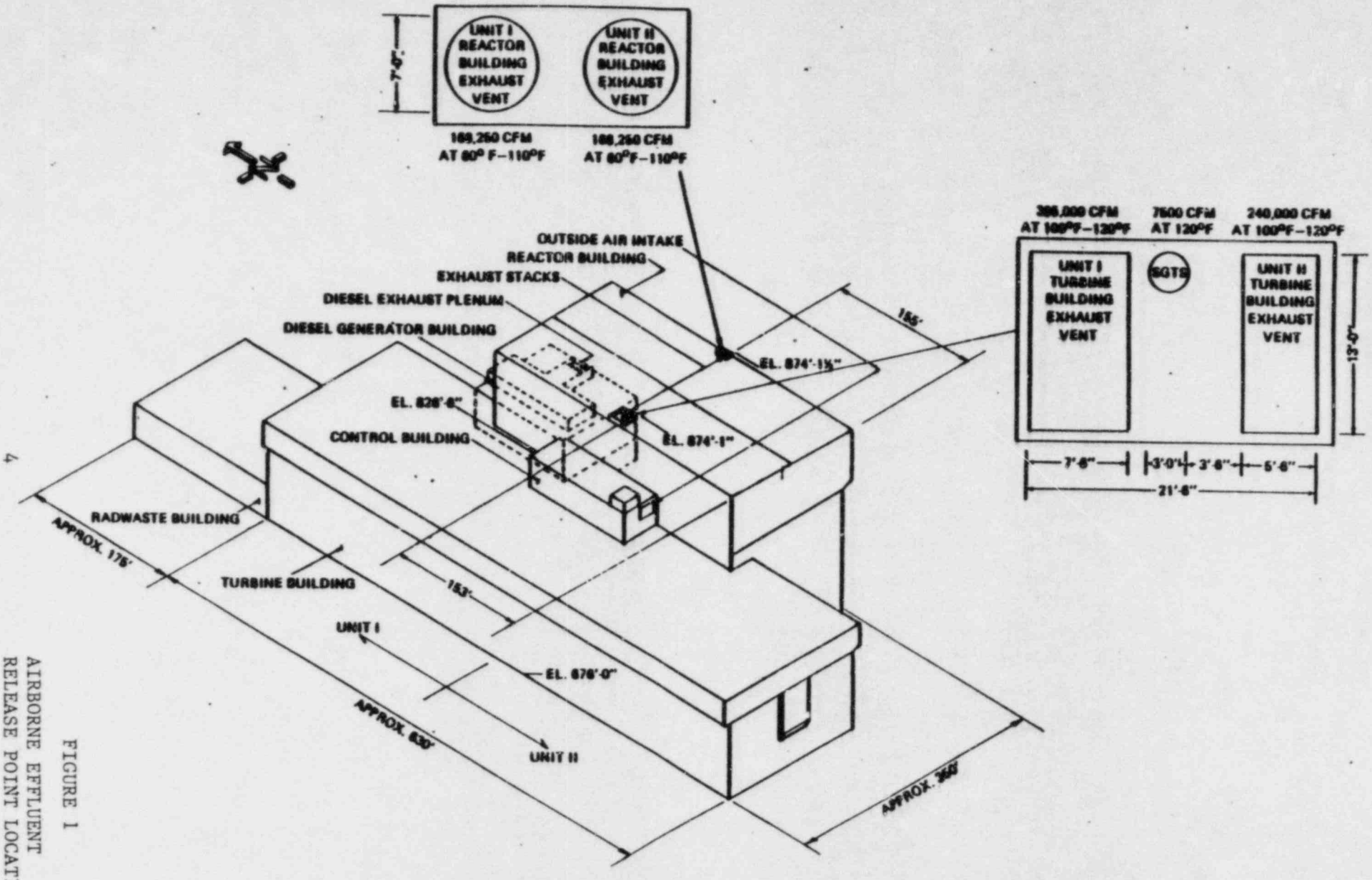


FIGURE 1

AIRBORNE EFFLUENT
RELEASE POINT LOCATIONS

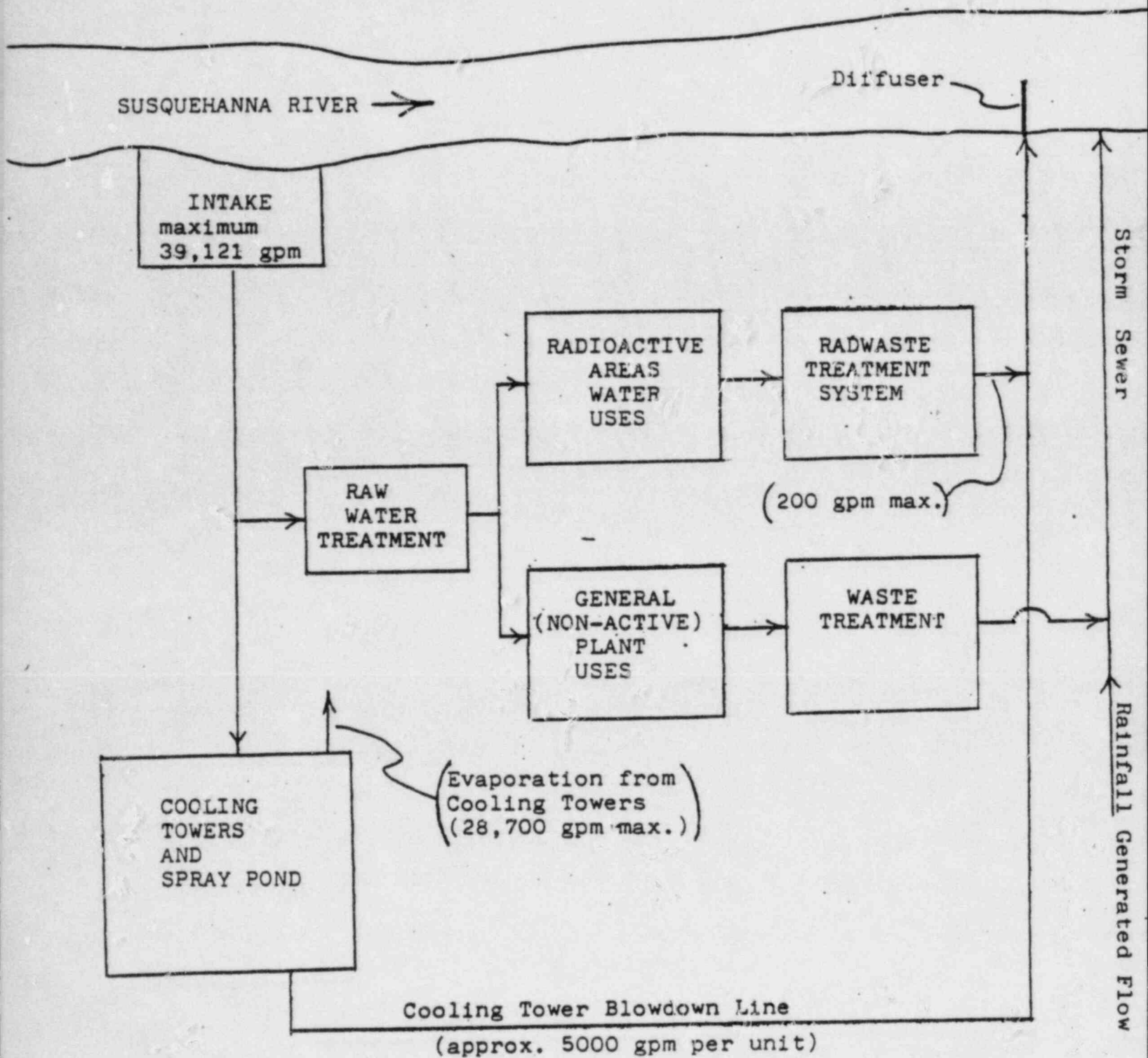


FIGURE 2
WATERBORNE EFFLUENT PATHWAY

TABLE 1
SEMIANNUAL EFFLUENT & WASTE DISPOSAL REPORT- 1984
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).

   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.

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 rooftop vent(s).

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).

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 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:	150
2. Total Time Period for Batch Releases:	3.46E+4 minutes
3. Maximum Time Period for a Batch Release:	305 minutes
4. Average Time Period for a Batch Release:	193 minutes
5. Minimum Time Period for a Batch Release:	20 minutes
6. Average Stream Flow During Period of Release of Effluent into a Flowing Stream:	>5000 gpm (cooling tower blowdown)
	3.47E+6 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- 1984
AIRBORNE EFFLUENTS- SUMMATION OF ALL RELEASES

Nuclide Category	Unit	Third Quarter		Fourth Quarter	
A. Fission and Activation Gases					
1. Total Release[1]	Ci	≥4.78E+01	<8.66E+02	≥8.56E+00	<8.40E+02
2. Average Release Rate for Period	uCi/sec	≥6.01E+00	<1.09E+02	≥1.08E+00	<1.06E+02
3. Percent of Applicable Limit[2]	%	≥4.24E-02	<7.69E-01	≥7.59E-03	<7.45E-01
B. Iodine-131					
1. Total Release	Ci	≥8.94E-03	<9.26E-03		<5.00E-04
2. Average Release Rate for Period	uCi/sec	≥1.12E-03	<1.16E-03		<6.29E-05
3. Percent of Applicable limit[2]	%	≥4.77E-02	<4.96E-02		<2.68E-03
C. Particulates					
1. Particulates with Half-lives >8 Days Released	Ci	≥1.62E-05	<2.10E-03	≥2.24E-03*	<4.67E-03*
2. Average Release Rate for Period	uCi/sec	≥2.04E=06	<2.64E-04	≥2.82E-04*	<5.88E-04*
3. Percent of Applicable Limit[2]	%	≥1.59E-05	<2.05E-03	≥2.19E-03	<4.57E-03
4. Gross Alpha Activity Released	Ci		<1.26E-06		<1.07E-06*
D. Tritium					
1. Total Release	Ci	≥6.46E+00	<1.39E+01	≥1.72E+01	<6.41E+01
2. Average Release Rate for Period	uCi/sec	≥8.13E-01	<2.16E+00	≥2.16E+00	<8.06E+00
3. Percent of Applicable Limit[3]	%	≥1.67E-02	<4.43E-02	≥4.43E-02	<1.65E-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.
[2]Based on release rate limit derived from dose rate Technical Specification.
[3]Based on release rate corresponding to ^{3}H Maximum Permissible Concentration in unrestricted areas (Relative concentration 4.1E-5 sec/m^3 assumed).
*Strontium and gross alpha values are estimated based on third quarter 1984 sample analyses and fourth quarter ventilation exhaust rates.

TABLE 3
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT- 1984
AIRBORNE EFFLUENTS (Curies)[1]

Nuclide	Third Quarter		Fourth Quarter	
A. Gases				
^{85}Kr m	1.04E+01		2.60E+00	
^{87}Kr		< 6.44E+01		<7.52E+01
^{88}Kr	≥1.23E+01	< 6.49E+01	≥3.08E+00	<6.80E+01
^{133}Xe m		< 2.16E+02		<2.52E+02
^{133}Xe	≥2.51E+01	< 1.10E+02	≥2.88E+00	<9.18E+01
^{135}Xe m		< 1.50E+02		<1.25E+02
^{135}Xe		< 2.34E+01		<2.58E+01
^{138}Xe		< 2.27E+02		<2.00E+02
Total	≥4.78E+01	< 8.66E+02	≥8.56E+00	<8.40E+02
B. Iodines				
^{131}I	≥8.94E-03	< 9.26E-03		<5.00E-04
^{133}I	7.23E-03		1.11E-04	
C. Particulates with Half-lives > 8 d				
^{51}Cr			≥2.21E-03	<2.26E-03
^{54}Mn	≥9.00E-06	< 2.14E-04		<2.20E-04
^{59}Fe		< 2.96E-04		<3.26E-04
^{58}Co		< 1.51E-04	≥2.71E-05	<1.86E-04
^{60}Co		< 2.34E-04		<2.53E-04
^{65}Zn		< 3.21E-04		<3.69E-04
^{89}Sr	≥7.20E-06	< 8.00E-06	≥5.79E-06*	<6.56E-06*
^{90}Sr	≥1.41E-08	< 7.39E-07	≥1.34E-08*	<6.23E-07*
^{134}Cs		< 1.22E-04		<1.43E-04
^{137}Cs		< 1.34E-04		<1.56E-04
^{141}Ce		< 1.21E-04		<1.62E-04
^{144}Ce		< 4.99E-04		<5.86E-04
Total	≥1.625E-05	< 2.10E-03	≥2.24E-03	<4.67E-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.

*Estimated based on third quarter 1984 sample analyses and fourth quarter 1984 ventilation exhaust rates.

TABLE 4
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT- 1984
WATERBORNE EFFLUENTS- SUMMATION OF ALL RELEASES

Nuclide Category	Unit	Third Quarter		Fourth Quarter	
A. Fission & Activation Products					
1. Total Release[1]	Ci	≥7.34E-02	<1.01E-01	≥1.74E-02	<2.46E-02
2. Average Diluted Concentration	uCi/ml	≥1.40E-07	<1.93E-07	≥1.21E-07	<1.72E-07
3. Percent of Applicable Limit[2]	%	≥5.20E-03	<1.37E-01	≥2.27E-03	<4.16E-02
B. Tritium					
1. Total Release	Ci	3.91E+00		1.33E+00*	
2. Average Diluted Concentration	uCi/ml	7.48E-06		9.28E-06	
3. Percent of Applicable limit[3]	%	2.49E-01		3.09E-01	
C. Dissolved and Entrained Gases					
1. Total Release	Ci	≥5.03E-03	<2.17E-01	≥8.72E-04	<6.58E-02
2. Average Diluted Concentration	uCi/ml	≥9.62E-09	<4.15E-07	≥6.08E-09	<4.59E-07
3. Percent of Applicable Limit[4]	%	≥2.41E-02	<1.04E+00	≥1.52E-02	<1.15E+00
D. Gross Alpha Radioactivity Released	Ci		<2.20E-04**		<5.78E-05**
E. Volume of Waste Released	gal.	2.33E+06		6.11E+05	
	liters	8.81E+06		2.31E+06	
F. Volume of Dilution Water Used	gal.	>1.36E+08		>3.72E+07	
	liters	>5.15E+08		>1.41E+08	

[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.
[4]Based on the most restrictive Maximum Permissible Concentration for a noble gas (^{87}Kr) from SSES Tech Spec Table 3.11.1.1-1.
*December tritium based on November sample due to loss of December sample.
**Based on sample analyses from August and September 1985 and release volumes from the applicable time period due to inavailability of July and 4th quarter gross alpha results at time of report preparation.

TABLE 5
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT- 1984
WATERBORNE EFFLUENTS (Curies)[1]

Nuclide	Third Quarter		Fourth Quarter	
A. Tritium	3.91E+00		1.33E+00*	
B. Fission and Activation Products				
^{24}Na	6.08E-02		1.25E-03	
^{51}Cr	9.21E-03		1.09E-02	
^{54}Mn	≥1.57E-03	< 2.22E-03	≥1.49E-03	<1.64E-03
^{55}Fe		< 7.06E-03		<1.85E-03**
^{59}Fe		< 2.50E-03	≥5.80E-04	<8.58E-04
^{58}Co	≥1.42E-03	< 1.90E-03	≥1.53E-03	<1.60E-03
^{60}Co	≥1.88E-04	< 1.73E-03	≥1.17E-03	<1.32E-03
^{65}Zn		< 2.80E-03		<5.66E-04
^{89}Sr		< 3.53E-04		<9.24E-05**
^{90}Sr		< 5.29E-05		<1.39E-05**
^{92}Sr			1.28E-04	
^{97}Nb	5.69E-05			
^{99}Mo		< 4.28E-03		<1.64E-03
^{110}Ag m	8.61E-05		≥3.37E-04	<3.37E-04
^{110}Ag	6.32E-05			
^{131}I	≥3.16E-06	< 7.23E-04	≥1.45E-05	<2.00E-04
^{134}Cs		< 8.59E-04		<2.49E-04
^{136}Cs			3.31E-05	
^{137}Cs		< 1.06E-03		<3.50E-04
^{141}Ce		< 9.90E-04		<2.80E-04
^{144}Ce		< 4.67E-03		<1.27E-03
Total	≥7.34E-02	< 1.01E-01	≥1.74E-02	<2.46E-02
C. Dissolved and Entrained Gases				
^{41}Ar		< 1.17E-03		<3.12E-04
^{85}Kr m		< 6.57E-04		<1.88E-04
^{85}Kr		< 1.98E-01		<6.12E-02
^{87}Kr		< 1.34E-03		<3.84E-04
^{88}Kr		< 1.44E-03		<4.12E-04
^{133}Xe m		< 5.33E-03		<1.42E-03
^{133}Xe	≥3.31E-03	< 4.97E-03	≥3.76E-04	<7.44E-04
^{135}Xe m		< 1.66E-03		<4.66E-04
^{135}Xe	≥1.72E-03	< 2.27E-03	≥4.96E-04	<6.41E-04
Total	≥5.03E-03	< 2.17E-01	≥8.72E-04	<6.58E-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.

*December tritium based on November sample due to loss of December sample.

**Based on third quarter 1984 sample analyses and fourth quarter discharge volumes.

FIGURE 3

Susquehanna River
Monthly Average Flow Rates
Data Period: 1984

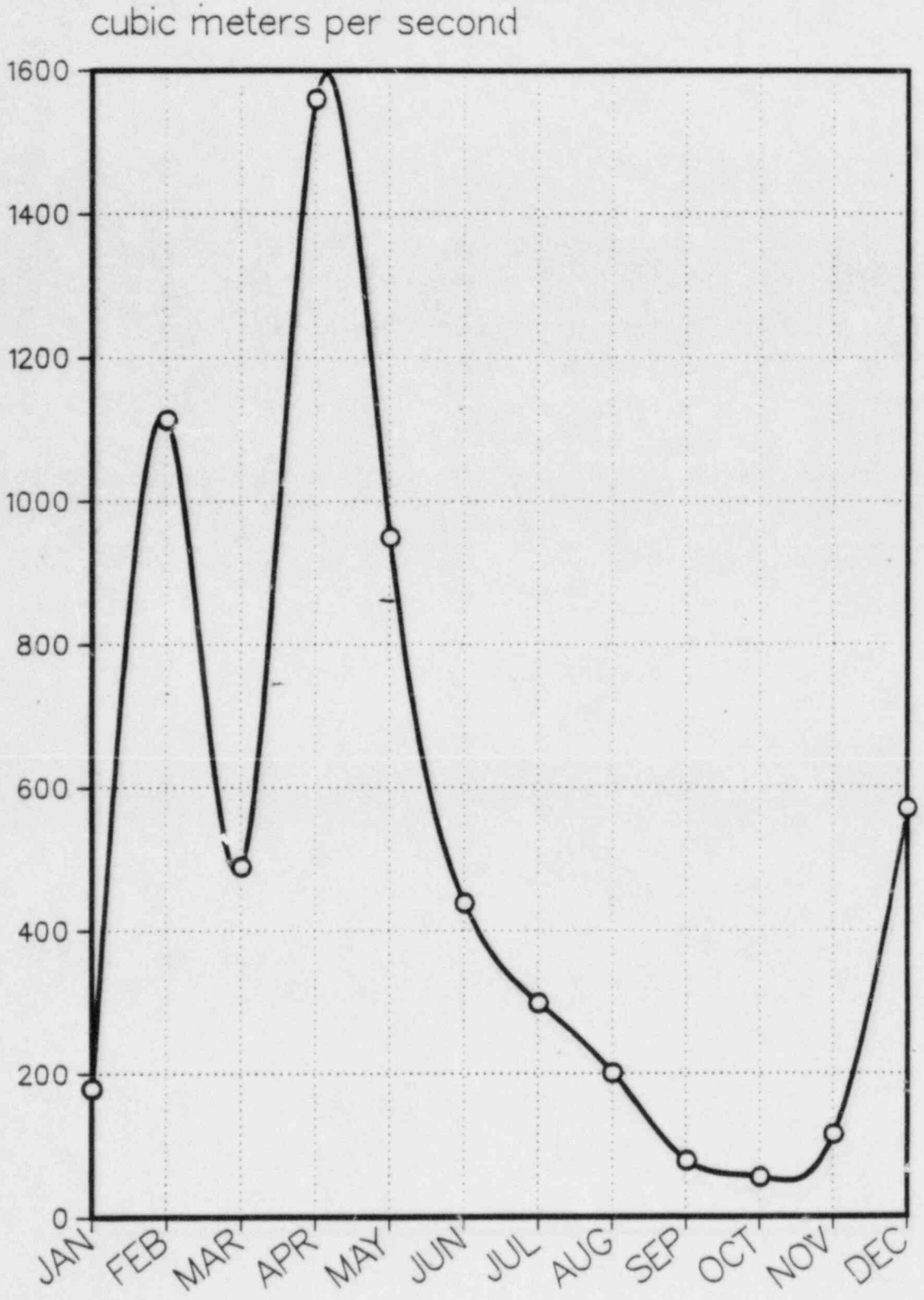


FIGURE 4

Susquehanna Steam Electric Station
MONTHLY LIQUID RADWASTE DISCHARGE TOTALS
Data Period: 1984

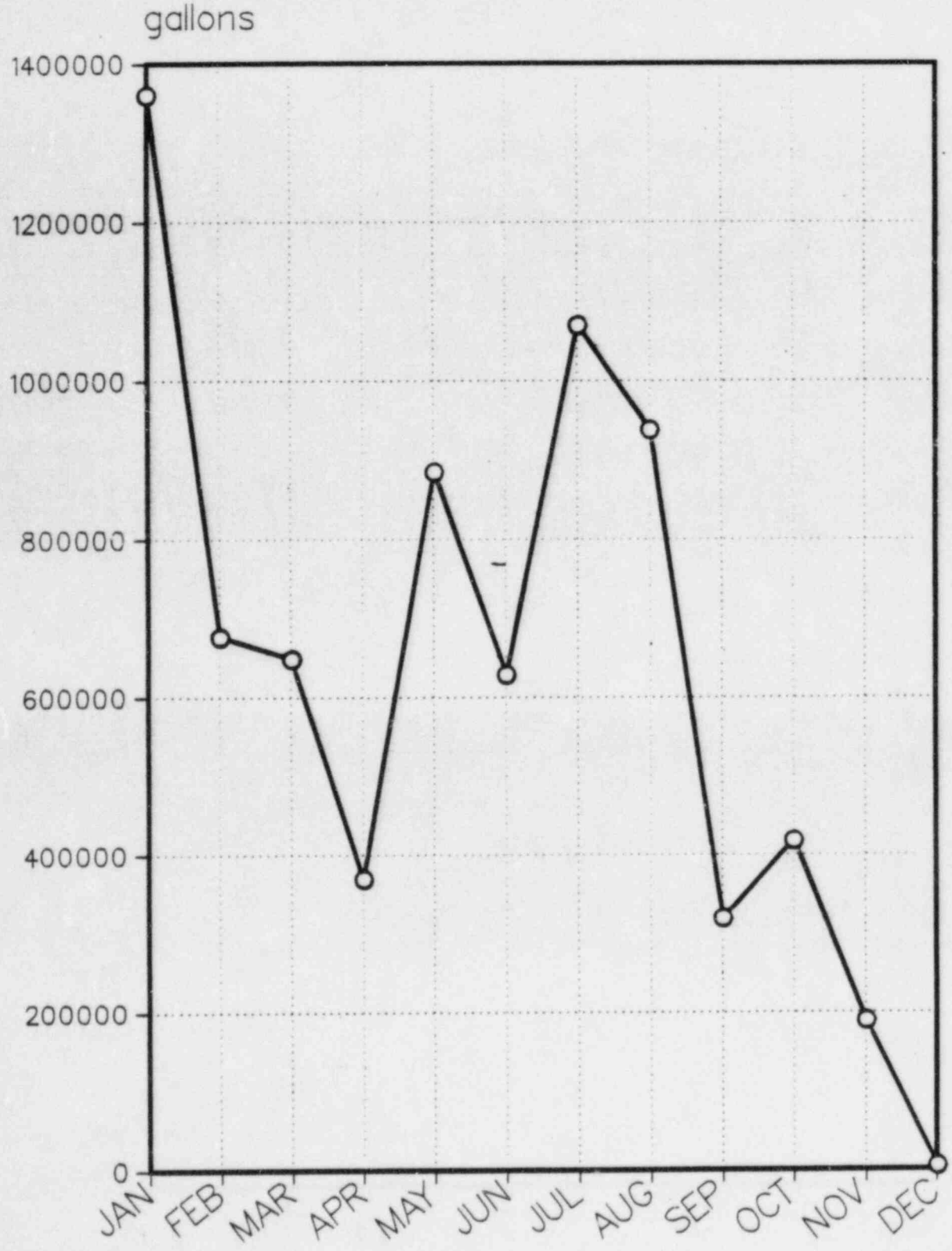


TABLE 6

SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
Data Period: July 1, 1984 - December 31, 1984

A. SOLID WASTE SHIPPED OFF SITE FOR BURIAL OR DISPOSAL

Number of Shipments	Mode of Transportation	Destination
43	Truck	Barnwell, SC
12	Truck	Richland, WA

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 RADIACTIVE WASTE- CLASS A*

Data Period: July 1, 1984 - December 31, 1984

Source of Waste and Processing Employed (Waste Stream)	Condensate Demineralizer (Bead Resin)	Reactor Water Clean-up/Fuel Pool Clean-up (Powdex)	Reactor Water Clean-up/Fuel Pool Clean-up (Powdex)	Liq. Radwaste Filters (Filter Media, Sludge, DE)
Container Volume (ft^3)	3570	680	170	5950
Total Activity Content (Ci)	5.42	383.1	99.1	269.6
Above Determined By: a) measurement b) estimation c) measurement and correlation factors	C	C	C	C
Principle Radionuclides (Identity and Percent Composition)	CR-51 36% MN-54 15% CO-60 14% CO-58 12% FE-55 12% H-3 4% C-14 4% FE-59 3%	FE-55 26% MN-54 21% CO-60 20% CR-51 18% CO-58 9% ZN-65 3% AG-110m 3%	CR-51 46% CO-60 17% MN-54 15% CO-58 12% ZN-65 5% AG-110m 3% FE-59 2%	FE-55 39% CR-51 33% MN-54 9% CO-60 8% CO-58 6% FE-59 5%
Above Determined by: a) measurement b) estimation c) measurement and correlation factors	C	C	C	C
Type of Container	Carbon Steel Liners	Carbon Steel Liners	High Integrity Container	Carbon Steel Liners
Solidification Agent or Absorbent	Portland Cement	Portland Cement	Dewatered	Portland Cement

* As defined in 10CFR Part 61.

TABLE 7
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
SOLID RADIACTIVE WASTE- CLASS A*
Data Period: July 1, 1984 - December 31, 1984

Source of Waste and Processing Employed (Waste Stream)	Condensate Demineralizer Regeneration (Evaporator Concentrates)	Plant Equipment (Oil and Evaporator Concentrates)	Non-Compactable Trash	Compacted Trash
Container Volume (ft^3)	1020	2040	1280	3390
Total Activity Content (Ci)	0.18	0.97	0.90	6.78
Above Determined By: a) measurement b) estimation c) measurement and correlation factors	C	C	B	B
Principle Radionuclides (Identity and Percent Composition)	FE-55 57% H-3 25% CO-60 7% MN-54 5% CO-58 3% CR-51 3%	FE-55 47% CO-60 15% MN-54 14% H-3 10% NI-63 9% CR-51 5%	FE-55 54% MN-54 17% CO-60 15% FE-59 7% CO-58 7%	FE-55 55% MN-54 17% CO-60 15% FE-59 8% CO-58 5%
Above Determined by: a) measurement b) estimation c) measurement and correlation factors	C	C	B	B
Type of Container	Carbon Steel Liners	Carbon Steel Liners	128 ft^3 Metal Boxes	55-gallon 17H Drums
Solidification Agent or Absorbent	Portland Cement	Portland Cement	Not Applicable	Not Applicable

* As defined in 10CFR Part 61.

TABLE 7
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
SOLID RADIACTIVE WASTE- CLASS A*
Data Period: July 1, 1984 - December 31, 1984

Source of Waste and Processing Employed (Waste Stream)	Oily Waste			
Container Volume (ft^3)	1882.5			
Total Activity Content (Ci)	0.77			
Above Determined By: a) measurement b) estimation c) measurement and correlation factors	B			
Principle Radionuclides (Identity and Percent Composition)	FE-55 33% H-3 22% CR-51 13% MN-54 12% CO-60 10% CO-58 5% FE-59 5%			
Above Determined by: a) measurement b) estimation c) measurement and correlation factors	B			
Type of Container	55-gallon 17H Drums			
Solidification Agent or Absorbent	Oil-Dri			

* As defined in 10CFR Part 61.

TABLE 8

SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT

SOLID RADIACTIVE WASTE - CLASS B*

Data Period: July 1, 1984 - December 31, 1984

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 RADIACTIVE WASTE- CLASS C*

Data Period: July 1, 1984 - December 31, 1984

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, 1984 - December 31, 1984

Measurement	Estimated Total Error
1. Airborne Effluents	
a. Fission and Activiation Gases	9.5 %
b. Iodines	13 %
c. Particulates	13 %
d. Tritium	11.4 %
2. Waterborne Effluents	
a. Fission and Activation Products	7.5 %
b. Tritium	9.3 %
c. Dissolved and Entrained Gases	8.0 %
3. Solid Wastes	
a. Condensate Demineralizers	26 %
b. Reactor Water Clean-up and Fuel Pool Clean-up (Powdex, solidified)	26 %
c. Reactor Water Clean-up and Fuel Pool Clean-up (Powdex, dewatered)	26 %
d. Liquid Radwaste Filters	26 %
e. Condensate Demineralizer Regeneration	26 %
f. Solidified Oil	26 %
g. Non-Compactable Trash	30 %
h. Compacted Trash	30 %
i. Absorbed Oily Waste	30 %

TABLE 11
SEMIANNUAL EFFLUENT AND WASTE DISPOSAL REPORT- 1984
EFFLUENT DATA NOT AVAILABLE FOR PREVIOUS SEMIANNUAL REPORT

Nuclide Category	Unit	Second Quarter 1984	
A. Airborne Effluents			
1. ^{89}Sr	Ci	≥3.33E-06	<4.31E-06
2. ^{90}Sr	Ci		<6.98E-07
3. Gross Alpha Radioactivity	Ci	≥2.40E-07	<8.78E-07
B. Liquid Effluents			
1. ^{89}Sr	Ci		<1.47E-04
2. ^{90}Sr	Ci		<7.34E-05
3. ^{55}Fe	Ci		<5.87E-03
4. Gross Alpha Radioactivity	Ci		<2.55E-04

SECTION 3

METEOROLOGY 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: 1984

Parameter	Percent of Valid Hours During Period
1. Wind Speed	
a. All Sensors Combined	99.83 %
b. 10-meter Sensors	99.83 %
c. 60-meter Sensor	87.47 %
2. Wind Direction	
a. All Sensors Combined	99.75 %
b. 10-meter Sensors	99.69 %
c. 60-meter Sensor	78.16 %
3. Indicator of Atmospheric Stability	
a. Temperature Differential or Sigma Theta	99.83 %
b. Delta Temperature	97.89 %
c. Sigma Theta	97.84 %

SUSQUEHANNA
STEAM ELECTRIC STATION
WIND ROSE
DATA PERIOD: 01/01/84 – 12/31/84
TOWER: ON-SITE (P)
ELEVATION: 10M

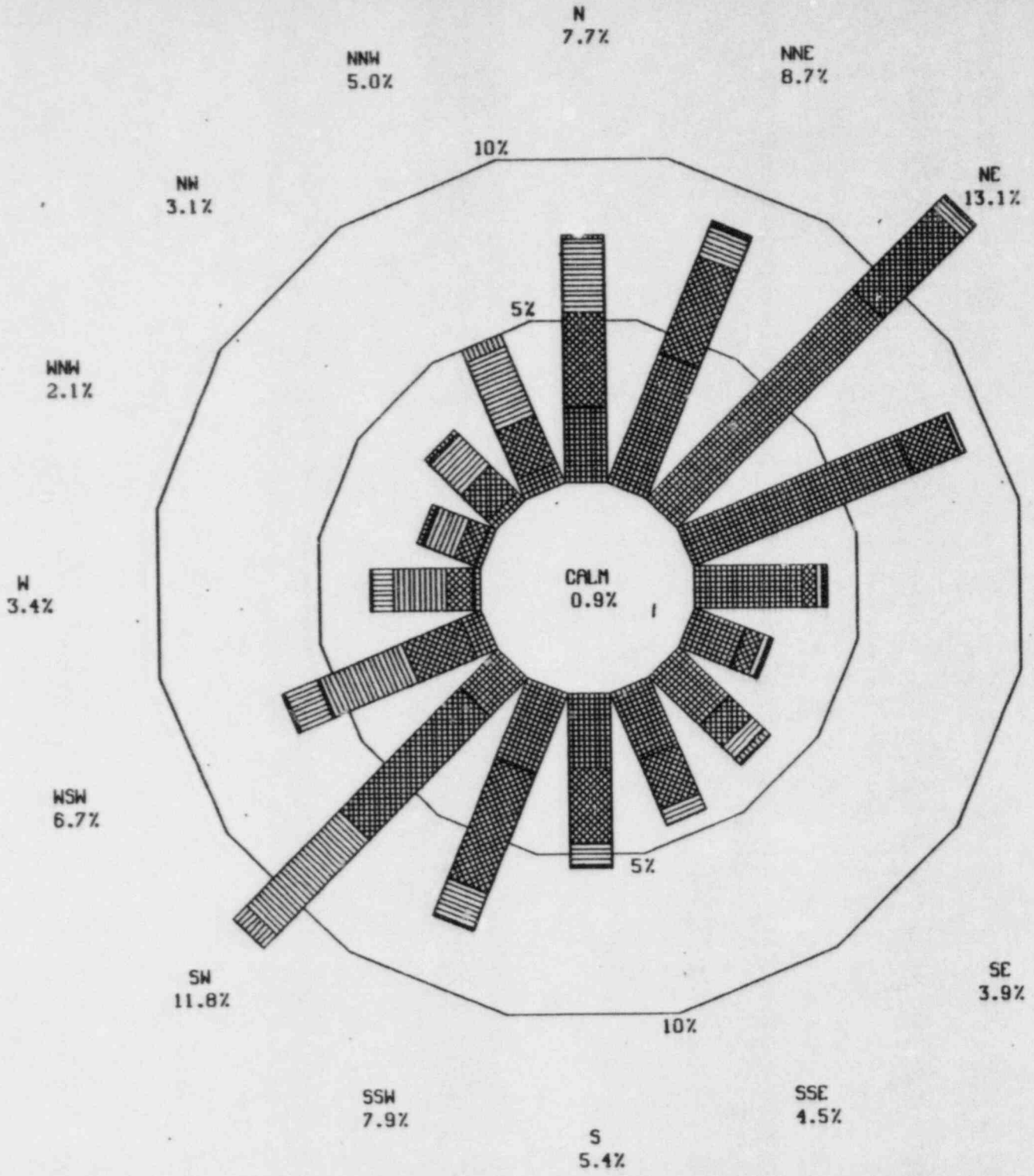


FIGURE 5

PP&L

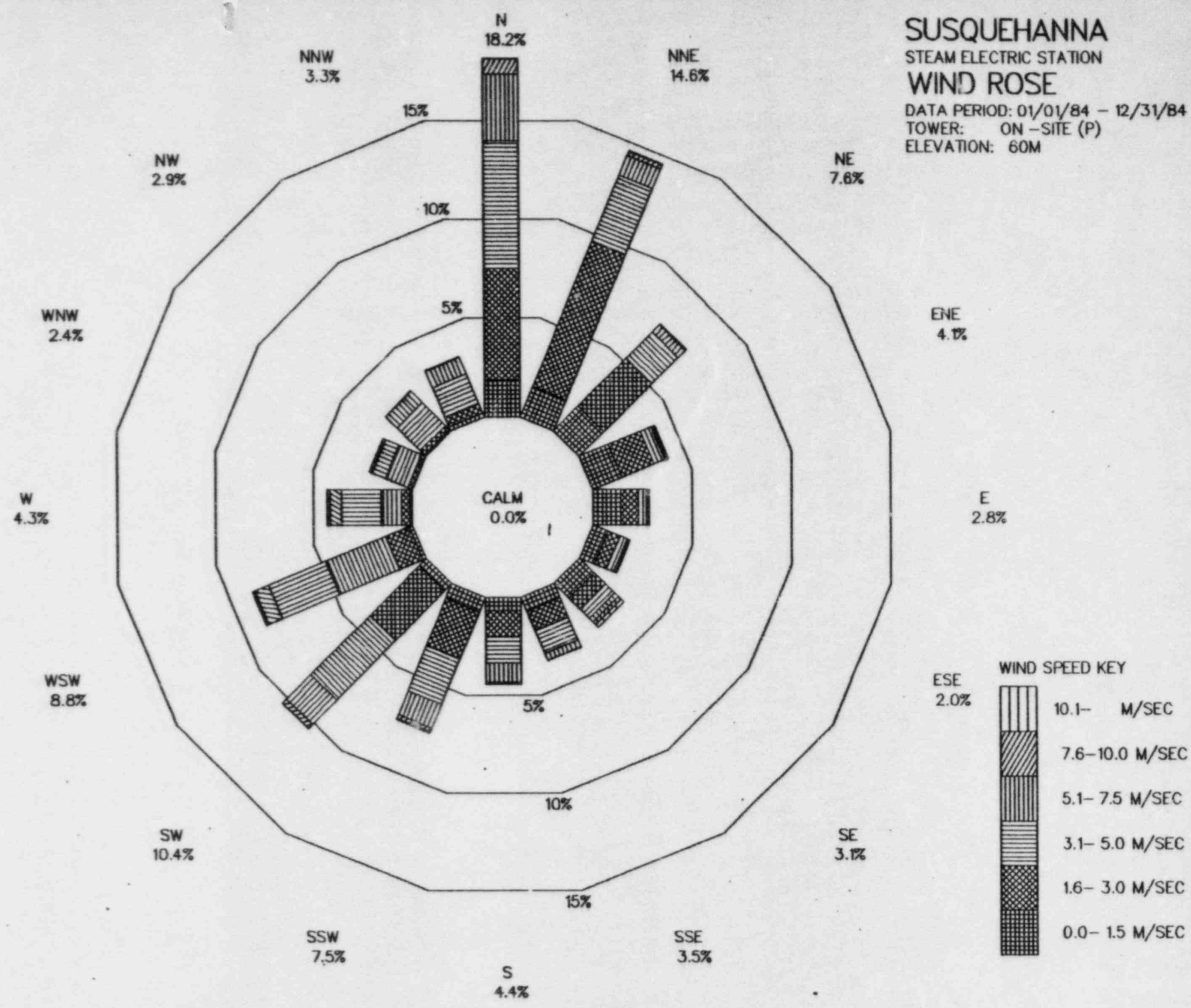

SUSQUEHANNA
STEAM ELECTRIC STATION
WIND ROSE
DATA PERIOD: 01/01/84 – 12/31/84
TOWER: ON –SITE (P)
ELEVATION: 60M
N
18.2%
NNE
14.6%
NE
7.6%
ENE
4.1%
E
2.8%
ESE
2.0%
SE
3.1%
SSE
3.5%
S
4.4%
SSW
7.5%
SW
10.4%
WSW
8.8%
W
4.3%
WNW
2.4%
NW
2.9%
NNW
3.3%
15%
10%
5%
CALM
0.0%
5%
10%
15%
WIND SPEED KEY
10.1– 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

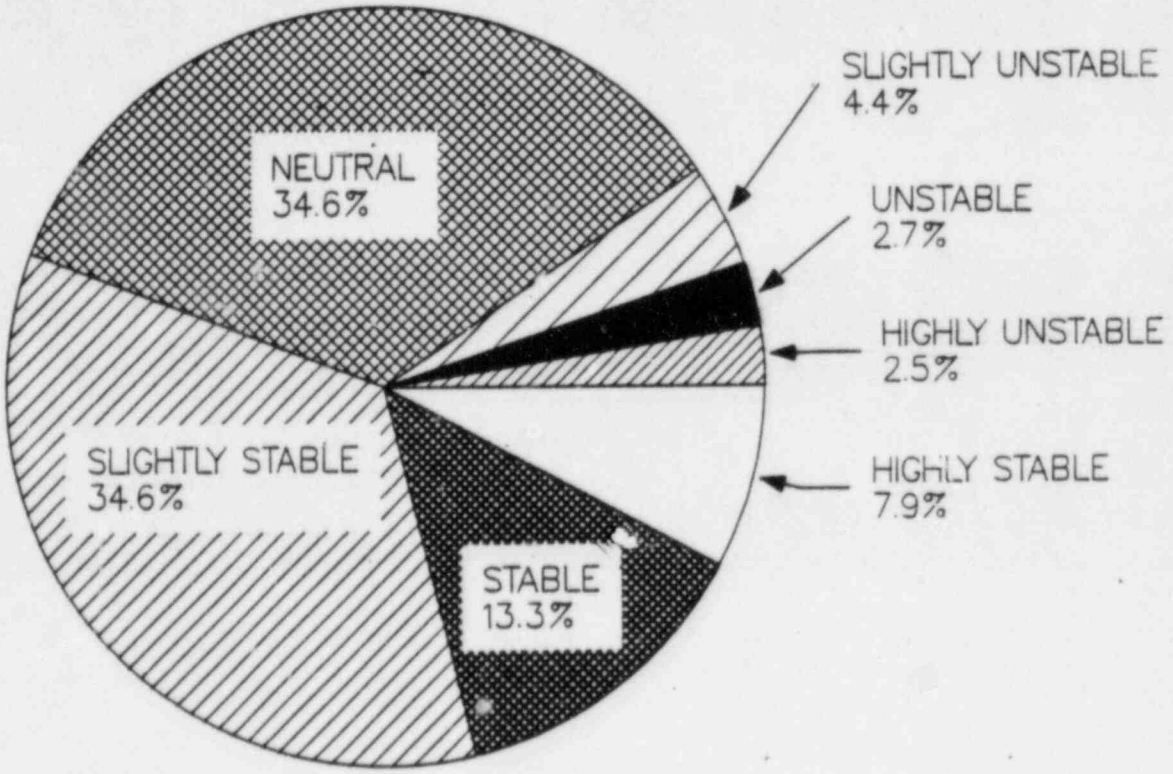
FIGURE 7

Susquehanna Steam Electric Station Pasquill Stability Class Prevalences

Based on the 10-meter Joint Wind Frequency Distribution

By Stability Class

Data Period: 1984



JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	0	4	2	0	0	0	6	2.86
	0.00	2.21	1.10	0.00	0.00	0.00	3.31	
	0.00	0.06	0.03	0.00	0.00	0.00	0.08	
NE	0	4	0	0	0	0	4	2.22
	0.00	2.21	0.00	0.00	0.00	0.00	2.21	
	0.00	0.06	0.00	0.00	0.00	0.00	0.06	
ENE	1	0	0	0	0	0	1	1.33
	0.55	0.00	0.00	0.00	0.00	0.00	0.55	
	0.01	0.00	0.00	0.00	0.00	0.00	0.01	
E	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	
ESE	0	1	0	0	0	0	1	2.88
	0.00	0.55	0.00	0.00	0.00	0.00	0.55	
	0.00	0.01	0.00	0.00	0.00	0.00	0.01	
SE	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	
SSE	0	4	8	0	0	0	12	3.36
	0.00	2.21	4.42	0.00	0.00	0.00	6.63	
	0.00	0.06	0.11	0.00	0.00	0.00	0.17	
S	0	7	18	0	0	0	25	3.40
	0.00	3.87	9.94	0.00	0.00	0.00	13.81	
	0.00	0.10	0.25	0.00	0.00	0.00	0.35	
SSW	3	12	15	0	0	0	30	2.79
	1.66	6.63	8.29	0.00	0.00	0.00	16.57	
	0.04	0.17	0.21	0.00	0.00	0.00	0.42	
SW	0	6	51	9	0	0	66	4.08
	0.00	3.31	28.18	4.97	0.00	0.00	36.46	
	0.00	0.08	0.71	0.12	0.00	0.00	0.92	
WSW	0	2	7	6	2	0	17	5.18
	0.00	1.10	3.87	3.31	1.10	0.00	9.39	
	0.00	0.03	0.10	0.08	0.03	0.00	0.24	
W	0	2	8	0	0	0	10	3.62
	0.00	1.10	4.42	0.00	0.00	0.00	5.52	
	0.00	0.03	0.11	0.00	0.00	0.00	0.14	
WNW	0	0	2	0	0	0	2	3.67
	0.00	0.00	1.10	0.00	0.00	0.00	1.10	
	0.00	0.00	0.03	0.00	0.00	0.00	0.03	
NW	1	0	2	0	0	0	3	2.70
	0.55	0.00	1.10	0.00	0.00	0.00	1.66	
	0.01	0.00	0.03	0.00	0.00	0.00	0.04	
NNW	0	1	0	0	0	0	1	2.21
	0.00	0.55	0.00	0.00	0.00	0.00	0.55	
	0.00	0.01	0.00	0.00	0.00	0.00	0.01	
N	0	1	2	0	0	0	3	4.18
	0.00	0.55	1.10	0.00	0.00	0.00	1.66	
	0.00	0.01	0.03	0.00	0.00	0.00	0.04	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	5	44	115	15	2	0	181	3.66
	2.76	24.31	63.54	8.29	1.10	0.00	100.00	
	0.07	0.61	1.60	0.21	0.03	0.00	2.51	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	4	4	0	0	0	8	3.01
	0.00	2.04	2.04	0.00	0.00	0.00	4.08	
	0.00	0.06	0.06	0.00	0.00	0.00	0.11	
NE	0	7	2	0	0	0	9	2.74
	0.00	3.57	1.02	0.00	0.00	0.00	4.59	
	0.00	0.10	0.03	0.00	0.00	0.00	0.12	
ENE	0	2	0	0	0	0	2	2.30
	0.00	1.02	0.00	0.00	0.00	0.00	1.02	
	0.00	0.03	0.00	0.00	0.00	0.00	0.03	
E	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	
ESE	1	0	0	0	0	0	1	1.40
	0.51	0.00	0.00	0.00	0.00	0.00	0.51	
	0.01	0.00	0.00	0.00	0.00	0.00	0.01	
SE	1	2	1	0	0	0	4	2.58
	0.51	1.02	0.51	0.00	0.00	0.00	2.04	
	0.01	0.03	0.01	0.00	0.00	0.00	0.06	
SSE	0	0	3	0	0	0	3	3.30
	0.00	0.00	1.53	0.00	0.00	0.00	1.53	
	0.00	0.00	0.04	0.00	0.00	0.00	0.04	
S	1	9	6	0	0	0	16	2.80
	0.51	4.59	3.06	0.00	0.00	0.00	8.16	
	0.01	0.12	0.08	0.00	0.00	0.00	0.22	
SSW	1	24	10	0	0	0	35	2.74
	0.51	12.24	5.10	0.00	0.00	0.00	17.86	
	0.01	0.33	0.14	0.00	0.00	0.00	0.49	
SW	0	16	37	8	0	0	61	3.70
	0.00	8.16	18.88	4.08	0.00	0.00	31.12	
	0.00	0.22	0.51	0.11	0.00	0.00	0.85	
WSW	0	1	21	2	0	0	24	4.08
	0.00	0.51	10.71	1.02	0.00	0.00	12.24	
	0.00	0.01	0.29	0.03	0.00	0.00	0.33	
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	1	1	0	0	2	5.13
	0.00	0.00	0.51	0.51	0.00	0.00	1.02	
	0.00	0.00	0.01	0.01	0.00	0.00	0.03	
NW	0	1	2	3	0	0	6	4.78
	0.00	0.51	1.02	1.53	0.00	0.00	3.06	
	0.00	0.01	0.03	0.04	0.00	0.00	0.08	
NNW	0	2	3	1	0	0	6	3.96
	0.00	1.02	1.53	0.51	0.00	0.00	3.06	
	0.00	0.03	0.04	0.01	0.00	0.00	0.08	
N	0	2	14	3	0	0	19	4.16
	0.00	1.02	7.14	1.53	0.00	0.00	9.69	
	0.00	0.03	0.19	0.04	0.00	0.00	0.26	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	4	70	104	18	0	0	196	3.47
	2.04	35.71	53.06	9.18	0.00	0.00	100.00	
	0.06	0.97	1.44	0.25	0.00	0.00	2.72	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	10	8	0	0	0	18	3.05
	0.00	3.17	2.54	0.00	0.00	0.00	5.71	
	0.00	0.14	0.11	0.00	0.00	0.00	0.25	
NE	0	7	5	0	0	0	12	2.67
	0.00	2.22	1.59	0.00	0.00	0.00	3.81	
	0.00	0.10	0.07	0.00	0.00	0.00	0.17	
ENE	3	3	0	0	0	0	6	1.59
	0.95	0.95	0.00	0.00	0.00	0.00	1.90	
	0.04	0.04	0.00	0.00	0.00	0.00	0.08	
E	1	2	0	0	0	0	3	1.81
	0.32	0.63	0.00	0.00	0.00	0.00	0.95	
	0.01	0.03	0.00	0.00	0.00	0.00	0.04	
ESE	0	3	0	0	0	0	3	2.29
	0.00	0.95	0.00	0.00	0.00	0.00	0.95	
	0.00	0.04	0.00	0.00	0.00	0.00	0.04	
SE	1	4	2	0	0	0	7	2.57
	0.32	1.27	0.63	0.00	0.00	0.00	2.22	
	0.01	0.06	0.03	0.00	0.00	0.00	0.10	
SSE	2	6	3	0	0	0	11	2.74
	0.63	1.90	0.95	0.00	0.00	0.00	3.49	
	0.03	0.08	0.04	0.00	0.00	0.00	0.15	
S	0	14	4	0	0	0	18	2.62
	0.00	4.44	1.27	0.00	0.00	0.00	5.71	
	0.00	0.19	0.06	0.00	0.00	0.00	0.25	
SSW	1	32	6	0	0	0	39	2.51
	0.32	10.16	1.90	0.00	0.00	0.00	12.38	
	0.01	0.44	0.08	0.00	0.00	0.00	0.54	
SW	4	33	50	4	0	0	91	3.29
	1.27	10.48	15.87	1.27	0.00	0.00	28.89	
	0.06	0.46	0.69	0.06	0.00	0.00	1.26	
WSW	0	14	17	9	1	0	41	3.90
	0.00	4.44	5.40	2.86	0.32	0.00	13.02	
	0.00	0.19	0.24	0.12	0.01	0.00	0.57	
W	0	0	6	6	0	0	12	5.43
	0.00	0.00	1.90	1.90	0.00	0.00	3.81	
	0.00	0.00	0.08	0.08	0.00	0.00	0.17	
WNW	0	1	7	1	0	0	9	3.70
	0.00	0.32	2.22	0.32	0.00	0.00	2.86	
	0.00	0.01	0.10	0.01	0.00	0.00	0.12	
NW	0	1	6	4	0	0	11	4.57
	0.00	0.32	1.90	1.27	0.00	0.00	3.49	
	0.00	0.01	0.08	0.06	0.00	0.00	0.15	
NNW	0	1	7	9	0	0	17	4.85
	0.00	0.32	2.22	2.86	0.00	0.00	5.40	
	0.00	0.01	0.10	0.12	0.00	0.00	0.24	
N	0	4	12	1	0	0	17	3.57
	0.00	1.27	3.81	0.32	0.00	0.00	5.40	
	0.00	0.06	0.17	0.01	0.00	0.00	0.24	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	12	135	133	34	1	0	315	3.34
	3.81	42.86	42.22	10.79	0.32	0.00	100.00	
	0.17	1.87	1.84	0.47	0.01	0.00	4.37	

SUSQUEHANNA STEAM ELECTRIC STATION METEOROLOGICAL REPORTS RUNDATE: 2/14/85

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	52	109	30	5	2	0	198	2.35
	2.09	4.37	1.20	0.20	0.08	0.00	7.95	
	0.72	1.51	0.42	0.07	0.03	0.00	2.75	
NE	28	76	23	3	0	0	130	2.28
	1.12	3.05	0.92	0.12	0.00	0.00	5.22	
	0.39	1.05	0.32	0.04	0.00	0.00	1.80	
ENE	40	42	7	3	0	0	92	1.84
	1.61	1.69	0.28	0.12	0.00	0.00	3.69	
	0.55	0.58	0.10	0.04	0.00	0.00	1.28	
E	39	32	8	7	2	0	88	2.23
	1.57	1.28	0.32	0.28	0.08	0.00	3.53	
	0.54	0.44	0.11	0.10	0.03	0.00	1.22	
ESE	23	34	13	1	2	1	74	2.44
	0.92	1.36	0.52	0.04	0.08	0.04	2.97	
	0.32	0.47	0.18	0.01	0.03	0.01	1.03	
SE	45	38	28	6	0	0	117	2.35
	1.81	1.52	1.12	0.24	0.00	0.00	4.70	
	0.62	0.53	0.39	0.08	0.00	0.00	1.62	
SSE	38	59	21	1	0	0	119	2.10
	1.52	2.37	0.84	0.04	0.00	0.00	4.78	
	0.53	0.82	0.29	0.01	0.00	0.00	1.65	
S	39	84	18	2	0	0	143	2.16
	1.57	3.37	0.72	0.08	0.00	0.00	5.74	
	0.54	1.17	0.25	0.03	0.00	0.00	1.98	
SSW	49	102	30	3	0	0	184	2.22
	1.97	4.09	1.20	0.12	0.00	0.00	7.38	
	0.68	1.41	0.42	0.04	0.00	0.00	2.55	
SW	37	160	131	21	0	0	349	2.86
	1.48	6.42	5.26	0.84	0.00	0.00	14.00	
	0.51	2.22	1.82	0.29	0.00	0.00	4.84	
WSW	16	65	96	49	3	0	229	3.79
	0.64	2.61	3.85	1.97	0.12	0.00	9.19	
	0.22	0.90	1.33	0.68	0.04	0.00	3.18	
W	1	27	64	37	3	0	132	4.21
	0.04	1.08	2.57	1.48	0.12	0.00	5.30	
	0.01	0.37	0.89	0.51	0.04	0.00	1.83	
WNW	2	20	41	6	0	0	69	3.54
	0.08	0.80	1.65	0.24	0.00	0.00	2.77	
	0.03	0.28	0.57	0.08	0.00	0.00	0.96	
NW	3	41	72	5	0	0	121	3.40
	0.12	1.65	2.89	0.20	0.00	0.00	4.86	
	0.04	0.57	1.00	0.07	0.00	0.00	1.68	
NNW	7	55	141	25	0	0	228	3.62
	0.28	2.21	5.66	1.00	0.00	0.00	9.15	
	0.10	0.76	1.96	0.35	0.00	0.00	3.16	
N	29	85	104	0	0	0	218	2.81
	1.16	3.41	4.17	0.00	0.00	0.00	8.75	
	0.40	1.18	1.44	0.00	0.00	0.00	3.02	
CALM	1						1	CALM
	0.04						0.04	
	0.01						0.01	
TOTAL	448	1029	827	176	12	1	2492	2.83
	17.98	41.29	33.19	6.96	0.48	0.04	100.00	
	6.21	14.27	11.47	2.41	0.17	0.01	34.56	

TABLE 13

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	140	103	29	3	0	0	275	1.69
	5.61	4.13	1.16	0.12	0.00	0.00	11.02	
	1.94	1.43	0.40	0.04	0.00	0.00	3.81	
NE	179	68	4	2	0	0	253	1.30
	7.17	2.72	0.16	0.08	0.00	0.00	10.14	
	2.48	0.94	0.06	0.03	0.00	0.00	3.51	
ENE	152	20	2	0	0	0	174	1.03
	6.09	0.80	0.08	0.00	0.00	0.00	6.97	
	2.11	0.28	0.03	0.00	0.00	0.00	2.41	
E	104	5	6	2	0	0	117	1.13
	4.17	0.20	0.24	0.08	0.00	0.00	4.69	
	1.44	0.07	0.08	0.03	0.00	0.00	1.62	
ESE	73	8	3	1	0	0	85	1.09
	2.92	0.32	0.12	0.04	0.00	0.00	3.41	
	1.01	0.11	0.04	0.01	0.00	0.00	1.18	
SE	83	22	7	2	0	0	114	1.32
	3.33	0.88	0.28	0.08	0.00	0.00	4.57	
	1.15	0.31	0.10	0.03	0.00	0.00	1.58	
SSE	94	53	5	1	0	0	153	1.44
	3.77	2.12	0.20	0.04	0.00	0.00	6.13	
	1.30	0.74	0.07	0.01	0.00	0.00	2.12	
S	93	68	12	0	0	0	173	1.63
	3.73	2.72	0.48	0.00	0.00	0.00	6.93	
	1.29	0.94	0.17	0.00	0.00	0.00	2.40	
SSW	101	130	21	0	0	0	252	1.84
	4.05	5.21	0.84	0.00	0.00	0.00	10.10	
	1.40	1.80	0.29	0.00	0.00	0.00	3.50	
SW	50	153	39	1	0	0	243	2.22
	2.00	6.13	1.56	0.04	0.00	0.00	9.74	
	0.69	2.12	0.54	0.01	0.00	0.00	3.37	
WSW	32	49	43	5	0	0	129	2.63
	1.28	1.96	1.72	0.20	0.00	0.00	5.17	
	0.44	0.68	0.60	0.07	0.00	0.00	1.79	
W	15	24	22	2	0	0	63	2.61
	0.60	0.96	0.88	0.08	0.00	0.00	2.52	
	0.21	0.33	0.31	0.03	0.00	0.00	0.87	
WNW	7	22	7	0	0	0	36	2.19
	0.28	0.88	0.28	0.00	0.00	0.00	1.44	
	0.10	0.31	0.10	0.00	0.00	0.00	0.50	
NW	15	39	6	0	0	0	60	2.02
	0.60	1.56	0.24	0.00	0.00	0.00	2.40	
	0.21	0.54	0.08	0.00	0.00	0.00	0.83	
NNW	18	50	12	0	0	0	80	2.22
	0.72	2.00	0.48	0.00	0.00	0.00	3.21	
	0.25	0.69	0.17	0.00	0.00	0.00	1.11	
N	99	109	43	4	0	0	255	1.99
	3.97	4.37	1.72	0.16	0.00	0.00	10.22	
	1.37	1.51	0.60	0.06	0.00	0.00	3.54	
CALM	34						34	CALM
	1.36						1.36	
	0.47						0.47	
TOTAL	1255	923	261	23	0	0	2496	1.70
	50.28	36.98	10.46	0.92	0.00	0.00	100.00	
	17.41	12.80	3.62	0.32	0.00	0.00	34.62	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	77	12	0	0	0	0	89	0.98
	8.03	1.25	0.00	0.00	0.00	0.00	9.28	
	1.07	0.17	0.00	0.00	0.00	0.00	1.23	
NE	247	63	0	0	0	0	310	1.08
	25.76	6.57	0.00	0.00	0.00	0.00	32.33	
	3.43	0.87	0.00	0.00	0.00	0.00	4.30	
ENE	221	31	0	0	0	0	252	1.03
	23.04	3.23	0.00	0.00	0.00	0.00	26.28	
	3.07	0.43	0.00	0.00	0.00	0.00	3.50	
E	82	0	0	0	0	0	82	0.72
	8.55	0.00	0.00	0.00	0.00	0.00	8.55	
	1.14	0.00	0.00	0.00	0.00	0.00	1.14	
ESE	27	0	0	0	0	0	27	0.84
	2.82	0.00	0.00	0.00	0.00	0.00	2.82	
	0.37	0.00	0.00	0.00	0.00	0.00	0.37	
SE	24	0	0	0	0	0	24	0.79
	2.50	0.00	0.00	0.00	0.00	0.00	2.50	
	0.33	0.00	0.00	0.00	0.00	0.00	0.33	
SSE	25	3	0	0	0	0	28	1.01
	2.61	0.31	0.00	0.00	0.00	0.00	2.92	
	0.35	0.04	0.00	0.00	0.00	0.00	0.39	
S	18	3	0	0	0	0	21	1.09
	1.88	0.31	0.00	0.00	0.00	0.00	2.19	
	0.25	0.04	0.00	0.00	0.00	0.00	0.29	
SSW	19	7	0	0	0	0	26	1.29
	1.98	0.73	0.00	0.00	0.00	0.00	2.71	
	0.26	0.10	0.00	0.00	0.00	0.00	0.36	
SW	5	11	0	0	0	0	16	1.72
	0.52	1.15	0.00	0.00	0.00	0.00	1.67	
	0.07	0.15	0.00	0.00	0.00	0.00	0.22	
WSW	2	5	0	0	0	0	7	1.90
	0.21	0.52	0.00	0.00	0.00	0.00	0.73	
	0.03	0.07	0.00	0.00	0.00	0.00	0.10	
W	2	0	0	0	0	0	2	0.76
	0.21	0.00	0.00	0.00	0.00	0.00	0.21	
	0.03	0.00	0.00	0.00	0.00	0.00	0.03	
WNW	2	2	0	0	0	0	4	1.36
	0.21	0.21	0.00	0.00	0.00	0.00	0.42	
	0.03	0.03	0.00	0.00	0.00	0.00	0.06	
NW	3	4	0	0	0	0	7	1.57
	0.31	0.42	0.00	0.00	0.00	0.00	0.73	
	0.04	0.06	0.00	0.00	0.00	0.00	0.10	
NNW	7	6	0	0	0	0	13	1.36
	0.73	0.63	0.00	0.00	0.00	0.00	1.36	
	0.10	0.08	0.00	0.00	0.00	0.00	0.18	
N	23	3	0	0	0	0	26	0.93
	2.40	0.31	0.00	0.00	0.00	0.00	2.71	
	0.32	0.04	0.00	0.00	0.00	0.00	0.36	
CALM	25						25	CALM
	2.61						2.61	
	0.35						0.35	
TOTAL	784	150	0	0	0	0	959	1.01
	81.75	15.64	0.00	0.00	0.00	0.00	100.00	
	10.87	2.08	0.00	0.00	0.00	0.00	13.30	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	50	3	0	0	0	0	53	0.91
	8.76	0.53	0.00	0.00	0.00	0.00	9.28	
	0.69	0.04	0.00	0.00	0.00	0.00	0.74	
NE	208	45	0	0	0	0	253	1.16
	36.43	7.88	0.00	0.00	0.00	0.00	44.31	
	2.88	0.62	0.00	0.00	0.00	0.00	3.51	
ENE	143	32	0	0	0	0	175	1.11
	25.04	5.60	0.00	0.00	0.00	0.00	30.65	
	1.98	0.44	0.00	0.00	0.00	0.00	2.43	
E	29	0	0	0	0	0	29	0.75
	5.08	0.00	0.00	0.00	0.00	0.00	5.08	
	0.40	0.00	0.00	0.00	0.00	0.00	0.40	
ESE	7	0	0	0	0	0	7	0.79
	1.23	0.00	0.00	0.00	0.00	0.00	1.23	
	0.10	0.00	0.00	0.00	0.00	0.00	0.10	
SE	12	0	0	0	0	0	12	0.73
	2.10	0.00	0.00	0.00	0.00	0.00	2.10	
	0.17	0.00	0.00	0.00	0.00	0.00	0.17	
SSE	3	0	0	0	0	0	3	0.84
	0.53	0.00	0.00	0.00	0.00	0.00	0.53	
	0.04	0.00	0.00	0.00	0.00	0.00	0.04	
S	3	1	0	0	0	0	4	1.20
	0.53	0.18	0.00	0.00	0.00	0.00	0.70	
	0.04	0.01	0.00	0.00	0.00	0.00	0.06	
SSW	3	1	0	0	0	0	4	1.15
	0.53	0.18	0.00	0.00	0.00	0.00	0.70	
	0.04	0.01	0.00	0.00	0.00	0.00	0.06	
SW	1	0	0	0	0	0	1	1.03
	0.18	0.00	0.00	0.00	0.00	0.00	0.18	
	0.01	0.00	0.00	0.00	0.00	0.00	0.01	
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	1.06
	0.35	0.00	0.00	0.00	0.00	0.00	0.35	
	0.03	0.00	0.00	0.00	0.00	0.00	0.03	
NNW	1	1	0	0	0	0	2	1.27
	0.18	0.18	0.00	0.00	0.00	0.00	0.35	
	0.01	0.01	0.00	0.00	0.00	0.00	0.03	
N	10	5	0	0	0	0	15	0.97
	1.75	0.88	0.00	0.00	0.00	0.00	2.63	
	0.14	0.07	0.00	0.00	0.00	0.00	0.21	
CALM	11						11	CALM
	1.93						1.93	
	0.15						0.15	
TOTAL	472	88	0	0	0	0	571	1.06
	82.66	15.41	0.00	0.00	0.00	0.00	100.00	
	6.55	1.22	0.00	0.00	0.00	0.00	7.92	

TABLE 13

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	319	245	73	8	2	0	647	1.79
	4.42	3.40	1.01	0.11	0.03	0.00	8.97	
	4.42	3.40	1.01	0.11	0.03	0.00	8.97	
NE	662	270	34	5	0	0	971	1.36
	9.18	3.74	0.47	0.07	0.00	0.00	13.47	
	9.18	3.74	0.47	0.07	0.00	0.00	13.47	
ENE	560	130	9	3	0	0	702	1.17
	7.77	1.80	0.12	0.04	0.00	0.00	9.74	
	7.77	1.80	0.12	0.04	0.00	0.00	9.74	
E	255	39	14	9	2	0	319	1.30
	3.54	0.54	0.19	0.12	0.03	0.00	4.42	
	3.54	0.54	0.19	0.12	0.03	0.00	4.42	
ESE	131	46	16	2	2	1	198	1.58
	1.82	0.64	0.22	0.03	0.03	0.01	2.75	
	1.82	0.64	0.22	0.03	0.03	0.01	2.75	
SE	166	66	38	8	0	0	278	1.73
	2.30	0.92	0.53	0.11	0.00	0.00	3.86	
	2.30	0.92	0.53	0.11	0.00	0.00	3.86	
SSE	162	125	40	2	0	0	329	1.77
	2.25	1.73	0.55	0.03	0.00	0.00	4.56	
	2.25	1.73	0.55	0.03	0.00	0.00	4.56	
S	154	186	58	2	0	0	400	1.99
	2.14	2.58	0.80	0.03	0.00	0.00	5.55	
	2.14	2.58	0.80	0.03	0.00	0.00	5.55	
SSW	177	308	82	3	0	0	570	2.08
	2.45	4.27	1.14	0.04	0.00	0.00	7.91	
	2.45	4.27	1.14	0.04	0.00	0.00	7.91	
SW	97	379	308	43	0	0	827	2.85
	1.35	5.26	4.27	0.60	0.00	0.00	11.47	
	1.35	5.26	4.27	0.60	0.00	0.00	11.47	
WSW	50	136	184	71	6	0	447	3.50
	0.69	1.89	2.55	0.98	0.08	0.00	6.20	
	0.69	1.89	2.55	0.98	0.08	0.00	6.20	
W	18	53	100	45	3	0	219	3.76
	0.25	0.74	1.39	0.62	0.04	0.00	3.04	
	0.25	0.74	1.39	0.62	0.04	0.00	3.04	
WNW	11	45	58	8	0	0	122	3.11
	0.15	0.62	0.80	0.11	0.00	0.00	1.69	
	0.15	0.62	0.80	0.11	0.00	0.00	1.69	
NW	24	86	88	12	0	0	210	3.01
	0.33	1.19	1.22	0.17	0.00	0.00	2.91	
	0.33	1.19	1.22	0.17	0.00	0.00	2.91	
NNW	33	116	163	35	0	0	347	3.26
	0.46	1.61	2.26	0.49	0.00	0.00	4.81	
	0.46	1.61	2.26	0.49	0.00	0.00	4.81	
N	161	209	175	8	0	0	553	2.37
	2.23	2.90	2.43	0.11	0.00	0.00	7.67	
	2.23	2.90	2.43	0.11	0.00	0.00	7.67	
CALM	71						71	CALM
	0.98						0.98	
	0.98						0.98	
TOTAL	2980	2439	1440	264	15	1	7210	2.12
	41.33	33.83	19.97	3.66	0.21	0.01	100.00	
	41.33	33.83	19.97	3.66	0.21	0.01	100.00	

JOINT WIND FREQUENCY DISTRIBUTION FOR ALL WINDS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	378	277	91	8	2	0	756	1.79
	4.37	3.20	1.05	0.09	0.02	0.00	8.73	
	4.37	3.20	1.05	0.09	0.02	0.00	8.73	
NE	786	302	41	8	0	0	1137	1.37
	9.08	3.49	0.47	0.09	0.00	0.00	13.14	
	9.08	3.49	0.47	0.09	0.00	0.00	13.14	
ENE	636	136	10	3	0	0	785	1.15
	7.35	1.57	0.12	0.03	0.00	0.00	9.07	
	7.35	1.57	0.12	0.03	0.00	0.00	9.07	
E	284	41	18	9	2	0	354	1.30
	3.28	0.47	0.21	0.10	0.02	0.00	4.09	
	3.28	0.47	0.21	0.10	0.02	0.00	4.09	
ESE	148	50	19	3	2	1	223	1.60
	1.71	0.58	0.22	0.03	0.02	0.01	2.58	
	1.71	0.58	0.22	0.03	0.02	0.01	2.58	
SE	189	82	47	18	4	0	340	1.94
	2.18	0.95	0.54	0.21	0.05	0.00	3.93	
	2.18	0.95	0.54	0.21	0.05	0.00	3.93	
SSE	195	147	43	2	0	0	387	1.73
	2.25	1.70	0.50	0.02	0.00	0.00	4.47	
	2.25	1.70	0.50	0.02	0.00	0.00	4.47	
S	200	205	60	5	0	0	470	1.92
	2.31	2.37	0.69	0.06	0.00	0.00	5.43	
	2.31	2.37	0.69	0.06	0.00	0.00	5.43	
SSW	235	346	100	6	0	0	687	2.06
	2.72	4.00	1.16	0.07	0.00	0.00	7.94	
	2.72	4.00	1.16	0.07	0.00	0.00	7.94	
SW	147	465	356	52	0	0	1020	2.77
	1.70	5.37	4.11	0.60	0.00	0.00	11.79	
	1.70	5.37	4.11	0.60	0.00	0.00	11.79	
WSW	59	172	248	95	7	0	581	3.56
	0.68	1.99	2.87	1.10	0.08	0.00	6.71	
	0.68	1.99	2.87	1.10	0.08	0.00	6.71	
W	21	70	140	60	3	0	294	3.80
	0.24	0.81	1.62	0.69	0.03	0.00	3.40	
	0.24	0.81	1.62	0.69	0.03	0.00	3.40	
WNW	19	58	93	12	0	0	182	3.13
	0.22	0.67	1.07	0.14	0.00	0.00	2.10	
	0.22	0.67	1.07	0.14	0.00	0.00	2.10	
NW	29	104	120	13	0	0	266	3.00
	0.34	1.20	1.39	0.15	0.00	0.00	3.07	
	0.34	1.20	1.39	0.15	0.00	0.00	3.07	
NNW	56	143	199	35	0	0	433	3.13
	0.65	1.65	2.30	0.40	0.00	0.00	5.00	
	0.65	1.65	2.30	0.40	0.00	0.00	5.00	
N	203	253	197	10	0	0	663	2.33
	2.35	2.92	2.28	0.12	0.00	0.00	7.66	
	2.35	2.92	2.28	0.12	0.00	0.00	7.66	
CALM	77						77	CALM
	0.89						0.89	
	0.89						0.89	
TOTAL	3585	2851	1782	339	20	1	8655	2.14
	41.42	32.94	20.59	3.92	0.23	0.01	100.00	
	41.42	32.94	20.59	3.92	0.23	0.01	100.00	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	0	2	2	0	0	0	4	3.05
	0.00	1.38	1.38	0.00	0.00	0.00	2.76	
	0.00	0.03	0.03	0.00	0.00	0.00	0.06	
NE	0	1	4	0	0	0	5	3.29
	0.00	0.69	2.76	0.00	0.00	0.00	3.45	
	0.00	0.02	0.06	0.00	0.00	0.00	0.08	
ENE	0	0	1	0	0	0	1	4.70
	0.00	0.00	0.69	0.00	0.00	0.00	0.69	
	0.00	0.00	0.02	0.00	0.00	0.00	0.02	
E	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	
ESE	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	
SE	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	
SSE	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	
S	0	1	4	8	0	0	13	5.70
	0.00	0.69	2.76	5.52	0.00	0.00	8.97	
	0.00	0.02	0.06	0.13	0.00	0.00	0.21	
SSW	0	5	6	12	0	0	23	4.64
	0.00	3.45	4.14	8.28	0.00	0.00	15.86	
	0.00	0.08	0.10	0.19	0.00	0.00	0.37	
SW	0	3	13	15	3	0	34	5.24
	0.00	2.07	8.97	10.34	2.07	0.00	23.45	
	0.00	0.05	0.21	0.24	0.05	0.00	0.55	
WSW	0	0	3	13	0	0	16	5.66
	0.00	0.00	2.07	8.97	0.00	0.00	11.03	
	0.00	0.00	0.05	0.21	0.00	0.00	0.26	
W	0	0	0	2	0	0	2	5.18
	0.00	0.00	0.00	1.38	0.00	0.00	1.38	
	0.00	0.00	0.00	0.03	0.00	0.00	0.03	
WNW	0	0	5	5	0	0	10	5.23
	0.00	0.00	3.45	3.45	0.00	0.00	6.90	
	0.00	0.00	0.08	0.08	0.00	0.00	0.16	
NW	0	0	0	1	0	0	1	5.00
	0.00	0.00	0.00	0.69	0.00	0.00	0.69	
	0.00	0.00	0.00	0.02	0.00	0.00	0.02	
NNW	0	0	1	1	0	0	2	5.00
	0.00	0.00	0.69	0.69	0.00	0.00	1.38	
	0.00	0.00	0.02	0.02	0.00	0.00	0.03	
N	0	3	6	12	11	2	34	6.57
	0.00	2.07	4.14	8.28	7.59	1.38	23.45	
	0.00	0.05	0.10	0.19	0.18	0.03	0.55	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	0	15	45	69	14	2	145	5.41
	0.00	10.34	31.03	47.59	9.66	1.38	100.00	
	0.00	0.24	0.73	1.12	0.23	0.03	2.35	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	0	1	4	2	0	0	7	4.64
	0.00	0.57	2.29	1.14	0.00	0.00	4.00	
	0.00	0.02	0.06	0.03	0.00	0.00	0.11	
NE	0	1	2	1	0	0	4	4.18
	0.00	0.57	1.14	0.57	0.00	0.00	2.29	
	0.00	0.02	0.03	0.02	0.00	0.00	0.06	
ENE	1	0	0	0	0	0	1	1.28
	0.57	0.00	0.00	0.00	0.00	0.00	0.57	
	0.02	0.00	0.00	0.00	0.00	0.00	0.02	
E	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	
ESE	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	
SE	0	1	1	0	0	0	2	2.79
	0.00	0.57	0.57	0.00	0.00	0.00	1.14	
	0.00	0.02	0.02	0.00	0.00	0.00	0.03	
SSE	1	0	0	0	0	0	1	1.19
	0.57	0.00	0.00	0.00	0.00	0.00	0.57	
	0.02	0.00	0.00	0.00	0.00	0.00	0.02	
S	0	2	2	5	1	0	10	5.04
	0.00	1.14	1.14	2.86	0.57	0.00	5.71	
	0.00	0.03	0.03	0.08	0.02	0.00	0.16	
SSW	0	4	9	12	0	0	25	4.54
	0.00	2.29	5.14	6.86	0.00	0.00	14.29	
	0.00	0.06	0.15	0.19	0.00	0.00	0.40	
SW	0	4	29	14	2	0	49	4.72
	0.00	2.29	16.57	8.00	1.14	0.00	28.00	
	0.00	0.06	0.47	0.23	0.03	0.00	0.79	
WSW	0	0	4	16	0	0	20	5.58
	0.00	0.00	2.29	9.14	0.00	0.00	11.43	
	0.00	0.00	0.06	0.26	0.00	0.00	0.32	
W	0	0	0	2	0	0	2	6.26
	0.00	0.00	0.00	1.14	0.00	0.00	1.14	
	0.00	0.00	0.00	0.03	0.00	0.00	0.03	
WNW	0	0	0	1	0	0	1	5.75
	0.00	0.00	0.00	0.57	0.00	0.00	0.57	
	0.00	0.00	0.00	0.02	0.00	0.00	0.02	
NW	0	0	1	0	0	0	1	3.89
	0.00	0.00	0.57	0.00	0.00	0.00	0.57	
	0.00	0.00	0.02	0.00	0.00	0.00	0.02	
NNW	0	0	2	3	0	0	5	5.37
	0.00	0.00	1.14	1.71	0.00	0.00	2.86	
	0.00	0.00	0.03	0.05	0.00	0.00	0.08	
N	0	5	24	16	2	0	47	4.94
	0.00	2.86	13.71	9.14	1.14	0.00	26.86	
	0.00	0.08	0.39	0.26	0.03	0.00	0.76	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	2	18	78	72	5	0	175	4.83
	1.14	10.29	44.57	41.14	2.86	0.00	100.00	
	0.03	0.29	1.26	1.16	0.08	0.00	2.83	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	0	3	18	3	0	0	24	4.08
	0.00	1.04	6.25	1.04	0.00	0.00	8.33	
	0.00	0.05	0.29	0.05	0.00	0.00	0.39	
NE	1	5	5	2	0	0	13	3.14
	0.35	1.74	1.74	0.69	0.00	0.00	4.51	
	0.02	0.08	0.08	0.03	0.00	0.00	0.21	
ENE	0	3	0	0	0	0	3	1.86
	0.00	1.04	0.00	0.00	0.00	0.00	1.04	
	0.00	0.05	0.00	0.00	0.00	0.00	0.05	
E	0	1	0	0	0	0	1	2.28
	0.00	0.35	0.00	0.00	0.00	0.00	0.35	
	0.00	0.02	0.00	0.00	0.00	0.00	0.02	
ESE	0	0	1	0	0	0	1	3.87
	0.00	0.00	0.35	0.00	0.00	0.00	0.35	
	0.00	0.00	0.02	0.00	0.00	0.00	0.02	
SE	0	1	0	0	0	0	1	2.98
	0.00	0.35	0.00	0.00	0.00	0.00	0.35	
	0.00	0.02	0.00	0.00	0.00	0.00	0.02	
SSE	1	1	2	0	0	0	4	3.17
	0.35	0.35	0.69	0.00	0.00	0.00	1.39	
	0.02	0.02	0.03	0.00	0.00	0.00	0.06	
S	0	2	3	5	0	0	10	4.40
	0.00	0.69	1.04	1.74	0.00	0.00	3.47	
	0.00	0.03	0.05	0.08	0.00	0.00	0.16	
SSW	0	5	20	3	0	0	28	3.88
	0.00	1.74	6.94	1.04	0.00	0.00	9.72	
	0.00	0.08	0.32	0.05	0.00	0.00	0.45	
SW	0	13	28	20	1	0	62	4.40
	0.00	4.51	9.72	6.94	0.35	0.00	21.53	
	0.00	0.21	0.45	0.32	0.02	0.00	1.00	
WSW	0	2	19	16	3	0	40	5.17
	0.00	0.69	6.60	5.56	1.04	0.00	13.89	
	0.00	0.03	0.31	0.26	0.05	0.00	0.65	
W	0	0	1	3	2	0	6	6.45
	0.00	0.00	0.35	1.04	0.69	0.00	2.08	
	0.00	0.00	0.02	0.05	0.03	0.00	0.10	
WNW	0	1	3	2	0	0	6	4.57
	0.00	0.35	1.04	0.69	0.00	0.00	2.08	
	0.00	0.02	0.05	0.03	0.00	0.00	0.10	
NW	0	0	5	3	0	0	8	4.84
	0.00	0.00	1.74	1.04	0.00	0.00	2.78	
	0.00	0.00	0.08	0.05	0.00	0.00	0.13	
NNW	0	0	1	2	0	0	3	5.18
	0.00	0.00	0.35	0.69	0.00	0.00	1.04	
	0.00	0.00	0.02	0.03	0.00	0.00	0.05	
N	0	11	28	25	14	0	78	5.26
	0.00	3.82	9.72	8.68	4.86	0.00	27.08	
	0.00	0.18	0.45	0.40	0.23	0.00	1.26	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	2	48	134	84	20	0	288	4.62
	0.69	16.67	46.53	29.17	6.94	0.00	100.00	
	0.03	0.78	2.17	1.36	0.32	0.00	4.66	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	13	58	80	30	1	5	187	3.85
	0.62	2.76	3.80	1.43	0.05	0.24	8.89	
	0.21	0.94	1.29	0.49	0.02	0.08	3.02	
NE	11	45	48	12	4	0	120	3.40
	0.52	2.14	2.28	0.57	0.19	0.00	5.71	
	0.18	0.73	0.78	0.19	0.06	0.00	1.94	
ENE	13	40	17	1	0	0	71	2.41
	0.62	1.90	0.81	0.05	0.00	0.00	3.38	
	0.21	0.65	0.27	0.02	0.00	0.00	1.15	
E	11	15	11	3	0	0	40	2.52
	0.52	0.71	0.52	0.14	0.00	0.00	1.90	
	0.18	0.24	0.18	0.05	0.00	0.00	0.65	
ESE	4	18	14	3	4	1	44	3.86
	0.19	0.86	0.67	0.14	0.19	0.05	2.09	
	0.06	0.29	0.23	0.05	0.06	0.02	0.71	
SE	4	18	22	8	5	7	64	4.85
	0.19	0.86	1.05	0.38	0.24	0.33	3.04	
	0.06	0.29	0.36	0.13	0.08	0.11	1.04	
SSE	9	18	22	13	1	0	63	3.49
	0.43	0.86	1.05	0.62	0.05	0.00	3.00	
	0.15	0.29	0.36	0.21	0.02	0.00	1.02	
S	7	22	37	31	3	0	100	4.13
	0.33	1.05	1.76	1.47	0.14	0.00	4.76	
	0.11	0.36	0.60	0.50	0.05	0.00	1.62	
SSW	11	66	45	36	5	0	163	3.63
	0.52	3.14	2.14	1.71	0.24	0.00	7.75	
	0.18	1.07	0.73	0.58	0.08	0.00	2.64	
SW	7	64	87	26	10	0	194	3.89
	0.33	3.04	4.14	1.24	0.48	0.00	9.22	
	0.11	1.04	1.41	0.42	0.16	0.00	3.14	
WSW	0	22	51	69	31	8	181	5.74
	0.00	1.05	2.43	3.28	1.47	0.38	8.61	
	0.00	0.36	0.82	1.12	0.50	0.13	2.93	
W	1	11	33	55	12	5	117	5.57
	0.05	0.52	1.57	2.62	0.57	0.24	5.56	
	0.02	0.18	0.53	0.89	0.19	0.08	1.89	
WNW	1	3	30	22	6	0	62	5.09
	0.05	0.14	1.43	1.05	0.29	0.00	2.95	
	0.02	0.05	0.49	0.36	0.10	0.00	1.00	
NW	1	4	49	32	3	0	89	4.77
	0.05	0.19	2.33	1.52	0.14	0.00	4.23	
	0.02	0.06	0.79	0.52	0.05	0.00	1.44	
NNW	2	8	62	38	3	0	113	4.64
	0.10	0.38	2.95	1.81	0.14	0.00	5.37	
	0.03	0.13	1.00	0.61	0.05	0.00	1.83	
N	28	98	215	128	25	1	495	4.27
	1.33	4.66	10.22	6.09	1.19	0.05	23.54	
	0.45	1.58	3.48	2.07	0.40	0.02	8.01	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	123	510	823	507	113	27	2103	4.24
	5.85	24.25	39.13	24.11	5.37	1.28	100.00	
	1.99	8.25	13.31	8.20	1.83	0.44	34.01	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	42	166	81	29	7	0	325	2.95
	1.92	7.60	3.71	1.33	0.32	0.00	14.89	
	0.68	2.68	1.31	0.47	0.11	0.00	5.26	
NE	61	83	35	7	1	0	187	2.26
	2.79	3.80	1.60	0.32	0.05	0.00	8.57	
	0.99	1.34	0.57	0.11	0.02	0.00	3.02	
ENE	47	34	10	1	0	1	93	1.96
	2.15	1.56	0.46	0.05	0.00	0.05	4.26	
	0.76	0.55	0.16	0.02	0.00	0.02	1.50	
E	39	16	10	2	0	0	67	1.89
	1.79	0.73	0.46	0.09	0.00	0.00	3.07	
	0.63	0.26	0.16	0.03	0.00	0.00	1.08	
ESE	26	6	9	0	0	0	41	1.77
	1.19	0.27	0.41	0.00	0.00	0.00	1.88	
	0.42	0.10	0.15	0.00	0.00	0.00	0.66	
SE	33	21	15	4	0	0	73	2.19
	1.51	0.96	0.69	0.18	0.00	0.00	3.34	
	0.53	0.34	0.24	0.06	0.00	0.00	1.18	
SSE	25	35	37	7	1	0	105	2.86
	1.15	1.60	1.69	0.32	0.05	0.00	4.81	
	0.40	0.57	0.60	0.11	0.02	0.00	1.70	
S	25	29	33	21	3	0	111	3.45
	1.15	1.33	1.51	0.96	0.14	0.00	5.08	
	0.40	0.47	0.53	0.34	0.05	0.00	1.80	
SSW	29	52	74	31	4	0	190	3.47
	1.33	2.38	3.39	1.42	0.18	0.00	8.70	
	0.47	0.84	1.20	0.50	0.06	0.00	3.07	
SW	21	90	109	41	2	0	263	3.48
	0.96	4.12	4.99	1.88	0.09	0.00	12.05	
	0.34	1.46	1.76	0.66	0.03	0.00	4.25	
WSW	9	35	70	57	8	0	179	4.28
	0.41	1.60	3.21	2.61	0.37	0.00	8.20	
	0.15	0.57	1.13	0.92	0.13	0.00	2.90	
W	4	14	23	23	1	0	65	4.36
	0.18	0.64	1.05	1.05	0.05	0.00	2.98	
	0.06	0.23	0.37	0.37	0.02	0.00	1.05	
WNW	0	8	26	2	0	0	36	3.66
	0.00	0.37	1.19	0.09	0.00	0.00	1.65	
	0.00	0.13	0.42	0.03	0.00	0.00	0.58	
NW	1	7	34	4	0	0	46	3.69
	0.05	0.32	1.56	0.18	0.00	0.00	2.11	
	0.02	0.11	0.55	0.06	0.00	0.00	0.74	
NNW	6	17	29	6	0	0	58	3.43
	0.27	0.78	1.33	0.27	0.00	0.00	2.66	
	0.10	0.27	0.47	0.10	0.00	0.00	0.94	
N	42	88	148	57	6	0	341	3.60
	1.92	4.03	6.78	2.61	0.27	0.00	15.62	
	0.68	1.42	2.39	0.92	0.10	0.00	5.52	
CALM	3						3	CALM
	0.14						0.14	
	0.05						0.05	
TOTAL	410	701	743	292	33	1	2183	3.19
	18.78	32.11	34.04	13.38	1.51	0.05	100.00	
	6.63	11.34	12.02	4.72	0.53	0.02	35.31	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	42	181	26	0	0	0	249	2.17
	5.10	21.97	3.16	0.00	0.00	0.00	30.22	
	0.68	2.93	0.42	0.00	0.00	0.00	4.03	
NE	29	43	4	0	0	0	76	1.77
	3.52	5.22	0.49	0.00	0.00	0.00	9.22	
	0.47	0.70	0.06	0.00	0.00	0.00	1.23	
ENE	31	24	0	0	0	0	55	1.50
	3.76	2.91	0.00	0.00	0.00	0.00	6.67	
	0.50	0.39	0.00	0.00	0.00	0.00	0.89	
E	19	15	1	0	0	0	35	1.51
	2.31	1.82	0.12	0.00	0.00	0.00	4.25	
	0.31	0.24	0.02	0.00	0.00	0.00	0.57	
ESE	15	6	1	0	0	0	22	1.60
	1.82	0.73	0.12	0.00	0.00	0.00	2.67	
	0.24	0.10	0.02	0.00	0.00	0.00	0.36	
SE	25	7	0	0	0	0	32	1.26
	3.03	0.85	0.00	0.00	0.00	0.00	3.88	
	0.40	0.11	0.00	0.00	0.00	0.00	0.52	
SSE	7	6	4	1	0	0	18	2.08
	0.85	0.73	0.49	0.12	0.00	0.00	2.18	
	0.11	0.10	0.06	0.02	0.00	0.00	0.29	
S	12	10	4	1	0	0	27	2.01
	1.46	1.21	0.49	0.12	0.00	0.00	3.28	
	0.19	0.16	0.06	0.02	0.00	0.00	0.44	
SSW	5	23	12	0	0	0	40	2.60
	0.61	2.79	1.46	0.00	0.00	0.00	4.85	
	0.08	0.37	0.19	0.00	0.00	0.00	0.65	
SW	3	15	21	4	0	0	43	3.27
	0.36	1.82	2.55	0.49	0.00	0.00	5.22	
	0.05	0.24	0.34	0.06	0.00	0.00	0.70	
WSW	1	10	13	5	0	0	29	3.63
	0.12	1.21	1.58	0.61	0.00	0.00	3.52	
	0.02	0.16	0.21	0.08	0.00	0.00	0.47	
W	0	1	1	2	0	0	4	4.19
	0.00	0.12	0.12	0.24	0.00	0.00	0.49	
	0.00	0.02	0.02	0.03	0.00	0.00	0.06	
WNW	1	2	5	0	0	0	8	3.06
	0.12	0.24	0.61	0.00	0.00	0.00	0.97	
	0.02	0.03	0.08	0.00	0.00	0.00	0.13	
NW	1	6	5	0	0	0	12	2.79
	0.12	0.73	0.61	0.00	0.00	0.00	1.46	
	0.02	0.10	0.08	0.00	0.00	0.00	0.19	
NNW	3	6	3	0	0	0	12	2.28
	0.36	0.73	0.36	0.00	0.00	0.00	1.46	
	0.05	0.10	0.05	0.00	0.00	0.00	0.19	
N	35	99	27	1	0	0	162	2.17
	4.25	12.01	3.28	0.12	0.00	0.00	19.66	
	0.57	1.60	0.44	0.02	0.00	0.00	2.62	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	229	454	127	14	0	0	824	2.16
	27.79	55.10	15.41	1.70	0.00	0.00	100.00	
	3.70	7.34	2.05	0.23	0.00	0.00	13.33	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	14	95	4	0	0	0	113	2.13
	3.01	20.43	0.86	0.00	0.00	0.00	24.30	
	0.23	1.54	0.06	0.00	0.00	0.00	1.83	
NE	16	41	1	0	0	0	58	1.79
	3.44	8.82	0.22	0.00	0.00	0.00	12.47	
	0.26	0.66	0.02	0.00	0.00	0.00	0.94	
ENE	19	7	0	0	0	0	26	1.37
	4.09	1.51	0.00	0.00	0.00	0.00	5.59	
	0.31	0.11	0.00	0.00	0.00	0.00	0.42	
E	20	6	0	0	0	0	26	1.34
	4.30	1.29	0.00	0.00	0.00	0.00	5.59	
	0.32	0.10	0.00	0.00	0.00	0.00	0.42	
ESE	11	7	0	0	0	0	18	1.45
	2.37	1.51	0.00	0.00	0.00	0.00	3.87	
	0.18	0.11	0.00	0.00	0.00	0.00	0.29	
SE	9	3	0	0	0	0	12	1.29
	1.94	0.65	0.00	0.00	0.00	0.00	2.58	
	0.15	0.05	0.00	0.00	0.00	0.00	0.19	
SSE	8	9	0	0	0	0	17	1.71
	1.72	1.94	0.00	0.00	0.00	0.00	3.66	
	0.13	0.15	0.00	0.00	0.00	0.00	0.27	
S	4	14	4	0	0	0	22	2.44
	0.86	3.01	0.86	0.00	0.00	0.00	4.73	
	0.06	0.23	0.06	0.00	0.00	0.00	0.36	
SSW	5	15	9	0	0	0	29	2.41
	1.08	3.23	1.94	0.00	0.00	0.00	6.24	
	0.08	0.24	0.15	0.00	0.00	0.00	0.47	
SW	2	11	3	1	0	0	17	2.58
	0.43	2.37	0.65	0.22	0.00	0.00	3.66	
	0.03	0.18	0.05	0.02	0.00	0.00	0.27	
WSW	0	2	5	1	0	0	8	3.72
	0.00	0.43	1.08	0.22	0.00	0.00	1.72	
	0.00	0.03	0.08	0.02	0.00	0.00	0.13	
W	0	1	2	0	0	0	3	3.49
	0.00	0.22	0.43	0.00	0.00	0.00	0.65	
	0.00	0.02	0.03	0.00	0.00	0.00	0.05	
WNW	1	1	0	0	0	0	2	2.03
	0.22	0.22	0.00	0.00	0.00	0.00	0.43	
	0.02	0.02	0.00	0.00	0.00	0.00	0.03	
NW	2	1	2	0	0	0	5	2.44
	0.43	0.22	0.43	0.00	0.00	0.00	1.08	
	0.03	0.02	0.03	0.00	0.00	0.00	0.08	
NNW	1	1	3	0	0	0	5	2.77
	0.22	0.22	0.65	0.00	0.00	0.00	1.08	
	0.02	0.02	0.05	0.00	0.00	0.00	0.08	
N	23	71	10	0	0	0	104	2.14
	4.95	15.27	2.15	0.00	0.00	0.00	22.37	
	0.37	1.15	0.16	0.00	0.00	0.00	1.68	
CALM	0						0	CALM
	0.00						0.00	
	0.00						0.00	
TOTAL	135	285	43	2	0	0	465	2.04
	29.03	61.29	9.25	0.43	0.00	0.00	100.00	
	2.18	4.61	0.70	0.03	0.00	0.00	7.52	

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	111	506	215	64	8	5	909	2.86
	1.80	8.18	3.48	1.04	0.13	0.08	14.70	
	1.80	8.18	3.48	1.04	0.13	0.08	14.70	
NE	118	219	99	22	5	0	463	2.47
	1.91	3.54	1.60	0.36	0.08	0.00	7.49	
	1.91	3.54	1.60	0.36	0.08	0.00	7.49	
ENE	111	108	28	2	0	1	250	1.93
	1.80	1.75	0.45	0.03	0.00	0.02	4.04	
	1.80	1.75	0.45	0.03	0.00	0.02	4.04	
E	89	53	22	5	0	0	169	1.88
	1.44	0.86	0.36	0.08	0.00	0.00	2.73	
	1.44	0.86	0.36	0.08	0.00	0.00	2.73	
ESE	56	37	25	3	4	1	126	2.44
	0.91	0.60	0.40	0.05	0.06	0.02	2.04	
	0.91	0.60	0.40	0.05	0.06	0.02	2.04	
SE	71	51	38	12	5	7	184	2.91
	1.15	0.82	0.61	0.19	0.08	0.11	2.98	
	1.15	0.82	0.61	0.19	0.08	0.11	2.98	
SSE	51	69	65	21	2	0	208	2.89
	0.82	1.12	1.05	0.34	0.03	0.00	3.36	
	0.82	1.12	1.05	0.34	0.03	0.00	3.36	
S	48	80	87	71	7	0	293	3.66
	0.78	1.29	1.41	1.15	0.11	0.00	4.74	
	0.78	1.29	1.41	1.15	0.11	0.00	4.74	
SSW	50	170	175	94	9	0	498	3.52
	0.81	2.75	2.83	1.52	0.15	0.00	8.05	
	0.81	2.75	2.83	1.52	0.15	0.00	8.05	
SW	33	200	290	121	18	0	662	3.83
	0.53	3.23	4.69	1.96	0.29	0.00	10.71	
	0.53	3.23	4.69	1.96	0.29	0.00	10.71	
WSW	10	71	165	177	42	8	473	4.96
	0.16	1.15	2.67	2.86	0.68	0.13	7.65	
	0.16	1.15	2.67	2.86	0.68	0.13	7.65	
W	5	27	60	87	15	5	199	5.14
	0.08	0.44	0.97	1.41	0.24	0.08	3.22	
	0.08	0.44	0.97	1.41	0.24	0.08	3.22	
WNW	3	15	69	32	6	0	125	4.49
	0.05	0.24	1.12	0.52	0.10	0.00	2.02	
	0.05	0.24	1.12	0.52	0.10	0.00	2.02	
NW	5	18	96	40	3	0	162	4.25
	0.08	0.29	1.55	0.65	0.05	0.00	2.62	
	0.08	0.29	1.55	0.65	0.05	0.00	2.62	
NNW	12	32	101	50	3	0	198	4.12
	0.19	0.52	1.63	0.81	0.05	0.00	3.20	
	0.19	0.52	1.63	0.81	0.05	0.00	3.20	
N	128	375	458	239	58	3	1261	3.79
	2.07	6.07	7.41	3.87	0.94	0.05	20.39	
	2.07	6.07	7.41	3.87	0.94	0.05	20.39	
CALM	3						3	CALM
	0.05						0.05	
	0.05						0.05	
TOTAL	901	2031	1993	1040	185	30	6183	3.49
	14.57	32.85	32.23	16.82	2.99	0.49	100.00	
	14.57	32.85	32.23	16.82	2.99	0.49	100.00	

SUSQUEHANNA STEAM ELECTRIC STATION METEOROLOGICAL REPORTS RUNDATE: 2/14/85

JOINT WIND FREQUENCY DISTRIBUTION FOR ALL WINDS

DATA PERIOD (YY/MM/DD/HH): 84/01/01/01 - 84/12/31/24

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	128	611	276	83	17	5	1120	2.93
	1.67	7.95	3.59	1.08	0.22	0.07	14.58	
	1.67	7.95	3.59	1.08	0.22	0.07	14.58	
NE	136	264	143	39	5	0	587	2.62
	1.77	3.44	1.86	0.51	0.07	0.00	7.64	
	1.77	3.44	1.86	0.51	0.07	0.00	7.64	
ENE	121	134	45	10	5	1	316	2.24
	1.58	1.74	0.59	0.13	0.07	0.01	4.11	
	1.58	1.74	0.59	0.13	0.07	0.01	4.11	
E	106	70	29	11	0	0	216	2.04
	1.38	0.91	0.38	0.14	0.00	0.00	2.81	
	1.38	0.91	0.38	0.14	0.00	0.00	2.81	
ESE	62	50	29	8	4	1	154	2.51
	0.81	0.65	0.38	0.10	0.05	0.01	2.00	
	0.81	0.65	0.38	0.10	0.05	0.01	2.00	
SE	80	63	49	19	16	13	240	3.44
	1.04	0.82	0.64	0.25	0.21	0.17	3.12	
	1.04	0.82	0.64	0.25	0.21	0.17	3.12	
SSE	59	82	97	29	2	0	269	2.99
	0.77	1.07	1.26	0.38	0.03	0.00	3.50	
	0.77	1.07	1.26	0.38	0.03	0.00	3.50	
S	53	102	102	76	7	0	340	3.57
	0.69	1.33	1.33	0.99	0.09	0.00	4.43	
	0.69	1.33	1.33	0.99	0.09	0.00	4.43	
SSW	62	200	191	102	15	4	574	3.56
	0.81	2.60	2.49	1.33	0.20	0.05	7.47	
	0.81	2.60	2.49	1.33	0.20	0.05	7.47	
SW	40	273	328	136	22	0	799	3.75
	0.52	3.55	4.27	1.77	0.29	0.00	10.40	
	0.52	3.55	4.27	1.77	0.29	0.00	10.40	
WSW	14	100	253	243	58	8	676	4.90
	0.18	1.30	3.29	3.16	0.76	0.10	8.80	
	0.18	1.30	3.29	3.16	0.76	0.10	8.80	
W	8	36	77	153	46	10	330	5.62
	0.10	0.47	1.00	1.99	0.60	0.13	4.30	
	0.10	0.47	1.00	1.99	0.60	0.13	4.30	
WNW	3	17	92	58	10	1	181	4.72
	0.04	0.22	1.20	0.76	0.13	0.01	2.36	
	0.04	0.22	1.20	0.76	0.13	0.01	2.36	
NW	7	24	126	62	3	0	222	4.29
	0.09	0.31	1.64	0.81	0.04	0.00	2.89	
	0.09	0.31	1.64	0.81	0.04	0.00	2.89	
NNW	17	42	123	70	3	0	255	4.14
	0.22	0.55	1.60	0.91	0.04	0.00	3.32	
	0.22	0.55	1.60	0.91	0.04	0.00	3.32	
N	145	430	500	262	59	3	1399	3.74
	1.89	5.60	6.51	3.41	0.77	0.04	18.21	
	1.89	5.60	6.51	3.41	0.77	0.04	18.21	
CALM	3						3	CALM
	0.04						0.04	
	0.04						0.04	
TOTAL	1041	2498	2460	1361	272	46	7681	3.58
	13.55	32.52	32.03	17.72	3.54	0.60	100.00	
	13.55	32.52	32.03	17.72	3.54	0.60	100.00	

AVERAGE METEOROLOGICAL RELATIVE CONCENTRATION ANALYSIS
DATA PERIOD : 01/01/84 TO 12/31/84

FIXED AND SPECIAL DISTANCES DISPERSION ANALYSIS
CALENDAR YEAR 1984

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

DATE 17-FEB-85 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)															
9.0E-06	7.8E-06	4.1E-06	2.1E-06	1.8E-06	2.6E-06	4.6E-06	1.2E-05	1.7E-05	3.3E-05	2.4E-05	1.3E-05	6.5E-06	1.0E-05	8.1E-06	6.7E-06
8.2E-06	7.2E-06	3.8E-06	1.9E-06	1.6E-06	2.4E-06	4.2E-06	1.1E-05	1.6E-05	3.0E-05	2.2E-05	1.2E-05	6.0E-06	9.1E-06	7.4E-06	6.2E-06
3.2E-08	4.3E-08	2.6E-08	1.4E-08	9.4E-09	1.3E-08	2.3E-08	3.6E-08	3.4E-08	4.4E-08	2.9E-08	1.7E-08	1.1E-08	2.1E-08	1.9E-08	2.0E-08
8.9E-06	7.8E-06	4.1E-06	2.0E-06	1.7E-06	2.6E-06	4.6E-06	1.2E-05	1.7E-05	3.3E-05	2.3E-05	1.3E-05	6.5E-06	9.9E-06	8.0E-06	6.7E-06
9.0E-06	7.8E-06	4.1E-06	2.1E-06	1.8E-06	2.6E-06	4.6E-06	1.2E-05	1.7E-05	3.3E-05	2.4E-05	1.3E-05	6.5E-06	1.0E-05	8.0E-06	6.7E-06
8.2E-06	7.2E-06	3.8E-06	1.9E-06	1.6E-06	2.4E-06	4.2E-06	1.1E-05	1.6E-05	3.0E-05	2.1E-05	1.2E-05	5.9E-06	9.1E-06	7.3E-06	6.1E-06
8.2E-06	7.2E-06	3.8E-06	1.9E-06	1.6E-06	2.4E-06	4.2E-06	1.1E-05	1.6E-05	3.0E-05	2.2E-05	1.2E-05	6.0E-06	9.1E-06	7.4E-06	6.2E-06
805.	805.	805.	805.	805.	805.	805.	805.	805.	805.	805.	805.	805.	805.	805.	805.
1.5 MILES (2.41 KM)															
1.9E-06	1.6E-06	8.6E-07	3.7E-07	3.1E-07	5.2E-07	8.5E-07	2.3E-06	3.7E-06	7.0E-06	5.8E-06	2.4E-06	1.3E-06	2.1E-06	1.8E-06	1.4E-06
1.6E-06	1.4E-06	7.3E-07	3.1E-07	2.6E-07	4.4E-07	7.2E-07	2.0E-06	3.1E-06	5.9E-06	4.9E-06	2.0E-06	1.1E-06	1.8E-06	1.6E-06	1.2E-06
5.5E-09	7.6E-09	4.6E-09	2.1E-09	1.4E-09	2.1E-09	3.5E-09	5.7E-09	6.1E-09	8.2E-09	6.1E-09	2.5E-09	1.9E-09	3.5E-09	3.6E-09	3.4E-09
1.9E-06	1.6E-06	8.6E-07	3.7E-07	3.1E-07	5.2E-07	8.4E-07	2.3E-06	3.6E-06	6.9E-06	5.7E-06	2.3E-06	1.3E-06	2.0E-06	1.8E-06	1.4E-06
1.9E-06	1.6E-06	8.6E-07	3.7E-07	3.1E-07	5.2E-07	8.5E-07	2.3E-06	3.6E-06	7.0E-06	5.7E-06	2.3E-06	1.3E-06	2.1E-06	1.8E-06	1.4E-06
1.6E-06	1.4E-06	7.3E-07	3.1E-07	2.6E-07	4.4E-07	7.1E-07	1.9E-06	3.1E-06	5.8E-06	4.8E-06	2.0E-06	1.1E-06	1.7E-06	1.5E-06	1.2E-06
1.6E-06	1.4E-06	7.3E-07	3.1E-07	2.6E-07	4.4E-07	7.2E-07	2.0E-06	3.1E-06	5.9E-06	4.8E-06	2.0E-06	1.1E-06	1.7E-06	1.5E-06	1.2E-06
2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.	2414.
2.5 MILES (4.02 KM)															
9.5E-07	8.2E-07	4.4E-07	1.7E-07	1.3E-07	2.2E-07	4.0E-07	1.0E-06	1.7E-06	3.3E-06	2.9E-06	1.1E-06	6.0E-07	9.5E-07	8.7E-07	7.2E-07
7.6E-07	6.6E-07	3.5E-07	1.4E-07	1.0E-07	1.8E-07	3.2E-07	8.4E-07	1.4E-06	2.7E-06	2.4E-06	8.7E-07	4.8E-07	7.6E-07	7.0E-07	5.8E-07
2.5E-09	3.5E-09	2.1E-09	8.8E-10	5.1E-10	8.4E-10	1.5E-09	2.3E-09	2.5E-09	3.3E-09	2.7E-09	1.0E-09	7.5E-10	1.4E-09	1.5E-09	1.6E-09
9.4E-07	8.1E-07	4.3E-07	1.7E-07	1.3E-07	2.2E-07	3.9E-07	1.0E-06	1.7E-06	3.3E-06	2.9E-06	1.1E-06	5.9E-07	9.2E-07	8.5E-07	7.1E-07
9.5E-07	8.2E-07	4.4E-07	1.7E-07	1.3E-07	2.2E-07	4.0E-07	1.0E-06	1.7E-06	3.3E-06	2.9E-06	1.1E-06	6.0E-07	9.4E-07	8.6E-07	7.2E-07
7.5E-07	6.5E-07	3.5E-07	1.4E-07	1.0E-07	1.8E-07	3.1E-07	8.2E-07	1.4E-06	2.6E-06	2.3E-06	8.4E-07	4.7E-07	7.4E-07	6.8E-07	5.7E-07
7.6E-07	6.6E-07	3.5E-07	1.4E-07	1.0E-07	1.8E-07	3.2E-07	8.3E-07	1.4E-06	2.7E-06	2.3E-06	8.6E-07	4.8E-07	7.6E-07	6.9E-07	5.8E-07
4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.	4023.
3.5 MILES (5.63 KM)															
5.2E-07	4.7E-07	2.6E-07	9.3E-08	7.0E-08	1.1E-07	2.1E-07	5.3E-07	8.7E-07	1.8E-06	1.6E-06	5.7E-07	3.3E-07	5.5E-07	4.6E-07	4.0E-07
4.1E-07	3.6E-07	2.0E-07	7.2E-08	5.4E-08	8.2E-08	1.6E-07	4.1E-07	6.7E-07	1.4E-06	1.2E-06	4.4E-07	2.6E-07	4.2E-07	3.6E-07	3.1E-07
1.3E-09	1.8E-09	1.2E-09	4.5E-10	2.6E-10	3.7E-10	7.1E-10	1.1E-09	1.1E-09	1.6E-09	1.3E-09	4.7E-10	3.7E-10	7.5E-10	7.4E-10	7.8E-10
5.1E-07	4.6E-07	2.6E-07	9.2E-08	6.8E-08	1.0E-07	2.0E-07	5.2E-07	8.5E-07	1.8E-06	1.5E-06	5.5E-07	3.2E-07	5.3E-07	4.5E-07	3.9E-07
5.2E-07	4.7E-07	2.6E-07	9.3E-08	6.9E-08	1.1E-07	2.1E-07	5.3E-07	8.6E-07	1.8E-06	1.6E-06	5.6E-07	3.3E-07	5.4E-07	4.6E-07	3.9E-07
4.0E-07	3.6E-07	2.0E-07	7.1E-08	5.3E-08	8.1E-08	1.6E-07	4.0E-07	6.5E-07	1.4E-06	1.2E-06	4.2E-07	2.5E-07	4.1E-07	3.5E-07	3.0E-07
4.0E-07	3.6E-07	2.0E-07	7.2E-08	5.3E-08	8.2E-08	1.6E-07	4.1E-07	6.7E-07	1.4E-06	1.2E-06	4.4E-07	2.5E-07	4.2E-07	3.6E-07	3.0E-07
5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.	5632.

TOTAL OBS - 8783 TOTAL INV OBS - 228 CALMS LOWER LEVEL - 58.00
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 : 01/01/84 TO 12/31/84

FIXED AND SPECIAL DISTANCES DISPERSION ANALYSIS
CALENDAR YEAR 1984

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

DATE 17-FEB-85 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)															
3.6E-07	3.3E-07	1.9E-07	6.2E-08	4.0E-08	6.0E-08	1.1E-07	3.3E-07	5.3E-07	1.2E-06	1.1E-06	3.7E-07	2.2E-07	3.6E-07	3.3E-07	2.7E-07
2.7E-07	2.5E-07	1.4E-07	4.7E-08	3.0E-08	4.5E-08	8.4E-08	2.5E-07	4.0E-07	8.6E-07	7.9E-07	2.8E-07	1.6E-07	2.7E-07	2.5E-07	2.0E-07
8.1E-10	1.2E-09	8.2E-10	2.8E-10	1.4E-10	1.9E-10	3.6E-10	6.0E-10	6.2E-10	9.1E-10	7.6E-10	2.8E-10	2.3E-10	4.5E-10	4.8E-10	5.0E-10
3.5E-07	3.2E-07	1.9E-07	6.1E-08	4.0E-08	5.8E-08	1.1E-07	3.2E-07	5.1E-07	1.1E-06	1.0E-06	3.6E-07	2.1E-07	3.4E-07	3.2E-07	2.6E-07
3.6E-07	3.3E-07	1.9E-07	6.2E-08	4.0E-08	5.9E-08	1.1E-07	3.3E-07	5.2E-07	1.1E-06	1.0E-06	3.7E-07	2.2E-07	3.5E-07	3.2E-07	2.7E-07
2.6E-07	2.4E-07	1.4E-07	4.6E-08	3.0E-08	4.4E-08	8.2E-08	2.4E-07	3.8E-07	8.3E-07	7.6E-07	2.7E-07	1.6E-07	2.6E-07	2.4E-07	2.0E-07
2.7E-07	2.5E-07	1.4E-07	4.6E-08	3.0E-08	4.4E-08	8.3E-08	2.4E-07	3.9E-07	8.5E-07	7.8E-07	2.8E-07	1.6E-07	2.7E-07	2.4E-07	2.0E-07
7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.	7241.
7.5 MILES (12.07 KM)															
1.7E-07	1.6E-07	9.0E-08	2.8E-08	1.4E-08	1.9E-08	3.7E-08	1.3E-07	2.1E-07	4.8E-07	4.6E-07	1.5E-07	9.3E-08	1.6E-07	1.5E-07	1.7E-07
1.2E-07	1.1E-07	6.3E-08	1.9E-08	9.8E-09	1.3E-08	2.6E-08	8.7E-08	1.4E-07	3.4E-07	3.2E-07	1.0E-07	6.5E-08	1.1E-07	1.1E-07	1.2E-07
3.1E-10	4.9E-10	3.3E-10	1.1E-10	4.2E-11	5.1E-11	1.0E-10	1.9E-10	2.0E-10	3.1E-10	2.6E-10	8.9E-11	8.0E-11	1.6E-10	1.9E-10	2.6E-10
1.6E-07	1.5E-07	8.7E-08	2.7E-08	1.4E-08	1.8E-08	3.5E-08	1.2E-07	1.9E-07	4.5E-07	4.3E-07	1.3E-07	8.6E-08	1.5E-07	1.4E-07	1.6E-07
1.6E-07	1.5E-07	8.9E-08	2.7E-08	1.4E-08	1.9E-08	3.6E-08	1.2E-07	2.0E-07	4.7E-07	4.5E-07	1.4E-07	9.1E-08	1.5E-07	1.5E-07	1.7E-07
1.1E-07	1.0E-07	6.1E-08	1.9E-08	9.5E-09	1.3E-08	2.5E-08	8.2E-08	1.3E-07	3.2E-07	3.0E-07	9.4E-08	6.0E-08	1.0E-07	1.0E-07	1.1E-07
1.1E-07	1.1E-07	6.2E-08	1.9E-08	9.7E-09	1.3E-08	2.5E-08	8.6E-08	1.4E-07	3.3E-07	3.1E-07	9.9E-08	6.3E-08	1.1E-07	1.0E-07	1.2E-07
12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.	12068.
15.0 MILES (24.1 KM)															
2.8E-08	3.5E-08	2.9E-08	6.1E-09	3.3E-09	4.6E-09	8.1E-09	1.6E-08	3.7E-08	8.1E-08	7.0E-08	2.2E-08	1.8E-08	3.2E-08	2.9E-08	2.6E-08
1.7E-08	2.1E-08	1.8E-08	3.8E-09	2.0E-09	2.8E-09	5.0E-09	9.7E-09	2.3E-08	5.0E-08	4.3E-08	1.3E-08	1.1E-08	2.0E-08	1.8E-08	1.6E-08
3.9E-11	8.4E-11	8.2E-11	1.8E-11	7.5E-12	9.4E-12	1.7E-11	1.8E-11	2.6E-11	3.6E-11	2.8E-11	9.5E-12	1.1E-11	2.5E-11	2.7E-11	2.9E-11
2.6E-08	3.3E-08	2.7E-08	5.7E-09	3.1E-09	4.2E-09	7.4E-09	1.4E-08	3.3E-08	7.2E-08	6.2E-08	1.9E-08	1.6E-08	2.8E-08	2.6E-08	2.3E-08
2.7E-08	3.4E-08	2.9E-08	6.0E-09	3.2E-09	4.5E-09	7.9E-09	1.5E-08	3.6E-08	7.8E-08	6.8E-08	2.1E-08	1.7E-08	3.1E-08	2.8E-08	2.5E-08
1.6E-08	2.0E-08	1.7E-08	3.5E-09	1.9E-09	2.6E-09	4.6E-09	8.7E-09	2.0E-08	4.4E-08	3.8E-08	1.1E-08	9.5E-09	1.7E-08	1.6E-08	1.4E-08
1.7E-08	2.1E-08	1.8E-08	3.7E-09	2.0E-09	2.7E-09	4.9E-09	9.4E-09	2.2E-08	4.8E-08	4.2E-08	1.3E-08	1.1E-08	1.9E-08	1.7E-08	1.5E-08
24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.	24135.
25.0 MILES (40.2 KM)															
4.8E-09	4.7E-09	8.9E-09	1.7E-09	1.0E-09	6.6E-10	1.3E-09	2.6E-09	6.5E-09	1.9E-08	1.2E-08	2.6E-09	3.2E-09	4.3E-09	4.4E-09	6.0E-09
2.6E-09	2.6E-09	4.9E-09	9.3E-10	5.6E-10	3.6E-10	7.2E-10	1.4E-09	3.6E-09	1.0E-08	6.5E-09	1.4E-09	1.8E-09	2.4E-09	2.4E-09	3.3E-09
5.1E-12	8.8E-12	2.0E-11	4.0E-12	1.8E-12	1.1E-12	2.1E-12	2.3E-12	3.4E-12	6.2E-12	3.5E-12	8.5E-13	1.5E-12	2.5E-12	3.0E-12	5.2E-12
4.1E-09	4.2E-09	8.0E-09	1.5E-09	9.0E-10	5.8E-10	1.1E-09	2.2E-09	5.2E-09	1.6E-08	9.5E-09	2.0E-09	2.5E-09	3.5E-09	3.6E-09	5.0E-09
4.6E-09	4.6E-09	8.6E-09	1.6E-09	9.8E-10	6.4E-10	1.3E-09	2.5E-09	6.1E-09	1.8E-08	1.1E-08	2.4E-09	3.0E-09	4.1E-09	4.1E-09	5.7E-09
2.3E-09	2.3E-09	4.4E-09	8.4E-10	4.9E-10	3.2E-10	6.3E-10	1.2E-09	2.9E-09	8.5E-09	5.2E-09	1.1E-09	1.4E-09	1.9E-09	2.0E-09	2.8E-09
2.5E-09	2.5E-09	4.7E-09	9.0E-10	5.4E-10	3.5E-10	6.9E-10	1.4E-09	3.3E-09	9.8E-09	6.1E-09	1.3E-09	1.6E-09	2.2E-09	2.3E-09	3.1E-09
40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.	40225.

TOTAL OBS - 8783 TOTAL INV OBS - 228 CALMS LOWER LEVEL - 58.00

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 : 01/01/84 TO 12/31/84

FIXED AND SPECIAL DISTANCES DISPERSION ANALYSIS
CALENDAR YEAR 1984

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

DATE 17-FEB-85 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)															
1.3E-09	1.2E-09	2.3E-09	3.5E-10	1.4E-10	1.3E-10	2.8E-10	6.6E-10	1.1E-09	6.1E-09	2.5E-09	5.2E-10	2.2E-10	5.5E-10	1.6E-09	1.1E-09
6.4E-10	6.1E-10	1.2E-09	1.8E-10	7.1E-11	6.3E-11	1.4E-10	3.3E-10	5.7E-10	3.0E-09	1.2E-09	2.6E-10	1.1E-10	2.8E-10	7.8E-10	5.4E-10
1.1E-12	1.9E-12	4.2E-12	6.9E-13	2.1E-13	1.7E-13	3.8E-13	4.6E-13	4.8E-13	1.6E-12	5.9E-13	1.4E-13	8.4E-14	2.6E-13	8.8E-13	7.6E-13
1.0E-09	1.0E-09	2.0E-09	3.0E-10	1.2E-10	1.1E-10	2.3E-10	5.1E-10	8.4E-10	4.6E-09	1.9E-09	3.6E-10	1.6E-10	4.1E-10	1.2E-09	8.5E-10
1.2E-09	1.2E-09	2.2E-09	3.4E-10	1.3E-10	1.2E-10	2.7E-10	6.1E-10	1.0E-09	5.6E-09	2.3E-09	4.6E-10	2.0E-10	5.0E-10	1.4E-09	1.0E-09
5.2E-10	5.2E-10	9.9E-10	1.5E-10	5.9E-11	5.3E-11	1.2E-10	2.6E-10	4.2E-10	2.3E-09	9.3E-10	1.8E-10	7.9E-11	2.0E-10	6.0E-10	4.3E-10
6.0E-10	5.8E-10	1.1E-09	1.7E-10	6.7E-11	6.0E-11	1.3E-10	3.1E-10	5.2E-10	2.8E-09	1.1E-09	2.3E-10	9.9E-11	2.5E-10	7.2E-10	5.0E-10
56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.	56315.
45.0 MILES (72.4 KM)															
5.0E-10	4.1E-10	8.1E-10	1.1E-10	3.4E-11	1.8E-11	8.8E-11	2.9E-10	3.3E-10	2.5E-09	6.1E-10	1.3E-10	5.3E-11	1.3E-10	5.1E-10	3.0E-10
2.3E-10	1.9E-10	3.7E-10	5.2E-11	1.6E-11	8.6E-12	4.1E-11	1.4E-10	1.6E-10	1.1E-09	2.9E-10	5.9E-11	2.5E-11	6.3E-11	2.4E-10	1.4E-10
3.7E-13	5.4E-13	1.3E-12	1.9E-13	4.3E-14	2.1E-14	1.0E-13	1.7E-13	1.2E-13	5.4E-13	1.2E-13	2.8E-14	1.7E-14	5.4E-14	2.4E-13	1.8E-13
3.9E-10	3.4E-10	6.7E-10	9.3E-11	2.7E-11	1.5E-11	6.9E-11	2.1E-10	2.3E-10	1.7E-09	4.3E-10	8.1E-11	3.5E-11	9.1E-11	3.6E-10	2.3E-10
4.6E-10	3.9E-10	7.6E-10	1.1E-10	3.2E-11	1.7E-11	8.2E-11	2.6E-10	3.0E-10	2.2E-09	5.5E-10	1.1E-10	4.7E-11	1.2E-10	4.6E-10	2.8E-10
1.8E-10	1.6E-10	3.1E-10	4.3E-11	1.3E-11	6.8E-12	3.2E-11	9.8E-11	1.1E-10	8.0E-10	2.0E-10	3.8E-11	1.6E-11	4.3E-11	1.7E-10	1.1E-10
2.2E-10	1.8E-10	3.5E-10	4.9E-11	1.5E-11	8.0E-12	3.8E-11	1.2E-10	1.4E-10	1.0E-09	2.6E-10	5.2E-11	2.2E-11	5.6E-11	2.1E-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	1.1E-05	5.6E-06	2.8E-06	2.5E-06	3.6E-06	6.1E-06	1.6E-05	2.5E-05	4.7E-05	3.2E-05	1.8E-05	9.1E-06	1.4E-05	1.1E-05	9.5E-06
1.0E-05	9.9E-06	5.2E-06	2.6E-06	2.3E-06	3.3E-06	5.7E-06	1.5E-05	2.3E-05	4.4E-05	3.0E-05	1.7E-05	8.4E-06	1.3E-05	9.7E-06	8.8E-06
4.1E-08	6.1E-08	3.7E-08	2.0E-08	1.4E-08	1.8E-08	3.1E-08	4.9E-08	5.0E-08	6.2E-08	3.9E-08	2.3E-08	1.6E-08	2.9E-08	2.6E-08	2.9E-08
1.1E-05	1.1E-05	5.6E-06	2.8E-06	2.5E-06	3.6E-06	6.1E-06	1.6E-05	2.5E-05	4.7E-05	3.2E-05	1.8E-05	9.1E-06	1.4E-05	1.0E-05	9.4E-06
1.1E-05	1.1E-05	5.6E-06	2.8E-06	2.5E-06	3.6E-06	6.1E-06	1.6E-05	2.5E-05	4.7E-05	3.2E-05	1.8E-05	9.1E-06	1.4E-05	1.1E-05	9.5E-06
1.0E-05	9.9E-06	5.2E-06	2.6E-06	2.3E-06	3.3E-06	5.7E-06	1.5E-05	2.3E-05	4.3E-05	3.0E-05	1.7E-05	8.4E-06	1.3E-05	9.7E-06	8.7E-06
1.0E-05	9.9E-06	5.2E-06	2.6E-06	2.3E-06	3.3E-06	5.7E-06	1.5E-05	2.3E-05	4.4E-05	3.0E-05	1.7E-05	8.4E-06	1.3E-05	9.7E-06	8.8E-06
644.	644.	644.	644.	644.	644.	644.	644.	644.	644.	644.	644.	644.	644.	644.	644.
0.6 MILES (0.965 KM)															
6.9E-06	6.2E-06	3.2E-06	1.6E-06	1.4E-06	2.0E-06	3.6E-06	9.4E-06	1.4E-05	2.6E-05	2.0E-05	1.0E-05	5.2E-06	7.8E-06	6.3E-06	5.3E-06
6.2E-06	5.6E-06	2.9E-06	1.4E-06	1.2E-06	1.8E-06	3.3E-06	8.5E-06	1.2E-05	2.4E-05	1.8E-05	9.4E-06	4.7E-06	7.1E-06	5.7E-06	4.8E-06
2.4E-08	3.3E-08	2.0E-08	1.0E-08	7.0E-09	9.6E-09	1.7E-08	2.7E-08	2.7E-08	3.5E-08	2.4E-08	1.3E-08	8.8E-09	1.6E-08	1.5E-08	1.5E-08
6.9E-06	6.2E-06	3.2E-06	1.6E-06	1.3E-06	2.0E-06	3.6E-06	9.3E-06	1.4E-05	2.6E-05	2.0E-05	1.0E-05	5.2E-06	7.7E-06	6.2E-06	5.3E-06
6.9E-06	6.2E-06	3.2E-06	1.6E-06	1.4E-06	2.0E-06	3.6E-06	9.4E-06	1.4E-05	2.6E-05	2.0E-05	1.0E-05	5.2E-06	7.8E-06	6.3E-06	5.3E-06
6.2E-06	5.6E-06	2.9E-06	1.4E-06	1.2E-06	1.8E-06	3.3E-06	8.5E-06	1.2E-05	2.4E-05	1.8E-05	9.3E-06	4.7E-06	7.0E-06	5.7E-06	4.8E-06
6.2E-06	5.6E-06	2.9E-06	1.4E-06	1.2E-06	1.8E-06	3.3E-06	8.5E-06	1.2E-05	2.4E-05	1.8E-05	9.3E-06	4.7E-06	7.0E-06	5.7E-06	4.8E-06
965.	965.	965.	965.	965.	965.	965.	965.	965.	965.	965.	965.	965.	965.	965.	965.

TOTAL OBS - 8783 TOTAL INV OBS - 228 CALMS LOWER LEVEL - 58.00

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 : 01/01/84 TO 12/31/84

FIXED AND SPECIAL DISTANCES DISPERSION ANALYSIS
CALENDAR YEAR 1984

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

DATE 17-FEB-85 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)															
5.7E-06	5.0E-06	2.6E-06	1.3E-06	1.1E-06	1.6E-06	2.9E-06	7.6E-06	1.1E-05	2.1E-05	1.6E-05	7.9E-06	4.0E-06	6.1E-06	5.3E-06	4.1E-06
5.2E-06	4.5E-06	2.3E-06	1.1E-06	9.5E-07	1.4E-06	2.6E-06	6.8E-06	9.8E-06	1.9E-05	1.4E-05	7.1E-06	3.6E-06	5.4E-06	4.8E-06	3.7E-06
1.9E-08	2.[illegible]E-08	1.6E-08	8.2E-09	5.4E-09	7.6E-09	1.4E-08	2.1E-08	2.1E-08	2.9E-08	1.9E-08	9.9E-09	6.7E-09	1.2E-08	1.2E-08	1.2E-08
5.7E-06	5.[illegible]E-06	2.6E-06	1.3E-06	1.1E-06	1.6E-06	2.9E-06	7.6E-06	1.1E-05	2.1E-05	1.6E-05	7.9E-06	4.0E-06	6.0E-06	5.3E-06	4.1E-06
5.7E-06	5.[illegible]E-06	2.6E-06	1.3E-06	1.1E-06	1.6E-06	2.9E-06	7.6E-06	1.1E-05	2.1E-05	1.6E-05	7.9E-06	4.0E-06	6.1E-06	5.3E-06	4.1E-06
5.1E-06	4.[illegible]E-06	2.3E-06	1.1E-06	9.5E-07	1.4E-06	2.6E-06	6.8E-06	9.8E-06	1.9E-05	1.4E-05	7.1E-06	3.6E-06	5.4E-06	4.7E-06	3.7E-06
5.1E-06	4.5E-06	2.3E-06	1.1E-06	9.5E-07	1.4E-06	2.6E-06	6.8E-06	9.8E-06	1.9E-05	1.4E-05	7.1E-06	3.6E-06	5.4E-06	4.8E-06	3.7E-06
1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.	1126.
0.8 MILES (1.287 KM)															
4.5E-06	4.2E-06	2.2E-06	1.1E-06	9.2E-07	1.5E-06	2.5E-06	6.2E-06	9.1E-06	1.8E-05	1.3E-05	6.2E-06	3.5E-06	5.5E-06	4.4E-06	3.5E-06
4.0E-06	3.7E-06	2.0E-06	9.4E-07	8.2E-07	1.3E-06	2.2E-06	5.5E-06	8.1E-06	1.6E-05	1.2E-05	5.5E-06	3.1E-06	4.9E-06	3.9E-06	3.1E-06
1.5E-08	2.2E-08	1.3E-08	6.6E-09	4.6E-09	6.7E-09	1.1E-08	1.7E-08	1.7E-08	2.3E-08	1.6E-08	7.7E-09	5.7E-09	1.1E-08	1.0E-08	9.8E-09
4.5E-06	4.1E-06	2.2E-06	1.1E-06	9.2E-07	1.4E-06	2.5E-06	6.2E-06	9.1E-06	1.8E-05	1.3E-05	6.2E-06	3.5E-06	5.4E-06	4.4E-06	3.5E-06
4.5E-06	4.2E-06	2.2E-06	1.1E-06	9.2E-07	1.5E-06	2.5E-06	6.2E-06	9.1E-06	1.8E-05	1.3E-05	6.2E-06	3.5E-06	5.5E-06	4.4E-06	3.5E-06
4.0E-06	3.7E-06	2.0E-06	9.3E-07	8.1E-07	1.3E-06	2.2E-06	5.5E-06	8.1E-06	1.6E-05	1.2E-05	5.5E-06	3.1E-06	4.8E-06	3.9E-06	3.1E-06
4.0E-06	3.7E-06	2.0E-06	9.4E-07	8.2E-07	1.3E-06	2.2E-06	5.5E-06	8.1E-06	1.6E-05	1.2E-05	5.5E-06	3.1E-06	4.9E-06	3.9E-06	3.1E-06
1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.	1287.
0.9 MILES (1.448 KM)															
3.9E-06	3.5E-06	1.8E-06	8.7E-07	7.5E-07	1.2E-06	2.1E-06	5.3E-06	7.6E-06	1.5E-05	1.2E-05	5.5E-06	2.9E-06	4.4E-06	3.9E-06	2.8E-06
3.5E-06	3.1E-06	1.6E-06	7.6E-07	6.6E-07	1.0E-06	1.8E-06	4.7E-06	6.7E-06	1.3E-05	1.1E-05	4.8E-06	2.6E-06	3.9E-06	3.4E-06	2.5E-06
1.3E-08	1.8E-08	1.1E-08	5.3E-09	3.7E-09	5.3E-09	9.4E-09	1.4E-08	1.4E-08	1.9E-08	1.4E-08	6.6E-09	4.7E-09	8.4E-09	8.5E-09	7.7E-09
3.9E-06	3.5E-06	1.8E-06	8.6E-07	7.5E-07	1.2E-06	2.1E-06	5.3E-06	7.5E-06	1.5E-05	1.2E-05	5.4E-06	2.9E-06	4.4E-06	3.9E-06	2.8E-06
3.9E-06	3.5E-06	1.8E-06	8.7E-07	7.5E-07	1.2E-06	2.1E-06	5.3E-06	7.5E-06	1.5E-05	1.2E-05	5.4E-06	2.9E-06	4.4E-06	3.9E-06	2.8E-06
3.5E-06	3.1E-06	1.6E-06	7.6E-07	6.6E-07	1.0E-06	1.8E-06	4.6E-06	6.6E-06	1.3E-05	1.1E-05	4.8E-06	2.6E-06	3.9E-06	3.4E-06	2.5E-06
3.5E-06	3.1E-06	1.6E-06	7.6E-07	6.6E-07	1.0E-06	1.8E-06	4.7E-06	6.6E-06	1.3E-05	1.1E-05	4.8E-06	2.6E-06	3.9E-06	3.4E-06	2.5E-06
1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.	1448.
1.0 MILES (1.609 KM)															
3.5E-06	2.9E-06	1.6E-06	7.0E-07	6.0E-07	1.0E-06	1.6E-06	4.4E-06	6.3E-06	1.3E-05	1.0E-05	4.4E-06	2.4E-06	3.7E-06	3.4E-06	2.4E-06
3.1E-06	2.5E-06	1.4E-06	6.1E-07	5.2E-07	8.7E-07	1.4E-06	3.9E-06	5.5E-06	1.1E-05	8.9E-06	3.9E-06	2.1E-06	3.2E-06	3.0E-06	2.1E-06
1.1E-08	1.4E-08	9.3E-09	4.2E-09	2.8E-09	4.4E-09	7.2E-09	1.2E-08	1.1E-08	1.6E-08	1.2E-08	5.2E-09	3.7E-09	6.9E-09	7.4E-09	6.3E-09
3.5E-06	2.9E-06	1.6E-06	7.0E-07	5.9E-07	9.9E-07	1.6E-06	4.4E-06	6.2E-06	1.3E-05	1.0E-05	4.4E-06	2.3E-06	3.7E-06	3.4E-06	2.4E-06
3.5E-06	2.9E-06	1.6E-06	7.0E-07	5.9E-07	1.0E-06	1.6E-06	4.4E-06	6.3E-06	1.3E-05	1.0E-05	4.4E-06	2.4E-06	3.7E-06	3.4E-06	2.4E-06
3.0E-06	2.5E-06	1.4E-06	6.1E-07	5.2E-07	8.7E-07	1.4E-06	3.8E-06	5.4E-06	1.1E-05	8.8E-06	3.8E-06	2.1E-06	3.2E-06	3.0E-06	2.1E-06
3.0E-06	2.5E-06	1.4E-06	6.1E-07	5.2E-07	8.7E-07	1.4E-06	3.9E-06	5.5E-06	1.1E-05	8.8E-06	3.9E-06	2.1E-06	3.2E-06	3.0E-06	2.1E-06
1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.	1609.

TOTAL OBS - 8783 TOTAL INV OBS - 228 CALMS LOWER LEVEL - 58.00
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 : 01/01/84 TO 12/31/84

FIXED AND SPECIAL DISTANCES DISPERSION ANALYSIS
CALENDAR YEAR 1984

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

DATE 17-FEB-85 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 (INCLUDING PURCHASED FARM IN SW)------															
1.1E-05	7.1E-06	2.0E-06	1.0E-06	1.7E-06	4.4E-06	6.5E-06	1.7E-05	2.3E-05	2.6E-05	2.0E-05	1.1E-05	5.1E-06	1.1E-05	1.0E-05	9.5E-06
9.9E-06	6.4E-06	1.7E-06	9.2E-07	1.5E-06	4.1E-06	6.0E-06	1.6E-05	2.1E-05	2.4E-05	1.8E-05	9.6E-06	4.7E-06	1.0E-05	9.7E-06	8.8E-06
3.9E-08	3.9E-08	1.1E-08	6.5E-09	8.8E-09	2.2E-08	3.3E-08	5.1E-08	4.5E-08	3.5E-08	2.4E-08	1.3E-08	8.7E-09	2.3E-08	2.6E-08	2.9E-08
1.1E-05	7.0E-06	1.9E-06	1.0E-06	1.7E-06	4.4E-06	6.5E-06	1.7E-05	2.3E-05	2.6E-05	2.0E-05	1.1E-05	5.1E-06	1.1E-05	1.0E-05	9.4E-06
1.1E-05	7.0E-06	2.0E-06	1.0E-06	1.7E-06	4.4E-06	6.5E-06	1.7E-05	2.3E-05	2.6E-05	2.0E-05	1.1E-05	5.1E-06	1.1E-05	1.0E-05	9.5E-06
9.9E-06	6.4E-06	1.7E-06	9.2E-07	1.5E-06	4.1E-06	6.0E-06	1.6E-05	2.1E-05	2.4E-05	1.8E-05	9.5E-06	4.6E-06	1.0E-05	9.7E-06	8.7E-06
9.9E-06	6.4E-06	1.7E-06	9.2E-07	1.5E-06	4.1E-06	6.0E-06	1.6E-05	2.1E-05	2.4E-05	1.8E-05	9.6E-06	4.6E-06	1.0E-05	9.7E-06	8.8E-06
664.	875.	1395.	1298.	837.	558.	587.	587.	682.	965.	972.	943.	972.	742.	645.	644.
NEAREST DAIRY ANIMALS (PER 1984 LAND-USE CENSUS)----															
3.1E-07	2.8E-07	3.9E-07	6.2E-08	1.4E-07	2.1E-07	2.5E-07	1.1E-06	1.2E-06	1.8E-06	4.8E-06	3.1E-07	1.8E-07	3.5E-06	3.6E-07	2.5E-07
2.3E-07	2.1E-07	3.1E-07	4.7E-08	1.1E-07	1.7E-07	1.9E-07	9.0E-07	9.5E-07	1.4E-06	4.0E-06	2.3E-07	1.4E-07	3.1E-06	2.7E-07	1.8E-07
6.7E-10	1.0E-09	1.9E-09	2.8E-10	5.6E-10	7.8E-10	8.6E-10	2.5E-09	1.6E-09	1.6E-09	5.0E-09	2.2E-10	1.8E-10	6.7E-09	3.4E-10	4.3E-10
3.0E-07	2.8E-07	3.8E-07	6.1E-08	1.4E-07	2.1E-07	2.4E-07	1.1E-06	1.2E-06	1.8E-06	4.8E-06	3.0E-07	1.8E-07	3.5E-06	3.5E-07	2.4E-07
3.1E-07	2.8E-07	3.9E-07	6.2E-08	1.4E-07	2.1E-07	2.5E-07	1.1E-06	1.2E-06	1.8E-06	4.8E-06	3.1E-07	1.8E-07	3.5E-06	3.6E-07	2.4E-07
2.2E-07	2.0E-07	3.1E-07	4.6E-08	1.1E-07	1.7E-07	1.9E-07	8.8E-07	9.3E-07	1.4E-06	4.0E-06	2.2E-07	1.3E-07	3.1E-06	2.6E-07	1.8E-07
2.3E-07	2.1E-07	3.1E-07	4.6E-08	1.1E-07	1.7E-07	1.9E-07	8.9E-07	9.5E-07	1.4E-06	4.0E-06	2.3E-07	1.3E-07	3.1E-06	2.7E-07	1.8E-07
8045.	8045.	4344.	7241.	3862.	4183.	5149.	3862.	4827.	5632.	2735.	8045.	8045.	1448.	6758.	8045.
NEAREST GARDENS (PER 1984 LAND-USE CENSUS)----------															
3.0E-06	9.2E-07	4.6E-07	1.8E-06	3.0E-07	3.6E-06	2.9E-06	3.4E-06	3.7E-06	1.8E-05	7.9E-06	3.0E-06	3.5E-06	4.2E-06	2.0E-06	5.3E-06
2.6E-06	7.4E-07	3.7E-07	1.7E-06	2.6E-07	3.3E-06	2.6E-06	2.9E-06	3.1E-06	1.6E-05	6.8E-06	2.5E-06	3.1E-06	3.7E-06	1.7E-06	4.8E-06
9.4E-09	3.9E-09	2.3E-09	1.3E-08	1.4E-09	1.8E-08	1.4E-08	8.6E-09	6.1E-09	2.3E-08	8.8E-09	3.3E-09	5.7E-09	8.0E-09	4.0E-09	1.5E-08
3.0E-06	9.1E-07	4.6E-07	1.8E-06	3.0E-07	3.6E-06	2.9E-06	3.3E-06	3.6E-06	1.8E-05	7.8E-06	2.9E-06	3.5E-06	4.2E-06	2.0E-06	5.3E-06
3.0E-06	9.1E-07	4.6E-07	1.8E-06	3.0E-07	3.6E-06	2.9E-06	3.3E-06	3.6E-06	1.8E-05	7.8E-06	2.9E-06	3.5E-06	4.2E-06	2.0E-06	5.3E-06
2.6E-06	7.4E-07	3.7E-07	1.7E-06	2.6E-07	3.3E-06	2.6E-06	2.9E-06	3.1E-06	1.6E-05	6.7E-06	2.5E-06	3.1E-06	3.7E-06	1.7E-06	4.8E-06
2.6E-06	7.4E-07	3.7E-07	1.7E-06	2.6E-07	3.3E-06	2.6E-06	2.9E-06	3.1E-06	1.6E-05	6.7E-06	2.5E-06	3.1E-06	3.7E-06	1.7E-06	4.8E-06
1770.	3701.	3862.	805.	2253.	644.	1126.	1931.	2414.	1287.	1931.	2092.	1287.	1448.	2253.	965.
NEAREST RESIDENCES (84 CENSUS)----------															
3.5E-06	9.2E-07	5.5E-07	1.8E-06	1.8E-06	3.6E-06	2.9E-06	3.8E-06	3.7E-06	2.8E-05	7.9E-06	6.2E-06	3.5E-06	4.4E-06	5.3E-06	5.3E-06
3.1E-06	7.4E-07	4.5E-07	1.7E-06	1.6E-06	3.3E-06	2.6E-06	3.3E-06	3.1E-06	2.5E-05	6.8E-06	5.5E-06	3.1E-06	3.9E-06	4.8E-06	4.8E-06
1.1E-08	3.9E-09	2.8E-09	1.3E-08	9.4E-09	1.8E-08	1.4E-08	9.9E-09	6.1E-09	3.7E-08	8.8E-09	7.7E-09	5.7E-09	8.4E-09	1.2E-08	1.5E-08
3.5E-06	9.1E-07	5.4E-07	1.8E-06	1.7E-06	3.6E-06	2.9E-06	3.8E-06	3.6E-06	2.8E-05	7.8E-06	6.2E-06	3.5E-06	4.4E-06	5.3E-06	5.3E-06
3.5E-06	9.1E-07	5.5E-07	1.8E-06	1.8E-06	3.6E-06	2.9E-06	3.8E-06	3.6E-06	2.8E-05	7.8E-06	6.2E-06	3.5E-06	4.4E-06	5.3E-06	5.3E-06
3.0E-06	7.4E-07	4.4E-07	1.7E-06	1.6E-06	3.3E-06	2.6E-06	3.3E-06	3.1E-06	2.5E-05	6.7E-06	5.5E-06	3.1E-06	3.9E-06	4.7E-06	4.8E-06
3.0E-06	7.4E-07	4.5E-07	1.7E-06	1.6E-06	3.3E-06	2.6E-06	3.3E-06	3.1E-06	2.5E-05	6.7E-06	5.5E-06	3.1E-06	3.9E-06	4.8E-06	4.8E-06
1609.	3701.	3379.	805.	805.	644.	1126.	1770.	2414.	965.	1931.	1287.	1287.	1448.	1126.	965.

TOTAL OBS - 8783 TOTAL INV OBS - 228 CALMS LOWER LEVEL - 58.00
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 : 01/01/84 TO 12/31/84

FIXED AND SPECIAL DISTANCES DISPERSION ANALYSIS
CALENDAR YEAR 1984

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

DATE 17-FEB-85 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 ----------															
6.9E-07	6.1E-07	3.3E-07	1.2E-07	9.3E-08	1.5E-07	2.8E-07	7.3E-07	1.2E-06	2.4E-06	2.1E-06	7.7E-07	4.4E-07	7.1E-07	6.2E-07	5.2E-07
5.4E-07	4.8E-07	2.6E-07	9.8E-08	7.3E-08	1.2E-07	2.2E-07	5.8E-07	9.5E-07	1.9E-06	1.7E-06	6.1E-07	3.4E-07	5.6E-07	4.9E-07	4.1E-07
1.7E-09	2.5E-09	1.6E-09	6.1E-10	3.6E-10	5.5E-10	1.0E-09	1.5E-09	1.6E-09	2.3E-09	1.8E-09	6.7E-10	5.2E-10	1.0E-09	1.0E-09	1.1E-09
6.8E-07	6.0E-07	3.3E-07	1.2E-07	9.1E-08	1.5E-07	2.8E-07	7.2E-07	1.2E-06	2.4E-06	2.1E-06	7.5E-07	4.2E-07	6.9E-07	6.1E-07	5.1E-07
6.9E-07	6.1E-07	3.3E-07	1.2E-07	9.2E-08	1.5E-07	2.8E-07	7.3E-07	1.2E-06	2.4E-06	2.1E-06	7.7E-07	4.3E-07	7.0E-07	6.2E-07	5.2E-07
5.4E-07	4.7E-07	2.6E-07	9.6E-08	7.2E-08	1.2E-07	2.2E-07	5.7E-07	9.3E-07	1.9E-06	1.6E-06	5.9E-07	3.3E-07	5.4E-07	4.8E-07	4.0E-07
5.4E-07	4.8E-07	2.6E-07	9.7E-08	7.3E-08	1.2E-07	2.2E-07	5.7E-07	9.5E-07	1.9E-06	1.7E-06	6.0E-07	3.4E-07	5.5E-07	4.9E-07	4.1E-07
4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.	4827.

TOTAL OBS - 8783 TOTAL INV OBS - 228 CALMS LOWER LEVEL - 58.00
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

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	2.13	2.24	2.51	2.33	2.58	2.37	2.34	2.09	2.29	2.04	2.05	2.40	2.67	3.00	2.35	2.17
NEAREST DAIRY ANIMAL	2.29	2.41	2.72	1.80	2.02	2.25	2.18	2.21	2.11	1.77	2.34	1.46	1.95	2.51	2.40	2.18
NEAREST GARDENS (PER	2.48	2.47	2.70	2.09	2.00	2.45	2.77	2.43	2.41	2.18	2.31	2.15	2.74	3.01	2.75	2.20
NEAREST RESIDENCES (	2.50	2.47	2.63	2.09	2.58	2.45	2.77	2.43	2.41	2.18	2.31	2.29	2.74	3.18	2.69	2.20
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	2.22

TABLE 14

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	0.0	0.0	0.200	0.0	0.0	0.0	0.0	0.0	0.600	0.0	0.0	0.0	0.0	0.200	0.0	0.0
B	0.0	0.0	0.0	0.0	0.250	0.250	0.0	0.250	0.250	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C	0.0	0.0	0.250	0.083	0.0	0.083	0.168	0.0	0.083	0.333	0.0	0.0	0.0	0.0	0.0	0.0
D	0.116	0.063	0.089	0.087	0.051	0.100	0.085	0.087	0.109	0.083	0.036	0.002	0.005	0.007	0.016	0.065
E	0.112	0.143	0.121	0.083	0.058	0.066	0.075	0.074	0.081	0.040	0.025	0.012	0.006	0.012	0.014	0.079
F	0.098	0.315	0.282	0.105	0.034	0.031	0.032	0.023	0.024	0.006	0.003	0.003	0.003	0.004	0.009	0.029
G	0.106	0.441	0.303	0.061	0.015	0.025	0.006	0.006	0.006	0.002	0.0	0.0	0.0	0.004	0.002	0.021

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 - MET84
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: 1984

	DOSE*** (millirem)				
Source	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Year**
A. Waterborne Effluents	1 2.66E-4	5 6.06E-5	9 7.80E-5	13 3.40E-5	17 3.82E-4
B. Airborne Effluents i) Iodines & Particulates	2 1.05E-2	6 8.12E-2	10 1.71E-1	14 4.52E-2	18 3.07E-1
ii) Noble Gases	3 5.31E-4	7 3.88E-2	11 8.00E-2	15 1.96E-2	19 1.39E-1
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

* "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 teen 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 lung via the vegetation, inhalation, and ground pathways. Calculated at the residence at 0.8 mi SW using the GASPAR program.

3. Dose to the total body via the plume pathway. Calculated at the residence at 0.8 mi SW using GASPAR.

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

5. Dose to the child total body, primarily via the drinking water and fish pathways. Location: Danville, PA.

6. Dose to the child thyroid via the vegetation, ground, and inhalation pathways. Location: Residence 0.8 mi SW.

7. See Footnote 3.

8. See Footnote 4.

9. See Footnote 5.

10. See Footnote 6.

11. See Footnote 3.

12. See Footnote 4.

13. See Footnote 5.

14. See Footnote 6.

15. See Footnote 3.

16. See Footnote 4.

17. See Footnote 1.

18. See Footnote 2.

19. See Footnote 3.

20. See Footnote 4.

METHOD FOR TLD DATA ANALYSIS

The historical relationships between SSES Radiological Environmental Monitoring Program (REMP) control TLD location data points and the indicator TLD location data points are used to predictively model the expected radiation levels at the indicator locations. Preoperational data from third quarter 1980 through second quarter 1982 were used to calculate the predictive model for 19 indicator locations*. For each of the 8 preoperational quarterly readings, the ratio of the indicator reading to the average of four control readings (4G1, 7G1, 12G1, and 3G3) was calculated for all 19 indicator locations. The average and standard deviation of the ratio for the 8 quarterly readings were calculated for each indicator location. This constitutes the predictive model.

The 1984 data was compared to the predictive model. For each quarter of 1984, the ratio of the indicator reading to the average of the four control readings was calculated for all 19 indicator locations. The four quarterly values calculated for each of the 19 indicator locations were compared to the respective predictive model via a Student's t-test. In all cases the 1984 data were not significantly different from the preoperational data at the 95% confidence level. It is therefore concluded that the radiation levels at the indicator locations are not higher than expected from natural background, and direct radiation from SSES is estimated to be 0 mR.

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* Indicator locations used: 1S2, 2S2, 2S3, 4S1, 3S4, 4S3, 5S7, 6S4, 7S3, 8S2, 9S1, 10S1, 11S2, 12S3, 13S2, 14S5, 15S3, 16S1, and 7A1.

DOSES TO MEMBERS OF THE PUBLIC WITHIN THE SITE BOUNDARY

SSES Technical Specification 6.9.1.8 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 1984 indicate radiation levels are not significantly different than observed natural background (See "Methods of TLD Data Analysis" on page 59).

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 0.4 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 0.4 mi in the SE sector indicated radiation levels that are not significantly different from background (See "Methods of TLD Data Analysis" on page 59).

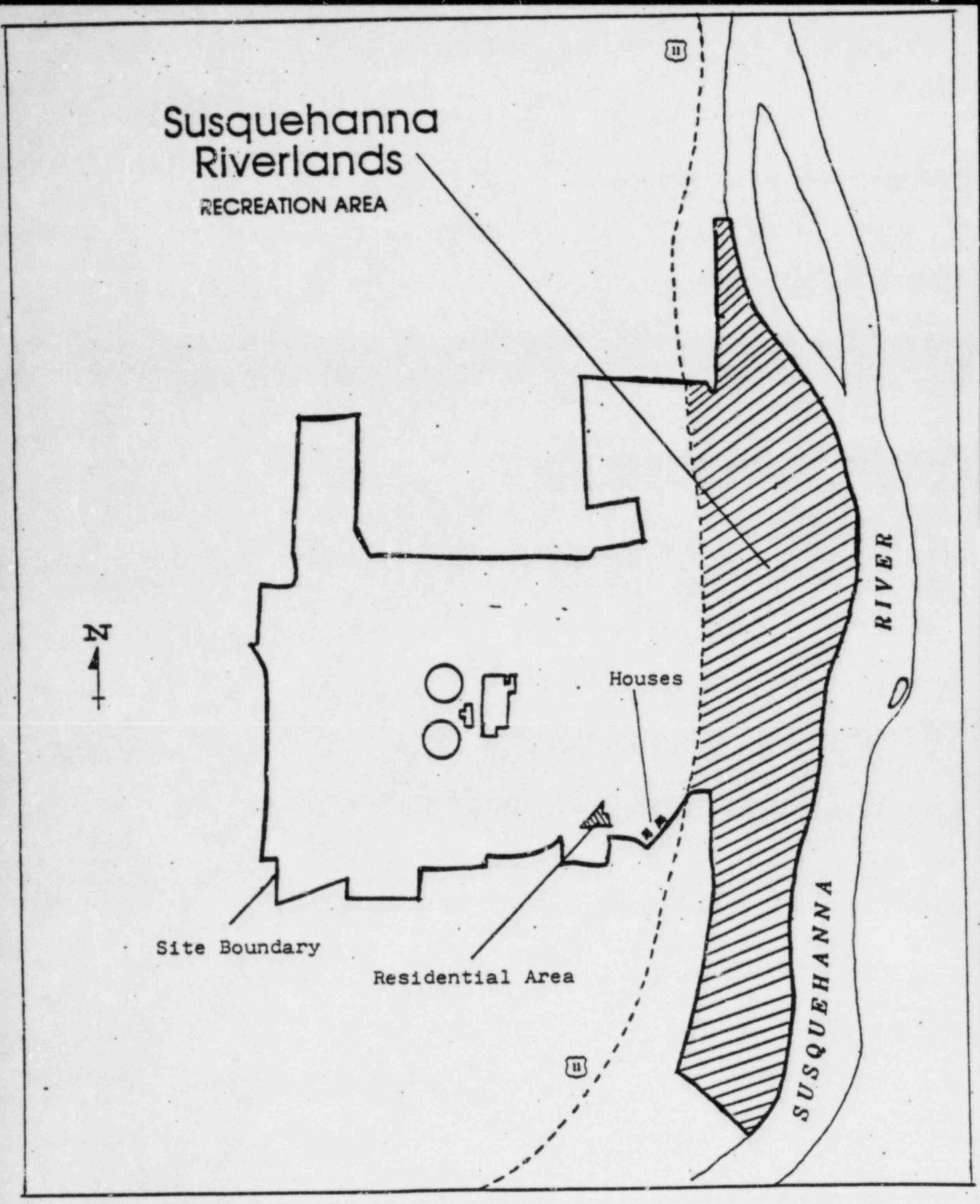

FIGURE 8: AREAS WITHIN THE SSES SITE BOUNDARY OPEN TO MEMBERS OF THE PUBLIC

TABLE 16

COLLECTIVE DOSES TO MEMBERS OF THE PUBLIC WITHIN THE RIVERLANDS/INFORMATION CENTER COMPLEX
Data Period: 1/1/84 - 12/31/84

Exposure Pathway	Organ(s)	Collective Dose (man-rem)
plume*	total body GI-tract, bone, liver, thyroid	9.70E-05
	lung	9.76E-05
	skin	1.56E-04
ground*	total body, GI-tract, bone, liver, kidney, thyroid, lung, skin	4.78E-06
	skin	5.64E-06
inhalation	teen total body	1.87E-05
	teen, adult GI-tract	1.87E-05
	child bone	2.91E-07
	teen liver	1.89E-05
	teen kidney	1.91E-05
	child thyroid	1.06E-04
	teen lung	1.90E-05
	teen skin	1.86E-05

* 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: 1/1/84 - 12/31/84

Exposure Pathway	Organ(s)	Dose (mrem)
plume*	total body, GI-tract, bone, liver, kidney, thyroid,	2.78E-02
	lung	2.80E-02
	skin	4.46E-02
ground*	total body, GI-tract, bone, liver, kidney, thyroid, lung	1.16E-03
	skin	1.37E-03
vegetation	child total body	1.46E-02
	child GI-tract	1.46E-02
	child bone	5.21E-04
	child liver	1.47E-02
	child kidney	1.48E-02
	child thyroid	7.88E-02
	child lung, skin	1.44E-02
inhalation	teen total body	5.37E-03
	teen GI-tract	5.35E-03
	child bone	8.37E-05
	teen liver	5.42E-03
	teen kidney	5.48E-03
	child thyroid	3.05E-02
	teen lung	5.45E-03
	teen skin	5.33E-03

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

SECTION 5

CHANGES TO THE OFF-SITE DOSE CALCULATION MANUAL AND THE SOLID WASTE PROCESS CONTROL PROGRAM

CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

The ODCM revision which became effective on July 9, 1984 incorporated a new method for calculation of airborne effluent monitor alarm setpoints. This method is based on the actual (or expected) nuclide mixture in the effluent streams instead of being based on a setpoint, for example, for Xe-133 alone for noble gases. Setpoint methodology for noble gases, iodine-131, and particulate monitors are included.

These changes improve the technical basis of the affected monitor setpoints. These changes will not reduce the accuracy or reliability of dose calculations or setpoint determinations.

There were no milk animal, residence, or garden locations identified in the 1984 SSES land use census which yield calculated doses or dose commitments greater than the values currently being calculated for Technical Specification 4.11.2.3. No locations were identified which yield calculated doses or dose commitments 20 percent greater than at a location from which samples are currently being taken as part of the Radiological Environmental Monitoring Program. No sampling locations were added to the program for this reason via the mechanism of Technical Specification 3.12.2.

PENNSYLVANIA POWER & LIGHT COMPANY
SUSQUEHANNA STEAM ELECTRIC STATION
OFFSITE DOSE CALCULATION MANUAL

Prepared By J.E. Widner Date 6/27/84

Reviewed By K.E. Shank Date 6/26/84

PORC Review Required Yes ( ) No (✓) Date

Approved By
Manager-Nuclear Support Date 7/9/84

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1. All exposure pathways of significance at the critical receptor locations;

2. Dose contributions to critical receptors from multiple release points; and

3. Dose contributions from major radioisotopes expected to be present in gaseous effluents.

The general methodology for establishing plant ventilation gaseous effluent monitor setpoints is based upon vent release rates derived from site-specific meteorological dispersion conditions, vent flow rates, and measured or expected radioisotopic mixtures in the gaseous effluents. The vent release rates can then be converted to vent concentrations for input as setpoints for the applicable detectors. Since the vent monitors are programmed to calculate concentrations of iodine-131 and particulate being released based on the rate of accumulation of activity on the filters, setpoints can be established for the iodine and particulate channels.

The following method is used for calculating vent monitor high radiation alarm setpoints:

1. An isotopic mixture is selected for the detector in question, if applicable. Noble gas and particulate detector setpoints are based on actual isotopic mixtures obtained from vent sample analysis or the FSAR/FES expected release mixtures if actual samples do not contain sufficient detectable activity to accurately estimate the mixtures. The assumed isotopic mixtures are periodically reviewed to verify that they remain representative of plant effluents.

2. The selected noble gas or particulate mixture is used in the GASPAR program run to calculate the associated doses. The total source term (total curies used for the calculation) does not matter as long as the proper nuclides are present in the relative proportions indicated in sample analysis data or FSAR/FES tables.

   For the iodine-131 setpoint, any release total for I-131 can be entered. The highest calculated annual average relative concentrations (χ/Qs) at the site boundary are used for these GASPAR calculations.

3. The following ratio concept is used to calculate a release rate limit for the assumed mixture (or I-131):

$$\frac{\text{Calculated Dose (mrem)}}{\text{Total GASPAR Source Term (Ci)}} = \frac{\text{Dose Rate Limit (mrem/yr)}}{\text{Limiting Release Rate (Ci/yr)}}$$

   The limiting release rate of the assumed mixture (or I-131) can therefore be calculated:

$$\text{Limiting Release (Ci/yr)} = \frac{\text{(Total GASPAR Source Term, Ci) (Dose Rate Limit, mrem/yr)}}{\text{(Calculated Dose, mrem)}}$$

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For the noble gas setpoint, the calculated whole body and skin dose rates via the plume pathway are subject to the 10CFR20-derived limits of 500 and 3000 mrem/yr, respectively. The whole body dose rate limit is usually most restrictive. For particulates and for iodine-131, the maximum calculated organ dose via the inhalation pathway is subject to the limit of 1500 mrem/yr.

4. The limiting release rates are converted to limiting vent concentrations using high limit vent flow rates.

Limiting Vent Concentration, uCi/cc =

$$\frac{\text{(Limiting Release Rate, Ci/yr) (10E6uCi/Ci)}}{\text{(5.26E5 min/yr) (Vent High Limit Flow Rate, cc/min)}}$$

Sample calculations of liquid and gaseous effluent monitor setpoints are presented in Appendix A.

Vent flow rates and sample flow rates are monitored and recorded for each of the five SSES release points. The measured flow rates are used to calculate vent concentrations and release rates. Flow channel setpoints are set at 10% and 90% of the calibrated sensor ranges to provide indication of possibly abnormal flow rates.

SPECIFICATION 3.11.2.6 - THE CONCENTRATION OF HYDROGEN OR OXYGEN IN THE MAIN CONDENSER OFFGAS TREATMENT SYSTEM SHALL BE LIMITED TO LESS THAN OR EQUAL TO 4% BY VOLUME.

Hydrogen recombiners are used at SSES to maintain the relative concentration of components of potentially explosive gas mixtures outside the explosive envelope. The main condenser offgas treatment system explosive gas monitoring system (offgas hydrogen analyzers) have setpoints of 1% hydrogen to alarm and 2% hydrogen to isolate.

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TABLE 2

DOSE FACTORS FOR NOBLE GASES AND DAUGHTERS[a]

Radionuclide	Whole Body Dose Factor K_i (mrem/yr per µCi/m^3)	Skin Dose Factor L_i (mrem/yr per µCi/m^3)	Gamma Air Dose Factor M_i (mrad/yr per µCi/m^3)	Beta Air Dose Factor N_i (mrad/yr per µCi/m^3)
Kr-83m	7.56E-02[b]	---	1.93E+01	2.88E+02
Kr-85m	1.17E+03	1.46E+03	1.23E+03	1.97E+03
Kr-85	1.61E+01	1.34E+03	1.72E+01	1.95E+03
Kr-87	5.92E+03	9.73E+03	6.17E+03	1.03E+04
Kr-88	1.47E+04	2.37E+03	1.52E+04	2.93E+03
Kr-89	1.66E+04	1.01E+04	1.73E+04	1.06E+04
Kr-90	1.56E+04	7.29E+03	1.63E+04	7.83E+03
Xe-131m	9.15E+01	4.76E+02	1.56E+02	1.11E+03
Xe-133m	2.51E+02	9.94E+02	3.27E+02	1.48E+03
Xe-133	2.94E+02	3.06E+02	3.53E+02	1.05E+03
Xe-135m	3.12E+03	7.11E+02	3.36E+03	7.39E+02
Xe-135	1.81E+03	1.86E+03	1.92E+03	2.46E+03
Xe-137	1.42E+03	1.22E+04	1.51E+03	1.27E+04
Xe-138	8.83E+03	4.13E+03	9.21E+03	4.75E+03
Ar-41	8.84E+03	2.69E+03	9.30E+03	3.28E+03

[a] The listed dose factors are for radionuclides that may be detected in gaseous effluents and derived from Table B-1 in Reg. Guide 1.109.

[b] 7.56E-02 = 7.56 x 10^{-2}.

$$\frac{5000 + f}{f} = \frac{10 \cdot (1E-5)}{1E-7}$$

$f = 5$ gpm

For an identified mixture with an actual MPC of 7.22E-7 µCi/ml and the same activity, blowdown flow and X and Y values as above, the LRW discharge monitor setpoint value and LRW discharge flow setpoint become:

Setpoint concentration (c) = 3E-5 µCi/ml

Setpoint value = 2.3E3 cpm + Background

LRW discharge flow setpoint (f) = 36 gpm

A.1.2 Gaseous Effluent Monitors

A.1.2.1 Noble Gas Monitor

To determine the release rate limit for noble gases, an isotopic mixture representative of plant effluents is selected. For example, the following mixture from Table 4.4 of the SSES Final Environmental Statement (FES) can be used:

Argon-41	25 Ci/yr per reactor
Krypton-83m	4
Krypton-85m	1,700
Krypton-85	270
Krypton-87	32
Krypton-88	660
Xenon-131m	71
Xenon-133m	14
Xenon-133	12,500
Xenon-135m	220
Xenon-135	590
Xenon-138	290
Total	16,376 Ci/yr per reactor

The above annual release quantities are entered into GASPAR with the following annual average dispersion estimates (Reference: 1982 SSES Meteorology Report):

Relative Concentration	4.1E-5 sec/m^3
Decayed Relative Concentration	4.1E-5 sec/m^3
Decayed Depleted Relative Concentration	3.8E-5 sec/m^3
Deposition Rate	4.2E-8 m^{-2}

This set of annual average meteorological parameters is the most conservative over the period 1973-1982.

The total body dose via the plume pathway which results is 18.3 mrem. Equation 5 of the ODCM is then used to calculate the limiting release rate from each of the five plant release points:

Limiting Release Rate =

$$\frac{(32{,}752\ \text{Ci})\ \ (500\ \text{mrem/yr})}{(36.6\ \text{mrem})\ \ (5\ \text{vents})} = 8.95\text{E}4\ \text{Ci/yr per vent}$$

This limiting release rate is then converted to limiting (setpoint) concentrations using Equation 6 of the ODCM and high limit vent flow rates.

Sample High Limit Vent Flow Rates:

Unit 1 Reactor Building Vent	4.75E9 cc/min
Unit 2 Reactor Building Vent	4.75E9 cc/min
Standby Gas Treatment System Vent	5.04E8 cc/min
Unit 1 Turbine Building Vent	8.63E9 cc/min
Unit 2 Turbine Building Vent	6.50E9 cc/min

Limiting Vent Concentration =

$$\frac{(8.95E4\ Ci/yr/vent)\ \ (1E6\ uCi/Ci)}{(5.26E5\ min/yr)\ \ (4.75E9\ cc/min)} = 3.58E\text{-}5\ uCi/cc\ for\ Reactor\ Buildings\ 1\&2$$

Substituting the other vent flow rates into Equation 6 as above, the following noble gas high radiation setpoint concentrations are calculated for the remaining vents:

Standby Gas Treatment System	3.37E-4 uCi/cc
Unit 1 Turbine Building	1.97E-5 uCi/cc
Unit 2 Turbine Building	2.62E-5 uCi/cc

A.1.2.2 Iodine-131 Monitor

When the FES expected annual release quantity for I-131 (2.40E-1 curies) is entered into GASPAR with the dispersion estimates of A.1.2.1, the maximum calculated organ dose via the inhalation pathway is 4.88 mrem to the child thyroid. Using Equation 5 of the ODCM, the limiting I-131 release rate is calculated as follows:

Limiting Release Rate =

$$\frac{(.24\ Ci)\ \ (1500\ mrem/yr)}{(4.88\ mrem)\ \ (5\ vents)} = 1.48E1\ Ci/yr/vent$$

Using Equation 6 of the ODCM, the limiting (setpoint) I-131 concentrations can be calculated for each of the five plant vents.

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Limiting Vent Concentration =

$$\frac{(14.8\ \text{Ci/yr/vent})\ (1E6\ \text{uCi/Ci})}{(5.26E5\ \text{min/yr})\ (4.75E9\ \text{cc/min})} = 5.92E\text{-}9\ \text{uCi/cc}$$

for Reactor Buildings 1&2

Substituting the other vent flow rates into Equation 6 of the ODCM above, the high radiation setpoints for the remaining plant vents are calculated to be the following:

Standby Gas Treatment System	5.58E-8 uCi/cc
Unit 1 Turbine Building	3.26E-9 uCi/cc
Unit 2 Turbine Building	4.33E-9 uCi/cc

A.1.2.3 Particulate Monitor

Following are the SSES Final Environmental Statement (FES) expected annual release quantities for particulate radionuclides:

Cr-51	1.2E-4 Ci/yr per reactor
Mn-54	3.6E-4
Fe-59	1.6E-4
Co-58	5.8E-5
Co-60	1.1E-3
Zn-65	5.5E-5
Sr-89	1.8E-5
Sr-90	3.1E-6
Zr-95	8.7E-6
Sb-124	5.1E-6
Cs-134	1.3E-4

Cs-136	1.3E-3
Cs-137	2.1E-4
Ba-140	4.2E-5
Ce-141	2.9E-5
Total	3.6E-3 Ci/yr per reactor

When the above annual release quantities are entered into GASPAR with the annual average dispersion estimates of A.1.2.1, the maximum calculated organ dose via the inhalation pathway is 1.33E-2 mrem to the teen lung. Using Equation 5 of the ODCM, the limiting release rate of particulates can be calculated:

Limiting Release Rate =

$$\frac{(7.2\text{E-}3\ \text{Ci})\ (1500\ \text{mrem/yr})}{(2.66\text{E-}2\ \text{mrem})\ (5\ \text{vents})} = 8.12\text{E}1\ \text{Ci/yr/vent}$$

Using Equation 6 of the ODCM, the limiting (setpoint) particulate concentrations can be calculated for each of the five plant vents.

Limiting Vent Concentration =

$$\frac{(81.2\ \text{Ci/yr/vent})\ \ (1\text{E}6\ \text{uCi/Ci})}{(5.26\text{E}5\ \text{min/yr})\ \ (4.75\text{E}9\ \text{cc/min})} = 3.25\text{E-}8\ \text{uCi/cc for Reactor Buildings 1\&2}$$

When the vent flow rates for the remaining five plant vents are substituted into Equation 6 as above, the following high radiation setpoint concentrations result.

Standby Gas Treatment System	3.06E-7 uCi/cc
Unit 1 Turbine Building	1.79E-8 uCi/cc
Unit 2 Turbine Building	2.38E-8 uCi/cc

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CHANGES TO THE SOLID WASTE PROCESS CONTROL PROGRAM

PROCEDURE COVER SHEET

PENNSYLVANIA POWER & LIGHT CO. SUSQUEHANNA STEAM ELECTRIC STATION	
SOLID WASTE PROCESS CONTROL PROGRAM	AD-QA-311 Revision 4 Page 1 of 54

Effective Date 11-16-84 Expiration Date 11-16-86

Revised Expiration Date _____

PROCEDURE TYPE: PORC X, NON-PORC ____, Alternate Review ____

PORC MTG. NO. 84-236 (If applicable)

CONTROLLED

Prepared by _____ Date 11/2/84

Reviewed by _____ Date 11/6/84

Recommended: _____ Date 11/8/84
Section Head/Manager

_____ Date 11/13/84
Superintendent of Plant

FORM AD-QA-101-1, Rev. 2, Page 1 of 1

PROCEDURE REVISION INDEX

Procedure No.	AD-QA-311	Title: Solid Waste Process Control Program

Rev. No.	Description of Revision	Effective Date
4	1. Added requirements and uses of high integrity containers. 2. Added Senior Project Engineer Radwaste in responsibilities. 3. Revised capping requirements to comply with burial site criteria. 4. Revised handling requirements for unacceptable waste containers.	

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ATTACHMENTS

1.0 PURPOSE

Provide Administrative control and guidance for the solidification and dewatering of applicable forms of Radwaste for ultimate disposal.

2.0 SCOPE

This procedure is applicable to SSES installed systems and temporary systems and equipment provided by vendors for solidification and dewatering 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 HNDC "Liner Dewatering Test Report" Report No. I-843-3.

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

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

3.8 HNDC 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 HNDC Report on Dewaterig Hittman Radlok 100 containers with Rigid Underdrains to less than 1% Drainable Liquid, Report No. Std.-P-03-005.

3.10 HNDC Report on Dewatering Hittman Radlok 100 containers with Flexible Underdrains to less than 1% Drainable Liquid, Report No. Std.-P-03-005.

3.11 HNDC Radioactive Waste Container General Specification, HNDC-S-1001.

3.12 South Carolina Department of Health and Environmental Control Bureau of Radiological Health Certificate of Compliance No. DHEC-HIC-PL-005 HNDC Radlok 100 container.

3.13 Burial Site Criteria for Barnwell S.C..

3.14 Burial Site Criteria for Richland, Washington as indicated in the site license Amendments 13 and 14.

3.15 AD-QA-765 "Solid Radwaste Program"

3.16 AD-QA-605 Calibration of Installed Plant Instrumentation

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

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

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

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

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

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

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

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

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

3.26 HNDC STD-D-03-009 USERS MANUAL for HNDC RADLOK-100 and RADLOK-200 containers

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

3.28 DHEC-HIC-PL-005 South Carolina Certificate of Compliance for HNDC RADLOK-100 container

3.29 DHEC-HIC-PL-007 South Carolina Certificate of Compliance for HNDC RADLOK-100 container

3.30 DHEC-HIC-PL-004 South Carolina Certificate of Compliance for HNDC RADLOK-55 container

4.0 RESPONSIBILITIES

4.1 Senior Project Engineer - Radwaste

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

4.1.2 Ensure test data is available to justify applicable solidification and dewatering functions.

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.

4.2 Shift Supervision shall assume the responsibility of the Radwaste Supervisor in his/her absense.

4.3 Radwaste Supervisor responsibilities:

4.3.1 Ensure Solidification 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 of Solidification and Dewatering.

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

b. Applicable vendor procedures may be used if approved by PORC.

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

4.3.6 Interface with H. P. Radwaste Specialist on 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 NTI-QA-3020.

4.3.10 Classification of waste to be processed.

4.3.11 Assure 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 Assure proper selection of High Integrity Containers for the waste stream being processed and packaged.

4.4 Chemistry Group responsibilities:

4.4.1 Sampling as required.

4.4.2 Performing required analysis in accordance with approved chemistry procedures.

4.4.3 Performing test solidification if required.

4.4.4 Providing the Isotopic mix and concentration of isotopes detected in the material sampled for solidification.

4.4.5 Providing mix ratios to the Radwaste Supervisor if analysis results indicate the waste type is out of the normal envelope for Solidification or an abnormal waste type is encountered.

4.4.6 Completing Chemistry portion of the Solidification Record Sheet. (Attachment A) and Dewatering Record Sheet. (Attachment B).

4.4.7 Ensures personnel are adequately trained per NTI-QA-3081A.

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

4.5 Health Physics Radwaste Specialist responsibilities:

4.5.1 Provide the Radwaste Supervisor with the type and specification of the liner to be used for solidification or dewatering.

4.5.2 Determining the type and specification of Casks which may be required.

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

4.5.4 Retention of the Solidification and Dewatering Record Sheet.

4.5.5 Storage of packaged solidified and dewatered material.

4.5.6 For determining curie content of solidified and dewatered material.

4.5.7 Final disposition of solidified and dewatered material.

4.5.8 Ensures SSES is a registered user of applicable High Integrity containers.

4.5.9 Ensures Radwaste Worker training has been conducted per AD-QA-765.

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

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

4.6 Quality Control is responsible for:

4.6.1 Ensuring process controls are adhered to

4.6.2 Review of Solidification and Dewatering record sheet.

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

4.6.4 Checking containers for free standing water through applicable procedural methods.

4.6.5 Verification of product acceptability when containers are checked through applicable procedural methods.

4.6.6 Receipt inspection of cement and additives including vendor supplied material.

4.7 I&C Supervisor

Ensure that periodic calibrations and inspections are performed as required.

4.8 Auxiliary Systems Operator is responsible for:

4.8.1 Operating the solidification and dewatering equipment in accordance with approved operating procedures as directed by the Radwaste Supervisor.

4.8.2 Completing applicable portions of the Solidification and Dewatering Record Sheet.

4.9 Vendors providing Solidification and/or Dewatering services.

4.9.1 Vendors providing solidification and/or dewatering service shall have in place 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 Vendors shall provide training documentation to demonstrate that the personnel being provided, to conduct the applicable service, are infact trained and knowledgable in the applicable functions.

4.9.3 Vendors shall provide procedure that are or can be placed into the SSES procedure format for the functions being provided.

4.9.4 Vendors shall have an acceptable Quality Assurance Program that covers the services being provided. The vendor shall work within the SSES Quality Assurance Program when applicable.

4.9.5 Vendors shall complete applicable sections of Attachments A,B and C as required for each line processed.

4.10 TECHNICAL GROUP SUPERVISOR

Assure all testing that may be required to support solidification and dewatering is complete and satisfactory.

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 .5% by volume.

5.3 Waste Type - The specific content of the waste to be solidified and may be Evaporator Concentrates, Filter Demineralizer Media, Dewatered Filter Sludges, Dewatered Bead resins 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 amounts of waste, cement and additive required for satisfactory solidification.

5.7 Test Solidification - The mixing of waste and solidification agents in the labratory to support selection of mixing ratios.

5.8 Dewatered - The removal of water from solid material to a point where less than 1% or 0.5% by volume remains as applicable to containers used and burial site limits.

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

5.10 High Integrity Container - An approved container for burial that has an expected life of 300 years.

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).

6.0 PROCEDURES

6.1 Waste Types - The following waste types may be solidified individually or in combinations as defined by specific chemistry procedures.

6.1.1 Evaporator Concentrates

a. Normally Evaporator Concentrates will be in the range of 5-25 weight % sodium sulfate waste.

b. Concentrates are the product of Condensate Demineralizer Regeneration OR

c. From processing of Chemical Waste Tank which may have low concentrations of the following:

(1) Tri Sodium Phophate

(2) Sodium sulfate

(3) Minute amounts of other chemicals used for chemistry analysis

(4) Decontamination Solutions (not including Phosphoric Acid)

(5) Phosphoric Acid

6.1.2 Filter/Demineralizer Media

a. Filter/Demineralizer media will consist of one or more of the following:

(1) Diatomaceous Earth

(2) Powdered Resin

(3) Carbon Materials

(4) Various solids, dirt and corrosion products in small concentrations

b. Filter/Demineralizer media may be dried to approximately 50 weight % moisture by air drying after removal of gross water volumes by draining.

c. Filter/Demineralizer media is discharged to the waste mixing tanks at the end of the filter run on a batch basis resulting in a minimum addition of 150 gal to the Waste Mixing Tank.

d. Filter/Demineralizer media may also be pumped from the Waste Mixing Tank to the appropriate container and dewatered/solidified. 6.1.3 Dewatered Filter Sludges for Solidification and Dewatering

a. RWCU Filter sludges are dewatered in the LRW Filter/Demineralizer from the RWCU Phase Separator where they are collected and allowed to decay.

(1) RWCU Phase Separator sludges are dewatered in volumes of approximately 20 cubic feet resulting in approximately 150 gallons of dewatered waste to the Waste Mixing Tanks.

(2) It is estimated that 7 to 10 Filter/Demineralizer batches will be required to process the RWCU Phase Separator sludge.

b. Fuel Pool Filter sludges and condensate demineralizer sludges are dewatered in the LRW Filter/Demineralizer from the Waste Sludge Phase Separator where they are collected.

(1) Waste Sludge Phase Separator sludges are dewatered in batches of approximately 20 cubic feet per batch resulting in approximately 150 gallons per batch of dewatered waste to the Waste Mixing Tank.

(2) It is estimated that 10-14 Filter/Demineralizer batches will be required to process the Waste Sludge Phase Separator.

c. Filter sludges may also be pumped directly from the appropriate phase separator to appropriate containers and dewatered/solidified.

6.1.4 Dewatered Bead Resin for Solidification

a. Bead Resins from the Condensate Demineralizers and the Liquid Radwaste Demineralizer are collected in the Spent Resin Tank.

b. Spent Resin Tank contents are Dewatered in the LRW Filter/Demineralizer.

c. Spent Resin Tank is dewatered in batches of approximately 20 cubic feet per batch. Resulting in approximatley 150 gallons per batch of resin addition to the Waste Mixing Tank.

d. It is estimated that approximately 21 batches will be required to process the Spent Resin Tank assuming that it contains resin from 1 Condensate Demineralizer and 1 LRW Demineralizer.

e. Spent Resin may also be transfered directly to appropriate liners and dewatered for solidification.

6.1.5 Bead Resin For Dewatering

a. Bead resins from Condensate Demineralizers and the Liquid Radwaste Demineralizer are collected in the Spent Resin Tank.

b. Spent Resin Tank contents may also be pumped directly to appropriate containers and dewatered.

6.1.6 Cartrige Filters

a. Cartrige Filters may be disposed of by emplacement in a cement matrix in steel drums/liners.

b. Cartrige Filters may be disposed of by placement in a high integrity container (HIC).

6.1.7 Oily Waste

a. 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.

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

c. Oily Waste less than 1% by volume of unintentional oil may be shipped to the Barnwell Disposal Facility.

d. Oily Waste at concentrations 1.2% 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.

e. For d above the non-oil portion of the waste must be water or other approved aqueous wastes.

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 Solidification and Dewatering Product Control

6.2.1 Sampling

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

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

c. The tank to be sampled shall be recirculated for a minimum of 1/2 hour prior to sampling.

d. The Chemistry Group shall obtain the required samples after the specified recirculation time is complete.

e. Material to be solidified may also be processed by mobile solidification equipment.

f. For the purpose of liner selection, if a sample point of the Batch tank is not available, a dose rate may be taken on the bottom of the tank with recirculation shut down to estimate the curie concentration.

6.2.2 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 is not met.

(1) A high or low pH condition, out of the acceptable band of 4 to 11, exists in the Batch.

(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 evevelope 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.

6.2.3 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 waste type as determined by checking:

(1) Density of the liquid

(2) Specific density of Sodium Sulfate

(3) Volumetric content of settled solids

(4) Type of solids contained in the waste.

d. Chemistry Group shall perform test solidification of waste as required in section 6.2.4.

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 total curie concentration to the Health Physics Specialist Radwaste.

h. Chemistry Group shall provide variation of the mixing ratios if the projected liner dose rates will exceed the required maximum levels.

6.2.4 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) 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.

c. 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.

d. Quality Control shall verify test solidification acceptability.

6.2.5 Curing Time

a. A minimum of 30 hours shall be allowed for curing prior to capping or transporting the container.

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)

6.2.6 Solidification Product Quality

a. Solidification product quality is assured by use of the predetermined mixing ratios of waste, cement and additive.

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

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

(1) Test solidifications performed periodically as stated in 6.2.4.

(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 ridgid 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 Supervisor.

6.2.7 Handling of Unacceptable Solidified Waste Containers.

a. 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.

b. If portions or all of the product did not solidify:

(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.

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

d. Quality Control shall verify acceptability of the solidified product.

(1) Less than 0.5% free standing water.

(2) The solidified product appears to be able to hold its shape if it were removed from the liner.

e. If the product solidifies prematurely prior to complete addition of the required amount of cement and additive as calculated on the solidification calculation sheet for the specific procedure used. At a minimum the following are 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 6.2.6.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 Health Physics Specialist - Radwaste agree that the waste can be re-classified as "Class A unstable" in accordance with 10CFR61 and the burial site criteria.

f. 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) Health Physics Specialist - Radwaste

(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 Senior Project Engineer - Radwaste.

(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.

6.2.8 Waste Container Space Utilization

a. 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 solidifcation or dewatering is complete.

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

c. Attachment C shall be used to track the waste volumes achieved in each individual liner; this form shall be completed by vendor personnel for each liner processed.

6.2.9 Capping of Solidified Waste Containers

a. At a minimum the requirements of 6.2.5 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 may be opened, vented, and then closed and shipped within (10) ten days.

c. If the container exceeds the limits for Low Specific Activity and contain 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 $\leq$5% by volume in those portions of the package which could have hydrogen greater than 5%.

6.3 Solidification Agent Control

6.3.1 Portland Type I/Type II Cement

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

b. Portland Cement - ASTM C-150 Type II shall be used for the designed in house solidification of Class A waste only.

c. Certification of the type of cement received shall be provided by the vendor and signed by a responsible representative of that vendor.

d. Quality Control shall verify receipt of the proper cement upon delivery.

6.3.2 Sodium Silicate

a. Solidum Silicate from the PQ Corporation Type N, or equivalent shall meet the following specifications:

(1) Weight Ratio Si02/Na20	3.20
(2) Percent Na20	8.90
(3) Percent Si02	28.70
(4) Degrees Baume	41.00
(5) Density, lb/gal	11.60
(6) Viscosity	180.00

b. Certification of the sodium silicate received shall be provided by the vendor and signed by a responsible representative of that vendor.

c. Quality Control shall verify receipt of the proper sodium silicate upon delivery.

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

6.3.4 VENDOR SUPPLIED SOLIDIFICATION AGENT. Documented Certification is not required for materials received in bags provided material verification can be obtained as follows:

a. Cement is acceptable provided the bag containing the cement indicates that the cement is Portland Type I.

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

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

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

6.4 Equipment Calibrations shall be in accordance with AD-QA-605 Calibration of Installed Plant Instrumentation.

6.5 Solidification Record Sheet

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

6.5.2 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 HP Radwaste Specialist or his designee.

Part IV, System Preparation and Processing shall be completed by the Auxiliary System Operator. Part IIIa shall be used with vendor supplied equipment and is completed by vendor personnel and the Radwaste Supervisor.

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

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

6.6 Solidification Processing

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

6.6.2 The solidification process shall be operated in accordance with approved operating procedures.

6.6.3 Quality Control personnel shall verify proper system variable settings and material additions to the solidification container.

6.7 Radioactive Waste Dewatering

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

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

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

6.7.4 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 goups.

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 HP Radwaste Specialist and 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 Radwaste Specialist as applicable.

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

6.7.5 The Health Physics Specialist Radwaste shall assure that SSES is a registered user of High Integrity Containers (HIC) used at SSES for the purpose of Radwaste disposal prior to the use of a specific type HIC.

6.8 Changes to the Solid Waste Process Control Program.

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

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

6.9 Container Inspections

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

a. This inspection shall assure and document that the conditions of the Certificate of Compliance for High Integrity Containers have been met.

b. 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.

6.10 Storage of High Integrity Containers

6.10.1 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 date of manufacture.

6.10.2 High Integrity Containers stored away from any sources of ultraviolet radiation must be filled within two years of the manufacture date.

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

6.10.4 Short exposures to sunlight, such as occurring during shipment and on site transfer need not be counted when determining total ultraviolet exposure.

6.11 Uses of High Integrity Containers

6.11.1 High Integrity Containers may be used to package the following waste materials for burial at the Barnwell South Carolina low level waste burial site.

a. Dewatered bead ion exchange resin

b. Dewatered powdered ion exchange resin

c. Activated carbon, powdered carbon, diatamaceous earth and other granular or fibrous filter media

d. Cartridge filter elements

e. Miscellaneous components

f. Filter Sludge

g. Sand blasting grit and crud

h. Stabilized incinerator ash

i. Other dewatered and dry material provided concurrence is received from the container vendor

6.11.2 High Integrity Containers are approved for use provided the following physical and chemical limitations of the waste are met.

a.	Bulk density	:	0.7 to 2.5 g/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

1. 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.

6.11.3 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.

6.11.4 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%

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

6.12 Closure of High Integrity Containers

6.12.1 Closure of High Integrity Containers shall be completed in accordance with approved procedures.

6.12.2 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 may be opened, vented, and then closed and shipped within (10) days.

6.12.3 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.

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 ≤5% by volume in those portions of the package which could have hydrogen greater than 5%.

7.0 RECORDS

7.1 The Solidification Record Sheet or Dewatering Record Sheet and the attached Isotopic Analysis shall be forwarded to the HP Radwaste Specialist 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 Sheet

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

b. Step 2 - Enter waste type to be processed.

c. Step 3 - Enter process number for this waste type from the Radwaste Supervisor's log book; this is the next sequential number for this waste type.

d. Step 4 - Enter the batch number associated with this process; this is obtained from the Radwaste Supervisor's log book for this waste type.

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 - Shift Supervision/Radwaste Supervisor signature indicates approval for sampling and test solidification if required.

Solidification Record Sheet

Part II Sampling and Pre-Solidification Analysis Instructions

a. Step 1 - Identify which mixing tank A or B or other tank that is to be processed by a check mark, or identify.

b. Step 2 - Check that the pH of the sample taken from the tank to be processed is within a range acceptable for solidification.

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

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" or less than one percent, "< 1%" or indicating the percentage of oil.

f. Step 6 - Check that a copy of the radionuclide analysis is attached.

g. Step 7 - Based on the isotopic analysis attached enter the total curie concentration.

h. Step 8 - Determine final product density.

i. Step 9 Identify here the type of cement used (i.e., Type I)

j. Step 10a - For the process feed pump (OP-304) provide the pump flow rate to be used for the solidification process. If a Vendor Supplied system is provided enter waste volume.

Part II cont'd
Instructions

k. Step 10b For the cement feed system (OS-305) provide the cement feed rate to be used for the solidification process. If vendor supplied System is provided, enter Cement Volume in lb/ft^3.

l. Step 10c - For the liquid sodium silicate feed pump (OP-309) provide the pump feed rate to be used in the solidification process. If Sodium Silicate or other agent is used with vendor provided systems, enter volume in lb/ft^3 or liters/gallon.

m. Step 11 Enter the curing time required based on the most recent test solidification of that waste type. At a minimum 30 hrs. cure time will be required.

n. Step 12 - Chemistry Supervision shall sign with the date and time signed that the waste in the identified tank has been sampled and analyzed in accordance with approved procedures and is acceptable for solidification at the indicated mixing ratios.

Solidification Record Sheet

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 waste classification 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 Instructions

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

b. Step 2 - Enter the PF&L identification number on the liner. (This must be the same as the number in Part II step 5)

c. Step 3 - Verify that the liner is properly loaded on the correct transfer cart.

d. Step 4 - After the cart is moved to the fill position verify that the liner is properly positioned under the fill port.

e. Step 5 - Check that the mating surface between the fill flange and the liner is proper and will not leak.

f. Step 6a - Enter the process speed control setting for the appropriate waste feed pump (OP-304 A or B). (As determined by the Radwaste Supervisor)

g. Step 6b - Enter the process speed control setting for the cement feed system, (OS-305). (As determined by the Radwaste Supervisor)

h. Step 6c - Enter the process speed control setting for the sodium silicate pump, (OP-309). (As determined by the Radwaste Supervisor)

i. Step 6d - Verify that the Process Mix Pump (OP-307) process speed control setting is on 10.

j. Step 7 - Shift Supervisor/RW Supervisor shall sign, with date and time, that the process control speed settings are proper and consistent with Section 6.5.2.

k. Step 8 - Verify that sufficient cement is available for solidification of the tank contents.

l. Step 9 - Verify that sufficient liquid sodium silicate is available for solidification of the tank contents.

Part IV cont'd
Instructions

m. Step 10 - Enter the quanitity of waste in the Waste Mixing Tank to be processed.

n. Step 11 - Shift Supervision shall verify and sign, with date and time, that all requirements of the Process Control Program have been met and that the authorization to proceed with the solidification process is granted.

o. Step 12 - Enter the time and solidification process is initiated.

p. Step 13 - Enter the time the solidification process is stopped.

q. Step 14 - Enter cement level in silo at completion of solidification process.

r. Step 15 - Enter liquid solium silicate tank level at completion of solidification process.

s. Step 16 - Enter final Waste Mixing Tank level.

t. Step 17 - Enter estimated weight of the liner with the solidified material.

u. Step 18 - The Radwaste Operator shall sign, with date and time, that the process has been completed.

v. Step 19 - QC verification of fifth (5th) filled liner check.

w. Step 20 - Enter the curing time between Steps 13 and 19.

x. Step 21 - Verify that the liner has been moved to the washdown area.

y. Step 22 - Shift Supervision shall sign, with date and time, that the solidification process has been accomplished according to the requirements of this procedure and that Health Physics has been notified.

Solidification Record Sheet
Part IVa System Preparation and Processing
Instruction (Vendor or alternate system)

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

b. Step 2 - Check that PP&L identification number is stenciled on the liner. (This must be the same as the number in Part II step 5).

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

d. Step 4 - Shift Supervision authorize start of processing.

e. Step 5 - Enter process parameters in appropriate units.

f. Step 6 - Enter processing start time.

g. Step 7 - Enter processing stop time

h. Step 8 - QC verification for hardness/solidification by manual penetration tests visual observations for water in the liner.

i. Step 9 - The actual curing time prior to capping shall be entered here.

j. Step 10 - Enter the Final solidified waste volume in cubic feet.

k. Step 11 - Supervisor review and release liner to Health Physics.

Solidification Record Sheet

Part V Filled Liner Data Instructions

a. Step 1a - The contact radiation levels on the top and bottom of the liner and at four points, 90° apart, around the centerline of the liner shall be recorded.

b. Step 1b - Enter the level of external contamination on the liner as determined by an analysis of a swipe smear.

c. Step 1c - Based on the data entered in 6.5.5.b of this procedure determine whether or not a liner washdown is to be performed. If a washdown is required signify by entering "yes", if a washdown is not required signify by entering "NR".

d. Step 1d - Enter the level of external contamination on the liner as determined by an analysis of a swipe smear. If a second, or subsequent, swipe smear is not required enter "NR".

e. Step 1e - 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.

f. Step 2 - Enter the storage location liner is transfered to. Enter "NA" if the liner is not stored prior to shipment.

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

h. Step 4 - Enter the transportation shipment number.

i. Step 5 - Enter the name of the burial site the liner is being shipped to Health Physics and QC shall sign, with date and time, that his procedure has been properly followed.

SOLIDIFICATION RECORD SHEET

Part I Cover Page

1. LINER Identification No. _____

2. WASTE TYPE _____

3. Sequential Liner No. of Waste Type _____

4. BATCH No. _____

5. Test Solidification required _____
Yes/No

6. Approval for use _____
Shift Supervision/Radwaste Supervisor

SOLIDIFICATION RECORD SHEET

Part II Sampling and Pre Solidification Analysis

1. Waste Mixing Tank Sampled _____A _____B _____ _____
   Other Date/Time
2. Waste Stream pH 4-11 _____
   Check
3. Type of Waste[1] _____
   a. Wet WT. % settled solids _____
   b. WT. % Sodium Sulfate _____
   c. % Water by volume _____
4. Waste sample density _____ ± gm/ml
5. Oil Content (check a or b, or enter % by volume in c)
   a. _____ None
   b. _____ Less 1%
   c. _____ % oil
6. Isotopic Analysis Attached _____
   Check
7. Estimated Total Curie Concentration _____ uCi/cc
8. Final product density _____ gm/cc
9. Type of cement to be used _____

[1] Include nomenclature of type of waste, i.e. bead resin, powdered resin, carbon, oil, diatomaceous earth sodium sulfate or combination, etc,

10. Mixing Ratios

SSES INPLANT SYSTEM	Initial		VENDOR SYSTEM	Initial
a. Waste (OP-304)	_____	gpm		
b. Cement (OS-305)	_____	lb/min	Cement _____	lbs/ft³ of waste
c. Sodium Silicate (OP-309)	_____	gpm	Sodium Silicate _____	lb/ft³ of waste
			Other additive _____	liters/gallons

11. Cure time required _____ hours.

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

_____	_____	_____
Chemistry Supervision	Date	Time

PART III CONTAINER SELECTION

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

   _____ mr/hr at 2 meters

2. Projected Curie Loading _____ uci/gm

3. Waste Classification _____

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 or His Designee | Date | Time

PART IV SYSTEM PREPARATION AND PROCESSING
(Use Part IVa if vendor supplied system is used)

1. Liner Serial Number _____

2. PP&L Liner Identification Number on liner _____
Check

3. Liner Properly Loaded on Transfer Cart _____
Check

4. Liner Properly Positioned Under Fill Port. _____
Check

5. Fill Flange Properly Mated To Liner _____
Check

6. Process Speed Control Setting. (obtained form Radwaste Supervisor)

   a. Water Feed (OP-304) _____A _____B

   b. Cement Feed (OS-305) _____A _____B

   c. Sodium Silicate (OP-309) _____A _____B

   d. Process Mix Pump (OP-307) 10 A 10 B

7. Process speed control settings verified

   _____ _____ _____
   Shift Supervision/RW Supervisor Date Time

   _____ _____ _____
   QC Verification Date Time

8. Sufficient Cement Available _____
Check

9. Sufficient Sodium Silicate _____
Check

10. Waste Mixing Tank Level _____ %

11. Authorization to Commence Process

_____ _____ _____
Shift Supervision Date Time

12. Time process started _____
Time

13. Time Process Stopped _____
Time

14. Cement Silo Level _____ %

15. Sodium Silicate Tank Level _____ %

16. Waste Mixing Tank Level _____ %

17. Liner Weight _____

18. Process completed

_____ _____ _____
Operator Date Time

19. Liner Check (5th liner) complete _____ (6.2.6.d)
QC Verification

20. Curing time allowed prior to capping

_____ _____
hours

21. Liner Transfered to wash down station _____
Check

22. Supervisory review and Health Physics notification

_____ _____ _____
Shift Supervision Date Time

Part IVa System Preparation and Processing
(Vendor or alternate system)

1. Liner Serial Number _____

2. PP&L Liner Identification Number on liner _____.
Check

3. Liner properly positioned and ALARA consideration made _____.
Check

4. Authorization to commence processing

_____ _____ _____
Shift Supervision Date Time

5. Process parameters

Waste in liner actual _____ ft³
Cement to be added to liner _____ lbs actual _____ lbs
Sodium Silicate to be added to liner _____ lbs actual _____ lbs
Other additive added to liner actual _____ lbs/ft³/gallon
Calcium Hydroxide to be added to liner _____ lbs
Tank from which waste is to be transferred _____

_____ _____ _____
QC Verification Date Time

6. Time processing started _____

7. Time processing stopped _____

8. Liner check for complete solidification and visible water or drainable water.

a. Penetration check (6.2.6.d) _____
QC Verification/Date/Time

b. Visible water (6.2.6.d) _____
QC Verification/Date/Time

9. Curing time actual _____ (A minimum of 30 hrs is required.)

10. Final container solidified waste volume _____ ft³

11. Supervisory review and Health Physics notification.

_____ _____ _____
Shift Supervision Date Time

PART V Filled Liner Data

1. Filled 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/100cm

c. Container washdown / decon performed _____
yes/NR

d. Smearable activity after washdown/decon _____dpm/100cm

e. Liner ready for transfer to storage

_____ _____ _____
HP Tech. Date Time

2. Storage Location: RW _____/_____/_____
Date Time Initials

LLWHF _____
Date Time Initials

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

4. Shipment #_____

5. Solidified waste acceptable for disposal at _____
burial site

_____ _____ _____
HP Radwaste Spec. Date Time

_____ _____ _____
Quality Control Review Date Time

DEWATERING RECORD SHEET

Part I Cover Page

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..)

Part II Sampling and Pre-Dewatering Analysis

a. Step 1 - Sample the appropriate tank after a recirc period of 1/2 hour or 1 tank volume as a minimum.

b. Step 2 - Same as Step 1.

c. Step 3 - Collect a liquid sample from the material to be dewatered to assure the liquid will not be corrosive to a carbon steel liner.

d. Step 4 - Determine the oil content of the material to be dewatered.

e. Step 5 - Conduct an isotopic analysis of the material to be dewatered.

f. Step 6 - Enter the specific activity.

Part III Container Selection

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 waste classification 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 the container if required.

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.

Part IV Dewatering Operations Documentation

a. Step 1 - A specific operating procedure for the container will be used to document the applicable dewatering functions.

b. Step 2 - Enter Final Dewatered Waste volume.

c. Step 3 - Supervision review of dewatering documentation.

Part V Dewatered Container Data

a. Step 1 - Document the container radiological data on a blank survey form and attach the form to the Dewatering Record Sheet.

Use HP-TP-800 to assist in determining the transport groups and curie content of material being dewatered.

b. Step 2 - The storage location shall be assigned by the HP Specialist Radwaste.

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

d. Step 4 - The shipment # and destination shall be designated by the HP Specialist Radwaste.

DEWATERING RECORD SHEET

Part I Cover Page

1. Liner Identification Number _____

2. Waste Identification _____

_____
Shift Supervision/
Radwaste Supervisor

Part II Sampling and Pre-Dewatering Analysis

1. Waste Mixing Tank Sampled _____A _____B
   Check/NA Check/NA

2. Other tank sampled _____
   Name

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

4. Oil Content (check one)

   _____ None

   _____ less than 1%

5. Isotopic Analysis attached _____
   Check

6. Specific activity of Dewatered Sample _____ µCi/gm

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

_____ _____ _____
Chemistry Supervisor Date Time

Part III Container Selection

1. Estimated Liner Dose Rates _____mr/hr on contact

   _____mr/hr at 2 meters

2. Projected Curie Loading _____ UCi/gm

3. Waste Classification _____

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 /or His Designee — Date — Time

Part IV Dewatering Operations Documentation

1. Attach the complete specific operating procedure check off sheet for the specific dewatering container being used

   _____
   Check

2. Final Dewatered Waste Volume _____ Ft^3

3. Dewatering check off sheet review and (Use specific check sheet for liner being used) transferred to HP Specialist Rad Waste

   _____ _____ _____
   Shift Supervision Date Time

Part V Dewatered Container Data

1. 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 _____ $dpm/100cm^2$

   c. Container washdown/decon performed _____
      Yes/No

   d. Smearable activity after washdown/decon
      _____ $dpm/100cm^2$
      (attach radiological survey form)

   e. Liner ready for transfer to storage

      _____ _____ _____
      HP Tech Date Time

Part V (Cont'd.)

2. Storage location: RW _____/_____/_____
Date Time Initials

LLWHF _____/_____/_____
Date Time Initials

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

4. Shipment # _____

Destination _____

_____ _____ _____
HP Specialist Radwaste Date Time

_____ _____ _____
Quality Control Review Date Time

SUSQUEHANNA GUARENTEED WASTE VOLUME RECORD

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

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

c. Step 3 - Describe the physical appearance of the waste (i.e., color clarity, etc..)

d. Step 4 - Enter liner type used.

e. Step 5 - Enter burial volume associated with this liner.

f. Step 6 - Enter the Q.C. verified waste volume from FORM AD-QA-311-1 or 2.

g. Step 7 - Enter usable liner volume for liner specified in Step 4.

h. Step 8 - Enter Guaranteed minimum waste volume in inches (measured from top of liner) and cubic feet.

i. Step 9 - Enter waste volume attained in inches (measured from top of liner) and cubic feet.

j. Step 10 - Enter the waste volume difference (±) from the guaranteed volumes as per Steps 8 and 9.

k. Step 11 - Remarks - this section is used to explain all waste shortages.

l. Step 12 - The solidification vendor representative signs indicating all the information contained on this document is correct.

m. Step 13 - The Radwaste Supervisor signs indicating agreement with the information contained on this documents.

SUSQUEHANNA GUARANTEED WASTE VOLUME RECORD

1. Date _____ Liner number _____

2. Type of waste _____ Source _____

3. Physical appearance _____

4. Liner Type _____

5. Burial Volume _____

6. Waste Volume _____

7. Useable Liner Volume _____

8. Guaranteed Minimum Waste Volume _____

9. Waste Volume Attained
_____inches _____ft^3

10. Waste Volume Difference
_____inches _____ft^3

11. Remarks:

12. Signature _____
Solidification Vendor Representative

13. Signature _____
Radwaste Supervisor SSES

SECTION 6

REPORTS OF EXCEPTION TO THE SSES EFFLUENT MONITORING PROGRAM

Based on a review of the Significant Operating Occurence Reports (SOORs) for SSES Units 1 and 2 for the report period, there were no cases in which effluent monitoring instrumentation was inoperable and was not restored to operability within the applicable time period specified in Technical Specification Table 3.3.7.10-1 or 3.3.7.11-1 Action Statements.

PP&L Pennsylvania Power & Light Company
Two North Ninth Street • Allentown, PA 18101 • 215 / 770-5151

Bruce D. Kenyon
Vice President-Nuclear Operations
215/770-7502

MAR 1 1985

Dr. Thomas E. Murley
Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

SUSQUEHANNA STEAM ELECTRIC STATION
SEMI-ANNUAL RADIOACTIVE EFFLUENT
RELEASE REPORT
ER 100450/100508 FILES 890-13/841
PLA-2420

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

Dear Dr. Murley:

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, 1984.

Very truly yours,

B. D. Kenyon
Vice President-Nuclear Operations

cc: Director
Office of Inspection & Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Director of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Ms. M. J. Campagnone - USNRC
Mr. R. H. Jacobs - USNRC

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