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MAR 29 1996

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SUSQUEHANNA STEAM ELECTRIC STATION
ANNUAL EFFLUENT & WASTE DISPOSAL REPORT — **Docket No. 50-387 and 50-388**
PLA-4437 FILE R41-2A

In accordance with 10CFR50.36a(a)(2) and the Susquehanna SES Unit 1 and 2 Technical Specifications, attached is the Annual Effluent & Waste Disposal Report for SSES Units 1 and 2 covering the period January 1 through December 31, 1995.

Very truly yours,

R. G. Byram

Attachment

copy: NRC Region I
Mr. C. Poslusny, Jr., NRC Sr. Project Manager - OWFN
Ms. M. Banerjee, NRC Sr. Resident Inspector - SSES

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ANNUAL EFFLUENT & WASTE DISPOSAL REPORT

FOR JANUARY - DECEMBER 1995

Pennsylvania Power & Light Company
Two North Ninth Street
Allentown, Pennsylvania 18101-1179

March 1996

SUSQUEHANNA STEAM ELECTRIC STATION

ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT

REPORT PERIOD: 01/01/95 - 12/31/95

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INTRODUCTION AND SUPPLEMENTAL INFORMATION

INTRODUCTION

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

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

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

This report presents a summary of the quantities of radioactive materials which were released from the Susquehanna Steam Electric Station during the period from January 1, 1995 to December 31, 1995. In addition, this report serves as a medium for notifying the US Nuclear Regulatory Commission staff of changes to PP&L's Offsite Dose Calculation Manual (ODCM) and Solid Waste Process Control Program (PCP) and documentation of any exceptions to the SSES effluent monitoring program which must be reported per Technical Specifications 3.3.7.10 and 3.3.7.11. A section containing corrections to a previously reported dose is also included.

Airborne and waterborne radioactive effluent releases to the environment during the report period were sampled and analyzed in accordance with the requirements of the Technical Specifications. All radioactive effluent releases were within the concentration and release limits specified in the Radiological Effluent Technical Specifications (RETS). Calculations and terms utilized in this report are those outlined in the SSES Offsite Dose Calculation Manual (ODCM).

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

Section 2 contains effluent and waste disposal data for the report period. 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 activity 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 3 lists the Susquehanna River monthly average flow rates for 1995 while Figure 4 presents the SSES monthly liquid radwaste discharge totals for 1995.

Tables 6 through 17 present a characterization of the solid radioactive waste shipped offsite 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 18 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 19 presents effluent data from previous report periods which was not available at preparation time for the associated annual report.

Section 3 of this report contains the meteorological data associated with the year 1995. Availability data for the SSES meteorological data are shown in Table 20. Meteorological data for the calendar year is presented in the form of joint wind frequency distributions by atmospheric stability class. These distributions are presented in Table 21. Figures 5 and 6 are wind rose plots for the SSES primary meteorological 10-meter and 60-meter sensors, respectively. Figure 7 presents the relative prevalences of the Pasquill stability classes. 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 22, and are required input for use of the GASPAR code for calculation of the doses resulting from airborne releases.

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Section 4 of this report contains an assessment of the calculated doses attributed to the reported radiological effluents for the calendar year. The LADTAP II code was used for calculation of doses from waterborne effluents. Table 23 contains site-specific parameters used for LADTAP II calculations, for the Danville receiver. The GASPAR code was used for calculation of doses from airborne effluents. The calculated doses and direct radiation estimates can be used to estimate the doses to maximally exposed members of the public. Table 24 summarizes maximum calculated doses and dose commitments to members of the public from airborne and waterborne effluents and direct radiation. Table 25 presents calculated collective doses to members of the public within the Riverlands/Information Center Complex. Table 26 summarizes the calculated doses for residences and other occupied areas within the SSES site boundary. Table 27 reports doses calculated for the nearest dairy facility.

Section 5 of this report is reserved for documentation of changes to the Offsite Dose Calculation Manual and the Solid Waste Process Control Program. A copy of changes to the ODCM during the report period is included in Appendix A. A copy of changes to the Solid Waste Process Control Program is included in Appendix B.

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.

Section 7 contains corrections to doses reported in previous Semi-annual or Annual Effluent and Waste Disposal reports. (Table 28)

Section 8 contains information on effluent (Table 29) and offsite dose (Table 30) from additional monitored release points.

FIGURE 1

SSES AIRBORNE EFFLUENT RELEASE POINTS

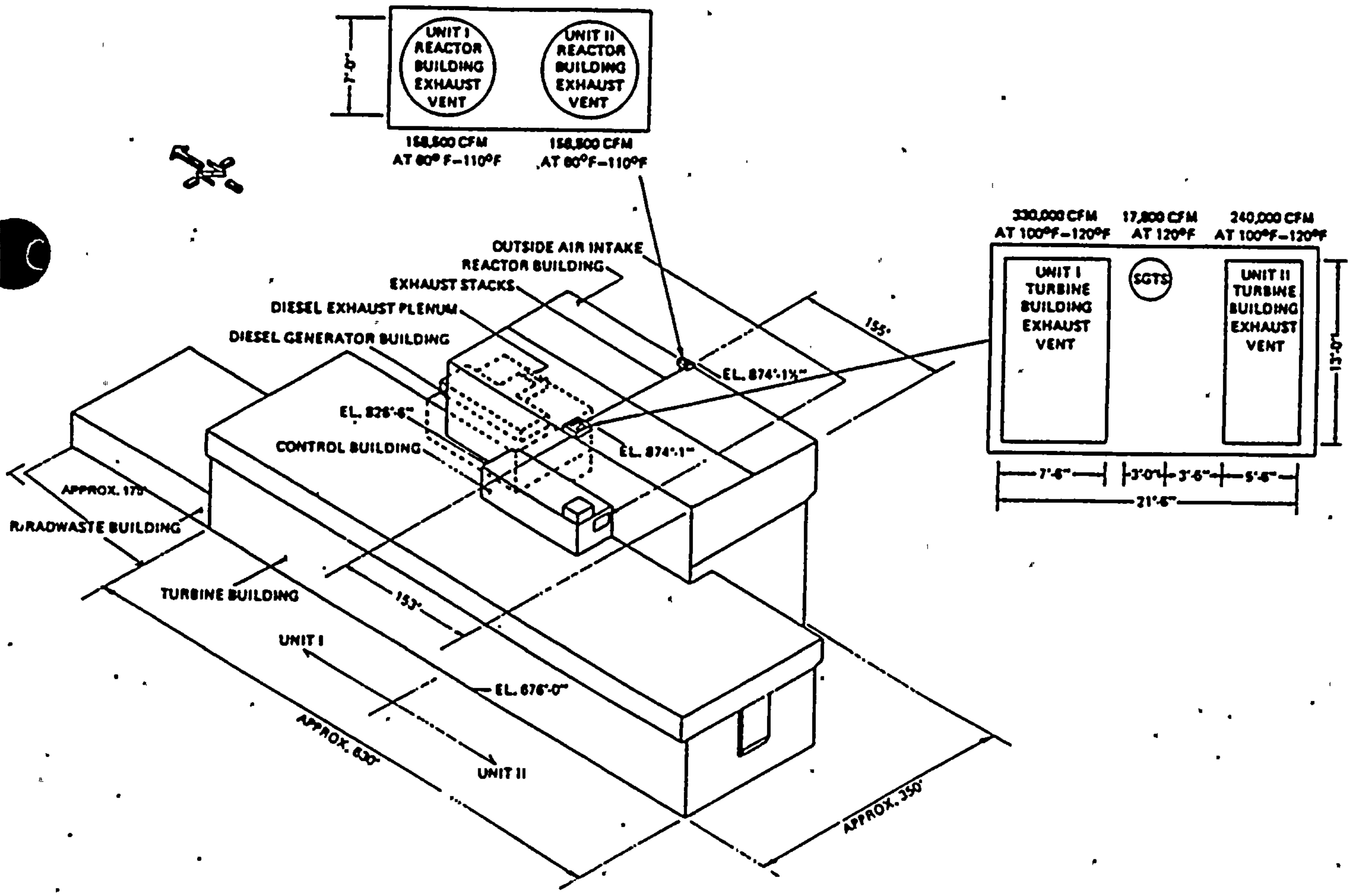
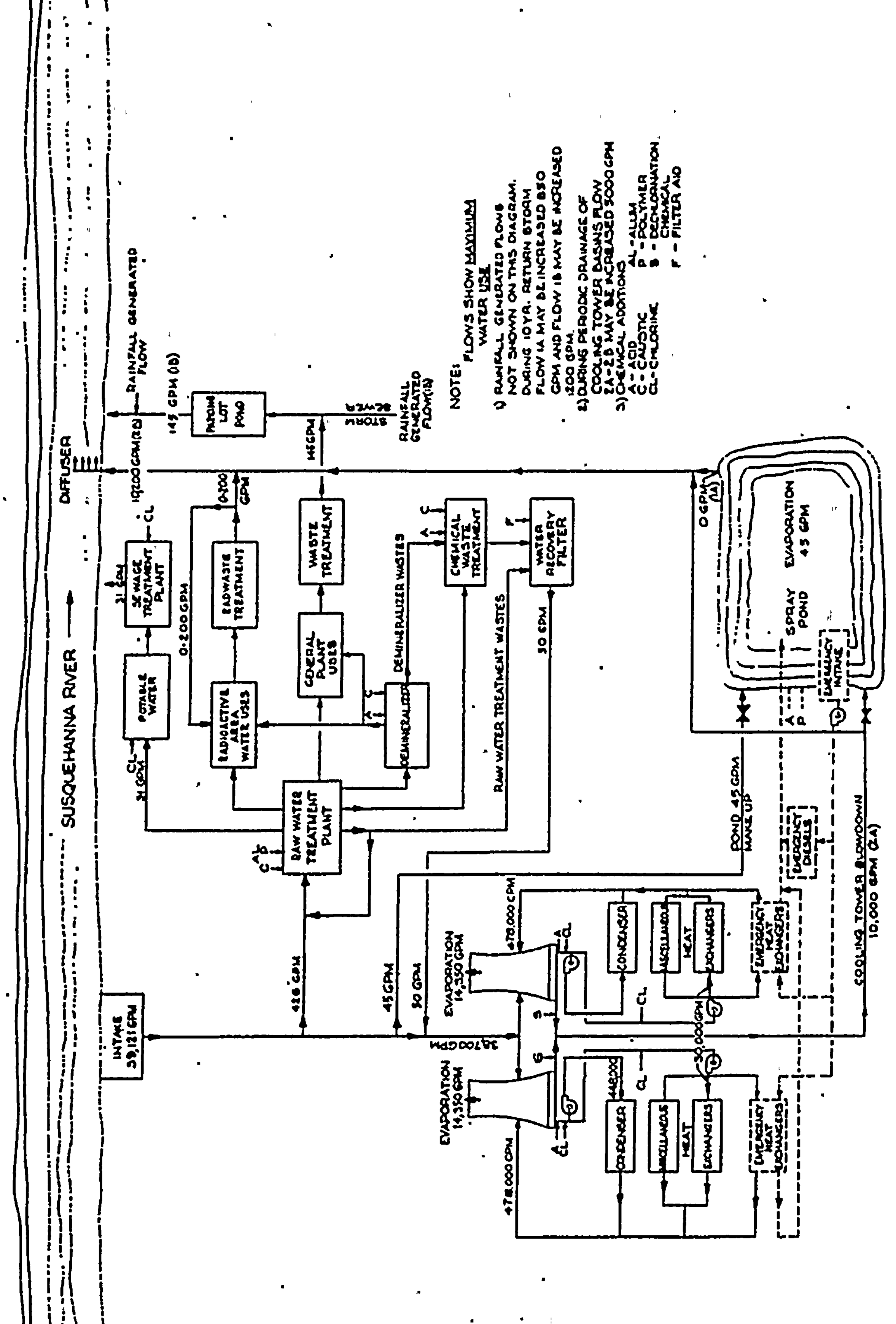


FIGURE 2
SSES WATERBORNE EFFLUENT PATHWAY



SUPPLEMENTAL INFORMATION

1. Regulatory Limits

Technical Specifications 3/4.11.1 and 3/4.11.2 outline requirements for release of radioactive liquid and gaseous effluents, respectively. Concentration of radioactive materials released in liquid effluents and dose or dose commitment resultant thereof are limited in unrestricted areas. Dose and dose rate due to radioactive materials released in gaseous effluents are limited in areas at or beyond the site boundary. Technical Specification limits are listed in Table 1.

2. Maximum Permissible Concentrations in Waterborne Effluents

The concentrations of radioactive materials in waterborne effluents are limited to the concentrations specified in 10 CFR 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)
^{85m}Kr	2.0E-04
^{85}Kr	5.0E-04
^{87}Kr	4.0E-05
^{88}Kr	9.0E-05
^{41}Ar	7.0E-05
^{133m}Xe	5.0E-04
^{133}Xe	6.0E-04
^{135m}Xe	2.0E-04
^{135}Xe	2.0E-04

3. Average Energy

Based on gaseous effluent releases for the report period average beta energy is 0.319 MeV and average gamma energy is 0.249 MeV.

4. Measurements and Approximations of Total Radioactivity

Analyses of specific radionuclides in effluent samples are used to evaluate the radioactive composition and concentration of effluents.

5. Methods of Quantifying Effluents

a. Fission and Activation Gases: Gas samples are routinely collected monthly and analyzed with a high resolution (Ge[Li] or HPGE) 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 high resolution (Ge[Li] or HPGE) isotopic scan is used to convert the continuous vent monitor activity to actual activity based on the determined nuclide mixture. The vent and sample flow rates are continuously monitored, and the average flow rates for each vent are used to calculate the total activity released in a given time period. When the continuous monitors are out of service, manual grab samples are taken from each vent once each eight hours (once each four hours for the standby gas treatment vent).

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

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

d. Tritium: Airborne tritium is collected monthly via bubbler sampler. The sample is collected for one hour at a flow rate of approximately 1000 cc/min. Tritium activity in the bubbler sample is determined by liquid scintillation counting. The liquid sample tritium concentration is converted to air concentration by volume proportion, then compared to the Technical Specification Table 4.11.2.1.2-1 Lower Limit of Detection (1 E-6 uCi/cc).

e. Waterborne Effluents: Each tank of liquid radwaste is sampled and analyzed for principal gamma emitters prior to release. Each sample tank is recirculated for a sufficient amount of time prior to sampling to ensure that a representative sample is obtained. Samples are analyzed on a high resolution (Ge[Li] or HPGE) 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 decay corrected from the time of counting to the midpoint of the release period, and is then multiplied by the volume of the batch to determine the total quantity of each nuclide released in each batch.. The isotopic totals for each are summed to determine the total source term for the report period.

TABLE 1

1. TECHNICAL SPECIFICATION LIMITS

   A. NOBLE GASES:

      1. ≤500 mrem - TOTAL BODY
         ≤3000 mrem - SKIN

         - annual site total "instantaneous" limits (Tech Spec. 3.11.2.1)

      2. ≤5 mrad - AIR GAMMA
         ≤10 mrad - AIR BETA

         - quarterly air dose limits per reactor unit (Tech Spec. 3.11.2.2)

      3. ≤10 mrad - AIR GAMMA
         ≤20 mrad - AIR BETA

         - annual air dose limits per reactor unit (Tech Spec. 3.11.2.2)

   B. AIRBORNE I-131, TRITIUM, PARTICULATES WITH HALF-LIVES > 8 DAYS:

      1. ≤1500 mrem - ORGAN
         (inhalation pathways only)

         - annual site total "instantaneous" limits (Tech Spec. 3.11.2.1)

      2. ≤7.5 mrem - ORGAN

         - quarterly dose limits per reactor unit (Tech Spec. 3.11.2.3)

      3. ≤15 mrem - ORGAN

         - annual dose limits per reactor unit (Tech Spec. 3.11.2.3)

C. LIQUID EFFLUENTS:

1. Concentration § 10CFR20 Appendix B, Table II, Column 2

   - site total "instantaneous" limits
     (Tech Spec. 3.11.1.1)

   ≤5 mrem - ORGAN

   - quarterly dose limits per reactor unit
     (Tech Spec. 3.11.1.2)

3. ≤3 mrem - TOTAL BODY
   ≤10 mrem - ORGAN

   - annual dose limits per reactor unit
     (Tech. Spec. 3.11.1.2)

D. AIRBORNE EFFLUENT: BASES FOR PERCENT OF APPLICABLE TECHNICAL SPECIFICATION LIMIT

Fission and Activation Gases

A derived release rate limit based on the Technical Specification limit of 500 mrem/yr was calculated from the expected mix of noble gas radionuclides presented in Table 4.4 of the SSES Final Environmental Statement (NUREG-0564). The limit is 8.51E+05 uCi/min (1.42E+04 uCi/sec).

Iodine-131

A derived release rate limit based on the Technical Specification limit of 1500 mrem/yr from I-131, tritium and particulates with half-lives greater than 8 days was calculated from the annual release quantity of I-131 provided in Table 4.4 of the SSES Final Environmental Statement (NUREG-0564). The limit is 1.41E+02 uCi/min (2.35E+00 uCi/sec).

Particulates

A derived release rate limit based on the Technical Specification limit of 1500 mrem/yr from I-131, tritium and particulates with half-lives greater than 8 days was calculated based on the expected mix of particulate radionuclides presented in Table 4.4 of the SSES Final Environmental Statement (NUREG-0564). The limit is 7.72E+02 uCi/min (1.29E+01 uCi/sec).

Tritium

A derived release rate was calculated based on the 10 CFR 20 Appendix B, Table II, Column 1, Maximum Permissible Concentration for tritium (2.0E-07 uCi/cc) to unrestricted areas. A relative concentration of 4.1E-05 sec/m^3 was assumed. The limit is 2.93E+05 uCi/min (4.88E+03 uCi/sec).

F. WATERBORNE EFFLUENT: BASES FOR PERCENT OF APPLICABLE TECHNICAL SPECIFICATION LIMIT

Fission and Activation Products

Concentrations of fission and activation products in liquid effluent from radwaste effluent are determined for each batch prior to release. Each isotope concentration is compared to 10CFR20 Appendix B, Table II, Column 2 Maximum Permissible Concentration Limits such that, with dilution, the sum of isotope concentrations divided by Maximum Permissible Concentrations must be <1.0. No Technical Specification limit for the total concentration of fission and activation products in liquid effluents is applicable for this category.

Tritium

Liquid effluent quarterly tritium concentrations are compared to the 10 CFR 20 Appendix B, Table II, Column 2, Maximum Permissible Concentration limit of 3.0E-03 uCi/ml to unrestricted areas.

Dissolved and Entrained Gases

Liquid effluent quarterly concentration totals for dissolved and entrained gases are compared to the most restrictive Maximum Permissible Concentration for a noble gas 4.0E-05 uCi/ml (Kr-87) from the SSES Technical Specification Table 3.11.1.1-1.

SECTION 2

EFFLUENT AND WASTE DISPOSAL DATA

Airborne Effluents

Summaries of the radionuclide total curie activities and average release rates are included in Tables 2 and 3.

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

Abnormal Releases

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

If a radionuclide was not detected, zero activity was used for that isotope in dose calculations. A zero activity indicates that no activity was positively detected in any sample when samples were analyzed with techniques which achieved the required Lower Limits of Detection (LLD) as specified in the SSES Technical Specification Table 4.11.2.1.2-1, Radioactive Gaseous Waste Sampling and Analysis Program. In all cases, these LLDs were less than the levels required by Technical Specifications. The following are typical LLDs.

Radionuclide	LLD (uCi/cc)
Kr-87	4.6 E-08
Kr-88	5.3 E-08
Xe-133	5.4 E-08
Xe-133m	1.3 E-07
Xe-135	1.5 E-08
Xe-135m	5.0E-08
Xe-138	1.2 E-07
Mn-54	2.9 E-14
Fe-59	2.8 E-14
Co-58	1.8 E-14
Co-60	3.8 E-14
Zn-65	4.4 E-14
Mo-99	3.3 E-13
Cs-134	2.4 E-14

Radionuclide	LLD (uCi/cc)
Cs-137	2.1 E-14
Ce-141	1.5 E-14
Ce-144	7.0 E-14
I-131	4.4 E-14
Sr-89	2.0 E-15
Sr-90	3.0 E-16
H-3	2.6 E-08
Gross Alpha	5.0 E-16

TABLE 2

ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT (1995)
AIRBORNE EFFLUENT - SUMMATION OF ALL RELEASES

A. Fission and Activation Gas	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Total Release	Ci	6.32E-02	1.53E+01	0.00E+00	0.00E+00
Average Release Rate for Period	uCi/sec	8.13E-03	1.95E+00	0.00E+00	0.00E+00
Percent of Technical Specification Limit	%	5.76E-05	1.38E-02	0.00E+00	0.00E+00

B. Iodines

Total I-131	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Average Release Rate for Period	uCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Percent of Technical Specification Limit	%	0.00E+00	0.00E+00	0.00E+00	0.00E+00

C. Particulate

Particulate with Half-Lives > 8 Days*	Ci	2.18E-04	4.60E-04	7.33E-05	9.35E-04
Average Release Rate for Period	uCi/sec	2.80E-05	5.85E-05	9.22E-06	1.18E-04
Percent of Technical Specification Limit	%	2.17E-04	4.55E-04	7.18E-05	9.15E-04
Gross Alpha Radioactivity*	Ci	1.06E-06	2.85E-07	0.00E+00	0.00E+00

D. Tritium

Total Release	Ci	1.59E+01	1.24E+01	2.36E+01	1.02E+01
Average Release Rate for Period	uCi/sec	2.04E+00	1.58E+00	2.97E+00	1.28E+00
Percent of Technical Specification Limit	%	4.17E-02	3.22E-02	6.06E-02	2.62E-02

*Sr-89, Sr-90 and Gross Alpha values for the fourth quarter 1995 are estimated based on third quarter 1995 sample analyses and fourth quarter 1995 ventilation exhaust rates.

TABLE 3

ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT (1995)
AIRBORNE EFFLUENT

		Releases in Continuous Mode			
		First	Second	Third	Fourth
Nuclides Released	Unit	Quarter	Quarter	Quarter	Quarter
A. Fission and Activation Gases					
Ar-41	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85m	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-133	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135	Ci	6.32E-02	1.53E+01	0.00E+00	0.00E+00
Total for Period	Ci	6.32E-02	1.53E+01	0.00E+00	0.00E+00
B. Iodines					
I-131	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-133	Ci	0.00E+00	0.00E+00	0.00E+00	1.71E-05
I-135	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	1.71E-05
C. Particulate	Ci				
Cr-51	Ci	1.62E-05	2.46E-05	0.00E+00	0.00E+00
Mn-54	Ci	1.10E-04	3.43E-04	4.95E-05	6.41E-04
Fe-59	Ci	0.00E+00	4.54E-05	0.00E+00	1.58E-04
Co-58	Ci	2.51E-05	0.00E+00	0.00E+00	0.00E+00
Co-60	Ci	2.99E-05	4.70E-05	2.38E-05	1.36E-04
Zn-65	Ci	3.65E-05	0.00E+00	0.00E+00	0.00E+00
Sr-89*	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90*	Ci	1.26E-07	0.00E+00	0.00E+00	0.00E+00
Cs-134	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce-141	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce-144	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period*	Ci	2.18E-04	4.60E-04	7.33E-05	9.35E-04

*Reported values for the fourth quarter 1995 are estimated based on third quarter 1994 sample analyses and fourth quarter 1995ventilation exhaust rates.

Waterborne Effluents

Summaries of the radionuclide total curie activities, average diluted concentrations, and percent of applicable Technical Specification limits are included in Tables 4 and 5.

	Batch Releases*	Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4
1.	Number of Batch Releases	40	70	52	62
2.	Total Time Period for a Batch Release	5.11E+03	1.30E+04	5.07E+03	1.10E+04
3.	Maximum Time Period for a Batch Release	3.08E+02	5.64E+02	3.48E+02	5.20E+02
4.	Average Time Period for a Batch Release	1.28E+02	1.86E+02	9.75E+01	1.78E+02
5.	Minimum Time Period for a Batch Release	2.50E+01	1.00E+00	2.00E+01	2.40E+01
6.	Average Stream Flow During Period of Release of Effluent into a Flowing Stream	6.76E+03	6.86E+03	1.00E+04	7.60E+03
		(Cooling Tower Blowdown Flow Rate)			
		7.94E+06	3.95E+06	6.53E+05	5.94E+06
		(Susquehanna River Flow Rate)			

*Units of time and flow are expressed in minutes and gallons per minute (gpm), respectively.

	Abnormal Releases		
1.	Number of Releases	0	0
2.	Volume Released	N/A	N/A
3.	Total Activity Released	N/A	N/A

If a radionuclide was not detected, zero activity was used for that isotope in dose calculations. A zero activity indicates that no activity was positively detected in any sample when samples were analyzed with techniques which achieved the required Lower Limits of Detection (LLD) as specified in the SSES Technical Specification Table 4.11.1.1.1-1, Radioactive Liquid Waste Sampling and Analysis Program. In all cases, these LLDs were less than the levels required by Technical Specifications. The following are typical LLDs.

Radionuclide	LLD (uCi/ml)
Mn-54	4.5 E-08
Fe-59	5.0 E-08
Co-58	2.4 E-08
Co-60	5.4 E-08
Zn-65	4.9 E-08
Mo-99	1.7 E-07
I-131	2.0 E-08
Cs-134	2.2 E-08

Radionuclide	LLD (uCi/ml)
Cs-137	2.6 E-08
Ce-141	3.2 E-08
Ce-144	1.3 E-07
Sr-89	4.0 E-08
Sr-90	4.0 E-09
Fe-55	1.0 E-06
H-3	4.6 E-06
Gross Alpha	3.0 E-08

TABLE 4

ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT (1995)
WATERBORNE EFLUENT - SUMMATION OF ALL RELEASES

A.	Fission and Activation Products	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1.	Total Release (not including Tritium, Gases, Alpha)*	Ci	5.91E-02	4.44E-01	3.43E-02	4.21E-02
2.	Average Diluted Concentration During Period	uCi/ml	4.52E-07	1.27E-06	1.81E-07	1.37E-07
3.	Percent of Applicable Limit	%	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B.	**Tritium**					
1.	Total Release	Ci	1.68E+01	2.75E+01	9.32E+00	2.57E+01
2.	Average Diluted Concentration During Period	uCi/ml	1.28E-04	7.86E-05	4.91E-05	8.37E-05
3.	Percent of Applicable Limit	%	4.28E+00	2.62E+00	1.64E+00	2.79E+00
C.	**Dissolved and Entrained Gases**					
1.	Total Release	Ci	1.51E-04	3.34E-03	3.19E-05	5.45E-04
2.	Average Diluted Concentration During Period	uCi/ml	1.15E-09	9.54E-09	1.68E-10	1.77E-09
3.	Percent of Applicable Limit	%	2.88E-05	2.39E-04	4.20E-06	4.43E-05
D.	**Gross Alpha Radioactivity**					
1.	Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
E.	**Volume of Waste Released** (Prior to Dilution)	Gallons	3.95E+05	3.07E+06	3.08E+05	8.25E+05
		Liters	1.50E+06	1.16E+07	1.17E+06	3.13E+06
F.	**Volume of Dilution Water** Used During Period of Release	Gallons	3.45E+07	9.22E+07	5.01E+07	8.10E+07
		Liters	1.31E+08	3.50E+08	1.90E+08	3.07E+08
G.	**Volume of Dilution Water** Used Over Entire Period	Gallons	8.76E+08	8.99E+08	1.32E+09	1.01E+09
		Liters	3.39E+09	3.48E+09	5.13E+09	3.90E+09

*Reported values for the fourth quarter 1995 are estimated based on third quarter 1995 sample analyses and fourth quarter 1995 discharge volumes.

TABLE 5
ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT (1995)
WATERBORNE EFFLUENT

Releases in Batch Mode

Nuclides Released	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
A. Fission and Activation Products					
F-18	Ci	0.00E+00	3.94E-13	0.00E+00	0.00E+00
Na-24	Ci	2.21E-05	0.00E+00	7.42E-04	0.00E+00
Cr-51	Ci	4.64E-02	1.85E-02	5.60E-05	3.49E-03
Mn-54	Ci	5.56E-03	8.66E-02	2.57E-02	2.07E-02
Mn-56	Ci	0.00E+00	0.00E+00	2.24E-10	0.00E+00
Fe-55	Ci	2.69E-03	2.72E-01	5.47E-03	5.47E-03
Fe-59	Ci	2.05E-03	3.63E-02	1.94E-04	6.13E-03
Co-58	Ci	1.40E-04	5.17E-03	1.51E-04	6.86E-04
Co-60	Ci	1.74E-03	1.93E-02	1.45E-03	3.91E-03
Zn-65	Ci	2.20E-04	3.72E-03	4.50E-04	5.86E-04
As-76	Ci	1.89E-04	0.00E+00	0.00E+00	0.00E-00
Sr-89	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-92	Ci	4.24E-08	6.53E-06	5.48E-07	5.71E-06
Nb-95	Ci	0.00E+00	3.15E-06	4.71E-06	0.00E+00
Tc-99m	Ci	3.05E-06	6.89E-07	3.58E-07	0.00E-00
Ag-110m	Ci	3.49E-05	1.94E-03	9.43E-05	1.10E-03
Sb-124	Ci	0.00E+00	5.28E-04	0.00E+00	3.21E-05
Te-131m	Ci	0.00E+00	4.01E-05	0.00E+00	0.00E+00
I-131	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-134	Ci	2.79E-06	2.88E-06	1.13E-06	4.22E-06
Cs-137	Ci	2.72E-05	3.46E-05	2.15E-05	1.17E-05
La-140	Ci	0.00E+00	0.00E+00	0.00E+00	8.23E-06
Ce-144	Ci	0.00E+00	1.08E-04	0.00E+00	0.00E+00
Hf-181	Ci	0.00E+00	5.03E-05	0.00E+00	0.00E+00
W-187	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period*	Ci	5.91E-02	4.44E-01	3.43E-02	4.21E-02
B. Tritium					
H-3	Ci	1.68E+01	2.75E+01	9.32E+00	2.57E+01
Total for Period	Ci	1.68E+01	2.75E+01	9.32E+00	2.57E+01
C. Dissolved and Entrained Gasses					
Ar-41	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-86m	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85	Ci	0.00E+00	3.07E-03	0.00E+00	3.86E-04
Kr-87	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-88	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-131m	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-133m	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-133	Ci	3.66E-05	1.75E-04	1.65E-05	9.05E-05
Xe-135m	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-135	Ci	1.14E-04	9.15E-05	1.54E-05	6.83E-05
Total for Period	Ci	1.51E-04	3.34E-03	3.19E-05	5.45E-04

*Reported values for the fourth quarter are estimated based on third quarter 1995 sample analyses and fourth quarter 1995 discharge volumes.

FIGURE 3
SUSQUEHANNA RIVER MONTHLY AVERAGE FLOW RATES
DATA PERIOD: 1995

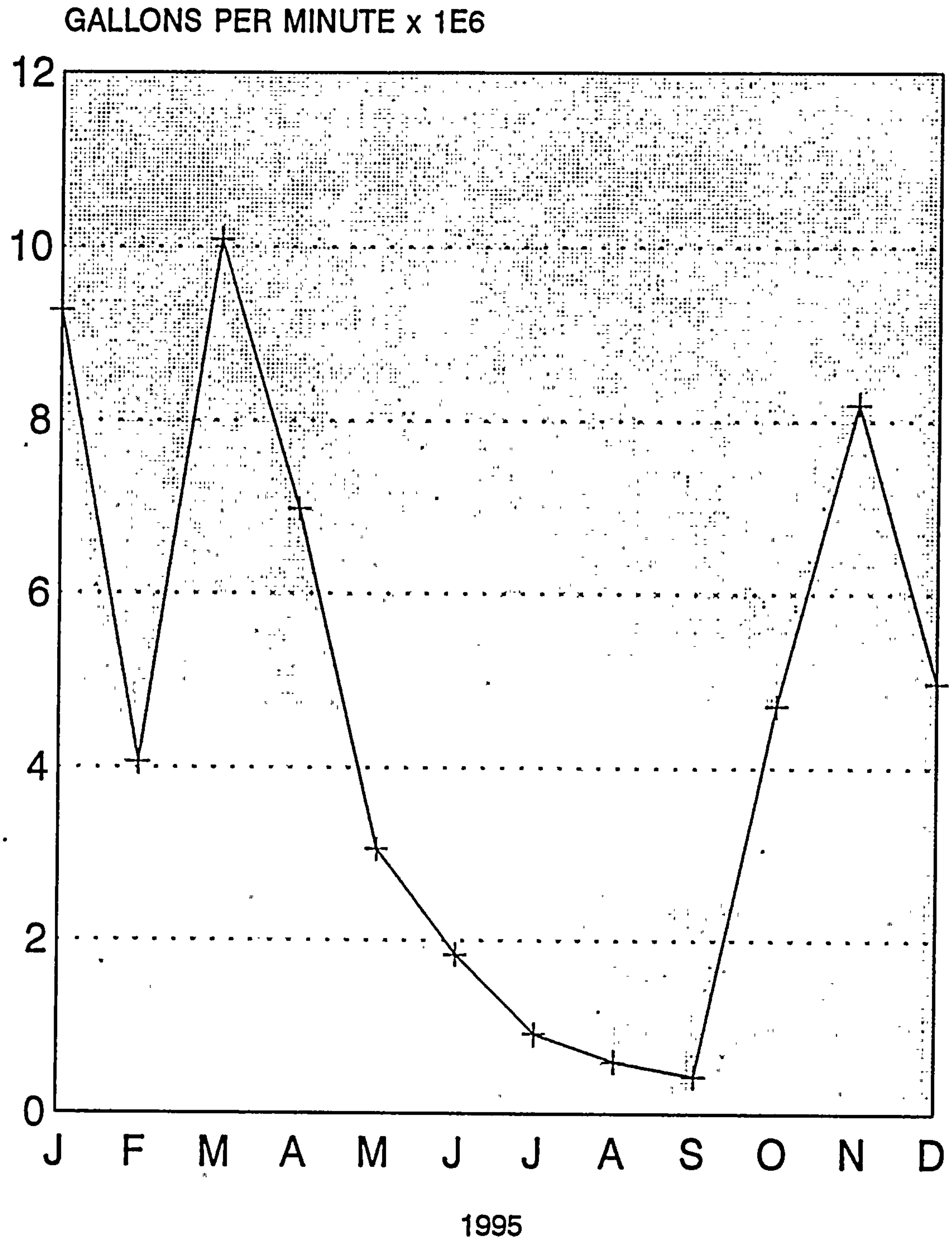
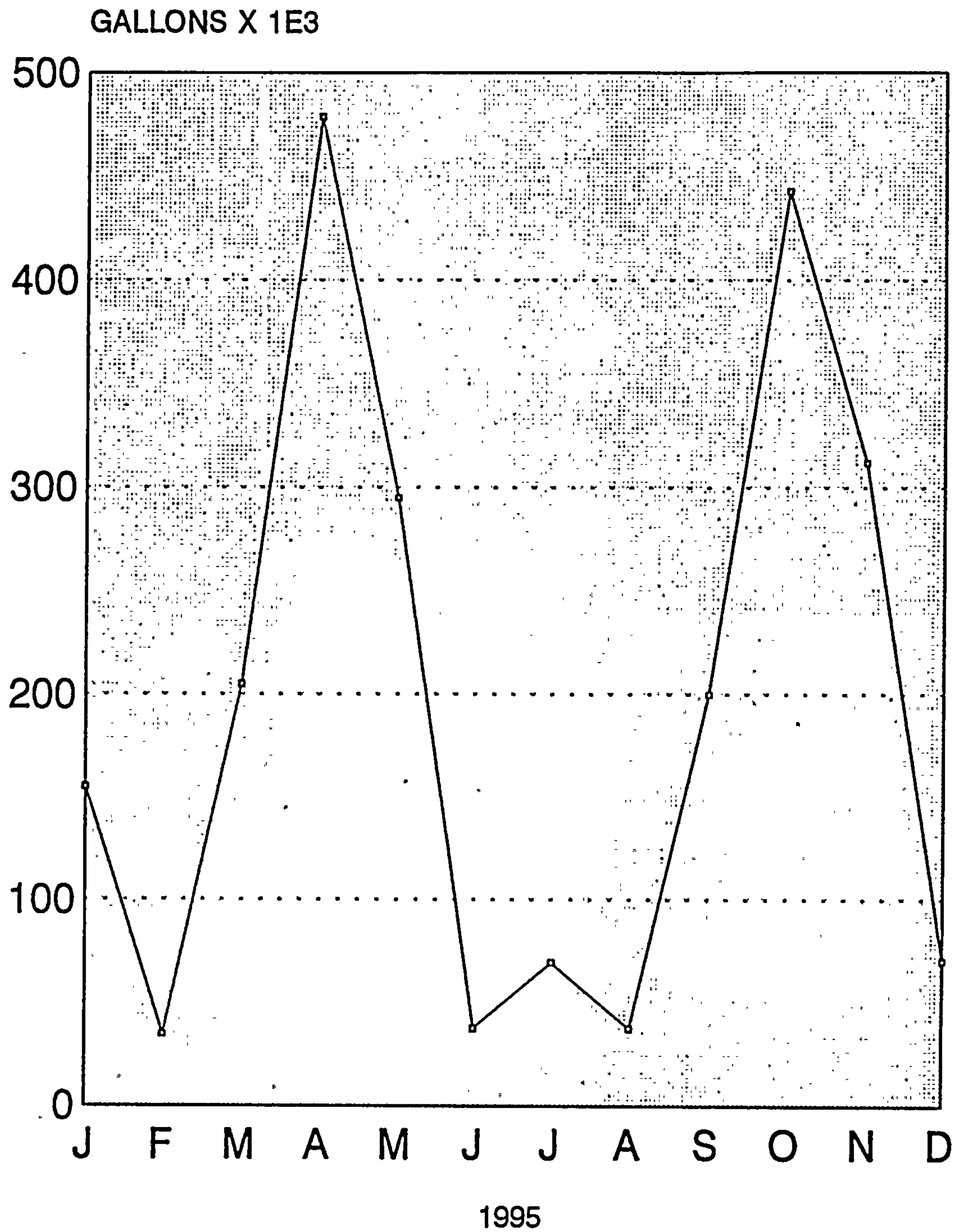


FIGURE 4
SSES MONTHLY LIQUID RADWASTE DISCHARGE TOTALS
DATA PERIOD: 1995



SUSQUEHANNA STEAM ELECTRIC STATION

RADIOACTIVE WASTE REPORT

ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT

SOLID RADIOACTIVE WASTE

DATA PERIOD: JANUARY 1, 1995 - DECEMBER 31, 1995

PREPARED BY: 2/16/96
C. P. LEWIS - HEALTH PHYSICIST

APPROVED BY:
JAMES DOXSEY - EFFLUENTS MANAGEMENT SUPV.

REPORT NOTES

1. All activities reported in millicuries (mCi) unless otherwise noted.

2. Reported activities, as indicated with the (<) sign, are comprised in whole or part of MDL Values.

3. No Class C Waste was disposed during this report period.

4. The number of shipments listed in Table 6 includes only the shipments from SSES to the disposal site. It does not include shipments made to or from volume reduction vendors.

TABLE 6

ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
DATA PERIOD: JANUARY 1, 1995 - DECEMBER 31, 1995

A.* SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL

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

B. IRRADIATED FUEL SHIPMENTS

Number of Shipments	Mode of Transportation	Destination
None	Not Applicable	Not Applicable

*The number of shipments listed in A include only the shipments from SSES to a disposal site. It does not include shipments made to or from volume reduction vendors.

TABLE 11

CLASS A

SOURCE OF WASTE INCINERATED DAW

TYPE OF CONTAINER STRONG TIGHT CONTAINER

METHOD OF PROCESS N/A

ISOTOPES	ACTIVITY	% OF TOTAL
Ag-110m	< 1.000E-04	0.00%
Am-241	< 3.076E-04	0.00%
C-14	1.621E+00	0.14%
Cm-242	1.644E-03	0.00%
Co-58	2.596E+00	0.22%
Co-60	2.556E+02	21.78%
Cr-51	1.501E-02	0.00%
Cs-137	6.911E+00	0.59%
Fe-55	7.828E+01	6.67%
Fe-59	5.373E+01	4.58%
H-3	4.013E+01	3.42%
I-129	1.800E-03	0.00%
I-131	2.280E-02	0.00%
Mn-54	7.099E+02	60.48%
Ni-63	1.627E+00	0.14%
Pu-238	< 5.039E-04	0.00%
Pu-239	< 6.063E-04	0.00%
Pu-241	3.386E-01	0.03%
Sr-90	1.004E-02	0.00%
Tc-99	4.951E-02	0.00%
Zn-65	1.859E+01	1.58%
Be-07	2.000E-04	0.00%
Cm-244	< 3.985E-04	0.00%
Ce-144	1.988E+00	0.17%
K-40	1.900E-03	0.00%
Nb-95	3.150E-01	0.02%
Pb-212	1.600E-03	0.00%
Zr-95	2.079E+00	0.18%
Xe-133	1.200E-03	0.00%
TOTAL ACTIVITY (Ci)	1,174	100.00%
CONTAINER VOLUME	295.600 ft 3	8.371 m3

TABLE 12

CLASS A

SOURCE OF WASTE PROCESSED DAW

TYPE OF CONTAINER STRONG TIGHT CONTAINER

METHOD OF PROCESS N/A

ISOTOPES	ACTIVITY	% OF TOTAL
Am-241	1.484E-03	0.00%
C-14	4.336E-01	0.05%
Cm-242	5.992E-03	0.00%
Co-58	1.716E+00	0.21%
Co-60	2.031E+02	24.32%
Cr-51	4.728E-02	0.01%
Cs-137	5.687E+00	0.68%
Fe-55	6.313E+01	7.56%
Fe-59	3.394E+01	4.06%
H-3	1.321E+01	1.58%
I-129*	2.400E-03	0.00%
Mn-54	4.894E+02	58.61%
Ni-63	1.321E+00	0.16%
Pu-238	1.237E-03	0.00%
Pu-239	1.271E-03	0.00%
Pu-241	2.325E-01	0.03%
Sr-90	4.431E-02	0.01%
Tc-99	5.930E-02	0.01%
Zn-65	1.279E+01	1.53%
Cm-243	6.832E-04	0.00%
Ce-144	1.881E+00	0.22%
Nb-95	1.091E+00	0.13%
Zr-95	6.933E+00	0.83%
TOTAL ACTIVITY (Ci)	0.835	100.00%
CONTAINER VOLUME	1113.100 ft3	31.520 m3

* **I-129 VALUES FOR SOME CONTAINERS WERE LISTED WITH LLD VALUES OF 3.01e-04 uCi/cc OR LESS AND ARE NOT INCLUDED IN THE ABOVE I-129 ACTIVITY.**

TABLE 13

CLASS A

SOURCE OF WASTE NON-PROCESSED DAW

TYPE OF CONTAINER STRONG TIGHT CONTAINER

METHOD OF PROCESS N/A

ISOTOPES	ACTIVITY	% OF TOTAL
Ag-110m	1.180E-03	0.45%
Am-241	7.340E-07	0.00%
C-14	2.700E-04	0.08%
Cm-242	4.370E-06	0.00%
Co-58	1.550E-03	0.59%
Co-60	1.290E-01	50.00%
Cr-51	5.250E-03	2.02%
Cs-137	3.500E-03	1.34%
Fe-55	4.060E-02	15.73%
Fe-59	2.780E-02	10.77%
H-3	7.620E-03	2.94%
I-129	N/A LLD (4.27E-08 uCi/cc)	
Mn-54	3.290E-02	12.73%
Ni-63	8.090E-04	0.31%
Pu-238	5.660E-07	0.00%
Pu-239	6.110E-07	0.00%
Pu-241	1.450E-04	0.05%
Sr-90	1.360E-05	0.00%
Tc-99	3.440E-05	0.01%
Zn-65	6.440E-03	2.48%
Ce-144	1.270E-03	0.50%
Cm-243	3.660E-07	0.00%
TOTAL ACTIVITY (Ci)	0.000	100.00%
CONTAINER VOLUME	5.9 ft	0.167 m3

TABLE 14

CLASS B

SOURCE OF WASTE RWCU FILTER MEDIA

TYPE OF CONTAINER HIC

METHOD OF PROCESS DEWATERED

ISOTOPES	ACTIVITY	% OF TOTAL
Am-241	7.810E-02	0.00%
C-14	6.250E+00	0.00%
Cm-242	5.160E-02	0.00%
Co-60	5.210E+05	48.56%
Cs-137	1.619E+03	0.15%
Fe-55	2.230E+05	20.78%
H-3	2.460E-01	0.00%
I-129	N/A LLD (1.45E-06 uCi/cc)	
Mn-54	2.870E+05	26.75%
Ni-63	8.170E+03	0.76%
Pu-238	1.942E-02	0.00%
Pu-239	1.956E-02	0.00%
Pu-241	1.938E+01	0.00%
SR-89	7.490E-01	0.00%
Sr-90	2.240E+00	0.00%
Tc-99	9.370E+01	0.01%
Zn-65	3.030E+04	2.82%
Ce-144	9.750E+00	0.00%
Ni-59	1.640E+03	0.17%
Cm-243	7.660E-02	0.00%
TOTAL ACTIVITY (Ci)	1073.000	100.00%
CONTAINER VOLUME	264.800 ft	7.498 m3

TABLE 15

CLASS A

SOURCE OF WASTE CONDENSATE DEMINERALIZER
RADWASTE DEMINERALIZER
TYPE OF CONTAINER HIC

METHOD OF PROCESS DEWATERED

ISOTOPES	ACTIVITY	% OF TOTAL
Am-241	1.756E-03	0.00%
C-14	5.263E+00	3.24%
Cm-242	1.756E-03	0.00%
Co-58	6.442E+01	39.61%
Co-60	5.033E+01	30.94%
Cs-137	3.894E-01	0.24%
Fe-55	2.234E+00	1.37%
Fe-59	3.150E-01	0.19%
H-3	1.448E+01	8.90%
I-129	N/A LLD (2.85E-05 uCi/cc)	
Mn-54	2.132E+01	13.11%
Ni-63	8.897E-01	0.55%
Pu-238	2.335E-03	0.00%
Pu-239	2.425E-03	0.00%
Pu-241	5.571E-01	0.35%
Sr-90	1.081E-02	0.01%
Tc-99	N/A LLD (4.57E-05 uCi/cc)	
Zn-65	1.853E+00	1.15%
Ce-144	5.362E-01	0.34%
Cm-243	1.572E-03	0.00%
TOTAL ACTIVITY (Ci)	0.163	100.00%
CONTAINER VOLUME	87.600 ft	2.481 m3

TABLE 16

CLASS A

SOURCE OF WASTE ULTRASONIC RESIN CLEANING WASTE

TYPE OF CONTAINER HIC

METHOD OF PROCESS DEWATERED

ISOTOPES	ACTIVITY	% OF TOTAL	
Ag-110m	1.664E+02	0.41%	
Am-241	8.600E-03	0.00%	
C-14	5.200E+01	0.13%	
Cm-242	5.600E-03	0.00%	
Co-58	2.863E+02	0.71%	
Co-60	6.200E+03	15.24%	
Cr-51	3.700E+02	0.91%	
Cs-137	2.220E+01	0.06%	
Fe-55	6.260E+03	15.38%	
Fe-59	1.795E+03	4.42%	
H-3	5.680E+01	0.14%	
I-129	N/A LLD (6.53E-05 uCi/cc)		
Mn-54	2.490E+04	61.18%	
Ni-63	1.078E+02	0.27%	
Pu-238	1.824E-02	0.00%	
Pu-239	1.691E-02	0.00%	
Pu-241	4.130E+00	0.01%	
Sb-124	4.680E+01	0.12%	
Sr-90	2.340E-01	0.00%	
Tc-99	2.720E-01	0.00%	
Zn-65	4.060E+02	1.00%	
Ce-144	1.110E+00	0.00%	
Cm-243	5.610E-03	0.00%	
Ni-59	6.710E+00	0.02%	
TOTAL ACTIVITY (Ci)	40.700	100.00%	
CONTAINER VOLUME	362.700 ft	10.271	m3

TABLE 17

CLASS A

SOURCE OF WASTE LIQUID RADWASTE FILTER MEDIA

TYPE OF CONTAINER HIC

METHOD OF PROCESS DEWATERED

ISOTOPES	ACTIVITY	% OF TOTAL	
Ag-110m	3.223E+02	0.18%	
Am-241	2.560E-01	0.00%	
C-14	2.377E+00	0.00%	
Cm-242	2.509E-01	0.00%	
Co-58	2.959E+03	1.64%	
Co-60	2.783E+04	15.39%	
Cr-51	8.496E+03	4.70%	
Cs-137	7.416E+01	0.04%	
Fe-55	2.406E+04	13.31%	
Fe-59	1.173E+04	6.49%	
H-3	1.213E+02	0 07%	
I-129	N/A LLD (4.75E-05 uCi/cc)		
Mn-54	1.006E+05	55.64%	
Ni-63	3.576E+02	0.20%	
Pu-238	5.433E-01	0.00%	
Pu-239	5.032E-01	0.00%	
Pu-241	1.227E+02	0.07%	
Sb-124	2.678E+02	0.15%	
Sr-89	4.336E+00	0.00%	
Sr-90	9.318E-01	0.00%	
Tc-99*	1.080E+00	0.00%	
Zn-65	3.520E+03	1.95%	
Ce-144	1.248E+02	0.07%	
Cm-243	3.257E-01	0.00%	
Hf-181	2.631E+01	0.01%	
Nb-95	7.619E+01	0.04%	
Ni-59	9.576E+01	0.05%	
Sr-92	7.910E-16	0.00%	
TOTAL ACTIVITY (Ci)	180.790	100.00%	
CONTAINER VOLUME	777.600 ft	22.020	m3

* TC-99 VALUES FOR SOME CONTAINERS WERE LISTED WITH LLD VALUES OF 8.84e-05 uCi/cc OR LESS AND ARE NOT INCLUDED IN THE ABOVE TC-99 ACTIVITY.

TABLE 18
ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
ESTIMATED TOTAL ERRORS ASSOCIATED WITH EFFLUENT MEASUREMENTS
DATA PERIOD: January 1, 1995 - December 31, 1995

Measurement	Estimated Total Error
1. Airborne Effluents	
a. Fission and Activation Gases	15.9%
b. I-131	13.3%
c. Particulates	15.8%
d. Tritium	13.6%
2. Waterborne Effluents	
a. Fission and Activation Products	5.0%
b, Tritium	3.3%
c. Dissolved and Entrained Gases	8.4%
d. Gross Alpha Activity	6.0%
e. Volume of Waste Released (Prior to Dilution)	5.0%
f. Volume of Dilution Water Used During Period	15.0%
3. Solid Wastes	
a. Atmospheric Deminerlizer (Dewatered - HIC)	15.1%
b. Condensate Demineralizer/ Radwaste Demineralizer (Dewatered - Carbon Steel Liner)	15.1%
c. Condensate Demineralizer/ Radwaste Demineralizer (Dewatered - HIC)	15.1%
d. Liquid Radwaste Filter Media (Dewatered - HIC)	15.1%
e. RWCU Filter Media (Dewatered - HIC)	15.1%

Measurement	Estimated Total Error
3. Solid Wastes (cont.)	
f. Ultrasonic Resin Cleaning Waste (Dewatered - HIC)	15.1%
g. Cartridge Filters (Dewatered - HIC)	25.0%
h. Processed DAW (Strong Tight Container)	25.0%
i. Non-Processed DAW (Strong Tight Container)	25.0%
j. Incinerated DAW (Strong Tight Container)	25.0%
k. Cartridge Filters (HIC)	25.0%
l. Irradiated Components (Dewatered-Steel Liner)	25.0%

TABLE 19

ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT DATA NOT REPORTED IN PREVIOUS ANNUAL REPORT

NUCLIDE CATEGORY	UNIT	FOURTH QUARTER 1994
A. Airborne Effluents		
1. Sr-89	Ci	0.00E+00
2. Sr-90	Ci	5.46E-09
3. Gross Alpha	Ci	1.73E-06
B. Waterborne Effluents		
1. Sr-89	Ci	0.00E+00
2. Sr-90	Ci	0.00E+00
3. Fe-55	Ci	6.18E-03
3. Gross Alpha	Ci	0.00E+00

SECTION 3

METEOROLOGICAL DATA AND DISPERSION ESTIMATES

METEOROLOGY AND DISPERSION DATA

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

Dispersion modeling for effluents from normal operation of SSES is done using X0QD0Q, a straight-line air flow Gaussian plume model designed to estimate average relative concentrations. The model was developed in accordance with Regulatory Guide 1.111. Calm periods are distributed as the first non-zero wind-speed class in the input joint frequency distribution file.

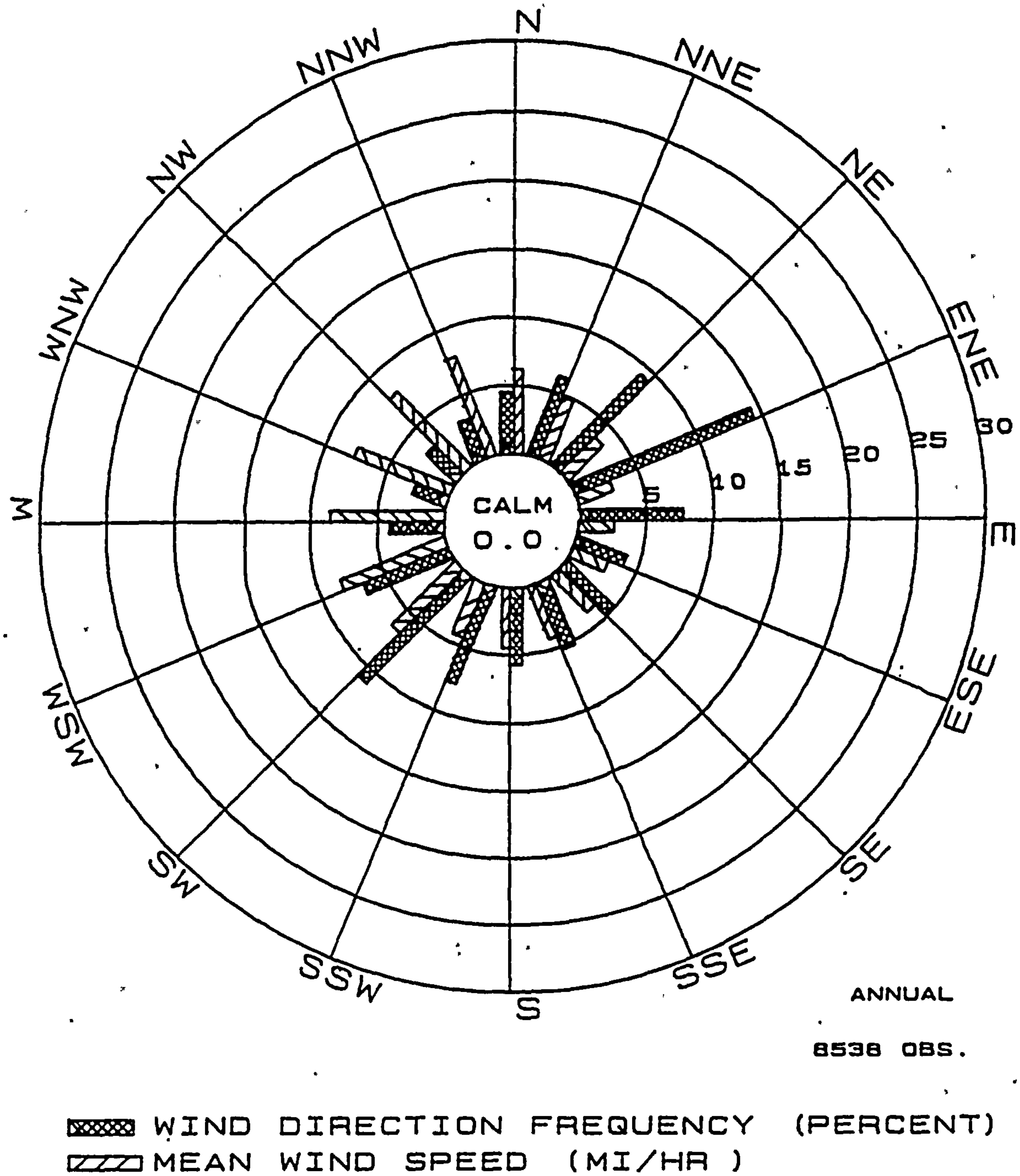
XOQDOQ uses terrain correction factors to account for the temporal and spatial variations in the airflow in the region, since a straight-line trajectory model assumes that a constant mean wind transports and diffuses effluents in the direction of air flow at the release point within the entire region of interest. The SSES terrain correction factors were determined by the ratio of the results of the straight-line model to the puff-advection model, and are incorporated into Table 22.

TABLE 20
ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT
METEOROLOGICAL DATA AVAILABILITY
DATA PERIOD: 1995

PARAMETER	PERCENT OF VALID HOURS DURING PERIOD
1. Wind speed	
a. 10-Meter Sensors	97.5%
b. 60-Meter Sensor	99.4%
2. Wind direction	
a. 10-Meter Sensors	99.4%
b. 60-Meter Sensor	99.5%
3. Indicator of Atmospheric Stability (Primary Tower)	
a. Temperature Differential between 10 and 60 meters (Delta-TA)	98.9%
b. Temperature Differential between 10 and 60 meters (Delta-TB)	98.7%
c. Sigma Theta @ 10 Meters	50.1%*
d. Sigma Theta @ 60 Meters	50.1%*
4. Percent of hours for which valid 10-meter wind speed, 10-meter wind direction, and temperature differential were available.	96.9%
5. Percent of hours for which valid 60-meter wind speed, 60-meter wind direction, and temperature differential were available.	98.8%

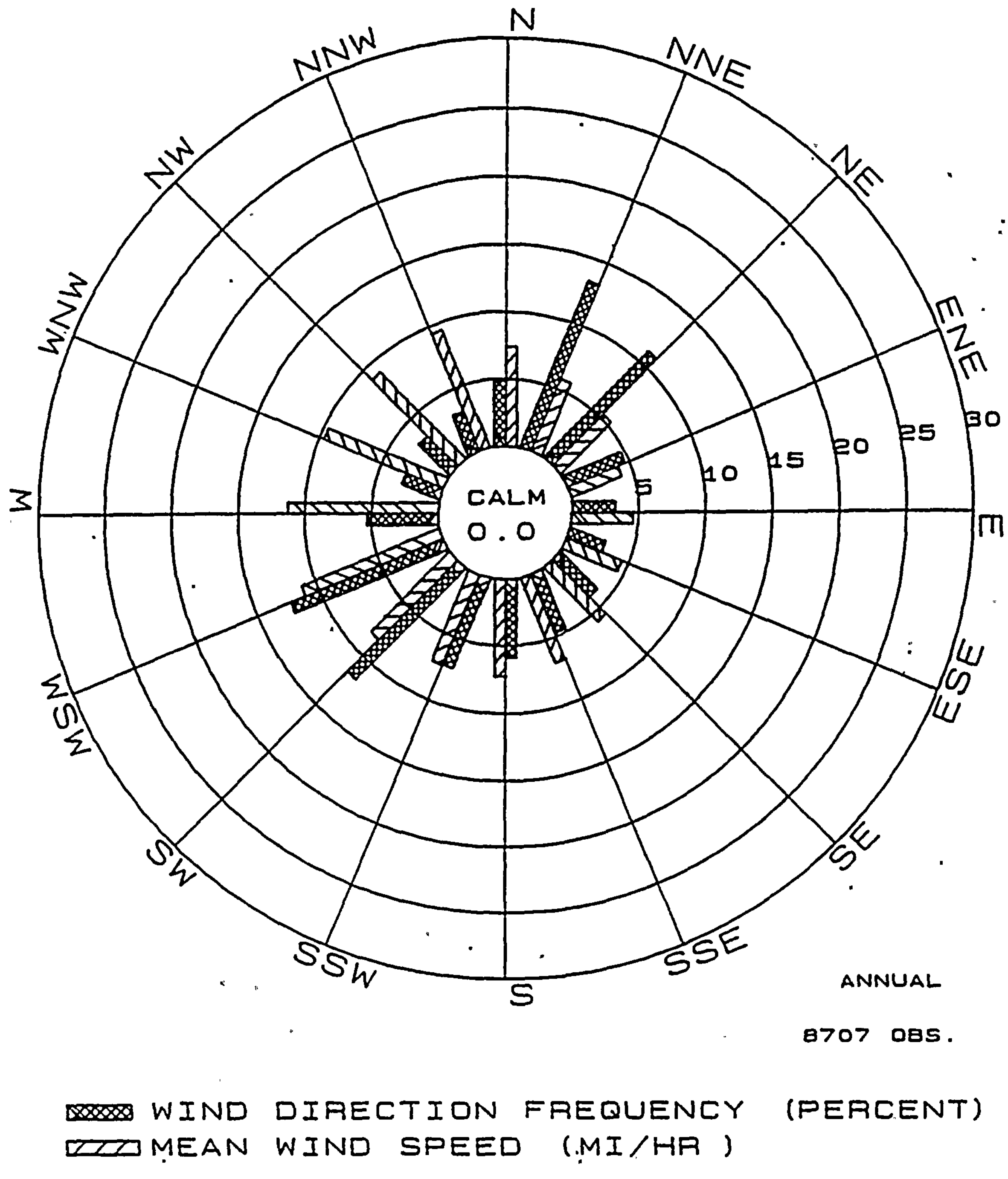
*Classification of atmospheric stability by sigma theta is the secondary method used at SSES. The input resolution of the Climatronic computer is reduced significantly by digital-analog conversion. Halliburton-NUS began using the sigma theta values from Campbell's dataloggers effective July 1, 1995.

FIGURE 5



10-METER ANNUAL WIND ROSE - 1995

FIGURE 6



60-METER ANNUAL WIND ROSE - 1995

Figure 7
SSES PASQUILL STABILITY CLASS PREVALENCES
Data Period: 1995

Based on Joint Frequency Distributions at 10 Meters
(8487 Hourly Values)

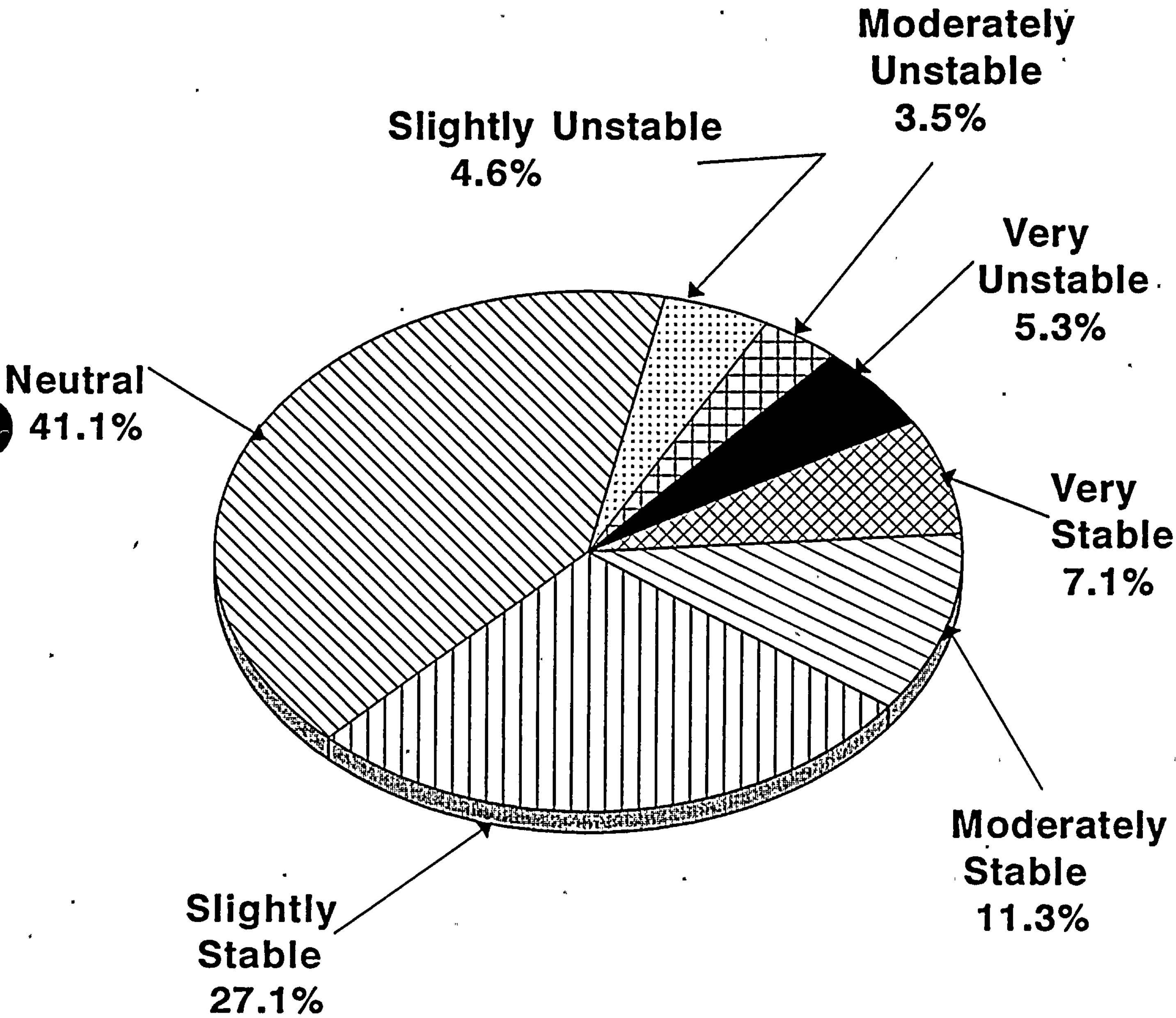


TABLE 21

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

PENNSYLVANIA POWER & LIGHT COMPANY (PP&L) - Susquehanna Steam Electric Station 1/26/1996 PAGE 62
TIME OF DAY: 13:51:57

PROGRAM: JFD VERSION: PC-1.2

1995 Primary Tower Data - 33-Foot level
SITE IDENTIFIER:
DATA PERIOD EXAMINED: 1/ 1/95 - 12/31/95

*** ANNUAL ***

STABILITY CLASS A

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 33.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 33.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.51- 3.40	0	0	1	0	7	0	1	2	0	0	0	0	0	0	0	0	11
3.41- 6.70	3	9	12	6	4	5	7	13	16	36	48	6	0	0	1	2	168
6.71-11.20	0	7	19	4	1	0	6	3	22	11	116	45	3	0	0	0	237
11.21-16.80	0	0	0	0	0	0	0	0	0	0	19	16	2	0	0	0	37
16.81-22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	3	16	32	10	12	5	14	18	38	47	183	67	5	0	1	2	453

STABILITY CLASS B

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 33.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 33.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.51- 3.40	0	0	1	0	2	2	4	1	1	1	1	0	0	0	0	0	13
3.41- 6.70	3	14	11	6	6	3	8	6	10	27	27	9	1	0	2	0	133
6.71-11.20	5	13	6	0	0	0	2	3	10	5	43	25	9	2	2	5	130
11.21-16.80	0	0	0	0	0	0	0	0	0	0	7	10	1	0	0	0	18
16.81-22.40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
>22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	8	27	18	6	8	5	14	10	21	33	78	45	11	2	4	5	295

TABLE 21

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

PENNSYLVANIA POWER & LIGHT COMPANY (PP&L) - Susquehanna Steam Electric Station 1/26/1996 PAGE 63
TIME OF DAY: 13:51:57

PROGRAM: JFD VERSION: PC-1.2

1995 Primary Tower Data - 33-Foot level
SITE IDENTIFIER:
DATA PERIOD EXAMINED: 1/ 1/95 - 12/31/95

*** ANNUAL ***

STABILITY CLASS C

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 33.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 33.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.51- 3.40	0	0	5	3	1	6	2	2	0	2	1	1	0	1	0	0	24
3.41- 6.70	6	15	14	6	3	7	12	11	12	18	41	15	5	2	3	3	173
6.71-11.20	7	13	3	0	0	1	4	1	3	4	44	28	13	9	9	12	151
11.21-16.80	3	0	0	0	0	0	0	0	0	0	6	16	6	4	2	5	42
16.81-22.40	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
>22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	16	28	22	9	4	14	18	14	15	24	92	62	24	16	14	20	392

STABILITY CLASS D

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 33.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 33.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.51- 3.40	31	51	88	69	107	62	82	67	51	66	40	26	12	9	4	9	774
3.41- 6.70	123	157	172	66	45	32	76	113	79	115	145	99	78	66	66	66	1498
6.71-11.20	104	51	30	5	10	9	24	17	18	18	133	119	111	92	140	111	992
11.21-16.80	9	1	0	0	1	0	1	2	4	0	23	69	56	15	13	19	213
16.81-22.40	0	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	8
>22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	267	260	290	140	163	103	183	199	152	199	341	317	261	182	223	205	3485

TABLE 21

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

PENNSYLVANIA POWER & LIGHT COMPANY (PP&L) - Susquehanna Steam Electric Station 1/26/1996 PAGE 64
TIME OF DAY: 13:51:57

PROGRAM: JFD VERSION: PC-1.2

1995 Primary Tower Data - 33-Foot level
SITE IDENTIFIER:
DATA PERIOD EXAMINED: 1/ 1/95 - 12/31/95

*** ANNUAL ***

STABILITY CLASS E

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 33.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 33.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.51- 3.40	27	77	180	228	185	114	115	117	128	136	50	12	6	5	4	4	1388
3.41- 6.70	39	76	54	21	2	2	28	35	67	160	140	54	25	11	12	26	752
6.71-11.20	12	3	8	1	2	2	4	20	23	18	27	16	3	1	0	4	144
11.21-16.80	0	0	0	0	1	0	0	6	3	0	1	2	0	0	0	1	14
16.81-22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	78	156	242	250	190	118	147	178	221	314	218	84	34	17	16	35	2298

STABILITY CLASS F

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 33.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 33.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	1
.51- 3.40	2	18	104	360	190	63	31	28	30	22	9	0	2	1	0	0	860
3.41- 6.70	7	5	5	47	3	1	1	1	2	12	8	0	1	0	0	2	95
6.71-11.20	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
11.21-16.80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16.81-22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	11	23	109	407	193	64	32	29	32	34	17	0	3	1	0	2	958

TABLE 21

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

PENNSYLVANIA POWER & LIGHT COMPANY (PP&L) - Susquehanna Steam Electric Station 1/26/1996 PAGE 65
TIME OF DAY: 13:51:57

PROGRAM: JFD VERSION: PC-1.2

1995 Primary Tower Data - 33-Foot level
SITE IDENTIFIER:
DATA PERIOD EXAMINED: 1/ 1/95 - 12/31/95

*** ANNUAL ***

STABILITY CLASS G

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 33.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 33.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.51- 3.40	1	12	75	358	82	21	5	2	4	2	0	1	0	0	0	1	564
3.41- 6.70	0	1	3	36	1	0	0	0	0	0	1	0	0	0	0	0	42
6.71-11.20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11.21-16.80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16.81-22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1	13	78	394	83	21	5	2	4	2	1	1	0	0	0	1	606

STABILITY CLASS ALL

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 33.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 33.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	1
.51- 3.40	61	158	454	1018	574	268	240	219	214	229	101	40	20	16	8	14	3634
3.41- 6.70	181	277	271	188	64	50	132	179	186	368	410	183	110	79	84	99	2861
6.71-11.20	130	87	66	10	13	12	40	44	76	56	363	233	139	104	151	132	1656
11.21-16.80	12	1	0	0	2	0	1	8	7	0	56	113	65	19	15	25	324
16.81-22.40	0	0	0	0	0	0	0	0	0	0	0	7	4	0	0	0	11
>22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	384	523	791	1216	653	330	413	450	483	653	930	576	338	218	258	270	8487

TABLE 21

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

PENNSYLVANIA POWER & LIGHT COMPANY (PP&L) - Susquehanna Steam Electric Station 1/26/1996 PAGE 66
TIME OF DAY: 13:51:57

PROGRAM: JFD VERSION: PC-1.2

1995 Primary Tower Data - 33-Foot level
SITE IDENTIFIER:
DATA PERIOD EXAMINED: 1/ 1/95 - 12/31/95

*** ANNUAL ***

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 33.0 FEET
WIND THRESHOLD AT: .50 MPH

TOTAL NUMBER OF OBSERVATIONS: 8760
TOTAL NUMBER OF VALID OBSERVATIONS: 8487
TOTAL NUMBER OF MISSING OBSERVATIONS: 273
PERCENT DATA RECOVERY FOR THIS PERIOD: 96.9 %
MEAN WIND SPEED FOR THIS PERIOD: 4.9 MPH
NUMBER OF OBSERVATIONS WITH BACKUP STABILITY: 0
TOTAL NUMBER OF OBSERVATIONS WITH BACKUP DATA: 0

PERCENTAGE OCCURRENCE OF STABILITY CLASSES

A	B	C	D	E	F	G
5.34	3.48	4.62	41.06	27.08	11.29	7.14

DISTRIBUTION OF WIND DIRECTION VS STABILITY

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
A	3	16	32	10	12	5	14	18	38	47	183	67	5	0	1	2	0
B	8	27	18	6	8	5	14	10	21	33	78	45	11	2	4	5	0
C	16	28	22	9	4	14	18	14	15	24	92	62	24	16	14	20	0
D	267	260	290	140	163	103	183	199	152	199	341	317	261	182	223	205	0
E	78	156	242	250	190	118	147	178	221	314	218	84	34	17	16	35	0
F	11	23	109	407	193	64	32	29	32	34	17	0	3	1	0	2	1
G	1	13	78	394	83	21	5	2	4	2	1	1	0	0	0	1	0
TOTAL	384	523	791	1216	653	330	413	450	483	653	930	576	338	218	258	270	1

TABLE 21

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

PENNSYLVANIA POWER & LIGHT COMPANY (PP&L) - Susquehanna Steam Electric Station 1/26/1996 PAGE 62
. TIME OF DAY: 13:54:54

PROGRAM: JFD VERSION: PC-1.2

1995 Primary Tower Data - 200-Foot level
SITE IDENTIFIER:
DATA PERIOD EXAMINED: 1/ 1/95 - 12/31/95

*** ANNUAL ***

STABILITY CLASS A

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 200.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT200.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.51- 3.40	0	0	0	4	2	1	0	0	1	0	0	0	0	0	0	0	8
3.41- 6.70	2	5	10	3	1	4	4	2	6	9	17	3	0	0	0	1	67
6.71-11.20	0	11	24	2	2	0	5	8	8	19	75	48	2	0	0	0	204
11.21-16.80	0	3	5	0	0	0	2	4	12	17	57	47	6	0	0	0	153
16.81-22.40	0	0	0	0	0	0	0	0	2	1	7	15	0	0	0	0	25
>22.40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
TOTAL	2	19	39	9	5	5	11	14	29	46	156	114	8	0	0	1	458

STABILITY CLASS B

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 200.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT200.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.51- 3.40	0	0	2	2	2	1	1	1	1	1	2	0	0	0	0	0	13
3.41- 6.70	3	2	7	3	6	4	2	2	1	13	10	1	0	1	0	0	55
6.71-11.20	6	18	12	0	0	0	6	6	6	9	41	29	6	0	2	1	142
11.21-16.80	2	6	0	0	0	0	0	1	4	11	14	23	10	1	1	3	76
16.81-22.40	0	0	0	0	0	0	0	0	0	1	2	7	0	0	0	0	10
>22.40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
TOTAL	11	26	21	5	8	5	9	10	12	35	69	60	17	2	3	4	297

TABLE 21

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

PENNSYLVANIA POWER & LIGHT COMPANY (PP&L) - Susquehanna Steam Electric Station 1/26/1996 PAGE 63
TIME OF DAY: 13:54:54

PROGRAM: JFD VERSION: PC-1.2

1995 Primary Tower Data - 200-Foot level
SITE IDENTIFIER:
DATA PERIOD EXAMINED: 1/ 1/95 - 12/31/95

*** ANNUAL ***

STABILITY CLASS C

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 200.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT200.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.51- 3.40	0	0	5	2	4	2	1	2	1	1	0	1	0	0	0	0	19
3.41- 6.70	2	8	9	2	4	3	4	7	9	5	20	6	6	2	1	2	90
6.71-11.20	5	17	9	1	0	4	6	4	7	11	34	31	15	7	7	6	164
11.21-16.80	7	6	0	0	0	0	2	1	4	1	13	31	11	8	4	12	100
16.81-22.40	0	0	0	0	0	0	0	0	1	0	1	10	6	0	0	0	18
>22.40	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4
TOTAL	14	31	23	5	8	9	13	14	22	18	68	83	38	17	12	20	395

STABILITY CLASS D

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 200.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT200.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.51- 3.40	4	38	60	51	29	25	35	29	29	40	21	7	7	5	3	4	387
3.41- 6.70	48	90	83	59	44	42	44	55	46	60	134	69	40	16	25	23	878
6.71-11.20	124	131	124	34	23	20	46	83	57	46	102	151	123	134	138	121	1457
11.21-16.80	31	34	20	4	10	6	12	13	18	35	59	174	102	51	49	62	680
16.81-22.40	1	1	3	0	1	0	3	2	6	0	4	52	56	8	1	2	140
>22.40	0	0	0	0	0	0	0	0	1	0	1	4	5	0	0	0	11
TOTAL	208	294	290	148	107	93	140	182	157	181	321	457	333	214	216	212	3553

TABLE 21

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

PENNSYLVANIA POWER & LIGHT COMPANY (PP&L) - Susquehanna Steam Electric Station 1/26/1996 PAGE 64
TIME OF DAY: 13:54:54

PROGRAM: JFD VERSION: PC-1.2

1995 Primary Tower Data - 200-Foot level
SITE IDENTIFIER:
DATA PERIOD EXAMINED: 1/ 1/95 - 12/31/95

*** ANNUAL ***

STABILITY CLASS E

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 200.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT200.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.51- 3.40	23	72	114	69	46	37	42	43	52	42	31	12	4	2	5	3	597
3.41- 6.70	41	170	99	42	19	14	37	36	62	79	106	51	16	10	14	9	805
6.71-11.20	26	57	40	10	3	0	18	30	64	94	128	132	31	15	16	18	682
11.21-16.80	4	9	13	2	2	1	3	12	27	34	42	91	6	0	0	2	248
16.81-22.40	0	2	1	0	1	1	1	8	9	5	3	4	0	0	0	1	36
>22.40	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	6
TOTAL	94	310	267	123	71	53	101	132	214	254	310	293	57	27	35	33	2374

STABILITY CLASS F

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 200.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT200.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.51- 3.40	16	66	107	59	37	36	29	25	18	18	10	4	0	2	2	2	431
3.41- 6.70	33	203	63	18	8	7	6	8	21	35	35	10	2	1	3	5	458
6.71-11.20	5	9	4	1	0	1	3	3	3	10	11	19	4	0	0	2	75
11.21-16.80	1	0	0	0	0	0	0	0	0	0	1	10	0	0	0	0	12
16.81-22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	55	278	174	78	45	44	38	36	42	63	57	43	6	3	5	9	976

TABLE 21

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

PENNSYLVANIA POWER & LIGHT COMPANY (PP&L) - Susquehanna Steam Electric Station 1/26/1996 PAGE
TIME OF DAY: 13:54:54

PROGRAM: JFD VERSION: PC-1.2

1995 Primary Tower Data - 200-Foot level
SITE IDENTIFIER:
DATA PERIOD EXAMINED: 1/ 1/95 - 12/31/95

*** ANNUAL ***

STABILITY CLASS G

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 200.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT200.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	
CALM																
.51- 3.40	3	36	62	32	24	28	17	13	8	14	6	1	1	1	1	
3.41- 6.70	29	159	65	8	8	5	8	8	17	17	14	2	0	0	4	
6.71-11.20	2	3	0	0	0	1	0	2	0	2	1	3	0	0	0	
11.21-16.80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16.81-22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
>22.40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	34	198	127	40	32	34	25	23	25	33	21	6	1	1	5	1

STABILITY CLASS ALL

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 200.0 FEET
WIND THRESHOLD AT: .50 MPH
JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT200.00 FEET

SPEED (MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
CALM																	0
.51- 3.40	46	212	350	219	144	130	125	113	110	116	70	25	12	10	11	9	1702
3.41- 6.70	158	637	336	135	90	79	105	118	162	218	336	142	64	30	47	41	2698
6.71-11.20	168	246	213	48	28	26	84	136	145	191	392	413	181	156	163	148	2738
11.21-16.80	45	58	38	6	12	7	19	31	65	98	186	376	135	60	54	79	1269
16.81-22.40	1	3	4	0	2	1	4	10	18	7	17	88	62	8	1	3	229
>22.40	0	0	0	0	0	0	0	3	1	0	1	12	6	0	0	0	23
TOTAL	418	1156	941	408	276	243	337	411	501	630	1002	1056	460	264	276	280	8659

TABLE 21

JOINT WIND FREQUENCY DISTRIBUTION BY STABILITY CLASS

PENNSYLVANIA POWER & LIGHT COMPANY (PP&L) - Susquehanna Steam Electric Station 1/26/1996 PAGE 66
TIME OF DAY: 13:54:54

PROGRAM: JFD VERSION: PC-1.2

1995 Primary Tower Data - 200-Foot level
SITE IDENTIFIER:
DATA PERIOD EXAMINED: 1/ 1/95 - 12/31/95

*** ANNUAL ***

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 33.0 FEET
WIND MEASURED AT: 200.0 FEET
WIND THRESHOLD AT: .50 MPH

TOTAL NUMBER OF OBSERVATIONS: 8760
TOTAL NUMBER OF VALID OBSERVATIONS: 8659
TOTAL NUMBER OF MISSING OBSERVATIONS: 101
PERCENT DATA RECOVERY FOR THIS PERIOD: 98.8 %
MEAN WIND SPEED FOR THIS PERIOD: 7.4 MPH
NUMBER OF OBSERVATIONS WITH BACKUP STABILITY: 0
TOTAL NUMBER OF OBSERVATIONS WITH BACKUP DATA: 0

PERCENTAGE OCCURRENCE OF STABILITY CLASSES

A	B	C	D	E	F	G
5.29	3.43	4.56	41.03	27.42	11.27	7.00

DISTRIBUTION OF WIND DIRECTION VS STABILITY

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	CALM
A	2	19	39	9	5	5	11	14	29	46	156	114	8	0	0	1	0
B	11	26	21	5	8	5	9	10	12	35	69	60	17	2	3	4	0
C	14	31	23	5	8	9	13	14	22	18	68	83	38	17	12	20	0
D	208	294	290	148	107	93	140	182	157	181	321	457	333	214	216	212	0
E	94	310	267	123	71	53	101	132	214	254	310	293	57	27	35	33	0
F	55	278	174	78	45	44	38	36	42	63	57	43	6	3	5	9	0
G	34	198	127	40	32	34	25	23	25	33	21	6	1	1	5	1	0
TOTAL	418	1156	941	408	276	243	337	411	501	630	1002	1056	460	264	276	280	0

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

Susquehanna Steam Electric Station - GROUND-LEVEL RELEASE - 1995
CORRECTED FOR OPEN TERRAIN RECIRCULATION USING SPECIAL TERRAIN ADJUSTMENT FACTORS

RELATIVE DEPOSITION PER UNIT AREA (M**-2) AT FIXED POINTS BY DOWNWIND SECTORS

DIRECTION FROM SITE	.25	.50	.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
	DISTANCES IN MILES										
S	6.156E-08	2.162E-08	1.137E-08	6.871E-09	3.244E-09	1.917E-09	1.256E-09	8.317E-10	5.726E-10	4.238E-10	3.211E-10
SSW	8.207E-08	2.739E-08	1.493E-08	8.788E-09	4.571E-09	2.726E-09	1.812E-09	1.189E-09	8.056E-10	5.908E-10	4.400E-10
SW	1.025E-07	3.504E-08	2.024E-08	1.243E-08	6.139E-09	3.654E-09	2.423E-09	1.637E-09	1.147E-09	8.477E-10	6.408E-10
WSW	1.436E-07	5.107E-08	3.170E-08	2.035E-08	1.028E-08	6.340E-09	4.341E-09	2.910E-09	2.023E-09	1.539E-09	1.201E-09
W	1.021E-07	3.496E-08	1.803E-08	1.060E-08	4.974E-09	2.914E-09	1.904E-09	1.267E-09	8.777E-10	6.662E-10	5.154E-10
WNW	5.742E-08	1.949E-08	1.040E-08	6.170E-09	3.112E-09	1.822E-09	1.183E-09	8.073E-10	5.760E-10	4.410E-10	3.450E-10
NW	8.454E-08	2.859E-08	1.566E-08	9.223E-09	4.643E-09	2.743E-09	1.812E-09	1.268E-09	9.306E-10	7.092E-10	5.525E-10
NNW	7.213E-08	2.596E-08	1.443E-08	9.325E-09	4.553E-09	2.762E-09	1.840E-09	1.246E-09	8.773E-10	6.972E-10	5.667E-10
N	7.151E-08	2.396E-08	1.259E-08	7.308E-09	3.834E-09	2.422E-09	1.702E-09	1.166E-09	8.350E-10	6.548E-10	5.250E-10
NNE	9.489E-08	3.540E-08	1.856E-08	1.187E-08	5.730E-09	3.590E-09	2.505E-09	1.724E-09	1.241E-09	9.779E-10	7.883E-10
NE	1.377E-07	4.742E-08	2.554E-08	1.522E-08	7.858E-09	4.950E-09	3.457E-09	2.435E-09	1.798E-09	1.435E-09	1.171E-09
ENE	9.313E-08	3.163E-08	1.692E-08	1.077E-08	5.222E-09	3.304E-09	2.330E-09	1.694E-09	1.288E-09	1.041E-09	8.638E-10
E	5.327E-08	1.809E-08	9.329E-09	5.286E-09	2.549E-09	1.539E-09	1.035E-09	7.138E-10	5.151E-10	3.993E-10	3.179E-10
ESE	4.031E-08	1.298E-08	6.714E-09	3.790E-09	1.771E-09	1.016E-09	6.483E-10	4.439E-10	3.179E-10	2.308E-10	1.709E-10
SE	4.312E-08	1.446E-08	7.885E-09	4.823E-09	2.283E-09	1.333E-09	8.632E-10	5.560E-10	3.699E-10	2.631E-10	1.901E-10
SSE	4.716E-08	1.669E-08	8.955E-09	5.086E-09	2.389E-09	1.449E-09	9.754E-10	6.575E-10	4.601E-10	3.242E-10	2.300E-10

DIRECTION FROM SITE	5.00	7.50	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
	DISTANCES IN MILES										
S	2.556E-10	1.009E-10	4.900E-11	1.032E-11	4.216E-12	1.361E-12	6.751E-13	2.816E-13	1.752E-13	1.050E-13	8.566E-14
SSW	3.504E-10	1.385E-10	7.090E-11	2.003E-11	8.081E-12	2.709E-12	1.226E-12	3.836E-13	2.386E-13	9.530E-14	7.778E-14
SW	5.129E-10	2.128E-10	1.072E-10	2.764E-11	1.222E-11	4.960E-12	2.627E-12	1.276E-12	8.120E-13	4.324E-13	3.530E-13
WSW	9.675E-10	4.123E-10	2.053E-10	4.903E-11	1.978E-11	6.301E-12	3.089E-12	1.071E-12	5.549E-13	2.216E-13	1.809E-13
W	4.122E-10	1.633E-10	8.074E-11	1.931E-11	7.171E-12	1.781E-12	8.932E-13	2.874E-13	1.690E-13	5.951E-14	4.857E-14
WNW	2.782E-10	1.203E-10	6.229E-11	1.863E-11	7.650E-12	2.610E-12	1.032E-12	1.452E-13	7.529E-14	2.406E-14	1.964E-14
NW	4.481E-10	1.995E-10	1.054E-10	3.302E-11	1.260E-11	3.491E-12	1.533E-12	3.635E-13	1.884E-13	7.526E-14	6.143E-14
NNW	4.649E-10	2.202E-10	1.148E-10	3.416E-11	1.334E-11	4.049E-12	2.286E-12	1.188E-12	6.672E-13	3.280E-13	2.677E-13
N	4.552E-10	2.763E-10	1.380E-10	3.375E-11	1.493E-11	6.189E-12	2.831E-12	9.211E-13	4.958E-13	2.200E-13	1.796E-13
NNE	6.664E-10	3.029E-10	1.545E-10	4.211E-11	1.699E-11	5.697E-12	2.934E-12	1.265E-12	7.448E-13	4.164E-13	3.399E-13
NE	9.648E-10	4.609E-10	2.546E-10	8.809E-11	3.403E-11	9.434E-12	4.905E-12	2.046E-12	1.167E-12	5.931E-13	4.841E-13
ENE	7.146E-10	3.445E-10	2.113E-10	9.519E-11	4.637E-11	2.355E-11	1.181E-11	5.069E-12	2.956E-12	1.522E-12	1.242E-12
E	2.601E-10	1.210E-10	6.559E-11	2.271E-11	1.072E-11	5.160E-12	2.443E-12	8.924E-13	5.011E-13	2.463E-13	2.011E-13
ESE	1.348E-10	5.080E-11	2.782E-11	9.959E-12	4.875E-12	2.496E-12	1.107E-12	2.878E-13	1.492E-13	5.958E-14	4.863E-14
SE	1.483E-10	5.083E-11	2.812E-11	1.023E-11	3.966E-12	1.196E-12	5.544E-13	1.892E-13	8.827E-14	2.350E-14	1.918E-14
SSE	1.797E-10	6.406E-11	3.445E-11	1.179E-11	4.721E-12	1.544E-12	7.384E-13	2.772E-13	1.540E-13	7.379E-14	6.023E-14

RELATIVE DEPOSITION PER UNIT AREA (M**-2) BY DOWNWIND SECTORS

SEGMENT BOUNDARIES IN MILES

DIRECTION FROM SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	1.165E-08	3.440E-09	1.263E-09	5.899E-10	3.273E-10	1.122E-10	1.620E-11	1.848E-12	3.535E-13	1.186E-13
SSW	1.497E-08	4.688E-09	1.807E-09	8.333E-10	4.515E-10	1.555E-10	2.602E-11	3.548E-12	5.690E-13	1.313E-13
SW	2.006E-08	6.432E-09	2.437E-09	1.173E-09	6.547E-10	2.326E-10	3.848E-11	5.964E-12	1.485E-12	5.155E-13
WSW	3.096E-08	1.077E-08	4.302E-09	2.092E-09	1.215E-09	6.437E-10	7.076E-11	8.612E-12	1.451E-12	3.053E-13
W	1.849E-08	5.309E-09	1.919E-09	9.083E-10	5.219E-10	1.819E-10	2.757E-11	2.863E-12	4.078E-13	8.197E-14
WNW	1.054E-08	3.218E-09	1.203E-09	5.907E-10	3.487E-10	1.296E-10	2.345E-11	3.322E-12	3.719E-13	3.760E-14
NW	1.567E-08	4.816E-09	1.843E-09	9.428E-10	5.603E-10	2.129E-10	4.003E-11	5.136E-12	6.309E-13	1.037E-13
NNW	1.482E-08	4.853E-09	1.843E-09	9.142E-10	5.677E-10	2.278E-10	4.284E-11	5.826E-12	1.303E-12	4.062E-13
N	1.277E-08	3.979E-09	1.680E-09	8.609E-10	5.376E-10	2.546E-10	4.856E-11	7.176E-12	1.305E-12	2.868E-13
NNE	1.933E-08	6.165E-09	2.482E-09	1.279E-09	7.919E-10	3.133E-10	5.592E-11	7.604E-12	1.537E-12	4.854E-13
NE	2.582E-08	8.201E-09	3.446E-09	1.842E-09	1.173E-09	4.839E-10	1.011E-10	1.425E-11	2.528E-12	7.227E-13
ENE	1.745E-08	5.603E-09	2.336E-09	1.310E-09	8.610E-10	3.682E-10	9.929E-11	2.494E-11	6.191E-12	1.843E-12
E	9.479E-09	2.708E-09	1.041E-09	5.277E-10	3.204E-10	1.273E-10	2.691E-11	5.556E-12	1.186E-12	3.051E-13
ESE	6.806E-09	1.884E-09	6.647E-10	3.207E-10	1.752E-10	5.924E-11	1.167E-11	2.575E-12	4.691E-13	8.207E-14
SE	7.986E-09	2.425E-09	8.657E-10	3.824E-10	1.963E-10	6.240E-11	1.163E-11	1.683E-12	2.551E-13	4.110E-14
SSE	8.955E-09	2.571E-09	9.746E-10	4.647E-10	2.393E-10	7.660E-11	1.368E-11	2.069E-12	3.620E-13	9.253E-14

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	9.60	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	.00	BUILDING HEIGHT	(METERS)	61.3
EXIT VELOCITY	(M/SEC)	.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2575.0
			HEAT EMISSION RATE	(CAL/SEC)	.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)
ELEVATED	LESS THAN .000
MIXED	BETWEEN .000 AND .000
GROUND LEVEL	ABOVE .000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS	WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS
ELEVATED	LESS THAN .000	LESS THAN .000
MIXED	BETWEEN .000 AND .000	BETWEEN .000 AND .000
GROUND LEVEL	ABOVE .000	ABOVE .000

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

Susquehanna Steam Electric Station - GROUND-LEVEL RELEASE - 1995
8.000 DAY DECAY, DEPLETED
CORRECTED FOR OPEN TERRAIN RECIRCULATION USING SPECIAL TERRAIN ADJUSTMENT FACTORS

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES

SECTOR	.250	.500	.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	1.048E-05	3.590E-06	2.002E-06	1.270E-06	6.413E-07	3.973E-07	2.704E-07	1.847E-07	1.307E-07	9.911E-08	7.671E-08
SSW	2.075E-05	6.419E-06	3.651E-06	2.257E-06	1.266E-06	8.005E-07	5.592E-07	3.825E-07	2.686E-07	2.033E-07	1.557E-07
SW	4.437E-05	1.339E-05	7.749E-06	4.976E-06	2.677E-06	1.714E-06	1.215E-06	8.675E-07	6.376E-07	4.911E-07	3.853E-07
WSW	1.087E-04	3.259E-05	1.916E-05	1.270E-05	7.007E-06	4.720E-06	3.525E-06	2.537E-06	1.875E-06	1.503E-06	1.230E-06
W	6.170E-05	1.836E-05	9.315E-06	5.761E-06	2.974E-06	1.891E-06	1.327E-06	9.375E-07	6.834E-07	5.423E-07	4.365E-07
WNW	2.855E-05	8.613E-06	4.658E-06	2.911E-06	1.612E-06	1.015E-06	7.015E-07	5.042E-07	3.761E-07	2.994E-07	2.424E-07
NW	2.850E-05	8.901E-06	5.117E-06	3.185E-06	1.744E-06	1.095E-06	7.600E-07	5.544E-07	4.215E-07	3.313E-07	2.654E-07
NNW	2.182E-05	7.270E-06	4.281E-06	2.990E-06	1.557E-06	9.962E-07	7.018E-07	4.948E-07	3.607E-07	2.955E-07	2.468E-07
N	2.112E-05	6.434E-06	3.578E-06	2.203E-06	1.265E-06	8.520E-07	6.307E-07	4.510E-07	3.352E-07	2.716E-07	2.242E-07
NNE	2.479E-05	8.473E-06	4.739E-06	3.214E-06	1.690E-06	1.126E-06	8.265E-07	5.908E-07	4.405E-07	3.579E-07	2.965E-07
NE	1.855E-05	5.934E-06	3.359E-06	2.095E-06	1.160E-06	7.678E-07	5.582E-07	4.067E-07	3.094E-07	2.534E-07	2.118E-07
ENE	1.004E-05	3.315E-06	1.861E-06	1.232E-06	6.301E-07	4.147E-07	3.015E-07	2.252E-07	1.752E-07	1.444E-07	1.222E-07
E	6.044E-06	2.053E-06	1.114E-06	6.588E-07	3.344E-07	2.113E-07	1.444E-07	1.038E-07	7.658E-08	6.055E-08	4.908E-08
ESE	4.960E-06	1.612E-06	8.789E-07	5.173E-07	2.552E-07	1.520E-07	9.981E-08	7.002E-08	5.120E-08	3.784E-08	2.850E-08
SE	4.562E-06	1.564E-06	9.002E-07	5.734E-07	2.857E-07	1.728E-07	1.149E-07	7.573E-08	5.138E-08	3.718E-08	2.728E-08
SSE	5.649E-06	1.999E-06	1.130E-06	6.695E-07	3.326E-07	2.100E-07	1.461E-07	1.012E-07	7.255E-08	5.220E-08	3.774E-08

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES

BEARING	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	6.229E-08	2.608E-08	1.261E-08	2.687E-09	1.120E-09	3.690E-10	1.867E-10	7.928E-11	5.011E-11	3.044E-11	2.518E-11
SSW	1.273E-07	5.470E-08	2.837E-08	8.311E-09	3.483E-09	1.209E-09	5.640E-10	1.813E-10	1.155E-10	4.713E-11	3.920E-11
SW	3.189E-07	1.481E-07	7.715E-08	2.120E-08	9.922E-09	4.227E-09	2.334E-09	1.176E-09	7.724E-10	4.230E-10	3.539E-10
WSW	1.033E-06	5.084E-07	2.673E-07	7.001E-08	3.046E-08	1.033E-08	5.338E-09	1.934E-09	1.044E-09	4.318E-10	3.434E-10
W	3.618E-07	1.616E-07	8.302E-08	2.130E-08	8.398E-09	2.194E-09	1.150E-09	3.842E-10	2.058E-10	8.459E-11	7.082E-11
WNW	2.017E-07	9.679E-08	5.150E-08	1.628E-08	7.028E-09	2.504E-09	1.028E-09	1.495E-10	7.975E-11	2.613E-11	2.180E-11
NW	2.208E-07	1.067E-07	5.697E-08	1.844E-08	7.283E-09	2.083E-09	9.405E-10	2.284E-10	1.211E-10	4.927E-11	6.009E-11
NNW	2.075E-07	1.064E-07	5.596E-08	1.715E-08	6.927E-09	2.163E-09	1.254E-09	6.672E-10	3.824E-10	1.914E-10	1.587E-10
N	1.996E-07	1.320E-07	6.685E-08	1.694E-08	7.785E-09	3.338E-09	1.572E-09	5.251E-10	2.892E-10	1.309E-10	1.088E-10
NNE	2.493E-07	1.267E-07	6.527E-08	1.838E-08	7.674E-09	2.655E-09	1.406E-09	6.119E-10	3.741E-10	2.133E-10	1.771E-10
NE	1.783E-07	9.292E-08	5.063E-08	1.796E-08	7.168E-09	2.092E-09	1.095E-09	4.687E-10	2.734E-10	1.418E-10	1.179E-10
ENE	1.029E-07	5.258E-08	3.178E-08	1.443E-08	7.179E-09	3.727E-09	1.909E-09	8.355E-10	4.960E-10	2.595E-10	2.150E-10
E	4.082E-08	1.991E-08	1.065E-08	3.685E-09	1.762E-09	8.615E-10	6.142E-10	1.535E-10	8.738E-11	4.348E-11	3.588E-11
ESE	2.282E-08	8.965E-09	4.822E-09	1.715E-09	8.442E-10	4.383E-10	1.968E-10	5.175E-11	2.711E-11	1.094E-11	9.004E-12
SE	2.159E-08	7.685E-09	4.165E-09	1.499E-09	5.872E-10	1.778E-10	8.327E-11	2.871E-11	1.352E-11	3.633E-12	2.909E-12
SSE	3.001E-08	1.125E-08	5.987E-09	2.057E-09	8.372E-10	2.791E-10	1.357E-10	5.181E-11	2.922E-11	1.620E-11	1.174E-11

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

SEGMENT BOUNDARIES IN MILES

DIRECTION FROM SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	2.029E-06	6.726E-07	2.700E-07	1.341E-07	7.800E-08	2.814E-08	4.195E-09	4.963E-10	9.885E-11	3.633E-11
SSW	3.647E-06	1.279E-06	5.528E-07	2.762E-07	1.593E-07	5.912E-08	1.062E-08	1.557E-09	2.654E-10	6.445E-11
SW	7.771E-06	2.760E-06	1.209E-06	6.475E-07	3.920E-07	1.545E-07	2.862E-08	4.988E-09	1.353E-09	5.009E-10
WSW	1.928E-05	7.257E-06	3.449E-06	1.923E-06	1.238E-06	5.178E-07	9.627E-08	1.370E-08	2.568E-09	5.880E-10
W	9.737E-06	3.108E-06	1.322E-06	7.023E-07	4.402E-07	1.712E-07	2.928E-08	3.431E-09	5.349E-10	1.154E-10
WNW	4.761E-06	1.636E-06	7.063E-07	3.835E-07	2.442E-07	9.998E-08	1.999E-08	3.120E-09	3.739E-10	4.041E-11
NW	5.099E-06	1.776E-06	7.672E-07	4.251E-07	2.684E-07	1.099E-07	2.204E-08	3.012E-09	3.910E-10	6.744E-11
NNW	4.371E-06	1.626E-06	6.975E-07	3.742E-07	2.447E-07	1.044E-07	2.123E-08	3.070E-09	7.263E-10	2.359E-10
N	3.602E-06	1.290E-06	6.178E-07	3.441E-07	2.291E-07	1.181E-07	2.397E-08	3.817E-09	7.344E-10	1.696E-10
NNE	4.891E-06	1.778E-06	8.113E-07	4.320E-07	2.972E-07	1.266E-07	2.404E-08	3.494E-09	7.483E-10	2.475E-10
NE	3.370E-06	1.193E-06	5.535E-07	3.159E-07	2.117E-07	9.310E-08	2.043E-08	3.047E-09	5.733E-10	1.719E-10
ENE	1.905E-06	6.481E-07	3.011E-07	1.778E-07	1.217E-07	5.451E-08	1.506E-08	3.921E-09	1.013E-09	3.131E-10
E	1.120E-06	3.524E-07	1.467E-07	7.824E-08	4.942E-08	2.044E-08	4.378E-09	9.228E-10	2.028E-10	5.367E-11
ESE	8.811E-07	2.676E-07	1.018E-07	5.149E-08	2.917E-08	1.020E-08	2.019E-09	4.505E-10	8.380E-11	1.501E-11
SE	9.025E-07	2.995E-07	1.167E-07	5.293E-08	2.811E-08	9.211E-09	1.486E-09	2.492E-10	3.852E-11	6.326E-12
SSE	1.118E-06	3.330E-07	1.452E-07	7.299E-08	3.916E-08	1.308E-08	2.388E-09	3.706E-10	6.718E-11	1.774E-11

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	9.60	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	.00	BUILDING HEIGHT	(METERS)	61.3
EXIT VELOCITY	(M/SEC)	.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2575.0
			HEAT EMISSION RATE	(CAL/SEC)	.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)			
ELEVATED	LESS THAN	.000		
MIXED	BETWEEN	.000	AND	.000
GROUND LEVEL	ABOVE	.000		

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS				WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS			
ELEVATED	LESS THAN	.000			LESS THAN	.000		
MIXED	BETWEEN	.000	AND	.000	BETWEEN	.000	AND	.000
GROUND LEVEL	ABOVE	.000			ABOVE	.000		

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

Susquehanna Steam Electric Station - GROUND-LEVEL RELEASE - 1995
2.260 DAY DECAY, UNDEPLETED
CORRECTED FOR OPEN TERRAIN RECIRCULATION USING SPECIAL TERRAIN ADJUSTMENT FACTORS

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES

SECTOR	.250	.500	.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	1.106E-05	3.926E-06	2.241E-06	1.447E-06	7.519E-07	4.771E-07	3.314E-07	2.306E-07	1.658E-07	1.276E-07	1.001E-07
SSW	2.190E-05	7.017E-06	4.086E-06	2.569E-06	1.483E-06	9.597E-07	6.840E-07	4.762E-07	3.398E-07	2.609E-07	2.026E-07
SW	4.683E-05	1.444E-05	8.668E-06	5.660E-06	3.132E-06	2.052E-06	1.484E-06	1.078E-06	8.047E-07	6.286E-07	4.996E-07
WSW	1.147E-04	3.561E-05	2.143E-05	1.445E-05	8.193E-06	5.648E-06	4.301E-06	3.150E-06	2.344E-06	1.922E-06	1.593E-06
W	6.512E-05	2.006E-05	1.042E-05	6.528E-06	3.477E-06	2.263E-06	1.619E-06	1.164E-06	8.615E-07	6.933E-07	5.632E-07
WNW	3.013E-05	9.410E-06	5.209E-06	3.310E-06	1.885E-06	1.215E-06	8.560E-07	6.260E-07	4.742E-07	3.828E-07	3.140E-07
NW	3.008E-05	9.727E-06	5.724E-06	3.623E-06	2.040E-06	1.311E-06	9.282E-07	6.890E-07	5.320E-07	4.242E-07	3.443E-07
NNW	2.303E-05	7.945E-06	4.790E-06	3.401E-06	1.822E-06	1.193E-06	8.576E-07	6.153E-07	4.557E-07	3.786E-07	3.204E-07
N	2.229E-05	7.031E-06	4.002E-06	2.507E-06	1.480E-06	1.021E-06	7.707E-07	5.608E-07	4.235E-07	3.480E-07	2.911E-07
NNE	2.617E-05	9.261E-06	5.303E-06	3.658E-06	1.979E-06	1.349E-06	1.008E-06	7.355E-07	5.572E-07	4.593E-07	3.856E-07
NE	1.958E-05	6.491E-06	3.761E-06	2.387E-06	1.340E-06	9.220E-07	6.843E-07	5.077E-07	3.925E-07	3.263E-07	2.765E-07
ENE	1.060E-05	3.626E-06	2.085E-06	1.604E-06	7.394E-07	4.984E-07	3.700E-07	2.815E-07	2.227E-07	1.845E-07	1.599E-07
E	6.384E-06	2.245E-06	1.248E-06	7.510E-07	3.949E-07	2.540E-07	1.800E-07	1.298E-07	9.738E-08	7.818E-08	6.427E-08
ESE	5.216E-06	1.763E-06	9.846E-07	5.897E-07	2.995E-07	1.827E-07	1.225E-07	8.755E-08	6.509E-08	4.886E-08	3.730E-08
SE	4.818E-06	1.711E-06	1.009E-06	6.540E-07	3.335E-07	2.079E-07	1.413E-07	9.482E-08	6.543E-08	4.808E-08	3.579E-08
SSE	5.987E-06	2.187E-06	1.266E-06	7.632E-07	3.904E-07	2.526E-07	1.795E-07	1.266E-07	9.229E-08	6.743E-08	4.944E-08

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES

BEARING	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	8.234E-08	3.619E-08	1.822E-08	4.133E-09	1.807E-09	6.194E-10	3.239E-10	1.416E-10	9.187E-11	5.716E-11	4.827E-11
SSW	1.676E-07	7.543E-08	4.066E-08	1.263E-08	5.528E-09	1.984E-09	9.542E-10	3.144E-10	2.047E-10	8.510E-11	7.198E-11
SW	4.185E-07	2.033E-07	1.099E-07	3.190E-08	1.555E-08	6.836E-09	3.874E-09	1.994E-09	1.334E-09	7.420E-10	6.292E-10
WSW	1.354E-06	6.965E-07	3.799E-07	1.051E-07	4.756E-08	1.643E-08	8.817E-09	3.266E-09	1.793E-09	7.525E-10	6.415E-10
W	4.740E-07	2.213E-07	1.179E-07	3.191E-08	1.309E-08	3.525E-09	1.893E-09	6.457E-10	3.518E-10	1.467E-10	1.244E-10
WNW	2.644E-07	1.326E-07	7.316E-08	2.440E-08	1.096E-08	4.028E-09	1.695E-09	2.517E-10	1.344E-10	4.540E-11	3.836E-11
NW	2.899E-07	1.444E-07	8.118E-08	2.779E-08	1.143E-08	3.376E-09	1.565E-09	3.888E-10	2.098E-10	8.480E-11	7.306E-11
NNW	2.727E-07	1.462E-07	7.990E-08	2.591E-08	1.091E-08	3.522E-09	2.098E-09	1.142E-09	6.679E-10	3.401E-10	2.863E-10
N	2.623E-07	1.815E-07	9.549E-08	2.564E-08	1.228E-08	5.442E-09	2.636E-09	9.010E-10	5.063E-10	2.333E-10	1.969E-10
NNE	3.283E-07	1.747E-07	9.357E-08	2.794E-08	1.219E-08	4.371E-09	2.385E-09	1.064E-09	6.654E-10	3.849E-10	3.269E-10
NE	2.358E-07	1.290E-07	7.323E-08	2.767E-08	1.159E-08	3.521E-09	1.907E-09	8.408E-10	5.037E-10	2.677E-10	2.273E-10
ENE	1.344E-07	7.326E-08	4.618E-08	2.239E-08	1.172E-08	6.344E-09	3.371E-09	1.523E-09	9.307E-10	5.000E-10	4.264E-10
E	5.415E-08	2.777E-08	1.549E-08	5.727E-09	2.883E-09	1.471E-09	7.334E-10	2.808E-10	1.645E-10	8.407E-11	7.110E-11
ESE	3.026E-08	1.250E-08	7.011E-09	2.662E-09	1.382E-09	7.466E-10	3.475E-10	9.635E-11	5.087E-11	2.106E-11	1.776E-11
SE	2.870E-08	1.075E-08	6.085E-09	2.343E-09	9.683E-10	3.064E-10	1.492E-10	5.323E-11	2.584E-11	7.148E-12	6.038E-12
SSE	3.984E-08	1.571E-08	8.722E-09	3.202E-09	1.372E-09	4.776E-10	2.410E-10	9.504E-11	5.519E-11	2.755E-11	2.334E-11

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

SEGMENT BOUNDARIES IN MILES

DIRECTION FROM SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	2.262E-06	7.841E-07	3.299E-07	1.698E-07	1.017E-07	3.846E-08	6.231E-09	8.179E-10	1.748E-10	6.415E-11
SSW	4.063E-06	1.492E-06	6.744E-07	3.487E-07	2.069E-07	8.046E-08	1.570E-08	2.518E-09	4.554E-10	1.157E-10
SW	8.657E-06	3.214E-06	1.473E-06	8.157E-07	5.078E-07	2.096E-07	4.196E-08	7.973E-09	2.280E-09	8.756E-10
WSW	2.148E-05	8.451E-06	4.200E-06	2.420E-06	1.602E-06	7.018E-07	1.406E-07	2.175E-08	4.291E-09	1.020E-09
W	1.083E-05	3.615E-06	1.609E-06	8.837E-07	5.694E-07	2.315E-07	4.264E-08	5.422E-09	8.901E-10	1.992E-10
WNW	5.299E-06	1.904E-06	8.597E-07	4.827E-07	3.160E-07	1.355E-07	2.926E-08	4.944E-09	6.202E-10	6.981E-11
NW	5.680E-06	2.068E-06	9.347E-07	5.358E-07	3.478E-07	1.493E-07	3.238E-08	4.799E-09	6.567E-10	1.182E-10
NNW	4.874E-06	1.893E-06	8.502E-07	4.719E-07	3.200E-07	1.449E-07	3.124E-08	4.923E-09	1.235E-09	4.173E-10
N	4.011E-06	1.504E-06	7.534E-07	4.340E-07	2.973E-07	1.612E-07	3.522E-08	6.142E-09	1.246E-09	3.007E-10
NNE	5.452E-06	2.072E-06	9.901E-07	5.708E-07	3.862E-07	1.728E-07	3.553E-08	5.663E-09	1.290E-09	4.472E-10
NE	3.757E-06	1.393E-06	6.770E-07	4.002E-07	2.762E-07	1.279E-07	3.065E-08	5.027E-09	1.017E-09	3.228E-10
ENE	2.125E-06	7.799E-07	3.688E-07	2.257E-07	1.591E-07	7.525E-08	2.293E-08	6.588E-09	1.825E-09	5.996E-10
E	1.249E-06	4.116E-07	1.796E-07	9.931E-08	6.464E-08	2.817E-08	6.633E-09	1.552E-09	3.658E-10	1.031E-10
ESE	9.821E-07	3.121E-07	1.244E-07	6.533E-08	3.812E-08	1.400E-08	3.059E-09	7.565E-10	1.501E-10	2.867E-11
SE	1.007E-06	3.496E-07	1.405E-07	6.722E-08	3.680E-08	1.267E-08	2.564E-09	4.200E-10	7.022E-11	1.228E-11
SSE	1.247E-06	4.120E-07	1.778E-07	9.263E-08	5.121E-08	1.796E-08	3.615E-09	6.215E-10	1.216E-10	3.418E-11

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	9.60	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	.00	BUILDING HEIGHT	(METERS)	61.3
EXIT VELOCITY	(M/SEC)	.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2575.0
			HEAT EMISSION RATE	(CAL/SEC)	.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)			
ELEVATED	LESS THAN	.000		
MIXED	BETWEEN	.000	AND	.000
GROUND LEVEL	ABOVE	.000		

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS					WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS				
ELEVATED	LESS THAN	.000				LESS THAN	.000			
MIXED	BETWEEN	.000	AND	.000		BETWEEN	.000	AND	.000	
GROUND LEVEL	ABOVE	.000				ABOVE	.000			

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

Susquehanna Steam Electric Station - GROUND-LEVEL RELEASE - 1995
NO DECAY, UNDEPLETED
CORRECTED FOR OPEN TERRAIN RECIRCULATION USING SPECIAL TERRAIN ADJUSTMENT FACTORS

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) — DISTANCE IN MILES

SECTOR	.250	.500	.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	1.107E-05	3.933E-06	2.248E-06	1.452E-06	7.564E-07	4.809E-07	3.347E-07	2.334E-07	1.682E-07	1.297E-07	1.020E-07
SSW	2.193E-05	7.035E-06	4.101E-06	2.582E-06	1.494E-06	9.695E-07	6.928E-07	4.834E-07	3.460E-07	2.664E-07	2.074E-07
SW	4.690E-05	1.468E-05	8.707E-06	5.694E-06	3.161E-06	2.077E-06	1.507E-06	1.098E-06	8.221E-07	6.442E-07	5.135E-07
WSW	1.149E-04	3.572E-05	2.153E-05	1.454E-05	8.273E-06	5.721E-06	4.371E-06	3.212E-06	2.418E-06	1.973E-06	1.640E-06
W	6.522E-05	2.013E-05	1.047E-05	6.571E-06	3.512E-06	2.293E-06	1.644E-06	1.187E-06	8.816E-07	7.118E-07	5.822E-07
WNW	3.018E-05	9.440E-06	5.234E-06	3.332E-06	1.903E-06	1.231E-06	8.700E-07	6.383E-07	4.851E-07	3.928E-07	3.233E-07
NW	3.013E-05	9.754E-06	5.750E-06	3.644E-06	2.059E-06	1.327E-06	9.422E-07	7.016E-07	5.433E-07	4.344E-07	3.538E-07
NNW	2.306E-05	7.967E-06	4.810E-06	3.621E-06	1.837E-06	1.207E-06	8.699E-07	6.260E-07	4.649E-07	3.874E-07	3.288E-07
N	2.232E-05	7.051E-06	4.019E-06	2.521E-06	1.493E-06	1.032E-06	7.817E-07	5.705E-07	4.321E-07	3.561E-07	2.987E-07
NNE	2.621E-05	9.285E-06	5.324E-06	3.677E-06	1.994E-06	1.343E-06	1.022E-06	7.471E-07	5.675E-07	4.690E-07	3.948E-07
NE	1.960E-05	6.503E-06	3.772E-06	2.396E-06	1.348E-06	9.294E-07	6.911E-07	5.138E-07	3.981E-07	3.316E-07	2.815E-07
ENE	1.061E-05	3.431E-06	2.090E-06	1.408E-06	7.430E-07	5.017E-07	3.731E-07	2.843E-07	2.253E-07	1.890E-07	1.623E-07
E	6.389E-06	2.249E-06	1.251E-06	7.532E-07	3.967E-07	2.554E-07	1.814E-07	1.310E-07	9.844E-08	7.915E-08	6.518E-08
ESE	5.220E-06	1.764E-06	9.870E-07	5.915E-07	3.009E-07	1.839E-07	1.235E-07	8.839E-08	6.583E-08	4.950E-08	3.785E-08
SE	4.821E-06	1.713E-06	1.011E-06	6.557E-07	3.348E-07	2.090E-07	1.422E-07	9.555E-08	6.602E-08	4.858E-08	3.620E-08
SSE	5.991E-06	2.190E-06	1.269E-06	7.654E-07	3.921E-07	2.540E-07	1.808E-07	1.278E-07	9.325E-08	6.823E-08	5.011E-08

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) — DISTANCE IN MILES

BEARING	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	8.404E-08	3.732E-08	1.899E-08	4.397E-09	1.963E-09	6.869E-10	3.667E-10	1.637E-10	1.084E-10	6.881E-11	5.930E-11
SSW	1.720E-07	7.845E-08	4.284E-08	1.347E-08	6.144E-09	2.268E-09	1.119E-09	3.787E-10	2.531E-10	1.081E-10	9.386E-11
SW	4.316E-07	2.129E-07	1.169E-07	3.500E-08	1.760E-08	7.982E-09	4.464E-09	2.478E-09	1.709E-09	9.808E-10	8.579E-10
WSW	1.398E-06	7.311E-07	4.052E-07	1.157E-07	5.409E-08	1.953E-08	1.069E-08	4.088E-09	2.316E-09	1.004E-09	8.834E-10
W	4.899E-07	2.325E-07	1.259E-07	3.522E-08	1.493E-08	4.155E-09	2.305E-09	8.123E-10	4.573E-10	1.970E-10	1.725E-10
WNW	2.731E-07	1.392E-07	7.809E-08	2.691E-08	1.249E-08	4.739E-09	2.060E-09	3.159E-10	1.771E-10	6.000E-11	5.306E-11
NW	2.968E-07	1.553E-07	8.627E-08	3.044E-08	1.291E-08	3.930E-09	1.878E-09	4.809E-10	2.675E-10	1.141E-10	9.894E-11
NNW	2.807E-07	1.527E-07	8.468E-08	2.828E-08	1.226E-08	4.074E-09	2.498E-09	1.400E-09	8.428E-10	4.417E-10	3.827E-10
N	2.699E-07	1.895E-07	1.011E-07	2.795E-08	1.377E-08	6.283E-09	3.131E-09	1.101E-09	6.367E-10	3.018E-10	2.620E-10
NNE	3.370E-07	1.817E-07	9.840E-08	3.022E-08	1.354E-08	4.980E-09	2.788E-09	1.277E-09	8.186E-10	4.883E-10	4.232E-10
NE	2.405E-07	1.329E-07	7.623E-08	2.939E-08	1.256E-08	3.891E-09	2.149E-09	9.640E-10	5.899E-10	3.196E-10	2.769E-10
ENE	1.387E-07	7.512E-08	4.775E-08	2.354E-08	1.253E-08	6.899E-09	3.725E-09	1.711E-09	1.062E-09	5.800E-10	5.002E-10
E	5.500E-08	2.843E-08	1.599E-08	6.008E-09	3.073E-09	1.593E-09	8.073E-10	3.140E-10	1.870E-10	9.706E-11	8.339E-11
ESE	3.075E-08	1.280E-08	7.244E-09	2.796E-09	1.477E-09	8.110E-10	3.839E-10	1.060E-10	5.809E-11	2.445E-11	2.096E-11
SE	2.907E-08	1.096E-08	6.246E-09	2.438E-09	1.021E-09	3.274E-10	1.615E-10	5.840E-11	2.875E-11	8.051E-12	6.891E-12
SSE	4.043E-08	1.607E-08	8.909E-09	3.352E-09	1.459E-09	5.156E-10	2.642E-10	1.058E-10	6.241E-11	3.164E-11	2.722E-11

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

SEGMENT BOUNDARIES IN MILES

DIRECTION FROM SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	2.269E-06	7.886E-07	3.332E-07	1.722E-07	1.036E-07	3.956E-08	6.558E-09	8.991E-10	2.006E-10	7.701E-11
SSW	4.078E-06	1.503E-06	6.829E-07	3.550E-07	2.117E-07	8.342E-08	1.681E-08	2.843E-09	5.426E-10	1.458E-10
SW	8.695E-06	3.242E-06	1.495E-06	8.331E-07	5.219E-07	2.188E-07	4.546E-08	9.220E-09	2.810E-09	1.151E-09
WSW	2.158E-05	8.531E-06	4.268E-06	2.475E-06	1.649E-06	7.345E-07	1.327E-07	2.521E-08	5.300E-09	1.348E-09
W	1.088E-05	3.650E-06	1.635E-06	9.041E-07	5.864E-07	2.423E-07	4.635E-08	6.288E-09	1.104E-09	2.651E-10
WNW	5.323E-06	1.922E-06	8.735E-07	4.937E-07	3.253E-07	1.418E-07	3.187E-08	5.734E-09	7.613E-10	9.239E-11
NW	5.704E-06	2.086E-06	9.486E-07	5.471E-07	3.574E-07	1.558E-07	3.505E-08	5.503E-09	7.988E-10	1.539E-10
NNW	4.894E-06	1.909E-06	8.622E-07	4.814E-07	3.284E-07	1.509E-07	3.369E-08	5.627E-09	1.502E-09	5.387E-10
N	4.027E-06	1.517E-06	7.641E-07	4.627E-07	3.050E-07	1.681E-07	3.791E-08	7.020E-09	1.504E-09	3.863E-10
NNE	5.472E-06	2.088E-06	1.003E-06	5.813E-07	3.954E-07	1.793E-07	3.800E-08	6.385E-09	1.534E-09	5.621E-10
NE	3.768E-06	1.401E-06	6.837E-07	4.058E-07	2.812E-07	1.316E-07	3.232E-08	5.505E-09	1.161E-09	3.839E-10
ENE	2.130E-06	7.836E-07	3.719E-07	2.283E-07	1.615E-07	7.708E-08	2.403E-08	7.131E-09	2.039E-09	6.934E-10
E	1.251E-06	4.132E-07	1.810E-07	1.004E-07	6.555E-08	2.881E-08	6.922E-09	1.673E-09	4.066E-10	1.184E-10
ESE	9.843E-07	3.135E-07	1.256E-07	6.605E-08	3.847E-08	1.432E-08	3.198E-09	8.177E-10	1.671E-10	3.313E-11
SE	1.009E-06	3.509E-07	1.413E-07	6.781E-08	3.723E-08	1.289E-08	2.654E-09	4.459E-10	7.656E-11	1.375E-11
SSE	1.250E-06	4.137E-07	1.791E-07	9.358E-08	5.189E-08	1.834E-08	3.763E-09	6.665E-10	1.345E-10	3.912E-11

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	9.60
DIAMETER	(METERS)	.00
EXIT VELOCITY	(M/SEC)	.00
REP. WIND HEIGHT	(METERS)	10.0
BUILDING HEIGHT	(METERS)	61.3
BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2575.0
HEAT EMISSION RATE	(CAL/SEC)	.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)
ELEVATED	LESS THAN .000
MIXED	BETWEEN .000 AND .000
GROUND LEVEL	ABOVE .000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS	WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS
ELEVATED	LESS THAN .000	LESS THAN .000
MIXED	BETWEEN .000 AND .000	BETWEEN .000 AND .000
GROUND LEVEL	ABOVE .000	ABOVE .000

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

Susquehanna Steam Electric Station - GROUND-LEVEL RELEASE - 1995
SPECIFIC POINTS OF INTEREST

RELEASE ID	TYPE OF LOCATION	DIRECTION	DISTANCE (MILES)	DISTANCE (METERS)	X/Q (SEC/CUB.METER) NO DECAY UNDEPLETED	X/Q (SEC/CUB.METER) 2.260 DAY DECAY UNDEPLETED	X/Q (SEC/CUB.METER) 8.000 DAY DECAY DEPLETED	D/Q (PER SQ.METER)
S	SITE BOUNDARY	S	.34	549.	6.691E-06	6.682E-06	6.260E-06	3.820E-08
S	SITE BOUNDARY	SSW	.42	670.	9.441E-06	9.421E-06	8.709E-06	3.722E-08
S	SITE BOUNDARY	SW	.82	1315.	7.693E-06	7.655E-06	6.811E-06	1.767E-08
S	SITE BOUNDARY	WSW	1.22	1965.	1.096E-05	1.088E-05	9.442E-06	1.432E-08
S	SITE BOUNDARY	W	1.02	1649.	6.349E-06	6.306E-06	5.538E-06	1.014E-08
S	SITE BOUNDARY	WNW	.62	992.	7.137E-06	7.108E-06	6.423E-06	1.443E-08
S	SITE BOUNDARY	NW	.64	1037.	6.813E-06	6.787E-06	6.115E-06	1.913E-08
S	SITE BOUNDARY	NNW	.59	948.	6.355E-06	6.334E-06	5.738E-06	2.002E-08
S	SITE BOUNDARY	N	.59	951.	5.684E-06	5.666E-06	5.131E-06	1.866E-08
S	SITE BOUNDARY	NNE	.79	1266.	4.883E-06	4.863E-06	4.334E-06	1.684E-08
S	SITE BOUNDARY	NE	.70	1121.	4.191E-06	4.179E-06	3.767E-06	2.881E-08
S	SITE BOUNDARY	ENE	.87	1398.	1.698E-06	1.693E-06	1.499E-06	1.335E-08
S	SITE BOUNDARY	E	.84	1354.	1.041E-06	1.038E-06	9.204E-07	7.580E-09
S	SITE BOUNDARY	ESE	.49	796.	1.792E-06	1.790E-06	1.637E-06	1.320E-08
S	SITE BOUNDARY	SE	.42	678.	2.196E-06	2.192E-06	2.023E-06	1.911E-08
S	SITE BOUNDARY	SSE	.34	549.	3.653E-06	3.650E-06	3.407E-06	2.926E-08
S	RESIDENCE	S	1.00	1609.	1.452E-06	1.447E-06	1.270E-06	6.871E-09
S	RESIDENCE	SSW	.90	1448.	3.112E-06	3.098E-06	2.739E-06	1.088E-08
S	RESIDENCE	SW	1.50	2415.	3.160E-06	3.131E-06	2.677E-06	6.137E-09
S	RESIDENCE	WSW	1.10	1770.	1.267E-05	1.258E-05	1.100E-05	1.729E-08
S	RESIDENCE	W	1.20	1931.	4.976E-06	4.937E-06	4.290E-06	7.582E-09
S	RESIDENCE	WNW	.80	1287.	4.885E-06	4.860E-06	4.330E-06	9.609E-09
S	RESIDENCE	NW	.80	1287.	5.391E-06	5.365E-06	4.779E-06	1.448E-08
S	RESIDENCE	NNW	.60	966.	6.210E-06	6.188E-06	5.599E-06	1.948E-08
S	RESIDENCE	N	1.30	2092.	1.797E-06	1.783E-06	1.540E-06	4.819E-09
S	RESIDENCE	NNE	1.00	1609.	3.677E-06	3.658E-06	3.214E-06	1.187E-08
S	RESIDENCE	NE	2.30	3702.	7.799E-07	7.649E-07	6.290E-07	3.954E-09
S	RESIDENCE	ENE	2.10	3381.	4.693E-07	4.661E-07	3.861E-07	3.057E-09
S	RESIDENCE	E	1.40	2253.	4.421E-07	4.403E-07	3.771E-07	2.885E-09
S	RESIDENCE	ESE	.50	805.	1.764E-06	1.761E-06	1.610E-06	1.296E-08
S	RESIDENCE	SE	.40	643.	2.377E-06	2.374E-06	2.198E-06	2.088E-08
S	RESIDENCE	SSE	.60	966.	1.702E-06	1.699E-06	1.535E-06	1.252E-08
S	GARDEN	S	1.10	1770.	1.267E-06	1.262E-06	1.083E-06	5.767E-09
S	GARDEN	SSW	1.20	1931.	2.015E-06	2.003E-06	1.739E-06	6.544E-09
S	GARDEN	SW	1.90	3059.	2.236E-06	2.211E-06	1.855E-06	4.013E-09
S	GARDEN	WSW	1.10	1770.	1.273E-05	1.264E-05	1.105E-05	1.737E-08
S	GARDEN	W	1.20	1931.	4.976E-06	4.937E-06	4.290E-06	7.582E-09
S	GARDEN	WNW	1.30	2092.	2.319E-06	2.300E-06	1.988E-06	3.967E-09
S	GARDEN	NW	.90	1448.	4.388E-06	4.362E-06	3.860E-06	1.143E-08
S	GARDEN	NNW	4.00	6438.	3.873E-07	3.785E-07	2.954E-07	6.970E-10
S	GARDEN	N	1.30	2092.	1.797E-06	1.783E-06	1.540E-06	4.819E-09
S	GARDEN	NNE	1.10	1770.	3.185E-06	3.167E-06	2.765E-06	1.001E-08
S	GARDEN	NE	2.30	3702.	7.719E-07	7.649E-07	6.290E-07	3.954E-09
S	GARDEN	ENE	2.40	3863.	3.938E-07	3.907E-07	3.196E-07	2.484E-09
S	GARDEN	E	1.40	2253.	4.421E-07	4.403E-07	3.771E-07	2.885E-09
S	GARDEN	ESE	2.50	4024.	1.235E-07	1.225E-07	9.979E-08	6.482E-10
S	GARDEN	SE	.60	966.	1.323E-06	1.321E-06	1.194E-06	1.077E-08
S	GARDEN	SSE	.80	1287.	1.162E-06	1.159E-06	1.031E-06	8.090E-09
S	DAIRY	E	4.50	7244.	6.514E-08	6.425E-08	4.907E-08	3.178E-10
S	DAIRY	E	4.60	7405.	6.268E-08	6.179E-08	4.706E-08	3.038E-10
S	DAIRY	ESE	2.70	4346.	1.076E-07	1.067E-07	8.625E-08	5.544E-10
S	DAIRY	ESE	4.10	6599.	4.679E-08	4.618E-08	3.567E-08	2.167E-10
S	DAIRY	ESE	4.20	6760.	4.436E-08	4.347E-08	3.344E-08	2.037E-10
S	DAIRY	SE	2.60	4185.	1.309E-07	1.300E-07	1.054E-07	7.874E-10
S	DAIRY	S	3.90	6277.	1.342E-07	1.340E-07	1.044E-07	4.484E-10
S	DAIRY	SSW	3.00	4829.	4.835E-07	4.761E-07	3.824E-07	1.189E-09
S	DAIRY	SSW	3.10	4990.	4.505E-07	4.433E-07	3.549E-07	1.095E-09
S	DAIRY	SSW	3.50	5634.	3.458E-07	3.396E-07	2.685E-07	8.052E-10
S	DAIRY	SSW	3.80	6117.	2.944E-07	2.888E-07	2.263E-07	6.657E-10
S	DAIRY	SSW	14.00	22536.	1.740E-08	1.616E-08	1.076E-08	2.609E-11
S	DAIRY	WSW	2.00	3220.	5.719E-06	5.645E-06	4.718E-06	6.337E-09
S	DAIRY	W	5.00	8049.	4.898E-07	4.739E-07	3.617E-07	4.121E-10
S	DAIRY	NNW	4.20	6760.	3.613E-07	3.526E-07	2.737E-07	6.386E-10
S	RIVERLANDS/EIC	NE	.70	1127.	4.150E-06	4.144E-06	3.716E-06	2.855E-08

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	9.60	REF. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	.00	BUILDING HEIGHT	(METERS)	41.3
EXIT VELOCITY	(M/SEC)	.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2573.0
			HEAT EMISSION RATE	(CAL/SEC)	.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)	
ELEVATED	LESS THAN	.000
MIXED	BETWEEN	.000 AND .000
GROUND LEVEL	ABOVE	.000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS		WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS	
ELEVATED	LESS THAN	.000	LESS THAN	.000
MIXED	BETWEEN	.000 AND .000	BETWEEN	.000 AND .000
GROUND LEVEL	ABOVE	.000	ABOVE	.000

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

Susquehanna Steam Electric Station - GROUND-LEVEL RELEASE - 1995
NO DECAY, UNDEPLETED
CORRECTED FOR OPEN TERRAIN RECIRCULATION USING SPECIAL TERRAIN ADJUSTMENT FACTORS
ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES

SECTOR	.250	.500	.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	1.107E-05	3.933E-06	2.248E-06	1.452E-06	7.564E-07	4.809E-07	3.347E-07	2.334E-07	1.682E-07	1.297E-07	1.020E-07
SSW	2.193E-05	7.035E-06	4.101E-06	2.582E-06	1.494E-06	9.695E-07	6.928E-07	4.836E-07	3.460E-07	2.664E-07	2.074E-07
SW	4.690E-05	1.468E-05	8.707E-06	5.694E-06	3.161E-06	2.077E-06	1.507E-06	1.098E-06	8.221E-07	6.442E-07	5.135E-07
WSW	1.149E-04	3.572E-05	2.153E-05	1.454E-05	8.273E-06	5.721E-06	4.371E-06	3.212E-06	2.418E-06	1.973E-06	1.640E-06
W	6.522E-05	2.013E-05	1.047E-05	6.571E-06	3.512E-06	2.293E-06	1.646E-06	1.187E-06	8.816E-07	7.118E-07	5.822E-07
WNW	3.018E-05	9.440E-06	5.234E-06	3.332E-06	1.903E-06	1.231E-06	8.700E-07	6.383E-07	4.851E-07	3.928E-07	3.233E-07
NW	3.013E-05	9.756E-06	5.750E-06	3.644E-06	2.059E-06	1.327E-06	9.422E-07	7.016E-07	5.433E-07	4.346E-07	3.538E-07
NNW	2.306E-05	7.967E-06	4.810E-06	3.421E-06	1.837E-06	1.207E-06	8.699E-07	6.260E-07	4.649E-07	3.874E-07	3.288E-07
N	2.232E-05	7.051E-06	4.019E-06	2.521E-06	1.493E-06	1.032E-06	7.817E-07	5.705E-07	4.321E-07	3.561E-07	2.987E-07
NNE	2.621E-05	9.285E-06	5.324E-06	3.677E-06	1.994E-06	1.363E-06	1.022E-06	7.471E-07	5.675E-07	4.690E-07	3.948E-07
NE	1.960E-05	6.503E-06	3.772E-06	2.396E-06	1.368E-06	9.294E-07	6.911E-07	5.138E-07	3.981E-07	3.316E-07	2.815E-07
ENE	1.061E-05	3.631E-06	2.090E-06	1.408E-06	7.430E-07	5.017E-07	3.731E-07	2.843E-07	2.253E-07	1.890E-07	1.623E-07
E	6.389E-06	2.249E-06	1.251E-06	7.532E-07	3.967E-07	2.556E-07	1.814E-07	1.310E-07	9.844E-08	7.915E-08	6.518E-08
ESE	5.220E-06	1.766E-06	9.870E-07	5.915E-07	3.009E-07	1.839E-07	1.235E-07	8.839E-08	6.583E-08	4.950E-08	3.785E-08
SE	4.821E-06	1.713E-06	1.011E-06	6.557E-07	3.368E-07	2.090E-07	1.422E-07	9.555E-08	6.602E-08	4.858E-08	3.620E-08
SSE	5.991E-06	2.190E-06	1.269E-06	7.654E-07	3.921E-07	2.540E-07	1.808E-07	1.278E-07	9.325E-08	6.823E-08	5.011E-08

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES

BEARING	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	8.404E-08	3.732E-08	1.899E-08	4.397E-09	1.963E-09	6.869E-10	3.667E-10	1.637E-10	1.084E-10	6.881E-11	5.930E-11
SSW	1.720E-07	7.845E-08	4.286E-08	1.367E-08	6.146E-09	2.268E-09	1.119E-09	3.787E-10	2.531E-10	1.081E-10	9.386E-11
SW	4.316E-07	2.129E-07	1.169E-07	3.500E-08	1.760E-08	7.982E-09	4.666E-09	2.478E-09	1.709E-09	9.808E-10	8.579E-10
WSW	1.398E-06	7.311E-07	4.052E-07	1.157E-07	5.409E-08	1.953E-08	1.069E-08	4.088E-09	2.316E-09	1.004E-09	8.834E-10
W	4.899E-07	2.325E-07	1.259E-07	3.522E-08	1.493E-08	4.155E-09	2.305E-09	8.123E-10	4.573E-10	1.970E-10	1.725E-10
WNW	2.731E-07	1.392E-07	7.809E-08	2.691E-08	1.249E-08	4.739E-09	2.060E-09	3.159E-10	1.771E-10	6.080E-11	5.306E-11
NW	2.988E-07	1.533E-07	8.627E-08	3.044E-08	1.291E-08	3.930E-09	1.878E-09	4.809E-10	2.675E-10	1.141E-10	9.894E-11
NNW	2.807E-07	1.527E-07	8.468E-08	2.828E-08	1.226E-08	4.074E-09	2.498E-09	1.400E-09	8.428E-10	4.417E-10	3.827E-10
N	2.699E-07	1.895E-07	1.011E-07	2.795E-08	1.377E-08	6.283E-09	3.131E-09	1.101E-09	6.367E-10	3.018E-10	2.620E-10
NNE	3.370E-07	1.817E-07	9.860E-08	3.022E-08	1.354E-08	4.980E-09	2.788E-09	1.277E-09	8.186E-10	4.883E-10	4.232E-10
NE	2.405E-07	1.329E-07	7.623E-08	2.939E-08	1.256E-08	3.891E-09	2.149E-09	9.660E-10	5.899E-10	3.196E-10	2.769E-10
ENE	1.387E-07	7.512E-08	4.775E-08	2.354E-08	1.253E-08	6.899E-09	3.725E-09	1.711E-09	1.062E-09	5.800E-10	5.002E-10
E	5.500E-08	2.843E-08	1.599E-08	6.008E-09	3.073E-09	1.593E-09	8.073E-10	3.140E-10	1.870E-10	9.706E-11	8.339E-11
ESE	3.075E-08	1.280E-08	7.244E-09	2.796E-09	1.477E-09	8.110E-10	3.839E-10	1.060E-10	5.809E-11	2.445E-11	2.096E-11
SE	2.907E-08	1.096E-08	6.246E-09	2.438E-09	1.021E-09	3.274E-10	1.615E-10	5.840E-11	2.875E-11	8.051E-12	6.891E-12
SSE	4.043E-08	1.607E-08	8.989E-09	3.352E-09	1.459E-09	5.156E-10	2.642E-10	1.058E-10	6.241E-11	3.164E-11	2.722E-11

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

SEGMENT BOUNDARIES IN MILES

DIRECTION FROM SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	2.269E-06	7.886E-07	3.332E-07	1.722E-07	1.036E-07	3.956E-08	6.558E-09	8.991E-10	2.006E-10	7.701E-11
SSW	4.078E-06	1.503E-06	6.829E-07	3.550E-07	2.117E-07	8.342E-08	1.681E-08	2.843E-09	5.424E-10	1.458E-10
SW	8.695E-06	3.242E-06	1.495E-06	8.331E-07	5.219E-07	2.188E-07	4.546E-08	9.220E-09	2.810E-09	1.151E-09
WSW	2.158E-05	8.531E-06	4.268E-06	2.475E-06	1.649E-06	7.345E-07	1.527E-07	2.521E-08	5.300E-09	1.348E-09
W	1.088E-05	3.650E-06	1.635E-06	9.041E-07	5.864E-07	2.423E-07	4.635E-08	6.288E-09	1.104E-09	2.651E-10
WNW	5.323E-06	1.922E-06	8.735E-07	4.937E-07	3.253E-07	1.418E-07	3.187E-08	5.734E-09	7.613E-10	9.239E-11
NW	5.704E-06	2.086E-06	9.486E-07	5.471E-07	3.574E-07	1.558E-07	3.505E-08	5.503E-09	7.988E-10	1.539E-10
NNW	4.894E-06	1.909E-06	8.622E-07	4.814E-07	3.284E-07	1.509E-07	3.369E-08	5.627E-09	1.502E-09	5.387E-10
N	4.027E-06	1.517E-06	7.641E-07	4.427E-07	3.050E-07	1.681E-07	3.791E-08	7.020E-09	1.504E-09	3.863E-10
NNE	5.472E-06	2.088E-06	1.003E-06	5.813E-07	3.954E-07	1.793E-07	3.800E-08	6.385E-09	1.534E-09	5.621E-10
NE	3.768E-06	1.401E-06	6.837E-07	4.058E-07	2.812E-07	1.316E-07	3.232E-08	5.505E-09	1.161E-09	3.839E-10
ENE	2.130E-06	7.836E-07	3.719E-07	2.283E-07	1.615E-07	7.708E-08	2.403E-08	7.131E-09	2.039E-09	6.934E-10
E	1.251E-06	4.132E-07	1.810E-07	1.004E-07	6.555E-08	2.881E-08	6.922E-09	1.673E-09	4.066E-10	1.186E-10

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

ESE	9.843E-07	3.135E-07	1.256E-07	6.605E-08	3.867E-08	1.432E-08	3.198E-09	8.177E-10	1.671E-10	3.313E-11
SE	1.009E-06	3.509E-07	1.413E-07	6.781E-08	3.723E-08	1.289E-08	2.654E-09	4.459E-10	7.656E-11	1.375E-11
SSE	1.250E-06	4.137E-07	1.791E-07	9.358E-08	5.189E-08	1.834E-08	3.763E-09	6.665E-10	1.345E-10	3.912E-11

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	9.60	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	.00	BUILDING HEIGHT	(METERS)	61.3
EXIT VELOCITY	(M/SEC)	.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2575.0
			HEAT EMISSION RATE	(CAL/SEC)	.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)	
ELEVATED	LESS THAN	.000
MIXED	BETWEEN	.000 AND .000
GROUND LEVEL	ABOVE	.000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS		WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS	
ELEVATED	LESS THAN	.000	LESS THAN	.000
MIXED	BETWEEN	.000 AND .000	BETWEEN	.000 AND .000
GROUND LEVEL	ABOVE	.000	ABOVE	.000

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

Susquehanna Steam Electric Station - GROUND-LEVEL RELEASE - 1995
2.260 DAY DECAY, UNDEPLETED
CORRECTED FOR OPEN TERRAIN RECIRCULATION USING SPECIAL TERRAIN ADJUSTMENT FACTORS

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES

SECTOR	.250	.500	.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	1.106E-05	3.926E-06	2.241E-06	1.447E-06	7.519E-07	4.771E-07	3.314E-07	2.306E-07	1.658E-07	1.276E-07	1.001E-07
SSW	2.190E-05	7.017E-06	4.086E-06	2.569E-06	1.483E-06	9.597E-07	6.840E-07	4.762E-07	3.398E-07	2.609E-07	2.026E-07
SW	4.683E-05	1.464E-05	8.668E-06	5.660E-06	3.132E-06	2.052E-06	1.484E-06	1.078E-06	8.047E-07	6.286E-07	4.996E-07
WSW	1.147E-04	3.561E-05	2.143E-05	1.445E-05	8.193E-06	5.648E-06	4.301E-06	3.150E-06	2.364E-06	1.922E-06	1.593E-06
W	6.512E-05	2.006E-05	1.042E-05	6.528E-06	3.477E-06	2.263E-06	1.619E-06	1.164E-06	8.615E-07	6.933E-07	5.652E-07
WNW.	3.013E-05	9.410E-06	5.209E-06	3.310E-06	1.885E-06	1.215E-06	8.560E-07	6.260E-07	4.742E-07	3.828E-07	3.140E-07
NW	3.008E-05	9.727E-06	5.724E-06	3.623E-06	2.040E-06	1.311E-06	9.282E-07	6.890E-07	5.320E-07	4.242E-07	3.443E-07
NNW	2.303E-05	7.945E-06	4.790E-06	3.401E-06	1.822E-06	1.193E-06	8.576E-07	6.153E-07	4.557E-07	3.786E-07	3.204E-07
N	2.229E-05	7.031E-06	4.002E-06	2.507E-06	1.480E-06	1.021E-06	7.707E-07	5.608E-07	4.235E-07	3.480E-07	2.911E-07
NNE	2.617E-05	9.261E-06	5.303E-06	3.658E-06	1.979E-06	1.349E-06	1.008E-06	7.355E-07	5.572E-07	4.593E-07	3.856E-07
NE	1.958E-05	6.491E-06	3.761E-06	2.387E-06	1.360E-06	9.220E-07	6.843E-07	5.077E-07	3.925E-07	3.263E-07	2.765E-07
ENE	1.060E-05	3.626E-06	2.085E-06	1.404E-06	7.394E-07	4.984E-07	3.700E-07	2.815E-07	2.227E-07	1.865E-07	1.599E-07
E	6.384E-06	2.245E-06	1.248E-06	7.510E-07	3.949E-07	2.540E-07	1.800E-07	1.298E-07	9.738E-08	7.818E-08	6.427E-08
ESE	5.216E-06	1.763E-06	9.846E-07	5.897E-07	2.995E-07	1.827E-07	1.225E-07	8.755E-08	6.509E-08	4.886E-08	3.730E-08
SE	4.818E-06	1.711E-06	1.009E-06	6.540E-07	3.355E-07	2.079E-07	1.413E-07	9.482E-08	6.543E-08	4.808E-08	3.579E-08
SSE	5.987E-06	2.187E-06	1.266E-06	7.632E-07	3.904E-07	2.526E-07	1.795E-07	1.266E-07	9.229E-08	6.743E-08	4.944E-08

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES

BEARING	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	8.234E-08	3.619E-08	1.822E-08	4.133E-09	1.807E-09	6.194E-10	3.239E-10	1.416E-10	9.187E-11	5.716E-11	4.827E-11
SSW	1.676E-07	7.543E-08	4.066E-08	1.263E-08	5.528E-09	1.986E-09	9.542E-10	3.144E-10	2.047E-10	8.510E-11	7.198E-11
SW	4.185E-07	2.033E-07	1.099E-07	3.190E-08	1.555E-08	6.836E-09	3.874E-09	1.994E-09	1.334E-09	7.420E-10	6.292E-10
WSW	1.354E-06	6.965E-07	3.799E-07	1.051E-07	4.756E-08	1.663E-08	8.817E-09	3.266E-09	1.793E-09	7.525E-10	6.415E-10
W	4.740E-07	2.213E-07	1.179E-07	3.191E-08	1.309E-08	3.525E-09	1.893E-09	6.457E-10	3.518E-10	1.467E-10	1.244E-10
WNW	2.644E-07	1.326E-07	7.316E-08	2.440E-08	1.096E-08	4.028E-09	1.695E-09	2.517E-10	1.366E-10	4.540E-11	3.836E-11
NW	2.899E-07	1.464E-07	8.118E-08	2.779E-08	1.143E-08	3.376E-09	1.565E-09	3.888E-10	2.098E-10	8.680E-11	7.306E-11
NNW	2.727E-07	1.462E-07	7.990E-08	2.591E-08	1.091E-08	3.522E-09	2.098E-09	1.142E-09	6.679E-10	3.401E-10	2.863E-10
N	2.623E-07	1.815E-07	9.549E-08	2.564E-08	1.228E-08	5.442E-09	2.636E-09	9.010E-10	5.063E-10	2.333E-10	1.969E-10
NNE	3.283E-07	1.747E-07	9.357E-08	2.794E-08	1.219E-08	4.371E-09	2.385E-09	1.064E-09	6.654E-10	3.869E-10	3.269E-10
NE	2.358E-07	1.290E-07	7.323E-08	2.767E-08	1.159E-08	3.521E-09	1.907E-09	8.408E-10	5.037E-10	2.677E-10	2.275E-10
ENE	1.364E-07	7.326E-08	4.618E-08	2.239E-08	1.172E-08	6.346E-09	3.371E-09	1.523E-09	9.307E-10	5.000E-10	4.244E-10
E	5.415E-08	2.777E-08	1.549E-08	5.727E-09	2.883E-09	1.471E-09	7.334E-10	2.808E-10	1.645E-10	8.407E-11	7.110E-11
ESE	3.026E-08	1.250E-08	7.011E-09	2.662E-09	1.382E-09	7.466E-10	3.475E-10	9.435E-11	5.087E-11	2.106E-11	1.776E-11
SE	2.870E-08	1.075E-08	6.085E-09	2.343E-09	9.683E-10	3.064E-10	1.492E-10	5.323E-11	2.586E-11	7.148E-12	6.038E-12
SSE	3.984E-08	1.571E-08	8.722E-09	3.202E-09	1.372E-09	4.776E-10	2.410E-10	9.504E-11	5.519E-11	2.755E-11	2.334E-11

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

SEGMENT BOUNDARIES IN MILES

DIRECTION FROM SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	2.262E-06	7.841E-07	3.299E-07	1.698E-07	1.017E-07	3.846E-08	6.231E-09	8.179E-10	1.748E-10	6.415E-11
SSW	4.063E-06	1.492E-06	6.744E-07	3.487E-07	2.069E-07	8.046E-08	1.570E-08	2.518E-09	4.554E-10	1.157E-10
SW	8.657E-06	3.214E-06	1.473E-06	8.157E-07	5.078E-07	2.096E-07	4.196E-08	7.973E-09	2.280E-09	8.756E-10
WSW	2.148E-05	8.451E-06	4.200E-06	2.420E-06	1.602E-06	7.018E-07	1.406E-07	2.175E-08	4.291E-09	1.020E-09
W	1.083E-05	3.615E-06	1.609E-06	8.837E-07	5.694E-07	2.315E-07	4.264E-08	5.422E-09	8.901E-10	1.992E-10
WNW	5.299E-06	1.904E-06	8.597E-07	4.827E-07	3.160E-07	1.355E-07	2.926E-08	4.944E-09	6.202E-10	6.981E-11
NW	5.680E-06	2.068E-06	9.347E-07	5.358E-07	3.478E-07	1.493E-07	3.238E-08	4.799E-09	6.567E-10	1.182E-10
NNW	4.874E-06	1.893E-06	8.502E-07	4.719E-07	3.200E-07	1.449E-07	3.124E-08	4.923E-09	1.235E-09	4.173E-10
N	4.011E-06	1.504E-06	7.534E-07	4.340E-07	2.973E-07	1.612E-07	3.522E-08	6.142E-09	1.246E-09	3.007E-10
NNE	5.452E-06	2.072E-06	9.901E-07	5.708E-07	3.862E-07	1.728E-07	3.533E-08	5.663E-09	1.290E-09	4.472E-10
NE	3.757E-06	1.393E-06	6.770E-07	4.002E-07	2.762E-07	1.279E-07	3.065E-08	5.027E-09	1.017E-09	3.228E-10
ENE	2.125E-06	7.799E-07	3.688E-07	2.257E-07	1.591E-07	7.525E-08	2.293E-08	6.588E-09	1.825E-09	5.996E-10
E	1.249E-06	4.114E-07	1.796E-07	9.931E-08	6.464E-08	2.817E-08	6.633E-09	1.552E-09	3.658E-10	1.031E-10

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

ESE	9.821E-07	3.121E-07	1.246E-07	6.533E-08	3.812E-08	1.400E-08	3.059E-09	7.565E-10	1.501E-10	2.867E-11
SE	1.007E-06	3.496E-07	1.405E-07	6.722E-08	3.680E-08	1.267E-08	2.564E-09	4.200E-10	7.022E-11	1.228E-11
SSE	1.247E-06	4.120E-07	1.778E-07	9.263E-08	5.121E-08	1.796E-08	3.615E-09	6.215E-10	1.216E-10	3.418E-11

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	9.60	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	.00	BUILDING HEIGHT	(METERS)	61.3
EXIT VELOCITY	(M/SEC)	.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2575.0
			HEAT EMISSION RATE	(CAL/SEC)	.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)	
ELEVATED	LESS THAN	.000
MIXED	BETWEEN	.000 AND .000
GROUND LEVEL	ABOVE	.000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS		WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS	
ELEVATED	LESS THAN	.000	LESS THAN	.000
MIXED	BETWEEN	.000 AND .000	BETWEEN	.000 AND .000
GROUND LEVEL	ABOVE	.000	ABOVE	.000

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

Susquehanna Steam Electric Station - GROUND-LEVEL RELEASE - 1995
8.000 DAY DECAY, DEPLETED
CORRECTED FOR OPEN TERRAIN RECIRCULATION USING SPECIAL TERRAIN ADJUSTMENT FACTORS

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES

SECTOR	.250	.500	.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	1.048E-05	3.590E-06	2.002E-06	1.270E-06	6.413E-07	3.973E-07	2.704E-07	1.847E-07	1.307E-07	9.911E-08	7.671E-08
SSW	2.075E-05	6.419E-06	3.651E-06	2.257E-06	1.266E-06	8.005E-07	5.592E-07	3.825E-07	2.686E-07	2.033E-07	1.557E-07
SW	4.437E-05	1.339E-05	7.749E-06	4.976E-06	2.677E-06	1.714E-06	1.215E-06	8.675E-07	6.376E-07	4.911E-07	3.853E-07
WSW	1.087E-04	3.259E-05	1.916E-05	1.270E-05	7.007E-06	4.720E-06	3.525E-06	2.537E-06	1.875E-06	1.503E-06	1.230E-06
W	6.170E-05	1.836E-05	9.315E-06	5.741E-06	2.974E-06	1.891E-06	1.327E-06	9.375E-07	6.834E-07	5.423E-07	4.365E-07
WNW	2.855E-05	8.613E-06	4.658E-06	2.911E-06	1.612E-06	1.015E-06	7.015E-07	5.042E-07	3.761E-07	2.994E-07	2.424E-07
NW	2.850E-05	8.901E-06	5.117E-06	3.185E-06	1.744E-06	1.095E-06	7.600E-07	5.544E-07	4.215E-07	3.313E-07	2.654E-07
NNW	2.182E-05	7.270E-06	4.281E-06	2.990E-06	1.557E-06	9.962E-07	7.018E-07	4.948E-07	3.607E-07	2.955E-07	2.468E-07
N	2.112E-05	6.434E-06	3.578E-06	2.203E-06	1.265E-06	8.520E-07	6.307E-07	4.510E-07	3.352E-07	2.716E-07	2.242E-07
NNE	2.479E-05	8.473E-06	4.739E-06	3.214E-06	1.690E-06	1.126E-06	8.245E-07	5.908E-07	4.405E-07	3.579E-07	2.965E-07
NE	1.855E-05	5.936E-06	3.359E-06	2.095E-06	1.160E-06	7.678E-07	5.582E-07	4.067E-07	3.094E-07	2.534E-07	2.118E-07
ENE	1.004E-05	3.315E-06	1.861E-06	1.232E-06	6.301E-07	4.147E-07	3.015E-07	2.252E-07	1.752E-07	1.446E-07	1.222E-07
E	6.046E-06	2.053E-06	1.114E-06	6.588E-07	3.364E-07	2.113E-07	1.466E-07	1.038E-07	7.658E-08	6.055E-08	4.908E-08
ESE	4.940E-06	1.612E-06	8.789E-07	5.173E-07	2.552E-07	1.520E-07	9.981E-08	7.002E-08	5.120E-08	3.786E-08	2.850E-08
SE	4.562E-06	1.564E-06	9.002E-07	5.736E-07	2.857E-07	1.728E-07	1.149E-07	7.573E-08	5.138E-08	3.718E-08	2.728E-08
SSE	5.669E-06	1.999E-06	1.130E-06	6.695E-07	3.326E-07	2.100E-07	1.461E-07	1.012E-07	7.255E-08	5.220E-08	3.774E-08

ANNUAL AVERAGE CHI/Q (SEC/METER CUBED) DISTANCE IN MILES

BEARING	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	6.229E-08	2.608E-08	1.261E-08	2.687E-09	1.120E-09	3.690E-10	1.867E-10	7.928E-11	5.011E-11	3.046E-11	2.518E-11
SSW	1.273E-07	5.470E-08	2.837E-08	8.311E-09	3.483E-09	1.209E-09	5.640E-10	1.813E-10	1.155E-10	4.713E-11	3.920E-11
SW	3.189E-07	1.481E-07	7.715E-08	2.120E-08	9.922E-09	4.227E-09	2.334E-09	1.176E-09	7.724E-10	4.230E-10	3.539E-10
WSW	1.033E-06	5.084E-07	2.673E-07	7.001E-08	3.046E-08	1.033E-08	5.338E-09	1.936E-09	1.044E-09	4.318E-10	3.634E-10
W	3.618E-07	1.616E-07	8.302E-08	2.130E-08	8.398E-09	2.194E-09	1.150E-09	3.842E-10	2.058E-10	8.459E-11	7.082E-11
WNW	2.017E-07	9.679E-08	5.150E-08	1.628E-08	7.028E-09	2.504E-09	1.028E-09	1.495E-10	7.975E-11	2.613E-11	2.180E-11
NW	2.208E-07	1.067E-07	5.697E-08	1.844E-08	7.283E-09	2.083E-09	9.405E-10	2.286E-10	1.211E-10	4.927E-11	4.089E-11
NNW	2.075E-07	1.064E-07	5.596E-08	1.715E-08	6.927E-09	2.163E-09	1.254E-09	6.672E-10	3.824E-10	1.914E-10	1.587E-10
N	1.996E-07	1.320E-07	6.685E-08	1.696E-08	7.785E-09	3.338E-09	1.572E-09	5.251E-10	2.892E-10	1.309E-10	1.088E-10
NNE	2.493E-07	1.267E-07	6.527E-08	1.838E-08	7.674E-09	2.655E-09	1.406E-09	6.119E-10	3.741E-10	2.133E-10	1.771E-10
NE	1.783E-07	9.292E-08	5.063E-08	1.796E-08	7.168E-09	2.092E-09	1.095E-09	4.687E-10	2.734E-10	1.418E-10	1.179E-10
ENE	1.029E-07	5.258E-08	3.178E-08	1.443E-08	7.179E-09	3.727E-09	1.909E-09	8.355E-10	4.960E-10	2.595E-10	2.150E-10
E	4.082E-08	1.991E-08	1.065E-08	3.685E-09	1.762E-09	8.615E-10	4.142E-10	1.535E-10	8.738E-11	4.348E-11	3.588E-11
ESE	2.282E-08	8.965E-09	4.822E-09	1.715E-09	8.462E-10	4.383E-10	1.968E-10	5.175E-11	2.711E-11	1.094E-11	9.004E-12
SE	2.159E-08	7.685E-09	4.165E-09	1.499E-09	5.872E-10	1.778E-10	8.327E-11	2.871E-11	1.352E-11	3.633E-12	2.989E-12
SSE	3.001E-08	1.125E-08	5.987E-09	2.057E-09	8.372E-10	2.791E-10	1.357E-10	5.181E-11	2.922E-11	1.420E-11	1.174E-11

CHI/Q (SEC/METER CUBED) FOR EACH SEGMENT

SEGMENT BOUNDARIES IN MILES

DIRECTION FROM SITE	.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	2.029E-06	6.726E-07	2.700E-07	1.341E-07	7.800E-08	2.814E-08	4.195E-09	4.963E-10	9.885E-11	3.433E-11
SSW	3.647E-06	1.279E-06	5.528E-07	2.762E-07	1.593E-07	5.912E-08	1.062E-08	1.557E-09	2.656E-10	6.445E-11
SW	7.771E-06	2.760E-06	1.209E-06	6.475E-07	3.920E-07	1.545E-07	2.862E-08	4.988E-09	1.353E-09	5.009E-10
WSW	1.928E-05	7.257E-06	3.449E-06	1.923E-06	1.238E-06	5.178E-07	9.627E-08	1.370E-08	2.568E-09	5.880E-10
W	9.737E-06	3.108E-06	1.322E-06	7.023E-07	4.402E-07	1.712E-07	2.928E-08	3.431E-09	5.349E-10	1.154E-10
WNW	4.761E-06	1.636E-06	7.063E-07	3.835E-07	2.442E-07	9.998E-08	1.999E-08	3.120E-09	3.739E-10	4.041E-11
NW	5.099E-06	1.776E-06	7.672E-07	4.251E-07	2.684E-07	1.099E-07	2.204E-08	3.012E-09	3.910E-10	6.744E-11
NNW	4.371E-06	1.626E-06	6.975E-07	3.742E-07	2.467E-07	1.064E-07	2.123E-08	3.070E-09	7.263E-10	2.359E-10
N	3.602E-06	1.290E-06	6.178E-07	3.441E-07	2.291E-07	1.181E-07	2.397E-08	3.817E-09	7.344E-10	1.696E-10
NNE	4.891E-06	1.778E-06	8.113E-07	4.520E-07	2.972E-07	1.266E-07	2.404E-08	3.494E-09	7.483E-10	2.475E-10
NE	3.370E-06	1.193E-06	5.535E-07	3.159E-07	2.117E-07	9.310E-08	2.043E-08	3.047E-09	5.733E-10	1.719E-10
ENE	1.905E-06	6.681E-07	3.011E-07	1.778E-07	1.217E-07	5.451E-08	1.506E-08	3.921E-09	1.013E-09	3.131E-10
E	1.120E-06	3.524E-07	1.467E-07	7.824E-08	4.942E-08	2.044E-08	4.378E-09	9.228E-10	2.028E-10	5.367E-11

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

ESE	8.811E-07	2.676E-07	1.018E-07	5.149E-08	2.917E-08	1.020E-08	2.019E-09	4.505E-10	8.380E-11	1.501E-11
SE	9.025E-07	2.995E-07	1.147E-07	5.293E-08	2.811E-08	9.211E-09	1.686E-09	2.492E-10	3.852E-11	6.326E-12
SSE	1.118E-06	3.530E-07	1.452E-07	7.299E-08	3.916E-08	1.308E-08	2.388E-09	3.706E-10	6.718E-11	1.774E-11

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	9.60	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	.00	BUILDING HEIGHT	(METERS)	61.3
EXIT VELOCITY	(M/SEC)	.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2575.0
			HEAT EMISSION RATE	(CAL/SEC)	.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)
ELEVATED	LESS THAN .000
MIXED	BETWEEN .000 AND .000
GROUND LEVEL	ABOVE .000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS	WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS
ELEVATED	LESS THAN .000	LESS THAN .000
MIXED	BETWEEN .000 AND .000	BETWEEN .000 AND .000
GROUND LEVEL	ABOVE .000	ABOVE .000

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

Susquehanna Steam Electric Station - GROUND-LEVEL RELEASE - 1995

CORRECTED FOR OPEN TERRAIN RECIRCULATION USING SPECIAL TERRAIN ADJUSTMENT FACTORS

********************** RELATIVE DEPOSITION PER UNIT AREA (M**-2) AT FIXED POINTS BY DOWNWIND SECTORS ********************

DIRECTION FROM SITE	DISTANCES IN MILES .25	.50	.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
S	6.156E-08	2.162E-08	1.137E-08	6.871E-09	3.244E-09	1.917E-09	1.256E-09	8.317E-10	5.726E-10	4.238E-10	3.211E-10
SSW	8.207E-08	2.739E-08	1.493E-08	8.788E-09	4.571E-09	2.726E-09	1.812E-09	1.189E-09	8.056E-10	5.908E-10	4.400E-10
SW	1.025E-07	3.504E-08	2.024E-08	1.243E-08	6.139E-09	3.654E-09	2.423E-09	1.637E-09	1.147E-09	8.477E-10	6.408E-10
WSW	1.436E-07	5.107E-08	3.170E-08	2.035E-08	1.028E-08	6.340E-09	4.341E-09	2.910E-09	2.023E-09	1.539E-09	1.201E-09
W	1.021E-07	3.496E-08	1.803E-08	1.060E-08	4.974E-09	2.916E-09	1.904E-09	1.267E-09	8.777E-10	6.662E-10	5.154E-10
WNW	5.742E-08	1.949E-08	1.040E-08	6.170E-09	3.112E-09	1.822E-09	1.183E-09	8.073E-10	5.760E-10	4.410E-10	3.450E-10
NW	8.454E-08	2.859E-08	1.566E-08	9.223E-09	4.643E-09	2.743E-09	1.812E-09	1.268E-09	9.306E-10	7.092E-10	5.525E-10
NNW	7.215E-08	2.596E-08	1.445E-08	9.525E-09	4.553E-09	2.742E-09	1.840E-09	1.246E-09	8.775E-10	6.972E-10	5.667E-10
N	7.151E-08	2.396E-08	1.259E-08	7.308E-09	3.836E-09	2.422E-09	1.702E-09	1.166E-09	8.350E-10	6.548E-10	5.250E-10
NNE	9.489E-08	3.540E-08	1.856E-08	1.187E-08	5.730E-09	3.590E-09	2.505E-09	1.724E-09	1.241E-09	9.779E-10	7.883E-10
NE	1.377E-07	4.742E-08	2.556E-08	1.522E-08	7.858E-09	4.950E-09	3.457E-09	2.435E-09	1.798E-09	1.435E-09	1.171E-09
ENE	9.313E-08	3.163E-08	1.692E-08	1.077E-08	5.222E-09	3.306E-09	2.330E-09	1.694E-09	1.288E-09	1.041E-09	8.638E-10
E	5.327E-08	1.809E-08	9.329E-09	5.286E-09	2.549E-09	1.539E-09	1.035E-09	7.138E-10	5.151E-10	3.993E-10	3.179E-10
ESE	4.031E-08	1.298E-08	6.714E-09	3.790E-09	1.771E-09	1.016E-09	6.483E-10	4.439E-10	3.179E-10	2.308E-10	1.709E-10
SE	4.312E-08	1.446E-08	7.885E-09	4.823E-09	2.283E-09	1.333E-09	8.632E-10	5.560E-10	3.699E-10	2.631E-10	1.901E-10
SSE	4.716E-08	1.669E-08	8.955E-09	5.086E-09	2.389E-09	1.449E-09	9.756E-10	6.575E-10	4.601E-10	3.242E-10	2.300E-10

DIRECTION FROM SITE	DISTANCES IN MILES 5.00	7.50	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
S	2.556E-10	1.009E-10	4.900E-11	1.032E-11	4.216E-12	1.361E-12	6.751E-13	2.816E-13	1.752E-13	1.050E-13	8.566E-14
SSW	3.504E-10	1.385E-10	7.090E-11	2.003E-11	8.081E-12	2.709E-12	1.226E-12	3.836E-13	2.386E-13	9.530E-14	7.778E-14
SW	5.129E-10	2.128E-10	1.072E-10	2.764E-11	1.222E-11	4.960E-12	2.627E-12	1.276E-12	8.120E-13	4.324E-13	3.530E-13
WSW	9.675E-10	4.123E-10	2.053E-10	4.903E-11	1.978E-11	6.301E-12	3.089E-12	1.071E-12	5.549E-13	2.216E-13	1.809E-13
W	4.122E-10	1.633E-10	8.074E-11	1.931E-11	7.171E-12	1.781E-12	8.932E-13	2.874E-13	1.490E-13	5.951E-14	4.857E-14
WNW	2.782E-10	1.203E-10	6.229E-11	1.863E-11	7.650E-12	2.610E-12	1.032E-12	1.452E-13	7.529E-14	2.406E-14	1.964E-14
NW	4.481E-10	1.995E-10	1.054E-10	3.302E-11	1.260E-11	3.491E-12	1.533E-12	3.635E-13	1.884E-13	7.526E-14	6.143E-14
NNW	4.649E-10	2.202E-10	1.148E-10	3.416E-11	1.336E-11	4.049E-12	2.286E-12	1.188E-12	6.672E-13	3.280E-13	2.677E-13
N	4.552E-10	2.763E-10	1.380E-10	3.375E-11	1.493E-11	6.189E-12	2.831E-12	9.211E-13	4.958E-13	2.200E-13	1.796E-13
NNE	6.464E-10	3.029E-10	1.545E-10	4.211E-11	1.699E-11	5.697E-12	2.934E-12	1.245E-12	7.448E-13	4.164E-13	3.399E-13
NE	9.648E-10	4.689E-10	2.546E-10	8.809E-11	3.403E-11	9.634E-12	4.905E-12	2.046E-12	1.167E-12	5.931E-13	4.841E-13
ENE	7.146E-10	3.465E-10	2.113E-10	9.519E-11	4.637E-11	2.355E-11	1.181E-11	5.069E-12	2.956E-12	1.522E-12	1.242E-12
E	2.601E-10	1.210E-10	6.559E-11	2.271E-11	1.072E-11	5.160E-12	2.443E-12	8.924E-13	5.011E-13	2.463E-13	2.011E-13
ESE	1.348E-10	5.080E-11	2.782E-11	9.959E-12	4.875E-12	2.496E-12	1.107E-12	2.878E-13	1.492E-13	5.958E-14	4.863E-14
SE	1.483E-10	5.083E-11	2.812E-11	1.023E-11	3.986E-12	1.196E-12	5.544E-13	1.892E-13	8.827E-14	2.350E-14	1.918E-14
SSE	1.797E-10	6.406E-11	3.445E-11	1.179E-11	4.721E-12	1.546E-12	7.384E-13	2.772E-13	1.540E-13	7.379E-14	6.023E-14

*********************** RELATIVE DEPOSITION PER UNIT AREA (M**-2) BY DOWNWIND SECTORS ***********************

DIRECTION FROM SITE	SEGMENT BOUNDARIES IN MILES .5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	1.165E-08	3.460E-09	1.263E-09	5.899E-10	3.273E-10	1.122E-10	1.620E-11	1.848E-12	3.535E-13	1.186E-13
SSW	1.497E-08	4.688E-09	1.807E-09	8.333E-10	4.515E-10	1.555E-10	2.602E-11	3.548E-12	5.690E-13	1.313E-13
SW	2.006E-08	6.432E-09	2.437E-09	1.173E-09	6.547E-10	2.326E-10	3.848E-11	5.964E-12	1.485E-12	5.155E-13
WSW	3.096E-08	1.077E-08	4.302E-09	2.092E-09	1.215E-09	4.437E-10	7.076E-11	8.612E-12	1.451E-12	3.053E-13
W	1.849E-08	5.309E-09	1.919E-09	9.083E-10	5.219E-10	1.819E-10	2.757E-11	2.863E-12	4.078E-13	8.197E-14
WNW	1.054E-08	3.218E-09	1.203E-09	5.907E-10	3.487E-10	1.296E-10	2.345E-11	3.322E-12	3.719E-13	3.760E-14
NW	1.567E-08	4.816E-09	1.843E-09	9.428E-10	5.603E-10	2.129E-10	4.003E-11	5.136E-12	6.309E-13	1.037E-13
NNW	1.482E-08	4.853E-09	1.843E-09	9.142E-10	5.677E-10	2.278E-10	4.284E-11	5.826E-12	1.303E-12	4.062E-13
N	1.277E-08	3.979E-09	1.680E-09	8.609E-10	5.376E-10	2.546E-10	4.856E-11	7.176E-12	1.305E-12	2.868E-13
NNE	1.933E-08	6.145E-09	2.482E-09	1.279E-09	7.919E-10	3.133E-10	5.592E-11	7.604E-12	1.537E-12	4.854E-13
NE	2.582E-08	8.201E-09	3.446E-09	1.842E-09	1.173E-09	4.839E-10	1.011E-10	1.425E-11	2.528E-12	7.227E-13
ENE	1.745E-08	5.603E-09	2.336E-09	1.310E-09	8.610E-10	3.682E-10	9.929E-11	2.494E-11	6.191E-12	1.843E-12
E	9.479E-09	2.708E-09	1.041E-09	5.277E-10	3.206E-10	1.273E-10	2.691E-11	5.556E-12	1.186E-12	3.051E-13
ESE	6.806E-09	1.884E-09	6.647E-10	3.207E-10	1.752E-10	5.924E-11	1.167E-11	2.575E-12	4.691E-13	8.207E-14
SE	7.986E-09	2.425E-09	8.657E-10	3.824E-10	1.963E-10	6.240E-11	1.143E-11	1.683E-12	2.551E-13	4.110E-14
SSE	8.955E-09	2.571E-09	9.746E-10	4.647E-10	2.393E-10	7.660E-11	1.368E-11	2.069E-12	3.620E-13	9.253E-14

VENT AND BUILDING PARAMETERS:

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

RELEASE HEIGHT	(METERS)	9.60	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	.00	BUILDING HEIGHT	(METERS)	61.3
EXIT VELOCITY	(M/SEC)	.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2575.0
			HEAT EMISSION RATE	(CAL/SEC)	.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)			
ELEVATED	LESS THAN	.000		
MIXED	BETWEEN	.000	AND	.000
GROUND LEVEL	ABOVE	.000		

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS				WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS			
ELEVATED	LESS THAN	.000			LESS THAN	.000		
MIXED	BETWEEN	.000	AND	.000	BETWEEN	.000	AND	.000
GROUND LEVEL	ABOVE	.000			ABOVE	.000		

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

Susquehanna Steam Electric Station - GROUND-LEVEL RELEASE - 1995
SPECIFIC POINTS OF INTEREST

RELEASE ID	TYPE OF LOCATION	DIRECTION	DISTANCE (MILES)	DISTANCE (METERS)	X/Q (SEC/CUB.METER) NO DECAY UNDEPLETED	X/Q (SEC/CUB.METER) 2.260 DAY DECAY UNDEPLETED	X/Q (SEC/CUB.METER) 8.000 DAY DECAY DEPLETED	D/Q (PER SQ.METER)
S	SITE BOUNDARY	S	.34	549.	6.691E-06	6.682E-06	6.240E-06	3.820E-08
S	SITE BOUNDARY	SSW	.42	670.	9.441E-06	9.421E-06	8.709E-06	3.722E-08
S	SITE BOUNDARY	SW	.82	1315.	7.693E-06	7.655E-06	6.811E-06	1.767E-08
S	SITE BOUNDARY	WSW	1.22	1965.	1.096E-05	1.088E-05	9.442E-06	1.452E-08
S	SITE BOUNDARY	W	1.02	1649.	6.349E-06	6.306E-06	5.538E-06	1.016E-08
S	SITE BOUNDARY	WNW	.62	992.	7.137E-06	7.108E-06	6.423E-06	1.443E-08
S	SITE BOUNDARY	NW	.64	1037.	6.813E-06	6.787E-06	6.115E-06	1.913E-08
S	SITE BOUNDARY	NNW	.59	948.	6.355E-06	6.334E-06	5.738E-06	2.002E-08
S	SITE BOUNDARY	N	.59	951.	5.684E-06	5.666E-06	5.131E-06	1.866E-08
S	SITE BOUNDARY	NNE	.79	1266.	4.883E-06	4.863E-06	4.334E-06	1.684E-08
S	SITE BOUNDARY	NE	.70	1121.	4.191E-06	4.179E-06	3.747E-06	2.881E-08
S	SITE BOUNDARY	ENE	.87	1398.	1.698E-06	1.693E-06	1.499E-06	1.335E-08
S	SITE BOUNDARY	E	.84	1354.	1.041E-06	1.038E-06	9.204E-07	7.580E-09
S	SITE BOUNDARY	ESE	.49	796.	1.792E-06	1.790E-06	1.637E-06	1.320E-08
S	SITE BOUNDARY	SE	.42	678.	2.194E-06	2.192E-06	2.023E-06	1.911E-08
S	SITE BOUNDARY	SSE	.34	549.	3.653E-06	3.650E-06	3.407E-06	2.926E-08
S	RESIDENCE	S	1.00	1609.	1.452E-06	1.447E-06	1.270E-06	6.871E-09
S	RESIDENCE	SSW	.90	1448.	3.112E-06	3.098E-06	2.739E-06	1.088E-08
S	RESIDENCE	SW	1.50	2415.	3.160E-06	3.131E-06	2.677E-06	6.137E-09
S	RESIDENCE	WSW	1.10	1770.	1.267E-05	1.258E-05	1.100E-05	1.729E-08
S	RESIDENCE	W	1.20	1931.	4.976E-06	4.937E-06	4.290E-06	7.582E-09
S	RESIDENCE	WNW	.80	1287.	4.885E-06	4.860E-06	4.330E-06	9.609E-09
S	RESIDENCE	NW	.80	1287.	5.391E-06	5.365E-06	4.779E-06	1.448E-08
S	RESIDENCE	NNW	.60	966.	6.210E-06	6.188E-06	5.599E-06	1.948E-08
S	RESIDENCE	N	1.30	2092.	1.797E-06	1.783E-06	1.540E-06	4.819E-09
S	RESIDENCE	NNE	1.00	1609.	3.677E-06	3.658E-06	3.214E-06	1.187E-08
S	RESIDENCE	NE	2.30	3702.	7.719E-07	7.649E-07	6.290E-07	3.954E-09
S	RESIDENCE	ENE	2.10	3381.	4.693E-07	4.661E-07	3.861E-07	3.057E-09
S	RESIDENCE	E	1.40	2253.	4.421E-07	4.403E-07	3.771E-07	2.885E-09
S	RESIDENCE	ESE	.50	805.	1.764E-06	1.761E-06	1.610E-06	1.296E-08
S	RESIDENCE	SE	.40	643.	2.377E-06	2.374E-06	2.198E-06	2.088E-08
S	RESIDENCE	SSE	.60	966.	1.702E-06	1.699E-06	1.535E-06	1.252E-08
S	GARDEN	S	1.10	1770.	1.247E-06	1.242E-06	1.083E-06	5.767E-09
S	GARDEN	SSW	1.20	1931.	2.015E-06	2.003E-06	1.739E-06	6.544E-09
S	GARDEN	SW	1.90	3059.	2.236E-06	2.211E-06	1.855E-06	4.013E-09
S	GARDEN	WSW	1.10	1770.	1.273E-05	1.264E-05	1.105E-05	1.737E-08
S	GARDEN	W	1.20	1931.	4.976E-06	4.937E-06	4.290E-06	7.582E-09
S	GARDEN	WNW	1.30	2092.	2.319E-06	2.300E-06	1.988E-06	3.967E-09
S	GARDEN	NW	.90	1448.	4.386E-06	4.362E-06	3.860E-06	1.143E-08
S	GARDEN	NNW	4.00	6438.	3.873E-07	3.785E-07	2.954E-07	6.970E-10
S	GARDEN	N	1.30	2092.	1.797E-06	1.783E-06	1.540E-06	4.819E-09
S	GARDEN	NNE	1.10	1770.	3.185E-06	3.167E-06	2.765E-06	1.001E-08
S	GARDEN	NE	2.30	3702.	7.719E-07	7.649E-07	6.290E-07	3.954E-09
S	GARDEN	ENE	2.40	3863.	3.938E-07	3.907E-07	3.196E-07	2.484E-09
S	GARDEN	E	1.40	2253.	4.421E-07	4.403E-07	3.771E-07	2.885E-09
S	GARDEN	ESE	2.50	4024.	1.235E-07	1.225E-07	9.979E-08	6.482E-10
S	GARDEN	SE	.60	966.	1.323E-06	1.321E-06	1.194E-06	1.077E-08
S	GARDEN	SSE	.80	1287.	1.162E-06	1.159E-06	1.031E-06	8.090E-09
S	DAIRY	E	4.50	7244.	6.516E-08	6.425E-08	4.907E-08	3.178E-10
S	DAIRY	E	4.60	7405.	6.268E-08	6.179E-08	4.706E-08	3.038E-10
S	DAIRY	ESE	2.70	4346.	1.076E-07	1.067E-07	8.625E-08	5.546E-10

TABLE 22

AVERAGE ANNUAL RELATIVE CONCENTRATIONS

S	DAIRY	ESE	4.10	6599.	4.679E-08	4.618E-08	3.567E-08	2.167E-10
S	DAIRY	ESE	4.20	6760.	4.426E-08	4.367E-08	3.364E-08	2.037E-10
S	DAIRY	SE	2.60	4185.	1.309E-07	1.300E-07	1.054E-07	7.874E-10
S	DAIRY	S	3.90	6277.	1.362E-07	1.340E-07	1.044E-07	4.486E-10
S	DAIRY	SSW	3.00	4829.	4.835E-07	4.761E-07	3.824E-07	1.189E-09
S	DAIRY	SSW	3.10	4990.	4.505E-07	4.433E-07	3.549E-07	1.095E-09
S	DAIRY	SSW	3.50	5634.	3.458E-07	3.396E-07	2.685E-07	8.052E-10
S	DAIRY	SSW	3.80	6117.	2.946E-07	2.888E-07	2.263E-07	6.657E-10
S	DAIRY	SSW	14.00	22536.	1.740E-08	1.616E-08	1.074E-08	2.609E-11
S	DAIRY	WSW	2.00	3220.	5.719E-06	5.645E-06	4.718E-06	6.337E-09
S	DAIRY	W	5.00	8049.	4.898E-07	4.739E-07	3.617E-07	4.121E-10
S	DAIRY	NNW	4.20	6760.	3.613E-07	3.526E-07	2.737E-07	6.386E-10
S	RIVERLANDS/EIC	NE	.70	1127.	4.158E-06	4.146E-06	3.716E-06	2.855E-08

VENT AND BUILDING PARAMETERS:

RELEASE HEIGHT	(METERS)	9.60	REP. WIND HEIGHT	(METERS)	10.0
DIAMETER	(METERS)	.00	BUILDING HEIGHT	(METERS)	61.3
EXIT VELOCITY	(M/SEC)	.00	BLDG.MIN.CRS.SEC.AREA	(SQ.METERS)	2575.0
			HEAT EMISSION RATE	(CAL/SEC)	.0

AT THE RELEASE HEIGHT:

VENT RELEASE MODE	WIND SPEED (METERS/SEC)
ELEVATED	LESS THAN .000
MIXED	BETWEEN .000 AND .000
GROUND LEVEL	ABOVE .000

AT THE MEASURED WIND HEIGHT (10.0 METERS):

VENT RELEASE MODE	WIND SPEED (METERS/SEC) STABLE CONDITIONS	WIND SPEED (METERS/SEC) UNSTABLE/NEUTRAL CONDITIONS
ELEVATED	LESS THAN .000	LESS THAN .000
MIXED	BETWEEN .000 AND .000	BETWEEN .000 AND .000
GROUND LEVEL	ABOVE .000	ABOVE .000

SECTION 4

DOSE MEASUREMENTS AND ASSESSMENTS

Radiological Impact on Man

Sampling and analysis of airborne and waterborne effluents were performed in accordance with the frequencies, types of analysis, and Lower Limit of Detection (LLD) outlined in the SSES Technical Specifications.

Radioactive material was detected in some of the airborne and waterborne effluent samples analyzed. Dose calculations using measured effluent activity levels, meteorological data from the current reporting period and quarterly averaged river flow dilution factors resulted in estimated doses to individuals at levels below 10 CFR 20 and 10 CFR 50, Appendix I limits. Direct radiation resulting from plant operation, as measured by environmental thermoluminescent dosimeters located around the plant contributed a maximum of 4.23E-03 mrem (measured at TLD Location 11S3) at the Protected Area Boundary southwest of the plant. The maximum organ/total body dose (child lung, 1.1 miles WSW:Table 26) from all airborne effluent is 1.27E-01 mrem. The maximum organ/total body dose from liquid effluent (adult GI-LLI:Table 24) is 1.00E-01 mrem. If it is conservatively assumed that a member of the public receives the maximum total body/organ dose from liquid and gaseous combined with the maximum total body dose determined from direct radiation, the result (2.31E-01 mrem) is <1% of the 40CFR190 limit of 25 mrem to total body/organ (except thyroid).

Doses to a maximally exposed member of the public from waterborne effluents are calculated for fish ingestion and shoreline exposure at the plant outfall, and drinking water ingestion at Danville, PA. Site specific parameters used in the calculations for the Danville receiver, specific for actual average blowdown and river level in each quarter and the entire year, are shown in Table 23.

TABLE 23
SITE-SPECIFIC PARAMETERS USED FOR LADTAP II CALCULATIONS
(DANVILLE RECEIVER)
FOR 1995

PARAMETER	ENTIRE YEAR
Cooling Tower Blowdown (CFS)	17.3
Average Net River Level (ft)(1)	5.3
Dilution Factor at Danville (2)	284.1
Transit time to Danville (hr)(2)	32.3

(1) Net River Level = Depth (ft above MSL) - 483'
(2) From ODCM Table 5-4

Summaries of maximum individual doses resulting from airborne and waterborne radioactive effluent releases are given in Table 24. Meteorological data from Section 3 were used to calculate the dose from airborne effluents.

Technical Specification 6.9.1.11 requires assessment of radiation doses from radioactive airborne and waterborne effluent to members of the public within the site boundary. There are no significant exposure pathways from waterborne effluents in these areas. Onsite doses are assessed relative to offsite dose values and are adjusted for appropriate dispersion and occupancy factors. Summaries of the calculated maximum onsite doses resulting from airborne effluents are presented in Tables 25 through 26.

TABLE 24

SUMMARY OF MAXIMUM INDIVIDUAL OFFSITE DOSES AND DOSE COMMITMENTS TO MEMBERS OF THE PUBLIC DATA PERIOD: 1/1/95 TO 12/31/95

EFFLUENT	AGE GROUP	APPLICABLE ORGAN	ESTIMATED MAXIMUM DOSE (MREM)	LOCATION		PERCENT OF LIMIT	LIMIT (MREM)[2]
				DIST (MILES)	AFFECTED SECTOR		
Liquid[1]	TEEN	TOTAL BODY	2.14E-02	(3)		0.71	3
Liquid[1]	ADULT	GI-LLI	1.00E-01	(3)		1.00	10
Noble Gas	N/A	AIR DOSE (GAMMA-MRAD)	7.10E-03	1.10	WSW	0.07	10
Noble Gas	N/A	AIR DOSE (BETA-MRAD)	9.10E-03	1.10	WSW	0.05	20
Noble Gas	N/A	TOTAL BODY	4.69E-03	1.10	WSW	0.09	5
Noble Gas	N/A	SKIN	1.24E-02	1.10	WSW	0.08	15
Iodine and Particulates	CHILD	LUNG	6.27E-02	1.10	WSW	0.42	15

(1)Estimated dose is based on a site total activity release.
(2)10 CFR 50, Appendix I limits are in terms of mrad or mrem/reactor-year.
(3)Doses from liquid effluent are estimated from fish ingestion and shoreline exposure at the site outfall and from the drinking water pathway at Danville, PA.

AIRBORNE PATHWAYS ANALYZED: 0.40 (SE): PLUME, GROUND, INHALATION; 1.10 (WSW) PLUME, GROUND, VEGETATION, INHALATION; 2.00 (WSW) DAIRY: PLUME, GROUND, VEGETATION, COW MILK, INHALATION

WATERBORNE PATHWAYS ANALYZED: FISH, DRINKING WATER, SHORELINE

The maximum calculated dose from all 1995 SSES waterborne effluent (combined pathways) was 1.00E-01 mrem (ADULT, GI-LLI).

The maximum calculated dose from all 1995 SSES airborne effluent (both units) at 0.40 miles (SE sector) was 1.22E-02 mrem (TEEN, LUNG).

The maximum calculated dose from all 1995 SSES airborne effluent (both units) at 1.10 miles (WSW sector) was 1.27E-01 mrem (CHILD, LUNG).

The maximum calculated dose from all 1995 SSES airborne effluent (both units) at 2.00 miles (WSW) was 7.26E-02 mrem (CHILD, LUNG).

DOSES TO MEMBERS OF THE PUBLIC WITHIN THE SITE BOUNDARY

SSES Technical Specification 6.9.1.11 requires that the Annual 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 three areas which are open to members of the public (See Figure 8):

- The Susquehanna Riverlands Recreation Area/Energy Information Center
- Residences in the southeast and west southwest sectors

In the area comprising the Riverlands recreation area, which surrounds the Energy Information Center, three pathways of radiation exposure can be identified; plume, ground and inhalation. There are no significant exposure pathways from waterborne effluents in this area. There are approximately 100,000 visitors to the Riverlands/Information Center complex each year. For dose calculations, the visitor stays in the area for one hour.

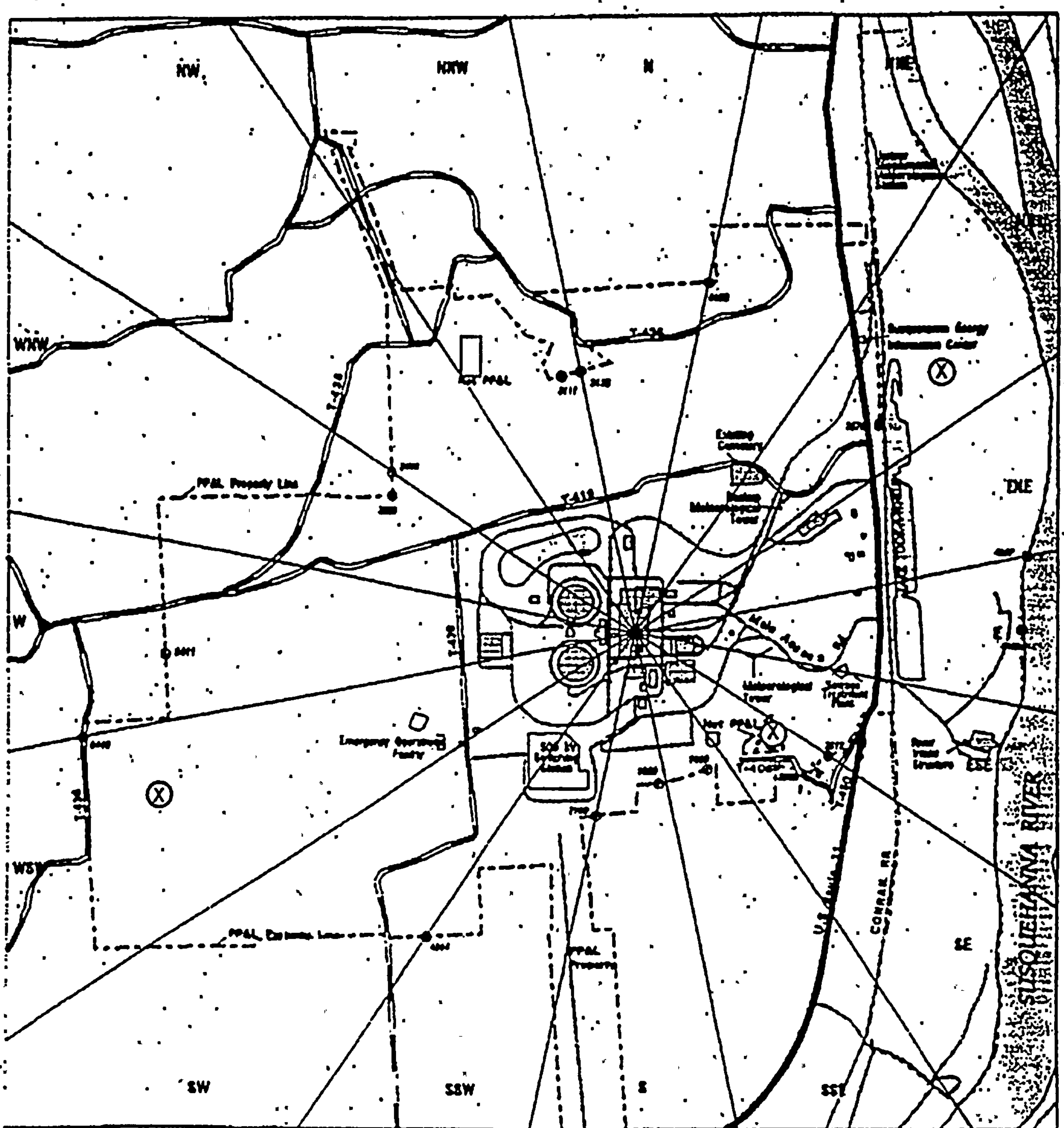
Use of the GASPAR code yields calculated doses for the Riverlands area for the report period. These doses are the total doses at the location from gaseous effluents during the report period. In order to compute doses to members of the public who stay for only short periods of time, these doses are converted to dose rates which are averages for the entire year. Taking into account the estimated 100,000 person-hours of occupancy, the collective (person-rem) doses shown in Table 25 are calculated.

Calculated doses for residences within the SSES site boundary for the following sectors are presented in Table 26.

- southeast (0.40 miles)
- west southwest (1.10 miles)

FIGURE 8

AREAS WITHIN THE SSES SITE BOUNDARY OPEN TO MEMBERS OF THE PUBLIC



SUSQUEHANNA STEAM ELECTRIC STATION
SITE BOUNDARY DISTANCES
(DISTANCES IN FEET)

PENNSYLVANIA POWER & LIGHT

HALLIBURTON NUS
November 02, 1993

LEGEND

PP&L Property Boundary
Sector Wheel (22.5-degree)
Roads
Railroads
Ⓧ Locations for dose calculations

Scale in Feet
0 500 1000 2000

TABLE 25

CALCULATED COLLECTIVE DOSES TO MEMBERS OF THE PUBLIC WITHIN THE RIVERLANDS/INFORMATION CENTER COMPLEX
DATA PERIOD: 1/1/95 TO 12/31/95

EFFLUENT	AGE GROUP	APPLICABLE ORGAN	MAXIMUM DOSE RATE* (MREM/HR)	COLLECTIVE DOSE (PERSON-REM)
NOBLE GAS	N/A	TOTAL BODY	2.90E-07	2.90E-05
NOBLE GAS	N/A	SKIN	7.66E-07	7.66E-05
IODINE AND PARTICULATES	TEEN	LUNG	1.95E-06	1.95E-04

*Estimated maximum dose rate is based on a site total activity release.

PATHWAYS ANALYZED: PLUME, GROUND, INHALATION

The maximum calculated dose from all 1995 SSES airborne effluent (both units) at this location was 1.97E-02 mrem (TEEN, LUNG).

TABLE 26

CALCULATED DOSES FOR RESIDENCES WITHIN THE SSES SITE BOUNDARY
0.40 MILES SE SECTOR
DATA PERIOD: 1/1/95 TO 12/31/95

EFFLUENT	AGE GROUP	APPLICABLE ORGAN	ESTIMATED MAXIMUM DOSE (MREM)	PERCENT OF LIMIT	LIMIT (MREM)
NOBLE GAS	N/A	TOTAL BODY	8.98E-04	0.02	5
NOBLE GAS	N/A	SKIN	2.37E-03	0.02	15
IODINE AND PARTICULATES	TEEN	LUNG	6.07E-03	0.04	15

10 CFR 50, Appendix I limits are in terms of mrad or mrem/reactor-year.

PATHWAYS ANALYZED: PLUME, GROUND, INHALATION

The maximum calculated dose from all 1995 airborne effluent (both units) at this location was 1.22E-02 mrem (TEEN, LUNG).

CALCULATED DOSES FOR RESIDENCES WITHIN THE SSES SITE BOUNDARY
1.10 MILES WSW SECTOR
DATA PERIOD: 1/1/95 TO 12/31/95

EFFLUENT	AGE GROUP	APPLICABLE ORGAN	ESTIMATED MAXIMUM DOSE (MREM)	PERCENT OF LIMIT	LIMIT (MREM)
NOBLE GAS	N/A	TOTAL BODY	4.69E-03	0.09	5
NOBLE GAS	N/A	SKIN	1.24E-02	0.08	15
IODINE AND PARTICULATES	CHILD	LUNG	4.86E-02	0.32	15

10 CFR 50, Appendix I limits are in terms of mrad or mrem/reactor-year.

PATHWAYS ANALYZED: PLUME, GROUND, VEGETATION, INHALATION

The maximum calculated dose from all 1995 SSES airborne effluent (both units) at this location was 1.27E-01 mrem (CHILD, LUNG).

TABLE 27
CALCULATED DOSES FOR NEAREST DAIRY FACILITY
2.00 MILES WSW SECTOR
DATA PERIOD: 1/1/95 TO 12/31/95

EFFLUENT	AGE GROUP	APPLICABLE ORGAN	ESTIMATED MAXIMUM DOSE (mrem)	PERCENT OF LIMIT	LIMIT (mrem)
Noble Gas	N/A	Total Body	2.06E-03	0.04	5
Noble Gas	N/A	Skin	5.44E-03	0.04	15
Iodine and Particulates	Child	Lung	3.64E-02	0.24	15

10 CFR 50, Appendix I limits are in terms of mrad or mrem/reactor-year.

PATHWAYS ANALYZED: PLUME, GROUND, INHALATION, VEGETATION AND COW MILK INGESTION

The maximum calculated dose from all 1995 airborne effluent (both units) at this location was 7.26E-02 mrem (CHILD, LUNG).

SECTION 5

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

CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

The SSES ODCM was revised four times in 1995. The changes in 1995 are designated Revisions 2 through 5 by SSES Document Control Center.

In Revision 2, Section 10.3 (Evaluation and Monitoring Criteria for Effluent Pathways) was expanded to show specific plant systems evaluated in the categories NOT AN EFFLUENT PATHWAY (listed in new Table 8), and INSIGNIFICANT EFFLUENT PATHWAY (listed in new Table 9). References for the bases for these evaluations are included for each system in the Table. Unless otherwise listed, most of the systems were evaluated in PP&L Calculation EC-ENVR-1008, which was performed in response to NRC Open Item 91-10-01-07. This revision to the ODCM was submitted in response to NRC Open Item 91-10-01-08.

ODCM Equations 7,8, 17 and 18 were revised to show the Gamma Shielding Factor (S_F). This factor has always been used in GASPAR calculations (NRC code referenced in the ODCM) for whole body and skin dose from noble gas effluent. The equations were revised to be consistent with the application of the GASPAR code. The Gamma Shielding Factor (= 0.7 for the Maximally-Exposed Member of the Public) is taken from Reg. Guide 1.109 Table E-15.

Sections 8.1 and 8.3 were revised to reflect the current state of liquid and solid radwaste processing, respectively. Figures 1, 3 and 4 have also been updated to show changes to liquid and solid radwaste processing systems, including vendor interfaces, based on information from Effluents Management.

Revision 2 was submitted to SSES PORC (1/19/95) and approved (1/20/95).

In Revision 3, Table 6 (Operational Environmental Monitoring Program) was corrected to show information originally in Revision 1 of the ODCM (approved 10/14/94). Some information in this table was noted to be incorrectly carried into Revision 2. Table 6 was not intended to be changed in any way in Revision 2. This information was documented as a status control issue in SOOR 95-045; corrections were made in resolution to that SOOR.

Slight changes were made to Figure 1, Liquid Radwaste System Flow Diagram. These changes made the pathway from the distillate sample tank to the cooling tower blowdown pipe clearer, and to correct labeling of distillate sample tank pumps OP-327 A, B and LRW Sample Tank pumps OP-305 A, B and C.

In Section 10.9.c.2, reference 10CFR20.302 is changed to 10CFR20.2002 to be consistent with the revision in the numbering of this regulation.

System classifications and references are added to Table 8 (NOT AN EFFLUENT PATHWAY) and Table 9 (INSIGNIFICANT EFFLUENT PATHWAY). Table 10 (SIGNIFICANT EFFLUENT PATHWAY) is added with references.

Section 11 is revised to state that ODCM revisions shall be reviewed by PORC after approval by the Manager - Nuclear Technology.

Revision 3 was submitted to SSES PORC (3/30/95) and approved (3/30/95).

In Revision 4, three milk sampling stations (10G1, 10D1 and 10D2) were inadvertently deleted in Revision 3 Table 6. These deletions were not noted in Revision 3 Table 6, which was submitted in resolution to SOOR 95-045.

The name of the restaurant at TLD station 6A4 was deleted to make the description more generic (to allow for ownership change) in response to a PORC comment from the meeting on March 30, 1995.

Revision 4 was approved by the Manger- Nuclear Technology (4/17/95) and reviewed by SSES PORC (4/20/95).

In Revision 5, the introduction was changed to specify that reference to MPC limits in 10CFR20 Appendix B apply to those limits in effect prior to January 1, 1994, and continuing in effect until such time that revised 10CFR20 Appendix B limits are implemented at SSES.

A description of systems with NRC I/E Bulletin 80-10 applicability was added to Section 10.3. Reference was made to Table 11, which lists the 80-10 systems by number and name.

Table 9 was revised to include Refuel Water Storage Tank with Condensate Storage Tank and Berm, and H_2 Seal Oil with Main Turbine/RFPT Lube Oil. The Sewage Treatment Plant was added to Table 9. Reference notes for these changes were located in the appropriate tables.

Table 11 (Systems with NRC I/E Bulletin Applicability) was added to the ODCM.

The Sewage Treatment Plant was added to Table 11 in response to PORC Meeting 95-098 Action Item E05532.

Section 11 (ODCM Review and Revision Control) was repaginated to follow Tables 8-11 of Section 10. Reference to revision in accordance with NEPM-QA-1011 was added, which was submitted as an Action to Prevent Recurrence in SOOR 95-045. The distribution of ODCM copies was revised to indicate SSES Document Control Services, which replaced the staff of the Nuclear Department Library.

Revision 5 was approved by the Manger- Nuclear Technology (7/17/95) and reviewed by SSES PORC (7/20/95).

Consistent with the requirements of Technical Specification 6.14.2.2, the revised methodology and parameters do not reduce the accuracy or reliability of dose calculations or setpoint determinations.

Copies of Revisions 2, 3, 4, and 5 of the SSES ODCM are included under separate cover in Appendix A.

CHANGES TO THE
SOLID WASTE PROCESS CONTROL PROGRAM

The SSES Solid Radioactive Waste Process Control Program, NDAP-QA-0646, was reviewed and found acceptable by the PORC (PORC Meeting 95-041) during the report period.

Revision 4 to NDAP-QA-0646 incorporated PCAF 1-94-1330 revising the PCP implementing procedure matrix to reflect actual procedures in use, and changed the requirements for disposal of radioactive waste samples after packaged radioactive waste has been in its designated storage area.

PCAF 1-94-1330 was incorporated into NDAP-QA-0646. This PCAF was implemented due to the unavailability of offsite disposal facilities. A review of existing regulatory guidance and implementing procedures reveals no requirement to store radioactive waste samples after the packaged radioactive waste is placed into its designated storage area. Existing records provide reasonable assurance that the waste has been properly analyzed. The Procedure Matrix (Attachment D) has been revised to reflect changes in the procedures. Pages 11, 31, 57 and 59 were affected by this PCAF.

These changes did not reduce the overall conformance of the solidified waste product to existing criteria.

A copy of SSES Radioactive Waste Process Control Program, NDAP-QA-0646, Revision 4, is included under separate cover as Appendix B.

Added SEG NRC-approved Topical Report STD-P-05-001-P-A to Contracted Vendor Services to reflect use of SEG for waste processing equipment, methods and verification of acceptable waste forms for dewatering and solidification. Added Activated Carbon as a new waste type which is generated from processing of liquid wastes using vendor-provided demineralization services.

Added the Solidification/Dewatering/Services Vendor may perform test solidification and determination of mixing ratios for solidification performed offsite (vendor facility).

Added Radlok (SEG)-type containers to High Integrity Container approved for use list. Added SNM inventory requirements during processing per SOOR 94-581 resolution. Added NRC Technical Position on Concentration Averaging and Encapsulation to Radioactive Waste Analysis and Classification to ensure that radionuclide/ concentrations are adequately distributed over the volume or weight of the waste.

SECTION 6

REPORTS OF EXCEPTION TO THE SSES EFFLUENT MONITORING PROGRAM

REPORTS OF EXCEPTION TO THE SSES
<u>EFFLUENT MONITORING PROGRAM</u>

No occurrences were indicated in 1995 where an instrument was INOPERABLE for a duration subject to the reporting conditions of Technical Specifications 3.3.7.10b or 3.3.7.11.b.

SECTION 7

CORRECTION TO DOSES REPORTED IN PREVIOUS SEMIANNUAL OR ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT

CORRECTIONS TO DOSES REPORTED IN PREVIOUS SEMIANNUAL OR ANNUAL EFFLUENT AND WASTE DISPOSAL REPORTS

During the preparation of calculations to determine the nuclear fuel cycle (40CFR190) dose to the public contribution from a proposed independent spent fuel storage installation (ISFSI) at SSES, it was noted that the program GASPAR rejected Ag-110m in the airborne source term. Ag-110m was reported in airborne samples from SSES only in 1985, however, it does enter the database for effluent calculations for the ISFSI licensing basis. This discrepancy caused a Condition Report (CR-95-0743) to be issued. During the investigation of this Condition Report, it was noted that Ag-110m was reported in Table 3 of the SSES Semiannual Effluent and Waste Disposal Reports for 1985. The isotope was grieved, however, in the GASPAR calculation submitted for that period, and it was not included in the determination of dose to Members of the Public reported at that time (February 1986). A separate gaseous dose calculation has been performed for the Ag-110m released in 1985, using the dose calculation factors in the SSES ODCM, and the actual dispersion (X/Q, D/Q) estimates for the offsite receivers reported for the period. Table 28 shows the maximum doses for the release of 148 μCi Ag-110m in 1985, calculated by maximum age group and organ for each of four receiver locations:

TABLE 28

AIRBORNE EFFLUENT OFFSITE DOSE FROM Ag-110m: 1985

LOCATION	PATHWAYS	AGE GROUP	ORGAN	DOSE (mrem)
0.7 miles WSW Site Boundary	1, 6	Teen	Lung	8.75 E-04
1.7 miles WSW Dairy Animal	1, 2, 3, 5, 6	Teen	G.I.	6.04 E-04
1.2 miles WSW Garden	1, 5, 6	Teen	G.I.	3.98 E-04
1.2 miles WSW Resident	1, 2, 3, 4, 5, 6	Teen	G.I.	1.17 E-03

where pathway 1 = ground shine
2 = goat milk ingestion
3 = cow milk ingestion
4 = meat ingestion
5 = vegetable ingestion
6 = inhalation

The highest dose calculated (1.17 E-03 mrem) from Ag-110m is approximately 1% of that reported for Members of the Public due to all other airborne iodine and particulate effluent in 1985.

SECTION 8

EFFLUENT FROM ADDITIONAL MONITORED RELEASE POINTS

EFFLUENT FROM ADDITIONAL MONITORED RELEASE POINTS

The temporary laundry facility is a processing system located in a trailer at the north end of the plant, near the radwaste building. Since the facility processes contaminated laundry, the trailer atmosphere is sampled routinely for airborne activity. The effluent potential for this system was determined in Safety Evaluation NL-90-029. It has been classified as an Insignificant Effluent Pathway in the ODCM. The facility has been in continuous use since 1991. Airborne effluent samples have been taken since operations began, with results typically indicating below detection level. In 1995, several air samples taken from the trailer were noted to have Mn-54 above the minimum detectable activity. The following airborne particulate effluent and resulting offsite dose to members of the public at the residence 1.1 miles WSW is reported for the temporary laundry facility. This effluent and resulting offsite dose is reported supplementary to Tables 3, 4, 24 and 26 since it is minor relative to the quantities reported therein (i.e. not observable at three significant figures):

TABLE 29

AIRBORNE PARTICULATE EFFLUENT FROM LAUNDRY TRAILER

Isotope	Mn-54
Effluent Released (Ci)	6.54E-08

TABLE 30

OFFSITE DOSE (RESIDENCE AT 1.1 MILES WSW) RESULTING FROM LAUNDRY TRAILER EFFLUENT

EFFLUENT	AGE GROUP	APPLICABLE ORGAN	ESTIMATED MAXIMUM DOSE (MREM)	LIMIT (MREM)	PERCENT OF LIMIT
Particulate	Teen	Lung	9.51E-08	15	6.34E-07

APPENDIX A

REVISIONS TO SSES ODCM

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

Revision 2

Prepared By		Date	1/16/95
Reviewed By	Kenneth E Shank Supervisor-Environmental Services Nuclear	Date	1/17/95
Reviewed By	95-006 PORC/Meeting No.	Date	1/19/95
Approved By	Manager-Nuclear Technology	Date	1/20/95

SUMMARY OF ODCM CHANGES

Changes other than those of a minor, editorial nature are summarized below.

1. Section 10.3 (Evaluation and Monitoring Criteria for Effluent Pathways) has been expanded to show specific plant systems evaluated in the categories NOT AN EFFLUENT PATHWAY (listed in new Table 8), and INSIGNIFICANT EFFLUENT PATHWAY (listed in new Table 9). References for the bases for these evaluations are included for each system in the Table. Unless otherwise listed, most of the systems were evaluated in PP&L Calculation EC-ENVR-1008, which was performed in response to NRC Open Item 91-10-01-07. This revision to the ODCM is submitted in response to NRC Open Item 91-10-01-08.

2. Equations 7, 8, 17 and 18 are revised to show the Gamma Shielding Factor (S_F). This factor has always been used in GASPAR calculations (NRC code referenced in the ODCM) for whole body and skin dose from noble gas effluent: the equations are revised to be consistent with the application of the GASPAR code. The Gamma Shielding Factor (= 0.7 for the Maximally-Exposed Member of the Public) is taken from Reg. Guide 1.109 Table E-15.

3. Sections 8.1 and 8.3 have been revised to reflect the current state of liquid and solid radwaste processing, respectively. Figures 1, 3 and 4 have also been updated to show changes to liquid and solid radwaste processing systems, including vendor interfaces, based on information from Effluents Management.

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4.0 AIRBORNE EFFLUENT DOSE RATES

SPECIFICATION 3.11.2.1. THE DOSE RATE DUE TO RADIOACTIVE MATERIALS RELEASED IN GASEOUS EFFLUENTS FROM THE SITE (SEE FIGURE 5.1.3-1) SHALL BE LIMITED TO THE FOLLOWING:

a. FOR NOBLE GASES: LESS THAN OR EQUAL TO 500 MREM/YR TO THE TOTAL BODY AND LESS THAN OR EQUAL TO 3000 MREM/YR TO THE SKIN, AND

b. FOR IODINE-131, FOR TRITIUM, AND FOR ALL RADIONUCLIDES IN PARTICULATE FORM WITH HALF-LIVES GREATER THAN 8 DAYS: LESS THAN OR EQUAL TO 1500 MREM/YR TO ANY ORGAN (INHALATION PATHWAY ONLY).

4.1 NOBLE GASES

Noble gas activity monitor setpoints are established at release rates which permit some margin for corrective action to be taken before exceeding offsite dose rates corresponding to the 10 CFR 20 annual dose limits as described in Section 2.2. The methods for sampling and analysis of continuous ventilation releases are given in the applicable plant procedures. The dose rate in unrestricted areas due to radioactive materials released in airborne effluents may be determined by the following equation for whole body dose:

$$D_{wb} = \sum_i (K_i (X/Q)_v (Q'_{iv})(S_F) \qquad \text{(Eq. 7)}$$

and by the following equation for skin dose:

$$D_S = \sum_i [L_i + ((1.11 (Mi)(S_F))] (X/Q)_v (Q'_{iv}) \qquad \text{(Eq. 8)}$$

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b. FOR IODINE-131, FOR TRITIUM, AND FOR ALL RADIONUCLIDES IN PARTICULATE FORM WITH HALF-LIVES GREATER THAN 8 DAYS: LESS THAN OR EQUAL TO 1500 MREM/YR TO ANY ORGAN (INHALATION PATHWAY ONLY).

4.1 NOBLE GASES

Noble gas activity monitor setpoints are established at release rates which permit some margin for corrective action to be taken before exceeding offsite dose rates corresponding to the 10 CFR 20 annual dose limits as described in Section 2.2. The methods for sampling and analysis of continuous ventilation releases are given in the applicable plant procedures. The dose rate in unrestricted areas due to radioactive materials released in airborne effluents may be determined by the following equation for whole body dose:

$$D_{wb} = \sum_{i} (K_i (X/Q)_v \; (Q'_{iv})(S_F) \qquad \text{(Eq. 7)}$$

and by the following equation for skin dose:

$$D_S = \sum_{i} [L_i + ((1.11 \; (Mi)(S_F))] \; (X/Q)_v \; (Q'_{iv}) \qquad \text{(Eq. 8)}$$

where:

K_i = the whole-body dose factor due to gamma emissions for each identified noble gas radionuclide (i) (mrem/yr per uCi/m^3) from Table 2.

Q'_{iv} = the release rate of radionuclide (i) from vent (v) (uCi/sec).

$(X/Q)_v$ = the highest calculated annual average relative concentration for any area at or beyond the site boundary in an unrestricted area from vent release point (v) (sec/m^3) such as from Table 3.

D_{wb} = the annual whole-body dose (mrem/yr).

L_i = the skin dose factor due to the beta emissions for each identified noble gas radionuclide (i) (mrem/yr per uCi/m^3) from Table 2.

M_i = the air dose factor due to gamma emissions for each identified noble gas radionuclide (i) (mrad/yr per uCi/m^3) from Table 2 (conversion constant of 1.1 converts air dose-mrad to skin dose-mrem).

D_s = the annual skin dose (mrem/yr).

S_F = the gamma shielding factor (0.7 for maximally exposed individual)

Sample calculations for determining whole body and skin doses from noble gas radionuclides released from the SSES are given in Section A.2.1 of Appendix A.

4.2 RADIONUCLIDES OTHER THAN NOBLE GASES

The methods for sampling and analysis of continuous ventilation releases for radioiodines and radioactive particulates are given in the applicable plant procedures. Additional monthly and quarterly analyses shall be performed in accordance with Table 4.11.2.1.2-1 of the SSES Technical Specifications. The dose rate in unrestricted areas due to inhalation of radioactive materials released in

7.0 TOTAL DOSE

SPECIFICATION 3.11.4 - THE ANNUAL (CALENDAR YEAR) DOSE OR DOSE COMMITMENT TO ANY MEMBER OF THE PUBLIC, DUE TO RELEASES OF RADIOACTIVITY AND RADIATION, FROM URANIUM FUEL CYCLE SOURCES SHALL BE LIMITED TO LESS THAN OR EQUAL TO 25 MREMS TO THE TOTAL BODY OR ANY ORGAN EXCEPT THE THYROID, WHICH SHALL BE LIMITED TO LESS THAN OR EQUAL TO 75 MREMS.

The cumulative dose to any member of the public due to radioactive releases from the SSES site is determined by summing the calculated doses to critical organs from the previously discussed effluent sources. The annual dose to critical organs of a maximally exposed individual for the liquid effluents is determined by using Equations 10, 11, and 12 of Section 5. The annual dose to critical organs of a real individual for the noble gases released in the gaseous effluents is determined by using Equation 14 modified by replacing M_i with K_i from Table 2 for the whole-body dose and by Equation 15 modified by replacing N_i by $[L_i+((1.11 M_i)(S_F))]$ from Table 2 for the skin dose of Section 6.0:

$$D_g = 3.17 \times 10^{-8} K_i (X/Q)_v (Q'_{iv})(S_F) \quad \text{(Eq. 17)}$$

$$D_b = 3.17 \times 10^{-8} [L_i + ((1.11M_i)(S_F))](X/Q)_v (Q'_{iv}) \quad \text{(Eq. 18)}$$

The annual dose to critical organs of a real individual for the radionuclides other than noble gases released in the gaseous effluents is determined by using Equation 16 of Section 6.0. For all dose calculations from airborne effluents, the deposition rate used in the analysis should be at the receptor location of the individual being evaluated, not the highest calculated annual average relative concentration or relative deposition rate for any area at or beyond the site boundary as given in Table 3. The direct radiation from the site should be determined from the environmental monitoring program's direct radiation (TLD) monitors. Since all other uranium fuel cycle sources are greater than 20 miles away, only the SSES site need be considered as a uranium fuel cycle source for meeting the EPA regulations.

In actual practice, the LADTAP and GASPAR computer code developed by the NRC to implement the liquid and gaseous dose methodology of Regulatory Guide 1.109 will be used to perform the total dose calculations for the

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8.0 OPERABILITY OF WASTE TREATMENT SYSTEMS

8.1 LIQUID WASTE TREATMENT

SPECIFICATION 3.11.1.3 - THE LIQUID RADWASTE TREATMENT SYSTEM, AS DESCRIBED IN THE ODCM, SHALL BE OPERABLE. THE APPROPRIATE PORTIONS OF THE SYSTEM SHALL BE USED TO REDUCE THE RADIOACTIVE MATERIALS IN LIQUID WASTE PRIOR TO THEIR DISCHARGE WHEN THE PROJECTED DOSES DUE TO THE LIQUID EFFLUENT, FROM EACH REACTOR UNIT, TO UNRESTRICTED AREA (SEE FIGURE 5.1.3-1) WOULD EXCEED 0.06 MREM TO THE TOTAL BODY OR 0.2 MREM TO ANY ORGAN IN A 31-DAY PERIOD.

The SSES Liquid Rad Waste Management system consists of three processing sub-systems, liquid, chemical and laundry. Redundant and backup equipment, alternate process routes, interconnections and spare volumes are designed into the system to provide for operational and unanticipated surge waste volumes due to refueling, abnormal leakage rates, decontamination activities and equipment downtime, maintenance and repair. The Liquid Rad Waste Management System processes equipment drain and floor drain liquids collected in a common plant drainage system. The system also processes filter backwash, resin transfer liquids and resin cleaning liquids. The system has piping connections to allow the installation of vendor-supplied equipment to provide specific treatment of off-normal wastes or to enhance the normal treatment capabilities as necessary. Appropriate vendor-supplied equipment may also be used in place of installed equipment to allow for repair or replacement of components.

Low conductivity liquid wastes are processed in the Liquid Radwaste Treatment Sub-system. Liquid is collected in three pairs of LRW Collection tanks. Each pair of tanks has an approximate capacity of 28,000 gallons. Surge capacity is maintained with two pairs LRW Surge Tanks also with a 28,000 gallon/pair capacity.

Liquids from these tanks are normally processed through two vertical centrifugal discharge precoat filters with 300 ft^2 filter area at a 200 gpm normal flow rate. Liquid from the filters is then sent to a mixed bed demineralizer with a volume of 140 ft^3 and normal flow rate of 200 gpm. The demineralizer effluent is collected in three pairs of LRW Sample Tanks. Each

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pair of tanks has an approximate capacity of 28,100 gallons. The water is isolated in these tanks for analysis prior to recycle to Unit 1 or discharge to the Susquehanna river. Off-specification liquids can be recycled back to the Liquid Rad Waste Management System for additional processing.

High conductivity wastes are collected in the Chemical Drain Tank and in specific sumps located in the Turbine and Radwaste Buildings. Liquid from these sources is collected in a Chemical Waste Tank of approximately 12,000 gallons capacity. This liquid can then be sent to any one of two pairs of Chemical Waste Neutralizing Tanks. Each pair has a capacity of 31,000 gallons. The liquid is then sent to a vendor-supplied Chemical Waste Processing Sub-system for radionuclide removal. The effluent from the Chemical Waste Processing Sub-system is routed to the Evaporator Distillate Sample Tank where it can be isolated for analysis prior to discharge. The capability exists to return the liquid to the Liquid Rad Waste Management System for additional processing if necessary.

The Laundry Waste Sub-system collects water from washdown, laundry and decontamination facilities in one of two Laundry Drain Tanks. Each tank has a capacity of approximately 820 gallons and has an independent mechanical filter system. One tank is normally valved to receive waste while the other is valved for processing. Effluent from these tanks is routed to the Laundry Drain Sample Tank where it can be isolated for analysis prior to discharge. Non-specification liquid can be returned to the Chemical Waste Processing Sub-system.

A flow diagram of the Liquid Radwaste Management System is shown in Figure 1.

Appropriate treatment for liquid effluents from SSES is defined in ODCM Policy Statement 10.6. In cases when a batch of liquid waste must be released with treatment less than that specified in Section 10.6, a dose assessment using LADTAP or the methodology of Section 5.4 shall be performed prior to release to ensure that the limits of Specification 3.11.1.3 are not exceeded.

8.2 GASEOUS WASTE TREATMENT

SPECIFICATION 3.11.2.4 - THE GASEOUS RADWASTE TREATMENT SYSTEM SHALL BE IN OPERATION.

APPLICABILITY: WHENEVER THE MAIN CONDENSER AIR EJECTOR (EVACUATION) SYSTEM IS IN OPERATION.

SPECIFICATION 3.11.2.5 - THE APPROPRIATE PORTIONS OF THE VENTILATION EXHAUST TREATMENT SYSTEM SHALL BE OPERABLE AND SHALL BE USED TO REDUCE RADIOACTIVE MATERIALS IN GASEOUS WASTE PRIOR TO THEIR DISCHARGE WHEN THE PROJECTED DOSES DUE TO GASEOUS EFFLUENT RELEASES FROM EACH REACTOR UNIT TO AREAS AT AND BEYOND THE SITE BOUNDARY (SEE FIGURE 5.1.3-1) WHEN AVERAGED OVER 31 DAYS WOULD EXCEED 0.3 MREM TO ANY ORGAN IN A 31-DAY PERIOD.

The SSES off gas treatment system operates with four steam jet air ejectors maintaining condenser vacuum. Noncondensible gases are passed through one of three recombiners (one for each reactor unit plus a common recombiner), reducing the amount of gases to be filtered and released. Gases pass through a two to nine minute holdup pipe before entering the off gas treatment system, which consists of one 100 percent capacity system per reactor unit. Each system consists of precoolers, chillers, reheaters, guard beds, and five charcoal absorbers and an outlet HEPA filter. Monitored, filtered air then exits to the turbine building vent. A flow diagram of the off gas and recombiner system is shown in Figure 2.

Filtered exhaust systems serve selected areas of Zone I, II, and III of the SSES reactor building. The Zone I and Zone II equipment compartment and Zone III filtered exhaust systems each consist of two 100% capacity redundant fans and two 55% capacity filter trains. Each filter train has, in the direction of air flow, roughing filters, upstream HEPA filters, a charcoal filter bed, and downstream HEPA filters. Exhaust fan discharge is then routed to the atmosphere via the reactor building vents, where effluents are continuously sampled and monitored.

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The turbine building filtered exhaust system draws air from those areas of the building that are most likely to become contaminated. Two 100% capacity fans serve each system, which contains two 50% capacity filter housings made up of a particulate prefilter, an upstream HEPA filter, a charcoal filter, and a downstream HEPA filter. Discharged air is released via the turbine building vents, which are continuously sampled and monitored.

The radwaste building filtered exhaust system draws potentially contaminated air from selected areas of the radwaste building. The system contains two 100% capacity fans and two 50% capacity filter housings, each containing a particulate filter bank and a HEPA filter. Filtered air is discharged via the turbine building vent.

In order to minimize the quantities of radioactivity in airborne effluents from the station, the ventilation exhaust treatment (filtered exhaust) systems are normally kept in service at SSES.

As the need arises, these systems are periodically rendered inoperable for maintenance or testing activities. If the most recent 31-day dose projection indicates that dose may exceed 0.3 mRem to any organ when averaged over the projected 31-day period, treatment systems rendered inoperable will be restored to operable status as quickly as is practicable.

The dose projections are performed at least once per 31 days based on the most recently available effluent data. If it is known prior to performing the dose projection that a treatment system will be out of service, and if data exists which indicates how the lack of treatment will impact effluents, these factors will be considered when performing the dose projection.

8.3 SOLID WASTE TREATMENT

SPECIFICATION 3.11.3 - THE SOLID RADWASTE SYSTEM SHALL BE USED IN ACCORDANCE WITH A PROCESS CONTROL PROGRAM, FOR THE PROCESSING AND PACKAGING OF RADIOACTIVE WASTES TO ENSURE MEETING THE REQUIREMENTS OF 10 CFR PART 20, 10 CFR PART 71, AND FEDERAL REGULATIONS COVERING THE DISPOSAL OF THE WASTE.

The SSES solid radwaste system collects all wet wastes produced from the operation of other plant systems. The wastes are then processed and packaged by a vendor-supplied system into a waste form that meets all applicable Federal, State and local requirements for transportation, storage and disposal. The processing methodology and acceptance criteria for the final waste forms are controlled by the Process Control Program.

Filter material from the Reactor Water Clean-up Systems and the Fuel Pool Clean-up Systems are collected in Backwash Receiving Tanks. There is one RWCU tank per unit, each with a capacity of approximately 2450 gallons and one similar tank for the FPCU System. Wastes from these tanks are directed to one of two 6300 gallon capacity Phase Separators. Normally, one Phase Separator is valved to collect waste while the other is isolated to provide time for radioactive decay. The solid content of the waste is concentrated in the Phase Separator and transferred and processed through a vendor-supplied system and packaged for storage or final disposal. The supernatant liquid is collected and processed by the Liquid Rad Waste Management System.

The Waste Sludge Phase Separator is a 9500 gallon capacity phase separator tank that accepts input from the Regen Waste Surge Tanks. The concentrated waste is then transferred and processed through a vendor-supplied system and packaged for storage or final disposal. The supernatant liquid is collected and processed by the Liquid Rad Waste Management System.

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Spent bead resin from the Condensate System and from the Liquid Radwaste Demineralizer are collected in the Spent Resin Tank. These are then processed through a vendor-supplied system and packaged for storage or final disposal. Spent filter material from the Liquid Radwaste Filters are collected in two Waste Mixing Tanks. The contents of these tanks are processed through a vendor-supplied system and packaged for storage or final disposal.

A flow diagram of the SSES solid radwaste treatment system is shown in Figure 3.

Dry Active Waste (DAW) consists of contaminated plastic, paper, clothing, metal or other trash and is collected throughout the RCA of SSES. DAW is processed and packaged for storage or disposal using off-site vendor-supplied super compaction and incineration services. DAW may also be compacted with an on-site drum compactor into 55-gallon drums. An automated DAW monitoring system is used to ensure non-radiological waste collected in the RCA is free from radiological contamination prior to release.

A flow diagram of DAW processing at SSES is shown in Figure 4.

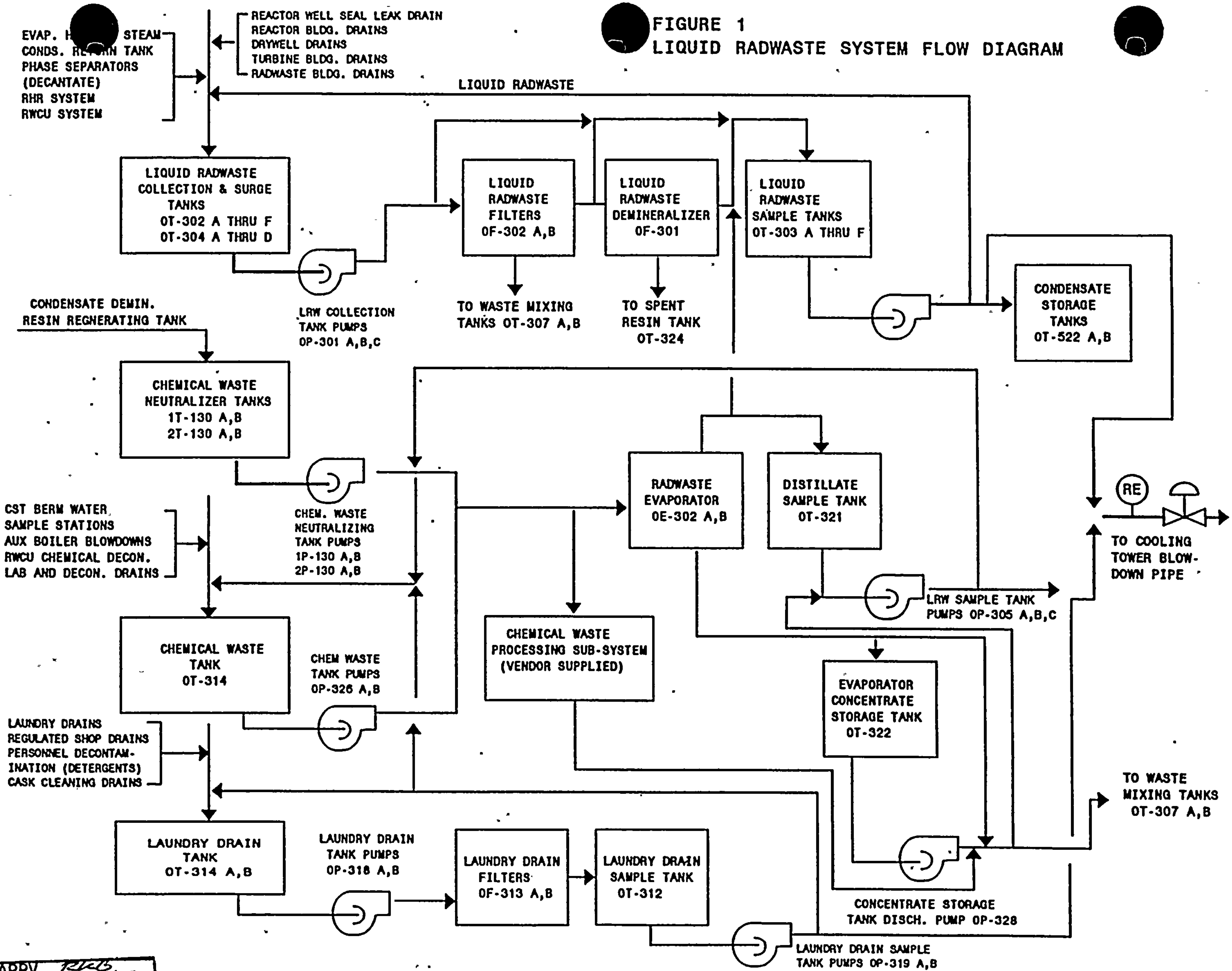

FIGURE 1
LIQUID RADWASTE SYSTEM FLOW DIAGRAM

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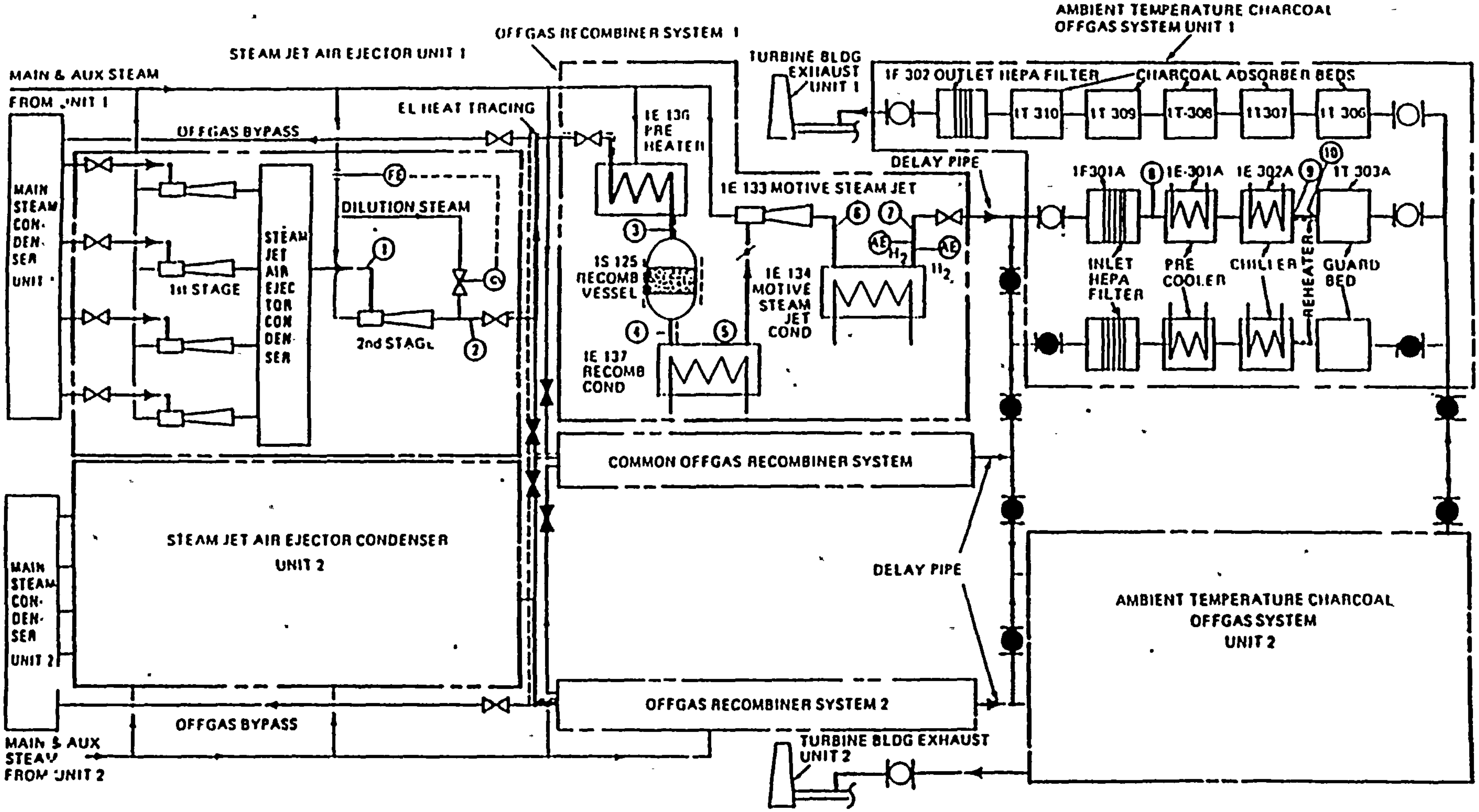

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FIGURE 2

OFFGAS AND RECOMBINER SYSTEM FLOW DIAGRAM

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FIGURE 3
SOLID WASTE MANAGEMENT SYSTEM FLOW DIAGRAM

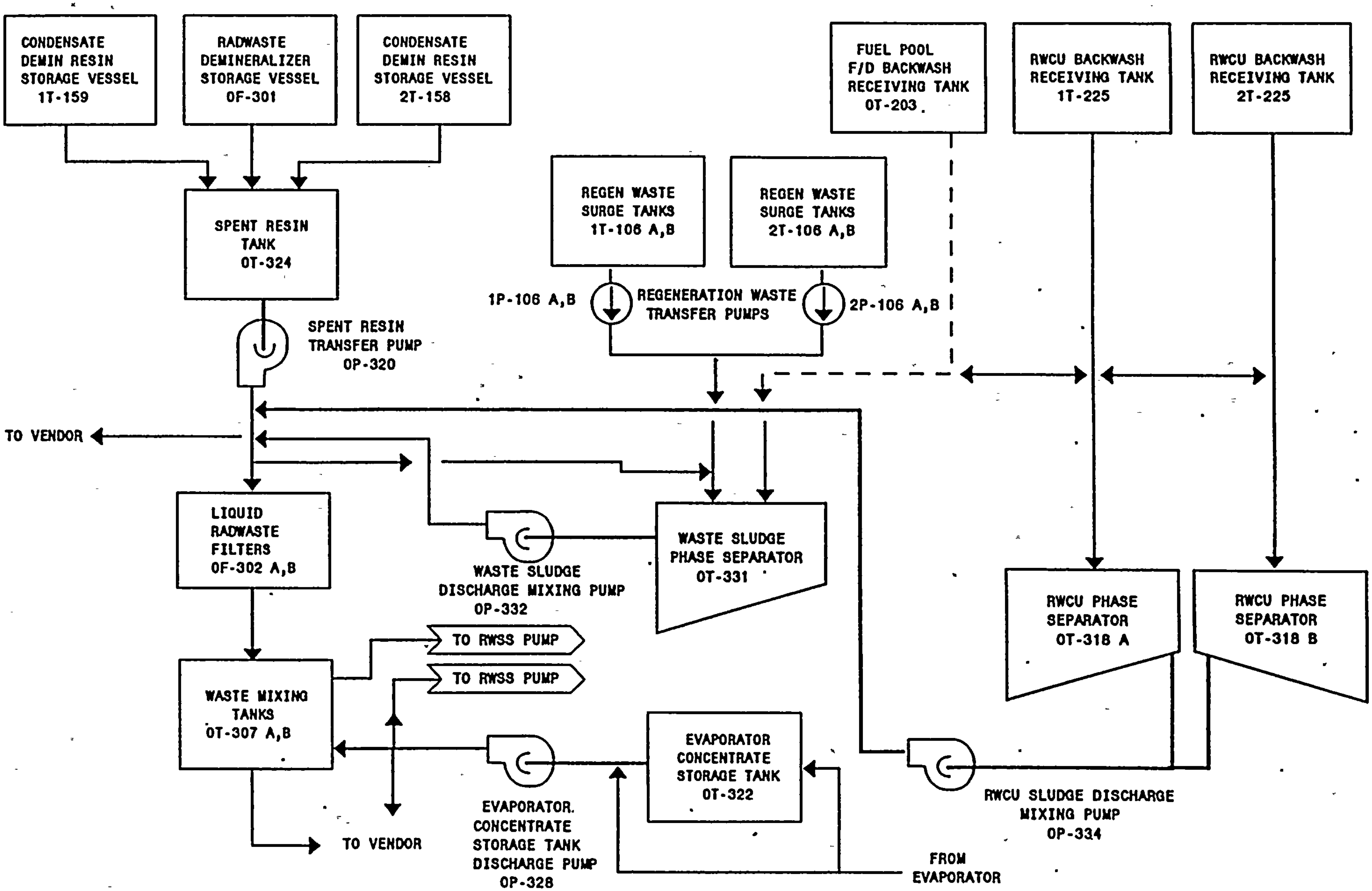

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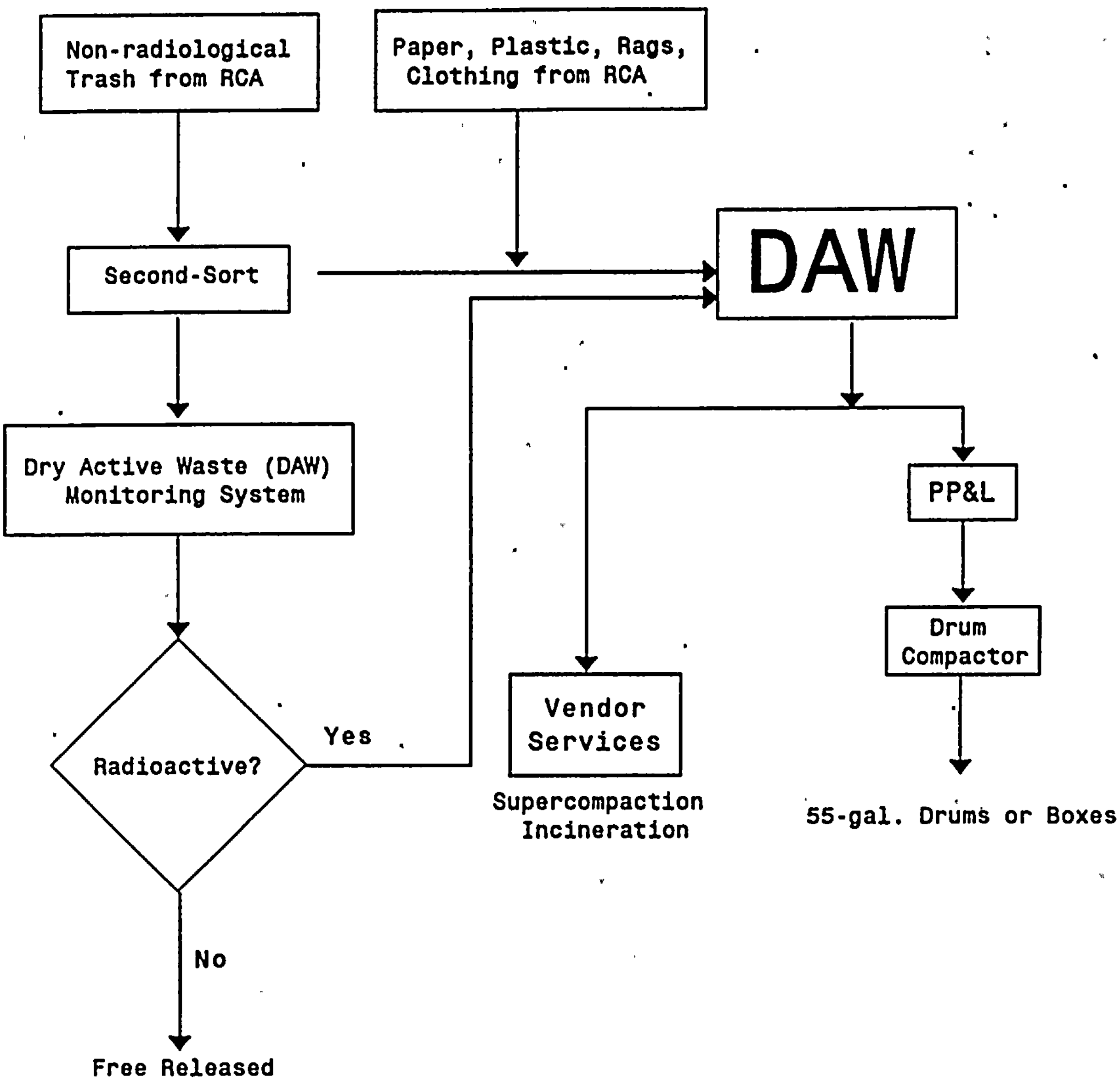
FIGURE 4

SSES DRY ACTIVE WASTE (DAW) PROCESSING



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9.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

9.1 DEFINITIONS

Weekly:	Once in each calendar week at intervals of approximately 7 days, plus or minus 2 days.
Semi-Monthly:	Twice each calendar month at intervals of approximately 15 days, plus or minus 4 days.
Monthly:	Once each calendar month at intervals of approximately 30 days, plus or minus 6 days.
Quarterly:	Once in each three month period of a calendar year at intervals of approximately 13 weeks, plus or minus 3 weeks.

9.2 MONITORING PROGRAM

SPECIFICATION 3.12.1 - THE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SHALL BE CONDUCTED AS SPECIFIED IN TABLE 3.12.1-1.

Environmental samples shall be collected and analyzed (as a minimum) according to Table 6 at locations shown in Figures 5 and 6. Analytical techniques used shall ensure that the detection capabilities in Table 7 are achieved.

A dust loading study (RMC-TR-81-01) was conducted to assure that the proper transmission factor was used in calculating gross beta activity of air particulate samples. This study concluded that the sample collection frequency of once per week was sufficient and that the use of 1 for the transmission correction factor for gross beta analysis of air particulate samples is valid.

The charcoal sampler cartridges used in the airborne radioiodine sampling program (Science Applications, Inc., Model CP-100) are designed and tested by the manufacturer to assure a high quality of radioiodine capture. A certificate from the manufacturer is supplied and retained with each batch of cartridges certifying the percent retention of radioiodine versus air flow rate through the cartridge.

The results of the radiological environmental monitoring program are intended to supplement the results of the radiological effluent monitoring by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and modeling of the environmental exposure pathways. Thus, the specified environmental monitoring program provides measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides which lead to the highest potential radiation exposures of individuals resulting from station operation. Program changes may be proposed based on operational experience. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability, malfunction of automatic sampling equipment, and other legitimate reasons. If specimens are unobtainable due to sampling equipment malfunction, an effort shall be made to complete corrective action prior to the end of the next sampling period. All deviations from the sampling schedule shall be documented in the next Annual Radioactive Effluent and Waste Disposal report. Reporting requirements for the radiological environmental surveillance program are given in Appendix B.

9.3 CENSUS PROGRAM

SPECIFICATION 3.12.2 - A LAND-USE CENSUS SHALL BE CONDUCTED AND SHALL IDENTIFY WITHIN A DISTANCE OF 8 KM (5 MILES) THE LOCATION IN EACH OF THE 16 METEOROLOGICAL SECTORS OF THE NEAREST MILK ANIMAL, THE NEAREST RESIDENCE AND THE NEAREST GARDEN* OF GREATER THAN 50 M^2 (500 FT^2) PRODUCING BROAD LEAF VEGETATION.

* Broad leaf vegetation sampling of at least three different kinds of vegetation may be performed at the site boundary in each of two direction sectors with the highest predicted D/Q's in lieu of the garden census. Specifications for broad leaf vegetation sampling in Table 3.12.1-1, item 4C shall be followed, including analysis of control samples.

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If a land use census identifies a location(s) with a higher average annual deposition rate (D/Q) than a current indicator location, the following shall apply:

1. If the D/Q is at least 20 percent greater than a previously high D/Q, the new location shall be added to the program within 30 days of documented identification of sampling feasibility. The indicator location having the lowest D/Q may be dropped from the program after October 31 of the year in which the land use census was conducted.

2. If the D/Q is not 20 percent greater than the previously highest D/Q, direction, distance, and D/Q will be considered in deciding whether to replace one of the existing sample locations. If applicable, replacement shall be within 30 days.

Any evaluations of possible location replacement should include the past history of the location, availability of sample, milk production history, and other applicable environmental conditions.

A land use census will be conducted at least once per calendar year by a door-to-door or aerial survey, by consulting local agricultural authorities, or by any combination of these methods.

9.4 INTERLABORATORY COMPARISON PROGRAM

SPECIFICATION 3.12.3 - ANALYSES SHALL BE PERFORMED ON RADIOACTIVE MATERIALS SUPPLIED AS PART OF AN INTERLABORATORY COMPARISON PROGRAM WHICH HAS BEEN APPROVED BY THE COMMISSION.

The laboratories of the licensee and licensee's contractors which perform analyses shall participate in the Environmental Protection Agency's (EPA's) Environmental Radioactivity Laboratory Intercomparisons Studies (Crosscheck) Program or an equivalent program which has been approved by the Commission. This participation shall include some of the determinations (sample medium-radionuclide combination) that are offered by EPA and that are also included in the monitoring program. The results of the analyses of these crosscheck samples shall be included in the annual report.

If the results of analyses performed by the licensee or licensee's contractor in conjunction with the EPA crosscheck program (or equivalent program) are outside the specified control limits, the laboratory shall investigate the cause of the problem and take steps to correct it. The results of this investigation and corrective action shall be included in the Annual Radiological Environmental Operating Report.

FIGURE 5

ENVIRONMENTAL MONITORING LOCATIONS WITHIN ONE MILE OF THE SSES

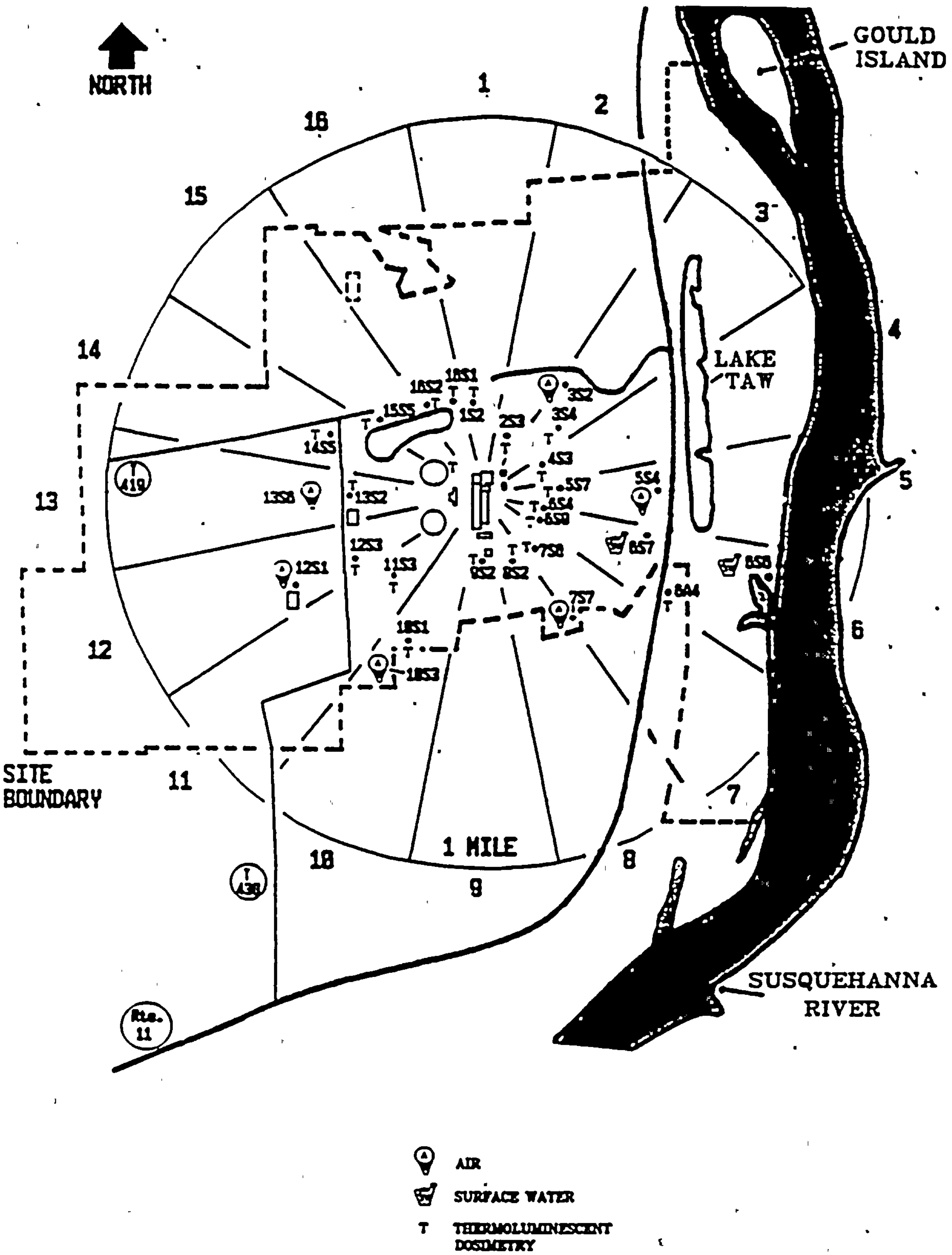

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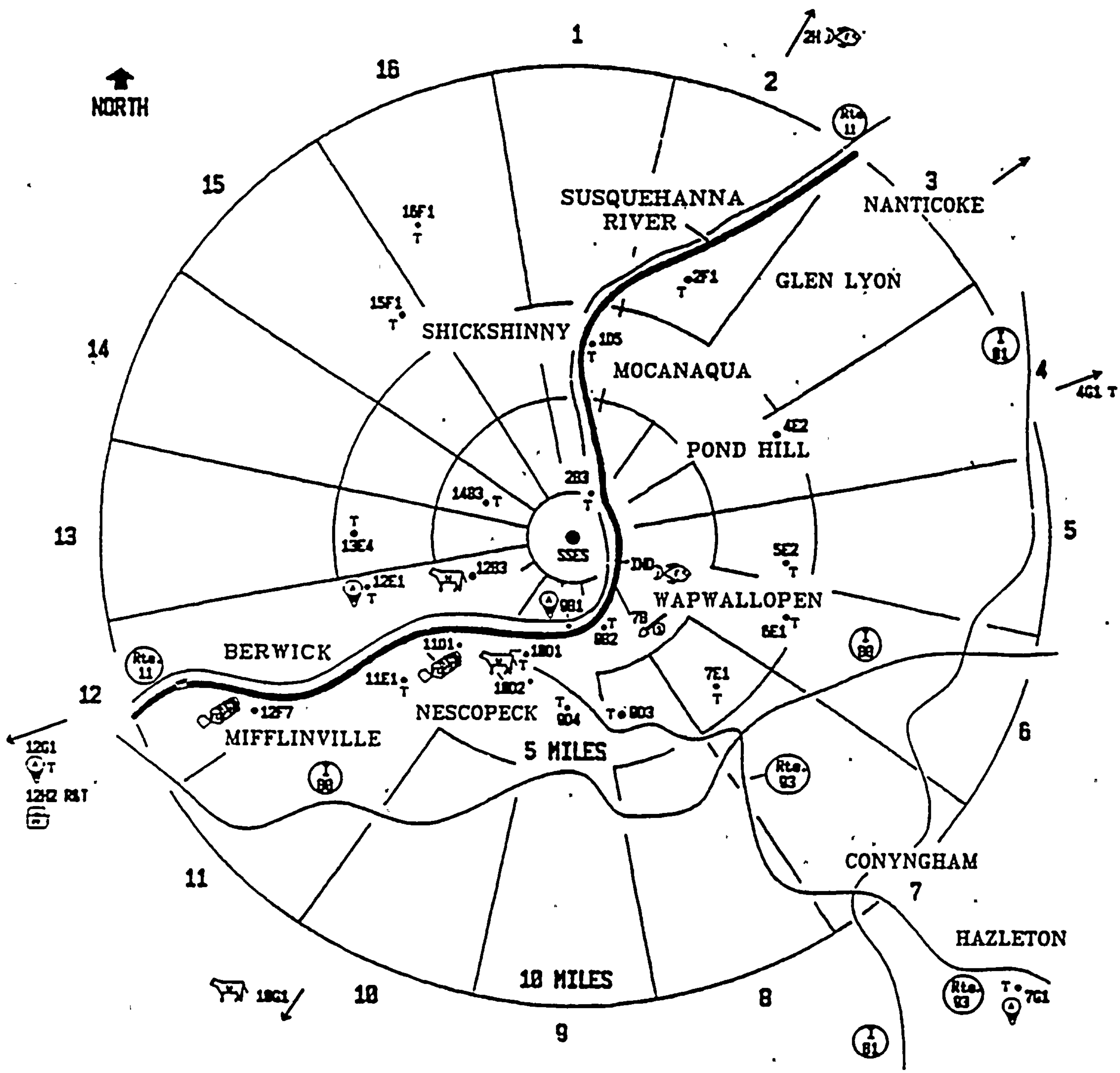
FIGURE 6
ENVIRONMENTAL MONITORING LOCATIONS GREATER THAN ONE MILE FROM THE SSES



AIR

DRINKING WATER

FISH

FOOD

MILK

SEDIMENT

T THERMOLUMINESCENT DOSIMETRY

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TABLE 6

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathways and/or Sample	Number of Samples and Locations*	Sampling and Collection Frequency	Type and Frequency of Analysis
Airborne			
Radioiodine and Particulates*	12S1 0.4 mi WSW - E.O.F. Building 12E1 4.7 mi WSW - Berwick Hospital 7G1 14 mi SE - PP&L Hazleton Complex 10S3 0.6 mi SSW - East of Confer's Lane, South of Towers Club 13S6 0.4 mi W - Former Laydown Area, West of Confer's Lane	Continual sampler operation with sample collection weekly.**	Radioiodine Canister: analyze weekly for I-131 Particulate Sample: Analyze for gross beta radioactivity less than 24 hours following filter change. Perform isotopic analysis on composite sample (by location) quarterly.
Direct Radiation	1S2 Perimeter Fence - 0.2 mi. N 1D2 Mocanaqua - 4.0 mi N 2S3 Perimeter Fence - 0.2 mi NNE 2B3 Durabond Corporation - 1.3 mi NNE 2F1 St. Adalberts Cemetery - 5.9 mi NNE 3S4 Perimeter Fence - 0.3 mi NE 3D1 Pond Hill/Lily Lake Fire Co. - 3.4 mi NE 3F1 Valania Residence - 9.1 mi NE 3G5 Wilkes-Barre-Parrish St. Substation - 16 mi NE* 4S3 West of SSES APF - 0.2 mi ENE 4E1 Ruckles Hill Road Pole (#) 46422/N35197 - 4.8 mi ENE 4G1 Crestwood Industrial Park - 14 mi ENE* 5S7 Perimeter Fence - 0.3 mi E 5E2 Bloss Farm - 4.5 mi E 6S4 Perimeter Fence - 0.2 mi ESE 6A4 Riverside Restaurant - 0.6 mi ESE	Quarterly	Gamma Dose: Quarterly.

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Exposure Pathways and/or Sample	Number of Samples and Locations*	Sampling and Collection Frequency	Type and Frequency of Analysis
	6E1 St. James Church - 4.7 mi ESE		
	6S9 Perimeter Fence - 0.2 mi ESE		
	7S6 Perimeter Fence - 0.2 mi SE		
	7E1 Harwood Transmission Line Pole #2 - 4.2 mi SE		
	7G1 PP&L Hazleton Complex - 14 mi SE[a]		
	8S2 Perimeter Fence - 0.2 mi SSE		
	8B2 LaWall Residence - 1.4 mi SSE		
	8D3 Mowry Residence - 4.0 mi SSE		
	9S2 Security Fence - 0.2 mi S		
	9D4 Country Folk Store - 3.6 mi S		
	10S1 Post South of Switching Station - 0.4 mi SSW		
	10D1 Ross Ryman Farm - 3.0 mi SSW		
	11S3 Security Fence - 0.3 mi SW		
	11E1 Thomas Residence - 4.7 mi SW		
	12S3 Perimeter Fence - 0.4 mi WSW		
	12E1 Berwick Hospital - 4.7 mi WSW		
	12G1 PP&L Bloomsburg Service Center - 15 mi WSW[a]		
	13S2 Perimeter Fence - 0.4 mi W		
	13E4 Kessler Farm - 4.1 mi W		
	14S5 Beach Grove Rd. & Confer's Lane Intersection 0.5 mi WNW		
	14E1 Canouse Farm - 4.1 mi WNW		
	15F1 Zawatski Farm - 5.4 mi NW		
	15S5 Perimeter Fence - 0.4 mi NW		
	16S1 Perimeter Fence - 0.3 mi NNW		
	16S2 Perimeter Fence - 0.3 mi NNW		
	16F1 Hidlay Residence - 7.8 NNW		
<u>Waterborne</u>			
Surface	6S6 river water intake line[a]	Monthly composite	Gamma isotopic analysis.
	6S7 cooling tower blowdown discharge line	Monthly composite	Composite tritium analysis at least quarterly.
Drinking	12H2 Danville Water Co. (Approximately 30 miles downstream)	Monthly composite[b]	Gross beta and gamma isotopic analyses monthly. Composite for tritium analysis at least quarterly.
Sediment from Shoreline	7B Bell Bend - 1.2 mi SE	Semi-annually	Gamma isotopic analysis semi-annually.

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Exposure Pathways and/or Sample	Number of Samples and Locations*	Sampling and Collection Frequency	Type and Frequency of Analysis
Milk***	12B3 Young Farm - 2.0 mi WSW 10G1 Davis Farm - 14 mi. SSW[a] 10D2 Ray Ryman Farm - 3.5 mi. SSW 10D1 R&C Ryman Farm - 3.0 mi. SSW	Semi-monthly when animals are on pasture, monthly otherwise	Gamma isotopic and I-131 analysis of each sample.
Fish and Invertebrates	Outfall area 2H Falls, PA[a] (Approximately 30 mi NNE)	Semi-annually. One sample[c] from each of two reacreationally important species from any of the following families: bullhead catfish, sunfish, pikes, or perches.	Gamma isotopic on edible portions.
Food Products	11D1 Zehner Farm - 3.3. mi SW vegetable 12F7 Lupini Farm - 8.3 mi WSW vegetable	At time of harvest	Gamma isotopic on edible portions.

*The location of samples and equipment were designed using the guidance in the Branch Technical Position to NRC Rev. Guide 4.8, Rev. 1, Nov. 1979, Reg. Guide 48. 1975 and ORP/SID 72-2 Environmental Radioactivity Surveillance Guide. Therefore, the airborne sampler locations were based upon X/Q and/or D/Q.

**A dust loading study (RMC-TR-81-01) concluded that the assumption of 1 for the transmission correction factor for gross beta analysis of air particulate samples is valid. Air particulate samples need not be weighed to determine a transmission correction factor.

***If a milk sample is unavailable for more than two sampling periods from one or more of the locations, a vegetation sample shall be substituted until a suitable milk location is evaluated. Such an occurrence will be documented in the REMP annual report.

[a] Control sample location.

[b] Two-week composite if calculated doses due to consumption of water exceed one millirem per year. In these cases, I-131 analyses will be performed.

[c] The sample collector will determine the species based upon availability, which may vary seasonally and yearly.

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TABLE 7

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS

Lower Limit of Detection (LLD)[a]

Analysis	Water (pCi/l)	Airborne Particulate or Gas (pCi/m³)	Fish (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)	Sediment (pCi/kg,dry)
gross beta	4	1×10^{-2}				
H-3	2000					
Mn-54	15		130			
Fe-59	30		260			
Co-58	15		130			
Zn-65	30		260			
Zr-95	30					
I-131	1[b]	7×10^{-2}		1	60	
Cs-134	15	5×10^{-2}	130	15	60	150
Cs-137	18	6×10^{-2}	150	18	80	180
Ba-140	60			60		
La-140	15			15		

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TABLE 7 (Continued)

[a] The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95 percent probability and with 5 percent probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation):

$$LLD = \frac{4.66\ s_b}{2.22\ EVY \exp(-\lambda\ \Delta t)}$$

where:

LLD is the "a priori" lower limit of detection as defined above (as pCi per unit mass or volume).

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute)

E is the counting efficiency (as counts per transformation)

V is the sample size (in units of mass or volume)

2.22 is the number of disintegrations per minute per picocurie

Y is the fractional radiochemical yield (when applicable)

λ is the radioactive decay constant for the particular radionuclide, and

Δt is the elapsed time between sample collection (or end of the sample collection period) and time of counting.

In calculating the LLD for a radionuclide determined by gamma-ray spectrometry, the background should include the contributions of other radionuclides normally present in the samples (e.g., potassium-40 milk samples). Typical values for E, V, Y, and t should be used in the calculations.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as a posteriori (after the fact) limit for a particular measurement.

[b] LLD for drinking water.

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10.0 DOSE ASSESSMENT POLICY STATEMENTS

10.1 Selection of Analysis Results for Dose Calculations

For determination of compliance with SSES Technical Specification dose limits, effluent totals shall be based only on activity positively detected at the 95% confidence level.

10.2 Assignment of Releases to the Reactor Units

For determination of compliance with SSES radioactive effluent dose limits which are on a "per reactor unit" basis:

a. Effluents from the Unit 1 Reactor Building vent and the Unit 1 Turbine Building vent shall be included as Unit 1 releases.

b. Effluents from the Unit 2 Reactor Building vent and the Unit 2 Turbine Building vent shall be included as Unit 2 releases.

c. Effluents from the Standby Gas Treatment System vent shall be equally divided between Unit 1 and Unit 2 release totals.

d. Waterborne effluents shall be equally divided between Unit 1 and Unit 2 release totals.

10.3 Evaluation and Monitoring Criteria for Effluent Pathways

Potential unmonitored effluent pathways will be evaluated on a case-by-case basis. Periodic sampling and/or realistic evaluation will be performed in order to demonstrate the significance of a potential effluent pathway. Results of sampling and/or evaluation may be used to classify a potential unmonitored effluent pathway into one of the following categories:

a. Not an Effluent Pathway: Realistic evaluation (e.g., engineering design, system operation, radionuclide inventory) demonstrates that the pathway has no potential for release of radioactive material (Table 8). Although not required, periodic

sampling may at times be performed to confirm the result of the evaluation.

b. <u>Insignificant Effluent Pathway</u>: Evaluation and/or periodic sampling demonstrate that the pathway may contain radioactive effluents, however, these effluents may not be reasonably expected to exceed 10 percent of the appropriate unrestricted area MPC value (fractional MPCs summed when appropriate) listed in Table II of Appendix B to 10 CFR 20 (Table 9). A release pathway which falls in this category will be sampled periodically.

c. <u>Significant Effluent Pathway</u>: Evaluation and/or periodic sampling demonstrate that the pathway may contain radioactive effluents, and these effluents may be reasonably expected to exceed 10 percent of the appropriate unrestricted area MPC value (fractional MPCs summed when appropriate) listed in Table II of Appendix B to 10 CFR 20. A release pathway which falls in this category will be sampled continuously.

Analyses of samples will be performed consistent with techniques used for samples of the same types collected from normal effluent pathways. Any radioactive materials detected in samples collected from either the Insignificant or the Significant Release Pathways will be included in determining compliance with site dose limits. Additionally, any such occurrences will be reported in the Annual Effluent and Waste Disposal Report.

10.4 <u>Flow from the SGTS Vent when the System is Not in Use</u>

When the Standby Gas Treatment is not being used, there remains a small amount of flow from the SGTS vent. This residual flow is exhaust from the battery rooms in the control structure. Because there are no identifiable sources of radioactivity in these rooms, auxiliary particulate and iodine sample and noble gas grab sample at 4-hour intervals are not required from the SGTS vent when the SGTS continuous vent monitor is out of service, <u>provided</u> <u>that</u> -

a. the Standby Gas Treatment System is not being used,

b. there are proper administrative controls in place to ensure that the required sampling will begin within 4 hours if the treatment system is operated.

10.5 ODCM Setpoints are Upper Limit Values

Effluent monitor alarm/trip setpoints calculated in accordance with the ODCM shall be considered upper limit values. Higher (less conservative) setpoints shall not be used, however lower (more conservative) setpoints may be used as required to maximize the utility of the monitor.

10.6 Definition of "Appropriate Treatment" for Liquid Wastes

Technical Specification 3.11.1.3 requires that the appropriate portions of the liquid waste treatment system be operable and be used to reduce radioactivity in liquid wastes prior to their release when projected doses from each reactor unit to unrestricted areas would exceed 0.06 mrem to the total body or 0.2 mrem to any organ in a 31 day period.

o The normal treatment, which is considered appropriate for each subsystem, is as follows:

- Filtration is considered appropriate treatment for the Liquid Radwaste Laundry Processing Subsystem, which consists of high conductivity liquid wastes, such as those from equipment washdown and personnel decontamination facilities, or laundry.

- The atmospheric demineralizer (a vendor-supplied system which is directed to the Distillate Sample Tank) is considered appropriate for the Liquid Radwaste Chemical Processing Subsystem.

- Demineralization and filtration are considered appropriate treatment for low conductivity/low organic contaminant liquid wastes entering the Liquid Radwaste Processing Subsystem (LRW collection tanks), except for batches which yield projected doses prior to treatment of less than or equal to 6.45-04 mrem to the total body and 2.15E-03 mrem to any organ, where filtration alone is appropriate,

or

o For batches which have no identified gamma activity above the Technical Specification Liquid Effluent LLD level (Table 4.11.1.1.1-1), release without treatment is considered appropriate.

BASES

The projected dose threshold values used are derived by dividing the site-total maximum projected doses without treatment (0.12 and 0.4 mrem) by 31 days and by 6, the maximum possible number of batches released per day, to yield per-batch dose action levels. The two levels of "appropriate" treatment are in place so as not to require application of demineralization for treating low activity, high conductivity water (e.g., from Circulating or Service Water leakage). This would increase the overall efficiency of the solid radwaste program while ensuring calculated doses remain at a suitable fraction of 10 CFR 50 design objectives and Technical Specification 3.11.1.2 limit.[1][2]

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[1]Reference Calculation No. OT-RKB-92-001: Calculation of Liquid Isotope Offsite Dose Consequences for Use of Atmospheric Demineralizer System, PLI-70360, 2/4/92.

[2]Reference Letter R. K. Barclay to R. A. Breslin: Atmospheric Demineralizer Effluent Results, PLI-70612, 3/4/92.

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10.7 Monitor Line Loss Corrections

In order to correct for airborne effluent monitor sample line loss, the following correction factors shall be applied to monitor data and sample analysis results:

ROUTINE EFFLUENT MONITORS	CORRECTION FACTORS IODINE	CORRECTION FACTORS PARTICULATES
Reactor Building Unit 1	1.5	3.2
Reactor Building Unit 2	1.5	3.2
Turbine Building Unit 1	1.6	3.6
Standby Gas Treatment	1.5	3.9
Turbine Building Unit 2	1.6	3.6

POST ACCIDENT VENT MONITORS	CORRECTION FACTORS IODINE	CORRECTION FACTORS PARTICULATES
Turbine Building Unit 1	1.7	4.2
Standby Gas Treatment	1.6	4.4
Turbine Building Unit 2	1.7	4.3

Each indicated iodine and particulates concentration shall be multiplied by the appropriate correction factor to estimate the actual concentration at the inlet to the sample line.

10.8 Selection of Data for Determination of Dose Rate Compliance

Airborne effluent monitor setpoints are maintained in accordance with Section 2.2 to alarm before the dose rate limits of Specification 3.11.2.1 are exceeded. Station alarm response procedures contain instructions for investigation and verification of monitor alarms. Because setpoint calculations must include assumptions about the composition of the monitored effluent, a monitor high alarm does not necessarily indicate that a dose rate limit has been exceeded.

Valid ten-minute averaged data should be the primary information used to determine the compliance status of an incident. One-minute averaged data should also be reviewed if available, but they may or may not provide additional information depending on the magnitude of the release due to the manner in which the monitors update values to be stored and associated statistical considerations. Averages over a longer period should be used only when data with higher resolution is not available. Grab sample analyses should be performed whenever possible to confirm or disprove monitor data, and to provide indication of the nuclide-specific composition of the effluent. When grab sample data are available which, based on vent monitor data, are indicative of the period of elevated release, dose rate calculations should be performed using the actual effluent mix. The determination of compliance status should not be based on monitor data alone when it is possible to collect and analyze a vent sample which will be representative of the period of elevated release.

10.9 Low-Level Radioactivity in the Sewage Treatment Plant

Like all sewage processing facilities, the SSES sewage treatment plant can under certain conditions receive low levels of radioactive materials. The most notable scenario is when individuals who work on-site have been subjected to the medical administration of radiopharmaceuticals for diagnostic or therapeutic purposes. In these cases, normal biological elimination processes can easily result in levels of radioactivity in sewage treatment plant solutions and suspensions which are within the detection capabilities of the associated sampling and analysis program.

Because disposal of sewage treatment plant sludge by controlled dispersal on specified tracts of land is a common practice, the following guidelines have been established:

a. All sludge collected in the sludge holding tank should be sampled and analyzed prior to land disposal to quantify any radioactivity present above natural background levels.

b. Sludge containing nuclides with short half-lives, for example iodine-131, should be contained on-site to permit decay to less than detectable levels.

c. When sludge is contaminated with nuclides which have half-lives sufficiently long to make hold-up for decay impractical, the following options should be considered:

   1. Dispose of the sludge as low level radioactive waste.

   2. Obtain a special permit pursuant to the requirements of 10 CFR 20.302.

d. The sewage treatment plant effluent should be sampled monthly for radioactivity. This can be accomplished by drawing a sample from the chlorine contact chamber.

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11.0 ODCM REVIEW AND REVISION CONTROL

The Supervisor-Environmental Services-Nuclear shall ensure that a total review of the ODCM is performed during each even-numbered year. Comments shall be documented and revisions initiated as appropriate.

Each ODCM page shall be numbered and provided with an approval and date box. The ODCM Table of Contents shall present the current revision date for each page so that any manual holder can check manual completeness based on a current Table of Contents.

All ODCM revisions shall be reviewed by PORC before approval by the Manager-Nuclear Technology. PORC review shall be indicated by PORC chairperson or designee signature on ODCM cover.

ODCM copies shall be issued in a controlled fashion by the staff of the Nuclear Department Library. The distribution list shall be maintained by the Nuclear Department Library Staff.

Any comments on ODCM contents or proposed revisions should be directed to the Supervisor-Environmental Services-Nuclear.

TABLE 8

SYSTEMS CLASSIFIED AS NOT AN EFFLUENT PATHWAY (Page 1 of 2)

SYSTEM DESCRIPTION	REFERENCE
Domestic Water	(1)
River Water Makeup	"
Intake Compressed Air	"
Screens and Screenwash	"
Fire Protection Water	"
Fire Protection CO_2	"
Fire Protection Halon	"
Turbine Building Closed Cooling Water	"
Building Drains: NON RAD	"
Water Pretreatment	"
Condensate and Refuel Water Transfer	"
Low Pressure Air	"
Condensate Demins	"
Lube Oil Transfer/Purification	"
Cooling Tower Acid/Chlorination	"
Circulating Water	"
Condenser Tube Cleaning	"
Feedwater	"
Extraction Steam	"
Feedwater Heaters	"
Residual Heat Removal	"
Reactor Core Isolation Cooling	"
Core Spray	"
High Pressure Coolant Injection	"
Standby Liquid Control	"
Control Rod Drives	"

(1) PP&L Calculation EC-ENVR-1008

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TABLE 8

SYSTEMS CLASSIFIED AS NOT AN EFFLUENT PATHWAY (Page 2 of 2)

SYSTEM DESCRIPTION	REFERENCE
Suppression Pool	(1)
Primary Containment Vacuum Breakers	"
Suppression Pool Cleanup	"
Reactor Water Cleanup	"
Reactor Pressure Vessel	"
Reactor Recirculation System	"
Radwaste Chilled Water	"
Solid Radwaste/Cement Silo	"
LRW Collection/Tb and Cond. Outer Area Sumps	"
LRW Processing/Radwaste Evaporator	"
Gaseous Radwaste Recombiner Closed Cooling Water	"
Nitrogen Storage	"
Hydrogen Storage	"
Sampling Stations	"
Post Accident Sampling System	"
Bypass Steam	"
Main Steam Isolation Valves/ Nuclear Steam Supply System Shutoff	"
Automatic Depressurization System	"
MSIV Leakage Control	"
Moisture Separators	"
Turbine Steam Seals	"
Electrohydraulic Control	"
Stator Cooling	"
Main Generator	"
Storm Drains	"

(1) PP&L Calculation EC-ENVR-1008

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TABLE 9

SYSTEMS CLASSIFIED AS INSIGNIFICANT EFFLUENT PATHWAY

SYSTEM DESCRIPTION	REFERENCE
H_2 Seal Oil	(1)
Condensate Storage Tank	"
Main Turbine/RFPT Lube Oil	"
Instrument Air	"
Service Air	"
Temporary Laundry Facility	(2)
Second Sort (DAW Volume Reduction) Facility	(3)
Low Level Radwaste Handling Facility	(4)

(1) PP&L Calculation EC-ENVR-1008
(2) Safety Evaluation NL-90-029: Temporary Laundry Facility
(3) Safety Evaluation NL-89-002: Dry Active Waste Volume Reduction System
(4) Safety Evaluation NL-92-007: Operation of LLRWHF at SSES

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DATE 1/16/95

PORC SUMMARY: ODCM CHANGE 1/20/95

1. Section 10.3 (Evaluation and Monitoring Criteria for Effluent Pathways) has been expanded to show specific plant systems evaluated in the categories NOT AN EFFLUENT PATHWAY (listed in new Table 8), and INSIGNIFICANT EFFLUENT PATHWAY (listed in new Table 9). References for the bases for these evaluations are included for each system in the Table. Unless otherwise listed, most of the systems were evaluated in PP&L Calculation EC-ENVR-1008, which was performed in response to NRC Open Item 91-10-01-07. This revision to the ODCM is submitted in response to NRC Open Item 91-10-01-08.

2. Equations 7, 8, 17 and 18 are revised to show the Gamma Shielding Factor (S_F). This factor has always been used in GASPAR calculations (NRC code referenced in the ODCM) for whole body and skin dose from noble gas effluent: the equations are revised to be consistent with the application of the GASPAR code. The Gamma Shielding Factor (= 0.7 for the Maximally-Exposed Member of the Public) is taken from Reg. Guide 1.109 Table E-15.

3. Sections 8.1 and 8.3 have been revised to reflect the current state of liquid and solid radwaste processing, respectively. Figures 1, 3 and 4 have also been updated to show changes to liquid and solid radwaste processing systems, including vendor interfaces, based on information from Effluents Management.

Submitted by: Robert K Barclay
Health Physicist-Operations Technology

Date: 1/16/95

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

Prepared By ______________________ Date 3/29/95

Reviewed By ______________________ Date 3/29/95
Supervisor-Environmental Services
Nuclear

Reviewed By ______________________ 95- Date 3-30-95
PORC/Meeting No.

Approved By ______________________ Date 3/30/95
Manager-Nuclear Technology

SUMMARY OF ODCM CHANGES

1. Table 6, Operational Environmental Monitoring Program, has been corrected to show information originally in Revision 1 of the ODCM (approved 10/14/94). Some information in this table was noted to be incorrectly carried into Revision 2 (approved 1/20/95). Table 6 was not intended to be changed in any way in Revision 2. This inconsistency was documented as a status control issue in SOOR 95-045; corrections are made in resolution to this SOOR.

2. Slight changes are made to Figure 1, Liquid Radwaste System Flow Diagram, to make the pathway from the distillate sample tank to the cooling tower blowdown pipe clearer, and to correct labeling of distillate sample tank pumps OP-327 A, B and LRW sample Tank Pumps OP-305 A, B, and C.

3. In Section 10.9.c.2, reference 10CFR20.302 is changed to 10CFR20.2002 to be consistent with the revision in the numbering of this regulation.

4. System classifications and references are added to Table 8 (Not an Effluent Pathway) and Table 9 (Insignificant Effluent Pathway). Table 10 (Significant Effluent Pathway) is added with references

5. Section 11 is revised to state that ODCM revisions shall be reviewed by PORC after approval by the Manager - Nuclear Technology.

APPV ___
DATE 3/30/95

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LIST OF FIGURES

FIGURE 1
LIQUID RADWASTE SYSTEM FLOW DIAGRAM

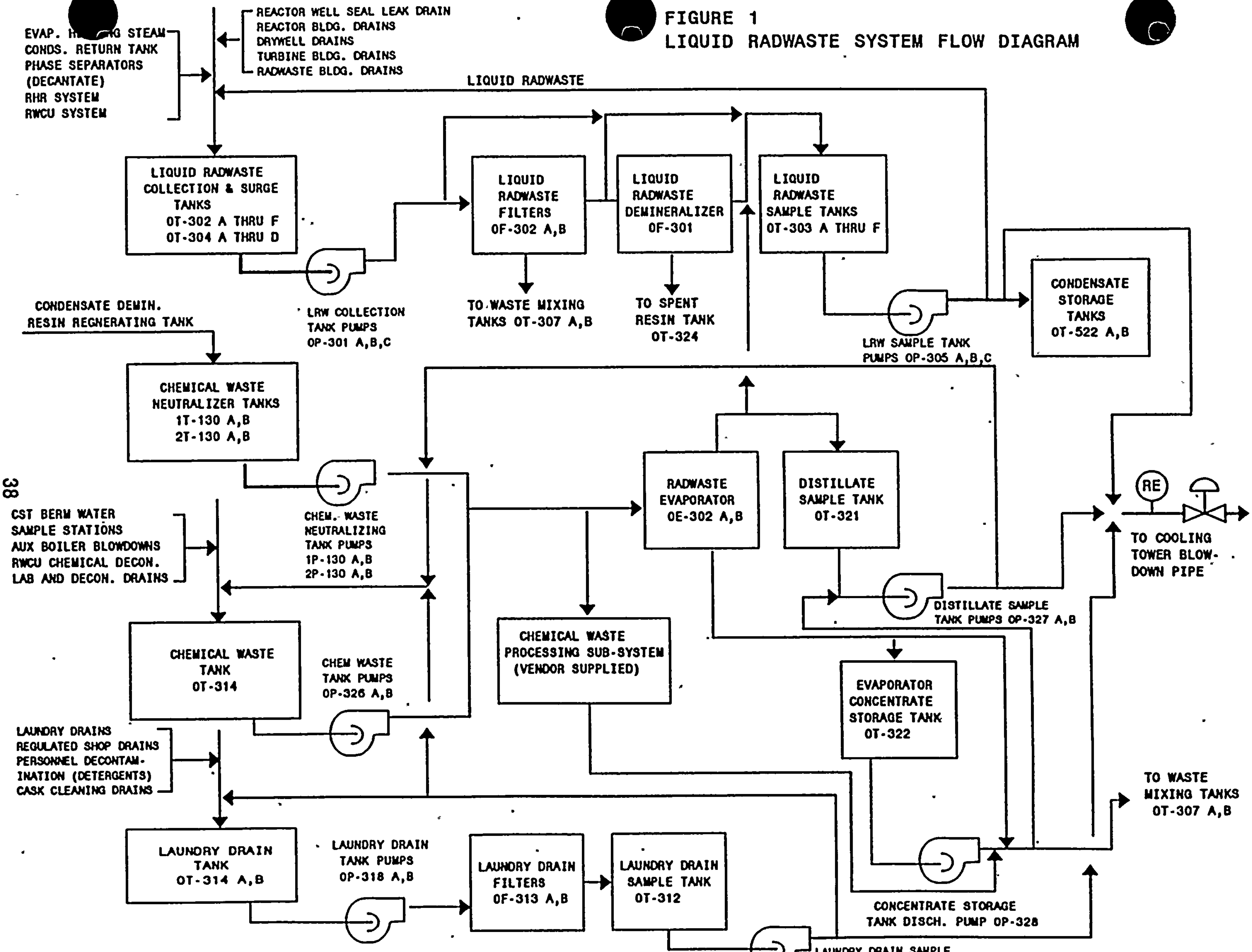

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TABLE 6

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathways and/or Sample	Number of Samples and Locations*				Sampling and Collection Frequency	Type and Frequency of Analysis
Airborne						
Radioiodine and Particulates*	12S1	0.4 mi	WSW	EOF Building	Continual sampler operation with sample collection weekly.**	Radioiodine Canister: analyze weekly for I-131
	9B1	1.3 mi	S	Transmission Line		
	5S4	0.8 mi	E	Environmental Laboratory		
	12E1	4.7 mi	WSW	Berwick Hospital		
	7G1	14 mi	SE	PP&L Hazleton Complex*		Particulate Sample: Analyze for gross beta radioactivity following filter change. Perform isotopic analysis on composite sample (by location) quarterly.
	3S2	0.5 mi	NE	SSES Backup Met. Tower		
	7S7	0.4 mi	SE	End of Kline's Road		
	10S3	0.6 mi	SSW	East of Confer's Lane, South of Towers Club		
	13S6	0.4 mi	W	Former Laydown Area, West of Confer's Lane		
	12G1	15 mi	WSW	PP&L Bloomsburg Service Center*		
Direct Radiation						
	1S2	Perimeter Fence - 0.2 mi N			Quarterly	Gamma Dose: Quarterly.
	1D5	Mocanaqua Sewage Treatment Plant - 4.0 mi N				
	2S3	Perimenter Fence - 0.2 mi NNE				
	2B3	Durabond Corporation - 1.3 mi NNE				
	2F1	St. Adalberts Cemetery - 5.9 mi NNE				
	3S4	Perimeter Fence - 0.3 mi NE				
	4S3	West of SSES APF - 0.2 mi ENE				
	4E2	Ruckles Hill & Pond Hill Roads Intersection: 4.7 mi ENE				
	4G1	Crestwood Industrial Park - 14 mi ENE*				
	5S7	Perimeter Fence - 0.3 mi E				
	5E2	Bloss Farm - 4.5 mi E				
	6S4	Perimeter Fence - 0.2 mi ESE				
	6A4	Riverside Restaurant - 0.6 mi ESE				
	6E1	St. James Church - 4.7 mi ESE				

Exposure Pathways and/or Sample	Number of Samples and Locations[a]	Sampling and Collection Frequency	Type and Frequency of Analysis
	6S9 Perimeter Fence - 0.2 mi ESE		
	7S6 Perimeter Fence - 0.2 mi SE		
	7E1 Harwood Transmission Line Pole #2 - 4.2 mi SE		
	7G1 PP&L Hazleton Complex - 14 mi SE[a]		
	8S2 Perimeter Fence - 0.2 mi SSE		
	8B2 LaWall Residence - 1.4 mi SSE		
	8D3 Mowry Residence - 4.0 mi SSE		
	9S2 Security Fence - 0.2 mi S		
	9D4 Country Folk Store - 3.6 mi S		
	10S1 Post South of Switching Station - 0.4 mi SSW		
	10D1 Ross Ryman Farm - 3.0 mi SSW		
	11S3 Security Fence - 0.3 mi SW		
	11E1 Thomas Residence - 4.7 mi SW		
	12S3 Perimeter Fence - 0.4 mi WSW		
	12E1 Berwick Hospital - 4.7 mi WSW		
	12G1 PP&L Bloomsburg Service Center - 15 mi WSW[a]		
	13S2 Perimeter Fence - 0.4 mi W		
	13E4 Kessler Farm - 4.1 mi W		
	14S5 Beach Grove Rd. & Confer's Lane Intersection 0.5 mi WNW		
	14B3 Moskaluk Residence - 1.3 mi WNW		
	15F1 Zawatski Farm - 5.4 mi NW		
	15S5 Perimeter Fence - 0.4 mi NW		
	16S1 Perimeter Fence 0.3 mi NNW		
	16S2 Perimeter Fence - 0.3 mi NNW		
	16F1 Hidlay Residence - 7.8 NNW		
Waterborne			
Surface	6S6 river water intake line[a] 6S7 cooling tower blowdown discharge line	Monthly composite Monthly composite	Gamma isotopic analysis. Composite tritium analysis at least quarterly.
Drinking	12H2 Danville Water Company (Approximately 30 miles downstream)	Monthly composite[b]	Gross beta and gamma isotopic analyses monthly. Composite for tritium analysis at least quarterly.

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Exposure Pathways and/or Sample	Number of Samples and Locations*	Sampling and Collection Frequency	Type and Frequency of Analysis
Sediment from Shoreline	7B Bell Bend - 1.2 mi SE	Semi-annually	Gamma isotopic analysis semi-annually.
Milk***	12B3 Young Farm - 2.0 mi WSW	Semi-monthly when animals are on pasture, monthly otherwise	Gamma isotopic and I-131 analysis of each sample
Fish and Invertebrates	Outfall area 2H Falls, Pa[a] (Approximately 30 mi NNE)	Semi-annually. One sample[c] from each of two reacreationally important species from any of the following families: bullhead catfish, sunfish, pikes, or perches.	Gamma isotopic on edible portions.
Food Products	11D1 Zehner Farm - 3.3 mi SW vegetable	At time of harvest	Gamma isotopic on edible portions.
	12F7 Lupini Farm - 8.3 mi WSW vegetable		

*The location of samples and equipment were designed using the guidance in the Branch Technical Position to NRC Rev. Guide 4.8, Rev. 1, Nov. 1979, Reg. Guide 48.1975 and ORP/SID 72-2 Environmental Radioactivity Surveillance Guide. Therefore, the airborne sampler locations were based upon X/Q and/or D/Q.

**A dust loading study (RMC-TR-81-01) concluded that the assumption of 1 for the transmission correction factor for gross beta analysis of air particulate samples is valid. Air particulate samples need not be weighed to determine a transmission correction factor.

***If a milk sample is unavailable for more than two sampling periods from one or more of the locations, a vegetation sample shall be substituted until a suitable milk location is evaluated. Such an occurrence will be documented in the REMP annual report.

[a]Control sample location.

[b]Two-week composite if calculated doses due to consumption of water exceed one millirem per year. In these cases, I-131 analyses will be performed.

[c]The sample collector will determine the species based upon availability, which may vary seasonally and yearly.

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10.0 DOSE ASSESSMENT POLICY STATEMENTS

10.1 Selection of Analysis Results for Dose Calculations

For determination of compliance with SSES Technical Specification dose limits, effluent totals shall be based only on activity positively detected at the 95% confidence level.

10.2 Assignment of Releases to the Reactor Units

For determination of compliance with SSES radioactive effluent dose limits which are on a "per reactor unit" basis:

a. Effluents from the Unit 1 Reactor Building vent and the Unit 1 Turbine Building vent shall be included as Unit 1 releases.

b. Effluents from the Unit 2 Reactor Building vent and the Unit 2 Turbine Building vent shall be included as Unit 2 releases.

c. Effluents from the Standby Gas Treatment System vent shall be equally divided between Unit 1 and Unit 2 release totals.

d. Waterborne effluents shall be equally divided between Unit 1 and Unit 2 release totals.

10.3 Evaluation and Monitoring Criteria for Effluent Pathways

Potential effluent pathways will be evaluated on a case-by-case basis. The evaluation will include identification of systems which are normally non-radioactive (as described in the FSAR) but could possibly become radioactive through interfaces with radioactive systems (Reference: NRC IE Bulletin No. 80-10). The evaluation will determine the significance of any potential effluents pathways and extent of sampling and/or monitoring required. The frequency of sampling or monitoring will be determined based on the potential for contamination, the potential for inadvertent releases, the potential levels of contamination and releases, and the potential impact on station offsite doses.

Results of sampling and/or evaluation will be used to classify potential effluent pathways into one of the following categories:

a. Not an Effluent Pathway: Realistic evaluation (e.g., engineering design, system operation, radionuclide inventory) demonstrates that the pathway has no potential for release of radioactive material (Table 8). Although not required, periodic sampling may at times be performed to confirm the result of the evaluation.

b. Insignificant Effluent Pathway: Evaluation and/or periodic sampling demonstrate that the pathway may contain radioactive effluents, however, these effluents may not be reasonably expected to exceed 10 percent of the appropriate unrestricted area MPC value (fractional MPCs summed when appropriate) listed in Table II of Appendix B to 10 CFR 20 (Table 9). A release pathway which falls in this category will be sampled periodically.

c. Significant Effluent Pathway: Evaluation and/or periodic sampling demonstrate that the pathway may contain radioactive effluents, and these effluents may be reasonably expected to exceed 10 percent of the appropriate unrestricted area MPC value (fractional MPCs summed when appropriate) listed in Table II of Appendix B to 10 CFR 20 (Table 10). A release pathway which falls in this category will be sampled continuously.

If sampling indicates a non-radioactive system has become contaminated, further use of the system shall be restricted until the cause of the contamination has been corrected and the system is decontaminated. If continued operation of the system as contaminated is necessary, a 10CFR50.59 safety evaluation of the operation of the system as a radioactive system shall be performed immediately by the system operator/engineer. The safety evaluation will include any changes in the effluent pathways and the impacts to offsite doses. (Ref. NRC IE Bulletin 80-10).

Positively detected radioactive material in samples collected from all airborne and waterborne offsite release pathways will be reported in the Annual Effluent and Waste Disposal Report.

10.4 Flow from the SGTS Vent when the System is Not in Use

When the Standby Gas Treatment is not being used, there remains a small amount of flow from the SGTS vent. This residual flow is exhaust from the battery rooms in the control structure. Because there are no identifiable sources of radioactivity in these rooms, auxiliary particulate and iodine sample and noble gas grab sample at 4-hour intervals are not required from the SGTS vent when the SGTS continuous vent monitor is out of service, provided that -

a. the Standby Gas Treatment System is not being used,

b. there are proper administrative controls in place to ensure that the required sampling will begin within 4 hours if the treatment system is operated.

10.5 ODCM Setpoints are Upper Limit Values

Effluent monitor alarm/trip setpoints calculated in accordance with the ODCM shall be considered upper limit values. Higher (less conservative) setpoints shall not be used, however lower (more conservative) setpoints may be used as required to maximize the utility of the monitor.

10.6 Definition of "Appropriate Treatment" for Liquid Wastes

Technical Specification 3.11.1.3 requires that the appropriate portions of the liquid waste treatment system be operable and be used to reduce radioactivity in liquid wastes prior to their release when projected doses from each reactor unit to unrestricted areas would exceed 0.06 mrem to the total body or 0.2 mrem to any organ in a 31 day period.

- o The normal treatment, which is considered appropriate for each subsystem, is as follows:

  - Filtration is considered appropriate treatment for the Liquid Radwaste Laundry Processing Subsystem, which consists of high conductivity liquid wastes, such as those from equipment washdown and personnel decontamination facilities, or laundry.

  - The atmospheric demineralizer (a vendor-supplied system which is directed to the Distillate Sample Tank) is considered appropriate for the Liquid Radwaste Chemical Processing Subsystem.

  - Demineralization and filtration are considered appropriate treatment for low conductivity/low organic contaminant liquid wastes entering the Liquid Radwaste Processing Subsystem (LRW collection tanks), except for batches which yield projected doses prior to treatment of less than or equal to 6.45-04 mrem to the total body and 2.15E-03 mrem to any organ, where filtration alone is appropriate,

or

- o For batches which have no identified gamma activity above the Technical Specification Liquid Effluent LLD level (Table 4.11.1.1.1-1), release without treatment is considered appropriate.

BASES

The projected dose threshold values used are derived by dividing the site-total maximum projected doses without treatment (0.12 and 0.4 mrem) by 31 days and by 6, the maximum possible number of batches released per day, to yield per-batch dose action levels. The two levels of "appropriate" treatment are in place so as not to require application of demineralization for

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treating low activity, high conductivity water (e.g., from Circulating or Service Water leakage). This would increase the overall efficiency of the solid radwaste program while ensuring calculated doses remain at a suitable fraction of 10 CFR 50 design objectives and Technical Specification 3.11.1.2 limit.[1][2]

10.7 Monitor Line Loss Corrections

In order to correct for airborne effluent monitor sample line loss, the following correction factors shall be applied to monitor data and sample analysis results:

	CORRECTION FACTORS	
ROUTINE EFFLUENT MONITORS	IODINE	PARTICULATES
Reactor Building Unit 1	1.5	3.2
Reactor Building Unit 2	1.5	3.2
Turbine Building Unit 1	1.6	3.6
Standby Gas Treatment	1.5	3.9
Turbine Building Unit 2	1.6	3.6

	CORRECTION FACTORS	
POST ACCIDENT VENT MONITORS	IODINE	PARTICULATES
Turbine Building Unit 1	1.7	4.2
Standby Gas Treatment	1.6	4.4
Turbine Building Unit 2	1.7	4.3

(1) Reference Calculation No. OT-RKB-92-001: Calculation of Liquid Isotope Offsite Dose Consequences for Use of Atmospheric Demineralizer System, PLI-70360, 2/4/92.

(2) Reference Letter R. K. Barclay to R. A. Breslin: Atmospheric Demineralizer Effluent Results, PLI-70612, 3/4/92.

Each indicated iodine and particulates concentration shall be multiplied by the appropriate correction factor to estimate the actual concentration at the inlet to the sample line.

10.8 Selection of Data for Determination of Dose Rate Compliance

Airborne effluent monitor setpoints are maintained in accordance with Section 2.2 to alarm before the dose rate limits of Specification 3.11.2.1 are exceeded. Station alarm response procedures contain instructions for investigation and verification of monitor alarms. Because setpoint calculations must include assumptions about the composition of the monitored effluent, a monitor high alarm does not necessarily indicate that a dose rate limit has been exceeded.

Valid ten-minute averaged data should be the primary information used to determine the compliance status of an incident. One-minute averaged data should also be reviewed if available, but they may or may not provide additional information depending on the magnitude of the release due to the manner in which the monitors update values to be stored and associated statistical considerations. Averages over a longer period should be used only when data with higher resolution is not available. Grab sample analyses should be performed whenever possible to confirm or disprove monitor data, and to provide indication of the nuclide-specific composition of the effluent. When grab sample data are available which, based on vent monitor data, are indicative of the period of elevated release, dose rate calculations should be performed using the actual effluent mix. The determination of compliance status should not be based on monitor data alone when it is possible to collect and analyze a vent sample which will be representative of the period of elevated release.

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10.9 Low-Level Radioactivity in the Sewage Treatment Plant

Like all sewage processing facilities, the SSES sewage treatment plant can under certain conditions receive low levels of radioactive materials. The most notable scenario is when individuals who work on-site have been subjected to the medical administration of radiopharmaceuticals for diagnostic or therapeutic purposes. In these cases, normal biological elimination processes can easily result in levels of radioactivity in sewage treatment plant solutions and suspensions which are within the detection capabilities of the associated sampling and analysis program.

Because disposal of sewage treatment plant sludge by controlled dispersal on specified tracts of land is a common practice, the following guidelines have been established:

a. All sludge collected in the sludge holding tank should be sampled and analyzed prior to land disposal to quantify any radioactivity present above natural background levels.

b. Sludge containing nuclides with short half-lives, for example iodine-131, should be contained on-site to permit decay to less than detectable levels.

c. When sludge is contaminated with nuclides which have half-lives sufficiently long to make hold-up for decay impractical, the following options should be considered:

    1. Dispose of the sludge as low level radioactive waste.

    2. Obtain a special permit pursuant to the requirements of 10 CFR 20.2002.

d. The sewage treatment plant liquid effluent should be sampled monthly for radioactivity. This can be accomplished by drawing a sample from the chlorine contact chamber.

APPV EVS
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11.0 ODCM REVIEW AND REVISION CONTROL

The Supervisor-Environmental Services-Nuclear shall ensure that a total review of the ODCM is performed during each even-numbered year. Comments shall be documented and revisions initiated as appropriate.

Each ODCM page shall be numbered and provided with an approval and date box. The ODCM Table of Contents shall present the current revision date for each page so that any manual holder can check manual completeness based on a current Table of Contents.

All ODCM revisions shall be reviewed by PORC after approval by the Manager-Nuclear Technology. PORC review shall be indicated by PORC chairperson or designee signature on ODCM cover.

ODCM copies shall be issued in a controlled fashion by the staff of the Nuclear Department Library. The distribution list shall be maintained by the Nuclear Department Library Staff.

Any comments on ODCM contents or proposed revisions should be directed to the Supervisor-Environmental Services-Nuclear.

TABLE 8

SYSTEMS CLASSIFIED AS NOT AN EFFLUENT PATHWAY (Page 1 of 3)

SYSTEM DESCRIPTION	REFERENCE
Domestic Water	(1)
River Water Makeup	"
Intake Compressed Air	"
Screens and Screenwash	"
Fire Protection Water	"
Fire Protection CO_2	"
Fire Protection Halon	"
Turbine Building Closed Cooling Water	"
Building Drains: NON RAD	"
Water Pretreatment	"
Condensate and Refuel Water Transfer	"
Low Pressure Air	"
Condensate Demins	"
Lube Oil Transfer/Purification	"
Cooling Tower Acid/Chlorination	"
Circulating Water	"
Condenser Tube Cleaning	"
Feedwater	"
Extraction Steam	"
Feedwater Heaters	"
Residual Heat Removal	"
Reactor Core Isolation Cooling	"
Core Spray	"
High Pressure Coolant Injection	"
Standby Liquid Control	"
Control Rod Drives	"

(1) PP&L Calculation EC-ENVR-1008

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TABLE 8

SYSTEMS CLASSIFIED AS NOT AN EFFLUENT PATHWAY (Page 2 of 3)

SYSTEM DESCRIPTION	REFERENCE
Suppression Pool	(1)
Primary Containment Vacuum Breakers	"
Suppression Pool Cleanup	"
Reactor Water Cleanup	"
Reactor Pressure Vessel	"
Reactor Recirculation System	"
Radwaste Chilled Water	"
Solid Radwaste/Cement Silo	"
LRW Collection/Tb and Cond. Outer Area Sumps	"
LRW Processing/Radwaste Evaporator	"
Gaseous Radwaste Recombiner Closed Cooling Water	"
Nitrogen Storage	"
Hydrogen Storage	"
Sampling Stations	"
Post Accident Sampling System	"
Bypass Steam	"
Main Steam Isolation Valves/ Nuclear Steam Supply System Shutoff	"
Automatic Depressurization System	"
MSIV Leakage Control	"
Moisture Separators	"
Turbine Steam Seals	"
Electrohydraulic Control	"
Stator Cooling	"
Main Generator	"
Storm Drains	"

(1) PP&L Calculation EC-ENVR-1008

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TABLE 8

SYSTEMS CLASSIFIED AS NOT AN EFFLUENT PATHWAY (Page 3 of 3)

SYSTEM DESCRIPTION	REFERENCE
Makeup Demineralizers	(1)
Fuel Oil	(1)
Containment Instrument Gas	(1)
Control Structure Chilled Water	(1)
Turbine Bldg. Chilled Water	(1)
Reactor Bldg. Chilled Water	(1)
Auxiliary Boilers	(1)
Fuel Pool Cooling	(1)
Fuel Pool Demineralizers	(1)
Fuel Pools	(1)
Temporary SDHR System	(7)

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TABLE 9

SYSTEMS CLASSIFIED AS INSIGNIFICANT EFFLUENT PATHWAY

SYSTEM DESCRIPTION	REFERENCE
H_2 Seal Oil	(1)
Condensate Storage Tank and Berm	"
Main Turbine/RFPT Lube Oil	"
Instrument Air	"
Service Air	"
Temporary Laundry Facility	(2)
Second Sort (DAW Volume Reduction) Facility	(3)
Low Level Radwaste Handling Facility	(4)

APPV RLZ
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TABLE 10

SYSTEMS CLASSIFIED AS SIGNIFICANT EFFLUENT PATHWAY

SYSTEM DESCRIPTION	REFERENCE
Liquid Waste Management Systems	(5)
Gaseous Waste Management Systems	(6)

(1) PP&L Calculation EC-ENVR-1008
(2) Safety Evaluation NL-90-029: Temporary Laundry Facility
(3) Safety Evaluation NL-89-002: Dry Active Waste Volume Reduction System
(4) Safety Evaluation NL-92-007: Operation of LLRWHF at SSES
(5) SSES FSAR Chapter 11.2
(6) SSES FSAR Chapter 11.3
(7) Safety Evaluation NL-95-001: Refueling Outage Decay Heat Removal and Tie-In of the SDHR Temporary Cooling Equipment.

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DATE 3/29/95

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

Revision 4

Prepared By [illegible] Date 4/17/95

Reviewed By Kenneth E Shank Date 4/17/95
Supervisor-Environmental Services Nuclear

Reviewed By [illegible] 95-052 Date 4/20/95
PORC/Meeting No.

Approved By [illegible] Date 4/17/95
Manager-Nuclear Technology

SUMMARY OF ODCM CHANGES

1. Three milk sampling stations (10G1, 10D2 and 10D1) were inadvertently deleted in Table 6, Rev. 3, and are restored herein. These deletions were not noted in review of Table 6, Rev. 3, which was submitted in resolution to SOOR 95-045.

2. The name of the restaurant at TLD station 6A4 has been deleted to make the description more generic, in response to a PORC comment from the meeting on March 30, 1995.

TABLE 6

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathways and/or Sample	Number of Samples and Locations*				Sampling and Collection Frequency	Type and Frequency of Analysis
Airborne						
Radioiodine and Particulates*	12S1	0.4 mi	WSW	EOF Building	Continual sampler operation with sample collection weekly.**	Radioiodine Canister: analyze weekly for I-131
	9B1	1.3 mi	S	Transmission Line		
	5S4	0.8 mi	E	Environmental Laboratory		
	12E1	4.7 mi	WSW	Berwick Hospital		
	7G1	14 mi	SE	PP&L Hazleton Complex[a]		Particulate Sample: Analyze for gross beta radioactivity following filter change. Perform isotopic analysis on composite sample (by location) quarterly.
	3S2	0.5 mi	NE	SSES Backup Met. Tower		
	7S7	0.4 mi	SE	End of Kline's Road		
	10S3	0.6 mi	SSW	East of Confer's Lane, South of Towers Club		
	13S6	0.4 mi	W	Former Laydown Area, West of Confer's Lane		
	12G1	15 mi	WSW	PP&L Bloomsburg Service Center[a]		
Direct Radiation						
	1S2	Perimeter Fence - 0.2 mi N			Quarterly	Gamma Dose: Quarterly.
	1D5	Mocanaqua Sewage Treatment Plant - 4.0 mi N				
	2S3	Perimenter Fence - 0.2 mi NNE				
	2B3	Durabond Corporation - 1.3 mi NNE				
	2F1	St. Adalberts Cemetery - 5.9 mi NNE				
	3S4	Perimeter Fence - 0.3 mi NE				
	4S3	West of SSES APF - 0.2 mi ENE				
	4E2	Ruckles Hill & Pond Hill Roads Intersection: 4.7 mi ENE				
	4G1	Crestwood Industrial Park - 14 mi ENE[a]				
	5S7	Perimeter Fence - 0.3 mi E				
	5E2	Bloss Farm - 4.5 mi E				
	6S4	Perimeter Fence - 0.2 mi ESE				
	6A4	Restaurant - 0.6 mi ESE				
	6E1	St. James Church - 4.7 mi ESE				

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Exposure Pathways and/or Sample	Number of Samples and Locations*	Sampling and Collection Frequency	Type and Frequency of Analysis
Sediment from Shoreline	7B Bell Bend - 1.2 mi SE	Semi-annually	Gamma isotopic analysis semi-annually.
Milk***	12B3 Young Farm - 2.0 mi WSW 10G1 Davis Farm - 14.0 mi. SSW[a] 10D2 Ray Ryman Farm - 3.5 mi. SSW 10D1 R&C Ryman Farm - 3.0 mi. SSW	Semi-monthly when animals are on pasture, monthly otherwise	Gamma isotopic and I-131 analysis of each sample
Fish and Invertebrates	Outfall area 2H Falls, Pa[a] (Approximately 30 mi NNE)	Semi-annually. One sample[c] from each of two reacreationally important species from any of the following families: bullhead catfish, sunfish, pikes, or perches.	Gamma isotopic on edible portions.
Food Products	11D1 Zehner Farm - 3.3 mi SW vegetable 12F7 Lupini Farm - 8.3 mi WSW vegetable	At time of harvest	Gamma isotopic on edible portions.

50

*The location of samples and equipment were designed using the guidance in the Branch Technical Position to NRC Rev. Guide 4.8, Rev. 1, Nov. 1979, Reg. Guide 48.1975 and ORP/SID 72-2 Environmental Radioactivity Surveillance Guide. Therefore, the airborne sampler locations were based upon X/Q and/or D/Q.

**A dust loading study (RMC-TR-81-01) concluded that the assumption of 1 for the transmission correction factor for gross beta analysis of air particulate samples is valid. Air particulate samples need not be weighed to determine a transmission correction factor.

***If a milk sample is unavailable for more than two sampling periods from one or more of the locations, a vegetation sample shall be substituted until a suitable milk location is evaluated. Such an occurrence will be documented in the REMP annual report.

[a]Control sample location.

[b]Two-week composite if calculated doses due to consumption of water exceed one millirem per year. In these cases, I-131 analyses will be performed.

[c]The sample collector will determine the species based upon availability, which may vary seasonally and yearly.

APPV [signature]
DATE 4/12/95

Rev. 4

PENNSYLVANIA POWER & LIGHT COMPANY

SUSQUEHANNA STEAM ELECTRIC STATION

OFFSITE DOSE CALCULATION MANUAL

Revision 5

Prepared by: Robert K Bracey Date: 7/14/95

Reviewed by: Kenneth E Shank Date: 7/14/95
Supervisor
Environmental Services - Nuclear

Reviewed by: 95 - 098 Date: 7-20-95
PORC/Meeting No.

Approved by: J. D. Miller Date: 7/17/95
Manager - Nuclear Technology

SUMMARY OF ODCM CHANGES

1. The Introduction has been revised to specify that reference to MPC limits of 10CFR20 Appendix B in the document applies to those limits in effect prior to January 1, 1994, and continuing in effect until such time that revised 10CFR20 Appendix B limits are implemented at SSES.

2. A description of systems with NRC I/E Bulletin 80-10 applicability has been added to Section 10.3. Reference is made to Table 11, which lists the 80-10 systems by number and name.

3. Table 9 is revised to include Refuel Water Storage Tank with Condensate Storage Tank and Berm, and H_2 Seal Oil with Main Turbine/RFPT Lube Oil. The Sewage Treatment Plant is added to Table 9. Reference notes for these changes are now located in the appropriate tables.

4. Table 11 (Systems with NRC I/E Bulletin 80-10 Applicability) is added to the ODCM.

   The Sewage Treatment Plant is added to Table 11 in response to PORC Meeting 95-098 Action Item E05532.

5. Section 11 (ODCM Review and Revision Control) is repaginated to follow Tables 8-11 of Section 10. Reference to revision in accordance with NEPM-QA-1011 is added, which is submitted as an Action to Prevent Recurrence in SOOR 95-045. The distribution of ODCM copies is revised to indicate SSES Document Control Services, which replaces the staff of the Nuclear Department Library.

6. This revision does not reduce the accuracy or reliability of dose calculations or setpoint determinations.

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DATE 7/14/95

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LIST OF TABLES

*Sewage Treatment Plant added in response to PORC Meeting 95-098 Action Item E05532.

LIST OF FIGURES

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1.0 INTRODUCTION

The purpose of this manual is to provide the parameters and methodology to be used in calculating offsite doses and effluent monitor setpoints for the Susquehanna Steam Electric Station, Units 1 and 2. Included are methods for determining maximum individual, whole-body, and organ doses due to waterborne and airborne effluents to ensure compliance with the dose limitations in the Technical Specifications. Methods are included for performing dose calculations to ensure compliance with the waterborne and airborne treatment system operability sections of the Technical Specifications. This manual includes the methods used for determining quarterly individual doses for inclusion in Annual Effluent and Waste Disposal Reports.

The dose models consider two release modes: airborne and waterborne. All airborne effluents are treated as ground-level releases. Dose to each of the seven organs listed in Regulatory Guide 1.109 (bone, liver, total body, thyroid, kidney, lung, and GI-LLI) are computed based on the individual nuclide composition of the effluent. The largest of the doses are compared to 10CFR50, Appendix I design objectives.

Liquid effluents discharged into a river undergo mixing prior to consumption as either potable water or through the fish pathway. For releases to the Susquehanna River, river model dilution factors are used. Doses to the seven critical organs are determined from individual nuclide contributions and are compared to the 10CFR50 Appendix I design objectives. Compliance with the 10CFR20 maximum permissible concentrations is done on a batch-by-batch basis prior to discharge. Henceforth in this document, reference to MPC limits of 10CFR20 Appendix B applies to those limits in effect prior to January 1, 1994, and continuing in effect until such time that revised 10CFR20 Appendix B limits are implemented at SSES.

This manual discusses the methodology to be used in determining effluent monitor alarm/trip setpoints to be used to ensure compliance with the instantaneous release rate limits in the Technical Specifications. Methods are described for determining the annual cumulative dose to a real individual from liquid effluents, gaseous effluents, and direct radiation for critical organs to ensure compliance with 40 CFR 190 limits. The calculational methodology for doses are based on models and data that make it unlikely to substantially underestimate the actual exposure of an individual through any of the appropriate pathways.

The Radiological Environmental Monitoring Program is described in Section 9.0 of the manual, which includes the annual land use census survey and interlaboratory comparison program.

It is the responsibility of the Superintendent of Plant-Susquehanna to ensure that this manual is used in performance of the surveillance requirements and for compliance with the limiting conditions of operations stated in the Technical Specifications. It is the responsibility of the Manager-Nuclear Technology to ensure adequacy and correctness of calculational approaches.

10.0 DOSE ASSESSMENT POLICY STATEMENTS

10.1 Selection of Analysis Results for Dose Calculations

For determination of compliance with SSES Technical Specification dose limits, effluent totals shall be based only on activity positively detected at the 95% confidence level.

10.2 Assignment of Releases to the Reactor Units

For determination of compliance with SSES radioactive effluent dose limits which are on a "per reactor unit" basis:

a. Effluents from the Unit 1 Reactor Building vent and the Unit 1 Turbine Building vent shall be included as Unit 1 releases.

b. Effluents from the Unit 2 Reactor Building vent and the Unit 2 Turbine Building vent shall be included as Unit 2 releases.

c. Effluents from the Standby Gas Treatment System vent shall be equally divided between Unit 1 and Unit 2 release totals.

d. Waterborne effluents shall be equally divided between Unit 1 and Unit 2 release totals.

10.3 Evaluation and Monitoring Criteria for Effluent Pathways

Potential effluent pathways will be evaluated on a case-by-case basis. The evaluation will include identification of systems which are normally non-radioactive (as described in the FSAR) but could possibly become radioactive through interfaces with radioactive systems (Reference: NRC IE Bulletin No. 80-10). The evaluation will determine the significance of

any potential effluents pathways and extent of sampling and/or monitoring required. The frequency of sampling or monitoring will be determined based on the potential for contamination, the potential for inadvertent releases, the potential levels of contamination and releases, and the potential impact on station offsite doses.

Results of sampling and/or evaluation will be used to classify potential effluent pathways into one of the following categories:

a. Not an Effluent Pathway: Realistic evaluation (e.g., engineering design, system operation, radionuclide inventory) demonstrates that the pathway has no potential for release of radioactive material (Table 8). Although not required, periodic sampling may at times be performed to confirm the result of the evaluation.

b. Insignificant Effluent Pathway: Evaluation and/or periodic sampling demonstrate that the pathway may contain radioactive effluents, however, these effluents may not be reasonably expected to exceed 10 percent of the appropriate unrestricted area MPC value (fractional MPCs summed when appropriate) listed in Table II of Appendix B to 10 CFR 20 (Table 9). A release pathway which falls in this category will be sampled periodically.

c. Significant Effluent Pathway: Evaluation and/or periodic sampling demonstrate that the pathway may contain radioactive effluents, and these effluents may be reasonably expected to exceed 10 percent of the appropriate unrestricted area MPC value (fractional MPCs summed when appropriate) listed in Table II of Appendix B to 10 CFR 20 (Table 10). A release pathway which falls in this category will be sampled continuously.

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If sampling indicates a non-radioactive system has become contaminated, further use of the system shall be restricted until the cause of the contamination has been corrected and the system is decontaminated. If continued operation of the system as contaminated is necessary, a 10CFR50.59 safety evaluation of the operation of the system as a radioactive system shall be performed immediately by the system operator/engineer. The safety evaluation will include any changes in the effluent pathways and the impacts to offsite doses. (Ref. NRC IE Bulletin 80-10). Systems with NRC I/E Bulletin applicability are designed to be used as non-radioactive, but which could possibly become radioactive through interface(s) with radioactive systems, and which have a path for unmonitored and/or uncontrolled release to the environment. (Table 11)

Positively detected radioactive material in samples collected from all airborne and waterborne offsite release pathways will be reported in the Annual Effluent and Waste Disposal Report.

10.4 <u>Flow from the SGTS Vent when the System is Not in Use</u>

When the Standby Gas Treatment is not being used, there remains a small amount of flow from the SGTS vent. This residual flow is exhaust from the battery rooms in the control structure. Because there are no identifiable sources of radioactivity in these rooms, auxiliary particulate and iodine sample and noble gas grab sample at 4-hour intervals are not required from the SGTS vent when the SGTS continuous vent monitor is out of service, <u>provided that</u> -

a. the Standby Gas Treatment System is not being used,

b. there are proper administrative controls in place to ensure that the required sampling will begin within 4 hours if the treatment system is operated.

10.5 ODCM Setpoints are Upper Limit Values

Effluent monitor alarm/trip setpoints calculated in accordance with the ODCM shall be considered upper limit values. Higher (less conservative) setpoints shall not be used, however lower (more conservative) setpoints may be used as required to maximize the utility of the monitor.

10.6 Definition of "Appropriate Treatment" for Liquid Wastes

Technical Specification 3.11.1.3 requires that the appropriate portions of the liquid waste treatment system be operable and be used to reduce radioactivity in liquid wastes prior to their release when projected doses from each reactor unit to unrestricted areas would exceed 0.06 mrem to the total body or 0.2 mrem to any organ in a 31 day period.

- The normal treatment, which is considered appropriate for each subsystem, is as follows:

  - Filtration is considered appropriate treatment for the Liquid Radwaste Laundry Processing Subsystem, which consists of high conductivity liquid wastes, such as those from equipment washdown and personnel decontamination facilities, or laundry.

  - The atmospheric demineralizer (a vendor-supplied system which is directed to the Distillate Sample Tank) is considered appropriate for the Liquid Radwaste Chemical Processing Subsystem.

- Demineralization and filtration are considered appropriate treatment for low conductivity/low organic contaminant liquid wastes entering the Liquid Radwaste Processing Subsystem (LRW collection tanks), except for batches which yield projected doses prior to treatment of less than or equal to 6.45-04 mrem to the total body and 2.15E-03 mrem to any organ, where filtration alone is appropriate,

or

- For batches which have no identified gamma activity above the Technical Specification Liquid Effluent LLD level (Table 4.11.1.1.1-1), release without treatment is considered appropriate.

BASES

The projected dose threshold values used are derived by dividing the site-total maximum projected doses without treatment (0.12 and 0.4 mrem) by 31 days and by 6, the maximum possible number of batches released per day, to yield per-batch dose action levels. The two levels of "appropriate" treatment are in place so as not to require application of demineralization for treating low activity, high conductivity water (e.g., from Circulating or Service Water leakage). This would increase the overall efficiency of the solid radwaste program while ensuring calculated doses remain at a suitable fraction of 10 CFR 50 design objectives and Technical Specification 3.11.1.2 limit.[1][2]

---

[1]Reference Calculation No. OT-RKB-92-001: Calculation of Liquid Isotope Offsite Dose Consequences for Use of Atmospheric Demineralizer System, PLI-70360, 2/4/92.

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10.7 Monitor Line Loss Corrections

In order to correct for airborne effluent monitor sample line loss, the following correction factors shall be applied to monitor data and sample analysis results:

CORRECTION FACTORS

Routine Effluent Monitors	Iodine	Particulates
Reactor Building Unit 1	1.5	3.2
Reactor Building Unit 2	1.5	3.2
Turbine Building Unit 1	1.6	3.6
Standby Gas Treatment	1.5	3.9
Turbine Building Unit 2	1.6	3.6

CORRECTION FACTORS

Post-Accident Vent Monitors	Iodine	Particulates
Turbine Building Unit 1	1.7	4.2
Standby Gas Treatment	1.6	4.4
Turbine Building Unit 2	1.7	4.3

Each indicated iodine and particulates concentration shall be multiplied by the appropriate correction factor to estimate the actual concentration at the inlet to the sample line.

(2) Reference Letter R. K. Barclay to R. A. Breslin: Atmospheric Demineralizer Effluent Results, PLI-70612, 3/4/92.

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10.8 Selection of Data for Determination of Dose Rate Compliance

Airborne effluent monitor setpoints are maintained in accordance with Section 2.2 to alarm before the dose rate limits of Specification 3.11.2.1 are exceeded. Station alarm response procedures contain instructions for investigation and verification of monitor alarms. Because setpoint calculations must include assumptions about the composition of the monitored effluent, a monitor high alarm does not necessarily indicate that a dose rate limit has been exceeded.

Valid ten-minute averaged data should be the primary information used to determine the compliance status of an incident. One-minute averaged data should also be reviewed if available, but they may or may not provide additional information depending on the magnitude of the release due to the manner in which the monitors update values to be stored and associated statistical considerations. Averages over a longer period should be used only when data with higher resolution is not available. Grab sample analyses should be performed whenever possible to confirm or disprove monitor data, and to provide indication of the nuclide-specific composition of the effluent. When grab sample data are available which, based on vent monitor data, are indicative of the period of elevated release, dose rate calculations should be performed using the actual effluent mix. The determination of compliance status should not be based on monitor data alone when it is possible to collect and analyze a vent sample which will be representative of the period of elevated release.

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10.9 Low-Level Radioactivity in the Sewage Treatment Plant

Like all sewage processing facilities, the SSES sewage treatment plant can under certain conditions receive low levels of radioactive materials. The most notable scenario is when individuals who work on-site have been subjected to the medical administration of radiopharmaceuticals for diagnostic or therapeutic purposes. In these cases, normal biological elimination processes can easily result in levels of radioactivity in sewage treatment plant solutions and suspensions which are within the detection capabilities of the associated sampling and analysis program.

Because disposal of sewage treatment plant sludge by controlled dispersal on specified tracts of land is a common practice, the following guidelines have been established:

a. All sludge collected in the sludge holding tank should be sampled and analyzed prior to land disposal to quantify any radioactivity present above natural background levels.

b. Sludge containing nuclides with short half-lives, for example iodine-131, should be contained on-site to permit decay to less than detectable levels.

c. When sludge is contaminated with nuclides which have half-lives sufficiently long to make hold-up for decay impractical, the following options should be considered:

   1. Dispose of the sludge as low level radioactive waste.

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2. Obtain a special permit pursuant to the requirements of 10 CFR 20.2002.

d. The sewage treatment plant liquid effluent should be sampled monthly for radioactivity. This can be accomplished by drawing a sample from the chlorine contact chamber.

TABLE 8

SYSTEMS CLASSIFIED AS NOT AN EFFLUENT PATHWAY (Page 1 of 3)

SYSTEM DESCRIPTION	REFERENCE
Domestic Water	(1)
River Water Makeup	"
Intake Compressed Air	"
Screens and Screenwash	"
Fire Protection Water	"
Fire Protection CO_2	"
Fire Protection Halon	"
Turbine Building Closed Cooling Water	"
Building Drains: NON RAD	"
Water Pretreatment	"
Condensate and Refuel Water Transfer	"
Low Pressure Air	"
Condensate Demins	"
Lube Oil Transfer/Purification	"
Cooling Tower Acid/Chlorination	"
Circulating Water	"
Condenser Tube Cleaning	"
Feedwater	"
Extraction Steam	"
Feedwater Heaters	"
Residual Heat Removal	"
Reactor Core Isolation Cooling	"
Core Spray	"
High Pressure Coolant Injection	"
Standby Liquid Control	"
Control Rod Drives	"

(1) PP&L Calculation EC-ENVR-1008

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TABLE 8

SYSTEMS CLASSIFIED AS NOT AN EFFLUENT PATHWAY (Page 2 of 3)

SYSTEM DESCRIPTION	REFERENCE
Suppression Pool	(1)
Primary Containment Vacuum Breakers	"
Suppression Pool Cleanup	"
Reactor Water Cleanup	"
Reactor Pressure Vessel	"
Reactor Recirculation System	"
Radwaste Chilled Water	"
Solid Radwaste/Cement Silo	"
LRW Collection/Tb and Cond. Outer Area Sumps	"
LRW Processing/Radwaste Evaporator	"
Gaseous Radwaste Recombiner Closed Cooling Water	"
Nitrogen Storage	"
Hydrogen Storage	"
Sampling Stations	"
Post Accident Sampling System	"
Bypass Steam	"
Main Steam Isolation Valves/ Nuclear Steam Supply System Shutoff	"
Automatic Depressurization System	"
MSIV Leakage Control	"
Moisture Separators	"
Turbine Steam Seals	"
Electrohydraulic Control	"
Stator Cooling	"
Main Generator	"
Storm Drains	"

(1) PP&L Calculation EC-ENVR-1008

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TABLE 8

SYSTEMS CLASSIFIED AS NOT AN EFFLUENT PATHWAY (Page 3 of 3)

SYSTEM DESCRIPTION	REFERENCE
Makeup Demineralizers	(1)
Fuel Oil	(1)
Containment Instrument Gas	(1)
Control Structure Chilled Water	(1)
Turbine Bldg. Chilled Water	(1)
Reactor Bldg. Chilled Water	(1)
Auxiliary Boilers	(1)
Fuel Pool Cooling	(1)
Fuel Pool Demineralizers	(1)
Fuel Pools	(1)
Temporary SDHR System	(7)

(1) PP&L Calculation EC-ENVR-1008

(7) Safety Evaluation NL-95-001: Refueling Outage Decay Heat Removal and Tie-In of the SDHR Temporary Cooling Equipment

TABLE 9

SYSTEMS CLASSIFIED AS INSIGNIFICANT EFFLUENT PATHWAY

SYSTEM DESCRIPTION	REFERENCE
H_2 Seal Oil	(1)
Condensate/Refuel Water Storage Tank and Berm	(1)
Main Turbine/RFPT Lube Oil/H_2 Seal Oil	(1), (8)
Instrument Air	(1), (8)
Service Air	(1), (8)
Temporary Laundry Facility	(2)
Second Sort (DAW Volume Reduction) Facility	(3)
Low Level Radwaste Handling Facility	(4)
Sewage Treatment Plant	(9)

(1) PP&L Calculation EC-ENVR-1008

(2) Safety Evaluation NL-90-029: Temporary Laundry Facility

(3) Safety Evaluation NL-89-002: Dry Active Waste Volume Reduction System

(4) Safety Evaluation NL-92-007: Operation of LLRWHF at SSES

(8) Main Tb/RFPT Lube Oil, Instrument Air and Service Air are designed to be operated as non-radioactive systems. They are classified as insignificant pathways based on source terms and offsite dose rate results for consideration of a contaminated source term.

(9) Sewage treatment plant is designed to be operated as a non-radioactive system. Classification as an insignificant effluent pathway is in accordance with Safety Evaluation NL-95-015.

TABLE 10

SYSTEMS CLASSIFIED AS SIGNIFICANT EFFLUENT PATHWAY

SYSTEM DESCRIPTION	REFERENCE
Liquid Waste Management Systems	(5)
Gaseous Waste Management Systems	(6)

(5) SSES FSAR Chapter 11.2

(6) SSES FSAR Chapter 11.3

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TABLE 11

SYSTEMS WITH NRC I/E BULLETIN 80-10 APPLICABILITY

SYSTEM NO.	DESCRIPTION
11	Service Water (F/P HTX Discharge)
16	RHR Service Water
18	Instrument Air
19	Service Air
27	Auxiliary Boilers
35	Shutdown Decay Heat Removal System
40	Batch Lube Oil Tank
48	Feedwater Pump Turbine Lube Oil
52	H_2 Seal Oil Tank
54	Emergency Service Water
93	Main Turbine Lube Oil
99D	Sewage Treatment Plant

11.0 ODCM REVIEW AND REVISION CONTROL

The Supervisor-Environmental Services-Nuclear shall ensure that a total review of the ODCM is performed during each even-numbered year. Comments shall be documented and revisions initiated as appropriate.

Revisions to the ODCM shall be initiated in accordance with NEPM-QA-1011.

Each ODCM page shall be numbered and provided with an approval and date box. The ODCM Table of Contents shall present the current revision date for each page so that any manual holder can check manual completeness based on a current Table of Contents.

All ODCM revisions shall be reviewed by PORC after approval by the Manager-Nuclear Technology. PORC review shall be indicated by PORC chairperson or designee signature on ODCM cover.

ODCM copies shall be issued in a controlled fashion by SSES Document Control Services. The distribution list shall be maintained by SSES Document Control Services.

Any comments on ODCM contents or proposed revisions should be directed to the Supervisor-Environmental Services-Nuclear.

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APPENDIX B

REVISIONS TO SSES SOLID WASTE PROCESS CONTROL PROGRAM (NDAP-QA-0646)

·CEDURE CHANGE APPROVAL FORM	1. PCAF NO. 1-95-1007	2. PAGE 1 OF 2
3. PROCEDURE NO. NDAP-QA-0646 REV. 4	4. FORM NO. NA REV.	
5. PROCEDURE TITLE Solid Radioactive Waste Process Control Program	6. PROCEDURE TYPE: QA PROGRAM (✓) YES (__) NO PLANT PROC (✓) YES (__) NO	

7. REQUESTED CHANGE

DELETE PCAFs (✓) NO (__) YES # ____ # ____ # ____ # ____

Replace page 47 of 63 with the attached

Continued (✓)

8. REASON FOR CHANGE

To proceduralize constraints on addin additional radioactive material to processed radwaste containers. This maximizes waste per container disposed.

Continued (__)

9. RECOMMENDED FOR PERMANENT STATUS? (✓) YES
(__) NO, EXPIRATION DATE NA
(60 DAY MAXIMUM FOR TEMPORARY STATUS)

10. IF PLANT PROCEDURE COMPLETE ITEMS 11 THRU 15 ON PAGE 2 OF THIS FORM.

16.
INITIATOR: [signature] DATE: 9/25/95

18. AUTHORIZATION (FOR PLANT PROCEDURES)
[signature] 9-27-95
SHIFT SUPERVISOR DATE

17. MANAGEMENT REVIEW
a. (_) QADR NOT REQUIRED
b. (✓) QADR PERFORMED, NO COMMENTS
c. (_) NQA QADR REQUIRED PRIOR TO APPROVAL PER BLOCK 21
[signature] 9/25/95
MANAGEMENT MEMBER DATE

19. NQA QADR
a. (_) NQA QADR NOT REQUIRED
b. (✓) NQA QADR PERFORMED, NO COMMENTS
c. (_) NQA QADR PERFORMED, COMMENTS ATTACHED
REVIEWER: [signature] DATE: 9-26-95

20. COMMITTEE MEETING
TYPE: ____
MTG #: ____
RECOMMENDED: (__) YES (__) NO
REVISED: (__) YES (__) NO

APPROVAL
____ ____
(INITIALS) DATE

UNCONTROLLED

PROCEDURE COVER SHEET

SUSQUEHANNA STEAM ELECTRIC STATION PP&L	NUCLEAR DEPARTMENT PROCEDURE SOLID RADIOACTIVE WASTE PROCESS CONTROL PROGRAM	NDAP-QA-0646 Revision 4 Page 1 of 63

EFFECTIVE DATE: 4-10-95

PERIODIC REVIEW FREQUENCY: 4 Years

PERIODIC REVIEW DUE DATE: 3-31-99

REVISED PERIODIC REVIEW DUE DATE: ______

PROCEDURE TYPE: QA Program (✓) YES (__) NO

Plant Procedure (✓) YES (__) NO

REVIEW METHOD:

(__) Alternate (__) Expedited

(✓) PORC (____) ERC

Prepared by [signature] Date 3-22-95

Reviewed by [signature] Date 3-24-95
Supervisor

Recommended [signature] Date 3/27/95
Functional Unit Manager

95-041 Date 4/6/95
PORC Committee Meeting No.

______ Date ______
ERC Committee Meeting No.

Approved by [signature] Date 4/6/95

FORM NDAP-QA-0002-1, Rev. 1, Page 1 of 1

NDAP-QA-0646

PROCEDURE REVISION SUMMARY

TITLE: SOLID RADIOACTIVE WASTE PROCESS CONTROL PROGRAM

The following changes will not reduce the overall conformance of the solidified waste product to existing criteria for solid wastes.

1) Incorporated PCAF 1-94-1330 revising the PCP implementing procedure matrix to reflect actual procedures in use and changed the requirements for disposal of radioactive waste samples after packaged radioactive waste has been in its designated storage area.

2) Added SEG NRC approved Topical Report STD-P-05-011-P-A to Contracted Vendor Services to reflect use of SEG for waste processing equipment, methods and verification of acceptable waste forms for dewatering and solidification.

3) Added Activated Carbon as a new waste type which is generated from processing of liquid wastes using vendor provided demineralization services.

4) Added the Solidification/Dewatering/Services Vendor may perform test solidification and determination of mixing ratios for solidification performed offsite (vendor facility)

5) Added Radlok (SEG) type containers to High Integrity Container approved for use list.

6) Added SNM inventory requirements during processing per SOOR 94-581 resolution.

7) Added NRC Technical Position on Concentration Averaging and Encapsulation to Radioactive Waste Analysis and Classification to ensure that radionuclide/concentrations are adequately distributed over the volume or weight of the waste.

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ATTACHMENTS

1.0 PURPOSE

Provide administrative control, guidance and records for the processing, packaging, transportation, and disposal of radioactive waste. This procedure is the Process Control Program required by SSES Technical Specifications.

2.0 POLICY/DISCUSSION

This procedure is applicable to Low Level Radwaste (LLRW) generated as a result of the operation of the Susquehanna Steam Electric Station (SSES). The waste streams include solid and liquid waste as defined in the FSAR, but do not include spent fuel or greater than Class C waste.

Efficient generation and processing of radioactive waste is very important to the overall operation of SSES. An important objective with respect to radioactive waste generation is to minimize the volume of waste generated. The processing of large volumes of waste can result in the inability to dispose of or store all waste packaged, the significant increased costs associated with increased waste generation, and the potential to over-burden the processing system and degrade its long term reliability. The Process Control Program describes the envelope within which processing and packaging of radioactive waste is accomplished to provide reasonable assurance of compliance with Low-Level Radwaste regulations and requirements. This procedure is applicable to SSES installed systems, temporary systems and equipment provided by vendors for processing, packaging, transportation, and disposal of applicable waste forms.

3.0 REFERENCES

3.1 49CFR100 - 177, Transportation

3.2 10CFR20, Standards for Protection Against Radiation

3.3 10CFR61, Licensing Requirement for Land Disposal of Radioactive Waste

3.4 10CFR71, Packaging and Transportation of Radioactive Material

3.5 40CFR261, Identification and Listing of Hazardous Waste

3.6 SSES Technical Specifications Section 3/4.11.3, Solid Radwaste System

3.7 SSES Technical Specifications Section 6.13, Process Control Program (PCP)

3.8 NUREG 0800, Standard Review Plan 11.4 Solid Waste Management Systems

3.9 Technical Position on Waste Form Rev. 1, 1991

3.10 Technical Position on Radioactive Waste Classification, Rev. 0, 1983

3.11 Technical Position on Concentration Averaging and Encapsulation, Rev. 0, 1995

3.12 Regulatory Guide 1.21, Measuring, Evaluating and Reporting Radioactive Material in Solid Wastes and Release of Radioactive Material in Liquid and Gaseous Effluents from Light Water Cooled Nuclear Power Plants

3.13 Regulatory Guide 1.143, Design Guidance of Solid Waste Management Systems

3.14 Regulatory Guide 7.1, Administrative Guide for Packaging and Transporting Radioactive Material

3.15 ANSI/ANS 40.35, Volume Reduction of Low Level Radioactive Waste

3.16 ANSI/ANS40.37, Mobile Radioactive Waste Processing Systems

3.17 ANSI/ANS 55.1, Solid Radioactive Waste Processing System for Light Water Cooled Reactor Plant

3.18 Pacific Nuclear Dewatering System Topical Report No. TP-02-P-A, Rev. 3

3.19 Pacific Nuclear Solidification Process Control Procedure No. PT-51-WS, Rev. 40

3.20 Scientific Ecology Group Mobile Incontainer Dewatering and Solidification System (MDSS) Topical Report No. STD-R-05-011-P-A, Rev. 2

3.21 Disposal Site Criteria for Barnwell, S.C.

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

3.23 DHEC-HIC-PO-006, South Carolina Certificate of Compliance for CNSI Overpack High Integrity Containers

3.24 DHEC-HIC-PL-012, South Carolina Certificate of Compliance for Vectra Technologies, Inc. High Integrity Container

3.25 DHEC-HIC-PL-005, South Carolina Certificate of Compliance for Scientific Ecology Group, Inc. High Integrity Containers

3.26 DHEC-HIC-PL-017, South Carolina Certificate of Compliance for Scientific Ecology Group, Inc. High Integrity Containers

3.27 PLA-1237, Process Control Program, August 17, 1982

3.28 Review of Process Control Program for Susquehanna, Unit 1, Youngblood to Curtis, September 30, 1982

3.29 Safety Evaluation NL-93-008, Solid Radwaste Waste Processing Services Utilizing Pacific Nuclear Processing System

3.30 IE Bulletin 79-19, Packaging of Low Level Radioactive Waste for Transportation and Burial

([1]) 3.31 NRC Information Notice No. 90-50, Minimization of Methane Gas Generation in Plant Systems and Radwaste Shipping Containers.

([2]) 3.32 Generic Letter 91-02, Reporting Mishaps Involving LLW Forms Prepared for Disposal

([3]) 3.33 SOOR-1-90-148, Barnwell Received Container Pressurized with Flammable Gas

([4]) 3.34 SOOR 1-90-172, Incorrect Sampling Method Used on Resin Liner

([5]) 3.35 SOOR 1-91-322, Dose Rates on Container Higher Than Expected

([6]) 3.36 SOOR 94-581, Spent TIP Found Unexpectedly in TIP Room.

4.0 RESPONSIBILITIES

4.1 Effluents Management Supervisor responsibilities:

4.1.1 Developing and implementing programs and procedures for radioactive waste processing, packaging, transportation and disposal.

4.1.2 Maintaining the overall radwaste program to ensure compliance with applicable radiological and shipping regulations.

4.1.3 Ensuring personnel who perform support activities such as processing, packaging, and transportation of low level radioactive waste are available and meet all qualifications and training required by SSES procedures.

4.1.4 Collecting, maintaining, reviewing and submitting accurate data/information related to waste stream quantity and nuclide composition for inclusion into Annual Radioactive Effluent Release Report and State DER-BRP Quarterly Report.

4.2 Supervisor - Operations Technology responsibilities:

4.2.1 Providing technical assistance to Effluents Management personnel. This includes interpretations of state, federal, and disposal facility regulations regarding new, imminent, or proposed regulatory changes governing processing, packaging, transportation, and disposal.

4.2.2 Maintaining a current copy of local, state, federal and disposal facility regulations pertaining to disposal and transportation of low level radioactive waste.

4.2.3 Coordinating the submittal of the Annual Radioactive Effluent Release Report as per the SSES Technical Specifications.

4.3 Power Production Engineer - Effluents Management responsibilities:

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

4.3.2 Ensure test data or rationale is available to justify applicable solidification and dewatering functions of each waste type, or any combinations, to address disposal and regulatory agencies' requirements.

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

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

4.3.5 Define waste streams based on generator, filtration media and means of processing.

4.3.6 Collecting, reviewing and submitting data related to the reporting of mishaps and results of PCP surveillance specimen examinations to applicable regulatory agencies.

4.4 Health Physicist - Effluents Management responsibilities:

4.4.1 Maintain a sampling and analysis program to ensure 10CFR61 compliance.

4.4.2 Ensure procedures are adequate to provide for proper packaging and shipment of waste to ensure compliance with all applicable regulations.

4.4.3 Evaluate services provided by various vendors to ensure contracted waste packaging, processing, and transportation services are performed in the most efficient and economical method, as required by applicable regulatory agencies.

4.4.4 Perform the duties of HP Foreman - Effluents Management as specified in this procedure in his absence.

4.4.5 Coordinate radioactive material evaluation of product acceptability for disposal at specific disposal facilities.

4.5 Radwaste Supervisor responsibilities:

4.5.1 Ensure Solidification/Dewatering Equipment is operated in accordance with approved operating procedure, including vendor supplied equipment.

4.5.2 Ensure appropriate waste solidification and dewatering records are generated.

4.5.3 Interface with station support groups to ensure proper implementation of process control programs.

4.5.4 Provide direction to contractor personnel involved in solid waste processing activities including:

a. Ensuring test data is available to justify specific processing techniques.

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

c. Coordinating pre-processing and post-processing treatment activities.

d. Evaluating services provided to ensure efficient and economical methods are used.

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

4.5.6 Interface with HP Foreman - Effluents Management for liner and cask selection for solid waste shipping activities.

4.5.7 Ensure proper marking of containers prior to filling.

4.5.8 Ensure solidification/dewatering personnel are adequately trained per NTP-QA-42.6.

4.5.9 Estimate classification of waste for container selection and processing method.

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

4.5.11 Ensure proper inspections and documentation are complete prior to use of a High Integrity Container and ensure that container is properly used up to the point of transfer to HP Foreman - Effluents Management.

4.5.12 Complete and process High Integrity Container User Certification Statement to ensure the container is used properly.

4.6 Chemistry Supervisor responsibilities:

4.6.1 Perform required sample preparation and analysis in accordance with approved chemistry procedures.

4.6.2 Perform test solidification if required. Store test solidification billet if required.

4.6.3 Provide density of initial and final waste form.

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

4.6.5 Complete Chemistry portion of the Solidification and Dewatering Records.

4.6.6 Ensure personnel are adequately trained per NTP-QA-41.2.

4.6.7 Provide chemical analysis and/or treatment support as necessary for use of High Integrity Containers and liners.

4.7 HP Foreman - Effluents Management responsibilities:

4.7.1 Interface with Radwaste Supervisor for liner and cask selection and scheduling for solid waste shipping activities.

4.7.2 Complete, process, and file radioactive waste shipping documentation.

4.7.3 Storage of packaged radioactive waste within the radwaste facilities.

4.7.4 Determine waste classification and description of solidified, dewatered, and other packaged waste.

4.7.5 Final disposition of solidified, dewatered and other packaged waste.

4.7.6 Ensures SSES is a registered user of applicable High Integrity Containers at specific disposal facilities.

4.7.7 Ensures HP personnel involved with radioactive waste handling have received Radwaste Worker training per NTP-QA-42.6.

4.7.8 Evaluate vendor services provided to ensure efficient and economical methods are used.

4.7.9 Complete and process Cert:-·cation Statement for Disposal of High Integrity Containers as required by applicable regulatory agencies.

4.7.10 Process and package Cartridge Filters, Dry Active Waste, solid sealed sources and other non process wastes.

(4) 4.7.11 Collection of DAW and non-process waste (10CFR61) samples.

4.8 Manager-Nuclear Assessment Services responsibilities:

4.8.1 Perform periodic audit of implementation of this program and review of radwaste service vendor's QA Programs.

4.8.2 Inspection of Radwaste Containers as required by applicable procedures.

4.8.3 Ensure process controls are adhered to by inspection of test solidification, waste volumes, solidification agent additions, product acceptability checks, dewatering process sequence/acceptance criteria and records review.

4.8.4 Inspection of packaging, storage, and shipping activities, as required by applicable procedures.

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

4.10 Solidification/Dewatering/Services Vendor responsibilities:

4.10.1 Provide solidification, dewatering and/or volume reduction services in accordance with a valid contract for said services.

4.10.2 Provide test data or make data available for PP&L review during vendor audits to demonstrate that their services and equipment meet the applicable regulatory and disposal facility limitations for the service they are providing.

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

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

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

4.10.6 Complete applicable sections of Solidification and Dewatering Records required for each container processed.

4.10.7 Ensure pre-qualification test data for each waste form shall be submitted to the Nuclear Regulatory Commission.

4.10.8 Provide a description of the equipment/process that is used in processing waste.

(4) 4.10.9 Obtain waste samples from processing equipment in accordance with approved operating procedures.

(3) 4.10.10 Perform all pre and post treatment activities as determined by Radwaste Supervisor.

4.11 Manager - Nuclear Procurement responsibilities:

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

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

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

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

4.12 Manager - Nuclear Systems Engineering is responsible for providing engineering support as required for operation of assigned radwaste systems and equipment.

4.13 Manager - Nuclear Maintenance responsibilities:

4.13.1 Calibration and maintenance of applicable plant equipment in Radwaste Processing Systems.

4.13.2 Provide maintenance personnel to support processing, packaging and transportation of low level radioactive waste.

4.14 Licensing Supervisor responsibilities:

4.14.1 Submitting transportation cask user registration requests to NRC per 10CFR71.12.

4.14.2 Submitting to the NRC the Annual Radioactive Effluent Release Report.

4.14.3 Coordinating and submitting to the NRC the reports required as a result of Condition Report (CR) events, investigations, and resolutions.

4.15 Manager - Nuclear Training responsibilities:

4.15.1 Providing training and re-training in applicable regulatory requirements to personnel directly involved in transfer, processing, packaging, storage, and transport of radioactive waste.

4.15.2 Maintaining a record of training, attendees, and subject material for all Low Level Radioactive Waste training.

4.16 Manager - Nuclear Security is responsible for notifying appropriate law enforcement agencies in the event of lost radioactive material shipments.

5.0 DEFINITIONS

5.1 APPROVED CONTAINERS: Approved means approval issued or recognized by the NRC for use in shipment of radioactive material.

5.2 BATCH: The total volume of waste contained in a liner, isolated - waste mixing tank - spent resin tank - concentrates tank or - phase separator that has been sampled for solidification/dewatering.

5.3 BILLS OF LADING: Shipping papers or manifests serving a similar purpose and containing the information required by 49 CFR 172.202, 203, and 204.

5.4 CARRIER: Means a person engaged in the transportation of passengers or property. (10CFR71.4)

5.5 CERTIFICATE OF COMPLIANCE: License requirements established by the Nuclear Regulatory Commission for the use of approved Radioactive Material Shipping Containers.

5.6 CHELATING AGENT: A chemical which combines with a metal so as to form a ring structure held by coordination bonds.

5.7 CHEMICAL FORM: The chemical content of the Radioactive Material being shipped.

5.8 CLOSED TRANSPORT VEHICLE: A vehicle equipped with a securely attached exterior enclosure, which during normal transport, restricts the access of unauthorized persons to the cargo space. (49 CFR 173-403[C])

5.9 COMPOSITE SAMPLE: A mixture of samples collected representing conditions at time of sampling, from the same sampling point, at different times.

5.10 CONSIGNEE: The individual or organization to whom the shipment is consigned or intended.

5.11 CURING TIME: The time allowed for the solidified product to set prior to its evaluation for product acceptability.

5.12 DECAY HEAT: The heat produced by radioactive decay, usually expressed in Watts or BTU/hr, but can be related to Curie Content.

5.13 DEWATERED: The removal of free liquid from solid material to a point where less than 1% for HIC's and less than 0.5% for steel liners by waste volume remains as required by the disposal facility license.

5.14 EXCLUSIVE USE VEHICLE (a/k/a: Sole Use or Full Load): Shipment from a single consignor having the exclusive use of a transport vehicle and for which all initial, intermediate. and final loading and unloading is carried out by, or under the direction of the consignor, consignee, or his designated agent. (49 CFR 173.403[i])

5.15 FREE LIQUID: Liquid which is still visible after solidification or dewatering is complete, or is drainable from the low point of a punctured container.

5.16 HAZARDOUS MATERIAL - A substance or material, including a hazardous substance which has been determined by the Secretary of Transportation to be capable of posing a threat to health, safety, and property when transported in commerce, and which has been so designated. The term includes hazardous substances, hazardous wastes, marine pollutants, and elevated temperature materials as defined in 49CFR171.8, materials designated as hazardous under the provisions of 49CFR172.101 and 172.102, and materials that meet the defining criteria for hazard classes and divisions in 49CFR173.

5.17 HAZARDOUS WASTE: Waste which contains material listed in 40 CFR 261, Subpart D and/or exhibits one or more of the four characteristics cited in 40 CFR 261, Subpart C, and is not excluded from regulation under 40 CFR 261, Subpart A.

5.18 Hazmat Employee means a person who is employed by a Hazmat Employer who during the course of employment:

5.18.1 Loads, unloads or handles hazardous materials.

5.18.2 Prepares hazardous materials for transportation.

5.18.3 Modifies, marks, or otherwise represents containers, drums, or packagings as qualified for use in transport of hazardous materials.

5.18.4 Is responsible for safety of transporting hazardous material.

5.19 HIGH INTEGRITY CONTAINER (HIC): A disposal site approved container that has an expected life of 300 years and provides the structural stability to meet disposal requirements.

5.20 HIGHWAY ROUTE CONTROLLED QUANTITY: A quantity, the aggregate radioactivity of which exceeds that specified in (49 CFR 173.403[1]).

5.21 ISOTOPIC ANALYSIS: The identification of the isotopic elements involved in a sample of Radioactive Material.

5.22 LABELING: Labels applied to a container denoting the contents of the container and degree of hazard associated with the containers. The labels are identified as the White I label, the Yellow II, and Yellow III label. A label stating Radioactive - LSA can also be applied to a container when appropriate. (49 CFR 172, Subpart E)

5.23 LIMITED QUANTITY OF RADIOACTIVE MATERIAL: Means a quantity of radioactive material not exceeding the material package limits specified in 49 CFR 172.423, and which conforms with requirements specified in 49 CFR 173.421. (49 CFR 173.403[m])

5.24 LINER: Steel container in which dewatered or solidification product is deposited.

5.25 LOW SPECIFIC ACTIVITY: Material in which the activity is essentially uniformly distributed and in which the estimated average concentration per gram of contents does not exceed the specification as stated in 49 CFR 173.403 (n).

5.26 LOW LEVEL RADIOACTIVE WASTE (LLRW): Radioactive waste generated as a result of operation of SSES, excluding spent fuel or by product material, is classified by the NRC as low-level radioactive waste. LLRW does not include "greater than class C" waste.

5.27 MIXING RATIO: The ratio of waste to cement and additives required for satisfactory solidification.

5.28 MIXING RECIPE: The amount of waste, cement and additives mixed to solidify waste.

5.29 MIXED WASTE: A mixture of low level radioactive and hazardous waste.

5.30 NORMAL FORM RADIOACTIVE MATERIALS: Means radioactive materials which do not meet the requirements of Special Form Radioactive Materials (49 CFR 173.403[s]).

5.31 PLACARDING: A label affixed to all four sides of the transport vehicle denoting the presence and level of Radioactive material on the vehicle. (49 CFR 172, Subpart F)

5.32 PROCESS CONTROL PROGRAM (PCP): Program which contains the sampling, analysis, and formulation determination by which solidification of radioactive wastes from liquid systems is assured.

5.33 RADIOACTIVE MATERIAL: For purposes of transportation only, material in which the activity is essentially uniformly distributed and the estimated specific activity exceeds 0.002 microcuries per gram of material. (49 CFR 173.403[y] and [aa])

5.34 RADWASTE WORKER: A Hazmat Employee involved with the collection, packaging, and transportation of radioactive waste.

5.35 SEALED SOURCES: Any by-product material that is encased in a capsule designed to prevent leakage o· escape of by-product material.

5.36 SOLIDIFICATION: A conversion of radioactive materials from liquid and solid systems to a homogeneous (uniformly distributed) monolithic, immobilized solid with definite volume and shape, bounded by a stable surface of distinct outline on all sides (free standing).

5.37 SOLIDIFIED RADWASTE: Wet waste which is solidified (e.g. evaporator concentrates, sludge), meets the free liquid criteria, and satisfies applicable transportation and disposal site requirements. Dewatered resins or filter sludge satisfying the two latter criteria shall also be defined as solidified radwaste.

5.38 SPECIAL FORM RADIOACTIVE MATERIALS: Radioactive material that is either a single piece, or is contained in a sealed capsule, that can be opened only be destroying the capsule and meets the additional requirements specified in 49 CFR Part 173.403(z).

5.39 STABLE AND UNSTABLE WASTE FORMS: Shall be defined as stated in 10CFRPart 61 and other supporting regulatory documents.

5.40 TEST SOLIDIFICATION: The mixing of waste(s) and solidification agents in the laboratory to support selection of mixing ratios and provide insurance for final product acceptability.

5.41 TRANSPORT INDEX (TI): The dimensionless number placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. The transport index will be determined in accordance with 49 CFR 173.403(bb).

5.42 TYPE "A" PACKAGING: Packaging which is designed in accordance with the general packaging requirements of 49 CFR 173.24, and which is adequate to prevent the loss or dispersal of the radioactive contents, and to retain the efficiency of its radiation shielding properties if the package is subjected to the test described in 49 CFR 173.465 or 173.466, as appropriate. (49 CFR 173.403[gg])

5.43 TYPE "A" QUANTITY RADIOACTIVE MATERIAL: That material which may be transported in Type "A" packaging. (49CFR 173.431[a])

5.44 TYPE "B" PACKAGING: Packaging which meets the standards for Type "A" Packaging, and in addition, meets the standards for the hypothetical accident conditions set forth in 10CFR71. (49 CFR 173.403[hh])

5.45 TYPE "B" QUANTITY RADIOACTIVE MATERIAL: That material which may be transported in Type "B" packaging. (49CFR 173.431[b])

5.46 WASTE STREAM: A by-product of a process system or component with unique characteristics and maintained separate from other waste streams.

5.47 WASTE TYPE: Specific contents of a liner or tank which may contain one or multiple waste streams, the category of waste suitable for a particular means of processing.

5.48 WASTE PRE-CONDITIONING: The physical or chemical adjustment of the waste to bring it within an established envelope to assure solidification.

6.0 PROCEDURE

6.1 CONTRACTED VENDOR SERVICES

6.1.1 Solidified radwaste processing services are provided by Vectra, Inc. for waste types included in this Process Control Program.

6.1.2 NRC approved Topical Report TP-02-P-A, describes Vectra Inc. waste processing equipment, methods and verification of acceptable waste forms for dewatering.

6.1.3 Vectra Inc. Solidification Process Control Procedure PT-51-WS, describes waste processing equipment, methods and verification of acceptable waste forms for solidification. This procedure does not provide stability per the Branch Technical Position on Waste Form, Rev. 1.

6.1.4 Volume reduction services are provided by Scientific Ecology Group (SEG) for waste types included in the Process Control Program.

6.1.5 NRC approved Topical Report STD-P-05-011-P-A, describes Scientific Ecoplogy Group (SEG) waste processing equipment, methods and verification of acceptable waste forms for dewatering and solidification. Selected solidified waste forms have been approved to provide stability per the Branch Technical Position on Waste Form, Rev. 1.

6.1.6 Other contracted vendor services which are required for solidification, dewatering and volume reduction services shall be evaluated to the requirements stated in this Process Control Program on a case by case basis.

6.2 WASTE TYPES

The following waste types shall be processed in accordance with this procedure or in combinations as defined. The waste should be dewatered whenever possible to minimize disposal volume.

6.2.1 Evaporator Concentrates

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

(1) Condensate Demineralizer regeneration effluent

(2) Decon Shop drains

(3) Chemistry Laboratory sink drains

(4) Auxiliary Boiler blowdown effluent

b. The constituents of this waste stream may include the following:

(1) Tri-Sodium Phosphate

(2) Sodium Sulfate

(3) Phosphoric Acid

(4) Sulfuric Acid

(5) Sodium Hydroxide

(6) Decontamination solutions

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

c. Evaporator Concentrates in the range of 0-24 weight percent sodium sulfate (equivalent) shall be solidified for final disposal.

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

6.2.2 Mixed Solids

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

(1) LRW Filter Media and drain liquid

(2) Sump Sludge

(3) Ultrasonic Resin Cleaner Waste (URC Waste)

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

(1) Diatomaceous Earth

(2) Powdered Resins

(3) Fibrous material

(4) Carbon material

(5) Corrosion products

(6) Various solids and dirt in small concentrations

c. Mixed Solids may be solidified or dewatered for final disposal.

d. Each waste stream should be processed separately.

6.2.3 RWCU Filter Media

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

b. The constituents of this waste stream may include anion and cation powdered resin, corrosion and contaminants removed from the primary coolant.

c. RWCU Filter Media shall be dewatered in High Integrity Containers. If this waste must be solidified, Technical Specification 3/4.11.3 action statement must be performed.

6.2.4 Condensate/Radwaste/Atmospheric Demineralizer Bead Resin

a. Resins from the Condensate Demineralizers, Liquid Radwaste Demineralizer and vendor provided demineralization are collected in the Spent Resin Tank or transferred directly to a liner/High Integrity Container. This is considered to be Condensate/Radwaste/Atmospheric Demineralizer Bead Resin.

b. The constituents of this waste stream may include various types of anion, cation, mixed bead resin and corrosion and contaminates removed from liquid waste streams.

c. Bead Resin may be used to demineralize Liquid Waste in either steel liners or High Integrity Containers.

d. Condensate Demineralizer bead resin should be ultrasonically cleaned prior to collection in the Spent Resin Tank.

e. Bead Resin may be solidified or dewatered for final disposal.

f. Bead Resin may also be processed by volume reduction methods which include drying, incineration, compaction, use as fill materials or other evaluated method(s) on a case by case basis.

6.2.5 Cartridge Filters

a. Cartridge Filter waste type consists of the following waste streams and constituents:

(1) CRD Filters - CRD or other filters and small un-irradiated primary system equipment such as valves, CRD lift pump filters, Rinse Tank filters and other metal components.

(2) RWCU Septa - Septa from RWCU Filter Demineralizer including septa from Fuel Pool Cleanup Filter Demineralizer.

(3) Radwaste Filters - including degasifier filters and other fiber or paper filters other than primary system.

(4) Underwater Vacuum Filters - non-process filters generated from wet cleaning activities.

b. Cartridge Filters may be processed by the following methods:

(1) Emplacement in a cement matrix in a steel drum/liner or in a High Integrity Container.

(2) Dried to a point where no free liquid is visible. Absorbent material may be included to absorb unintentional and incidental amounts of liquids.

(3) Dewatered if drying is impractical.

(4) Incineration or other volume reduction methods.

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

d. Each cartridge filter waste stream should be packaged separately unless analyzed prior to packaging in accordance with the requirements of this procedure.

6.2.6 Irradiated Hardware

a. Irradiated hardware is neutron activated metal removed from the internal area of the reactor pressure vessel. This waste stream is considered Irradiated Hardware.

b. The constituents of this waste stream may include control rod blades, LPRMS's, IRM's, TIP's and components expended during hardware processing and packaging activities. Startup sources may also be processed as part of this waste stream.

c. Irradiated hardware is packaged in steel liners for disposal.

d. Liquid shall be drained to ensure free liquid Acceptance Criteria are met.

e. Irradiated hardware shall not be mixed with any other waste type in final processing.

6.2.7 Dry Active Waste (DAW)

a. Dry Active Waste is a waste stream.

b. The constituents of this waste stream consist of contaminated paper, plastic, wood, metal and other discarded material.

c. Dry Active Waste shall be processed by volume reduction methods which may include incineration, compaction, decontamination and metal melting.

d. At a minimum, DAW shall be packaged in strong-tight containers for disposal.

6.2.8 Liquid Oil Waste or Petroleum Based Materials

a. The constituents of this waste stream may include turbine lubricating oil, EHC fluid and other petroleum based materials.

b. Contaminated Liquid Oil Waste generated at the facility should be processed by a decontamination system, solidified for final disposal, volume reduced by incineration, or other acceptable methods.

c. Liquid Oil Waste at concentrations 1% and greater may be solidified provided the following are adhered to:

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

(2) The Liner is NOT SHIPPED to a disposal facility without prior disposal facility approval.

6.2.9. Solid Sealed Sources

a. Solid Sealed Sources requiring disposal shall be packaged for disposal as requested by Health Physics Supervision.

b. Method of disposal is dependent on waste class of the Solid Sealed Source and disposal facility requirements.

c. Acceptable methods of disposal include:

(1) Placement within a container consisting of another waste type provided:

(a) The source contains isotopics already in the waste.

(b) The source activity is significantly less than the waste activity.

(2) Class B and C sources shall be stabilized within an approved solidification or encapsulation media.

6.2.10 Activated Carbon

a. Activated Carbon from vendor provided liquid waste demineralization is transferred directly to a liner/High Integrity Container. This waste stream is considered Activated Carbon.

b. The constituents of this waste stream may include various types of charcoal, ion specific carbon filter media and corrosion and contaminants from liquid waste streams.

c. Activated Carbon may be solidified, dewatered or processed by volume reduction methods which include drying, incineration, compaction, use as fill materials or other evaluated methods on a case by case basis.

6.2.11 A Waste Type that is combined with a known amount of hazardous waste or "Mixed Waste" shall be processed for final disposal pending approval obtained from the processing and disposal facilities, Environmental Protection Agency, U.S. Nuclear Regulatory Commission and other regulatory agencies as required.

6.2.12 Waste types containing chelating agents within the range of 0.1 to 8.0 percent by weight shall be processed to a stable waste form in accordance with and authorized by disposal facility requirements and approvals.

6.2.13 Various other materials not specifically identified as waste types will be evaluated for solidification, dewatering volume reduction or other processing on a case by case basis.

(4) 6.3 RADIOACTIVE WASTE ANALYSIS AND CLASSIFICATION

6.3.1 Radionuclide concentrations of radioactive waste are used to classify waste for shipping and disposal. Radionuclide concentrations should be determined based upon isotopic analysis, volume and weight of final waste form.

6.3.2 The 10CFR61 Compliance Program establishes a methodology for characterizing radioactive waste through the use of correlation factors. This program shall require as a minimum that:

a. Samples representative of Susquehanna's waste streams are collected and analyzed such that results are obtained from a designated laboratory at least every two years (Class A) for development of specific correlation factors. Waste streams known or suspected to be classified Class B or Class C should be analyzed on an annual basis.

b. Technical basis documentation and justification of correlation factors are developed for each waste stream and are acceptable for use. Periodic evaluations and necessary adjustments to established ratios are performed in a timely manner.

c. Correlation factors are re-evaluated following significant changes (greater than a factor of 10) in plant operations (such as significant changes in fuel leakage, radwaste operations, or equipment).

6.3.3 Determination of waste classification shall be in accordance with 10CFR61.55, Waste Classification, and its supplementary Branch Technical Position on Radioactive Waste Classification as follows:

a. Class A - Usually segregated from other waste classes at the disposal facility. Physical form and characteristics shall meet the minimum requirements specified in 10CFR61.56(a). If the stability requirements in 10CFR61.56(b) are met, the waste does not have to be segregated for disposal.

b. Class B - Physical form and characteristics shall meet both the minimum and stability requirements specified in 10CFR61.56.

c. Class C - Physical form and characteristics shall meet both the minimum and stability requirements specified in 10CFR61.56. In addition, measures shall be taken at the disposal facility to protect against inadvertent intrusion.

6.3.4 Isotopic analysis may be performed by:

a. Gamma spectrometry of a sample and use of correlation factors.

b. Direct gamma spectrometry of waste and use of correlation factors.

c. Complete radionuclide analysis of waste sample.

d. Dose to Curie calculations.

e. Activation analysis.

6.3.5 Volume and weight of final waste may be determined by:

a. Calculation using analytically derived sample densities.

b. Calculation using standard waste densities.

c. Direct measurement of volume and weight.

d. Acceptable methods described in the Technical Position on Concentration Averaging and Encapsulation.

6.3.6 If samples of waste are used for classification, sampling program shall include:

a. Samples shall be obtained and analyzed for each batch of wet waste if practical and ALARA.

b. Preferentially, samples should be taken for analysis following processing into a final waste form.

c. Samples taken prior to final processing should enable results of sample analysis to be directly translated to final waste form.

d. Bead resin and Activated Carbon used for chemical demineralization shall be sampled after having has been depleted in process.

e. Solidification/Dewatering Services Vendor or another qualified individual shall obtain required samples.

6.3.7 Preparation of waste for sampling or analysis

a. Wet Waste Collection tanks shall be recirculated in accordance with approved operating procedures prior to sampling or analysis.

b. Waste processing in solidification liners/High Integrity Containers shall be mixed in accordance with approved procedures prior to sampling or analysis.

c. Wet waste to be processed may also be mixed, recirculated and sampled or analyzed from mobile processing equipment.

(5) 6.3.8 Final waste form containing a mixture of waste types or streams shall be individually analyzed to determine radionuclide concentrations. The summation of each individual radionuclide concentration shall be used to characterize the final waste form for shipping and disposal. Waste types or streams of different waste classes (estimated by historical precedent or projected analysis) shall not be mixed.

6.3.9 Deviations from sampling and analysis requirements shall be approved by Chemistry Supervisor and Effluents Management Supervision.

(1) (3) 6.4 TESTING/TREATMENT OF SOLIDIFIED RADWASTE FOR COMBUSTIBLE GASES

6.4.1 Solidified waste shall be tested and/or treated to ensure it is not capable of generating quantities of flammable or toxic gases, vapors or fumes which may be harmful to persons transporting, handling, storing or disposing of the waste.

6.5 RADIOACTIVE WASTE SOLIDIFICATION

6.5.1 General Requirements

a. Wet Waste Types which may be solidified in High Integrity Containers are Evaporator Concentrates, Mixed Solids, Condensate/Radwaste Demineralizer Bead Resin, RWCU Filter Media and Liquid Oil Waste or Petroleum Based Material, Cartridge Filters, Solid Sealed Sources and Activated Carbon.

b. High Integrity Containers shall be used to meet the stability criteria in accordance with federal and disposal facility regulations.

c. Solidification processing shall be conducted by qualified SSES or Solidification/Dewatering/ Services Vendor personnel.

d. The solidification process shall be operated in accordance with approved procedures. Procedures shall specify waste stream, amounts of solidification agent and additives or method for determination.

6.5.2 Waste Preconditioning

a. Waste preconditioning requirements shall be determined by chemistry analysis.

b. Preconditioning of waste shall be performed if required prior to determining mixing ratios.

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

(1) A high or low pH condition, as determined by chemical analysis.

(2) Liquid content of the batch is out of the acceptable envelope for solidification.

(3) Solids content of the batch is out of the acceptable envelope for solidification.

(4) Known potential problem chemicals and constituents within waste that may adversely affect setting and stability of cement-solidified waste form.

d. Waste preconditioning shall be performed in accordance with approved procedures to ensure waste is within the acceptable envelope for solidification.

e. Upon completion of waste preconditioning, additional samples, as required, shall be obtained in accordance with Radioactive Waste Analysis and Classification section of this procedure.

6.5.3 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 reviewed by Plant Operations Review Committee (PORC).

c. Chemistry Group determines:

(1) Density of the waste samples.

(2) Specific gravity of Sodium Sulfate Solution in Evaporator Concentrates.

d. Solidification/Dewatering/Services Vendor determines if the final mixing ratios are within the acceptable envelope for solidification.

e. For solidification performed on site:

(1) Chemistry Group shall perform test solidification of waste as required by Test Solidification section of this procedure.

(2) Chemistry Group determines mixing ratios to ensure proper solidification.

f. For solidification performed offsite:

(1) Solidification/Dewatering/Services Vendor shall perform test solidification of waste as required by Test Solidification section of this procedure.

(2) Solidification/Dewatering/Services Vendor determines mixing ratios to ensure proper solidification.

6.5.4 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 stream.

(2) When sample analysis fall outside the established range and criteria indicating a change in waste characteristics.

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

(4) When requested by Radwaste Supervisor.

(5) Mixing of materials shall be accomplished in a manner that duplicates, to the extent practical, mixing conditions that are obtained with full-scale mixing in container.

(6) Curing shall be performed under conditions similar to those used in laboratory qualification test program.

b. Upon failure of a test solidification, an LCO is entered, additional samples shall be obtained, alternative solidification parameters are determined and a subsequent test verifies solidification. Test solidification shall be performed on each subsequent batch of the same waste stream until at least three (3) consecutive initial test solidification demonstrate acceptability in accordance with Technical Specification 3/4.11.3.

c. Quality Control shall verify test solidification acceptability and indicate the acceptability on the surveillance documentation. The acceptability requirements are defined in the PCP Surveillance Specimen section of this procedure.

d. Extra sample volume for backup testing shall be disposed of after acceptable container checks are completed.

e. High Integrity Container test solidification billets should be disposed after acceptable container checks are completed.

f. Test solidification should be performed with samples from waste obtained as follows:

(1) In accordance with Radioactive Waste Analysis and Classification section of this procedure.

(2) Sampling of the solids in the container and the liquids used for hydration, then mixed to the ratios that exist in the container.

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

h. Cement, water type and additives to be used in actual solidification shall be used in preparation of test solidification.

6.5.5 PCP Surveillance Specimens

a. High Integrity Container test solidification billets shall be examined and tested for acceptability after the specified cure time for:

(1) Liquid on surface of solidified product less that 1.0% by waste volume.

(2) Visible defects, such as cracking, spalling, or disintegration.

(3) Strength by physically poking the surface of solidified product with a rigid unyielding device. Nominal surface denting is acceptable.

b. If cement solidification in steel liners is NRC approved to provide stability, PCP surveillance specimen examination testing and reporting is required in accordance with the Branch Technical Position on Waste Form, Rev. 1.

6.5.6 Curing Time

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

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

c. Deviations from minimum required curing time shall be approved by Radwaste Supervisor and justifications documented in remarks section of Solidification Record.

6.5.7 Solidification Product Quality

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

b. Pre-qualification mixing ratios are based on laboratory testing using non-radioactive waste materials.

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

(1) Test solidification performed periodically as stated in Test Solidification section of this procedure.

(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 solidified product for liquid on surface of product not to exceed 1.0% by waste volume.

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

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

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

6.5.8 Handling of Unacceptable Solidified Waste Containers.

a. If a solidified waste container does not meet acceptability requirements, a Condition Report (CR) shall be issued.

b. If the reason for unacceptability is free liquid:

(1) The free liquid will be removed; or

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

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

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

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

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

(1) A test solidification shall be performed using the actual ratio of cement and waste in the container, provided sufficient sample volume remains to complete this item.

(2) Quality Control shall check the product for acceptability in accordance with Container Checks section of this procedure.

(3) The container is considered to meet acceptable waste form criteria for shipping provided the subsequent test solidification and/or container checks are acceptable to Quality Control and concurrence of the Radwaste Supervisor is obtained.

(4) The above apply only if the Effluents Management Supervisor determines that the product can be classified as "Class A Unstable" or is placed in a High Integrity Container or structure that provides stability in accordance with 10CFR61 and the disposal facility criteria.

e. If the product does not solidify properly in accordance with the specific solidification procedure, the following is required:

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

(a) Effluents Management Supervision

(b) Solidification Vendor - Operations

(c) Solidification Vendor - Engineering

(2) Disposal facilities 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 Power Production Engineer-Effluents Management.

(5) Final disposition shall be reviewed by Plant Operations Review Committee (PORC).

(6) Records shall be kept and documentation supportive of final disposition attached to the solidification record package.

(7) The liner may be shipped after Q.C. review of documentation is complete and disposal facility concurrence is received in letter form.

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

g. Quality Control shall re-verify acceptability of solidified product by performance of Container Checks.

6.5.9 Capping of Solidified Waste Containers

a. The requirements of Solidification Product Quality section of this procedure shall be met prior to capping the container.

b. If the container is not equipped with a passive vent and its contents are within the requirements of Low Specific Activity (LSA) ensure one of the following:

(1) The container should be shipped within (10) ten days after capping; or

(2) If a container has been capped for longer than (10) days, it shall be opened, vented, and re-capped within (10) ten days of shipment.

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

(1) The hydrogen generated shall 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 shall be inerted with a diluent to assure that oxygen is limited to less than 5% by volume in those portions of the package which could have hydrogen greater than 5%.

6.5.10 Solidification Agent Control

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

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

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

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

(2) Sodium Silicate is acceptable provided the bag containing the additive indicates Anhydrous Sodium Metasilicate.

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

d. Other additives may be used for enhancement of solidification process as specified in the solidification procedure and documented in the solidification records.

6.5.11 Radioactive Waste Solidification Records

A Solidification Record Sheet (Form NDAP-QA-0646-1) shall be completed for each container filled with solidification products.

Completion of the Solidification Record Sheet and the required accompanying documentation shall be as follows:

a. The Radwaste Supervisor is responsible for initiating this form and completing Parts 1 and 2.

b. Effluents Management Supervision, Chemistry and Solidification/Dewatering/Services Vendor personnel shall provide and check off the required documentation specified in Part 3.

c. Quality Control shall provide review as required for the Solidification Records.

6.6 RADIOACTIVE WASTE DEWATERING

6.6.1 General Requirements

a. Waste Streams which may be dewatered in either High Integrity Containers or steel liners are LRW Filter Media, Ultrasonic Resin Cleaner Waste, Sump Sludge, RWCU Filter Media, Condensate/Radwaste Demineralizer Bead Resin, Cartridge Filters and Activated Carbon. The type of container used shall be based on the waste classification and stability criteria in accordance with federal and disposal facility regulations.

b. Dewatering of Radioactive Waste shall be performed by qualified SSES or Solidification/ Dewatering Services Vendor personnel.

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

d. Dewatering procedures shall be based on documented test data that has demonstrated the ability to achieve free liquid limits as specified by disposal facilities and applicable regulatory agencies. Liquid volume and drainage calculations and actual drainage verification may also be used to meet free liquid limits.

e. High Integrity Containers shall be used for disposal when the concentration of radionuclides with half-lives greater than 5 years exceeds 1 μCi/cc.

f. Each waste stream which may be dewatered should be characterized by the Solidification/ Dewatering Services Vendor to ensure the operating parameters and effectiveness of the dewatering system are in accordance with the parameters established in the Topical Report.

6.6.2 Dewatered Product Control

a. The final dewatered product shall contain less than 1% non-corrosive free liquid for High Integrity Containers and 0.5% for steel liners. Quality Control checks shall be performed on process steps.

b. If a dewatered waste container does not meet acceptability requirements, a Condition Report (CR) shall be issued.

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

d. Deviation from the container checking requirement shall be approved by the Power Production Engineer-Effluents Management.

6.6.3 Radioactive Waste Dewatering Records

A Dewatering Record Sheet (Form NDAP-QA-0646-2) shall be completed for each container filled with dewatered waste streams. Parts of the form shall be completed by the following responsible individuals or groups:

a. The Radwaste Supervisor is responsible for initiating this form and completing Parts 1 and 2.

b. Chemistry Group shall complete Part 3 Sampling and Analysis.

c. Effluents Management Supervision, Chemistry and Solidification/Dewatering/Services Vendor personnel shall provide and check off the required documentation specified in Part 4.

d. Quality Control shall provide review as required for the Dewatering Records.

6.7 HIGH INTEGRITY CONTAINERS (HIC)

6.7.1 Storage of High Integrity Containers

a. Vectra, Radlok and CNSI High Integrity Containers (HIC) stored in direct sunlight or in areas where there is a strong source of ultraviolet radiation shall be filled and disposed of within one year of manufacturing date.

b. Once filled a High Integrity Container may be stored for a period until a total of one (1) year of ultraviolet radiation is received.

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

6.7.2 Uses of High Integrity Containers

a. High Integrity Containers may be used to package the following waste materials for disposal:

(1) Dewatered bead resin, powdered resin and diatomaceous earth.

(2) Compressible and non-compressible solid wastes.

(3) Filter elements and cartridges.

(4) Solidified resins, sludges, and liquid wastes.

(5) Incinerator ash, residuals, or equivalent waste which has been rendered non-dispensable in a binding matrix.

(6) Other dewatered and dry material provided concurrence is received by container vendor and disposal facility.

b. Prior to using a High Integrity Container for a specific waste material, procedures shall be established to define the specific requirement that shall be met during use of the container.

The procedures shall contain:

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

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

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

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

f. The procedures shall establish specific Quality Control inspection requirements.

g. Prior to the first shipment of a specific type of High Integrity Container, authorization shall be requested from the applicable regulatory agency governing use of the container in question at the disposal facility of concern.

6.7.3 High Integrity Container Limitations

a. High Integrity Containers are approved for use provided the following physical limitations of the waste are met:

(1)	Vectra Payload density	:	≤1.47 gms/cc
(2)	Loading temperature	:	≤170°F
(3)	Vectra EL-50 N.S. loaded weight	:	≤4200 lb
(4)	Vectra EL-142 N.S. loaded weight	:	≤8250 lb
(5)	Vectra EL-142 S. loaded weight	:	≤11250 lb
(6)	Vectra EL-190 N.S. loaded weight	:	≤11950 lb
(7)	Vectra EL-190 S. loaded weight	:	≤14800 lb
(8)	Vectra EL-210 N.S. loaded weight	:	≤13000 lb
(9)	Vectra EL-210 S loaded weight	:	≤17300 lb
(10)	CNSI Small loaded weight	:	≤2500 lb
(11)	CNSI Medium loaded weight	:	≤2500 lb
(12)	CNSI Large loaded weight	:	≤2500 lb
(13)	Radlok 179 loaded weight	:	≤18500 lb
(14)	Radlok 195 loaded weight	:	≤18500 lb
(15)	Enduropak 105 loaded weight	:	≤1700 lb
(16)	Enduropak 205 loaded weight	:	≤1900 lb
(17)	Enduropak 150 loaded weight	:	≤2400 lb

b. 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. Other waste forms shall not exceed 1.0 X 10^8 rads maximum integrated dose to the container.

c. The polyethylene High Integrity Containers shall not come into contact with materials listed in Attachment E.

d. A passive vent design shall be incorporated into the container to relieve internal container pressure.

6.7.4 Closure of High Integrity Containers

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

b. If the container is not equipped with a passive vent and its contents are within the limits of Low Specific Activity ensure one of the following:

(1) The container is shipped within (10) ten days after closing; or

(2) If the container has been closed for longer than (10) ten days, it shall be opened, vented, and re-closed within ten (10) days of shipment.

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

(1) The hydrogen generated shall 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 shall be inerted with a diluent to assure that oxygen is limited to ≤5% by volume in those portions of the package which could have hydrogen greater than 5%.

d. Step 6.7.4.b and 6.7.4.c shall also apply to dewatered waste in steel liners.

6.8 IRRADIATED HARDWARE PROCESSING AND DEWATERING

6.8.1 General Requirements

a. Processing and dewatering of Irradiated Hardware shall be performed by qualified SSES or vendor personnel.

b. Processing and dewatering of Irradiated Hardware shall be performed in accordance with approved procedures.

(6) c. Irradiated Hardware consisting of non-fuel Special Nuclear Material shall be inventoried during processing in accordance with NDAP-QA-0337.

d. Dewatering procedures shall be based on liquid volume and drainage calculations and actual drainage verification to demonstrate the ability to achieve free liquid limits as specified by disposal facilities and applicable regulatory agencies.

6.8.2 Dewatered Product Control

a. The final dewatered product shall contain less than 0.5% free liquid for steel liners.

b. Quality Control checks shall be performed on process steps.

6.8.3 Irradiated Hardware Processing and Dewatering Records

a. All records generated shall be completed and filed in accordance with approved implementing procedures.

6.9 CONTAINER INSPECTIONS

6.9.1 Quality Control shall inspect containers to be used for solidification, dewatering, and other packaging for disposal.

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

6.9.3 Packages shall meet the general criteria for normal transport conditions in accordance with the requirements of 49 CFR. Type A packages shall meet the additional design requirements specified in 49 CFR.

6.10 WASTE CONTAINER SPACE UTILIZATION

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

a. Additional radioactive material should be added only after the initial waste volume is in final form and sampled and the added waste volume is in final form and sampled.

b. The additional material may be drawn into containers able to withstand higher external pressures without degredation by creating an area of low pressure inside the container, such as with steel liners.

c. For all other containers, the additional material shall be added via mechanical processes or by other conveyance which does not exert higher external pressures.

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6.10.2 Waste volumes shall meet or exceed disposal site criteria. If waste volume is less than disposal facility criteria; requirements for disposal of the container in question shall be defined by the disposal facility.

6.10.3 Specific waste volumes committed to by the Solidification/Dewatering/Services Vendor shall be met or otherwise justified as to why waste volumes were not achieved.

6.10.4 Susquehanna Guaranteed Solidified/Dewatered Waste Volume Record, Form NDAP-QA-0646-3, shall be completed by the Solidification/Dewatering/Services vendor personnel, approved by Radwaste Supervisor and shall be used to track solidified/dewatered waste volumes achieved in each individual container.

6.11 STORAGE OF PACKAGED RADIOACTIVE WASTE

6.11.1 Radwaste Supervisor shall provide Solidification and/or Dewatering Record sheets that have been reviewed by Quality Control personnel stating that processed waste has been solidified or de-watered in accordance with the Process Control Program and meets the applicable shipping and disposal criteria.

6.11.2 Solidification and Dewatering Records shall include the isotopic mix, isotopic concentration of the waste that was packaged, the total volume of the waste, and the amount of water, cement or other solidification agent used, as appropriate.

6.11.3 Solidification and Dewatering Records shall be part of the permanent shipping records and adhere to requirements of the Process Control Program.

6.11.4 For materials packaged in a high integrity container, documentation shall be maintained on HIC storage and pre-shipment checklist information.

6.11.5 Packaged radioactive waste shall be stored in areas designated by HP Foreman Effluents Management. Storage of packaged radioactive waste in the Low Level Radwaste Holding Facility (LLRWHF) shall be in accordance with approved procedures.

6.11.6 An inventory of stored, packaged waste shall be maintained in accordance with approved procedures.

6.12 TRANSPORTATION, SHIPPING AND DISPOSAL REGULATIONS

6.12.1 Specific regulatory documents shall be maintained on site in a status that is current. Specific regulations that shall be maintained include but are not limited to the following:

a. 10CFR71 Packaging of Radioactive Material for transport and transportation of radioactive material under certain conditions.

b. 49CFR100 - 199 Transportation.

c. Chem-Nuclear Systems Inc. Barnwell S.C. disposal site operating license number 097 State of South Carolina, as required.

d. Chem-Nuclear System Inc. NRC Material License 12-13536-01, as required.

e. Chem-Nuclear System Inc. Barnwell S.C. disposal site operating procedures and site criteria, as required.

f. Scientific Ecology Group Licenses R-73008-E94, R-01052-A91.

g. Cask Manuals for casks of which PP&L is an authorized user.

h. A copy of the license for each facility to which Radioactive Material is sent.

i. 10CFR61 Licensing requirements for land disposal of Radioactive Waste.

6.12.2 Procedures applicable to transportation, shipping and disposal shall be developed.

a. Procedures shall be established and maintained to provide directions and assure regulatory compliance for manifesting, which include applicable federal, state, and disposal facility regulations, and NRC guidance.

b. Procedures shall contain check off lists where and when applicable to assure specific attention is paid to the critical function being controlled.

c. Procedures shall contain Quality Control notifications or hold points.

6.12.3 Computer software used to implement applicable portions of the Process Control Program shall be in accordance with NDAP-QA-0801.

6.13 SHIPPING OF RADIOACTIVE WASTE

6.13.1 All radioactive waste shall be shipped by Effluents Management.

6.13.2 All radioactive waste shipped from SSES shall only be to facilities licensed to receive the waste and in accordance with 10CFR20, 10CFR71 and 49CFR100-199.

6.13.3 Dry Active Waste (DAW) should normally be shipped as Type A quantities and therefore do not require specific licensed containers.

6.13.4 Waste containers shall be placed in a USNRC approved licensed shipping container if it:

a. Exceeds Type A quantities

b. Exceeds 1000 mr/hr on contact

c. Exceeds 1000 dpm/100 cm^2 loose surface contamination on the exterior of the container.

6.13.5 The specific conditions of the Certificate of Compliance for each approved shipping cask shall be strictly adhered to.

6.13.6 Packaged waste may be shipped unshielded if:

a. Contact dose rates are less than 200 mrem/hr and dose rates at 6 feet are less than 10mrem/hr.

b. Curie content of the package shall be a Type A quantity.

c. Container shall be a minimum of a strong tight container.

6.13.7 Prior to the shipment of a package of radioactive waste, the HP Foreman Effluents Management shall assure the container is surveyed for contact dose rates and surface contamination. Decontamination, if required, shall be done under the direction of the HP Foreman Effluents Management. Decontamination may be waived based upon radiological conditions.

6.13.8 All vehicles used to transport radioactive waste requiring the vehicle to be placarded shall be checked for adequate operation and safety conditions.

6.13.9 All Radwaste shipments from SSES shall normally be via "Exclusive Use" vehicles. Specific instructions given to the driver include:

a. Expected route of travel to his final destination.

b. Maintaining "Exclusive Use" status.

c. Specific actions to be taken in the event of an accident.

6.13.10 No vehicle carrying radioactive waste that is overweight shall leave SSES without a Pennsylvania overweight permit.

a. A DAW shipment or other shipment capable of having its weight adjusted, shall not be allowed to leave SSES overloaded.

b. An overloaded condition for any vehicle is based on total weight and weight per axle.

6.13.11 In the event access is denied to SSES at all operating disposal facilities, PP&L will provide carrier with a letter stating that SSES will meet all applicable federal, state, and compact requirements for receipt back of the radioactive waste/material in carrier's possession.

6.14 SHIPMENT CONFIRMATION

If disposal site shipment acknowledgement is not received within 18 days from departure from SSES, Effluents Management Supervision shall conduct a trace investigation for shipment location. If the disposal facility shipment receipt can not be confirmed within 20 days, a Condition Report (CR) shall be generated.

6.15 CHANGES TO THE SOLID RADIOACTIVE WASTE PROCESS CONTROL PROGRAM

6.15.1 Any changes as described in the Technical Specifications, to the Solid Radioactive Waste Process Control Program shall be provided in the Annual Radioactive Effluent Release Report filed with the NRC.

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

(4) 6.16 EVALUATION OF PROCESS OR OPERATIONAL CHANGES

6.16.1 Changes in radioactive waste processing or operational changes shall be evaluated to determine any impacts on waste characteristics and/or form.

6.16.2 Evaluation should include as a minimum:

a. Operational evaluation of processing impacts:

b. Chemistry evaluation of changes to sampling and analysis methodology.

c. Effluents Management evaluation of packaging and/or shipping impacts.

d. Effluents Management evaluation for 10CFR61 compliance.

e. Solidification/Dewatering Services Vendor waste stream characteristic evaluation of the dewatering/solidification system operating parameters and effectiveness.

(2) 6.17 REPORTING OF MISHAPS INVOLVING LOW LEVEL WASTE FORMS

6.17.1 10CFR61 establishes the minimum and stability requirements for Low Level Waste (LLW) forms. 10CFR20 requires certification that the processed waste satisfies the requirements of 10CFR61. Mishaps which may impact the final waste form shall be reported to the NRC.

6.17.2 Types of mishaps which should be reported include:

a. Failure of high-integrity containers used to ensure a stable waste form. Container failure can be evidenced by changed container dimensions, cracking, or damage resulting from mishandling (e.g., dropping or impacting against another object).

b. Misuse of high-integrity containers, evidenced by a quantity of free liquid greater than 1 percent of container volume, or by an excessive (>15%) void space within the container.

c. Production of a cement solidified Class B or C waste form that has any of the following characteristics:

(1) Contains free liquid in quantities exceeding 0.5 percent of the volume of the waste.

(2) Contains waste with radionuclides in concentrations exceeding those considered during waste form qualification testing accepted by the regulatory agency, which could lead to errors in assessment of waste class.

(3) Contains a significantly different waste loading than that used in qualification testing accepted by the regulatory agency.

(4) Contains chemical ingredients not present in qualification testing accepted by the regulatory agency, and those quantities are sufficient to unacceptably degrade the waste product.

(5) Shows instability evidenced by crumbling, cracking, spalling, voids, softening, disintegration, non-homogeneity, or dimensional changes.

(6) Evidence of processing phenomena that exceed the limiting processing conditions identified in applicable topical reports or process control plans, e.g., foaming, temperature extremes, premature or slow hardening, and production of volatile material.

d. Failure to adhere to high integrity container limitations as required by container certificate of compliance.

e. Notification of violation by disposal facility regulatory authorities at time of container receipt for disposal.

f. Failure of cement-solidified stable waste form long term PCP surveillance specimens due to evidence of significant cracking, spalling, or bulk disintegration, compression or penetrometer strength and immersion test results.

6.17.3 Requirements for reporting of mishaps shall apply only to processing liners and high integrity containers containing radioactive waste in its final product form.

6.17.4 A Condition Report (CR) shall be generated if one of the mishaps mentioned occurs.

6.18 PCP IMPLEMENTING PROCEDURES

Procedures required for implementation of the Process Control Program are shown in Attachment D.

7.0 RECORDS

7.1 The Solidification Records or Dewatering Records and the attached documents shall be forwarded to Effluents Management Supervision for retention until such time as the container identified on Record is shipped for final disposition.

7.2 When the identified container is shipped the Solidification Records or Dewatering Records and other documents concerning the Shipment shall be filed with the shipping documentation and forwarded to DCS for retention.

7.3 Documentation of Radioactive Waste Shipments shall be retained as required by SSES Technical Specifications.

7.4 Radioactive waste shipping documentation shall consist of, but not limited to, the following records:

7.4.1 Radioactive Material Shipping Manifest

7.4.2 Evaluation of isotopic mix and concentration

7.4.3 Radiological surveys of:

a. Vehicle upon arrival

b. Package to be shipped

c. Loaded vehicle prior to shipment

7.4.4 Vehicle Safety inspection

7.4.5 Check-off sheet for loading procedure

7.4.6 Documentation of adherence to Process Control Program (if applicable)

7.4.7 Special instructions to driver

SOLIDIFICATION RECORD SHEET

PART 1: Container Identification Information

1. PP&L Liner Number________ 2. Container Vendor Serial Number________

3. Waste Stream________(RWCU Filter Media cannot be entered)

4. Test Solidification required? YES NO (circle one)

PART 2: Container Selection (Refer to WM-PS-100)

1. Estimated Liner Contact Dose Rates________mR/hr

2. Projected Curie Concentration ________μCi/gm

3. Expected Waste Classification/Stability ________

4. Container Type to be Used ________ 5. Empty Weight of Container ______lbs

6. Expected Cask Type to be Used ________

PART 3: Documentation Checklist

1. Form NDAP-QA-0646-1 (original)
2. Waste Form Documentation
   - ___ WM-RP- ___ Forms (original)
   - ___ SC-068-002 Forms (copy)
   - ___ Waste Form: STABLE UNSTABLE (circle one)
   - ___ ≥85% Liner Volume Utilized: YES NO (circle one)
3. Waste Activity Documentation
   - ___ CH-RC-___ Forms (copy)
   - ___ Isotopic Analysis (copy)
   - ___ Compost added/Log entry made on CH-TP-055-1 ________/______ Chem. Suprvn. Date
4. Health Physics Data
   - ___ Liner Radiological Survey (original)
   - ___ Actual Filled Container Weight ________ lb. (If available ALARA)

PART 4: REMARKS:

____

____

RADWASTE SUPERVISOR / DATE   QC REVIEW / DATE   HP FOREMAN EFFL. MGMT / DATE

FORM NDAP-QA-0646-1, Rev. 2, Page 1 of 1 (File R69-1)

DEWATERING RECORD SHEET

PART 1: Container Identification Information

1. PP&L Liner Number ________ 2. Container Vendor Serial Number ________

3. Waste Stream ____________

PART 2: Container Selection (Refer to WM-PS-100)

1. Estimated Liner Contact Dose Rates _________mR/hr

2. Projected Curie Concentration ______________μCi/gm

3. Expected Waste Classification/Stability ________________________

4. Liner Type to be Used ___________ 5. Empty Weight of Container ________ lbs.

6. Expected Cask Type to be Used ________________________________

________________________ ________________ ________________
Radwaste Supervisor Date Time

DEWATERING RECORD SHEET

PART 3: Sampling and Analysis

1. Tank/Container sampled ____________________

2. Sample Number ____________________

3. Waste Stream ____________________

4. Isotopic Analysis attached ____________________
By

5. Specific activity of Dewatered Sample ____________ μCi/gm

6. a. Dewatered Volume __________ ml

   b. Dewatered Weight __________ gm

   c. Sample density __________ gm/cc x 62.43 = __________ lb/ft^3

7. Composite added/Log entry made on CH-TP-055-1 ____________________
BY

The above tank/container containing solids has been analyzed in accordance with CH-RC-075 and found to contain the isotopes and specific activities as indicated on the attached data sheets.

Chemistry Supervision	Date	Time

DEWATERING RECORD SHEET

PART 4: Container Shipment Information Summary

1. PP&L Liner Number ____________ 2. Waste Volume ____________ ft^3

3. Form NDAP-QA-0646-2 (original)

4. Waste Form Documentation

____ WM-RP-____, ____, ____, ____, ____ Forms (original)

____ Calculated Waste Weight = ________ lb/ft^3 x ________ ft^3 = ______ lb.
(Part 3.6.c) (Part 4.2)

____ Actual Filled Container Weight __________ lb. (if available ALARA)

____ 100 x (Dewatered Waste Volume) ________ ft^3 ÷ ________ ft^3 = ____%
(Part 4.2) (Avail Volume)

____ >85% Container Volume Utilized YES / NO (Circle one)

____ Waste Form: STABLE UNSTABLE (Circle one)

5. Waste Activity Documentation

____ CH-RC-_____ Forms (Copy)

____ Isotopic Analysis (Copy)

PART 5: REMARKS:

____

____

____

________________/______ ________________/______ ________________/______
Radwaste Supv / Date QC Review / Date HP Foreman Effl. Mgmt. / Date

SUSQUEHANNA GUARANTEED SOLIDIFIED/DEWATERED WASTE VOLUME RECORD

1. Date ____________ Liner number ____________

2. Waste Type ____________

3. Container Type ________________

4. Burial Volume ________________

5. Useable Container Volume ___________ ft^3

6. Guaranteed Minimum Waste Volume ____________ ft^3

7. Waste Volume Attained

   ________ inches x ______ ft^3/inch = ______ ft^3

8. Waste Volume Container Usage

   100 x (Waste Vol. ___ ft^3 ÷ Guaranteed Min. Waste Vol. ___ ft^3) -100 = ____ %

9. Dead band Assessment Volume

   Guaranteed Min. Waste Vol. ___ ft^3 ± (0.01 X Guaranteed Min. Waste Vol. ___ ft^3

   Minimum(-) ___ ft^3 to Maximum(+) ___ ft^3

10. Performance Assessment Volume

    Dead band Assessment Vol. ___ ft^3 - Waste Vol. ___ ft^3 = ___ ft^3

11. Remarks:

12. Signature ______________________________
    Solidification Vendor Representative

13. Signature ______________________________
    Radwaste Supervisor

PCP IMPLEMENTING PROCEDURE MATRIX

WASTE PROCESSING

Evaporator Concentrates - Solidified

Pacific Nuclear PT-51-WS
Pacific Nuclear OM-114-NS
Pacific Nuclear OM-104

Mixed Solids - Solidified

Pacific Nuclear PT-51-WS
Pacific Nuclear OM-104
Pacific Nuclear OM-114-NS

LRW Filter Media, URC Waste, RWCU Filter Media, Sump Sludge - Dewatered

Pacific Nuclear OM-43-WS
WM-RP-107

Condensate/Radwaste Demineralizer Bead Resin - Solidified

Pacific Nuclear PT-51-WS
Pacific Nuclear OM-114
Pacific Nuclear OM-104

Condensate/Radwaste Demineralizer Bead Resin - Dewatered

Pacific Nuclear OM-43-WS	SEG STD-P-22-002 (Resin Express)	SEG STD-P-03-051
WM-RP-106	WM-RP-104	WM-RP-108

Cartridge Filters

CNSI FO-OP-019 (Overpack)

WM-PS-230

Pacific Nuclear OM-16-NS

WM-RP-105

PCP IMPLEMENTING PROCEDURE MATRIX

Irradiated Hardware - Dewatered (Steel Liner)

None

Dry Active Waste (DAW) - Packaging

WM-PS-210

Liquid Oil Waste - Solidified

None

Liquid Oil Waste - Decontamination

None

Solid Sealed Sources

None

WASTE ANALYSIS AND CLASSIFICATION - 10CFR61

CH-RC-075
CH-RC-076
CH-TP-055

WM-PS-155
WM-PS-160
WM-PS-170

Pacific Nuclear OM-45 NS
WM-RP-008

TESTING/TREATMENT COMBUSTIBLE GASES

WM-RP-009

WM-RP-301

RADIOACTIVE WASTE SOLIDIFICATION - GENERAL (CEMENT)

Pacific Nuclear OM-114-NS

SC-068-002 (Test Solidification)

PCP IMPLEMENTING PROCEDURE MATRIX

RADIOACTIVE WASTE DEWATERING - GENERAL

Pacific Nuclear OM-60-WS
WM-RP-010
WM-RP-011

HIGH INTEGRITY CONTAINERS

Pacific Nuclear OM-16-NS
Pacific Nuclear H-18-NS
WM-RP-012

DISPOSAL FACILITY REQUIREMENTS

WM-PS-180
WM-PS-401 (LLRWHF)

PACKAGING

WM-PS-310 (HN-142)
WM-PS-311 (LN-142)
WM-PS-315 (SEG 3-82)
WM-PS-345 (CNSI 14-195)
WM-PS-351 (CNSI 21-300)
WM-PS-352 (CNSI 8-120A)
WM-PS-356

WM-PS-354 (CNSI 14-215)
WM-PS-316 (SEG 14-215)
WM-PS-318 (Westinghouse TCT)

TRANSPORTATION - 49CFR/10CFR71

WM-PS-100
WM-PS-120
WM-PS-140
WM-PS-180
WM-PS-240
WM-PS-250

MATERIALS NOT COMPATIBLE WITH POLYETHYLENE CONTAINERS

Aliphatic hydrocarbons (hexane, octane, bexene, octane, etc.)
Acetone
Amyl Acetate
Amyl Chloride
Aniline
Aqua Regia

Benzene
Bromine liquid
Butane

Camphor Oil
Carbon Disulphide
Carbon Tetrachloride
Chlorine liquid
Chlorobenzene
Chloroform
Chlorosulfonic acid
Chromic/sulfuric acid
Cyclohexanone

Dibutylphtalate
Dimethylamine
Diesel fuel

Ethyl acetate
Ethyl butyrate
Ethyl chloride
Ethyl ether
Ethylene chloride
Ethylene chlorohydrin
Ethylene dichloride

Fluorine
Furfural
Furfuryl alcohol
Fuel Oil

Gasoline

Iodine

Methyl bromide
Methyl Chloride
Methyl ethyl ketone (MEK)
Methylene Chloride
Moist Chlorine gas

Nitric Acid (50% weight concentration)

Organ Peroxides
Octyl cresol
Oleic acid
Oleum

Pentane
Petroleum ether
Phenol
Propane
Propylene dichloride

Sulfric acid (60% weight concentration)

Tetrahydrofurance
Titanium tetrachloride
Toulene
Trichloroethylene
Turpentine
Tetralin

Xylene