



# Florida Power

A Progress Energy Company

Crystal River Nuclear Plant  
Docket No. 50-302  
Operating License No. DPR-72

Ref: 10 CFR 50.36(a)(2)  
ITS 5.7.1.1(c)

April 23, 2002  
3F0402-05

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555-0001

Subject: Crystal River Unit 3 - 2001 Radioactive Effluent Release Report

Dear Sir:

Florida Power Corporation hereby submits the 2001 Radioactive Effluent Release Report for Crystal River Unit 3 (CR-3) in accordance with 10 CFR 50.36(a)(2) and the CR-3 Improved Technical Specifications (ITS), Section 5.7.1.1(c). The report, provided as Attachment A, includes a summary of the quantities of radioactive liquid and gaseous effluents, and solid waste released from the CR-3 site during 2001. The material provided is consistent with the objectives outlined in the Off-Site Dose Calculation Manual (ODCM) and the Process Control Program (PCP), and is in conformance with 10 CFR 50, Appendix I, Section IV.B.1.

ITS 5.6.2.3.3 requires submittal of licensee initiated changes to the ODCM as part of the Radioactive Effluent Release Report. A complete copy of the ODCM, provided as Attachment B, is included herewith with the affected pages appropriately marked with vertical bars in the left margin. The PCP, revised during 2001, is also included as part of this submittal. The affected pages in the PCP are appropriately marked with vertical bars in the left margin.

If you have any questions regarding this submittal, please contact Mr. Sid Powell, Supervisor, Licensing and Regulatory Programs at (352) 563-4883.

Sincerely,

D. L. Roderick  
Director Site Operations

DLR/ff

Attachments:

- A. 2001 Radioactive Effluent Release Report
- B. Off-Site Dose Calculation Manual, Revision 25
- C. Process Control Program, Revision 5

xc: NRR Project Manager  
Regional Administrator, Region II  
Senior Resident Inspector

IE48  
A008

**FLORIDA POWER CORPORATION**

**CRYSTAL RIVER UNIT 3**

**DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72**

**ATTACHMENT A**

**2001 Radioactive Effluent Release Report**

**RADIOACTIVE EFFLUENT**

**RELEASE REPORT**

**2001**

FLORIDA POWER CORPORATION

CRYSTAL RIVER - UNIT 3

Facility Operating License No. DPR-72

Docket No. 50-302

Prepared By: Pete F. Ezzell  
Environmental Coordinator

Approved By: [Signature]  
Superintendent Environmental and Chemistry

Date: 4/18/02

# CONTENTS

Introduction.....	1
Tabular Data Summaries	
Gaseous Effluents - Quarters 1 & 2 .....	2
Gaseous Effluents - Quarters 3 & 4 .....	4
Liquid Effluents - Quarters 1 & 2.....	6
Liquid Effluents - Quarters 3 & 4.....	9
Radwaste Shipments.....	12
Unplanned Releases .....	13
Radioactive Waste Treatment Systems .....	13
Annual Land Use Census.....	13
Effluent Monitor Instrument Operability.....	13
ODCM & PCP Changes.....	13
Emergency Feed Pump 2.....	13
Appendix I Dose Summary .....	14

## INTRODUCTION

This report is submitted as required by the Offsite Dose Calculation Manual, section 6.5.

The scope of this report includes:

- A summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the plant.
- Quarterly and annual dose summaries.
- A list and description of unplanned releases to unrestricted areas.
- A description of any changes to the:
  - Process Control Program (PCP), and
  - Offsite Dose Calculation Manual (ODCM).
- Significant changes to any radioactive waste treatment system.
- A list of new dose calculation location changes identified by the annual land-use census.
- Information relating to effluent monitors or required supporting instrumentation being inoperable for 30 or more days.

**TABLE 1**

**EFFLUENT AND WASTE DISPOSAL REPORT - 2001**

**GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES**

Unit	Quarter 1	Quarter 2	Est. Total Error %
------	--------------	--------------	-----------------------

A. Fission and activation gases

1. Total release	Ci	2.31E-01	3.41E+02	30
2. Average release rate for period	$\mu\text{Ci}/\text{sec}$	2.97E-02	4.34E+01	
3. Percent of technical specification limit	%	2.10E-04	6.10E-02	

B. Iodines

1. Total Iodine-131	Ci	0.00E+00	9.84E-07	30
2. Average release rate for period	$\mu\text{Ci}/\text{sec}$	0.00E+00	1.25E-07	
3. Percent of technical specification limit	%	0.00E+00	3.58E-02	

C. Particulates\*

1. Particulates with half-lives > 8 days	Ci	7.58E-09	1.57E-07	30
2. Average release rate for period	$\mu\text{Ci}/\text{sec}$	9.75E-10	1.99E-08	
3. Percent of technical specification limit	%	5.79E-03	3.58E-02	
4. Gross alpha radioactivity	Ci	0.00E+00	0.00E+00	

D. Tritium

1. Total release	Ci	1.81E+00	8.59E+00	30
2. Average release rate for period	$\mu\text{Ci}/\text{sec}$	2.32E-01	1.09E+00	
3. Percent of technical specification limit	%	5.79E-03	3.58E-02	

\* The sum of the particulates reported on this page may be less than the sum from Table 2, as Table 2 includes all particulates, while this table includes only those with half-lives greater than 8 days.

TABLE 2

EFFLUENT AND WASTE DISPOSAL REPORT - 2001

GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

Nuclides Released	Unit	CONTINUOUS MODE		BATCH MODE	
		Quarter 1	Quarter 2	Quarter 1	Quarter 2

A. Fission gases

Argon-41	Ci				
Krypton-85	Ci				3.20E+01
Krypton-85m	Ci				
Krypton-87	Ci				
Krypton-88	Ci				
Xenon-131m	Ci		2.77E+00		3.93E+00
Xenon-133	Ci		1.12E+02	2.16E-01	1.88E+02
Xenon-133m	Ci		9.96E-01		1.53E+00
Xenon-135	Ci			1.53E-02	8.91E-02
Xenon-135m	Ci				
Xenon-138	Ci				
Total for period	Ci	0.00E+00	1.16E+02	2.31E-01	2.25E+02

B. Iodines

Iodine-131	Ci		5.40E-07		4.43E-07
Iodine-132	Ci				
Iodine-133	Ci				
Iodine-135	Ci				
Total for period	Ci	0.00E+00	5.40E-07	0.00E+00	4.43E-07

C. Particulates

Zinc-72	Ci				
Cobalt-58*	Ci				2.41E-08
Cobalt-60*	Ci				
Strontium-89*	Ci				
Strontium-90*	Ci				
Niobium-95m	Ci				
Technicium-99m	Ci				
Tellurium-132	Ci				
Cesium-134*	Ci				
Cesium-137*	Ci		1.33E-07	7.58E-09	
Cesium-138	Ci				
Barium-139	Ci				
Lanthanum-142	Ci				
Cerium-141*	Ci				
Cerium-144*	Ci				
Rhenium-188	Ci				
Total for period	Ci	0.00E+00	1.33E-07	7.58E-09	2.41E-08

\* > 8 day half-life

TABLE 3

EFFLUENT AND WASTE DISPOSAL REPORT - 2001

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 3	Quarter 4	Est. Total Error %
A. Fission and activation gases				
1. Total release	Ci	1.77E+01	6.11E+01	30
2. Average release rate for period	μCi/sec	2.23E+00	7.69E+00	
3. Percent of technical specification limit	%	1.62E-02	5.39E-02	
B. Iodines				
1. Total Iodine-131	Ci	2.88E-06	1.00E-05	30
2. Average release rate for period	μCi/sec	3.63E-07	1.26E-06	
3. Percent of technical specification limit	%	3.06E-02	9.23E-02	
C. Particulates*				
1. Particulates with half-lives > 8 days	Ci	0.00E+00	1.28E-07	30
2. Average release rate for period	μCi/sec	0.00E+00	1.61E-08	
3. Percent of technical specification limit	%	0.00E+00	9.23E-02	
4. Gross alpha radioactivity	Ci	0.00E+00	0.00E+00	
D. Tritium				
1. Total release	Ci	1.89E+00	2.23E+00	30
2. Average release rate for period	μCi/sec	2.38E-01	2.81E-01	
3. Percent of technical specification limit	%	3.06E-02	9.23E-02	

\* The sum of the particulates reported on this page may be less than the sum from Table 4, as Table 4 includes all particulates, while this table includes only those with half-lives greater than 8 days.



TABLE 4

EFFLUENT AND WASTE DISPOSAL REPORT - 2001  
 GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

Nuclides Released	Unit	CONTINUOUS MODE		BATCH MODE	
		Quarter 3	Quarter 4	Quarter 3	Quarter 4

A. Fission gases

Argon-41	Ci			6.48E-03	
Krypton-85	Ci			1.38E+00	3.02E+00
Krypton-85m	Ci				8.80E-04
Krypton-87	Ci				
Krypton-88	Ci				
Xenon-131m	Ci			1.39E-02	3.89E-01
Xenon-133	Ci	1.15E+01	4.92E+01	4.36E+00	7.62E+00
Xenon-133m	Ci	7.56E-02	2.02E-01		1.95E-02
Xenon-135	Ci	3.22E-01	6.44E-01	6.48E-02	4.87E-02
Xenon-135m	Ci				
Xenon-138	Ci				
Total for period	Ci	1.19E+01	5.00E+01	5.83E+00	1.11E+01

B. Iodines

Iodine-131	Ci	2.88E-06	1.00E-05		
Iodine-132	Ci				
Iodine-133	Ci	1.04E-06			
Iodine-135	Ci				
Total for period	Ci	3.93E-06	1.00E-05	0.00E+00	0.00E+00

C. Particulates

Zinc-72	Ci				
Cobalt-58*	Ci				
Chromium-51*	Ci				
Strontium-89*	Ci				
Strontium-90*	Ci				
Niobium-95m	Ci				
Tin-113*	Ci				
Indium-113m	Ci				
Barium-133m	Ci	1.80E-07	1.67E-07		
Cesium-137*	Ci		1.28E-07		
Cesium-138	Ci				
Barium-139	Ci				
Lanthanum-142	Ci				
Cerium-143	Ci		1.54E-07		
Cerium-144*	Ci				
Rhenium-188	Ci				
Total for period	Ci	1.80E-07	4.50E-07	0.00E+00	0.00E+00

\* > 8 day half-life

TABLE 5

EFFLUENT AND WASTE DISPOSAL REPORT - 2001

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 1	Quarter 2	Est. Total Error %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	4.53E-02	4.49E-02	25
2. Average diluted concentration during period	μCi/ml	8.71E-11	7.50E-11	
3. Percent of applicable limit	%	4.54E-02	2.36E-02	
B. Tritium				
1. Total release	Ci	1.57E+02	9.33E+01	30
2. Average diluted concentration during period	μCi/ml	3.02E-07	1.56E-07	
3. Percent of applicable limit	%	2.83E-01	1.59E-01	
C. Dissolved and entrained gases				
1. Total release	Ci	1.86E-01	2.10E-01	25
2. Average diluted concentration during period	μCi/ml	3.58E-10	3.51E-10	
3. Percent of applicable limit	%	1.68E-02	1.79E-02	
D. Gross alpha radioactivity				
1. Total release	Ci	0.00E+00	0.00E+00	30
E. Volume of waste released (prior to dilution)				
1. Batch and continuous modes	Liters	5.60E+06	9.01E+06	10
F. Volume of dilution water used during period				
1. Batch and continuous modes	Liters	5.20E+11	5.99E+11	10

**TABLE 6**  
**EFFLUENT AND WASTE DISPOSAL REPORT - 2001**

**LIQUID EFFLUENTS**

Fission and activation products	Unit	CONTINUOUS MODE		BATCH MODE	
		Quarter 1	Quarter 2	Quarter 1	Quarter 2
Sodium-24	Ci			3.51E-06	
Chromium-51	Ci			3.13E-04	6.90E-03
Manganese-54	Ci			4.82E-05	3.63E-04
Manganese-56	Ci				
Iron-55	Ci			2.14E-04	1.10E-03
Iron-59	Ci				1.41E-03
Cobalt-57	Ci				
Cobalt-58	Ci		6.87E-05	1.46E-03	1.50E-02
Cobalt-60	Ci			1.11E-03	1.26E-03
Zinc-72	Ci				
Strontium-85	Ci				8.03E-06
Strontium-89	Ci				
Strontium-90	Ci				
Yttrium-91m	Ci				
Yttrium-92	Ci				
Yttrium-93	Ci				
Niobium-95	Ci			5.45E-05	2.04E-03
Niobium-95m	Ci				
Niobium-97	Ci				2.77E-04
Zirconium-95	Ci			1.96E-04	1.68E-03
Zirconium-97	Ci			1.01E-03	1.04E-04
Molybdenum-99	Ci				2.55E-04
Technetium-99m	Ci			3.73E-04	4.85E-04
Technetium-101	Ci				
Ruthenium-103	Ci			1.26E-05	2.87E-05
Ruthenium-106	Ci			2.52E-03	
Silver-110m	Ci			2.03E-02	1.78E-03
Tin-113	Ci				1.23E-04
Indium-113m	Ci				1.75E-04
Antimony-122	Ci				
Antimony-124	Ci			4.30E-04	2.35E-05
Antimony-125	Ci			8.07E-03	3.86E-04
Tellurium-129	Ci			3.26E-05	
Tellurium-132	Ci				4.93E-05
Iodine-131	Ci			3.18E-03	6.46E-03
Iodine-133	Ci			3.56E-03	2.12E-03
Iodine-135	Ci			1.71E-04	2.22E-04
Cesium-134	Ci			6.13E-06	1.24E-04
Cesium-137	Ci		6.00E-05	1.22E-05	8.46E-05
Cesium-138	Ci				
Barium-139	Ci				1.80E-05
Barium-140	Ci				2.55E-04
Lanthanum-140	Ci			2.11E-03	1.98E-03
Cerium-143	Ci			4.56E-06	
Cerium-144	Ci			6.76E-05	
Rhenium-188	Ci				3.29E-05
Tungsten-187	Ci				5.91E-05
Neptunium--239	Ci				2.68E-05
Total for period	Ci	0.00E+00	1.29E-04	4.53E-02	4.49E-02

TABLE 6 (CONTINUED)

EFFLUENT AND WASTE DISPOSAL REPORT - 2001

LIQUID EFFLUENTS

Dissolved and entrained gases	Unit	CONTINUOUS MODE		BATCH MODE	
		Quarter 1	Quarter 2	Quarter 1	Quarter 2
Argon-41	Ci				
Krypton-85	Ci				1.88E-03
Krypton-85m	Ci				
Krypton-87	Ci			2.00E-07	
Krypton-88	Ci				
Xenon-131m	Ci			3.54E-04	6.63E-03
Xenon-133	Ci			1.27E-01	1.70E-01
Xenon-133m	Ci			4.86E-03	3.88E-03
Xenon-135	Ci			5.41E-02	2.80E-02
Xenon-135m	Ci			1.77E-05	3.74E-05
Total for period	Ci	0.00E+00	0.00E+00	1.86E-01	2.10E-01
Tritium	Ci	0.00E+00	3.24E-02	1.57+02	9.32E+01

TABLE 7

EFFLUENT AND WASTE DISPOSAL REPORT - 2001

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

Unit	Quarter 3	Quarter 4	Est. Total Error %
------	-----------	-----------	--------------------

A. Fission and activation products

1. Total release (not including tritium, gases, alpha)	Ci	3.52E-02	4.13E-02	25
2. Average diluted concentration during period	μCi/ml	5.57E-11	8.65E-11	
3. Percent of applicable limit	%	2.44E-03	1.60E-03	

B. Tritium

1. Total release	Ci	4.78E+01	3.61E+01	30
2. Average diluted concentration during period	μCi/ml	7.56E-08	7.56E-08	
3. Percent of applicable limit	%	6.99E-02	5.38E-02	

C. Dissolved and entrained gases

1. Total release	Ci	7.02E-02	2.53E-01	25
2. Average diluted concentration during period	μCi/ml	1.11E-10	5.30E-10	
3. Percent of applicable limit	%	5.13E-03	1.88E-02	

D. Gross alpha radioactivity

1. Total release	Ci	0.00E+00	6.67E-04	30
------------------	----	----------	----------	----

E. Volume of waste released (prior to dilution)

1. Batch and continuous modes	Liters	8.28E+06	7.56E+06	10
-------------------------------	--------	----------	----------	----

F. Volume of dilution water used during period

1. Batch and continuous modes	Liters	6.32E+11	4.77E+11	10
-------------------------------	--------	----------	----------	----

TABLE 8

## EFFLUENT AND WASTE DISPOSAL REPORT - 2001

## LIQUID EFFLUENTS

Fission and activation products	Unit	CONTINUOUS MODE		BATCH MODE	
		Quarter 3	Quarter 4	Quarter 3	Quarter 4
Sodium-24	Ci			1.95E-06	8.47E-06
Chromium-51	Ci			9.01E-04	1.05E-03
Manganese-54	Ci			2.77E-05	5.46E-05
Manganese-56	Ci				
Iron-55	Ci			1.89E-03	3.93E-03
Iron-59	Ci				8.78E-07
Cobalt-57	Ci				
Cobalt-58	Ci			3.18E-03	6.93E-04
Cobalt-60	Ci			5.47E-04	2.50E-04
Zinc-69	Ci			6.70E-06	
Zinc-72	Ci				
Strontium-85	Ci			5.95E-06	2.84E-05
Strontium-89	Ci				
Strontium-90	Ci				
Strontium-92	Ci				
Yttrium-91	Ci				2.60E-04
Yttrium-92	Ci				7.74E-06
Yttrium-93	Ci				
Rubidium-88	Ci				
Niobium-95	Ci			8.56E-05	9.65E-05
Zirconium-95	Ci			3.23E-05	3.79E-05
Zirconium-97	Ci			9.36E-06	
Molybdenum-99	Ci				
Technetium-99m	Ci				
Technetium-101	Ci				
Ruthenium-106	Ci				2.43E-05
Silver-110m	Ci			6.69E-04	8.15E-06
Tin-113	Ci				5.15E-07
Indium-113m	Ci				8.71E-07
Antimony-122	Ci			1.51E-07	2.11E-07
Antimony-124	Ci			1.55E-05	1.39E-04
Antimony-125	Ci			2.78E-02	3.19E-02
Tellurium-129	Ci				
Tellurium-132	Ci			6.75E-06	2.17E-04
Iodine-131	Ci			5.05E-06	1.33E-04
Iodine-132	Ci				1.80E-04
Iodine-133	Ci			1.96E-07	
Iodine-135	Ci				
Cesium-134	Ci			3.78E-06	7.18E-05
Cesium-136	Ci				
Cesium-137	Ci			9.83E-06	8.87E-05
Barium-133m	Ci			6.69E-06	
Barium-139	Ci				
Barium-140	Ci			5.36E-07	
Lanthanum-140	Ci				
Cerium-143	Ci		5.38E-05		
Cerium-144	Ci				
Praseodymium-144	Ci				1.95E-03
Tungsten-187	Ci				
Rhenium-188	Ci				2.83E-05
Total for period	Ci	0.00E+00	5.38E-05	3.52E-02	4.13E-02

TABLE 8 (CONTINUED)

EFFLUENT AND WASTE DISPOSAL REPORT - 2001

LIQUID EFFLUENTS

Dissolved and entrained gases	Unit	CONTINUOUS MODE		BATCH MODE	
		Quarter 3	Quarter 4	Quarter 3	Quarter 4
Argon-41	Ci				
Krypton-85	Ci			1.39E-03	6.65E-03
Krypton-85m	Ci				
Krypton-87	Ci				
Krypton-88	Ci				
Xenon-131m	Ci			7.18E-04	7.50E-03
Xenon-133	Ci	2.41E-04		6.68E-02	2.37E-01
Xenon-133m	Ci			9.28E-05	1.55E-03
Xenon-135	Ci			8.91E-04	2.41E-04
Xenon-135m	Ci			9.36E-06	
Total for period	Ci	2.41E-04	0.00E+00	6.99E-02	2.53E-01
Tritium	Ci	2.66E-02	1.74E-02	4.77E+01	3.61E+01

**TABLE 9**

**EFFLUENT AND WASTE DISPOSAL REPORT - 2001**

**SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**

**A. SOLID WASTE SHIPPED OFFSITE FOR PROCESSING OR BURIAL (Non-irradiated fuel)**

1. Type of waste	Unit	12 month period	Est. Total Error %			
a. Spent resins, filter sludges, evaporator bottoms, etc.	m3	2.79E+01	25			
	Ci	1.38E+00				
b. Dry compressible waste, contaminated equipment, etc.	m3	7.06E+02	25			
	Ci	2.17E+00				
c. Irradiated components, control rods, etc.	m3	0.00E+00	25			
	Ci	0.00E+00				
d. Other (describe): Expended charcoal	m3	0.00E+00	25			
	Ci	0.00E+00				
2. Estimate of major nuclide composition (by type of waste in %)*						
a.	Co-58	33.8	Co-60	8.2	Ni-63	3.1
	Nb-95	27.4	Ag-110m	3.6	Zr-95	3.1
	Fe-55	16.8	Mn-54	3.2		
b.	Fe-55	35.5	Co-60	11.6	Mn-54	2.8
	Cs-137	15.4	Co-58	11.5	Nb-95	2.0
	Ni-63	13.0	Ag-110m	3.3		
c.						
d.						

**3. Solid Waste Disposition**

Number of Shipments	Mode of Transportation	Destination
1	Exclusive use truck	Barnwell Waste Mngmt (SC)
4	Exclusive use truck	Alaron Corp. (SC)
5	Exclusive use truck	Duratek (TN)
5	Exclusive use truck	ATG Nuclear Services (TN)
1	Exclusive use truck	ATG Richland Corp (WA)
1	Exclusive use truck	Envirocare (UT)

**B. IRRADIATED FUEL SHIPMENTS (Disposition)**

Number of Shipments	Mode of Transportation	Destination
0	N/A	N/A

\* Curie values and principle radionuclides are estimates based on a combination of direct and indirect methods.



### Unplanned Releases

There was one unplanned releases during 2001. The release was documented in NCR 52926. An estimated 4.4E-06 Curies of gamma emitters and 3.6E-02 Curies of tritium were released. The release path was from Nuclear Services Closed Cycle Cooling System (SW) to the Nuclear Services and Decay Seawater System (RW) by way of leaks in two heat exchangers. The RW system discharges to the site discharge canal. The SW system contains residual contaminated due to a primary coolant leak into the system earlier in 2001, prior to Refuel 12.

### Radioactive Waste Treatment Systems

There were no significant changes to the radioactive waste treatment systems.

### Annual Land Use Census

The July 2001 land-use census did not identify any new dose calculation locations.

### Effluent Monitor Instrument Operability

Required effluent monitor instrumentation was not out of service for more than 30 days during 2001.

### ODCM & PCP Changes

The PCP was revised during 2001. The entire PCP underwent a significant rewrite. The main reason for the revision was to clarify that only qualified vendors, and not station personnel, will perform solidification activities when required.

The ODCM was revised during 2001. The affected pages are ii, 1, 2, 3, 24, 29, 40, 51, 58, 68, 101, 109, 117. The changes were made primarily to make the ODCM consistent with the technical specification 5.6.2.3.g and 5.6.2.3.i language pertaining to I-133. ODCM definitions that were also in technical specifications were deleted from the ODCM.

### Emergency Feed Pump 2

Emergency Feed Pump 2 (EFP-2) overspeed testing is performed quarterly using steam from CR-3's steam generators. Due to a small primary to secondary leak, an evaluation was performed to estimate the quantity of radioactive material which was released during 2001 due to operation of this pump. The results of this evaluation are given below in units of Curies/year.

Xe-133	2.23E-07	I-131	1.64E-08	Cs-137	1.00E-08
Xe-135	6.91E-08	I-133	8.91E-08	Cs-137	8.48E-09
H-3	1.90E-03				

These values are not included in Tables 1 through 4.

## 2001 Appendix I Dose Summary

### Maximum Hypothetical Individual

#### Liquid Effluent Dose Limits

Total Body: 1.5 mrem/quarter, 3 mrem/year  
Any Organ: 5 mrem/quarter, 10 mrem/year

#### Liquid Effluent Dose Summary

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual Total
Total Body Dose (mrem)	1.55E-05	4.77E-05	6.74E-06	2.39E-05	9.39E-05
Maximum Organ Dose (mrem)	2.27E-03	1.18E-03	1.22E-04	7.43E-05	3.65E-03
Maximum Organ was GI					

#### Gaseous Effluent Dose Limits

Gamma Air Dose: 5 mrad/quarter, 10 mrad/year  
Beta Air Dose: 10 mrad/quarter, 20 mrad/year  
  
Any Organ: 7.5 mrem/quarter, 15 mrem/year

#### Gaseous Release Dose Summary

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual Total
Gamma Air Dose (mrad)	8.37E-06	2.90E-04	5.32E-04	1.71E-03	2.54E-03
Beta Air Dose (mrad)	2.10E-05	6.10E-03	1.62E-03	5.39E-03	1.31E-02
Total Body Dose (mrem)	4.34E-04	2.06E-03	4.57E-04	5.46E-04	3.50E-03
Maximum Organ Dose (mrem)	4.34E-04	2.69E-03	2.29E-03	6.92E-03	1.23E-02
Maximum Organ was Thyroid					