

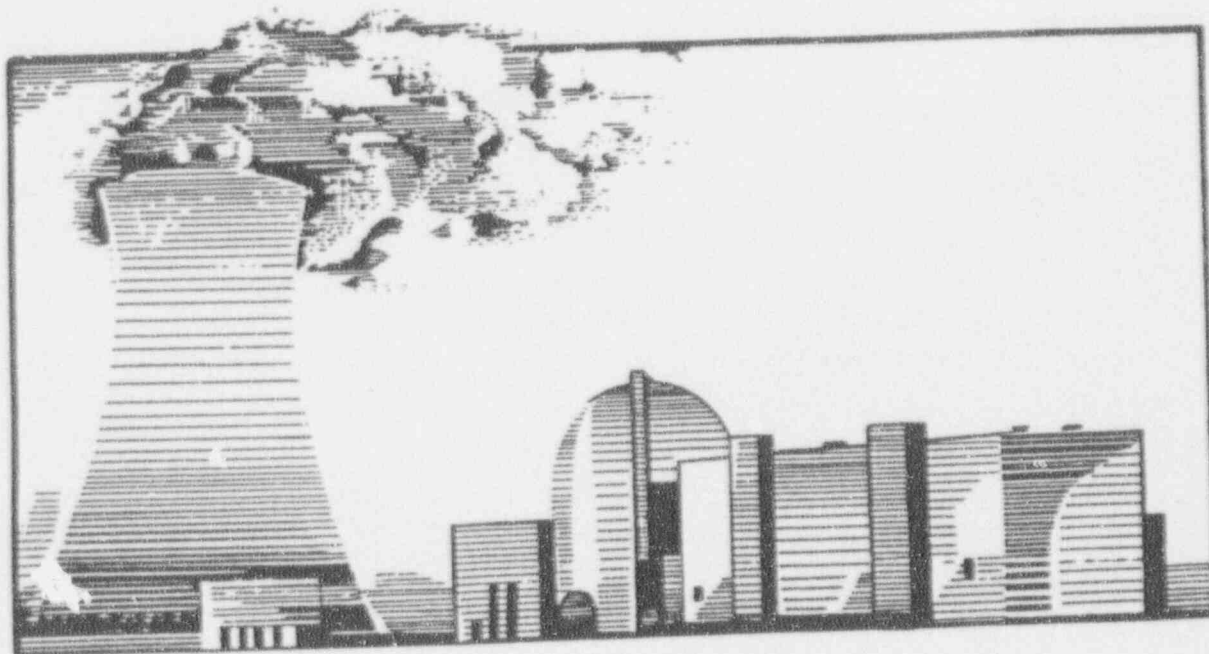
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# Callaway Plant

## Semiannual Radioactive Effluent Release Report

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July - December 1992



SEMIANNUAL RADIOACTIVE EFFLUENT

RELEASE REPORT

CALLAWAY NUCLEAR PLANT

UNION ELECTRIC COMPANY

LICENSE NPF - 30

JULY - DECEMBER 1992

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## 1.0

### INTRODUCTION

This Semiannual Radioactive Effluent Release Report is submitted in accordance with Section 6.9.1.7 of the Callaway Plant Technical Specifications.

The report presents a summary of radioactivity released in liquid and gaseous effluents, and solid waste shipped from the Callaway Plant during the period from July 1, 1992 to December 31, 1992. The information is presented in the format outlined in Appendix B of Regulatory Guide 1.21, Revision 1, June 1974.

All liquid and gaseous effluents discharged during this reporting period were in compliance with federal regulations and the limits of Union Electric Administrative Procedure APA-ZZ-01003.

## 2.0

### SUPPLEMENTAL INFORMATION

### 2.1

#### Regulatory Limits

Specified as follows are the APA-ZZ-01003, Section 9 limits applicable to the release of radioactive material in liquid and gaseous effluents.

#### 2.1.1

##### Fission and Activation Gases (Noble Gases)

The dose rate due to radioactive noble gases released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to less than or equal to 500 mrem/yr to the total body and less than or equal to 3000 mrem/yr to the skin.

The air dose due to noble gases released in gaseous effluents, from each unit, to areas at and beyond the site boundary shall be limited to the following:

- a. During any calendar quarter: Less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation and,
- b. During any calendar year: Less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

#### 2.1.2

##### Radioiodine, Tritium, and Particulates

The dose rate due to Iodine 131 and 133, tritium and all radionuclides in particulate form with half lives greater than eight (8) days released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to less than or equal to 1500 mrem/yr to any organ.

The dose to a member of the public from Iodine 131 and 133, tritium, and all radionuclides in particulate form with half-lives greater than eight (8) days in gaseous effluents released to areas at and beyond the site boundary shall be limited to the following:

- a. During any calendar quarter: Less than or equal to 7.5 mrem to any organ and,
- b. During any calendar year: Less than or equal to 15 mrem to any organ.

#### 2.1.3 Liquid Effluents

The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to  $2.0\text{E-}04$  microcuries/ml total activity.

The dose or dose commitment to an individual from radioactive materials in liquid effluents released to unrestricted areas shall be limited:

- a. During any calendar quarter to less than or equal to 1.5 mrem to the total body and less than or equal to 5 mrem to any organ, and
- b. During any calendar year to less than or equal to 3 mrem to the whole body and to less than or equal to 10 mrem to any organ.

#### 2.1.4 Uranium Fuel Cycle Sources

The annual (calendar year) dose or dose commitment to any member of the public due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to less than or equal to 25 mrem to the total body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrem.

#### 2.2 Maximum Permissible Concentrations

- 2.2.1 The maximum permissible concentration values specified in 10CFR20, Appendix B, Table II, Column 2 are used to calculate release rates and permissible concentrations of liquid radioactive effluents at the unrestricted area boundary. A value of  $2.0\text{E-}4$  microcuries/ml is used as the MPC for dissolved and entrained noble gases in liquid effluents.

- 2.2.2 For gaseous effluents, maximum permissible concentrations are not utilized in release rate calculations since the applicable limits are based on dose rate at the unrestricted area boundary. The "Percent of Tech Spec Limit" for Table 1A is therefore not applicable to the Callaway Plant.

2.3 Average Energy

This is not applicable to the Callaway Plant radiological effluent monitoring program.

2.4 Measurements and Approximations of Total Radioactivity

The quantification of radioactivity in liquid and gaseous effluents was accomplished by performing sampling and radiological analysis of effluents in accordance with the requirements of Table 9.3-A and Table 9.6-A of APA-ZZ-01003, Offsite Dose Calculation Manual.

Gamma spectroscopy was the primary analysis technique used to determine radionuclide composition and concentration of liquid and gaseous effluents. Composite samples were analyzed for Sr-89, Sr-90, and Fe-55 by an independent laboratory. Tritium and alpha were measured for both liquid and gaseous effluents using liquid scintillation counting and gas flow proportional counting techniques, respectively.

The total radioactivity in effluent releases was determined from the measured concentrations of each radionuclide present and the total volume of effluents discharged. Gross beta or gamma radioactivity measurement techniques were not utilized to approximate the total radioactivity in effluents.

2.5 Batch Releases

2.5.1 Liquid

Number of batch releases: 121

Total time period for batch releases: 47,954 minutes

Maximum time period for a batch release: 936 minutes

Average time period for batch releases: 396 minutes

Minimum time period for a batch release: 45 minutes

Average stream flow during periods of release of effluent into a flowing stream: 101,777 cfs\*

\*Ref: Letter, United States Department of the Interior - Geological Survey - Missouri, dated January 14, 1993.

2.5.2 Gaseous

Total for the  
Reporting Period

Number of batch releases: 42  
Total time period for batch releases: 8,247 minutes  
Maximum time period for a batch release: 1,315 minutes  
Average time period for batch releases: 196 minutes  
Minimum time period for a batch release: 45 minutes

2.6 Unplanned Releases

2.6.1 Liquid

Number of releases: 0  
Total Activity released: 0

2.6.2 Gaseous

Number of releases: 1  
Total Activity released: 2.17E-04Ci

3.0 SUMMARY OF GASEOUS RADIOACTIVE EFFLUENTS

3.1 The quantities of radioactive material released in gaseous effluents are summarized in Tables 1A and 1B. Note that for this reporting period no gaseous effluents were considered as elevated releases.

4.0 SUMMARY OF LIQUID RADIOACTIVE EFFLUENTS

4.1 The quantities of radioactive material released in liquid effluents are summarized in Tables 2A and 2B.

5.0 SOLID WASTES

5.1 The quantities of radioactive material released in shipments of solid waste and irradiated fuel transported from the site during the reporting period are summarized in Table 3. The activity and fractional abundance of each nuclide was determined for each waste type by an independent laboratory based upon radiochemical analysis of samples of that waste type. The curie amount of each nuclide

listed in Table 3 was determined as the product of the fractional abundance and the total curies shipped. Those nuclides which comprise at least 1% of the total activity for a particular waste type are presented in Table 3.

- 5.2 All dry compressible waste, contaminated equipment, etc. was shipped to reprocessing facilities for supercompaction, decontamination, or incineration. "Other" wastes shipped off-site consisted of contaminated oil which was solidified by a vendor to achieve satisfactory waste form for burial.

6.0 RELATED INFORMATION

6.1 Unplanned Releases

Unplanned releases are: 1) Inadvertent or accidental releases of radioactive material; 2) Releases of radioactive material via normal pathways without a release permit, proper authorization, or proper sampling and analysis; and 3) Releases which are conducted in such a manner as to result in significant deviation from the requirements of the release permit.

There was one unplanned release during the reporting period, involving the release of noble gases to the turbine building during routine maintenance of the condenser air removal filtration unit without a valid release permit. This release resulted in an insignificant offsite dose; the health and safety of the public was not compromised.

On September 23, 1992, during routine filter replacement on the condenser air removal filtration unit, the filtration unit dampers were opened for a total of 870 minutes. The condenser off gas samples taken before the maintenance began showed Xe-133 and Xe-135 activity of  $6.301\text{E-}08$   $\mu\text{Ci/cc}$  and  $2.533\text{E-}08$   $\mu\text{Ci/cc}$ , respectfully. This resulted in a release of  $1.55\text{E-}04$  Ci of Xe-133 and  $6.23\text{E-}05$  Ci of Xe-135 to the turbine building atmosphere. The doses at the site boundary, assuming no dilution by the turbine building atmosphere are:

Gama Air Dose:	$3.31\text{E-}06$ mrad
Beta Air Dose:	$6.00\text{E-}06$ mrad
Total Body Dose Rate:	$3.00\text{E-}06$ mrem
Skin Dose Rate:	$6.73\text{E-}06$ mrem

These values are a small fraction of the Technical Specification Limits.



6.2 Changes to the Process Control Program

There were no changes made to Administrative Procedure APA-ZZ-01011, "Process Control Program Manual", during the reporting period.

6.3 Changes to the Offsite Dose Calculation Manual

There were no changes made to Administrative Procedure APA-ZZ-01003, "Offsite Dose Calculation Manual", during the reporting period.

6.4 Major Changes to Radwaste Treatment Systems

During the reporting period, there were no changes to the plant which would be considered a major change to a Liquid, Gaseous, or Solid Radwaste Treatment System.

6.5 Land Use Census Changes

There were no changes in critical receptor locations for dose calculations during the reporting period.

6.6 Inoperability of Effluent Monitoring Instrumentation

All effluent monitoring instrumentation was OPERABLE within the limits specified by APA-ZZ-01003, Section 9.1.1 and 9.2.1 during the reporting period.

6.7 Instances of Liquid Holdup Tanks or Waste Gas Decay Tanks Exceeding Technical Specification Limits

All liquid tanks and waste gas decay tanks were within the limits of Specifications 3.11.1.4 and 3.11.2.6 during the reporting period.

7.0 METEOROLOGICAL DATA

Meteorological data for the reporting period is presented in Table 4 as Cumulative Joint Frequency Distributions for both 10 and 60 meter elevations.

8.0 ASSESSMENT OF DOSES

The assessment of doses to the maximum exposed individual from Gaseous and Liquid effluents was performed for locations representing the maximum dose. In all cases, doses were well below Technical Specification limits.

8.1 Dose at the SITE BOUNDARY From Gaseous Effluents

An assessment of doses from gaseous effluents was performed in accordance with Administrative Procedure APA-ZZ-01003 for the maximum exposed individual at the SITE BOUNDARY location with the

highest ground level concentration of radioactive material, based upon actual meteorological conditions existing during the year. Doses were assessed at each location considering noble gas submersion, inhalation and ground plane pathways. This assessment was performed for each age group, with the Child age group receiving the highest dose.

The calculations for the SITE BOUNDARY location conservatively assumed a hypothetical maximum exposed individual. The results of the assessment for the Child age group are presented in Table 5.

#### 8.2 Dose at the Nearest Residence From Gaseous Effluents

An assessment of doses from gaseous effluents was performed in accordance with Administrative Procedure APA-ZZ-01003 for the maximum exposed individual at the Nearest Residence location with the highest ground level concentration of radioactive material, based upon actual meteorological conditions existing during the year. Doses were assessed at each location considering noble gas submersion, inhalation, ground plane, and ingestion pathways. The ingestion pathways considered were produce, vegetable, goat's milk, cow's milk, and meat pathways. This assessment was performed for the Child age group.

The results of the assessment for the Child age group are presented in Table 5. The calculations for the Nearest Residence are for a "real" individual. It is conservatively assumed that each ingestion pathway exists at the Nearest Residence location, and that the Child age group exists at each location.

#### 8.3 Dose to the MEMBER OF THE PUBLIC from Activities Within the SITE BOUNDARY

The assessment of dose to the MEMBER OF THE PUBLIC from activities within the SITE BOUNDARY was performed in accordance with Administrative Procedure APA-ZZ-01003 Section 4. The dose to the MEMBER OF THE PUBLIC from activities within the SITE BOUNDARY is presented in Table 6.

#### 8.4 Total Dose Due to the Uranium Fuel Cycle

Since there are no other Uranium Fuel Cycle facilities within 8 km of the Callaway plant, the total dose to the most likely exposed MEMBER OF THE PUBLIC results from direct radiation and radioactive effluents from the Callaway Plant. The methodology for assessing this dose is described in Administrative Procedure APA-ZZ-01003 Section 4.

The Total Dose from the Uranium Fuel Cycle was evaluated for the MEMBER OF THE PUBLIC who may use portions of the area within the SITE BOUNDARY for purposes not associated with plant operations.

The Total Dose to the MEMBER OF THE PUBLIC (Table 7) is the sum of the dose due to activities within the SITE BOUNDARY (Table 6) and the dose due to gaseous effluents at his residence (Table 7).

The Total Dose at the Nearest Residence is due to the dose from gaseous effluents, assuming that each food ingestion pathway exists at this location (Table 5).

In each case, the whole body gamma dose from Noble Gases and ground plane exposure is added to the organ dose from the inhalation and ingestion pathways.

The Total Dose from the Uranium Fuel Cycle is presented in Table 7.

#### 8.5

##### Dose Due to Liquid Effluents

The total dose to the maximum exposed individual from liquid effluents released from the Callaway Plant during the year is presented in Table 8.



TABLE 1A  
SEMIANNUAL SUMMATION OF GASEOUS RELEASES  
ALL AIRBORNE EFFLUENTS  
QUARTERS 3 AND 4, 1992

TYPE OF EFFLUENT	UNITS	THIRD QUARTER	FOURTH QUARTER	EST TOTAL ERROR %
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A. FISSION AND ACTIVATION GASES

1. TOTAL RELEASE	CURIES	5.41E+01	3.97E+01	20
2. AVERAGE RELEASE RATE FOR PERIOD	$\mu\text{Ci/SEC}$	6.81E+00	4.99E+00	
3. PERCENT OF TECH SPEC LIMIT	%	N/A	N/A	

B. RADIOIODINES

1. TOTAL IODINE-131	CURIES	5.10E-06	3.37E-06	23
2. AVERAGE RELEASE RATE FOR PERIOD	$\mu\text{Ci/SEC}$	6.42E-07	4.24E-07	
3. PERCENT OF TECH SPEC LIMIT	%	N/A	N/A	

C. PARTICULATES

1. PARTICULATE (HALF-LIVES > 8 DAYS)	CURIES	2.40E-06	1.34E-04	30
2. AVERAGE RELEASE RATE FOR PERIOD	$\mu\text{Ci/SEC}$	3.02E-07	1.69E-05	
3. PERCENT OF TECH SPEC LIMIT	%	N/A	N/A	
4. GROSS ALPHA RADIOACTIVITY	CURIES	5.28E-07	7.07E-07	

D. TRITIUM

1. TOTAL RELEASE	CURIES	1.32E+01	1.51E+01	14
2. AVERAGE RELEASE RATE FOR PERIOD	$\mu\text{Ci/SEC}$	1.65E+00	1.90E+00	
3. PERCENT OF TECH SPEC LIMIT	%	N/A	N/A	

TABLE 1B

SEMIANNUAL AIRBORNE CONTINUOUS AND BATCH RELEASES  
GROUND LEVEL RELEASES  
FISSION GASES, IODINES, AND PARTICULATES

QUARTERS 3 AND 4, 1992

NUCLIDE	UNIT	CONTINUOUS RELEASES			BATCH RELEASES	
		THIRD QUARTER	FOURTH QUARTER		THIRD QUARTER	FOURTH QUARTER

1. FISSION GASES

FISSION GASES							
KR-85	CURIES	2.73E+01	0.00E+00		1.20E+00	6.20E-02	
XE-131M	CURIES	0.00E+00	0.00E+00		1.53E-01	9.02E-02	
XE-133	CURIES	1.55E+01	3.04E+01		9.10E+00	3.24E+00	
XE-133M	CURIES	0.00E+00	0.00E+00		2.13E-02	3.00E-02	
XE-135	CURIES	5.59E-01	5.73E+00		1.59E-02	4.61E-03	
AR-41	CURIES	0.00E+00	0.00E+00		2.95E-01	9.06E-02	
TOTAL FOR PERIOD		CURIES	4.34E+01	3.61E+01		1.08E+01	3.53E+00

2. IODINES

2 IODINES						
I-131	CURIES	3.80E-06	2.85E-06		0.00E+00	0.00E+00
I-133	CURIES	1.30E-06	5.14E-07		0.00E+00	0.00E+00
TOTAL FOR PERIOD	CURIES	5.10E-06	3.37E-06		0.00E+00	0.00E+00

3. PARTICULATES

3. PARTICULATES						
CO-58	CURIES	9.11E-07	0.00E+00		0.00E+00	0.00E+00
BR-82	CURIES	7.79E-07	0.00E+00		0.00E+00	0.00E+00
RB-88	CURIES	0.00E+00	1.34E-04		0.00E+00	0.00E+00
NB-95	CURIES	7.20E-07	0.00E+00		0.00E+00	0.00E+00
MO-99	CURIES	0.00E+00	0.00E+00		0.00E+00	1.11E-08
G ALPHA	CURIES	3.37E-07	7.95E-07		1.91E-07	1.51E-09
TOTAL FOR PERIOD	CURIES	2.74E-06	1.35E-04		1.91E-07	1.26E-08

4. TRITIUM

H-3	CURIES	1.19E+01	1.47E+01		1.24E+00	3.68E-01
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TABLE 2A  
SEMIANNUAL SUMMATION OF LIQUID RELEASES  
ALL LIQUID EFFLUENTS

QUARTERS 3 AND 4, 1992

TYPE OF EFFLUENT	UNITS	THIRD QUARTER	FOURTH QUARTER	EST TOTAL ERROR %
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A. FISSION AND ACTIVATION PRODUCTS

1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	3.10E-04	3.48E-04	20
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	μCi/ML	6.59E-10	7.26E-10	
3. PERCENT OF APPLICABLE LIMIT	%	N/A	N/A	

B. TRITIUM

1. TOTAL RELEASE	CURIES	9.87E+01	1.86E+02	14
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	μCi/ML	2.10E-04	3.88E-04	
3. PERCENT OF APPLICABLE LIMIT	%	N/A	N/A	

C. DISSOLVED AND ENTRAINED GASES

1. TOTAL RELEASE	CURIES	0.00E+00	0.00E+00	27
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	μCi/ML	0.00E+00	0.00E+00	

D. GROSS ALPHA RADIOACTIVITY

1. TOTAL RELEASE	CURIES	5.03E-04	1.94E-04	29
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E. WASTE VOL RELEASED(PRE-DILUTION)	GAL	5.47E+06	5.63E+06	10
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F. VOLUME OF DILUTION WATER USED	GAL	1.19E+08	1.21E+08	10
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SEMIANNUAL LIQUID CONTINUOUS AND BATCH RELEASES  
TOTALS FOR EACH NUCLIDE RELEASED

NUCLIDE	UNITS	CONTINUOUS RELEASES		BATCH RELEASES	
		THIRD QUARTER	FOURTH QUARTER	THIRD QUARTER	FOURTH QUARTER

1. ALL NUCLIDES					
H-3	CURIES	0.00E+00	0.00E+00	9.87E+01	1.86E+02
MN-54	CURIES	0.00E+00	0.00E+00	2.23E-05	5.86E-05
CO-58	CURIES	0.00E+00	0.00E+00	.83E-05	3.59E-05
CO-60	CURIES	0.00E+00	0.00E+00	1.68E-04	1.91E-04
BR-82	CURIES	0.00E+00	0.00E+00	5.57E-07	0.00E+00
NB-95	CURIES	0.00E+00	0.00E+00	0.00E+00	2.78E-06
CS-134	CURIES	0.00E+00	0.00E+00	2.95E-05	1.87E-05
CS-137	CURIES	0.00E+00	0.00E+00	3.11E-05	4.10E-05
G ALPHA	CURIES	0.00E+00	0.00E+00	5.03E-04	1.94E-04

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TABLE 3  
SOLID WASTE & IRRADIATED FUEL SHIPMENTS  
QUARTERS 3 & 4, 1992

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (DOES NOT INCLUDE IRRADIATED FUEL)

TYPE OF WASTE	6-MONTH PERIOD	EST. TOTAL ERROR (%)
a. Spent resins, filter sludges evaporator bottoms, etc.	33.89 m <sup>3</sup> 8.31E+02Ci	±25%
	<u>Percent Abundance</u>	<u>Curies</u>
Co-58	44.401%	3.14E+02
Co-60	23.182%	1.76E+02
Mn-54	14.307%	1.08E+02
Fe-55	9.888%	7.50E+01
Ni-63	5.249%	3.98E+01
Cs-137	1.930%	1.46E+01
Cs-134	1.557%	1.18E+01
Zn-65	1.211%	9.18E+01
b. Dry compressible waste, contaminated equipment, etc.	36.69 m <sup>3</sup> 5.00E+00 Ci	±25%
Co-60	55.153%	2.75E+00
Ni-63	26.413%	1.32E+00
Mn-54	12.381%	6.18E-01
Fe-55	2.273%	1.14E-01
Sb-125	2.082%	1.03E-01
Co-58	1.483%	7.41E-02
c. Irradiated components, control rods, etc.	0 m <sup>3</sup> 0 Ci	
d. Other: Solidified oil and oil sludges	2.64 m <sup>3</sup> 6.31E-03 Ci	
Co-60	51.515%	3.25E-03
Cs-137	27.794%	1.75E-03
Ce-144	20.716%	1.31E-03



Solid Waste Disposition

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>	<u>Class of Solid Waste Shipped</u>	<u>Type of Container</u>
3	Truck	Richland, WA	A	LSA
5	Cask	Richland, WA	A	LSA
2	Cask	Richland, WA	B	LSA
4	Truck	Oak Ridge, TN (QUADREX)	A	LSA
3	Truck	Oak Ridge, TN (SEG)	A	LSA
2	Truck	Richland, WA (ATG)	A	LSA

Solidification Agent

Cement (applicable to waste type "a" only)

B. IRRADIATED FUEL SHIPMENTS (DISPOSITION)

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
0	N/A	N/A

TABLE 4

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

MIB

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REPORT CATEGORY : METEOROLOGICAL, RAW DATA INPUTS.  
 TYPE OF ACTIVITY : 1 - HOUR AVERAGES FILE  
 REPORT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 0783:59 HRS = 11:59PM DECEMBER 31, 1992

	UNIT	INPUT	% GOOD
			DATA
STABILITY CLASS	A - G	E	96%
PRECIPITATION	CM.	2.89E 02	96%
SOLAR RADIATION	LANGLEY/MIN	0.00E-01	0%
10 M LEVEL WIND SPEED	M/S	1.88E 00	96%
" " WIND DIRECTION	DEG	2.17E 02	96%
" " WIND DIRECTION VARIABILITY	DEG	1.17E 01	96%
" " REFERENCE TEMPERATURE	DEG C	1.25E 01	96%
" " DEWPOINT	DEG C	2.76E 00	96%
60 M LEVEL WIND SPEED	M/S	1.65E 00	96%
" " WIND DIRECTION	DEG	2.29E 02	96%
" " WIND DIRECTION VARIABILITY	DEG	7.87E 00	96%
" " DEWPOINT	DEG C	0.00E-01	0%
TEMPERATURE DIFFERENCE 10 M - 60 M	DEG C	6.21E-01	96%

TABLE 4 (Cont.)

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

MIC

PAGE 1 OF 7

REPORT CATEGORY : METEOROLOGICAL DATA, QUARTERLY TOTALS OF HOURS AT  
 : EACH WIND SPEED AND DIRECTION  
 PERIOD OF RECORD : QUARTER # \*\*\*  
 REPORT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 8783:59 HRS = 11:59PM DECEMBER 31, 1992  
 STABILITY CLASS : A  
 ELEVATION : 10 METERS

## WIND SPEED(MPH) AT 10 METER LEVEL

	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NNE	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NE	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NNE	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
E	0.00E-01	1.00E 00	1.00E 00	0.00E-01	0.00E-01	0.00E-01	2.00E 00
ESE	0.00E-01	3.00E 00	1.00E 00	0.00E-01	0.00E-01	0.00E-01	4.00E 00
SE	0.00E-01	4.00E 00	5.00E 00	0.00E-01	0.00E-01	0.00E-01	9.00E 00
SSE	1.00E 00	7.00E 00	4.00E 00	2.00E 00	0.00E-01	0.00E-01	1.40E 01
S	0.00E-01	5.00E 00	1.10E 01	5.00E 00	0.00E-01	0.00E-01	2.10E 01
SSW	1.00E 00	1.00E 01	1.00E 01	1.00E 00	0.00E-01	0.00E-01	2.20E 01
SW	0.00E-01	4.00E 00	7.00E 00	0.00E-01	0.00E-01	1.00E 00	1.20E 01
WSW	0.00E-01	2.00E 00	0.00E-01	0.00E-01	0.00E-01	0.00E-01	2.00E 00
W	1.00E 00	0.00E-01	1.00E 00	0.00E-01	0.00E-01	2.00E 00	4.00E 00
WNW	0.00E-01	1.00E 00	2.00E 00	1.00E 00	0.00E-01	0.00E-01	4.00E 00
NW	0.00E-01	2.00E 00	9.00E 00	0.00E-01	0.00E-01	0.00E-01	1.10E 01
NNW	0.00E-01	0.00E-01	1.00E 00	0.00E-01	0.00E-01	0.00E-01	1.00E 00
TOT	3.00E 00	3.90E 01	5.20E 01	9.00E 00	0.00E-01	3.00E 00	1.06E 02

PERIODS OF CALM(HOURS): 0.000E-01

HOURS OF INVALID DATA: 0.000E-01



TABLE 4 (Cont.)

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

MIC

PAGE 2 OF 7

REPORT CATEGORY : METEOROLOGICAL DATA. QUARTERLY TOTALS OF HOURS AT  
 : EACH WIND SPEED AND DIRECTION  
 PERIOD OF RECORD : QUARTER # \*\*\*  
 REPORT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 8783:59 HRS = 11:59PM DECEMBER 31, 1992  
 STABILITY CLASS : B  
 ELEVATION : 10 METERS

## WIND SPEED(MPH) AT 10 METER LEVEL

	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0.00E-01	0.00E-01	1.00E 00	0.00E-01	0.00E-01	0.00E-01	1.00E 00
NNE	0.00E-01	1.00E 00	1.00E 00	0.00E-01	0.00E-01	0.00E-01	2.00E 00
NE	0.00E-01	1.00E 00	0.00E-01	0.00E-01	0.00E-01	0.00E-01	1.00E 00
ENE	0.00E-01	1.00E 00	0.00E-01	0.00E-01	0.00E-01	0.00E-01	1.00E 00
E	0.00E-01	1.00E 00	3.00E 00	0.00E-01	0.00E-01	0.00E-01	4.00E 00
ESE	0.00E-01	5.00E 00	0.00E-01	1.00E 00	0.00E-01	0.00E-01	6.00E 00
SE	3.00E 00	1.10E 01	3.00E 00	0.00E-01	0.00E-01	0.00E-01	1.70E 01
SSE	1.00E 00	6.00E 00	5.00E 00	2.00E 00	0.00E-01	0.00E-01	1.40E 01
S	1.00E 00	4.00E 00	7.00E 00	2.00E 00	0.00E-01	0.00E-01	1.40E 01
SSW	1.00E 00	1.20E 01	9.00E 00	0.00E-01	0.00E-01	0.00E-01	2.20E 01
SW	0.00E-01	7.00E 00	3.00E 00	0.00E-01	0.00E-01	0.00E-01	1.00E 01
WSW	0.00E-01	2.00E 00	6.00E 00	0.00E-01	0.00E-01	3.00E 00	1.10E 01
W	0.00E-01	4.00E 00	4.00E 00	0.00E-01	0.00E-01	0.00E-01	8.00E 00
WNW	0.00E-01	2.00E 00	7.00E 00	0.00E-01	0.00E-01	0.00E-01	9.00E 00
NW	0.00E-01	0.00E-01	1.30E 01	1.00E 00	0.00E-01	0.00E-01	1.40E 01
NNW	0.00E-01	1.00E 00	0.00E-01	1.00E 00	0.00E-01	0.00E-01	2.00E 00
TOT	6.00E 00	5.80E 01	6.20E 01	7.00E 00	0.00E-01	3.00E 00	1.36E 02

PERIODS OF CALM(HOURS): 0.000E-01  
 HOURS OF INVALID DATA: 0.000E-01

TABLE 4 (Cont.)

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

MHC

PAGE 3 OF 7

REPORT CATEGORY : METEOROLOGICAL DATA. QUARTERLY TOTALS OF HOURS AT  
 : EACH WIND SPEED AND DIRECTION  
 PERIOD OF RECORD : QUARTER # \*\*\*  
 REPORT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 6783:59 HRS = 11:59PM DECEMBER 31, 1992  
 STABILITY CLASS : C  
 ELEVATION : 10 METERS

## WIND SPEED(MPH) AT 10 METER LEVEL

	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NNE	0.00E-01	8.00E 00	6.00E 00	1.00E 00	0.00E-01	0.00E-01	1.50E 01
NE	0.00E-01	3.00E 00	5.00E 00	0.00E-01	0.00E-01	0.00E-01	8.00E 00
ENE	0.00E-01	0.00E-01	1.00E 00	0.00E-01	0.00E-01	0.00E-01	1.00E 00
E	1.00E 00	2.00E 00	5.00E 00	0.00E-01	0.00E-01	0.00E-01	8.00E 00
ESE	2.00E 00	1.60E 01	5.00E 00	0.00E-01	0.00E-01	0.00E-01	2.30E 01
SE	5.00E 00	1.60E 01	9.00E 00	1.00E 00	0.00E-01	0.00E-01	3.10E 01
SSE	5.00E 00	1.20E 01	1.10E 01	2.00E 00	0.00E-01	0.00E-01	3.00E 01
S	3.00E 00	1.50E 01	1.20E 01	2.00E 00	0.00E-01	0.00E-01	3.20E 01
SSW	5.00E 00	2.10E 01	8.00E 00	4.00E 00	0.00E-01	0.00E-01	3.80E 01
SW	1.00E 00	1.10E 01	1.00E 01	0.00E-01	0.00E-01	0.00E-01	2.20E 01
WSW	2.00E 00	1.00E 01	5.00E 00	0.00E-01	0.00E-01	1.00E 00	1.80E 01
W	0.00E-01	5.00E 00	5.00E 00	0.00E-01	0.00E-01	0.00E-01	1.00E 01
WNW	1.00E 00	5.00E 00	1.20E 01	3.00E 00	0.00E-01	0.00E-01	2.10E 01
NW	0.00E-01	2.00E 00	1.40E 01	4.00E 00	0.00E-01	0.00E-01	2.00E 01
NNW	1.00E 00	2.00E 00	7.00E 00	1.00E 00	0.00E-01	0.00E-01	1.10E 01
TOT	2.60E 01	1.28E 02	1.15E 02	1.80E 01	0.00E-01	1.00E 00	2.88E 02

PERIODS OF CALM(HOURS): 2.000E 00

HOURS OF INVALID DATA : 0.000E-01

TABLE 4 (Cont.)

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

WIC

PAGE 4 OF 7

REPORT CATEGORY : METEOROLOGICAL DATA. QUARTERLY TOTALS OF HOURS AT  
 : EACH WIND SPEED AND DIRECTION  
 PERIOD OF RECORD : QUARTER # \*\*\*  
 REPORT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 8783:59 HRS = 11:59PM DECEMBER 31, 1992  
 STABILITY CLASS : D  
 ELEVATION : 10 METERS

## WIND SPEED(MPH) AT 10 METER LEVEL

	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0.00E-01	1.40E 01	2.20E 01	1.00E 00	0.00E-01	0.00E-01	3.70E 01
NNE	5.00E 00	6.00E 01	2.80E 01	1.00E 00	0.00E-01	0.00E-01	9.40E 01
NE	1.70E 01	3.80E 01	2.80E 01	0.00E-01	0.00E-01	0.00E-01	7.50E 01
ENE	1.00E 01	4.40E 01	1.50E 01	0.00E-01	0.00E-01	0.00E-01	6.90E 01
E	1.30E 01	5.90E 01	4.40E 01	0.00E-01	0.00E-01	0.00E-01	1.16E 02
ESE	1.30E 01	6.60E 01	3.00E 01	1.00E 00	0.00E-01	0.00E-01	1.12E 02
SE	1.10E 01	5.80E 01	6.00E 01	1.20E 01	0.00E-01	0.00E-01	1.41E 02
SSE	2.00E 01	4.70E 01	5.10E 01	1.30E 01	0.00E-01	0.00E-01	1.31E 02
S	3.00E 01	6.40E 01	6.90E 01	1.20E 01	0.00E-01	0.00E-01	1.75E 02
SSH	2.00E 01	6.40E 01	5.10E 01	2.20E 01	1.00E 00	0.00E-01	1.58E 02
SW	1.50E 01	5.30E 01	5.30E 01	1.30E 01	0.00E-01	0.00E-01	1.34E 02
WSW	1.70E 01	3.50E 01	1.70E 01	7.00E 00	0.00E-01	6.00E 00	8.20E 01
W	1.90E 01	7.70E 01	6.20E 01	3.00E 00	0.00E-01	0.00E-01	1.61E 02
WNW	1.40E 01	5.30E 01	5.70E 01	1.30E 01	4.00E 00	0.00E-01	1.41E 02
NW	1.50E 01	4.00E 01	5.90E 01	2.80E 01	0.00E-01	0.00E-01	1.42E 02
NNW	8.00E 00	5.00E 01	6.40E 01	6.00E 00	1.00E 00	0.00E-01	1.29E 02
TOT	2.27E 02	8.24E 02	7.02E 02	1.32E 02	6.00E 00	6.00E 00	1.90E 03

PERIODS OF CALM(HOURS): 8.000E 00  
 HOURS OF INVALID DATA : 0.000E-01



TABLE 4 (Cont.)

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

HIC

PAGE 5 OF 7

REPORT CATEGORY : METEOROLOGICAL DATA, QUARTERLY TOTALS OF HOURS AT  
 : EACH WIND SPEED AND DIRECTION  
 PERIOD OF RECORD : QUARTER # \*\*\*  
 REPORT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 8783:59 HRS = 11:59PM DECEMBER 31, 1992  
 STABILITY CLASS : E  
 ELEVATION : 10 METERS

## WIND SPEED(MPH) AT 10 METER LEVEL

	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	2.00E 00	2.90E 01	3.10E 01	4.00E 00	0.00E-01	0.00E-01	6.60E 01
NNE	2.30E 01	5.50E 01	1.40E 01	0.00E-01	0.00E-01	0.00E-01	9.20E 01
NE	2.90E 01	3.80E 01	4.00E 00	0.00E-01	0.00E-01	0.00E-01	7.10E 01
ENE	3.10E 01	3.30E 01	3.10E 01	0.00E-01	0.00E-01	0.00E-01	9.50E 01
E	3.50E 01	8.60E 01	2.60E 01	0.00E-01	0.00E-01	1.00E 00	1.48E 02
ESE	3.60E 01	1.46E 02	7.10E 01	4.00E 00	0.00E-01	0.00E-01	2.57E 02
SE	2.80E 01	1.10E 02	8.20E 01	5.00E 00	0.00E-01	0.00E-01	2.25E 02
SSE	7.00E 01	1.04E 02	8.70E 01	1.10E 01	0.00E-01	0.00E-01	2.72E 02
S	2.80E 01	9.60E 01	9.60E 01	1.50E 01	0.00E-01	0.00E-01	2.35E 02
SSH	1.60E 01	5.90E 01	5.50E 01	5.00E 00	0.00E-01	1.00E 00	1.36E 02
SW	3.70E 01	7.30E 01	3.20E 01	1.60E 01	0.00E-01	0.00E-01	1.58E 02
WSW	4.00E 01	4.80E 01	4.00E 01	1.20E 01	0.00E-01	5.00E 00	1.45E 02
W	4.70E 01	9.10E 01	4.90E 01	9.00E 00	0.00E-01	0.00E-01	1.96E 02
WNW	2.30E 01	1.07E 02	6.90E 01	2.00E 01	0.00E-01	0.00E-01	2.19E 02
NW	2.60E 01	9.70E 01	3.10E 01	3.20E 01	0.00E-01	0.00E-01	1.86E 02
NNW	1.90E 01	8.20E 01	5.70E 01	1.50E 01	0.00E-01	0.00E-01	1.73E 02
TOT	4.90E 02	1.25E 03	7.75E 02	1.48E 02	0.00E-01	7.00E 00	2.67E 03

PERIODS OF CALM(HOURS): 3.600E 01  
 HOURS OF INVALID DATA : 0.000E-01

TABLE 4 (Cont.)

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

MIC

PAGE 6 OF 7

REPORT CATEGORY : METEOROLOGICAL DATA. QUARTERLY TOTALS OF HOURS AT  
 : EACH WIND SPEED AND DIRECTION  
 PERIOD OF RECORD : QUARTER # \*\*\*  
 REPORT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 8783:59 HRS = 11:59PM DECEMBER 31, 1992  
 STABILITY CLASS : F  
 ELEVATION : 10 METERS

## WIND SPEED(MPH) AT 10 METER LEVEL

	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	6.00E 00	2.70E 01	4.00E 00	1.00E 00	0.00E-01	0.00E-01	3.80E 01
NNE	2.50E 01	3.40E 01	1.10E 01	5.00E 00	1.00E 00	0.00E-01	7.60E 01
NE	3.80E 01	3.80E 01	1.50E 01	0.40E-01	0.00E-01	0.00E-01	9.10E 01
ENE	5.20E 01	4.30E 01	9.00E 00	0.00E-01	0.00E-01	0.00E-01	1.04E 02
E	3.00E 01	7.00E 01	1.10E 01	0.00E-01	0.00E-01	0.00E-01	1.11E 02
ESE	5.60E 01	6.90E 01	1.00E 01	0.00E-01	0.00E-01	0.00E-01	1.35E 02
SE	5.50E 01	1.85E 02	4.20E 01	0.00E-01	0.00E-01	0.00E-01	2.82E 02
SSE	3.20E 01	1.79E 02	3.30E 01	0.00E-01	0.00E-01	0.00E-01	2.44E 02
S	5.50E 01	1.82E 02	3.20E 01	0.00E-01	0.00E-01	0.00E-01	2.69E 02
SSW	3.80E 01	1.30E 02	1.70E 01	3.00E 00	0.00E-01	1.00E 00	1.89E 02
SW	3.40E 01	7.50E 01	1.40E 01	3.00E 00	0.00E-01	0.00E-01	1.26E 02
WSW	4.10E 01	5.30E 01	1.20E 01	0.00E-01	0.00E-01	2.40E 01	1.30E 02
W	3.50E 01	6.50E 01	1.60E 01	3.00E 00	0.00E-01	0.00E-01	1.19E 02
WNW	3.70E 01	4.20E 01	1.30E 01	1.00E 00	0.00E-01	0.00E-01	9.30E 01
NW	2.30E 01	6.00E 01	1.40E 01	0.00E-01	0.00E-01	0.00E-01	9.70E 01
NNW	2.40E 01	5.20E 01	3.10E 01	0.00E-01	0.00E-01	0.00E-01	1.07E 02
TOT	5.81E 02	1.30E 03	2.84E 02	1.60E 01	1.00E 00	2.50E 01	2.21E 03

PERIODS OF CALM(HOURS): 6.600E 01  
 HOURS OF INVALID DATA : 0.00E-01

TABLE 4 (Cont.)

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

MIC

PAGE 7 OF 7

REPORT CATEGORY : METEOROLOGICAL DATA. QUARTERLY TOTALS OF HOURS AT  
 : EACH WIND SPEED AND DIRECTION  
 PERIOD OF RECORD : QUARTER # \*\*\*  
 REPORT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 0703:59 HRS = 11:59PM DECEMBER 31, 1992  
 STABILITY CLASS : G  
 ELEVATION : 10 METERS

## WIND SPEED(MPH) AT 10 METER LEVEL

	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	2.10E 01	1.40E 01	6.00E 00	4.00E 00	0.00E-01	0.00E-01	4.50E 01
NNE	3.00E 01	5.00E 00	3.00E 00	0.00E-01	0.00E-01	0.00E-01	3.60E 01
NE	4.10E 01	3.00E 00	0.00E-01	0.00E-01	0.00E-01	0.00E-01	4.40E 01
ENE	1.80E 01	7.00E 00	1.00E 00	0.00E-01	0.00E-01	0.00E-01	2.60E 01
E	2.70E 01	1.10E 01	3.00E 00	0.00E-01	0.00E-01	0.00E-01	4.10E 01
ESE	3.00E 01	1.20E 01	9.00E 00	0.00E-01	0.00E-01	0.00E-01	5.10E 01
SE	3.70E 01	5.00E 01	6.00E 00	0.00E-01	0.00E-01	0.00E-01	9.30E 01
SSE	4.80E 01	7.70E 01	3.00E 00	0.00E-01	0.00E-01	0.00E-01	1.28E 02
S	4.80E 01	4.10E 01	6.00E 00	0.00E-01	0.00E-01	0.00E-01	9.50E 01
SSW	4.00E 01	2.70E 01	2.00E 00	1.00E 00	0.00E-01	0.00E-01	7.00E 01
SW	3.10E 01	1.30E 01	0.00E-01	2.00E 00	0.00E-01	0.00E-01	4.60E 01
WSW	1.50E 01	1.00E 01	0.00E-01	0.00E-01	0.00E-01	1.00E 00	2.60E 01
W	2.70E 01	1.50E 01	3.00E 00	4.00E 00	0.00E-01	0.00E-01	4.90E 01
WNW	2.30E 01	1.00E 01	2.00E 00	0.00E-01	0.00E-01	0.00E-01	3.50E 01
NW	1.40E 01	2.40E 01	9.00E 00	5.00E 00	0.00E-01	0.00E-01	5.20E 01
NNW	2.40E 01	1.90E 01	2.50E 01	7.00E 00	0.00E-01	0.00E-01	7.50E 01
TOT	4.74E 02	3.38E 02	7.80E 01	2.30E 01	0.00E-01	1.00E 00	9.14E 02

PERIODS OF CALM(HOURS): 5.200E 01  
 HOURS OF INVALID DATA : 0.000E-01  
 HOURS OF GOOD DATA : 8.390E 03 = 95.5% OF TOTAL HOURS



TABLE 4 (Cont.)

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

MID

PAGE 1 OF 7

REPORT CATEGORY : METEOROLOGICAL DATA, QUARTERLY TOTALS OF HOURS AT  
 : EACH WIND SPEED AND DIRECTION  
 PERIOD OF RECORD : QUARTER # \*\*\*  
 REPORT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 8783:59 HRS = 11:59PM DECEMBER 31, 1992  
 STABILITY CLASS : A  
 ELEVATION : 60 METERS

## WIND SPEED(MPH) AT 60 METER LEVEL

	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	1.00E 00	1.00E 00
NNE	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NE	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ENE	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
E	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
ESE	0.00E-01	2.00E 00	1.00E 00	0.00E-01	0.00E-01	0.00E-01	3.00E 00
SE	0.00E-01	2.00E 00	3.00E 00	3.00E 00	0.00E-01	0.00E-01	8.00E 00
SSE	0.00E-01	2.00E 00	4.00E 00	3.00E 00	0.00E-01	1.00E 00	1.00E 01
S	0.00E-01	6.00E 00	1.10E 01	3.00E 00	1.00E 00	0.00E-01	2.10E 01
SSW	0.00E-01	4.00E 00	5.00E 00	8.00E 00	3.00E 00	0.00E-01	2.00E 01
SW	0.00E-01	2.00E 00	1.00E 01	7.00E 00	0.00E-01	0.00E-01	1.90E 01
WSW	0.00E-01	2.00E 00	1.00E 00	2.00E 00	0.00E-01	0.00E-01	5.00E 00
W	0.00E-01	1.00E 00	2.00E 00	0.00E-01	2.00E-01	0.00E-01	3.00E 00
WNW	0.00E-01	0.00E-01	0.00E-01	1.00E 00	0.00E-01	0.00E-01	1.00E 00
NW	0.00E-01	0.00E-01	4.00E 00	5.00E 00	0.00E-01	0.00E-01	9.00E 00
NNW	0.00E-01	0.00E-01	0.00E-01	4.00E 00	0.00E-01	2.00E 00	6.00E 00
TOT	0.00E-01	2.10E 01	4.10E 01	3.60E 01	4.00E 00	4.00E 00	1.06E 02

PERIODS OF CALM(HOURS): 0.000E-01

HOURS OF INVALID DATA : 0.000E-01

TABLE 4 (Cont.)

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

MID

PAGE 2 OF 7

REPORT CATEGORY : METEOROLOGICAL DATA. QUARTERLY TOTALS OF HOURS AT  
 : EACH WIND SPEED AND DIRECTION  
 PERIOD OF RECORD : QUARTER # \*\*\*  
 REPORT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 8783:59 HRS = 11:59PM DECEMBER 31, 1992  
 STABILITY CLASS : B  
 ELEVATION : 60 METERS

## WIND SPEED(MPH) AT 60 METER LEVEL

	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NNE	0.00E-01	0.00E-01	2.00E 00	0.00E-01	0.00E-01	0.00E-01	2.00E 00
NE	0.00E-01	1.00E 00	0.00E-01	0.00E-01	0.00E-01	0.00E-01	1.00E 00
ENE	1.00E 00	1.00E 00	0.00E-01	0.00E-01	0.00E-01	0.00E-01	2.00E 00
E	0.00E-01	1.00E 00	1.00E 00	0.00E-01	0.00E-01	0.00E-01	2.00E 00
ESE	1.00E 00	4.00E 00	2.00E 00	1.00E 00	0.00E-01	0.00E-01	8.00E 00
SE	1.00E 00	5.00E 00	9.00E 00	1.00E 00	0.00E-01	0.00E-01	1.60E 01
SSE	0.00E-01	5.00E 00	6.00E 00	2.00E 00	0.00E-01	0.00E-01	1.30E 01
S	0.00E-01	4.00E 00	7.00E 00	3.00E 00	1.00E 00	0.00E-01	1.50E 01
SSW	0.00E-01	3.00E 00	1.10E 01	4.00E 00	0.00E-01	0.00E-01	1.80E 01
SW	1.00E 00	5.00E 00	7.00E 00	1.00E 00	0.00E-01	0.00E-01	1.40E 01
WSW	0.00E-01	1.00E 00	2.00E 00	3.00E 00	0.00E-01	0.00E-01	6.00E 00
W	0.00E-01	1.00E 00	6.00E 00	3.00E 00	0.00E-01	0.00E-01	1.00E 01
WNW	0.00E-01	0.00E-01	1.00E 00	5.00E 00	0.00E-01	0.00E-01	6.00E 00
NW	0.00E-01	1.00E 00	1.40E 01	2.00E 00	0.00E-01	0.00E-01	1.70E 01
NNW	0.00E-01	1.00E 00	0.00E-01	0.00E-01	1.00E 00	4.00E 00	6.00E 00
TOT	4.00E 00	3.30E 01	6.80E 01	2.50E 01	2.00E 00	4.00E 00	1.36E 02

PERIODS OF CALM(HOURS): 0.000E-01  
 HOURS OF INVALID DATA : 0.000E-01



TABLE 4 (Cont.)

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

MID PAGE 3 OF 7

REPORT CATEGORY : METEOROLOGICAL DATA. QUARTERLY TOTALS OF HOURS AT  
 : EACH WIND SPEED AND DIRECTION  
 PERIOD OF RECORD : QUARTER # \*\*\*  
 RE-CRT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 8783:59 HRS = 11:59PM DECEMBER 31, 1992  
 STABILITY CLASS : C  
 ELEVATION : 60 METERS

## WIND SPEED(MPH) AT 60 METER LEVEL

	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
NNE	0.00E-01	2.00E 00	5.00E 00	4.00E 00	1.00E 00	0.00E-01	1.20E 01
NE	0.00E-01	3.00E 00	9.00E 00	2.00E 00	0.00E-01	0.00E-01	1.40E 01
ENE	0.00E-01	1.00E 00	2.00E 00	0.00E-01	0.00E-01	0.00E-01	3.00E 00
E	1.00E 00	3.00E 00	1.00E 00	1.00E 00	0.00E-01	0.00E-01	6.00E 00
ESE	2.00E 00	8.00E 00	4.00E 00	0.00E-01	0.00E-01	0.00E-01	1.40E 01
SE	0.00E-01	9.00E 00	1.10E 01	4.00E 00	0.00E-01	0.00E-01	2.40E 01
SSE	2.00E 00	2.00E 01	6.00E 00	8.00E 00	0.00E-01	0.00E-01	3.60E 01
S	3.00E 00	1.30E 01	7.00E 00	9.00E 00	1.00E 00	0.00E-01	3.30E 01
SSW	0.00E-01	1.20E 01	1.50E 01	6.00E 00	2.00E 00	0.00E-01	3.50E 01
SW	2.00E 00	5.00E 00	1.10E 01	8.00E 00	0.00E-01	0.00E-01	2.60E 01
WSW	0.00E-01	4.00E 00	8.00E 00	4.00E 00	0.00E-01	0.00E-01	1.60E 01
W	0.00E-01	2.00E 00	1.10E 01	2.00E 00	0.00E-01	0.00E-01	1.50E 01
WNW	0.00E-01	5.00E 00	3.00E 00	7.00E 00	4.00E 00	0.00E-01	1.90E 01
NW	0.00E-01	3.00E 00	6.00E 00	1.00E 01	4.00E 00	0.00E-01	2.30E 01
NNW	0.00E-01	1.00E 00	6.00E 00	4.00E 00	1.00E 00	2.00E 00	1.40E 01
TOT	1.00E 01	9.10E 01	1.05E 02	6.90E 01	1.30E 01	2.00E 00	2.90E 02

PERIODS OF CALM(HOURS): 0.000E-01  
 HOURS OF INVALID DATA : 0.000E-01

TABLE 4 (Cont.)

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

MID PAGE 4 OF 7

REPORT CATEGORY : METEOROLOGICAL DATA, QUARTERLY TOTALS OF HOURS AT  
 PERIOD OF RECORD : EACH WIND SPEED AND DIRECTION  
 : QUARTER # \*\*\*  
 REPORT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 8783:59 HRS = 11:59PM DECEMBER 31, 1992  
 STABILITY CLASS : D  
 ELEVATION : 60 METERS

## WIND SPEED(MPH) AT 60 METER LEVEL

	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1.00E 00	6.00E 00	2.40E 01	2.00E 01	1.00E 00	1.00E 00	5.30E 01
NNE	4.00E 00	2.70E 01	5.60E 01	1.30E 01	0.00E-01	0.00E-01	1.00E 02
NE	1.20E 01	5.80E 01	3.10E 01	1.00E 01	0.00E-01	0.00E-01	1.11E 02
ENE	7.00E 00	3.30E 01	2.50E 01	6.00E 00	0.00E-01	0.00E-01	7.10E 01
E	4.00E 00	3.60E 01	4.20E 01	7.00E 00	0.00E-01	0.00E-01	8.90E 01
ESE	1.20E 01	3.20E 01	5.30E 01	9.00E 00	0.00E-01	0.00E-01	1.06E 02
SE	8.00E 00	3.50E 01	5.40E 01	3.20E 01	1.00E 00	0.00E-01	1.30E 02
SSE	1.40E 01	2.90E 01	4.80E 01	2.90E 01	5.00E 00	0.00E-01	1.25E 02
S	1.60E 01	5.40E 01	6.70E 01	3.60E 01	1.00E 01	2.00E 00	1.85E 02
SSW	7.00E 00	3.50E 01	5.00E 01	2.80E 01	1.50E 01	0.00E-01	1.35E 02
SW	6.00E 00	3.90E 01	4.10E 01	4.30E 01	1.50E 01	2.00E 00	1.46E 02
WSW	1.30E 01	3.00E 01	2.20E 01	1.70E 01	5.00E 00	1.00E 00	8.80E 01
W	8.00E 00	4.70E 01	6.40E 01	3.00E 01	4.00E 00	0.00E-01	1.53E 02
WNW	7.00E 00	2.50E 01	4.60E 01	5.10E 01	1.50E 01	6.00E 00	1.52E 02
NW	6.00E 00	2.90E 01	3.40E 01	3.20E 01	1.50E 01	5.00E 00	1.21E 02
NNW	1.00E 00	2.60E 01	5.90E 01	3.30E 01	1.00E 01	8.00E 00	1.37E 02
TOT	1.26E 02	5.41E 02	7.18E 02	3.96E 02	9.60E 01	2.50E 01	1.90E 03

PERIODS OF CALM(HOURS): 3.000E 00  
 HOURS OF INVALID DATA : 0.000E-01

TABLE 4 (Cont.)

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

HID PAGE 5 OF 7

REPORT CATEGORY : METEOROLOGICAL DATA. QUARTERLY TOTALS OF HOURS AT  
 : EACH WIND SPEED AND DIRECTION  
 PERIOD OF RECORD : QUARTER # \*\*\*  
 REPORT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 8783:59 HRS = 11:59PM DECEMBER 31, 1992  
 STABILITY CLASS : E  
 ELEVATION : 60 METERS

## WIND SPEED(MPH) AT 60 METER LEVEL

	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1.00E 00	1.00E 01	3.70E 01	2.10E 01	2.00E 00	0.00E-01	7.10E 01
NNE	2.00E 00	2.40E 01	6.90E 01	2.70E 01	0.00E-01	0.00E-01	1.22E 02
NE	6.00E 00	3.50E 01	4.10E 01	2.00E 00	0.00E-01	0.00E-01	8.60E 01
ENE	1.10E 01	3.30E 01	4.00E 01	2.10E 01	0.00E-01	0.00E-01	1.05E 02
E	7.00E 00	4.30E 01	7.60E 01	5.00E 00	0.50E-01	0.00E-01	1.31E 02
ESE	1.10E 01	6.80E 01	1.26E 02	5.20E 01	2.00E 00	0.00E-01	2.59E 02
SE	7.00E 00	5.60E 01	1.09E 02	6.50E 01	6.00E 00	0.00E-01	2.43E 02
SSE	1.00E 01	3.80E 01	8.10E 01	7.20E 01	7.00E 00	0.00E-01	2.08E 02
S	7.00E 00	4.60E 01	8.50E 01	8.60E 01	9.00E 00	2.00E 00	2.35E 02
SSW	9.00E 00	1.50E 01	5.10E 01	7.50E 01	8.00E 00	3.00E 00	1.61E 02
SW	6.00E 00	3.20E 01	5.20E 01	5.50E 01	2.40E 01	1.00E 00	1.70E 02
WSW	5.00E 00	5.10E 01	4.20E 01	3.30E 01	2.00E 01	2.00E 00	1.53E 02
W	5.00E 00	2.70E 01	7.10E 01	5.60E 01	1.40E 01	3.00E 00	1.76E 02
WNW	6.00E 00	4.10E 01	7.00E 01	7.50E 01	2.60E 01	3.00E 00	2.21E 02
NW	8.00E 00	2.60E 01	8.30E 01	3.20E 01	8.00E 00	2.00E 00	1.59E 02
NNW	3.00E 00	2.30E 01	8.40E 01	5.00E 01	3.60E 01	5.00E 00	2.01E 02
TOT	1.06E 02	5.68E 02	1.12E 03	7.27E 02	1.62E 02	2.10E 01	2.70E 03

PERIODS OF CALM(HOURS): 9.000E 00  
 HOURS OF INVALID DATA : 0.000E-01

TABLE 4 (Cont.)

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

MID

PAGE 6 OF 7

REPORT CATEGORY : METEOROLOGICAL DATA. QUARTERLY TOTALS OF HOURS AT  
 : EACH WIND SPEED AND DIRECTION  
 PERIOD OF RECORD : QUARTER # \*\*\*  
 REPORT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 8783:59 HRS = 11:59PM DECEMBER 31, 1992  
 STABILITY CLASS : F  
 ELEVATION : 60 METERS

## WIND SPEED(MPH) AT 60 METER LEVEL

	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
H	0.00E-01	3.00E 00	3.00E 01	2.70E 01	0.00E-01	0.00E-01	6.00E 01
HNE	3.00E 00	2.00E 01	6.70E 01	3.00E 01	3.00E 00	2.00E 00	1.25E 02
NE	4.00E 00	2.40E 01	7.50E 01	3.00E 00	0.00E-01	0.00E-01	1.06E 02
ENE	8.00E 00	2.00E 01	6.90E 01	4.00E 00	0.00E-01	0.00E-01	1.01E 02
E	6.00E 00	2.60E 01	7.50E 01	6.00E 00	0.00E-01	0.00E-01	1.13E 02
ESE	3.00E 00	2.20E 01	1.03E 02	1.40E 01	0.00E-01	0.00E-01	1.42E 02
SE	9.00E 00	3.20E 01	1.15E 02	4.20E 01	1.00E 00	0.00E-01	1.99E 02
SSE	6.00E 00	2.50E 01	1.30E 02	7.20E 01	0.00E-01	0.00E-01	2.33E 02
S	1.30E 01	2.50E 01	1.19E 02	5.40E 01	0.00E-01	0.00E-01	2.11E 02
SSW	7.00E 00	2.20E 01	1.66E 02	7.70E 01	2.00E 00	1.00E 00	2.75E 02
SW	5.00E 00	2.70E 01	8.00E 01	7.20E 01	6.00E 00	0.00E-01	1.90E 02
WSW	6.00E 00	2.10E 01	5.00E 01	2.90E 01	1.00E 00	0.00E-01	1.07E 02
W	7.00E 00	1.30E 01	4.80E 01	3.80E 01	5.00E 00	1.00E 00	1.12E 02
WNW	4.00E 00	2.00E 01	3.80E 01	2.50E 01	2.00E 00	0.00E-01	8.90E 01
NW	5.00E 00	1.10E 01	4.10E 01	2.90E 01	2.00E 00	0.00E-01	8.80E 01
NNW	3.00E 00	1.30E 01	4.60E 01	3.00E 01	0.00E-01	2.40E 01	1.16E 02
TOT	8.90E 01	3.24E 02	1.25E 03	5.52E 02	2.20E 01	2.80E 01	2.27E 03

PERIODS OF CALM(HOURS): 1.000E 01  
 HOURS OF INVALID DATA : 0.000E-01

APPROVED BY:

TITLE:

DATE:

TABLE 4 (Cont.)

CUMULATIVE JOINT FREQUENCY DISTRIBUTIONS  
1992

MID

PAGE 7 OF 7

REPORT CATEGORY : METEOROLOGICAL DATA. QUARTERLY TOTALS OF HOURS AT  
 : EACH WIND SPEED AND DIRECTION  
 PERIOD OF RECORD : QUARTER # \*\*\*  
 REPORT START TIME : 1:00 HRS = 01:00AM JANUARY 1, 1992  
 REPORT END TIME : 0783:59 HRS = 11:59PM DECEMBER 31, 1992  
 STABILITY CLASS : G  
 ELEVATION : 60 METERS

## WIND SPEED(MPH) AT 60 METER LEVEL

	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0.00E-01	1.00E 00	7.00E 00	3.90E 01	3.00E 00	0.00E-01	5.00E 01
NNE	0.00E-01	2.00E 00	2.00E 01	2.40E 01	0.00E-01	0.00E-01	4.60E 01
NE	1.00E 00	1.80E 01	4.10E 01	5.00E 00	0.00E-01	0.00E-01	6.50E 01
ENE	2.00E 00	1.00E 01	4.20E 01	1.10E 01	0.00E-01	0.00E-01	6.50E 01
E	2.00E 00	1.60E 01	4.30E 01	6.00E 00	3.00E 00	0.00E-01	7.00E 01
ESE	2.00E 00	5.00E 00	2.90E 01	1.30E 01	0.00E-01	0.00E-01	4.90E 01
SE	4.00E 00	1.40E 01	3.40E 01	7.00E 00	0.00E-01	0.00E-01	5.90E 01
SSE	7.00E 00	2.20E 01	4.80E 01	9.00E 00	0.00E-01	0.00E-01	8.60E 01
S	3.00E 00	2.30E 01	5.50E 01	1.70E 01	0.00E-01	0.00E-01	9.80E 01
SSW	2.00E 00	1.20E 01	6.10E 01	1.70E 01	0.00E-01	1.00E 00	9.30E 01
SW	2.00E 00	1.60E 01	5.00E 01	2.80E 01	1.00E 00	1.00E 00	9.80E 01
WSW	5.00E 00	1.40E 01	1.40E 01	4.00E 00	0.00E-01	0.00E-01	3.70E 01
W	3.00E 00	1.40E 01	1.80E 01	9.00E 00	3.00E 00	0.00E-01	4.70E 01
WNW	4.00E 00	9.00E 00	9.00E 00	1.20E 01	0.00E-01	0.00E-01	3.40E 01
NW	1.00E 00	2.00E 00	9.00E 00	1.10E 01	1.10E 01	2.00E 00	3.60E 01
NNW	1.00E 00	4.00E 00	1.00E 01	1.10E 01	3.00E 00	1.00E 00	3.00E 01
TOT	3.90E 01	1.82E 02	4.90E 02	2.23E 02	2.40E 01	5.00E 00	9.63E 02

PERIODS OF CALM(HOURS): 3.000E 00  
 HOURS OF INVALID DATA : 0.000E-01  
 HOURS OF GOOD DATA : 8.390E 03 = 95.5% OF TOTAL HOURS



TABLE 5

DOSE AT THE SITE BOUNDARY AND TO THE NEAREST RESIDENT  
FROM GASEOUS EFFLUENTS

ORGAN	SITE BOUNDARY		NEAREST RESIDENT	
	LOCATION: 2.05km N AGE GROUP: CHILD		LOCATION: 2.83 km N AGE GROUP: CHILD	
	DOSE	% LIMIT(a)	DOSE	% LIMIT(b)
Gamma Air Dose (mRad)*	9.62E-03	0.10	5.76E-03	N/A
Beta Air Dose (mRad)*	4.44E-02	0.22	2.66E-02	N/A
Whole Body (mRem)*	8.11E-03	N/A	4.86E-03	N/A
Skin (mRem)*	3.15E-02	N/A	1.89E-02	N/A
Bone (mRem)**	4.82E-06	N/A	2.39E-04	0.00
Liver (mRem)**	1.81E-03	N/A	9.61E-03	0.06
Total Body (mRem)**	1.81E-03	N/A	9.61E-03	0.06
Thyroid (mRem)**	2.00E-03	N/A	3.70E-02	0.25
Kidney (mRem)**	1.81E-03	N/A	9.66E-03	0.06
Lung (mRem)**	1.81E-03	N/A	9.52E-03	0.06
GI-LLI (mRem)**	1.81E-03	N/A	9.53E-03	0.06

\* Dose from Noble Gases only

\*\* Dose from Tritium, Radioiodines and Particulates only

(a) Annual dose limits of Offsite Dose Calculation Manual (APA-ZZ-01003)  
of 10 mRad gamma air dose and 20 mRad beta air dose.(b) Annual dose limits of Offsite Dose Calculation Manual (APA-ZZ-01003)  
of 15 mRem to any organ from I-131, I-133, H-3 and particulate radio-  
nuclides with half-lives greater than 8 days.