# Attachment to

# W3F1-2011-0033

# Annual Radioactive Effluent Release Report - 2010



# Annual Radioactive Effluent Release Report

# January 1, 2010 - December 31, 2010



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# **Table of Contents**

1.0 Introduction	1
2.0 Supplemental Information	2
2.1 Regulatory Limits	<b>2</b>
2.1.1 Fission and Activation Gases (Noble Gases)	2
2.1.2 lodines, Particulates with Half Lives > Eight (8) Days, and Tritium	3
2.1.3 Liquid Effluents	3
2.1.4 Uranium Fuel Cycle Sources	4
2.2 Maximum Permissible Concentrations	4
2.2.1 Fission and Activation Gases, Iodines, and Particulates, With Half Lives > Eight (8) Days	4
2.2.2 Liquid Effluents	4
2.3 Average Energy (E-Bar)	4
2.4 Measurements and Approximations of Total Radioactivity	5
2.4.1 Fission and Activation Gases (Noble Gases)	5
2.4.2 lodines, Particulates, and Tritium	5
2.4.3 Liquid Effluents	6
2.5 Batch Releases	6
2.6 Unplanned/Abnormal Releases	6
2.6.1 Unplanned/Abnormal Gaseous Releases	6
2.6.2 Unplanned/Abnormal Liquid Releases	6
3.0 Gaseous Effluents	7
4.0 Liquid Effluents	7
5.0 Solid Wastes	7
6.0 Meteorological Data	8
7.0 Assessment of Doses	9
7.1 Dose Due to Gaseous Effluents	9
7.1.1 Air Doses at the Site Boundary	9
7.1.2 Maximum Organ Dose to the Critical Receptor	10
7.2 Doses Due to Liquid Effluents	11
7.3 40 CFR Part 190 Dose Evaluation	11

# **Table of Contents**

7.4 Doses to Public Inside the Site Boundary	
8.0 Related Information	
8.1 Changes to the Process Control Program	
8.2 Changes to the Offsite Dose Calculation Manual	
8.3 Unavailability of REMP Milk Samples	
8.4 Report of Required Effluent Instrument Inoperability	
8.5 Activity Released Via Secondary Pathways	
8.6 Missed Effluent Samples	
8.7 Major Changes to Radioactive Waste Systems	
8.8 Biennial Land Use Census	
8.9 Gaseous Storage Tank Total Radioactivity Limit	
8.10 Unprotected Outside Tank Total Radioactivity Limit	
9.0 Additional Information	
9.1 Reactor Coolant System Average Energy (E-Bar)	
9.2 Groundwater Initiative Data	
10.0 Tables	
11.0 Attachments	

# 1.0 Introduction

This Annual Radioactive Effluent Release Report is submitted as required by Waterford 3 Technical Specification 6.9.1.8. It covers the period from January 1, 2010 through December 31, 2010. 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 2010.
- Assessment of radiation doses due to liquid and gaseous radioactive effluents released during 2010.
- 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 lodines, Particulates with Half Lives > Eight (8) Days, and Tritium

The dose rate due to lodine-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 2.0E-4 µCi/ml.

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 total 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); 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 2.0E-4  $\mu$ 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 effluent specifications. E-Bar is 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 at least monthly for noble gases. Each week a Gas Ratio (GR) was calculated according to the following equation:

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

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 lodines, Particulates, and Tritium

lodines 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 (Gel, Laboratories). 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. Annual Carbon-14 release estimate was obtained from the Waterford 3 Final Safety Analysis Report. Release of Carbon-14 was assumed to be continuous.

Grab samples of continuous releases 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 (Gel, Laboratories) 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 included 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, 2010 through December 31, 2010, 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:

Differiential Temp.	98.30%
Wind Speed	98.30%
Wind Direction	98.30%
Overall*	98.30%

A. - Simultaneous occurrence of valid data for all three parameters.

Dispersion and deposition values were determined from the 2010 data and used in the assessment of doses due to gaseous effluents released from site during the 2010 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) 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 2010, this location was determined to be in the NNE sector ( $\chi/Q = 2.0E-05 \text{ sec/m}^3$ ) at a distance of 869 meters (0.54 miles) from the reactor building. 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 2010 are summarized as follows:

Beta air dose:	0.00 mrad
Gamma air dose:	0.00 mrad

The above beta and gamma air doses represent the following percentage of the annual dose limits:

0% of the Beta air dose limit (20 mrad) 0% 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 2010.

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 2010 the residence with the highest  $\chi/Q$  value (7.6E-06 sec/m<sup>3</sup>) and the highest D/Q value (1.9E-08 m<sup>-2</sup>) was determined to be in the ENE sector at a distance of 1513 meters (0.94 miles) from the reactor building. 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 excluding C-14 was determined for historical trending to be:

0.057 mrem to the child thyroid.

This represents 0.4% of the Annual Organ Dose limit (15 mrem).

The maximum organ dose to the critical receptor including C-14 was determined to be:

3.86 mrem to the child bone.

This represents 25.7% 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, an adult, resulting from exposure to liquid effluents released during 2010 from Waterford 3 were:

1.81E-4 mrem to the Total Body.

2.11E-4 mrem to the maximum exposed organ (liver)

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

0.01% of the Total Body Dose Limit (3 mrem), and 0.002% 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 2010 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 reactor building.

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:

1.38E-2 mrem to the maximum exposed organ (thyroid)

All doses for receptors inside the site boundary 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

There were no changes to EN-RW-105 in 2010.

### 8.2 Changes to the Offsite Dose Calculation Manual

There were minor editorial changes to the ODCM in 2010.

### 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 location 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, all instrumentation was restored to operability within the time specified.

### 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

During the reporting period, no incident occurred for which effluent samples were not sampled and/or analyzed as required by the ODCM/TRM.

### 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 2010. The land use census performed in 2010 did not identify the need for any changes to locations being 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 8.5E+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 7.85E-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)

Reactor Coolant System E-Bar calculations were done on 2/22/10 and 8/16/10 with values of 0.1028 and 0.0355 Mev/disintegration, respectively. Reactor Coolant System E-Bar is supplied for information only and is not used for effluent dose calculations.

# 9.2 Groundwater Initiative Data

Groundwater wells were monitored at Waterford 3 during 2010 as part of the NEI Groundwater Initiative. Sampling of the three installed wells was conducted on a quarterly basis. All results were less than minimum detectable activity for gamma emitters and tritium during 2010.

# 10.0 Tables

Table 1,	Batch Release Summary	18
Table 1A,	Annual Summation of All Releases by Quarter All Airborne Effluents	19
Table 1B,	Annual Airborne Continuous Elevated and Ground Level Releases Totals for Each Nuclide Released	20
Table 1C,	Annual Airborne Batch Elevated and Ground Level Releases Totals for Each Nuclide Released	21
Table 2,	Annual Summation of All Releases by Quarter All Liquid Effluents	22
Table 2B,	Annual Liquid Continuous and Batch Releases Totals for Each Nuclide Released	23
Table 3,	Solid Waste Shipped Offsite for Burial or Disposal	24
Table 4,	Joint Frequency Distribution of Meteorological Data	31
Table 5A,	Doses Due to Gaseous Radioactive Effluents	35
Table 5B,	Doses Due to Liquid Radioactive Effluents	

# **11.0 Attachments**

Copy of UNT-005-014, "Offsite Dose Calculation Manual" Revision 302.

# Table 1Batch Release Summary

Batch Release Summary information for 2010 Report Period.

:	Batch Release Summary
:	All
:	Batch Liquid and Gaseous
:	01-jan-2010 00:00:00
:	31-dec-2010 23:59:59
	:::::::::::::::::::::::::::::::::::::::

Liquid Releases

Number of Releases	:	40	
Total Time for All Releases	:	11712.0	Minutes
Maximum Time for a Release	:	343.0	Minutes
Average Time for a Release	:	292.8	Minutes
Minimum Time for a Release	:	235.0	Minutes
Average Stream Flow	:	618316	ft <sup>3</sup> /s
· Gaseous Re.	leases	5	

Number of Re	leases		:	0		
lotal Time f	or All	Releases	:	0	Minutes	
Maximum Time	for a	Release	:	0	Minutes	
Average Time	for a	Release	:	0	Minutes	
Minimum Time	for a	Release	:	0	Minutes	

### Batch Release Summary information for 2010 by Quarter.

Report Category	:	Batch Release Summary
Release Point	:	All
Type of Release	:	Batch Liquid and Gaseous
Period Start Time	:	01-jan-2010 00:00:00
Period End Time	:	31-dec-2010 23:59:59

Liquid Releases								
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	•		
Number of Releases : Total Time for All Releases : Maximum Time for a Release : Average Time for a Release : Minimum Time for a Release : Average Stream Flow :		10 2804.0 321.0 280.4 235.0 780366	12 3562.0 343.0 296.8 259.0 696433	11 3298.0 321.0 299.8 269.0 472400	7 2048.0 309.0 292.6 265.0 712400	Minutes Minutes Minutes Minutes ft <sup>3</sup> /s		
		Gaseous R	eleases		· .			
		Qtr 1	Qtr 2	Qtr 3	Qtr	4		
Number of Releases : Total Time for All Releases : Maximum Time for a Release : Average Time for a Release : Minimum Time for a Release :		0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0	Minutes Minutes Minutes Minutes		

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

Report Category	:	Summation of Al	l Releases
Type of Activity	:	All Airborne Ef	fluents
Period Start Time	:	01-jan-2010 00:	00:00
Period End Time	:	31-dec-2010 23:	59:59

Type of Effluent	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Est.Total Error %
A. Fission and Activation Gases						
<ol> <li>Total Release</li> <li>Average Release Rate for Period</li> <li>Percent of Applicable Limit</li> </ol>	Curies uCi/sec %	0.00E+00 0.00E+00 n/a	0.00E+00 0.00E+00 n/a	0.00E+00 0.00E+00 n/a	0.00E+00 0.00E+00 n/a	1.50E+01
B. Radioiodines						
<ol> <li>Total Iodine-131</li> <li>Average Release Rate for Period</li> <li>Percent of Applicable Limit</li> </ol>	Curies uCi/sec %	5.77E-06 7.41E-07 n/a	0.00E+00 0.00E+00 n/a	0.00E+00 0.00E+00 n/a	1.24E-07 1.57E-08 n/a	1.50E+01
C. Particulates	-					
<ol> <li>Particulates (Half-lives &gt; 8 Days)</li> <li>Average Release Rate for Period</li> <li>Percent of Applicable Limit</li> <li>Gross Alpha Radioactivity</li> <li>Carbon-14</li> </ol>	Curies uCi/sec % Curies Curies	9.60E-06 1.23E-06 n/a 8.27E-07 2.53E+00	2.04E-06 2.59E-07 n/a 4.29E-07 2.53E+00	2.27E-06 2.86E-07 n/a 1.51E-06 2.53E+00	2.81E-06 3.54E-07 n/a 1.21E-06 2.53E+00	1.50E+01 1.50E+01
D. Tritium						
<ol> <li>Total Release</li> <li>Average Release Rate for Period</li> <li>Percent of Applicable Limit</li> </ol>	Curies uCi/sec %	1.74E+01 2.23E+00 n/a	1.67E+01 2.12E+00 n/a	1.47E+01 1.85E+00 n/a	1.08E+01 1.35E+00 n/a	1.50E+01

Page 19 of 37

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

Report Ca	tegory :	Airborne	Continuous	Elevated	and Ground	Level Rel	eases.			
Type of A Period St Period End	ctivity : art Time : d Time :	Fission ( 01-jan-2) 31-dec-2)	Gases, Iodi 010 00:00:0 010 23:59:5	nes, and P 0 9	articulate	S				
				Elevated R	eleases			Ground Re	leases	
Nuclide		Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
Fission a	nd Activat	ion Gases		·						
Total for	Period	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radioiodi	nes									
I-131 I-133		Curies Curies	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	5.77E-06 0.00E+00	0.00E+00 0.00E+00	0.00E+00 0.00E+00	3.67E-08 8.77E-08
Total for	Period	Curíes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.77E-06	0.00E+00	0.00E+00	1.24E-07
Particula	tes									
.H-3 Br-82 0.00E+00	0.00E+00	Curies	0.00E+00	0.00E+00 Curies	0.00E+00 0.00E+00	0.00E+00 0.00E+00	1.74E+01 0.00E+00	1.67E+01 0.00E+00	1.47E+01 0.00E+00	1.08E+01 0.00E+00
Co-58 Co-60 Cr-51 Cs-134 Cs-137 Fe-59 La-140 Nb-95 Os-185 Os-191 Ru-103 Zr-95 Gralpha C-14	· · · · · · · · · · · · · · · · · · ·	Curies Curies Curies Curies Curies Curies Curies Curies Curies Curies Curies Curies Curies Curies	0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	$\begin{array}{c} 0.002+00\\ 0.002+00\\ 0.002+00\\ 0.002+00\\ 0.002+00\\ 0.002+00\\ 0.002+00\\ 0.002+00\\ 0.002+00\\ 0.002+00\\ 0.002+00\\ 0.002+00\\ 0.002+00\\ 0.002+00\\ 0.002+00\\ 0.002+00\\ 0.002+00\\ \end{array}$	$\begin{array}{c} 0.002+00\\ 0.002+0\\ 0.0$	1.22E-06 1.03E-07 0.00E+00 2.99E-06 2.19E-07 0.00E+00 4.17E-07 1.28E-07 1.19E-06 2.44E-07 1.84E-07 8.27E-07 2.53E+00	1.092-07 0.00E+00 8.62E-07 1.07E-06 0.00E+00 0.00E+	$\begin{array}{c} 0.002+00\\ 2.06E-07\\ 0.00E+00\\ 8.64E-07\\ 1.20E-06\\ 1.14E-09\\ 0.00E+00\\ 0.00E+00\\ 0.00E+00\\ 0.00E+00\\ 0.00E+00\\ 0.00E+00\\ 1.51E-06\\ 2.53E+00\\ \end{array}$	$\begin{array}{c} 0.002+00\\ 1.04E-07\\ 4.52E-07\\ 7.15E-07\\ 1.54E-06\\ 0.00E+00\\ 0.00E+00\\ 0.00E+00\\ 0.00E+00\\ 0.00E+00\\ 0.00E+00\\ 0.00E+00\\ 1.21E-06\\ 2.53E+00\\ \end{array}$
Total for	Period	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E+01	1.92E+01	1.72E+01	1.33E+01

# Table 1CAnnual Airborne Batch Elevated and Ground Level ReleasesTotals for Each Nuclide Released

Report Category Type of Activity	: Airborne : Totals f : Fission	Batch Elev or Each Nuc Gases, Iodi	ated and G lide Relea nes, and F	Fround Levensed. Particulate	l Releases	-			
Period Start Time Period End Time	: 01-jan-2 : 31-dec-2	010 00:00:0 010 23:59:5	0 9						
		<del></del> .	Elevated R	Releases		Gro	und Releas	es	
Nuclide	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
Fission and Activa	tion Gases								
Total for Period	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radioiodines									
Total for Period	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Particulates									
Н-3	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total for Period	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

# Table 2AAnnual Summation of All Releases by QuarterAll Liquid Effluents

Report Category	:	Summation of All Releases
Type of Activity	:	All Liquid Effluents
Period Start Time	:	01-jan-2010 00:00:00
Period End Time	:	31-dec-2010 23:59:59

Type of Effluent	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Est.Total Error %
A. Fission and Activation Products						· · ·
1. Total Release (Not Including Tritium, Gases, and Alpha 2. Average Diluted Concentration	Curies	2.00E-03	2.82E-03	1.53E-03	2.50E-04	1.50E+01
During Period 3. Percent of Applicable Limit	uCi/sec %	7.08E-11 n/a	8.36E-11 n/a	3.49E-11 n/a	1.26E-11 n/a	
B. Tritium						
1. Total Release	Curies	5.51E+01	3.18E+01	3.01E+01	2.60E+01	1.50E+01
<ol> <li>Average Diluted Concentration During Period</li> <li>Percent of Applicable Limit</li> </ol>	uCi/sec	1.95E-06 n/a	9.41E-07 n/a	6.86E-07 n/a	1.32E-06 n/a	
C. Dissolved and Entrained Gases			<u> </u>	- <u> </u>		
1. Total Release	Curies	1.85E-03	9.47E-06	4.43E-06	8.19E-06	1.50E+01
<ol> <li>Average Diluted Concentration During Period</li> <li>Percent of Applicable Limit</li> </ol>	uCi/sec %	6.55E-11 n/a	2.80E-13 n/a	1.01E-13 n/a	4.14E-13 n/a	
D. Gross Alpha Radioactivity			<u> </u>			
1. Total Release	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E+01
E. Waste Volume Released (Pre-Dilution) F. Volume of Dilution Water Used	Liters Liters	1.36E+07 2.83E+10	1.27E+07 3.38E+10	1.59E+07 4.38E+10	9.01E+06 1.98E+10	1.50E+01 1.50E+01

Annual Radioactive Effluent Release Report

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

5

Report Category	:	Liquid Continuous and Batch Releases. Totals for Each Nuclide Released.
Type of Activity Period Start Time Period End Time	::	All Radionuclides 01-jan-2010 00:00:00 31-dec-2010 23:59:59

	Continuous Releases					Batch Releases			
Nuclide	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
All Nuclides									
H-3 Ag-110m	Curies	7.51E-02 0.00E+00	2.00E-01	3.41E-01 0.00E+00	2.48E-01 0.00E+00	5.51E+01 2.54E-05	3.16E+01 2.17E-05	2.97E+01 0.00E+00	2.58E+01 0.00E+00
Co-58	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.47E-04	9.48E-05	3.85E-05	1.35E-05
Co-60	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-04	1.70E-05	8.45E-05	6.19E-06
Cr-51	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.34E-05	0.00E+00	0.00E+00	0.00E+00
Cs-134	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-06	4.75E-06	3.71E-06	0.00E+00
Cs-137	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.58E-06	2.15E-06	4.31E-06	0.00E+00
Fe-55	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-03	2.50E-03	1.31E-03	2.04E-04
Fe-59	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-05	0.00E+00	0.00E+00	0.00E+00
Kr-85	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E~03	0.00E+00	0.00E+00	0.00E+00
Mn-54	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.15E-05	3.53E-06	1.64E-05	0.00E+00
Mo-99	Curies	0.00Ė+00	0.00E+00	0.00E+00	0.00E+00	9.72E-06	0.00E+00	0:00E+00	0.00E+00
Nb-95	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-04	3.81E-06	3.14E-05.	0.00E+00
Sb-125	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.82E-05	1.79E-04	1.68E-05	2.63E-05
Xe-131m	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-04	0.00E+00	0.00E+00	0.00E+00
Xe-133	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.47E-06	4.43E-06	8.19E-06
Zr-95	Curies	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.86E-05	0.00E+00	2.28E-05	0.00E+00
Total for Period	Curies	7.51E-02	2.00E-01	3.41E-01	2.48E-01	5.51E+01	3.16E+01	2.97E+01	2.58E+01

Page 23 of 37

# Table 3Solid Waste Shipped Offsite for Burial or Disposal

# SUMMARY BY MAJOR WASTE TYPES

### Waste Stream : Resins, Filters, and Evaporator Bottoms +

Waste	Volume	Volume	Curies	% Error
Class	Ft^3	M^3	Shipped	(Ci)
A	8.70E+02	2.46E+01	1.35E+01	+/- 25%
В	1.40E+02	3.96E+00	2.68E+01	+/- 25%
С	0.00E+00	0.00E+00	0.00E+00	+/- 25%
ALL	1.01E+03	2.86E+01	4.04E+01	+/- 25%

### Waste Stream : Dry Active Waste +

Waste	Volume	Volume	Curies	%Error
Class	Ft^3	M^3	Shipped	(Ci)
A	1.25E+04	3.55E+02	4.00E-01	+/-25%
В	0.00E+00	0.00E+00	0.00E+00	+/-25%
С	0.00E+00	0.00E+00	0.00E+00	+/-25%
ALL	1.25E+04	3.55E+02	4.00E-01	+/-25%

### Waste Stream : Irradiated Components

Waste	Volume	Volume	Curies	%Error
Class	Ft^3	M^3	Shipped	(Ci)
A	0.00E+00	0.00E+00	0.00E+00	+/-25%
В	0.00E+00	0.00E+00	0.00E+00	+/-25%
С	0.00E+00	0.00E+00	0.00E+00	+/-25%
ALL	0.00E+00	0.00E+00	0.00E+00	+/-25%

### Waste Stream : Other Waste (Combined Packages)

Waste	Volume	Volume	Curies	%Error
Class	Ft^3	M^3	Shipped	(Ci)
А	5.00E+02	1.42E+01	1.01E-01	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
С	0.00E+00	0.00E+00	0.00E+00	+/-25%
ALL	5.00E+02	1.42E+01	1.01E-01	+/-25%

### Waste Stream : Sum of All 4 Categories

Waste	Volume	Volume	Curies	%Error
Class	Ft^3	M^3	Shipped	(Ci)
A	1.39E+04	3.94E+02	1.40E+01	+/-25%
В	1.40E+02	3.96E+00	2.68E+01	+/-25%
С	0.00E+00	0.00E+00	0.00E+00	+/-25%
ALL	1.40E+04	3.98E+02	4.09E+01	+/-25%

\* Activity determined by estimations

Activity determined by measurements

### Table 3

# Estimate of major nuclide composition (by waste type)

# Waste Stream : Resins, Filters, and Evap Bottoms

Nuclide	Percent	Curies
Name	Abundance	
H-3	1.866%	7.53E-01
_Be-7	0.007%	2.74E-03
C-14	0.092%	3.71E-02
Cr-51	0.021%	8.62E-03
<u>Mn-54</u>	0.843%	3.40E-01
Fe-55	16.428%	6.63E+00
Co-57	0.010%	4.19E-03
<u>Co-58</u>	0.636%	2.57E-01
<u>Co-60</u>	3.054%	1.23E+00
Ni-63	26.764%	1.08E+01
Sr-89	0,042%	1.69E-02
Sr-90	0.146%	5.89E-02
Zr-95	0.029%	1.18E-02
Nb-95	0.067%	2.70E-02
Sb-125	3.145%	1.27E+00
<u>Cs-134</u>	6.802%	2.75E+00
Cs-137	40.008%	1.62E+01
Ce-144	0.026%	1.06E-02
Pu-238	0.000%	1.23E-04
Pu-239	0.000%	4.52E-05
Pu-241	0.010%	3.94E-03
Am-241	0.000%	9.58E-05
Cm-242	0.000%	2.79E-09
Cm-243	0.001%	3.27E-04
Cm-244	0.000%	1.56E-04

### Table 3

# Estimate of major nuclide composition (by waste type)

# Waste Stream : Dry Active Waste

Nuclide	Percent	Curies
Name	Abundance	ļ
H-3	0.948%	3.79E-03
C-14	0.196%	7.83E-04
Mn-54	3.525%	1.41E-02
Fe-55	26.895%	1.07E-01
Co-57	0.099%	3.96E-04
<u>Co-58</u>	5.164%	2.06E-02
<u>Co-60</u>	3.799%	1.52E-02
Ni-59	0.037%	1.49E-04
<u>Ni-63</u>	21.658%	8.65E-02
Sr-89	0.116%	4.62E-04
Sr-90	0.088%	3.51E-04
Zr-95	0.067%	2.67E-04
Nb-95	0.159%	6.37E-04
<u>Tc-99</u>	0.001%	3.54E-06
Sb-125	0.583%	2.33E-03
<u>Cs-134</u>	12.844%	5.13E-02
Cs-137	23.780%	9.50E-02
Ce-144	0.037%	1.49E-04
Pu-238	0.000%	2.87E-07
<u>Pu-239</u>	0.000%	3.81E-08
<u>Pu-240</u>	0.000%	3.81E-08
Pu-241	0.001%	5.98E-06
Pu-242	0.000%	5.67E-08
Am-241	0.000%	2.64E-07
Cm-242	0.000%	7.09E-08
Cm-243	0.001%	3.76E-06
Cm-244	0.001%	3.75E-06

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# Table 3 Estimate of major nuclide composition (by waste type)

# Waste Stream : Irradiated Components

N/A - None Shipped in 2010.

### Table 3

# Estimate of major nuclide composition (by waste type)

## Waste Stream : Other Waste (Combined Packages)

Nuclide Name	Percent Abundance	Curies
H-3	1.538%	1.56E-03
C-14	0.293%	2.96E-04
Mn-54	2.925%	2.96E-03
Fe-55	39.818%	4.03E-02
Co-57	0.036%	3.67E-05
Co-58	2.340%	2.37E-03
Co-60	3.397%	3.44E-03
Ni-63	19.796%	2.01E-02
Sr-89	0.158%	1.60E-04
Sr-90	0.077%	7.82E-05
Zr-95	0.107%	1.09E-04
Nb-95	0.254%	2.58E-04
Sb-125	0.643%	6.51E-04
Cs-134	12.552%	1.27E-02
Cs-137	16.035%	1.62E-02
Ce-144	0.027%	2.77E-05
Cm-243	0.001%	1.46E-06
Cm-244	0.001%	1 46E-06

1

### Table 3

# Estimate of major nuclide composition (by waste type)

# Waste Stream : Sum of All 4 Categories

Percent	Curies
Abundance	
1.856%	7.59E-01
_0.007%	2.74 <u>E-03</u>
0.093%	3.82E-02
0.021%	8.62E-03
0.875%	3.57E-01
16.589%	6.78E+00
0.011%	4.63E-03
0.685%	2.80E-01
3.062%	1.25E+00
0.000%	1.49E-04
26.697%	1.09E+01
0.043%	1.75E-02
0.145%	5.93E-02
0.030%	1.22E-02
0.068%	2.79E-02
0.000%	3.54E-06
3.114%	1.27E+00
6.875%	2.81E+00
39.790%	1.63E+01
0.026%	1.08E-02
0.000%	1.24E-04
0.000%	4.53E-05
0.000%	3.81E-08
0.010%	3.94E-03
0.000%	5.67E-08
0.000%	9.61E-05
0.000%	7.37E-08
0.001%	3.33E-04
0.000%	1 62E-04
	Percent Abundance 1.856% 0.007% 0.093% 0.021% 0.875% 16.589% 0.011% 0.685% 3.062% 0.000% 26.697% 0.043% 0.043% 0.043% 0.145% 0.030% 0.068% 0.000% 3.114% 6.875% 39.790% 0.026% 0.000% 0.000% 0.000% 0.000% 0.000% 0.000%

### Table 3

# **Solid Waste Disposition**

Number of Shipments	Mode of Transportation	Destination
1	Hittman Transport Services	Energy Solutions
10	Hittman Transport Services	Energy Solutions Bear Creek
3	Hittman Transport Services	Studsvik Processing Facility LLC- Erwin

# Irradiated Fuel Shipments (Disposition)

Number of Shipments	Mode of Transportation	Destination
None	N/A	N/A

# Table 4Joint Frequency Distribution of Meteorological Data

JOINT FREQU	JENCY DISTR	IBUTION OF	WIND SPEE	D AND DIRE	CTION IN H	OURS 01/0	1/2010 00:	00:00 TO 1	2/31/2010	23:59:59	PASQU	ILL CLASS	Α.
Wind					wind Spee	d (M/S) at	IU-m Leve	T					
Direction	.2250	.5175	.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	0	0	0	<u> </u>		1	20	8	0	0	0		30
NNE	0	Û	0	0	1	· 9	15	1	0	0	0	0	26
NE	0	0	0	0	0	19	49	5	0	0	0	0	73
ENE	0	0	0	0	0	1	8	1	0	0	0	0	10
E	0	0	0	0	. 0	1	2	2	0	0	0	0	5
ESE	0	. 0	0	0	0	2	3	3	3	0	0	0	11
SE	0	0	0	0	0	2	14	8	3	0	0	0	27
SSE	0	0	0	0	0	1	18	27	0	0	0.	0	46
S	0	0	0	0	0	1	10	10	.0	0	0	0	21
SSW	0	0	0	0	0	0	9	0	0	. 0	0	0	9
SW	0	0	0	0	0	• 3	3	0	0	0	0	0	6
WSW	0	0	0	0	0	1	2	3	0	0	0	0	6
W	0	0	0	0	0	0	9	5	0	0	0	0	14
WNW	0	0	0	0	0	0	8	7	• 0	0	0	. 0	15
NW	0	0	0	0	0	0	6	8	1	0	0	0	15
NNW	0	0	0	0	2	1	31	10	2	0	0	0	46
Total	0.	0	0	1	3	42	207		<u> </u>	0		0	360

Number of calms for A Stability: 0

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS 01/01/2010 00:00:00 TO 12/31/2010 23:59:59 PASQUI

PASQUILL CLASS B

#### Wind Speed (M/S) at 10-m Level

Wind						- (, -,		_					
Direction	.2250	.5175	.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 1	3.1-18.0	>18.0	Total
Ñ	0	0	0		4	6	9	3	ī		0	0	24
NNE	0	0	0	0	2	10	2	. 1	0	0	0	0	. 15
NE	0	· 0	0	1	1	18	40	3	0	0	0	0	63
ENE	0	· 0	0	0	0	4	2	0	0	0	0	0	6
E	0	0	0	0	1	0	3	1	0	. 0	0	0	5
ESE	0	0	0	0	0	0	6	2	0	0	0	0	8
SE	0	0-	0	0	0	1	14	8	1	0	0	. 0	24
SSE	0	0	0	0	1	8	18	11	0	· 0	0	0	38
S	0	0	0	0	0	ġ	14	5	0	0	0	- 0	28
SSW .	0	0	0	0	0	3	7	1	0	0	0	0	· 11
SW	0	Û	0	0	2	13	7	0	0	0	Ο.	0	22
WSW	0	0	0	0	1	5	5	3	0	0	0	0	14
W	0	. 0	0	1	1	2	7	5	0	0	0	0	16
WNW	0	0	0	0	0	2	10	- 2	0	0	0	0	14.
NW	0	0	0	0	· 1	0	10	3	0	0	0	0	14
NNW	0	0	0	0	3	6	11	11	0	0	0	0	31
Total	0	0	0		. 17	87	165	59	2	0	0	0	333

Number of calms for B Stability: 0

## Annual Radioactive Effluent Release Report

# Table 4Joint Frequency Distribution of Meteorological Data

					Wind Speed	d (M/S) at	10-m Level	1.					
rection	.2250	.5175	.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	Tota
		0	<u>0</u>				12		1	1			4
E	0	. 0	0	. 1	4	10	10	0	0	Û	0	0	2
	0	0	0	0	2	23	64	4	0	0	· 0	0	9
E ·	0	0	. 0	0	0	6	11	1	0	0	0	0	1
	· 0	0	. 0	0	0 ·	2	5	3	. 0	0	0	0	
E .	0	0	0	0	1	2	12	3	0	0	.0	Ò	
	0	0	0	0	1	4	32	13	0	0	0	0	
E .	0	0	· 0	0	· 0	<u>9</u>	28	<u>9</u>	0	0	0	0	
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tal mber of c OINT FREQ Wind	0 calms for C QUENCY DISTF	0 Stability IBUTION O	0 : 0 F WIND SPE	8 ED AND DIR	58 ECTION IN N Wind Spe⊖(	HOURS, 01/(	01/2010 00 10-m Leve	:00:00 TO 3	12/31/2010	23:59:59	PASQ	UILL CLASS	D
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# Page 32 of 37

# Annual Radioactive Effluent Release Report

# Table 4Joint Frequency Distribution of Meteorological Data

177 d					Wind Spee	d (M/S) at	10-m Leve.	1					
wind Direction	.2250	.5175	.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	Tota
	0	2 -	6	10	19	110	82	<u></u>	. 0	0	0		23
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	0	1	2	8	24	69	90	· 11	0	0	0	0	20
E	. 0	1	0	8	13	21	52	15	2	0	0	<ul> <li>○</li> </ul>	11
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	ō	ő	5	3	12	83	100	. 5	Ő	n n	ñ	õ	
c.	. 0		- 5	1 2	30	156	64	3	õ	Û	· 0	Ő	26
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67	0	4	1		41	24	. גע גע	õ	0	0	0	0	
w	-	-	4	20	32	. 34		0	0	0	0	0	10
	1	4	1.		4∠	. 38.	17	0	0	. 0	0	0	15
W	U	2	8	58	47	30	10	0	U	0	. 0	U	15
	1	· 4	13	49	26	12	6	0	0	0	0	0	11
W	0 .	3	8	30	31	24	5	· 0	0	0	. 0	0	10
	0.	4	4	15	35	47	38	1	. 0	· 0	0	0	14
W	0	2	0.	14	17	. 46	48	8	Û	0	0	0	13
otal imber of c JOINT FREQ	alms for E UENCY DISTR	36 Stability: IBUTION OF	0 WIND SPE	317 ED AND DIR	410 ECTION IN	895 HOURS 01/0	836 01/2010 00	83 :00:00 TO	4 12/31/2010 • .	0 23:59:59	0 PAS	0 QUILE CLASS	265 F
otal umber of c TOINT FREQ Wind	alms for E UENCY DISTR	36 Stability: IBUTION OF	0 V WIND SPE	317 ED AND DIR	410 ECTION IN Wind Spee	895 HOURS 01/( d (M/S) at	836 01/2010 00 10-m Leve.	83 :00:00 TO 1	4 12/31/2010 • .	0 23:59:59	0 PAS	0 QUILL CLASS	265 F
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otal Imber of c IOINT FREQ Wind .rection	alms for E UENCY DISTF .2250	36 Stability: IBUTION OF .5175 6	67 0 WIND SPEN .76-1.0 7	317 ED AND DIR 1.1-1.5 12	410 ECTION IN Wind Spee 1.6-2.0 20	895 HOURS 01/( d (M/S) at 2.1-3.0 25	836 01/2010 00 10-m Leve 3.1-5.0 2	83 :00:00 TO 1 5.1-7.0 0	4 12/31/2010  7.1-10.	0 23:59:59 10.1-13 0	0 PAS 13.1-18.0	0 QUILE CLASS 	265 F Tota 7
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tal mber of c OINT FREQ Wind rection E	5	36 Stability: IBUTION OF .5175 6 0 1	67 0 WIND SPE .76-1.0 7 7 3	317 ED AND DIR 1.1-1.5 12 3 6	410 ECTION IN Wind Spee 1.6-2.0 20 9 3	895 HOURS 01/( d (M/S) at 2.1-3.0 25 15 11	836 01/2010 00 10-m Leve. 3.1-5.0 2 0 6	83 :00:00 TO 1 5.1-7.0 0 0 0	4 12/31/2010  7.1-10. 0 0 0	0 23:59:59 10.1-13 0 . 0 0	0 PAS 13.1-18.0 0 0	0 QUILE CLASS >18.0 0 0	265 F Tota 7 3 3
tal Imber of c OINT FREQ Wind rection IE	alms for E UENCY DISTR .2250	36 Stability: IBUTION OF .5175 6 0 1 1	67 0 WIND SPEN .76-1.0 7 7 3 3	317 ED AND DIR 1.1-1.5 12 3 6 8	410 ECTION IN Wind Spee 1.6-2.0 20 9 3 5	895 HOURS 01/( d (M/S) at 2.1-3.0 25 15 11 5	836 01/2010 00 10-m Leve. 3.1-5.0 2 0 6 2	83 :00:00 TO 1 5.1-7.0 0 0 0 0	4 12/31/2010  7.1-10. 0 0 0 0	0 23:59:59 10.1-13 0 0 0 0 0	0 PAS 13.1-18.0 0 0 0 0	0 QUILE CLASS >18.0 0 0 0 0	265 F Tota 7 3 3
otal Imber of c JOINT FREQ Wind irection NE S JE	alms for E UENCY DISTF .2250	36 Stability: IBUTION OF .5175 6 0 1 1 0	67 0 WIND SPER .76-1.0 7 7 3 3 1	317 ED AND DIR 1.1-1.5 12 3 6 8 4	410 ECTION IN Wind Spee 1.6-2.0 20 9 3 5	895 HOURS 01/( d (M/S) at 2.1-3.0 25 15 11 5 4	836 01/2010 00 10-m Leve 3.1-5.0	83 :00:00 TO 1 5.1-7.0 0 0 0 1 0	- 4 12/31/2010  7.1-10. 0 0 0 0 0 0 0	0 23:59:59 10.1-13 0 0 0 0 0 0 0	0 PAS 13.1-18.0 0 0 0 0 0	0 QUILE CLASS >18.0 0 0 0 0 0	265 F Tota 3 3 2 1
tal mber of c OINT FREQ Wind rection E E	5 - alms for E UENCY DISTF .2250 0 1 2 1	36 Stability: IBUTION OF .5175 6 0 1 1 0 4	67 0 WIND SPER .76-1.0 7 7 3 3 1 3	317 ED AND DIR 1.1-1.5 12 3 6 8 4 0	410 ECTION IN Wind Spee 1.6-2.0 9 3 5 2 1	895 HOURS 01/( d (M/S) at 2.1-3.0 25 15 11 5 4 2	836 01/2010 00 10-m Leve: 3.1-5.0 2 0 6 2 2 3	83 :00:00 TO 1 5.1-7.0 0 0 0 0 0 0 0	4 12/31/2010  7.1-10. 0 0 0 0 0 0 0 0	0 23:59:59 10.1-13 0 0 0 0 0 0 0 0 0	0 PAS 13.1-18.0 0 0 0 0 0 0 0	0 QUILE CLASS >18.0 0 0 0 0 0 0	265 F Tota 7 3 3 2 1
tal Imber of c OINT FREQ Wind rection IE IE	alms for E UENCY DISTR .2250	36 Stability: IBUTION OF .5175 6 0 1 1 0 4 3	67 0 WIND SPEN .76-1.0 7 7 3 3 1 3 3 3 3	317 ED AND DIR 1.1-1.5 12 3 6 8 4 0	410 ECTION IN Wind Spee 1.6-2.0 20 9 3 5 2 1	895 HOURS 01/( d (M/S) at 2.1-3.0 25 15 11 5 4 20	836 01/2010 00 10-m Leve. 3.1-5.0 2 0 6 2 2 3 8	83 :00:00 TO 1 5.1-7.0 0 0 0 0 1 0 0 0	4 12/31/2010  7.1-10. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 23:59:59 10.1-13 0 0 0 0 0 0 0 0 0 0	0 PAS 13.1-18.0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 QUILE CLASS >18.0 0 0 0 0 0 0 0 0	265 F Tota 7 3 3 2 1 1 1
tal mber of c OINT FREQ Wind rection IE E	31ms for E UENCY DISTF .2250	36 Stability: IBUTION OF .5175 6 0 1 1 0 4 3 0	67 0 WIND SPER .76-1.0 7 7 3 3 1 3 3 1 3 3	317 ED AND DIR 1.1-1.5 12 3 6 8 4 0 4 0 4	410 ECTION IN Wind Spee 1.6-2.0 20 9 3 5 2 1 1 3 5	895 HOURS 01/( d (M/S) at 2.1-3.0 25 15 11 5 4 2 20 8	836 01/2010 00 10-m Leve 3.1-5.0 2 0 6 2 3 9 9	83 :00:00 TO 1 5.1-7.0 0 0 0 1 0 0 0 0 0 0 0	- 4 12/31/2010  7.1-10. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 23:59:59 10.1-13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 PAS 13.1-18.0 0 0 0 0 0 0 0 0 0 0	0 QUILE CLASS >18.0 0 0 0 0 0 0 0 0 0 0 0 0	265 F Tota 3 2 1 1 5
otal mmber of c NOINT FREQ Wind rection NE SE SE	5 - alms for E UENCY DISTF .2250 0 1 2 1 1 0 0	36 Stability: IBUTION OF .5175 6 0 1 1 0 4 3 0 2	67 0 WIND SPEN .76-1.0 7 7 3 3 1 3 3 2 1 2	317 ED AND DIR 1.1-1.5 12 3 6 8 4 0 4 20	410 ECTION IN Wind Spee 1.6-2.0 9 3 5 2 1 13 54	895 HOURS 01/( d (M/S) at 2.1-3.0 25 15 11 5 4 2 20 88 23	836 01/2010 00 10-m Leve. 3.1-5.0 2 0 6 2 2 3 9 4	83 :00:00 TO 1 5.1-7.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4 12/31/2010  7.1-10. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 23:59:59 10.1-13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 PAS 13.1-18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 QUILE CLASS >18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	265 F Tota 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
vtal Imber of c TOINT FREQ Wind rection HE SE SE SE	alms for E UENCY DISTR .2250 0 1 2 1 1 0 0 1	36 Stability: IBUTION OF .5175 6 0 1 1 0 4 3 0 2 2	67 0 WIND SPEH .76-1.0 7 7 3 3 1 3 3 2 13 3 2 13	317 ED AND DIR 1.1-1.5 12 3 6 8 4 0 4 20 61	410 ECTION IN Wind Spee 1.6-2.0 20 9 3 5 2 1 13 54 66	895 HOURS 01/( d (M/S) at 2.1-3.0 25 15 11 5 4 20 88 23	836 01/2010 00 10-m Leve: 3.1-5.0 2 0 6 2 2 3 9 9 4 2 2	83 :00:00 TO 1 5.1-7.0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	4 12/31/2010  7.1-10. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 23:59:59 10.1-13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 PAS 13.1-18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 QUILE CLASS >18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	265 F Tota 7 3 3 3 1 1 1 1 1 5 16
tal Imber of c IOINT FREQ Wind rection IE IE SE	alms for E UENCY DISTF .2250 0 1 2 1 1 0 0 1 1	36 Stability: IBUTION OF .5175 6 0 1 1 1 0 4 3 0 2 8	67 0 WIND SPEN .76-1.0 7 7 3 3 1 3 3 1 3 2 13 21 13 21	317 ED AND DIR 1.1-1.5 12 3 6 8 4 0 4 20 61 85	410 ECTION IN Wind Spee 1.6-2.0 20 9 3 5 2 1 13 5 4 66 37	895 HOURS 01/( d (M/S) at 2.1-3.0 25 15 11 5 4 20 88 23 4 23 4	836 01/2010 00 10-m Leve 3.1-5.0 2 0 6 2 2 3 9 9 4 4 2 0 0	83 :00:00 TO 1 5.1-7.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4 12/31/2010  7.1-10. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 23:59:59 10.1-13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 PAS 13.1-18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 QUILE CLASS >18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	265 F Tota 7 3 3 2 1 1 5 16 15
tal mber of c NOINT FREQ Wind rection IE E E E E E	alms for E UENCY DISTF .2250 0 1 2 1 1 0 0 1 1 2 1 1 2 2	36 Stability: IBUTION OF .5175 6 0 1 1 0 4 3 0 2 8 7 7	67 0 WIND SPER .76-1.0 7 7 3 3 1 3 3 2 13 21 18 8	317 ED AND DIR 1.1-1.5 12 3 6 8 4 0 4 20 61 85 71	410 ECTION IN Wind Spee 1.6-2.0 20 9 3 5 2 1 13 54 66 37 26	895 HOURS 01/( d (M/S) at 2.1-3.0 25 15 11 5 4 2 20 88 23 4 2 2 3 4 2	836 01/2010 00 10-m Leve 3.1-5.0 2 0 6 2 2 3 9 4 4 2 0 0	83 :00:00 TO 1 5.1-7.0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	- 4 12/31/2010  7.1-10. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 23:59:59 10.1-13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 PAS 13.1-18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 QUILL CLASS >18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	265 F Tota 7 3 3 2 1 1 5 16 16 15 12
stal mmber of c NOINT FREQ Wind rection HE SE SE SW SW	alms for E UENCY DISTR .2250 0 1 2 1 1 0 0 1 2 2 2 2	36 Stability: IBUTION OF .5175 6 0 1 1 0 4 3 0 2 8 8 7 9	67 0 WIND SPEH .76-1.0 7 7 3 3 1 3 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 3 3 3 1 3 3 3 1 3 3 3 3 3 1 3	317 ED AND DIR 1.1-1.5 12 3 6 8 4 0 0 61 85 71 58	410 ECTION IN Wind Spee 1.6-2.0 20 9 3 5 2 1 13 54 66 37 26 15	895 HOURS 01/( d (M/S) at 2.1-3.0 25 15 11 5 4 2 20 88 23 4 2 1	836 01/2010 00 10-m Leve. 3.1-5.0 2 0 6 2 2 3 9 4 2 0 0 4 2 0 0 0 0 0	83 :00:00 TO 1 5.1-7.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4 12/31/2010  7.1-10. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	C 23:59:59 10.1-13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 PAS 13.1-18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 QUILE CLASS >18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	265 F Tota 7 3 3 3 3 1 1 1 1 5 16 15 10
Stal Imber of c JOINT FREQ Wind irection NE SE SE SW V	alms for E UENCY DISTF .2250 0 1 2 1 1 0 0 1 1 2 2 6	36 Stability: IBUTION OF .5175 6 0 1 1 1 0 4 3 0 2 8 7 7 9 9	67 0 WIND SPEN .76-1.0 7 7 3 3 1 3 3 1 3 3 1 3 2 1 3 2 1 3 2 1 3 44 25	317 ED AND DIR 1.1-1.5 12 3 6 8 4 0 4 20 61 85 71 58 63	410 ECTION IN Wind Spee 1.6-2.0 20 9 3 5 2 1 1 3 3 5 4 66 37 26 65 15	895 HOURS 01/( d (M/S) at 2.1-3.0 25 15 11 5 4 20 88 23 4 2 20 88 23 4 2 1 0	836 D1/2010 00 10-m Leve. 3.1-5.0 2 0 6 2 2 3 9 9 4 2 0 0 0 0 0 0 0	83 :00:00 To 1 5.1-7.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4 12/31/2010 7.1-10. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 23:59:59 10.1-13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 PAS 13.1-18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 QUILE CLASS >18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	265 F Tota 7 3 3 2 1 1 5 16 16 15 12 12 12
SW Wind DOINT FREQ Wind irection NE SE SE SE SW W W	alms for E UENCY DISTF .2250 0 1 2 1 1 0 0 1 1 2 6 2	36 Stability: IBUTION OF .5175 6 0 1 1 0 4 3 0 2 8 7 9 9 10	67 0 WIND SPEN 76-1.0 7 7 3 3 1 3 3 1 3 2 1 3 2 1 3 21 18 44 25 9	317 ED AND DIR 1.1-1.5 12 3 6 8 4 0 4 20 61 85 71 58 63 33	410 ECTION IN Wind Spee 1.6-2.0 20 9 3 5 2 1 1 3 54 1 1 3 54 1 3 54 1 5 1 5 15 16	895 HOURS 01/( d (M/S) at 2.1-3.0 25 15 11 5 4 20 88 23 4 2 20 88 23 4 2 1 0 1	836 01/2010 00 10-m Leve 3.1-5.0 2 0 6 2 2 3 9 4 4 2 0 0 0 0 0 0 0 0 0	83 :00:00 TO 1 5.1-7.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	7.1-10. 7.1-10. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	23:59:59 10.1-13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 PAS 13.1-18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 QUILE CLASS >18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	265 F Tota 7 3 3 2 1 1 1 5 16 16 16 15 12 12 12 12 7 7
stal month of c NOINT FREQ Wind rection NE SE SE SW N W N W	alms for E UENCY DISTR .2250 0 0 1 2 1 1 0 0 1 2 2 1 2 1 1 2 1 1 2 0 0 1 1 2 2 1	36 Stability: IBUTION OF .5175 6 0 1 1 0 4 3 0 2 8 7 9 9 9 10 9 9	67 0 WIND SPEH .76-1.0 7 7 3 3 1 1 3 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 9 8	317 ED AND DIR 1.1-1.5 12 3 6 8 4 0 6 8 4 20 61 85 71 58 63 33 10	410 ECTION IN Wind Spee 1.6-2.0 20 9 3 5 2 1 13 54 66 37 26 15 15 15 16 10	895 HOURS 01/( d (M/S) at 2.1-3.0 25 15 11 5 4 2 20 88 23 4 20 88 23 4 2 1 0 1 6	836 01/2010 00 10-m Leve: 3.1-5.0 2 0 6 6 2 2 2 3 9 4 2 0 0 0 0 0 0 0 0 0 0 0	83 :00:00 TO 1 5.1-7.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4 12/31/2010  7.1-10. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	C 23:59:59 10.1-13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 PAS 13.1-18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 QUILE CLASS >18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	265 F Tota 7 3 3 2 1 1 5 16 16 15 12 12 12 11 1 7 4
tal mber of c OINT FREQ Wind rection E E E E W W W W W	alms for E UENCY DISTR .2250 0 0 1 2 1 1 0 0 1 1 2 2 6 2 1 2 2 6 2 1 2	36 Stability: IBUTION OF .5175 6 0 1 1 0 4 3 0 2 8 7 9 9 10 9 9 10 9 4	67 0 WIND SPEH .76-1.0 7 7 3 3 1 3 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 3 2 1 5 8 8 7 7 7 7 7 7 7 8 8 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1	317 ED AND DIR 1.1-1.5 12 3 6 8 4 0 61 85 71 58 63 33 10 15	410 ECTION IN Wind Spee 1.6-2.0 20 9 3 5 2 1 13 54 66 37 7 26 15 15 15 16 10 7	895 HOURS 01/0 d (M/S) at 2.1-3.0 25 15 11 5 4 2 20 88 23 4 2 1 0 88 23 4 1 0 1 6 12	836 01/2010 00 10-m Leve: 3.1-5.0 2 0 6 2 2 3 9 9 4 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	83 :00:00 TO 1 5.1-7.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	7.1-10. 7.1-10. 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	C 23:59:59 10.1-13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 PAS 13.1-18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 QUILE CLASS >18.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	265 F Tota 7 3 3 2 1 1 5 16 16 16 16 15 12 12 12 11 1 7 4 4

Page 33 of 37

# Table 4Joint Frequency Distribution of Meteorological Data

JOINT FREQU	JENCY DISTR	IBUTION OF	WIND SPEE	D AND DIRE	CTION IN H	OURS 01/0	1/2010 00:	00:00 TO 1	2/31/2010	23:59:59	PASQU	JILL CLASS	G
					Wind Spee	d (M/S) at	10-m Leve	1					
Wind Direction	.2250	.5175	.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	1	4	5	5	3	1	0	0	0	0	0 ~		19
NNE	1	2	4	4	1	0	0	0	0	0	0	0	12
NE	. 2	1	3	2	1	1	0	0	0	0	0	0	10
ËNE	1	1	0	1	0	0	0	0	0	0	0	0	3
E	0	0	0	0	0	0.	0	0	0	0	0	0	0
ESE	1	0	2	0	0	0	0	0	0	0	0	0	3
SE	1	1	1	3	. 0	1	0	0	0	0	0	0	7
SSE	0	3	3	6	9	9	1	0	0	0	0	0	31
S	1	4	. 13	25	18	3	0	0	0	0	0	0	64
SSW	4	14	18	67	28	1	0	0	0	0	0	0	132
SW	7	16	22	36	19	0	0	0	0	0	. 0	0	100
WSW	7	32	36	28	1	0	0	0	0	0	0	0	104
W	6	33	32	33	4	0	0	0	0	0	0	0	108
WNW	4	16	13	15	8	0	0	0	0	0	0	0	56
NW	4	10	7	12	1	0	0	0	0	0	0	0	34
NNW	2	6	8	14	1	1	0	0	0	0	0	0	32
Total	42	143	167	251	94	17	1	0	0	0	0	0	715

Number of calms for G Stability: 3

Total valid hours for all stablities = 8607Total invalid hours for all stablities = 0

Page 34 of 37

### Table 5A

### **Doses Due to Gaseous Radioactive Effluents**

Doses due to Noble Gases (mRad or mrem)

		Age Gr	oup : All		
Organ	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year Total
Total-body Skin Air Beta Air Gamma	0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 0.00E+00 0.00E+00	0.00E+00 0.00E+00 0.00E+00 0.00E+00

Doses	due	to	Radioiodines/	Particu.	lates/	Tritium	Excluding	C-14	(mrem)	

Age Group : Adult								
Organ	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year Total			
Bone	7.66E-05	2.46E-05	2.92E-05	3.13E-05	1.62E-04			
Liver	1.03E-02	9.85E-03	8.70E-03	6.37E-03	3.53E-02			
Total-body	1.03E-02	9.84E-03	8.69E-03	6.37E-03	3.52E-02			
Thyroid	1.09E-02	9.82E-03	8.67E-03	6.35E-03	3.57E-02			
Kidney	1.03E-02	9.83E-03	8.68E-03	6.35E-03	3.51E-02			
Lung	1.03E-02	9.82E-03	8.67E-03	6.35E-03	3.51E-02			
Gi-11i	1.03E-02	9.82E-03	8.67E-03	6.35E-03	3.51E-02			
Skin	3.75E-05	1.19E-Ò5	1.60E-05	1.62E-05	8.16E-05			
		Age Gro	oup : Teen					
Drgan	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year Total			
Bone	1.07E-04	3.44E-05	3.98E-05	4.33E-05	2.24E-04			
Liver	1.17E-02	1.12E-02	9.86E-03	7.23E-03	4.00E-02			
Total-body	1.17E-02	1.11E-02	9.83E-03	7.20E-03	3.98E-02			
Thyroid	1.25E-02	1.11E-02	9.81E-03	7.19E-03	4.06E-02			
Kidney	1.17E-02	1.11E-02	9.83E-03	7.20E-03	3.98E-02			
Lung	1.16E-02	1.11E-02	9.82E-03	7.19E-03	3.98E-02			
Gi-ĺli	1.16E-02	1.11E-02	9.82E-03	7.18E-03	3.97E-02			
Skin	3.75E-05	1.19E-05	1.60E-05	1.62E-05	8.16E-05			
		Age Gro	up : Child					
Organ	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year Total			
Bone	2.06E-04	6.67E-05	7.48E-05	8.31E-05	4.31E-04			
Liver	1.63E-02	1.55E-02	1.36E-02	1.00E-02	5.54E-02			
Total-body	1.61E-02	1.54E-02	1.36E-02	9.95E-03	5.50E-02			
Thyroid	1.77E-02	1.54E-02	1.36E-02	9.94E-03	5.66E-02			
Kidnev	1.61E-02	1.54E-02	1.36E-02	9.96E-03	5.51E-02			
Lung	1.61E-02	1.54E-02	1.36E-02	9.94E-03	5.50E-02			
Gi-lli	1.61E-02	1.54E-02	1.36E-02	9.93E-03	5.49E-02			
Skin	3.75E-05	1.19E-05	1.60E-05	1.62E-05	8.16E-05			
		Age Grou	ıp : Infant					
Drgan	Qtr l	Qtr 2	Qtr 3	Qtr 4	Year Total			
Bone	1.98E-04	6.24E-05	7.01E-05	7.77E-05	4.08E-04			
Liver	7.51E-03	7.03E-03	6.22E-03	4.58E-03	2.53E-02			
Total-body	7.29E-03	6.96E-03	6.15E-03	4.50E-03	2.49E-02			
Thyroid	1.09E-02	6.96E-03	6.14E-03	4.52E-03	2.86E-02			
Kidney	7.34E-03	6.98E-03	6.16E-03	4.52E-03	2.50E-02			
Lung	7.29E-03	6.96E-03	6.15E-03	4.51E-03	2.49E-02			
Gi-ĺli	7.27E-03	6.96E-03	6.14E-03	4.50E-03	2.49E-02			
Skin	3.75E-05	1.19E-05	1.60E-05	1.62E-05	8.16E-05			

Page 35 of 37

 Table 5A (continued)

 Critical Dose due to Radioiodines/Particulates/Tritium Including C-14 (mrem)

Age Group : Child								
Organ	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year Total			
Bone Total-body	9.65E-01 1.93E-01	9.65E-01 1.93E-01	9.65E-01 1.93E-01	9.65E-01 1.93E-01	3.86E+00 7.71E-01			

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

Cumulative Dose Information for 2010 (mrem)

Age Group : Adult								
Organ	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year Total			
Bone	2.53E-05	2.07E-05	1.60E-05	7.89E-07	6.27E-05			
Liver	8.71E-05	5.50E-05	4.51E-05	2.38E-05	2.11E-04			
Total-body	7.45E-05	4.51E-05	3.74E-05	2.34E-05	1.81E-04			
Thyroid	4.91E-05	2.52E-05	2.05E-05	2.32E-05	1.18E-04			
Kidney	6,05E-05	3.30E-05	2.77E-05	2.32E-05	1.45E-04			
Lung	5,45E-05	3.12E-05	2.44E-05	2.35E-05	1.34E-04			
Gi-ĺli	7.74E-05	3,12E-05	2.76E-05	2.39E-05	1.60E-04			

### Page 36 of 37

# ATTACHMENT 11.1

Copy of UNT-005-014, "Offsite Dose Calculation Manual" Revision 302.