Progress Energy

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 17, 2003
3F0403-08

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

Subject: Crystal River Unit 3 - 2002 Radioactive Effluent Release Report

Dear Sir:

Progress Energy Florida, Inc. hereby submits the 2002 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 attached report includes a summary of the quantities of radioactive liquid and gaseous effluents, and solid waste released from the CR-3 site during 2002. 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 for the period of the report in which any changes were made. During 2002, no changes were made to the ODCM since the previous submittal of the 2001 Radioactive Effluent Release Report.

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

Sincerely,

J. A. Franke
Plant General Manager

JAF/ff

Attachment: 2002 Radioactive Effluent Release Report

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

IE48
A009

Progress Energy Florida, Inc.
Crystal River Nuclear Plant
15760 W Powerline Street
Crystal River, FL 34428

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

DOCKET NUMBER 50-302 / LICENSE NUMBER DPR-72

ATTACHMENT

2002 Radioactive Effluent Release Report

RADIOACTIVE EFFLUENT

RELEASE REPORT

2002

PROGRESS ENERGY FLORIDA, INC.

CRYSTAL RIVER UNIT 3

Facility Operating License No. DPR-72

Docket No. 50-302

Prepared By: Pat Ezzell
Sr. Environmental Specialist

Approved By: [signature]
Superintendent Environmental and Chemistry

Date: 4/16/03

CONTENTS

INTRODUCTION

This report is submitted as required by the Offsite Dose Calculation Manual, section 6.5, and Technical Specfications 5.6.2.3.3 and 5.7.1.1.c.

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 - 2002

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 1	Quarter 2	Est. Total Error %
A. Fission and activation gases				
1. Total release	Ci	7.81E-01	3.58E+00	30
2. Average release rate for period	μCi/sec	1.00E-01	4.55E-01	
3. Percent of technical specification limit	%	1.26E-03	4.17E-03	
B. Iodines				
1. Total Iodine-131	Ci	0.00E+00	0 00E+00	30
2. Average release rate for period	μCi/sec	0.00E+00	0 00E+00	
3. Percent of technical specification limit	%	0.00E+00	0.00E+00	
C. Particulates*				
1. Particulates with half-lives > 8 days	Ci	1.70E-07	7.85E-08	30
2. Average release rate for period	μCi/sec	2.19E-08	9.99E-09	
3 Percent of technical specification limit	%	3.34E-03	2.60E-03	
4. Gross alpha radioactivity	Ci	0.00E+00	0 00E+00	
D. Tritium				
1. Total release	Ci	1.01E+00	8.13E-01	30
2 Average release rate for period	μCi/sec	1.30E-01	1.03E-01	
3. Percent of technical specification limit	%	3.34E-03	2.60E-03	

* 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 – 2002

GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

		CONTINUOUS MODE		BATCH MODE	
Nuclides Released	**Unit**	**Quarter 1**	**Quarter 2**	**Quarter 1**	**Quarter 2**
A. Fission gases					
Argon-41	Ci				
Krypton-85	Ci			6 34E-01	1 64E+00
Krypton-85m	Ci				
Krypton-87	Ci				4 64E-04
Krypton-88	Ci				
Xenon-131m	Ci				8.20E-03
Xenon-133	Ci		8 12E-01	6 15E-03	1.09E+00
Xenon-133m	Ci				
Xenon-135	Ci	1.41E-01			2.25E-02
Xenon-135m	Ci				
Xenon-138	Ci				
Total for period	Ci	1 41E-01	8.12E-01	6 40E-01	2.77E+00
B. Iodines					
Iodine-131	Ci				
Iodine-132	Ci				
Iodine-133	Ci				
Iodine-135	Ci				
Total for period	Ci	0 00E+00	0 00E+00	0 00E+00	0 00E+00
C. Particulates					
Zinc-72	Ci				
Cobalt-58*	Ci				
Cobalt-60*	Ci				
Strontium-89*	Ci				
Strontium-90*	Ci				
Niobium-95m	Ci				
Technicium-99m	Ci	4 35E-08			
Tellurium-132	Ci				
Cesium-134*	Ci				
Cesium-137*	Ci	1.70E-07			
Cesium-138	Ci				
Barium-139	Ci				
Lanthanum-142	Ci				
Cerium-143	Ci	2.73E-07	3.30E-07		
Cerium-144*	Ci				7.85E-08
Rhenium-188	Ci				
Total for period	Ci	4.87E-07	3.30E-07	0.00E+00	7.85E-08

* > 8 day half-life

TABLE 3

EFFLUENT AND WASTE DISPOSAL REPORT - 2002

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 3	Quarter 4	Est. Total Error %
A. Fission and activation gases				
1. Total release	Ci	2.89E+00	4 54E+00	30
2. Average release rate for period	μCi/sec	3.63E-01	5 71E-01	
3. Percent of technical specification limit	%	3.53E-03	6 08E-03	
B. Iodines				
1. Total Iodine-131	Ci	0 00E+00	0.00E+00	30
2. Average release rate for period	μCi/sec	0 00E+00	0.00E+00	
3. Percent of technical specification limit	%	0 00E+00	0.00E+00	
C. Particulates*				
1. Particulates with half-lives > 8 days	Ci	6 35E-07	1.74E-07	30
2. Average release rate for period	μCi/sec	7.99E-08	2.19E-08	
3 Percent of technical specification limit	%	1.83E-03	3 30E-03	
4 Gross alpha radioactivity	Ci	1.46E-07	0 00E+00	
D. Tritium				
1. Total release	Ci	5.50E-01	1.01E+00	30
2. Average release rate for period	μCi/sec	6 91E-02	1.28E-01	
3. Percent of technical specification limit	%	1.83E-03	3.30E-03	

* 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 - 2002

GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

		CONTINUOUS MODE		BATCH MODE	
Nuclides Released	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
A. Fission gases					
Argon-41	Ci				
Krypton-85	Ci			4 57E-01	3 24E+00
Krypton-85m	Ci				
Krypton-87	Ci				
Krypton-88	Ci				
Xenon-131m	Ci			2 09E-03	1.53E-02
Xenon-133	Ci		5.23E-01	5.48E-02	7.56E-01
Xenon-133m	Ci	2.37E+00			
Xenon-135	Ci			4.75E-04	
Xenon-135m	Ci				
Xenon-138	Ci				
Total for period	Ci	2.37E+00	5 23E-01	5.14E-01	4 02E+00
B. Iodines					
Iodine-131	Ci				
Iodine-132	Ci				
Iodine-133	Ci				
Iodine-135	Ci				
Total for period	Ci	0 00E+00	0 00E+00	0 00E+00	0.00E+00
C. Particulates					
Zinc-72	Ci		5 09E-08		
Cobalt-58*	Ci				
Chromium-51*	Ci				
Strontium-89*	Ci				
Strontium-90*	Ci				
Niobium-95m	Ci				
Tin-113*	Ci				
Indium-113m	Ci				
Barium-133m	Ci				
Cesium-137*	Ci	1.17E-07	8.76E-08		
Cesium-138	Ci				
Barium-139	Ci				
Lanthanum-142	Ci				
Cerium-141	Ci		8.62E-08		
Cerium-143	Ci	1.21E-07			
Cerium-144*	Ci	5.18E-07			
Rhenium-188	Ci				
Total for period	Ci	7.56E-07	2.25E-07	0.00E+00	0 00E+00

* > 8 day half-life

TABLE 5

EFFLUENT AND WASTE DISPOSAL REPORT - 2002

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	2.84E-03	1.00E-03	25
2. Average diluted concentration during period	μCi/ml	5.36E-12	1.67E-12	
3. Percent of applicable limit	%	6 03E-05	6 90E-05	
B. Tritium				
1. Total release	Ci	1.59E+01	2 50E+01	30
2. Average diluted concentration during period	μCi/ml	3.00E-08	4.17E-08	
3 Percent of applicable limit	%	2.79E-02	3.90E-02	
C. Dissolved and entrained gases				
1. Total release	Ci	2 03E-03	4 95E-03	25
2. Average diluted concentration during period	μCi/ml	3 83E-12	8 26E-12	
3. Percent of applicable limit	%	1.78E-04	3.86E-04	
D. Gross alpha radioactivity				
1. Total release	Ci	5.99E-04	8.20E-05	30
E. Volume of waste released (prior to dilution)				
1. Batch and continuous modes	Liters	5.22E+06	4.84E+06	10
F. Volume of dilution water used during period				
1. Batch and continuous modes	Liters	5.30E+11	5.99E+11	10

TABLE 6

EFFLUENT AND WASTE DISPOSAL REPORT - 2002

LIQUID EFFLUENTS

		CONTINUOUS MODE		BATCH MODE	
Fission and activation products	Unit	Quarter 1	Quarter 2	Quarter 1	Quarter 2
Sodium-24	Ci				
Chromium-51	Ci			5 95E-05	
Manganese-54	Ci			2 04E-06	
Manganese-56	Ci				
Iron-55	Ci			9.72E-05	4.29E-05
Iron-59	Ci				
Cobalt-57	Ci				
Cobalt-58	Ci			1 46E-04	5.62E-05
Cobalt-60	Ci			8 78E-05	7.51E-05
Zinc-72	Ci				
Strontium-85	Ci				
Strontium-89	Ci				
Strontium-90	Ci				
Yttrium-91m	Ci				
Yttrium-92	Ci				
Yttrium-93	Ci				
Niobium-95	Ci				
Niobium-95m	Ci				
Niobium-97	Ci				
Zirconium-95	Ci				
Zirconium-97	Ci				8.25E-07
Molybdinum-99	Ci				
Technetium-99m	Ci				
Technetium-101	Ci				
Ruthenium-103	Ci				
Ruthenium-106	Ci				
Silver-110m	Ci			4 08E-05	1.89E-05
Tin-113	Ci				
Indium-113m	Ci				
Antimony-122	Ci				
Antimony-124	Ci			1.56E-05	
Antimony-125	Ci			2 37E-03	7.71E-04
Tellurium-129	Ci				
Tellurium-132	Ci			1.16E-06	
Iodine-131	Ci				1.67E-06
Iodine-133	Ci				2.54E-07
Iodine-135	Ci				
Cesium-134	Ci			3 30E-06	3 20E-06
Cesium-137	Ci			1 87E-05	2 35E-05
Cesium-138	Ci				
Barium-139	Ci				
Barium-140	Ci			2.22E-06	1.30E-06
Lanthanum-140	Ci				
Cerium-143	Ci				
Cerium-144	Ci				
Rhenium-188	Ci				
Tungsten-187	Ci				
Neptunium--239	Ci				
Total for period	Ci	0.00E+00	0.00+00	2 84E-03	1.00E-03

TABLE 6 (CONTINUED)

EFFLUENT AND WASTE DISPOSAL REPORT - 2002

LIQUID EFFLUENTS

		CONTINUOUS MODE		BATCH MODE	
Dissolved and entrained gases	**Unit**	**Quarter 1**	**Quarter 2**	**Quarter 1**	**Quarter 2**
Argon-41	Ci				
Krypton-85	Ci			1.41E-03	2.92E-03
Krypton-85m	Ci				
Krypton-87	Ci				
Krypton-88	Ci				
Xenon-131m	Ci				
Xenon-133	Ci			5.93E-04	1 98E-03
Xenon-133m	Ci				
Xenon-135	Ci			3.38E-05	4 64E-05
Xenon-135m	Ci				
Total for period	Ci	0 00E+00	0 00E+00	2.03E-03	4.95E-03

Tritium	Ci	0 00E+00	6 05E-02	1.59E+01	2.50E+01

TABLE 7

EFFLUENT AND WASTE DISPOSAL REPORT - 2002

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	1.11E-03	4.43E-04	25
2. Average diluted concentration during period	μCi/ml	1.81E-12	7.73E-13	
3. Percent of applicable limit	%	4.03E-04	3.05E-04	
B. Tritium				
1. Total release	Ci	2.17E+02	1.81E+02	30
2. Average diluted concentration during period	μCi/ml	3.55E-07	3.16E-07	
3. Percent of applicable limit	%	3.58E-01	3.04E-01	
C. Dissolved and entrained gases				
1. Total release	Ci	1.78E-02	2.24E-02	25
2. Average diluted concentration during period	μCi/ml	2.91E-11	3.91E-11	
3 Percent of applicable limit	%	1.47E-03	1.88E-03	
D Gross alpha radioactivity				
1. Total release	Ci	9.75E-05	8.44E-05	30
E. Volume of waste released (prior to dilution)				
1. Batch and continuous modes	Liters	4.80E+06	5.77E+06	10
F. Volume of dilution water used during period				
1. Batch and continuous modes	Liters	6 12E+11	5.73E+11	10

TABLE 8

EFFLUENT AND WASTE DISPOSAL REPORT - 2002

LIQUID EFFLUENTS

		CONTINUOUS MODE		BATCH MODE	
Fission and activation products	Unit	Quarter 3	Quarter 4	Quarter 3	Quarter 4
Sodium-24	Ci				
Chromium-51	Ci				
Manganese-54	Ci			1.20E-06	
Manganese-56	Ci				
Iron-55	Ci			1.54E-04	1.75E-04
Iron-59	Ci				
Cobalt-57	Ci			7.40E-07	
Cobalt-58	Ci			8.29E-05	6 34E-06
Cobalt-60	Ci			2.16E-04	9.13E-05
Zinc-69	Ci				
Zinc-72	Ci				6 81E-06
Strontium-85	Ci				
Strontium-89	Ci				
Strontium-90	Ci				
Strontium-92	Ci				
Yttrium-91	Ci				
Yttrium-92	Ci				4 75E-06
Yttrium-93	Ci				
Rubidium-88	Ci				
Niobium-95	Ci			5 87E-06	5 29E-07
Zirconium-95	Ci				
Zirconium-97	Ci			6 59E-07	
Molybdinum-99	Ci				
Technetium-99m	Ci			6 98E-06	
Technetium-101	Ci				
Ruthenium-106	Ci				
Silver-110m	Ci			1 03E-04	2 70E-05
Tin-113	Ci			1 48E-06	
Indium-113m	Ci			3.78E-06	
Antimony-122	Ci			1 73E-06	1 89E-07
Antimony-124	Ci				
Antimony-125	Ci			4.79E-04	9.00E-05
Tellurium-129	Ci				
Tellurium-132	Ci				
Iodine-131	Ci			7.41E-06	1.24E-06
Iodine-132	Ci				
Iodine-133	Ci			4.27E-06	2.34E-07
Iodine-135	Ci				
Cesium-134	Ci			4.03E-06	5.31E-06
Cesium-136	Ci				
Cesium-137	Ci			2.60E-05	2.04E-05
Barium-133m	Ci				
Barium-139	Ci				1.31E-05
Barium-140	Ci				
Lanthanum-140	Ci				
Cerium-143	Ci				
Cerium-144	Ci				
Praseodymium-144	Ci				
Neodymium-147	Ci			6 65E-06	7 36E-07
Rhenium-188	Ci				
Total for period	Ci	0.00E+00	0 00E+00	1.11E-03	4.43E-04

TABLE 8 (CONTINUED)

EFFLUENT AND WASTE DISPOSAL REPORT - 2002

LIQUID EFFLUENTS

		CONTINUOUS MODE		BATCH MODE	
Dissolved and entrained gases	**Unit**	**Quarter 3**	**Quarter 4**	**Quarter 3**	**Quarter 4**
Argon-41	Ci				
Krypton-85	Ci			7.06E-03	5 42E-03
Krypton-85m	Ci			8.14E-06	
Krypton-87	Ci				
Krypton-88	Ci				
Xenon-131m	Ci			3.16E-05	1.94E-04
Xenon-133	Ci			9.83E-03	1 66E-02
Xenon-133m	Ci			1.20E-04	1 32E-04
Xenon-135	Ci			7.53E-04	1.07E-04
Xenon-135m	Ci				
Total for period	Ci	0.00E+00	0.00E+00	1.78E-02	2.24E-02

Tritium	Ci	0 00E+00	8 01E-02	2.17E+02	1.81E+02

TABLE 9

EFFLUENT AND WASTE DISPOSAL REPORT - 2002

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 Ci	4.60E+01 2 36E+02	25
b Dry compressible waste, contaminated equipment, etc	m3 Ci	2.17E+02 2.36E+00	25
c. Irradiated components, control rods, etc.	m3 Ci	0 00E+00 0 00E+00	25
d. Other (describe): CRDMs	m3 Ci	1.44E+01 3.78E+00	25

2. Estimate of major nuclide composition (by type of waste in %)*

a	Ni-63 42.1 Cs-137 18.4 Co-60 13.3	Cs-134 10 2 Fe-55 8 0 Co-58 5 7	
b	Fe-55 51.2 Ni-63 22 2 Co-60 15 1	Cs-137 3 5	
c.			
d.	Fe-55 50 0 Co-60 16.2 Co-58 13 2	Ni-63 9.5 Mn-54 3.5	

3 Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
5	Exclusive use truck	Barnwell Waste Mngmt (SC)
4	Exclusive use truck	Duratek (TN)
2	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 release in April 2002. An estimated 3900 gallons containing 1.6E-06 Curies of gamma emitters and 3.7E-03 Curies of tritium were released. The release path was from the Nuclear Services Closed Cycle Cooling System (SW) to the Nuclear Services and Decay Seawater System (RW) by way of a leak in SW heat exchanger 1D. The RW system discharges to the site discharge canal. The SW system contains residual contamination due to a primary coolant leak into the system in 2001, prior to Refuel 12 (ref NCR 58934).

Radioactive Waste Treatment Systems

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

Annual Land Use Census

The 2002 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 2002.

ODCM & PCP Changes

The ODCM was not revised during 2002.

The PCP was not revised during 2002.

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 2002 due to operation of this pump. The results of this evaluation are given below in units of Curies/year.

Xe-133	3.20E-07	I-131	4.00E-09	Cs-137	1.20E-08
Xe-135	2.00E-07	I-133	4.00E-08	Cs-137	1.20E-08
H-3	3.60E-06				

These values are not included in Tables 1 through 4.

Errors in Past Reports

Review of effluent analytical methodology indicates that Strontium 85 was incorrectly identified in some liquid effluent samples, and was subsequently reported as being present in several previous effluent reports. This was due to Strontium 85 having same primary gamma energy as Krypton 85, and the analytical software used for gamma ray analysis not being set up to make this distinction. Strontium 85 is not a fission product while Kr-85 is a common fission product known to be present at CR3. These reporting errors overestimated the quantity of fission and activation products released by an amount on the order of 1% or less (well within accepted analytical error), and are therefore not significant. (ref. NCR 90625)

2002 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)	9.05E-07	1.03E-06	6.05E-06	4.58E-06	1.26E-05
Maximum Organ Dose (mrem)	2.67E-06	1.46E-06	1.34E-05	6.04E-06	2.36E-05
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)	2.25E-05	5.92E-05	6.37E-05	4.04E-05	1.86E-04
Beta Air Dose (mrad)	1.26E-04	4.17E-04	3.53E-04	6.09E-04	1.51E-03
Total Body Dose (mrem)	2.45E-04	1.95E-04	1.33E-04	2.44E-04	8.17E-04
Maximum Organ Dose (mrem)	2.50E-04	1.95E-04	1.37E-04	2.47E-04	8.30E-04
Maximum Organ was Liver					