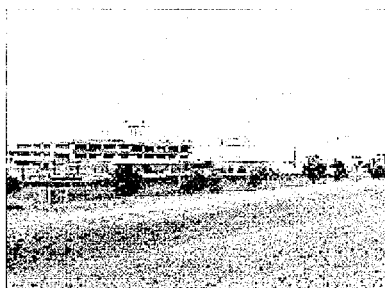


*Entergy*

**Annual  
Radioactive Effluent Release  
Report**

**January 1, 2000 - December 31, 2000**

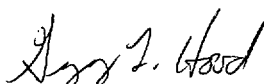


**Waterford 3 SES  
Entergy Operations, Inc.**

**Docket Number 50-382**

**License Number NPF-38**

Originator:



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4/23/01

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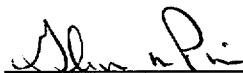
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Date

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## 1.0 Introduction

This Annual Radioactive Effluent Release Report is submitted as required by Waterford 3's Technical Specification 6.9.1.8. It covers the period from January 1, 2000 through December 31, 2000. Information in this report is presented in the format outlined in Appendix B of Regulatory Guide 1.21 and in Section 5.8.1 of the Offsite Dose Calculation Manual (UNT-005-014).

The information contained in this report includes:

- A summary of the quantities of radioactive liquid and gaseous effluents and solid wastes released from the plant during the reporting period.
- A summary of the meteorological data collected during 2000.
- Assessment of radiation doses due to liquid and gaseous radioactive effluents released during 2000.
- A discussion of Unplanned/Abnormal releases that occurred during the reporting period.
- A submittal of changes to the Offsite Dose Calculation Manual and Process Control Program during this reporting period.
- A discussion of why required radioactive effluent monitoring instrumentation was not returned to service within the time specified.
- A discussion of any instances in which effluent samples were not collected within the required frequency.

## 2.0 Supplemental Information

### 2.1 Regulatory Limits

The limits applicable to the release of radioactive material in liquid and gaseous effluents are described in the following sections. These limits are addressed by reference in UNT-005-014, Offsite Dose Calculation Manual, and directly in the Technical Requirements Manual (TRM).

#### 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,
- 3000 mrem/yr to the skin.

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

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

### 2.1.2 Iodines, Particulates with Half Lives > Eight (8) Days, and Tritium

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:

- ◆ During any calendar quarter, Less than or equal to:

- 7.5 mrem to any organ.

- ◆ 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 ten 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 shall be limited to  $2.0\text{E-}4$   $\mu\text{Ci/ml}$  (Total Activity).

The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released to unrestricted areas shall be limited to the following:

During any calendar quarter, Less than or equal to:

- 1.5 mrem to the total body; and,
- 5 mrem to any organ, and

During any calendar year, Less than or equal to

- 3 mrem to the whole body; and,
- 10 mrem to any organ.

#### **2.1.4 Uranium Fuel Cycle Sources**

The dose or dose commitment to any member of the public due to releases of radioactivity and radiation from uranium fuel cycle sources over 12 consecutive months shall be limited to less than or equal to:

- 25 mrem to the Total Body or any organ (except thyroid organ); and,
- 75 mrem to the Thyroid

### **2.2 Maximum Permissible Concentrations**

#### **2.2.1 Fission and Activation Gases, Iodines, and Particulates, With Half Lives > Eight (8) Days**

For gaseous effluents, maximum permissible concentrations are not directly used in release rate calculations since the applicable limits are expressed in terms of dose rate at the site boundary.

#### **2.2.2 Liquid Effluents**

Ten times the effluent concentration (EC) values specified in 10 CFR Part 20, Appendix B, Table 2, Column 2 are used as the permissible concentrations of liquid radioactive effluents at the unrestricted area boundary. A value of  $2.0\text{E-}4$   $\mu\text{Ci/ml}$  is used as the concentration limit for dissolved and entrained noble gases in liquid effluents.

### **2.3 Average Energy (E-Bar)**

This is not applicable to Waterford 3's effluent specifications. E-Bar's are not required to be calculated from effluent release data. The average energy (E-Bar) for the Reactor Coolant System (RCS) is supplied as additional information in the report further below.



## **2.4 Measurements and Approximations of Total Radioactivity**

The quantification of radioactivity in liquid and gaseous effluents was accomplished by performing the sampling and radiological analysis of effluents in accordance with the requirements of Tables 4.11-1 and 4.11-2 of the Technical Requirements Manual (TRM).

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

For continuous releases, a gas grab sample was analyzed monthly for noble gases. Each week a Gas Ratio (GR) was calculated according to the following equation:

$$GR = \frac{\text{Average Weekly Noble Gas Monitor Reading}}{\text{Monitor Reading During Noble Gas Sampling}}$$

The monthly sample analysis and weekly Gas Ratio were then used to determine noble gases discharged continuously for the previous week. For gas decay tank and containment purge batch releases, a gas grab sample was analyzed prior to release to determine noble gas concentrations in the batch. In all cases the total radioactivity in gaseous effluents was determined from measured concentrations of each radionuclide present and the total volume discharged.

### **2.4.2 Iodines and Particulates**

Iodines and particulates discharged were sampled using a continuous sampler which contained a charcoal cartridge and a particulate filter. Each week the charcoal cartridge and particulate filter were analyzed for gamma emitters using gamma spectroscopy. The determined radionuclide concentrations and effluent volumes discharged were used to calculate the previous week's activity released. The particulate samples were composited and analyzed quarterly for Sr-89 and Sr-90 by a contract laboratory (Teledyne Brown Engineering or Duke Engineering). Particulate gross alpha activity was measured weekly using alpha scintillation or gas-flow proportional counting techniques. The determined activities were used to estimate effluent concentrations in subsequent releases until the next scheduled analysis was performed.

Grab samples of continuous were analyzed at least monthly for tritium. Containment Purge batch releases are analyzed prior to release. The determined concentrations were used to estimate tritium activity in subsequent releases until the next scheduled analysis was performed.

### **2.4.3 Liquid Effluents**

For continuous releases, samples were collected weekly and analyzed using gamma spectroscopy. The measured concentrations were used to determine radionuclide concentrations in the following week's releases. For batch releases, gamma analysis was performed on the sample prior to release.

For both continuous and batch releases, composite samples were analyzed quarterly by a contract laboratory (Teledyne Brown Engineering or Duke Engineering) for Sr-89, Sr-90, and Fe-55. Samples were composited and analyzed monthly for tritium and gross alpha using liquid scintillation and gas flow proportional counting techniques, respectively. For radionuclides measured in the composite samples, the measured concentrations in the composite samples from the previous month or quarter were used to estimate released quantities of these isotopes in liquid effluents during the current month or quarter when the analysis results became available.

The total radioactivity in liquid effluent releases was determined from the measured and estimated concentrations of each radionuclide present and the total volume of the effluent discharged.

## **2.5 Batch Releases**

A summary of information for gaseous and liquid batch releases is included in Table 1.

## **2.6 Unplanned/Abnormal Releases**

### **2.6.1 Unplanned/Abnormal Gaseous Releases**

There were no unplanned/abnormal gaseous releases during the reporting period.

### **2.6.2 Unplanned/Abnormal Liquid Releases**

There were no unplanned/abnormal liquid releases during this reporting period.

## **3.0 Gaseous Effluents**

The quantities of radioactive material released in gaseous effluents are summarized in Tables 1A, 1B, and 1C. Note that there were no elevated releases, since all Waterford 3 releases are considered to be at ground level. The estimated total error in % is based upon several statistical uncertainties due to sample counting, efficiency, volume, etc.

## **4.0 Liquid Effluents**

The quantities of radioactive material released in liquid effluents are summarized in Tables 2A and 2B. The estimated total error in % is based upon several statistical uncertainties due to sample counting, efficiency, volume, etc.

## **5.0 Solid Wastes**

The summary of radioactive solid wastes shipped offsite for disposal is listed in Table 3. For certain waste forms, Waterford 3 uses volume reduction services provided by a contractor. These waste forms are identified in Table 3 and the volumes reported reflect the volume of waste shipped offsite, not final disposal volumes. Final disposal volumes for wastes compacted offsite are available upon request. The estimated total error in % is based upon several statistical uncertainties due to sample counting, efficiency, volume, etc.

## 6.0 Meteorological Data

In Table 4, the hourly meteorological data from January 1, 2000 through December 31, 2000, is presented in the form of a joint frequency distribution of wind speed, wind direction, and atmospheric stability (hourly data is also available upon request). The standard Pasquill classification scheme, as presented in Regulatory Guide 1.23, is used to determine stability class from differential temperature measurements. The Waterford-3 data recovery results by parameter are as follows:

Parameter Monitored	Annual Data Recovery Rate
Differential Temp.	100.00%
Wind Speed	100.00%
Wind Direction	100.00%
Overall*	100.00%

\* - Simultaneous occurrence of valid data for all three parameters.

Dispersion and deposition values were determined from the 2000 data and used in the assessment of doses due to gaseous effluents released from site during the 2000 period.

## 7.0 Assessment of Doses

### 7.1 Dose Due to Gaseous Effluents

#### 7.1.1 Air Doses at the Site Boundary

Air doses from gaseous effluents were evaluated at the closest offsite location that could be occupied continuously during the term of plant operation and that would result in the highest dose. This location was determined by examining the atmospheric dispersion parameters ( $\chi/Q$ 's) at the closest offsite locations that could be continuously occupied during plant operation in each of the meteorological sectors surrounding the plant. The location that would have the highest dose would be that location having the most restrictive (largest)  $\chi/Q$  value.

Based on actual meteorological data collected during 2000, this location was determined to be in the NE sector at a distance of 966 meters (0.6 miles) from the plant. Doses were assessed at this location in accordance with the methodology described in the Waterford 3 Offsite Dose Calculation Manual considering only beta and gamma exposures in air due to noble gas. The results of these assessments for the year 2000 are summarized as follows:

Beta air dose:	0.15 mrad
Gamma air dose:	0.05 mrad

The above Beta and Gamma air doses represent the following percentage of the Annual Dose limits:

0.75% of the Beta air dose limit (20 mrad).

0.50% of the Gamma air dose limit (10 mrad).

Dose calculation results are summarized by quarters in Table 5A. The doses were calculated in accordance with the methodology described in the Waterford 3 Offsite Dose Calculation Manual.

### 7.1.2 Maximum Organ Dose to the Critical Receptor

The maximum organ dose to a MEMBER OF THE PUBLIC from I-131, I-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 was determined for 2000.

An assessment of the maximum organ dose was performed for the critical receptor. The critical receptor was assumed to be located at the nearest residence to the plant having the most restrictive atmospheric dispersion ( $\chi/Q$ ) and deposition ( $D/Q$ ) parameters. Furthermore, it was assumed that the receptor living at this residence consumed food products that were either raised or produced at this residence.

Using land use census and meteorological data for 2000, the residence with the highest  $\chi/Q$  and  $D/Q$  values was determined to be in the NE sector at a distance of 1448 meters (0.9miles) from the plant. The dose calculation was performed in accordance with the methodology described in the Waterford 3 Offsite Dose Calculation Manual considering the inhalation, ground plane exposure, and ingestion pathways. The maximum organ dose to the critical receptor was determined to be:

0.17 mrem to the infant thyroid.

This represents 1.13% of the Annual Organ Dose limit (15 mrem).

Dose calculation results are summarized by quarters in Table 5A. The doses were calculated in accordance with the methodology described in the Waterford 3 Offsite Dose Calculation Manual.

## 7.2 Doses Due to Liquid Effluents

The annual doses to the maximum exposed individual resulting from exposure to liquid effluents released during 2000 from Waterford 3 were:

- 0.01 mrem to the Total Body.
- 0.01 mrem to the maximum exposed organ (Liver).

The above doses represent the following percentage of the Annual Dose limits:

- 0.33% of the Total Body Dose Limit (3 mrem), and
- 0.10% of the Organ Dose Limit (10 mrem).

Dose calculation results are summarized by quarter in Table 5B. The doses were calculated in accordance with the methodology described in the Waterford 3 Offsite Dose Calculation Manual.

## 7.3 40 CFR Part 190 Dose Evaluation

In accordance with Technical Requirements Manual (TRM), Specification 3/4.11.4, Total Dose, dose evaluations to demonstrate compliance with Surveillance Requirements 4.11.4.1 and 4.11.4.2 of the Technical Requirements Manual (TRM), dealing with dose from the uranium fuel cycle, need to be performed only if quarterly doses exceed 3 mrem to the total body (liquid releases), 10 mrem to any organ (liquid releases), 10 mrad gamma air dose, 20 mrad beta air dose, or 15 mrem to any organ from radioiodines and particulates.

At no time during 2000 were any of these limits exceeded; therefore, the evaluation was not required.

## 7.4 Doses to Public Inside the Site Boundary

The Member of the Public inside the site boundary expected to have the maximum exposure due to gaseous effluents would be an employee at the Waterford 1 and 2 fossil fuel plants, located in the NW sector at a distance of approximately 670 meters (0.42 miles) from the plant.

The doses for such an individual were determined by scaling the full-time occupancy doses due to airborne effluents by the occupancy time due to a normal working year. Based on an assumed occupancy of 25% (40 hour work week) and the fact that all employees are adults, the calculated doses were determined to be less than:

3.20E-03 mrem to the maximum exposed organ (Thyroid)

3.03E-03 mrem to the Total body

1.15E-02 mrem to the skin

Doses were calculated according to the methodology described in the Waterford 3 Offsite Dose Calculation Manual considering only the inhalation and ground plane exposure pathways.



## **8.0 Related Information**

### **8.1 Changes to the Process Control Program**

No changes were made to the Process Control Program (PCP), procedure RW-001-210, during the reporting period.

### **8.2 Changes to the Offsite Dose Calculation Manual**

Changes were made to the Waterford 3 Offsite Dose Calculation Manual (ODCM), procedure UNT-005-014, during the reporting period. The changes are discussed below. A complete copy of UNT-005-014 and applicable sections of the Technical Requirements Manual (TRM) are included in this report as attachments.

Revision 6, Change 3, was performed to add provisions and clarifications for liquid and gaseous release points and to make a minor modification to the REMP. Specific changes were as follows:

- Added flow path for Dry Cooling Tower Sumps to Circulating Water due to plant design change DC-3521 which allows flow via this path.
- Added a note to the Main Condenser Evacuation System Automatic Isolation valves indicating that the Auto Divert feature of these valves has been disabled due to a plant modification (ER-99-3550-00-00) and fixed a typographical on the same attachment (loacl -> local).
- Removed milk location MKR-50 due to batch mixing of several sources of milk at the dairy prior to sample collection. Added Christine Herring's dairy as the new control milk location (MKR-40).

### **8.3 Unavailability of REMP Milk Samples**

Due to the unavailability of three milk sampling locations within five kilometers of the plant, Broad Leaf sampling is performed in accordance with Technical Requirements Manual (TRM) Table 3.12-1. Milk is collected, when available, from the control location and one identified sampling locations as indicated in UNT-005-014, Offsite Dose Calculation Manual, Attachment 7.13.

## 8.4 Report of Required Effluent Instrument Inoperability

Technical Requirements Manual (TRM) Specifications 3.3.3.10 and 3.3.3.11 require reporting in the Annual Radioactive Effluent Release Report of why designated inoperable effluent monitoring instrumentation was not restored to operability within the time specified in the Action Statement.

During the reporting period, there was one case when instrumentation was not restored to operability within the time specified. This case is described in the following section.

### 8.4.1 Steam Generator Blowdown Continuous Composite Sampler (BD MVAAA 30313)

Time Required by Specifications to Restore Operability: 30 Days

Period of Inoperability: 10/21/00 19:31 to 11/29/00 16:01 (38.85 Days)

Release period with monitor out of service: 24.85 hours total

11/01/00 15:06 to 11/01/00 20:03 (297.0 min.)

11/10/00 05:21 to 11/10/00 09:37 (323.0 min.)

11/10/00 12:33 to 11/10/00 18:28 (355.0 min.)

11/11/00 05:21 to 11/11/00 13:57 (516.0 min.)

Cause of Inoperability: The valve was found to be 90 degrees out of position. It was not determined why the valve was found turned 90 degrees out of position.

Reason Operability Not Restored Within Allotted Time: The reason that the monitor was not returned to service within the time specified was due to work scheduling problems and difficulty in troubleshooting the problem. Due to a refueling outage in progress at Waterford-3, I&C resources were in high demand. During troubleshooting, efforts were focused upon the control circuitry. The cause was not determined until the valve was disassembled. The ACTION requirements of TRM table 3.3-12 were implemented during releases from Steam Generator Blowdown during the equipment unavailability period.

## **8.5 Activity Released Via Secondary Pathways**

The following secondary release paths were continuously monitored for radioactivity:

- The Hot Machine Shop Exhaust (AH-35),
- Decontamination Shop Exhaust (AH-34),
- The RAB H&V Equipment Room Ventilation system Exhaust (E-41A and E-41B); and,
- The Switchgear/Cable Vault Area Ventilation System (AH-25).

Continuous sampling for these areas is maintained in order to demonstrate the operability of installed treatment systems and to verify integrity of barriers separating primary and secondary ventilation systems. Sampling for these areas was limited to continuous particulate and iodine sampling and monthly noble gas grab sampling. The activity released via these secondary pathways resulted from routine operations and remained below significant levels.

## **8.6 Missed Effluent Samples**

All effluent samples were collected within the frequency requirements specified in the ODCM/TRM during this reporting period.

## **8.7 Major Changes to Radioactive Waste Systems**

During the reporting period, no major changes were made to any Radioactive Waste Systems. All major changes to Radioactive Waste Systems are included in Waterford 3's FSAR updates.

## **8.8 Biennial Land Use Census**

A land use census was last performed in 2000. The land use census performed in 2000 did not identify the need for any changes to locations used for effluent dose calculations or radiological environmental sampling.

## **8.9 Gaseous Storage Tank Total Radioactivity Limit**

Technical Specification 3/4.11.2.6 specifies that the quantity of radioactivity contained in each gas storage tank be maintained less than or equal to  $8.5\text{E}+04$  Curies noble gas (considered as Xe-133 equivalent). At no time during the reporting period was this value exceeded.

## **8.10 Unprotected Outside Tank Total Radioactivity Limit**

Technical Specification 3/4.11.1.4 specifies that the quantity of radioactive material contained in each unprotected outdoor tank be maintained less than or equal to  $7.85\text{E}-04$  Curies (excluding tritium and dissolved and entrained noble gases). During this reporting period, there were no instances in which this limit was exceeded.

## **9.0 Additional Information**

### **9.1 Reactor Coolant System Average Energy (E-Bar)**

The most recent Reactor Coolant System E-Bar calculation was 0.295 MeV/Disintegration from a sample obtained on December 11, 2000. Reactor Coolant System E-Bar is supplied for information only and is not used for effluent dose calculations.

## 10.0 Tables

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## 11.0 Attachments

- Attachment 11.1, Copy of Offsite Dose Calculation Manual (ODCM) Procedure, UNT-005-014, Revision 6, Change 3
- Attachment 11.2, Copy of Applicable Sections of the Technical Requirements Manual (TRM), which are programmatically part of the ODCM.

**Table 1**  
**Batch Release Summary**

**Batch Release Summary information for 2000 Report Period.**

Report Category	:	Batch Release Summary
Release Point	:	All
Type of Release	:	Batch Liquid and Gaseous
Period Start Time	:	01-jan-2000 00:00:00
Period End Time	:	31-dec-2000 23:59:59
Liquid Releases		
Number of Releases	:	141
Total Time for All Releases	:	39775.0 Minutes
Maximum Time for a Release	:	516.0 Minutes
Average Time for a Release	:	282.1 Minutes
Minimum Time for a Release	:	210.0 Minutes
Average Stream Flow	:	756317.2 GPM
Gaseous Releases		
Number of Releases	:	15
Total Time for All Releases	:	4554.0 Minutes
Maximum Time for a Release	:	1067.0 Minutes
Average Time for a Release	:	303.6 Minutes
Minimum Time for a Release	:	91.0 Minutes

**Batch Release Summary information for 2000 by Quarter.**

Report Category : Batch Release Summary					
Release Point : All					
Type of Release : Batch Liquid and Gaseous					
Period Start Time : 01-jan-2000 00:00:00					
Period End Time : 31-dec-2000 23:59:59					
Liquid Releases					
		Qtr 1	Qtr 2	Qtr 3	Qtr 4
Number of Releases	:	30	30	28	53
Total Time for All Releases	:	8391.0	8403.0	7830.7	15150.3 Minutes
Maximum Time for a Release	:	378.0	304.0	307.0	516.0 Minutes
Average Time for a Release	:	279.7	280.1	279.7	285.9 Minutes
Minimum Time for a Release	:	231.0	210.0	241.0	225.0 Minutes
Average Stream Flow	:	750044.1	775689.6	990275.0	628121.9 GPM
Gaseous Releases					
		Qtr 1	Qtr 2	Qtr 3	Qtr 4
Number of Releases	:	4	5	1	5
Total Time for All Releases	:	749.0	1434.0	203.0	2168.0 Minutes
Maximum Time for a Release	:	345.0	600.0	203.0	1067.0 Minutes
Average Time for a Release	:	187.2	286.8	203.0	433.6 Minutes
Minimum Time for a Release	:	91.0	119.0	203.0	240.0 Minutes

**Table 1A**  
**Annual Summation of All Releases by Quarter**  
**All Airborne Effluents**

Report Category : Summation of All Releases  
Type of Activity : All Airborne Effluents  
Period Start Time : 01-jan-2000 00:00:00  
Period End Time : 31-dec-2000 23:59:59

Type of Effluent	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Est.Total Error %
<b>A. Fission and Activation Gases</b>						
1. Total Release	Curies	5.75e+00	3.00e+01	1.29e+01	1.40e+02	1.50e+01
2. Average Release Rate for Period	uCi/sec	7.31e-01	3.81e+00	1.62e+00	1.76e+01	
3. Percent of Applicable Limit	%	n/a	n/a	n/a	n/a	
<b>B. Radioiodines</b>						
1. Total Iodine-131	Curies	1.87e-07	2.26e-05	3.61e-07	1.71e-04	1.50e+01
2. Average Release Rate for Period	uCi/sec	2.38e-08	2.87e-06	4.54e-08	2.16e-05	
3. Percent of Applicable Limit	%	n/a	n/a	n/a	n/a	
<b>C. Particulates</b>						
1. Particulates (Half-lives > 8 Days)	Curies	7.79e-07	8.46e-08	0.00e+00	3.97e-05	1.50e+01
2. Average Release Rate for Period	uCi/sec	9.91e-08	1.08e-08	0.00e+00	4.99e-06	
3. Percent of Applicable Limit	%	n/a	n/a	n/a	n/a	
1. Gross Alpha Radioactivity	Curies	7.00e-07	4.74e-07	6.01e-07	7.65e-07	1.50e+01
<b>D. Tritium</b>						
1. Total Release	Curies	1.08e+01	1.22e+01	8.67e+00	2.20e+01	1.50e+01
2. Average Release Rate for Period	uCi/sec	1.38e+00	1.55e+00	1.09e+00	2.76e+00	
3. Percent of Applicable Limit	%	n/a	n/a	n/a	n/a	

**Table 1B**  
**Annual Airborne Continuous Elevated and Ground Level Releases**  
**Totals for Each Nuclide Released**

Report Category : Airborne Continuous Elevated and Ground Level Releases.  
: Totals for Each Nuclide Released.  
Type of Activity : Fission Gases, Iodines, and Particulates  
Period Start Time : 01-jan-2000 00:00:00  
Period End Time : 31-dec-2000 23:59:59

Nuclide	Units	Elevated Releases				Ground Releases			
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
Fission and Activation Gases									
Xe-133	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.10e+00	2.21e+01	1.15e+01	1.12e+02
Xe-135	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.71e-01	1.12e+00	0.00e+00	0.00e+00
Total for Period	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.37e+00	2.32e+01	1.15e+01	1.12e+02
Radioiodines									
I-131	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.87e-07	2.26e-05	3.61e-07	1.67e-04
I-132	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.17e-06
I-133	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.71e-06
Total for Period	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.87e-07	2.26e-05	3.61e-07	1.71e-04
Particulates									
H-3	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.01e+01	1.13e+01	8.60e+00	2.17e+01
Co-58	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	6.64e-07
Co-60	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.73e-07	0.00e+00	0.00e+00	1.82e-07
Ru-103	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	4.62e-06
Cs-137	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	6.07e-07	8.46e-08	0.00e+00	0.00e+00
Os-185	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.74e-06
Os-191	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	3.25e-05
Gralpha	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	7.00e-07	4.74e-07	6.01e-07	7.65e-07
Total for Period	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.01e+01	1.13e+01	8.60e+00	2.17e+01



**Table 1C**  
**Annual Airborne Batch Elevated and Ground Level Releases**  
**Totals for Each Nuclide Released**

Report Category : Airborne Batch Elevated and Ground Level Releases.  
: Totals for Each Nuclide Released.  
Type of Activity : Fission Gases, Iodines, and Particulates  
Period Start Time : 01-jan-2000 00:00:00  
Period End Time : 31-dec-2000 23:59:59

Nuclide	Units	Elevated Releases				Ground Releases			
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
Fission and Activation Gases									
Ar-41	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.23e-01	2.81e-01	8.01e-02	1.27e-01
Kr-85	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	4.11e+00	5.91e-01	3.47e+00
Xe-131m	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	3.81e-01
Xe-133	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	3.21e+00	2.34e+00	6.83e-01	2.29e+01
Xe-133m	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.86e-02	0.00e+00	0.00e+00	1.42e-01
Xe-135	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.04e-02	1.18e-02	5.93e-03	4.64e-02
Total for Period	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	3.38e+00	6.74e+00	1.36e+00	2.71e+01
Radioiodines									
None									
Particulates									
H-3	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	7.17e-01	9.07e-01	6.65e-02	2.38e-01
Total for Period	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	7.17e-01	9.07e-01	6.65e-02	2.38e-01

**Table 2A**  
**Annual Summation of All Releases by Quarter**  
**All Liquid Effluents**

Report Category : Summation of All Releases  
Type of Activity : All Liquid Effluents  
Period Start Time : 01-jan-2000 00:00:00  
Period End Time : 31-dec-2000 23:59:59

Type of Effluent	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Est.Total Error %
<b>A. Fission and Activation Products</b>						
1. Total Release (Not Including Tritium, Gases, and Alpha	Curies	6.29e-02	8.55e-02	2.66e-02	1.14e-01	1.50e+01
2. Average Diluted Concentration During Period	uCi/sec	1.69e-10	2.22e-10	5.34e-11	3.39e-10	
3. Percent of Applicable Limit	%	n/a	n/a	n/a	n/a	
<b>B. Tritium</b>						
1. Total Release	Curies	1.32e+02	2.83e+02	1.25e+02	1.24e+02	1.50e+01
2. Average Diluted Concentration During Period	uCi/sec	3.55e-07	7.35e-07	2.52e-07	3.71e-07	
3. Percent of Applicable Limit	%	n/a	n/a	n/a	n/a	
<b>C. Dissolved and Entrained Gases</b>						
1. Total Release	Curies	3.07e-01	5.50e-01	1.12e-01	1.43e+00	1.50e+01
2. Average Diluted Concentration During Period	uCi/sec	8.24e-10	1.43e-09	2.25e-10	4.27e-09	
3. Percent of Applicable Limit	%	n/a	n/a	n/a	n/a	
<b>D. Gross Alpha Radioactivity</b>						
1. Total Release	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.50e+01
<b>E. Waste Volume Released (Pre-Dilution)</b>						
F. Volume of Dilution Water Used	Liters	9.03e+06	1.15e+07	1.16e+07	1.33e+07	1.50e+01
	Liters	3.72e+11	3.85e+11	4.98e+11	3.35e+11	1.50e+01

**Table 2B**  
**Annual Liquid Continuous and Batch Releases**  
**Totals for Each Nuclide Released**

Report Category : Liquid Continuous and Batch Releases.  
: Totals for Each Nuclide Released.  
Type of Activity : All Radionuclides  
Period Start Time : 01-jan-1999 00:00:00  
Period End Time : 31-dec-1999 23:59:59

Nuclide	Units	Continuous Releases				Batch Releases			
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
All Nuclides									
H-3	Curies	2.63e-02	5.24e-02	2.51e-02	9.04e-03	1.32e+02	2.83e+02	1.25e+02	1.24e+02
Na-24	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	4.15e-05	0.00e+00	0.00e+00	0.00e+00
Ar-41	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.37e-04	0.00e+00	0.00e+00	0.00e+00
Cr-51	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	3.82e-04	4.19e-05	1.63e-02
Mn-54	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.06e-03	4.97e-04	4.62e-04	4.42e-03
Fe-55	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.49e-02	7.27e-02	1.26e-02	1.03e-02
Fe-59	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	4.41e-04	2.67e-04	5.96e-05	9.78e-04
Co-57	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.59e-04	0.00e+00	0.00e+00	2.37e-04
Co-58	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	7.44e-03	4.05e-03	5.57e-03	3.42e-02
Co-60	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	8.95e-03	2.60e-03	2.62e-03	1.88e-02
Ni-56	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.59e-06	3.83e-05
Kr-85	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	5.09e-02	1.56e-01	5.14e-02	1.25e-01
Kr-85m	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.21e-04	0.00e+00	1.88e-05	0.00e+00
Kr-87	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	9.63e-06	0.00e+00	0.00e+00	1.80e-05
Kr-88	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.60e-04	0.00e+00	0.00e+00	0.00e+00
Rb-88	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	5.00e-04	0.00e+00	0.00e+00	0.00e+00
Zr-95	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.74e-03	3.71e-04	8.69e-05	5.95e-03
Nb-95	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	6.48e-03	9.16e-04	3.12e-04	9.43e-03
Nb-97	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	4.68e-06	0.00e+00	0.00e+00	0.00e+00
Tc-99m	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	3.65e-06	0.00e+00	0.00e+00
Ag-110m	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	7.81e-03	1.16e-03	1.27e-03	5.35e-03
Sn-113	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.91e-04	3.68e-05	7.57e-06	1.15e-03
Sb-124	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	5.18e-05	4.82e-06	0.00e+00	6.76e-05
Sb-125	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	9.01e-03	1.73e-03	2.73e-03	4.70e-03
Sb-127	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.53e-05
I-131	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	5.56e-05	2.38e-05	0.00e+00	3.14e-04
I-133	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.31e-04	8.71e-06	1.31e-05	0.00e+00
I-135	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	7.35e-06	0.00e+00	0.00e+00
Xe-131m	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.07e-03	1.17e-02	9.82e-04	2.62e-02
Xe-133	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.41e-01	3.80e-01	5.84e-02	1.27e+00
Xe-133m	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	2.72e-03	1.19e-03	4.23e-04	6.12e-03
Xe-135	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	9.65e-03	4.41e-04	6.75e-04	1.70e-05
Cs-134	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	8.65e-04	3.01e-04	4.48e-04	2.54e-04
Cs-137	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	8.87e-04	3.40e-04	3.99e-04	2.18e-04
La-140	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	5.92e-05	5.04e-05	0.00e+00	2.45e-04
Ce-141	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	1.92e-04
Ce-144	Curies	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	0.00e+00	5.44e-04
Total for Period	Curies	2.63e-02	5.24e-02	2.51e-02	9.04e-03	1.33e+02	2.83e+02	1.26e+02	1.26e+02

**Table 3**  
**Solid Waste Shipped Offsite for Burial or Disposal**

**SUMMARY BY MAJOR WASTE TYPES**

**Waste Stream : Resins, Filters, and Evap Bottoms**

10CFR61	Volume			% Error
Waste Class	Ft <sup>3</sup>	M <sup>3</sup>	Curies Shipped	(Ci)
A	0.00E+00	0.00E+00	0.00E+00	+/- 25%
B	2.41E+02	6.81E+00	1.71E+02 ♦	+/- 25%
C	0.00E+00	0.00E+00	0.00E+00	+/- 25%
All	2.41E+02	6.81E+00	1.71E+02	+/- 25%

**Waste Stream : Dry Active Waste**

10CFR61	Volume			% Error
Waste Class	Ft <sup>3</sup>	M <sup>3</sup>	Curies Shipped	(Ci)
A	1.02E+04	2.90E+02	1.86E-01 ♣	+/- 25%
B	0.00E+00	0.00E+00	0.00E+00	+/- 25%
C	0.00E+00	0.00E+00	0.00E+00	+/- 25%
All	1.02E+04	2.90E+02	1.86E-01	+/- 25%

**Waste Stream : Irradiated Components**

10CFR61	Volume			% Error
Waste Class	Ft <sup>3</sup>	M <sup>3</sup>	Curies Shipped	(Ci)
A	0.00E+00	0.00E+00	0.00E+00	+/- 25%
B	0.00E+00	0.00E+00	0.00E+00	+/- 25%
C	0.00E+00	0.00E+00	0.00E+00	+/- 25%
All	0.00E+00	0.00E+00	0.00E+00	+/- 25%

♣ Activity determined by estimations

♦ Activity determined by measurements

**Table 3**  
**Solid Waste Shipped Offsite for Burial or Disposal**

**Waste Stream : Other Waste**

10CFR61	Volume			% Error
Waste Class	Ft <sup>3</sup>	M <sup>3</sup>	Curies Shipped	(Ci)
A	2.19E+03	6.20E+01	1.42E+00 ♦	+/- 25%
B	0.00E+00	0.00E+00	0.00E+00	+/- 25%
C	0.00E+00	0.00E+00	0.00E+00	+/- 25%
All	2.19E+03	6.20E+01	1.42E+00	+/- 25%

**Waste Stream : Sum of All 4 Categories**

10CFR61	Volume			% Error
Waste Class	Ft <sup>3</sup>	M <sup>3</sup>	Curies Shipped	(Ci)
A	1.24E+04	3.52E+02	1.60E+00	+/- 25%
B	2.41E+02	6.81E+00	1.71E+02	+/- 25%
C	0.00E+00	0.00E+00	0.00E+00	+/- 25%
All	1.27E+04	3.59E+02	1.72E+02	+/- 25%

♣ Activity determined by estimations

♦ Activity determined by measurements

**Table 3**  
**Solid Waste Shipped Offsite for Burial or Disposal**

**Estimate of major nuclide composition (by waste type)**

**Waste Stream : Resins, Filters, and Evap Bottoms**

Nuclide Name	Percent Abundance	Curies
C-14	0.123%	2.11E-01
Mn-54	4.810%	8.21E+00
Fe-55	11.703%	2.00E+01
Fe-59	0.028%	4.74E-02
Co-57	0.199%	3.40E-01
Co-58	32.707%	5.58E+01
Co-60	3.947%	6.74E+00
Ni-59	0.191%	3.26E-01
Ni-63	12.496%	2.13E+01
Sr-90	0.023%	3.97E-02
Tc-99	0.010%	1.71E-02
Ag-110m	0.097%	1.65E-01
Sb-125	1.826%	3.12E+00
I-132	0.000%	9.43E-15
Cs-134	12.476%	2.13E+01
Cs-137	19.025%	3.25E+01
Ce-144	0.335%	5.73E-01
Pu-238	0.000%	2.23E-04
Pu-239	0.000%	1.38E-04
Pu-240	0.000%	6.08E-05
Pu-241	0.002%	4.11E-03
Am-241	0.000%	1.13E-04
Cm-242	0.000%	2.29E-05
Cm-243	0.000%	2.99E-04
Cm-244	0.000%	1.72E-04

**Table 3**  
**Solid Waste Shipped Offsite for Burial or Disposal**

**Estimate of major nuclide composition (by waste type)**

**Waste Stream : Dry Active Waste**

Nuclide Name	Percent Abundance	Curies
Cr-51	22.705%	4.21E-02
Mn-54	1.463%	2.72E-03
Fe-55	3.428%	6.36E-03
Fe-59	0.275%	5.10E-04
Co-58	33.316%	6.18E-02
Co-60	3.343%	6.20E-03
Ni-63	8.263%	1.53E-02
Sr-89	0.235%	4.35E-04
Sr-90	0.206%	3.82E-04
Zr-95	9.594%	1.78E-02
Nb-95	13.757%	2.55E-02
Sb-124	0.040%	7.44E-05
Sb-125	0.569%	1.06E-03
Cs-134	1.713%	3.18E-03
Cs-137	1.093%	2.03E-03

**Table 3**  
**Solid Waste Shipped Offsite for Burial or Disposal**

**Estimate of major nuclide composition (by waste type)**

**Waste Stream : Irradiated Components**

Nuclide Name	Percent Abundance	Curies
H-3	0.000%	0.00E+00
C-14	0.000%	0.00E+00
Cr-51	0.000%	0.00E+00
Mn-54	0.000%	0.00E+00
Fe-55	0.000%	0.00E+00
Fe-59	0.000%	0.00E+00
Co-57	0.000%	0.00E+00
Co-58	0.000%	0.00E+00
Co-60	0.000%	0.00E+00
Ni-59	0.000%	0.00E+00
Ni-63	0.000%	0.00E+00
Sr-89	0.000%	0.00E+00
Sr-90	0.000%	0.00E+00
Zr-95	0.000%	0.00E+00
Nb-95	0.000%	0.00E+00
Tc-99	0.000%	0.00E+00
Ag-110m	0.000%	0.00E+00
Sb-124	0.000%	0.00E+00
Sb-125	0.000%	0.00E+00
I-132	0.000%	0.00E+00
Cs-134	0.000%	0.00E+00
Cs-137	0.000%	0.00E+00
Ce-144	0.000%	0.00E+00
Pu-238	0.000%	0.00E+00
Pu-239	0.000%	0.00E+00
Pu-240	0.000%	0.00E+00
Pu-241	0.000%	0.00E+00
Am-241	0.000%	0.00E+00
Cm-242	0.000%	0.00E+00
Cm-243	0.000%	0.00E+00
Cm-244	0.000%	0.00E+00



**Table 3**  
**Solid Waste Shipped Offsite for Burial or Disposal**

**Estimate of major nuclide composition (by waste type)**

**Waste Stream : Other Waste**

Nuclide Name	Percent Abundance	Curies
H-3	18.072%	2.56E-01
C-14	0.046%	6.53E-04
Mn-54	3.596%	5.10E-02
Fe-55	9.842%	1.40E-01
Fe-59	0.007%	9.95E-05
Co-57	0.245%	3.48E-03
Co-58	16.936%	2.40E-01
Co-60	8.870%	1.26E-01
Ni-63	14.328%	2.03E-01
Zr-95	0.224%	3.18E-03
Nb-95	0.109%	1.54E-03
Ag-110m	0.074%	1.06E-03
Sb-125	0.472%	6.69E-03
Cs-134	11.812%	1.68E-01
Cs-137	15.183%	2.15E-01
Ce-144	0.180%	2.55E-03
Pu-239	0.002%	3.01E-05
Pu-240	0.000%	3.17E-06
Cm-243	0.003%	3.86E-05
Cm-244	0.000%	4.10E-06

**Table 3**  
**Solid Waste Shipped Offsite for Burial or Disposal**

**Estimate of major nuclide composition (by waste type)****Waste Stream : Sum of All 4 Categories**

Nuclide Name	Percent Abundance	Curies
H-3	0.149%	2.56E-01
C-14	0.123%	2.11E-01
Cr-51	0.024%	4.21E-02
Mn-54	4.797%	8.27E+00
Fe-55	11.679%	2.01E+01
Fe-59	0.028%	4.80E-02
Co-57	0.199%	3.43E-01
Co-58	32.578%	5.61E+01
Co-60	3.986%	6.87E+00
Ni-59	0.189%	3.26E-01
Ni-63	12.507%	2.16E+01
Sr-89	0.000%	4.35E-04
Sr-90	0.023%	4.01E-02
Zr-95	0.012%	2.10E-02
Nb-95	0.016%	2.71E-02
Tc-99	0.010%	1.71E-02
Ag-110m	0.096%	1.66E-01
Sb-124	0.000%	7.44E-05
Sb-125	1.814%	3.13E+00
I-132	0.000%	9.43E-15
Cs-134	12.459%	2.15E+01
Cs-137	18.974%	3.27E+01
Ce-144	0.334%	5.75E-01
Pu-238	0.000%	2.23E-04
Pu-239	0.000%	1.68E-04
Pu-240	0.000%	6.40E-05
Pu-241	0.002%	4.11E-03
Am-241	0.000%	1.13E-04
Cm-242	0.000%	2.29E-05
Cm-243	0.000%	3.38E-04
Cm-244	0.000%	1.76E-04

**Table 3**  
**Solid Waste Shipped Offsite for Burial or Disposal**

**Solid Waste Disposition**

<b>Number of Shipments</b>	<b>Mode of Transportation</b>	<b>Destination</b>
2	Suttles Truck Leasing LLC	ATG
2	Hittman Transport Services	Barnwell Waste Management Facility
2	Hittman Transport Services	Chem-Nuclear Consolidation Facility
4	Hittman Transport Services	GTS Duratek Bear Creek

**Irradiated Fuel Shipments (Disposition)**

<b>Number of Shipments</b>	<b>Mode of Transportation</b>	<b>Destination</b>
None <sup>1</sup>	N/A	N/A

**Table 4**  
**Joint Frequency Distribution of Meteorological Data**

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS 01/01/2000 00:00:00 TO 12/31/2000 23:59:59 PASQUILL CLASS A

Wind Direction	Wind Speed (M/S) at 10-m Level												Total
	.22-.50	.51-.75	.76-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-5.0	5.1-7.0	7.1-10.	10.1-13	13.1-18.0	>18.0	
N	0	0	0	0	2	2	24	8	3	2	0	0	41
NNE	0	0	0	0	0	4	17	5	0	0	0	0	26
NE	0	0	0	0	0	7	113	19	0	0	0	0	139
ENE	0	0	0	0	0	4	7	2	0	0	0	0	13
E	0	0	0	0	0	3	3	2	0	0	0	0	8
ESE	0	0	0	0	0	2	5	3	0	0	0	0	10
SE	0	0	0	0	0	0	16	12	0	0	0	0	28
SSE	0	0	0	0	0	2	28	14	2	0	0	0	46
S	0	0	0	0	0	3	26	56	2	0	0	0	87
SSW	0	0	0	0	1	3	17	8	1	0	0	0	30
SW	0	0	0	0	1	9	36	14	1	0	0	0	61
WSW	0	0	0	0	0	5	3	5	0	0	0	0	13
W	0	0	0	0	0	0	9	1	0	0	0	0	10
WNW	0	0	0	0	0	0	12	2	0	0	0	0	14
NW	0	0	0	0	0	0	8	2	0	0	0	0	10
NNW	0	0	0	0	0	1	21	14	2	0	0	0	38
Total	0	0	0	0	4	45	345	167	11	2	0	0	574

Number of calms for A Stability: 0

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS 01/01/2000 00:00:00 TO 12/31/2000 23:59:59 PASQUILL CLASS B

Wind Direction	Wind Speed (M/S) at 10-m Level												Total
	.22-.50	.51-.75	.76-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-5.0	5.1-7.0	7.1-10.	10.1-13	13.1-18.0	>18.0	
N	0	0	0	1	1	12	13	0	0	0	0	0	27
NNE	0	0	0	0	2	7	9	3	0	0	0	0	21
NE	0	0	0	0	0	26	43	13	0	0	0	0	82
ENE	0	0	0	1	1	6	9	2	0	0	0	0	19
E	0	0	0	0	0	2	2	1	0	0	0	0	5
ESE	0	0	0	0	1	1	6	3	0	0	0	0	11
SE	0	0	0	0	0	1	15	11	1	0	0	0	28
SSE	0	0	0	1	0	0	20	13	3	0	0	0	37
S	0	0	0	0	1	6	25	12	3	0	0	0	47
SSW	0	0	0	0	3	10	18	3	0	0	0	0	34
SW	0	0	0	1	1	13	25	2	0	0	0	0	42
WSW	0	0	0	0	2	18	12	1	0	0	0	0	33
W	0	0	0	0	2	8	8	0	0	0	0	0	18
WNW	0	0	0	0	1	8	13	1	1	0	0	0	24
NW	0	0	0	0	0	1	5	5	0	0	0	0	11
NNW	0	0	0	0	3	5	19	15	2	1	0	0	45
Total	0	0	0	4	18	124	242	85	10	1	0	0	484

Number of calms for B Stability: 0

**Table 4**  
**Joint Frequency Distribution of Meteorological Data**

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS 01/01/2000 00:00:00 TO 12/31/2000 23:59:59

PASQUILL CLASS C

Wind Direction	Wind Speed (M/S) at 10-m Level												Total
	.22-.50	.51-.75	.76-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-5.0	5.1-7.0	7.1-10.	10.1-13	13.1-18.0	>18.0	
N	0	0	0	0	5	13	8	6	1	0	0	0	33
NNE	0	0	0	1	6	14	12	2	1	0	0	0	36
NE	0	0	0	0	2	28	65	6	1	0	0	0	102
ENE	0	0	0	1	0	2	12	3	0	0	0	0	18
E	0	0	0	0	1	3	4	0	0	0	0	0	8
ESE	0	0	0	0	1	3	6	2	0	0	0	0	12
SE	0	0	0	0	1	4	18	12	2	0	0	0	37
SSE	0	0	0	1	1	8	23	15	0	0	0	0	48
S	0	0	0	1	1	10	29	19	6	0	0	0	66
SSW	0	0	0	2	1	10	26	7	2	0	0	0	48
SW	0	0	0	0	4	20	28	5	0	0	0	0	57
WSW	0	0	0	3	3	19	12	0	0	0	0	0	37
W	0	0	0	0	8	12	14	0	0	0	0	0	34
WNW	0	0	0	0	6	16	10	0	0	0	0	0	32
NW	0	0	0	2	2	4	8	7	0	0	0	0	23
NNW	0	0	0	0	6	10	24	13	2	0	0	0	55
Total	0	0	0	11	48	176	299	97	15	0	0	0	646

Number of calms for C Stability: 0

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS 01/01/2000 00:00:00 TO 12/31/2000 23:59:59

PASQUILL CLASS D

Wind Direction	Wind Speed (M/S) at 10-m Level												Total
	.22-.50	.51-.75	.76-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-5.0	5.1-7.0	7.1-10.	10.1-13	13.1-18.0	>18.0	
N	0	0	0	4	21	42	98	92	7	0	0	0	264
NNE	0	0	0	10	24	35	74	32	3	0	0	0	178
NE	0	0	2	6	13	75	143	73	4	0	0	0	316
ENE	0	0	0	6	8	28	55	35	7	0	0	0	139
E	0	0	2	1	3	6	16	7	0	0	0	0	35
ESE	0	0	0	2	2	12	48	25	0	0	0	0	89
SE	0	0	0	4	4	17	83	29	1	0	0	0	138
SSE	0	1	2	3	7	31	138	32	0	0	0	0	214
S	0	0	0	3	9	36	95	42	17	0	0	0	202
SSW	0	1	3	6	12	34	42	25	12	0	0	0	135
SW	0	0	2	7	11	34	55	15	2	0	0	0	126
WSW	0	0	2	11	23	56	26	8	1	0	0	0	127
W	0	1	2	5	19	37	38	2	0	0	0	0	104
WNW	0	0	0	6	10	30	25	5	0	0	0	0	76
NW	0	0	1	4	11	22	41	9	0	0	0	0	88
NNW	0	0	0	7	8	44	112	59	8	1	0	0	239
Total	0	3	16	85	185	539	1089	490	62	1	0	0	2470

Number of calms for D Stability: 0

**Table 4**  
**Joint Frequency Distribution of Meteorological Data**

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS 01/01/2000 00:00:00 TO 12/31/2000 23:59:59

PASQUILL CLASS E

Wind Direction	Wind Speed (M/S) at 10-m Level												Total
	.22-.50	.51-.75	.76-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-5.0	5.1-7.0	7.1-10.	10.1-13	13.1-18.0	>18.0	
N	0	0	3	9	13	56	70	21	0	0	0	0	172
NNE	0	1	2	15	16	46	71	17	6	0	0	0	174
NE	0	0	1	12	20	80	82	7	3	0	0	0	205
ENE	0	0	1	9	11	37	56	12	0	0	0	0	126
E	0	0	2	9	4	24	31	3	0	0	0	0	73
ESE	0	2	1	7	6	38	70	5	0	0	0	0	129
SE	0	3	2	9	20	69	96	12	0	0	0	0	211
SSE	0	3	2	12	39	117	72	4	0	0	0	0	249
S	0	5	4	33	67	90	58	4	0	0	0	0	261
SSW	1	4	7	26	38	48	34	5	0	0	0	0	163
SW	1	5	8	29	56	61	21	2	0	0	0	0	183
WSW	0	3	12	68	74	47	6	0	0	0	0	0	210
W	0	4	12	38	23	10	6	2	0	0	0	0	95
WNW	1	3	10	22	17	16	6	2	0	0	0	0	77
NW	0	0	5	9	11	17	3	1	0	0	0	0	46
NNW	1	0	2	8	13	33	31	4	0	0	0	0	92
Total	4	33	74	315	428	789	713	101	9	0	0	0	2466

Number of calms for E Stability: 0

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS 01/01/2000 00:00:00 TO 12/31/2000 23:59:59

PASQUILL CLASS F

Wind Direction	Wind Speed (M/S) at 10-m Level												Total
	.22-.50	.51-.75	.76-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-5.0	5.1-7.0	7.1-10.	10.1-13	13.1-18.0	>18.0	
N	2	4	3	10	13	18	1	0	0	0	0	0	51
NNE	1	1	3	11	10	11	4	0	0	0	0	0	41
NE	0	2	6	14	6	36	2	0	0	0	0	0	66
ENE	1	1	3	8	3	10	4	0	0	0	0	0	30
E	0	2	2	7	5	1	0	0	0	0	0	0	17
ESE	0	2	4	5	3	2	1	0	0	0	0	0	17
SE	0	1	4	11	14	9	4	1	0	0	0	0	44
SSE	1	2	10	29	75	57	4	0	0	0	0	0	178
S	4	17	22	60	64	21	0	0	0	0	0	0	188
SSW	5	14	27	67	37	9	2	0	0	0	0	0	161
SW	3	12	24	69	36	11	0	0	0	0	0	0	155
WSW	1	18	23	70	20	1	0	0	0	0	0	0	133
W	0	6	18	23	5	1	1	0	0	0	0	0	54
WNW	1	3	7	17	9	0	1	0	0	0	0	0	38
NW	1	2	3	5	4	2	1	0	0	0	0	0	18
NNW	0	3	0	7	9	11	2	1	0	0	0	0	33
Total	20	90	159	413	313	200	27	2	0	0	0	0	1224

Number of calms for F Stability: 1

**Table 4**  
**Joint Frequency Distribution of Meteorological Data**

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS 01/01/2000 00:00:00 TO 12/31/2000 23:59:59												PASQUILL CLASS G	
	Wind Speed (M/S) at 10-m Level												
Wind Direction	.22-.50	.51-.75	.76-1.0	1.1-1.5	1.6-2.0	2.1-3.0	3.1-5.0	5.1-7.0	7.1-10.	10.1-13	13.1-18.0	>18.0	Total
N	2	7	8	4	2	1	0	0	0	0	0	0	24
NNE	2	9	9	7	3	1	0	0	0	0	0	0	31
NE	3	3	9	4	5	2	1	0	0	0	0	0	27
ENE	1	2	3	3	1	0	0	0	0	0	0	0	10
E	1	0	0	0	1	0	0	0	0	0	0	0	2
ESE	0	5	1	1	0	0	0	0	0	0	0	0	7
SE	2	3	1	1	0	3	1	0	0	0	0	0	11
SSE	1	3	5	15	26	12	1	0	0	0	0	0	63
S	1	4	18	53	26	0	0	0	0	0	0	0	102
SSW	2	14	32	76	20	1	0	0	0	0	0	0	145
SW	11	28	54	49	4	1	0	0	0	0	0	0	147
WSW	15	30	27	19	1	0	0	0	0	0	0	0	92
W	14	54	21	12	2	1	0	0	0	0	0	0	104
WNW	10	22	12	7	9	2	0	0	1	0	0	0	63
NW	9	14	7	9	2	0	0	0	0	0	0	0	41
NNW	8	12	11	8	1	0	0	0	0	0	0	0	40
Total	82	210	218	268	103	24	3	0	1	0	0	0	909

Number of calms for G Stability: 10

Total valid hours for all stabilities = 8784  
Total invalid hours for all stabilities = 0

**Table 5A**  
**Doses Due to Gaseous Radioactive Effluents**

**Doses due to Noble Gases (mRad or mrem)**Age Group : **All**

Organ	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year Total
Total-body	2.3231e-03	8.6027e-03	3.1441e-03	3.0000e-02	4.4070e-02
Skin	4.7163e-03	2.2390e-02	7.5286e-03	7.3642e-02	1.0828e-01
Air Beta	4.9089e-03	2.7278e-02	1.0375e-02	1.0946e-01	1.5202e-01
Air Gamma	2.6177e-03	9.8437e-03	3.6963e-03	3.5901e-02	5.2059e-02

**Doses due to Radioiodines/Particulates/Tritium (mrem)**Age Group : **Adult**

Organ	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year Total
Bone	2.1059e-05	1.0649e-05	3.3899e-06	5.1089e-05	8.6187e-05
Liver	8.2416e-03	9.2685e-03	6.5833e-03	1.6747e-02	4.0840e-02
Total-body	8.2540e-03	9.2697e-03	6.5893e-03	1.6720e-02	4.0833e-02
Thyroid	8.2571e-03	1.2126e-02	6.6289e-03	3.7944e-02	6.4956e-02
Kidney	8.2363e-03	9.2740e-03	6.5834e-03	1.6793e-02	4.0887e-02
Lung	8.2347e-03	9.2588e-03	6.5831e-03	1.6683e-02	4.0760e-02
Gi-lli	8.2506e-03	9.2667e-03	6.5898e-03	1.6702e-02	4.0810e-02
Skin	1.7577e-05	4.3168e-06	3.8123e-06	6.7914e-06	3.2497e-05

Age Group : **Teen**

Organ	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year Total
Bone	2.5263e-05	1.5042e-05	3.4507e-06	7.9359e-05	1.2312e-04
Liver	9.3323e-03	1.0497e-02	7.4522e-03	1.8987e-02	4.6268e-02
Total-body	9.3485e-03	1.0498e-02	7.4622e-03	1.8941e-02	4.6249e-02
Thyroid	9.3523e-03	1.4537e-02	7.5168e-03	4.8965e-02	8.0371e-02
Kidney	9.3235e-03	1.0505e-02	7.4524e-03	1.9061e-02	4.6343e-02
Lung	9.3209e-03	1.0481e-02	7.4520e-03	1.8886e-02	4.6140e-02
Gi-lli	9.3194e-03	1.0484e-02	7.4521e-03	1.8907e-02	4.6162e-02
Skin	1.7577e-05	4.3168e-06	3.8123e-06	6.7914e-06	3.2497e-05

Age Group : **Child**

Organ	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year Total
Bone	3.9229e-05	3.0176e-05	3.6615e-06	1.7728e-04	2.5035e-04
Liver	1.2915e-02	1.4531e-02	1.0313e-02	2.6306e-02	6.4064e-02
Total-body	1.2943e-02	1.4535e-02	1.0332e-02	2.6234e-02	6.4044e-02
Thyroid	1.2955e-02	2.2197e-02	1.0435e-02	8.3179e-02	1.2877e-01
Kidney	1.2899e-02	1.4543e-02	1.0313e-02	2.6417e-02	6.4172e-02
Lung	1.2894e-02	1.4504e-02	1.0312e-02	2.6135e-02	6.3846e-02
Gi-lli	1.2892e-02	1.4506e-02	1.0312e-02	2.6150e-02	6.3861e-02
Skin	1.7577e-05	4.3168e-06	3.8123e-06	6.7914e-06	3.2497e-05

Age Group : **Infant**

Organ	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year Total
Bone	3.7340e-05	4.9896e-05	3.9809e-06	3.2559e-04	4.1681e-04
Liver	5.8592e-03	6.6100e-03	4.6622e-03	1.2188e-02	2.9319e-02
Total-body	5.9112e-03	6.6046e-03	4.6924e-03	1.1981e-02	2.9189e-02
Thyroid	5.9713e-03	2.3257e-02	4.9280e-03	1.3566e-01	1.6982e-01
Kidney	5.8405e-03	6.6159e-03	4.6623e-03	1.2251e-02	2.9370e-02
Lung	5.8362e-03	6.5560e-03	4.6614e-03	1.1812e-02	2.8866e-02
Gi-lli	5.8332e-03	6.5574e-03	4.6614e-03	1.1825e-02	2.8877e-02
Skin	1.7577e-05	4.3168e-06	3.8123e-06	6.7914e-06	3.2497e-05



**Table 5B**  
**Doses Due to Liquid Radioactive Effluents**

Age Group : **Adult**

Organ	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year Total
Bone	3.5604e-03	1.5988e-03	1.2949e-03	1.2252e-03	7.6793e-03
Liver	6.5814e-03	2.8566e-03	2.4713e-03	2.5352e-03	1.4445e-02
Total-body	4.9308e-03	2.1017e-03	1.8793e-03	1.9288e-03	1.0841e-02
Thyroid	1.8153e-04	3.1073e-04	1.1666e-04	3.3533e-04	9.4425e-04
Kidney	2.2515e-03	1.0784e-03	8.8240e-04	8.9050e-04	5.1028e-03
Lung	8.6567e-04	6.6627e-04	3.8394e-04	3.9906e-04	2.3149e-03
Gi-lli	1.4032e-03	7.0726e-04	3.2679e-04	2.8778e-03	5.3150e-03