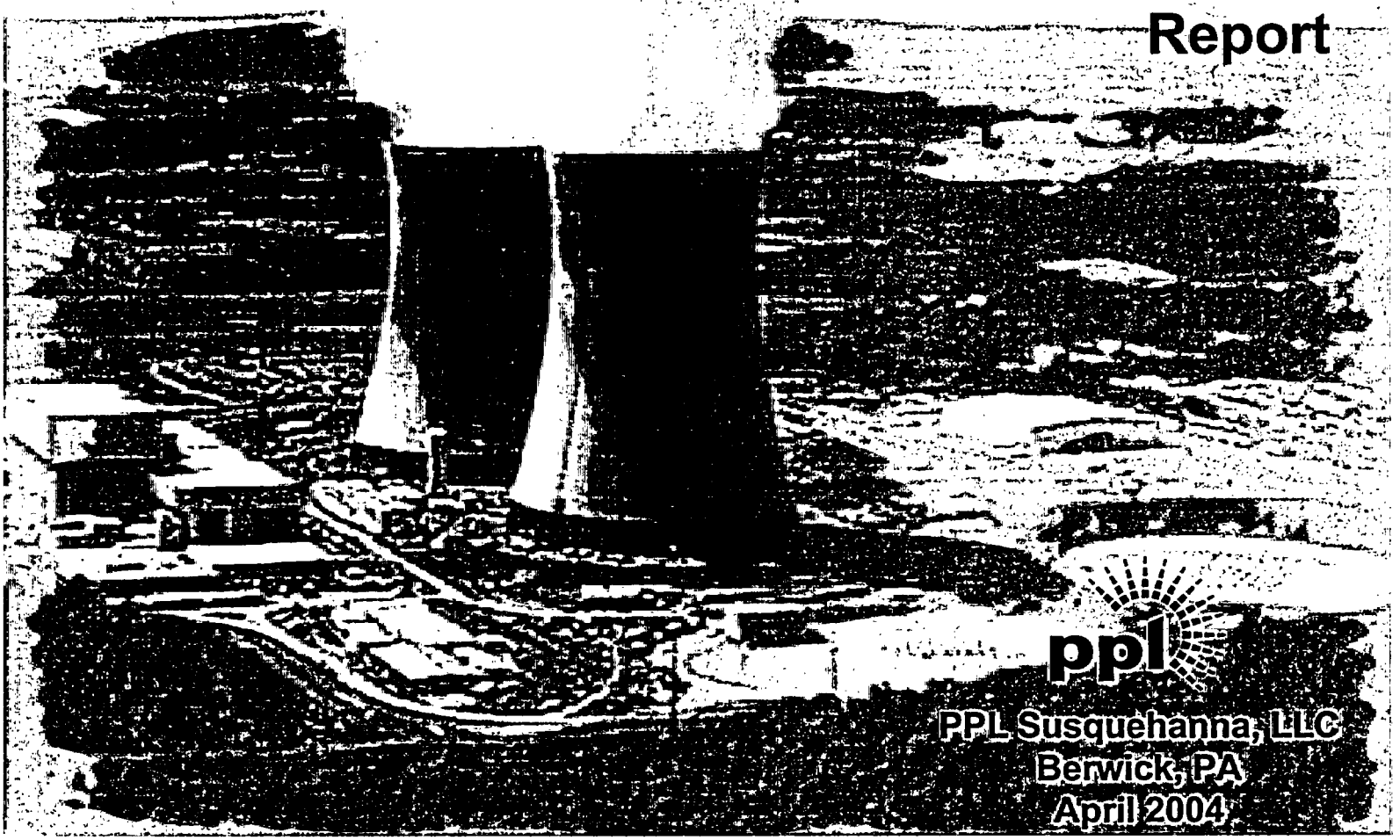
Susquehanna Steam Electric Station

Units 1 & 2

Radioactive Effluent Release Report

2003 Annual Report



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PPL Susquehanna, LLC
Berwick, PA
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SUSQUEHANNA STEAM ELECTRIC STATION

RADIOACTIVE EFFLUENT RELEASE REPORT

REPORT PERIOD: 01/01/03 - 12/31/03

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SECTION 1

INTRODUCTION, SUMMARY AND SUPPLEMENTAL INFORMATION

INTRODUCTION

The submittal of the 2003 Radioactive Effluent Release Report is in accordance with Susquehanna Steam Electric Station (SSES) Tech Spec. 5.6.3. The enclosed information is consistent with the objectives outlined in the SSES ODCM and Process Control Program. The 2003 Radioactive Effluent Release Report is in conformance with 10CFR50.36a and 10CFR50, Appendix I, Section IV.B.1.

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 about 1,100 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 1-1). Each vent is continuously monitored for Noble Gases, and a program of periodic sampling and analysis for Particulates, Iodine, Tritium and Noble Gases is conducted as specified in the plant Technical Requirements. 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 1-2). 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, 2003 to December 31, 2003. In addition, this report serves as a medium for notifying the US Nuclear Regulatory Commission staff of changes to the SSES Offsite Dose Calculation Manual (ODCM) and Solid Radioactive Waste Process Control Program (PCP) and documentation of any exceptions to the SSES effluent monitoring program which must be reported per Technical Requirements.

Airborne and waterborne radioactive effluent releases to the environment during the report period were sampled and analyzed in accordance with the Technical Requirements. All radioactive effluent releases were within the concentration and

release limits specified in the Technical Requirements. Calculations and terms utilized in this report are those outlined in the SSES ODCM.

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

Section 2 contains effluent and waste disposal data for the report period. Table 2-1 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 2-2 presents the activity totals of specific radionuclides in airborne effluents.

Waterborne effluents are summarized in Table 2-3. Average diluted concentrations are presented and compared to the applicable limits. Table 2-4 presents the release quantities of specific radionuclides in waterborne effluents over the report period. Figures 2-1 and 2-2 present the Susquehanna River Monthly Average Flow Rates for 2003 and the SSES Monthly Liquid Radwaste Discharge Totals for 2003 respectively.

Table 2-5 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.

Tables 2-7 through 2-21 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.

Section 3 presents meteorological data for 2003 including data recovery, joint frequency distribution of wind speed and direction, stability class distribution, and atmospheric dispersion estimates for selected locations.

Section 4 of this report contains an assessment of the calculated doses attributed to the reported radiological effluents for the calendar year. The Radioactive Effluent Tracking and Dose Assessment Software (RETDAS) computer code was used for calculation of doses from waterborne effluents. Site-specific parameters used in the calculations for the Danville receiver are shown in Table 4-1. The RETDAS code was also 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 4-2 summarizes maximum calculated doses and dose commitments to members of the public from airborne and waterborne effluents and direct radiation. Table 4-3 presents calculated collective doses to members of the public within the

Riverlands/Information Center Complex. Table 4-4 summarizes the calculated doses for residences and other occupied areas within the SSES site boundary and the nearest dairy.

Section 5 of this report documents changes to the Offsite Dose Calculation Manual, Technical Requirements Manual and the Solid Radioactive Waste Process Control Program.

Section 6 presents a listing of cases (if any) in which airborne or waterborne effluent monitoring instrumentation was declared inoperable and was not restored to operability within the time period specified in Technical Requirements 3.11.1.4, 3.11.1.5 and 3.11.2.6 Action Statements. In addition, this section presents issues (if any) with the collection of milk or fresh leafy vegetables per Technical Requirement 3.11.4.1 and changes due to the land use census per Technical Requirement 3.11.4.2.

Section 7 contains corrections (if any) to doses reported in previous Semiannual or Annual Radioactive Effluent Release Reports.

Section 8 contains information on effluent and offsite dose from the systems classified as insignificant effluent pathways.

SUMMARY

Liquid and gaseous effluent releases for 2003 were similar to those of previous years. During 2003 there were one hundred seven (107) liquid batch releases resulting in a total release volume of one million thirty six thousand (1,036,000) gallons. The total number of liquid batch releases in 2003 was higher than in 2002 (83 releases in 2002), but the total volume released in 2003 was slightly lower than in 2002 (1,063,000 gallons released in 2002). The predominant radionuclide released in liquid effluents during 2003 was tritium. Approximately seventy (70) curies of tritium were released in liquid effluents in 2003, compared to sixty-six (66) curies released in 2002. The radionuclides that had the greatest impact on offsite dose from liquid effluents during 2003 were Mn-54 and Co-60. Though the total curies released for these isotopes (0.0053 and 0.0051 respectively) was lower than tritium, the resultant offsite dose was higher due to the differences in the dose conversion factors. Consistent with previous years, the offsite dose from liquid releases in 2003 was less than one percent (1%) of the annual limits for both organ and whole body dose.

Gaseous effluents for 2003 were also comparable to those of previous years. Similar to liquid effluents in 2003, the predominant radionuclide released in gaseous effluents was tritium. When compared with all radionuclides released in gaseous effluents in 2003, tritium was the main contributor to the resultant offsite dose. The resultant offsite organ dose for the Susquehanna Steam Electric Station from gaseous effluents for 2003 was 1.17 mrem, which is 7.8 percent (7.8%) of the per unit annual limit of fifteen (15) mrem. The main source of the tritium in liquid and gaseous effluents is from control rod blades currently in each reactor's core.

FIGURE 1-1

SSES AIRBORNE EFFLUENT RELEASE POINTS

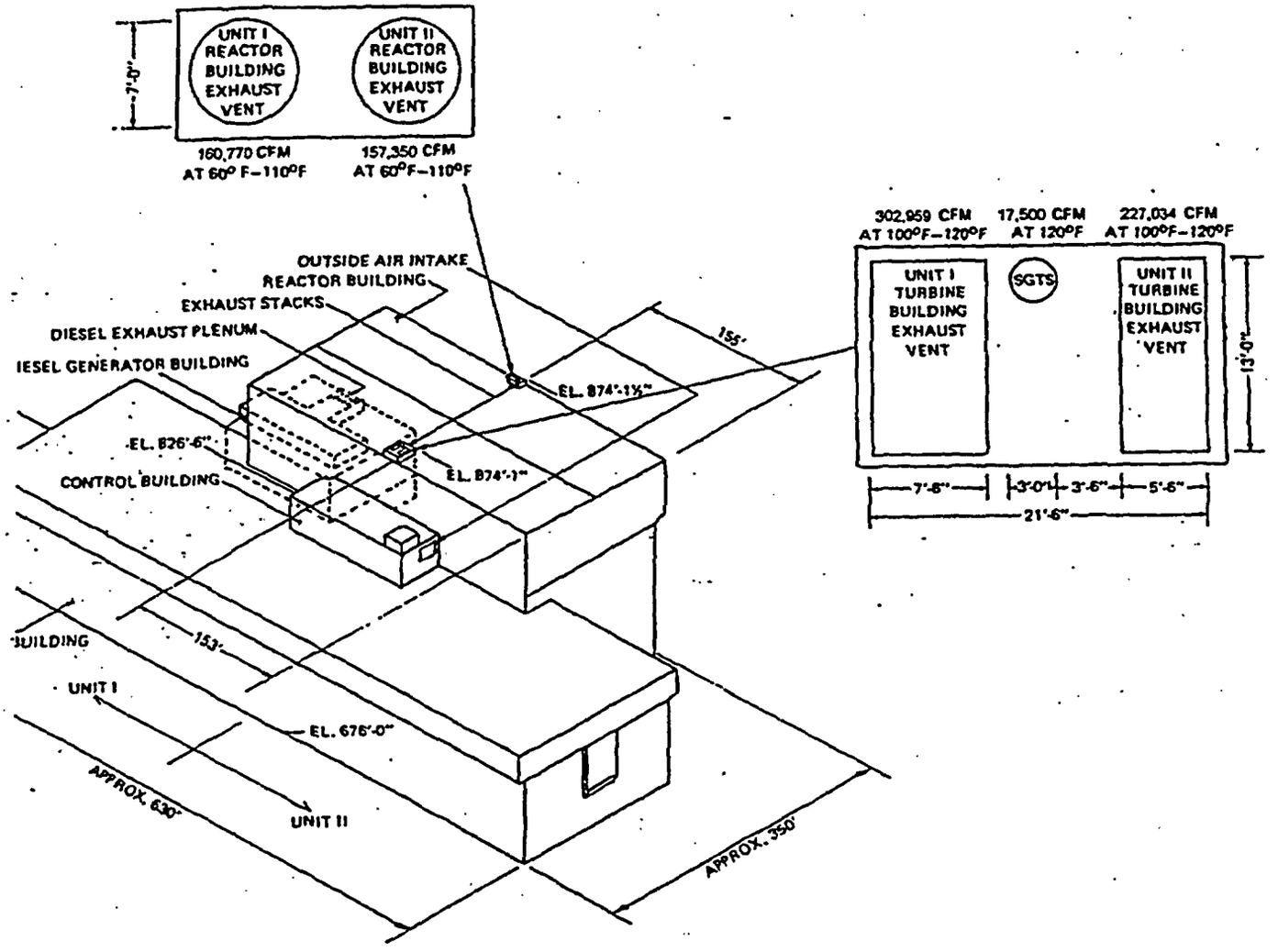
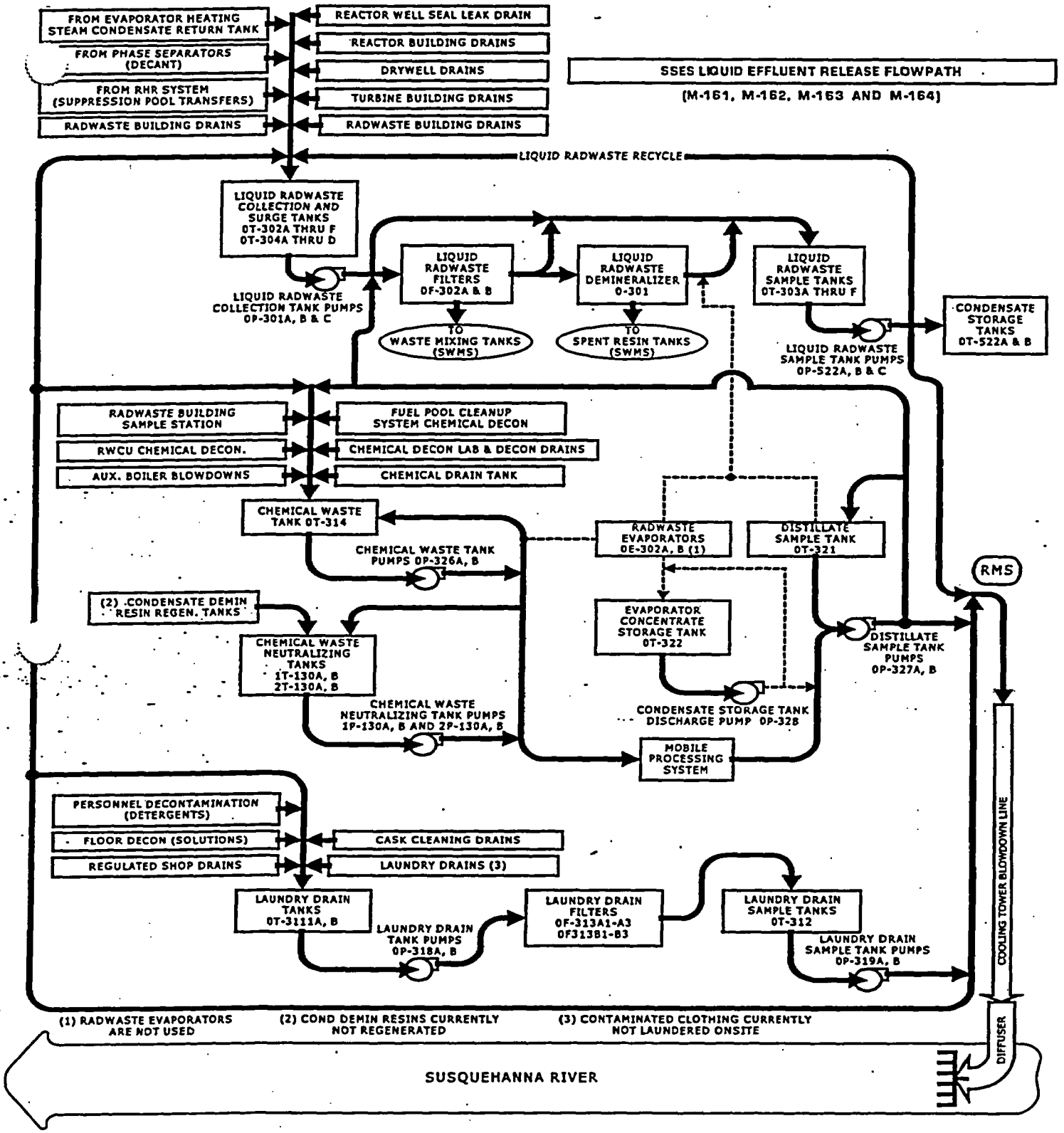


FIGURE 1-2
SSES WATERBORNE EFFLUENT PATHWAY



SUPPLEMENTAL INFORMATION

1. Regulatory Limits

Technical Requirements 3.11.1 and 3.11.2 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 Requirement limits are listed in Table 1-1.

2. Maximum Permissible Concentrations in Waterborne Effluents

The concentration of radioactive material released in liquid effluents to unrestricted areas is limited to 10 times the concentrations specified in 10 CFR Part 20 Appendix B Table 2, Column 2, for radionuclides other than dissolved or entrained noble gases.

For dissolved or entrained noble gases, the concentration is limited to 2.0E-04 μCi/ml total activity (TRO 3.11.1.1).

3. Average Energy of Fission and Activation Gas

The Calculation of Noble Gas Effluent Average Energies E-Bar Beta and Gamma for 2003 resulted in an Annual E-Bar Beta value of 4.05E-01 and an E-Bar Gamma value of 7.09E-01.

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 (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 (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 on charcoal or silver zeolite cartridges via an isokinetic sampling assembly in each vent. Filters are normally exchanged once per week and analyzed on a high resolution (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 samplers 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 (HPGE) system. Flow rate corrections are performed as for iodines. When the continuous samplers are out of service, particulates are continuously collected 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 Requirement Table (TRO) 3.11.2.1.-1 Lower Limit of Detection (1 E-6 μCi/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 (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 multiplied by the volume of the batch to determine the total quantity of each nuclide released in each batch. The isotopic totals for each batch are summed to determine the total source term for the report period.

TABLE 1-1

1. TECHNICAL REQUIREMENT LIMITS

A. NOBLE GASES:

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

   - dose rate limit at and beyond the site boundary
     (TRO 3.11.2.1)

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

   - quarterly air dose limits per reactor unit at and beyond the site boundary
     (TRO 3.11.2.2a)

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

   - annual air dose limits per reactor unit at and beyond the site boundary
     (TRO 3.11.2.2.b)

B. AIRBORNE I-131, I-133, TRITIUM, PARTICULATES WITH HALF-LIVES > 8 DAYS:

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

   - dose rate limit at and beyond the site boundary
     (TRO 3.11.2.1.II.A)

2. ≤7.5 mrem - ORGAN

   - quarterly dose limit per reactor unit at and beyond the site boundary
     (TRO 3.11.2.3.a)

3. ≤15 mrem - ORGAN

   - annual dose limit per reactor unit at and beyond the site boundary
     (TRO 3.11.2.3.b)

C. **LIQUID EFFLUENTS:**

1. ≤1.5 mrem - TOTAL BODY
   ≤5.0 mrem ORGAN
   - quarterly dose limits per SSES unit (TRO 3.11.1.2.a)

2. ≤3.0 mrem - TOTAL BODY
   ≤10.0 mrem - ORGAN
   - annual dose limits per SSES unit (TRO 3.11.1.2.b)

D. **AIRBORNE EFFLUENT: BASES FOR PERCENT OF APPLICABLE LIMIT VALUES IN TABLE 2-1**

Fission and Activation Gases

A derived release rate limit based on the Technical Requirement (TRO 3.11.2.1.I.A) limit of 500 mrem/yr was calculated from the expected mix of noble gas radionuclides presented in Table 11.3-1 of the SSES Final Safety Analysis Report. The limit is 1.00E+06 μCi/min (1.67E+04 μCi/sec).

Iodines

A derived release rate limit based on the Technical Requirement (TRO 3.11.2.1.II.A) limit of 1500 mrem/yr from I-131, I-133, tritium and particulates with half-lives greater than 8 days was calculated from the annual release quantity of I-131 provided in Table 11.3-1 of the SSES Final Safety Analysis Report. The limit is 1.04E+02 μCi/min (1.73E+00 μCi/sec).

Particulates

A derived release rate limit based on the Technical Requirement (TRO 3.11.2.1.II.A) limit of 1500 mrem/yr from I-131, I-133, tritium and particulates with half-lives greater than 8 days was calculated based on the expected mix of particulate radionuclides presented in Table 11.3-1 of the SSES Final Safety Analysis Report. The limit is 3.00E+03 μCi/min (5.00E+01 μCi/sec).

Tritium

A derived release rate was calculated based on the 10 CFR 20, Appendix B, Table 2, Column 1, Effluent Concentration Limit for tritium (1.0E-07 μCi/cc) to unrestricted areas. A relative concentration of 4.1E-05 sec/m^3 was assumed. The limit is 1.46E+05 μCi/min (2.44E+03 μCi/sec).

E. WATERBORNE EFFLUENT: BASES FOR PERCENT OF APPLICABLE LIMIT VALUES IN TABLE 2-3

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 ten times the 10CFR20 Appendix B, Table 2, Column 2 Effluent Concentration Values.

Tritium

Liquid effluent quarterly tritium concentrations are compared to ten times the 10 CFR 20 Appendix B, Table 2, Column 2, Effluent Concentration value of 1.0E-03 μCi/ml to unrestricted areas.

Dissolved and Entrained Gases

Liquid effluent concentrations for dissolved and entrained gases are compared to the limiting value for total noble gas activity of 2.0E-04 μCi/ml.

Radionuclide Fractional Summation

The sum of the ratios between the concentration of each radionuclide present in a batch release and ten times the effluent concentration limit in 10CFR20 Appendix B, Table 2, Column 2 or the dissolved and entrained noble gas limit of 2.0E-04 μCi/ml, may not exceed "1". The sum of the percents of applicable limits for fission and activation products, tritium and dissolved and entrained gases must be less than 100%.

SECTION 2

EFFLUENT AND WASTE DISPOSAL DATA

Airborne Effluents

Summaries of the radionuclide total curie activities and average release rates are included in Tables 2-1 and 2-2.

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

Abnormal Releases

1. Number of Releases	0
2. Total Activity Released	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 Requirement (TRO) Table 3.11.2.1-1, Radioactive Gaseous Effluent Sampling and Analysis Program. In all cases, these LLDs were less than the levels required by Technical Requirements. The following are typical LLDs.

Radionuclide	LLD (μCi/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 (μCi/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 2-1

AIRBORNE EFFLUENT - SUMMATION OF ALL RELEASES

A. Fission and Activation Gas	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Total Release	Ci	3.11E-01	0	0	0
Average Release Rate for Period	μCi/sec	4.00E-02	0	0	0
Percent of Applicable Limit (1.67E+04 μCi/sec)	%	2.40E-04	0	0	0

B. Iodines

Total I-131	Ci	0	0	0	0
Total I-133	Ci	0	0	0	0
Average Release Rate for Period	μCi/sec	0	0	0	0
Percent of Applicable Limit (1.73E+00 μCi/sec)	%	0	0	0	0

C. Particulate

Particulate with Half-Life >8 Days	Ci	4.22E-04	4.69E-04	5.72E-04	7.36E-05
Average Release Rate for Period	μCi/sec	5.43E-05	5.96E-05	7.20E-05	9.26E-06
Percent of Applicable Limit (5.00E+01 μCi/sec)	%	1.09E-04	1.19E-04	1.44E-04	1.85E-05
Gross Alpha Radioactivity	Ci	0	0	0	0

D. Tritium

Total Release	Ci	2.88E+01	5.17E+01	4.63E+01	2.95E+01
Average Release Rate for Period	μCi/sec	3.71E+00	6.58E+00	5.83E+00	3.71E+00
Percent of Applicable Limit (2.44E+03 μCi/sec)	%	1.52E-01	2.70E-01	2.39E-01	1.52E-01

TABLE 2-2

AIRBORNE EFFLUENT - RADIONUCLIDES RELEASED

Nuclides Released	Unit	Releases in Continuous Mode			
		First Quarter	Second Quarter	Third Quarter	Fourth Quarter
A. Fission and Activation Gases					
Ar-41	Ci	3.37E-03	0	0	0
Kr-85	Ci	0	0	0	0
Kr-85m	Ci	7.68E-04	0	0	0
Kr-87	Ci	5.44E-03	0	0	0
Kr-88	Ci	3.01E-03	0	0	0
Kr-89	Ci	6.03E-02	0	0	0
Xe-133	Ci	2.36E-04	0	0	0
Xe-133m	Ci	0	0	0	0
Xe-135	Ci	2.84E-03	0	0	0
Xe-135m	Ci	1.52E-02	0	0	0
Xe-137	Ci	1.52E-01	0	0	0
Xe-138	Ci	6.73E-02	0	0	0
Total for Period	Ci	3.10E-01	0	0	0
B. Iodines					
I-131	Ci	0	0	0	0
I-133	Ci	0	0	0	0
I-135	Ci	0	0	0	0
Total for Period	Ci	0	0	0	0
C. Particulate					
Cr-51	Ci	2.58E-04	2.66E-04	5.17E-04	5.21E-05
Mn-54	Ci	6.59E-05	1.58E-04	2.74E-05	9.63E-06
Fe-59	Ci	0	0	0	0
Co-58	Ci	0	3.17E-06	5.94E-06	3.10E-07
Co-60	Ci	1.37E-05	4.10E-05	2.21E-05	1.15E-05
Zn-65	Ci	0	0	0	0
Sr-89	Ci	0	0	0	0
Sr-90	Ci	0	0	0	0
Cs-134	Ci	0	0	0	0
Cs-137	Ci	0	0	0	0
Ce-141	Ci	0	0	0	0
Ce-144	Ci	0	0	0	0
Ag-110M	Ci	0	0	0	0
Nb-95	Ci	0	0	0	0
Ba-La-140	Ci	0	0	0	0
Total for Period	Ci	3.38E-04	4.68E-04	5.72E-04	7.35E-05

Waterborne Effluents

Summaries of the radionuclide total curie activities, average diluted concentrations, and percent of applicable Technical Requirement limits are included in Tables 2-3 and 2-4.

	Batch Releases*	Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4	Annual
1.	Number of Batch Releases	29	20	33	25	107
2.	Total Time Period for a Batch Release	3.74E+03	2.26E+03	4.83E+03	4.06E+03	1.49E+04
3.	Maximum Time Period for a Batch Release	2.88E+02	1.05E+03	3.08E+02	2.84E+02	1.05E+03
4.	Average Time Period for a Batch Release	1.29E+02	1.13E+02	1.46E+02	1.62E+02	1.39E+02
5.	Minimum Time Period for a Batch Release	2.50E+01	2.70E+01	2.80E+01	2.60E+01	2.50E+01
6.	Average Cooling Tower Blowdown Flow Rate During Periods of Release	6.47E+03	7.69E+03	1.17E+04	9.04E+03	9.07E+03
7.	Susquehanna River Flow Rate	1.11E+07	1.08E+07	5.70E+06	1.20E+07	9.91E+06

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

	Abnormal Releases				
1.	Number of releases	0	0	0	0
2.	Volume Released	N/A	N/A	N/A	N/A
3.	Total Activity Released	N/A	N/A	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 Requirement 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 Requirements. The following are typical LLDs.

Radionuclide	LLD (μCi/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 (μCi/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 2-3

WATERBORNE EFLUENT - SUMMATION OF ALL RELEASES

A. Fission and Activation Products	Unit	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1. Total Release (excluding: Tritium, Ent. Gases, Alpha)	Ci	1.10E-02	5.21E-03	8.24E-03	3.83E-03
2. Average Diluted Concentration During Period	μCi/ml	1.20E-07	7.94E-08	3.84E-08	2.75E-08
3. Sum of Average Diluted C_n/L_n Ratio During Period	Unitless	8.19E-04	6.05E-04	2.94E-04	1.86E-04
4. Percent of Applicable Limit (Ratio < 1.0)	%	0.08	0.06	0.03	0.02
B. Tritium					
1. Total Release	Ci	1.96E+01	4.35E+00	2.19E+01	2.44E+01
2. Average Diluted Concentration During Period	μCi/ml	2.14E-04	6.63E-05	1.02E-04	1.76E-04
3. Percent of Applicable Limit (1.0E-2 μCi/ml)	%	2.14E+00	6.63E-01	1.02E+00	1.76E+00
C. Dissolved and Entrained Gases					
1. Total Release	Ci	8.92E-05	0.00E+00	4.23E-05	3.00E-05
2. Average Diluted Concentration During Period	μCi/ml	9.74E-10	0.00E+00	1.97E-10	2.16E-10
3. Percent of Applicable Limit (2.0E-4 μCi/ml)	%	4.87E-04	0.00E+00	9.87E-05	1.08E-04
D. Radionuclide Fractional Summation					
1. Sum of Percentages/Percent of Applicable Limit During Period (Limit = 100%)	%	2.22	0.72	1.05	1.78
E. Gross Alpha Radioactivity					
1. Total Release	Ci	4.68E-05	1.60E-05	4.88E-06	5.85E-06
F. Volume of Water Released (Prior to Dilution)	Gallons	2.85E+05	7.66E+04	3.49E+05	3.25E+05
	Liters	1.08E+06	2.90E+05	1.32E+06	1.23E+06
G. Volume of Dilution Water Used During Period of Release	Gallons	2.39E+07	1.73E+07	5.63E+07	3.65E+07
	Liters	9.05E+07	6.54E+07	2.13E+08	1.38E+08
H. Volume of Dilution Water Used Over Entire Period	Gallons	6.67E+08	9.96E+08	1.42E+09	9.14E+08
	Liters	2.53E+09	3.77E+09	5.36E+09	3.46E+09

TABLE 2-4

WATERBORNE EFFLUENT - RADIONUCLIDES RELEASED

Nuclides Released	Unit	Releases in Batch Mode			
		First Quarter	Second Quarter	Third Quarter	Fourth Quarter
A. Fission and Activation Products					
F-18	Ci	0	0	0	0
Na-24	Ci	0	0	0	0
Cr-51	Ci	6.52E-03	8.27E-04	3.52E-04	4.65E-04
Mn-54	Ci	2.24E-03	1.18E-03	1.07E-03	8.54E-04
Fe-55	Ci	0.00E+00	2.09E-03	5.18E-03	1.80E-03
Co-58	Ci	2.00E-04	7.85E-05	7.27E-06	5.61E-05
Fe-59	Ci	7.87E-05	4.93E-05	9.24E-07	0.00E+00
Co-60	Ci	1.93E-03	9.77E-04	1.63E-03	6.04E-04
Zn-65	Ci	1.06E-05	2.60E-06	0.00E+00	3.31E-05
As-76	Ci	0	0	0	0
Rb-86	Ci	0	0	0	0
Sr-89	Ci	0	0	0	0
Sr-90	Ci	0	0	0	0
Sr-92	Ci	0	0	0	0
Nb-95	Ci	0.00E+00	6.81E-07	0.00E+00	0.00E+00
Sn-117M	Ci	0.00E+00	8.93E-07	0.00E+00	0.00E+00
Sb-124	Ci	0.00E+00	0.00E+00	0.00E+00	2.96E-06
Ba-131	Ci	0.00E+00	0.00E+00	0.00E+00	1.46E-05
Ta-182	Ci	0.00E+00	9.76E-06	0.00E+00	0.00E+00
Total for Period	**Ci**	**1.10E-02**	**5.22E-03**	**8.24E-03**	**3.83E03**
B Tritium					
Total for Period	**Ci**	**1.96E+01**	**4.35E+00**	**2.19E+01**	**2.44E+01**
C. Dissolved and Entrained Gases					
Ar-41	Ci	5.68E-07	0.00E+00	0.00E+00	0.00+00
Kr-85	Ci	0	0	0	0
Kr-86m	Ci	0	0	0	0
Kr-87	Ci	0	0	0	0
Kr-88	Ci	0	0	0	0
Xe-131m	Ci	0	0	0	0
Xe-133m	Ci	0	0	0	0
Xe-133	Ci	6.98E-05	0.00E+00	1.17E-05	1.31E-05
Xe-135m	Ci	0	0	0	0
Xe-135	Ci	1.88E-05	0.00E+00	3.06E-05	1.69E-05
Total for Period	**Ci**	**8.92E-05**	**0.00E+00**	**4.23E-05**	**3.00E-05**

Figure 2-1

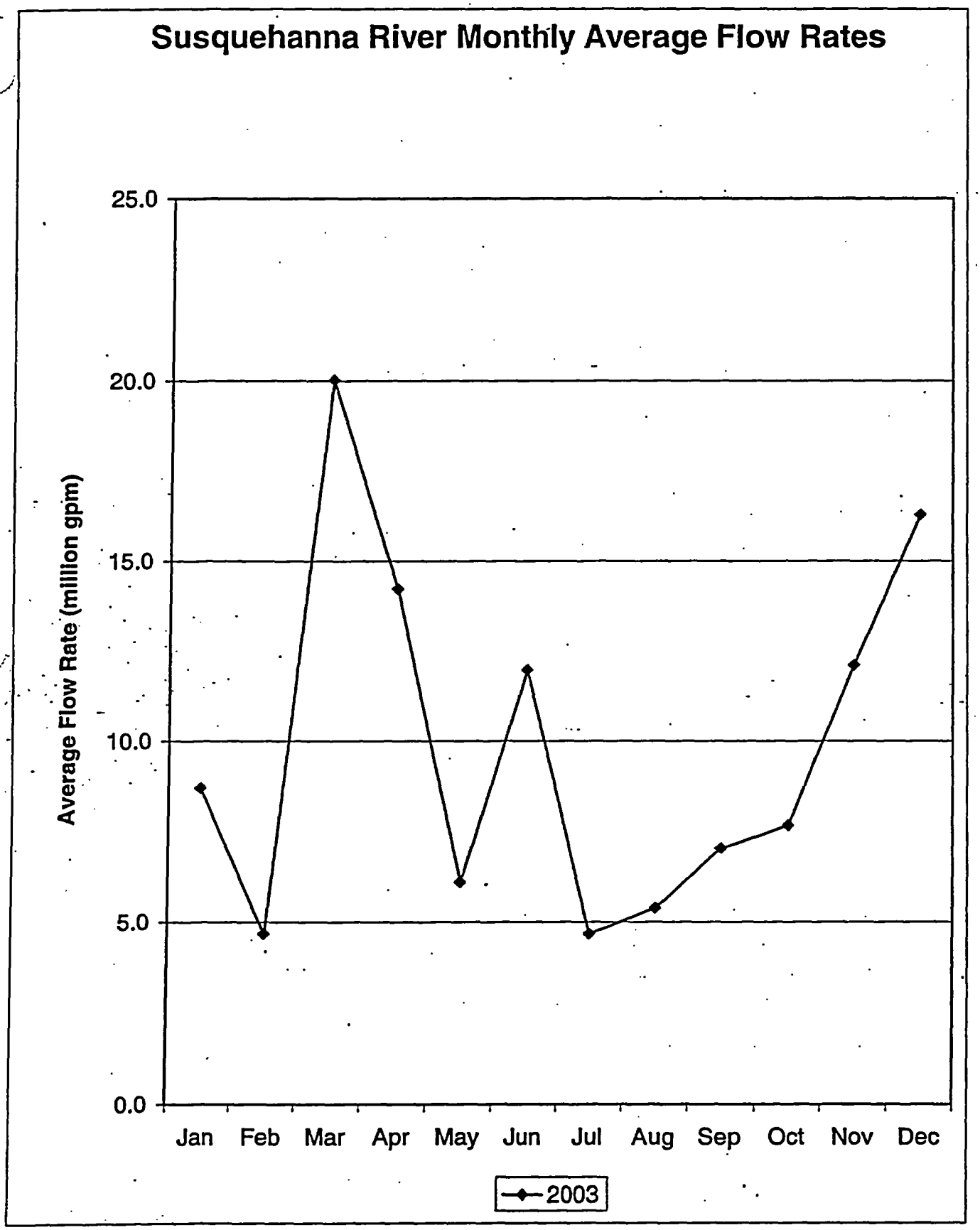

Susquehanna River Monthly Average Flow Rates
Average Flow Rate (milllion gpm)
25.0
20.0
15.0
10.0
5.0
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2003

Figure 2-2

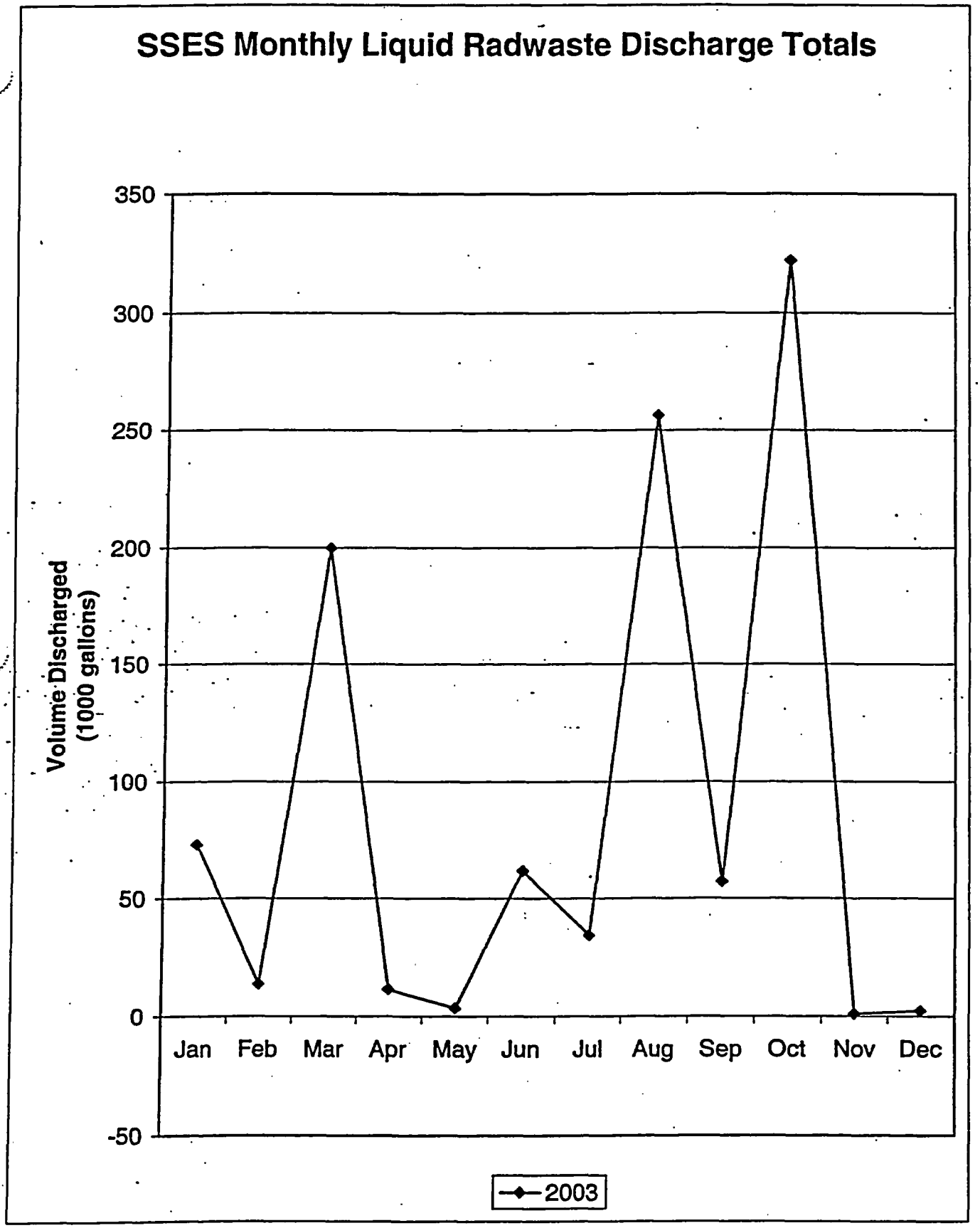

SSES Monthly Liquid Radwaste Discharge Totals
Volume Discharged (1000 gallons)
350
300
250
200
150
100
50
0
-50
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2003

TABLE 2-5

ESTIMATED TOTAL ERRORS ASSOCIATED WITH EFFLUENTS MEASUREMENTS

	MEASUREMENT	ESTIMATED TOTAL ERROR
1.	**Airborne Effluents**	
a.	Fission and Activation Gases	15.9%
b.	I-131	13.3%
c.	Particulates (incl. Gross Alpha)	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%
		ESTIMATED MAXIMUM MEASUREMENT ERROR
3.	**Solid Wastes**	
a.	LRW Filter Media – Class A HIC (Dewatered)	±25%
b.	Chem-Decon Resin – Class A HIC (Pyrolysis)	±25%
c.	Asbestos – Class A Strong Tight Container (Compacted)	±25%
d.	Ash – Class A Strong Tight Container (Incineration)	±25%
e.	Bead Resin/Charcoal – Class A HIC (Pyrolysis)	±25%
f.	Condensate Demineralizer/Radwaste Demineralizer - Class A Steel Liner (Dewatered)	±25%
g.	Condensate Demineralizer/Radwaste Demineralizer - Class A HIC (Pyrolysis)	±25%
h.	Contaminated Waste Oil – Class A (Fuel Blending for Co-Generation)	±25%
i.	Processed DAW Class A Strong Tight Container (Compacted)	±25%
j.	Irradiated Components Class B HIC	±25%

	MEASUREMENT	ESTIMATED MAXIMUM MEASUREMENT ERROR
3.	**Solid Wastes (cont.)**	
k.	Dry Active Waste (DAW) – Class B HIC (Non-Processed)	±25%
l.	RWCU Filter Media – Class B HIC (Dewatered)	±25%
m.	Dry Active Waste (DAW) – Class C HIC (Non-Processed)	±25%
n.	Irradiated Components – Class C Steel Liner	±25%
o.	Cartridge Filters – Class C HIC (Non-Processed)	±25%

SUSQUEHANNA STEAM ELECTRIC STATION

RADIOACTIVE WASTE REPORT

ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT

SOLID RADIOACTIVE WASTE

DATA PERIOD: JANUARY 1, 2003 - DECEMBER 31, 2003

PREPARED BY: Michael C. Micca

MICHAEL C. MICCA
HEALTH PHYSICIST

APPROVED BY: Ray T. Hock

RAY T. HOCK
RADIOLOGICAL OPERATIONS SUPERVISOR

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. Estimated maximum measurement error is ±25%.

TABLE 2-6

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

Data Period: January 1, 2003 - December 31, 2003

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		

Table 2-7

Year: 2003
Class: A Volume Reduction Vendor: No
Source: Liquid Radwaste Filter Media
Container: HIC (High Integrity Container)
Process: Dewatered

Nuclides	Activity (mCi)	% of Total
C-14	6.493E+00	0.00 %
CE-144	3.129E+01	0.00 %
CM-242	1.790E-03	0.00 %
CO-58	6.185E+03	0.59 %
CO-60	3.783E+04	3.63 %
CR-51	1.105E+05	10.61 %
CS-137	1.292E+01	0.00 %
FE-55	7.230E+05	69.44 %
FE-59	1.168E+04	1.12 %
H-3	7.470E+01	0.01 %
I-129	1.110E-04	0.00 %
MN-54	1.498E+05	14.38 %
NB-95	5.118E+02	0.05 %
NI-59	6.960E-01	0.00 %
NI-63	6.697E+02	0.06 %
SB-124	6.272E+02	0.06 %
SR-90	7.255E+00	0.00 %
TC-99	3.660E-06	0.00 %
ZR-95	3.275E+02	0.03 %
Total Activity (Ci)	1041.233	100.00 %
Container Volume	264.800 ft3	7.498 m3

Table 2-8

Year: 2003
Class: A Volume Reduction Vendor: Yes
Source: Chem-Decon Resin
Container: HIC (High Integrity Container)
Process: Pyrolysis

Nuclides	Activity (mCi)	% of Total
AM-241	4.100E-03	0.00 %
C-14	9.327E-01	0.00 %
CE-141	6.040E+01	0.02 %
CE-144	1.070E+02	0.04 %
CM-244	4.740E-03	0.00 %
CO-58	3.362E+03	1.10 %
CO-60	6.058E+04	19.91 %
CR-51	2.186E+04	7.19 %
CS-137	3.076E+01	0.01 %
FE-55	2.042E+05	67.10 %
FE-59	4.029E+01	0.01 %
H-3	1.603E+02	0.05 %
I-129	7.773E-01	0.00 %
MN-54	1.146E+04	3.77 %
NB-95	8.038E+00	0.00 %
NI-59	2.733E+00	0.00 %
NI-63	8.388E+02	0.28 %
PU-238	8.210E-03	0.00 %
SB-124	2.750E+00	0.00 %
SB-125	1.469E+01	0.00 %
TC-99	1.202E+00	0.00 %
ZN-65	1.571E+03	0.52 %
Total-Activity (Ci)	304.275	100.00 %
Container Volume	50.919 ft3	1.442 m3

Table 2-9

Year: 2003
Class: A
Volume Reduction Vendor: Yes
Source: Asbestos
Container: Strong Tight Container
Process: Compacted

Nuclides	Activity (mCi)	% of Total
C-14	1.000E-04	0.00 %
CE-144	1.700E-03	0.06 %
CO-58	5.600E-03	0.20 %
CO-60	2.955E-01	10.42 %
CS-137	6.000E-04	0.02 %
FE-55	2.079E+00	73.28 %
FE-59	1.020E-02	0.36 %
H-3	2.400E-03	0.08 %
I-129	< 0.000E+00	0.00 %
MN-54	4.350E-01	15.33 %
NI-59	4.000E-04	0.01 %
NI-63	5.400E-03	0.19 %
SB-125	1.000E-03	0.04 %
SR-89	< 0.000E+00	0.00 %
SR-90	< 0.000E+00	0.00 %
TC-99	< 0.000E+00	0.00 %
Total Activity (Ci)	0.003	100.00 %
Container Volume	1.500 ft3	0.042 m3

Table 2-10

Year: 2003
Class: A
Source: Ash
Container: Strong Tight Container
Process: Incineration
Volume Reduction Vendor: Yes

Nuclides	Activity (mCi)	% of Total
AG-110M	2.980E-02	0.00 %
C-14	1.670E+01	0.03 %
CE-144	7.196E-01	0.00 %
CM-242	2.000E-04	0.00 %
CM-244	1.600E-03	0.00 %
CO-58	2.280E+01	0.04 %
CO-60	3.893E+03	6.46 %
CR-51	3.293E-01	0.00 %
CS-134	4.938E+00	0.01 %
CS-137	5.173E+00	0.01 %
FE-55	5.248E+04	87.16 %
FE-59	1.869E+00	0.00 %
H-3	7.524E+01	0.12 %
I-129	1.210E-02	0.00 %
MN-54	3.642E+03	6.05 %
NB-95	1.870E-02	0.00 %
NI-59	7.850E-02	0.00 %
NI-63	7.078E+01	0.12 %
PU-238	3.900E-03	0.00 %
PU-239	1.000E-03	0.00 %
PU-241	5.452E-01	0.00 %
SB-125	1.868E-01	0.00 %
SR-89	1.458E-01	0.00 %
SR-90	1.402E-01	0.00 %
TC-99	< 0.000E+00	0.00 %
ZN-65	5.470E-02	0.00 %
ZR-95	1.250E-02	0.00 %
Total Activity (Ci)	60.219	100.00 %
Container Volume	54.148 ft3	1.533 m3

Table 2-11

Year: 2003
Class: A Volume Reduction Vendor: Yes
Source: Bead Resin/Charcoal
Container: HIC (High Integrity Container)
Process: Pyrolysis

Nuclides	Activity (mCi)	% of Total
C-14	6.189E-01	0.26 %
CE-144	1.210E-02	0.01 %
CO-58	2.460E-01	0.10 %
CO-60	2.549E+01	10.59 %
CS-137	9.590E-02	0.04 %
FE-55	8.460E+01	35.16 %
H-3	8.390E+01	34.87 %
I-129	3.410E-02	0.01 %
MN-54	4.550E+01	18.91 %
NI-63	6.570E-02	0.03 %
TC-99	2.854E-02	0.01 %
Total Activity (Ci)	0.241	100.00 %
Container Volume	40.930 ft3	1.159 m3

Table 2-12

Year: 2003
Class: A Volume Reduction Vendor: No
Source: Condensate Demineralizer / Radwaste Demineralizer
Container: Steel Liner
Process: Dewatered

Nuclides	Activity (mCi)	% of Total
C-14	< 2.320E-03	0.00 %
CO-58	5.920E+01	1.99 %
CO-60	5.300E+02	17.80 %
CR-51	9.810E+01	3.29 %
CS-137	6.110E+00	0.21 %
FE-55	1.690E+03	56.76 %
H-3	7.330E+01	2.46 %
I-129	< 1.350E-05	0.00 %
MN-54	5.110E+02	17.16 %
NI-63	7.480E+00	0.25 %
TC-99	< 3.410E-05	0.00 %
ZN-65	2.450E+00	0.08 %
Total Activity (Ci)	2.978	100.00 %
Container Volume	199.400 ft3	5.646 m3

Table 2-13

Year: 2003
Class: A Volume Reduction Vendor: Yes
Source: Condensate Demineralizer / Radwaste Demineralizer
Container: HIC (High Integrity Container)
Process: Pyrolysis

Nuclides	Activity (mCi)	% of Total
C-14	1.379E+02	0.55 %
CE-144	4.634E-01	0.00 %
CM-242	1.000E-04	0.00 %
CM-244	2.022E-03	0.00 %
CO-58	1.918E+02	0.76 %
CO-60	3.837E+03	15.17 %
CR-51	7.378E+02	2.92 %
CS-137	6.805E+00	0.03 %
FE-55	1.505E+04	59.50 %
FE-59	3.285E+01	0.13 %
H-3	7.656E+02	3.03 %
I-129	7.998E-01	0.00 %
I-131	2.570E-02	0.00 %
MN-54	4.467E+03	17.66 %
NA-24	1.741E-12	0.00 %
NB-95	4.680E+00	0.02 %
NI-59	1.214E-01	0.00 %
NI-63	5.520E+01	0.22 %
SB-124	1.936E+00	0.01 %
SR-90	1.796E-01	0.00 %
TC-99	1.630E+00	0.01 %
Total Activity (Ci)	25.289	100.00 %
Container Volume	277.755 ft3	7.865 m3

Table 2-14

Year: 2003
Class: A Volume Reduction Vendor: Yes
Source: Contaminated Waste Oil
Container: None
Process: Fuel Blending for Co-Generation

Nuclides	Activity (mCi)	% of Total
C-14	5.710E-06	0.00 %
CE-144	9.620E-05	0.06 %
CO-60	1.640E-02	10.11 %
CS-137	3.570E-05	0.02 %
FE-55	1.150E-01	70.86 %
H-3	2.620E-02	16.14 %
I-129	3.190E-06	0.00 %
MN-54	4.220E-03	2.60 %
NI-59	2.370E-05	0.01 %
NI-63	3.040E-04	0.19 %
SR-90	1.230E-06	0.00 %
TC-99	< 3.460E-11	0.00 %
Total Activity (Ci)	0.000	100.00 %
Container Volume	0.000 ft3	0.000 m3

Table 2-15

Year: 2003
Class: A Volume Reduction Vendor: Yes
Source: Processed DAW
Container: Strong Tight Container
Process: Compacted

Nuclides	Activity (mCi)	% of Total
AG-110M	3.564E+00	0.06 %
AM-241	2.129E-05	0.00 %
C-14	2.052E-01	0.00 %
CE-144	6.154E-01	0.01 %
CM-242	2.054E-05	0.00 %
CM-244	1.652E-05	0.00 %
CO-58	1.704E+01	0.27 %
CO-60	6.068E+02	9.73 %
CR-51	1.152E+02	1.85 %
CS-137	7.141E-01	0.01 %
FE-55	4.510E+03	72.33 %
FE-59	3.494E+01	0.56 %
H-3	4.608E+00	0.07 %
I-129	1.143E-01	0.00 %
MN-54	9.152E+02	14.68 %
NB-95	4.672E+00	0.07 %
NI-59	2.295E-01	0.00 %
NI-63	1.179E+01	0.19 %
PU-238	5.330E-05	0.00 %
PU-239	3.126E-05	0.00 %
PU-241	6.440E-03	0.00 %
SB-124	1.009E-01	0.00 %
SB-125	2.679E-01	0.00 %
SR-89	1.400E-03	0.00 %
SR-90	4.564E-03	0.00 %
TC-99	2.047E-02	0.00 %
ZN-65	6.997E+00	0.11 %
ZR-95	1.949E+00	0.03 %
Total Activity (Ci)	6.235	100.00 %
Container Volume	6356.390 ft3	179.996 m3

Table 2-16

Year: 2003
Class: B Volume Reduction Vendor: No
Source: Irradiated Components
Container: HIC (High Integrity Container)
Process: N/A

Nuclides	Activity (mCi)	% of Total
C-14	3.963E+00	0.00 %
CE-144	2.233E+02	0.01 %
CM-244	4.721E-02	0.00 %
CO-58	9.823E+02	0.03 %
CO-60	1.284E+05	3.62 %
CR-51	1.689E+03	0.05 %
CS-137	6.659E+01	0.00 %
FE-55	3.263E+06	92.11 %
FE-59	1.682E+03	0.05 %
H-3	6.220E+02	0.02 %
I-129	1.900E-03	0.00 %
MN-54	1.358E+05	3.83 %
NB-94	3.590E-02	0.00 %
NB-95	1.645E+03	0.05 %
NI-59	3.851E+01	0.00 %
NI-63	6.057E+03	0.17 %
PU-238	4.291E-02	0.00 %
SB-124	8.501E+01	0.00 %
SB-125	7.400E+02	0.02 %
TC-99	4.868E+00	0.00 %
ZN-65	5.354E+02	0.02 %
ZR-95	9.165E+02	0.03 %
Total Activity (Ci)	3542.393	100.00 %
Container Volume	240.360 ft3	6.806 m3

Table 2-17

Year: 2003
Class: B Volume Reduction Vendor: No
Source: Non-Processed DAW
Container: HIC (High Integrity Container)
Process: Non-Processed

Nuclides	Activity (mCi)	% of Total
C-14	3.910E-03	0.00 %
CE-144	3.860E-01	0.00 %
CM-244	4.780E-05	0.00 %
CO-58	1.900E+00	0.02 %
CO-60	2.330E+02	2.90 %
CR-51	4.380E+00	0.05 %
CS-137	1.200E-01	0.00 %
FE-55	7.440E+03	92.72 %
FE-59	3.970E+00	0.05 %
H-3	1.490E+00	0.02 %
I-129	< 1.010E-03	0.00 %
MN-54	3.210E+02	4.00 %
NB-95	2.930E+00	0.04 %
NI-59	8.110E-02	0.00 %
NI-63	1.040E+01	0.13 %
SB-124	1.940E-01	0.00 %
SB-125	1.690E+00	0.02 %
TC-99	1.380E-02	0.00 %
ZN-65	1.290E+00	0.02 %
ZR-95	1.450E+00	0.02 %
Total Activity (Ci)	8.024	100.00 %
Container Volume	0.200 ft3	0.006 m3

Table 2-18

Year: 2003
Class: B Volume Reduction Vendor: No
Source: RWCU Filter Media
Container: HIC (High Integrity Container)
Process: Dewatered

Nuclides	Activity (mCi)	% of Total
C-14	1.270E+01	0.00 %
CE-144	5.870E+02	0.02 %
CM-242	9.330E-03	0.00 %
CM-244	1.100E-02	0.00 %
CO-58	6.680E+03	0.23 %
CO-60	3.260E+05	11.11 %
CR-51	2.700E+03	0.09 %
CS-137	7.240E+02	0.02 %
FE-55	2.280E+06	77.73 %
FE-59	6.920E+02	0.02 %
H-3	8.970E+02	0.03 %
I-129	< 3.860E-05	0.00 %
MN-54	3.020E+05	10.30 %
NB-95	5.040E+02	0.02 %
NI-59	8.620E+01	0.00 %
NI-63	7.950E+03	0.27 %
PU-241	1.460E+00	0.00 %
SR-89	1.180E+02	0.00 %
SR-90	4.600E+00	0.00 %
TC-99	2.750E-01	0.00 %
ZN-65	3.570E+03	0.12 %
ZR-95	6.200E+02	0.02 %
Total Activity (Ci)	2933.147	100.00 %
Container Volume	132.400 ft3	3.749 m3

Table 2-19

Year: 2003
Class: C Volume Reduction Vendor: No
Source: Non-Processed DAW
Container: HIC (High Integrity Container)
Process: Non-Processed

Nuclides	Activity (mCi)	% of Total
C-14	3.310E-01	0.00 %
CE-144	4.800E+00	0.06 %
CO-58	1.230E+01	0.14 %
CO-60	9.280E+02	10.84 %
CS-137	2.060E+00	0.02 %
FE-55	6.360E+03	74.30 %
FE-59	2.040E+01	0.24 %
I-129	1.850E-01	0.00 %
MN-54	1.210E+03	14.13 %
NI-59	1.370E+00	0.02 %
NI-63	1.760E+01	0.21 %
SB-125	3.330E+00	0.04 %
SR-89	1.850E-02	0.00 %
SR-90	7.110E-02	0.00 %
TC-99	< 1.920E-05	0.00 %
Total Activity (Ci)	8.560	100.00 %
Container Volume	96.320 ft3	2.728 m3

Table 2-20

Year: 2003
Class: C Volume Reduction Vendor: No
Source: Irradiated Components
Container: Steel Liner
Process: N/A

Nuclides	Activity (mCi)	% of Total
AM-241	1.458E-02	0.00 %
AM-243	5.629E-04	0.00 %
C-14	4.013E+03	0.00 %
CM-242	1.339E-01	0.00 %
CM-243	6.187E-04	0.00 %
CM-244	9.860E-02	0.00 %
CO-58	1.550E+05	0.16 %
CO-60	4.710E+07	47.49 %
CR-51	4.840E+04	0.05 %
FE-55	4.260E+07	42.95 %
FE-59	1.160E+04	0.01 %
H-3	6.610E+03	0.01 %
HF-181	1.250E+06	1.26 %
I-129	5.900E-06	0.00 %
MN-54	1.565E+06	1.58 %
NB-94	8.090E+01	0.00 %
NB-95	1.427E+03	0.00 %
NI-59	1.507E+04	0.02 %
NI-63	2.848E+06	2.87 %
NP-237	2.660E-03	0.00 %
PU-238	2.998E+01	0.00 %
PU-239	2.099E-02	0.00 %
PU-240	2.628E-02	0.00 %
PU-241	3.089E+00	0.00 %
SB-124	3.813E+02	0.00 %
SB-125	1.475E+00	0.00 %
TA-182	3.538E+06	3.57 %
TC-99	1.624E+01	0.00 %
U-235	1.345E-04	0.00 %
ZN-65	3.355E+04	0.03 %
ZR-95	1.205E+03	0.00 %
Total Activity (Ci)	99178.388	100.00 %
Container Volume	229.600 ft3	6.502 m3

Table 2-21

Year: 2003
Class: C Volume Reduction Vendor: No
Source: Cartridge Filters
Container: HIC (High Integrity Container)
Process: Non-Processed

Nuclides	Activity (mCi)	% of Total
C-14	6.730E-01	0.00 %
CE-144	1.203E+01	0.06 %
CM-242	9.470E-03	0.00 %
CM-244	1.690E-04	0.00 %
CO-58	1.375E+00	0.01 %
CO-60	1.242E+03	5.88 %
CR-51	1.750E-01	0.00 %
CS-137	1.962E+00	0.01 %
FE-55	1.930E+04	91.39 %
FE-59	7.770E-01	0.00 %
H-3	1.709E-01	0.00 %
HF-181	5.610E-02	0.00 %
I-129	8.072E-02	0.00 %
MN-54	4.720E+02	2.23 %
NB-95	2.768E+00	0.01 %
NI-59	3.150E-01	0.00 %
NI-63	1.960E+01	0.09 %
PU-238	3.910E-04	0.00 %
PU-241	6.774E+00	0.03 %
SB-124	1.110E-01	0.00 %
SB-125	2.310E+01	0.11 %
SN-113	3.350E+00	0.02 %
SR-89	4.300E-03	0.00 %
SR-90	1.160E-02	0.00 %
TC-99	3.120E-01	0.00 %
ZN-65	1.009E+01	0.05 %
ZR-95	2.120E+01	0.10 %
Total Activity (Ci)	21.119	100.00 %
Container Volume	36.080 ft3	1.022 m3

SECTION 3

METEOROLOGICAL DATA AND DISPERSION ESTIMATES

METEOROLOGY AND DISPERSION DATA

Meteorological data have been collected at the Susquehanna SES (SSES) 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 10m and 60m 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 10m tower providing alternate measurements of wind speed, wind direction, and sigma theta. A 10m supplemental downriver meteorological tower is also available. This tower measures wind speed, wind direction, sigma theta, temperature and dew point.

SSES meteorological data are transmitted to the plant Control Room, Technical Support Center, Emergency Operations Facility for emergency response availability, and ABSG Consulting, Inc. ABSG Consulting, Inc., located in Rockville, Maryland, provides meteorological consulting services to PPL Susquehanna, LLC.

Dispersion modeling for effluents from normal operation of SSES is done using the MIDAS system XDCALC program, a straight-line Gaussian plume model designed to estimate average relative concentration. The model was developed in accordance with Regulatory Guide 1.111. For periods when the wind speed is calm, the actual wind direction that last occurred is used.

XDCALC and the XQINTR program that interpolates X/Q values to exact locations both use terrain correction factors to account for the temporal and spatial variations in the airflow in the region. A straight-line trajectory model assumes that a constant mean wind transports and diffuses effluents in the direction of airflow at the release point within the entire region of interest. The SSES terrain correction factors were taken from SSES FSAR Table 2.3-128.

TABLE 3-1

SSES METEOROLOGICAL DATA RECOVERY FOR 2003

PARAMETER	PERCENT VALID DATA RECOVERY
Wind Speed 10m – Primary [1]	99.6
Wind Speed 60m – Primary	99.3
Wind Speed 10m – Backup[2]	99.9
Wind Speed 10m – Downriver[3]	99.3
Wind Direction 10m – Primary	99.7
Wind Direction 60m – Primary	99.7
Wind Direction 10m – Backup	99.9
Wind Direction 10m – Downriver	100.0
Temperature 10m – Primary	99.0
Dew Point 10m – Primary	98.9
Delta Temperature 60m – Primary	99.1
Sigma Theta 10m – Primary	99.7
Sigma Theta 60m – Primary	99.7
Sigma Theta 10m- Backup	99.9
Sigma Theta 10m - Downriver	100.0
Precipitation – Primary	100.0
Composite Parameters	
Wind Speed and Direction 10m, Delta Temperature 60-10m	99.0
Wind Speed and Direction 60m, Delta Temperature 60-10m	98.6

[1]SSES "Primary" meteorological tower
[2]SSES "Backup" meteorological tower
[3]SSES "Downriver" meteorological tower

Table 2. SSES Joint Frequency Distribution of Wind Speed and Direction 10m Versus Delta Temperature 60-10m for the Period of January 1, 2003 through December 31, 2003

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: A DT/DZ
ELEVATION: SPEED:10M SP DIRECTION:10M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1	2	5	1	0	0	9
NNE	1	7	6	0	0	0	14
NE	0	7	6	0	0	0	13
ENE	3	3	0	0	0	0	6
E	8	2	0	0	0	0	10
ESE	0	3	1	0	0	0	4
SE	2	4	7	0	0	0	13
SSE	5	10	5	0	0	0	20
S	2	20	11	0	0	0	33
SSW	9	39	12	0	0	0	60
SW	8	47	33	1	0	0	89
WSW	3	18	24	2	0	0	47
W	1	6	6	0	0	0	13
WNW	0	6	1	0	0	0	7
NW	0	0	6	0	0	0	6
NNW	1	0	7	2	0	0	10
TOTAL	44	174	130	6	0	0	354

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 84

TABLE 3-2
(continued)

Table 2 (continued)

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: B DT/DZ
ELEVATION: SPEED:10M SP DIRECTION:10M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	4	0	0	0	4
NNE	1	5	2	0	0	0	8
NE	0	5	4	0	0	0	9
ENE	3	2	0	0	0	0	5
E	1	2	2	0	0	0	5
ESE	2	1	0	0	0	0	3
SE	1	3	2	0	0	0	6
SSE	1	3	1	0	0	0	5
S	2	2	3	0	0	0	7
SSW	5	5	1	0	0	0	11
SW	1	14	17	1	0	0	33
WSW	1	7	10	3	0	0	21
W	0	2	3	0	0	0	5
WNW	0	1	6	0	0	0	7
NW	0	1	5	0	0	0	6
NNW	0	6	5	1	0	0	12
TOTAL	18	59	65	5	0	0	147

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 84

TABLE 3-2
(continued)

Table 2 (continued)

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: C DT/DZ
ELEVATION: SPEED:10M SP DIRECTION:10M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	6	8	0	0	0	14
NNE	2	11	3	1	0	0	17
NE	2	9	3	0	0	0	14
ENE	6	0	1	0	0	0	7
E	4	2	1	0	0	0	7
ESE	5	3	1	0	0	0	9
SE	6	6	2	0	0	0	14
SSE	2	5	4	0	0	0	11
S	10	5	3	0	0	0	18
SSW	4	12	1	0	0	0	17
SW	4	25	28	2	0	0	59
WSW	0	6	17	4	0	0	27
W	1	2	3	5	0	0	11
WNW	0	2	6	1	0	0	9
NW	0	2	6	0	0	0	8
NNW	0	0	6	2	0	0	8
TOTAL	46	96	93	15	0	0	250

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 84

TABLE 3-2
(continued)

Table 2 (continued)

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: D DT/DZ
ELEVATION: SPEED:10M SP DIRECTION:10M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED (MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	23	115	67	4	0	0	209
NNE	95	181	50	1	0	0	327
NE	126	167	26	0	0	0	319
ENE	90	57	10	3	0	0	160
E	104	37	14	0	0	0	155
ESE	97	67	13	0	0	0	177
SE	94	114	29	2	0	0	239
SSE	70	70	16	2	0	0	158
S	101	84	19	0	0	0	204
SSW	83	136	21	1	0	0	241
SW	50	246	209	13	1	0	519
WSW	28	100	149	62	12	0	351
W	15	57	90	26	7	0	195
WNW	9	47	52	29	1	0	138
NW	11	60	103	20	2	0	196
NNW	9	60	142	13	0	0	224
TOTAL	1005	1598	1010	176	23	0	3812

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 84

TABLE 3-2
(continued)

Table 2 (continued)

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: E DT/DZ
ELEVATION: SPEED:10M SP DIRECTION:10M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	29	55	12	0	0	0	96
NNE	127	117	13	0	0	0	257
NE	244	84	12	0	0	0	340
ENE	289	26	1	3	0	0	319
E	190	16	4	0	0	0	210
ESE	132	20	7	3	0	0	162
SE	170	30	7	7	0	0	214
SSE	119	45	15	1	0	0	180
S	140	68	12	0	0	0	220
SSW	103	120	9	0	0	0	232
SW	39	89	27	2	0	0	157
WSW	20	46	18	6	0	0	90
W	9	19	3	0	0	0	31
WNW	7	14	4	0	0	0	25
NW	6	23	2	1	0	0	32
NNW	7	34	4	1	0	0	46
TOTAL	1631	806	150	24	0	0	2611

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 84

TABLE 3-2
(continued)

Table 2 (continued)

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: F DT/DZ
ELEVATION: SPEED:10M SP DIRECTION:10M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	7	0	0	0	0	0	7
NNE	27	7	1	0	0	0	35
NE	140	9	0	0	0	0	149
ENE	407	6	0	0	0	0	413
E	140	0	0	0	0	0	140
ESE	62	0	0	0	0	0	62
SE	38	0	0	0	0	0	38
SSE	27	1	0	0	0	0	28
S	38	3	0	0	0	0	41
SSW	22	9	0	0	0	0	31
SW	6	8	0	0	0	0	14
WSW	1	2	0	0	0	0	3
W	3	0	0	0	0	0	3
WNW	0	0	0	0	0	0	0
NW	0	1	0	0	0	0	1
NNW	1	1	0	0	0	0	2
TOTAL	919	47	1	0	0	0	967

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 84

TABLE 3-2
(continued)

Table 2 (continued)

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: G DT/DZ
ELEVATION: SPEED:10M SP DIRECTION:10M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1	0	0	0	0	0	1
NNE	9	0	0	0	0	0	9
NE	103	4	0	0	0	0	107
ENE	309	8	0	0	0	0	317
E	57	0	0	0	0	0	57
ESE	14	0	0	0	0	0	14
SE	13	1	0	0	0	0	14
SSE	9	0	0	0	0	0	9
S	6	0	0	0	0	0	6
SSW	1	0	0	0	0	0	1
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
TOTAL	522	13	0	0	0	0	535

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 84

TABLE 3-2
(continued)

Table 2 (continued)

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: ALL DT/DZ
ELEVATION: SPEED:10M SP DIRECTION:10M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	61	178	96	5	0	0	340
NNE	262	328	75	2	0	0	667
NE	615	285	51	0	0	0	951
ENE	1107	102	12	6	0	0	1227
E	504	59	21	0	0	0	584
ESE	312	94	22	3	0	0	431
SE	324	158	47	9	0	0	538
SSE	233	134	41	3	0	0	411
S	299	182	48	0	0	0	529
SSW	227	321	44	1	0	0	593
SW	108	429	314	19	1	0	871
WSW	53	179	218	77	12	0	539
W	29	86	105	31	7	0	258
WNW	16	70	69	30	1	0	186
NW	17	87	122	21	2	0	249
NNW	18	101	164	19	0	0	302
TOTAL	4185	2793	1449	226	23	0	8676

PERIODS OF CALM(HOURS): 0
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 84

Table 3. SSES Joint Frequency Distribution of Wind Speed and Direction 60m Versus Delta Temperature 60-10m for the Period of January 1, 2003 through December 31, 2003

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: A DT/DZ
ELEVATION: SPEED:60M SP DIRECTION:60M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	0	6	1	0	0	7
NNE	0	1	16	2	0	0	19
NE	3	9	4	1	0	0	17
ENE	3	0	0	0	0	0	3
E	0	1	0	0	0	0	1
ESE	3	3	1	0	0	0	7
SE	0	4	7	2	0	0	13
SSE	2	5	3	1	0	0	11
S	7	12	10	5	0	0	34
SSW	4	28	15	9	1	0	57
SW	5	29	40	18	1	0	93
WSW	2	14	21	24	2	0	63
W	1	3	2	4	0	0	10
WNW	0	1	3	1	0	0	5
NW	1	0	3	2	0	0	6
NNW	0	0	3	5	0	0	8
TOTAL	31	110	134	75	4	0	354

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 120

TABLE 3-3
(continued)

Table 3 (continued)

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: B DT/DZ
ELEVATION: SPEED:60M SP DIRECTION:60M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	1	3	1	0	0	5
NNE	0	1	4	3	0	0	8
NE	2	6	4	1	0	0	13
ENE	0	1	0	0	0	0	1
E	1	1	1	1	0	0	4
ESE	0	3	0	0	0	0	3
SE	2	3	2	1	0	0	8
SSE	0	2	0	0	0	0	2
S	2	0	3	1	0	0	6
SSW	2	4	1	3	1	0	11
SW	2	3	13	10	0	0	28
WSW	0	1	11	13	4	0	29
W	0	0	6	4	0	0	10
WNW	0	1	2	1	0	0	4
NW	0	2	5	1	0	0	8
NNW	0	1	4	2	0	0	7
TOTAL	11	30	59	42	5	0	147

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 120

TABLE 3-3
(continued)

Table 3 (continued)

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: C DT/DZ
ELEVATION: SPEED:60M SP DIRECTION:60M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	3	4	3	0	0	10
NNE	3	6	11	1	1	0	22
NE	3	5	5	2	0	0	15
ENE	2	2	2	0	0	0	6
E	4	4	1	0	0	0	9
ESE	0	1	1	1	0	0	3
SE	3	6	3	1	0	0	13
SSE	2	2	3	2	0	0	9
S	2	2	3	3	0	0	10
SSW	8	8	3	0	1	0	20
SW	2	13	21	10	1	0	47
WSW	0	3	20	21	3	0	47
W	1	1	7	7	2	0	18
WNW	0	1	2	3	0	0	6
NW	0	0	4	3	0	0	7
NNW	0	0	5	2	1	0	8
TOTAL	30	57	95	59	9	0	250

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 120

TABLE 3-3
(continued)

Table 3 (continued)

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: D DT/DZ
ELEVATION: SPEED:60M SP DIRECTION:60M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	12	53	87	20	0	0	172
NNE	66	111	140	37	2	0	356
NE	86	110	110	27	1	0	334
ENE	44	54	36	4	1	2	141
E	31	48	16	12	3	0	110
ESE	33	44	48	4	0	0	129
SE	34	55	54	11	2	1	157
SSE	38	49	51	22	1	2	163
S	53	40	40	20	2	0	155
SSW	59	95	50	25	5	0	234
SW	47	169	173	63	5	0	457
WSW	13	85	175	240	53	18	584
W	7	34	87	88	25	10	251
WNW	5	31	57	55	19	0	167
NW	4	23	97	57	1	1	183
NNW	11	33	100	62	2	0	208
TOTAL	543	1034	1321	747	122	34	3801

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 120

TABLE 3-3
(continued)

Table 3 (continued)

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: E DT/DZ
ELEVATION: SPEED:60M SP DIRECTION:60M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	24	67	21	1	0	0	113
NNE	107	219	65	22	0	0	413
NE	127	95	62	12	1	0	298
ENE	65	63	17	0	1	2	148
E	64	41	11	5	0	1	122
ESE	45	25	15	7	2	1	95
SE	56	39	21	7	4	3	130
SSE	56	56	38	10	2	1	163
S	56	68	35	17	7	0	183
SSW	64	66	72	20	3	0	225
SW	48	125	87	21	3	0	284
WSW	20	61	102	51	5	0	239
W	5	17	21	9	2	1	55
WNW	2	22	12	0	0	0	36
NW	4	10	39	3	0	0	56
NNW	6	17	21	1	0	0	45
TOTAL	749	991	639	186	30	9	2605

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 120

TABLE 3-3
(continued)

Table 3 (continued)

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: F DT/DZ
ELEVATION: SPEED:60M SP DIRECTION:60M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	13	55	0	0	0	0	68
NNE	78	209	5	0	0	0	292
NE	96	52	7	0	0	0	155
ENE	48	11	0	0	0	0	59
E	38	4	0	0	0	0	42
ESE	34	0	0	0	0	0	34
SE	39	3	1	0	0	0	43
SSE	21	11	2	0	0	0	34
S	27	13	2	0	0	0	42
SSW	14	28	13	0	0	0	55
SW	14	35	15	1	0	0	65
WSW	2	9	33	5	0	0	49
W	2	2	0	0	0	0	4
WNW	3	3	0	0	0	0	6
NW	0	3	0	1	0	0	4
NNW	1	4	0	0	0	0	5
TOTAL	430	442	78	7	0	0	957

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 120

TABLE 3-3
(continued)

Table 3 (continued)

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: G DT/DZ
ELEVATION: SPEED:60M SP DIRECTION:60M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	15	49	0	0	0	0	64
NNE	40	106	2	0	0	0	148
NE	42	47	0	0	0	0	89
ENE	28	13	0	0	0	0	41
E	17	2	0	0	0	0	19
ESE	17	4	1	0	0	0	22
SE	15	2	0	0	0	0	17
SSE	16	3	0	0	0	0	19
S	15	14	3	0	0	0	32
SSW	12	16	8	1	0	0	37
SW	3	21	3	0	0	0	27
WSW	0	0	4	0	0	0	4
W	1	0	0	0	0	0	1
WNW	1	0	1	0	0	0	2
NW	1	1	0	0	0	0	2
NNW	2	0	0	0	0	0	2
TOTAL	225	278	22	1	0	0	526

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 120

TABLE 3-3
(continued)

Table 3 (continued)

SITE: SSES

HOURS AT EACH WIND SPEED AND DIRECTION
PERIOD OF RECORD = 03010101-03123124
STABILITY CLASS: ALL DT/DZ
ELEVATION: SPEED:60M SP DIRECTION:60M WD LAPSE:DT A

WIND DIRECTION	WIND SPEED(MPH) 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	64	228	121	26	0	0	439
NNE	294	653	243	65	3	0	1258
NE	359	324	192	43	2	0	921
ENE	190	144	55	4	2	4	399
E	155	101	29	18	3	1	307
ESE	132	80	66	12	2	1	293
SE	149	112	88	22	6	4	381
SSE	135	128	97	35	3	3	401
S	162	149	96	46	9	0	462
SSW	163	245	162	58	11	0	639
SW	121	395	352	123	10	0	1001
WSW	37	173	366	354	67	18	1015
W	17	57	123	112	29	11	349
WNW	11	59	77	60	19	0	226
NW	10	39	148	67	1	1	266
NNW	20	55	133	72	3	0	283
TOTAL	2019	2942	2348	1117	170	43	8640

PERIODS OF CALM(HOURS): 1
VARIABLE DIRECTION 0
HOURS OF MISSING DATA: 120

TABLE 3-4

2003 SSES ANNUAL RELATIVE CONCENTRATIONS NO DECAY, UNDEPLETED X/Q (sec/m^3)

DATES OF LAST X/Q ACCUMULATION ARE FROM 3 1 1 1 0 TO 3123124 0
X/Q ACCUMULATION FOR GROUND AVERAGE SEC/M3
FOR RELEASE POINT 1

	MILES								
0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
**DIRECTION FROM N									
3.2435E-06	6.3244E-07	2.6332E-07	1.3842E-07	8.8935E-08	3.2978E-08	9.0140E-09	4.3560E-09	2.7352E-09	1.9308E-09
**DIRECTION FROM NNE									
8.7684E-06	1.7997E-06	8.0303E-07	4.2928E-07	2.7717E-07	1.0282E-07	2.8114E-08	1.3777E-08	8.7280E-09	6.2252E-09
**DIRECTION FROM NE									
2.0428E-05	3.8436E-06	1.7466E-06	9.9371E-07	6.5969E-07	2.6161E-07	7.9521E-08	4.0052E-08	2.5772E-08	1.8753E-08
**DIRECTION FROM ENE									
4.2878E-05	7.9928E-06	3.8724E-06	2.2896E-06	1.5302E-06	6.0628E-07	1.7630E-07	8.5725E-08	5.5585E-08	4.0806E-08
**DIRECTION FROM E									
1.8535E-05	3.4300E-06	1.5019E-06	8.4370E-07	5.6288E-07	2.2811E-07	7.1684E-08	3.6208E-08	2.3359E-08	1.6991E-08
**DIRECTION FROM ESE									
1.1657E-05	2.3011E-06	1.0372E-06	5.7616E-07	3.8111E-07	1.5277E-07	4.1948E-08	1.8354E-08	1.1760E-08	8.4772E-09
**DIRECTION FROM SE									
1.3991E-05	2.8164E-06	1.2800E-06	7.1796E-07	4.7575E-07	1.9377E-07	4.8199E-08	1.7741E-08	1.1315E-08	8.1284E-09
**DIRECTION FROM SSE									
8.7706E-06	1.7421E-06	7.6972E-07	4.3004E-07	2.8893E-07	1.2443E-07	3.2494E-08	1.1591E-08	7.3841E-09	5.2971E-09
**DIRECTION FROM S									
7.2101E-06	1.5361E-06	7.4824E-07	4.3415E-07	2.9754E-07	1.3782E-07	3.8075E-08	1.3089E-08	8.3354E-09	5.9694E-09
**DIRECTION FROM SSW									
7.6272E-06	1.5610E-06	7.2096E-07	4.0846E-07	2.7074E-07	1.1224E-07	2.9157E-08	1.1086E-08	7.0346E-09	5.0144E-09
**DIRECTION FROM SW									
5.8188E-06	1.1886E-06	5.6211E-07	3.2062E-07	2.1397E-07	9.2779E-08	2.3519E-08	7.8088E-09	4.8838E-09	3.4285E-09
**DIRECTION FROM WSW									
3.5834E-06	7.1444E-07	3.3459E-07	1.9700E-07	1.3522E-07	6.4288E-08	2.0242E-08	7.5995E-09	3.8885E-09	2.1267E-09
**DIRECTION FROM W									
1.6492E-06	3.1777E-07	1.3898E-07	7.6803E-08	5.0518E-08	2.0777E-08	5.6769E-09	2.3127E-09	1.4425E-09	1.0095E-09
**DIRECTION FROM WNW									
1.2047E-06	2.2383E-07	8.9733E-08	4.6898E-08	2.9936E-08	1.1065E-08	3.0076E-09	1.4226E-09	8.8011E-10	6.1142E-10
**DIRECTION FROM NW									
1.7204E-06	3.2455E-07	1.2936E-07	6.5792E-08	4.1726E-08	1.5045E-08	3.9464E-09	1.8574E-09	1.1443E-09	7.9152E-10
**DIRECTION FROM NNW									
2.0586E-06	3.9538E-07	1.6735E-07	8.8919E-08	5.6126E-08	1.9628E-08	4.9080E-09	2.3339E-09	1.4486E-09	1.0095E-09

TABLE 3-5

2003 SSES ANNUAL RELATIVE CONCENTRATIONS 2.26-DAY DECAY, UNDEPLETED X/Q (sec/m^3)

DATES OF LAST X/Q ACCUMULATION ARE FROM 3 1 1 1 0 TO 3123124 0
X/Q ACCUMULATION FOR GROUND DECAYED S.AVG SEC/M3
FOR RELEASE POINT 1

	MILES								
0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
**DIRECTION FROM N									
3.2378E-06	6.2907E-07	2.6097E-07	1.3668E-07	8.7492E-08	3.2082E-08	8.5240E-09	3.9669E-09	2.3989E-09	1.6308E-09
**DIRECTION FROM NNE									
8.7486E-06	1.7876E-06	7.9398E-07	4.2248E-07	2.7151E-07	9.9327E-08	2.6223E-08	1.2266E-08	7.4184E-09	5.0510E-09
**DIRECTION FROM NE									
2.0368E-05	3.8102E-06	1.7212E-06	9.7341E-07	6.4237E-07	2.5022E-07	7.2714E-08	3.4499E-08	2.0915E-08	1.4340E-08
**DIRECTION FROM ENE									
4.2744E-05	7.9174E-06	3.8117E-06	2.2396E-06	1.4874E-06	5.7835E-07	1.6047E-07	7.3308E-08	4.4670E-08	3.0830E-08
**DIRECTION FROM E									
1.8463E-05	3.3906E-06	1.4732E-06	8.2117E-07	5.4361E-07	2.1524E-07	6.3812E-08	2.9831E-08	1.7817E-08	1.2001E-08
**DIRECTION FROM ESE									
1.1615E-05	2.2765E-06	1.0186E-06	5.6171E-07	3.6884E-07	1.4462E-07	3.7570E-08	1.5271E-08	9.0916E-09	6.0898E-09
**DIRECTION FROM SE									
1.3945E-05	2.7881E-06	1.2585E-06	7.0104E-07	4.6133E-07	1.8401E-07	4.3431E-08	1.4910E-08	8.8711E-09	5.9454E-09
**DIRECTION FROM SSE									
8.7455E-06	1.7271E-06	7.5871E-07	4.2142E-07	2.8150E-07	1.1912E-07	2.9770E-08	1.0019E-08	6.0236E-09	4.0785E-09
**DIRECTION FROM S									
7.1917E-06	1.5244E-06	7.3873E-07	4.2641E-07	2.9072E-07	1.3257E-07	3.5222E-08	1.1496E-08	6.9522E-09	4.7285E-09
**DIRECTION FROM SSW									
7.6106E-06	1.5507E-06	7.1307E-07	4.0219E-07	2.6540E-07	1.0857E-07	2.7273E-08	9.9182E-09	6.0214E-09	4.1072E-09
**DIRECTION FROM SW									
5.8100E-06	1.1832E-06	5.5781E-07	3.1718E-07	2.1101E-07	9.0644E-08	2.2444E-08	7.2235E-09	4.3802E-09	2.9815E-09
**DIRECTION FROM WSW									
3.5781E-06	7.1122E-07	3.3206E-07	1.9491E-07	1.3337E-07	6.2813E-08	1.9314E-08	7.0264E-09	3.4846E-09	1.8471E-09
**DIRECTION FROM W									
1.6462E-06	3.1601E-07	1.3766E-07	7.5769E-08	4.9637E-08	2.0165E-08	5.3376E-09	2.0845E-09	1.2465E-09	8.3614E-10
**DIRECTION FROM WNW									
1.2030E-06	2.2284E-07	8.9074E-08	4.6416E-08	2.9539E-08	1.0818E-08	2.8735E-09	1.3181E-09	7.9091E-10	5.3281E-10
**DIRECTION FROM NW									
1.7179E-06	3.2315E-07	1.2843E-07	6.5132E-08	4.1188E-08	1.4722E-08	3.7783E-09	1.7278E-09	1.0346E-09	6.9560E-10
**DIRECTION FROM NNW									
2.0558E-06	3.9375E-07	1.6619E-07	8.8052E-08	5.5419E-08	1.9212E-08	4.6985E-09	2.1693E-09	1.3072E-09	8.8434E-10

TABLE 3-6

2003 SSES ANNUAL RELATIVE CONCENTRATIONS 8-DAY DECAY, DEPLETED X/Q (sec/m^3)

DATES OF LAST X/Q ACCUMULATION ARE FROM 3 1 1 1 0 TO 3123124 0
X/Q ACCUMULATION FOR DECAYED DEPLETION SEC/M3
FOR RELEASE POINT 1

	MILES								
0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
**DIRECTION FROM N									
2.9634E-06	5.3573E-07	2.1298E-07	1.0725E-07	6.6628E-08	2.2944E-08	5.5573E-09	2.3443E-09	1.3194E-09	8.4528E-10
**DIRECTION FROM NNE									
8.0102E-06	1.5239E-06	6.4908E-07	3.3231E-07	2.0740E-07	7.1394E-08	1.7266E-08	7.3674E-09	4.1732E-09	2.6947E-09
**DIRECTION FROM NE									
1.8658E-05	3.2527E-06	1.4104E-06	7.6823E-07	4.9280E-07	1.8115E-07	4.8565E-08	2.1219E-08	1.2163E-08	7.9833E-09
**DIRECTION FROM ENE									
3.9160E-05	6.7626E-06	3.1261E-06	1.7693E-06	1.1425E-06	4.1950E-07	1.0753E-07	4.5327E-08	2.6165E-08	1.7316E-08
**DIRECTION FROM E									
1.6924E-05	2.9004E-06	1.2113E-06	6.5108E-07	4.1950E-07	1.5735E-07	4.3449E-08	1.8944E-08	1.0834E-08	7.0738E-09
**DIRECTION FROM ESE									
1.0645E-05	1.9463E-06	8.3674E-07	4.4483E-07	2.8421E-07	1.0547E-07	2.5468E-08	9.6290E-09	5.4744E-09	3.5453E-09
**DIRECTION FROM SE									
1.2778E-05	2.3825E-06	1.0330E-06	5.5455E-07	3.5498E-07	1.3390E-07	2.9313E-08	9.3327E-09	5.2870E-09	3.4157E-09
**DIRECTION FROM SSE									
8.0108E-06	1.4743E-06	6.2162E-07	3.3250E-07	2.1587E-07	8.6183E-08	1.9855E-08	6.1468E-09	3.4898E-09	2.2591E-09
**DIRECTION FROM S									
6.5861E-06	1.3004E-06	6.0455E-07	3.3589E-07	2.2248E-07	9.5582E-08	2.3329E-08	6.9728E-09	3.9644E-09	2.5666E-09
**DIRECTION FROM SSW									
6.9679E-06	1.3218E-06	5.8280E-07	3.1624E-07	2.0263E-07	7.7966E-08	1.7921E-08	5.9364E-09	3.3703E-09	2.1765E-09
**DIRECTION FROM SW									
5.3168E-06	1.0071E-06	4.5482E-07	2.4856E-07	1.6041E-07	6.4629E-08	1.4538E-08	4.2213E-09	2.3711E-09	1.5137E-09
**DIRECTION FROM WSW									
3.2742E-06	6.0533E-07	2.7073E-07	1.5273E-07	1.0138E-07	4.4783E-08	1.2511E-08	4.1073E-09	1.8871E-09	9.3839E-10
**DIRECTION FROM W									
1.5068E-06	2.6916E-07	1.1239E-07	5.9494E-08	3.7833E-08	1.4445E-08	3.4938E-09	1.2405E-09	6.9240E-10	4.3894E-10
**DIRECTION FROM WNW									
1.1008E-06	1.8965E-07	7.2612E-08	3.6362E-08	2.2446E-08	7.7094E-09	1.8597E-09	7.6936E-10	4.2751E-10	2.7008E-10
**DIRECTION FROM NW									
1.5720E-06	2.7500E-07	1.0468E-07	5.1015E-08	3.1290E-08	1.0485E-08	2.4415E-09	1.0056E-09	5.5673E-10	3.5041E-10
**DIRECTION FROM NNW									
1.8810E-06	3.3503E-07	1.3543E-07	6.8953E-08	4.2092E-08	1.3680E-08	3.0364E-09	1.2633E-09	7.0440E-10	4.4652E-10

TABLE 3-7

2003 SSES ANNUAL RELATIVE DEPOSITION (D/Q meters^{-2})

DATES OF LAST X/Q ACCUMULATION ARE FROM 3 1 1 1 0 TO 3123124 0
X/Q ACCUMULATION FOR DEPOSITION 1/M2
FOR RELEASE POINT 1

	MILES								
0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
**DIRECTION FROM N									
1.9596E-08	2.8873E-09	1.1842E-09	5.6127E-10	3.3170E-10	1.0512E-10	2.5148E-11	9.2592E-12	4.9420E-12	3.1047E-12
**DIRECTION FROM NNE									
3.6152E-08	5.6016E-09	2.4296E-09	1.1556E-09	6.8025E-10	2.1196E-10	4.9409E-11	1.8192E-11	9.7095E-12	6.0999E-12
**DIRECTION FROM NE									
4.8125E-08	7.2586E-09	3.1037E-09	1.5022E-09	8.9119E-10	2.8708E-10	7.0342E-11	2.5898E-11	1.3823E-11	8.6842E-12
**DIRECTION FROM ENE									
6.6118E-08	1.0267E-08	4.5720E-09	2.2368E-09	1.3215E-09	4.1819E-10	9.5297E-11	3.3415E-11	1.7835E-11	1.1205E-11
**DIRECTION FROM E									
3.0512E-08	4.4570E-09	1.8159E-09	8.6704E-10	5.1732E-10	1.7060E-10	4.3196E-11	1.5904E-11	8.4885E-12	5.3328E-12
**DIRECTION FROM ESE									
2.5951E-08	3.9228E-09	1.6725E-09	8.0747E-10	4.8243E-10	1.5997E-10	3.6345E-11	1.1737E-11	6.2647E-12	3.9357E-12
**DIRECTION FROM SE									
3.8696E-08	5.8800E-09	2.5681E-09	1.2682E-09	7.6125E-10	2.5722E-10	5.3531E-11	1.4651E-11	7.8199E-12	4.9128E-12
**DIRECTION FROM SSE									
2.8021E-08	4.1825E-09	1.7817E-09	8.7978E-10	5.3619E-10	1.9196E-10	4.2111E-11	1.1193E-11	5.9740E-12	3.7531E-12
**DIRECTION FROM S									
2.5779E-08	4.1330E-09	1.9410E-09	9.9750E-10	6.2169E-10	2.4062E-10	5.6159E-11	1.4406E-11	7.6891E-12	4.8306E-12
**DIRECTION FROM SSW									
3.4733E-08	5.3125E-09	2.3828E-09	1.2062E-09	7.3010E-10	2.5474E-10	5.6589E-11	1.6149E-11	8.6193E-12	5.4150E-12
**DIRECTION FROM SW									
4.5914E-08	7.2886E-09	3.4292E-09	1.7743E-09	1.0964E-09	4.1216E-10	9.3111E-11	2.3720E-11	1.2660E-11	7.9536E-12
**DIRECTION FROM WSW									
3.2454E-08	5.0027E-09	2.3364E-09	1.2508E-09	7.9528E-10	3.2798E-10	9.2301E-11	2.6669E-11	1.1675E-11	5.7274E-12
**DIRECTION FROM W									
1.3046E-08	1.9582E-09	8.4734E-10	4.2282E-10	2.5770E-10	9.2259E-11	2.2512E-11	7.0533E-12	3.7646E-12	2.3651E-12
**DIRECTION FROM WNW									
1.0415E-08	1.5028E-09	6.0552E-10	2.8939E-10	1.7192E-10	5.5695E-11	1.3758E-11	5.0653E-12	2.7036E-12	1.6985E-12
**DIRECTION FROM NW									
1.4993E-08	2.1948E-09	8.7938E-10	4.0908E-10	2.4186E-10	7.6784E-11	1.8417E-11	6.7810E-12	3.6193E-12	2.2738E-12
**DIRECTION FROM NNW									
1.8325E-08	2.7215E-09	1.1498E-09	5.5588E-10	3.2561E-10	9.9258E-11	2.2338E-11	8.2243E-12	4.3896E-12	2.7577E-12

TABLE 3-8

2003 ATMOSPHERIC DISPERSION ESTIMATES FOR RETDAS INPUT AT SELECTED LOCATIONS

AFFECTED SECTOR	LOCATION	MILES	X/Q[1]	X/Q DEC[2]	X/Q DEC+DEP[3]	DEPOSITION[4]
11/SW	Maximum (X/Q) Site Boundary	0.6	1.44E-05	1.43E-05	1.29E-05	3.25E-08
9/S	Closest (X/Q) Site Boundary	0.38	4.58E-06	4.58E-06	4.26E-06	2.97E-08
12/WSW	Maximum (X/Q) Residence	1.1	1.27E-05	1.26E-05	1.10E-05	1.72E-08
15/NW	Maximum (D/Q) Residence	0.8	7.59E-06	7.54E-06	6.71E-06	1.86E-08
12/WSW	Maximum (D/Q) Garden	1.1	1.27E-05	1.26E-05	1.10E-05	1.72E-08
12/WSW	Maximum (D/Q) Dairy	1.7	6.75E-06	6.68E-06	5.65E-06	8.50E-09
12/WSW	Maximum (D/Q) Meat Producer	1.7	6.75E-06	6.68E-06	5.65E-06	8.50E-09
3/NE	Riverlands / EIC	0.7	3.63E-06	3.62E-06	3.24E-06	2.65E-08
12/WSW	Tower's Club	0.5	3.39E-05	3.38E-05	3.09E-05	5.22E-08
5/E	East Gate	0.5	1.78E-06	1.78E-06	1.63E-06	1.41E-08

NEAREST RESIDENCE WITHIN A 5-MILE RADIUS OF SSES BY SECTOR

SECTOR NUMBER	AFFECTED SECTOR	NAME	MILES	X/Q	X/Q DEC	X/Q DEC+DEP	DEPOSITION
1	N	H.Burd	1.3	1.86E-06	1.85E-06	1.59E-06	5.20E-09
2	NNE	E.Ashbridge III	1	2.80E-06	2.79E-06	2.44E-06	1.06E-08
3	NE	W.Tuggle	0.9	2.52E-06	2.52E-06	2.22E-06	1.74E-08
4	ENE	D.Barberi	2.1	4.32E-07	4.29E-07	3.55E-07	3.02E-09
5	E	L.Kozlowski	1.4	3.50E-07	3.48E-07	2.98E-07	2.19E-09
6	ESE	R.Panetta	0.5	1.30E-06	1.30E-06	1.19E-06	1.12E-08
7	SE	J.Futoma	0.5	1.62E-06	1.62E-06	1.48E-06	1.42E-08
8	SSE	J.Naunczek	0.6	1.64E-06	1.64E-06	1.48E-06	1.40E-08
9	S	S.Slusser	1	1.18E-06	1.18E-06	1.03E-06	5.99E-09
10	SSW	S.Molnar	0.9	3.86E-06	3.84E-06	3.39E-06	1.37E-08
11	SW	F.Michael	1.5	3.87E-06	3.83E-06	3.27E-06	7.30E-09
12	WSW	W.Kisner	1.1	1.27E-05	1.26E-05	1.10E-05	1.72E-08
13	W	E. Seely/F. Hummel	1.2	4.90E-06	4.85E-06	4.21E-06	6.68E-09
14	WNW	R.Orlando	0.8	6.24E-06	6.19E-06	5.51E-06	1.24E-08
15	NW	L.Hidlay	0.8	7.59E-06	7.54E-06	6.71E-06	1.86E-08
16	NNW	W.Metzler	0.6	5.85E-06	5.83E-06	5.28E-06	1.78E-08

NEAREST GARDEN WITHIN A 5-MILE RADIUS OF SSES BY SECTOR

SECTOR NUMBER	AFFECTED SECTOR	NAME	MILES	X/Q	X/Q DEC	X/Q DEC+DEP	DEPOSITION
1	N	J.Wojcik	3.2	4.93E-07	4.85E-07	3.86E-07	1.17E-09
2	NNE	R.Chapin	2.3	8.40E-07	8.32E-07	6.84E-07	2.79E-09
3	NE	Yokum	2.7	5.05E-07	5.01E-07	4.05E-07	3.01E-09
4	ENE	G.Dennis	2.4	3.60E-07	3.58E-07	2.93E-07	2.52E-09
5	E	W.Daily	1.8	2.36E-07	2.35E-07	1.97E-07	1.45E-09
6	ESE	L.Travelpiece	2.5	8.94E-08	8.87E-08	7.23E-08	6.03E-10
7	SE	F.Scholl	0.6	1.25E-06	1.24E-06	1.12E-06	1.04E-08
8	SSE	D.Dawson	1.5	3.84E-07	3.83E-07	3.26E-07	2.65E-09
9	S	M.Cope	1.1	1.02E-06	1.02E-06	8.83E-07	5.04E-09
10	SSW	S.Bodnar	1.2	2.50E-06	2.49E-06	2.15E-06	8.24E-09
11	SW	H.Schultz	1.9	2.71E-06	2.68E-06	2.25E-06	4.98E-09
12	WSW	W.Kisner	1.1	1.27E-05	1.26E-05	1.10E-05	1.72E-08
13	W	F.Hummel	1.2	4.90E-06	4.85E-06	4.21E-06	6.68E-09
14	WNW	None					
15	NW	D.Goff	1.8	2.16E-06	2.13E-06	1.80E-06	4.44E-09
16	NNW	P.Culver	4	3.40E-07	3.32E-07	2.58E-07	6.60E-10

TABLE 3-8
(continued)

NEAREST ANIMAL RAISED FOR MEAT CONSUMPTION WITHIN A 5-MILE RADIUS OF SSES BY SECTOR

SECTOR NUMBER	AFFECTED SECTOR	NAME	MILES	X/Q	X/Q DEC	X/Q DEC+DEP	DEPOSITION
2	NNE	R.Chapin	2.3	8.40E-07	8.32E-07	6.84E-07	2.79E-09
4	ENE	G.Dennis	2.4	3.60E-07	3.58E-07	2.93E-07	2.52E-09
5	E	K. Kozlowski/W.Witts	1.4	3.50E-07	3.48E-07	2.98E-07	2.19E-09
10	SSW	R. & C. Ryman	3	5.66E-07	5.58E-07	4.47E-07	1.61E-09
10	SSW	C.K.Drasher	3.5	3.97E-07	3.91E-07	3.07E-07	1.07E-09
12	WSW	T. & M. Berger	1.7	6.75E-06	6.68E-06	5.65E-06	8.50E-09
15	NW	D.Goff	1.8	2.16E-06	2.13E-06	1.80E-06	4.44E-09

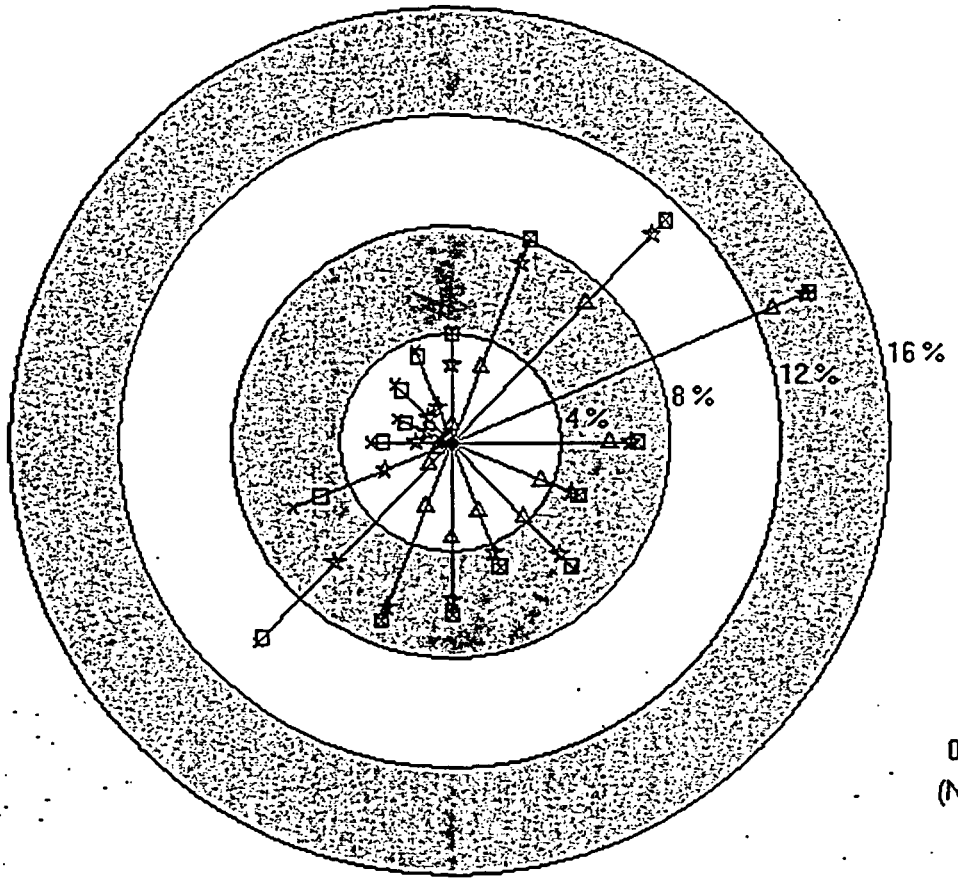
ALL DAIRY LOCATIONS NEAR SSES

SECTOR NUMBER	AFFECTED SECTOR	NAME	MILES	X/Q	X/Q DEC	X/Q DEC+DEP	DEPOSITION
5	E	W.Bloss	4.5	4.97E-08	4.88E-08	3.72E-08	2.53E-10
6	ESE	D.Moyer	2.7	7.70E-08	7.64E-08	6.17E-08	5.09E-10
	ESE	F.Rinehimer	4.2	3.09E-08	3.05E-08	2.34E-08	1.81E-10
10	SSW	R. & C. Ryman	3	5.66E-07	5.58E-07	4.47E-07	1.61E-09
	SSW	R.Ryman	3.1	5.26E-07	5.19E-07	4.14E-07	1.48E-09
	SSW	C.K.Drasher	3.5	3.97E-07	3.91E-07	3.07E-07	1.07E-09
	SSW	K.Davis	14.01	3.20E-08	2.99E-08	1.99E-08	5.70E-11
12	WSW	T. & M. Berger	1.7	6.75E-06	6.68E-06	5.65E-06	8.50E-09
13	W	J. & N. Dent	5	4.38E-07	4.21E-07	3.21E-07	3.86E-10
16	NNW	H.Shoemaker	4.2	3.18E-07	3.11E-07	2.40E-07	6.07E-10

1	X/Q	RELATIVE CONCENTRATION (SEC/M^3)
2	X/Q DEC	DECAYED AND UNDEPLETED, HALF-LIFE 2.26 DAYS (SEC/M^3)
3	X/Q DEC+DEP	DECAYED AND DEPLETED, HALF-LIFE 8 DAYS (SEC/M^3)
4	DEPOSITION	RELATIVE DEPOSITION RATE ($1/M^2$)

FIGURE 3-1

SSES 2003 ANNUAL WIND ROSE 10M LEVEL – PRIMARY TOWER



WIND ROSE
(WINDS FROM)
N

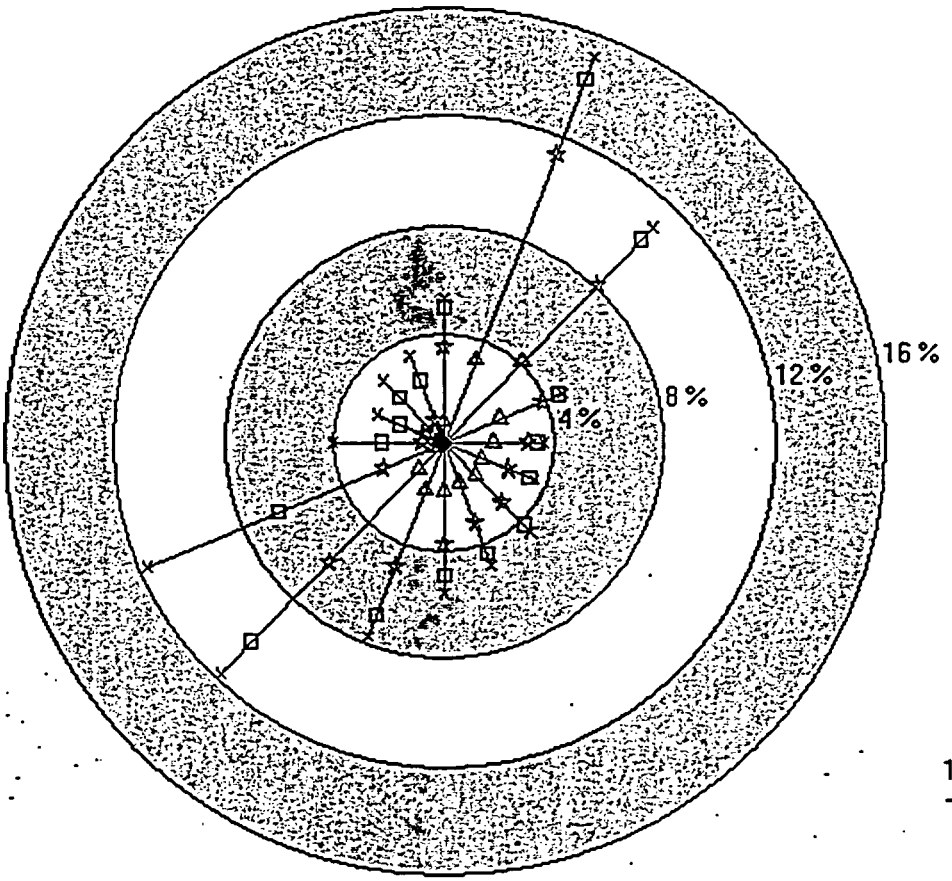
0.00% PERCENT CALMS
(NOT INCLUDED IN PLOT)

△	WIND SPEED LESS THAN 3.5 MPH
☆	WIND SPEED LESS THAN 7.5 MPH
□	WIND SPEED LESS THAN 12.5 MPH
×	WIND SPEED GREATER THAN 12.5 MPH

This wind rose displays the frequency of hourly average wind direction from a given sector. In 2003, the predominant wind direction occurred 14.1% of the time from the ENE sector. The average wind speed was 4.8 mph and the average wind speed for the predominant sector (ENE) was 2.6 mph. The sector with the highest average wind speed was WSW (8.6 mph.).

FIGURE 3-2

SSES 2003 ANNUAL WIND ROSE 60M LEVEL – PRIMARY TOWER

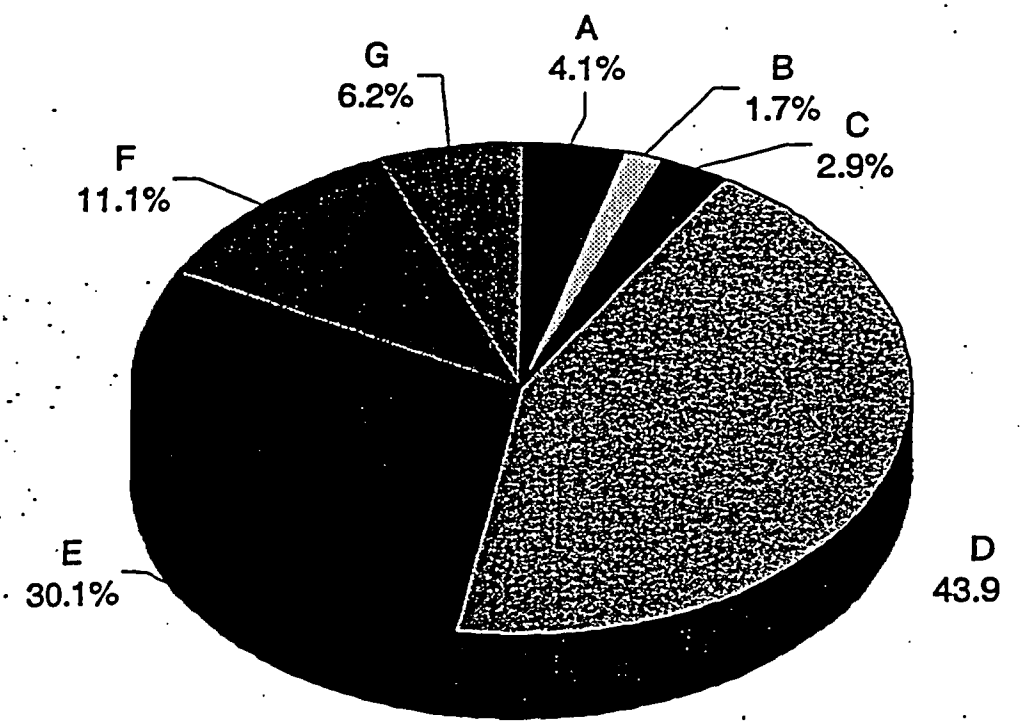


This wind rose displays the frequency of hourly average wind direction from a given sector. In 2003, the predominant wind direction occurred 14.6% of the time from the NNE sector. The average wind speed was 7.5 mph and the average wind speed for the predominant sector (NNE) was 5.9 mph. The sector with the highest average wind speed was W (11.9mph.).

FIGURE 3-3

SSES PASQUIL STABILITY CLASS PREVALENCES DATA
Period: 2003

SSES Joint Frequency Distributions at 10 Meters
Wind Speed and Direction 10M vs. Delta Temperature 60-10M
(Based on 8,676 Valid Hours)



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 Requirements.

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 average 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 3.14E-2 mrem (measured at TLD Location 9S2) at the Protected Area Boundary south of the plant. The maximum organ/total body dose including thyroid from all airborne effluent is 1.17E0 mrem (CHILD, LUNG Table 4-4). The maximum organ/total body dose from liquid effluent is 4.99E-3 mrem (ADULT, GI-LLI: two times the unit dose shown Table 4-2). Conservatively adding the maximum total body/organ dose from liquid and gaseous effluent (even though different age groups) and the maximum total body dose determined from direct radiation bounds the dose that any member of the public receives from operation of SSES. The result (1.21E0 mrem) is 4.8% of the 40CFR190 limit of 25 mrem to total body/organ (except thyroid) and 1.6% of the 40CFR190 limit of 75 mrem to the 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 for the entire year are shown in Table 4-1.

TABLE 4-1

SITE-SPECIFIC PARAMETERS USED FOR RETDAS CALCULATIONS (DANVILLE RECEIVER) FOR 2003

PARAMETER	ENTIRE YEAR
Cooling Tower Blowdown (CFS)	17.2
Average Net River Level (ft.)	8.3
Dilution Factor at Danville[1]	936.1
Transit time to Danville (hr.)[1]	16.0

[1]From ODCM-QA-005, Att. E

Summaries of maximum individual doses resulting from airborne and waterborne radioactive effluent releases are given in Table 4-2. Meteorological data from Section 3 were used to calculate the dose from airborne effluents.

Technical Specifications 5.5.4 require 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 doses within the site boundary and selected locations resulting from airborne effluents are presented in Tables 4-3 through 4-4.

SSES Technical Specification 5.5.4 requires that the Radioactive Effluent Release Report 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 several areas frequented by members of the public. Doses from airborne effluent are calculated for members of the public for the following locations: SSES Riverlands Energy Information Center, the Guard House at access Gate No. 10, the Towers Club, the Kisner Farm and the site boundary with the maximum X/Q value. The above referenced locations are shown on Figure 4-1.

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, it is assumed the visitor stays in the area for one hour.

Use of the RETDAS 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.

TABLE 4-2

SUMMARY OF MAXIMUM INDIVIDUAL DOSES TO MEMBERS OF THE PUBLIC
DATA PERIOD: 1/1/03 TO 12/31/03

EFFLUENT	AGE GROUP	APPLICABLE ORGAN	ESTIMATED MAXIMUM DOSE (MREM)	LOCATION		PERCENT OF LIMIT	LIMIT (MREM)[2]
				DIST (MILES)	AFFECTED SECTOR		
Liquid[1]	Child	Total Body	9.45E-4	(3)		0.03	3
Liquid[1]	Adult	GI-LLI	2.50E-3	(3)		0.03	10
Noble Gas[4]	N/A	Air Dose (Gamma-MRAD)	2.21E-3	0.5	WSW	0.02	10
Noble Gas[4]	N/A	Air Dose (Beta-MRAD)	3.21E-3	0.5	WSW	0.02	20
Airborne Iodine, Tritium and Particulates[4]	Child	Lung	1.17E 0	0.5	WSW	7.8	15

[1]Estimated dose is based on a site total activity release equally divided between Unit 1 and Unit 2.

[2]10 CFR 50, Appendix I limits are in terms of mrad or mrem/reactor-year for airborne effluent and mrem per year for waterborne effluent from each unit.

[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.

[4]Estimated dose is based on the site total activity release.

TABLE 4-3

CALCULATED COLLECTIVE DOSES TO MEMBERS OF THE PUBLIC WITHIN THE RIVERLANDS/INFORMATION CENTER COMPLEX

DATA PERIOD: 1/1/03 TO 12/31/03

EFFLUENT	AGE GROUP	APPLICABLE ORGAN	DOSE RATE[1] (MREM/HR)	COLLECTIVE DOSE[2] (PERSON-REM)
Noble Gas	N/A	Total Body	2.70E-08	2.70E-06
Noble Gas	N/A	Skin	3.90E-08	3.90E-06
Iodine, Tritium and Particulates	Child	Total Body	1.45E-05	1.45E-03

[1]Estimated dose and dose rate is based on annual site total activity release.

[2]Collective dose is based on 100,000 person-hours.

TABLE 4-4

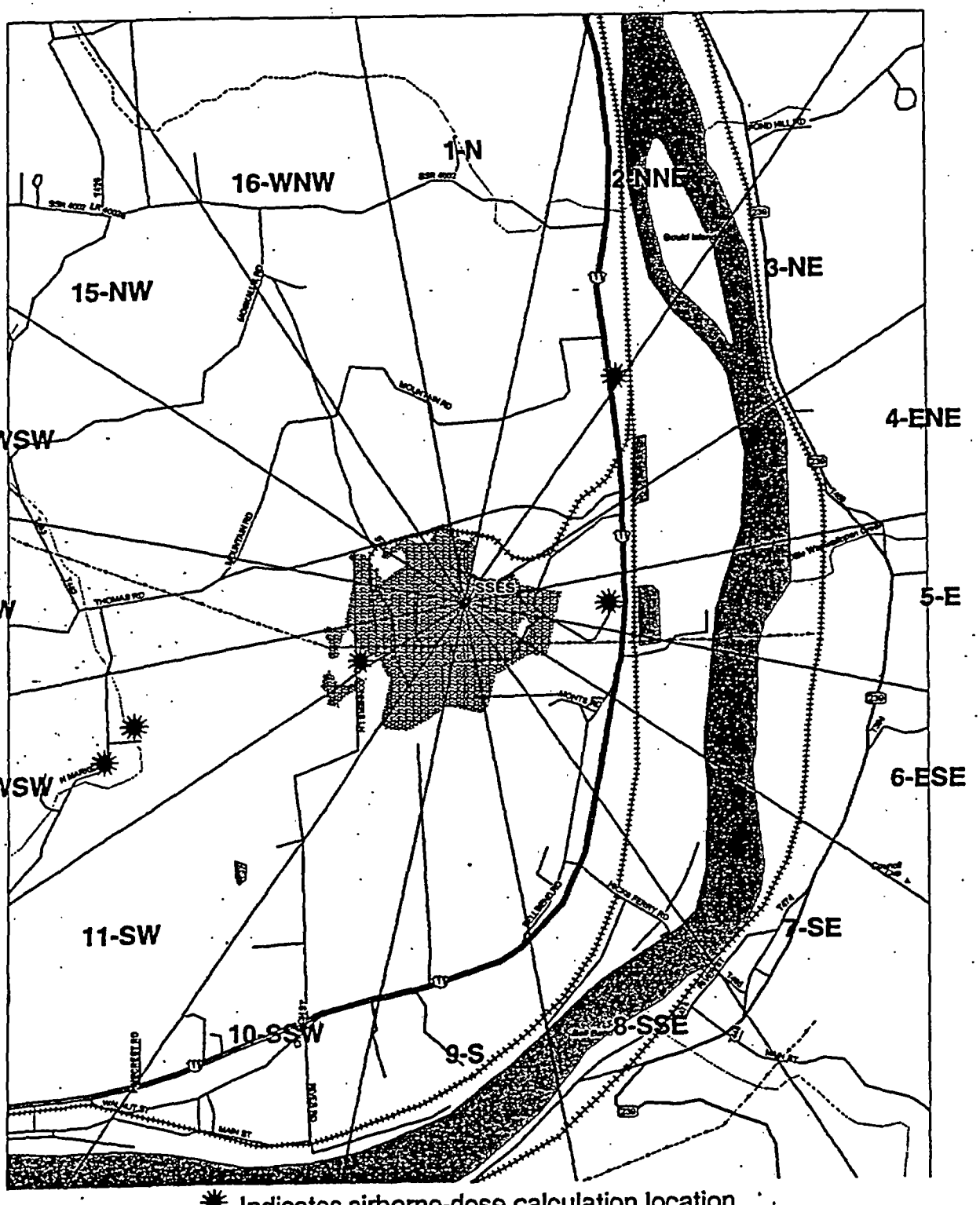
SUMMARY OF MAXIMUM INDIVIDUAL DOSES FROM AIRBORNE EFFLUENT

LOCATION	PATHWAY	MAXIMUM TOTAL BODY DOSE (MREM)		MAXIMUM ORGAN DOSE (MREM)		MAXIMUM THYROID DOSE (MREM)	
1. Maximum site boundary X/Q	Total (All)	4.98E-01	(CHILD)	4.98E-01	(CHILD, LUNG)	4.98E-01	(CHILD)
2. Maximum X/Q Residence & Maximum D/Q Garden	Total (All)	4.38E-01	(CHILD)	4.38E-01	(CHILD, LUNG)	4.38E-01	(CHILD)
3. Maximum D/Q Dairy & Meat	Total (All)	2.33E-01	(CHILD)	2.33E-01	(CHILD, GI-LLI)	2.33E-01	(CHILD)
4. Tower's Club	Total (All)	1.17E 00	(CHILD)	1.17E 00	(CHILD, LUNG)	1.17E 00	(CHILD)
5. Riverland/EIC	Total (All)	1.27E-01	(CHILD)	1.27E-01	(CHILD, GI-LLI)	1.27E-01	(CHILD)
6. Gate No. 10 Guard House	Total (All)	6.23E-02	(CHILD)	6.24E-02	(CHILD, GI-LLI)	6.22E-02	(CHILD)

Note: The doses shown above are based on 100% occupancy at the indicated locations.
Note: The doses shown above are based on a composite of all applicable pathways resulting in a total dose to the maximally exposed individual.

FIGURE 4-1

AIRBORNE-DOSE CALCULATION LOCATIONS



✷ Indicates airborne-dose calculation location

SECTION 5

CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL (ODCM), TECHNICAL REQUIREMENTS MANUAL (TRM) AND THE SOLID RADIOACTIVE WASTE PROCESS CONTROL PROGRAM

CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL

The SSES ODCM consists of nine (9) individual procedures.

The following ODCM procedures were revised and effective on March 24, 2003 to add "Nuclear Emergency Planning" to the "Recommended Reviews" section of each procedure:

ODCM-QA-001, ODCM-QA-002, ODCM-QA-004, ODCM-QA-005, ODCM-QA-006, ODCM-QA-008

ODCM-QA-003 was revised and effective on March 5; 2003. The revision provided more operational flexibility regarding effluent data retrieval in order to determine the compliance status of a gaseous effluent release.

ODCM-QA-007 was revised and effective on September 9, 2003. The revision removed any reference to the "Primary Coolant Degasifier Filter Exhaust System", based on PPL 10CFR50.59 evaluation E-01-22.

ODCM-QA-009 was revised and effective on March 18, 2003. The revision provides guidance regarding the identification of radionuclides in the Sewage Treatment Plant waste sludge and or liquid effluent. The revision provides clarification in order to evaluate the impact of non-SSES generated isotopes identified in the Sewage Treatment Plant sludge and liquid effluent, relative to regulatory compliance and the disposition of Sewage Treatment Plant sludge.

CHANGES TO THE TECHNICAL REQUIREMENTS MANUAL

Section 3.11 and 3.6.1 of the SSES Unit-1 and Unit-2 Technical Requirements Manual (TRM) by reference are part of the ODCM. The following limits and requirements are contained in Section 3.11: liquid and gaseous effluent dose limits, liquid and gaseous effluent treatment system operability criteria (based on effluent dose), liquid and gaseous effluent radiation monitor operability criteria and the conduct of the Radiological Environmental Monitoring Program. Section 3.6.1 contains requirements for venting or purging of primary containment. The only change to Section 3.11 of the Unit-1 and Unit-2 TRM during 2003 was in the "Bases" section for TRO 3.11.2.5. The following text was removed from the Bases section for TRO 3.11.2.5: "The Radwaste Degasifier Exhaust System, including the following filters: 0F372, 0F373 and 0F374." Based on PPL 10CFR50.59 Evaluation E-01-22, the Primary Coolant Degasifier Filter Exhaust System is no longer required to perform its intended function. There were no changes to the Unit-1 or Unit-2 TRM Section 3.6.1 during 2003.

PROCESS CONTROL PROGRAM CHANGES

The following changes were made to the Process Control Program and implementing procedures during 2003. None of the changes reduce the overall conformance of the solidified waste product to existing criteria for solid wastes. All changes were reviewed and approved by PORC (if necessary) as documented on the attached Procedure Change Process Forms. The following procedures were changed:

1. NDAP-QA-0646, Process Control Program
2. WM-PS-100, Shipment of Radioactive Waste
3. WM-PS-110, General Shipment of Radioactive Material
4. WM-PS-120, Shipment of Radioactive Material by Air Carrier
5. WM-PS-155, 10CFR61 Sample Shipping and Correlation Factor Determination
6. WM-PS-180, Advanced Notification of Applicable States
7. WM-PS-210, Packaging and Loading of DAW and Radioactive Material
8. WM-PS-250, Use of RADMAN and RAMSHP Computer Programs
9. WM-PS-318, Use of Tandem Container Transport (TCT)
10. WM-RP-012, Handling and Use of Steel Liners and High Integrity Containers
11. ME-ORF-165, Fuel Pool Cleanout – Duratek – Handling Procedure for 3-55 Cask C of C #5805 at PPL Susquehanna LLC
12. ME-ORF-172, Fuel Pool Cleanout – Duratek – Guidelines for Use of Polyethylene High Integrity Containers
13. ME-EO-051, Fuel Pool Cleanout – Operation of Duratek Shielded Transfer Bell and Verification of No Free-Standing Water.in Fexm High Integrity Container

NDAP-QA-0646 continues to fully implement the requirements and intent of the following:

1. Sections 11.4 and 13.5 of the FSAR
2. Section 3.7.4 of the Technical Requirements Manual
3. 10 CFR 20, 10 CFR 61, 10 CFR 71, 49 CFR 100-177, and 40 CFR 261

Compliance with all applicable regulatory requirements listed above continues to be met as the result of these changes to the program. These changes to the Process Control Program will not reduce the overall conformance of the solidified waste product to existing criteria for solid wastes.

PROCEDURE REVISION SUMMARY
NDAP-QA-0646, Revision 7

1. Incorporated PCAF 2002-1218.

2. Updated Procedure Cover Sheet and Responsibilities section to reflect current staffing.

3. PCAF 2002-1218 missed removing PORC review requirements in existing step 4.4.4b. This revision removed the requirement for PORC review of solid waste processing vendor and plant procedures.

4. Changed the radwaste processing services vendor's name to a generic term (i.e. vendor).

5. Clarified what resin shall be ultrasonically cleaned.

6. Revised Dewatered Record Sheet (form NDAP-QA-0646-2) to specify sampling and compositing requirements for Chemistry.

7. Deleted WM-RP-301 from Attachment C, PCP Implementing Procedure Matrix, because the procedure has been deleted.

PROCEDURE REVISION SUMMARY
WM-PS-100, Revision 8

1. Incorporated PCAF 2002-1539.

2. Implemented Transportation Security Plan item per NDAP-QA-0641.

3. Updated Transport Vehicle Inspection Form to ensure the vehicle is checked prior to shipment (AR490900) and that driver of placarded shipments have a HazMat endorsement (CR 483279).

4. Incorporated several minor enhancements.

PROCEDURE REVISION SUMMARY
WM-PS-110, Revision 4

1. Incorporated PCAF 1999-6710.

2. Implemented Transportation Security Plan items per NDAP-QA-0641.

3. Updated Transport Vehicle Inspection Form to ensure the vehicle is checked prior to shipment (AR490900) and that drivers of placarded shipments have a HazMat endorsement (CR 483279).

4. Added requirements to account for tritium in non-radioactive material shipment calculations (CR 507962).

PROCEDURE REVISION SUMMARY
WM-PS-120, Revision 3

1. Revised procedure to respond to CR# 483279. Clarified use of this procedure in the Purpose section. Defined Dangerous Goods Regulations and Radioactive Material. Added directions on how to complete a Shippers Declaration for dangerous goods. Added emergency response instructions and destination facility notification. Added note to require Yellow-III shipments to be picked up by the carrier due to placarding requirements. Added a marking and labeling requirement attachments. PCAF 1-97-6080 was superceded by this revision.

PROCEDURE REVISION SUMMARY
WM-PS-155, Revision 3

1. Revised procedure to implement NRC recommendations (AR#491494) (Section 6.9.4). Added several references. Changed procedure adherence level to Information Use. Updated the waste streams in section 3.5. Updated sampling frequency. Incorporated PCAF 2001-1488. Converted the Waste Stream Sample Sheet into an electronic form. Revised the SCAN users instructions, Attachment E. Made various administrative changes.

PROCEDURE REVISION SUMMARY
WM-PS-180, Revision 6

1. Added requirement to contact the Iowa Department of Public Health prior to shipping radioactive waste through Iowa.

2. Added new advance notification requirements in accordance with the Hazardous Material Transportation Security Plan per NDAP-QA-0641, Waste Management Program.

PROCEDURE REVISION SUMMARY
WM-PS-210, Revision 6

1. Incorporated PCAF 2002-1092.
2. Added new 49CFR393 load securement requirements.
3. Added reference to Reference Section.
4. Updated some job titles.
5. Clarified what is to be documented on the Packaging Data Sheet (Form WM-PS-210-1).
6. Added requirement for the qualified loader to sign Form SM-PS-210-1.
7. Made various administrative changes.

PROCEDURE REVISION SUMMARY
WM-PS-250, Revision 2

1. Clarified SCO shipment requirements to ensure compliance with NUREG 1608.

2. Administrate Correction to incorporate PCAF #s 1-98-7136 and 2003-1362.

PROCEDURE REVISION SUMMARY
WM-PS-318, Revision 3

1. Added clarification to allow liners with contact dose rates that exceed 300 mr/hr to be shipped in the TCT with Effluents Supervision Approval. This change allows the dose rate, on a container to be loaded, to exceed a recommended value. If in Effluents Supervision judgement, the container will not cause any shipping dose rate limit to be exceeded, this approval may be granted.

PROCEDURE REVISION SUMMARY
WM-RP-012, Revision 5

1. Incorporated PCAF 2000-4985.

2. Added filter size element criteria throughout the procedure as recommended by CR #398647 (CRA# 459945).

PROCEDURE REVISION SUMMARY
ME-ORF-165, Revision 1

1. To consolidate cask handling steps and administrative guidance from ME-ORF-164.

2. Incorporate changes from the current revision of the vendor originated procedure.

PROCEDURE REVISION SUMMARY
ME-ORF-172, Revision 1

1. Revise vendor name throughout procedure.

2. Change procedure reference to recognize procedure consolidation.

PROCEDURE REVISION SUMMARY
MT-EO-051, Revision 1

1. Revised Vendor name change from CNSI to DURATEK.
2. Updated references to latest DURATEK procedures.
3. Changed description of items to be loaded in HIC from "filters" to "components."

SECTION 6

MISCELLANEOUS TECHNICAL REQUIREMENTS MANUAL (TRM) FSAR AND 40CFR190 REPORTING

1. TRM Action 3.11.1.4.F.2 requires the reporting of Liquid Radwaste Effluent Monitoring Instrumentation inoperability not corrected in a timely.

   None to report for 2003.

2. TRM Action 3.11.1.5.C.1 requires the reporting of Radioactive Liquid Process Effluent Monitoring Instrumentation inoperability not corrected in a timely.

   None to report for 2003.

3. TRM Action 3.11.2.6.K requires an explanation for Radioactive Gaseous Effluent Monitoring Instrumentation required actions and completion times not met.

   TRO 3.11.2.6 Condition D (Reactor Building Ventilation Monitoring System Effluent System Flow Rate Monitor or Sampler Flow Rate Monitor Inoperable) was entered on 12/16/03 at 09:27. Required Action D.1 (Estimate Flow Rate) was required to be performed initially at 13:27. Required Action D.1 was not completed until 13:40. Multiple activities created confusion and loss of focus on time of priority item (TRO Requirement). There were minimal potential consequences of the event since the vent flow channel was available and alternate sampling was setup using a calibrated external pump. The Unit-1 Reactor Building ventilation monitoring system flow rate monitor was returned to service on 12/17/03 at 16:14.

4. TRM Action 3.11.4.1.F.2 requires reporting the cause of the unavailability of milk or fresh leafy vegetables samples and identify the new locations for obtaining replacements.

   None to report for 2003.

5. TRM Action 3.11.4.2.A requires reporting when land use census identifies a new location which yields a calculated dose or dose commitment greater than the values currently being calculated in Requirement 3.11.2.3 (Gaseous Effluent Dose due to Iodine, Tritium, and Radionuclides in Particulate Form).

   None to report for 2003.

6. TRM Action 3.11.4.2.B requires reporting when land use census identifies locations that yields a calculated dose or dose commitment (via the same exposure pathway) 20 percent greater than at a location from which samples are currently being obtained in accordance with Requirement 3.11.4.1 (Radiological Environmental Monitoring Program).

   None to report for 2003.

7. The 40CFR190.10 standard for normal operation for the uranium fuel cycle including annual dose equivalent and total quantities of radioactive material limits were not exceeded by SSES operation. Refer to Page 4-2 for specific values.

8. FSAR Section 11.6.11 requires the reporting of airborne radioactivity detected in the Low Level Radwaste Holding Facility.

   None detected in 2003.

SECTION 7

CORRECTIONS 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

No corrections to previous semiannual or annual Radioactive Effluent Release Reports are submitted for this report period.

SECTION 8

EFFLUENT FROM SYSTEMS CLASSIFIED AS INSIGNIFICANT EFFLUENT PATHWAYS

EFFLUENT FROM SYSTEMS CLASSIFIED AS INSIGNIFICANT EFFLUENT PATHWAYS

Systems classified as Insignificant Effluent Pathways are evaporation from the Unit 1 and Unit 2 Condensate Storage Tanks (CST's), evaporation from the common Refueling Water Storage Tank (RWST) and from the Hydrogen Seal Oil and the Main Turbine and RFPT lubrication oil mist eliminators which vent to the turbine building roofs.

These pathways are not continuously monitored. The CSTs and RWST are sampled monthly to determine the concentration of radionuclides present in these tanks. Tritium analysis on these samples is performed quarterly. Airborne release to the environment from the tanks is estimated based on conservative estimates of the evaporation rates from each of the tanks using a modified method established within Chapter 7 of EPA AP-42. A conservative carry-over fraction of radionuclides from the water to the evaporated liquid is then assumed. Airborne release to the environment from the demisters conservatively assumes the maximum contamination of the oil by condensate (1000 ppm) as it passes through the turbines followed by immediate removal of 100% of the water by the oil mist eliminators. The annual release of tritium, iodines and particulates with half-lives greater than 8 days was calculated based on these conservative assumptions; the calculated releases are shown in Table 8-1. All nuclides are negligible compared to the airborne release shown in Tables 2-1 and 2-2 except for tritium. The maximum dose to the public from a release of 37.9 Ci of tritium is calculated to be 2.00-01 mrem (child). This is a fraction of the maximum dose from airborne effluent reported in Section 4.

TABLE 8-1

ANNUAL RELEASE FROM SYSTEMS CLASSIFIED AS INSIGNIFICANT EFFLUENT PATHWAYS

Nuclide	RWST (Ci)	U1-CST and Main Turbine/RFPT Lube Oil Systems (Ci)	U2-CST and Main Turbine/RFPT Lube Oil Systems (Ci)	Total (Ci)
H-3	8.407E-02	1.904E+01	1.881E+01	3.793E+01
Mn-54	2.387E-08	4.064E-07	1.178E-06	1.608E-06
Co-60	8.038E-08	7.592E-07	2.176E-06	3.015E-06
Cs-137	5.020E-10	0.000E+00	1.693E-08	1.743E-08
Xe-135	0.000E+00	2.304E-05	4.269E-06	2.731E-05